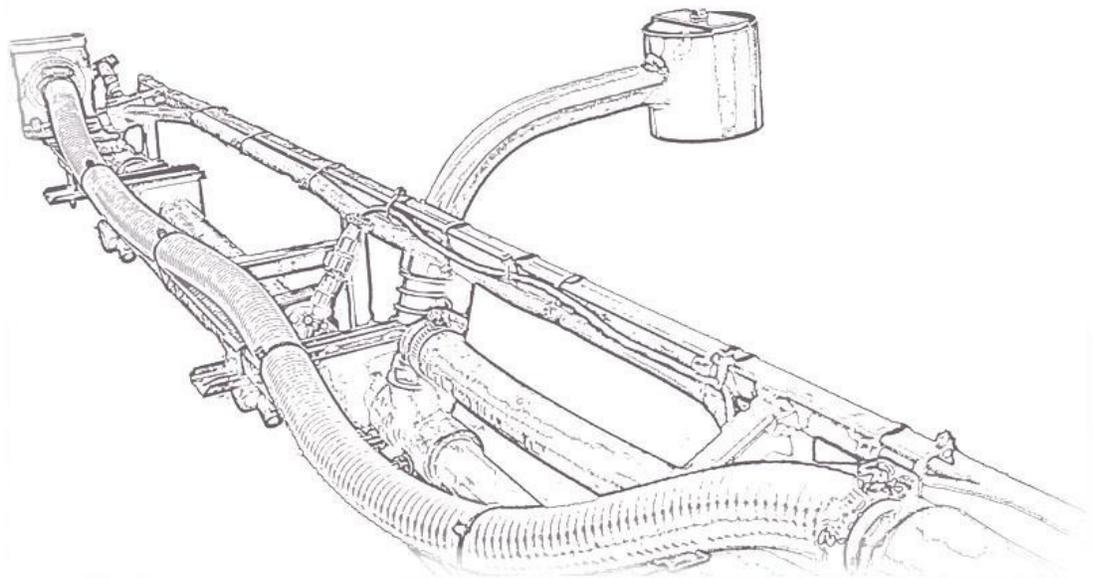




# UC5<sup>TM</sup> CAN BUS Spray Height Control System



## John Deere R-Series Active Wing Roll Control Installation Manual

Printed in Canada

Copyright © 2016 by NORAC Systems International Inc.

Reorder P/N: UC5-BC-JD12A-INST Rev G (John Deere R-Series Active Wing Roll Control)

---

**NOTICE:** NORAC Systems International Inc. reserves the right to improve products and their specifications without notice and without the requirement to update products sold previously. Every effort has been made to ensure the accuracy of the information contained in this manual. The technical information in this manual was reviewed at the time of approval for publication.

## Contents

---

1	Introduction.....	1
2	Technical Specifications .....	2
3	General UC5 System Layout.....	3
4	Kit Parts .....	4
5	Pre-Install Checklist.....	10
6	Ultrasonic Sensor Installation .....	11
7	Position Sensor Installation .....	17
8	Module Installation .....	18
9	Connecting the Sensors to the CANbus .....	23
10	Hydraulic Installation .....	24
11	Wing Roll Cylinder Air Bleed Procedure.....	33
12	Software Setup.....	37
13	Cable Drawings .....	42
14	Appendix A: Optional Severe Terrain Sensor Mounting .....	48

## I Introduction

---

Congratulations on your purchase of the NORAC UC5 Spray Height Control System. This system is manufactured with top quality components and is engineered using the latest technology to provide operating reliability unmatched for years to come.

When properly used the system can provide protection from sprayer boom damage, improve sprayer efficiency, and ensure chemicals are applied correctly.

Please take the time to read this manual completely before attempting to install the system. A thorough understanding of this manual will ensure that you receive the maximum benefit from the system.

Your input can help make us better! If you find issues or have suggestions regarding the parts list or the installation procedure, please don't hesitate to contact us.

### Important

**Every effort has been made to ensure the accuracy of the information contained in this manual. All parts supplied are selected to specially fit the sprayer to facilitate a complete installation. However, NORAC cannot guarantee all parts fit as intended due to the variations of the sprayer by the manufacturer.**

**Please read this manual in its entirety before attempting installation.**

## 2 Technical Specifications

---



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

This Class A digital apparatus complies with Canadian ICES-003.

Pursuant to EMC Directive – Article 9, this product is not intended for residential use.

**Table 1: System Specifications**

Supply Voltage (rated)	12VDC
Supply Current (rated)	10A
Hydraulic Pressure (maximum)	3300 psi
Baud Rate	250 kbps
Clock Frequency (maximum)	96 MHz
Solenoid Valve PWM Frequency	300 Hz
Ultrasonic Sensor Transmit Frequency	50 kHz
Operating Temperature Range	0°C to 80°C

### 3 General UC5 System Layout

Figure 1 illustrates the general layout of the UC5 system components:

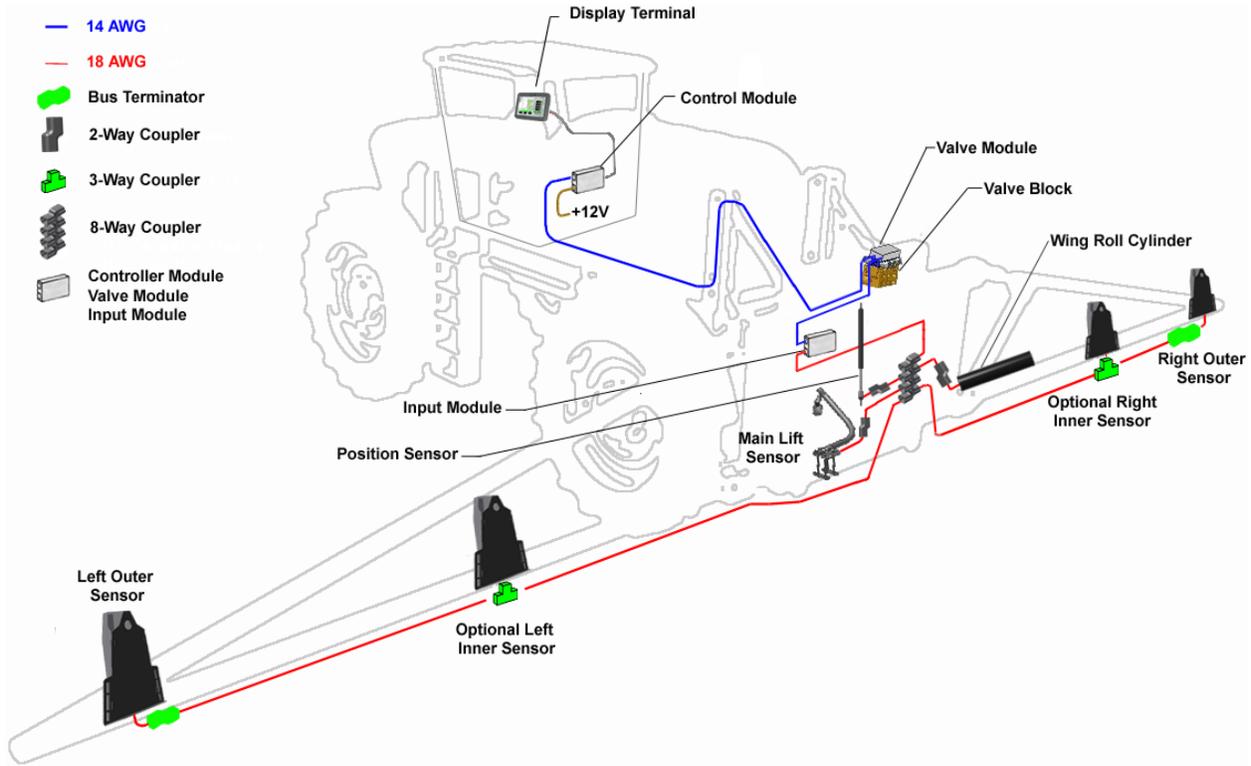


Figure 1: General UC5 System Layout

## 4 Kit Parts

### 4.1 Kit Overview

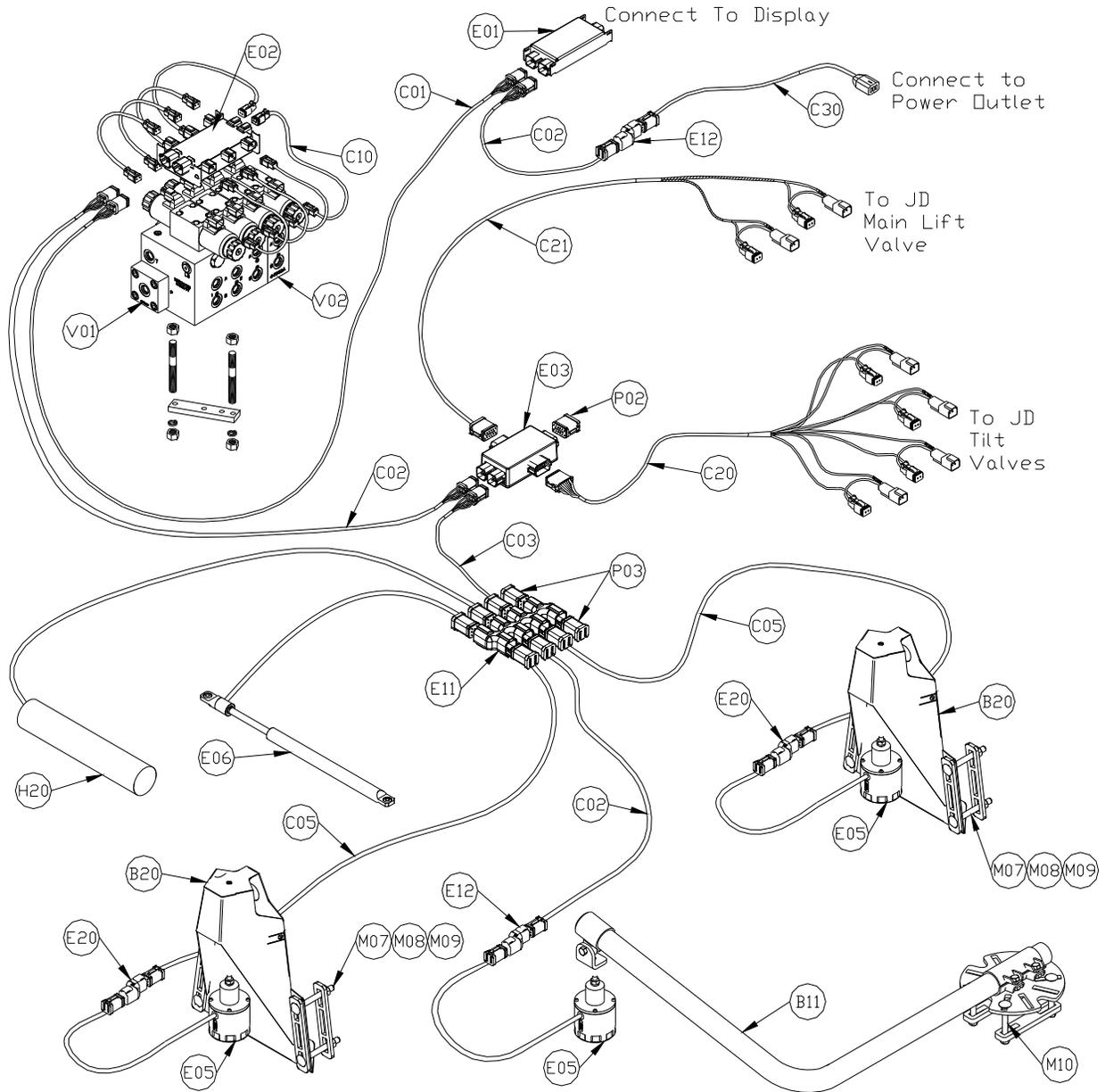


Figure 2: JD12A System Parts

## 4.2 Hydraulic Plumbing

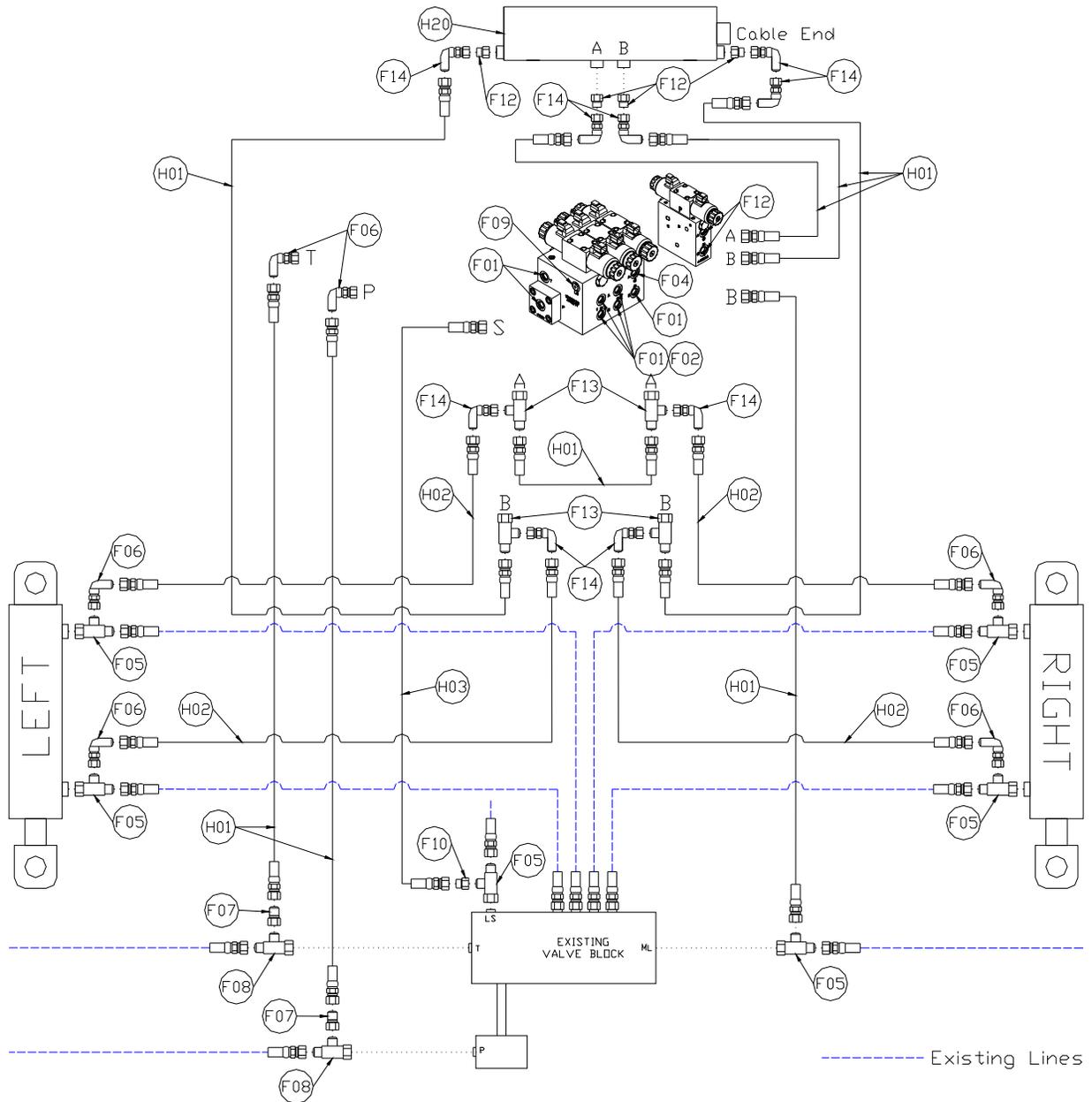


Figure 3: JD12A Hydraulic Plumbing

### 4.3 List of Parts

Item	Part Number	Name	Quantity
B05	44706-01	KIT CABLE TIE BLACK 10 PCS 21 IN 150 PCS 7.5 IN	1
B07	44745	MOUNTING BRACKET WRC JD R SERIES	1
B08	45032-1	BRACKET POSITION SENSOR	2
B11	44743	MOUNTING BRACKET MAIN LIFT SENSOR UC4 PLUS	1
B20	44971	SENSOR MOUNTING BRACKET LOW PROFILE 16GA	2
C01	43220-10	CABLE UC5 NETWORK 14 AWG 10M	1
C02	43220-01	CABLE UC5 NETWORK 14 AWG 1M	3
C03	43220-03	CABLE UC5 NETWORK 14 AWG 3M	1
C05	43210-20	CABLE UC5 NETWORK 18 AWG 20M	2
C10	43230-04	CABLE UC5 VALVE 2PIN DT TO 2PIN DT	8
C20	43240-41	CABLE UC5 INTERFACE TILT DT R4038	1
C21	43240-38	CABLE UC5 INTERFACE JOHN DEERE R4030 4038 ML	1
C30	43250-07	CABLE UC5 BATTERY JD FUSED	1
E01	43710	UC5 CONTROLLER MODULE	1
E02	43720	UC5 VALVE MODULE	1
E03	43732	UC5 INPUT MODULE PASS THRU	1
E05	43750	UC5 ULTRASONIC SENSOR	3
E06	45030	UC5 POSITION SENSOR NF W/O HARDWARE	1
E11	43765	UC5 NETWORK COUPLER 8-WAY	1
E12	43764	UC5 NETWORK COUPLER 2-WAY	2
E20	43764T	UC5 NETWORK COUPLER 2-WAY WITH TERMINATOR	2
H01	44863-23	HOSE ASSEMBLY 122R2-06 32IN L 6FORX 6FORX	8
H02	44863-25	HOSE ASSEMBLY 122R2-06 136 IN L 6FORX 6FORX	4
H03	44862-13	HOSE ASSEMBLY 122R2-04 36 IN L 4FORX 4FORX90	1
H10	44865-70	HYDRAULICS FITTING KIT - JD12	1
H11	44865-75	HYDRAULICS FITTING KIT - AWR1	1
H20	44978	WING ROLL CYLINDER W/POSITION SENSOR	1
M02	UC5-BC-JD12A-INST	MANUAL INSTALLATION UC5 JOHN DEERE R-SERIES ACTIVE WING ROLL	1
M07	106610	BOLT HEX SS 5/16X4.5	8
M08	100870	NUT LOCK NYLON SS 5/16 IN	8
M09	103025	WASHER FLAT SS 5/16 IN	16
M10	101374	BOLT CARRIAGE SS 3/8X3	2

Item	Part Number	Name	Quantity
P02	106602	UC5 NETWORK 12 PIN PLUG (A-KEY)	1
P03	105882	UC5 NETWORK 6 PIN PLUG	2
V01	44960D	VALVE BLOCK ASSEM 3 STATION CC/LS PROP DT 4	1
V02	44962D	VALVE ASSEMBLY EXPANSION DPOC PROP DT 4 BOLT	1

 **Important**

**Do not use high speed power tools/drills when installing hardware.**

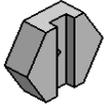
 **Important**

**The use of dielectric grease is not recommended on any NORAC electrical connections.**

 **Important**

**To ensure all stainless steel hardware does not gall or seize apply a light coating of the supplied Permatex Anti-seize grease to all threaded parts upon installation. Permatex Anti-seize lubricant is preferred, but other similar anti-seize products may be used.**

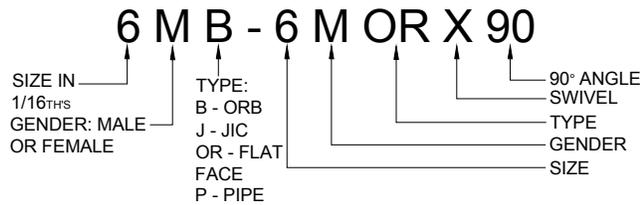
#### 4.4 Hydraulic Fitting Kit Details (P/N: 44865-70)

Item	Part Number	Name	Quantity	Picture
F01	44917	MALE ADAPTER - 6MB 6MOR	7	
F02	44929	ORIFICE INSERT .0625 IN ONE WAY	4	
F04	104369	PLUG - 6MBP	1	
F05	104586	TEE ADAPTER - 6FORXR 6MORT	6	
F06	104590	90 DEG ADAPTER - 6MOR 6FORX90	6	
F07	104884	MALE TO FEMALE ADAPTER - 6MOR 8FORX	2	
F08	104885	TEE ADAPTER - 8FORXR 8MORT	2	
F09	104693	MALE ADAPTER - 4MB 4MOR	1	
F10	105226	MALE TO FEMALE ADAPTER - 4MOR 6FORX	1	
F11	105500	SETSCREW 1/4X3/8	1	

## 4.5 Hydraulic Fitting Kit Details (P/N: 44865-75)

Item	Part Number	Name	Quantity	Picture
F12	44917	MALE ADAPTER - 6MB 6MOR	6	
F13	104586	TEE ADAPTER - 6FORXR 6MORT	4	
F14	104590	90 DEG ADAPTER - 6MOR 6FORX90	9	

Fitting Name  
Example:



## 5 Pre-Install Checklist

The pre-install checklist is necessary to check the existing sprayer functionality before the installation.

1. Unfold the sprayer over a flat, unobstructed area (i.e. no power lines...etc.).
2. Ensure all boom-fold operations are functional (place a check mark in boxes below).
3. Bring engine to field-operational RPM and record below.
4. Record the time (seconds) it takes for a full stroke for all boom functions. To ensure repeatable measurements, take the average of 3 trials.
5. Not all sprayers will have the functions listed below in **Figure 4**.

### ⚠ Important

Ensure the boom has sufficient travel so it does not contact the ground during these tests.

<input type="checkbox"/>	<input type="checkbox"/>	Inner Fold	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	Outer Fold	<input type="checkbox"/>
	IN	OUT	Engine RPM
Left Tilt Up Full Stroke	<input type="checkbox"/>	<input type="checkbox"/>	Right Tilt Up Full Stroke
	↑	↑	↑
	Main Lift Up, Full Stroke		
	Main Lift Down, Full Stroke		
Left Tilt Down Full Stroke	<input type="checkbox"/>	<input type="checkbox"/>	Right Tilt Down Full Stroke
	↓	↓	↓
	<input type="checkbox"/>	<input type="checkbox"/>	
	↶	↷	
	Roll CCW (Slant Left)	Roll CW (Slant Right)	

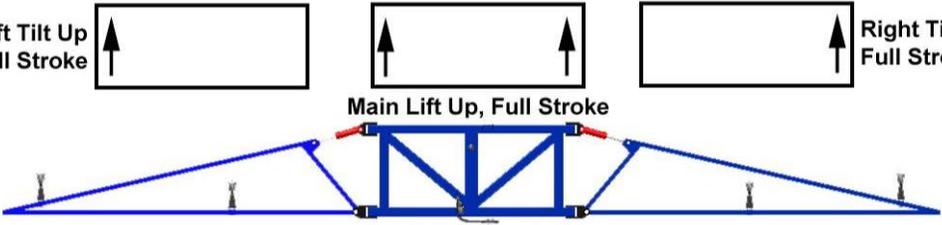


Figure 4: Pre-Install Boom Speeds

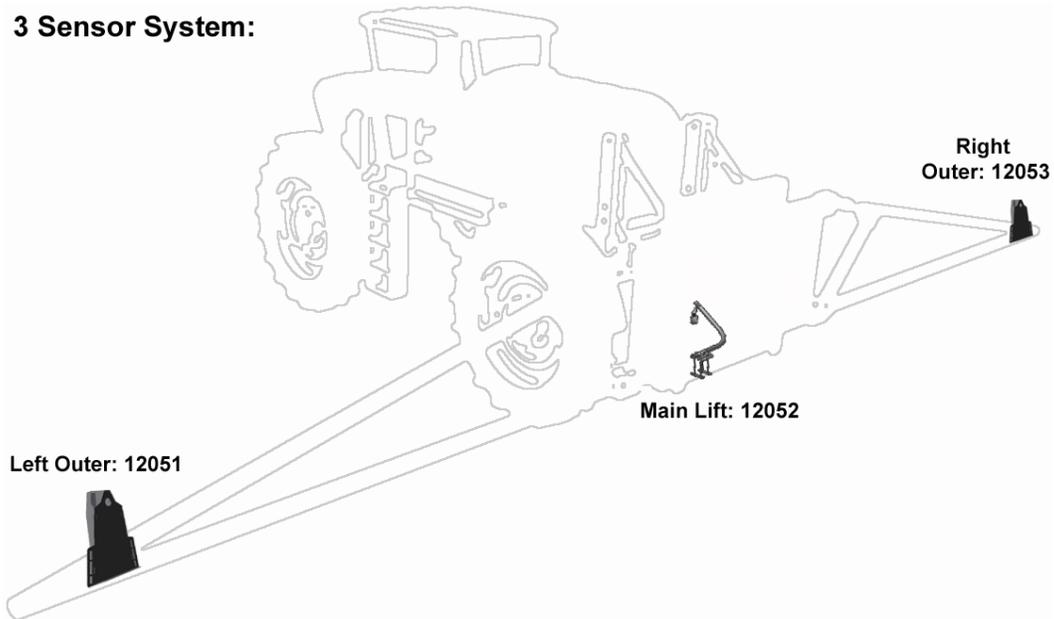
## 6 Ultrasonic Sensor Installation

### 6.1 Ultrasonic Sensor Serial Number Arrangement

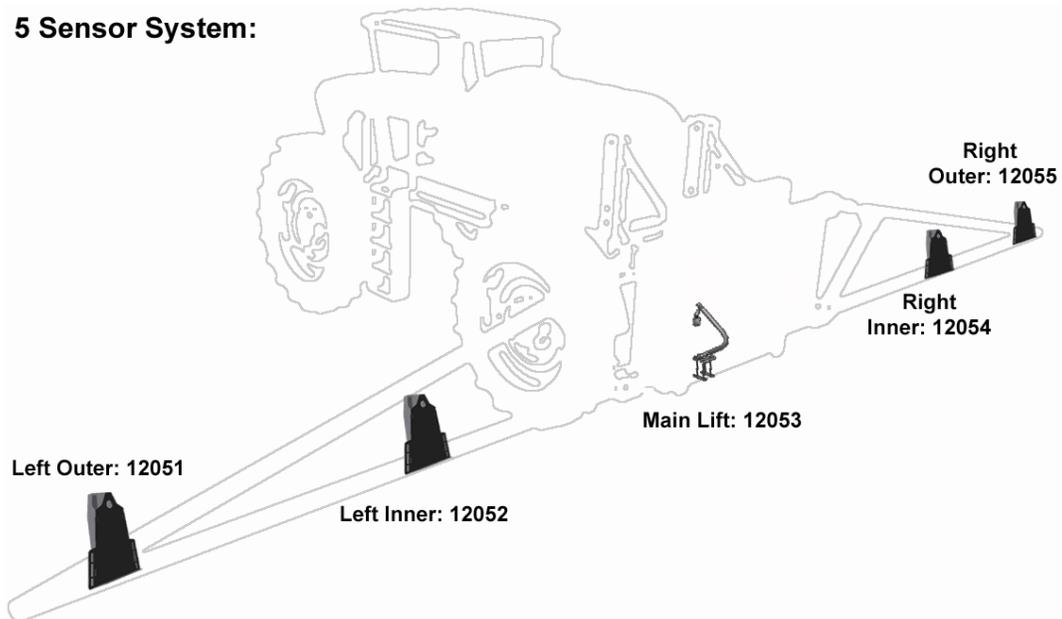
When installing the UC5 sensors, start with the smallest serial number on the left-hand side, and proceed to the largest serial number on the right hand side. Each UC5 sensor has a serial number stamped on the sensor housing.

**Apply a light coating of the supplied Permatex Anti-seize grease to all threaded parts upon installation.**

#### 3 Sensor System:



#### 5 Sensor System:



**Figure 5: Sensor Serial Number Arrangement**

## 6.2 Ultrasonic Wing Sensor Mounting Guidelines

The following guidelines will ensure optimal sensor performance and prevent sensor measurement error.

1. In its lowest position, the sensor must be 9 inches (23 cm) or more from the ground.
2. Ensure that there are no obstructions within a 12-inch diameter circle projected directly below the center of the sensor.
3. The sensor should be approximately vertical at normal operating heights.

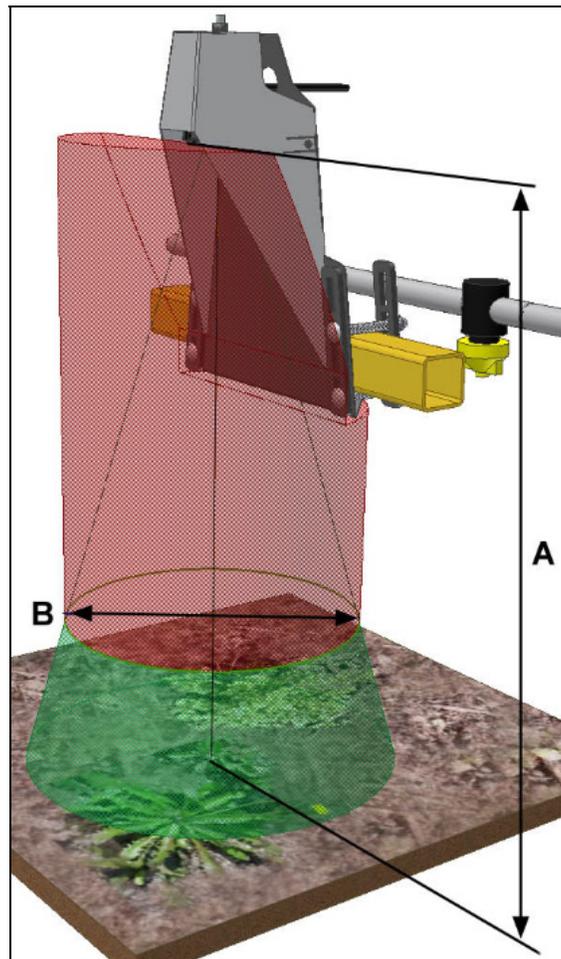


Figure 6: Sensor Mounting Guidelines

### 6.3 Low Profile Bracket Mounting Guidelines

1. Minimize the distance between the bolts to prevent bending the bracket and prevent the bracket from loosening over time.
2. Ensure the bracket is mounted tight against the bottom of the boom, minimizing the distance between the boom structure and the angled flange.

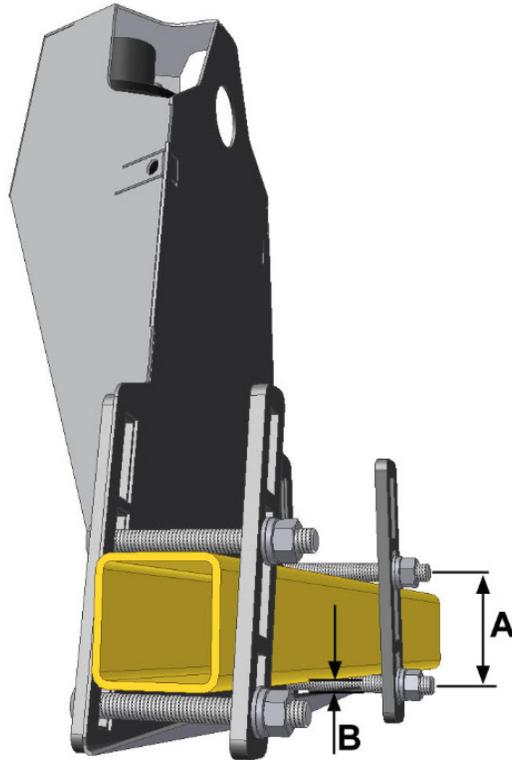


Figure 7: Bracket Mounting Guidelines

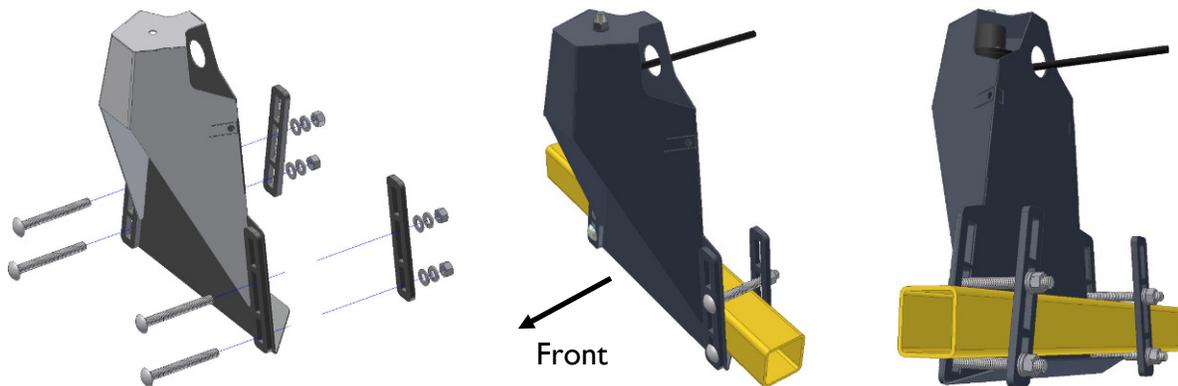
#### Important

A problem can arise if a sensor is not mounted correctly. It is possible for the sensor to read off of the boom instead of the ground. This may only become apparent once the control system is switched from soil to crop mode.

Also be careful that the sensor bracket does not collide with any other part of the boom when the boom is folded to transport position. If possible, mount the sensor brackets while the booms are folded to ensure they will not cause interference.

## 6.4 Wing Sensor Installation

1. The sensor bracket should be oriented forward (ahead of the boom).
2. Typically the best mounting location for the wing sensor brackets will be near the end of the boom tips, approximately two feet (60cm) from the end.
3. Depending on the boom design, some breakaway sections will lift upwards as they break back. If the sensor is mounted to this portion of the boom, the system will force the boom downwards towards the ground as the boom folds backwards.
4. Use M07, M08 and M09 in place of the supplied hardware to mount the brackets.
5. Mount the NORAC UC5 ultrasonic sensor into the sensor bracket and run the sensor cable either through hole in the back or through the side cut-out and behind the bracket. Ensure the cable is clear of moving parts and will not be damaged during folding.



**Figure 8: Bracket Mounting Example**



**Figure 9: Wing Sensor Bracket Mounting**

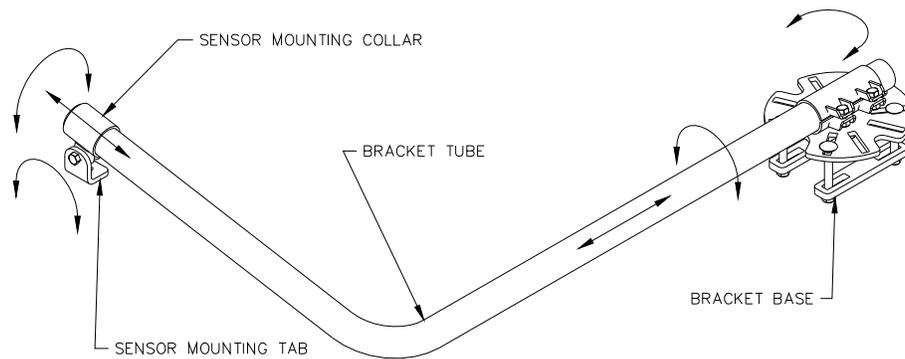
If the Severe Terrain option is being installed, refer to Appendix A: Optional Severe Terrain Sensor Mounting for instructions on mounting the inner sensor brackets.

## **6.5 Ultrasonic Main Lift Sensor Mounting Guidelines**

The following guidelines will ensure optimal sensor performance and prevent sensor measurement error.

1. In its lowest position, the sensor must be 9 inches (23 cm) or more from the ground.
2. The centerline of the acoustic cone should be approximately vertical at normal operating heights.
3. The bottom of the sensor must be at least 9 inches in front of the spray nozzles and boom structure. (This does not apply for the main lift sensor)
4. The bottom of the sensor must be at least 9 inches above the spray nozzles.
5. Ensure there are no other obstructions with a 12 inch (23 cm) diameter circle projected directly below the sensor.

## 6.6 Main Lift Sensor Installation



**Figure 10: Main Lift Bracket Assembly**

1. The main lift bracket should position the sensor approximately in the center of the sprayer, forward of the boom. An example of this mounting is illustrated in **Figure 11**.
2. Discard the bolts included with the bracket. Use the 3/8"×3" bolts (M10) to mount the bracket.
3. Mount the ultrasonic sensor to the main lift bracket. Run the sensor cable along the main lift bracket tube.



**Figure 11: Example Mounting of the Main Lift Bracket**

### **⚠ Important**

**Avoid mounting the main lift sensor over or near a wheel-track. Measurements from the wheel-track do not provide an accurate crop height and will cause measurement and control error.**

**Ensure the bracket does not collide with any other part of the sprayer throughout the full range of main lift motion.**

## 7 Position Sensor Installation

1. The position sensor (E06) should be mounted such that the largest amount of travel of the sensor can be utilized without exceeding the travel limit. The sensor install length is 17" (430mm) center to center with  $\pm 3.5"$  ( $\pm 90\text{mm}$ ) travel recommended. It should be mounted with the cable on the bottom in a location where the sensor will not bind or contact. Roll the boom fully in each direction and take measurements to ensure the travel limit is not exceeded.



Figure 12: Position Sensor Mounting

2. Mount the position sensor to the brackets using the mounting hardware as shown in Figure 13.

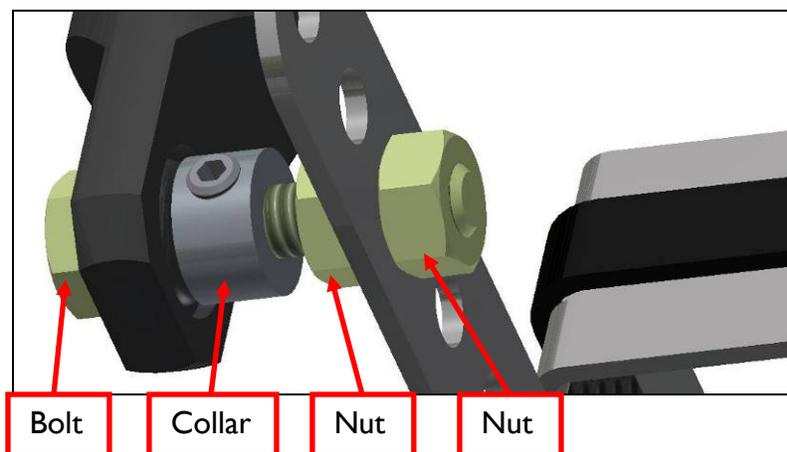


Figure 13: Mounting Hardware

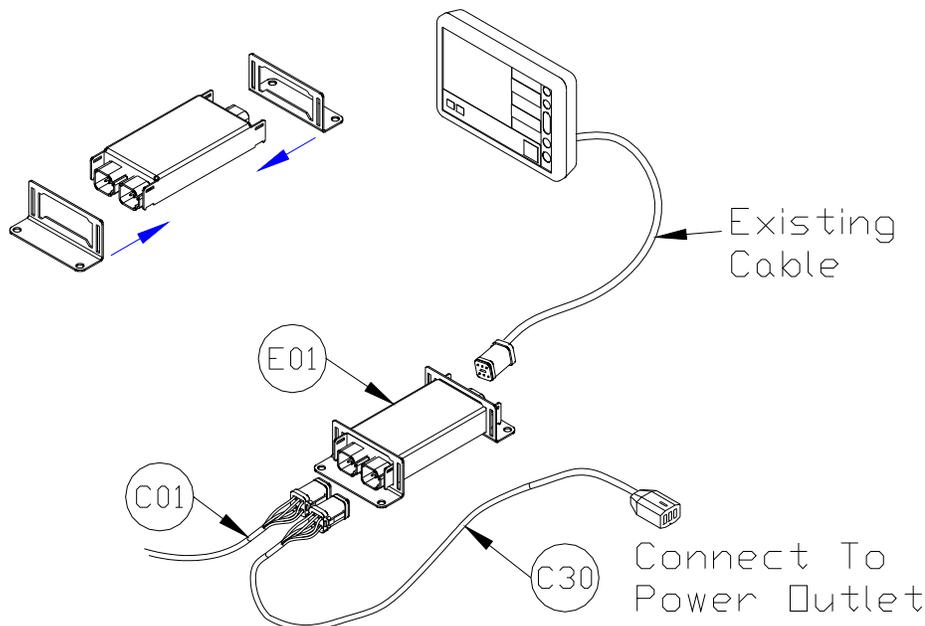
## 8 Module Installation

An optional module mounting bracket kit is available for purchase from NORAC. The mounting brackets are compatible with control modules and input modules. One kit is needed per module.

Item	Part Number	Name	Quantity
B20	43708	UC5 MOUNTING BRACKET KIT (CONTROL AND INPUT MODULES)	1

### 8.1 Control Module

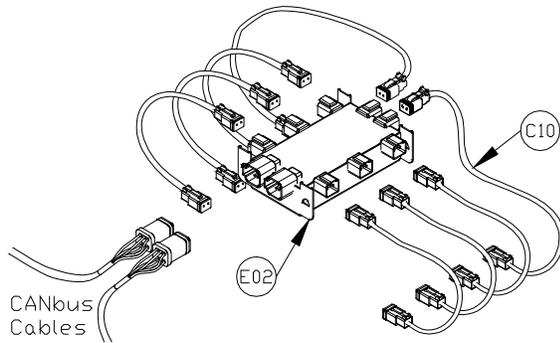
1. Refer to **Figure 1** and **Figure 14**.
2. Securely mount the control module (E01) inside the sprayer cab using screws, cable ties or optional brackets. If installing with a display kit, follow the control mounting instructions in the display kit installation manual.
3. Connect the display terminal to the control module using the display cable. This cable must be connected to the end of the control module with only one Deutsch connector. Refer to the display kit installation instructions.
4. Connect the power cable (C30) to one of the two CANbus connectors on the control module using cable C02 and a 2-way coupler (E12). Connect the other end of the power cable to the John Deere power bar inside the cab. Cable C02 and item E12 may not be needed if the control module is mounted close enough to the power bar.
5. Route cable C01 from the other CANbus connector towards the rear of the sprayer.



**Figure 14: Control Module Mounting**

## 8.2 Valve Module

1. Install the valve module (E02) to the top of the NORAC valve block. Orient the 6-pin Deutsch (CANbus) connectors towards the “P” and “T” ports with the label facing up.



Output Number	Normal Function
1	Left Up
2	Left Down
3	Right Up
4	Right Down
5	Main Up
6	Main Down
7	Roll CW
8	Roll CCW

Figure 15: Valve Module

2. Verify the valve coil connectors are oriented vertically (Figure 16).

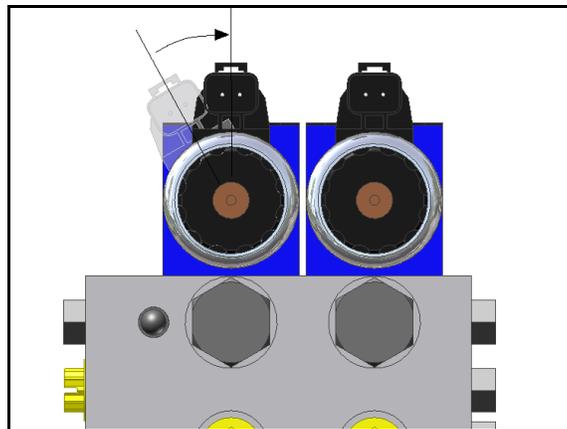
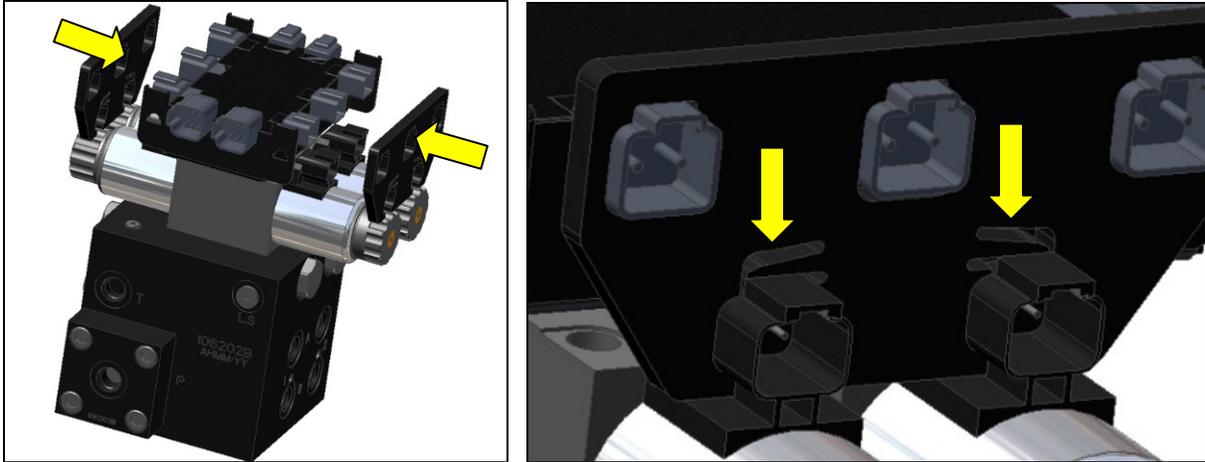


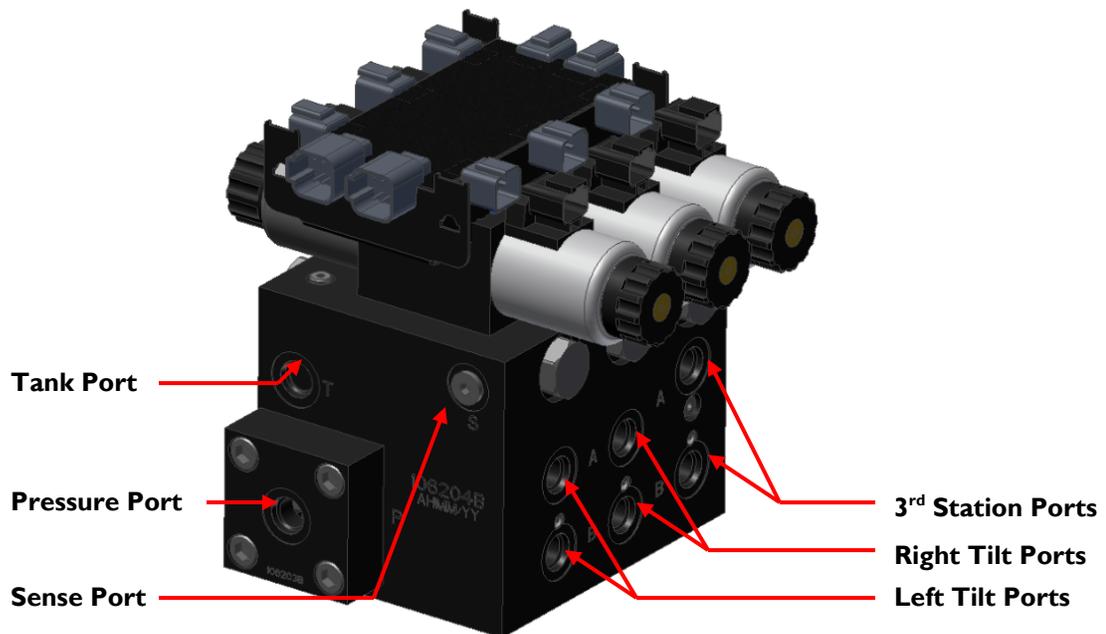
Figure 16: Align Coils

3. Place the valve module between the valve coils. Slide a valve mounting bracket over the connectors of the valve module and the valve coil connectors. This may require flexing the plastic bracket slightly (Figure 17).
4. Ensure the bracket is pushed over the connectors far enough to allow the clips to engage behind the valve connectors.



**Figure 17: Valve Module Bracket Installation**

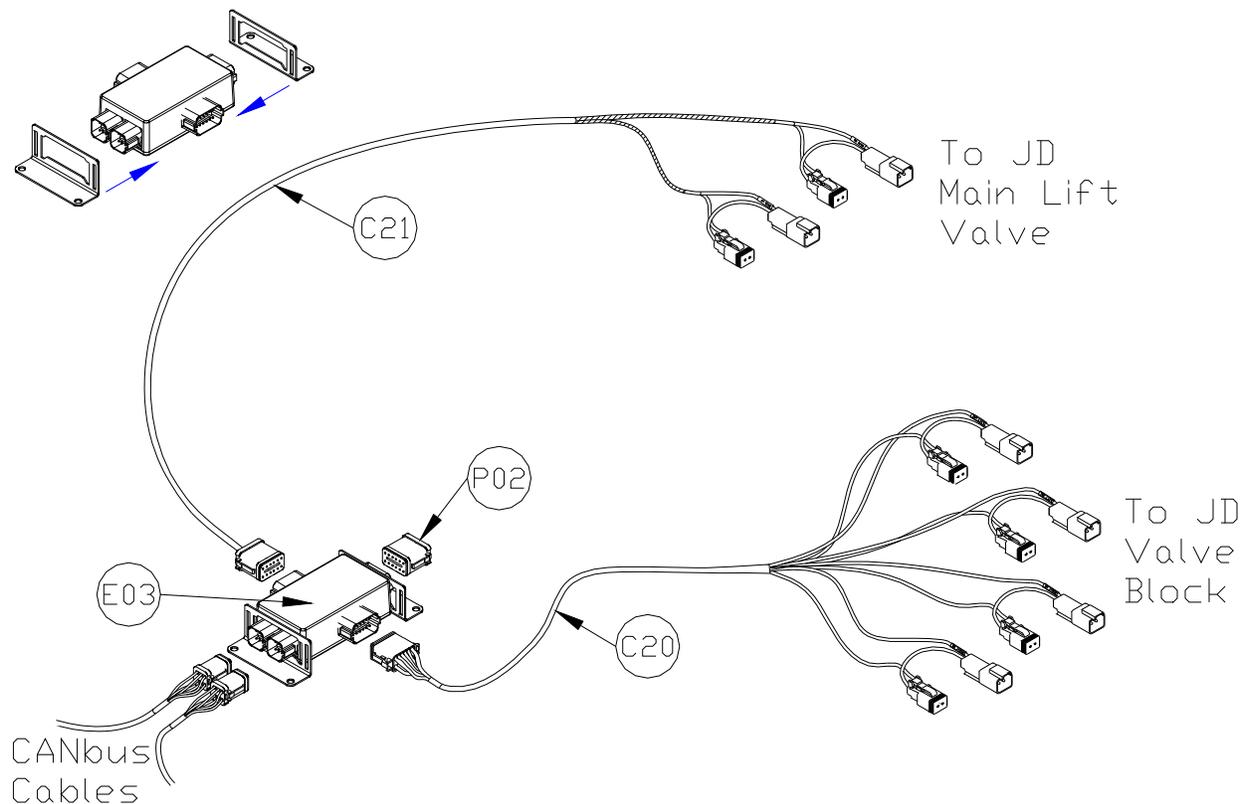
5. Connect the valve module CANbus to cable C01 from the control module. Route cable C02 from the other CANbus connector to the input module.
6. With the valve module securely mounted to the valve block, connect the valve cables (C10), to the valve coils.
7. Connect the temperature probe to the valve block using the supplied 3/8" x 1/2" hex bolt.



**Figure 18: Valve Module Installation**

### 8.3 Input Module

1. Install the input module (E03) on the boom near the John Deere valve block. Secure it to the boom using cable ties or optional brackets.
2. Connect the CANbus cable (C02) from the valve module to the input module.
3. Connect the CANbus cable (C03) to the input module.
4. Insert the 12 pin plug (P02) into the OEM 3 connector on the end of the input module



**Figure 19: Input Module Connections**

5. Connect the 12 pin connector on the tilt interface cable (C20) to the *Thru 2* connector on the side of the input module. Insert the other connectors on C20 into the tilt connectors on the John Deere solenoids (**Figure 20**).
6. Connect the 12 pin connector on the main lift interface cable (C21) to the *Thru 1* connector on the side of the input module. Insert the other connectors on C21 into the main lift connectors on the John Deere solenoids (**Figure 20**).

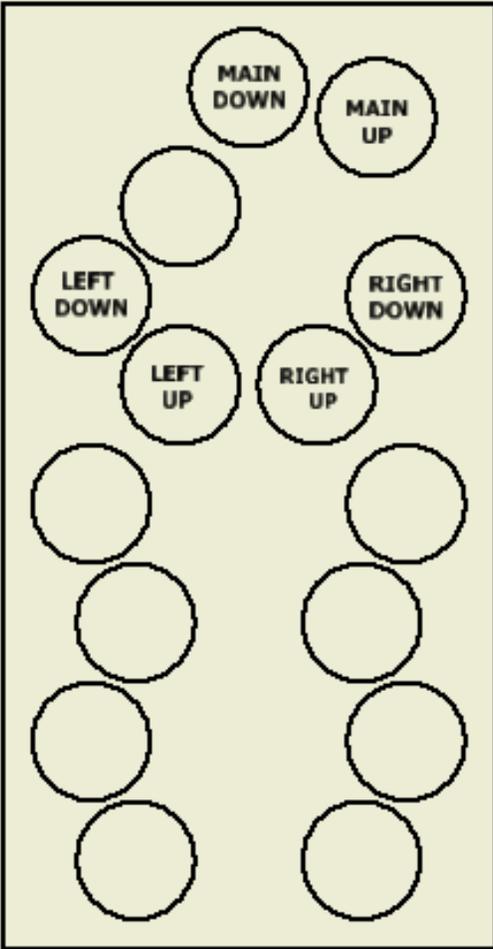


Figure 20: Valve Block Solenoid Locations

## 9 Connecting the Sensors to the CANbus

---

1. Fasten the 8-way coupler to the boom with cable ties. The recommended mounting location is shown in **Figure 12**.
2. Route cable C03 from the input module to the 8-way coupler (E11).
3. Connect the position sensor (E06) to the 8-way coupler.
4. Connect the wing roll cylinder (H20) to the 8-way coupler.
5. Connect the main lift sensor to the 8-way coupler using cable C02 and a 2-way coupler (E12).
6. Connect two cables (C05) to the 8-way coupler and route along the booms to the wing sensors. Follow existing cables and hoses to be sure the cable will not be pinched or stretched.
7. At the sensor brackets, attach a 2-way coupler with terminator (E20) to the sprayer boom. Plug the sensor and the CANbus cable into the 2-way coupler.
8. Insert the 6 pin plugs (P03) into the remaining receptacles of the 8-way coupler.

### **Important**

**Ensure that all unused connectors are plugged with the plugs provided.**

## 10 Hydraulic Installation

### ⚠ Warning!

Ensure all pressure has been bled from the system before disconnecting any lines or fittings. Hydraulic pressure will exist on the wing tilt circuits unless the wings are being supported by other means. The hydraulic installation may be performed with the wings in transport position, resting on the ground or with the tilt cylinders fully extended.

### ⚠ Important

Component failure due to oil contamination is not covered under the NORAC UC5 system warranty. It is recommended that a qualified technician perform the hydraulic installation.

### 10.1 Expansion Block Assembly

1. Remove the four 4MBP plugs from the 3 station valve block (**Figure 21**). Gently tap the plugs with a hammer to loosen before attempting to remove.
2. Coat the four o-rings in hydraulic oil and install them into the expansion block. Ensure the o-rings are seated properly.
3. Attach the expansion block to the 3 station block using the included spring washers and bolts.
4. Tighten the bolts to 31 ft-lbs (42 Nm).

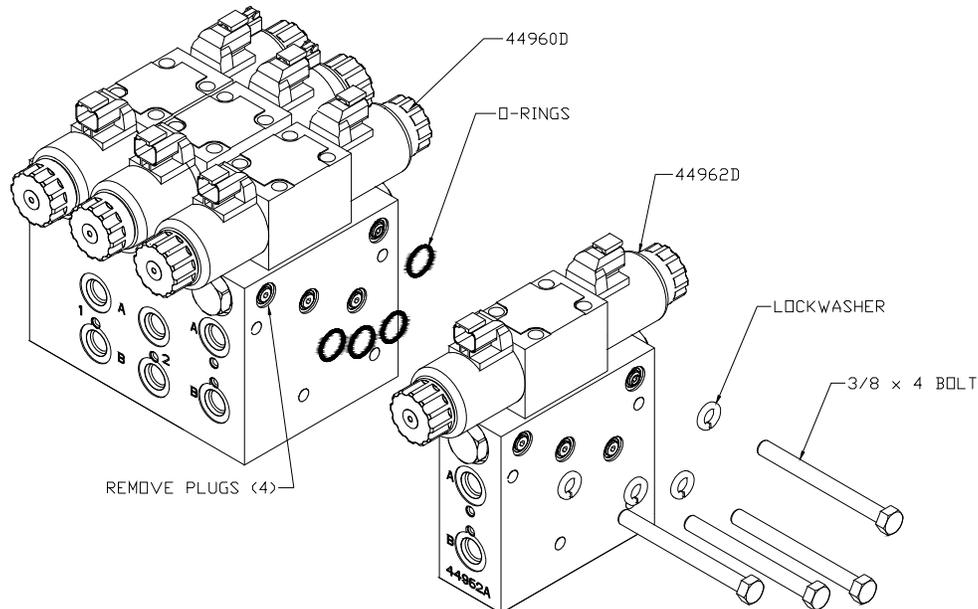
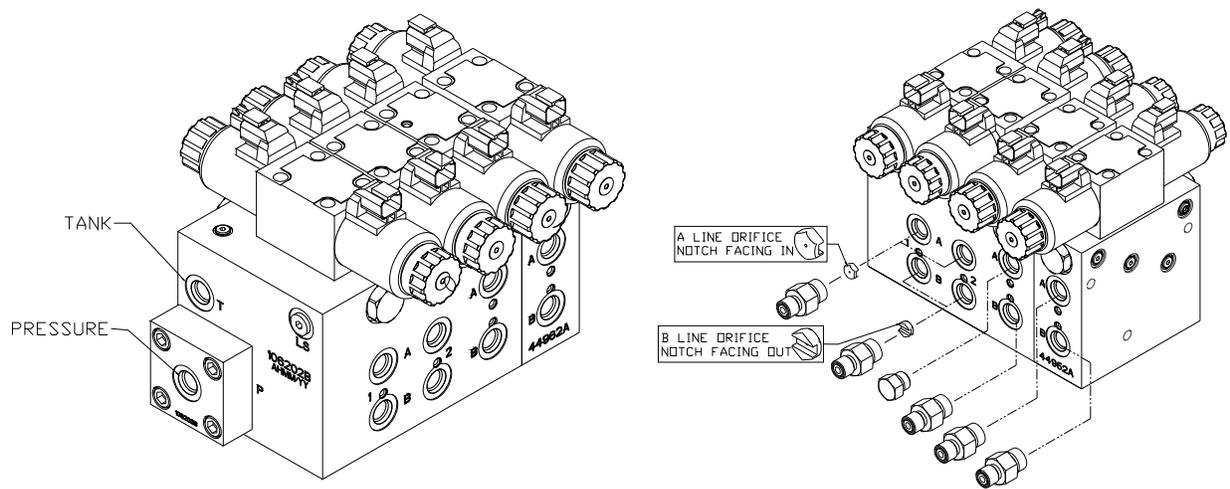


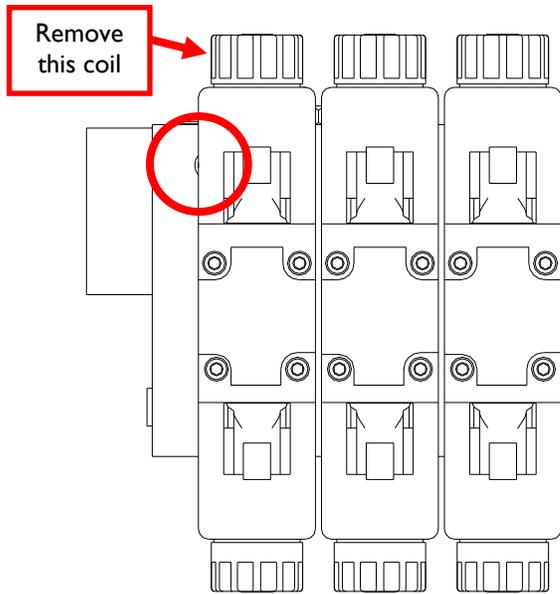
Figure 21: NORAC Expansion Block Assembly

## 10.2 Valve Assembly

1. On a clean surface remove the plastic plugs from the block.
2. Install the 6MB-6MOR (F01) fittings into the “P” and “T” ports. Tighten to 18 ft-lbs (24 Nm).
3. Install the 4MB-4MOR (F09) fitting into the “S” port. Tighten to 11 ft-lbs (15 Nm).
4. Insert two orifices (F02) into the “B” ports with the notch facing outward.
5. Insert two orifices (F02) into the “A” ports with the notch facing inward.
6. Install the 6MB-6MOR (F01) fittings into the “A” and “B” ports. Tighten to 18 ft-lbs (24 Nm).
7. Install the 6MBP plug (F04) into the “A” port of the 3<sup>rd</sup> station of the block.
8. Install a 6MB-6MOR (F01) fitting into the “B” port of the 3<sup>rd</sup> station of the block. Tighten to 18 ft-lbs (24 Nm).
9. Install the 6MB-6MOR (F12) fittings into the “A” and “B” ports of the expansion block. Tighten to 18 ft-lbs (24 Nm).
10. Remove the plug from the Sense Line Bleed port. Location is shown in **Figure 23**. Gently tap the plug with a hammer to loosen it before attempting to remove it. To access bleed orifice, remove the valve coil that is covering it, by unscrewing the nut on the coil. Remove the Sense Line Bleed Orifice and discard.
11. Install the setscrew (F11) into the Sense Line Bleed Orifice location. Ensure the setscrew is threaded entirely into the hole and tightened to 35-40 in-lbs (4-4.5 Nm) to ensure a tight seal. Reinstall the plug and tighten to 35-40 in-lbs (4-4.5 Nm).



**Figure 22: NORAC Valve Block Details**



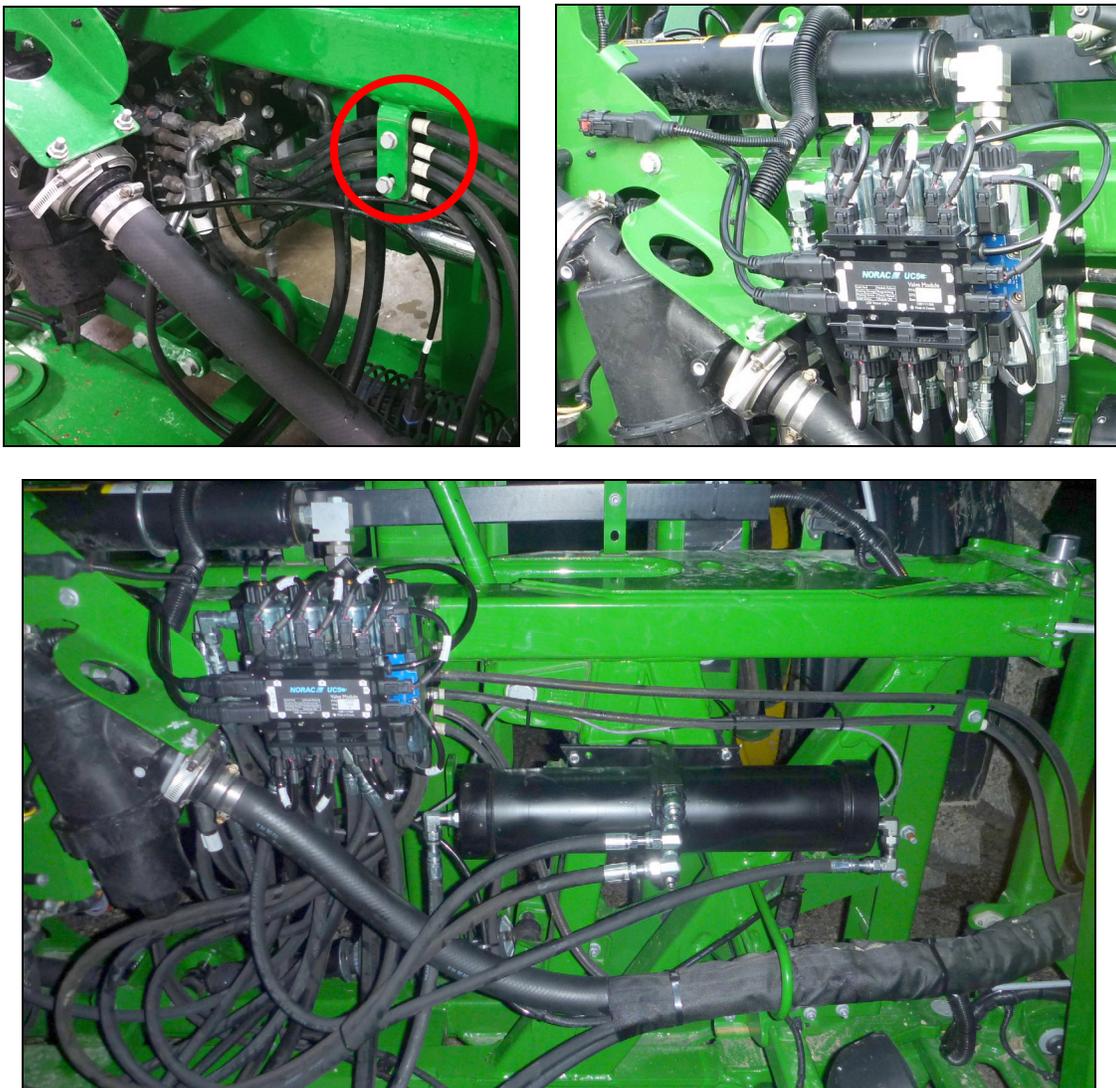
**Figure 23: Load Sense Bleed Orifice Location on Top of Block**

## 10.3 Valve Block Mounting

1. A good mounting location for the valve block on the John Deere is illustrated in **Figure 24**. This will require remounting the hose clamp as shown.

**Note:** *The valve block cannot be mounted on the top of the boom. If the valve block is mounted on top, it will be hit when the boom rolls.*

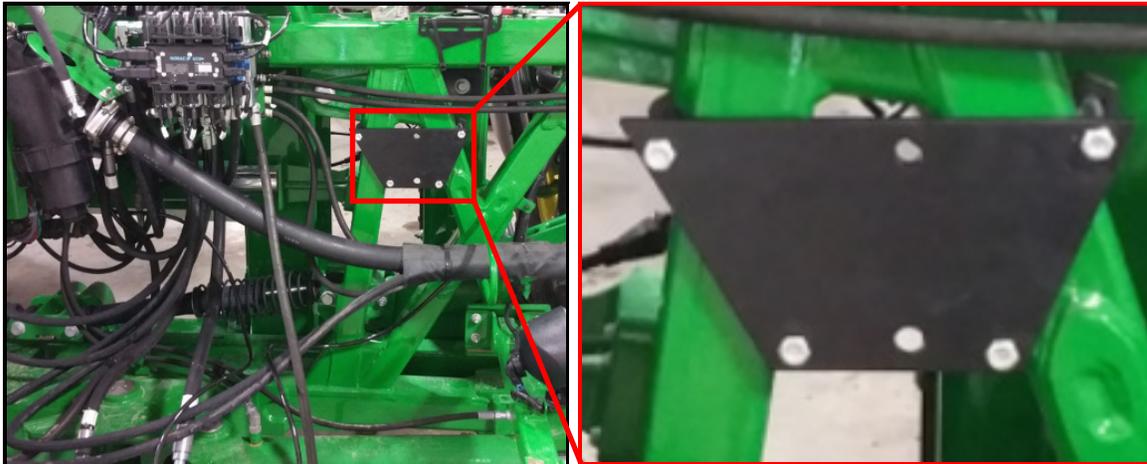
2. Insert the threaded rod into the block and use a hex nut to hold the rod. The block holes are 3/8" NC-1" deep. If bolts are used instead of the threaded rod, ensure the bolts thread in at least 3/8".
3. Use the remaining hardware to secure the block to the sprayer.
4. Cut off excess threaded rod, if necessary.



**Figure 24: Valve Block Mounting**

## 10.4 Wing Roll Cylinder Mounting

1. Install the WRC mounting bracket (B07) on the boom frame as shown in **Figure 25**. Clamp bracket to boom frame using supplied hardware. Tighten hardware to 30-40 ft-lb (41-54 Nm).



**Figure 25: WRC Mounting Bracket Installed on Boom Frame**

2. Mount the WRC (H20) to the bracket using the supplied M12x1.75x25mm bolts and lock washers. Install the WRC with the cable end pointing towards the right-hand wing. Tighten mounting bolts to 60-70 ft-lb (81-95 Nm).
3. Route the WRC sensor cable to the 8-way coupler (E11).



**Figure 26: WRC Installed on the Boom Frame**

## 10.5 Hydraulic Plumbing

### **Warning!**

**From this point on in the installation the booms will be inoperative until the hydraulics are fully installed.**

After the NORAC valve is mounted, the hydraulic hoses and fittings can be plumbed. The plumbing for the hydraulic circuit is shown schematically in **Figure 3**.

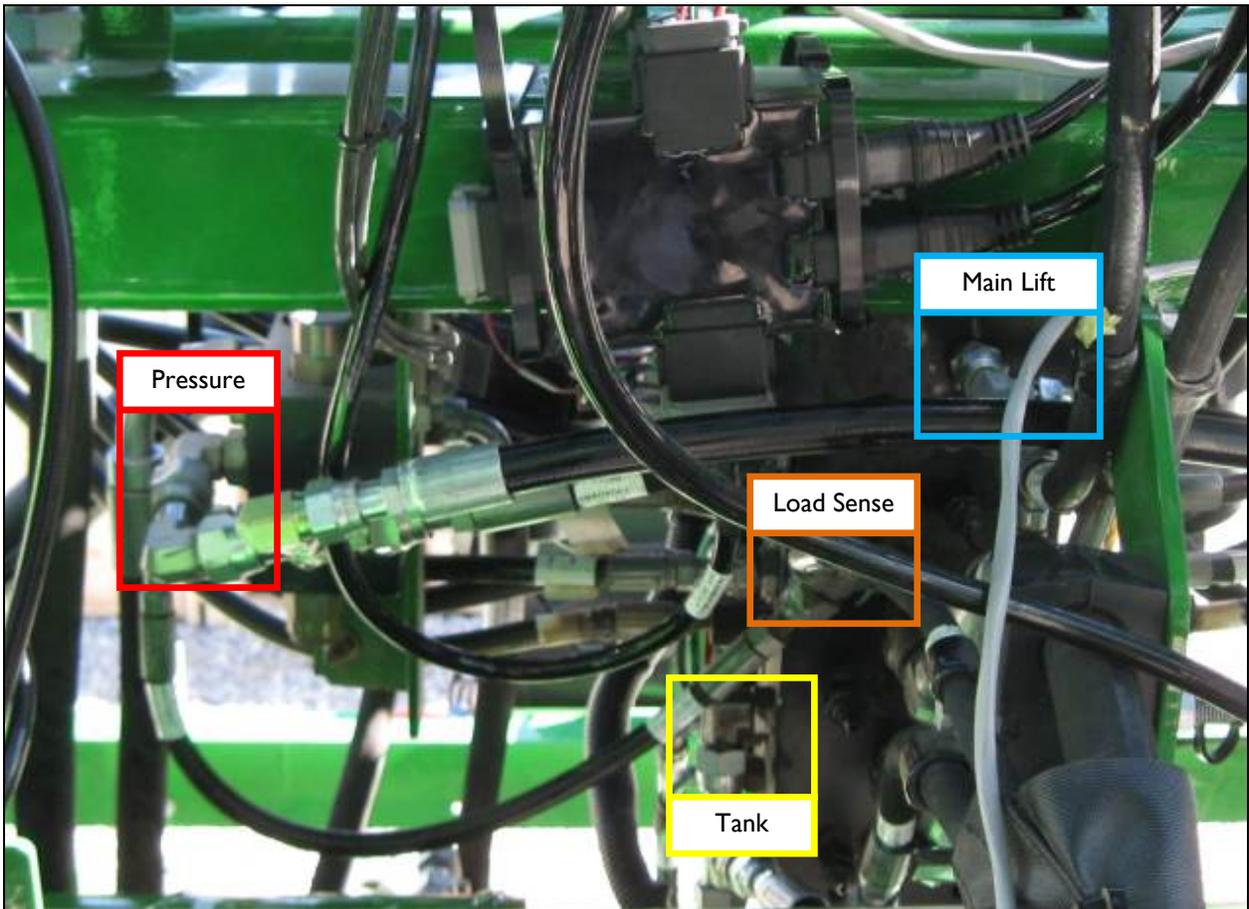
1. Install two (2) 6MOR-6FORX90 fittings (F06) onto the “P” and “T” ports of the NORAC valve block.
2. Connect the hoses (H01) to the 90 degree fittings (F06) on the pressure and tank ports on the NORAC valve block (V01).
3. Install an 8FORXR-8MORT (F08) tee between the existing tank line and the sprayer valve block.
4. Install a 6MOR-8FORX (F07) fitting onto the tee (F08). Connect the tank line (H01) from the NORAC valve block to the F07 fitting.
5. Install an 8FORXR-8MORT (F08) tee between the existing pressure line and the sprayer valve block. The pressure port is located on the smaller valve block next to the main block.
6. Install a 6MOR-8FORX (F07) fitting onto the tee (F08). Connect the pressure line (H01) from the NORAC valve block to the F07 fitting.
7. Insert the 6FORXR-6MORT tees (F05) into the existing raise and lower lines at the wing cylinders.
8. Install four (4) 6MOR-6FORX90 fittings (F06) onto the 6FORXR-6MORT tees (F05).
9. Install four (4) 6FORXR-6MORT tees (F13) onto the “A” and “B” ports of the NORAC valve block.
10. Install four (4) 6MOR-6FORX90 fittings (F14) onto the 6FORXR-6MORT tees (F05). Orient the fittings to face downwards as shown in **Figure 27**.
11. Connect four (4) hoses (H02) between the 90 degree fittings (F06).
12. The “raise” lines must be connected to the "B" ports of the NORAC valve block. The “lower” lines of the cylinders must be connected to the "A" ports of the NORAC block.
13. Connect hose H01 to the “B” port on the 3<sup>rd</sup> station of the block.
14. Insert a 6FORXR-6MORT tee (F05) into the existing main lift line. Connect hose H01 to the F05 tee.

**NOTE: A John Deere disc orifice is found between the John Deere block fitting and hose end. Be careful to not lose this part when removing the main lift hose to insert the F05 tee. Position the orifice between the F05 tee fitting and the John Deere hose, so that the orifice restricts flow of both the John Deere controls and the NORAC controls.**

15. Connect hose H03 to the “S” port of the NORAC block.
16. Insert a 6FORXR-6MORT tee (F05) into the existing load sense connection. Install the 4MOR-6FORX fitting (F10) onto the F05 tee. Connect hose H03 to the F10 fitting.
17. Connect hose H01 between the tees (F13) on the “lower” (“A”) lines.
18. Connect two (2) hoses H01 to the tees (F13) on the “raise” (“B”) lines.
19. Install four (4) 6MB-6MOR fittings (F12) onto the ports on the wing roll cylinder (H20).
20. Install four (4) 6MOR-6FORX90 fittings (F14) onto the F12 fitting on the wing roll cylinder (H20).
21. Install a 6MOR-6FORX90 fitting (F14) onto the F14 fitting on the cable end of H20.
22. Connect hoses H01 from the “raise” lines to the outer ports on the wing roll cylinder (H20).
23. Connect hose H01 between the “A” port on the wing roll cylinder (H20) and the “A” port on the NORAC expansion block.
24. Connect hose H01 between the “B” port on the wing roll cylinder (H20) and the “B” port on the NORAC expansion block.



**Figure 27: Fittings Installed on NORAC Valve Block**



**Figure 28: Pressure, Tank, Load Sense and Main Lift Locations  
(as viewed from the leading side of the boom center)**

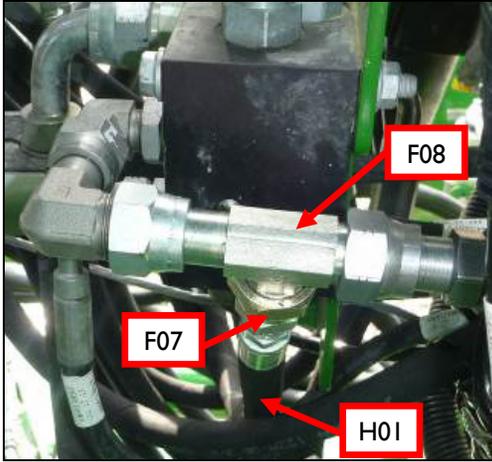


Figure 29: Pressure Line Plumbing

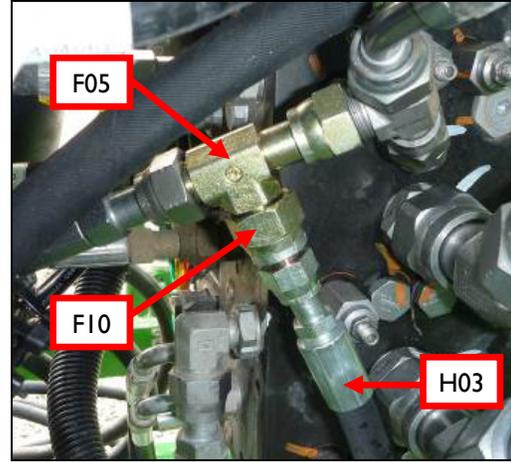


Figure 30: Load Sense Plumbing

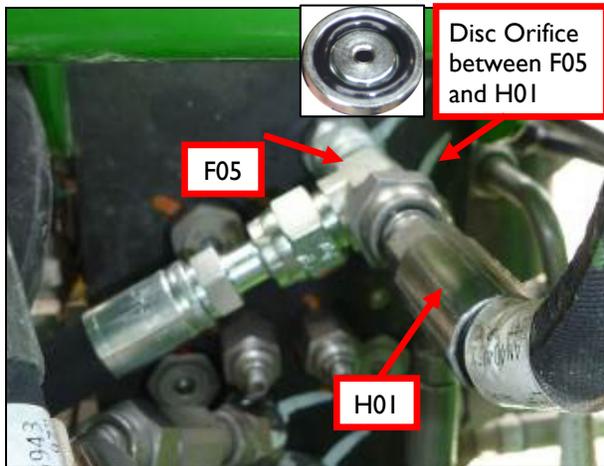


Figure 31: Main Lift Plumbing

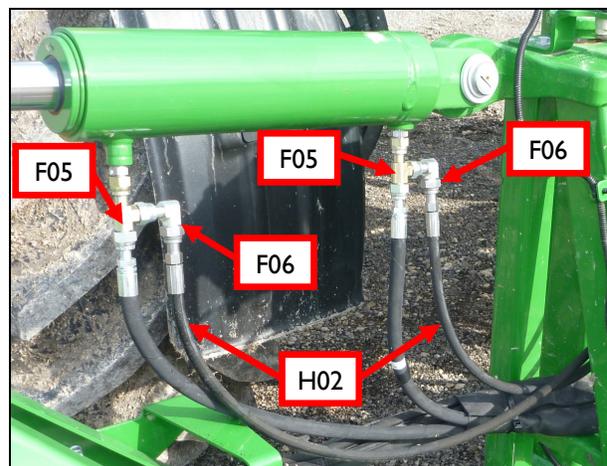


Figure 32: Fittings and Hoses Installed at Tilt Cylinder

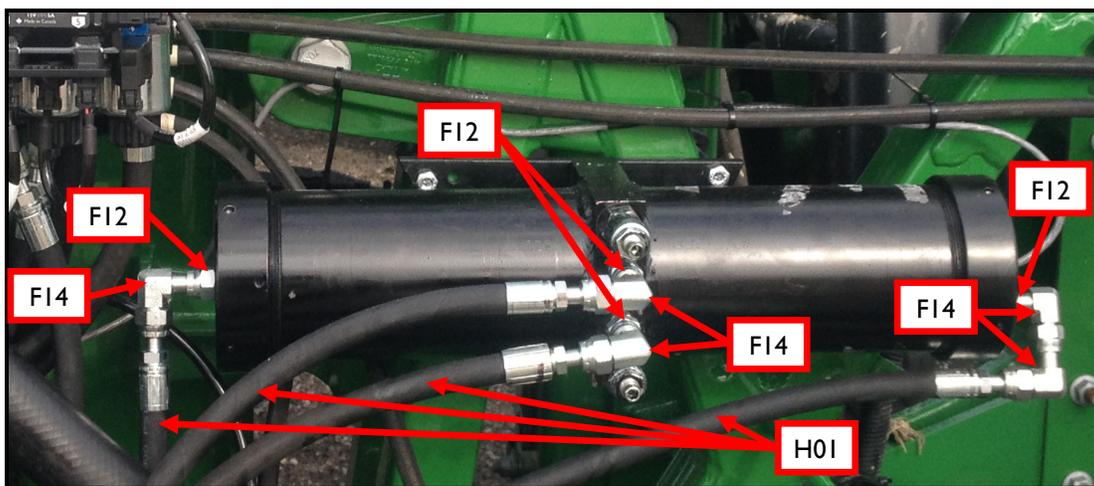


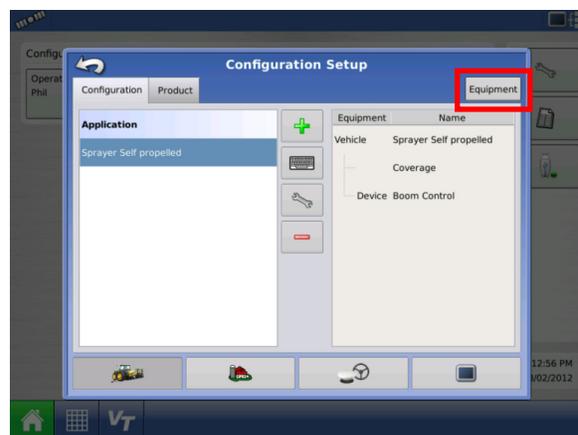
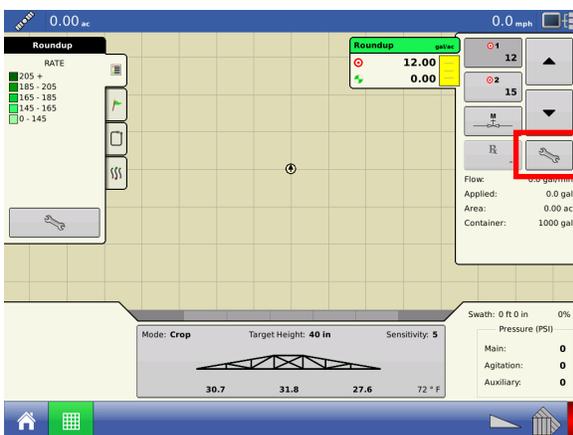
Figure 33: WRC with Fittings and Hoses Installed



## 11.2 Using an AgLeader Proprietary Display

This section is only for AgLeader displays with the UC5™ on the proprietary display. If the UC5 is operating on the VT within the AgLeader screen, follow the procedure in Section 11.1.

1. Remove the air from the tilt cylinders, using the sprayer's joystick controls.
  - a) Move the left tilt cylinder full stroke three times.
  - b) Move the right tilt cylinder full stroke three times.
2. Remove air from the roll channel using the AgLeader display:
  - a) Start an Automatic Install (Figure 34 and Figure 35).
  - b) Select the appropriate sprayer make and model on the screen.
  - c) Read the disclaimer menus and move through the screens.
  - d) At the screen reading "level the boom at 35in", press the picture of a house.
  - e) Using the sprayer's controls raise the boom center to max height and level the wings.
  - f) Navigate to the roll gain screen (Figure 34 and Figure 36).
  - g) Press the manual gain test a few times for each direction to allowing the air to escape. **Don't adjust the wings individually; only use the roll gain tests.**
  - h) Stop with the wings at approximately the same height.
  - i) Ensure that each roll button allows for the boom to rotate in both directions. If the boom doesn't roll in one direction, roll it the opposite way and adjust the wings to their level position.
3. Run a complete automatic install (Figure 34 and Figure 35).



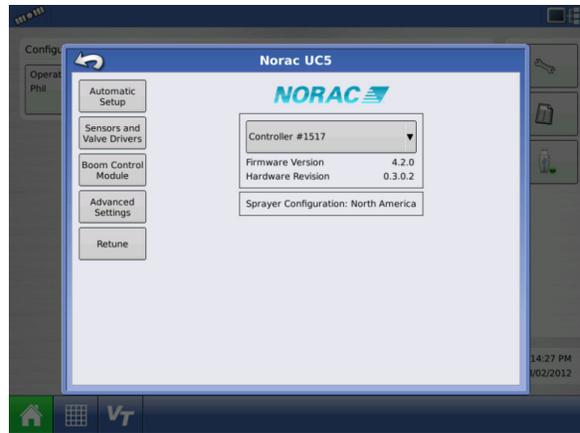
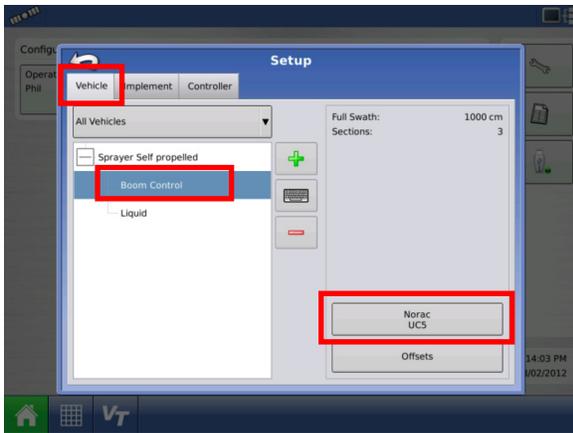


Figure 34: Navigating to NORAC Setup Screen

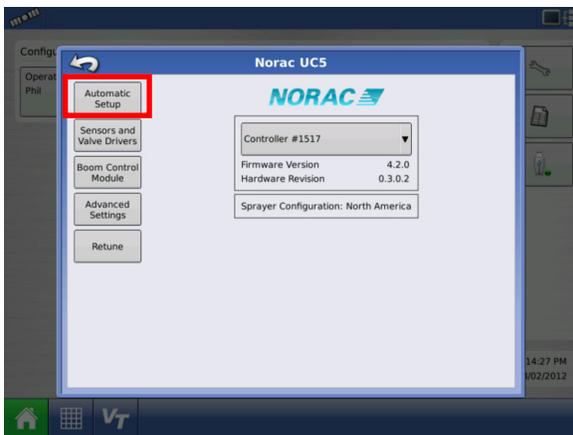
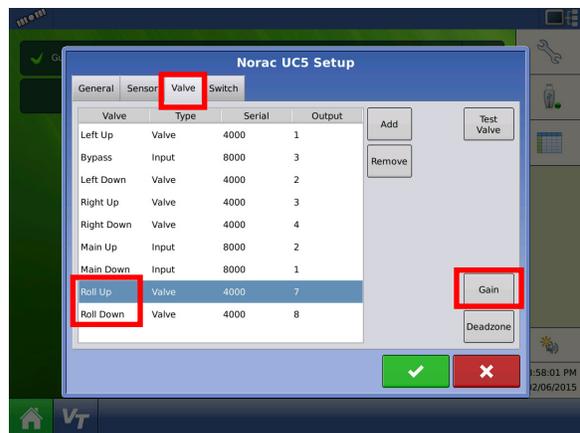
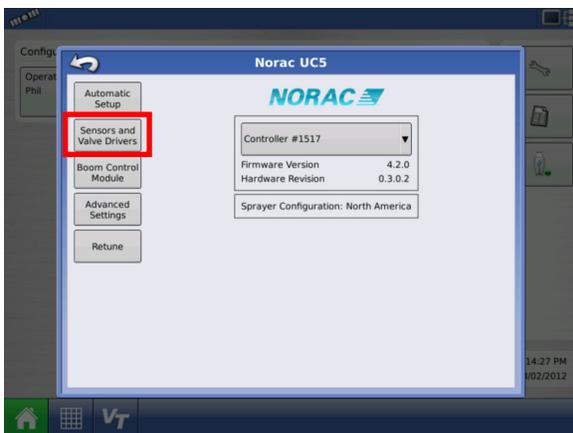
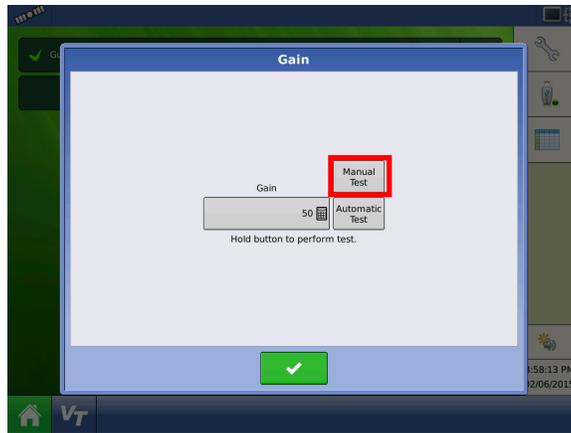


Figure 35: Automatic Setup



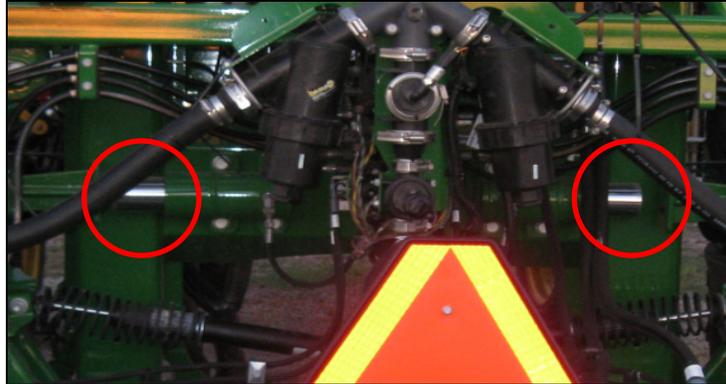


**Figure 36: Roll Gain Screens**

## 12 Software Setup

---

**NOTE:** Before beginning the automatic setup, check the locking cylinders to ensure they have compressed to allow the center section to rotate freely.



**Figure 37: Locking Cylinders Compressed Properly**

1. Start up the sprayer and test the sprayer's functionality. The display terminal does not need to be powered on for the original boom function switches to operate. Unfold the booms and raise/lower each boom and the main section.

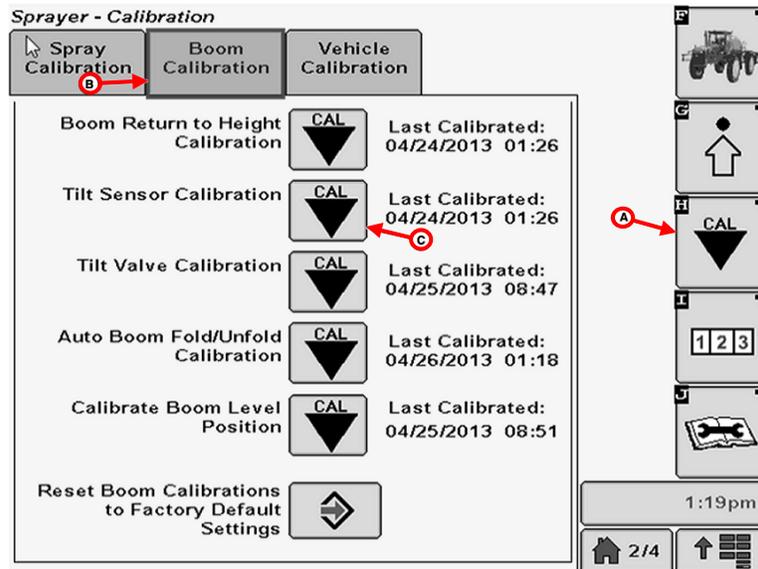
### **Important**

**Confirm that the cabling and hoses are agreeable to the entire range of motion.**

2. If any functions do not work, review the hydraulic and electrical portions of this manual to check for proper installation.
3. Turn on the power for the display terminal using the switch on the side.
4. The procedure for the installation of the UC5 Spray Height Control system is now complete. Begin the AUTOMATIC SYSTEM SETUP procedure as described in the UC5 Spray Height Control Operator's Manual.
5. After the installation has been performed the following procedures must be performed to recalibrate the JD tilt functions.

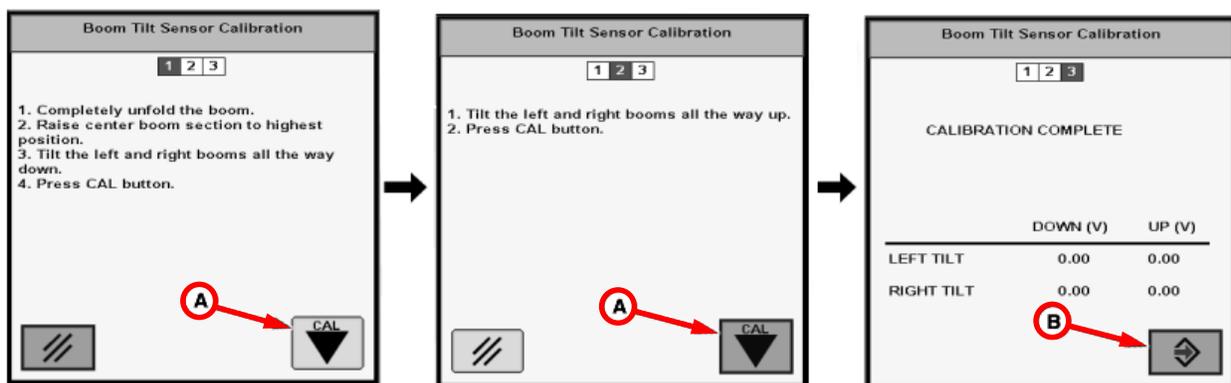
## 12.1 JD Tilt Sensor Calibration Instructions

1. Ensure the NORAC system is plugged in and powered up.



**Figure 38: Calibration Screen (Tilt Sensor Selection)**

2. Select the Calibration softkey (A) to view the setup menu.
3. Select the Boom Calibration tab (B).
4. Select the Calibration icon (C) next to Tilt Sensor Calibration.
5. The Boom Tilt Sensor Calibration screen will appear.

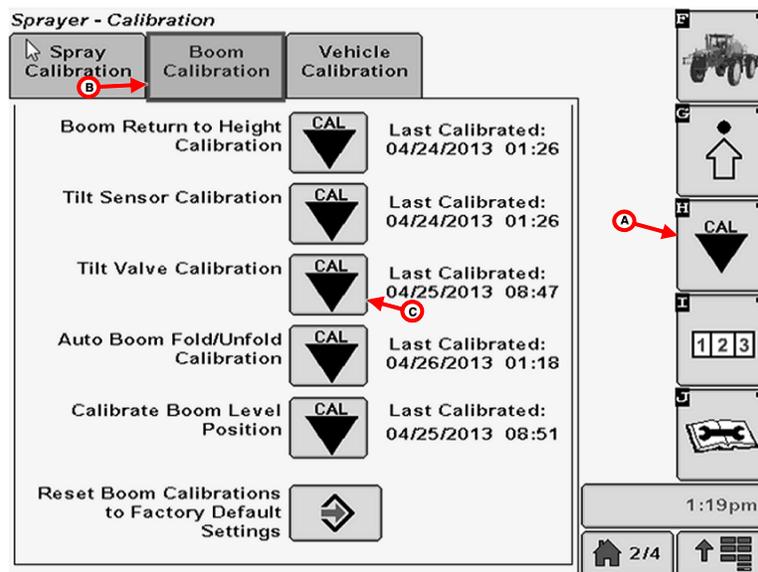


**Figure 39: Tilt Sensor Calibration Screens**

6. Follow the instructions on the first screen. When finished, select the Cal icon (A) to proceed to the next screen.
7. Follow the instructions on the second screen. When finished, select the Cal icon (A) to proceed to the next screen.
8. "Calibration Complete" will be displayed. Press the Enter button (B) to return to the Boom Calibration tab.

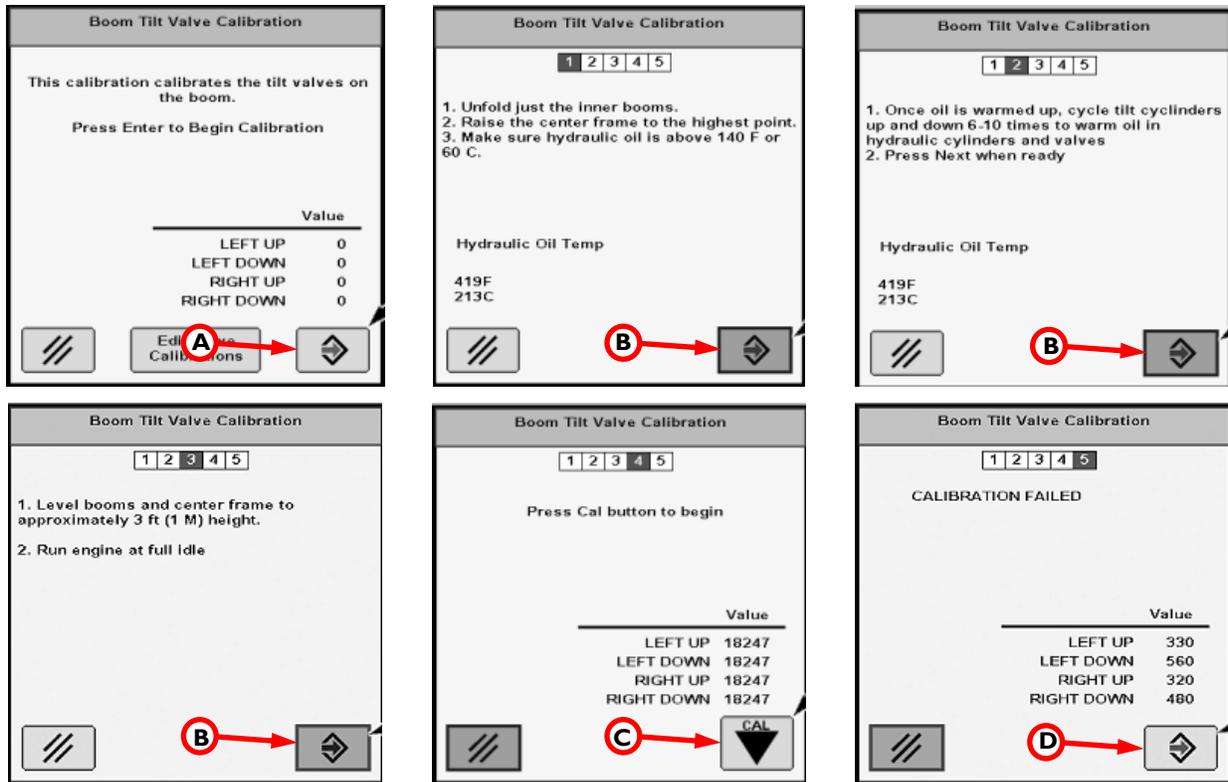
## 12.2 JD Tilt Valve Calibration Instructions

1. Warm up the hydraulic oil to at least 60°C. The calibration screen it will show the oil temperature.
2. Ensure the NORAC system is plugged in and powered up.
3. Test the JD Autofold. Press and hold the foot switch and main up to fold. Press and hold the foot switch and main down to unfold.
4. On the display, press the Calibration button (**Figure 40**).



**Figure 40: Calibration Screen (Tilt Valve Selection)**

5. Select the Calibration softkey (A) to view the setup menu.
6. Select the Boom Calibration tab (B).
7. Select Calibration icon (C) next to Tilt Sensor Calibration.
8. Boom Tilt Valve Calibration screen will appear.



**Figure 41: Tilt Valve Calibration Screens**

9. Select the Enter button (A) to begin calibration.
10. Follow the instructions on screens 1 – 3 then press the Enter button (B).
11. Follow instructions on screen 4 then press the Cal icon (C).
12. When the calibration is complete, press the Enter button (D) to exit calibration.
13. Table 2 shows examples of “before” and “after” calibration values. The new values should be slightly higher to account for the additional UC5 wiring on the John Deere valve.

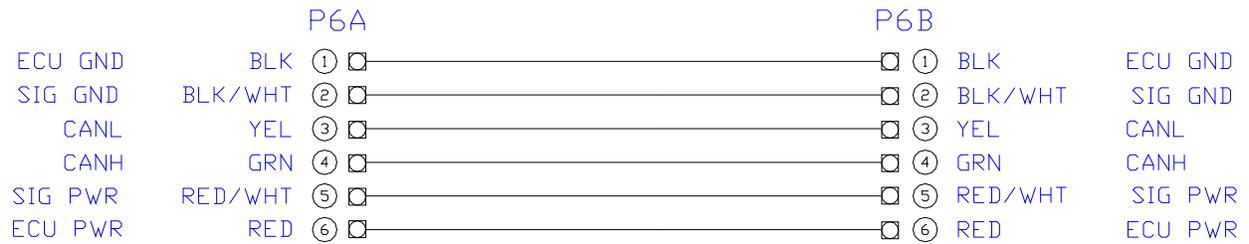
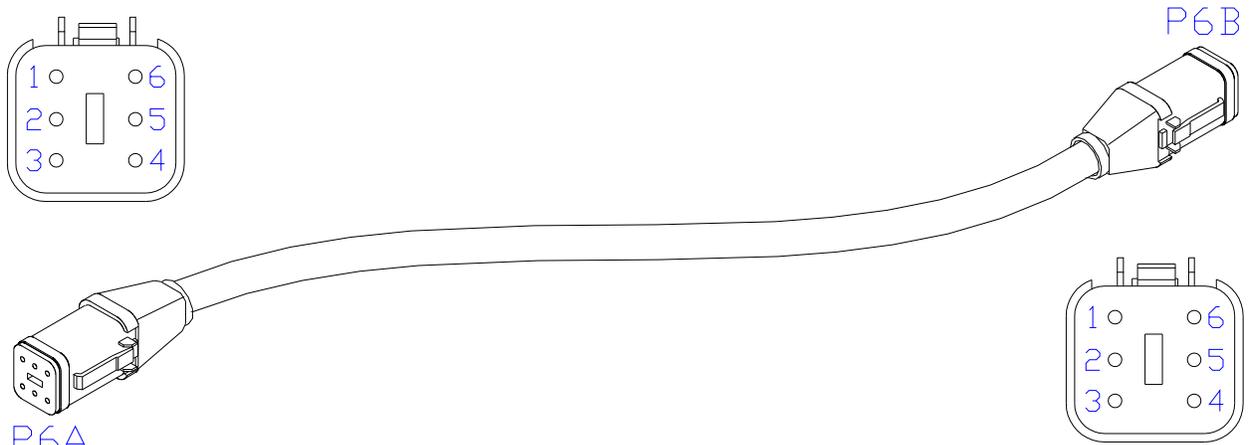
**Table 2: Calibration Value Examples**

Function	Calibration before UC5 Installed	Calibration after UC5 Installed
Left Up	550	860
Left Down	600	910
Right Up	620	860
Right Down	620	900

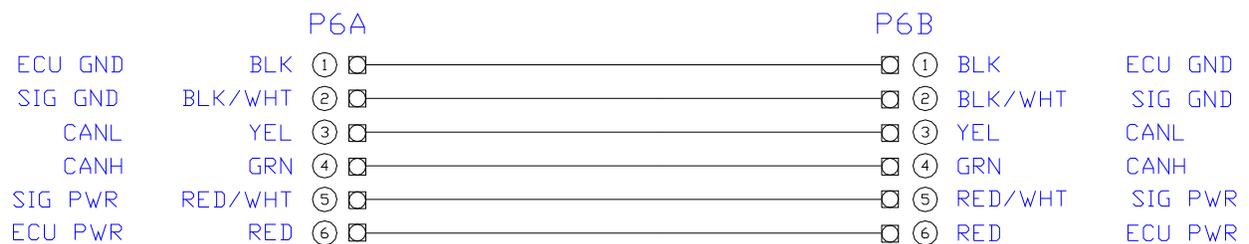
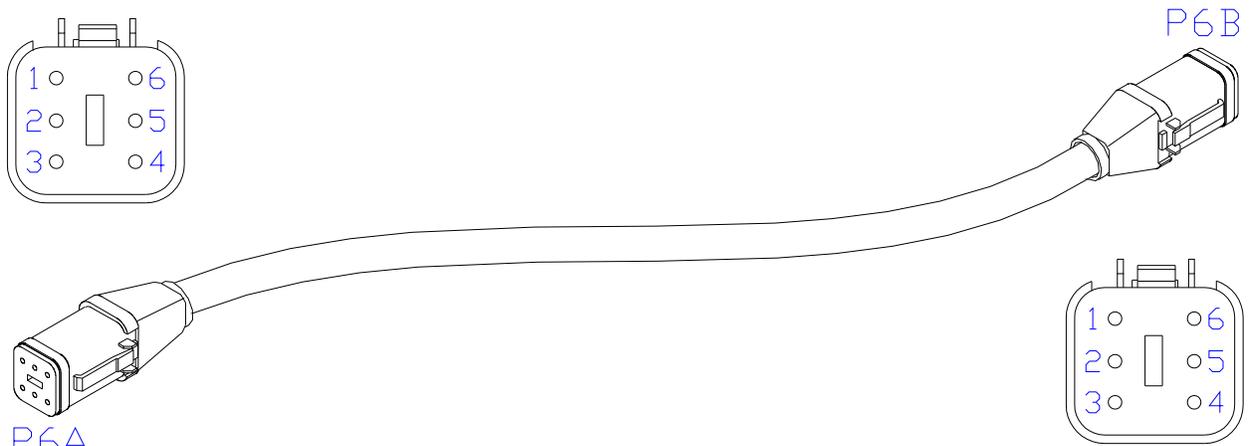
14. Test Autofold and confirm that it is functioning properly. If it is not, repeat the calibration procedure.

## 13 Cable Drawings

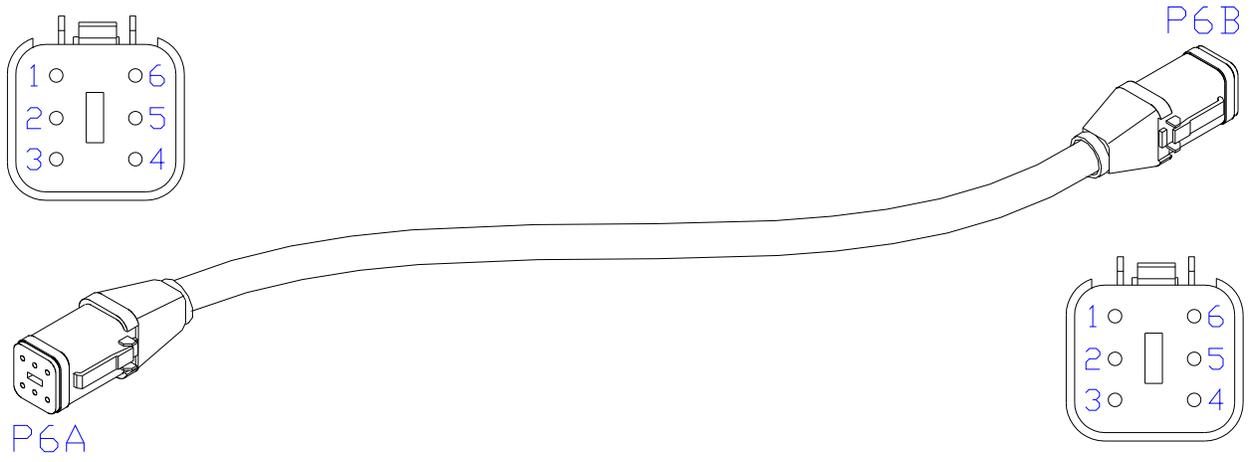
### 13.1 ITEM C01: 43220-10 - CABLE UC5 NETWORK 14 AWG - 10M



### 13.2 ITEM C02: 43220-01 - CABLE UC5 NETWORK 14 AWG - 1M

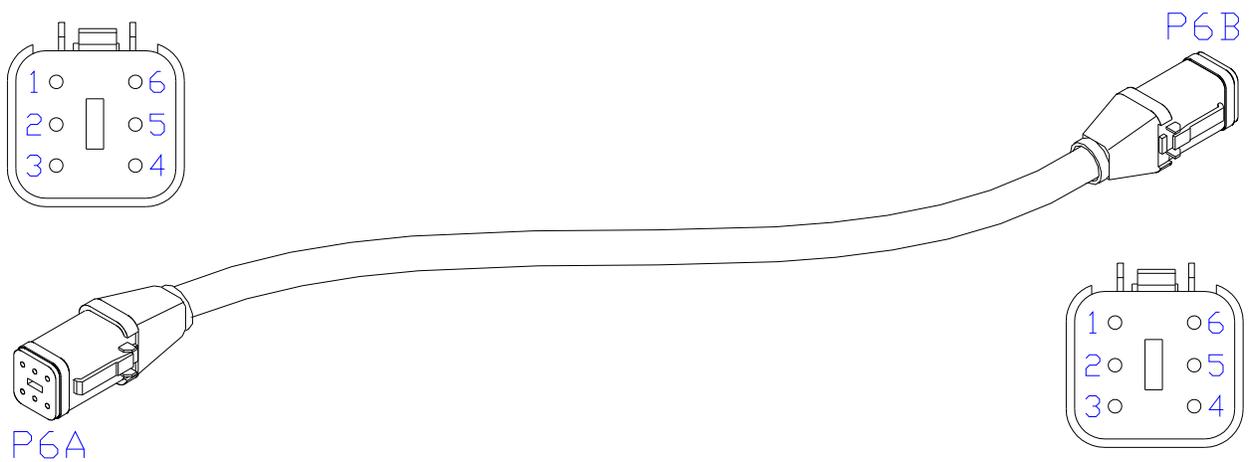


### 13.3 ITEM C03: 43220-03 - CABLE UC5 NETWORK 14 AWG - 3M



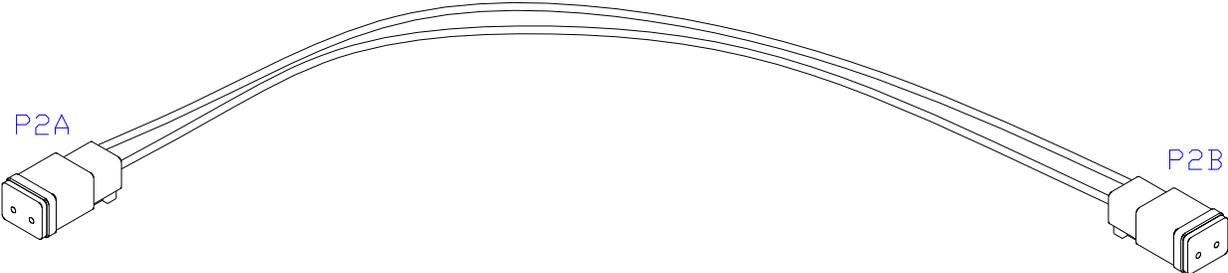
		P6A		P6B			
ECU GND	BLK	①	□	□	①	BLK	ECU GND
SIG GND	BLK/WHT	②	□	□	②	BLK/WHT	SIG GND
CANL	YEL	③	□	□	③	YEL	CANL
CANH	GRN	④	□	□	④	GRN	CANH
SIG PWR	RED/WHT	⑤	□	□	⑤	RED/WHT	SIG PWR
ECU PWR	RED	⑥	□	□	⑥	RED	ECU PWR

### 13.4 ITEM C05: 43210-20 - CABLE UC5 NETWORK 18 AWG - 20M

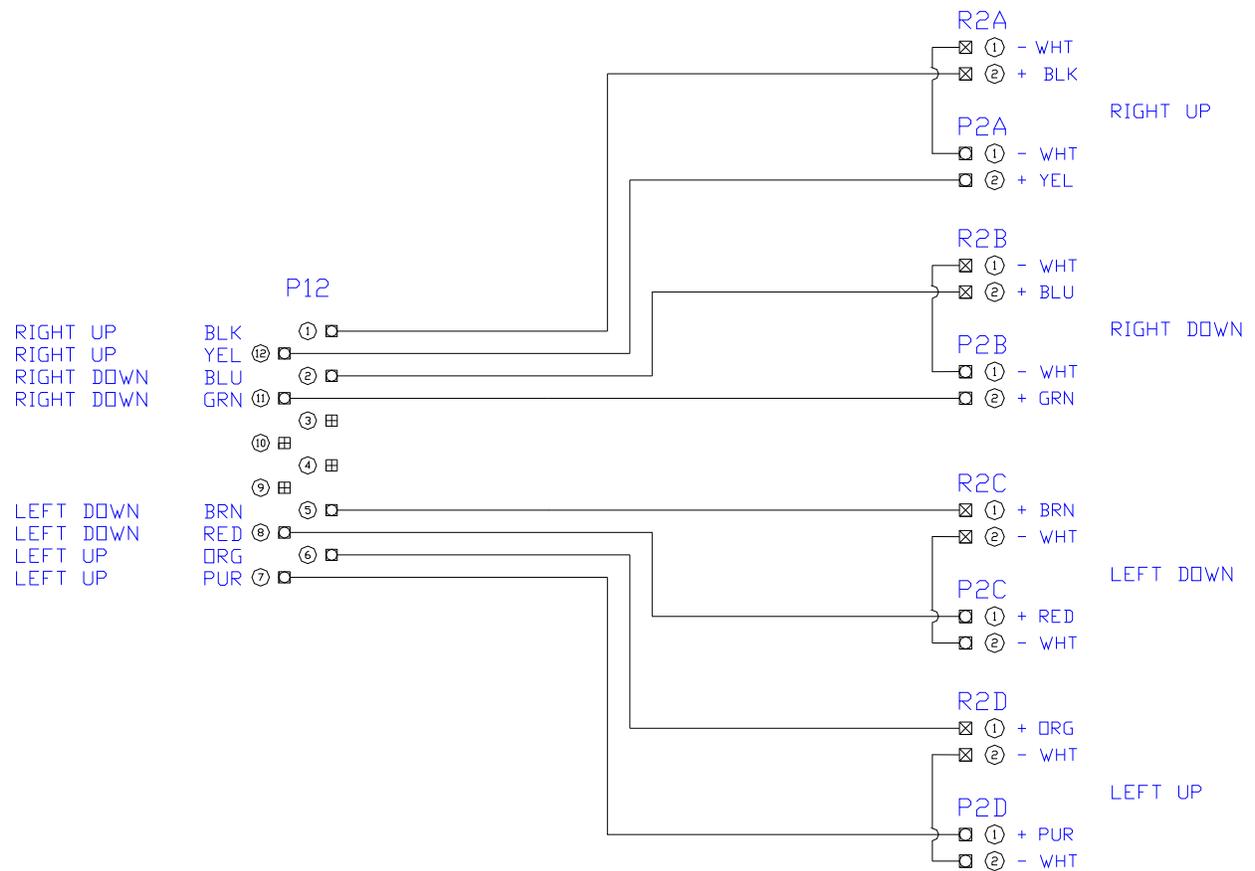
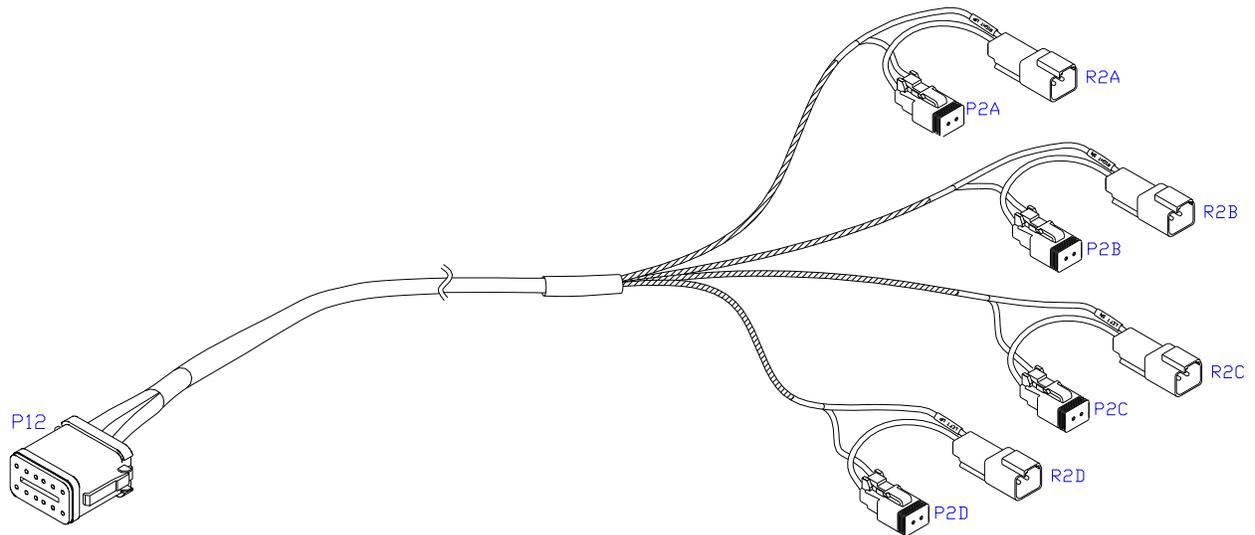


		P6A		P6B			
ECU GND	BLK	①	□	□	①	BLK	ECU GND
SIG GND	BLK/WHT	②	□	□	②	BLK/WHT	SIG GND
CANL	YEL	③	□	□	③	YEL	CANL
CANH	GRN	④	□	□	④	GRN	CANH
SIG PWR	RED/WHT	⑤	□	□	⑤	RED/WHT	SIG PWR
ECU PWR	RED	⑥	□	□	⑥	RED	ECU PWR

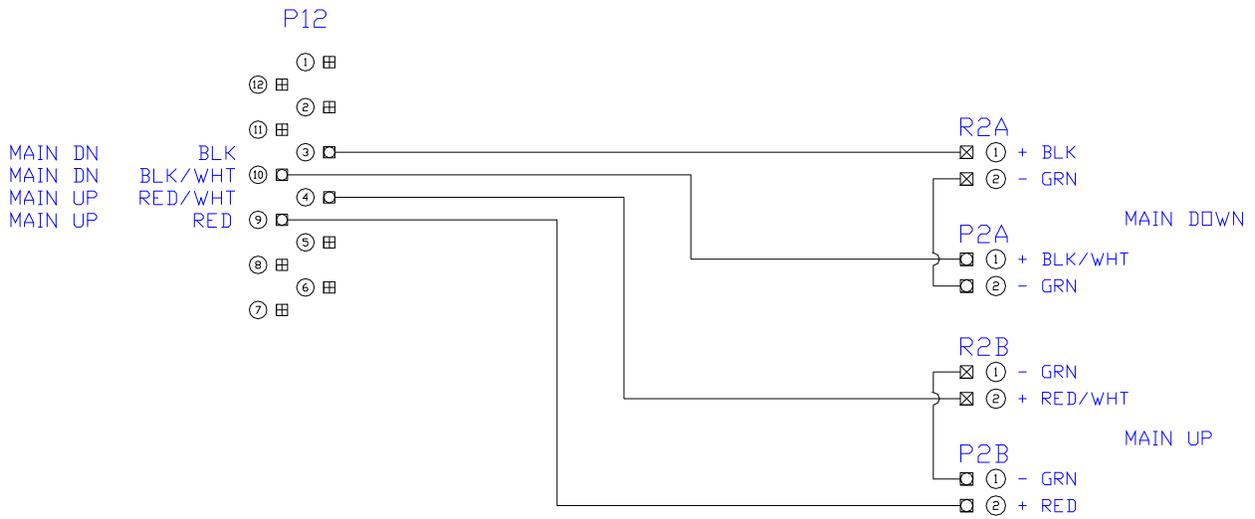
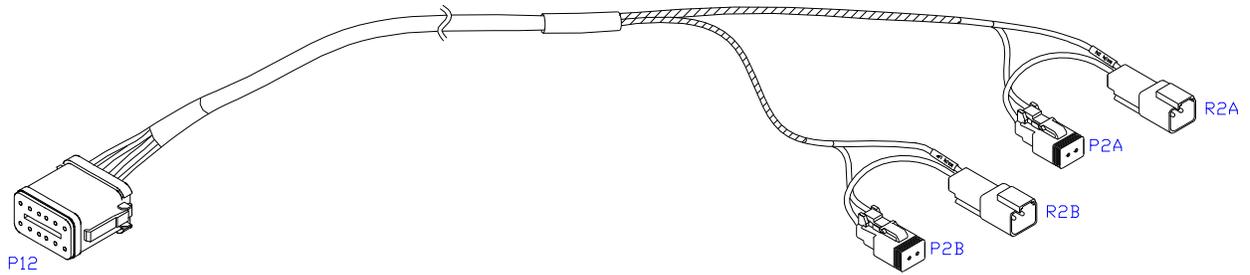
**13.5 ITEM C10: 43230-04 – CABLE UC5 VALVE DT TO DT**



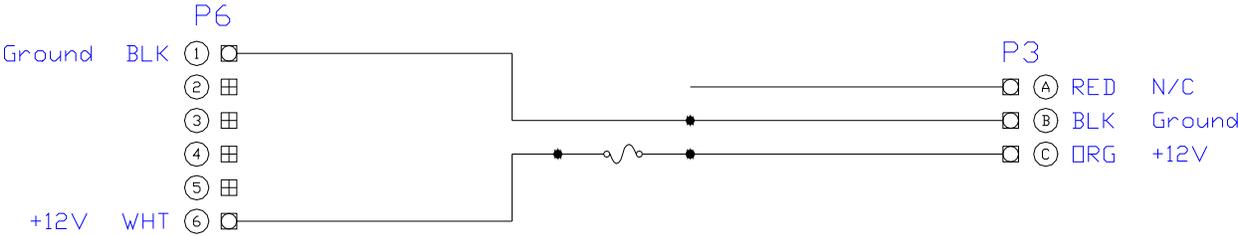
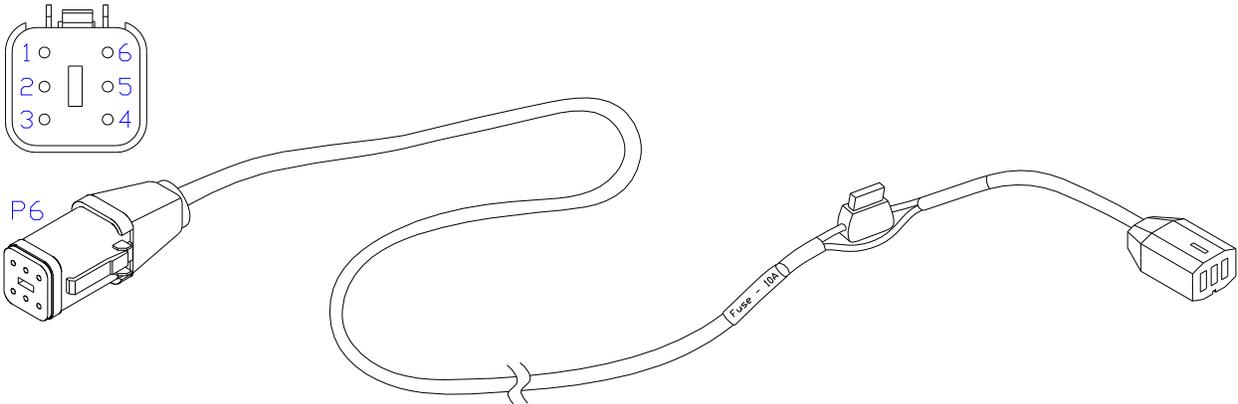
### 13.6 ITEM C20: 43240-41 – CABLE UC5 INTERFACE TILT DT R4038



# 13.7 ITEM C21: 43240-38 – CABLE UC5 INTERFACE JOHN DEERE R4030 4038 ML



### 13.8 ITEM C30: 43250-07 – CABLE UC5 BATTERY JD FUSED



## 14 Appendix A: Optional Severe Terrain Sensor Mounting

When installing the severe terrain option, the inner wing sensor brackets should be mounted as shown in **Figure 42** for 120' booms and **Figure 43** for 100' booms.

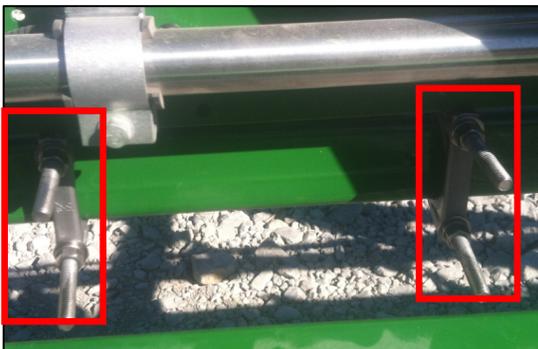
Always follow the sensor mounting guidelines to ensure optimal sensor performance and prevent sensor measurement error.



**Figure 42: Inner Wing Sensor Bracket Mounting on 120' Boom**



**Figure 43: Inner Wing Sensor Bracket Mounting on 100' Boom**



**Figure 44: Rear and Bottom View of Inner Wing Sensor Bracket Mounting on 100' Boom (Using Exhaust Clamps)**

**TOPCON Agriculture Canada**

3702 Kinnear Place  
Saskatoon, SK S7P 0A6

**TOPCON Agriculture Americas**

W5527 Hwy 106  
Fort Atkinson, WI 53538

**TOPCON Precision Agriculture Europe**

Avenida de la industria,  
35, Tres Cantos, España  
Spain

**Support**

Phone: 888 979 9509  
E-mail: [tasupportn@topcon.com](mailto:tasupportn@topcon.com)  
Web: [www.norac.ca](http://www.norac.ca)

**NORAC** 