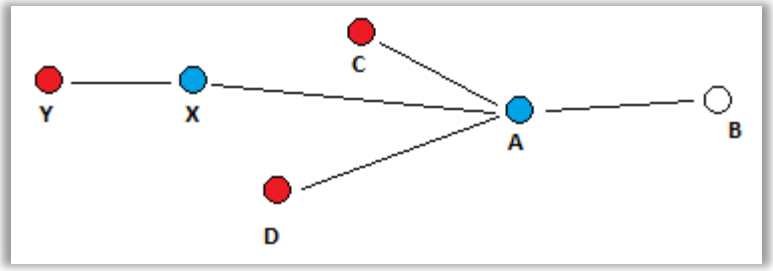
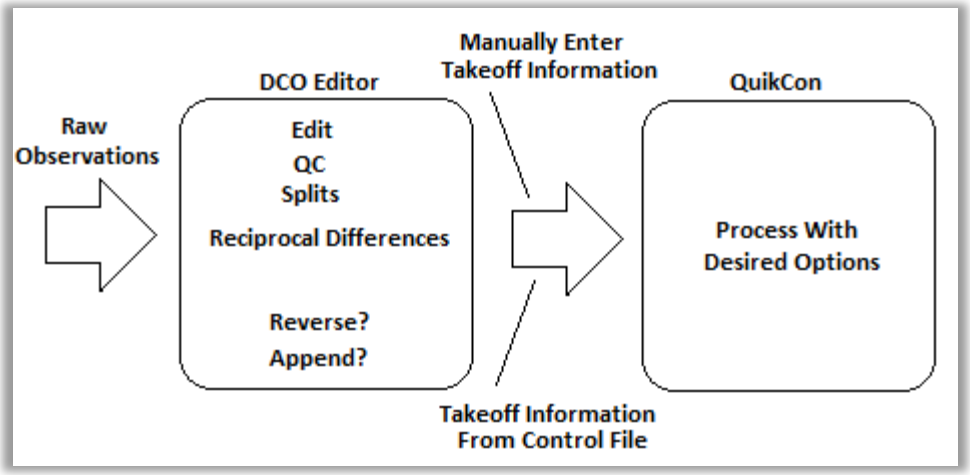
QuikCon Basic Processing Tutorial

QuikCon processing has not fundamentally changed since it was written in the late 1990's except for user interface items. What has continually changed is the library which makes up the DCO editor. We have continued to improve editing capabilities and to add additional raw observation import mechanisms.

QuikCon was originally written to accommodate a major geophysical company doing reciprocal surveys in the jungles of South America. Presently, it is used in South America, Africa, South East Asia, Indonesia, Mexico and several US locations.



In the traditional reciprocal survey, the surveyor set up on location, shoot sideshots (optionally), shoots a point to set up on (turnpoint), moves to the new setup point, backsights on the point he moved from, and then repeats the process. Backsights and turnpoints are normally shot twice, once with the scope flipped. This is called a face turn. For the purposes of this document, we will refer to the simple traverse shown here. The surveyor sets up on 'A', backsights 'B', shoots sideshots 'C' and 'D', then shoots turnpoint 'X'. He moves his equipment to 'X', backsights 'A', then shoots sideshot 'Y'.



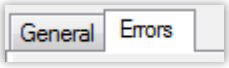
Before we start, let's look at the overall picture of what we are about to do. The first thing is to import your observations into the DCO editor. Here you can correct errors, compute splits and reciprocal, and otherwise prepare to make a QCN file. Then we save a file with the extension, QCN. When we save it, we must provide the coordinates and backsight azimuth for the very first takeoff point. The takeoff information comes from one of two sources: 1) Manually enter it, or 2) point to a file that has that information in it. The final step is to open the QCN file with QuikCon. The coordinates for the entire traverse are computed.

Importing The Raw Observations

PtId	PCOD	Horz	Zenith	Dist Slope	HiHr	SetupId	BsId
B	BS	000.0000	098.2140	52.787	1.48	A	B
B	BS	180.0003	261.3821	52.788	1.48	A	B
A	TO	000.0000	090.0000	0	1.527	A	B
C	RP	223.2433	096.0419	51.2	1.48	A	B
D	RP	173.5410	101.2741	65.2	1.48	A	B
X	FS	178.4036	070.3816	138.572	1.3	A	B
X	FS	358.5041	289.2147	138.571	1.3	A	B
A	BS	359.5958	109.1728	138.522	1.48	X	A
A	BS	180.0006	250.4236	138.522	1.48	X	A
X	IP	000.0000	090.0000	0	1.47	X	A
Y	RP	190.1254	116.1848	45.93	1.48	X	A

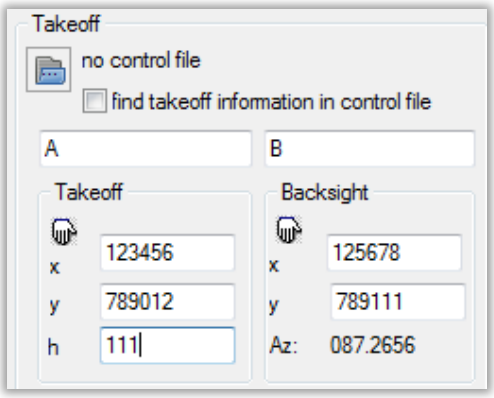
This is the tough part. We support many file types but in many cases the field procedures to obtain those files are as important as what type of instrument it came from. At this point, we can only say that if the import is successful, you will see something like this in the DCO Editor.

At this point you could make the QCN file assuming you provided the coordinates and backsight azimuth for takeoff point ‘A’. However, you will typically check the observations for error and compute splits first. The DCO Editor makes this very simple for you. To compute splits and reciprocal information, simply press  . You will see the split and reciprocal values appear on the right side of the spreadsheet.

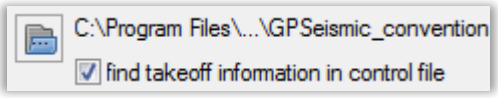


Next, you would display he ‘Errors’ tab page and press the buttons there. The DCO Editor will spot a many types of errors and categorize them for you. Finally, you will create the QCN file.

Supplying Takeoff Information



Manual Entry - Here you either enter the known coordinates and height for ‘A’ and the coordinates for ‘B’ or the known coordinates and height for ‘A’ and the know backsight azimuth to B. Either way works.



Using A QCC Control File - The other way is to assign the required information to the takeoff is to indicate on the DCO dialog that a QCC control file is to be used. You check the appropriate checkbox and then navigate to and then select the file to be used.

The control file must either have one record in it that indicates the coordinates and height for ‘A’ AND the backsight azimuth at that point…….

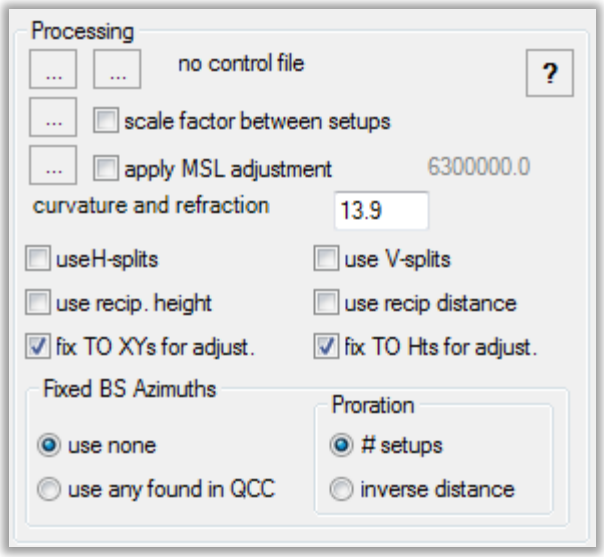
Fix XY	Fix H	Fix Az	Station	Easting	Northing	Height	Backsight Az	RO	Comment	Tag
☑	☑	☑	A	123456	789012	111	87.2656	B		☐

…or two records, one for ‘A’ and one for ‘B’. For A, the coordinates and height are required and for ‘B’, the coordinates:

Fix XY	Fix H	Fix Az	Station	Easting	Northing	Height	Backsight Az	RO	Comment	Tag
☑	☑	☐	A	123456	789012	111				☐
☑	☐	☐	B	125678	789111					☐

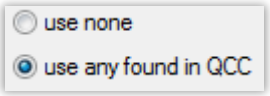
Note above the use of the checkboxes. You check on what information is to be used for that record.

Opening/Processing The QCN



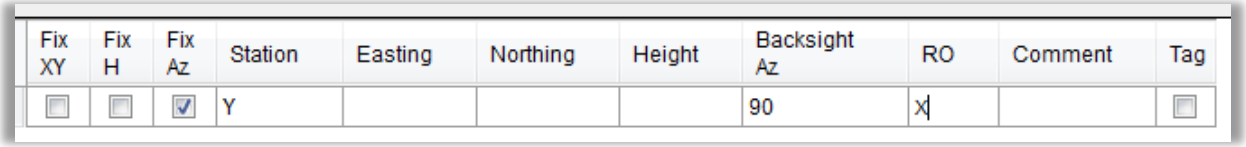
OK, now let’s say you make the QCN. Exit the DCO editor and open the QCN in QuikCon. When you do, the file is processed and it determines coordinates for all points. However, there are many options that you either used are didn’t use as the file was processed:

Scale factor and MSL adjustment don’t make large differences unless you are at significant altitude or at the extreme distance from your projection’s central meridian. A curvature and refraction value of 13.9 is fine for most situations. Using any reciprocal heights or distances is probably a good idea since in essence you are meaning reciprocal shot and face turn differences.



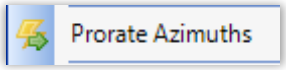
An option that can have a significant effect is whether to use a control file and fix backsight azimuths.

Let's say you went back to the field and did a sunshot at a bend so you know that from turnpoint point 'X' to turnpoint 'Y' is 90 degrees. You could make a control file with a record like this:



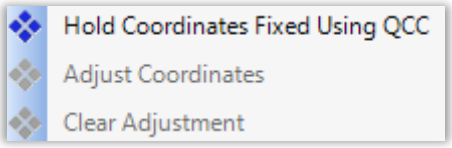
Fix XY	Fix H	Fix Az	Station	Easting	Northing	Height	Backsight Az	RO	Comment	Tag
☐	☐	☑	Y				90	X		☐

If you don't fix backsights, then when QuikCon computes the coordinates and backsight at 'X', it might come up with something else. Let's say 90.0010 (which is ninety degrees ten seconds in DD.MMSS). If you fix backsights, at each turn point, QuikCon looks at the control file and determines if there is a fixed backsight azimuth record for that turn point. If there is, it blows off the computed backsight angle and uses the one in the file. So the remaining part of the traverse is affected (by the ten second change if horizontal angle at 'X'). The difference between the computed and known is displayed in the spreadsheet (in this case ten seconds).



If you do fix azimuths, this option becomes enabled.

What this does is to take all azimuth differences and prorate them backwards into the traverse. It would determine how many setups there were between 'X' and the initial takeoff, divide the ten seconds by this, and then give each setup that amount of adjustment rather than just a single ten second adjustment at 'X'. Some of our clients do this and some don't. We believe it would actually produce more accurate coordinates for the points prior to the sunshot since all of the angular error up until setup 'X' is more likely the result of an accumulation of errors rather than a single error.



There is an optional final step. If, in the control file, you have the known coordinates for any points you shot in your traverse, you can elect to hold those coordinates fixed, then select 'Adjust Coordinates'. This action would have the effect of rubber sheeting all coordinates to best fit the points held fixed. Note that this is not a least squares adjustment, but rather adjusted coordinates are equivalent to the processed coordinates plus a weighted set of translation values.

In summary, the conventional data workflow can be as follows:

Import into DCO
Make QCN by providing takeoff information
Open/process w/no backsights held fixed

-or-

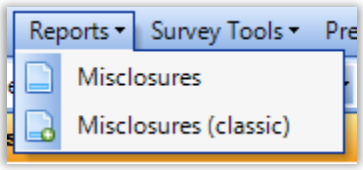
Import into DCO
Make QCN by providing takeoff information
Open/process w/backsights held fixed

-or-

Import into DCO
Make QCN by providing takeoff information
Open/process w/backsights held fixed
Prorate Azimuths

-or-

Import into DCO
Make QCN by providing takeoff information
Open/process w/backsights held fixed
Prorate Azimuths
Adjust coordinates



At any time after opening/processing a QCN you can generate a misclosure report. Misclosures also rely on a currently selected control file. If you have known coordinates for any processed point or you have a known backsight from any processed point, then you will get a summary of the coordinate misclosures and azimuth differences if there is a match on station name and you have checked the appropriate 'FixXY', 'FixH' and 'FixAz' checkboxes.