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# *SurvCE Raw Data File Format (*.rw5) – Version 3.03*



## *Introduction*

This document outlines the Carlson SurvCE RW5 format in detail. The format is a comma separated ASCII file containing record types, headers, recorded data and comments and is based on the RW5 raw data specification with the exception of angle sets. Angle sets are recorded as BD, BR, FD and FR records to allow reduction of all possible data that can be recorded by Carlson SurvCE using the "Set Collection" routine. Essentially, these records are identical to a Sideshot record.
With the exception of the aforementioned angle set records, if the RW5 specification is modified to provide enhanced functionality, the added or modified data will reside in comment records to avoid incompatibility with existing software.

## *Format Structure*

**FILE HEADER RECORDS**

**Job Record**
Record type: JB
Field headers:

| | |
|---|---|
| NM | Job Name |
| DT | Date |
| TM | Time |

Sample(s):
JB,NMSAMPLE,DT06-27-2003,TM14:21:53

**Mode Setup Record**
The mode setup will be recorded at the beginning of the raw data file.
Record type: MO
Field headers:

| | |
|---|---|
| AD | Azimuth Direction ( 0 for North, 1 for South) |
| UN | Distance Unit (0 for feet, 1 for meter) |
| SF | Scale Factor |
| EC | Earth Curvature (0 for off, 1 for on) |
| EO | EDM Offset (inch) |
| AU | |

Sample(s):
MO,AD0,UN0,SF1.00000000,EC1,EO0.0,AU0

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## MISCELANEOUS RECORDS

**Line of Sight Record**
Record type: LS
Field headers:

| | |
|---|---|
| HI | Height of Instrument |
| HR | Height of Rod |

*GPS heights always to be recorded to phase center
Sample(s):

```
LS,HI5.000000,HR6.000000
LS,HR4.000000
```

**Store Point Record**
Record type: SP
Field headers:

| | |
|---|---|
| PN | Point Name |
| N | Northing |
| E | Easting |
| EL | Elevation |
| -- | Note |

Sample(s):

```
SP,PN100,N 5002.0000,E 5000.0000,EL100.0000,--PP
```

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## TOTAL STATION RECORDS

**Occupy Record**
Record type: OC
Field headers:
- OP Occupy Point
- N Northing (the header is N space)
- E Easting (the header is E space)
- EL Elevation
- -- Note

Sample(s):
OC,OP1,N 5000.00000,E 5000.00000,EL100.000,--CP

**Backsight Record**
Record type: BK
Field headers:
- OP Occupy Point
- BP Back Point
- BS Backsight
- BC Back Circle

Sample(s):
BK,OP1,BP2,BS315.0000,BC0.0044

**Traverse / Sideshot Record / Backsight Direct / Backsight Reverse / Foresight Direct / Foresight Reverse**
Record type: TR / SS / BD / BR / FD / FR
Field headers:
- OP Occupy Point
- FP Foresight Point

(one of the following)
- AZ Azimuth
- BR Bearing
- AR Angle-Right
- AL Angle-Left
- DR Deflection-Right
- DL Deflection-Left

(one of the following)
- ZE Zenith
- VA Vertical angle
- CE Change Elevation

(one of the following)
- SD Slope Distance
- HD Horizontal Distance
- -- Note

Sample(s):
TR,OP1,FP4,AR90.3333,ZE90.3333,SD25.550000,--CP
SS,OP1,FP2,AR0.0044,ZE86.0133,SD10.313750,--CP
BD,OP1,FP2,AR0.0055,ZE86.0126,SD10.320000,--CP
BR,OP1,FP2,AR180.0037,ZE273.5826,SD10.315000,--CP
FD,OP1,FP3,AR57.1630,ZE89.4305,SD7.393000,--CP
FR,OP1,FP3,AR237.1612,ZE270.1548,SD7.395000,--CP

**Off Center Shot Record**
Record type: OF
Field headers:
- AR Angle right
- ZE Zenith (actual)

SD Slope Distance

Sample(s):

OF,AR90.3333,ZE90.0000,SD25.550000
OF,ZE90.3333,--Vert Angle Offset

## GNSS OBSERVATION RECORDS

**Base Position**
Record type: BP
Field headers:

- PN Point Name
- LA Latitude (WGS84, negative for South)
- LN Longitude (WGS84, negative for West)
- EL Ellipsoid Height (meters, located at APC or ARP as defined in AT field header)
- AG Antenna distance from ARP (bottom of antenna) to Ground
- PA Phase Center to ARP (meters, corresponding to Antenna L1 offset)
- AT Antenna position where EL (Ellipsoid Height field above) is recorded.
  Options are:
  - APC Antenna Phase Center (L1)
  - ARP Antenna Reference Point (Bottom of Antenna Mount)
  - UNK Unknown
- SR Indicates the source of the Base Position fields: LA / LN/ EL
  Options are:
  - BASE Collected by Base Setup
  - ROVER Broadcasted and collected by Rover
- -- Note

Sample(s):
BP,PN001,LA40.364883159071,LN-3.420590114521,EL765.6980,AG1.000,PA0.084,ATARP,SRROVER,--

**GNSS Position**
Record type: GPS
Field headers:

- PN Point Name
- LA Latitude (WGS84, negative for South)
- LN Longitude (WGS84, negative for West)
- EL Ellipsoid Height (meters) *
- -- Note

*GPS heights always to be recorded to phase center

Sample(s):
GPS,PN701,LA42.214630920,LN-71.081409184,EL-21.8459,--CP /Brass Disk

**GNSS Vector**
Record type: G0 / G1 / G2 / G3 / G4

- G0 - Date, time, Base ID
- G1 - Base point number, Rover point number, Delta X, Delta Y, Delta Z
- G2 - Variance X, Variance Y, Variance Z
- G3 - Covariance XY, Covariance XZ, Covariance YZ
- G4 – Antenna point in Base, Antenna point in Rover

Field headers:

- BP Base Point Name
- PN Rover Point Name
- DX Geocentric delta X vector Base to Rover
- DY Geocentric delta Y vector Base to Rover
- DZ Geocentric delta Z vector Base to Rover
- VX Variance X
- VY Variance Y
- VZ Variance Z
- XY Covariance XY
- XZ Covariance XZ
- YZ Covariance YZ

BV Antenna position for vector in Base

RV Antenna position for vector in Rover

Options for antenna position are:

APC Antenna Phase Center (L1)

ARP Antenna Reference Point (Bottom of Antenna Mount)

UNK Unknown

Sample(s):

```
G0,2013/12/06 15:44:50,(Average) - Base ID read at rover: 0
G1,BP0,PN3,DX-3444.43582,DY-4918.56294,DZ3862.46787
G2,VX0.00013303,VY0.00008997,VZ0.00014449
G3,XY-0.00005549,XZ0.00010642,YZ-0.00005627
G4, BVARP,RVAPC
```

## Alphabetical Listing of Record Types

BD Backsight Direct
BK Backsight
BR Backsight Reverse
FD Foresight Direct
FR Foresight Reverse
GPS GPS Position in Lat(dd.mmss) Lon(dd.mmss - Negative for West) and WGS84 Ellipsoid Elv(meters)
JB Job
LS Line of Sight
MO Mode Setup
OC Occupy
OF Off Center Shot
SP Store Point
SS Side Shot
TR Traverse
-- Note Record

## Alphabetical Listing of Field Headers

AD Azimuth Direction ( 0 for North, 1 for South)
AG Vertical Distance from the bottom of the GNSS antenna (ARP) to the ground
AL Angle-Left
AR Angle-Right
AT GNSS Antenna point where the ellipsoidal height (EL) is referred. Options are: APC/ARP/UNK
AZ Azimuth
BC Back Circle
BP Back Point
BR Bearing (this field will be recorded as N123.4500W)
BS Backsight (when back point is not defined)
BV Antenna point where vector applies in Base. Options are: APC/ARP/UNK
CE Change Elevation
DL Deflection-Left
DR Deflection-Right
DT Local Date (MM-DD-YYYY)
E Easting (the header is E space)
EC Earth Curvature (0 for off, 1 for on)
EL Elevation (GPS value is ellipsoid elevation in meters)
EO EDM Offset
FE Foresight Elevation
FP Foresight Point
HD Horizontal Distance
HI Height of Instrument
HR Height of Rod
LA Latitude
LN Longitude
N Northing (the header is N space)
OC Occupy
OP Occupy Point
PA GNSS antenna distance from the bottom of the antenna (ARP) to L1 Phase Center (APC)
PN Point Name
RV Antenna point where vector applies in Rover. Options are: APC/ARP/UNK
SD Slope Distance
SR Indicates the source of the Base Position record. Options are BASE/ROVER
SF Scale Factor
TM Local Time (HH:MM:SS)
UN Distance Unit (0 for feet, 1 for meter, 2 for US feet)

VA Vertical Angle
ZE Zenith