This is the general purpose installation guide for custom A5 AutoSteer installation using the high flow valve on machines with closed center steering system. The installation requires custom hoses and mounting brackets.
Special Requirements

Tools
This list consists of special tools that are needed. A complete set of common installation tools is assumed. If you find other tools are required, please notify Documentation@gpsfarm.com.

- Portable drill
- Drill bits 1/8”-1/2”
- Tape Measure
- Tools for fabricating custom steel brackets (saw, welding equipment, drill, file)
- Paint for steel
- Soft brush
- Clean rags
- Oil collection pan

Attention
Tighten all screws, bolts, nuts, hose connections and cable connections after the final assembly of the AutoFarm Steering System on the vehicle.

Technical Support
Contact AutoFarm Technical Support at: (877) 947-7327.

Documentation Feedback
Please contact Novariant via email to Documentation@gpsfarm.com with:
- outdated pictures or instructions
- tips for other installers
- general comments or suggestions
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1. Installation Overview

1.1 Installation Process Overview

This guide provides installation instructions for installing the Novariant AutoSteer™ assisted steering system on a tractor, sprayer, or combine. The primary installation steps are illustrated in the flow chart below.

**Warning:** Customer AutoSteer installation on vehicles should only be performed by technicians who have received AutoFarm training from the product and understand how the AutoSteer system works and how it should be installed. Incorrect AutoSteer installation can result in hydraulic pump failure steering system malfunction and loss of vehicle steering control.
The AutoSteer Tractor Installation Kit PN 182-0028-01 contains the following components.
## 1.3 Installation Kit Components

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Component</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High Flow Valve</td>
<td>500-0016-02</td>
</tr>
<tr>
<td>2</td>
<td>Mounting hardware</td>
<td>200-0076-01</td>
</tr>
<tr>
<td>3</td>
<td>WAS Assembly</td>
<td>200-0247-01</td>
</tr>
<tr>
<td>4</td>
<td>Adapter</td>
<td>506-0007-01</td>
</tr>
<tr>
<td>5</td>
<td>User Terminal Monitor Bracket</td>
<td>200-0200-01</td>
</tr>
<tr>
<td>6</td>
<td>Installation Guide</td>
<td>602-0090-01</td>
</tr>
<tr>
<td>7</td>
<td>SA Module Assembly</td>
<td>200-0206-01</td>
</tr>
<tr>
<td>8</td>
<td>Main Harness</td>
<td>201-0153-01</td>
</tr>
<tr>
<td>9</td>
<td>SAM Harness</td>
<td>201-0161-01</td>
</tr>
<tr>
<td>10</td>
<td>Roof Module Rail</td>
<td>200-0221-02</td>
</tr>
<tr>
<td>11</td>
<td>SA Module Bracket</td>
<td>200-0190-01</td>
</tr>
<tr>
<td>12</td>
<td>Valve Bracket</td>
<td>200-0248-01</td>
</tr>
<tr>
<td>13</td>
<td>Roof Module Brackets</td>
<td>202-0132-01</td>
</tr>
</tbody>
</table>
1.4 Installation Kit Overview

The overall AutoSteer tractor installation kit contains the components shown in the diagrams below. Note: The mounting positions may differ slightly depending on what model tractor you are installing on. These components remain permanently mounted on the vehicle.

The user terminal and roof module shown below are not part of the vehicle installation kit and can be shared across several vehicles.
2. Install the Roof Module

## 2.1 Safety Notes

The AutoFarm system must be powered OFF when installing or removing the roof module.

The supplied locking pin or a padlock must be in place whenever the vehicle is in operation.

The AutoFarm AutoSteer system is designed for off road vehicles such as agricultural tractors, combine harvesters and sprayers. The AutoSteer system is not intended for and should never be installed on highway vehicles such as cars or trucks.

**Warning:** The roof module must be removed from the vehicle when transporting or driving the vehicle at speeds above 30 mph.

**Warning:** Make sure that you are in a stable position on the tractor platform when removing the roof module, so that you do not fall or drop the roof module.

**Warning:** To avoid collisions or electrical shock hazard, remove the AutoFarm roof module from the vehicle before driving under low structures or low electrical power lines.

## 2.2 Install the Mounting Rail

The mounting rail supports the AutoFarm roof module and should be installed over the cab or in another high position with a clear view of the sky. The mounting rail has several holes and a long slot to accommodate the existing bolt spacing on the cab roof as shown in the figure below.

![Mounting Rail Diagram](mountingRail.png)
You can mount the mounting rail directly on the cab roof using two existing bolts if the bolt spacing is between 30.5” and 46.5”. The two bolts must be at least 1/2” (12 mm) diameters and no larger than 5/8” (16mm) diameter. The two bolts must be threaded directly into the cab and have sufficient threads for a secure installation. Use longer bolts if necessary. Spacer washers can be used to elevate the mounting rail and clear the curvature found on some roofs. Below is a picture of a mounting rail bolted to a tractor cab roof.
AutoFarm recommends using the two mounting brackets shown in the figure below if the cab roof does not have two strong bolts of at least 1/2” (12 mm) diameter.

Secure the two brackets on the cab roof using two screws for each bracket. You can use smaller screws to secure these brackets, typically 1/4” (6 mm) or 5/16” (8 mm). These brackets fit smaller screws found on some tractor cabs. The brackets have a series of holes plus one slotted hole to accommodate different screw spacings.

Some vehicles do not have bolts or screws available on the cab roof and require custom brackets for mounting the mounting rail. Below are some examples of custom brackets made for these vehicles.
2.3 Attach Antenna

Attach the radio modem antenna. Note: The antenna should be attached “hand tight.” Do not use any tools to tighten the antenna. Apply a small amount of silicone grease to the o-ring seal on the antenna before mounting on the roof module.
<table>
<thead>
<tr>
<th>2.4 Mount the Roof Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide the roof module into locked position. The cable connection must be on the left side of the tractor, facing the rear.</td>
</tr>
</tbody>
</table>

[Image of roof module in locked position]

Make sure that the spring lock is in place.

[Image of spring lock in place]

Insert and close the locking pin through the holes in the roof module and the mounting rail. Note that a padlock can replace the locking pin.

[Image of locking pin being inserted and closed]
The installed roof module is shown in the photo below. Note: The roof module shown in this manual is not part of the installation kit but is supplied separately as part of the AutoSteer system.
3. Install the Wheel Angle Sensor (WAS)

3.1 Wheel Angle Sensor Assembly Overview

The general wheel angle sensor components are shown in the diagram below. Note: The components may require changes and new mounting holes depending on what model vehicle you are installing on. Some machines will require making custom brackets.

---

3.2 Wheel Angle Sensor Overview

Below are four examples of different custom Wheel Angle Sensor bracket made to fit different vehicles.
3.3 Recommended Wheel Angle Sensor Mounting Positions

Below are four examples of wheel angle sensor installations.
3.4 Mount Linkage Arm and Sensor Brackets

The Wheel Angle Sensor is shown in the diagram below. Mount the linkage bracket to a moving part on the steering axle such as a tie rod, wheel knuckle, or cylinder rod. Mount the angle sensor bracket to a part that doesn’t move such as the axle or steering cylinder. When the wheels are turned, the linkage bracket should move relative to the angle sensor bracket. The linkage arm and rod rotate the angle sensor when the wheels are turned. The standard linkage lengths are 12” but can be cut to a shorter length as necessary.
3.5 Adjust the Sensor and Linkage Arms

Adjust linkage arm length and/or linkage bracket position to obtain between 3200 and 3800 counts. Turn the tractor all the way right and left to make sure the linkage arms can move without interference. Note: This step is done after final assembly during the calibration and tuning steps. Do not turn the steering until the installation is complete and the count is confirmed in the Examine Steering screen.
4. Install the User Terminal

4.1 User Terminal Installation Overview

The general user terminal components are shown in the diagrams below. Note: The components may differ slightly depending on what model tractor you are installing on.
4.2 Assemble and Mount the User Terminal Bracket

Some tractors have existing threads on the cab post for securing accessories. The threads can be under plastic caps or behind plastic panels on some machines.

Mount the monitor bracket inside the cab using existing bolt threads if available. Some machines require drilling new holes and using different bolts. Never drill holes or weld to Roll Over Protective Structures (ROPS). The bracket should position the monitor at a convenient height for seeing the screen and touching the touch screen. The monitor should also be positioned so the driver/operator can easily reach the emergency stop button on top. It should never obstruct the driver’s view of the road ahead.
Mount the bracket assembly.

### 4.3 Mount and Adjust the User Terminal

Attach the mounting plate on the adjustable arm to the user terminal using four screws.
The completed user terminal installation is shown in the photos below.

Adjust the position and angle of the user terminal for easy operation.
5. Install the SA Module

5.1 Recommended SA Module Mounting Positions

The SA module is shown in the diagrams below. AutoFarm recommends mounting the SA module in the positions shown below.

Do NOT mount the SA module in the positions shown in the figure below.
5.2 Mount the SA Module Bracket

Mount the SA module in a protected position using existing bolts if available. You can also drill holes on the machine to secure the SA Module.

5.3 Mount the SA Module to the Bracket

It is essential that the SA Module is NOT mounted so that the cable connection is on the top or on the side with the cable going up.
6. Assemble and Mount the Hydraulic Valve

6.1 High Flow Valve Overview

The high flow valve ports and components are shown in the diagrams below.

<table>
<thead>
<tr>
<th>Port Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Pump Pressure port</td>
</tr>
<tr>
<td>T</td>
<td>Tank Return port</td>
</tr>
<tr>
<td>LS</td>
<td>Load Sense port</td>
</tr>
<tr>
<td>SL</td>
<td>Steer in Left port</td>
</tr>
<tr>
<td>SR</td>
<td>Steer in Right port</td>
</tr>
<tr>
<td>L</td>
<td>Left=Steer out Left port</td>
</tr>
<tr>
<td>R</td>
<td>Right =Steer out Right port</td>
</tr>
</tbody>
</table>
6.2 Recommended Positions for Hydraulic Valve Installation

Using the AutoFarm bracket allows for two different mounting positions as shown in the diagrams below.

Secure the bracket to the tractor frame then mount the valve on the bracket. You can also mount the valve directly on the machine if it has a strong flat surface where you can drill three holes for mounting the valve.
6.3 Hydraulic Valve Overview

The AutoFarm hydraulic valve receives electrical signals from the AutoFarm GPS steering controller and directs oil to the right or left steering cylinder to steer the tractor. On tractors with Closed Center steering systems, the valve can be connected to either “Power Beyond” ports on the rear of the tractor or directly to the hoses that supply oil to the manual steering unit. If “Power Beyond” ports are available on the tractor, AutoFarm recommends connecting your AutoFarm valve directly to the “Power Beyond” ports. The steps below describe how to install the valve by connecting to either Power Beyond or connecting to existing steering unit oil supply hoses. Both methods are shown below.

6.4 Identifying Power Beyond Ports on a Tractor

The Power Beyond ports are located at the rear of the tractor and provide oil pressure for hydraulically driven implements. The oil pressure in the Pressure line is adjusted according to the pressure signal in the Load Sense line. The Power Beyond ports can be simple threaded ports with a plug or they can be quick couplers.
7. Installing the Hydraulic Hoses Using Power Beyond

<table>
<thead>
<tr>
<th>7.1 Connect the Valve using Power Beyond Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many tractors have optional Power Beyond ports in the rear for connecting hydraulic accessories. AutoFarm recommends using the Power Beyond ports to connect your AutoFarm steering valve whenever these ports are available. Below are two examples of typical Power Beyond ports on agricultural tractors.</td>
</tr>
</tbody>
</table>

The example below shows Power Beyond ports before connecting hoses.
The Power Beyond ports will usually have the three hose connectors identified below.

7.2 Hose Connections

The diagram below shows the existing hoses on a typical closed center tractor steering system before installing the AutoFarm valve. The AutoFarm valve will be connected along the two steering hoses between the steering unit and the steering cylinder.
Refer to the step-by-step instructions in the next section, “Hose Connection Process” on page 27, and the figure above for all the necessary hose connections. A complete installation typically requires seven new hoses that must be custom built according to the required length and hose fitting. Only use hoses rated for at least 3000 psi working pressure.
7.3 Hose Connection Process

Note: make sure the AF hydraulic valve is in place. The tractor’s Power Beyond system provides reliable and easy to install oil supply for the AutoFarm Steering valve and should be used when it is available on the machine. The Power Beyond Ports must not be used for AutoSteer when the steering system and Power Beyond system uses separate oil reservoir and pumps.

1. Measure required hose lengths.
2. You must make custom hydraulic hoses to connect the AutoFarm steering valve to the machine. Below is a list of all the required hoses and connection points. Refer to the diagrams below for specific hose numbers.

**Hose #1:** Connect between “P” port on AutoFarm valve and PRESSURE port on the tractor’s Power Beyond system.
**Hose #2:** Connect between “T” port on AutoFarm valve and TANK/RETURN port on the tractor’s Power Beyond system.
**Hose #3:** Connect between “LS” port on AutoFarm valve and LOAD SENSE (LS) port on tractor’s Power Beyond system.
**Hose #4:** Connect between “SL” port on AutoFarm valve and the left steering line coming out of the manual steering unit (Orbitrol).
**Hose #5:** Connect between “SR” port on AutoFarm valve and the right steering line coming out of the manual steering unit (Orbitrol).
**Hose #6:** Connect between the “L” port on AutoFarm valve and the left steering cylinder.
**Hose #7:** Connect between the “R” port on AutoFarm valve and the right steering cylinder.

Note: The left steering cylinder is the side that turns the wheels towards the left and the right steering cylinder is the cylinder that turns the wheels towards the right.

Note: Hoses 1, 2 and 3 can be equipped with quick coupler tips that match the quick coupler ports available on the tractor’s Power Beyond system.

**Hose specifications:** All hydraulic hoses should be rated for at least 3000psi working pressure and all hose fittings must be installed per the manufacturers specifications.
Below is an example of a set of hoses using quick couplers on the three hoses that connect to the Power Beyond ports. You can use quick couplers when the Power Beyond ports have quick couplers. *(Note: Hoses are not shown to true length.)*
Below is an example of what a typical set of hoses will look like when using threaded hose adapters to connect to the three Power Beyond ports. (Note: Hoses are not shown to true length.)

The picture below is an example of where you can open the two original steering lines to connect the four AutoFarm steering hoses. You can also open the lines at the steering cylinder.
Connect power beyond hoses to valve.

Connect hoses to power beyond ports.
8. Installing the Hydraulic Hoses without Power Beyond

8.1 Connect the Valve without Power Beyond Ports

When the vehicle does not have Power Beyond ports, follow the procedures below to connect your AutoFarm valve to the steering system. Combine harvesters and sprayers are examples of machines that do not have Power Beyond.

Below is a diagram showing the main steering hoses you will find on vehicles that have a Load Sense Closed Center Steering system. Hoses must be rated for 3000 PSI working pressure.

![Diagram of steering system]

8.2 Connect Hoses on Machines without Power Beyond

When the machine does not have Power Beyond ports, the AutoSteer Pressure, Return, and Load Sense lines will have to be connected directly to the machine’s hydraulic lines.

The exact hydraulic installation can only be determined by a hydraulic specialist after using the machine’s hydraulic diagram that shows how the hydraulic system works on the machine. On some machines you can connect the AutoSteer valve to the existing steering oil supply, while on other machines you can connect the AutoSteer valve to auxiliary hydraulic lines.

**Caution:** To avoid possible pump damage or steering loss always consult a hydraulic specialist or AutoFarm for a recommendation on how to connect the AutoSteer valve to your specific machine.
8.3 Installing an Open Center Steering System

Auto Steer valve installation on vehicles using the Open Center system requires special parts and special instructions. Consult your AutoFarm dealer for details. The picture below is an example of where you can open the two original steering lines to connect the four AutoFarm steering hoses. You can also open the lines at the steering cylinder.

8.4 Orifice and Plug Kit Overview

The high flow valve is supplied with an orifice and plug kit as shown below. Refer to the next sections for detailed instructions on when the orifice or plug must be installed.
8.5 Installing the Load Sense Drain Orifice

The high flow valve has an internal plug that can be replaced by an orifice to drain down the load sense pressure on machines that do not have a load sense drain. The orifice allows the Load Sense pressure to drain the tank so the hydraulic pump does not remain stroked up. To replace the plug by the orifice, perform the following steps.

1. Remove the D05 proportional valve after loosening the four socket head cap screws using a 3/16” Allen Key.

2. Remove the external plug shown below using a 1/4” Allen Key.
3. Remove the internal plug using a 1/8” Allen Key.

4. Install the orifice and tighten using a 1/8” Allen Key.
5. Replace the external plus using 1/4” Allen Key.
6. Replace the D05 proportional valve taking care that all the o-rings are correctly installed.

### 8.6 Installing the Pilot Drain Plug

If the machine can have more than 150 PSI of pressure on the return line, you must install an internal plug and an extra drain hose to complete the installation. The drain hose allows the enable valve pilot pressure to drain down when you change from AutoSteer mode to Manual Steer mode.

**Caution:** Failure to install a drain hose as described below on machines that can have more than 150 PSI on the Return Line, can prevent engagement of manual steering cause loss of manual steering control.

1. After installing the High Flow valve, measure the return line pressure while working all the hydraulic systems on the machine. This includes moving the steering system, moving the three point hitch and moving the implements connected to the hydraulic remotes. If you measure a return pressure that is more than 120 PSI, install the drain hose as described below.
2. Remove the solenoid coil using a 3/4” wrench.

3. Remove the valve cartridge using a 7/8” wrench.
4. Install a blind plug using a 1/8” Allen Key.

5. Remove the plug from the DRAIN port on the bottom of the valve and connect a 1/4” hose from the DRAIN port directly to the tank. This hose must drain directly to tank or other line that does not exceed 150 PSI.

6. Test the manual steering while lifting and dropping implements connected to the remotes and three point hitch. Manual steering should work normally when other hydraulic systems are being used.
9. Install the Pressure Transducer

9.1 Install the Pressure Transducer

Mount the 90 degree fitting to the port marked “trans” on the AutoSteer valve. Note: Use teflon tape to ensure a good seal.

Attach the pressure transducer to the 90 degree fitting. Note: Use teflon tape to ensure a good seal.
Attach the cable connector from the valve harness to the pressure transducer. A rubber gasket must go between the connector and the pressure transducer.

- Pressure transducer
- Cable connector

Make sure to line up the connectors correctly. Do not force the connection.
### 10. Install the Main Cable Harness

- **10.1 Attach the Main Cable Harness to the User Terminal**

- **10.2 Route the Main Cable Harness**

  Route the cable out of the cab through an existing rubber plug under the left side of rear window.
Attach the cable to the roof module. Rotate the connector clockwise to engage.

Secure the cable to the roof using the eye clamp.
Route the cable down the left side of the cab and secure with cable ties.

10.3 Attach the Cable to the Power Supply in the Cab
11. Install the SA Module Cable Harness

11.1 Attach the Cable to the SA Module

Connect the cable to the SA Module.

Close the cable connector locking mechanism.
Note: To disconnect the cable from the SA module, the connector must first be unlocked as shown.

**11.2 Connect the SA Module Harness to the Hydraulic Valve**

Route and secure the steering cable from the SA Module to the hydraulic valve.
### 11.3 Connect the SA Module Harness to the Wheel Angle Sensor

Route and secure the WAS cable from the SA Module beneath the cab to the WAS. The two connectors on the main must exit under that cab to connect to the SAM Module cable. Attach the cable to the WAS.

### 11.4 Attach SA Module Cable Harness to Main Cable Harness

Route the SA Module cable into the cab through the rubber plug under the right side of rear window.
11.5 Optional Power Cable Adapters

Several optional power cable adapters are available as shown in the diagram below.

- **20 foot battery cable**
  - PN #201-0156-01

- **Power splitter cable**
  - PN #201-0024-01

- **Case-New Holland power adapter cable**
  - PN #201-0024-01
## 12. Final Checklist

<table>
<thead>
<tr>
<th>Check all hose connections.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check all cable connections.</td>
</tr>
<tr>
<td>Power up the vehicle and check for hydraulic leaks.</td>
</tr>
<tr>
<td>Check manual steering.</td>
</tr>
<tr>
<td>Power up the AutoSteer system and begin the calibration and tuning process.</td>
</tr>
</tbody>
</table>