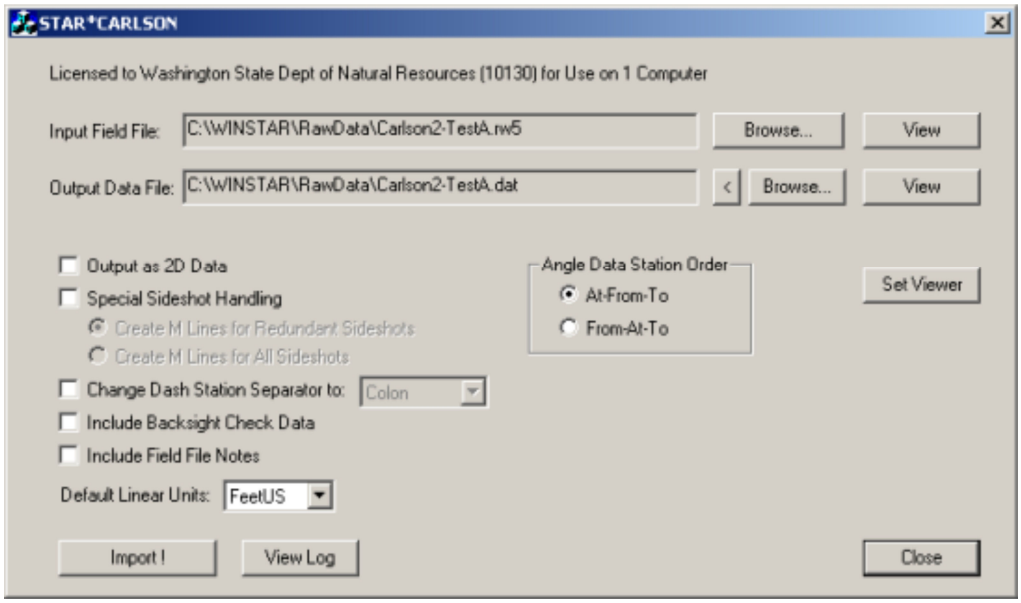
STAR*NET CONVERSION UTILTIES

STAR*CARLSON CONVERSION UTILITY

The STAR*CARLSON utility converts Carlson Software data collector files to STAR*NET data format. This updated utility handles most new collection sequences created by SurvCE V2.



Running the program is easy. First browse for the raw field file to convert, then browse for an output file (a new or existing file), set desired options and press the “Import” button. If errors or warnings are found, they are listed in a Log file - review by pressing “View Log” button. When errors are found, data will not be created in the output file. In this case, review the errors listed in the Log File, edit the raw field file to make necessary corrections and then re-import.

When browsing for the output file, you can press one of two buttons. The standard “Browse” button opens the output file dialog in the same directory as the raw field file and offers the same file name as the raw field file, but with a “dat” extension. Of course you can modify the offered name to whatever you wish to use. The smaller “<” button opens the output file dialog in the same directory already shown in the field to the left – useful when you’ve stored output in a different directory during the previous run, and you want to output to that directory again.

A “View” button, next to each of the input and output file fields, brings up an editor. So besides viewing a file, you can also edit it. By default, the editor assigned is Windows “Notepad”, but just as in the STAR*NET program, you can set an editor of your choice by pressing the “Set Viewer” button and browsing for the editor program you prefer.

Selecting Processing Options

- Output as 2D Data – By default, the STAR*NET data file will be created in a 3D output format. STAR*NET can handle 3D formatted data in both 2D and 3D adjustments. Since STAR*NET can internally reduce 3D data to 2D when need be, creating data in 3D format should be considered preferable since all original data remains intact and STAR*NET handles reductions rigorously using curved-earth geometry. However if you have localized projects that are 2D and prefer to have your data immediately converted to 2D format by applying a simple reduction of distance and zenith observations to horizontal distances, select this option.
- Special Sideshot Handling – By default, SS lines in the field file are converted to SS sideshot lines in the STAR*NET file created. Remember that SS lines in STAR*NET are handled as non-redundant shots that are automatically calculated after the adjustment is performed. This allows the processing of thousands of topo sideshots without slowing down the adjustment. To have sideshots handled differently, select this option and one of the two special handling methods below:

    1. Create M Lines for Redundant Sideshots – Causes a sideshot SS to be output as an M line if the target of

the sideshot has the same name as any other foresight point, backsight point or occupied point in the file. This assures that the observation will be included as a redundant observation in the STAR*NET adjustment. Recommended option for most conversions.

2. Create M Lines for All Sideshots – Causes all sideshot SS lines to be output as M lines. Good for small networks when you want all sideshots included in the actual network adjustment.

Note that when backsight and foresight names in a SS line are the same, a DV line is always output. The assumption is that you are taking a measurement to your backsight.

- Change Dash Station Separator to – By default, the dash (e.g. 121-120-122) is used for station name separators. If some of your station names already contain dashes and you wish to keep them, this option allows you to change the separator to some other character.
- Include Backsight Check Data – In this importer utility, "backsight check data" is defined as single-faced or double-faced backsight data (BD or BD/BR records) that are sandwiched alone between two occupy (OC) lines. No foresight records are in this data. By default, these backsight observations are not included since they are considered "check shots" that may contain erroneous data, but will be included if this option is selected.
- Include Field File Notes – Causes field file comment lines (those lines in the rw5 file that are lines prefixed with "--" dash characters) to be included in the output data file.
- Default Linear Units – A "Mode" line existing in most Carlson files defines the linear units. Some older Carlson files do not include a "Mode" line. So here you can specify default units that will be assigned whenever the Mode line is missing.
- Angle Data Station Order – This is simply an output preference. Some surveyors prefer to see angular observations shown as At-From-To, others as From-At-To.

General Notes on Input and Output

- The program assumes field files have "rw5" extensions. If you have a file with a different extension, choose "All Files (*.*)" from the "File of type" field in the file selection dialog and then select the file you wish to convert from the complete list.
- In the raw field file, blank lines and lines beginning with the "#" character are ignored. You can edit the raw file and prefix any line with a "#" character rather that deleting the line. Or you can add your own notes to the collected file by beginning each line with a "#" character.
- The Program supports ".DATA ON" and ".DATA OFF" inline options just like in several other Starplus Software programs. To cause selected parts of the raw field file to be ignored, insert a ".DATA OFF" line beginning at the place you want data to start being ignored and then a ".DATA ON" where you want data to be again converted.
- Stored Points found in the field file are copied into the data file as comments. To use one of these points as a control point in STAR*NET data, simply uncomment the data line and edit-in the appropriate fixity codes. Example: C 25 10000.000 10000.000 500.000 ! ! !
- Note that at the beginning of a STAR*NET data file created by this utility program, several inline option lines are listed. For example:

```
.Units  FeetUS
.Units  DMS
.Order  AtFromTo
.Sep    -
.3D
```

Some of these inline options define information such as linear or angular units defined in the field file header data or set by options in the converter dialog. These inline options precede data they define making it possible to combine data files having different characteristics in a single STAR*NET project.

- An entire data file created by this utility can be added to a STAR*NET project using the "Input Data Files" dialog

(see the STAR*NET manual), or using a text editor you can copy and paste all or parts of the file contents into a data file that already exists as part of a STAR*NET project.

- The “Log File” is always created during a run. It lists any errors, warnings or notes produced during the run and references actual line numbers in the field file. This file has the same name as the input field file but with a “log” extension and is always created in the same directory as the input file. Review it by pressing the “View Log” button.

  When errors are reported, an output data file is not created and you should review the log file so you can correct errors and rerun. When only warnings or notes are reported, an output data file is created, but it is still always important to review any warning messages in the log file to determine the reason they were reported. Notes, when posted, are only informational. For example, when the first BK (backsight) line in a field file contains a non-zero azimuth, it is posted as a note in the log file in case the user wants to use this information in some fashion.

How the Program Processes the Field File

The conversion utility reads a complete field file into memory, verifying the syntax of all data codes and values, and organizing all data in sequence by type. If errors are found in syntax or numerical data fields, no data conversion is performed and errors are written to the log file.

When the converter parses raw data lines, it checks to assure the code beginning each data line (eg. JB, SP, BK, LS, OC, SS, BD, FD, etc.) is one of the codes in Carlson’s code set documented at the time this converter version was released. If not, the data line is ignored.

If the data from the field file appears OK, the output is created based on the processing options you selected. Since all data from a field file is organized in memory, checking requirements for processing certain options are very efficient. For example, checking a sideshot to see if the target is redundant is determined by checking all other targets, backsights and points occupied.

Using a Slash “/” Code in the Descriptor to Automatically Rename a Point

When re-observing a point in the field in the field, some surveyors enter a fake name such as “9999” so they can compare the resulting coordinates in the instrument to the currently stored coordinates by inversing the two points. But of course, if this data is used in an adjustment, the real point name must always be used in STAR*NET observation data.

To cause the real name to be automatically output during conversion, you can do the following in the field: Enter a slash “/” as the first character of the descriptor and follow it directly by the actual point name you want to appear in the STAR*NET data. You can optionally follow that point name by a space and add the descriptor text.

Example raw data line with point name 9999 and the “/” command to change it to 4567:

```
SS,OP210,FP9999,AR317.0432,ZE98.2710,SD59.582886,--/4567 CURB EDGE
```

Resulting data file in STAR*NET format with 4567 used as the target name:

```
SS 210-209-4567  317-04-30.00  59.582  98-27-10.00  5.390/7.000 'CURB EDGE
```

Note that the change to the specified target name it is a simple and immediate substitution as the raw data is being read by the converter. This renaming feature can be used with any observation type including “Sets” of observations.

Example Input Field File #1 – Carlson2-TestA.rw5

The following file is a short segment illustrating traditional “set collection” using the same collection set method that existed in SurvCE V1 and also exists in SurvCE V2.

```
JB,NM08001JA,DT06-17-2008,TM09:56:21
MO,AD0,UN2,SF1.00000000,EC0,EO0.0,AU0
--SurvCE Version 2.02
--Equipment: Leica TPS Series (Direct)
SP,PN661,N 212401.8750,E 1313781.4710,EL100.0000,--520
SP,PN133,N 212386.4150,E 1314523.1140,EL100.0000,--520
--Set Collection with Obs Order 123...321...
OC,OP661,N 212401.87500,E 1313781.47100,EL100.000,--520
LS,HI5.4900,HR5.4800
BD,OP661,FP133,AR0.0001,ZE87.5755,SD742.282000,--520
LS,HI5.4900,HR5.9200
FD,OP661,FP2521,AR270.0019,ZE92.4730,SD470.480000,--520
FR,OP661,FP2521,AR90.0020,ZE267.1238,SD470.480000,--520
LS,HI5.4900,HR5.4800
BR,OP661,FP133,AR180.0000,ZE272.0207,SD742.281000,--520
LS,HI5.4900,HR5.4800
BD,OP661,FP133,AR359.5956,ZE87.5759,SD742.281000,--520
LS,HI5.4900,HR5.9200
FD,OP661,FP2521,AR270.0014,ZE92.4729,SD470.481000,--520
FR,OP661,FP2521,AR90.0021,ZE267.1234,SD470.480000,--520
LS,HI5.4900,HR5.4800
BR,OP661,FP133,AR179.5958,ZE272.0208,SD742.281000,--520
```

Output File - Carlson2-TestA.dat

This is the resulting “dat” file created using the processing options shown on the first page. Using this “traditional” collection method, every backsight and foresight observation set has been actually observed and is unique. (An alternate-style “set collection” method now exists in Carlson SurvCE V2 which is illustrated in the example on the next page. For this alternate style, only a single backsight pair is actually observed for multiple foresights pairs.)

```
# STAR*CARLSON Version 7.2.2
# Copyright 2012 MicroSurvey Software Inc.

# Input Field File : C:\RawData\Carlson2-TestA.rw5
# Date Processed   : 08-06-2009 16:31:38

.Units  FeetUS
.Units  DMS
.Order  AtFromTo
.Sep    -
.3D

# C  661               212401.87500 1313781.47100   100.00000 '520
# C  133               212386.41500 1314523.11400   100.00000 '520


# Job  : 08001JA
# Date : 06-17-2008
# Time : 09:56:21

.Delta  Off
DV 661-133                          742.2815  87-57-54.00   5.490/5.480 '520
M  661-133-2521      270-00-19.00   470.4800  92-47-26.00   5.490/5.920 '520
DV 661-133                          742.2810  87-57-55.50   5.490/5.480 '520
M  661-133-2521      270-00-20.50   470.4805  92-47-27.50   5.490/5.920 '520
```

Example Input Field File #2 – Carlson2-TestB.rw5

The following file contains examples of two new collection methods: The first segment illustrates what Carlson still calls “Set Collection” but with this alternate-style collection, a backsight direct and reverse pair is observed only once even though “appearing” to be collected for each repeat! The second segment illustrates a new collection method called “D/R on the Fly.” See further notes regarding both new collection methods with the example data created on next page.

```
JB,NMTEST,DT03-24-2009,TM13:45:34
MO,AD0,UN2,SF1.00000000,EC0,EO0.0,AU0
--Leica SurvCE Version 2.05
--Equipment: Leica Robotic Total Station
SP,PN1,N 5000.0000,E 5000.0000,EL100.0000,--START
OC,OP1,N 5000.00000,E 5000.00000,EL100.000,--START
LS,HI5.0000,HR5.0000
BK,OP1,BP2,BS0.0000,BC0.0000
--Backsight by Azimuth
BD,OP1,FP2,AR0.00000,ZE83.09380,SD10.427670,--
BR,OP1,FP2,AR180.00010,ZE276.50260,SD10.427214,--
--SS,OP1,FP2,AR0.00000,ZE83.09360,SD10.427342,--X
--Calculated: AR0°00'00"
--Measured: AR0°00'00"
--Delta: AR0°00'00"

#Example "Alternate-Style Set Collection Sequence"
--Set Collection with Obs Order 112233...
OC,OP1,N 5000.00000,E 5000.00000,EL100.000,--START
LS,HI5.0000,HR5.0000
BK,OP1,BP2,BS0.0000,BC0.0000
BD,OP1,FP2,AR0.0000,ZE83.0931,SD10.427998,--
FD,OP1,FP3,AR73.0028,ZE87.2045,SD9.595005,--
BR,OP1,FP2,AR180.0003,ZE276.5028,SD10.426686,--
FR,OP1,FP3,AR253.0027,ZE272.3913,SD9.594349,--
--SS,OP1,FP2,AR0.0000,ZE83.0932,SD10.427342,--
--SS,OP1,FP3,AR73.0026,ZE87.2046,SD9.594677,--
BD,OP1,FP2,AR0.0000,ZE83.0931,SD10.427998,--
FD,OP1,FP4,AR88.3809,ZE95.5313,SD8.206902,--
BR,OP1,FP2,AR180.0003,ZE276.5028,SD10.426686,--
FR,OP1,FP4,AR268.3806,ZE264.0648,SD8.204278,--
--SS,OP1,FP2,AR0.0000,ZE83.0932,SD10.427342,--
--SS,OP1,FP4,AR88.3806,ZE95.5312,SD8.205590,--
BD,OP1,FP2,AR0.0000,ZE83.0931,SD10.427998,--
FD,OP1,FP5,AR303.0506,ZE88.2410,SD11.032648,--
BR,OP1,FP2,AR180.0003,ZE276.5028,SD10.426686,--
FR,OP1,FP5,AR123.0508,ZE271.3546,SD11.030680,--
--SS,OP1,FP2,AR0.0000,ZE83.0932,SD10.427342,--
--SS,OP1,FP5,AR303.0506,ZE88.2412,SD11.031664,--

#Example "D/R on the Fly" Collection Sequence"
OC,OP1,N 5000.00000,E 5000.00000,EL100.000,--START
LS,HI5.0000,HR5.0000
BK,OP1,BP2,BS0.0000,BC0.0000
BD,OP1,FP2,AR0.00000,ZE83.08340,SD10.428655,--XMARK
BR,OP1,FP2,AR180.00020,ZE276.51270,SD10.425702,--XMARK
--SS,OP1,FP2,AR0.00000,ZE83.08330,SD10.427178,--XMARK
--Calculated: AR0°00'00", HD10.353, Z101.242
--Measured: AR0°00'00", HD10.353, Z101.245
--Delta: AR0°00'00", HD-0.001, Z0.003
FD,OP1,FP6,AR72.22050,ZE87.20580,SD9.594349,--XMARK 3
FR,OP1,FP6,AR252.22040,ZE272.38520,SD9.591396,--XMARK 3
--SS,OP1,FP6,AR72.22040,ZE87.21030,SD9.592873,--XMARK 3
FD,OP1,FP7,AR88.01450,ZE95.50490,SD8.203950,--XMARK 4
FR,OP1,FP7,AR268.01460,ZE264.09140,SD8.202309,--XMARK 4
--SS,OP1,FP7,AR88.01450,ZE95.50470,SD8.203129,--XMARK 4
SS,OP1,FP8,AR302.2619,ZE88.2551,SD11.029039,--XMARK 5
SS,OP1,FP9,AR72.2023,ZE87.2112,SD9.596974,--XMARK 3
FD,OP1,FP10,AR302.26460,ZE88.23470,SD11.033304,--XMARK 5
FR,OP1,FP10,AR122.26490,ZE271.36140,SD11.031008,--XMARK 5
```

Output File - Carlson2-TestB.dat

This is the resulting “dat” file created using the processing options shown on the first page.

```
# STAR*CARLSON Version 7.2.2
# Copyright 2012 MicroSurvey Software Inc.

# Input Field File : C:\RawData\Carlson2-TestB.rw5
# Date Processed   : 08-06-2009 16:35:49

.Units  FeetUS
.Units  DMS
.Order  AtFromTo
.Sep    -
.3D

# C  1                    5000.00000    5000.00000   100.00000 'START

# Job  : TEST
# Date : 03-24-2009
# Time : 13:45:34

.Delta  Off
DV 1-2                                 10.4273  83-09-31.50   5.000/5.000
M  1-2-3              73-00-26.00       9.5947  87-20-46.00   5.000/5.000
M  1-2-4              88-38-06.00       8.2056  95-53-12.50   5.000/5.000
M  1-2-5             303-05-05.50      11.0317  88-24-12.00   5.000/5.000
DV 1-2                                 10.4272  83-08-33.50   5.000/5.000 'XMARK
M  1-2-6              72-22-03.50       9.5929  87-21-03.00   5.000/5.000 'XMARK 3
M  1-2-7              88-01-44.50       8.2031  95-50-47.50   5.000/5.000 'XMARK 4
SS 1-2-8             302-26-19.00      11.0290  88-25-51.00   5.000/5.000 'XMARK 5
SS 1-2-9              72-20-23.00       9.5970  87-21-12.00   5.000/5.000 'XMARK 3
M  1-2-10            302-26-46.50      11.0322  88-23-46.50   5.000/5.000 'XMARK 5
```

The “dat” file shown above was converted from the “rw5” field file shown on the previous page. And as already mentioned, this “rw5” field files illustrates new field collection procedures.

1. The first part of the file, a single “DV” line followed directly by three “M’Lines, were created from what we call Carlson’s new alternate-style” set collection sequence. In this sequence, only one set of backsight direct and reverse observations are created from multiple backsight direct and reverse pairs shown. Why just one set? Because the direct and reverse observations for all the backsights repeats are 100% identical, meaning they are simply copies of the first set - not actual observations! (The utility goes thorough a “comparison process” to determine whether repeated backsight observations are identical to those of the first backsight, or not.) Therefore the single DV data line created in this data section represents the true backsight observation, not one of the repeated backsight observations just “copied” into the rw5 file!

   Note that if the “Include Backsight Check Data” option had been selected for this conversion, another “DV” line would have appeared at the beginning of this data file representing the “backsight check” data sequence shown as the first section in the field file.

2. The last part of the data file is created from the new “D/R on the Fly” collection sequence. The surveyor can occupy, do a single backsight direct and reverse (or alternately just a single backsight direct) and then take multiple foresight direct and reverse shots. While observing these foresights, the surveyor can also mix in single-face sideshots. This new collection scheme is straight forward and appears to be a popular addition to SurvCE V2.

Additional Inline Option Available - Using the “.EDM VALUE” Inline Option

The “.EDM” inline option allows the user to add a correction to slope distances. This correction value may be positive or negative. The reason for this option is to provide a convenient way for a user to repair distances in a field file that were corrupted because an incorrect EDM constant value was entered in the field instrument. We understand there was no easy way to regenerate an RW5 file corrected for an erroneous EDM constant entered in the field using SurvCE V1. This

option was developed for the original StarCarlson V1 utility and has been simply included in this new version in case it is still relevant.

Note the value you enter here is not necessarily the actual EDM constant, but it is some value that that you must determine on your own that will “fix-up” the incorrect distances in the field file.

The “.EDM” inline value affects all following slope distances until the value is changed or the option is turned off by entering the “.EDM” inline without a value. The example below illustrates turning on the option to add 0.02 to every slope distance and then later turning the option off.

```
.EDM 0.02 #adds 0.02 to every slope distance
LS,HR5.440000
BD,OP297,FP296,AR0.0002,ZE88.4834,SD413.424042,--60DNS
LS,HR5.250000
FD,OP297,FP299,AR169.5831,ZE91.2312,SD161.797577,--60DNS
FR,OP297,FP299,AR349.5833,ZE268.3653,SD161.796592,--60DNS
LS,HR5.440000
BR,OP297,FP296,AR179.5955,ZE271.1133,SD413.423386,--60DNS
.EDM #turns the correction off
LS,HI5.390000,HR13.400000
OC,OP297,N 1358079.13057,E 2121842.61238,EL1083.436,--60DNS
BK,OP297,BP296,BS58.5558,BC0.0002
SS,OP297,FP38999,AR333.1821,ZE90.2938,SD83.000162,--BL*BS113
etc...
```

If the field data is recorded in a “horizontal distance/vertical difference” format, the EDM option value will be proportioned to each by geometry. If the “Output as 2D Data” option is selected the, the EDM offset value is proportioned to the horizontal distance component output.