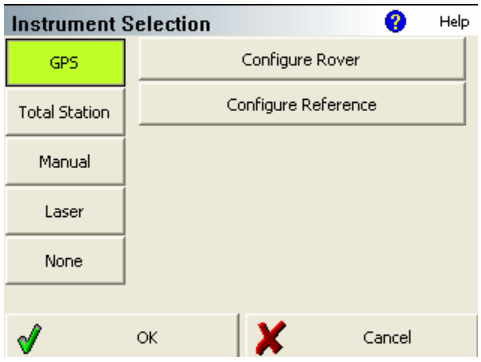
OmniSTAR Connection to FieldGenius

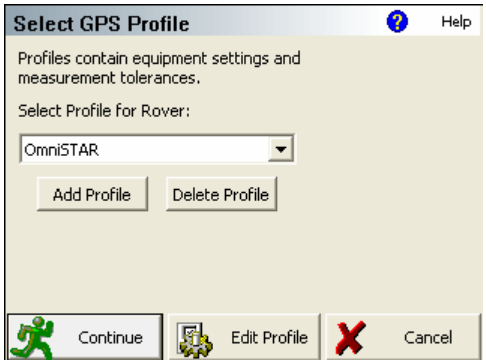
FieldGenius 2005 Version 1.2 includes support for the OmniSTAR HP and VBS services. Currently only the Novatel Pro Pack driver in the Rover GPS profile can utilize the OmniSTAR corrections.

GPS Settings & Rover Profile

You first need to make sure you've specified that you want to connect to a GPS receiver. You can do this by going to the **Main Menu → Settings → Instrument Settings** and select **GPS**.



Press **Configure Rover** to go to the rover profile page.

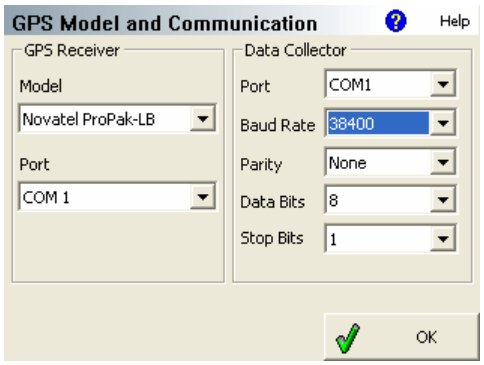


You will now want to create a profile so your configuration settings are recorded and saved for future use.

Press the **Add Profile** button to create a new profile name.

To edit the profile, press the **Edit Profile** button.

Configure Profile – Model and Communication

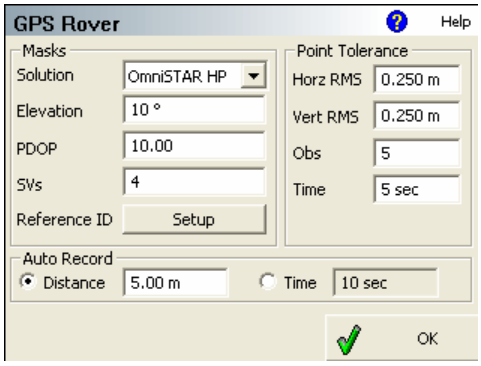


You need to select the Novatel ProPak –LB as the receiver type you want to connect to. Then you need to configure what port the data collector is connected to.

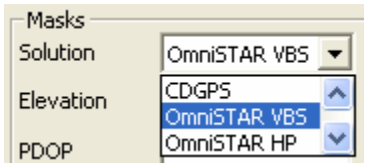
Finally, specify the com settings that the data collector needs to use to connect to the receiver.

Press **OK** when done.

Configure Profile – GPS Rover



Masks (Solution)



Select the OmniSTAR correction type that you want to use for your solution.

Masks (Elevation)

The elevation mask is used to filter out satellites that are close to the horizon and are, thus, unreliable. Typical elevation mask angles can range between 10º and 20º.

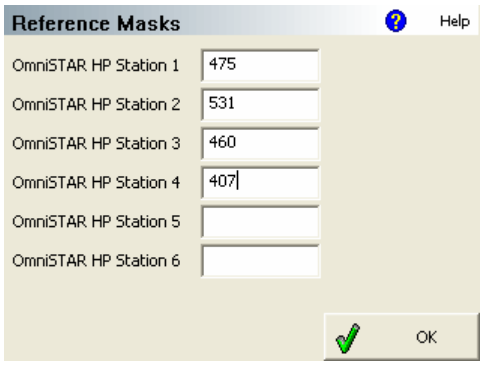
Masks (PDOP)

The PDOP mask is used to control the acceptable geometry of the satellites used to compute the RTK position. If the PDOP value exceeds this number, the user will not be able to collect and store a position.

Masks (SVs)

The SV's setting is used to establish the minimum number of satellites that are necessary to produce a solution with a valid position. The SV's must also pass the elevation mask test to be included in this number for the calculation of the rover position.

Masks (Reference ID)



The OmniSTAR stations that are listed in this screen will force FieldGenius to only allow the user to store a position if these stations are currently being tracked.

For example, if stations 475 & 460 are the only one being tracked, a position can not be stored.

These fields can be left blank, which would force FieldGenius to use all stations in the position computation.

Point Tolerance (Horz & Vert RMS)

The horizontal (2D) and vertical (1D) RMS (root mean square) values describe the desired position precision. The term RMS is often used interchangeably with standard deviation (a slight difference does exist but will not be discussed) and represents normally distributed residuals of a population with a probability of one sigma (1 σ). A one sigma probability has an associated value of 68.3% which essentially means that approximately 68% of the measured positions will have the desired position tolerance. Table 1 can be used as a guide for determining suitable values for the RMS tolerances. Do not expect 3 cm accuracies if doing positioning with autonomous solutions.

If the current RMS value computed by the receiver is less than or equal to the value specified, this test will pass. If it fails, you will see **"High RMS"** warning in the measurement screen.

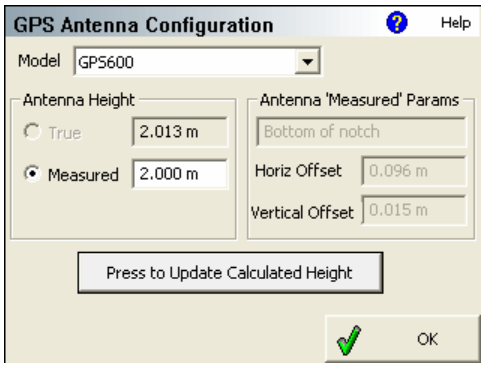
Point Tolerance (Obs & Time)

A population of suitable size is required in order to successfully obtain the precision of a position. Population size is defined by a combination of time and observation number and both must be satisfied for a position to be accepted. For most RTK applications it is recommended to set the observation number and time to identical values of between 5 and 20.

Auto Record

Auto record measurements allow the user to automatically record positions at a periodic interval of distance or time. Examples of applications can include measuring the center line of a road or the perimeter of a water body. Keep in mind that correction messages are received and positions generated at a one second rate, therefore it may be necessary to restrict the speed of the rover station to correspond to the position update rate. Consideration must be given for achievable accuracies because of observation latency and care in positioning the antenna.

Configure Profile – GPS Antenna



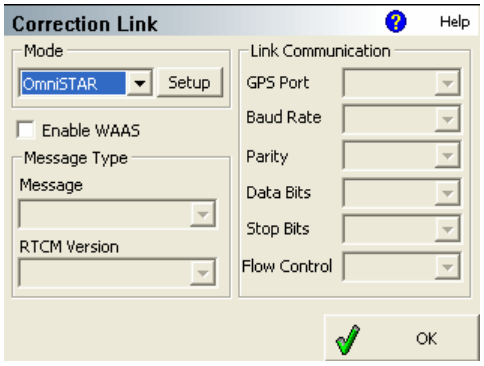
The antenna settings are used to calculate or enter the height of the antenna phase center above the ground. You can enter the true height (if it is known) or enter the measured height and any horizontal or vertical offsets and have FieldGenius calculate the antenna height for you.

Depending on the model you've selected, manufacturer specific antenna offsets will be

listed. For more detailed information about these offsets, refer to you users guide for your receiver.

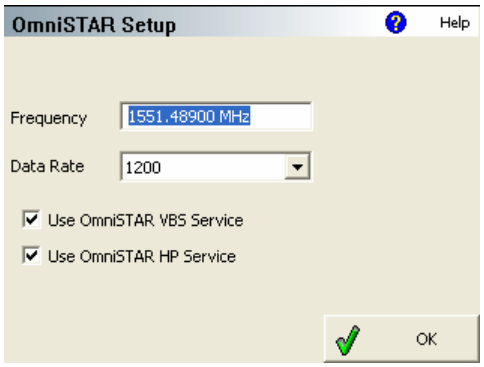
The Model name is just for your use to identify the antenna in use. It is not a pull down list. Enter any value you wish in this edit field to identify the Antenna type. This edit field is for information purposes only.
The true height is simply computed by the use of Pythagoras' theorem.

Configure Profile – Correction Link



You need to select OmniSTAR has the correction link type to use.

Press **Setup** to configure the OmniSTAR connection.

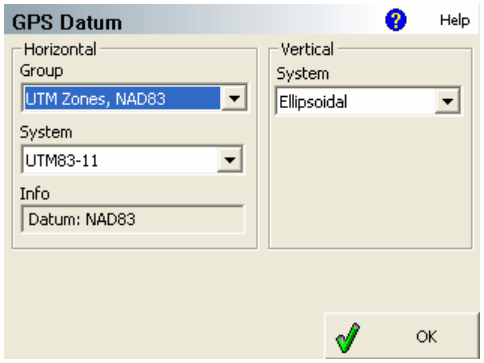


When you press Setup you will see the parameters to be used to make the connection to the OmniSTAR service.

Enter the frequency and data rate that will be used to connect to the service.

You can also specify which service to use. For example if you turn off the VBS service, FieldGenius will display that it has an autonomous connection until the receiver position has been converged. At that time you would see OmniHP as the solution type.

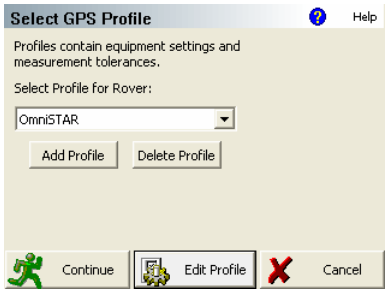
Configure Profile – GPS Datums



On this page you need to select the horizontal and vertical systems that you will be surveying in.

Connect to Receiver

Once you've configured your profile it is now time to connect to the receiver.

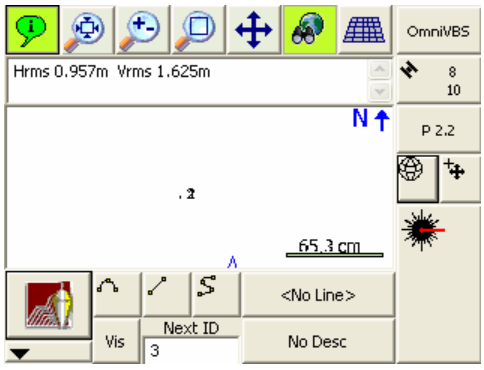


On the Select GPS Profile page, simply select the profile you want to use and press **Continue**.

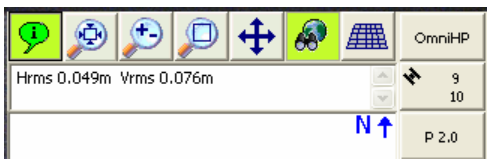
You will then see another message asking you to connect to the receiver and switch the power on. On this screen press **Continue**.

OmniSTAR VBS Connection

OmniVBS Solution:



OmniHP Solution:

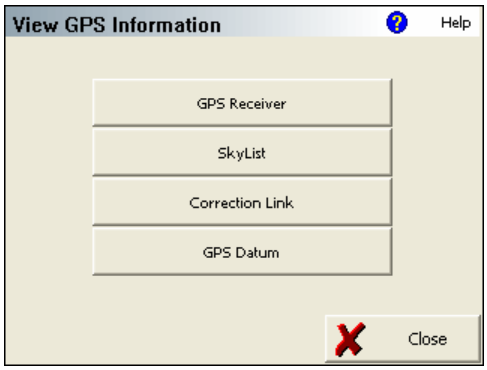


When you first connect to the receiver, the solution type button will most likely read **Auton** which indicates that it has an autonomous position.

Once you're connected to and receiving corrections from the OmniSTAR VBS service, you will see **OmniVBS** as the solution type.

To view the current Cartesian and Geodetic position computed by FieldGenius, simply press the  button. If you press it three times it will display the RMS values computed by the receiver. In the screen shot to the left, you can see that the RMS values.

GPS Task Screen:



From the Map view, if you press the solution type button you will see the GPS task screen. To view information about your current connection, press the **Information** button.

GPS Receiver – This will show you information pertaining to the receiver you've connected to.

SkyList - The skylist screen lists all satellites currently being tracked by your receiver. The checkbox beside the PRN number for the satellite indicates that this satellite is used in the RTK solution. Un-checked checkboxes usually indicate that the satellite is below your elevation mask.

Correction Link - This screen displays information about the correction message being received by your receiver.

GPS Datum - The Datum screen shows information about location and the Datum Grid you are working in.

Correction Link (Details)

Signal	
Frequency	1551.489000 MHz
Frequency Mea...	1551.488996 MHz
Data Rate	1200 Baud
Carrier to Noise	36.89 dB-Hz
Lock Time	804 s
Status	Tracking - Locked
Service	OmniSTAR
OmniSTAR	
Serial Number	763395
VBS Subscription	FIXEDTIME
VBS Expire Date	2005-03-25
HP Subscription	FIXEDTIME
HP Expire Date	2005-03-25
HP Status	No Errors
HP Solution	Coverged
HP Process By...	981251
HP Station 1	475
HP Station 2	531
HP Station 3	460
HP Station 4	407
HP Station 5	
HP Station 6	
Standard	
Status	No Errors
Process Bytes	986491
Good Data	1348
Bad Data	64

When you press the Correction Link button you will see the following information about the OmniSTAR service.

Converging
Also when you first connect to the receiver it takes some time before the solution is converged. During this process you will typically see the following:

HP Status	Updating
HP Solution	Not Converged

Once it is converged you will see the word converged as shown on the left side.

HP Stations

These are the stations that are currently being tracked by your receiver.

Seeding a Point

To help converge your position, you can load a seed point into the receiver. The seed point is a point that has a known position, which when uploaded to the receiver will help converge the solution.

Seed points are created for you automatically when you measure a position. In the FieldGenius raw file two records are written to record the Cartesian (GS Record) and Geodetic (EP Record) position for the point that was measured. Any of your measured point can be used as a seed point.

GS Record

When you store a measured point, a GS record is written to the raw file. It will look like this:

GS,PN1,N 5523151.2053,E 311529.9384,EL385.7531,--

Record Type: GS
Field Headers:
PN: Point Name
N: Local Northing
E: Local Easting
EL: Local Elevation (Orthometric)
--: Point Description

EP Record

When you store a measured point, a GS record is written to the raw file along with an EP record to store the WGS 84 position data. It will look like this:

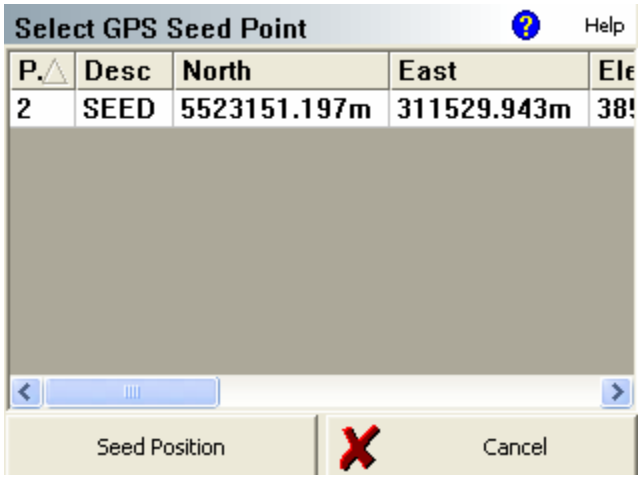
EP,TM19:59:12.0000,LA49.83113986063,LN-119.62078500702,HT385.7581,RN0.0306,
RE0.0286,RV0.0420,DH1.2,DV1.5,GM3,CL1

Record Type: GS
Field Headers:
TM: Time
LA: Latitude
LN: Longitude
HT: Ellipsoid Height
RN: Northing RMS returned from receiver
RE: Easting RMS returned from receiver
RV: Vertical RMS returned from receiver
DH: HDOP if receiver returns this info
DV: VDOP if receiver returns this info
GM: GPS Method (ENUM)
CL: Classification (ENUM) **** This value will always equal 1 for “Normal”

GM Enumeration Values:
0 = Unknown Method
1 = User Input
2 = Autonomous
3 = RTK Float
4 = RTK Fixed
5 = Copied Point
6 = RTCM Code
7 = WASS

Seeding a Point (Method 1 – From Menu)

If you press the solution type button so you go to the Select GPS Task screen, you can press the **Seed Position** button.



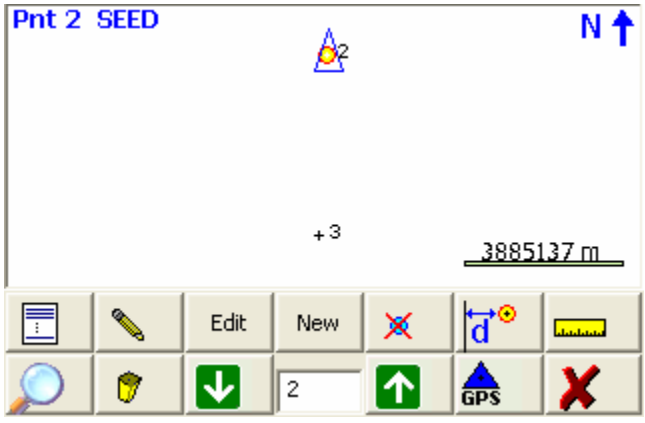
When you do this, you will see a list of seed point that you can use.

Simply highlight the point that you want and press the **Seed Position** button.

When you seed the position, if you have the "Use OmniSTAR VBS Service" turned off, or you're not subscribed to use it, you will see the solution type change to Autonomous. If you have this turned on, as soon as Seed the position you will see the position type change to OmniVBS. As soon as the solution is converged, you will see it change to OmniHP.

The seed positions displayed in the list will display the point number, point description, northing, easting, elevation, Latitude, longitude, ellipsoid height, lat std. dev., long std. dev., and height std. dev.

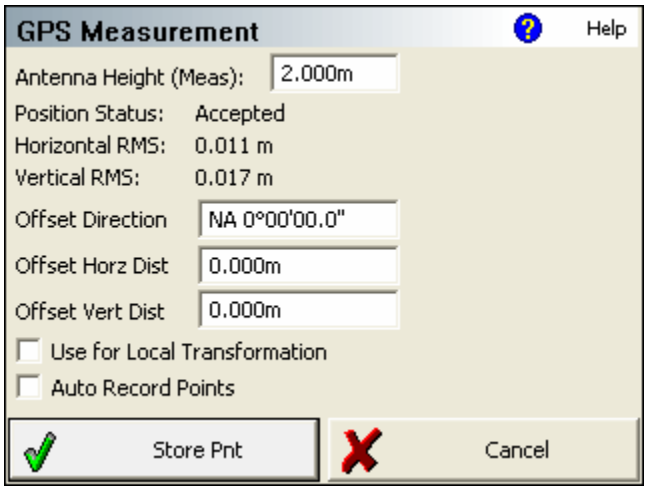
Seeding a Point (Method 2 – From Map)



Alternatively, you can seed a point by selecting it from the Map screen. Simply tap the point you want to use as a seed point and the point toolbar will appear.

Simply press the GPS button which will take you automatically to the Select GPS Seed Point screen. The point will also be automatically highlighted for you.

Measuring a Point



At any time you can press the Measure button to store a position.

When you measure a point, the tolerance settings that you specified in your Rover profile will help ensure that the position being calculated meets certain criteria.

If the position passes all tests specified in the tolerances and masks section for the profile, you will see the message **Accepted**.

Position Status:	Accepted
Horizontal RMS:	0.011 m
Vertical RMS:	0.017 m

You will also see the computed RMS values. These RMS values are computed using the sample that was collected during the measurement. To store the position, simply press **Store Pnt**.

A **High RMS** message indicates:

Position Status:	High RMS
Horizontal RMS:	0.010 m
Vertical RMS:	0.016 m

Horizontal and/or vertical RMS exceeds tolerance.

A **Deficient SVs** message indicates:

Position Status:	Deficient SVs
Horizontal RMS:	99.000 m
Vertical RMS:	99.000 m

Insufficient number of satellites used in solution.

A **High PDOP** message indicates:

Position Status:	High PDOP
Horizontal RMS:	99.000 m
Vertical RMS:	99.000 m

PDOP value is greater than value defined in mask.

A **Invalid Ref** message indicates:

Position Status:	Invalid Ref
Horizontal RMS:	99.000 m
Vertical RMS:	99.000 m

Correction messages are being received from incorrect reference station.

Position Status:	Poor Solution
Horizontal RMS:	99.000 m
Vertical RMS:	99.000 m

A **Poor Solution** message indicates:

Current solution type quality is less than defined mask.

Measuring a Point – Options

In the program setting for FieldGenius you can specify two options that will make storing measured points that much quicker.

Auto GPS Stats

When this feature is turned on it will automatically move onto the Store Point Screen. This will only happen if the computed position passes all the tolerances and masks settings. Essentially, this saves the user from pressing the Store Pnt button on the GPS measurement screen.

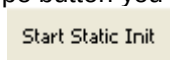
Auto GPS Store

When this feature is turned on it will automatically store the point in the point database. It saves the user from having to press the Store Pnt button on the Store and Edit Point screen.

This option can be used in conjunction with the Auto GPS Stat option. If you're using it this way, the description that is specified in the MAP screen will be used for the stored point.

Static Init

If your current position is stationary, you can send a command to the receiver that will help it converge more quickly. The command name is HPSTATICINIT.

From the Map view, if you press the solution type button you will see the GPS task screen. To send the command to the receiver, press the 

button.

Once your position has converged, you should end the static init and set it back to kinematic by pressing the 

button.

Map Orientation

Depending on the orientation of your survey datum your using, you may need to rotate your map view so that the correct perspective is used in the Map view.

If you go to Main Menu → Settings → Program you will see an option named **Coordinates Oriented: North or South.**

Most survey systems are referenced to North, but there are some exceptions such as the ones used in South Africa.