

Mirus GNSS Attachment Plugin Training

First Some Definitions...

- ▶ NMEA (National Marine Electronics Association): Founded in 1957, this group created a standard GPS data communications format that all GPS/GNSS receiver manufacturers could use in their products in order to send and transmit positional information from a GPS satellite.
- ▶ NMEA STRINGS “MESSAGES”: Are lines of data obtained from a satellite by a GPS/GNSS receiver while actively tracking position. (i.e., latitude, longitude, timestamps, satellites, quality of data, etc.) here is a complete breakdown of what a typical NMEA string looks like: <https://www.gpsworld.com/what-exactly-is-gps-nmea-data/>
- ▶ RTK (Real-Time Kinematic): Is the name of a positioning algorithm used to take additional measurements while receiving GPS/GNSS receiver data. It works by taking additional measurements of the phase angle of the carrier wave from the satellite signal combined with the NMEA string information already in the signal. This provides increased positional accuracy (to within a centimeter). RTK relies on a reference station or interpolated virtual station (imaginary point) to provide real-time positional corrections based on these additional measurements.
- ▶ NTRIP: (Network Transport of RTCM (Radio Technical Commission for Maritime Services) via Internet Protocol); Is a service that lets you get NMEA messages over an internet connection rather than over traditional radio waves via radio equipment. This usually requires that your receiver be RTK compatible (RTK radios generally can connect to reference stations which provide this service) and that you are registered with a local NTRIP provider (usually an NTRIP relay service provided by the reference station). You can read more about it here: <https://www.agleader.com/blog/ntrip-cors-how-it-works-and-what-is-involved/>

3rd Party GNSS Receiver Considerations...

- ▶ Not all GNSS receivers are created equally or have the same features and abilities.
- ▶ It's always best to make sure the representative from the manufacturer of a GNSS receiver is contacted prior to, or available to come on site during a visit, to get all the appropriate settings/setup information and available features lined up prior to setting up the GNSS receiver for use with the GNSS attachment in Mirus.
- ▶ Certain additional NMEA strings can be enabled or disabled within the GNSS/GPS receiver to show different satellite information received by the by the GPS satellite, by default you should only enable these aspects of the NMEA string as needed. If you enable more NMEA strings, it will take more processing time to handle and may or may not be needed:
 - ▶ For basic reporting or machine control enable: GGA and VTG
 - ▶ To show EHE (Estimated Horizontal Error) enable: GST or RRE
 - ▶ To show number of Satellites connected enable: GSV

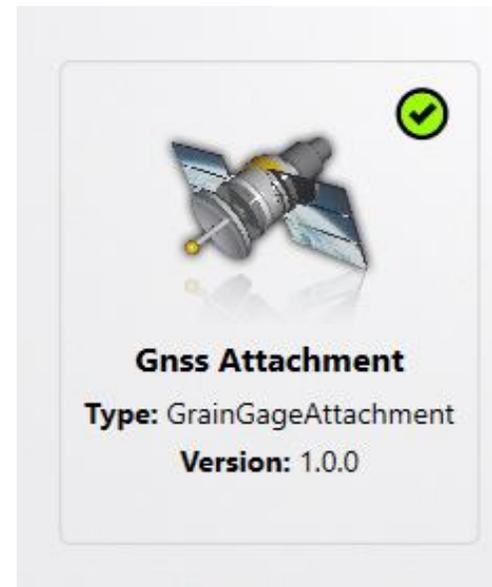
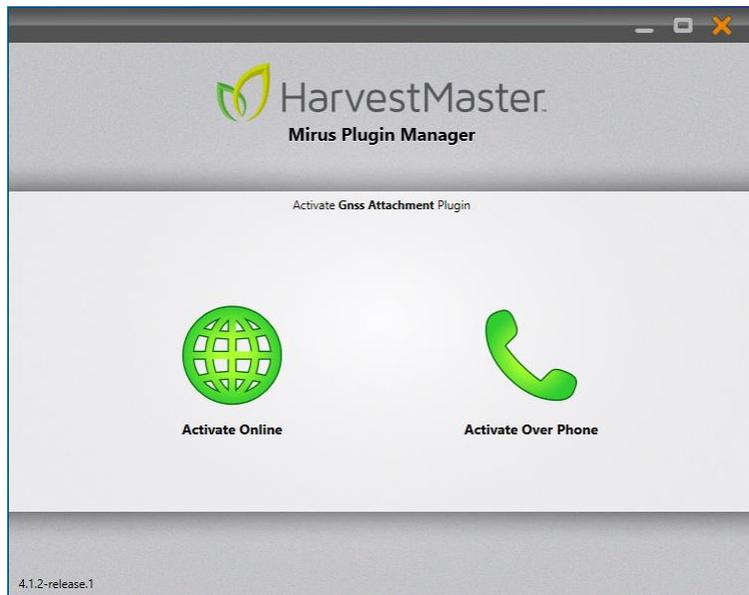
GNSS Attachment Plugin Versions & Uses

Mirus Version	GNSS Plugin Version Number
3.2	1.0.0.2
4.1.1	1.1.1 (Kincaid Only)
4.1.2	1.0.0.2
4.2.1	1.0.0.2
4.2.1	1.3.0 - Dev 98 (Cone Planter Only)
4.2.3	2.0.0

*Version 2.0.0 does not work with the Applicator plugin
1.0.0.2 is the compatible version to use*

Where to Download & Install

- ▶ The Mirus GNSS 2.0.0 Attachment can be found on our website at: <http://harvestmaster.com/support/article/14648>
- ▶ With Mirus installed, begin the installation of the plugin and go through activation, once activate the attachment should be enabled in the plugin manager.



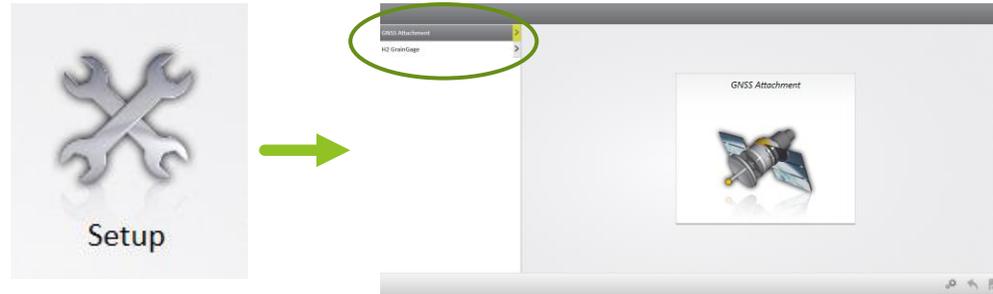
First Steps After Installation

- ▶ Open Mirus after installing and enabling the plugin; a valid plugin connection is required before proceeding to connect to the GNSS Attachment (i.e., GrainGage, Planter, Sprayer).
- ▶ After connecting to an appropriate plugin navigate to the attachments and enable the GNSS attachment plugin.
- ▶ You should see a successful connection to both plugins on the main Mirus home screen.



The GNSS Attachment Setup Screen

- ▶ From the setup wrenches navigate to the setup screen and go into the GNSS Attachment settings menu.



- ▶ There are several areas where you can set and adjust settings for the plugin.

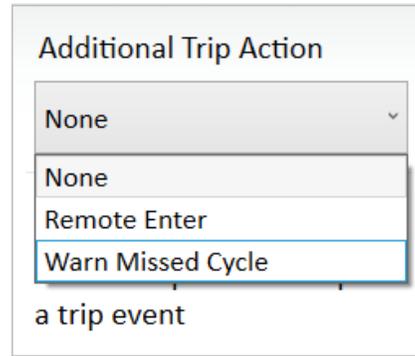
GNSS Settings
Distance Trip
GNSS Port Detector
NMEA Console
NTRIP

The GNSS Settings Area

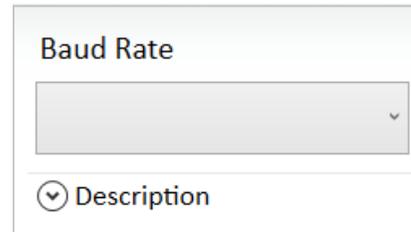
GNSS Attachment

<p>Additional Trip Action</p> <p>None</p> <p>Description</p>	<p>Baud Rate</p> <p></p> <p>Description</p>	<p>Collection Type</p> <p></p> <p>Description</p>	<p>Communication Delay</p> <p>- 0 +</p> <p>milliseconds</p> <p>Description</p>
<p>Front/Back Offset</p> <p>0</p> <p>feet</p> <p>Description</p>	<p>Left/Right Offset</p> <p>0</p> <p>inches</p> <p>Description</p>	<p>Port Name</p> <p></p> <p>Description</p>	<p>Receiver Type</p> <p>Generic</p> <p>Description</p>
<p>Trip Origin</p> <p>Antenna</p> <p>Description</p>			

GNSS Settings Screen Walkthrough

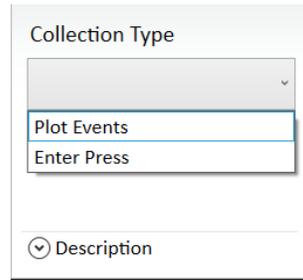


- ▶ Can allow one of two additional trip actions to perform after the main trip event.



- ▶ This is the communication speed in bits per second that you will be automatically set when you run the port detection tool.

GNSS Settings Screen Walkthrough (Cont.)



Collection Type

Plot Events
Enter Press

Description

- ▶ Defines how/when GNSS data will be collected for a plot during harvest.

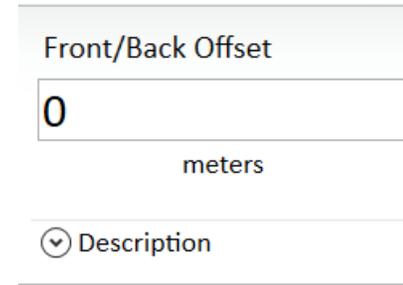


Communication Delay

- 0 +
milliseconds

Description

- ▶ This is an estimate in milliseconds on what the communication lag will be between the GNSS receiver and Mirus.



Front/Back Offset

0
meters

Description

- ▶ Position in meters away from GNSS antenna to equipment being triggered, either to the front or to the back. Distances to the front are positive, distances to the back are negative.

GNSS Settings Screen Walkthrough (Cont.)

Left/Right Offset

0

centimeters

Description

- ▶ Similar as the front/back offset, distance in centimeters from GNSS antenna to working equipment. Distances to right are positive, to the left are negative.

Port Name

Description

- ▶ This is the COM port Mirus will use to make a serial connection to the GNSS receiver on to receive NMEA data. This is auto set by GNSS Port Detector.

Receiver Type

Generic

Generic

Performance NMEA

Description

- ▶ Sets receiver as one of two types, generic means it has to be manually configured, performance NMEA means it can automatically configure itself, generic is the default setting.

GNSS Settings Screen Walkthrough (Cont.)



- ▶ This is the positional data point Mirus will use to trip the cycle as the point crosses the center of the alley. It can be where the antenna is or at an offset position. This can be used to represent the cone planter, sprayer head, GG locations, etc.

Distance Trip

Distance Tripping

No

▼ Description

- ▶ Enables the ability to trigger a cycle using the GNSS attachment and position data (in addition to the weight and/or level detect triggers) while in strip mode. Starts a cycle after GG has traveled a set distance in feet.

Trip Distance

0

feet

▼ Description

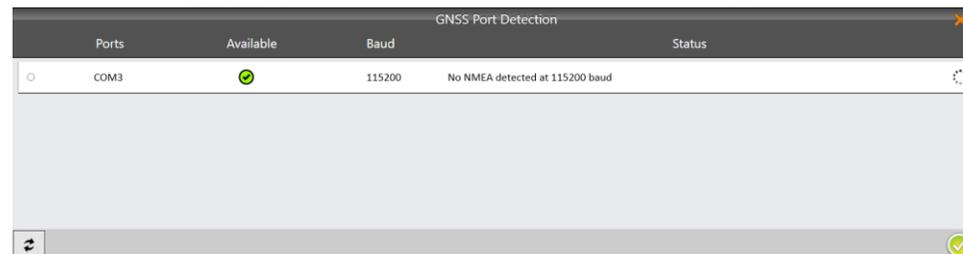
- ▶ Distance in feet that combine will travel before distance tripping will trigger cycle.

GNSS Port Detector

- ▶ This is the tool used to automatically detect which Serial COM port the attached GNSS receiver is using to transmit NMEA data on.

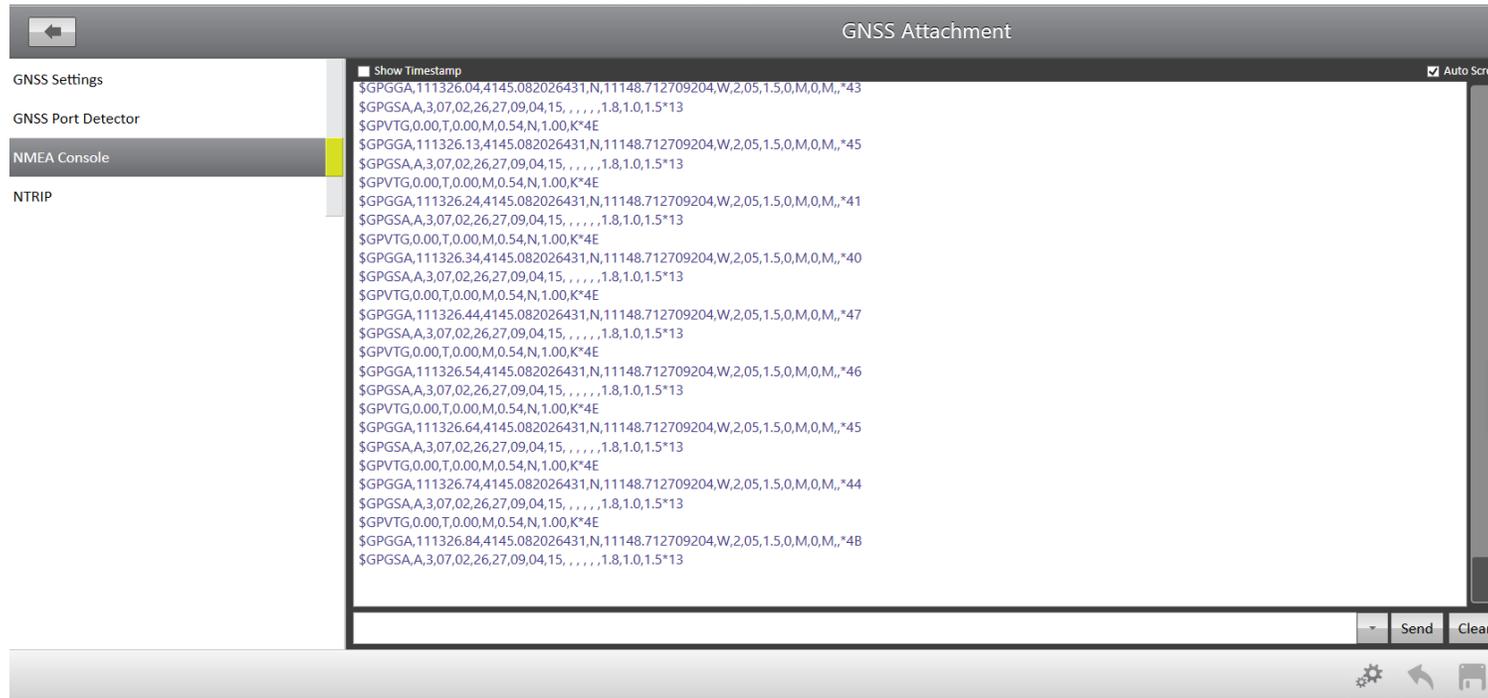


- ▶ Running the detector shows the ports, if they are available, the baud rate of each, and if NMEA strings are detected. Once the right port is discovered, checking the radio button will select the port and automatically set the port name and baud rate in the GNSS settings.



NMEA Console

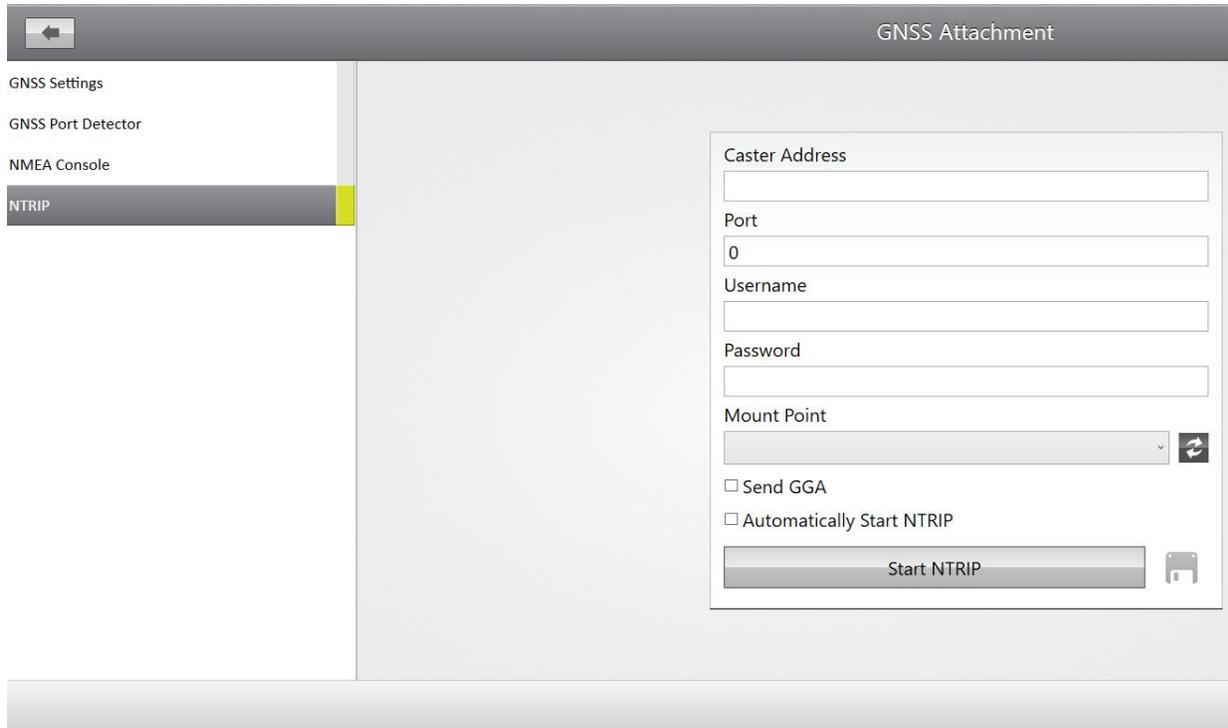
- ▶ If you are successfully connected to your GNSS receiver this console will show you the incoming NMEA strings that are being captured by your receiver.



- ▶ You can send HIDE LOG and SHOW LOG commands, as well as other commands to enable/disable information in the string or to filter the incoming NMEA string data.

NTRIP

- ▶ This is where you can enter your registration information for your NTRIP provider and associate your GNSS receiver as the mount point to automatically begin using NTRIP on startup.

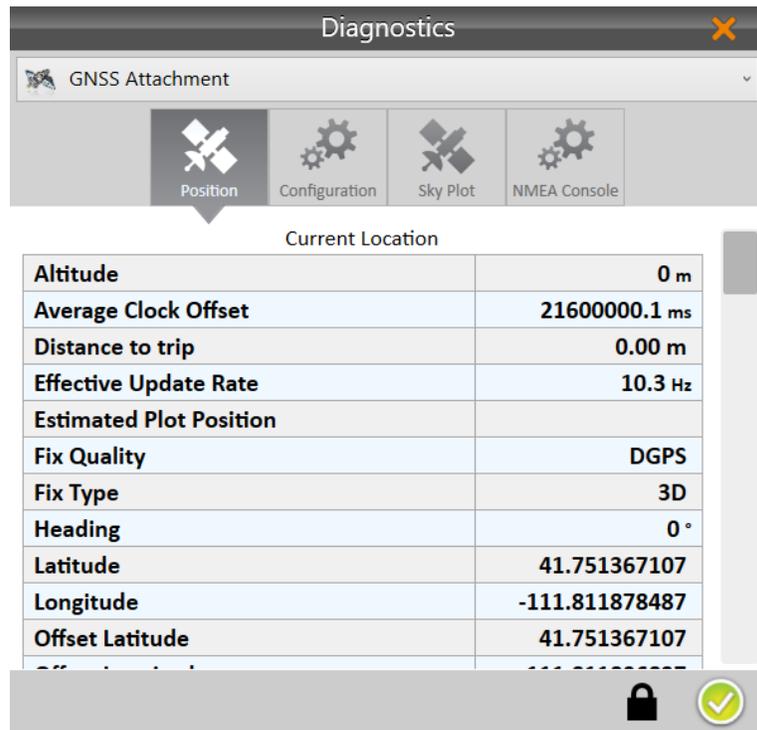


The screenshot shows a software interface titled "GNSS Attachment". On the left, there is a sidebar menu with the following items: "GNSS Settings", "GNSS Port Detector", "NMEA Console", and "NTRIP" (which is highlighted with a yellow bar). The main area of the interface contains a form with the following fields and options:

- Caster Address**: A text input field.
- Port**: A text input field containing the value "0".
- Username**: A text input field.
- Password**: A text input field.
- Mount Point**: A dropdown menu with a refresh icon to its right.
- Send GGA**
- Automatically Start NTRIP**
- Start NTRIP**: A button with a save icon to its right.

GNSS Attachment in Diagnostics

- ▶ Once you have setup and configured your GNSS receiver you can go into the diagnostics menu, select GNSS Attachment from the pull down and be able to see all the live information being reported by the receiver.



The screenshot shows a software interface titled "Diagnostics" with a close button (X) in the top right corner. Below the title bar is a dropdown menu labeled "GNSS Attachment". Underneath the dropdown are four icons representing different diagnostic views: "Position" (selected), "Configuration", "Sky Plot", and "NMEA Console". Below these icons is a section titled "Current Location" containing a table of GNSS data.

Current Location	
Altitude	0 m
Average Clock Offset	21600000.1 ms
Distance to trip	0.00 m
Effective Update Rate	10.3 Hz
Estimated Plot Position	
Fix Quality	DGPS
Fix Type	3D
Heading	0 °
Latitude	41.751367107
Longitude	-111.811878487
Offset Latitude	41.751367107

At the bottom of the interface, there is a lock icon and a green checkmark icon.

AB Lines in Maps w/GNSS Attachment

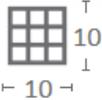
- ▶ After creating a new map in Mirus, you will be presented with an additional button to create an “AB Line”.
- ▶ AB Line, or A to B line, is an imaginary reference line where the points at each end of the line are created using GNSS positional data at each point. This line is then used as a reference in Mirus to layout the plot geometry of the field that the map represents.

Map With GNSS Attachment

Created: 5/4/2020 12:45:03 PM

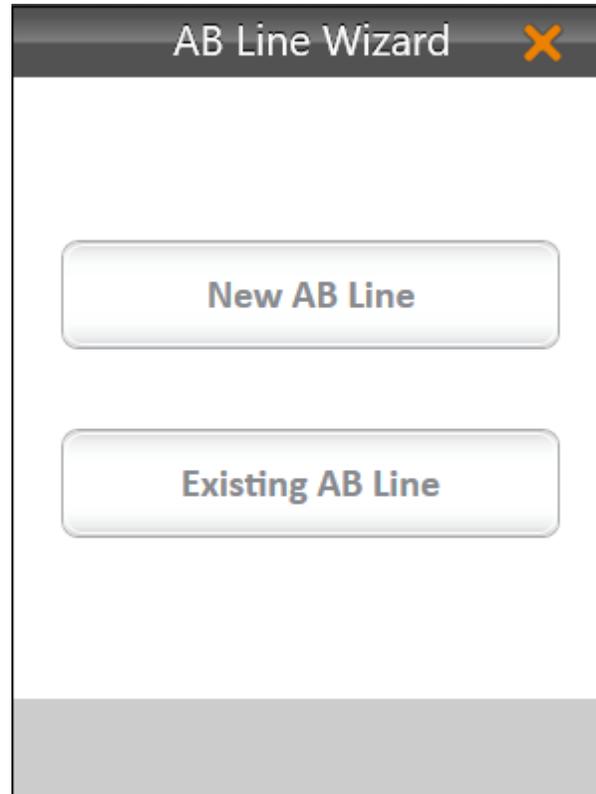
Location: C:\HarvestMaster\Mirus\Maps\Map With GNSS Attachment\Map With GNSS Attachment.hmf

Ranges Deep: 10 Rows Wide 10



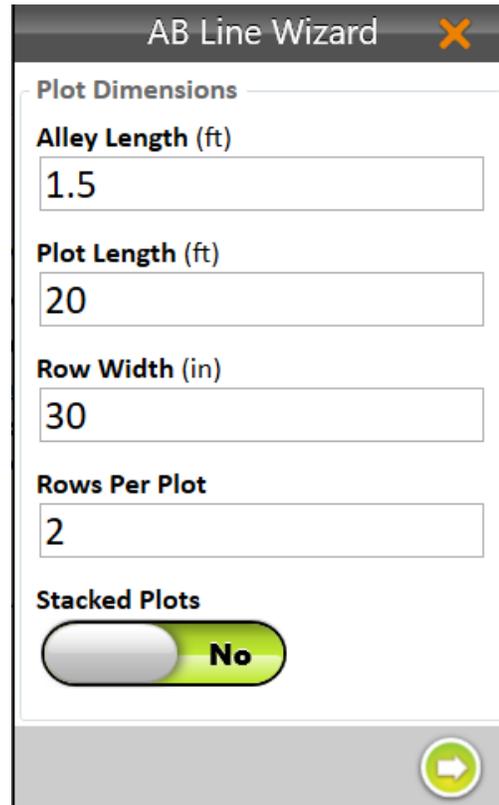
AB Line Wizard

- ▶ After clicking the “AB Line” button, the “AB Line Wizard” will open allowing you to create a new line or edit an existing AB Line.



AB Line Wizard(Cont.)

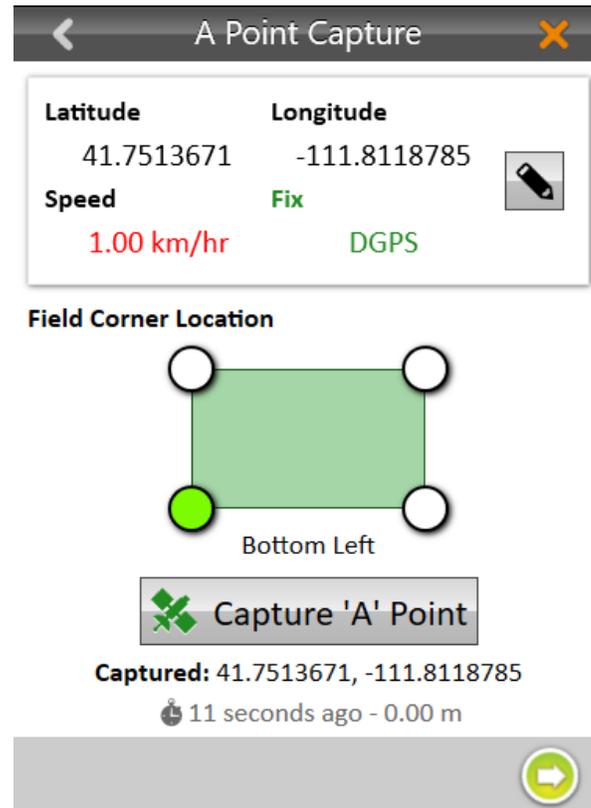
- ▶ When you create a new AB Line you will be asked to enter in the various distances that correspond with the layout of your field (i.e., alley length, plot length, row width, rows per plot, etc.)



The screenshot shows a mobile application dialog box titled "AB Line Wizard" with a close button (orange 'X') in the top right corner. The dialog is divided into sections for inputting field layout parameters. Under the "Plot Dimensions" section, there are four text input fields: "Alley Length (ft)" with the value "1.5", "Plot Length (ft)" with the value "20", "Row Width (in)" with the value "30", and "Rows Per Plot" with the value "2". Below these fields is a "Stacked Plots" section featuring a toggle switch currently set to "No". At the bottom right of the dialog is a green circular button with a white right-pointing arrow.

AB Line Wizard(Cont.)

- ▶ You will then move the GNSS receiver to the lower left-hand corner of the field and capture the 'A' point of the field by clicking the "Capture 'A' Point" button.



- ▶ You can also manually edit the latitude and longitude of the 'A' before capturing it.

AB Line Wizard(Cont.)

- ▶ Next you will go to the upper left-hand corner of the field and capture the 'B' point using the "Capture 'B' Point" button.

B Point Capture

Distance from 'A'
0.00 m

Bearing from 'A'
0.0 °

Latitude Longitude
41.7513671 -111.8118785

Speed Fix
1.00 km/hr DGPS

B Capture Orientation

Top Left

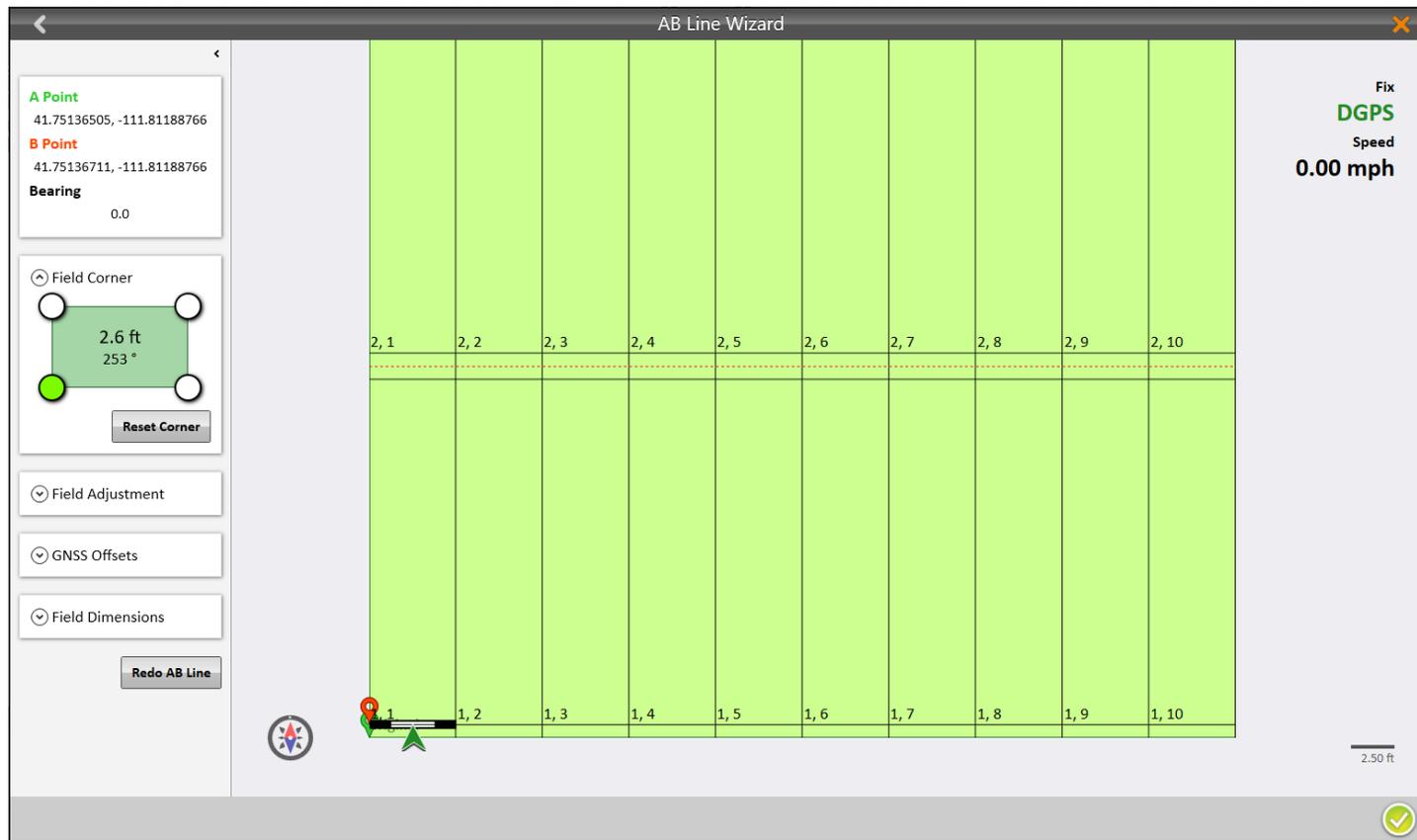
Capture 'B' Point

Captured: 41.751367, -111.811878
5 seconds ago - 0.00 m

- ▶ You can also edit your distance from the lower left hand 'A' corner and you're bearing from 'A' to 'B' in degrees to improve the accuracy of the field layout that will be generated when you hit the green next arrow.

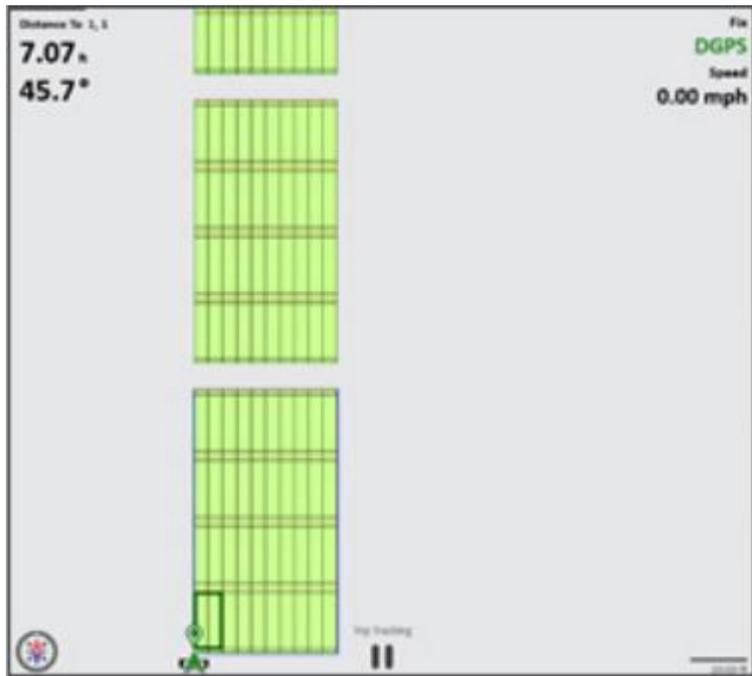
AB Line Wizard(Cont.)

- ▶ Finally, you will be shown what the calculated layout of your field will look like in Mirus using the AB Line information you captured.
- ▶ The A and B points, field corner, and additional field layout parameters that can be edited will be listed along the left-hand side of the screen.



Stacked Plots Feature

- ▶ A longer alley can be created after a specified number of ranges with shorter alleys; alley lengths can be variable and do not need to be uniform throughout the field layout.
- ▶ The following image represents 4 ranges with normal 3-foot alleys, then a separation between the next block of ranges by a larger 10-foot alley.



Field Dimensions

Alley Length (ft)
3

Plot Length (ft)
20

Row Width (in)
30

Rows Per Plot
2

Stacked Plots
 Yes

Plots Per Stack
- 3 +

Stack Alley Width (ft)
4

Apply

Field Width: 50 ft
Field Length: 242 ft
Map Size: 10x10

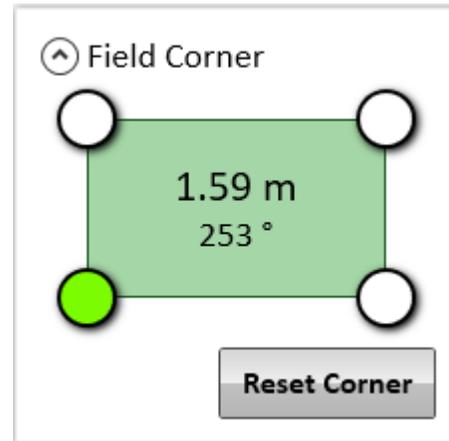


AB Line Wizard(Final Screen Walkthrough)

A Point
41.75136300, -111.81189684

B Point
41.75136711, -111.81189684

Bearing
0.0



Field Adjustment

Vertical Offset m
- 0 +

Horizontal Offset m
- 0 +

Apply

- ▶ Starting at the top of the left-hand side you will see the coordinates of both your 'A' and 'B' captured points.

- ▶ Going down you will next see the field corner area, with the option to reset the bottom left corner of your field if your 'A' was in a different location.

- ▶ Next you will see the field adjustment area where you can adjust vertical or horizontal widths of your field layout.

AB Line Wizard(Final Screen Walkthrough Cont.)

⬆️ GNSS Offsets
AB line was offset according to the current GNSS offsets configured

Front/Back Offset
0.00 m

Left/Right Offset
0.00 cm

- ▶ Next you will see the GNSS offsets that are currently set within the GNSS settings menu.

⬆️ Field Dimensions

Alley Length (ft)
1.5

Plot Length (ft)
20

Row Width (in)
30

Rows Per Plot
2

Stacked Plots
 No

Apply

Field Width: 50 ft
Field Length: 215 ft
Map Size: 10x10

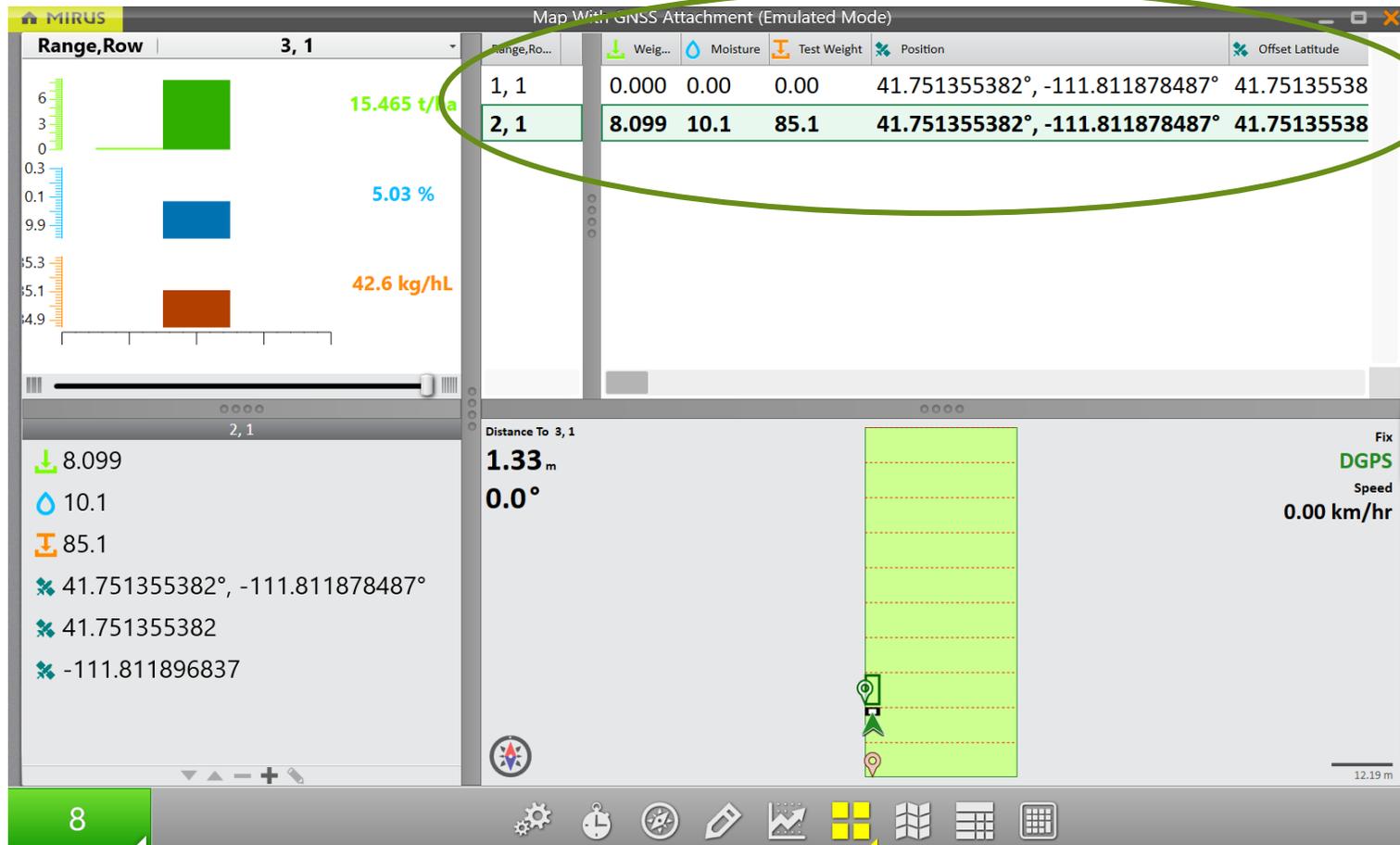
- ▶ Towards the bottom of the left-hand side is the field dimensions area where you can adjust any of the other measurements that are a part of your field layout.

Redo AB Line

- ▶ Finally, there is a 'Redo AB Line' button that will allow you to restart the wizard and re-capture your 'A' and 'B' lines if needed before finishing the wizard.

Harvesting w/GNSS Attachment

- ▶ If everything is setup properly you will then get GNSS positional data appended to the cycle data for each plot as the GG is cycled moving through the field.



Exporting GNSS Harvest Data

- ▶ After a field has been harvested and data collected, the map export utility will automatically include all GNSS traits in the data to be exported along with Weight/Moisture/Test Weight.

