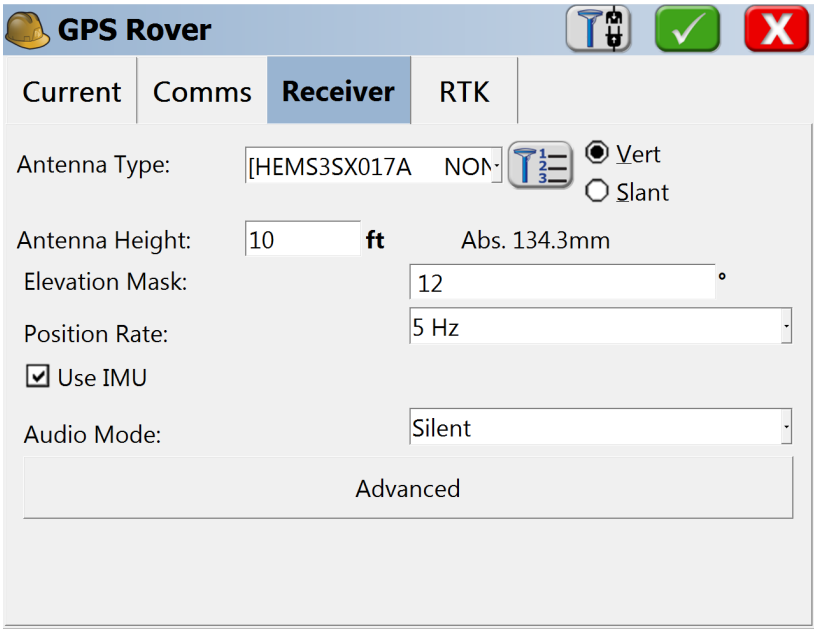
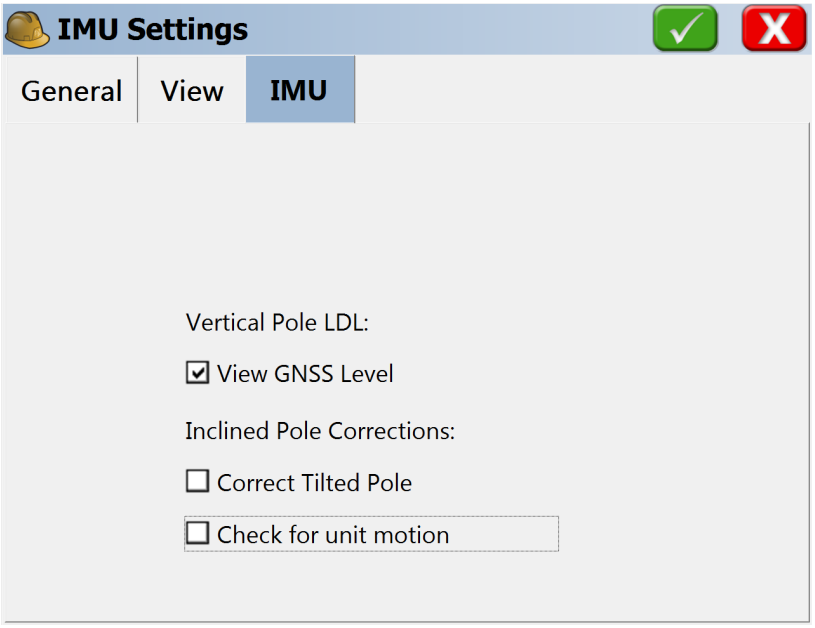
Using IMU Features in SurvCE and SurvPC

Using the digital level

To use any IMU feature in SurvCE, it is first necessary to activate the sensors in the receiver. Do this by going to **Equip->GPS Rover**, and checking the box "**Use IMU**" on the Receiver tab. Note that a position rate of 5 Hz is required to use IMU features.

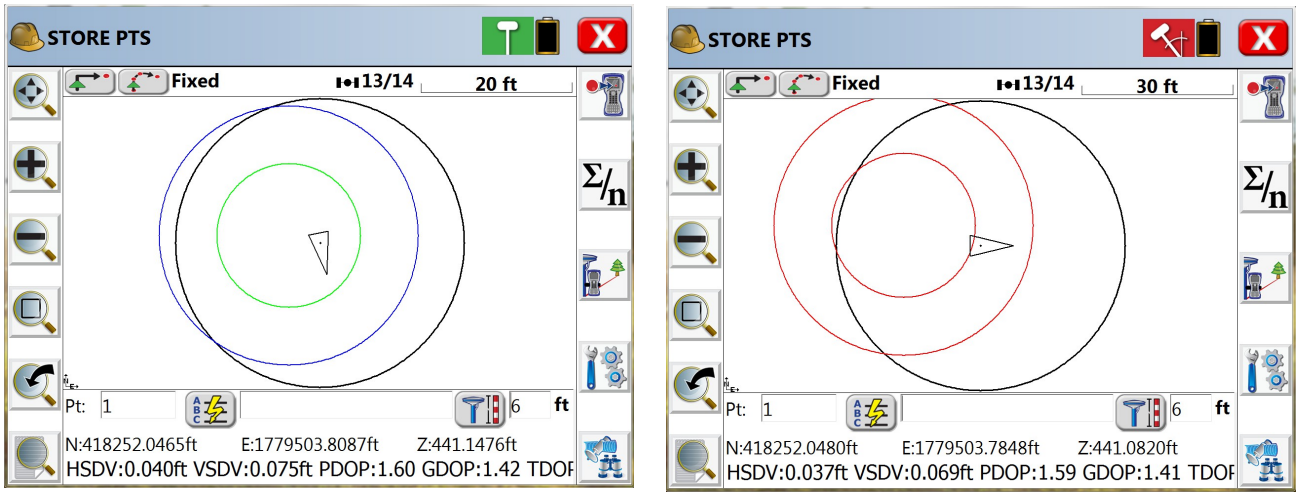


Individual IMU features of SurvCE are controlled in **Equip->Configure**, on the IMU tab:



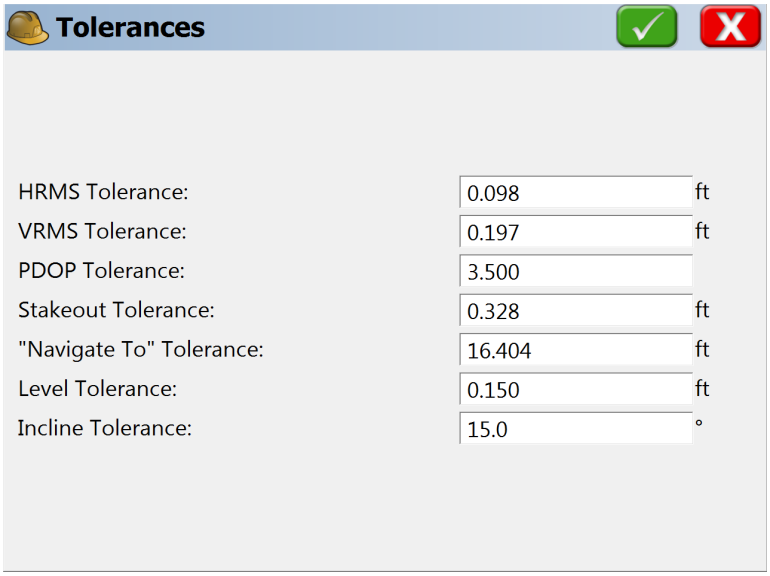
SurvCE allows the option to view the GNSS level on live survey screen.

Check the box for **View GNSS Level** to view the GNSS level on the live survey screen. The digital level will let the user know visibly whether he is level enough to store a reading. A green circle indicates a reading can be stored, and red indicates that the incline of the pole exceeds the user configured tolerance, and the reading will be blocked. The digital level is aligned on the X/Y axis of the receiver. *The face of the receiver should be facing towards the operator for intuitive display.*



Users who wish to stay within level tolerance but do not like the appearance of the digital level can simply turn off **View GNSS Level** in the configure screen. As long as the IMU is enabled in the receiver configuration, SurvCE will still block readings which exceed the level tolerance. For those users, the Green or Red "GPS pole icon" in the top right by the Red X serves as an indicator of whether a reading can be stored at any given moment.

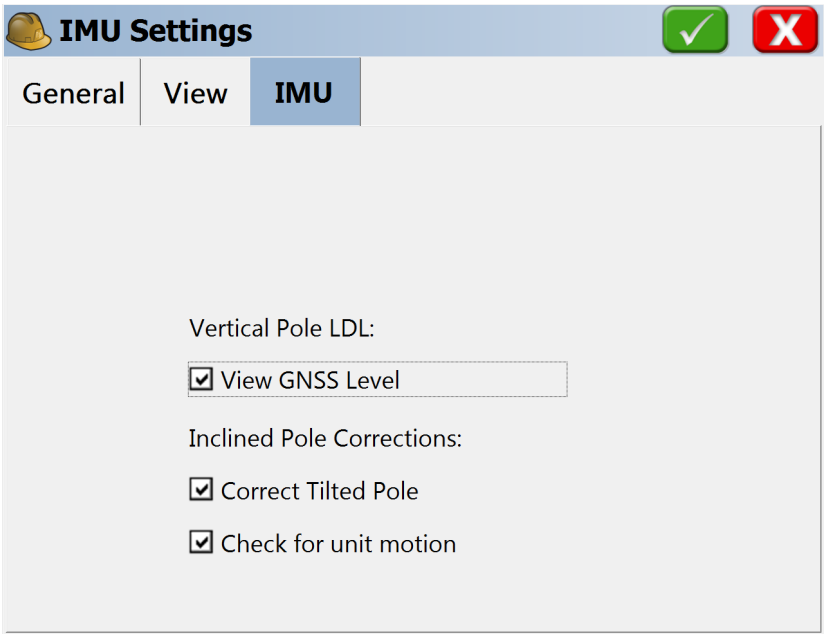
Tolerances are configured from the main menu under **Equip->Tolerances**:



The **Level Tolerance** defines the amount of error that will be accepted when storing points. The tolerance is defined as the amount of distance error allowable on the ground, and thus is a function of both the incline of the pole and the rod height.

Storing measurements at an incline:

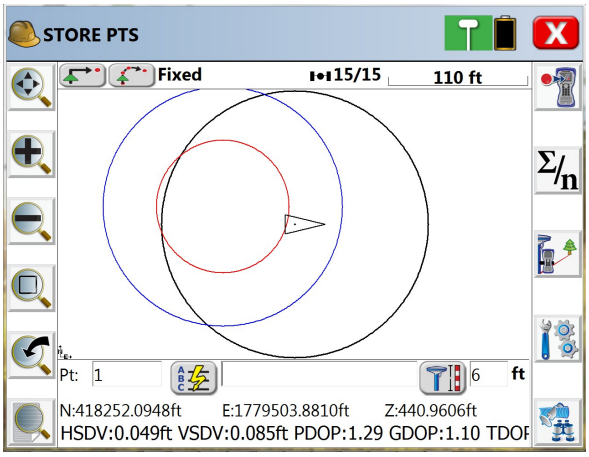
Some receivers also include a compass, and by combining the heading of the instrument with the incline, the software can adjust for positional error due to the incline of the pole. To use this feature, go back to the **Equip->Configure** screen and check the box for "**Correct Tilted Pole**".



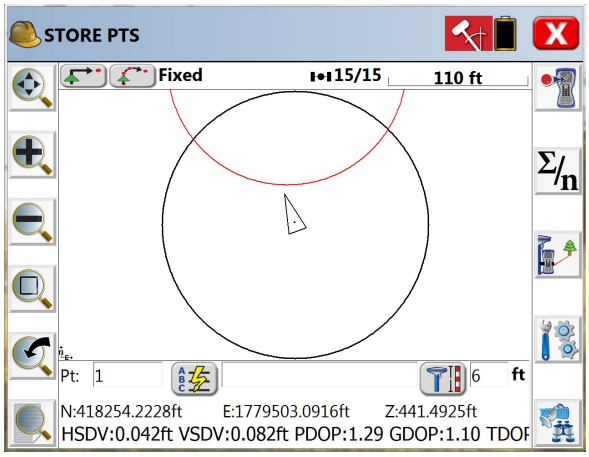
The **Incline Tolerance** in the tolerance menu defines the maximum amount of tilt allowable in this mode. Most receivers begin to lose accuracy when tilted more than 20 degrees.

In the store points screen, the icon in the top bar and the appearance of the digital level provide information to the user about whether a point can be stored. Please see examples below:

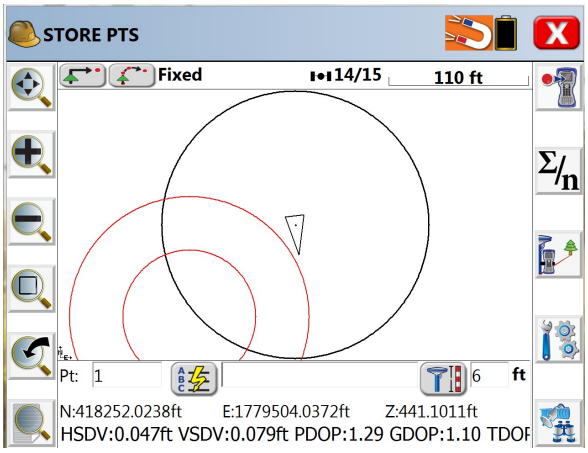
Example 1: The red circle indicates that the receiver is not within level tolerance, but the green icon in the top right indicates that a reading can be stored, and the software will account for the incline of the receiver.



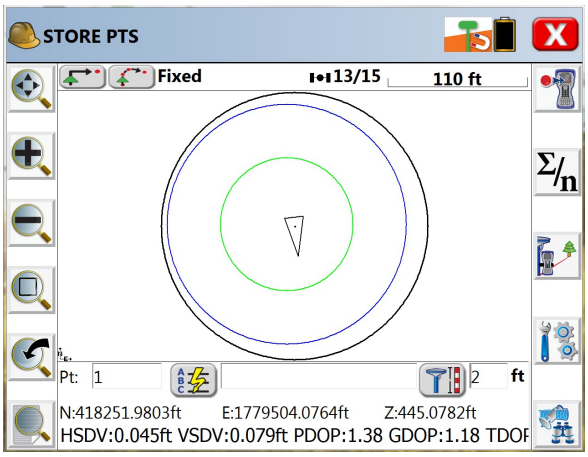
Example 2: The red icon in the topbar indicates that the receiver is tilted too far to correct for tilt, as configured in the tolerances dialog by the Incline Tolerance (for example, more than 20 degrees). The bubble level also shows that the receiver is very unlevel. No point can be stored.



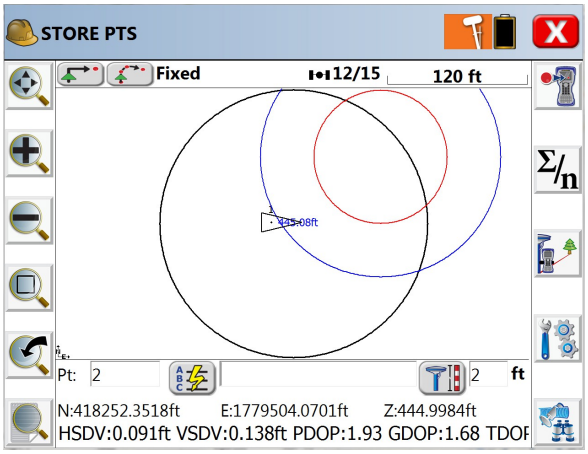
Example 3: Correcting for incline measurement can be unreliable in areas of magnetic noise. SurvCE will indicate this situation using a magnet symbol in the top bar. If magnetic noise is detected, SurvCE will block any reading outside of the level tolerance. No point can be stored in this state.



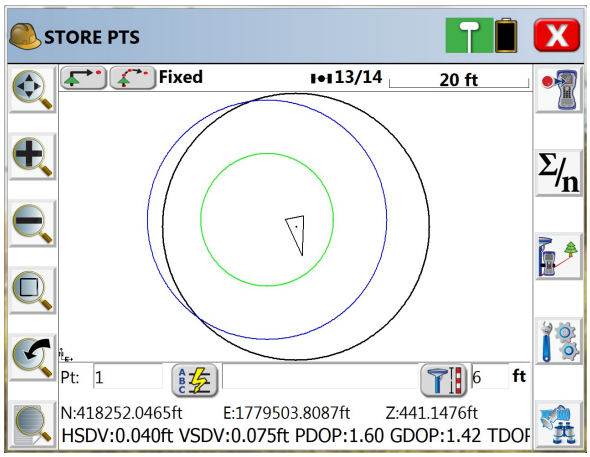
Example 4: To store a reading in areas of magnetic noise, simply level up the pole to within level tolerance. The icon now indicates that there is magnetic noise, but the receiver is level enough to store. Note that in this state, due to the magnetic noise, no adjustment will be made for incline.



Example 5: Some receivers also detect instability in the compass which can lead to inaccurate compass readings. When **Check for Unit Motion** is checked in Equip/Configure/IMU tab, an orange icon will be used to indicate that instability is detected. When the read button is pressed in this state, SurvCE will wait up to 1 second for the receiver to stabilize before storing the reading.

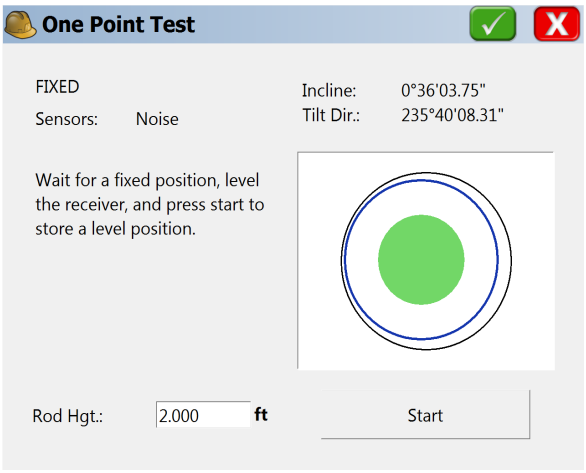


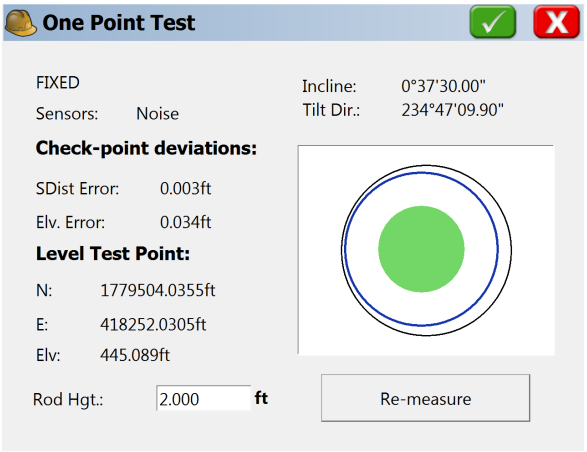
Example 5: The digital level is green, indicating that the receiver is within level tolerance, and the icon is green, indicating that a point can be stored. When Correct For Tilt is enabled in this situation, corrections will still be applied for the small tilt of the pole.



The One-Point-Test

SurvCE offers a handy One-Point-Test utility to help users to get more accustomed to the IMU capabilities of their receiver. To access this feature, go to **Equip->GPS Utilities**, and tap the **Sensor Calibration** button, and then tap "**One Point Test**".





To use the feature, make sure your Rover has a FIXED solution shown in the upper left, then level the receiver and press the Start button to take a level reading.

Then hold the tip of the pole in a fixed location, and practice tilting the top of the pole. The software will apply corrections based on the tilt, and the screen will display the error between the fixed location and the calculated location. Every receiver is different, and calibration is tied to location and temperature.

Using the **One Point Test** can help field crews understand the limitations of their receiver. Very bad results in this screen could indicate that the receiver needs to be re-calibrated.

Icon Cheat Sheet

	OK to store. Either within level tolerance, or if incline adjustment being used, within incline tolerance.
	Magnetic interference detected, unsafe to store. Must level up to within level tolerance to store.
	Unit motion detected, possibly unsafe to store. If you press store in this state, SurvCE will wait up to 1 second for the compass to stabilize before storing the point.
	Magnetic interference detected, but unit is within level tolerance, so it is OK to store. Tilt adjustments will not be made.
	Out of tolerance. Either outside of level tolerance, or outside of incline tolerance if tilted pole is being used.
	Error State. This icon indicates that there is a delay between the sensor messages and the positions. Unsafe to store.