A Guide to GPS Observations in the RAW File:

- Open the RAW file in a text editor to view its contents
- To learn about how to export certain attributes from the file, review this Video

Each Typical GPS Observation begins with a few comments on the GNSS statistics, and ends with a GS record:

```
--GNSS Statistics RT: Obs=10,Solution=RTK
Fixed,PDOPMax=2.87,SVMin=11,StdDevH=0.004m,StdDevV=0.007m,RefID=0000,RefLat=N0°11'41.55532",RefLon=E32°33'10.30849",RefHgt=1136.719m,RefFormat=CMR,MountPoint=
--GNSS Statistics PP: Not Active
--PP Time: StartWeek=2012,StartSec=113821.0,StopWeek=2012,StopSec=113832.0
EP,TM07:37:12.0000,LA0.19528989136,LN32.55267565587,HT1134.3556,RN0.0029,RE0.0029,RV0.0074,DH1.0,DV2.7,GM4,CL1
BL,DCROVER,PN11300,DX10.9046,DY-17.8471,DZ45.7199,--RIB,GM4,CL1,HP0.003,VP0.007
CV,DCROVER,SV11,SC1,XX0.00041196000,XY0.00023360000,XZ0.00008994700,YY0.00018829000,YZ0.00005883400,ZZ0.00004622200
GS,PN11300,N 21586.0638,E 450223.7783,EL1147.4259,--RIB
```

--GNSS Statistics is a summary of the Real-Time and Post-Processed observations measured and stored

Real-Time GNSS Statistics

--GNSS Statistics **RT**: **Obs**=10,**Solution**=RTK
Fixed,**PDOPMax**=2.87,**SVMin**=11,**StdDevH**=0.004m,**StdDevV**=0.007m,**RefID**=0000,**RefLat**=N0°11'41.55532",**RefLon**=E32°33'10.30849",**RefHgt**=1136.719m,**RefFormat**=CMR,**MountPoint**=

Field Headers:

--: (two dashes always denotes a comment or description)

RT: Real Time

Obs: Observations (number of observations recorded)

Solution: Type of solution (Autonomous, DGPS, RTK Float, RTK Fixed)

PDOPMax: Max positional dilution of precision

SVMin: Minimum amount of satellite vehicles included in observation

StdDevH: Horizontal standard deviation (recorded in feet and metres)

StdDevV: Vertical standard deviation (recorded in feet and metres)

RefID: Reference station ID

RefLat: Reference station Latitude (recorded in DMS format)

RefLon: Reference station Longitude (recorded in decimal degrees format)

RefHgt: Height of reference station (in feet or metres)

RefFormat: Message type of reference station (RTCM, CMR)

MountPoint: Location of mountpoint

--GNSS Statistics **RT**: **Obs**=10,**Solution**=RTK
Fixed,**PDOPMax**=2.87,**SVMin**=11,**StdDevH**=0.004m,**StdDevV**=0.007m,**RefID**=0000,**RefLat**=N0°11'41.55532",**RefLon**=E32°33'10.30849",**RefHgt**=1136.719m,**RefFormat**=CMR,**MountPoint**=

Post Processed GNSS Statistics

--**PP Time**: **StartWeek**=2012,**StartSec**=113821.0,**StopWeek**=2012,**StopSec**=113832.0

Field Headers:

PP Time: Post Processing Time

StartWeek: Start Week of Post Processing (Recorded using GPS constellation)

StartSec: Start Second of Post Processing (recorded using GPS constellation)

StopWeek: Stop Week of Post Processing (recorded using GPS constellation)

StopSec: Stop Second of Post Processing (recorded using GPS constellation)

--**PP Time**: **StartWeek**=2012,**StartSec**=113821.0,**StopWeek**=2012,**StopSec**=113832.0

MicroSurvey

The EP record is a record of the GPS observation derived from satellites.

EP,**TM**07:37:12.0000,**LA**0.19528989136,**LN**32.55267565587,**HT**1134.3556,**RN**0.0029,**RE**0.0029,**RV**0.0074,**DH**1.0,**DV**2.7,**GM**4,**CL**1

Record Type: EP

Field Headers:

EP - Geodetic position (this is the position recorded as Latitude and Longitude)

TM: Time (in 24 hour format)

LA: Latitude (recorded in decimal degrees format)

LN: Longitude (recorded in decimal degrees format)

HT: Ellipsoid Height (In feet or meters)

RH: Horizontal RMS returned from receiver (Root Mean Square is an expression of how much the measurement has varied) *When using the Omnistar service, FieldGenius substitutes an **RN** and **RE** record for more detail. You must enable storing EP+ records in the FieldGenius GPS settings for this to take place.

RV: Vertical RMS returned from receiver

DH: HDOP (Horizontal Dilution of Precision, this is a measure of precision derived from the satellite geometry)

DV: VDOP (Vertical Dilution of Precision, this is a measure of precision derived from the satellite geometry)
*some receivers may not return HDOP and VDOP

GM: GPS Method (This describes the correction method, if any. Entry is a numeral, see below for the key)

CL: Classification (Always 1 in FieldGenius)

EP,**TM**07:37:12.0000,**LA**0.19528989136,**LN**32.55267565587,**HT**1134.3556,**RN**0.0029,**RE**0.0029,**RV**0.0074,**DH**1.0,**DV**2.7,**GM**4,**CL**1

The BL Record contains Information about the GPS “Baseline,” or the vector between the Reference and Rover. It is not reported by some GPS receivers and is read by Star*Net for least squares adjustments. STAR*NET will use DX, DY and DZ to compute a position, these records may be referred to as APC-APC or Mark-Mark depending on the receiver (refer to this Article)

BL,**DC**ROVER,**PN**11300,**DX**10.9046,**DY**-17.8471,**DZ**45.7199,--RIB,**GM**4,**CL**1,**HP**0.003,**VP**0.007

Record Type: BL

Field Headers:

BL: GPS Base Line

DC: Derivation (This will always be set to “Rover.”)

PN: Point Name (Alphanumeric point number or name that you have assigned to point)

DX: Base line Delta X (difference in meters or feet between reference and rover positions)

DY: Base line Delta Y (difference in meters or feet between reference and rover positions)

DZ: Base line Delta Z (difference in meters or feet between reference and rover positions)

GM: GPS Measure Method (See Key below for an explanation)

CL: Classification (Always 1 in FieldGenius)

HP: Horizontal Precision (Entry is in feet or meters, it is derived from satellite geometry and “noise” detected)

VP: Vertical Precision (Entry is in feet or meters, it is derived from satellite geometry and “noise” detected)

BL,**DC**ROVER,**PN**11300,**DX**10.9046,**DY**-17.8471,**DZ**45.7199,--RIB,**GM**4,**CL**1,**HP**0.003,**VP**0.007

Example of imported BL Star*Net vector)

G1 RefID0000_112-11300 10.904600 -17.847100 45.719900 2.136/2.086

***Note**
For more information regarding Star*Nets BL record refer to this Article

The CV Record Reports RMS Covariance of the GPS Position. It is not reported by some GPS receivers. This will be read by STAR*NET and used to weight the vectors.

CV,DCROVER,**SV**11,**SC**1,**XX**0.00041196000,**XY**0.00023360000,**XZ**0.00008994700,**YY**0.00018829000,**YZ**0.00005883400,**ZZ**0.00004622200

Record Type: CV

Field headers:

CV: RMS Covariance of GPS Base Line

DC: Derivation (This will always be set to “Rover.”)

SV: Minimum number of Satellites Visible during observation

SC: Error Scale

XX: Variance X

XY: Covariance X,Y

XZ: Covariance X,Z

YY: Variance Y

YZ: Covariance Y,Z

ZZ: Variance Z

Example of imported CV record in Star*Net)

G2 4.119600000000E-04 1.882900000000E-04 4.622200000000E-05

CV,DCROVER,**SV**11,**SC**1,**XX**0.00041196000,**XY**0.00023360000,**XZ**0.00008994700,**YY**0.00018829000,**YZ**0.00005883400,**ZZ**0.00004622200

GS - GPS Store Point (The GS record records the coordinate of a point as measured using GPS.)

GS,**PN**13200,**N** 21570.9552,**E** 450299.6040,**EL**1144.9506,--RIB

Record Type: GS

Field headers:

PN: Point Name (Alphanumeric point number or name that you have assigned to point)

N : Local Northing

E : Local Easting

EL: Local Elevation

--: (two dashes always denotes a comment or description)

GS,**PN**13200,**N** 21570.9552,**E** 450299.6040,**EL**1144.9506,--RIB

--GNSS Raw Data Logging is a summary of raw observations measured and stored

GNSS Raw Data Logging Information

--GNSS Raw Data Logging Started: **File**=BASEESTRECHO,**Rate**=1000mSec
--Instrument Selected: **Type**=GNSS,**Profile**= ZENITH 25,**Model**=Zenith25/25Pro
--GNSS Profile Tolerance RT: **Obs**=3,**Solution**=Autonomous,**Elev**=10,**PDOP**=8.0,**SVs**=4,**RefID**=Any,**StdDevH**=10.000m,**StdDevV**=20.000m,**Tilt**=0.50
--GNSS Profile Tolerance PP: Not Active
--GNSS Statistics RT: **Obs**=3,**Solution**=RTK
Fixed,PDOPMax=1.43,**SVMin**=15,**StdDevH**=0.003m,**StdDevV**=0.008m,RefID=1,**RefLat**=N1°57'54.67903",**RefLon**=W77°07'06.74120",**RefHgt**=645.679m,**RefFormat**=,**MountPoint**=
--GNSS Statistics PP: Not Active
--**PP Time**: **StartWeek**=1970,**StartSec**=319390.0,**StopWeek**=1970,**StopSec**=319394.0

Field Headers:

--: (two dashes always denotes a comment or description)

Section: “**--GNSS Raw Data Logging**”

File: Saved File Name

Rate: The rate information is being received and stored recorded in milliseconds

Section: “**--Instrument Selected**”

Type: Type of Sensor

Profile: Name given to the instrument

Model: Model of the instrument

Section: “**--GNSS Profile Tolerance RT”**

Obs: Number of observations used in measurement (this can be changed in the real time tolerance settings found in instrument settings in FieldGenius)

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Solution: Tolerance Setting for Solution (Autonomous, DGPS, RTK Float, RTK Fixed) found in instrument settings in FieldGenius

Elev: Elevation Mask tolerance for satellites used in solution (this can only be changed in a GNSS Reference profile in the tolerance settings)

PDOP: positional dilution of precision

SVs: Number Satellite Vehicles included in observation

RefID: Reference ID

StdDevH: Horizontal standard deviation (recorded in feet and metres)

StdDevV: Vertical standard deviation (recorded in feet and metres)

Tilt: Tilt Tolerance (this setting is controlled in the instruments settings > Sensor Configure > electronic bubble)

PP: Post-Processing

Section: **--GNSS Statistics RT**

Obs: Number of observations used in measurement (this can be changed in the real time tolerance settings found in instrument settings in FieldGenius)

Solution: Tolerance Setting for Solution (Autonomous, DGPS, RTK Float, RTK Fixed) found in instrument settings in FieldGenius

PDOP Max: Max positional dilution of precision at time of observation

SVMIN: Minimum number of Satellite Vehicles included in observation

StdDevH: Horizontal standard deviation (recorded in feet and metres)

StdDevV: Vertical standard deviation (recorded in feet and metres)

RefID: Reference ID

RefLat: Reference station Latitude (recorded in DMS format)

RefLon: Reference station Longitude (recorded in decimal degrees format)

RefHgt: Height of reference station (in feet or metres)

RefFormat: Message type of reference station (RTCM, CMR)

MountPoint: Location of mountpoint

Section: **"--GNSS Statistics PP"**

PP Time: Post Processing Time

StartWeek: Start Week of Post Processing (Recorded using GPS constellation)

StartSec: Start Second of Post Processing (recorded using GPS constellation)

StopWeek: Stop Week of Post Processing (recorded using GPS constellation)

StopSec: Stop Second of Post Processing (recorded using GPS constellation)

--GNSS Raw Data Logging Started: **File**=BASEESTRECHO,**Rate**=1000mSec
--Instrument Selected: **Type**=GNSS,**Profile**= ZENITH 25,**Model**=Zenith25/25Pro
--GNSS Profile Tolerance RT: **Obs**=3,**Solution**=Autonomous,**Elev**=10,**PDOP**=8.0,**SVs**=4,**RefID**=Any,**StdDevH**=10.000m,**StdDevV**=20.000m,**Tilt**=0.50
--GNSS Profile Tolerance PP: Not Active
--GNSS Statistics RT: **Obs**=3,**Solution**=RTK
Fixed,**PDOPMax**=1.43,**SVMin**=15,**StdDevH**=0.003m,**StdDevV**=0.008m,**RefID**=1,**RefLat**=N1°57'54.67903",**RefLon**=W77°07'06.74120",**RefHgt**=645.679m,**RefFormat**=,**MountPoint**=
--GNSS Statistics PP: Not Active
--**PP Time**: **StartWeek**=1970,**StartSec**=319390.0,**StopWeek**=1970,**StopSec**=319394.0

--Antenna: Is a summary of the Antenna heights and offsets used for the GPS Receivers

--Antenna: **Desc**=Zenith25/25Pro,**True**=2.086m,**Meas**=2.000m,**ARP_V**=0.0mm,**ARP_H**=0.0mm,**NGS_ID**="GMXZENITH25 NONE",**NGS_L1**=86.0mm,**NGS_L2**=91.0mm
AH,**DC**2,**MA**2.000,**ME**2,**RA**2.086

Field Headers:

--: (two dashes always denotes a comment or description)

Desc: Description

True: True height of Antenna

Measured: Measured height of Antenna

ARP_V : Vertical offset used if measuring slant height to Antenna (this is controlled in the Antenna settings in FieldGenius)

ARP_H: Horizontal offset used if measuring slant height to Antenna (this is controlled in the Antenna settings in FieldGenius)

NGS_ID, NGS_L1, NGS_L2: Stored Attributes used for Post Processing

AH: Antenna Height (this is controlled in the Antenna settings in FieldGenius)

DC: Derivation Code ((1 = ModeBase (Base) • 2 = ModeRover (Rover) • 3 = ModeGetBase (GetBase) • 4 = ModeStatic (Static))

MA: Measured Antenna Height

ME: Measure Method (0 = Unknown • 1 = True • 2 = Uncorrected)

RA: Reduced antenna height (to phase center)

--Antenna: **Desc**=Zenith25/25Pro,**True**=2.086m,**Meas**=2.000m,**ARP_V**=0.0mm,**ARP_H**=0.0mm,**NGS_ID**="GMXZENITH25 NONE",**NGS_L1**=86.0mm,**NGS_L2**=91.0mm **AH**,**DC**2,**MA**2.000,**ME**2,**RA**2.086

Key to GPS Method:

GM: GPS Measure Method

0 = UnknownMethod

1 = UserInput

2 = Autonomous (GPS Observation is uncorrected)

3 = RTKFloat (GPS Observation is corrected to another position with a low degree of reliability)

4 = RTKFixed (GPS Observation is corrected to another position with a high degree of reliability)

5 = CopiedPoint

6 = RTCMCode (Real Time Correction Method Code. A method often applied in Marine Applications)

7 = DGPS, WAAS, Starfire, OmniStar, Various Extended RTK Services (GPS Observation is corrected by a DGPS satellite signal for meter level accuracy)