



# INSTALLATION MANUAL

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# **Recon Blockage Plus™ Installation Manual**

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<b>Related Documentation</b>	
<b>Document Number</b>	<b>Document Title</b>
600820-000044	Recon Blockage Plus™ Quick Reference Guide
600820-000045	Recon Blockage Plus™ Troubleshooting Guide
600890-000075	Recon Blockage Plus™ Operator's Guide

# 1. Introduction

## 1.1. About Recon Blockage Plus™

Intelligent Ag's Recon Blockage Plus is an acoustic-based monitoring system that quickly and accurately notifies operators of blockages anywhere in their implement. Operators interact with the system via an iPad® app in the tractor cab.

For instructions to use the system after installation, see the Recon Blockage Plus Operator's Guide from the app's Guides  screen.

For current documentation, iPad and software requirements, and other resources, visit [intelligentag.com/support](http://intelligentag.com/support).

## 1.2. Required Tools and Equipment

You will need the following tools and equipment to install Recon Blockage Plus:

- Standard wrench and socket sets
- Measuring tape
- Cutting tool, such as a PEX tubing cutter, box cutter, or shears
- Pliers
- Phillips screwdriver
- Cordless drill and/or flathead screwdriver (optional)
- Paint pen or other permanent marking tool (optional)

## 1.3. Installation Overview

**ESTIMATED INSTALL TIME:** 6 hours

- Install flow sensors
- Install ECUs
- Connect auditory tubes to ECUs
- Install work switch
- Install gateway
- Install Wi-Fi antenna
- Install harnessing
- Install iPad mount and download app

## 2. Installing Flow Sensors

Flow sensors detect when product is flowing through the run.

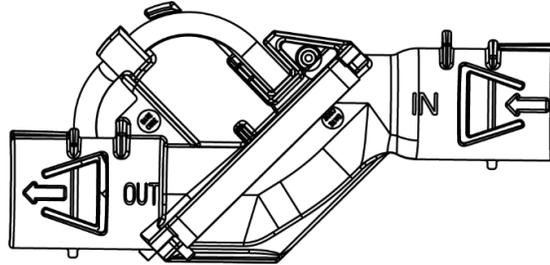


Figure 1: Flow sensor

### Provided Parts

Part Name	Part Number	Quantity
1-inch flow sensor <i>or</i> 1.25-inch flow sensor	153510-000022 <i>or</i> 153510-000066	1/run
Adapter (optional)	353070-000022 <i>or</i> 353070-000112 <i>or</i> 353070-000252	2/run
Hose clamp	356060-000025	2/run

### Tools Needed

- 5/16 inch socket, 5/16 inch nut driver on a cordless drill, or a flathead screwdriver
- Measuring tape
- Cutting tool, such as a PEX tubing cutter, box cutter, or shears

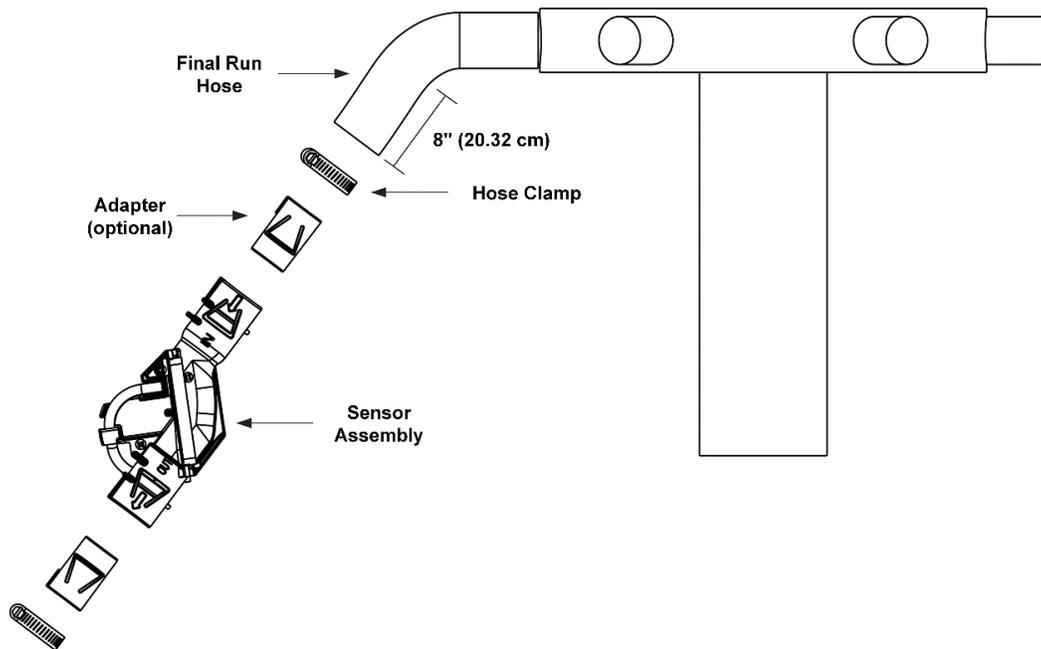
### Installation Location

Installed at the beginning of every final run hose.



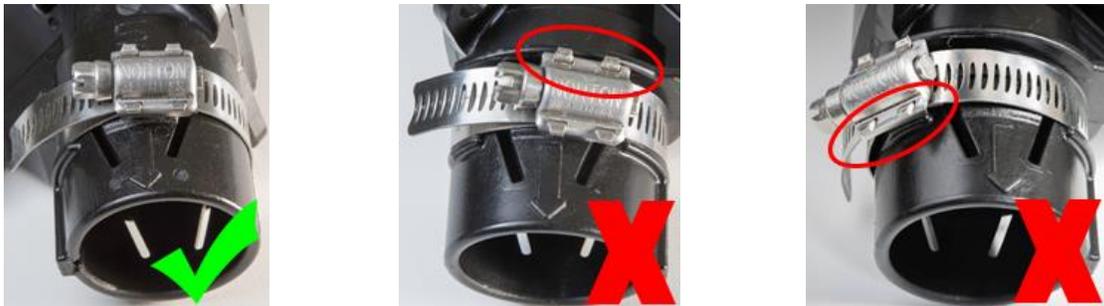
Figure 2: Flow sensor installation location

## Installing Flow Sensors



**Figure 3: Installing flow sensors on a manifold**

1. If you are using adapters, snap them into the sensor in the orientation shown in Figure 3.
2. Cut each original run hose to about 8 inches (20.32 cm), or other length that allows for a downward flow and appropriate fit once the sensor and adapters (if applicable) are installed.
3. Orient the sensor (153510-000022 or 153510-000066) so that the flow arrows point away from the manifold. Slide a sensor assembly on each final run hose piece until the hose piece hits the backstop inside of the sensor assembly. Make sure that you install the sensor so that the auditory tube is pointing up.
4. Secure using a hose clamp (356060-000025) between the two ridges on the end of the sensor assembly, ensuring that the hose clamp lays flat and the head (worm drive) does not hit the sensor ridge, as shown in Figure 4.



**Figure 4: Correctly placing the hose clamps**

5. Slide the remaining final hose piece into the lower end of the sensor assembly until the hose piece hits the backstop inside of the sensor assembly. Secure using a hose clamp between the two ridges on the end of the sensor assembly, ensuring that the hose clamp lays flat and the head (worm drive) does not hit the sensor ridge.

### 3. Installing ECUs

Electronic Control Units (ECUs) communicate the flow measurement data recorded by the flow sensors to the gateway.



Figure 5: ECU

#### Tools Needed

- Standard socket set

#### Installation Location

Installed underneath each implement manifold.



Figure 6: ECU installation location

## Installing the ECUs (Standard Orientation)

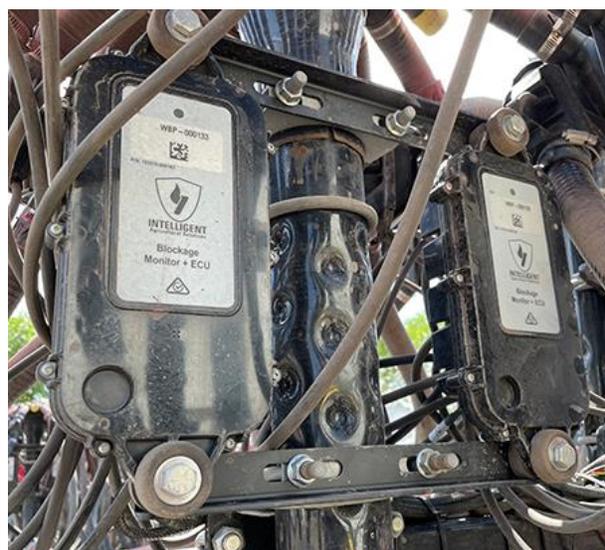
**NOTE:** This section is for installing the ECUs in the standard (vertical) orientation. If your dealer ordered you a horizontal mounting kit, skip this section and use the instructions in *Installing the ECUs (horizontal installation)*.

### Provided Parts

Part Name	Part Number	Quantity
ECU	153510-000182	1/manifold (for standard setup)
3/8" lock nut	352011-000045	2/ECU
3/8" flat washer	352012-000031	4/ECU
2.5" diameter U-bolt <i>or</i> 5" diameter U-bolt	352013-000007 <i>or</i> 356060-000108	2/manifold
Vibration damping mount	353070-000239	2/ECU
ECU mounting bracket	353070-000490	2/manifold
3/8" x 2" bolt	356060-000371	2/ECU



1 ECU per manifold



2 ECUs per manifold

**Figure 7: ECU installed on a tower (standard installation)**

**NOTE:** ECUs can be mounted in any order; however, we recommend installing the ECUs in numeric order from left to right (when facing the back of the tractor) based on the ECU's serial number. The serial number is located on the front of the ECU. Use the table in Appendix B to record your system setup.

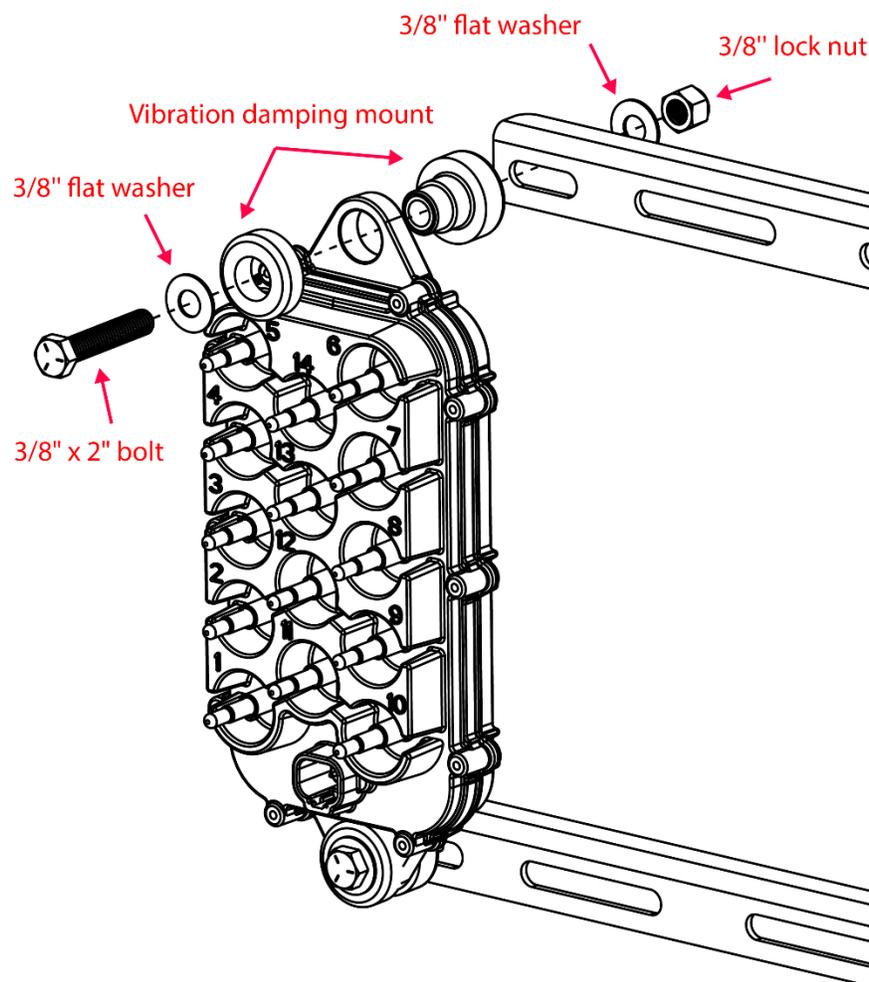


**Figure 8: Installing the ECUs from left to right**

1. Determine the number of ECUs (153510-000182) you need per manifold. The number of ECUs you use depends on the number of runs per manifold.

Runs per Manifold	ECUs
7 or fewer	1 ECU for 2 manifolds
8-14	1 ECU per manifold
More than 14	2 ECUs per manifold

2. Secure the top and bottom of the ECU to a bracket using a 3/8" x 2" bolt (356060-000371), washers (352012-000031), vibration damping mount (353070-000239), and lock nut (352011-000045) as shown in Figure 9. Hand tighten.



**Figure 9: Securing ECU to brackets**

3. If you're using 2 ECUs per manifold, install another ECU onto the other end of the brackets.
4. Orient the ECU so that the LED faces the tractor (recommended). Use u-bolts (352013-000007 or 356060-000108) to secure the center of the brackets to the manifold post, right below the manifold. Hand tighten.
5. Adjust the assembly as needed and fully tighten the hardware.

## Installing the ECUs (Horizontal Installation)

**NOTE:** This section is for installing the ECUs in the horizontal orientation. If you've already installed your ECUs in the standard (vertical) installation, skip this section.

### Provided Parts

Part Name	Part Number	Quantity
ECU	153510-000182	1/manifold (for standard setup)
3/8" lock nut	352011-000045	2/ECU, plus 2
3/8" flat washer	352012-000031	4/ECU, plus 4
2.5" diameter U-bolt <i>or</i> 5" diameter U-bolt	352013-000007 <i>or</i> 356060-000108	1/manifold
Vibration damping mount	353070-000239	2/ECU
ECU mounting bracket	353070-000490	2/ECU, plus 1
3/8" x 1" bolt	356060-000400	2/manifold
3/8" x 2" bolt	356060-000371	2/ECU

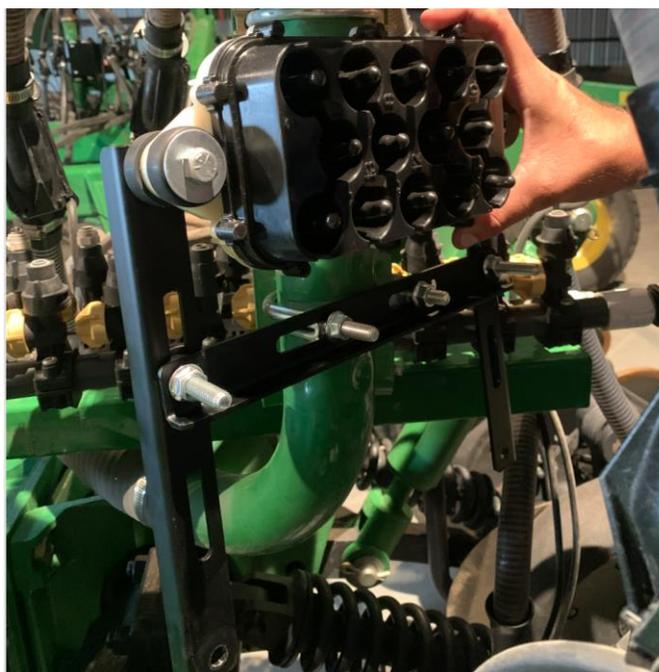


Figure 10: ECU installed on a tower (horizontal installation)

**NOTE:** ECUs can be mounted in any order; however, we recommend installing the ECUs in numeric order from left to right (when facing the back of the tractor) based on the ECU's serial number. The serial number is located on the front of the ECU. Use the table in Appendix B to record your system setup.

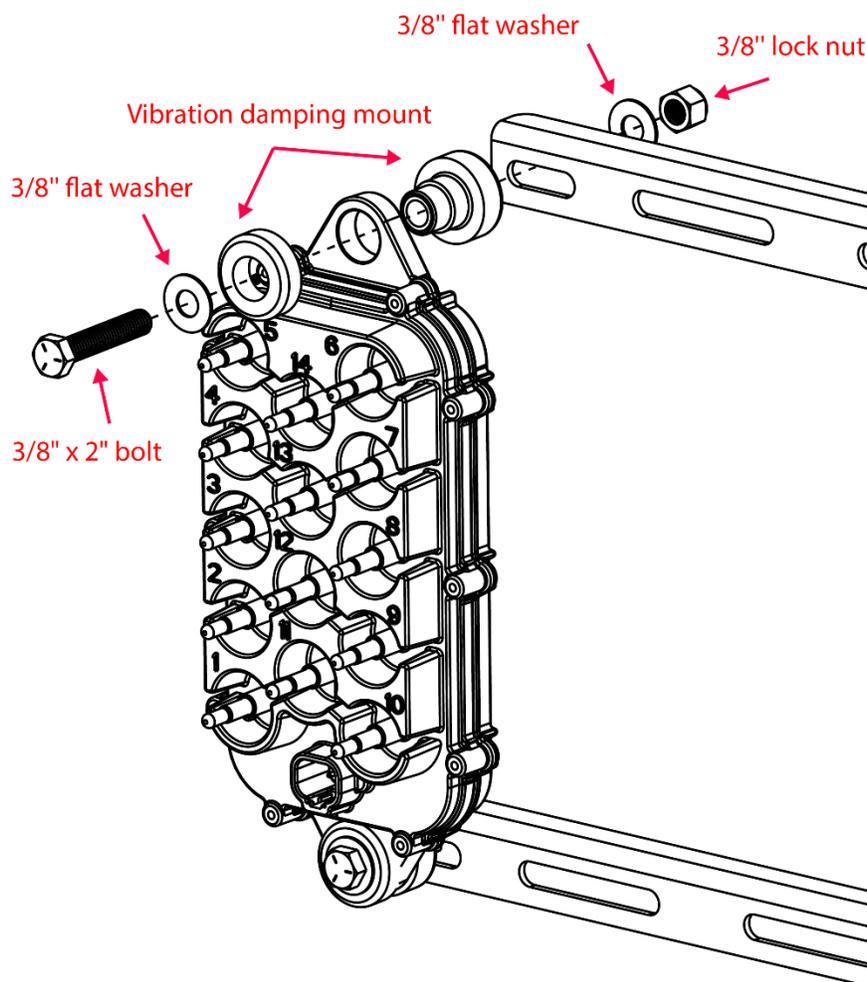


Figure 11: Installing the ECUs from left to right

1. Determine the number of ECUs (153510-000182) you need per manifold. The number of ECUs you use depends on the number of runs per manifold.

Runs per Manifold	ECUs
7 or fewer	1 ECU for 2 manifolds
8-14	1 ECU per manifold
More than 14	2 ECUs per manifold

2. Secure the top and bottom of the ECU to a bracket using a 3/8" x 2" bolt (356060-000371), washers (352012-000031), vibration damping mount (353070-000239), and lock nut (352011-000045) as shown in Figure 12.



**Figure 12: Securing ECU to brackets**

3. If you're using 2 ECUs per manifold, install another ECU onto the other end of the brackets.
4. Use 3/8" x 1" bolts (356060-000400), washers (352012-000031), and locknuts (352011-000045) to install a third bracket across the center of the two brackets, as shown in Figure 10.

5. Orient the ECU so that the LED faces the tractor (recommended). Use a u-bolt (352013-000007 or 356060-000108) to secure the center bracket to the manifold post. Hand tighten.
6. Adjust the assembly as needed and fully tighten the hardware.

## 4. Connecting Auditory Tubes to ECUs

The auditory tubes on the sensors allow sound to be transmitted from the sensor to the ECU.

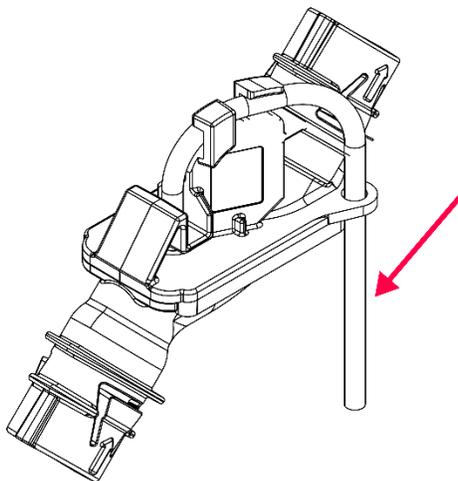


Figure 13: Auditory tube

### Tools Needed

- Pliers
- Paint pen or other permanent marking tool (optional)

### Connecting Auditory Tubes to ECUs

**IMPORTANT:** Do not cut or change the length of the auditory tubes. This will cause incorrect readings.

1. Remove the caps from the ECU ports that you will be using, beginning with ECU port 1. You will use one ECU port per sensor on the manifold. The number of ECUs you use depends on the number of runs per manifold.

Runs per Manifold	ECUs
7 or fewer	1 ECU for 2 manifolds
8-14	1 ECU per manifold
More than 14	2 ECUs per manifold

2. Locate the auditory tube of the sensor that is closest to the tractor when facing the back of the tractor (labeled “1” in Figure 14) and route it toward the ECU. connect the auditory tube to the port labeled “1”. Make sure that the hose is not kinked.

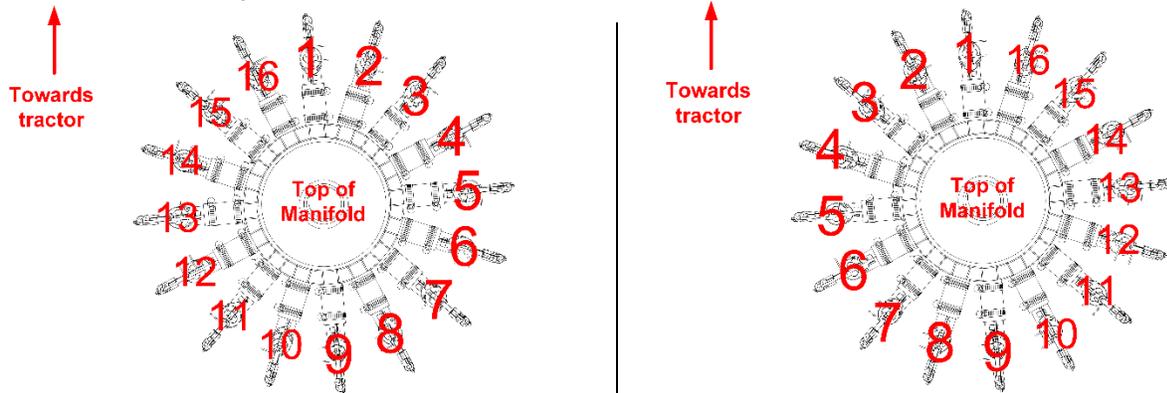


Figure 14: Order to connect flow sensors to ECU

Default order on left (clockwise), Reverse order on right (counterclockwise)

3. **Optional:** Mark the flow sensor hose with the ECU port number that the sensor is connected to.
4. Continue connecting auditory tubes to the ECU, working clockwise around the manifold as shown in Figure 14.

**NOTE:** If you connect ports in the reverse order, you can change the run direction while configuring the system in the app.

## 5. Installing the Work Switch

The work switch signals to the app when the implement is in or out of the ground.



Figure 15: Work switch

### Provided Parts

Part Name	Part Number	Quantity
Work switch assembly	353070-000534	1

### Tools Needed

- None

### Installation Location

Installed in a location where the work switch tilts from one end to the other when the toolbar is changing from raised to lowered positions.



Figure 16: Work switch mounting location

## 5.1. Installing the Work Switch

The work switch is a mercury switch, meaning the switch is engaged when the mercury inside is tilted toward the wires and it contacts the electrical leads.

Mount the work switch (353070-000534) in a location where the work switch tilts from one end to the other when the toolbar is changing from raised to lowered positions.

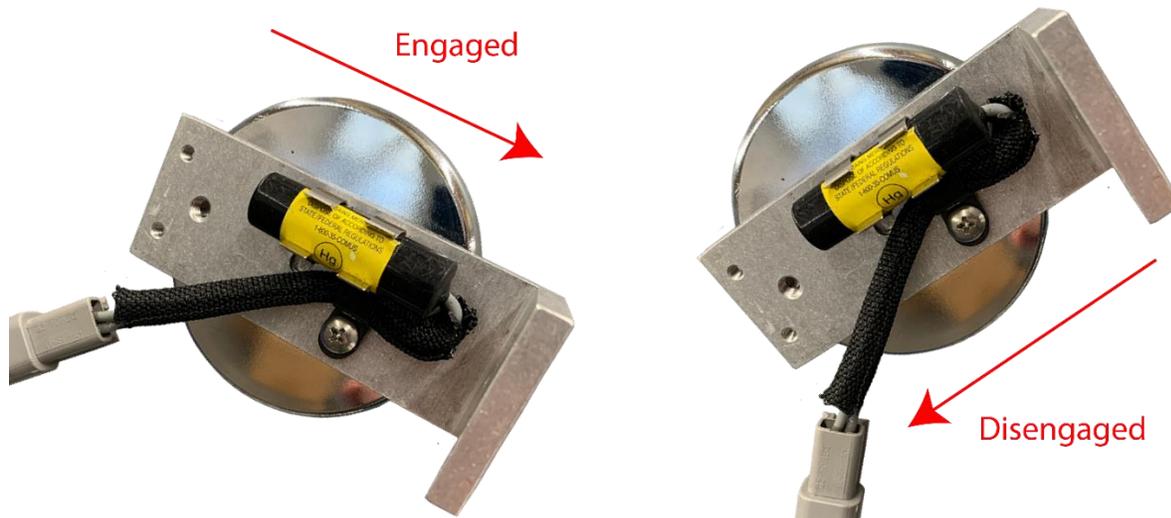


Figure 17: Work switch functionality

## Determining Work Switch Method

The work switch uses one of two methods to determine when the implement is in the ground:

- **Default method**
  - The work switch is **tilted toward the wires** when the implement is **in the ground**.
  - The work switch is **tilted away from the wires** when the implement is **out of the ground**.
- **Inverted method**
  - The work switch is **tilted away from the wires** when the implement is **in the ground**.
  - The work switch is **tilted toward the wires** when the implement is **out of the ground**.

Take note of your work switch method. It will be configured during system configuration in the app. See the Recon Blockage Plus™ Operator's Guide (Intelligent Ag document number 600890-000075) for instructions.

## 5.2. Verifying Work Switch Installation

Refer to Section 2.3 of the Operator's Guide for instructions to verify that the work switch was correctly installed and configured.

## 6. Installing the Gateway

The gateway is a computing platform that sends ECU data to the iPad through the Wi-Fi antenna.

### Provided Parts

Part Name	Part Number	Quantity
Gateway 260	153010-000085	1
1/4" flat washer	352012-000002	8
U-bolt	352013-000007, 356060-000152, or 356060-000403	2
Gateway mounting bracket	353070-000079	1
3/8" locknut (for square u-bolts)	356060-000094	4
3/8" washer (for square u-bolts)	356060-000239	4
1/4" nut	356060-000241	4
1/4" x 2-1/2" screw	356060-000303	4

### Tools Needed

- Standard wrench set

### Installation Location

Mounted on the tractor or on top of the air cart. Refer to the steps below for specific mounting locations for your air cart configuration.

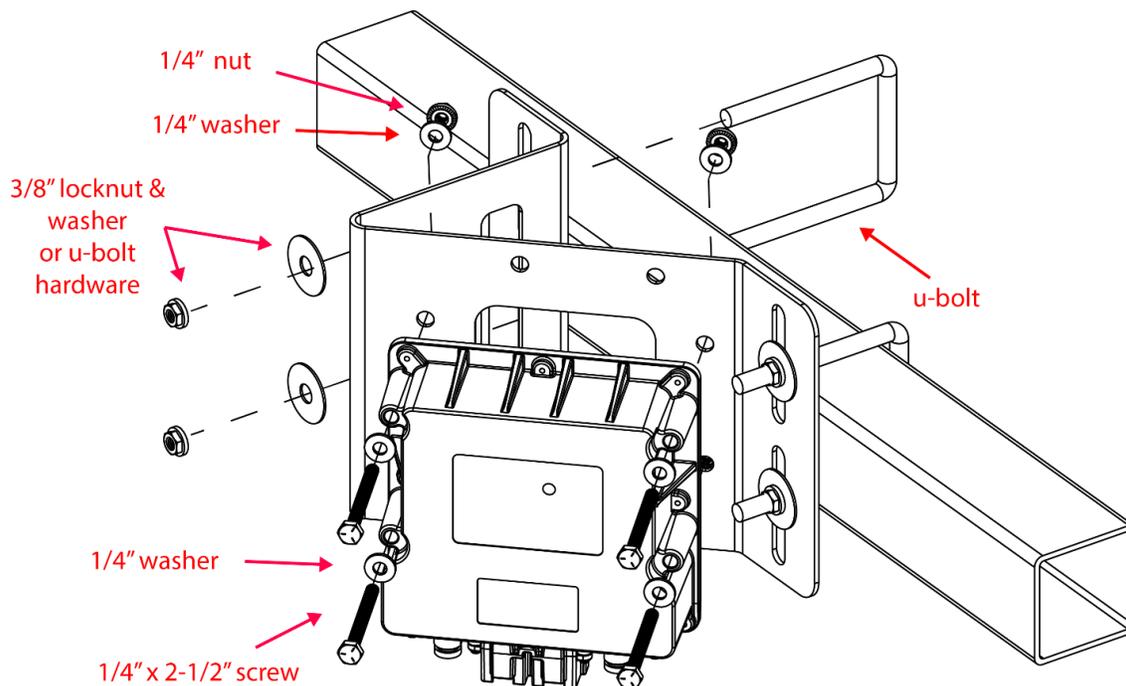


Figure 18: Mounting a gateway

1. Position the gateway (153010-000085) on the mounting bracket (353070-000079). The gateway can be mounted on the bracket in any direction, but the connectors should not face up when the bracket is mounted on the air cart or tractor.
2. Secure the gateway to the mounting bracket using the provided screws (356060-000303), washers (352012-000002), and nuts (356060-000241) as shown in Figure 18.
3. Mount the gateway according to the instructions below for your air cart configuration. The mounting location must be at least 8 inches (20 cm) away from the operator to ensure safe operation.
  - **Tow-behind:** Mount the gateway on the exterior frame of the tractor or inside the cab. Make sure that the gateway is within reach of the antenna cables. Secure it to the mounting location using u-bolts and the included u-bolt hardware or locknuts (356060-000094) and washers (356060-000239).
  - **Tow-between:** Mount the gateway on the rear of the air cart catwalk, facing rearward. Make sure that the gateway is within reach of the antenna cables. Secure it to the mounting location using u-bolts and the included u-bolt hardware or locknuts (356060-000094) and washers (356060-000239).



Example tow-behind mounting location



Example tow-between mounting location

**Figure 19: Example gateway mounting locations**

## 7. Installing the Wi-Fi Antenna

The Wi-Fi antenna sends information from the Recon Blockage Plus™ system to the iPad.

### Provided Parts

Part Name	Part Number	Quantity Needed
SMA cap	251015-000139	2
SMA terminator jack	251015-000272	1
Wi-Fi antenna	252005-000010	1
U-bolt	352013-000007 or 356060-000152	2
Antenna bracket	353070-000083	1
3/8" locknut (for square u-bolts)	356060-000094	4
3/8" washer (for square u-bolts)	356060-000239	4

### Tools Needed

- Standard wrench set

### Installation Location

Mounted on the rear of the tractor or on top of the air cart. Refer to the steps below for specific mounting locations for your air cart configuration.

### Installing the Wi-Fi Antenna

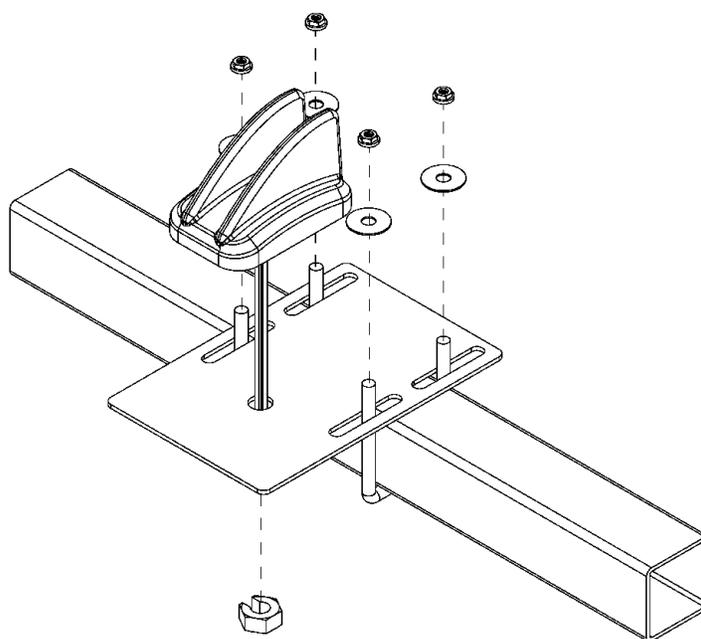


Figure 20: Mounting the Wi-Fi antenna

1. Thread the Wi-Fi antenna (252005-000010) cables through the hole in the mounting bracket (353070-000083) and through the nut. Tighten the nut to secure the antenna to the bracket. Do not over-torque.
2. Mount the antenna and bracket according to the instructions below for your air cart configuration. The mounting location must be at least 2 feet (60 cm) away from the operator and at least 8 inches (20 cm) from the gateway to ensure safe operation.
  - **Tow-behind cart:** Mount the bracket high on the exterior of the rear of the tractor cab using u-bolts (352013-000007 or 356060-000152). Secure with the included u-bolt hardware or locknuts (356060-000094) and washers (356060-000239).
  - **Tow-between cart:** Mount the bracket on the air cart catwalk using u-bolts (352013-000007 or 356060-000152). Secure with the included u-bolt hardware or locknuts (356060-000094) and washers (356060-000239).



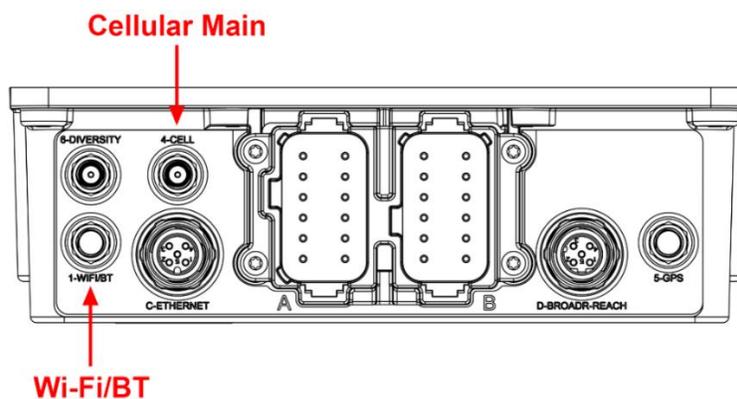
Example tow-behind mounting location



Example tow-between mounting location

**Figure 21: Example Wi-Fi antenna mounting locations**

3. Connect the Cellular Main and Wi-Fi/BT antenna cables to the gateway.



**Figure 22: Gateway connections**

4. Cap the 433 MHz antenna cable with the SMA terminator jack (251015-000272). Zip-tie the cable to the other cables.
5. Cover connectors 5 and 6 with the provided caps (251015-000139).

## 8. Installing Harnessing

The wiring harnesses provide power from the tractor to Recon Blockage Plus™.

**NOTE:** The gateway uses the tractor's key switch for proper operation. Make sure that the key switch is wired to the key switch terminal of the 3-pin power outlet in the tractor cab.

Part Name	Part Number	Quantity
4 Pin sealing plug	153510-000051	2
Cable tie	355032-000004	varies
20' ECU harness	353050-000097	1/ECU
Power harness	353050-000098	1 (tow-behind cart) or 2 (tow-between cart)
10' ECU harness (dual-shoot systems only)	353050-000099	1/ECU
Tractor harness	353050-000100	1
Gateway harness	353050-000101	1
Gateway extension harness (tow-between carts only)	353050-000103	2
3 pin CAN terminator plug	356070-000104	2

### Tools Needed

- None

### Installation Location

Refer to Appendix A for wiring diagrams for your implement type.

#### 8.1. Installing 10' ECU Harnesses (353050-000099) (dual-shoot only)

**NOTE:** If you have a single shoot system, skip this step.

1. Connect **S2** of a 10' ECU harness (353050-000099) to each **4-pin connector** on a Product A ECU.
2. Connect **S3** of a 10' ECU harness to **4-pin connector** on each Product B ECU near it.

#### 8.2. Installing 20' ECU Harnesses (353050-000097)

1. Connect **S3** of a 20' ECU harness (353050-000097).
  - **Dual-shoot:** Connect **S3** of a 20' ECU harness to **S1** of each 10' ECU harness.
  - **Single-shoot:** Connect **S3** of a 20' ECU harness to each ECU's **4-pin connector**.
2. Locate the two centermost ECUs, then connect the gateway harness.
  - a. Connect **S4** of the gateway harness to **S1** of the left-center 20' ECU harness
  - b. Connect **S3** of the gateway harness to **S1** of the right-center 20' ECU harness.

3. Chain the remaining 20' ECU harnesses together by connecting **S1** to **S2**.
4. Insert a **4 pin sealing plug** (153510-000051) into **S2** of the leftmost and the rightmost 20' ECU harnesses at the end of the implement.

### 8.3. Installing the Gateway Harness (353050-000101)

1. Connect **S6** of the gateway harness (353050-000101) to the **connector on the work switch**.
2. Connect **S1** of the gateway harness.
  - a. **Tow-behind:** Connect **S1** of the gateway harness to **Port A** of the gateway.
  - b. **Tow-between:** Connect **S1** of the gateway harness to **S3** of a gateway extension harness (353050-000103).
3. Connect **S2** of the gateway harness.
  - a. **Tow-behind:** Connect **S2** of the gateway harness to **Port B** of the gateway.
  - b. **Tow-between:** Connect **S2** of the gateway harness to **S4** of a gateway extension harness.
4. Insert a **3 pin CAN terminator plug** (356070-000104) into **T1** and **T2** of the gateway harness.

### 8.4. Installing the Gateway Extension Harnesses (353050-000103) (Tow-Between Only)

**NOTE:** If you have a tow-behind air cart, skip this step.

1. Connect **S2** of the gateway extension harness to **S4** of another gateway extension harness.
2. Connect **S1** of the gateway extension harness to **S3** of another gateway extension harness.
3. Connect **S1** of the second gateway extension harness to **Port A** of the gateway.
4. Connect **S2** of the second gateway extension harness to **Port B** of the gateway.

### 8.5. Installing the Power Harness (353050-000098)

1. Connect **S2** of the power harness (353050-000098) to **S5** of the gateway harness.
2. If you're installing on a **tow-between cart**, connect **S1** of the power harness to **S2** of another power harness.

### 8.6. Installing the Tractor Harness (353050-000100)

1. Connect **S2** of the tractor harness (353050-000100) to **S1** of the closest power harness (if you have more than one).
2. Connect **S1** of the tractor harness to the tractor's **three-pin power outlet** in the tractor cab.

**NOTE:** If your tractor does not have a convenience plug, contact your dealer for assistance.

## **8.7. Securing Loose Harnessing**

Coil any loose harnessing around a hydraulic line or electrical wire. Secure all harnessing to the tractor and/or implement using cable ties (355032-000004)

## 9. Installing the iPad Mount and App

### 9.1. Installing the iPad Mount

Part Name	Part Number	Quantity needed
USB charger	254040-000002	1
Tablet mount arm	352004-000003	1
Rail attachment	352004-000004	1
iPad mount (for 9"-11.5" iPads)	356070-000089	1

#### Tools Needed

- Phillips screwdriver

#### Installation Location

Installed on a mounting bar in the tractor cab, or anywhere in the tractor cab where it is easily visible and within reach of the operator while seeding.



Figure 23: Installing the iPad mount

## Installing the iPad Mount

1. Connect the iPad mount (356070-000089) to the tablet mount arm (352004-000003) and rail attachment (352004-000004) according to the instructions provided with the mount. Then, mount it to the cab's mounting bar or other desired installation location.
2. Place the iPad into the iPad mount.
3. Plug the USB charger (254040-000002) into the tractor's cigarette lighter receptacle. Use it to keep the iPad charged while using the system.

## 9.2. Downloading the Recon Blockage Plus app

To interface with the system, you need to download the Recon Blockage Plus app from the Apple App Store and install it onto your iPad.

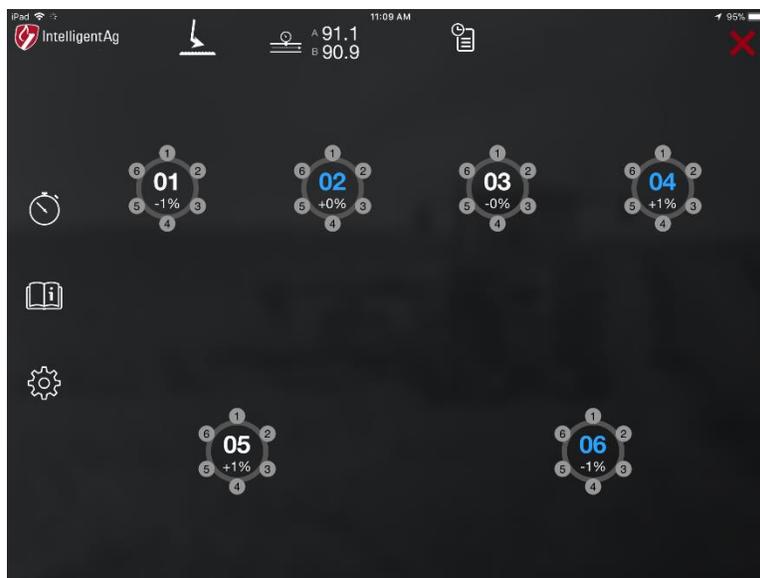


Figure 24: Recon Blockage Plus app

1. Connect the iPad to the internet.
2. Tap the **App Store** icon from the iPad's home screen.
3. Tap **Search** in the bottom right corner of the App Store screen.
4. Type *Intelligent Ag* in the search field, then tap **Search**.
5. Tap the Recon Blockage Monitor app when it appears in your search results.
6. Tap the **Get** button, and then tap **Install**. Enter your Apple ID and password, if prompted. A progress bar will appear over the app's icon while it is downloading.

**IMPORTANT:** When you open the app for the first time, you will be prompted to enable location services. Select **Only While Using the App** or **Always Allow**. If you select **Don't Allow**, this will prevent the iPad from connecting to the "IASBlockage" network.

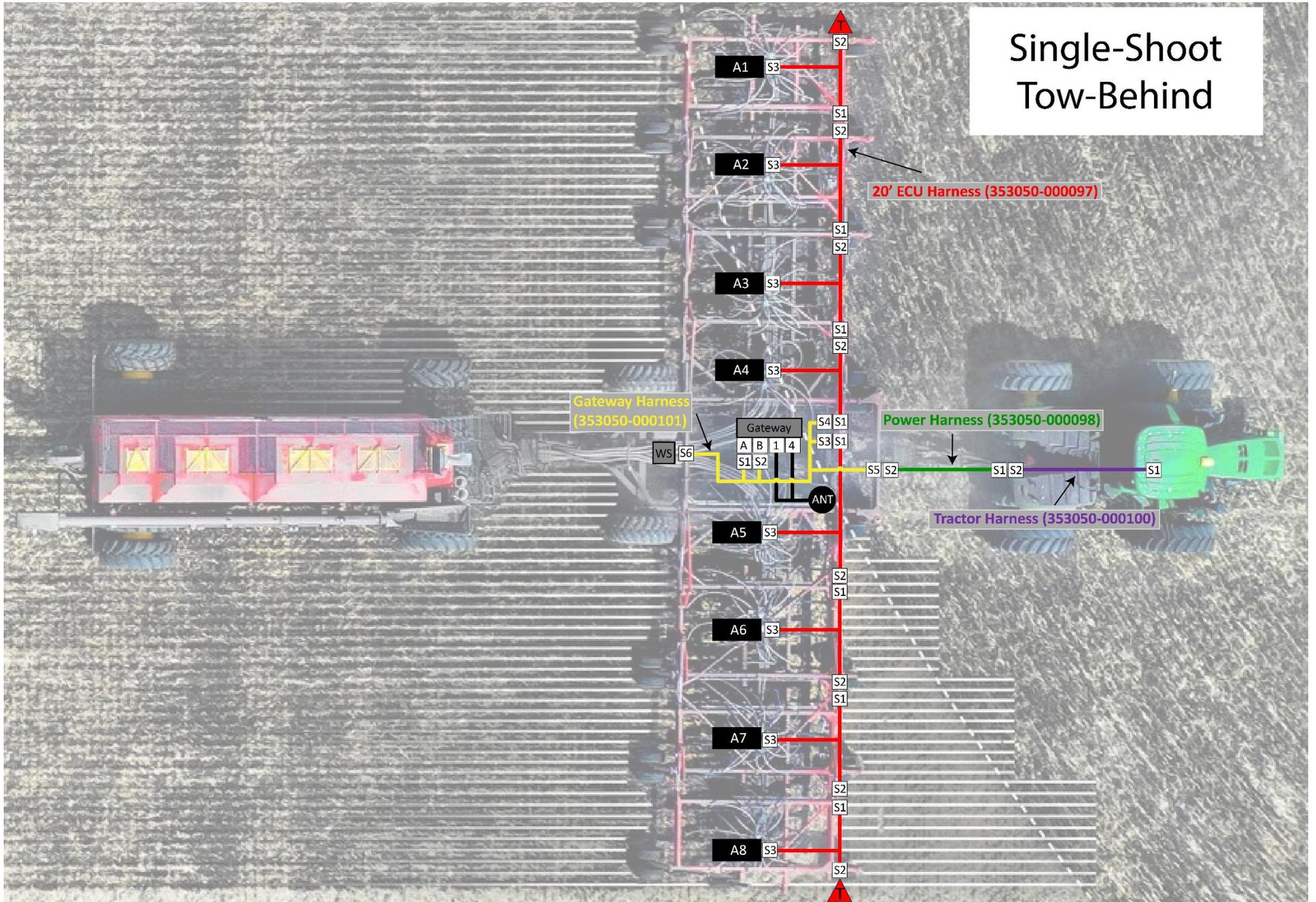
### 9.3. Connecting to the Gateway

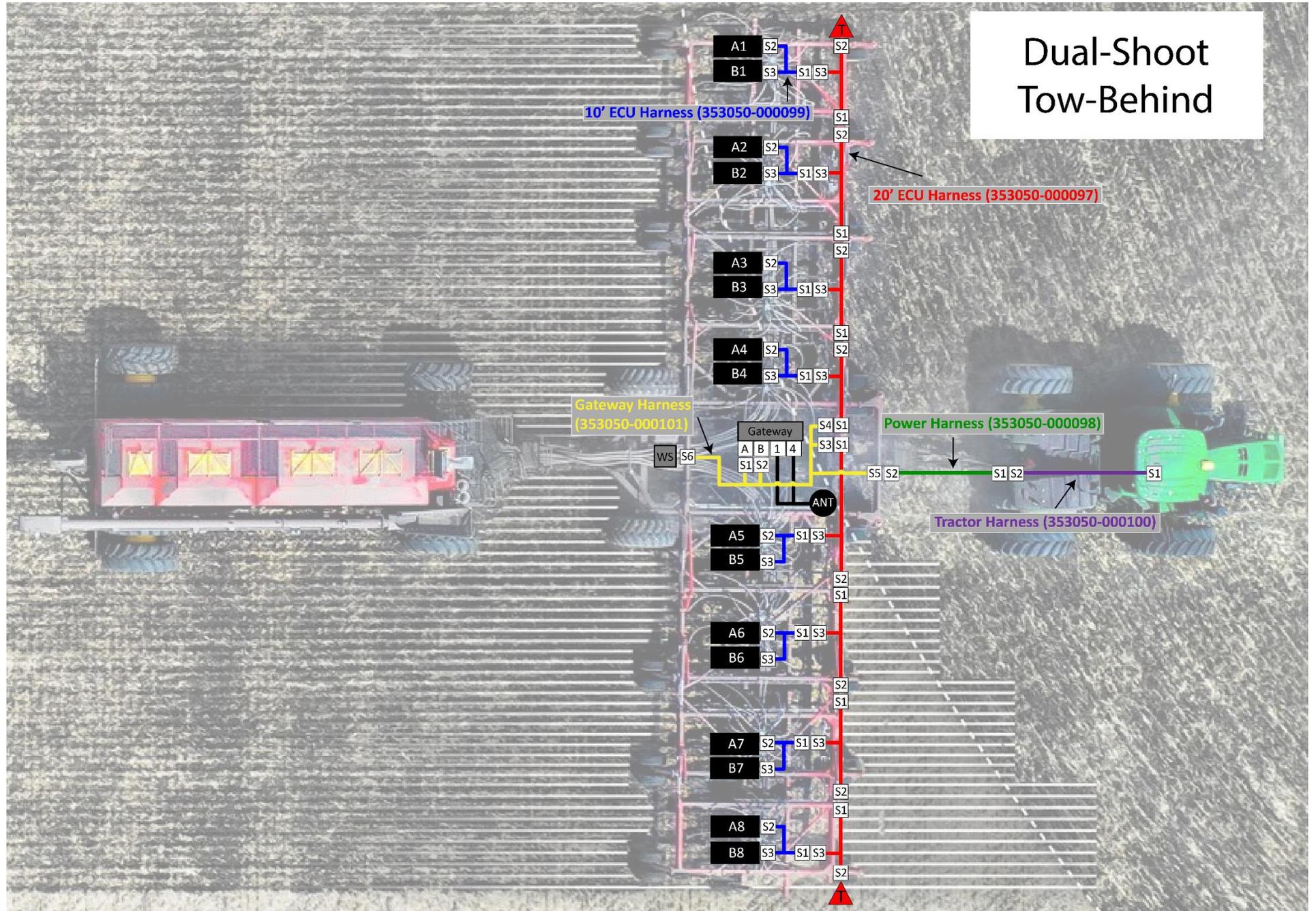
1. Make sure that you have power to the gateway. The gateway's LED is green when it's done booting.
2. Tap the **Settings** icon on your iPad's home screen.
3. Tap **Wi-Fi**. Then, connect to the *Gateway-XXXXXX* network (if it's your first time using the system) or the **IASBlockage** network  
*“XXXXXX” represents the gateway's serial number.*
4. Open the Recon Blockage Plus app from the iPad's Home screen. Follow the on-screen prompts to begin configuring your system

For instructions to configure and use Recon Blockage Plus™ after installation, see the Recon Blockage Plus Operator's Guide (600890-000015) from the app's Manuals screen.

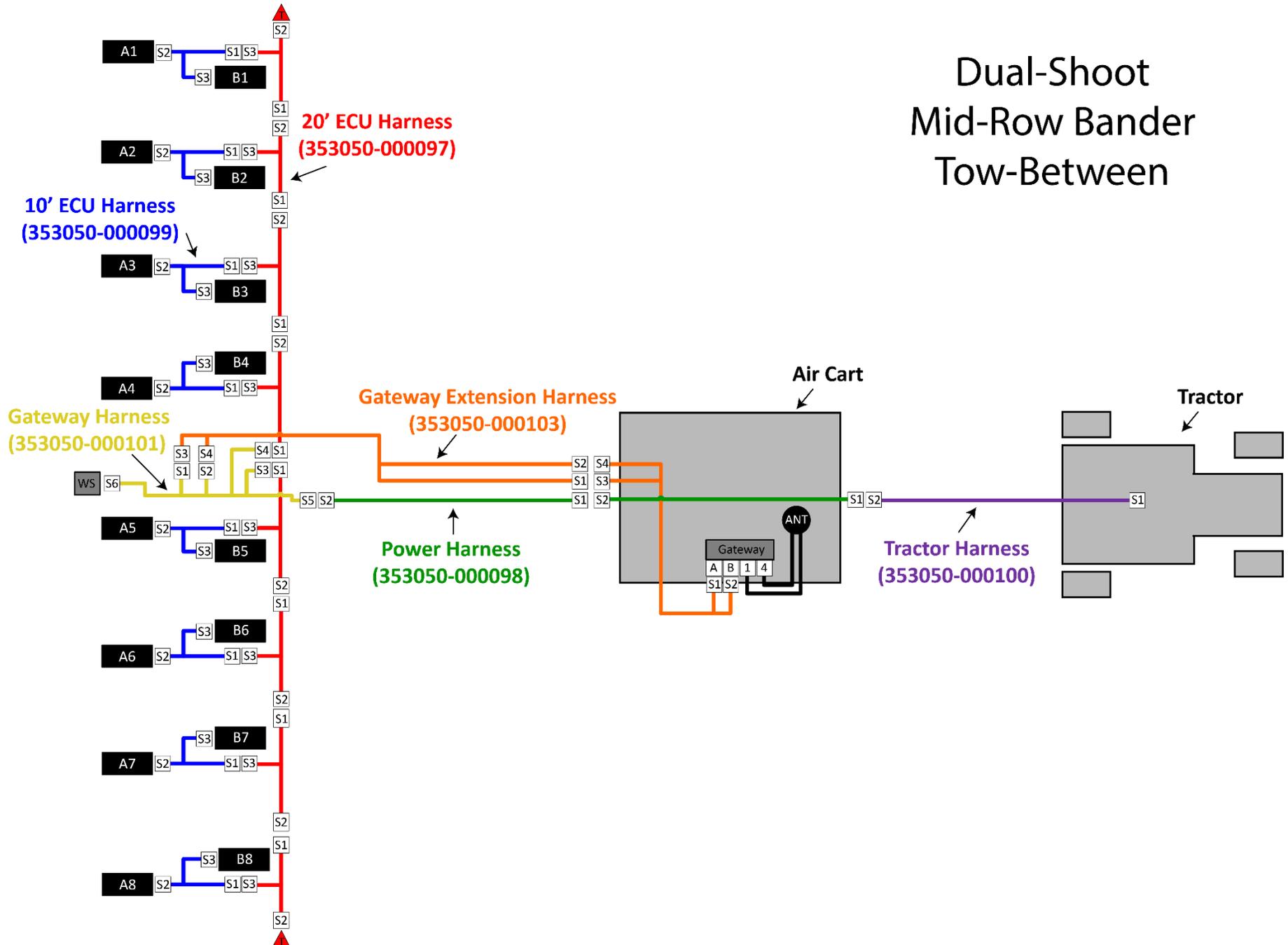








# Dual-Shoot Mid-Row Bander Tow-Between



# Dual-Shoot Mid-Row Bander Tow-Behind

