

### Pitch Calibration

Intellislope senses and controls the plow's shank pitch via a pitch sensor in the plow control unit (PCU). The PCU is factory-calibrated for sensitivity and temperature compensation. However, one calibration value cannot be determined until after the PCU has been mounted to the plow shank, and must be entered by the operator. This value is the *pitch zero*.

A basic principle of pitch plows is that they go where they are pointed, i. e. parallel to the skid plate on the bottom of the shank. When the pitch sensor reads the pitch zero value, the shank is oriented in such a way as to cause approximately level installation of tile. So the pitch zero tells the system what pitch value corresponds to level operation of the plow.

The pitch zero is entered by the operator using the plow setup screen, shown in Figure 1. Pressing the button next to "Pitch Zero" selects the number so it may be changed by turning the spin dial.

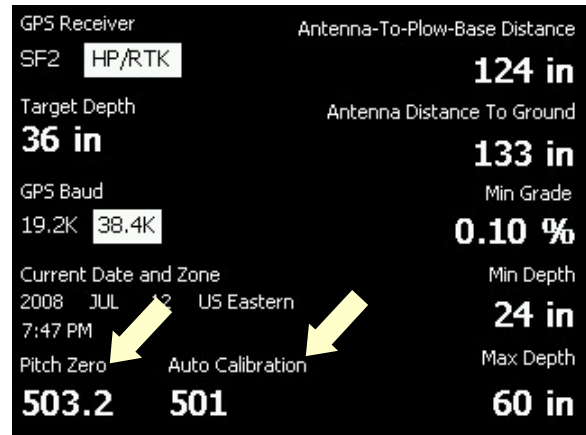


Figure 1: Pitch zero is adjusted using the plow setup screen.

### Initial Calibration

When a PCU is operated for the first time, the plow status will indicate "Uncalibrated", as shown in Figure 2. This indicates that before installing tile, the plow must be operated in the ground as if installing tile so that the auto calibration algorithm can determine the correct pitch zero. It does this by correlating the plow pitch with GPS elevation. Once the plow has been operated long enough for the algorithm to converge on a solution, (probably more than 300') the plow status will change from "Uncalibrated" to "OK", and the system will set the pitch zero to the converged value.

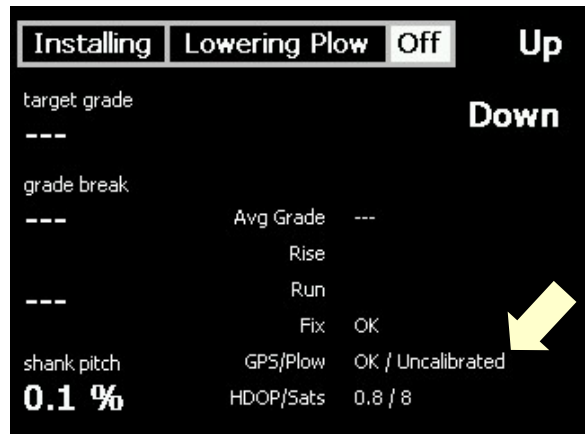


Figure 2: Plow status will indicate "Uncalibrated" until a calibration run has been completed.

### Ongoing Calibration

At the end of the initial calibration run, the Pitch Zero will automatically be set. However, there are reasons why the Pitch Zero will need to change. These include changes in soil conditions, ambient temperature and moisture. When this happens, the setting on the plow setup needs to be updated. You have to make this adjustment manually on the Plow Setup screen. To help you with this, the system keeps the "Auto Calibration" value updated. Whenever the plow is operating in Grade Control or AutoTile mode, the Pitch Zero auto calibration algorithm is running, and the latest result is displayed under the "Auto Calibration" label on the plow setup screen.

If for any reason Intellislope has been left in the "Installing" state in either Grade Control mode or AutoTile mode while the plow is out of the ground, then the Auto Calibration number will be meaningless and should be ignored.

### Effect of Miscalibration

The primary effect of a high Pitch Zero setting is to cause the plow to run somewhat shallower than desired. A low Pitch Zero setting causes the plow to run somewhat deeper than desired. These effects are summarized in figures 3, 4 and 5.

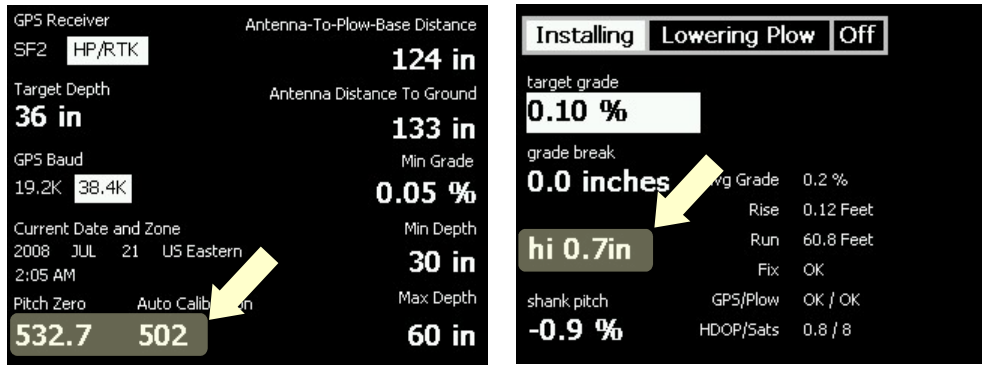


Figure 3: If the Pitch Zero is set too high, the plow will tend to run too shallow (too high).



Figure 4: A low Pitch Zero will cause the plow to run too deep (too low).

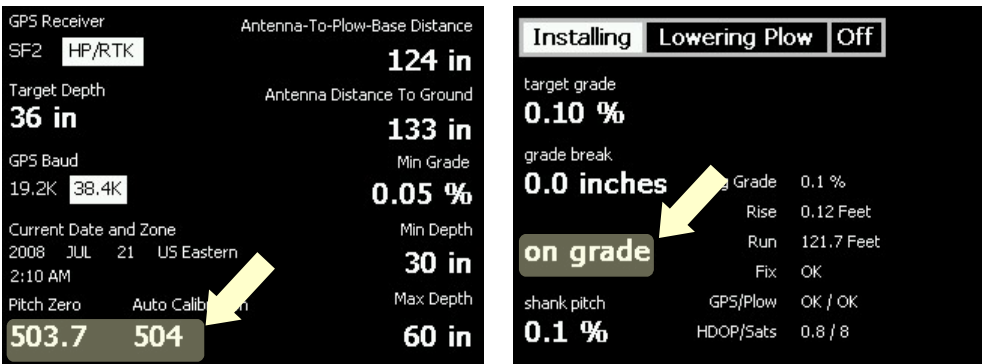


Figure 5: A correctly-set Pitch Zero.

Gradient Inc.  
3260 Red Barn Road  
Terre Haute, Indiana 47805

<http://www.intellislope.com>  
phone 888-764-5629



Intellislope and AutoTile are trademarks of Gradient Inc.  
© 2008 Gradient Inc. All Rights Reserved.  
Intellislope is Patent Pending