

# X-PAD: Base Position Adjustment

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There are many applications where you would like use RTK, you have valid coordinates for a point but you don't want to set your Base on the control point.

In X-PAD, 'Base Position Adjustment' (BPA) is a great way to address this issue. You can setup a Base anywhere, with a 'Read GPS (autonomous)' position.

X-PAD's BPA will make the required compensation on the Rover side that effectively moves the Base to EXACTLY the correct location.

It is important to note that BPA does not adjust the broadcast location in the Base. The Base continues to broadcast corrections with the autonomous, or WAAS corrected, position. All corrections / adjustments are performed on the Rover side.

There are some great bonuses when using BPA:

1. The **Base** antenna type, antenna height, position and tilt all wash out in the Base Point Adjustment. These error sources will not matter. The Rover computes the necessary adjustment to compensate for the position difference. The Base only needs to be placed at a stable location.
2. The **Rover** antenna type, antenna height also washes out in the adjustment. So, if your Rover prism pole is 1 cm shorter than the entered value, BPA will fully compensate.

**The result of the BPA is the Rover will measure EXACTLY at the point of compensation.** All other points will match to the accuracy of their initial survey measurements.

3. Because you get a 'free backsight' or 'free basis of bearings' with GPS measurements, a BPA at a single point will force match at all other points.
4. The BPA combines with any other projection or localization settings. This means you can setup a complex, multi-point localization for a job. Then you can move your Base to any convenient location and do a BPA to match the local coordinates of any previously surveyed point. The job localization will still work and all points will exactly match the previous setup.

BPA allows you to set a hub and store its position with a network connection. You can then setup a Base at ANY random location using a 'Here' position. With a simple BPA adjustment, the Rover will EXACTLY match the previously surveyed point.

5. BPA allows you to place a Base at a random, un-surveyed point chosen to optimize Base UHF radio propagation.

BPA as implemented in X-PAD does not require a previously surveyed point for calibration. You can use any point that you have Lat-Lon-HAE or State Plane Northing, Easting, Orthometric Height available for.

## Example

Set two nails behind about 20 feet apart.

Using a network Base position, stored the two positions 201 and 202:

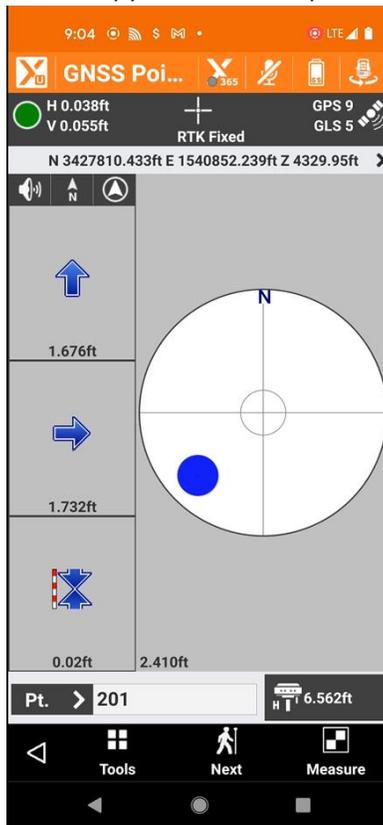


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Next, disconnect the Rover from the network and turn on an X91+S Base which is set to 'AutoBase' mode. After the X91+S boots, it takes a 15-second average and begins broadcasting corrections with an **autonomous** 'Read GPS' Base position.

This autonomous Base position will typically be within 15 feet of the 'true' network position, but it will never be close enough to continue surveying.

To test this, occupy and stakeout point 201:

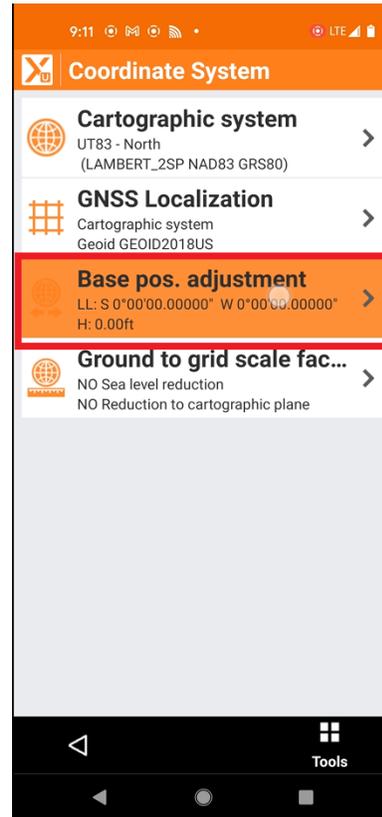
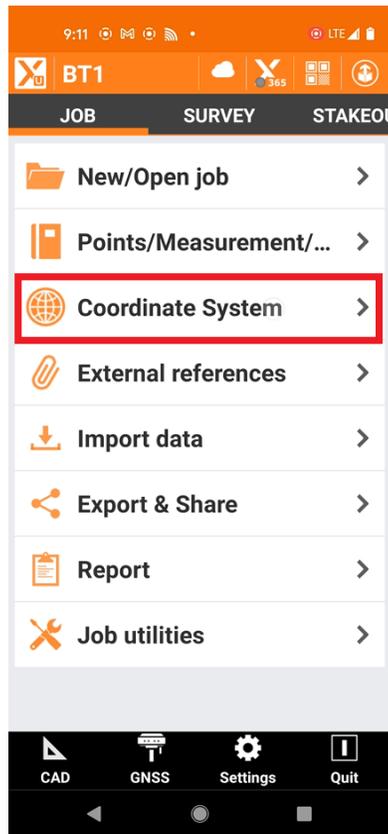


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In this case there is a 2.41 foot bust!

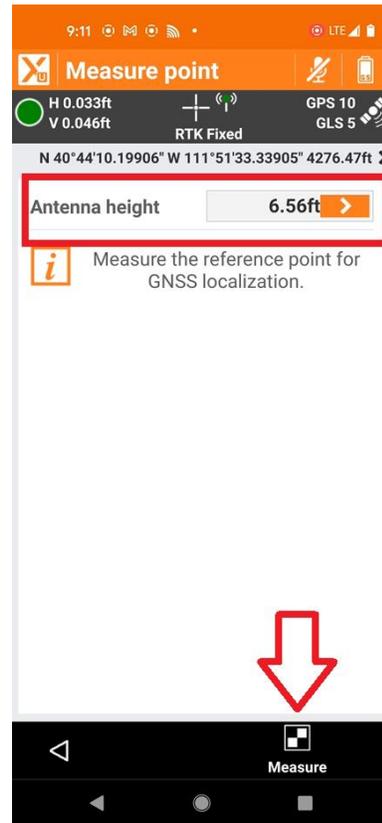
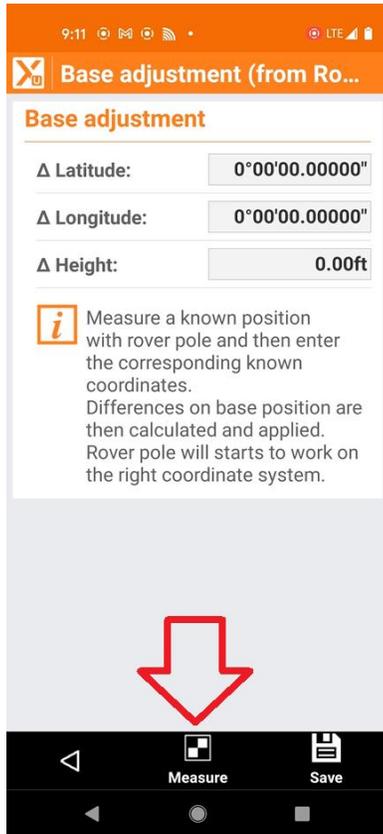
Let's do a Base Position Adjustment on the Rover side, we are not going to change the UHF Base's configuration or position.

From the main JOB menu:



Click on 'Coordinate System', then click on 'Base position adjustment'.

The 'Base adjustment' screen is shown:

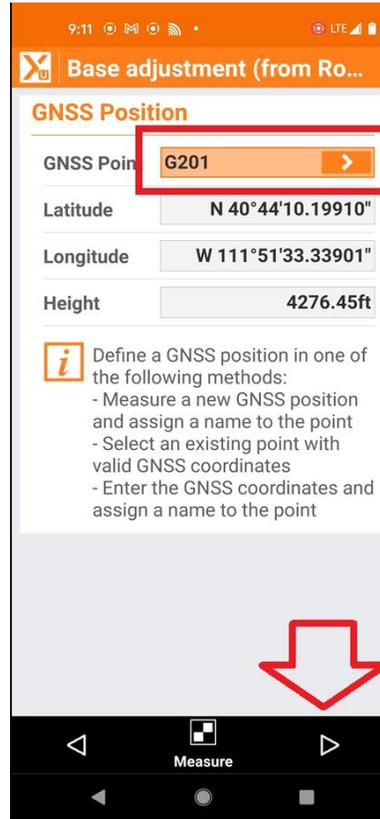
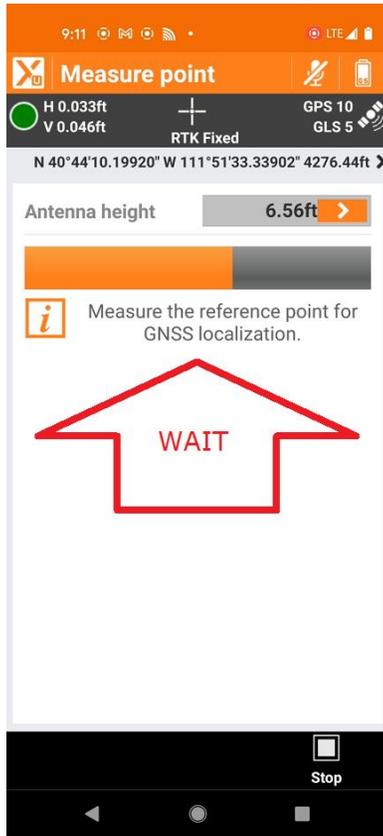


Click on the 'Measure' button at the bottom.

Verify the rod height, level up the Rover (I recommend that you use a prism pole bipod to exactly level the Rover).

Click Measure to obtain the current GNSS Position from the receiver

Wait for the measurement average to complete:



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Then name the point ('G201' above) with a unique point name, then click the next arrow on the bottom.

Now enter the 'Local coordinate' (the value you would like the receiver to measure) at this point:

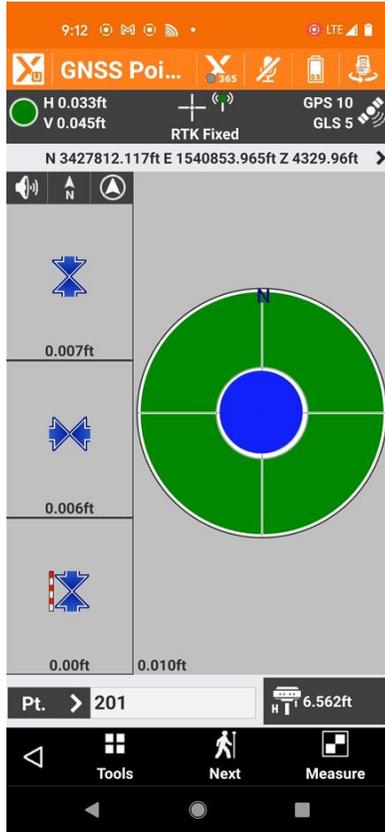


Click on the 'Local Point' arrow (1) and pick the previously surveyed point at 201 from the list.

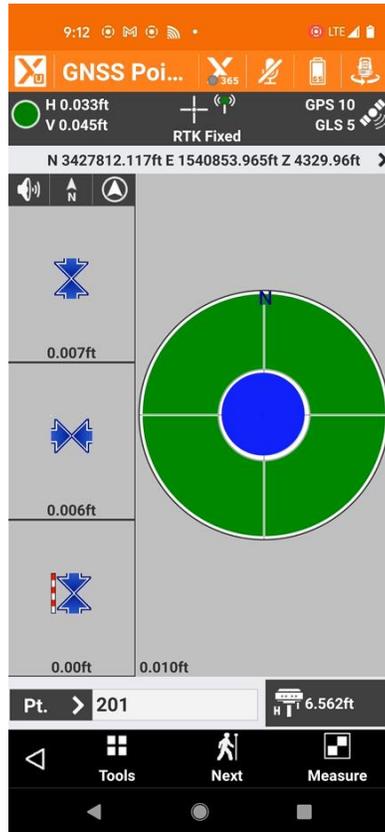
Then click the Next button.

The Base adjustment deltas will be shown, click the Save button to continue and put the BPA into play.

Now, if you occupy and stake point 201:



And, if you occupy and stake point 203:



The BPA has successfully compensated for the changed Base position.