

RECON

SPREADSENSE®

INSTALLATION MANUAL

Document revision: 1.4

Last revised: February 5, 2020



Recon SpreadSense® Installation Manual

© 2017-20 Intelligent Agricultural Solutions. All Rights Reserved.

Recon SpreadSense® Installation Manual. All content within is copyrighted by Intelligent Agricultural Solutions, and may not be reprinted without permission.

The content of this manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by Intelligent Agricultural Solutions. Intelligent Agricultural Solutions assumes no responsibility or liability for any errors or inaccuracies that may appear in the content contained in this guide.

Patent pending. Recon, SpreadSense®, Intelligent Agricultural Solutions, Intelligent Ag, Intelligent Ag Monitoring Solutions, IAS, and the IAS logo are trademarks or registered trademarks of Intelligent Agricultural Solutions. iPad is a registered trademark of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc. All other trademarks are property of their respective owner.

Intelligent Agricultural Solutions, 1810 NDSU Research Circle North, Fargo, ND 58102 USA.

Visit us on the web at www.intelligentag.com/support
Questions? E-mail us at info@intelligentag.com

Table of Contents

1.	Getting Started.....	5
1.1.	About Recon SpreadSense®.....	5
1.2.	Compatible Floaters.....	5
1.3.	Required tools and Equipment.....	5
1.4.	Installation Overview.....	6
2.	Installing Flow Sensors	7
3.	Installing ECUs	9
4.	Connecting Auditory Tube to ECUs.....	12
5.	Connecting Harnessing	13
5.1.	Install ECU Wiring Harnesses.....	13
5.2.	Install Gateway Harness	13
5.3.	Connect Cab Harness	13
6.	Installing the Gateway	14
7.	Install Wi-Fi antenna	17
8.	Install the iPad and SpreadSense® App	20
8.1.	Install the iPad Mount	20
8.2.	Download the SpreadSense® App	21
8.3.	Connect to the Gateway	21
9.	Daily Maintenance.....	22

Record of Revision			
Revision Number	Change Description	Revision Date	Inserted By
1.0	Initial release	11/29/17	AAL
1.1	Added alternate gateway mounting instructions and clarified some steps	6/21/18	AAL
1.2	Updated with new hardware	9/19/18	AAL
1.3	Removed incompatible system, added new hose clamps, updated ECU install instructions, added system maintenance	1/02/19	AAL
1.4	Added new compatible machines, gateway model, and harnessing	2/05/20	AAL

1. Getting Started

1.1. About Recon SpreadSense®

Recon SpreadSense is the industry's first blockage monitor for floaters. Utilizing the same acoustic technology developed for other Recon monitoring systems, Recon SpreadSense provides reliable real-time blockage detection. Acoustic sensors installed on the back of each deflector listen to the material flow and send sound pulses through auditory tubes, similar to a stethoscope. The data is collected by the Electronic Control Unit (ECU), which displays the information on an iPad® in the cab. If there's a blockage anywhere in the system, you'll know.

For instructions to use and configure SpreadSense, see the Recon SpreadSense Operator's Guide (Intelligent Ag document number 600890-000015) from the SpreadSense app's Guides screen.

For installation videos and current documentation, visit www.intelligentag.com/support.

For iPad and software requirements, visit www.intelligentag.com/support/ipad-buying-guide.

1.2. Compatible Floaters

Recon SpreadSense can be installed on the following floaters:

- TerraGator AirMax Precision
- RoGator AirMax Precision
- John Deere F4365 AB485
- Titan 810 Flex-Air
- RBR Enterprise 810 Flex-Air

1.3. Required tools and Equipment

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

- Standard wrench and socket sets
- Cordless drill with 5/16 driver and/or flathead screwdriver
- Cleaning rags
- Two flathead screwdrivers, WD-40, rag, brake cleaner (if removing flow sensors)



WARNING: Do not use a high pressure washer on electronic components.

1.4. Installation Overview

ESTIMATED INSTALL TIME: 6 hours

Recon SpreadSense® is installed through the following steps:

- Install flow sensors
- Install ECUs
- Connect auditory tubes to ECUs
- Connect harnessing
- Install gateway
- Install Wi-Fi antenna
- Install iPad and SpreadSense app

NOTE: Detailed wiring diagrams are found in Appendix B.

2. Installing Flow Sensors

Flow sensors detect when product is impacting the deflector.

Part name	Part number	Quantity
Sensor	153510-000085	1/deflector
Auditory tube	353070-000138 <i>and/or</i> 353070-000238	1/sensor
Alcohol wipes	356070-000063	varies

Installation location

Mount flow sensors on each deflector. **See Appendix A for sensor placement diagrams.**

Installing the Flow Sensors

1. Refer to Appendix A for sensor placement diagrams for your floater.
 2. Clean the deflector with alcohol wipes (356070-000063). If there is a lot of dirt, clean the deflectors with a cleaning rag first.
 3. If it is below 60°F (15°C), apply heat to the underside of the deflector. The sensor adhesive will not stick in cold temperatures.
 4. Remove the protective backing from the sensor (153510-000085).
 5. Align the sensor with the deflector according to the sensor placement diagrams in Appendix A, with the port for the auditory tube pointing up. Firmly push the sensor onto the deflector with about 75 lbs of force to ensure a good seal.
 6. Verify that the flow sensor is firmly adhered to the deflector by pulling on the sensor. If it comes loose, re-install the sensor with more force.
 7. **AirMax Precision systems:** Connect either a standard or thicker auditory tube to the sensor. The type of auditory tube you will use depends on where the sensor is located.
 - **Center two ECUs:** Connect a thicker auditory tube (353070-000238).
 - **All other ECUs:** Connect a standard auditory tube (353070-000138).
- 810 Flex-Air systems:** Connect an auditory tube (353070-000138) to the sensor.

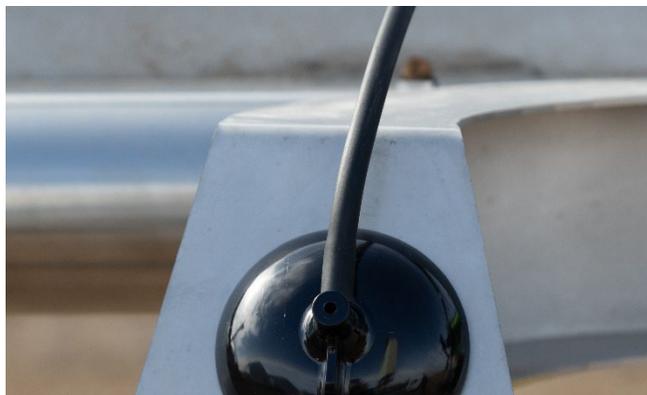


Figure 1: Connecting auditory tubes

8. Repeat the steps above for each deflector.



WARNING: Use caution when folding and unfolding the booms. Failure to properly fold booms may cause damage to your sensors and other components of the SpreadSense® system.

Removing Flow Sensors

If you need to replace a sensor, contact Intelligent Ag for a replacement adhesive disk. Then, follow the instructions below.

1. Push a screwdriver between the sensor adhesive and the deflector. Lift the sensor slightly until there is enough room to push the other screwdriver further under the sensor. Pry the sensor gently until it comes off of the deflector.
2. Completely cover the sensor and deflector with WD-40 and let it soak for 3 to 5 minutes.
3. Use a rag to clean the sensor and deflector until there's no adhesive left. You may need to scrape larger pieces off with a screwdriver.
4. Spray and wipe the deflector with a cleaning solution such as brake cleaner to remove any additional residue.
5. Remove the protective backing from the replacement adhesive disk and adhere it to the bottom of the sensor.
6. Reinstall the sensor on the back of the deflector using the instructions in **Installing the Flow Sensors** on the previous page.

3. Installing ECUs



WARNING: Do not use a high pressure washer on electronic components.

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

Part name	Part number	Quantity
ECU	153510-000045	8-10*
Hose clamp	356060-000246	2 per flat plate ECU
Flat-plate ECU bracket	353070-000135	6-8*
C-channel ECU bracket	353070-000139	2
Rubber mount	353070-000239	2 per ECU
3/8"-16 locknut	356060-000094	2 per ECU
3/8"-16 x 2.5" bolt	356060-000237	2 per ECU
1.25" OD washer	356060-000239	4 per ECU

*See Appendix B for installation drawings for your system.

Installation location

Mount ECUs on the booms and middle implement plate.

Installing the ECUs

The ECUs use two different types of mounting brackets: a flat-plate ECU bracket and a C-channel ECU bracket. **Refer to Appendix B to determine where to use each bracket.**



Figure 2: ECU installation locations

Installing ECUs with the Flat-Plate Bracket

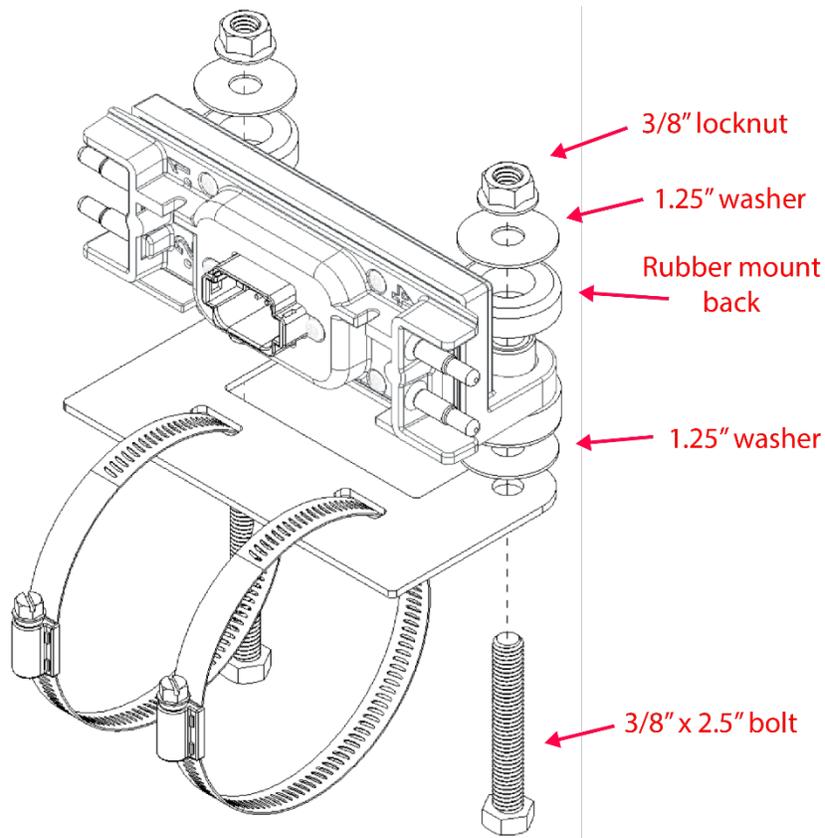


Figure 3: Installing flat-plate bracket ECUs

1. Refer to Appendix B to determine the installation location for the ECUs that use the flat-plate bracket (353070-000135).
2. Align the flat-plate ECU bracket (353070-000135) with the bottom of the ECU (153510-000045). Secure the ECU to the bracket using bolts (356060-000237), washers (356060-000239), rubber mount back (353070-000239), and locknuts (356060-000094), as shown in Figure 3.
3. Position the bracket onto the machine using the auditory hoses to help guide placement. Thread the hose clamps (356060-000246) through the bracket and secure the ECU to the boom.

NOTE: Make sure that when the boom is folded up, the ECU connectors point downward so that they do not collect water. This might mean rotating the bracket and ECU on the machine.

NOTE: If the hose clamp won't fit around larger structures, connect two hose clamps together to make a larger hose clamp.

4. Repeat the steps above for each flat-plate ECU.

Installing ECUs with the C-Channel Bracket

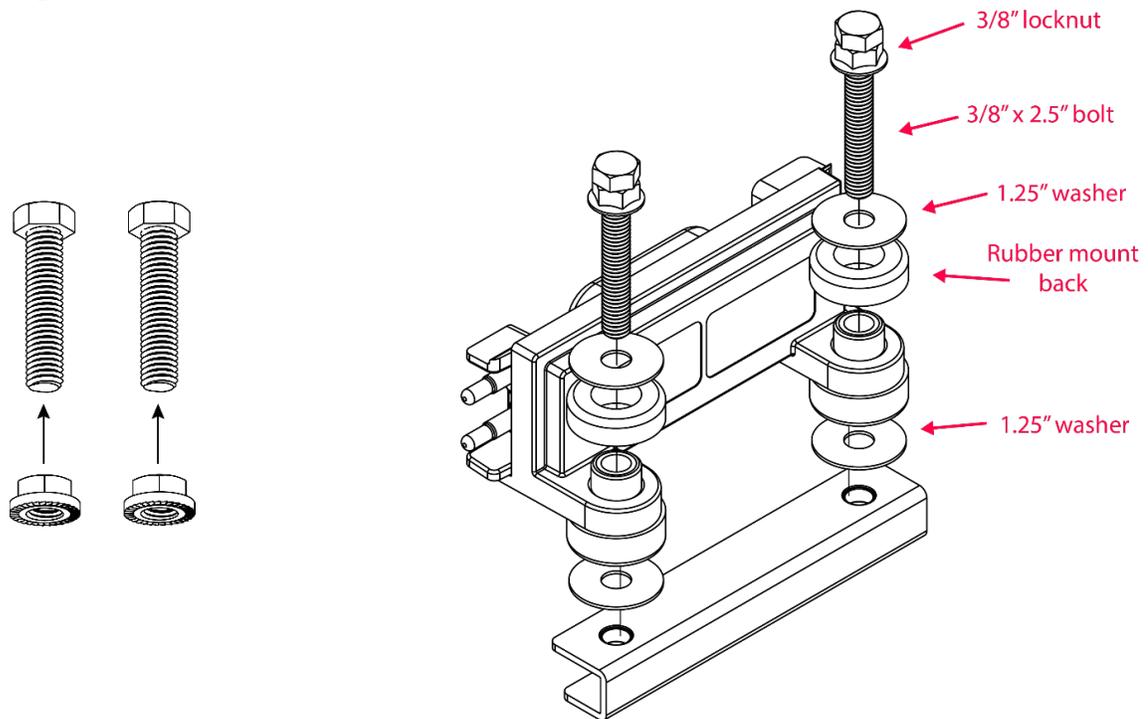


Figure 4: Installing C-channel bracket ECUs

1. Refer to Appendix B to determine the installation location for the ECUs that use the C-channel bracket (353070-000139).
2. Twist the locknut (356060-000094) onto the bolt (356060-000237) and screw it upwards until it reaches the head of the bolt, as shown in the left image of Figure 4.
3. Align the ECU (153510-000045) with the bracket as oriented in the right image of Figure 4. Secure the ECU to the bracket using the bolt/locknut, washers (356060-000239), and rubber mount back (353070-000239).
4. Position the bracket onto the machine using the auditory hoses to help guide placement. Tighten the bolt head to secure the bracket to the machine.

NOTE: Make sure that when the boom is folded up, the ECU connectors point downward so that they do not collect water. This might mean re-installing the ECU on the bracket so that the ECU faces the other direction.



Figure 5: Installed C-channel bracket ECU

5. Screw the nut downward to secure the ECU to the bracket.
6. Repeat the steps above for each C-channel ECU.

4. Connecting Auditory Tube to ECUs

Auditory tubes allow sound to be transmitted from the sensor to the ECU.

Part name	Part number	Quantity
Tubing clamp	153510-000137	2/sensor
Auditory tube	353070-000138 <i>and/or</i> 353070-000238	1/sensor



Figure 6: Auditory tubes connected to an ECU

Connecting Auditory Tubes to ECUs

1. Remove the caps from the ECU ports that you will be using. Refer to the diagrams in Appendix B for the number of sensors per ECU.
2. Connect the loose end of the auditory tube to an ECU port. You can connect it to any port, but we recommend connecting auditory ports in numeric order to make configuration in the app easier.
3. Repeat the steps above for all sensors.

Routing and Securing Auditory Tubes

IMPORTANT: Do not cut or shorten auditory tubing. This could cause inaccurate readings.

1. Clean one or two small areas along the path of each auditory tube toward the ECU where you will place tubing clamps (153510-000137).
2. Unplug the auditory tube from the ECU and thread the tubing clamps on the hose. Then, remove the backing from the clamps and stick them on the recently-cleaned areas on the implement. If needed, install a zip tie through the clamp to help secure it.

IMPORTANT: Do not zip tie auditory tubes directly to product delivery tubes without a tubing clamp. This will increase the amount of noise picked up by the ECUs.

3. Re-connect the auditory tubes. Secure loose auditory tube and verify that the tubing is **NOT**:
 - Kinked
 - Impeding product flow
 - Coiled
 - At risk of getting pinched when the booms are folded
 - Compressed by zip ties (if used)

5. Connecting Harnessing

Refer to Appendix B for wiring diagrams for the steps below.

TIP: Start with harnessing on leftmost and rightmost side of the booms and work toward the center. Then, work on harnessing toward the cab.

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
CAN termination plug	153510-000051	2
Cab harness	353050-000054	1
Gateway harness	353050-000055	1
10' ECU harness	353050-000025	varies
20' ECU harness (810 Flex-Air only)	353050-000027	2
Power/CAN split harness	353050-000028	1
Cable ties	356070-000079	varies

5.1. Install ECU Wiring Harnesses

1. Connect S3 of a 10' ECU harness (353050-000025) to each ECU.

NOTE: If installing on an 810 Flex-Air, use S3 of two 20' ECU harnesses (353050-000027) to connect to the two middle ECUs.

2. Connect S1 of each ECU harness to S2 of the nearest ECU harness to form a daisy chain on each boom. Do not connect S1 of the two centermost ECU harnesses until the next step.
3. Connect S2 and S3 of the Power/CAN Split harness (353050-000028) to S1 of each of the two centermost ECU harnesses.
4. Insert a CAN termination plug (153510-000051) into the two unused S2 ends of the outermost ECU harnesses.

5.2. Install Gateway Harness

1. Connect S2 of the Gateway harness into S1 of the Power/CAN Split harness (353050-000028).

NOTE: S3 and S4 of the Gateway harness are connected in Section 6.

5.3. Connect Cab Harness

1. Connect S1 of the Cab harness (353050-000054) into the convenience outlet of the cab.
2. Connect S2 of the Cab harness to S1 of the Gateway harness (353050-000055).

6. Installing the Gateway

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

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

Installation location

Mount the gateway between the cab and bins. The mounting location must be at least 8 inches (20 cm) away from the operator to ensure safe operation.

NOTE: Your gateway may look different than the one pictured below.



Figure 7: Gateway mounting location

Installing the Gateway

Intelligent Ag recommends mounting the gateway to a beam between the cab and bin. If you don't have a beam to mount to, use the Alternate Installation instructions.

Standard Installation (mounted to a beam between the cab and bin)

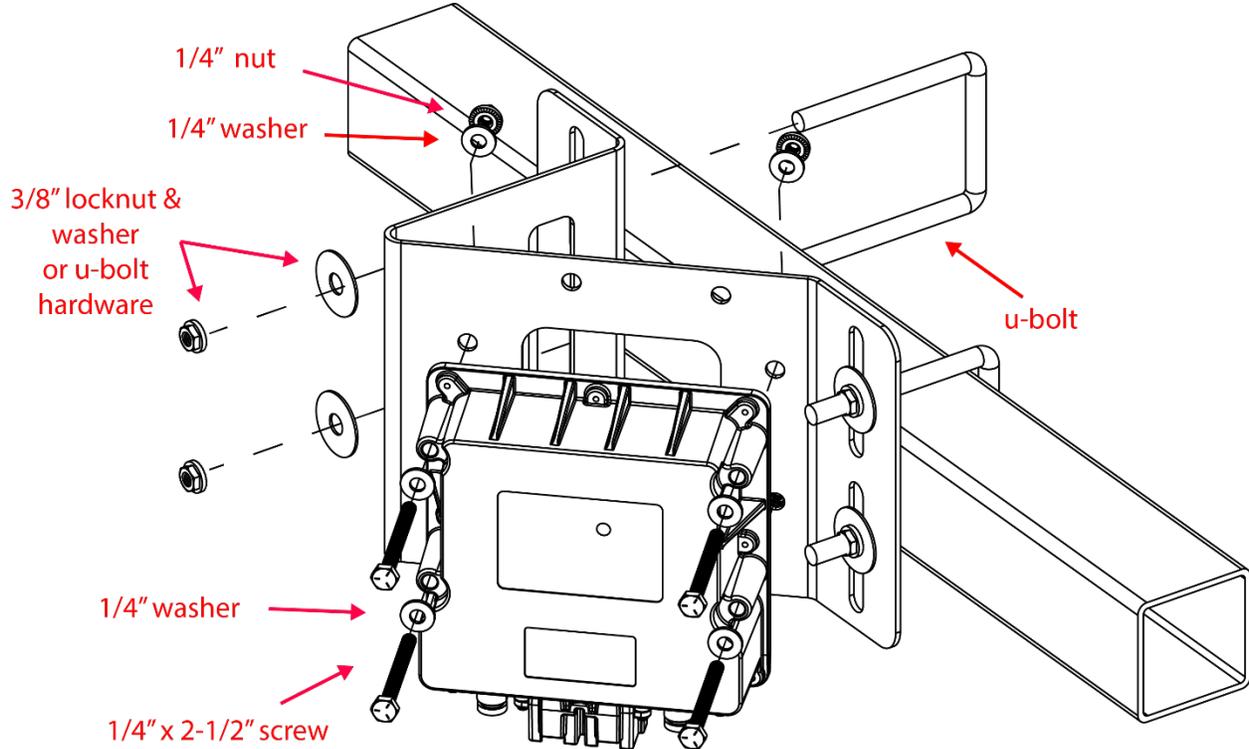
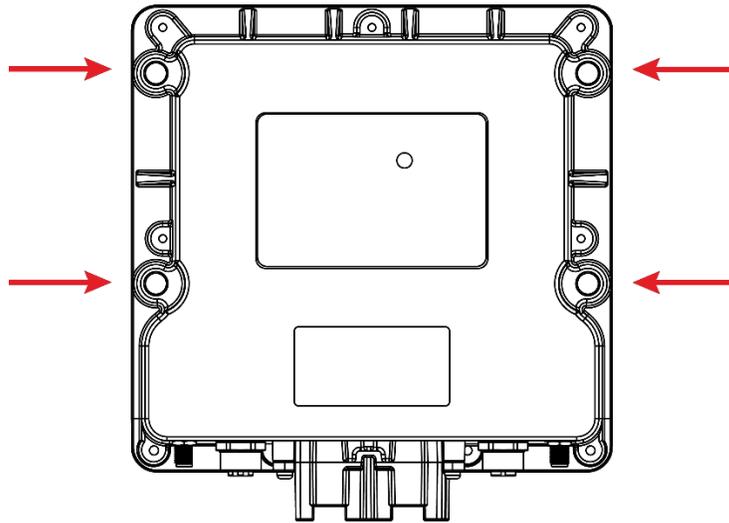


Figure 8: Installing the gateway

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 beam.
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 8.
3. Mount the gateway to the beam using u-bolts (352013-000007 or 356060-000152). Secure with the included u-bolt hardware or locknuts (356060-000094) and washers (356060-000239).

Alternate Installation (mounted directly to bin)**WARNING:** Do not drill into structural framework.

1. Position the gateway (153010-000085) on a mounting location between the cab and the bin. The connectors should not face up.
2. On the bin, mark the location of the four mounting holes shown in Figure 9. Remove the gateway and drill out the holes using a 5/16 inch or 8 mm drill bit.
3. Secure the gateway to the sheet metal using the provided screws (356060-000303), washers (352012-000002), and nuts (356060-000241) that are typically used to secure the gateway to the bracket.

**Figure 9: Gateway mounting holes****Connect Gateway harness to Gateway**

1. Connect S3 of the Gateway harness into Port A of the gateway.
2. Connect S4 of the Gateway harness into Port B of the gateway.

7. Install Wi-Fi antenna

The Wi-Fi antenna sends information from the SpreadSense® system to the iPad.

Part name	Part number	Quantity
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-bolt)	356060-000094	4
3/8" washer (for square u-bolt)	356060-000239	4

Installation location

Mount the Wi-Fi antenna on the bin between the cab and bins. Mount it at least 2 feet (60 cm) away from the operator and at least 8 inches (20 cm) from the gateway to ensure safe operation.

If you don't have a beam behind the cab, find a beam within 6 feet of the cab that has line of sight to the cab.



Figure 10: Wi-Fi antenna mounting location

Installing the Wi-Fi Antenna

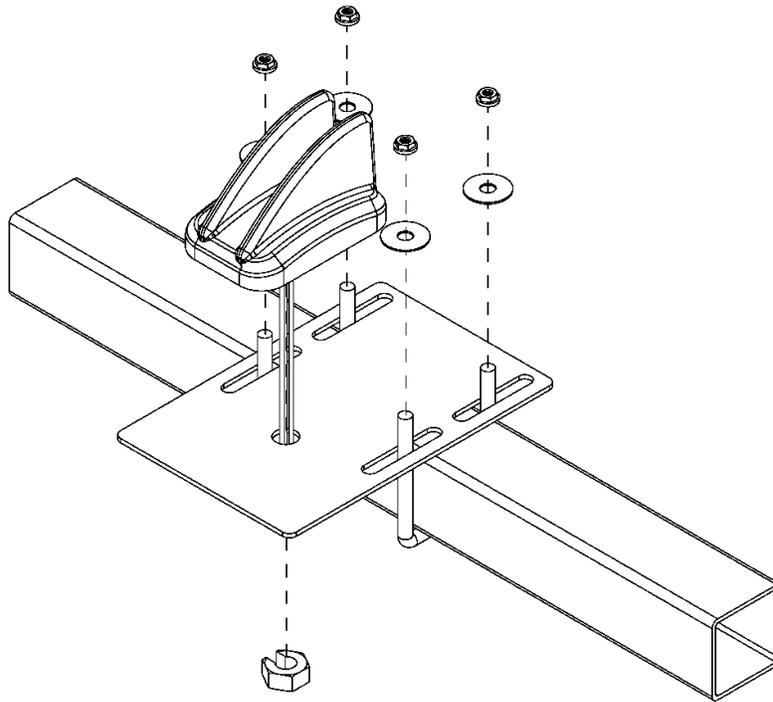


Figure 11: Mounting the Wi-Fi antenna

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 bracket on a beam behind the cab using the u-bolts (356060-000152) and locknuts (356060-000094). If you don't have a beam behind the cab, find a beam within 6 feet of the cab that has line of site to the cab.
3. Connect the Cellular Main and Wi-Fi/BT antenna cables to the gateway.

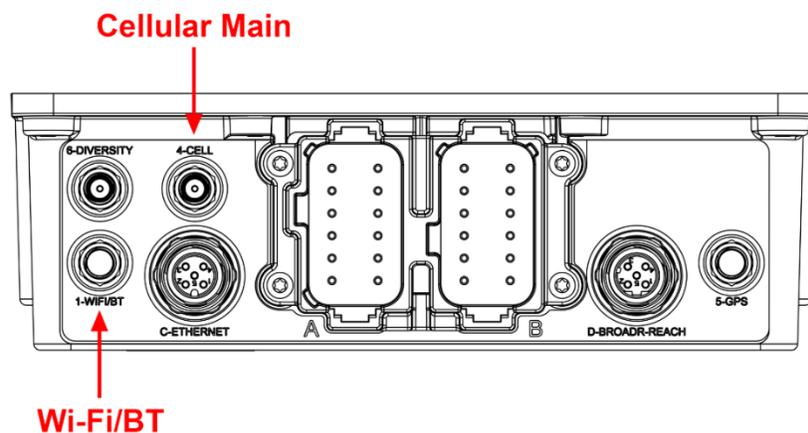


Figure 12: Gateway connectors

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).

Routing Loose Harnessing

Coil any loose harnessing around a hydraulic line or existing electrical wire and ensure that harnessing will not get pinched when you fold the booms up. Secure all harnessing to the implement using cable ties (356070-000079).

8. Install the iPad and SpreadSense® App

8.1. Install the iPad Mount

Part name	Part number	Quantity
Tablet mount arm	352004-000003	1
Rail attachment	352004-000004	1
iPad mount (for iPad Air and iPad Air 2)	356070-000004	1



Figure 13: Installing the iPad mount

1. Connect the base of the tablet mount arm (352004-000003) to the back of the iPad mount (356070-000004) using the screws provided with the mount.
2. Insert the ball of the rail attachment (352004-000004) into the other end of the mount arm. Twist the knob on the rail attachment to tighten the mount.
3. Mount the rail attachment to the cab's mounting bar, or other desired installation location, using the u-bolts provided with the rail attachment.
4. Place the iPad into the iPad mount.
5. **OPTIONAL:** Plug the iPad into a USB charger in the cab to keep the iPad charged while using the system.

8.2. Download the SpreadSense® App

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

1. Connect the iPad to the internet.
2. Tap the **App Store** icon on the iPad's home screen.
3. Tap **Search** in the bottom right corner of the App Store screen.
4. Type *SpreadSense* in the search field, then tap **Search**.
5. Tap the SpreadSense app when it appears in your search results.
6. Tap the **Get** button, 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.

8.3. Connect to the Gateway

1. Ensure that you have power to the ECUs and 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 **SpreadSense-XXXXXX** network.
4. Press the iPad's Home button and open the SpreadSense app. Follow the on-screen prompts to begin configuring your system.

For instructions to configure and use SpreadSense after installation, see the Recon SpreadSense Operator's Manual (Intelligent Ag document number 600890-000061) from the SpreadSense app's Manuals screen.

9. Daily Maintenance



WARNING: Use caution when folding and unfolding the booms. Failure to properly fold booms may cause damage to your sensors and other components of the SpreadSense® system.

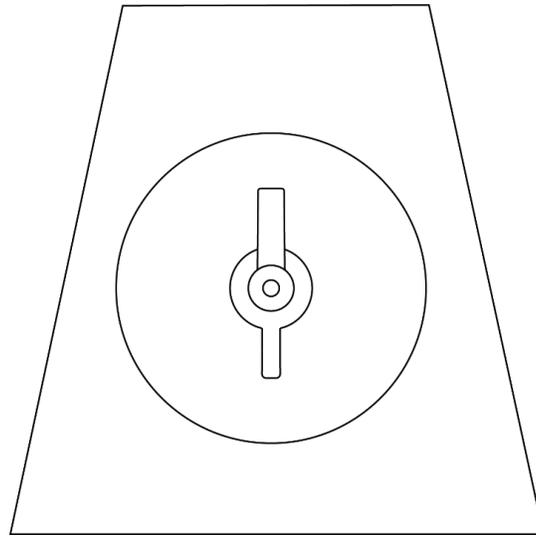
Intelligent Ag recommends a daily visual inspection of the SpreadSense system to ensure proper operation and reduce downtime.

Make sure that the system does not have any of the issues below. Correct any issues before operating the system again.

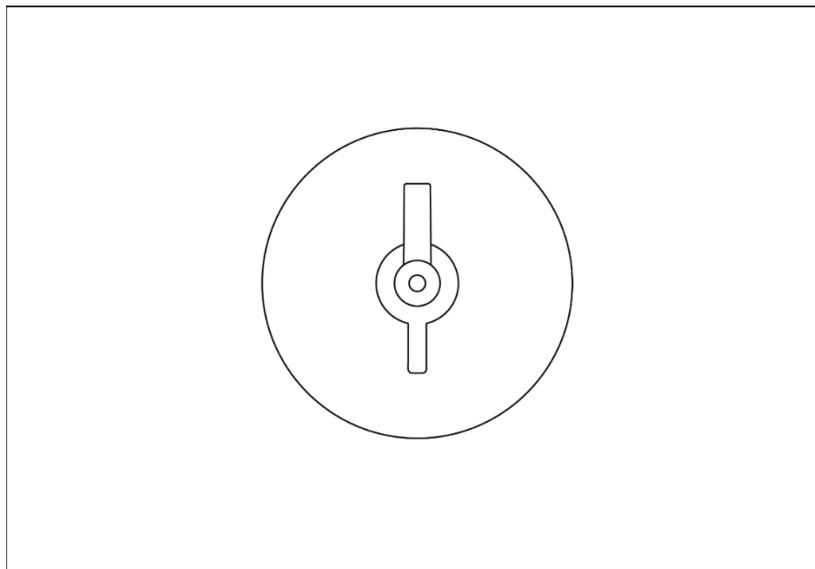
- **Sensors:** Loose adhesion, cracking, broken sensor
- **Auditory Tubing:** Signs of rubbing, cuts, pinched tubes, holes, hoses detached from sensors or ECUs
- **Harnessing:** Loose connections, signs of rubbing, pinching
- **ECUs:** Not securely mounted, powered off, harnesses incorrectly connected
- **Gateway:** Not securely mounted, powered off, harnesses incorrectly connected
- **Antenna:** Not securely mounted

Appendix A: Sensor Placement Diagrams

AirMax Precision John Deere F4365 AB485



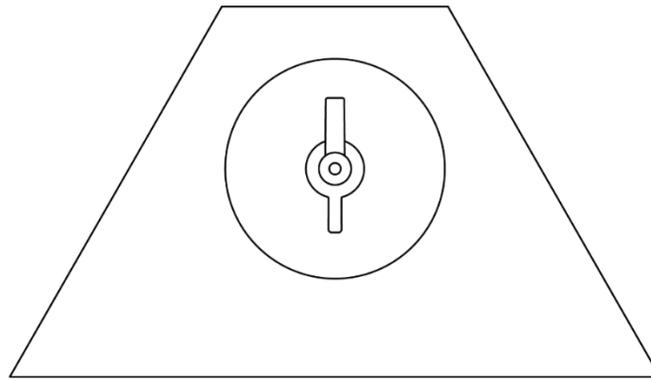
Side deflector



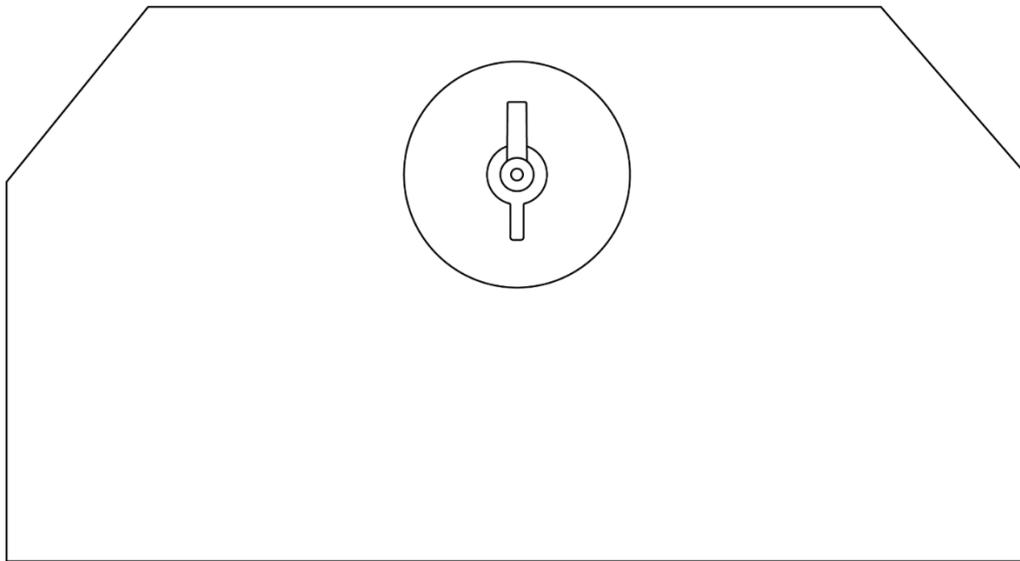
Middle deflector

Figure 14: TerraGator AirMax Precision and John Deere F4365 AB485 sensor placement

810 Flex-Air



Side deflector



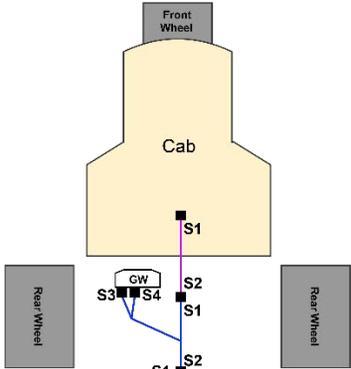
Middle deflector

Figure 15: 810 Flex-Air sensor placement

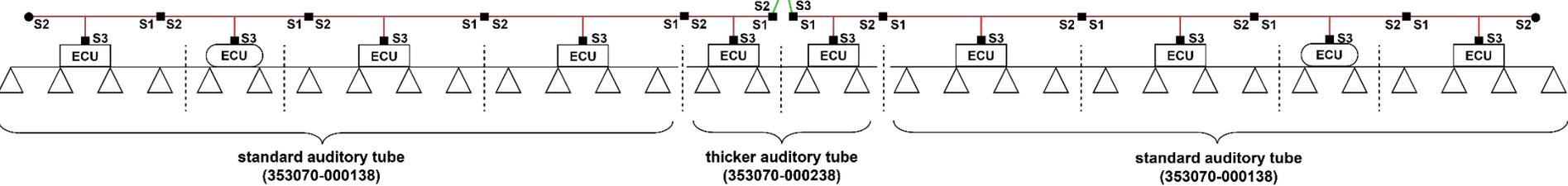
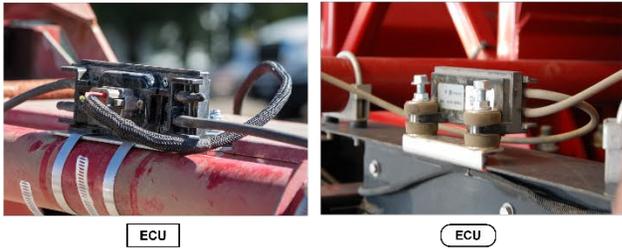
Appendix B: Wiring Diagrams

KEY

	Cab harness	353050-000054
	Gateway harness	353050-000055
	10' ECU harness	353050-000025
	Power/CAN Split harness	353050-000028
	ECU with flat-plate bracket	353070-000135
	ECU with C-channel bracket	353070-000139
	CAN termination plug	
	Connector	
	Deflector	



TerraGator AirMax Precision John Deere F4365 AB485



TIP: Start with harnessing on leftmost and rightmost side of the booms and work toward the center. Then, work on harnessing toward the cab.

Figure 16: TerraGator AirMax Precision and John Deere F4365 AB485 wiring diagram

RoGator AirMax Precision

KEY

	Cab harness	353050-000054
	Gateway harness	353050-000055
	10' ECU harness	353050-000025
	Power/CAN Split harness	353050-000028
	ECU with flat-plate bracket	353070-000135
	CAN termination plug	
	Connector	
	Deflector	

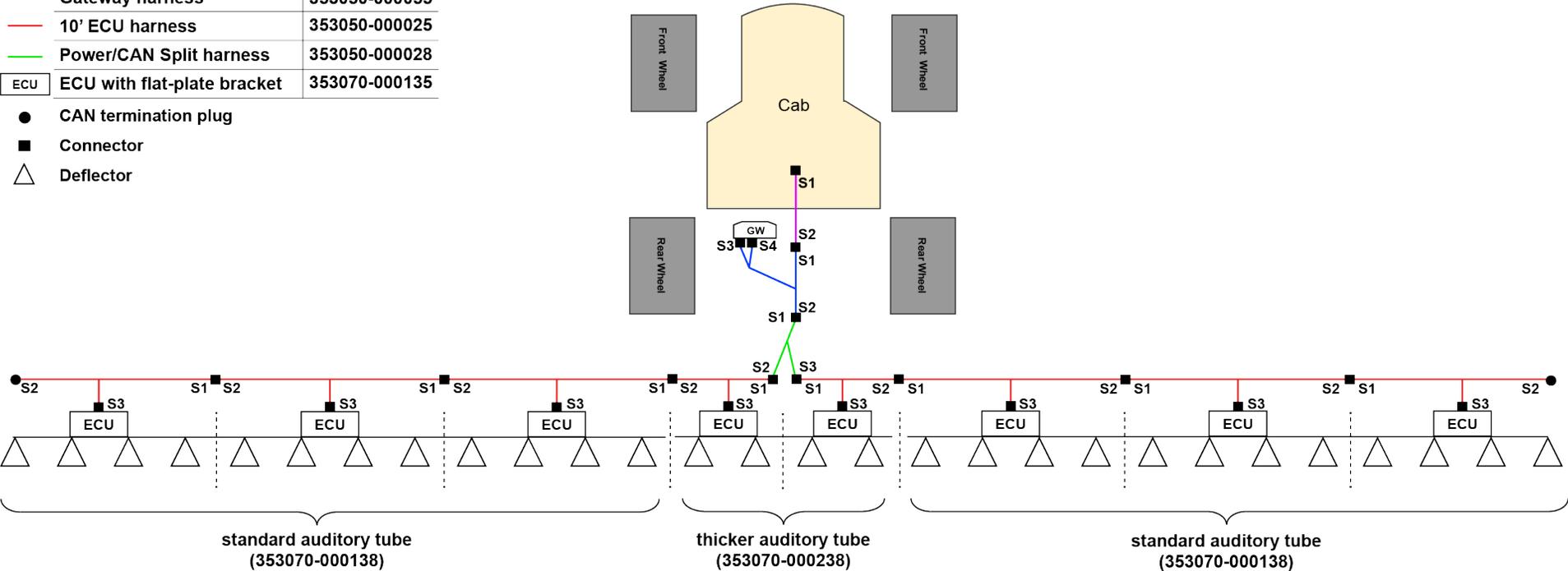


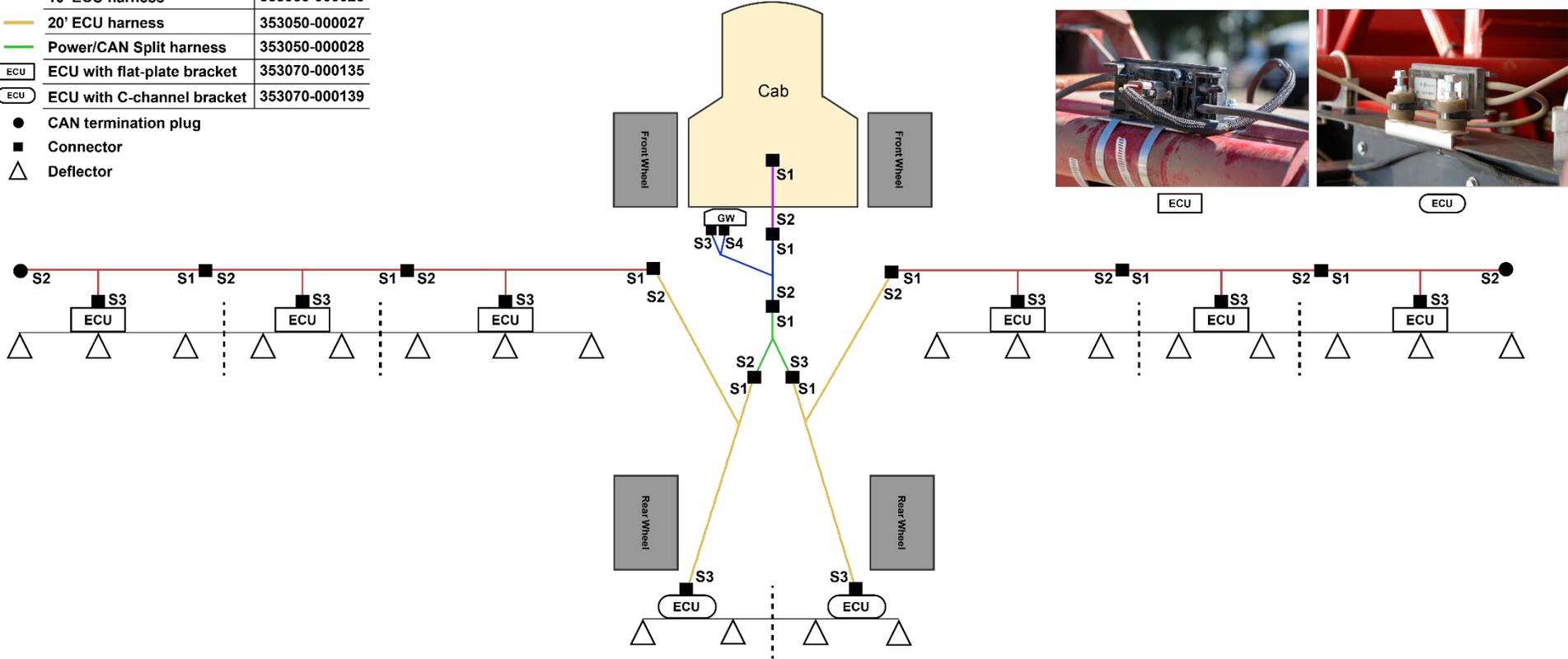
Figure 17: RoGator AirMax Precision wiring diagram

TIP: Start with harnessing on leftmost and rightmost side of the booms and work toward the center. Then, work on harnessing toward the cab.

810 Flex-Air

KEY

	Cab harness	353050-000054
	Gateway harness	353050-000055
	10' ECU harness	353050-000025
	20' ECU harness	353050-000027
	Power/CAN Split harness	353050-000028
	ECU with flat-plate bracket	353070-000135
	ECU with C-channel bracket	353070-000139
	CAN termination plug	
	Connector	
	Deflector	



TIP: Start with harnessing on leftmost and rightmost side of the booms and work toward the center. Then, work on harnessing toward the cab.

Figure 18: 810 Flex-Air wiring diagram