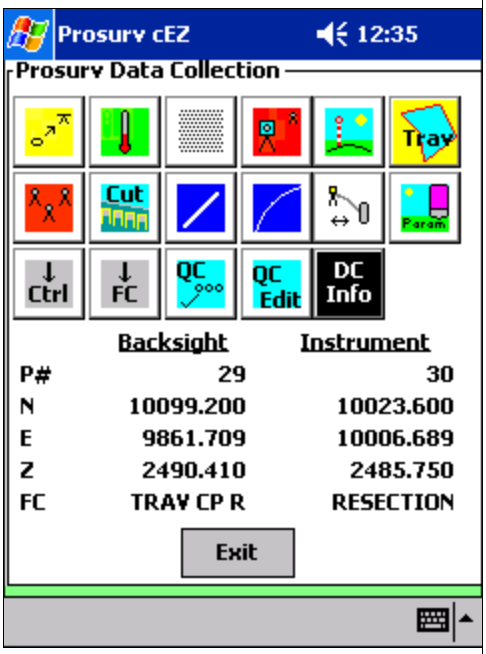
Data Collection

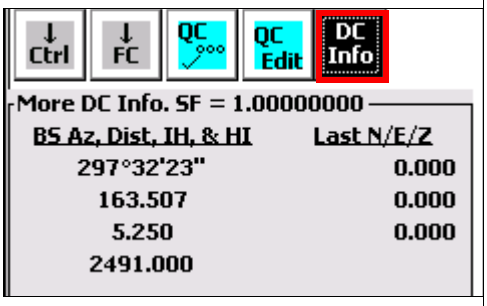
The Prosurv cEZ Data Collection screen has 15 functions, plus a DC Info button.

The Backsight and Instrument information of your current Setup are displayed.



You can tap the **DC Info** button to view more information about your current Setup.

Tap it again to go back to the previous view.

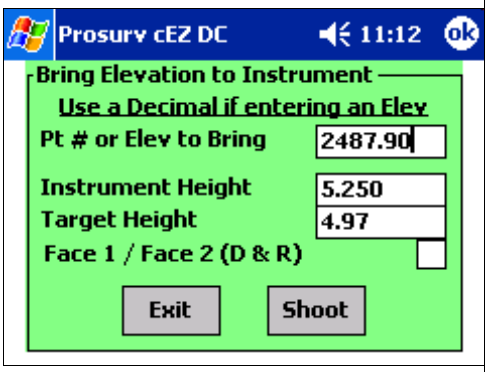


Bring Elevation From Benchmark

Tap the Bring Elevation Icon to activate the routine. This routine will allow you to shoot a point with a known elevation and transfer it to the point that the instrument is setup over. You can use the elevation of a point number that is already stored in the coordinate file, or, you may simply enter the elevation of the point you'll be shooting manually.

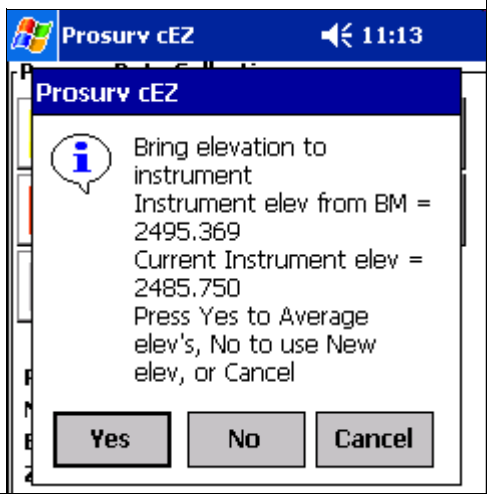
Using the elevation of an existing Point

Prosurv cEZ checks the "Point # or Elevation to Bring" text box for a decimal point. If you enter a decimal, then Prosurv cEZ assumes that the actual elevation has been given, rather than a point number. If there is no decimal, then Prosurv cEZ assumes that you've entered a point number. So, if you want to use an elevation of 605' then be sure to enter it as 605.00.



After the shot is taken, a window will appear showing you specific elevation information. You're now presented with three different options.

- Tap the **Cancel button to Abort the routine**.
- **Average** the two elevations by tapping **Yes**.
- **Throw out** your current setup's elevation and used the **New** one by pressing **No.**



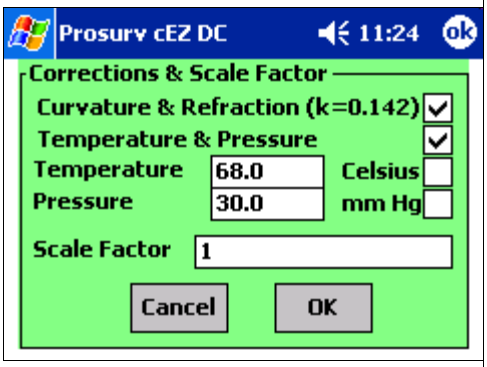
If you select to average the elevations or use the new elevation, the current setup will be changed automatically. Also, and most importantly, the point representing the current setup's gun will be edited to reflect the new elevation. This, too, is done automatically.

Manually enter an Elevation to use

Prosurv cEZ checks the "Point # or Elevation to Bring" text box for a decimal point. If you enter a decimal, then Prosurv cEZ assumes that the actual elevation has been given, rather than a point number. If there is no decimal, then Prosurv cEZ assumes that you've entered a point number. So, if you want to use an elevation of 605' then be sure to enter it as 605.00.

Notes about the Shot: The raw data of the shot *is* stored, but no coordinate is computed or stored. When reviewing the raw data, it will have a shot # of zero (0).

Temperature, Pressure, and Scale Factor Settings



You may enter Temperature and Pressure information that will be used to multiply each shot by a correction factor (for atmospheric correction). You can select to turn the correction on or off at any time. When the correction is turned off, no correction factor will be applied to the measured slope distance.

If your instrument is already correcting for Temperature and Pressure and/or curvature and refraction error, then you should NOT use corrections in Prosurv cEZ. Alternatively, by turning the correction(s) off in your instrument, and ON in Prosurv cEZ, you will have a record (in the raw data) of your correction values.

You may also enter a scale factor that will be used to multiply every *horizontal* distance measured. This allows you to be in a State Plane coordinate system, shoot 'surface' or 'ground' distances, and have the resultant coordinate be a State Plane coordinate.

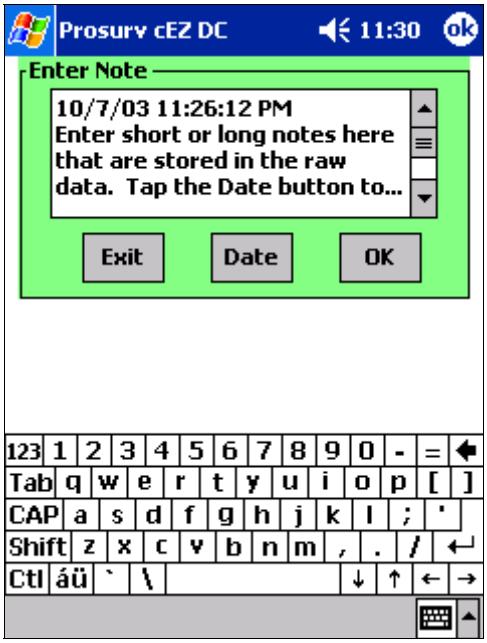
A scale factor is automatically computed if you're using a Zone within the SPC coordinate system. All NAD83 Zones are currently supported by Prosurv CE. To select a zone, exit Data Collection and tap the **Config** button. Then tap the **Decimals & Units** button.

To use your zone (i.e. apply the correct scale factor), select the Setup (Ctrl-S) routine in Data Collection, then perform a Setup. The instrument's coordinates will be used to compute the Horizontal Scale Factor of that point. The instrument's elevation will be used to compute a Sea Level Scale Factor. Then Prosurv cEZ computes the Combined Scale Factor (csf=hsf*slsf). This combined scale factor then becomes your *scale factor* as shown in this routine.

Enter a Note

Notes are stored in the raw data. You can enter a note at any time. Tap the **Date** button and the current date and time are automatically inserted into the Note.

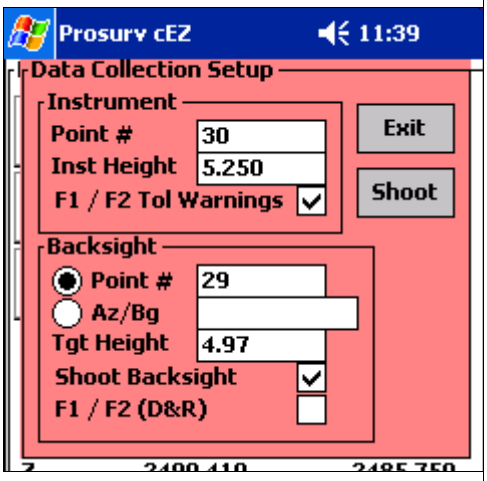
Prosurv cEZ automatically stores a time stamp as a note in the raw data every time you Setup.



Setup (Backsight and Instrument Occupation)

The Prosurv cEZ Setup routine lets you perform a Setup four different ways:

- You can Backsight a Point #, and shoot the Backsight. Prosurv cEZ automatically Inverses from the shot point to the known point, and gives you the Inversed distance and elevation difference of the shot point and the known point.
- You can Backsight a Point #, and take "line-only" on the Backsight (no distance measurement is taken by the Instrument)
- You can Backsight using an Azimuth or Bearing, and shoot the Backsight. Prosurv cEZ will compute the coordinates of the Backsight point, based on your Azimuth or Bearing, and will store the coordinates as a new point, assigning an Auto # to the Backsight. The computed elevation of the Backsight is also stored with the new point.
- You can Backsight using an Azimuth or Bearing, without a distance measurement (line-only)



First, enter the Instrument (occupied point) information such as point number and Instrument Height. If the point doesn't exist, Prosurv cEZ will prompt you for the coordinates.

Next, enter the Backsight information. If you enter and select to use a point number, you have the option of taking a distance measurement shot to the Backsight (**Shoot Backsight**).

Again, if the point doesn't exist, and you're Backsighting using a Point #, then you will be prompted to enter the coordinates for the Backsight.

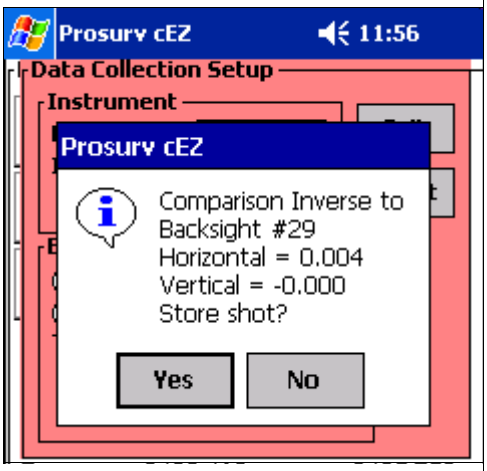
If you select to enter an **Az/Bg**, you must enter the azimuth or bearing in D.MMSS format. If you want to sight due East, then enter 90.0000 or

n90.0000e. If you take a distance measurement to your Backsight, Prosurv cEZ will compute and store the Backsight's coordinates to the job, and the new Setup is stored.

Note: If you are currently using a State Plane Coordinate zone, Prosurv cEZ will internally compute and use a combined scale factor for the Setup, even if your Scale Factor is set to 1 in the Temperature/Pressure/Scale Factor settings.

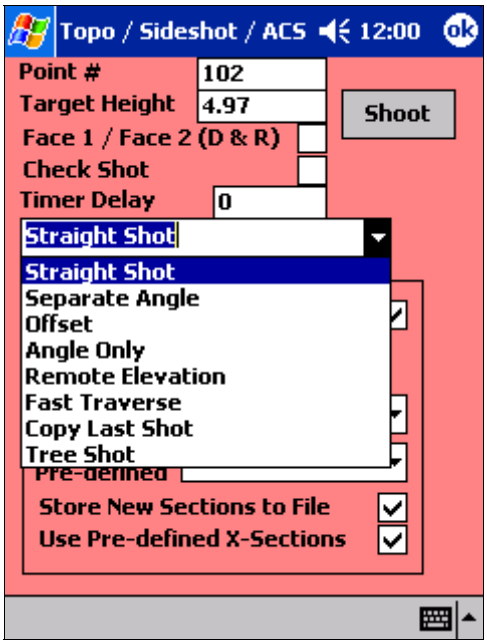
The window shown here is displayed when you take a distance measurement (Shoot) to the Backsight and you're using a Backsight point number.

Select **Yes** to store the new Setup, or, if the Inverse doesn't look good to you, select **No** to Cancel the new Setup.



Once you complete a Setup, a date/time stamp will automatically be recorded in the raw data, and the new data will appear on the main data collection screen.

Topo/Sideshot



Whether you're performing **Topography**, or simply conducting a **Boundary** survey, the Topo/Sideshot routine is perhaps the one you'll be using most often in Prosurv cEZ. You can think of this routine as a **Side-Shot** routine. With this routine you can shoot a point **8 different ways** and even set a timer (up to 5 minutes) that counts down to zero and then takes a shot.

Descriptors can be entered or selected from

- The Pop-Up Quick Codes list
- The complete Feature Codes and Control Codes window
- Automatically using the Cross Sectioning routine which learns Feature Codes as you go
- Automatically using the Cross Section routine *and* pre-defined sequences

Entering the Descriptor (Feature Codes)

As soon as you press Enter or tap **Shoot**, you will either see the Quick Pick Pop-up code list, or the Feature Code entry window. You can select or enter your descriptor (feature code) while the instrument is still shooting. The maximum code length for descriptors (feature codes) and attributes is 4096 characters each.

Type of Shot

There are **eight** different types of shots you can take with Take A Shot:

- **Straight Shot**
- **Separate Angle**
- **Offset**
- **Angle Only**
- **Remote Elevation**
- **Fast Traverse**
- **Copy Last Shot**
- **Tree Shot**

Tap the Type of Shot pull-down arrow to select the type of shot you wish to take.

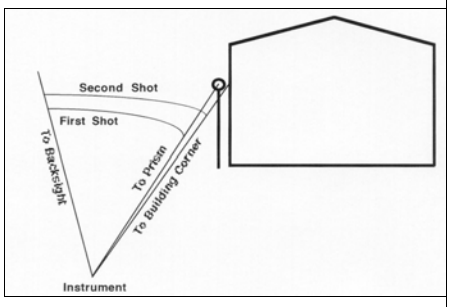
Straight Shot

A **Straight Shot** implies that the **prism is exactly at or over the point** which, when the shot is reduced, will result in the correct Northing, Easting, and Elevation of the point in question. You'll most likely be using this setting more than any other. Select **Straight Shot** in the window and tap **Shoot** to take the Shot.

Separate Angle

The Separate Angle selection can be used to accurately locate:

- Center of a large tree
- Center of a power pole
- Building corner

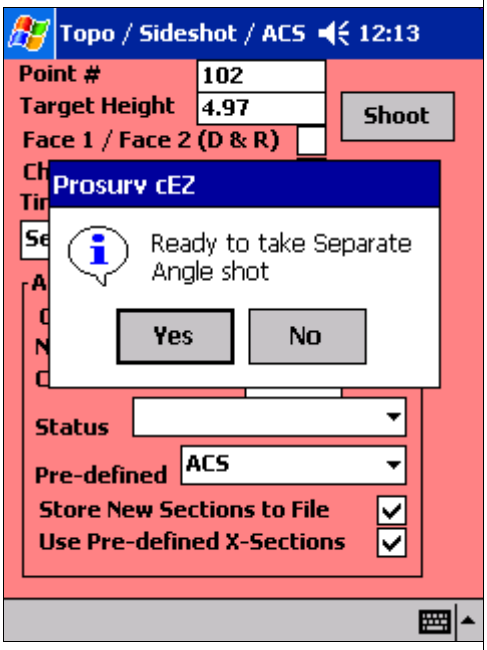


Two shots will be taken when using the **Separate Angle** routine. The first will measure the **distance** to the prism. Keep in mind that whenever a shot is taken by the instrument, three pieces of data are returned to Prosurv CE.

These are:

- **The Horizontal Angle**
- **The Vertical Angle (Zenith Angle)**
- **The Slope Distance**

The first shot (the distance measurement shot) of the Separate Angle routine will send the Vertical Angle and the Slope Distance to Prosurv cEZ.



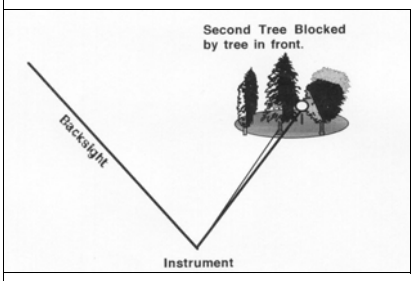
Tap **No** to cancel the entire shot.

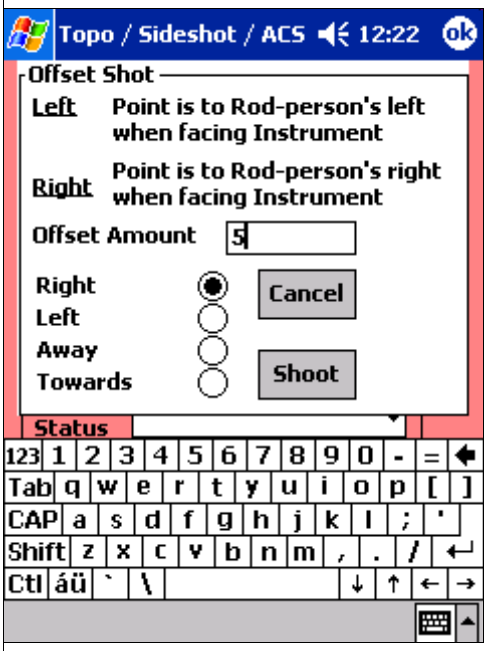
To record the second shot, turn the desired angle to the object. Tap Yes to record the angle currently in the instrument. A prism is not required for this second shot since no distance measurement is performed.

The three pieces of data are then combined to compute the Northing, Easting, and Elevation of that point.

Offset Shot

If you **can not directly** locate an object, you can use the **Offset** routine to locate it for you. The routine requires that you first indicate the direction and offset amount of the shot.





Enter the offset amount, then select the direction of the offset.

Tap **Shoot** to take the measurement, or **Cancel** to Exit.

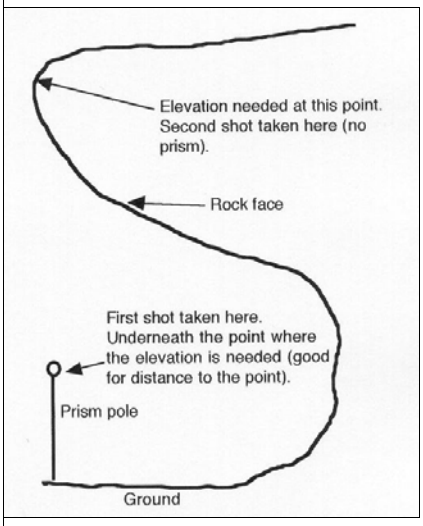
Note: The raw data will reflect the computed angle and distance, based on your offset information.

Angle Only

Taking a shot using Angle Only will simply record the Horizontal & Vertical Angles only. A bogus distance is supplied by Prosurv cEZ automatically.

Keep in mind that since the distance is fake, the elevation computed for the point will be fake also.

Remote Elevation



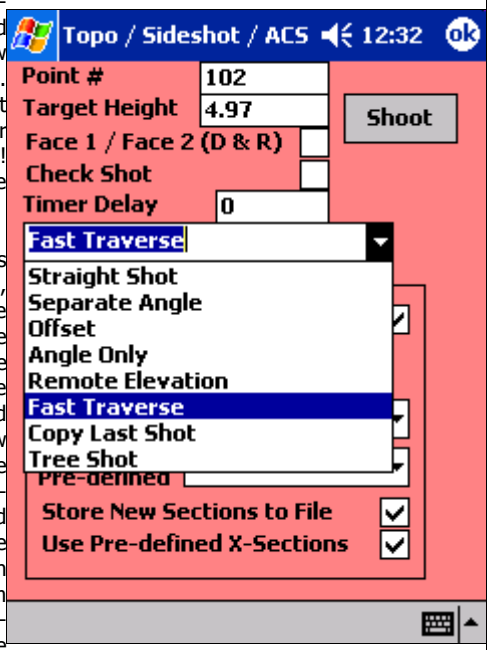
The Remote elevation routine allows you to find the elevation of a point by using the vertical angle measurement (zenith angle) of your instrument. In order to perform this operation, two shots must be taken. The first shot is a **distance** shot above or below the point in question.

This distance is required in order to compute the elevation of the point. The second shot simply records the **current vertical angle** in the instrument. In summary, the following data is recorded in this routine:

- Horizontal Angle of the first shot
- Slope distance (reduced to horizontal distance) of the first shot
- Vertical (Zenith) Angle of the second shot

Fast Traverse

The Fast Traverse selection offers a quick and easy way of setting a new control point to occupy. All you have to do is set the point (i.e. nail or rebar and cap), then shoot it! Prosurv cEZ will do the rest.



As soon as the shot is taken on the new point, Prosurv cEZ will prepare the Setup routine, and the Setup dialog will be shown. You will notice that the current occupied point has become the new Backsight point, and the newly shot point has become the Gun (occupied point). If you leave the Setup window, you can continue shooting from your current setup. However, you would lose the automated Setup information.

This routine is designed to immediately move up to the new point. If you need to take more sideshots, **do not use this routine until you're ready to move up** to the next occupied point. You can take a Face 1/Face 2 (Direct and Reverse) shot on the new point.

After the shot has been taken, the Setup dialog will automatically appear.

Once you've physically set up over the new point, simply enter the new instrument height. Now you're ready to shoot the point you just came from. Press Enter to Shoot your Backsight (as shown above).

Now you're ready for more sideshots!

Copy Last Shot

The Copy last shot routine is a powerful tool that can save time. Sometimes you may have a point that will end up having three different descriptors or feature codes. For example, the point may represent the beginning of a fence line, a telephone pedestal, and a ground shot. Rather than trying to fit all this in one descriptor (especially when using feature codes and attributes), you can use this routine instead. Simply take the first shot (maybe the ground shot).

Then select the Copy last shot routine and press Enter. The **Raw Data** that was taken from the instrument during the first shot is repeated. In other words, the Horizontal Angle, Vertical (Zenith) Angle, and Slope Distance are copied from the previous shot. The new descriptor that you typed in **prior** to the shot is used in place of the previous descriptor.

Also, you could change the target height prior to pressing Enter. Then, Prosurv cEZ would compute the elevation of the copied point using the changed rod height.

- **Note: Do not use this routine in conjuction with the Automated Cross Sectioning routine, as you may get erroneous results.**

Point #

The point number will reflect the next auto-point number each time a shot is taken. You can enter a different point number at any time, **then, the Auto # will be reset .** For example, you enter a new number, 5000, for this shot. Then, the next shot will be 5001 (the Auto # has been reset).

Target Height

The target height must always be entered prior to taking the shot. This height is recorded for each shot in the raw data file. This means you don't have to guess what height was used to compute the elevation of each shot.

3-3.5: Timer Delay:

This rather neat function will allow you to set a countdown timer prior to taking the next shot. You can enter any amount between 0 seconds and 300 seconds (5 minutes). Of course, an amount of 0 seconds means that the shot will be taken as soon as you press Enter. Any other amount will begin counting down until it reaches zero, at which time the shot will be taken. An example is discussed below.

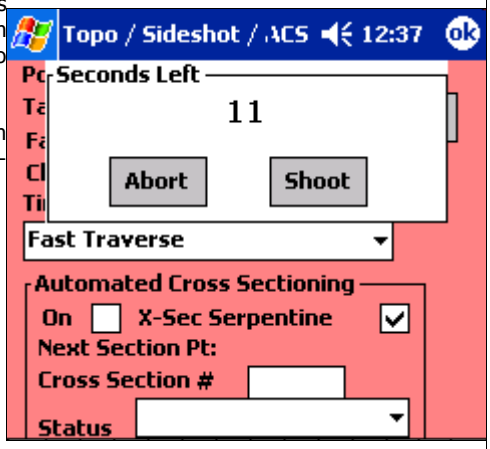
Countdown timer example

On some occasions the instrument operator may need to move an object off of line (such as a tree branch) in order to successfully take the shot. You can set the timer to allow you enough time to press the Enter key, walk to

the object to be moved, and then wait until the shot is taken! While Prosurv cEZ is counting down, you'll see this display:

While Prosurv cEZ is counting down, you can tap the **Abort** button to Abort the shot.

Or, tap the **Shoot** button to take the shot immediately.



Using and Creating Pre-Defined ACS Sequences

- What is Automated Cross Sectioning?
- Automated Cross Sectioning is a convenient way of storing feature codes that constantly change. For example, you may need to cross section an existing road every 25'. During the first cross section, you take shots on each point as normal, and Prosurv cEZ learns and remembers each code you enter. Then, when your rod person moves up to locate the next section, the codes are repeated automatically by Prosurv cEZ! And, you can shoot the cross sections in "serpentine" mode, like you're used to (back and forth).

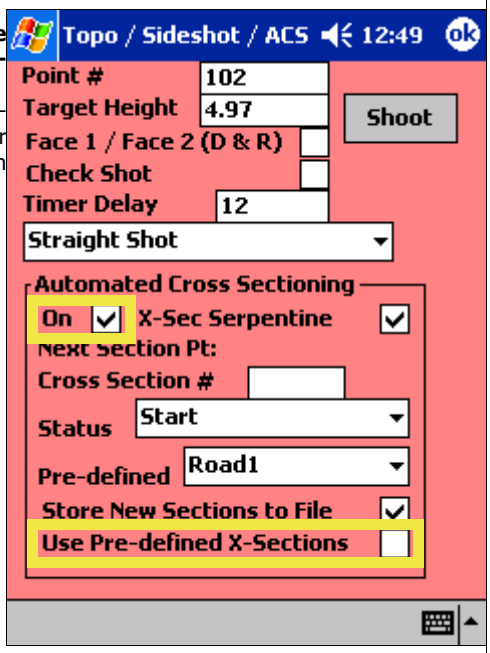
To begin using ACS, you have 2 choices:

1. Have Prosurv cEZ **learn-as-you-go**
2. Use a pre-defined ACS Sequence from the drop-down **Pre-defined** list

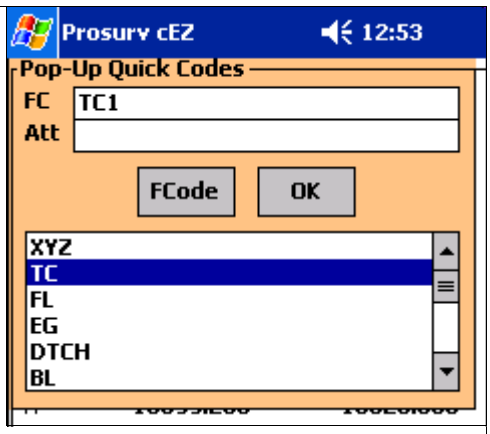
Learn-as-you-go ACS

To get started:

1. Check the "**On**" box
2. Uncheck the "**Use Pre-defined X-Sections**" box
3. Tap the **Shoot** button and locate your first cross section point

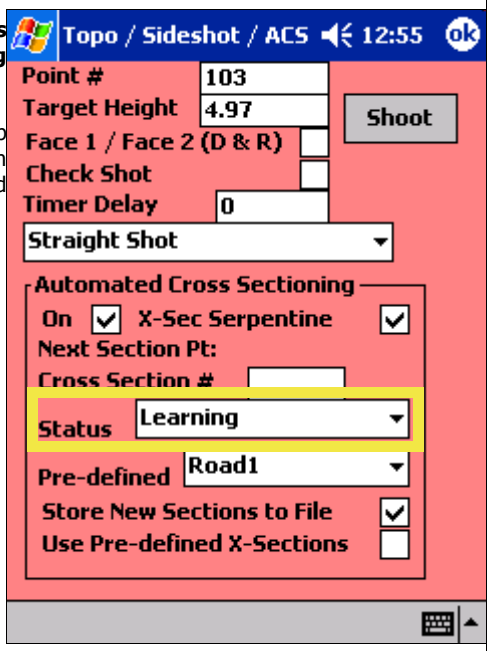


Enter or select your first cross section point's feature code and tap **OK**.

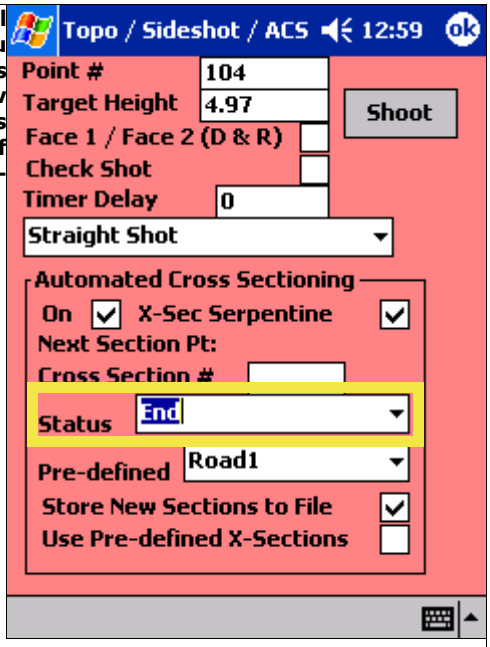


Notice that the **Status** has switched to **Learning** mode.

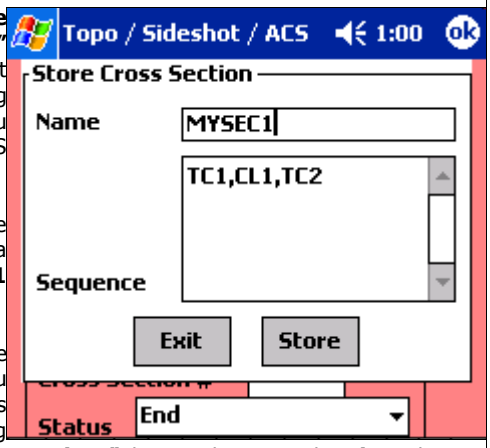
Now, you would keep taking your cross section shots, such as CL1 and TC2.



Prior to the final cross section shot, you must change the Status to *End* so that Prosurv cEZ knows that this will be the last shot of the learned cross section.



The check box **"Store New Sections to File"** tells Prosurv cEZ that when you're done learning a new cross-section, you want to store it as an ACS sequence for later use.



You can give the learned cross section a name, such as **MYSEC1** as shown here.

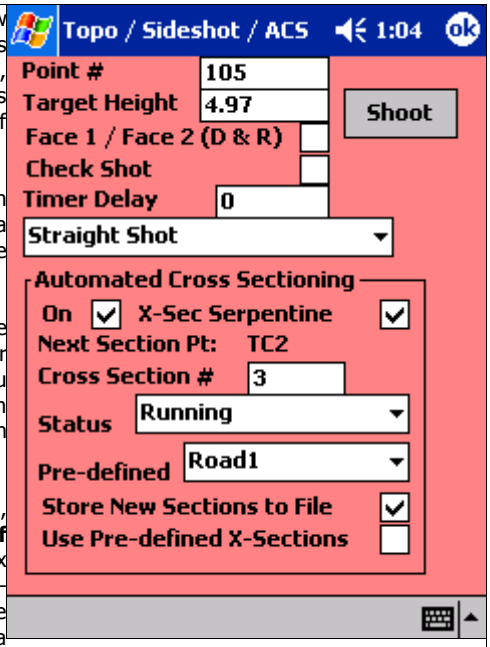
Later, when you come back to the job site, you can re-use the same cross section just by checking the **"Use Pre-defined X-Sections"** box, and tapping the **Shoot** button. The pre-defined sequence will pop up, and you can even edit the sequence before you begin.

Prosurv cEZ has now learned the feature codes of the first cross section, and will repeat the codes (in serpentine mode—if checked) automatically.

Prosurv cEZ won't even stop to ask you for a code...you just take the shot and move on.

The next point's code and cross section number are displayed so that you don't lose track of which point your rod person should be shooting next.

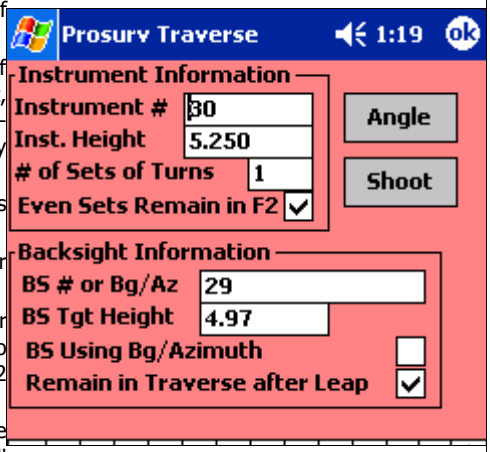
You can, of course, turn cross sectioning **Off** by unchecking the On box in order to shoot something that's not in the cross section, such as a Power Pole. Then, you can resume the cross section **by checking the On box and changing the Status to Running.**



Check Shot

While in Topo/Sideshot, you can quickly and easily check in to a known point by selecting the **Check Shot** box. As soon as you check the box, you will be prompted for a point number (the known point). Enter the point and tap OK. Then tap the **Shoot** button to take the shot on the known point. Prosurv cEZ will automatically display and store horizontal and vertical difference information for the check shot.

Traverse by Closing the Horizon

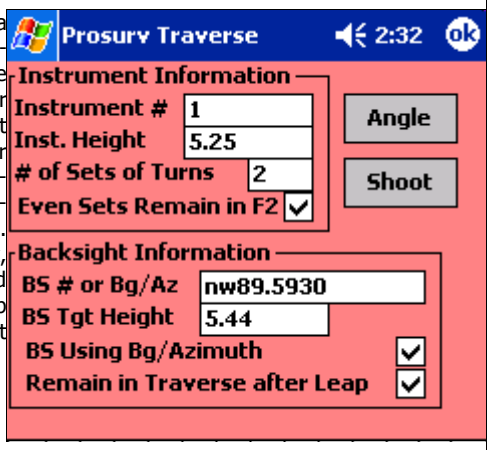


- Allows up to 8 sets of Direct/Reverse
- Each set consists of BS Direct, FS Direct, FS Reverse, BS Reverse, effectively "closing the horizon"
- Stops and displays the result of each set
- Re-turn any set after the set is complete
- Shoot distances or take angles only to any of the up to 32 'shots'
- If no distances are shot, Prosurv cEZ will ask for a slope distance when complete
- Averages all slope distances and vertical angles
- Records each and every shot in the Raw Data file, and records set closure information
- Allows viewing of all sets for that traverse point, prior to storing
- Allows a Backsight Bearing or Azimuth to be used, and computes and stores the Backsight point after completing the set
- Allows you to select to keep your current Setup, Compute a new Setup based on your BS & Gun, or Leapfrog (uses the Gun as the new BS, and the FS as the new Gun)
- Does not require you to press any buttons on the instrument (such as a Hold button)
- By default, allows you to leave the Instrument in Face 2 when you begin even-numbered sets, to reduce the amount of "flopping". In other words, set #1 is BSd,FSd,FSr,BSr; set #2 is BSr,FSr,FSd,BSd and so on. This minimizes flopping of the gun, but still yields a "true" Close the Horizon method

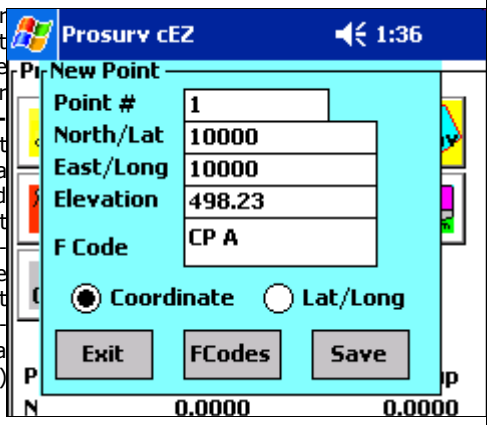
Traverse by Closing the Horizon.

Enter the Instrument Information and Backsight Information. If you're using a Backsight point number, then the "Backsight using…" check box should be **unchecked**. If you're using a Backsight Bearing or Azimuth, then be sure to check the "Backsight using…" check box.

If you are performing a traverse, with no side-shots, you can check the "Remain in Traverse after Leapfrog" check box. At the conclusion of your sets, Prosurv cEZ will continue to display the Closing the Horizon window. By not checking the box, Prosurv cEZ will instead display the standard Setup window (if you select Leapfrog).

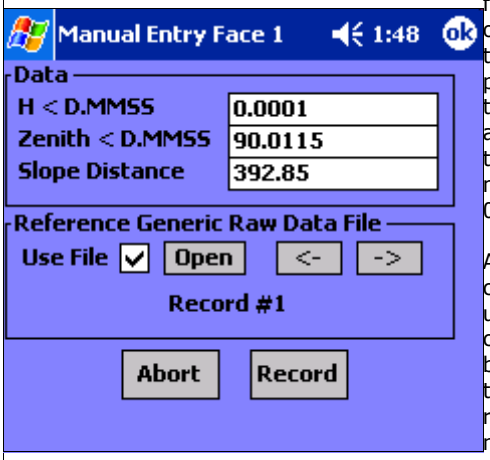


If the Instrument or Backsight Points are not found, you will be prompted to enter their coordinates (after **Tabbing** down to the next box). In this example, a Backsight Bearing is used instead of a Backsight Point number. The Backsight point will then be saved using a given point number. You will be allowed to enter or select a descriptor (feature code) as well.



Note: This example uses Manual Raw Data entry

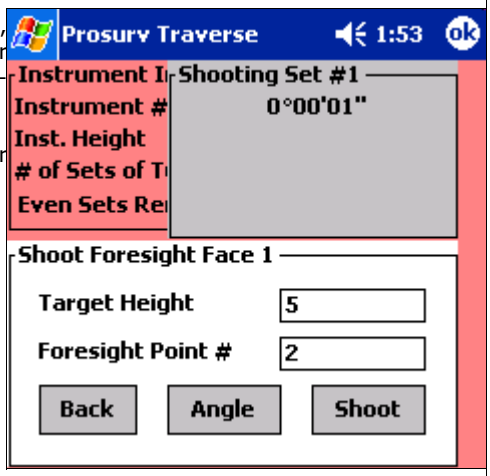
Raw data can be entered manually at any time by switching to manual mode in the **Communication Settings**. Also, in this example, a simple text file is being referenced to obtain the raw data. The text file is created in Notepad and simply contains the horizontal and vertical angles and the slope distance, separated by commas:
0.0001,90.0115,392.85



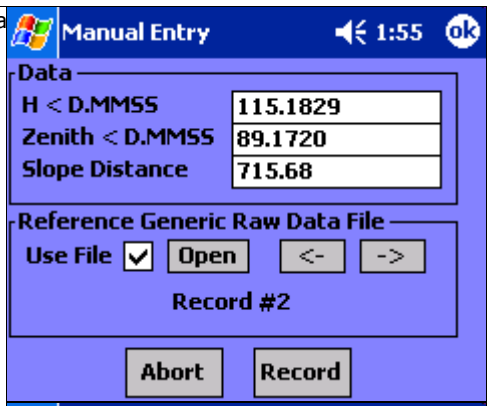
After each "shot", Prosurv cEZ automatically "moves up" in the file by one record. You can easily flip backwards or forwards through the file to find the raw data shot that you need.

After your first shot, you will be prompted for information for your Foresight.

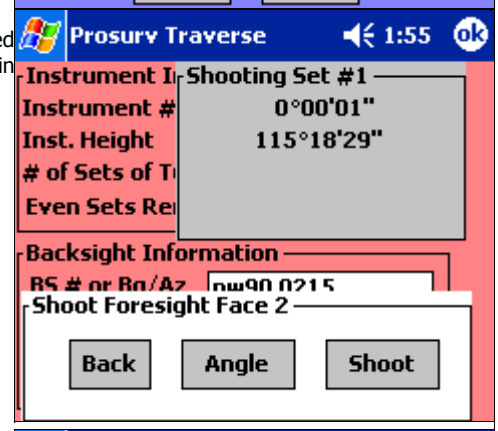
Tap **Shoot** to take your second shot.



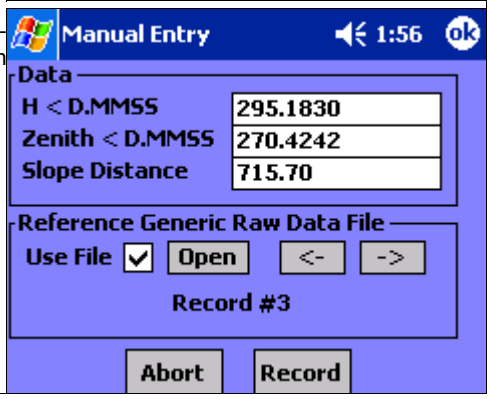
The second shot's data is shown here.



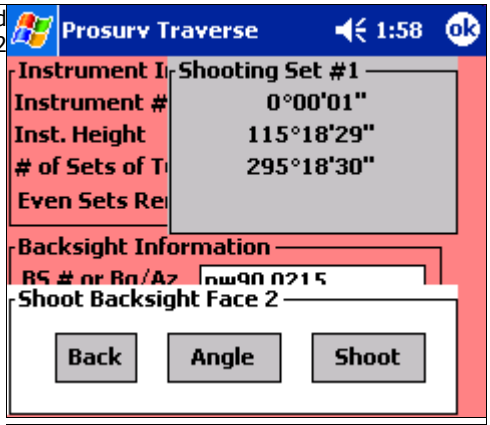
You're now prompted to shoot the Foresight in Face 2.



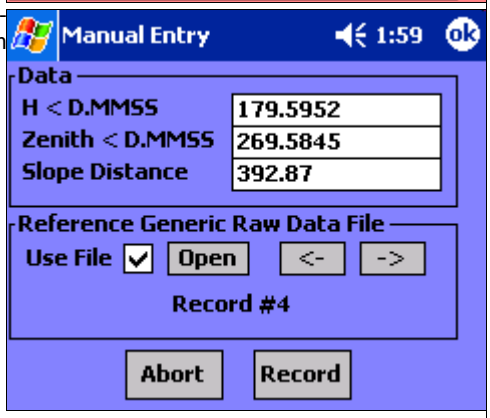
The data for the Foresight Face 2 shot is shown here.



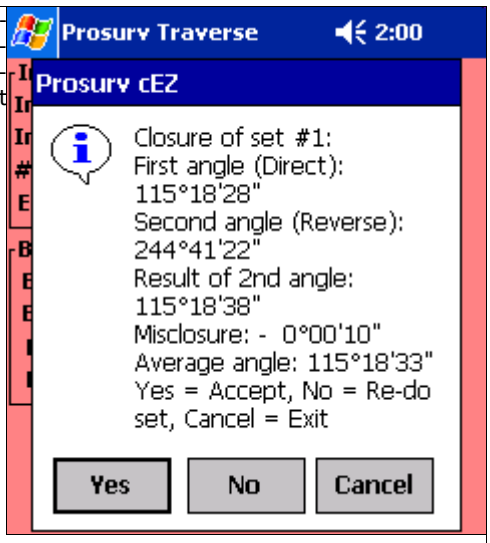
You're now prompted for the Backsight Face 2 shot.



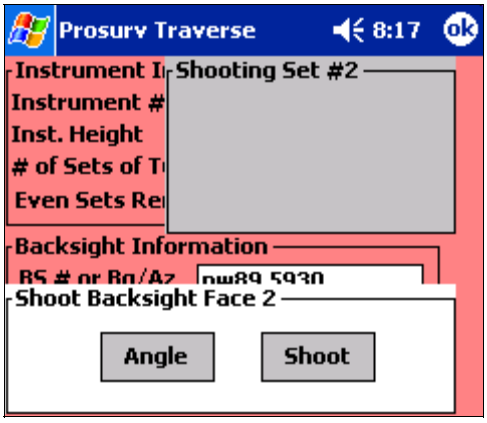
The data for the Backsight Face 2 shot is shown here.

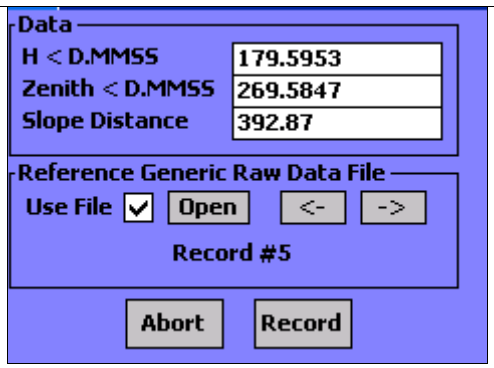


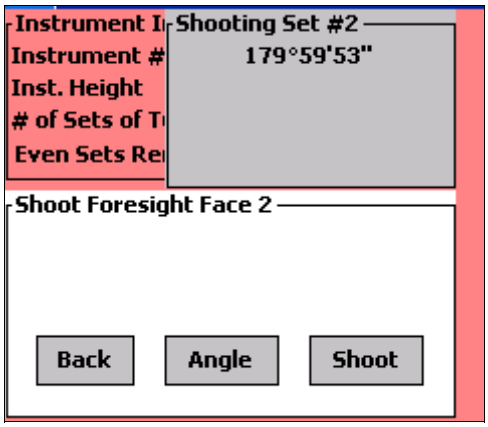
The Closure information for set #1 is displayed. Tap **Yes** to continue and move on to set #2.

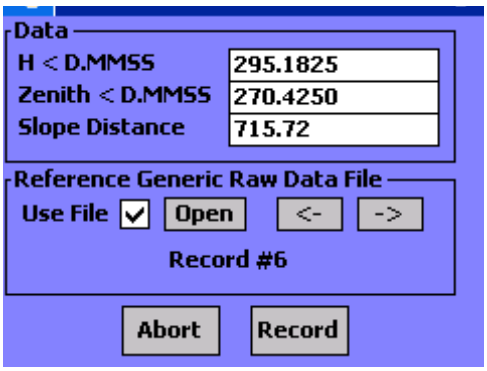


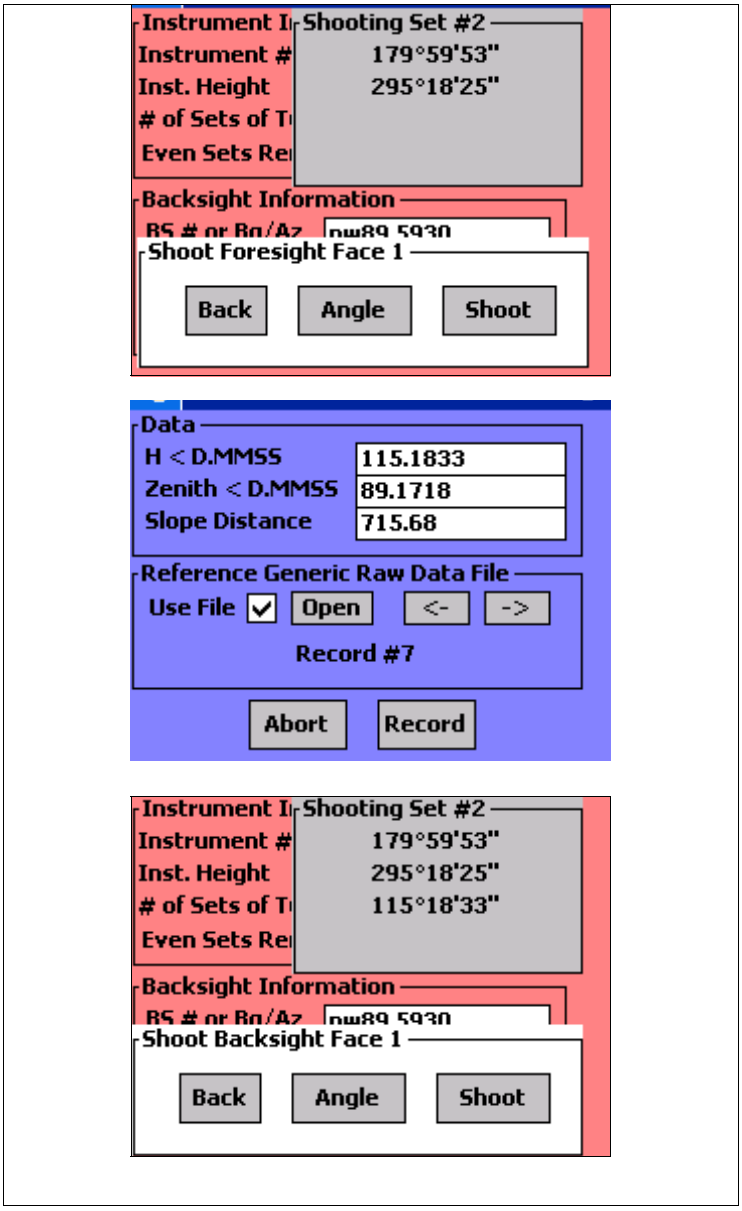
The remaining screen captures are shown below.

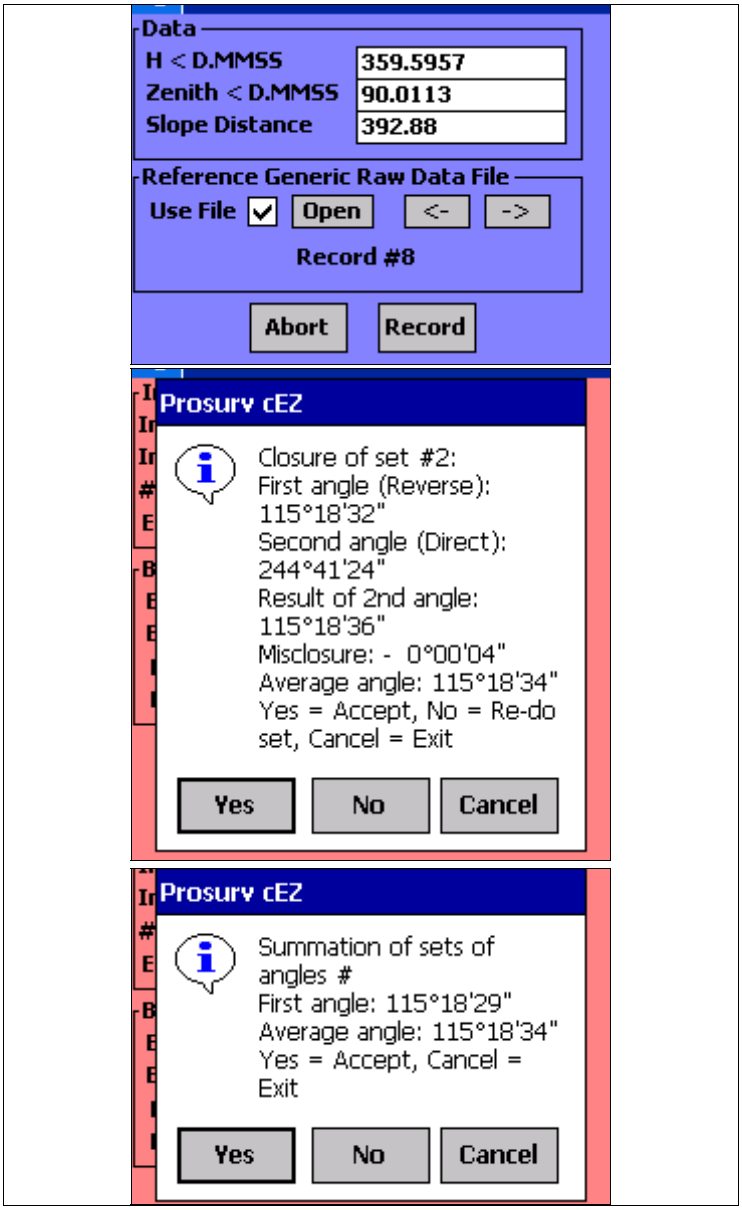



Data
H < D.MMSS
179.5953
Zenith < D.MMSS
269.5847
Slope Distance
392.87
Reference Generic Raw Data File
Use File
Open
<-
->
Record #5
Abort
Record


Instrument I
Instrument #
Inst. Height
# of Sets of T
Even Sets Re
Shooting Set #2
179°59'53"
Shoot Foresight Face 2
Back
Angle
Shoot

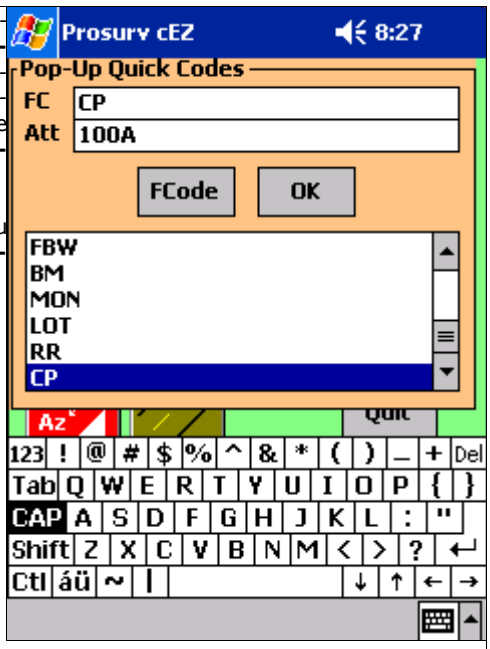

Data
H < D.MMSS
295.1825
Zenith < D.MMSS
270.4250
Slope Distance
715.72
Reference Generic Raw Data File
Use File
Open
<-
->
Record #6
Abort
Record


Instrument I
Shooting Set #2
Instrument #
179°59'53"
Inst. Height
295°18'25"
# of Sets of T
Even Sets Re
Backsight Information
Shoot Foresight Face 1
Back
Angle
Shoot
Data
H < D.MMSS
115.1833
Zenith < D.MMSS
89.1718
Slope Distance
715.68
Reference Generic Raw Data File
Use File
Open
<-
->
Record #7
Abort
Record
Instrument I
Shooting Set #2
Instrument #
179°59'53"
Inst. Height
295°18'25"
# of Sets of T
115°18'33"
Even Sets Re
Backsight Information
Shoot Backsight Face 1
Back
Angle
Shoot

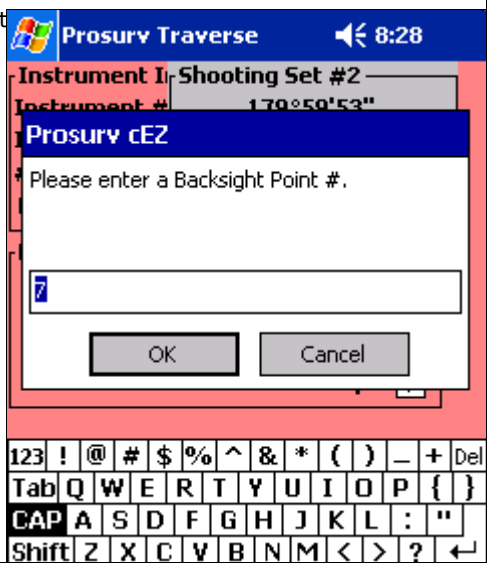

Data
H < D.MMSS
359.5957
Zenith < D.MMSS
90.0113
Slope Distance
392.88
Reference Generic Raw Data File
Use File
Open
<-
->
Record #8
Abort
Record
Prosurv cEZ
Closure of set #2:
First angle (Reverse):
115°18'32"
Second angle (Direct):
244°41'24"
Result of 2nd angle:
115°18'36"
Misclosure: - 0°00'04"
Average angle: 115°18'34"
Yes = Accept, No = Re-do
set, Cancel = Exit
Yes
No
Cancel
Prosurv cEZ
Summation of sets of
angles #
First angle: 115°18'29"
Average angle: 115°18'34"
Yes = Accept, Cancel =
Exit
Yes
No
Cancel

If you're using a Backsight **Azimuth** or **Bearing**, rather than an existing point for the Backsight, you will be prompted for **two feature codes.**

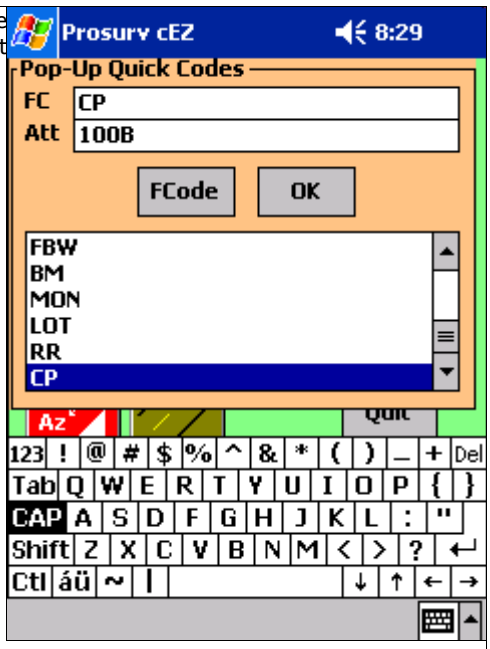
The first code that you enter will be for the **Backsight** point.



Now, enter a Backsight point number.



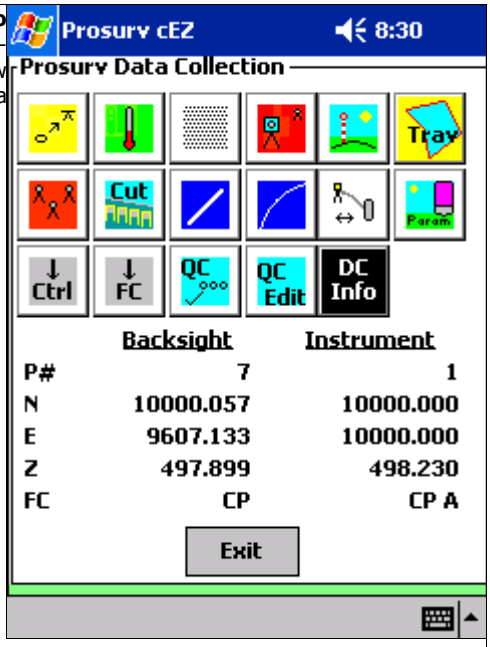
Now enter the feature code for the new Foresight point.



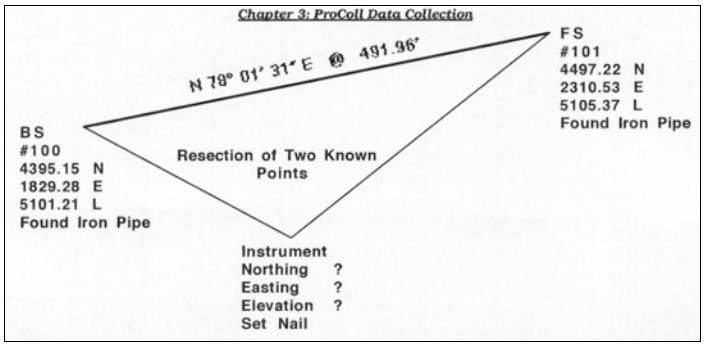
The traverse point is now complete. If you select to **Leapfrog**, then Prosurv cEZ will update the **Traverse** screen by placing the new Foresight point number into the **Instrument #** box, and the **Backsight #** becomes the point number you just occupied.

Or, tap **No** to exit the routine, saving the new Setup so you can take sideshots.

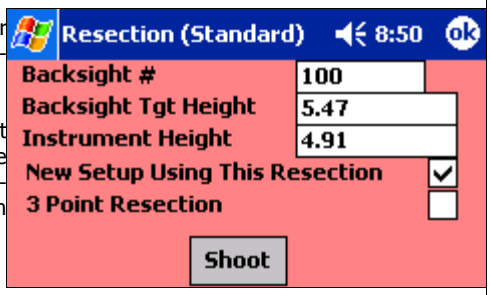
In this example, **No** was selected in the previous screen, and the new Setup is shown in the Data Collection screen.



Resection (2 or 3 Point Standard)



This routine will allow you to perform a 3-D two or three point resection. A resection is used to place coordinates and elevation on an unknown point by shooting two or more ***known*** points. The resection routine **does not require a Setup** prior to its use, since you'll probably be using the resected point as your next setup's 'instrument' point.

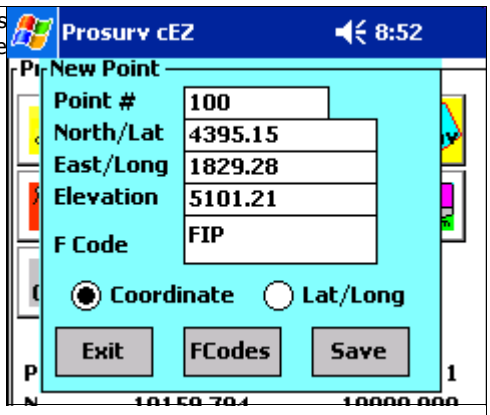


Enter the point number to be used for the Back-sight point.

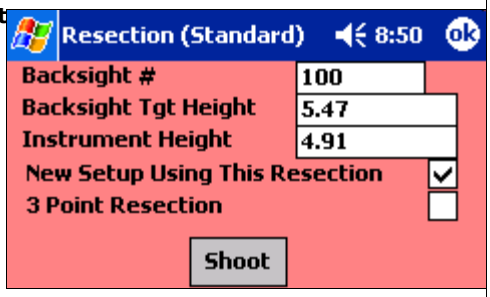
If the point doesn't exist, you will be prompted for the coordinates once you **tab** down to the target height.

Prosurv cEZ can use the resected point, along with your Backsight point to automatically create a new Setup. Simply check the "Use Resection…" box before tapping the Shoot button.

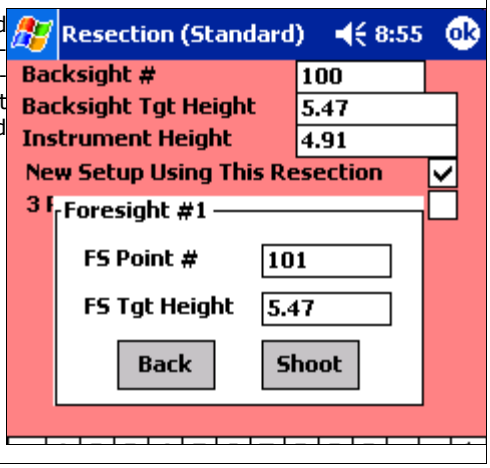
Enter the coordinates that you're using for the Backsight.



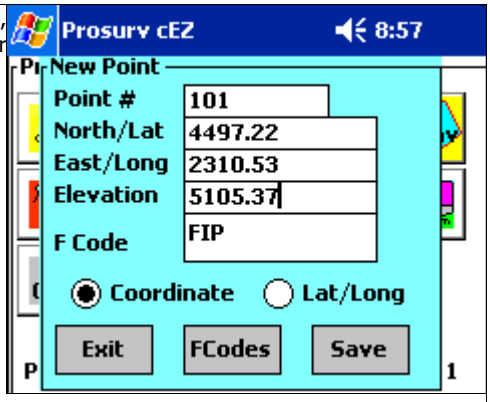
Now tap the **Shoot** button to begin.



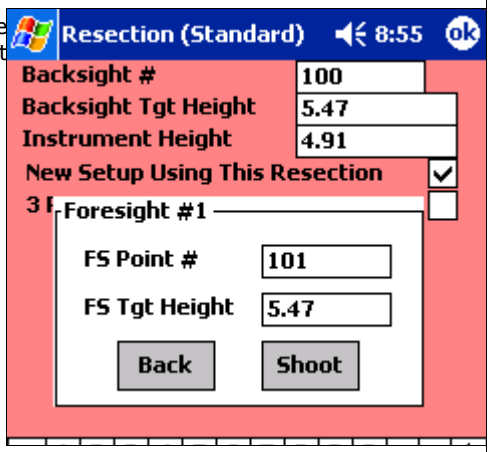
You're now prompted for the Foresight information. Again, if the foresight point number doesn't exist, you'll be prompted to enter it's coordinates.

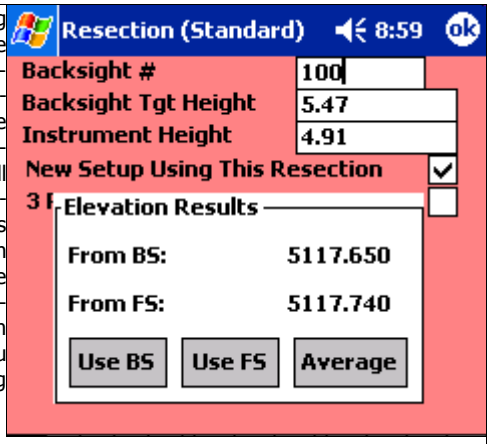


Since 101 didn't exist, you're now prompted for it's coordinates.

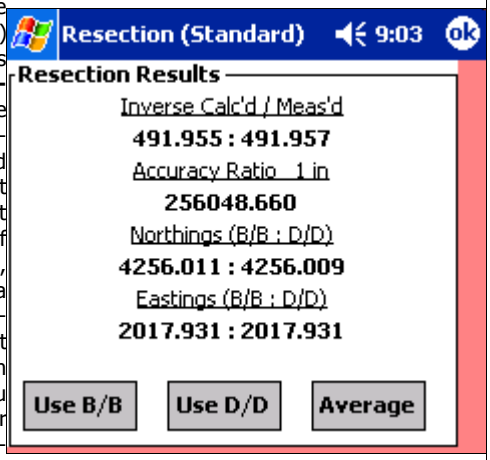


Tap **Shoot** to take the shot on the foresight point.





This routine will bring **both** elevations from the resected points to the occupied point. Both elevations (representing the elevation that the instrument is set up over) will be displayed. Theoretically, these elevations should be the same, but in reality will probably be different. You will be allowed to choose which elevation to hold, or you may average the resulting elevations.

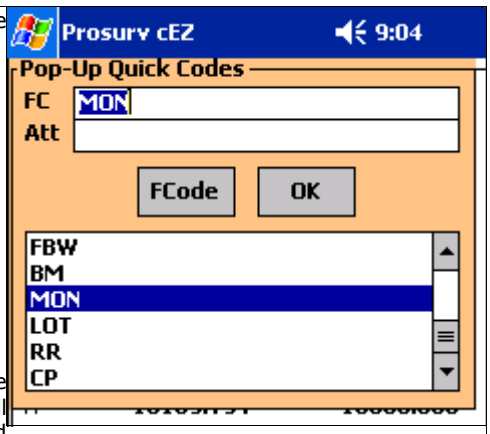


Prosurv cEZ uses two methods for computing the resulting coordinate. The first method uses the angle (that you measured) between the known points to compute a **Bearing-Bearing** intersect for the coordinates of your instrument. The second method uses the distances that you shot to your Backsight and Foresight points of your resection. Then, Prosurv cEZ displays a comparison of the Northings and Eastings that are the result of each method used. Again, you may average the results or select one of the two results.

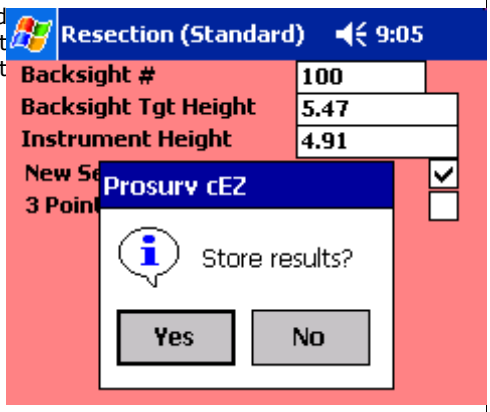
If a resection is the first thing you perform in a new job, then no setups will exist. If this is the case, and you wish to **review** the raw data stored when you shot the points (for the resection), you could use the Raw Data to Text file conversion routine located in the Main Menu under the Jobs pull-down.

Select a feature code for the new point (your occupied point) from the

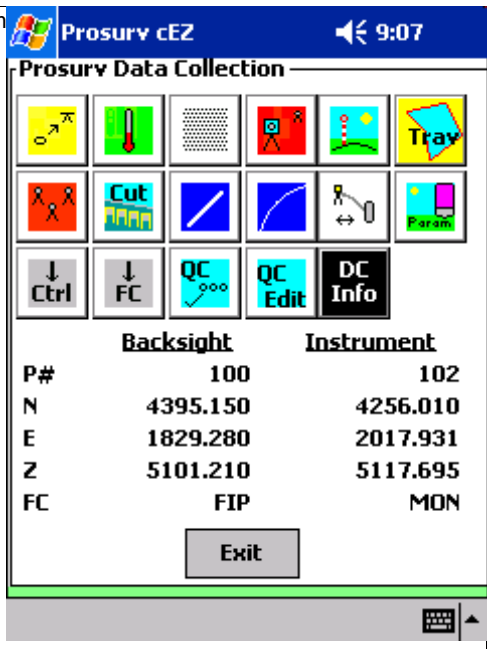
Pop-Up Quick Codes or the Feature Code list.



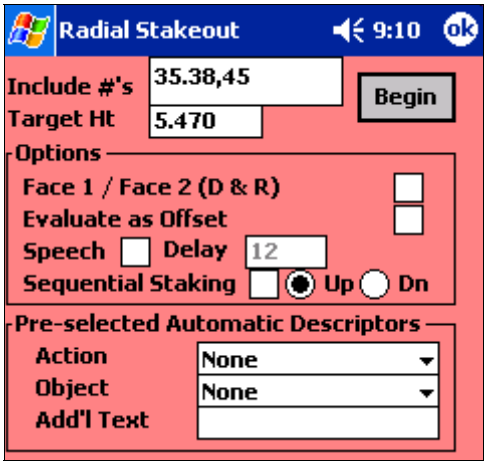
Finally, confirm the results. Prosurv cEZ will automatically compute and store a **new Setup** based on your occupied point and the original Backsight point (if checked).



Your 2 point resection is now complete.



Radial Stakeout



The stakeout routine can use several different methods to stake points. These methods are:

- **Stake consecutive points increasing the point # by 1 each time.**
- **Stake consecutive points decreasing the point # by 1 each time.**
- **Stake points in a list (Include #'s).**
- **Stake points in a set.**

Automatic descriptors

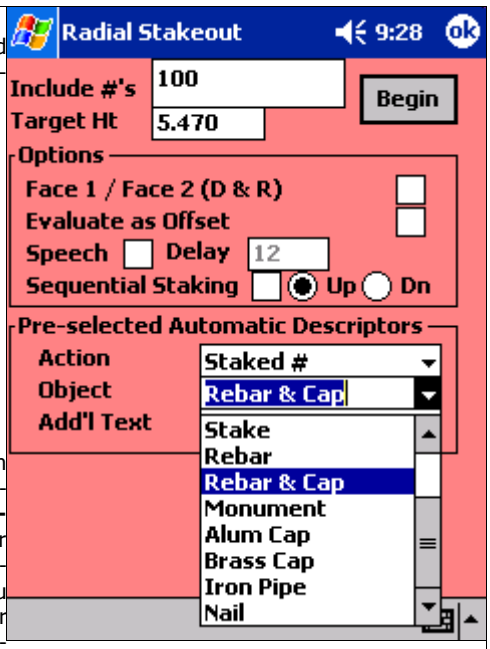
Automatic descriptors can save you a lot of time when staking out many points in a row. They create descriptors that automatically appear after you "Record" the shot. These descriptors can be edited before the point is stored, or can be used just by pressing Enter. Currently, Prosurv cEZ supports the following "Actions" and "Types" of stakeouts:

Action	Example
Staked #	"Staked #35"
Staked # with descriptor	"Staked #35 NW CNR LOT 1"
Found # with descriptor	"Found #20 NW CNR LOT 1"
Check #	"Check #102"
None	

Types of Descriptors

(These can be modified in your ProsurvCE_Defaults.txt file)

- **Hub**
- **Hub & Tack**
- **Lath**
- **Stake**
- **Rebar**
- **Rebar & Cap**
- **Monument**
- **Alum Cap**
- **Brass Cap**
- **Iron Pipe**
- **Nail**
- **None**



By selecting an Action and a Type, you can create descriptors that **automatically 'pop-up'** after recording a shot. For example, let's say that you need to set several Rebar & Caps for property corners. The point numbers that you'll be staking out are 35.38, and 45. You select an **Action: Staked # and a Type: Rebar & Cap**. You also enter a short descriptor that will be added to each point as well (Lot X). After staking out point #35, tap the **Record** button to record the shot.

Notice that the description of the point will automatically contain "Staked Rebar & Cap #35 Lot X::Cut 6.36". The "Add text" line has been added to the end of the words Set Rebar & Cap #35. By selecting different Actions and Types, you can easily create automatic descriptors that pop-up after recording each shot.

One special ***Action*** is the **"Check Shot".** By selecting the Check Shot action in Stakeout, Prosurv cEZ will record specific information about the shot once the shot is recorded. The automatic descriptor will appear as: "Check #35...". Two raw data notes for the point will be stored. The first note shows the "Change" in Northing and "Change" in Easting. The second note shows the grade information (P/A/C-F) which stands for Proposed grade, Actual grade and Cut or Fill information. The Proposed grade is the elevation contained in the original point that was staked out. The descriptor contained in the coordinate that was stored contains: "Check #35:N=0.02':E=0.05':Z=Fill-0.03'" for this example.

Staking consecutive points +1 or -1

To stake sequentially, just check the Sequential Staking box. Below the selection, you have the option of staking Sequentially Up or Down.

Staking out a list of points

The powerful **include #'s or ;set#** line allows you to enter a list of points to be staked. This list can include commas and periods. The best way to illustrate its use is by examples:

- To stake points 125 and 128 enter: **125,128**
- To stake points 125 through 128 enter: **125.128**
- To stake points 125 through 128 and 300 through 305 enter: **125.128,300.305**

Keep in mind that you could enter this list of points in a **SET** prior to staking them.

Staking out a Set

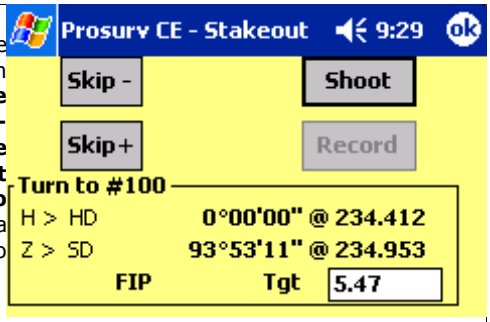
If you've previously entered a series of points into a set, you can easily stake them out by pressing **the ;(semi-colon) key** and then entering the set # to stake. For example, if the numbers are already in set #5, simply enter **;5**. Points 125, 126, 127, 128, 300, 301, 302, 303, 304, and 305 will be staked in that order.

Notes about staking points.

- Prosurv cEZ always stakes in the order of the points as given.
- All computations for staking the points are done prior to staking the first point. Therefore after recording a point, the next one is displayed almost instantly.
- If you are performing sequential staking, each point will be computed individually. If a point is not found during sequential staking, you will be asked whether to abort or proceed. If you decide to proceed, then the next existing point number will be staked.
- If a point number is not found while *not* using sequential staking, the point is ignored and Prosurv cEZ will proceed with the next existing point in your list.

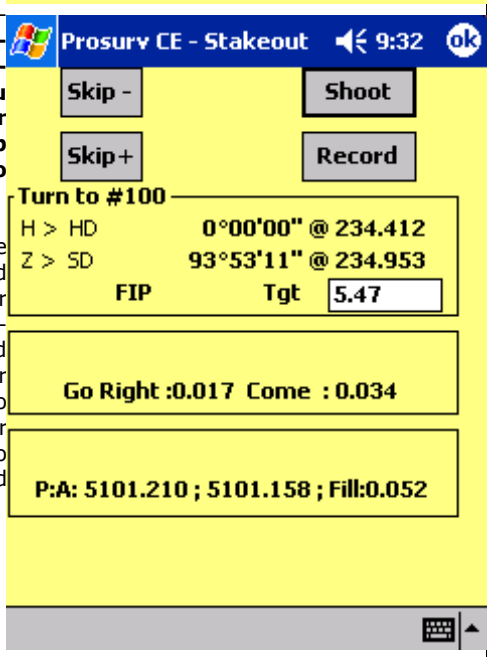
The Stakeout display

The point number to be staked is shown along with the **Horizontal Angle and Horizontal Distance** to the point. **The descriptor of the point to be staked is also shown.** You can enter a new target height **prior** to taking a shot on the point.



The second line displays the computed **Vertical Angle & Slope Distance to the point. You can tap the Skip+ or Skip– buttons to skip to the next (or back to the previous) point.**

The Horizontal Angle displayed should be turned in the instrument in order to put the rod person 'on-line'. However, if the rod person is not on-line or you simply would like to tell the rod person how far left or right he needs to go, you can go ahead and take a shot on the prism.

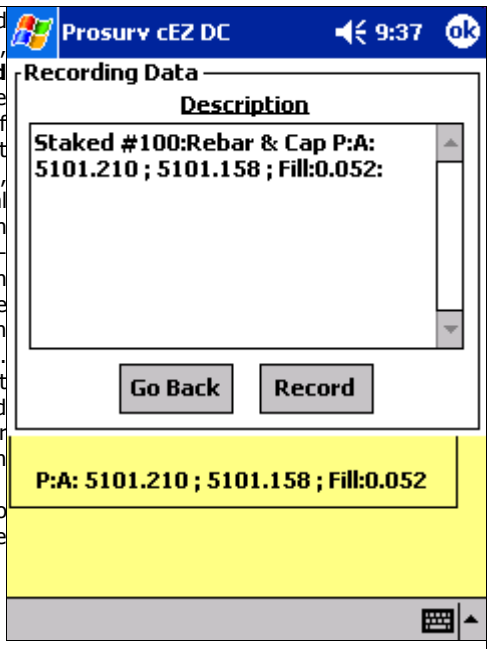


After each shot, the window will display the stakeout information along with data telling the rod person where he needs to go in order to be at the point which is being staked. Two extra lines are now displayed. The first line of new information gives the **Come/Go** and **Left/Right** information.

The second line of information gives the **Actual elevation** of the point shot, and the **Cut or Fill** amount to get to the **proposed grade** of the point being staked.

Once you're satisfied with the position staked, press **tap the Record button** to **Record** the point. For instance, if you're staking a 3 foot offset to the back of curb, you may take several shots until the rod person reaches the correct position. Then the rod person would set a hub or stake at the point and then shoot the top of the hub. This final shot is what you'd use to tell the rod person the proper Cut or Fill amount. This is when you'd record the point.

Once you've selected to **record** the point you'll see the screen shown here.



The **Proposed Grade, Actual Grade, and Cut/Fill** are displayed. You'll notice that Prosurv cEZ has already given the point a description. If this descriptor is ok with you, simply press Enter and the shot is finally recorded. You can, if you wish, edit the descriptor. You can even select to **Re-Shoot** the point (by tapping **Go Back)**.

When reviewing or printing Raw Data, a shot using the Stakeout routine will be indicated by the letters 'SO:'.

Using the Vertical information features

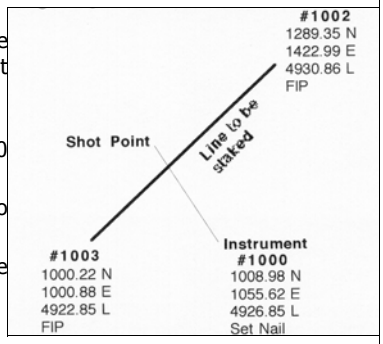
Prosurv cEZ will also display the computed Vertical Angle and Slope Distance when staking a point. This functionality can be useful in the field. You could also use this information to create example shots for yourself when studying for an exam etc…

Note: The first Stakeout window asks you for a target height. This height will be used to determine the Vertical Angles and Slope Distances *for all points to be staked.* If you change the Target Height later (when taking a shot in Stakeout), the Vertical information *will not be updated!* ***If you need to see <u>updated</u> Vertical information based on a** new **target height, go back to the Stakeout window, enter your new target height, and press Enter to allow Prosurv cEZ to re-compute the Vertical Information.***

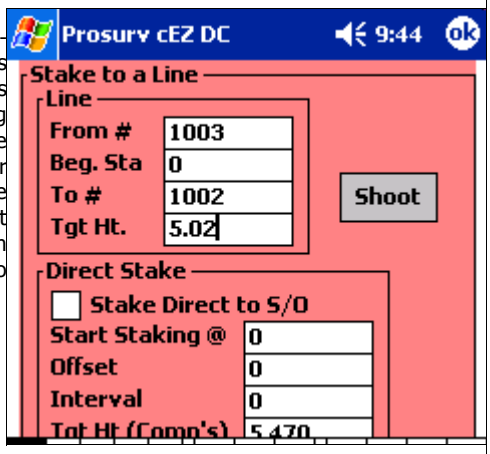
Stake to a Line (2D or 3D)

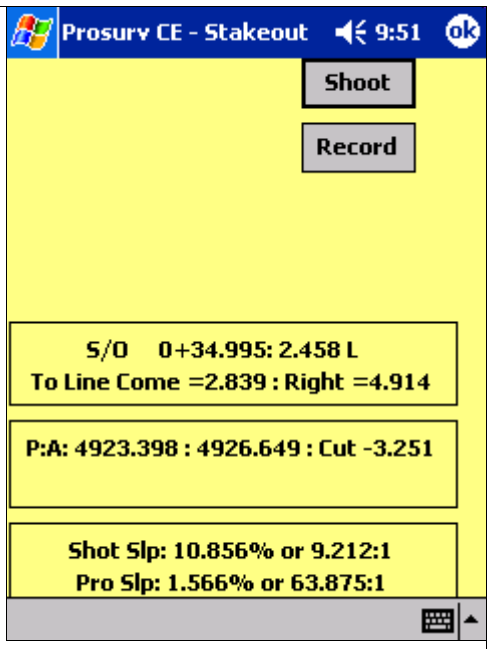
The stake to a line routine can be extremely useful in several different ways. You can use it to:

- Stake a property line every 50 feet.
- Stake a curb line every 25 feet to a percentage of grade.
- You can even use it for slope staking.



The general idea behind staking to a line is that you have two points representing the beginning and end of the line. The first point is the point your starting **From** and the second point is the point you're going **To**. You can even assign a station to the **From** point.





When a shot is taken, the station and offset amounts are computed. Prosurv cEZ then uses this station amount to determine the **proposed grade** at the shot (using the pre-computed slope percentage). So, after the shot is taken, you'll see several pieces of information including:

- **The Come/Go and Left/Right amounts to get to the Line.**
- **The Station and Offset of the point shot (along the line).**
- **The Proposed Grade/Actual Grade/ and Cut or Fill at that point.**

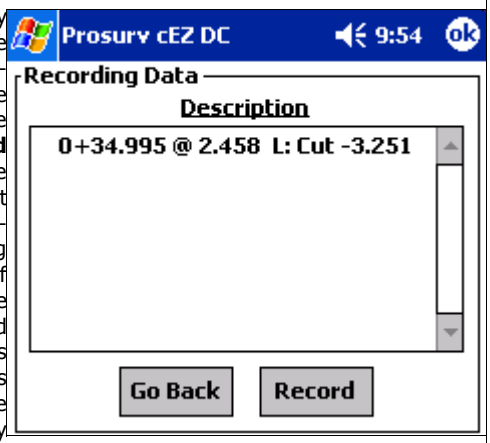
To use the Stake to a Line for Slope Staking, simply keep in mind that a **Cut or Fill of 0.00 is what you're trying to achieve. This is where the actual grade matches the proposed grade and therefore catches the proposed slope.**

Example using Stake to a Line:

The Backsight used in this example is at 1800 N, 1800 E, 4955.00 Elevation and the Instrument Height is 4.50.

Once your rod person is ready, you may take a shot by tapping the **Shoot** key. The window will allow you to enter a Target Height **prior** to taking the shot. For this example, the angle turned to the prism was 252° 18' 49". The

Vertical Angle was 89° 19' 10" and the Slope distance was 30.22'. The results of the shot are then displayed.

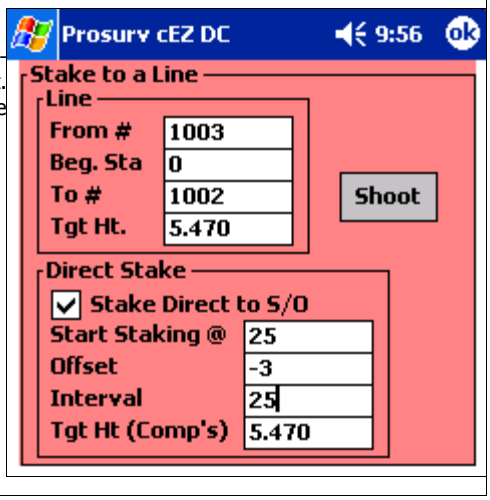


You can take as many shots as you like until the rod person is at the desired position. Once you're satisfied with the results, tap the **Record** button to **Record** the shot. Like the Stakeout routine, an automatic descriptor pops up showing the station and offset of the shot along with the Cut or Fill to the proposed slope. You may edit this descriptor or use it as-is and press Enter to store the shot. Or, you may take a new shot by pressing Esc and then pressing Enter at the next screen.

When reviewing or printing Raw Data, a shot using the Stake Line routine will be indicated by the letters 'SL:'.

Direct Stake to the Line

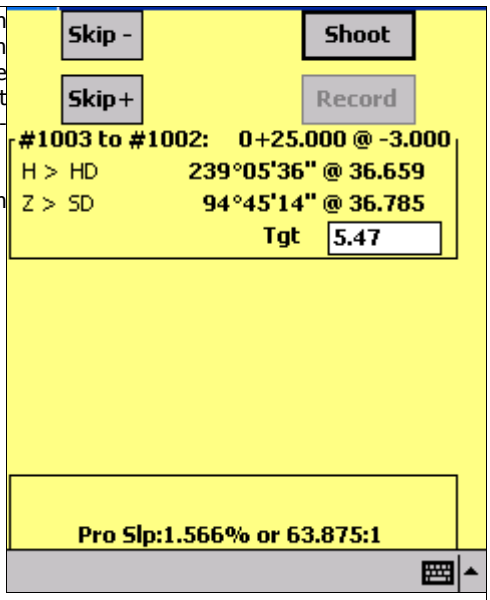
The Direct Stake option lets you stakeout given intervals and offsets quickly and easily.



Enter a station to begin staking and an offset. Then enter the interval (ie every 25').

At first you're shown the stakeout information and the proposed slope between the "From" point and "To" point that defined the line.

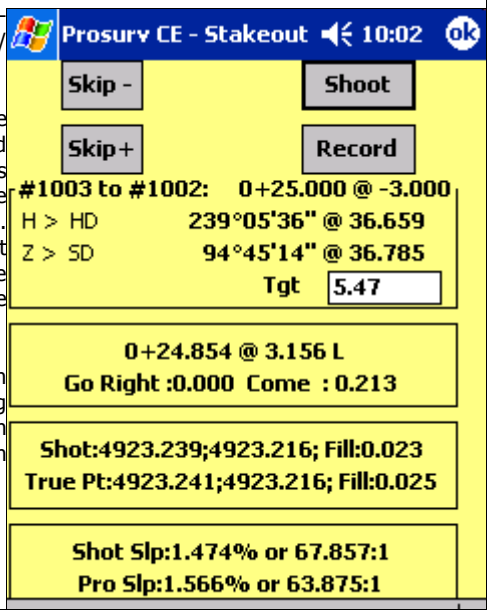
Tap the **Shoot** button take a shot.



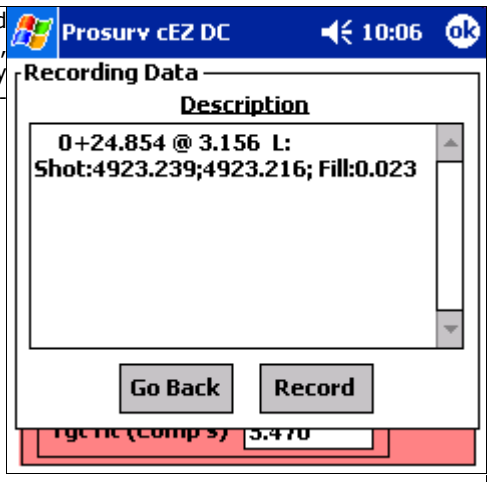
All relevant data is displayed, including the Cut/Fill to the current shot.

In the Stake to a Line routine, the Proposed Grade of the shot point is computed by using the slope of the given line. The **station** of the shot point is used to compute the proposed grade at the given slope.

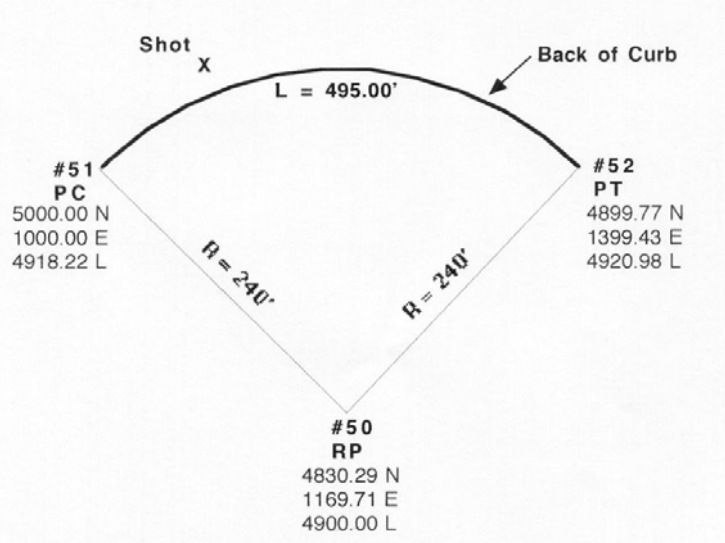
Tap **Record** when you're finished staking that station. You can **Skip+** or **Skip–** through the stations.



When you're finished recording the shot's data, Prosurv cEZ automatically moves up to the next station.



Stake to a Curve



Press **Ctrl-D** to activate the Stake to a Curve routine. This routine, much like the Stake to a Line routine will give you the current station and offset of any point you shoot. The required information before you take the first shot are:

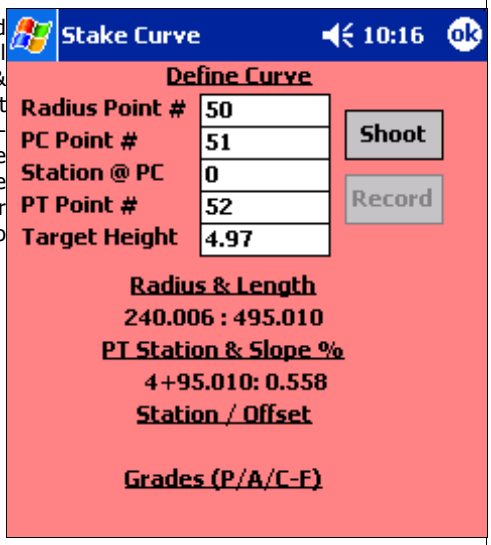
- **The Radius Point #**
- **The PC Point #**
- **The Station at the PC (optional)**
- **The PT Point #**

The distance (radius) from the Radius point to the PC and PT should of course, be the same. Any point shot that falls outside of the given arc will not be computed (you'll see 'Past PT' in the lower right hand corner).

This routine, like Stake to a Line, is also 3-D capable. The example below illustrates how you can use this routine to stake a 3' offset for a back of curb including Cut/Fill. The proposed elevation at the shot point is computed by using the slope percentage from the PC to the PT **along the arc length**. The station of the shot point is used in determining the proposed grade. In other words, the offset amount is not factored into the computation of the

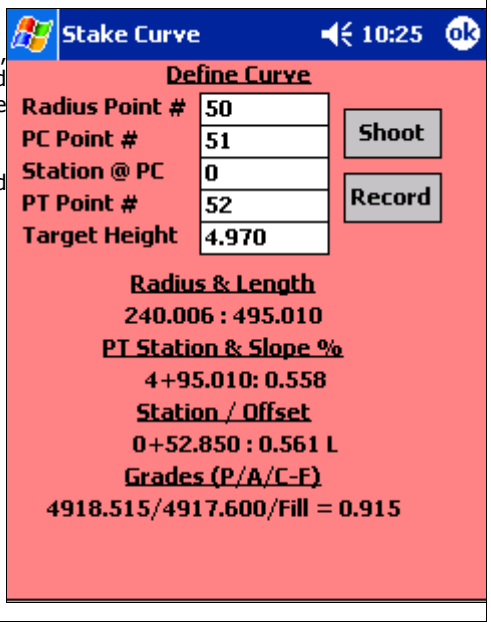
proposed grade.

Once you've tapped **Shoot**, the window will display the Radius & Length of the Curve. It will also display the Station at the PT and the slope percentage of the curve. You can now enter a Target Height prior to the first shot.

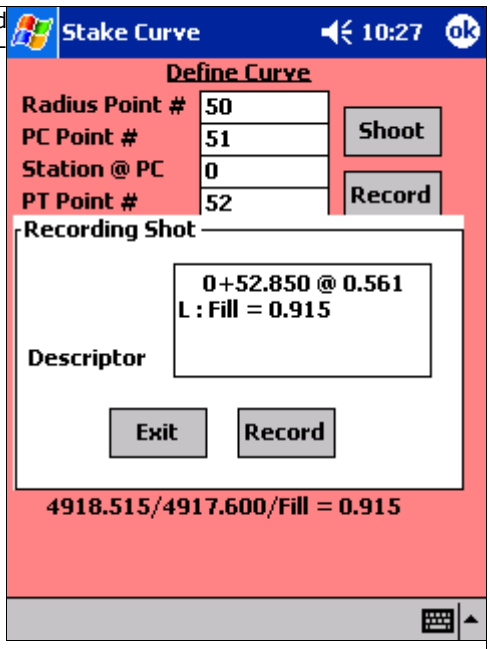


After the shot is taken, the station/offset and grade information for the shot is displayed.

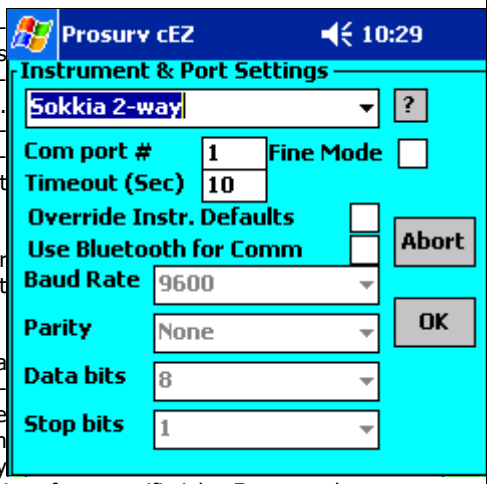
Tap **Record** to record the point.



The Station/Offset and Cut/Fill is shown automatically.



Communication and Instrument Settings



Most of your communication and port settings are pre-set in your ProsurvCE_Defaults.txt file. Defaults such as Instrument, Com port, and Bluetooth are found in that file.

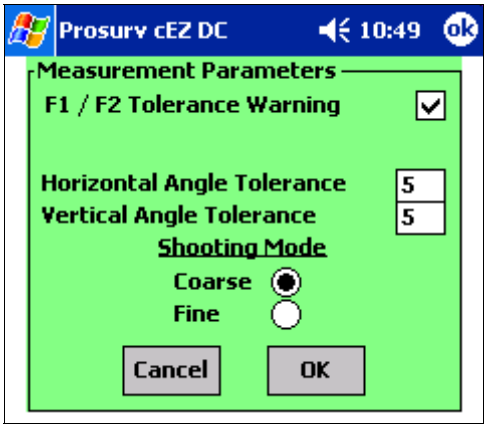
See Appendix B for more information about your default settings.

Each time you create a new job, your default settings are used to define the instrument and com port. However, you may need to change these settings for a specific job. For example, you may get to a job site where the contractor is using a Nikon, rather than a Sokkia which you would normally use. You can select Nikon from the pull-down menu. Then, when you close the job (by opening a different job or creating a new job), Prosurv cEZ will store the Nikon as your instrument ***for that job***.

The instrument selection itself determines the com port parameters that will be used for that instrument (by using manufacturer's defaults). For example, **Sokkia 2-way** uses 1200 baud, no parity, 8 data bits, and 1 stop bit. However, you can override these instrument defaults by checking the **"Override Instr. Defaults"** box. Then, you can select from the com port parameters pull-downs. Tap **OK** to store the changes. The port will then be closed and opened with the new parameters.

If you are using a **Bluetooth** solution for wireless communication to your instrument, you must check the **"Use Bluetooth"** box. Bluetooth may require a minimum baud rate of 2400, and Prosurv cEZ will override the instrument defaults with 2400 baud. **Therefore,** be sure to use a matching baud rate in your instrument.

Parameters



The Parameters screen let's you set the following parameters:

- F1/F2 Tolerance Warning On/Off
- Your Horizontal Angle Tolerance*
- Your Vertical Angle Tolerance*
- Shooting mode Coarse or Fine if supported by your instrument*

*These parameters can be set by default in your ProsurvCE_Defaults.txt file. See Appendix B for more information.

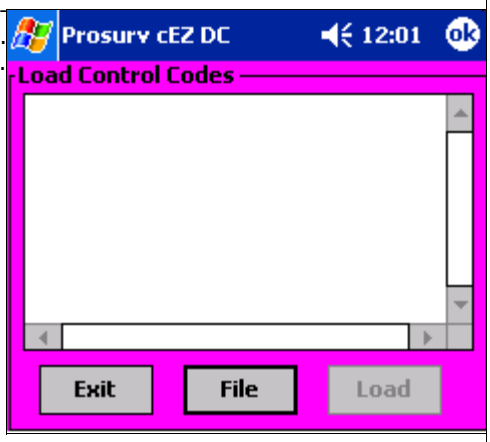
Load Control Codes From File

Control Codes are codes that tell drafting software when to begin a line, end a line, put a curve etc... Control codes are loaded from any comma-delimited text file (created by Notepad, or even in Word on your CE device). An example Control Code list is shown below:

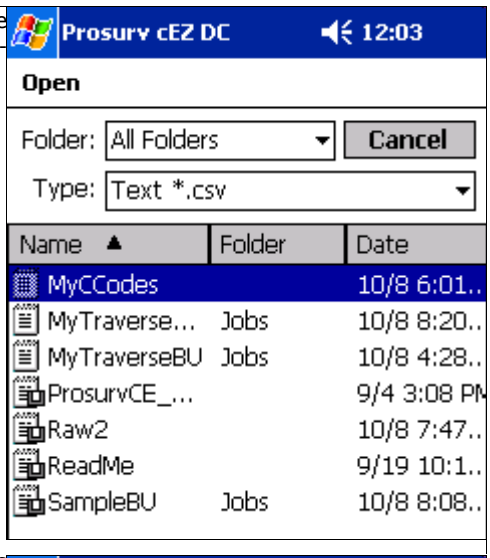
- **BL*,Begin a line**
- **CF*,Curve fit**
- **CL*,Close figure**
- **EL*,End a line**
- **OC*,Point on curve**

There are only two fields in the list. The first field is the actual control code itself. The second field is a description of the code. The text file **must** contain both fields and be separated by a comma. The list should be in alphabetical order prior to loading.

First, tap the **File** button to view the available .txt files on your Pocket PC.

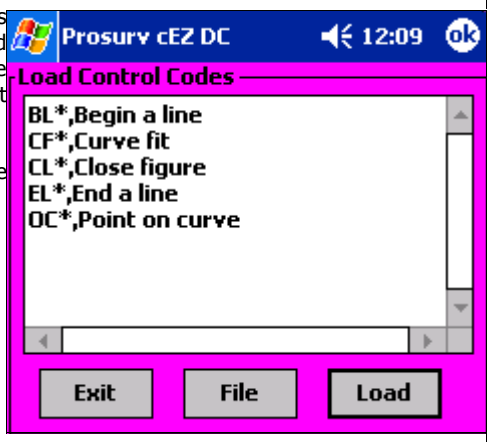


Then, tap the File to be loaded as your new Control Codes.

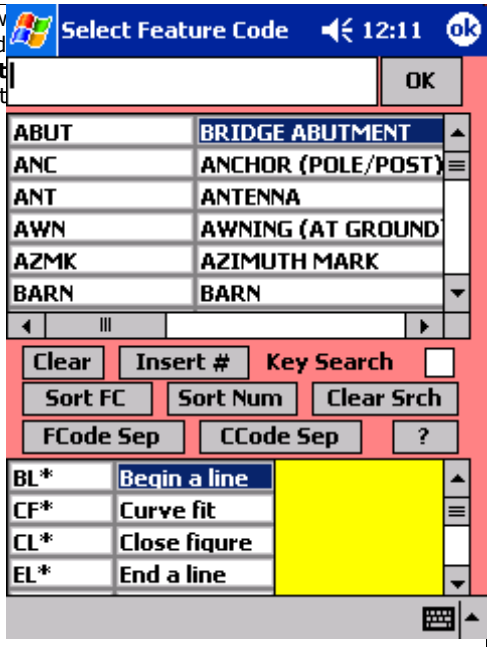


Text from the file is displayed before you load the new codes, to be sure that you have the correct file.

Tap **Load** to load the new control code list.



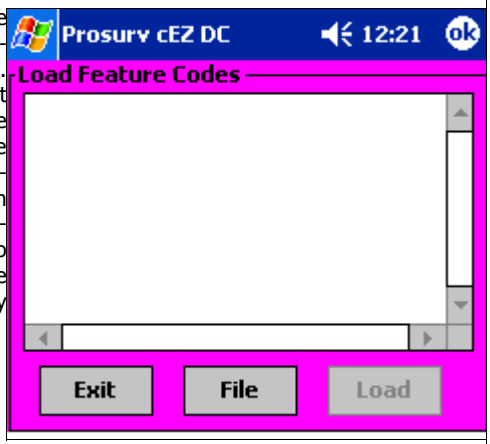
You can see the new list has been loaded and appears in the **"Select Feature Code"** list (at the bottom).



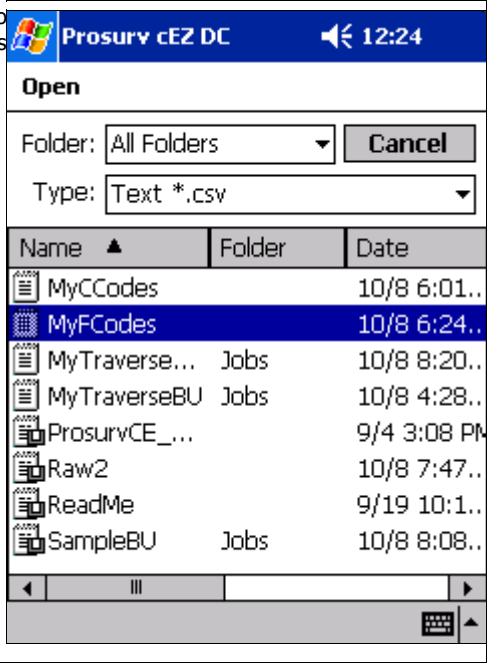
By being able to load different files, Prosurv cEZ makes it easy to switch between a list for your company and another list that's used for your State DOT jobs. When Prosurv cEZ reads the list, it stores it in the main program folder of the CE device. The name of the newly created file is Ccodes.ccf.

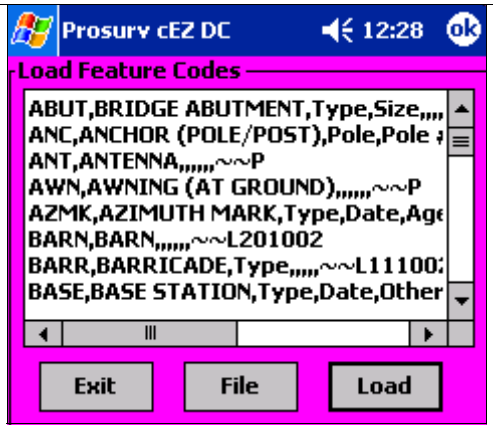
Load Feature Codes From Text File

Feature Codes are codes that help to automate the drafting process. If your CAD program is set up correctly (i.e. to use the description or feature code of each point to connect the dots), you can see a dramatic improvement in the time spent to draft a project. Feature codes are loaded from any comma-delimited text file.



Tap the **File** button to view all available text files on your Pocket PC.





Tap the **Load** button to load your new codes.

To create your very own feature code & attribute list, simply use a spreadsheet program such as Microsoft Excel and save the list as a comma-delimited text file (.csv in Excel).

- The **first column** in the spreadsheet must be the code itself.
- The **second column** should contain a description of the code.
- **Columns C through G (in the spreadsheet)** should contain the text that will prompt for an attribute for the feature code. You may ask for up to 5 attributes per code. If there's no attribute for a particular code, simply leave columns C through G blank.

Before saving the list, you should **alphabetize** it in Excel. You should also be sure that you do not save the row at the top of the list (i.e. row #1 above) since it is not truly part of the list. Then, just copy the file to your CE device.

Each line must have the code itself, followed by a description of the code, followed by up to five attribute questions. Regardless of how many questions there are for a particular code, there must always be six commas on each line.

By being able to load different files, Prosurv CE makes it easy to switch between a list for your company and another list that's used for your State DOT jobs. When Prosurv CE reads the list, it stores it in the program folder of your CE device. The name of the newly created file is Fcodes.fcf.

The list may now include Point/Line, Line weight, and Line color information. These parameters are used by the Auto-draw* routine when drawing the linework. When making your own FC list, simply enter the information as follows:

Code,Description of code,Q1,Q2,Q3,Q4,Q5,~~P20

Where Q stands for an attribute question, followed by two tildes, then a P representing a Point Code, or an L representing a Line Code. The 2 indicates a line 2 pixels wide, and the 0 indicates Black. You may enter colors from 0 to 9 (Black to White).

An example is shown below

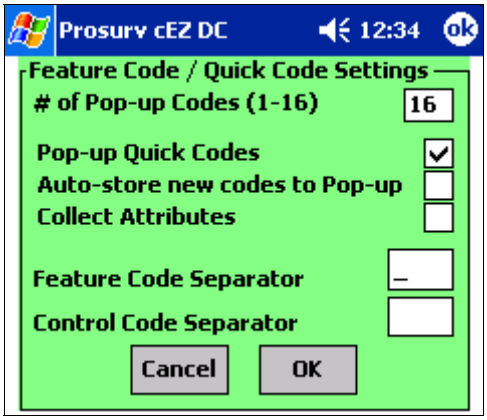
ELEC,UNDERGROUND ELECTRIC,Company,,,,,~~L11
EMH,ELECTRIC MANHOLE,Company,,,,,~~P
EMTR,ELECTRIC METER,Company,,,,,~~P
EPED,ELECTRIC PEDESTAL,Company,Size,,,,~~P
EW,EDGE OF WATER,,,,,,~~P
FBW,BARBED WIRE FENCE,,,,,,~~L12
FCL,CHAIN LINK FENCE,,,,,,~~L11
ECC,ECENTRIC,,,,,,~~P
FDN,FOUNDATION,Type,,,,,~~L24

As shown above, the FDN code has a linecode of L24. The L indicates that this is a line (as opposed to P which indicates a point only). The first number (2) is the line thickness or weight, and the second number (4) is the COLOR of the line. Use the color chart below:

- **0 Black**
- **1 Red**
- **2 Green**
- **3 Yellow**
- **4 Blue**
- **5 Magenta**
- **6 Cyan**
- **7 White**

Auto-draw (automated linework) is not currently supported in Prosurv cEZ, but may be offered as an add-on module in a future release.

Quick Code Settings



Quick Code Settings include:

- Enter the # of Pop-Up Quick Codes (1—>16)
- Turn Quick Codes On/Off
- Automatically store newly entered codes to Pop-Up quick code list
- Collect Attributes (searches for and displays attribute questions if the feature code requires them)
- Character to use as your Feature Code separator*
- Character to use as your Control Code separator*

*User definable by default in the ProsurvCE_Defaults.txt file. See Appendix B for more information.

Edit the Quick Code List

The Pop-Up Quick Code list can be set by default in the ProsurvCE_Defaults.txt file. In the Pop-Up Quick Codes settings, you can select to have new codes be added to the top of the list, or to keep the same list all the time.

This routine lets you edit the Quick Code list.