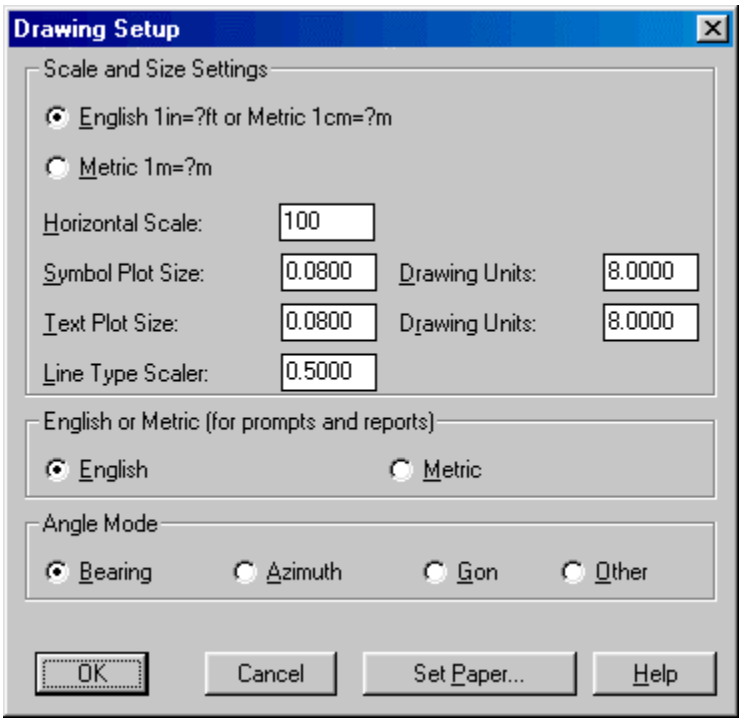
Survey Data Entry Procedure

Drawing Setup

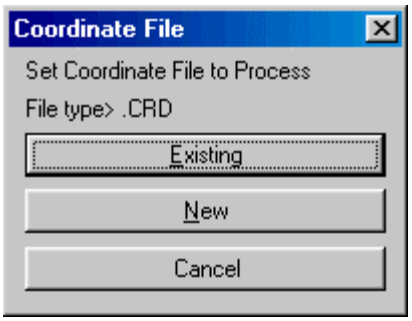
Under Inq-Set Pull-Down, select 'Drawing Setup', set desired drawing scale. This will take care of the standard symbol and text sizes for the SurvCADD Points that will be created. For example, if you have a drawing with a Horizontal scale set to 100, with the Symbol and Text sizes set to 0.08, then the symbols and text will be inserted at a size of 8.



These settings only affect the symbol and text sizes in the active drawing and have no affect on the plotting scale. The plotting scale is set in the plotting routine. However, it is a good practice to begin drawings with the desired plotting scale in mind. If you know the desired plotting scale, then manipulate the Drawing Setup to set your text and symbol size accordingly.

Setting a Coordinate File

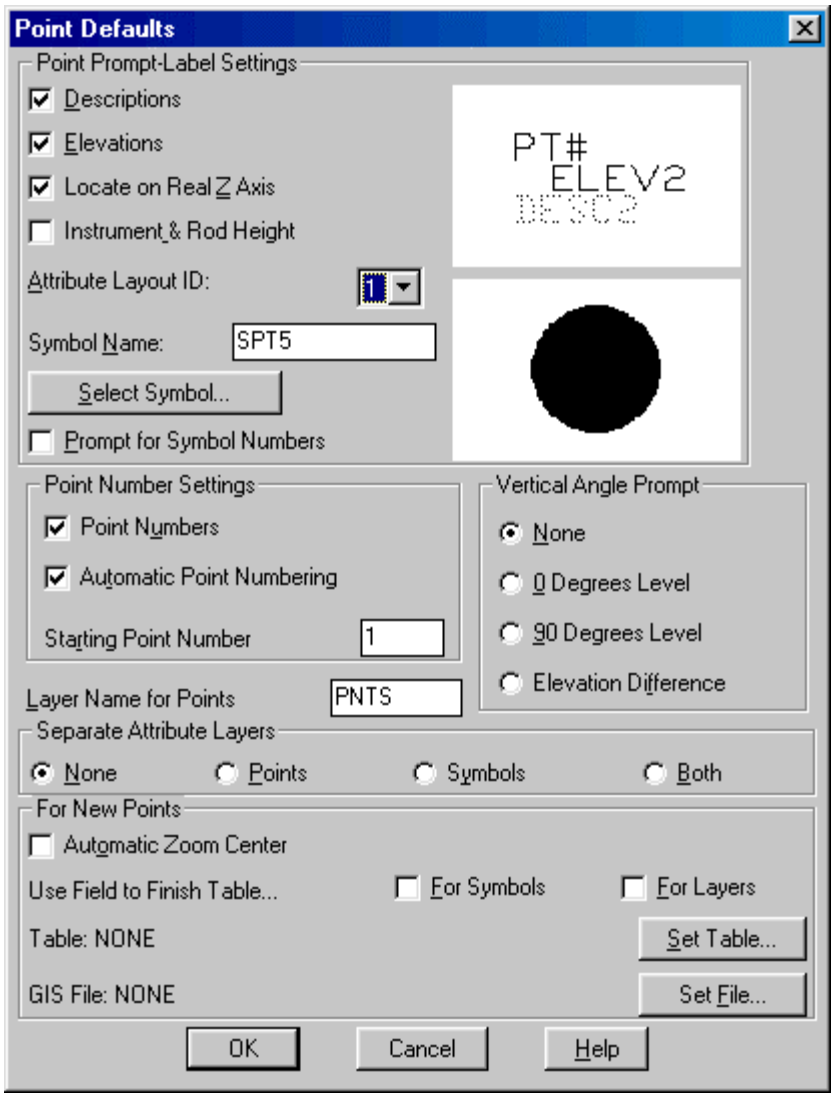
1. From the Pnts Pull-Down, choose Set Coordinate File. This file can be an existing or new file.
2. Specify the type and name of the file. Naming the coordinate file up front is a good habit to get into. This will eliminate a lot of confusion.



Traverse Entry Settings

There are a number of settings that can be manipulated at this point by the user. These settings are user preferences. If you would like to have lines drawn between each traverse point, then from the Cogo Pull-Down select the Line On/Off option. This will place a check mark beside this option to let the user know that this has been selected and is in effect. Again, checking this option on will instruct the program to draw lines between the traverse stations.
If you prefer or would also like to produce a raw file, RW5 extension, simply from the Cogo Pull-Down select the Raw File On/Off option. This will also place a check mark beside this option to let the user know that this option has been selected and is now in effect. The Raw Data File, RW5 extension is a very useful file for the surveyor. This file gives the surveyor the ability to review his raw data, process his raw data, make changes to the raw data and then reprocess the data. This file also allows for traverse adjustment using different methods.
Also the options for the various point data should be set now.
Under the Pnts Pull-Down, Point Default option select the desired options.

- If you would like to plot descriptions when the points are drawn on the screen or prompted for a point description when creating points, place a check in Descriptions box.
- To include elevations when drawing points on screen or to be prompted for elevations when creating points place a check in the Elevations box.
- The Locate on Real Z Axis allows the user to located points on the true elevation, or when checked off to locate points on zero elevation.
- The Instrument & Rod Height option, when checked on will prompt for instrument and rod height during traverse entry on screen.
- The Symbol Number option, when toggled on, will allow for a prompt for a symbol number as each point is drawn. Otherwise the Symbol Number set in the Point Settings dialog box will automatically be used.



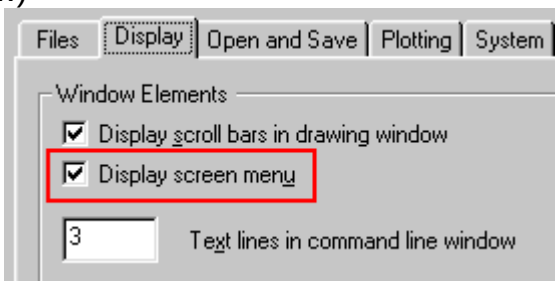
Locating Starting Points

From the Pnts Pull-Down, select Locate Points. Now you are ready to locate the first occupied point and backsight point. These points can be located on the screen by picking points or can be located by known or assumed coordinates. If a picked location on the screen is desired, just simply pick the points on the screen. Be sure to pick the location of the backsight first and then the first set-up point. This way the program will be orientated. If known or assumed coordinates are used, select "E" for enter coordinates, and simply enter the coordinate values. The program prompts for northing first and then easting. These prompts will be seen if you keep your eyes on the command line prompt.

Traversing

From the Cogo Pull-Down, select Traverse. Assuming that the backsight point was located first and then the first occupied point, you are now ready to begin

traverse entry. If the backsight was located last in the above described steps, then the Inverse command should be executed to orientate the program. To do this select from the Cogo Pull-Down, - Inverse. Then inverse from the occupied point to the backsight point and then back to the occupied point. By selecting point number 2 to 1. Although this may seem like a unnecessary step, it is necessary because the program recognizes the last located point as the occupied point. Even if you are traversing using azimuths or bearings, you would have to inverse to the correct occupied point in order to proceed with the traverse. If the backsight was located first and the occupied point last then the inverse described above is unnecessary. Now continuing with our first assumption lets begin traverse entry. At this point it is important to point out a recommendation that is very useful. We recommend that the AutoCAD Screen Menu be present in the drawing window. This allows for the user to see the codes for the various traverse entry options at all times. These codes define whether the data is entered as angle right, angle left, bearing, azimuth, deflection right or left etc. Having this menu turned on relieves the user from having to memorize the codes to be used. To turn this menu on, from the File Pull-Down, select Preferences, then click on the Display tab, and then place a check in the checkbox. (See below)



At this point the traverse entry begins. If the steps above have been followed, the instrument is occupying the first traverse point and the program has been orientated to the backsight. Simply enter the first shot by selecting the appropriate code from the side menu, the angle, distance and vertical or zenith angle of the shot. If the Instrument Rod Height option was turned on, you will be prompted for the instrument and rod heights. When the data entry for the first shot is entered you will be shown the calculated elevation of the point base upon the data input. You have the ability to enter the elevation of each shot if you so desire.
Also if automatic numbering is on, then each shot will be numbered in sequential order. If this option has been turned off then you will be prompted for the point number.
In addition you will be prompted for the description for the shot. Continue data entry until complete.

Overview of Above

The steps outlined above will assist the user with data entry of a survey. Every surveyor will have his or her own preference for most of the options described

above, and this narrative is designed to only aid in understanding the options provided to the user by the software. The specific requirements of the program, for example toggling on the edit process raw data file, described above are described in order to illustrate how and why the user may want to use these options.

Edit Process Raw

This section is devoted to assist or provide instruction on how to edit, process or adjust the survey data entered above. Please refer to the manual for specific codes for the data.
If the Raw File On/Off under the Cogo Pull-Down was toggled on before the survey data entry then a raw file was created during the data entry. To view, edit and process this raw file select from the Cogo Pull-Down, Edit Process Raw Data File. You will be prompted for an existing or new file. If an existing file is desired, as would be the case if the steps above have been followed, you would simply select the existing button and the desired file. However before we get into the processing procedures lets look at the options if we select the New option. If new was our selection, then we would be prompted for the name of the raw file to be created. Next you are prompted for the name of the coordinate file to be used with the raw file, existing or new. You can use an existing coordinate file if desired. However, most often you will want to specify a new coordinate file.
After the file is named, an empty raw file sheet will appear on the screen.
At this point data entry in a spread sheet format is available. The far left column on the spreadsheet is for the type of data. Examples of these "types" are PT for points, BK for backsight, TR for traverse and SS for sideshot. Again please refer to the manual for the specific types of data codes.
To get started let's input a point.

1. From the type column pick on the down arrow and select the PT code.
2. Enter the point number, northing, easting, elevation and description. Note that this is the format for the spreadsheet headings for the point code.
3. Now from the ADD Pull-Down located at the top of the spread sheet select Backsight. Note how the heading in the spreadsheet changes to reflect OcPt, BsPt, Azi and Set Azi.
4. Fill in the blanks. If you are using a random point for the backsight and setting the instrument to "0", fill in the set Azimuth column with a 0. You need only to fill in the Azi or the Set Azi column with 0 not both. Also if you had a specific azimuth from the occupied point to the backsight you could enter it instead of 0. Lastly, if you had a known point to be used for a backsight, with a known azimuth from the occupied point, it can be specified here. It should be noted that if you are going to specify a point for a backsight, for example occupied point 1 backsight point 2, point 2 would have to be defined with coordinates as a point record.

Now lets add a traverse entry. Select from the ADD Pull-Down, Traverse. Note that now the code in the type column is now changed to TR and the spread sheet headings have changed to Code, HorzAngle, SlopeDist, ZenithAng and Desc. The later four headings are self explanatory, however the Code column is where the actual type of the shot is recorded. For example for an Azimuth entry the code is AZ, northeast, southeast, southwest and northwest bearing entries are coded by the letters NE, SE, SW and NW. Angle right, angle left, deflection right and deflection left entries are coded by the letters AR, AL, DR and DL.
To enter a side shot from an occupied point, the only change that would need to be made is that of the type. In the type column, the code would be SS for sideshot. Note that if a instrument height and rod height record is to be added, you would move the cursor to the cell that the record needs to be placed in front of. For example to include an instrument height record for station 4 and a rod height record for station 5 then the cursor would be placed in the cell containing the occupied point 4 entry. Then the Add Pull-Down would be selected and the Instrument Height option selected. This will place the HI record above traverse entry from station 4 to station 5 as it should be. Data entry would continue until all data is entered into the spreadsheet. If survey data has been downloaded from a data collector, then the edit process raw file spread sheet will be filled out automatically.

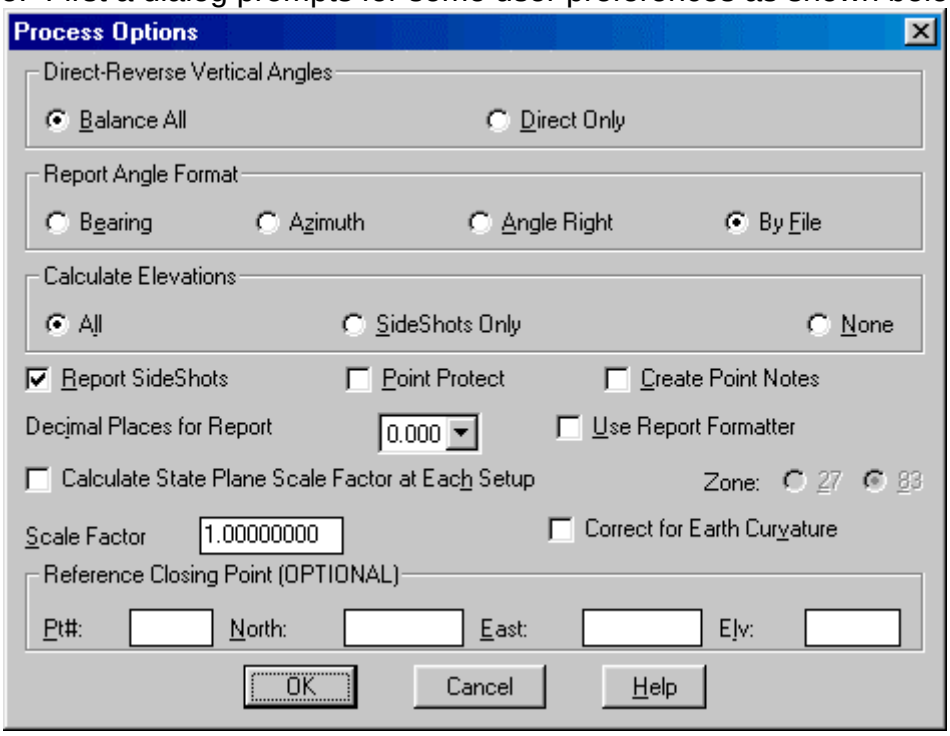
Raw File Preparation From CRD File

Another useful advantage of the Edit Process Raw File routine, is the ability to use a CRD file or plotted points on the screen to fill in the raw file spread sheet. Some preparatory work is required for this to work.
First if points are located on the screen, they need to also be stored in a CRD file. Basically the user needs to know what type and how many traverse shots are represented. Only the coordinates of the beginning traverse point needs to be input into the spread sheet if the surveyor is going to set up on the initial point and backsight any object, such as a tack in a tree or power pole, with zero. If the surveyor is set up on one point and taking a backsight on another point with known coordinates, then both the initial and backsight points need to be defined by coordinates. This is simple to do. The user need not type the coordinates of these points into the spreadsheet. Simply from the ADD Pull-Down menu select Point. A row will now be created with the type column defined as PT. If only one known coordinate is needed, you are ready to proceed. However, if the backsight point has known coordinate values then another point entry row needs to be added.
From the Add Pull-Down again select Points. Another row with the Pt type is inserted. At this point simply go to the first PT record that was added and type in the point number in the PNTNO column. If a known point is being used for the backsight then enter the number of this point in the second Pt row.
From the Options Pull-Down select Update Raw From Points. Either one or both of the added PT record rows will now be filled in with the coordinates of the specified points. Now select the Add Pull-Down again and add a Backsight

record. Specify the occupied point and the backsight point. Next select the Add Pull-Down and select Traverse. Fill in the occupied point number and the foresight point number. If the Code column is left blank then when the routine will use the appropriate bearing codes in this column. If a particular code is desired then it should be selected. All that is needed is one column of data to be filled out.
Place the cursor in the Horizontal Angle cell and simply select the Add Pull-Down and Traverse and add traverse entry rows. The point numbers will automatically be input in sequential order while the code column will be filled in with the desired code if input in the first line of traverse entry. When the appropriate number of lines has been added to the spread sheet, then again from the Options Pull-Down select Update Raw From Points and the spread sheet will be filled in. This option is useful when survey drawings are received from other surveyors. A coordinate file can be created from the points on the screen by selecting from the PNTS Pull-Down, Coordinate File Utilities, Update From Drawing, or from the Cogo Pull-Down, Convert Entities to Points - Entities to SurvCADD Points. If a coordinate file has not already been specified then a prompt for the name of the coordinate files will appear. From this coordinate file a raw file can be created that can be edited and processed an endless number of times.

Process No Adjust

This routine processes the raw file and stores the calculated coordinates to the CRD file. First a dialog prompts for some user preferences as shown below.

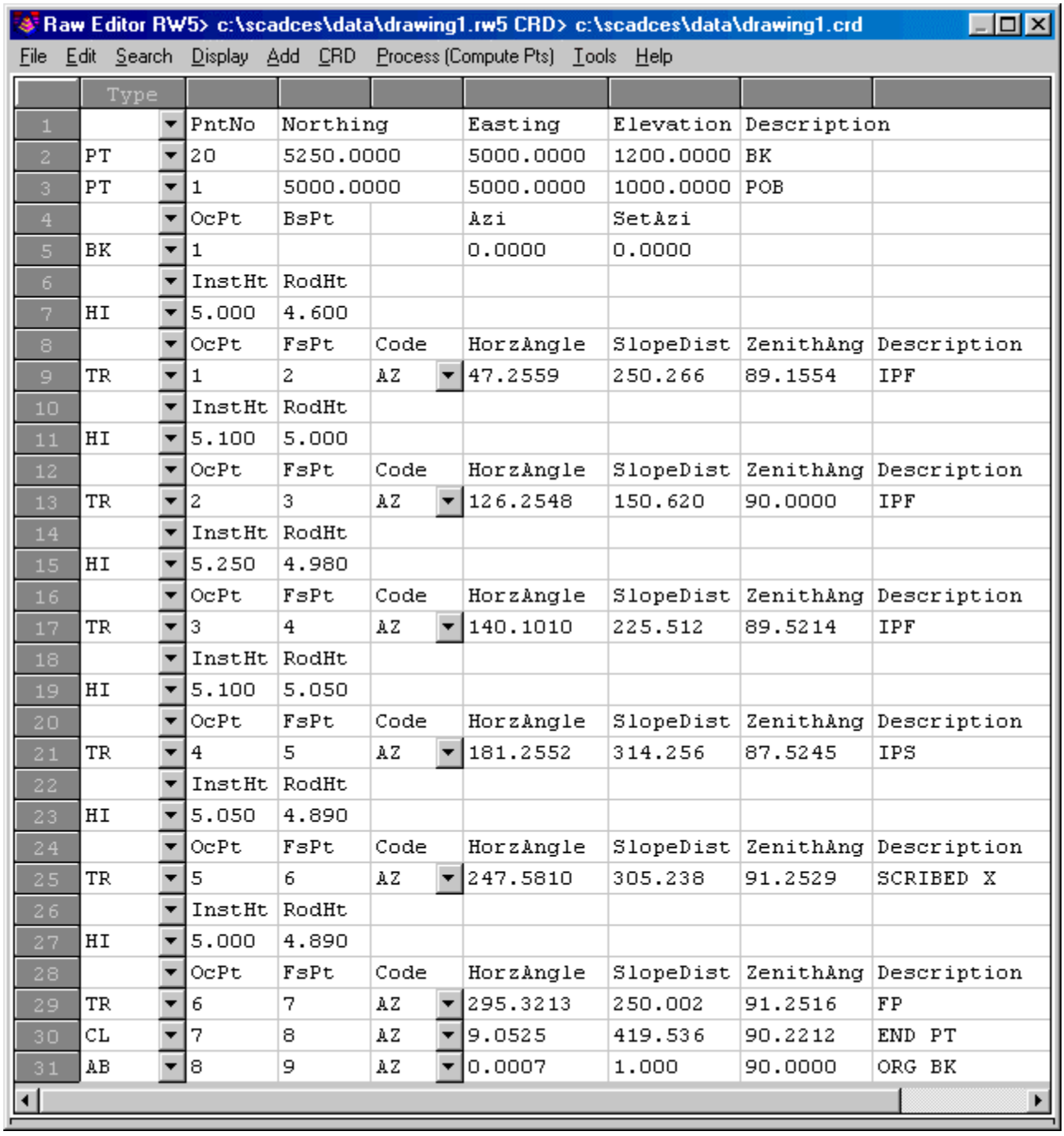


For any direct and reverse raw data, there is the option to process the direct-reverse shots and use only the foresight direct shot. There is an option whether to include the sideshot data in the process results report. This option may be

turned off, in the case of a large quantity of sideshots, so that only the traverse shots are displayed in the process results dialog box. The point protect option will check the coordinate file for existing point data before processing. If the foresight point number for any traverse or sideshot record already is a stored coordinate in the CRD file, then the program shows a list of conflicting point numbers. You can either continue processing and overwrite the CRD file coordinates with the calculated raw file coordinates or cancel the processing to go back to the editor to change foresight numbers.
This routine assumes that the traverse begins and ends on the same point. A closure cannot be calculated for an open traverse in this routine in the present version of SurvCADD 98. An option for this will be added to the release due out sometime this year. However closure for open traverses can be calculated upon adjustment of the traverse.

Processing with Different Adjustment Methods

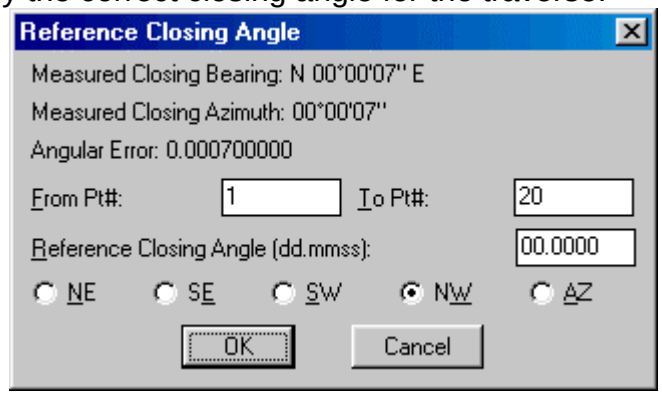
The key to any adjustment is the set up of the raw file. For a closed traverse, ideally, the user would tag a closing shot, CL in the Type Column, and an angle balance shot, AB in the Type Column. These shots do not have to be defined in the raw file, however, if they are not specified in the file then the user will be prompted during the adjustment routine for these respective shots. It makes it a lot easier and less confusing if the shots are identified in the raw file spread sheet. The following illustration shows a closed traverse raw file properly set up for the survey adjustment.



	Type							
1		PntNo	Northing		Easting	Elevation	Description	
2	PT	20	5250.0000		5000.0000	1200.0000	BK	
3	PT	1	5000.0000		5000.0000	1000.0000	POB	
4		OcPt	BsPt		Azi	SetAzi		
5	BK	1			0.0000	0.0000		
6		InstHt	RodHt					
7	HI	5.000	4.600					
8		OcPt	FsPt	Code	HorzAngle	SlopeDist	ZenithAng	Description
9	TR	1	2	AZ	47.2559	250.266	89.1554	IPF
10		InstHt	RodHt					
11	HI	5.100	5.000					
12		OcPt	FsPt	Code	HorzAngle	SlopeDist	ZenithAng	Description
13	TR	2	3	AZ	126.2548	150.620	90.0000	IPF
14		InstHt	RodHt					
15	HI	5.250	4.980					
16		OcPt	FsPt	Code	HorzAngle	SlopeDist	ZenithAng	Description
17	TR	3	4	AZ	140.1010	225.512	89.5214	IPF
18		InstHt	RodHt					
19	HI	5.100	5.050					
20		OcPt	FsPt	Code	HorzAngle	SlopeDist	ZenithAng	Description
21	TR	4	5	AZ	181.2552	314.256	87.5245	IPS
22		InstHt	RodHt					
23	HI	5.050	4.890					
24		OcPt	FsPt	Code	HorzAngle	SlopeDist	ZenithAng	Description
25	TR	5	6	AZ	247.5810	305.238	91.2529	SCRIBED X
26		InstHt	RodHt					
27	HI	5.000	4.890					
28		OcPt	FsPt	Code	HorzAngle	SlopeDist	ZenithAng	Description
29	TR	6	7	AZ	295.3213	250.002	91.2516	FP
30	CL	7	8	AZ	9.0525	419.536	90.2212	END PT
31	AB	8	9	AZ	0.0007	1.000	90.0000	ORG BK

The above example shows a raw file that represents a closed traverse, with elevations and instrument heights, that begins on station 1, backsights known point 20, and traverses through sequential shots with shot 8 being the ending shot and the same as station 1. Please note that if a known Azimuth or Bearing from point 1 to backsight point 20 was desired it could have been input into the set azimuth column. This file was created by toggling on the Raw File ON/OFF option under the Cogo Pull-Down before actual data entry. Data entry was performed on screen. Note that shot 7 to 8 has been tagged as a CL record, closing shot and an additional shot from 8 to 9 has been tagged as an AB record,

angle balance shot. Shot 8 to 9 is required for the angle balance. This shot allows the user to use the angle tie shot from the closing point to the original backsight point for the angle balance.
If another traverse line is desired for the angle balance, then the desired traverse leg should be tagged as the angle balance shot, AB record. In most cases however, the angle tie shot from the closing point to the original backsight will be the angle balance shot. In the example above the azimuth from point 8, which is the closing shot, to point 20, which is the initial backsight point, is 0.0007. The original backsight was 0.0000. So the angular error for this traverse is 7 seconds. Now lets look at the different methods of traverse adjustment.
From the Process Pull-Down in raw file editor, select Angle Balance. In every adjustment option, including process no adjust, the user has the option of reporting sideshots in the process results dialog box. This is user preference and if you don't want to report the sideshots, simply turn off this option. The angle balance adjustment balances the angles only. The process results shows the closure before adjustment and also the closure after angle balance. The process result dialog box is set up so the user can scroll up or down to see all of the information contained in the process results. The closure after angle balance can be and often is less than the unadjusted closure.
Please note that the angle balance routine does not have to be run first in order to use adjusted angles in the other adjustment routines. In each of the adjustment routines, the option to apply angle balance is provided. After selecting Angle Balance from the Process Pull-Down, the same dialog box shown above under No Adjust will appear.
These options are user preference and have been described earlier in this document. When the options are selected as desired click the OK button. It is important to remember that in this example the angle balance shot has been specified in the type column. If this shot had not been specified, the user would be prompted for the angle balance shot prior to seeing the Reference Closing Angle dialog box. The Reference Closing Angle dialog box shown below, allows the user to specify the correct closing angle for the traverse.



It also shows, based upon the data input and setup, measured closing Bearing, Azimuth and the angular error. From the example the measured closing bearing in N 0.0007 E and the Azimuth is 0.0007 for an angular error of 0.0007, or 7 seconds. The correct azimuth for angle tie, we know is the line between the beginning point and the initial backsight, which in this case was 0.0000. So to

specify the reference closing angle, we can either type 0.0000 in the reference closing angle window or we and specify, in the appropriate windows, from point 1 to point 20. If we do the later, the reference closing angle window will be automatically filled in with the initial backsight data. Upon selecting the OK button the process will appear in the Process Results dialog box.
The process results will first show the unadjusted traverse legs and the unadjusted closure for the traverse.
(A single screen shot of the report viewer would not show you the entire closure report, so only the report text is shown below)

Process Results 07/29/2001 17:30

Raw file> c:/scadces/data/drawing1.rw5

CRD file> c:/scadces/data/drawing1.crd

Scale Factor: 1.00000000

Correct for Earth Curvature: OFF

Starting Point 1: N 5000.000 E 5000.000 Z 1000.000

BackSight Azimuth: 00°00'00"

Point Horizontal Zenith Slope Inst Rod Northing Easting Elev

No. Angle Angle Dist HT HT

Description

2 AZ47.2559 89.1554 250.266 5.000 4.600 5169.279 5184.303 1003.610

IPF

3 AZ126.2548 90.0000 150.620 5.100 5.000 5079.835 5305.489 1003.710

IPF

4 AZ140.1010 89.5214 225.512 5.250 4.980 4906.655 5449.933 1004.490

IPF

5 AZ181.2552 87.5245 314.256 5.100 5.050 4592.712 5442.090 1016.170

IPS

6 AZ247.5810 91.2529 305.238 5.050 4.890 4478.252 5159.227 1008.740

SCRIBED X

7 AZ295.3213 91.2516 250.002 5.000 4.890 4585.993 4933.718 1002.650

FP

8 AZ9.0525 90.2212 419.536 5.000 4.890 5000.252 4999.999 1000.051

END PT

9 AZ0.0007 90.0000 1.000 5.000 4.890 5001.252 4999.999 1000.161

ORG BK

Closure Results (Before Angle Balance)

Starting Point 1: N 5000.000 E 5000.000 Z 1000.000

Ending Point 8: N 5000.252 E 4999.999 Z 1000.051

Azimuth Error : 359°45'24"

North Error : 0.25163

East Error : -0.00107

Vertical Error: 0.05084

Hz Dist Error : 0.25163

Sl Dist Error : 0.25672

Traverse Lines> 7

SideShots> 0

Horiz Dist Traversed: 1915.014

Slope Dist Traversed: 1915.430

Closure Precision: 1 in 7610

Angle Balance

Angular Error: 0.000700000 for 7 traverse sides

Adjusting Each Angle: 0.000100000

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev	Description
2	AZ47.2559	89.1554	250.266	5.000	4.600	5169.279	5184.303	1003.610	IPF
3	AZ126.2547	90.0000	150.620	5.100	5.000	5079.835	5305.489	1003.710	IPF
4	AZ140.1008	89.5214	225.512	5.250	4.980	4906.657	5449.935	1004.490	IPF
5	AZ181.2549	87.5245	314.256	5.100	5.050	4592.714	5442.097	1016.170	IPS
6	AZ247.5806	91.2529	305.238	5.050	4.890	4478.249	5159.236	1008.740	SCRIBED X
7	AZ295.3208	91.2516	250.002	5.000	4.890	4585.984	4933.724	1002.650	FP
8	AZ9.0519	90.2212	419.536	5.000	4.890	5000.244	4999.993	1000.051	END PT
9	AZ0.0000	90.0000	1.000	5.000	4.890	5001.244	4999.993	1000.161	ORG BK

Closure Results (After Angle Balance)

Traverse Lines> 7

SideShots> 0

Starting Coordinates: N 5000.000 E 5000.000 Z 1000.000

Ending Coordinates: N 5000.244 E 4999.993 Z 1000.051

Azimuth Error : 358°23'57"

North Error : 0.24448

East Error : -0.00683

Vertical Error: 0.05084

Hz Dist Error : 0.24458

Sl Dist Error : 0.24981

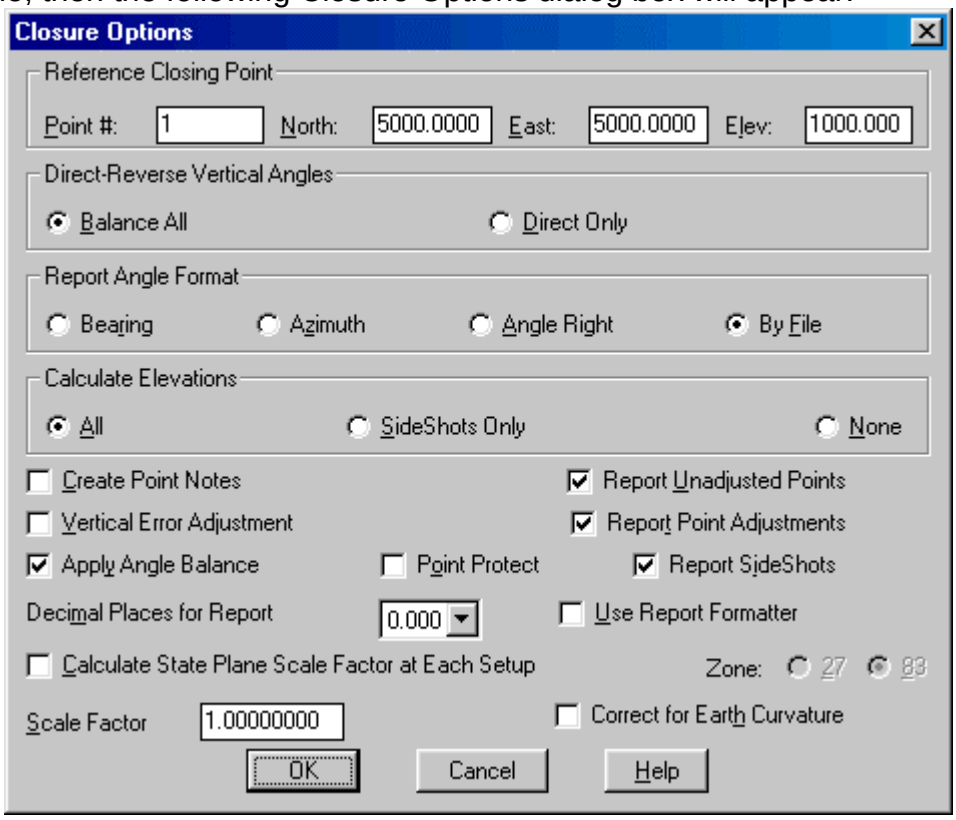
Total Hz Dist Traversed: 1915.01356

Total Sl Dist Traversed: 1915.43000

Closure Precision: 1 in 7830

Compass, Crandall and Transit Adjustment Methods

In all of these adjustment methods, if the raw file has been set up like the one in our example, the same dialog boxes will appear. To avoid duplication only the Compass Method will be shown here. From the Process Pull-Down select Compass. As a reminder, if the closing traverse leg, or closing shot, and the angle balance shot have not been identified in the raw file, then the user will be prompted for this information. However, if the raw file is set up as in our example, then the following Closure Options dialog box will appear.



In this box various user defined preferences can be set. The most important part of this box is the Reference Closing Point record. This field should be filled in with the point number that the survey closes to. In our example, which is a

closed traverse, our closing point is point 1. If we type the point number in the point number field and press enter, then the coordinates for the point will appear in their respective fields.
When the dialog box has been filled in with the desired preferences and the closing point record click on the OK button. Now the Reference Closing Angle dialog box will appear. Again as in the Angle Balance routine, specify either the closing angle by survey data from shot to shot or by simply typing in the reference closing angle in the reference closing field. After the required information has been entered into the dialog box, click the OK button and the Process Results dialog box will appear.
As with the angle balance process results, the results dialog box will show the unadjusted traverse legs and the closure results before adjustment first. Then the angular error and angular adjustments along with the closure report after the angle balance will be shown.
(A single screen shot of the report viewer would not show you the entire closure report, so only the report text is shown below)

Process Results 07/29/2001 17:37

Raw file> c:/scadces/data/drawing1.rw5

CRD file> c:/scadces/data/drawing1.crd

Scale Factor: 1.00000000

Correct for Earth Curvature: OFF

Starting Point 1: N 5000.000 E 5000.000 Z 1000.000

BackSight Azimuth: 00°00'00"

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev	Description
2	AZ47.2559	89.1554	250.266	5.000	4.600	5169.279	5184.303	1003.610	IPF
3	AZ126.2548	90.0000	150.620	5.100	5.000	5079.835	5305.489	1003.710	IPF
4	AZ140.1010	89.5214	225.512	5.250	4.980	4906.655	5449.933	1004.490	IPF
5	AZ181.2552	87.5245	314.256	5.100	5.050	4592.712	5442.090	1016.170	IPS
6	AZ247.5810	91.2529	305.238	5.050	4.890	4478.252	5159.227	1008.740	SCRIBED X
7	AZ295.3213	91.2516	250.002	5.000	4.890	4585.993	4933.718	1002.650	FP
8	AZ9.0525	90.2212	419.536	5.000	4.890	5000.252	4999.999	1000.051	END PT

9 AZ0.0007 90.0000 1.000 5.000 4.890 5001.252 4999.999 1000.161
ORG BK
Closure Results (Before Angle Balance)
Starting Point 1: N 5000.000 E 5000.000 Z 1000.000
Closing Reference Point 1: N 5000.000 E 5000.000 Z 1000.000
Ending Point 8: N 5000.252 E 4999.999 Z 1000.051
Azimuth Error : 359°45'24"
North Error : 0.25163
East Error : -0.00107
Vertical Error: 0.05084
Hz Dist Error : 0.25163
Sl Dist Error : 0.25672
Traverse Lines> 7
SideShots> 0
Horiz Dist Traversed: 1915.014
Slope Dist Traversed: 1915.430
Closure Precision: 1 in 7610
Angle Balance
Angular Error: 0.000700000 for 7 traverse sides
Adjusting Each Angle: 0.000100000
Point Horizontal Zenith Slope Inst Rod Northing Easting Elev
No. Angle Angle Dist HT HT
Description
2 AZ47.2559 89.1554 250.266 5.000 4.600 5169.279 5184.303 1003.610
IPF
3 AZ126.2547 90.0000 150.620 5.100 5.000 5079.835 5305.489 1003.710
IPF
4 AZ140.1008 89.5214 225.512 5.250 4.980 4906.657 5449.935 1004.490
IPF
5 AZ181.2549 87.5245 314.256 5.100 5.050 4592.714 5442.097 1016.170
IPS
6 AZ247.5806 91.2529 305.238 5.050 4.890 4478.249 5159.236 1008.740
SCRIBED X
7 AZ295.3208 91.2516 250.002 5.000 4.890 4585.984 4933.724 1002.650
FP
8 AZ9.0519 90.2212 419.536 5.000 4.890 5000.244 4999.993 1000.051
END PT

9 AZ0.0000 90.0000 1.000 5.000 4.890 5001.244 4999.993 1000.161
ORG BK
Closure Results (After Angle Balance)
Traverse Lines> 7
SideShots> 0
Starting Coordinates: N 5000.000 E 5000.000 Z 1000.000
Closing Reference Point 1: N 5000.000 E 5000.000 Z 1000.000
Ending Coordinates: N 5000.244 E 4999.993 Z 1000.051
Azimuth Error : 358°23'57"
North Error : 0.24448
East Error : -0.00683
Vertical Error: 0.05084
Hz Dist Error : 0.24458
Sl Dist Error : 0.24981
Total Hz Dist Traversed: 1915.01356
Total Sl Dist Traversed: 1915.43000
Closure Precision: 1 in 7830
Compass Closure
Adjusted Point Comparison

	Original		Adjusted			
Point#	Northing	Easting	Northing	Easting	Dist	Bearing
2	5169.279	5184.303	5169.247	5184.304	0.032	S 01°36'03" E
3	5079.835	5305.489	5079.784	5305.491	0.051	S 01°36'03" E
4	4906.657	5449.935	4906.577	5449.938	0.080	S 01°36'03" E
5	4592.714	5442.097	4592.594	5442.100	0.120	S 01°36'03" E
6	4478.249	5159.236	4478.090	5159.240	0.159	S 01°36'03" E
7	4585.984	4933.724	4585.793	4933.729	0.191	S 01°36'03" E
8	5000.244	4999.993	5000.000	5000.000	0.245	S 01°36'03" E

Max adjustment: 0.245
Starting Point 1: N 5000.000 E 5000.000 Z 1000.000
BackSight Azimuth: 00°00'00"

Point No.	Horizontal Angle	Zenith Angle	Slope Dist	Inst HT	Rod HT	Northing	Easting	Elev	Description
2	AZ47.2619	89.1554	250.251	5.000	4.600	5169.247	5184.304	1003.610	IPF
3	AZ126.2608	90.0000	150.632	5.100	5.000	5079.784	5305.491	1003.710	

IPF

4 AZ140.1024 89.5214 225.535 5.250 4.980 4906.577 5449.938 1004.490

IPF

5 AZ181.2548 87.5245 314.298 5.100 5.050 4592.594 5442.100 1016.170

IPS

6 AZ247.5741 91.2529 305.248 5.050 4.890 4478.090 5159.240 1008.740

SCRIBED X

7 AZ295.3145 91.2516 249.985 5.000 4.890 4585.793 4933.729 1002.650

FP

8 AZ9.0524 90.2212 419.483 5.000 4.890 5000.000 5000.000 1000.051

END PT

9 AZ359.4108 90.0000 1.249 5.000 4.890 5001.244 4999.993 1000.161

ORG BK

Note that there is no survey closure calculation after the adjusted traverse leg section. This is due to the survey at this point being balanced and the closure would be perfect and need not be reported. The remaining adjustment methods all have the same prompts.

The results may vary slightly depending on what method is used. However, the most important aspect of using the Edit Process Raw Data File routine, is the set up of the raw file. Specifying the CL and the AB records is very important. The angle balance shot from the last traverse point to the original backsight point is very important if an adjustment is going to be performed. The angle will be measured in the field, the distance does not have to be measured in the field. However, it is necessary to specify some distance in the distance field. Typically a slope distance of 1.00 and a zenith angle of 90.0000 is sufficient for the angle balance shot. Make sure that the zenith angle is flat or 90 degrees. This record will add a point to the coordinate file. The user can choose not to locate this point when locating points, or can simply erase this point after locating the points.

Least Squares Adjustment

The Least Squares Adjustment routine was completely rewritten for SurvCADD CES. Until the online procedure is rewritten, review the methods displayed in the SurvCADD manual.

Overview of Edit Process Raw Data

As has been illustrated above this routine is very powerful and useful. The keys to effectively using this routine is the set up of the raw file. If the raw file has been downloaded to the computer, via data collector, then the set up has been made based upon the data downloaded. The raw file makes manipulation of the data very easy if manipulation is required.

Survey data entry from the keyboard is also very easy and again set up is critical. Knowing how the survey was conducted and what shots are traverse shots and what shots are sideshots is all you need to know. Any mistake during data entry is easily corrected, by simply highlighting the wrong value and changing them. Even after processing, if an error has been identified, then manipulation of the data is a breeze.

Becoming efficient with the edit process raw data routine comes with practice and use. We recommend turning the Raw File ON/OFF toggle to the ON position before manual input of survey data.