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## Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>App</td>
<td>Software application</td>
<td>A computer program, especially one designed for a mobile device</td>
</tr>
<tr>
<td>ECU</td>
<td>Electronic Control Unit</td>
<td>A component of the Zone Blockage and Flow Monitor that allows for the communication of the flow sensors to the iPad software app via a LAN connection</td>
</tr>
<tr>
<td>Gateway 300</td>
<td>(gateway)</td>
<td>A computing platform that enables communication from the system to an iPad</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
<td>A semiconductor diode that converts applied voltage to light. In the Zone Blockage and Flow Monitor, an LED is used to signify the status of the ECU</td>
</tr>
<tr>
<td>Primary</td>
<td></td>
<td>Tube that feeds multiple secondary runs, usually leading to a manifold that splits the product flow to the secondaries</td>
</tr>
<tr>
<td>Product A/</td>
<td></td>
<td>When running two different products through two different airstreams, one product is product A and the other product is product B. Product types are assigned to their respective manifolds during app configuration</td>
</tr>
<tr>
<td>Product B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td></td>
<td>Section of the toolbar, usually defined by the primary (or manifold) that is feeding that section</td>
</tr>
<tr>
<td>Work Switch</td>
<td></td>
<td>A component of the implement that signifies when the equipment is enabled (in the ground) or disabled (out of the ground). When the work switch is disabled, the Zone Blockage and Flow Monitor’s audible alarm that alerts the operator to blockage of flow in the equipment’s runs will automatically be silenced</td>
</tr>
</tbody>
</table>
1. Introduction

1.1. About Recon Zone Blockage and Flow Monitor

The Recon Zone Blockage and Flow Monitor enables you to monitor for major blockages on your air seeder without monitoring every run.

1.2. Additional required tools and equipment

You will need the following tools and equipment to install the Recon Zone Blockage and Flow Monitor:

- Standard wrench and socket sets
- Measuring tape
- Cutting tool, such as a box cutter or shears
- Cordless drill with 5/16 driver and/or flathead screwdriver (optional)
- Paint pen or other permanent marking tool (optional)
- Dielectric grease (optional)

1.3. Installation Overview

The Recon Zone Blockage and Flow Monitor is installed through the following steps:

☐ Install ECUs
☐ Install flow sensors
☐ Connect auditory hoses to ECUs
☐ Install Gateway 300
☐ Install antennas
☐ Install work switch
☐ Connect harnessing
☐ Install iPad and Blockage Monitor app

NOTE: Detailed wiring diagrams are found in Appendix A.

For videos, current documentation, and other resources, visit www.intelligentag.com/support.
2. Install Recon Zone Blockage and Flow Monitor

2.1. Install ECUs

The Electronic Control Units (ECUs) communicate the flow measurement data recorded by the flow sensors to the Gateway 300. For each manifold that will be monitored, complete the steps below.

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU</td>
<td>153510-000045</td>
<td>varies</td>
</tr>
<tr>
<td>U-bolt</td>
<td>356070-000064 or 356070-000065 or 356070-000066</td>
<td>varies</td>
</tr>
</tbody>
</table>

Figure 1: Parts needed to install ECUs

**Installation location:** Manifold towers

![Diagram showing installation of ECUs](image)

1. Position two U-bolts (356070-000064, 356070-000065, or 356070-000066) on the mounting location as shown in Figure 2 and place the saddle clamp overtop of the U-bolt.

2. Secure the unused end of the U-bolts with nuts.

3. Place the ECU (153510-000045) on the other end of the U-bolts so that the LED is facing the cab. If this orientation is not possible, position the ECU so that the LED does not face the ground. Secure with nuts.

**NOTE:** ECUs can be mounted in any order; however, installing the ECUs in numeric order based on the ECU’s serial number (located on the front of the ECU) is an easy way to remember which ECU is on each tower. Use the table in Appendix B to record your system setup.
2.2. Install flow sensors

Flow sensors detect when seed or fertilizer is flowing through the run.

The system uses either 1-inch, 90 degree, or 1.25-inch flow sensors (and adapters, if needed) based on your implement and blockage and flow monitoring preferences. Identify your sensor type and part number by looking at your pack slip or the images below. Refer to the correct installation instructions in this section based on your flow sensor size.

Streamline 1” sensor (153510-000022)  Streamline 1.25” sensor (153510-000066)

90 degree sensor (153570-000015)  1.25” inline sensor (153570-000016)

**Figure 3: Sensor types**

**Installation location:** On each manifold being monitored. Distribute flow sensors evenly around the manifold.

**EXAMPLE:** Spacing 2 sensors (left) and 4 sensors (right) on a 16-opener manifold

**Figure 4: Spacing flow sensors on a manifold**
Installing Streamline 1-inch and 1.25-inch flow sensors (153510-000022 and 153510-000066)

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streamline 1-inch flow sensor</td>
<td>153510-000022 or 153510-000066</td>
<td>1/run</td>
</tr>
<tr>
<td>Streamline 1.25-inch flow sensor</td>
<td>353070-000038 or 353070-000112 or 353070-000113</td>
<td>2/run</td>
</tr>
<tr>
<td>Adapter (optional)</td>
<td>356060-000025</td>
<td>2/run</td>
</tr>
</tbody>
</table>

Table 1: Parts needed to install Streamline 1-inch and 1.25-inch flow sensors

Figure 5: Installing Streamline 1-inch and 1.25-inch flow sensors on a manifold

For each run that will be monitored:

1. If you are using adapters, snap adapters into the sensor as shown in Figure 5.
2. Cut the original run hose to about 8 inches (20.32 cm), or other length that allows a downward flow and appropriate fit once the sensor and adapters (if applicable) are installed. Reattach the hose piece to the manifold.
3. Orient the sensor so that the flow arrows point away from the manifold. Slide the sensor assembly on the final run hose piece attached to the manifold until the hose piece hits the backstop inside the adapter or sensor. Try to keep the sensor mounted vertically.
4. 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, as shown in Figure 6.
5. Slide the remaining final hose piece into the lower end of the sensor assembly until the hose piece hits the backstop inside the adapter or sensor. 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.
Installing 90 degree flow sensors (153570-000015)

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 degree flow sensor</td>
<td>153570-000015</td>
<td>1/run</td>
</tr>
<tr>
<td>Adapter (optional)</td>
<td>351060-000008</td>
<td>1/run</td>
</tr>
<tr>
<td>Hose clamp</td>
<td>352013-000010</td>
<td>2-4/run</td>
</tr>
</tbody>
</table>

Table 2: Parts needed to install 90 degree flow sensors

For each run that will be monitored:

1. Detach the existing hose from the manifold.

2. Place a sensor (153570-000015) on the manifold, orienting the sensor so that auditory hose routes down. If the sensor does not fit directly on the manifold, cut a 2 inch piece of the final hose run and attach it to the manifold, then attach the sensor to the 2 inch hose piece. Secure with a hose clamp (352013-000010).

3. Slide the remaining final hose piece into the other end of the sensor. If the hose doesn’t fit on the sensor, attach an adapter to the sensor. Secure with a hose clamp.
Installing 1.25-inch flow sensors (153570-000016)

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.25-inch flow sensor</td>
<td>153570-000016</td>
<td>1/run</td>
</tr>
<tr>
<td>Adapter (optional)</td>
<td>353070-000029 or 353070-000031 or 353070-000022 or 353070-000030 or 353070-000032</td>
<td>2/run</td>
</tr>
<tr>
<td>Hose clamp</td>
<td>352013-000010 or 356060-000025</td>
<td>2-4/run</td>
</tr>
</tbody>
</table>

Table 3: Parts needed to install 1.25-inch flow sensors

Figure 8: Installing 1.25-inch flow sensors on an air seeder

For each run that will be monitored:

1. Bend each adapter in half until the center seam holding the two halves together snaps. Align the two halves to make a cylinder.

Figure 9: Preparing the adapters
2. Attach an adapter to each end of the sensor (153570-000016) and secure with a hose clamp (352013-000010 or 356060-000025).

3. Cut the original run hose about 8 inches (20.32 cm), or other length to ensure a downward flow and appropriate fit once the sensor and adapters (if applicable) are installed.

4. Orient the sensor so that the flow arrows point away from the manifold. Place the upper adapter on the final run hose piece, making sure that the hose is pushed into the adapter past the retaining ring and locking tabs until it hits the backstop (about 2 inches). Try to keep the sensor mounted as vertically as possible. Secure using a hose clamp.

![Figure 10: Securing hose pieces into adapter](image)

5. Slide the remaining final hose piece into the lower adapter until it hits the backstop. Secure using a hose clamp between the two ridges on the end of the sensor assembly.
2.3. Connect auditory hoses to ECUs

The sensor’s auditory hoses allow the sound to be transmitted from the sensor to the ECU. For each sensor, complete the steps below.

1. Remove the caps from the ECU ports that you will be using, beginning with ECU port 1. The number of ECU ports that you will use is equal to the number of sensors installed on the manifold.

2. Remove and discard the cap at the end of each auditory hose (if it has a cap). Push each sensor’s auditory hose on top of its corresponding ECU port. ECU ports should be connected in a clockwise order.

**EXAMPLE:** 2 sensors (left) and 4 sensors (right) on a 16-opener manifold

![Figure 11: Connecting auditory hoses to the ECU on a manifold](image)

**NOTE:** If all auditory hoses are too short, pull the existing auditory hoses off of the sensors and replace them with the 10’ hoses included with the kit. **All auditory hoses on the entire system must be the same length.**

3. **OPTIONAL:** Mark the associated ECU port number on each flow sensor hose using a paint pen or other marking tool.
2.4. Install Gateway 300

The Gateway 300 is a computing platform that allows for the communication from the ECUs to the iPad. To install the gateway, complete the steps below.

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway 300</td>
<td>153010-000042</td>
<td>1</td>
</tr>
<tr>
<td>¼” flat washer</td>
<td>352012-000002</td>
<td>8</td>
</tr>
<tr>
<td>U-bolt and mounting hardware</td>
<td>356070-000064 or 356070-000065 or 356070-000066</td>
<td>2</td>
</tr>
<tr>
<td>Gateway mounting bracket</td>
<td>353070-000079</td>
<td>1</td>
</tr>
<tr>
<td>¼-20 x 1 1/2” screw</td>
<td>356060-000033</td>
<td>4</td>
</tr>
<tr>
<td>¼”-20 nut</td>
<td>356060-000075</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4: Parts needed to install Gateway 300

**Installation location:** The toolbar or on the air cart (if using a tow between air cart). The mounting location must be at least 8 inches (20 cm) away from the operator to ensure safe operation.

![Gateway 300 installation diagram](image)

**Figure 12: Installing the Gateway 300**

1. Position the Gateway 300 (153010-000042) 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 implement or air cart.

2. Secure the gateway to the mounting bracket using the provided screws (356060-000033), washers (352012-000002), and nuts (356060-000075) as shown in Figure 12.

3. Mount the gateway to the toolbar or on the air cart (if using a tow between air cart) using the provided u-bolts and mounting hardware (356070-000064, 356070-000065, or 356070-000066). The mounting location must provide the gateway with a clear view of the sky.
2.5. Install Wi-Fi antenna

The Wi-Fi antenna sends information to the Gateway 300.

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMA cap</td>
<td>251015-000139</td>
<td>3</td>
</tr>
<tr>
<td>Wi-Fi antenna</td>
<td>252005-000010</td>
<td>1</td>
</tr>
<tr>
<td>U-bolts and mounting hardware</td>
<td>352013-000007</td>
<td>2</td>
</tr>
<tr>
<td>Wi-Fi antenna bracket</td>
<td>353070-000083</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 5: Parts needed to install Wi-Fi antenna

**Installation location:** Mounted on the air cart frame or railing, at least 2 feet (60 cm) away from the operator and at least 8 inches (20 cm) from the Gateway 300 to ensure safe operation.

1. Thread the Wi-Fi antenna (252005-000010) cables through the hole on the antenna bracket (353070-000083) and through the nut. Tighten the nut to secure the antenna to the bracket.

2. Mount the bracket to the implement using the u-bolts and mounting hardware (352013-000007).
3. Connect the antenna cables to the gateway. Refer to the table below for the associated gateway connectors.

<table>
<thead>
<tr>
<th>Gateway Connector</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wi-Fi</td>
</tr>
<tr>
<td>2</td>
<td>Iridium</td>
</tr>
<tr>
<td>3</td>
<td>433-MHz</td>
</tr>
<tr>
<td>4</td>
<td>Cellular Main</td>
</tr>
<tr>
<td>5</td>
<td>GPS</td>
</tr>
<tr>
<td>6</td>
<td>Cellular Diversity</td>
</tr>
</tbody>
</table>

Table 6: Gateway connectors

2.6. Install the work switch

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

**Types of work switches**

Intelligent Ag sells two different types of work switches: a whisker switch and the magnetic work switch. Identify your work switch type and part number by looking at your pack slip or the images below.

![Work switch assembly (whisker switch)](image1)

**Work switch assembly (whisker switch)**

900000-000001

![Work switch assembly (magnetic)](image2)

**Work switch assembly (magnetic)**

153560-000014

**Figure 14: Work switch assemblies**

**Installation location**

Next to the implement's existing work switch, if one exists. The existing work switch is typically found towards the center of the implement's frame on a hydraulic cylinder. If the implement does not have an existing work switch, find a location on the hydraulic cylinders that are used to lift the implement in and out of the ground at the end of rows.

### 2.6.1. Installing the work switch (900000-000001)

**NOTE:** Skip this step and follow the instructions in Section 2.6.2 if you are using the magnetic work switch with part number 153560-000014. Refer to Figure 14 to identify your work switch.

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work switch ECU harness</td>
<td>355020-000018</td>
<td>1</td>
</tr>
<tr>
<td>Work switch assembly</td>
<td>900000-000001</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 7: Parts needed to install the work switch (whisker switch)**

Mount the work switch (900000-000001) in a location where the work switch is triggered when the toolbar is in the lowered position.

**TIP:** You can mount the work switch onto an existing work switch bracket, if one exists.

**NOTE:** You can unscrew the work switch magnet from the bracket and re-attach it to the other end of the bracket to allow for other mounting orientations.
About work switch methods
The work switch uses one of two methods to determine when the implement is in the ground:

- **Default method:** the work switch is engaged (the work switch is triggered by the height sensor) when the implement is in the ground. Likewise, the work switch is disengaged (the work switch is not triggered) when the implement is out of the ground.
- **Inverted method:** the work switch is disengaged (the work switch is not triggered) when the implement is in the ground. Likewise, the work switch is engaged (the work switch is triggered by the height sensor) when the implement is out of the ground.

Your work switch method will be configured during configuration in the Blockage Monitor app.

2.6.2. Installing the work switch (153560-000014)

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work switch assembly</td>
<td>153560-000014</td>
<td>1</td>
</tr>
<tr>
<td>Work switch bracket</td>
<td>351050-000016</td>
<td>1</td>
</tr>
<tr>
<td>¼”-20 x ¾” steel bolt</td>
<td>352010-000084</td>
<td>2</td>
</tr>
<tr>
<td>¼”-20 steel locknut</td>
<td>352011-000040</td>
<td>2</td>
</tr>
<tr>
<td>¾” steel washer</td>
<td>352012-000024</td>
<td>4</td>
</tr>
<tr>
<td>Work switch magnet</td>
<td>359035-000001</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 8: Parts needed to install the work switch (magnetic work switch)

**Installation location:** Near the implement’s existing work switch, if there is one. Otherwise, in a location on the hydraulic cylinder where you can mount the work switch and magnet so that they will be moved apart when the implement is out of the ground.
1. Place the work switch magnet (359035-000001) on the hydraulic cylinder or frame.
2. Remove the front locknut from the work switch assembly (153560-000014) and insert it into the work switch bracket (351050-000016). Replace the locknut.

3. Attach the work switch bracket to the cylinder using bolts (352010-000084), washers (352012-000024) and locknuts (352011-000040), or using zip ties. The mounting location should allow at least 4 inches of movement when you’re lifting or lowering the tool. To adjust the length of the work switch, adjust the locknuts on the work switch assembly.
   • Moving the locknuts closer to the end of the work switch moves the work switch farther from the magnet.
   • Moving the locknuts away from the end of the work switch moves the work switch closer to the magnet.
3. Connect harnessing

Refer to Appendix A for wiring diagrams.

**TIP:** Leave a drip loop for harnessing parallel to the ground.

![Figure 18: Installing a drip loop](image)

**TIP:** Apply dielectric grease to connectors to provide a better seal.

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealing plug</td>
<td>153510-000019</td>
<td>2</td>
</tr>
<tr>
<td>CAN termination plug</td>
<td>153510-000051</td>
<td>2</td>
</tr>
<tr>
<td>Tractor harness</td>
<td>353050-000010</td>
<td>1</td>
</tr>
<tr>
<td>Work Switch Extension harness (optional)</td>
<td>353050-000011</td>
<td>varies</td>
</tr>
<tr>
<td>Gateway harness</td>
<td>353050-000024</td>
<td>1</td>
</tr>
<tr>
<td>10’ ECU harness</td>
<td>353050-000025</td>
<td>1</td>
</tr>
<tr>
<td>20’ ECU harness (optional)</td>
<td>353050-000027</td>
<td>varies</td>
</tr>
<tr>
<td>Power/CAN Split harness</td>
<td>353050-000028</td>
<td>1</td>
</tr>
<tr>
<td>Intermediary harness (optional)</td>
<td>353050-000030</td>
<td>varies</td>
</tr>
</tbody>
</table>

Table 9: Parts needed to connect harnessing

3.1. Connect Tractor and Intermediary harnesses

1. Connect S2 of the Tractor harness (353050-000010) into the convenience outlet of the tractor.
2. Insert a sealing plug (153510-000019) into S1 of the Tractor harness.
3. Connect S3 of the Tractor harness to S1 of the Gateway harness (353050-000024).
   If you need more harnessing to reach the Gateway harness, connect S3 of the tractor harness to S1 of the Intermediary harness (353050-000030). Then, connect S2 of the Intermediary harness to S1 of the Gateway harness.
3.2. Connect gateway harness

1. Connect S3 of the Gateway harness into Port A of the Gateway 300.
2. Connect S4 of the Gateway harness into Port B of the Gateway 300.
3. Connect S2 of the Gateway harness into S1 of the Power/CAN Split harness (353050-000028).
4. Connect S5 of the Gateway harness into the work switch.
   
   If you need more harnessing to reach the work switch, connect S5 of the Gateway harness into S1 of the Work Switch Extension harness (353050-000011). Then, connect S2 of the Work Switch Extension harness to the work switch.

3.3. Connect ECU wiring harnesses

1. Connect S3 of a 10’ ECU harness (353050-000025) to each ECU.
2. Connect S1 of each ECU harness to S2 of the nearest ECU harness to form a daisy chain on each half of the toolbar. Leave S1 of the centermost ECU harnesses open. There will be one unused S2 connector on each half.
   
   **NOTE:** If there are areas where you need a longer ECU harness, use a 20’ ECU harness (353050-000027) instead of a 10’ harness.
3. Insert a CAN termination plug (153510-000051) into the two unused S2 ends of the ECU harness.
4. Connect S2 and S3 of the Power/CAN Split harness (353050-000028) to S1 of each of the two centermost ECU harnesses.
5. Route loose harnessing toward the tractor and secure using zip ties.
4. Install the iPad and Blockage Monitor app

4.1. Install the iPad

<table>
<thead>
<tr>
<th>Part name</th>
<th>Part number</th>
<th>Quantity needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablet mount arm</td>
<td>352004-000003</td>
<td>1</td>
</tr>
<tr>
<td>Rail attachment</td>
<td>352004-000004</td>
<td>1</td>
</tr>
<tr>
<td>iPad mount (for iPad Air and iPad Air 2)</td>
<td>356070-000004</td>
<td>1</td>
</tr>
</tbody>
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Table 10: Parts to install 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 tractor cab’s mounting bar, or other desired installation location, using the u-bolts provided with the rail attachment.

4. Place the iPad in the iPad mount.

5. **OPTIONAL:** Intelligent Ag recommends keeping the iPad plugged into a USB charger in the cab to keep the iPad charged while using the system.
4.2. **Download the Blockage Monitor app**

To interface with the system, you need to download the Blockage Monitor 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 the **Search** field in the top right corner of the App Store screen.
4. Type *Intelligent Ag* in the search field and tap the **Search** button.
5. Tap the Recon Wireless Blockage and Flow Monitor app when it appears in your search results.
6. Tap the **Get** button and tap **Install**. Enter your Apple ID and password, if prompted. A progress bar will appear over the app’s icon while it is downloading.

4.3. **Connect to the Gateway 300**

1. Ensure that you have power to the ECUs and gateway.
2. Tap the **Settings** icon on your iPad’s home screen.
3. Tap **Wi-Fi**.
4. Connect to the **IASBlockage** network.
5. Press the iPad’s Home button and open the Blockage Monitor app. Follow the on-screen prompts to begin configuring your system.
Appendix A: Wiring Diagrams

Figure 20: 6 manifold wiring diagram

Four ECU harness 10’, two ECU harness 20’, one each all other harnesses
Figure 21: 12 manifold wiring diagram

Ten ECU harness 10', two ECU harness 20', one each all other harnesses
Figure 22: Tow-between air cart wiring diagram
Appendix B:
System Configuration Table

Use the following table to record notes about your system configuration.

<table>
<thead>
<tr>
<th>Primary or Section #</th>
<th>ECU Serial #</th>
<th># of Runs</th>
<th>Product</th>
<th>Notes on Ports Out of Sequence (i.e. “Run 5 on Port 12”)</th>
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Table 11: System Configuration Table