

First need to find the point that is the intersection of GPS-L to GPS-R and the centre of the bucket or stick to centre of the boom near the boom pin.

- Calculate > Offsets > Intersection.
- Enter the below points (BOOM-C1 is centre of bucket or stick and BOOM-C is the centre of the boom near the boom pin)
- Name this point GPS-C as it is the centre measurement between the two GPS antennas in-relation to the boom.

Intersection

Input Results Map Drawing

Point 1: GPS-L

Az to Pt: GPS-R

Right Offset: 0.000 m

Point 2: BOOM-C1

Az to Pt: BOOM-C

Right Offset: 0.000 m

Calc

To correctly find the behind and left measurements, the BOOM-H (height measurement that is taken from the centre of the boom pin) needs to be intersected with the BOOM-C and BOOM-C1 measurements.

- Calculate > Inverse > Pt to Line
- Enter the below points and name the Calc Point BOOM-CP for Boom centre pin as this point is going to represent the centre of the boom pin in all 3 axis.

Inverse Point to Line

Input Results Map Drawing

Point: BOOM-H

Start Point: BOOM-C1

End Point: GPS-C

Start: 0+00.000 m

Calc Point: GPS-CP





Code: [dropdown]

☐ PTL Point

Calc

The last calculated point is the GPS-MBIAS point that is a point that is perpendicular to the GPS-L to GPS-R line at the GPS-C point.

- Calculate > Point in Direction
- Enter the below points and name the calculated point GPS-MBIAS
- Any distance can be used for the forward measurement, so long as the field has a measurement otherwise it can not compute.
- The Angle Offset must be 90°


 Point in Direction   

Input



Results


Map

Drawing



 From Point


GPS-C


 Az to Pt


GPS-L

 Angle Offset


90°00'00"



 Forward


10.000

m

 Up

0.000

m

 Calc

Now to calculate the required measurements, Right, Behind, Height and MBIAS.

Right

- Calculate > Inverse > Point to Point
- Enter the following.

The screenshot shows the 'Two-Point Inverse' software window. It has a title bar with an 'M' icon and three icons (calculator, undo, home). Below the title bar are four tabs: 'Input' (selected), 'Results', 'Map', and 'Drawing'. The main area contains two input sections. The first section is labeled 'From Point' with a pencil icon and a text box containing 'GPS-L'. To its right are two map icons. The second section is labeled 'To Point' with a pencil icon and a text box containing 'GPS-C'. To its right are also two map icons. At the bottom right is a 'Calc' button with a calculator icon.





- The measurement that is needed is – Hdist
- Remembering that this number is always negative unless the main GPS antenna is to the right of the GPS-C

The screenshot shows the 'Two-Point Inverse' software window with the 'Results' tab selected. It displays a table of calculated values. The 'HDist' value is highlighted in yellow. A small map icon is visible in the bottom left corner of the results area.

From Point	GPS-L
To Point	GPS-C
Azimuth	89°37'21"
HDist	1.406 m
dNorth	0.009 m
dEast	1.406 m
dHeight	-2.409 m
Grade(Slope)	-171.321%

Behind

- Calculate > Inverse > Point to Point
- Enter the following.


 Two-Point Inverse   



Input


Results



Map


Drawing

 From Point





 

 To Point

 **Calc**

- Again, the HDist is the measurement needed.

 Two-Point Inverse   


Input

Results

Map





Drawing

From Point	GPS-CP
To Point	GPS-C
Azimuth	181°32'20"
HDist	1.194 m
dNorth	-1.194 m
dEast	-0.032 m
dHeight	0.000 m
Grade(Slope)	0.000%



Height

- Calculate > Inverse > Point to Point
- Enter the following.


 Two-Point Inverse   

Input



Results


Map

Drawing



 From Point


BOOM-H





 To Point

GPS-L

 Calc

- The measurement required is dHeight, this measurement should be positive.

 Two-Point Inverse   


Input

Results

Map





Drawing

From Point	BOOM-H
To Point	GPS-L
Azimuth	219°53'37"
HDist	1.583 m
dNorth	-1.215 m
dEast	-1.015 m
dHeight	1.481 m
Grade(Slope)	93.5510%



MBIAS

- Calculate > Angles > Corner Angle
- Enter the following.

 Corner Angle   

Input


Results


Map

Drawing

Start Point


BOOM-C1






Middle Point


GPS-C







End Point





GPS-MBIAS





 Calc

- The measurement that's needed in this example is Angle Left.
- In this case the GPS-R is closest to the BOOM-C1 so the small angle is to the left of GPS-C.
- This being the case the MBIAS will be a negative measurement.

 Corner Angle   


Input

Results

Map

Drawing

Start Pt ID	BOOM-C1
Middle Pt ID	GPS-C
End Pt ID	GPS-MBIAS
Angle Right	358°05'01"
Angle Left	1°54'59"
180 - right	178°05'01"
180 - left	181°54'59"
Dist to Start Pt	0.606 m



This angle is given in degrees, minutes, seconds and needs to be converted to decimal degrees.

The easiest way to do this is to use an online calculator. However, the formula is as follows:

$$dd = d + m/60 + s/3600$$

Using the above measurement as an example.

$$1^{\circ} 54' 59''$$

$$= 1 + 54/60 + 59/3600$$

$$= 1.916389^{\circ}$$

The above is the calculated MBIAS.