

DeltaForce®

DeltaForce Hardware Installation

 Precision Planting®

Quick Start

Overview:

These instructions will cover the row unit hardware installation for the DeltaForce system. Please refer to your DeltaForce Owner's Manual for additional details regarding Operation & Setup. This will also include information on when it is necessary to install a Smart Connector.

Additional installation instructions regarding SRM and Load Cell installation, troubleshooting, and operation are available online in the DeltaForce Product Resources page at <https://cloud.precisionplanting.com/products/>

1. Seed monitoring system

- a. You will need an SRM system or smart connector with DeltaForce.

2. Hydraulic system specifications

3. Remove current down force system

- a. Read the instructions for the specific planter that is being equipped with DeltaForce. Some components will be reused from the OEM planter.

4. Install brackets

- a. Refer to planter specific instructions within this document.
- b. **Install cylinder**
- c. Install the Hydraulic Cylinder on the Cylinder Bracket using your respective Cylinder Pin. Set aside the second cylinder pin and cotter pin. These will be installed after the air purge test has been completed.

5. Install load cell

- a. See load pin installation document for planter specific instructions.

6. Lift Manifold and Spare Kit

7. Internal Row Hose Install

8. Custom Hose Recommendations and Install

9. Air purge test

- a. **Gen 3** - select "Setup," "Diagnose," "Health Checks," and then scroll down to the DeltaForce Health Checks and select "Air Purge Test".
- b. **Gen 2** - Select "Setup," "Diagnose," "DeltaForce," "Health Check," "Air Purge Test" from the home screen on the 20/20 Display.

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Section 1 - Seed Monitoring Guide

Seeding	SRM	SmartConnector Needed	Seedtube Sensor Plug In
vDrive	X		SRM
RowFlow (Hydraulic Motor Control)	X		SRM
RowFlow (Clutch Control Only or Ground Drive)		X	Planter Harness
OEM controls Seeding/ Ground Drive		X	Planter Harness

Note: Installing DeltaForce will require a complete install of the SRM system.

Section 2 - Hydraulic Specifications

This section includes several important notes about the hydraulic specifications of the DeltaForce system that the user will want to be aware of. It may also be necessary to refer back to these specs during the install process.

1. DeltaForce must be installed on a closed center hydraulic system. DeltaForce is not compatible on an open center hydraulic system.
2. While the flow requirements suggest the system could be tied in to similar locations as the AirForce hydraulic compressor, the pressure requirements of DeltaForce limit what existing lines could be used. Do not tie DeltaForce into the lift/lower or CCS fan circuit on the planter. Hydraulics for the DeltaForce system should be supplied by:
 - a. Dedicated SCV
 - b. SCV with Power Beyond return
 - c. Power Beyond
 - d. Tied in to existing hydraulic motors
 - e. PTO pump- must be closed center
3. A maximum of 11 rows may be plumbed in succession before a performance loss may occur. In other words, after the user “T’s in” the hydraulics to a wing of the planter no more than 11 rows should be plumbed in either direction from the T. For more information of hose routing and plumbing see the Hose Routing section in Section 4.
4. The maximum amount of rows that can be plumbed off one face of the lift manifold is 24.

Other Hydraulic Notes

Hose Sizes

- -8 (1/2”) minimum supply and return hose size (potentially larger based on gallons used).
- -6 (3/8”) hose from lift manifold to frame sections.
- -6 (3/8”) hose for case drain if an alternator is installed
- For more information on hose sizing and when to add an alternator please consult the Order Guide and Hydraulic Hose Sizing Chart on the Cloud.

A minimum of -8 (1/2”) for Supply and Return hoses is recommended, even on planters that do not currently require an alternator, to allow for easier installation in the future for any additional systems that might be added. These hoses will be custom made. See Section 6 on Hose Making Requirements for more information.

Normal Operating Ranges:

- Pressure Sensor on lift manifold – Up to 3000 psi
- “P” port on lift manifold – 2250 psi and up to 3000 psi

- “R” port on lift manifold – Less than 100 psi
- “L” port on lift manifold – 200 psi-Supply Pressure psi *
- “P” port on cylinder – Up to 3000 psi
- “R” port on cylinder – Less than 100 psi
- “L” port on cylinder – 200 psi-Supply Pressure psi *
- Cylinder Pressure – 200-2800 psi *

* Will only read when the system is activated. When the system is deactivated, should read less than 100 psi.

In order for DeltaForce to operate correctly the following conditions must be met:

1. Speed Source set up and the planter moving
2. Planter lowered
3. Master Plant switch on
4. DeltaForce enabled on Home Screen (DeltaForce is actually enabled by clicking the “DeltaForce” box on the Home Screen and then clicking “Enable Control” in the Control Page)

System Hardware

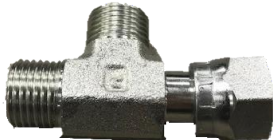
Part Number	Description	Quantity
729650	DeltaForce Base Kit (Includes: 729651– DF Lift Manifold, 729656 – DF Lift Manifold Mount Kit, 729693 – DF Lift Manifold Hose Kit, 729058 – DF Diagnostic & Spare Kit)	1
729602	Hydraulic Cylinder	1 Per Row
Based on Row Unit Type (See Order Guide for information)	Brackets	1 Per Row
729610–729613	Hydraulic Row Hoses	Number of Rows Minus Number of Frame Sections
729614	End Row Plug Kit	1 per Planter Section
Based on Row Unit Type (See Order Guide for information)	DownForce Sensors	1 Per Row
729616	2 Frame Hydraulic Fitting Kit	1 (If a 2 Frame Section Planter)
729617	3 Frame Hydraulic Fitting Kit	1 (If a 3 Frame Section Planter)
729627	Tight Clearance Fitting Kit	*1 Per Row (Optional)
729615	Fitting Kit for Custom Inter-Row Hose	*1 Per Row (Optional)
729619	End Row Diagnostic Kit	*1 (Optional)
729621	Run Tee Fitting Kit	*6 Fittings (Optional)
729620	90 Degree Fitting Kit	*6 Fittings (Optional)
729628	90 Degree Cylinder Fitting Kit	*6 Fittings (Optional)
729314	Cylinder Pin and Cotter Pin	*2 of Each (Optional)

*The next chart will show an image of the additional fittings that are optional to order.

Hydraulic Fittings

Hydraulic Fittings						
Kit Part Number	Quantity	Part Number	A	B	Description	
729615	6	729247	-6 ORB-M	-6 ORFS-M	Custom Long Adapter	
729627	6	780153	-6 ORB-M	-6 ORFS-M	Adapter	
729614	6	780104	-6 ORB-M		Plug	
729620	6	780182	-6 ORB-M	-6 ORB-F	90 Deg Fitting	
729621	6	780214	-6 ORB-M	-6 ORB-F	Swivel Nut Run T	
729628	4	780142	-6 ORB-M	-6 ORFS-M	90 Deg Adapter	
	2	780250	-6 ORB-M	-6 ORFS-M	90 Deg Long Adapter	

The DeltaForce Lift Manifold kit (729650) comes with the Lift Manifold, mounting bracket, spare parts bracket and the following hydraulic fittings for plumbing the system. Additional pressure gauges and a hydraulic diagnostic kit are also available. See the price list for part number and details.

Kit	Description	Quantity	Picture
729693			
	Hose -6 X 36" ORFS-F, ORFS-F	3	
	Cable Tie Kit	1	
	Tee -6 ORFS Run	3	
	Adapter -8 ORB to -6 ORFS	3	
	90 DEG. -6 ORFS Run	3	
	90 Adapter -8 ORB to -6 ORFS	3	
	Diagnostic Nipple -6 ORB to 1/8" Nipple	6	

Kit	Description	Quantity	Picture
	Dust Cap 1/8" Nipple	8	
	90 DEG. -4 ORB-M to -4 ORB-F	2	
	Diagnostic Nipple -4 ORB to 1/8" Nipple	2	
	Adapter -10 ORB to -10 ORFS	2	
	Adapter -10 ORB to -8 ORFS	2	
729058			
	Spare Parts Case (Maroon)	1	
	Gauge (3000 PSI)	1	
	-6 ORB Hex Plug	6	

Kit	Description	Quantity	Picture
	-6 ORFS Hex Plug	6	
	-6 ORFS Hex Cap	6	
	-8 ORB Hex Plug	3	

Section 3 - Removal of Current Down Force System

Remove the current down force system from the planter.

Read the instructions for the specific planter that is being equipped with DeltaForce. Some components will be reused from the OEM planter.

See the table of contents to locate the install section for each row unit type.

Section 4 - Install Brackets

JD 1700/7200 Installation

John Deere DeltaForce Row Unit Kit 729300

QTY	Part Number	Part Name	Description
1	729328	W Mount Cylinder Bracket	JD 17XX, 72XX
1	729302	Parallel Arm Cylinder Bracket	JD 17XX, 72XX
1	729332	Hardware Kit	DF - JD 17XX, 72XX

Hardware Kit 729332

QTY	Part Number	Part Name	Description
2	729303	Bushing	1.05 OD X 0.5 ID X 0.75 Sleeve Bearing
2	729304	Bushing	0.75 OD X 0.5 ID X 0.75 Sleeve Bearing
4	729308	Mount Bolt	JD Pro Shaft — Long
2	726508	Bolt	M12-1.75x50 CLASS 10.9 ZN Y Partial Thread
4	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
2	90702	Flange Nut	M10-1.5 Hex ZN
2	162348	Bolt	M10-1.5x55 ZN Y
1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
1	162436	Bolt	M16-2.0x45 ZN Y
2	729309	Pin	DeltaForce Cylinder
2	0154007	Bolt	M12-1.75x60 CLASS 10.9 ZN
2	65104	Cotter Pin	5/32 X 1 1/4" Zinc Coated
1	33090	Flat Washer	5/8" Zinc Finish SAE Flat Washer



Step 1:

Remove the current down force system. It will be beneficial to read through the install instructions as some OEM parts may be used to install DeltaForce.

Step 2:

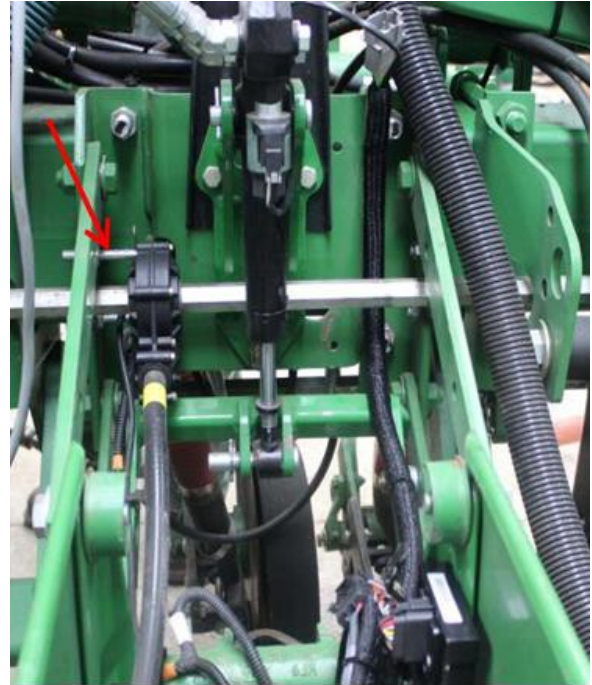
Use the two (2) supplied 7/16" X14 nuts/bolts and the 5/8" X11 nut/bolt hex nuts to attach the 729510 Upper Cylinder Mount Bracket to the row unit.

Note: The bottom bolt on the W mount cylinder bracket should always be installed with the head of the bolt on the inside of the row unit.

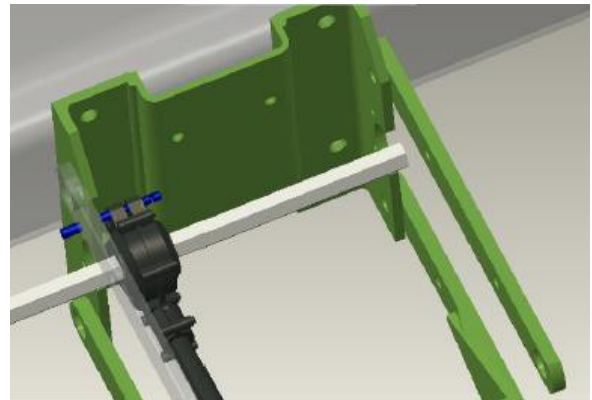


Step 3:

If the row unit is equipped with Pro-Shaft driven meters, replace the upper and lower mounting stud on the row unit with the longer 729308 mount bolt as shown. If equipped with chain drive or vDrive move to step 5.

**Step 4:**

If the row units are narrow mounted (the W plate inside the parallel arms), do not replace the stud. Instead, move the Pro- Shaft drive unit to the innermost position on the existing stud as shown.



Step 5:

Orient the Parallel Arm Cylinder Bracket based on the parallel arm length on the row unit. If the row unit has short (14") parallel arms, orient the bracket with the side stamped "SHORT UP" facing up. If the row unit has long (21") parallel arms, orient the bracket with the side stamped "LONG UP" facing up.



Figure 1.
Short Up



Figure 2.
Long Up

Step 6:

Install the M12x50 bolts, the M12 top lock nuts, and the smaller bushings into the holes closest to the row unit. If applicable, use this same bolt to mount the lift switch.

Position the 729302 parallel arm cylinder bracket inside the lower parallel arms. The larger bushing will always go into one of the two holes in the bracket that are closest to the planter bar. For short parallel arms (14") use the hole closest to the planter bar. For long parallel arms (21") use the holes closer to the row unit. Use the M12x50 bolts and M12 lock nuts to secure the Parallel Arm Cylinder Bracket to the lower parallel arm.



Note: If the meter is driven by a Pro-Shaft drive, mount the bolts on the Pro-Shaft side (from the inside out). All other installs should be mounted from the outside in.

Step 7:

Install the 729602 Hydraulic Cylinder on the w-mount bracket using a 729309 cylinder pin and cotter pin. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm bracket. Set aside the second cylinder pin and cotter pin for installation after the completion of the air purge test. See figure JD6 for short parallel arm (forward hole, rearward facing cylinder) and long parallel arm (rearward hole, forward facing cylinder) installation.

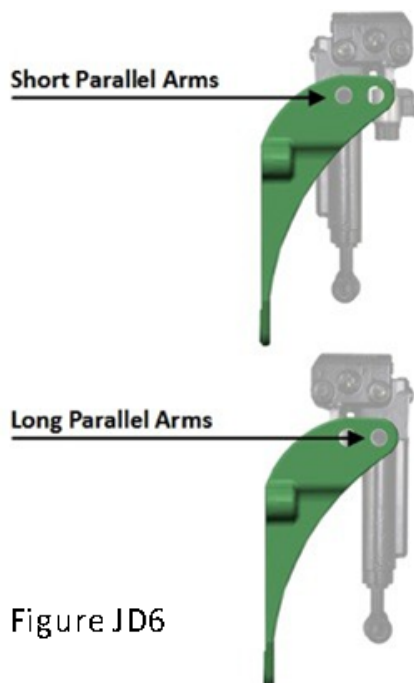


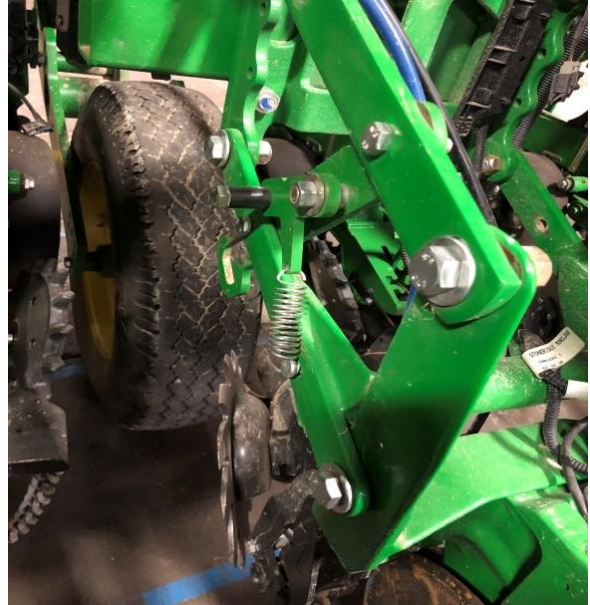
Figure JD6



Step 8:

Use the 5/8" SAE flat washer between the cotter key and bottom of the w-mount cylinder bracket. This will be done **AFTER** the air purge test.

Note: On some 1790 planters there is a row lock-up on the center rows which will interfere with the install of the DeltaForce Parallel Arm Bracket. This lock-up will need to be moved to the outside of the row unit and a longer bolt may be needed for the bottom of the bracket.



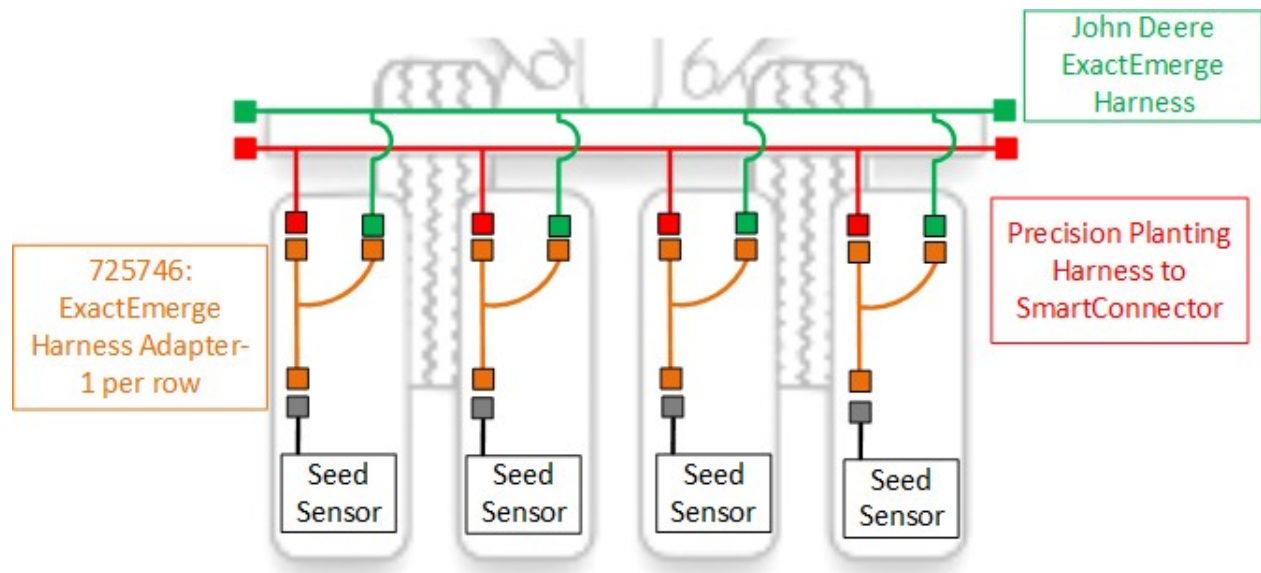
Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

ExactEmerge Seed Monitoring

John Deere Exact Emerge 17X5 Exact Emerge planters use a ME5 row unit. DeltaForce Bracket installation will be the same as previously listed, but a specific adapter will need to be ordered to obtain seeding information. See the note below for install information.

To monitor Seeding Data on ExactEmerge Planters, a SmartConnector will need to be installed. Using the JD ExactEmerge Seed Sensor Adapter Harness 725746 (1 per row) - This harness will plug into the Belt Delivery seed sensor then Y into the Precision Planting Planter Harness (or John Deere planter harness for ExactEmerge Retrofit) and also plug into the John Deere Exact Emerge Harness.

SEEDING DATA CANNOT BE READ THROUGH SRM ARCHITECTURE



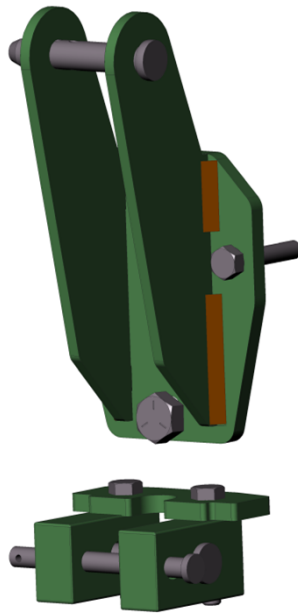
John Deere Twin Row Installation

John Deere Twin Row Kit: 729396

QTY	Part Number	Part Name	Description
1	729510	Upper Bracket	JD Twin Row
2	729512	Lower Pin Joint Bracket	JD Twin Row
1	729514	Hardware Kit	JD Twin Row
2	729513	Lower Bracket Clamp Kit	JD Twin Row

Twin Row Hardware Kit 729514

QTY	Part Number	Part Name	Description
2	13159	Bolt	7/16-14 X 1.5 GRD 5 BOLT ZN
2	13165	Bolt	7/16-14 X 3 GRD 5 BOLT ZN
4	36308	Hex Nut	7/16 HEX NUT ZINC
1	36314	Hex Nut	5/8 HEX NUT ZINC
1	38621	Hex Cap Screw	M8 X 1.25 X 50 HEX HEAD CAP SCREW
1	40357	Washer	M8.0 WASHER ZN
2	65104	Pin	5/32 X 1.25 COTTER ZN
1	200009	Bolt	5/8-11 X 1.5 HEX HEAD
1	200010	Pin, Clevis	½" DIAM X 5" L CLEVIS PIN
1	200011	Pin	0.62" DIAM, 3.125" L
1	200015	Washer, Split Lock	M8 SPLIT LOCK WASHER
1	729309	Pin	DF CYLINDER - LONG



Step 1:

Remove the current downforce.



Step 2:

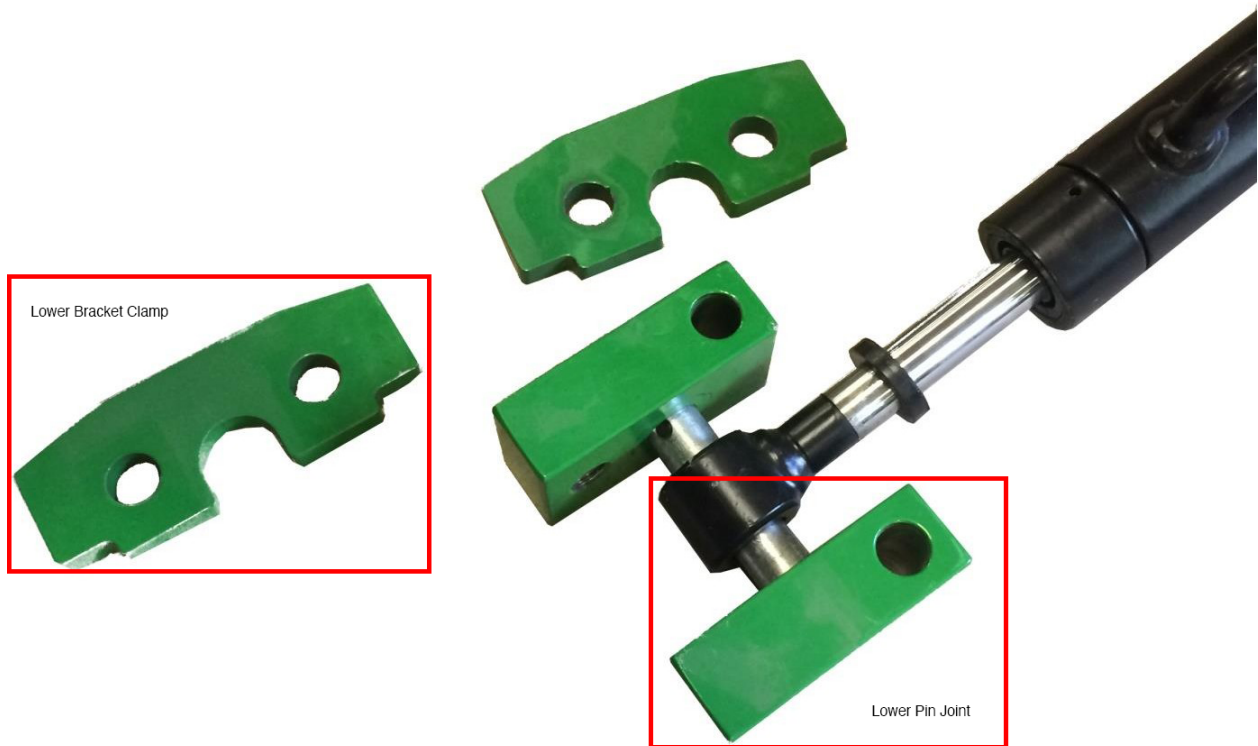
Use the two (2) supplied 7/16" X 1.5" nuts/bolts and the 5/8" X11 nut/bolt hex nuts to attach the 729510 Upper Cylinder Mount Bracket to the row unit.

**Step 3:**

Before proceeding to step 4 to pin the cylinder rod, proceed to health checks and run the AIR PURGE TEST. The lower cylinder clamp CANNOT be installed until after the AIR PURGE Health Check is performed. For information on performing the Air Purge Test see Section 7 of this manual. It will be necessary to complete the rest of the DeltaForce system install to perform the Air Purge Test, thus steps 4-7 will need to be done last.

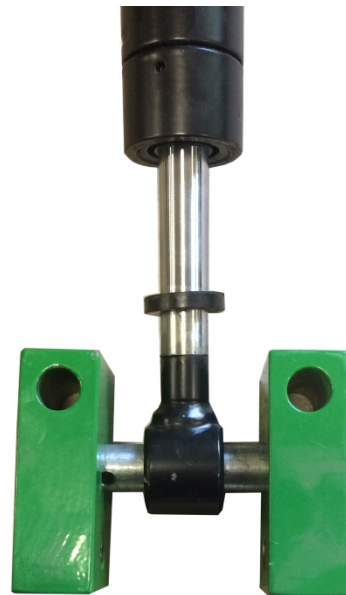
Step 4:

Install the lower bracket clamp.



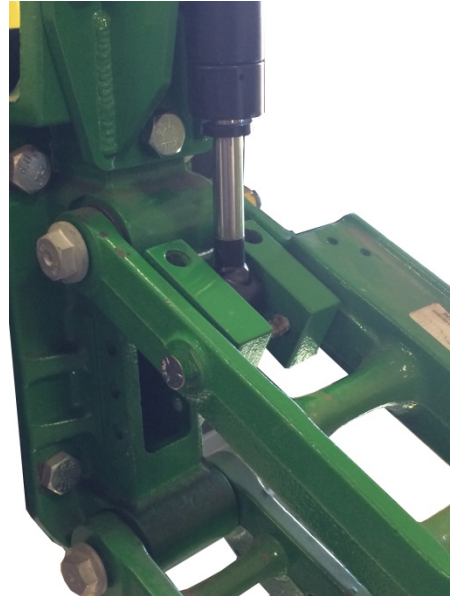
Step 5:

Install the 5/8" X 3" pin on through the lower pin joint and the DeltaForce cylinder rod.



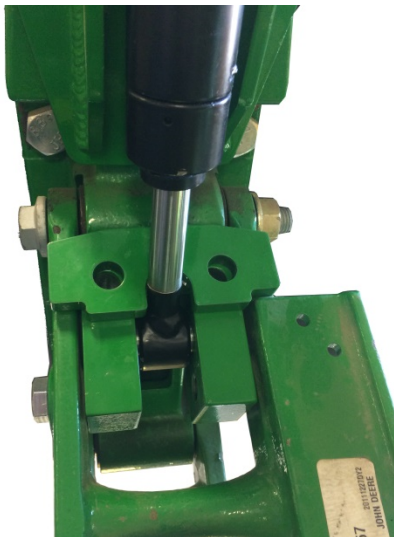
Step 6:

Place Lower Pin joint into installation position and use the ½" X 5" pin to secure Pin Joint into position.



Step 7:

Use the two (2) supplied 7/16" X 3" nuts/bolt to install the lower bracket clamp.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

John Deere 7000 and Monosem NG+ 3 & 4 Wide Row Unit Installation

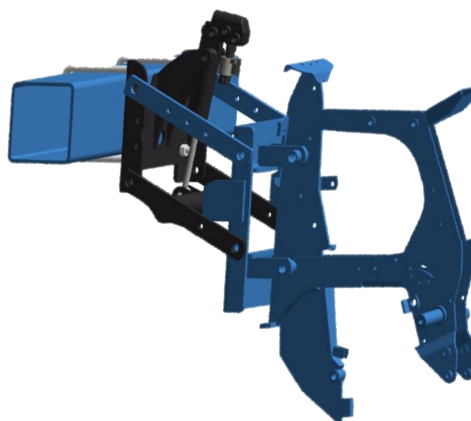
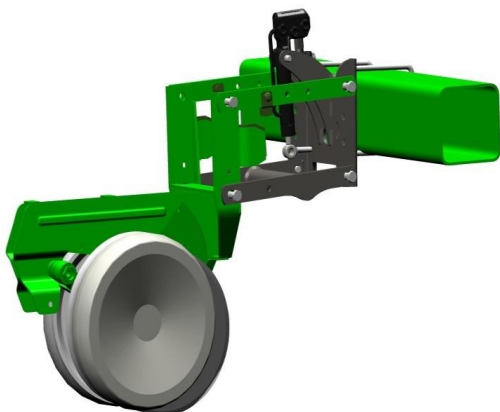
Note: The Installation Process and parts will be the same on the John Deere 7000 and Monosem NG+ 3 & 4 Wide style row unit. Please follow the steps below for both installs.

John Deere 7000 and Monosem NG 3 & 4 Wide Row Unit Kit 729393 and 729647

QTY	Part Number	Part Name	Description
1	729314	Hardware Kit (Cylinder Pin and Cotter Pin)	
1	729341	W-Plate Mount Assembly	
1	729392	Lower Parallel Arms	

729646 Hardware Kit for Monosem NG +4 Wide Linkage (Only Used For Monosem Install)

QTY	Part Number	Part Name	Description
4	33090	Washer	5/8 SAE FLAT ZN
4	37272	Lock Nut	5/8-11 GRD C TOPLOCK NUT
2	727031	U-Bolt	7" x 7" TUBE
4	729644	Bushing	5/8" ID X 7/8"OD X .625"



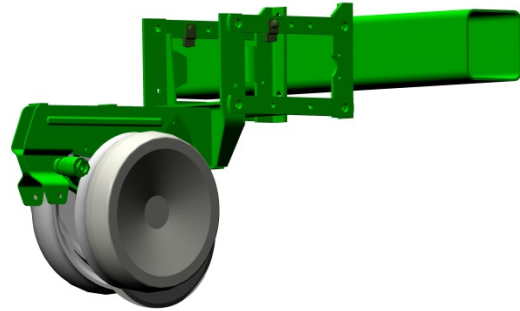
The row unit will be removed from the planter bar, make sure personal safety is ensured through this process.

Step 1:

Remove the current down force system from the planter. It may be beneficial to read through row unit Install instructions as some parts of the OEM row unit may be used for installing DeltaForce.

Step 2:

Using a fork lift or engine hoist lift row unit to remove weight from planter bar. Mark center location of Angle Iron with a marker or paint marker. This will be used to align placement of new W-Plate.



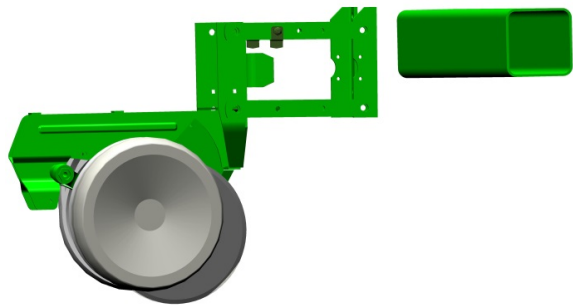
Step 3:

With row unit secured, remove nuts from U-Bolts holding angle irons to planter bar. The U-Bolts, washers, and nuts will be re-used in later steps, so place in a secure location. The angle iron will no longer be needed.

This is necessary as we will replace the angle irons with a W-Plate.

Step 4:

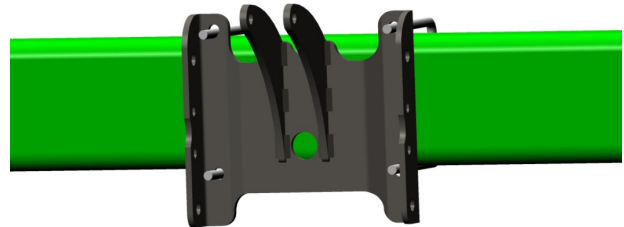
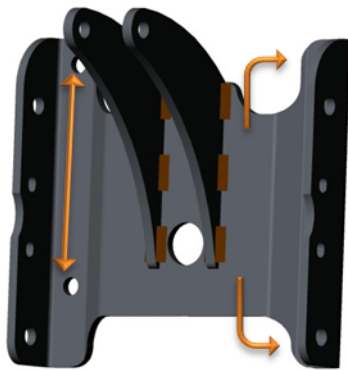
Remove row unit from planter frame.



Step 5:

Install W-Plate 729341 to U-Bolts on planter frame, install washer & nuts from step 3, then tighten.

Note: If performing this install on a Monosem, replace the OEM u-bolts with the 7"x7" u-bolts provided in the 729646 kit. Also, replace the OEM bushings with the Lower Parallel Arm Bracket in the next step. Deere installs can ignore this note.

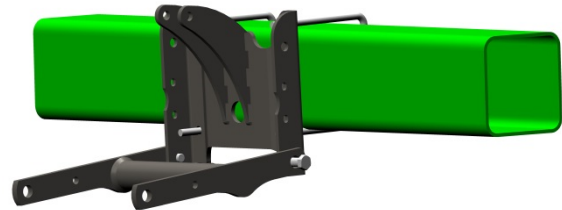


Step 6:

Remove lower parallel arms from Row Unit. The bolts, bushings, washers, & nuts will be reused in next step. Place in a secure location.

Step 7:

Install provided lower parallel arms 729392 to the W-Plate using hardware (X2 bolts, washers, bushings, & nuts) that were taken off in Step 3.

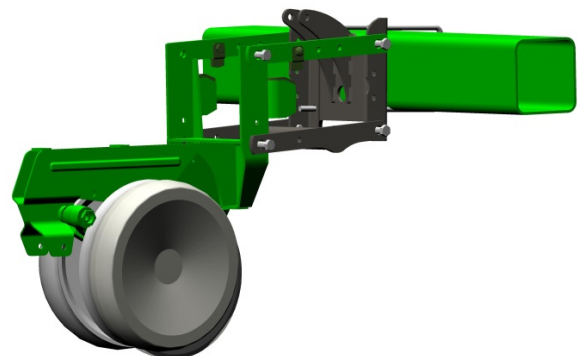


Orientation: The tab from the cross brace on the parallel arms will face downward. The two tabs inside the cross brace should be pointed toward the planter bar.



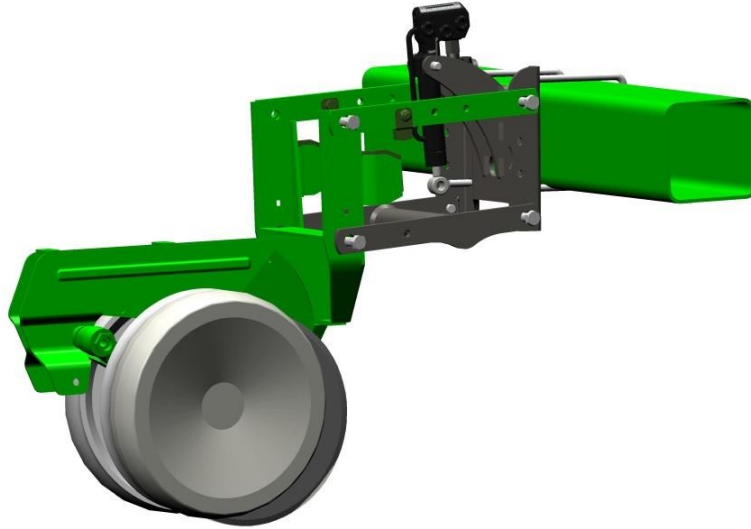
Step 8:

Carefully orient the row unit to reinstall the row unit to the planter bar.



Step 9:

Install the 729602 Hydraulic Cylinder on the W-Mount Cylinder Bracket using a 729309 Cylinder Pin and cotter pin. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm bracket. Set aside the other 729309 Cylinder Pin and cotter pin. The second pin and cotter pin will be installed after the “Air Purge Test” has been completed.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

White 6/8/9xxx DeltaForce Installation with vDrive

Row Unit Kit 729390

QTY	Part Number	Part Name	Description
1	729336	Upper Cylinder Mount	White DeltaForce
1	729364	Lower Cylinder Mount	White DeltaForce
1	729385	Hardware Kit	White DeltaForce w/ vDrive

Hardware Kit 729385

QTY	Part Number	Part Name	Description
4	38656	Hex Cap Screw	M10X1.5 X 30 Full Thread Hex Head Cap Screw ZN
4	38710	Hex Cap Screw	M12X1.75 X 50 Hex Head Cap Screw ZN
2	65104	Cotter Pin	5/32 x 1.25 Cotter ZN
4	90682	Nut	M10 TOP Lock Nut ZN
4	90683	Nut	M12 TOP Lock Nut ZN
2	729303	Bushing	1.05 OD X 0.50 ID X 0.75
2	729304	Bushing	0.75 OD X 0.50 ID X 0.75
2	729309	Pin	DeltaForce Cylinder — Long



Step 1:

Remove the current down force system. The W-plate designed for air bags is necessary for DeltaForce to be compatible with this row unit. If the existing W-plate does not have the holes for air bag installation, contact your local AGCO dealer to order the needed W-plate.



Step 2:

Use the four (4) supplied M10x30 bolts and two (2) M10 hex nuts to attach the 729339 Upper Cylinder Mount to the W-plate.

**Step 3:**

Orient the parallel arm cylinder bracket so that the tabs on the cross bar are facing down. The word “TOP” is also stamped into one side of the bracket to help with proper installation. This side should be facing up.

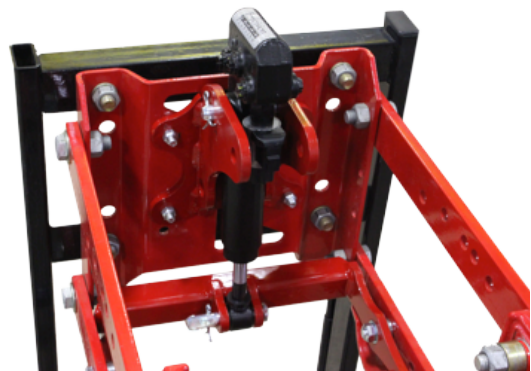
**Step 4:**

Install the larger bushings in the hole on the parallel arm cylinder bracket that is closest to the planter frame. Use the M12x50 bolts and the M12 lock nuts to secure the lower cylinder mount to the lower parallel arm. Then, install the M12x50 bolts, M12 lock nuts, and smaller bushings into the holes closest to the row unit.

**Step 5:**

Install the 729602 hydraulic cylinder to the W- mount cylinder bracket using a cylinder pin and cotter pin. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm bracket. Set aside the second cylinder pin and cotter pin. These will be installed after the air purge test has been completed.

Note: The DeltaForce cylinder should be pinned using the front hole of the W Mount bracket with the solenoid facing rearward.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

White 6/8/9xxx with Hex Shaft or Cable Drive (Non-vDrive)

White Row Unit Kit DeltaForce with Hex Shaft (non-vDrive): 729330

QTY	Part Number	Part Name	Description
1	729686	Upper Cylinder	White DeltaForce
1	729687	Lower Cylinder	White DeltaForce
1	729385	Hardware Kit	White DeltaForce w/ vDrive
1	729386	Cylinder Offset Kit	White DeltaForce

White DeltaForce Cylinder Offset kit: 729386

QTY	Part Number	Part Name	Description
1	729335	Hardware Kit	White DeltaForce w/ Hex Shaft
2	729365	Alignment Strap	White DeltaForce
1	729367	Cylinder Arm Left	White DeltaForce
1	729368	Cylinder Arm Right	White DeltaForce

White DeltaForce Hex Shaft Hardware Kit: 729335

QTY	Part Number	Part Name	Description
2	38719	Hex Cap Screw	M12 X 1.75 X 110 HEX HEAD CAP SCREW ZN
1	65104	Cotter Pin	5/32 X 1.25 COTTER ZN
2	90683	Nut	M12 TOP LOCK NUT ZN
2	729303	Bushing	1.05 OD X 0.50 ID X 0.75
6	729304	Bushing	0.75 OD X 0.50 ID X 0.75
1	729309	Pin	DF CYLINDER - LONG

White DeltaForce Hardware Kit: 729385

QTY	Part Number	Part Name	Description	
4	38656	Hex Cap Screw	M10X1.5 X 30 FULL THREAD HEX HEAD CAP SCREW ZN	
4	38710	Hex Cap Screw	M12X1.75 X 50 HEX HEAD CAP SCREW ZN	
2	65104	Pin	5/32 x 1.25 COTTER ZN	
4	90682	Nut	M10 TOP LOCK NUT ZN	
4	90683	Nut	M12 TOP LOCK NUT ZN	
2	729303	Bushing	1.05 OD X 0.50 ID X 0.75	1" DIAMETER
2	729304	Bushing	0.75 OD X 0.50 ID X 0.75	¾" DIAMETER
2	729309	Pin	DF CYLINDER - LONG	



Cylinder Offset Kit for White 6/8/9xxx Row Units

**729367/8: Cylinder Left/Right (Left
Shown)**

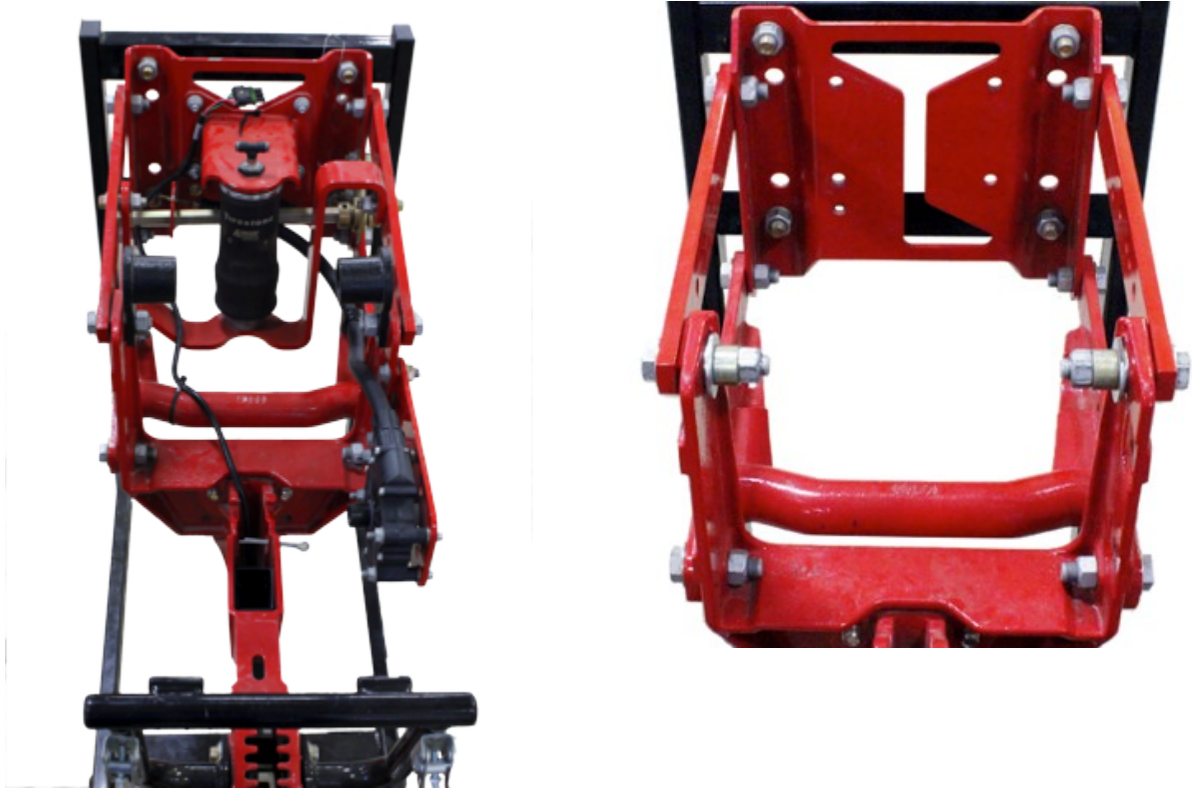


729365: Alignment Strap



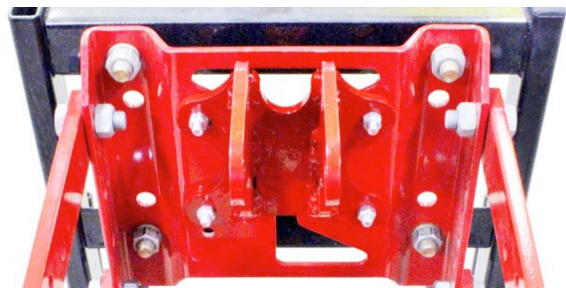
Step 1:

Remove current down force system. A W-plate with holes for air bags is necessary for DeltaForce compatibility with this row unit (see below). If the existing W-plate is not compatible, contact your local AGCO dealer for a replacement.



Step 2:

Use the four (4) supplied M10x30 bolts and two (2) M10 hex nuts to attach the 729339 Upper Cylinder Mount to the W-plate.



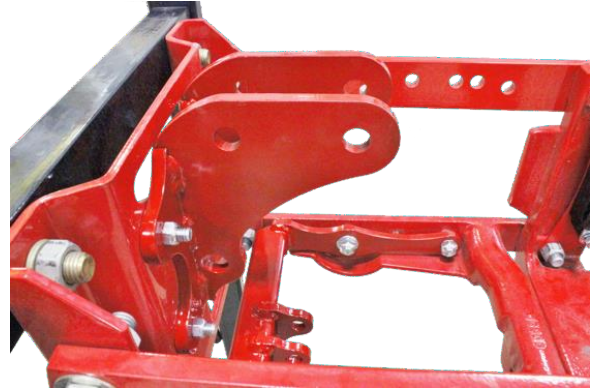
Step 3:

Orient the parallel arm cylinder bracket so that the longer support tabs are on top of the center frame brace.

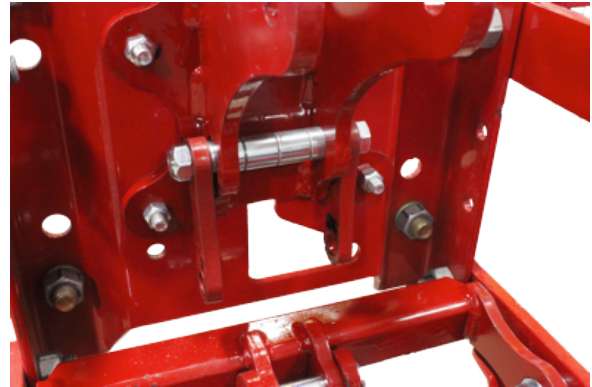


Step 4:

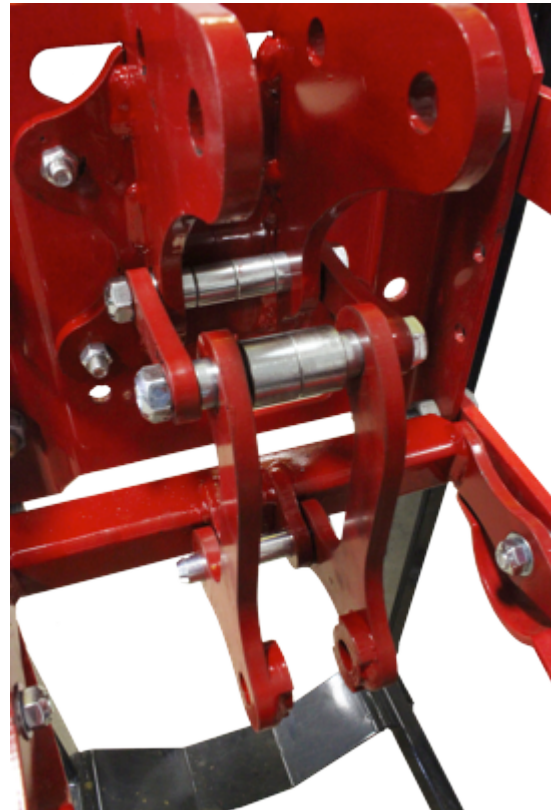
Install the larger bushings in the hole on the parallel arm cylinder bracket that is closest to the planter frame. Use the M12x50 bolts and the M12 top lock nuts to secure the lower cylinder mount to the lower parallel arm. Then, install the M12x50 bolts, the M12 top lock nuts, and the smaller bushings into the holes closest to the row units.

**Step 5:**

Use the 5/32 x 1.25 bolts to attach the cylinder offset bracket alignment straps to the upper cylinder mount. Use four of the 3/4" bushings on the bolt.

**Step 6:**

Use a cylinder pin and cotter pin to attach the cylinder offset bracket to the lower cylinder mount. Next, use a long 5/32 x 1.25 bolts to attach the setback bracket to the alignment straps. Use four bushings (2 x 3/4" and 2 x 1") across the bolt as shown in figure. The setback bracket should be oriented such that the welded bushings of the cylinder arm bracket will face inward and make contact with the lower cylinder arm DeltaForce cylinder.



Step 7:

Install the DeltaForce Cylinder using the furthest back hole from the solenoid facing forward towards the planter bar using one cylinder pin and cotter pin. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm bracket. Set aside the second cylinder pin and cotter pin. These will be installed after the air purge test has been completed.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

Kinze 3xxx Puller Bracket Installation

Kinze 3XXX DeltaForce Puller Row Unit Kit 729310

QTY	Part Number	Part Name	Description
1	729311	W Mount Cyl Bracket	KZ 3XXX PULLER
1	729312	Parallel Arm Cyl Bracket	KZ 3XXX PULLER
1	729316	W Mount Support Bracket	KZ 3XXX PULLER
1	729315	Hardware Kit	KZ 3XXX PULLER

KINZE 3XXX Hardware Kit 729315

QTY	Part Number	Part Name	Description
2	729313	Bushing	1.05 OD X .0625 ID X 0.75 SLEEVE
2	729304	Bushing	0.75 OR X 0.5 ID X 0.75 SLEEVE
4	13211	Bolt	½" X 2 GRD 5 ZN
2	33626	Lock Washer	½" SPLIT
1	13309	Bolt	5/8-11 X 1.5 GRD 5 ZN
1	33630	Lock Washer	5/8 SPLIT
2	37268	Lock Nut	½" TOP LOCK ZN
2	17313	Bolt	5/8-18 X 2.5 GRD 5 ZN
2	33090	Flat Washer	5/8 FLAT ZN
2	37312	Nut	5/8-18 TOP LOCK ZN
2	729309	Pin	DF CYLINDER - LONG
2	65104	Cotter Pin	5/32 X 1 1/4" ZINC COATED



Step 1:

Remove the current down force system.

Step 2:

Lower the planter. Then, remove the lower, front left hand parallel arm bolt. Install the 5/8" x 3" bolts and the 5/8" flat washers into the open hole on the lower parallel arm. Then, install the 1.05" x 0.625" x 0.75" bushings onto the bolts. Thread the 5/8" lock nut and tighten. Repeat this process for the front, right hand parallel arm.



Note: If the row unit does not have a parallel arm extension, mount the bracket with "Short Up" facing up. If the row units have the Kinze 4" parallel arm extensions or the 726480 4.5" Precision Planting parallel arm extensions, orient the bracket with "Long Up" facing up. DeltaForce is not compatible with Martin or Yetter 6" parallel arm extensions.

Step 3:

Insert the 0.75" x 0.5" bushings into the bolt hole on the parallel arm cylinder bracket. Install the 1/2" x 2" bolt and the 1/2" lock nut. If installing a lift switch, it will be installed on the back, right bolt. Ensure that the large center hole on the W- plate is free of any harnesses.

**Step 4:**

Install the 729311 W mount cylinder bracket to the 729316 W mount bracket support using two 1/2" x 2" bolts with 1/2" lock washers. Do not tighten.

**Step 5:**

Slide the 729316 W mount bracket support behind the W bracket. Align the two brackets with the W-plate. Insert the 5/8" x 1.5" bolt with the 5/8" lock washer into the lower hole. Tighten all three bolts.



Step 6:

Install the 729602 hydraulic cylinder on the W mount cylinder bracket using a cylinder pin and cotter pin. The solenoid must face the planter bar. Use a zip tie to secure the lower section of the cylinder to the tabs of the parallel arm bracket. Set aside the other pin and cotter pin until after the air purge test has been completed. The cylinder will be tipped slightly to the rear on row units with short parallel arms. The cylinder will be tipped slightly to the front on row units with long parallel arms.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

Kinze 3xxx Pusher Bracket Installation

Kinze 3XXX DeltaForce Pusher Row Unit Kit 729350

QTY	Part Number	Part Name	Description
1	729351	W Mount Cyl Bracket	KZ 3XXX PUSHES
1	729352	Upper Parallel Arm Br.	KZ 3XXX PUSHES
1	729354	W Mount Support	KZ 3XXX PUSHES
1	729356	Lower Parallel Arm Br.	KZ 3XXX PUSHES
1	729355	Hardware Kit	KZ 3XXX PUSHES

KINZE 3XXX Hardware Kit 729355

QTY	Part Number	Part Name	Description
4	13207	Bolt	½"-13 X 1-1/4" ZINC FINISH SAE J429 GRADE 5 HEX CAP SCREW

4	1133626	Lock Washer	½" ZINC FINISH MEDIUM SPLIT LOCK WASHER
2	729309	Pin	DF CYLINDER - LONG
2	65104	Cotter Pin	5/32 X 1 ¼" ZINC COATED



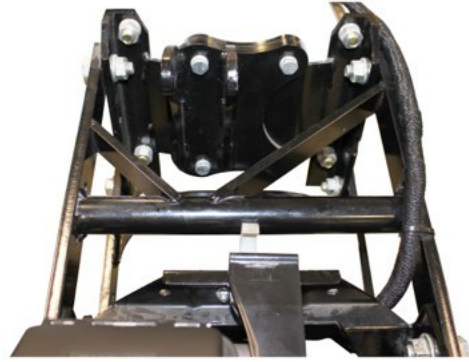
Step 1:

Lower the planter until the parallel arms are level. Secure the row unit by using an A-frame engine puller or similar device before continuing. Remove the bottom parallel arm. Retain the bolts, bushings, washers, and nuts. Install the 729356 lower parallel arm with existing hardware. Orient the parallel arm cylinder bracket so that the cylinder mount stubs are angled downward.

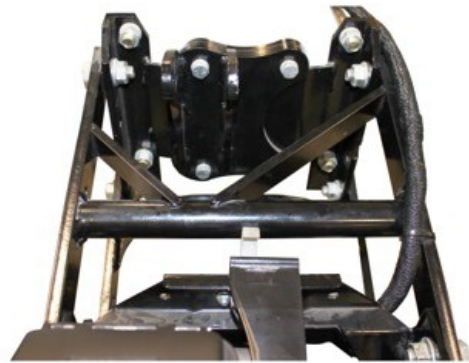


Step 2:

Install the 729351 W mount cylinder bracket to the 729354 W mount bracket support using two ½" x 1 ¼" bolts with ½" lock washers. Do not tighten. Slide the 729354 W mount bracket support behind the W bracket. Install two ½" x 1 ¼" bolts with ½" lock washers into the lower bolt holes on the 729351 W mount cylinder bracket. Align the upper cylinder bracket to be directly above the mount tabs on the lower parallel arm bracket. Tighten all four bolts.

**Step 3:**

Remove the upper parallel arm. Retain the bolts, bushings, washers, and nuts. Install the 729352 upper parallel arm with existing hardware. Ensure that the latch for the hopper is aligned correctly prior to mounting the upper parallel arm.



The latch must be above the parallel arm and the lever below the upper parallel arm before securing the upper parallel arm in place.



Step 4:

Install the 729602 hydraulic cylinder on the W mount cylinder bracket using a cylinder pin and cotter pin. The cylinder should be installed with the solenoid facing the planter bar. Use a zip tie to secure the lower section of the cylinder on the tabs on the parallel arm bracket. Set aside the other cylinder pin and cotter pin. This pin will be installed after the air purge test has been completed.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

Kinze 3XXX Pusher Stop Kit

Upon full upward travel of the pusher style row unit there is a possibility the DeltaForce bracket could contact the depth handle. The stop kit is required for all pusher rows to prevent this from happening.

Kinze 3XXX DeltaForce Pusher Row Stop Kit 729273

QTY	Part Number	Part Name	Description
2	13107	Bolt	3/8-16 x 1.25 GRD 5 BOLT ZN
2	33082	Washer	3/8 SAE FLAT ZN
2	37264	Lock Nut	3/8-16 GRD C TOPLOCK NUT
2	729272	Row Unit Stop	KZ 3XXX PUSHES

Step 1:

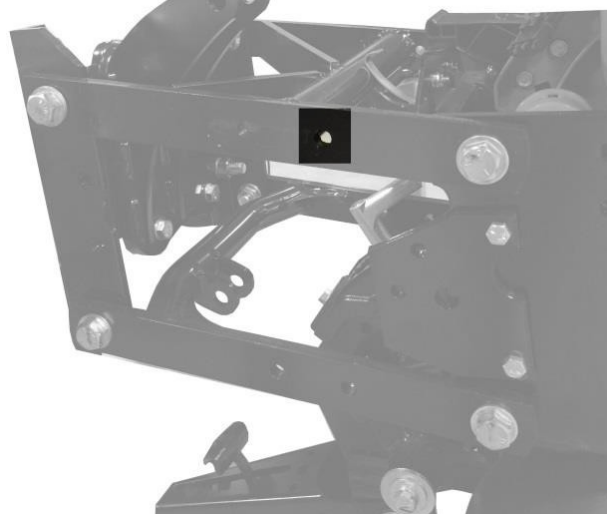
Install Stop Kit on each side of parallel arms.



Step 2:

Using given nuts and bolts, install Stop kit in rear hole of DeltaForce Upper Parallel Arm.

Hole Location for Installation

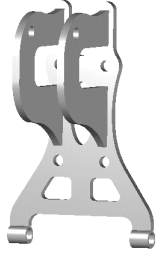


Stop Kit installed



Kinze 4900 Row Unit Installation

Kinze 4900 Row Unit Kit 729395

QTY	Part Number	Part Name	Description
1	729275	Lower Bracket Assembly	
1	729640	W Mount Cylinder Bracket	
1	729645	Hardware Kit 4900	
1	729314	DeltaForce Cylinder Pin (x2)	
1	729515	SRM Mounting Bracket	



Step 1:

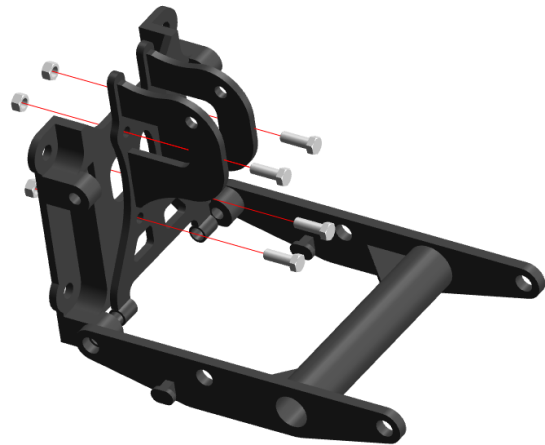
Remove the current downforce system from the planter. It will be beneficial to read through the following steps as some parts on the existing row unit may be used to install DeltaForce.

Step 2:

Lower the planter until parallel arms are level, this should balance the row unit and help facilitate the installation.

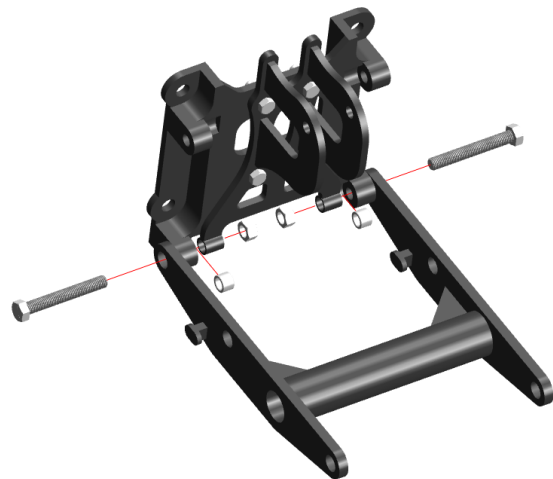
Step 3:

Install the 729640 W-Mount Cylinder Bracket to the OEM Kinze W-Plate utilizing four ½" x 1 ½" bolts. Thread the ½" lock nut and tighten.

**Step 4:**

Remove the lower parallel arm bolts. Install the 5/8" x 4 ½" bolts and 5/8" flat washers into the open hole on the lower parallel arm, then the 1.05" x 7/8" x 0.625" bushings onto the bolts. Thread the 5/8" lock nut and tighten.

Note: DeltaForce brackets are not compatible with Martin or Yetter 6" Parallel Arm Extensions.



Step 5:

Insert the 0.75" x 0.5" bushings into the bolt hole on the parallel arm cylinder bracket. Install the 1/2" x 1 1/2" bolt and the 1/2" lock nut.



Note: If installing a lift switch, the lift switch will be installed on the back right bolt.

Note: Ensure that the large center hole on the W-Plate is free of any harnesses.

Step 6:

Install the 729602 Hydraulic Cylinder on the W-Mount Cylinder Bracket using a 729309 Cylinder Pin and cotter pin. The cylinder should be installed with the solenoid facing the planter bar. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm bracket. Set aside the other pin and cotter pin. The second pin and cotter pin will be installed after the "Air Purge Test" has been completed.



Note: The cylinder will be tipped slightly to the rear on short parallel arms. The cylinder will be tipped slightly to the front on long parallel arms.

Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

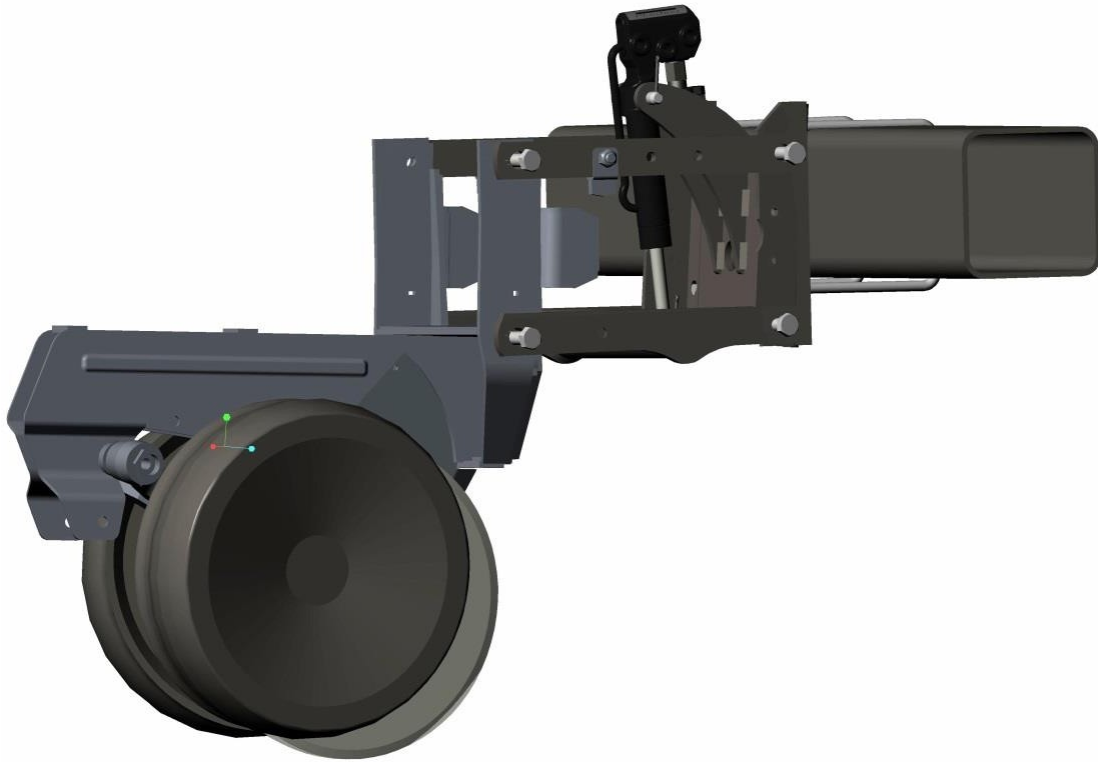
Kinze 2000 Row Unit Installation

Kinze 2000 Row Unit Kit: 729340

QTY	Part Number	Part Name	Description
1	729312	Lower Parallel Arm Bracket	
1	729341	W-Plate Mount Assembly	
1	729315	Kinze DF Hardware Kit	

Kinze 2000 Hardware Kit: 729315

QTY	Part Number	Part Name	Description
2	729313	Bushing	1.05 OD X .0625 ID X 0.75 SLEEVE
2	729304	Bushing	0.75 OR X 0.5 ID X 0.75 SLEEVE
4	13211	Bolt	½" X 2 GRD 5 ZN
2	33626	Lock Washer	½" SPLIT
1	13309	Bolt	5/8-11 X 1.5 GRD 5 ZN
1	33630	Lock Washer	5/8 SPLIT
2	37268	Lock Nut	½" TOP LOCK ZN
2	17313	Bolt	5/8-18 X 2.5 GRD 5 ZN
2	33090	Flat Washer	5/8 FLAT ZN
2	37312	Nut	5/8-18 TOP LOCK ZN
2	729309	Pin	DF CYLINDER - LONG
2	65104	Cotter Pin	5/32 X 1 1/4" ZINC COATED



The row unit will be removed from the planter bar, make sure personal safety is ensured through this process.

Step 1:

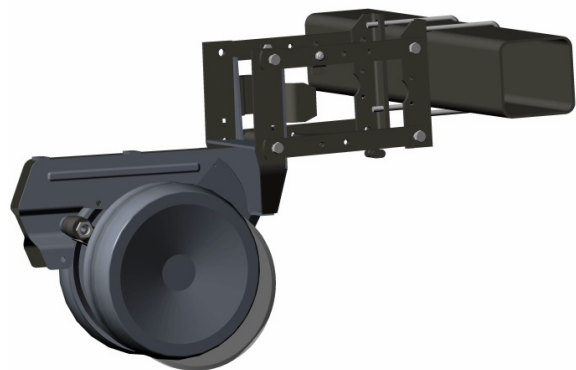
Remove the current down force system. It will be beneficial to read through the installation steps as some of the existing parts will be used to install DeltaForce.

Step 2:

Using a fork lift or cherry hoist, lift row unit to remove weight from planter bar. Mark outside location of Angle Iron with a marker or paint marker. This will be used to align placement of new W-Plate.

Step 3:

With row unit secured, remove nuts from U-bolts holding angle irons to planter bar. The U-bolts, washers, and nuts will be re-used in later steps, so place in a secure location. The angle irons will no longer be needed.



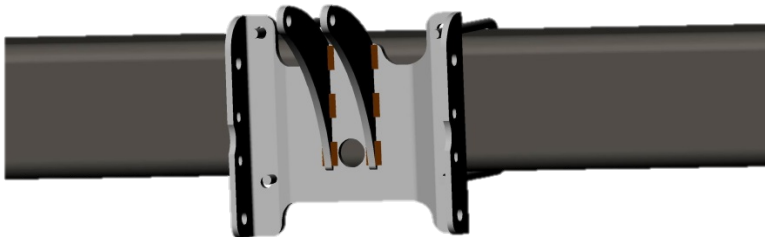
This is necessary as we will replace the angle irons with a W- Plate.

Step 4:

Remove row unit from planter frame.

**Step 5:**

Install W-plate to U-bolts on planter frame, install washer & nuts, then tighten.

**Step 6:**

Carefully orient the row unit to reinstall the row unit to the planter bar. For upper parallel arms re-use OEM Kinze nuts, bolts, washers, & bushings. Replace the lower, front right hand parallel arm bolt with supplied 5/8" x 3" bolts and 5/8" flat washers. Then install the 1.05" x 0.625" x 0.75" bushings onto the bolts. Thread the 5/8" lock nut and tighten. Repeat on left hand side.



Step 7:

Install the 729312 lower parallel arm brackets between the lower parallel arms. The lower parallel arm brackets will slide over bushings where the parallel arms attach to the W-Plate.

Note: For orientation of the bracket, see below.

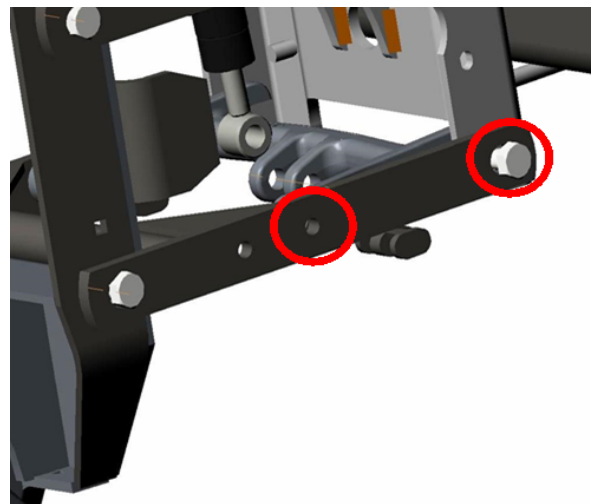


If the row unit does not have a parallel arm extension, ensure that the “Short Up” is facing up on the bracket. If the row units have Kinze 4 inch Parallel Arm Extensions or Precision Planting 726480 4.5 inch parallel arm extensions, orient the bracket to have the words “LONG UP” facing upwards.



Step 8:

Insert the 0.75” x 0.5” bushings into the bolt hole on the parallel arm cylinder bracket. Install the ½” x 2” bolt and the ½” lock nut.



Note: If installing a lift switch, the lift switch will be installed on the back right bolt.

Step 9:

Install the 729602 Hydraulic Cylinder on the 729341 W-mount cylinder bracket using a 729309 Cylinder Pin and cotter pin. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm bracket. Set aside the other 729390 Cylinder Pin and cotter pin, they will be installed after the completion of the air purge test.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

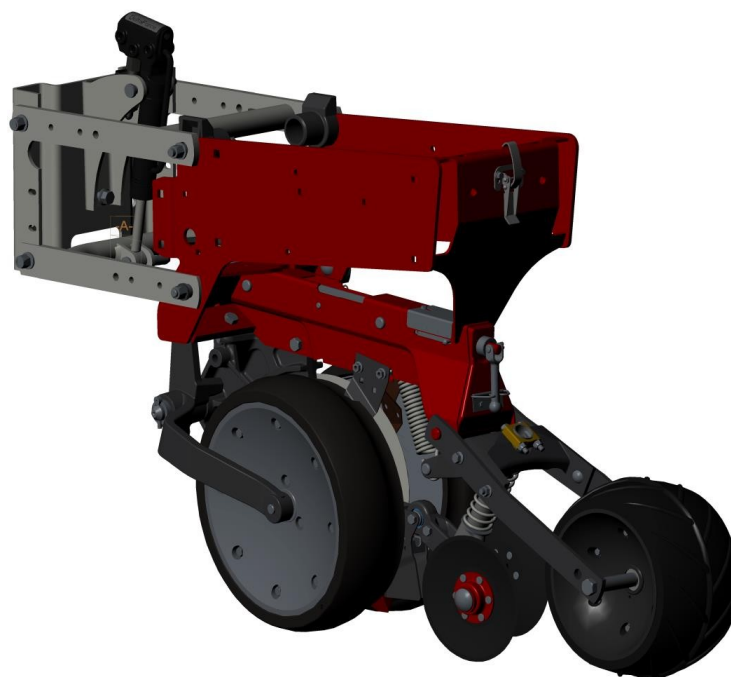
Case IH 12XX Row Unit Installation

Case IH DeltaForce 12XX Row Unit Kit 729320

QTY	Part Number	Part Name	Description
1	729321	W Mount Cylinder Bracket	Case 12XX
1	729322	Parallel Arm Cylinder Bracket	Case 12XX — 14"
1	729325	Hardware Kit	Case 12XX

Hardware Kit 729325

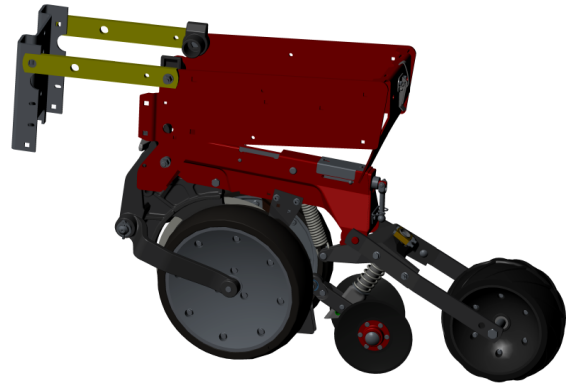
QTY	Part Number	Part Name	Description
2	729309	Pin	DeltaForce Cylinder — Long
2	65104	Cotter Pin	5/32 X 1 1/4" Zinc Coated
3	13206	Bolt	1/2–13 X 1.125 GRD 5 ZN
3	37268	Hex Nut	1/2–13 Top Lock Nut ZN



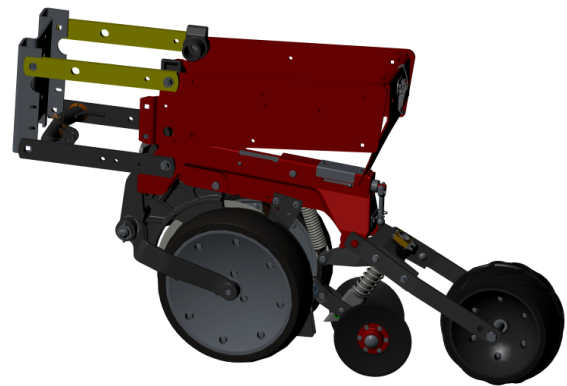
Step 1:

Lower the planter until the parallel arms are level. Secure the row unit by utilizing an A-frame engine puller or similar device before continuing. Remove the bottom parallel arm. Retain the bolts, bushings, washers and nuts. THE LOWER PARALLEL ARMS WILL BE REUSED TO REPLACE THE OEM UPPER PARALLEL ARMS.

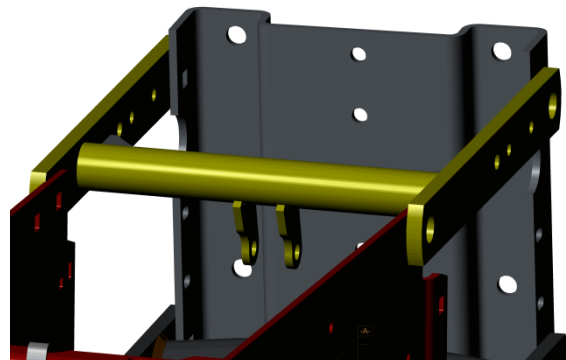
Note: If the OEM bottom parallel arm bracket has a square cross member and new, round, lower parallel arm bracket will need to be ordered from Case. It will still be used as the upper parallel arm bracket for the DeltaForce install.

**Step 2:**

Install the 729322 Lower Parallel Arm Bracket with the existing hardware. Refer to the illustration for reference. Orient the parallel arm cylinder bracket so that the cylinder mount stubs are angled downward.

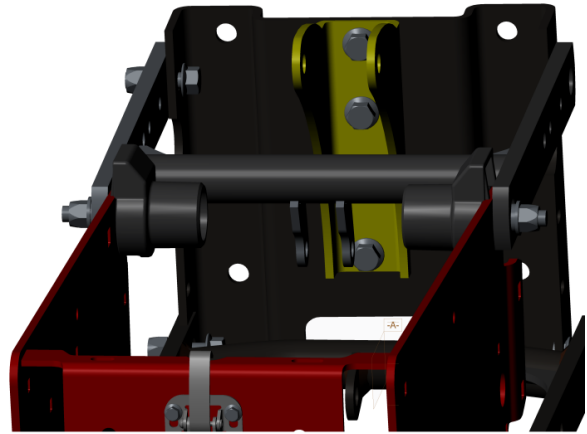
**Step 3:**

Replace the original Case upper parallel arms with the Case lower parallel arm bracket that was removed in step 1 using the existing hardware. The orientation will have the cross member rearward facing and with the tabs facing down, as seen below.



Step 4:

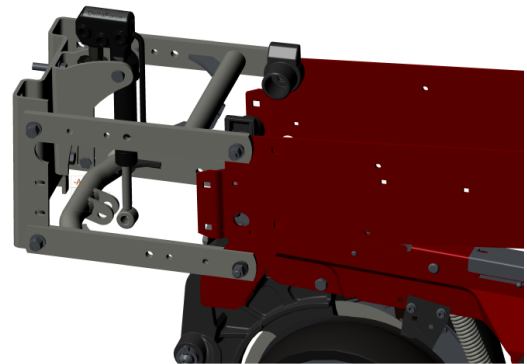
Install the 729321 W Mount Cylinder Bracket to the W plate using the ½” x 1.125” bolts and the ½” Locknuts.

**Step 5:**

Install the 729602 Hydraulic Cylinder on the W-Mount Cylinder Bracket using a 729309 Cylinder Pin and a cotter pin. Use a zip tie to secure the lower section of the cylinder to the tabs on the parallel arm. Set aside the other pin and cotter pin. The second pin and cotter pin will be installed after the “Air Purge Test” has been completed.

Note: The cylinder should be installed with the solenoid facing the planter bar.

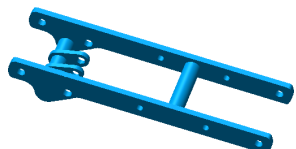
Note: The cylinder will be tipped toward the rear.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

Monosem NG+ 3 & 4 Standard (Narrow) Row Unit Installation

Monosem NG+ 3 & 4 Row Unit Kit: 712105

QTY	Part Number	Part Name	Description
1	712180	W- Mount Bracket	
1	712186	Upper Parallel Arm Bracket	
1	712200	Lower Parallel Arm Bracket	
1	712185	Hardware Kit	See Below

Monosem NG+ 3 & 4 Hardware Kit: 712185

QTY	Part Number	Part Name	Description
1	38768	Hex Cap Screw	M16 X 2 X 90 HEX HEAD CAP SCREW ZN
3	38776	Hex Cap Screw	M16 X 2 X 180 HEX HEAD CAP SCREW ZN
8	40361	Washer	M16.0 WASHER ZN
4	65104	Pin	5/32 X 1.25 COTTER ZN
4	90684	Nut	M16 TOP LOCK NUT ZN
2	712174	Pin	CYLINDER PIN
6	712187	Spacer	16.5mm ID X 26mm OD X 1mm THICK
2	712188	Spacer	16.5mm ID X 50 mm OD X 1mm THICK



The row unit will need to be secured or lifted with an engine hoist or fork truck, make sure personal safety is insured during this process.

Step 1:

Remove the current down force system from the planter. Using an engine hoist or a fork truck, secure the row unit. The chain from the chain drive assembly will need to be removed. If converting the planter to vDrive the chain will no longer be needed.

Step 2:

Remove the Monosem lower parallel arm bracket and replace with the 712200 Deltaforce Lower Parallel Arm Bracket. Install the front of the bracket (closest to w plate) first using one of the three M16x2x180 (longer) bolts, the only two supplied larger spacers, and two washers. The spacers will install between the lower parallel arm bracket and the w-plate as shown in the picture below. Refer for reference.



The spacer should be installed between the lower parallel arm bracket and w-plate on the right hand side of the row unit as well.

Note: It may be easier to remove the entire row unit, except for the w- plate, and lay it on its side to install the bracketing and then reinstall the entire row unit onto the w-plate.

Note: The Deltaforce Lower Parallel Arm Bracket should be installed with the tabs or “tabs” facing downward and closer to the w-plate. Refer to the picture for assistance.



Step 3:

Connect the Lower Parallel Arm Bracket to the row unit shank in the same hole that was used for the Monosem bracket. Use another M16X2X180 bolt, two washers, and two of the six smaller spacers to install the bracket to the row unit. The spacer should be between the lower parallel arm bracket and row unit shank, just like the other end.

**Step 4:**

Remove the Monosem upper parallel arm bracket. Using the one M16x2x90 (shorter) bolt, two smaller spacers, and two washers, install the 712186 Deltaforce Upper Parallel Arm Bracket. Install the end that contacts the row unit shank first with the spacers installed between the shank and upper parallel arm bracket on both sides. The bow or bend in this bracket should face downward.



Step 5:

The front of the Deltaforce Upper Parallel Arm Bracket and top of the 712180 Deltaforce W-Mount bracket need to be installed at the same time. The hooks at the bottom of the Deltaforce W-Mount bracket will sit over the bar at the bottom of the Monosem w-plate, as shown in the picture to the right.



Step 6:

The top of the W-Mount bracket will install on the outside of the w-plate, and the upper parallel arm bracket on the inside. Use the remaining M16x2x180 bolt, two washers, and two smaller spacers and install the spacers between the upper parallel arm bracket and Monosem w-plate on both sides. See the pictures below.



Picture on right is on planter bar side of row unit.

Note: If the row unit is not lying on its side it may be necessary to do this step with two people, one to hold the W-Mount bracket and one to install the spacer and washer.

Step 7:

Using one of the cylinder pins, install the top of the Deltaforce cylinder to the W-Mount bracket. The solenoid must be facing the bar to protect it from damage during row unit travel. A cotter pin will be installed on both sides of the cylinder pin. Set aside the other cylinder pin and cotter pins. They will be installed after the air purge test.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second cylinder pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

Monosem NG+ 3 & 4 Monoshox Row Unit Installation

Monosem MG+ 3 & 4 Monoshox Row Unit Kit: 712106

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	712190	CYLINDER MOUNT BRACKET	
1	712195	LOWER PARALLEL ARM BRACKET	
1	712196	UPPER PARALLEL ARM BRACKET	
1	712198	MONOSHOX HARDWARE KIT	SEE BOX BELOW

Monosem NG+ 3 & Monoshox Hardware Kit: 712198

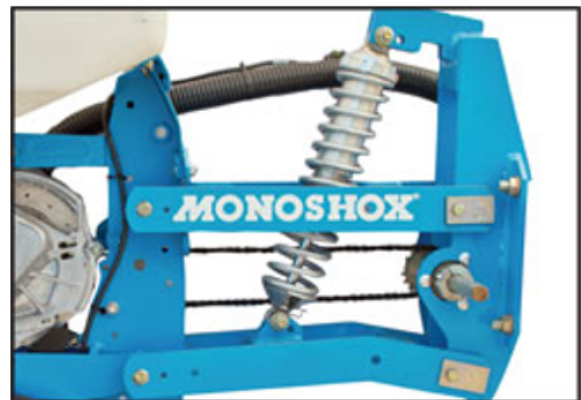
QTY	PART NUMBER	PART NAME	DESCRIPTION
1	38717	HEX CAP SCREW	M12 X 1.75 X 90 HEX HEAD CAP SCREW ZN
4	65104	PIN	5/32 X 1.25 COTTER ZN
1	90683	NUT	M12 TOP LOCK NUT ZN
2	712174	PIN	CYLINDER PIN
1	712197	BUSHING	0.75 OD X 0.50 ID X 0.725
2	712202	BUSHING	1.0 OD X 0.50 ID X 0.275



The row unit will need to be secured or lifted with an engine hoist or fork truck, make sure personal safety is insured during this process.

Step 1:

Remove the existing down force system (Monoshox spring). If the metering system is chain drive, remove the drive chain. It may be beneficial to read through row unit Install instructions as some parts of the Monosem row unit may be used for installing DeltaForce.



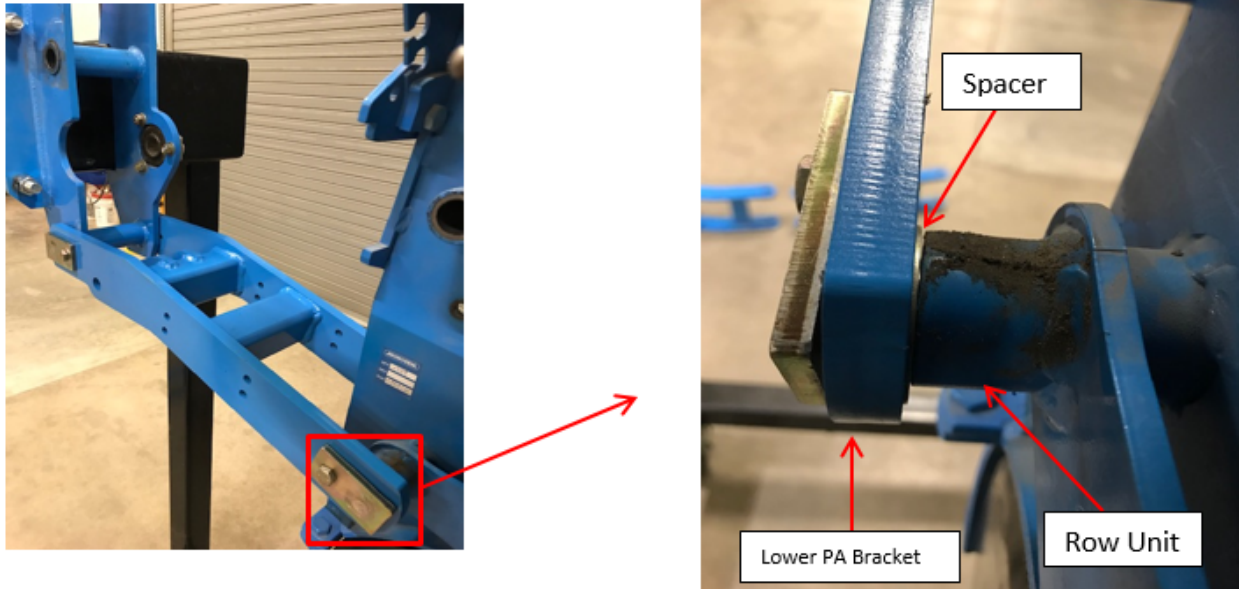
Step 2:

Using an engine hoist or a fork truck, secure the row unit and remove the Monosem lower parallel arm bracket. Save both Monosem parallel arm pins, bolts, and spacers that come out. These parts will also need to be saved when removing the Monosem upper parallel arm bracket. All parts pictured will be reused.



Step 3:

Install the 712195 Deltaforce Lower Parallel Arm Bracket using two of the Monosem pins, four spacers, and two pin bolts that were removed. At the front of the lower parallel arm bracket (closer to bar), the spacer will install between the bracket and Monosem w-plate on both sides. Toward the back of the bracket the spacer will go between the bracket and the row unit on both sides.



Note: It may be easier to remove the entire row unit, except for the w-plate, and lay it on its side to install the bracketing and then reinstall the entire row unit onto the w-plate.

Note: The Deltaforce Lower Parallel Arm Bracket should be installed with the bend in the bracket facing up and closer to the planter bar, just like the picture to the right.



Step 4:

Remove the Monosem upper parallel arm bracket and replace with the 712196 DeltaForce Upper Parallel Arm Bracket. Use the remaining two cylinder pins, four spacers, and two cylinder bolts. On the end of the bracket closer to the bar, install the spacers between the w-plate and upper parallel arm bracket on both sides of the w-plate. At the opposite end of the bracket (connecting to row unit) the spacers will install between the upper parallel arm bracket and row unit on both sides.



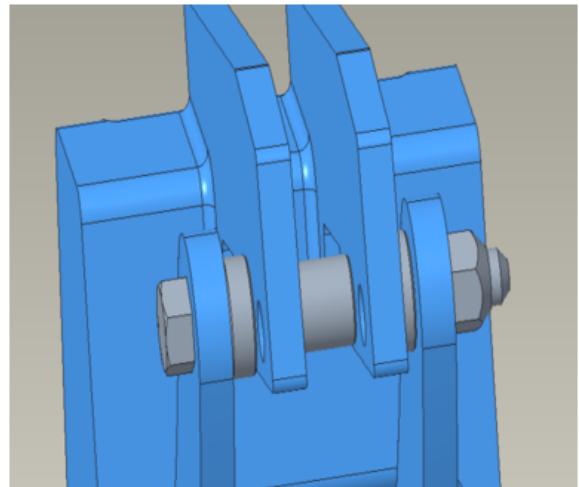
Note: Install the Deltaforce Upper Parallel Arm Bracket with the dip in the bracket facing up and closer to the planter bar.

Step 5:

The hooks on the 712190 Deltaforce Cylinder Mount Bracket will install on the top bar that runs across the w-plate. Install the top of the Cylinder Mount Bracket into the forward most hole (closer to bar) on the w-plate, near where the Monoshox spring was installed. Use the provided bolt, nut, and bushings to complete this step. See the note on this step for orientation of hardware at the top of the bracket. See pictures below for cylinder mount bracket installation.



Note: To install the Cylinder Mount Bracket, the wider bushing will install between the w-plate bracket. The narrower bushings will install between the Cylinder Mount Bracket and w-plate bracket on both sides. See picture on right for reference.



Step 6:

Using one of the 712174 cylinder pins, install the top of the Deltaforce cylinder to the 712190 Cylinder Mount Bracket. The solenoid must be facing the bar to protect it from damage during row unit travel. A cotter pin will be installed on both sides of the cylinder pin. Set aside the other cylinder pin and cotter pins. They will be installed after the air purge test.



Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second cylinder pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

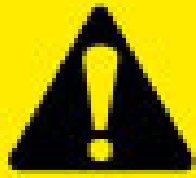
Vaderstad Tempo Row Unit Install

Vaderstad Tempo Row Unit Install Kit: 712445

QTY	Part Number	Part Name	Description
1	712446	HARDWARE KIT	SEE BOX BELOW
1	712447	CYLINDER MOUNT BRACKET- TOP	
1	712452	LOWER PARALLEL ARM BRACKET- UPPER	
1	712458	LOWER PARALLEL ARM BRACKET- LOWER	
1	712463	TOP STOP BRACKET	

Vaderstad Tempo Hardware Kit: 712446

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	38714	HEX CAP SCREW	M12 X 1.75 X 70 HEX HEAD CAP SCREW ZN
2	38771	HEX CAP SCREW	M16 X 2 X 120 HEX HD CAP SCREW ZN
3	40359	WASHER	M12.0 WASHER ZN
4	40361	WASHER	M16.0 WASHER ZN
1	40364	WASHER	M22.0 WASHER ZN
4	65104	PIN	5.32 X 1.25 COTTER ZN
2	90683	NUT	M12 TOP LOCK NUT ZN
2	90684	NUT	M16 TOP LOCK NUT ZN
1	0145165	HEX CAP SCREW	M12 X 1.75 X 45 HEX HEAD CAP SCREW ZN
1	0162024	PIN	M5 X 45 COTTER ZN
2	712174	PIN	CYLINDER PIN

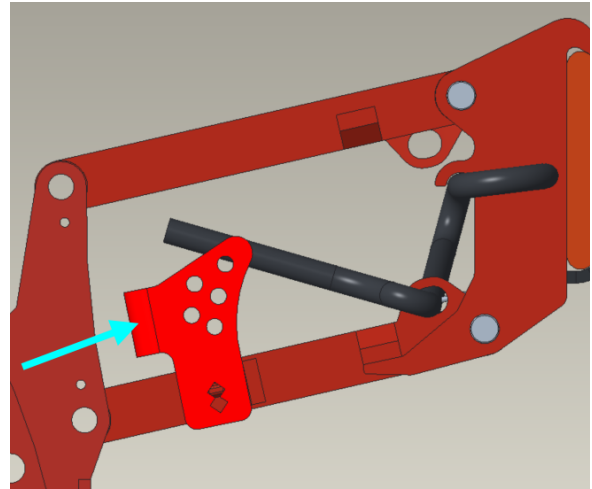


CAUTION

The row unit will need to be secured or lifted with an engine hoist or fork truck, make sure personal safety is insured during this process.

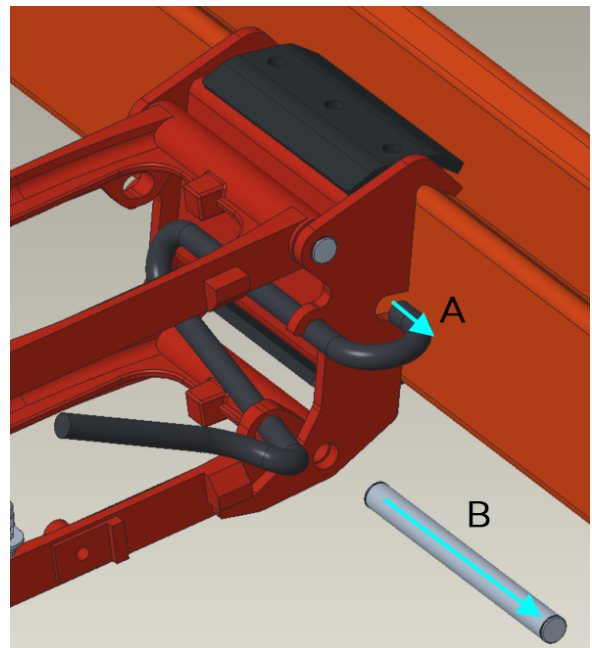
Step 1:

Remove the down force setting bracket. Indicated by the blue arrow.



Step 2:

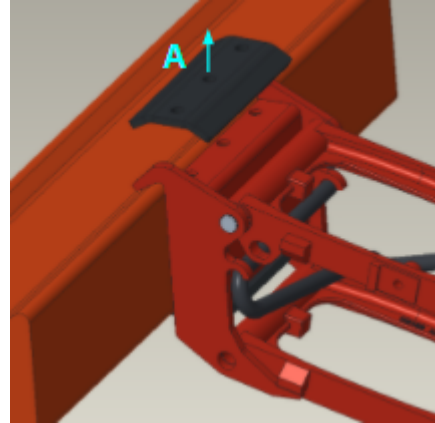
Disengage downforce rod spring (part A) from W-bracket. Pull from left to right (standing at the rear of the planter). Then remove the front, lower parallel arm rod (part B). Save this rod to be reinstalled later.



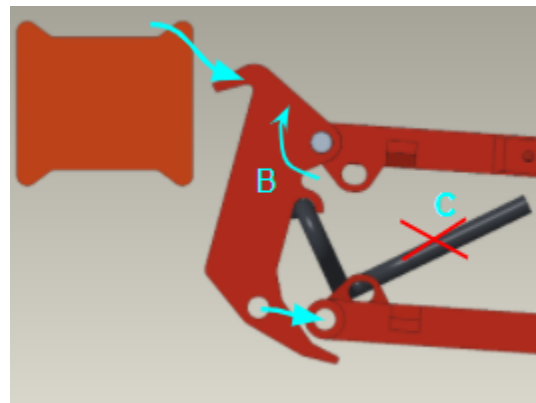
Step 3:

Secure the row unit with an engine hoist or fork truck. Remove the three nuts on the top flange that is holding the row unit in place.

Note: There is a flange on the underside of the row unit that can be removed once the top flange is removed. Save the underside flange as it will be used later.

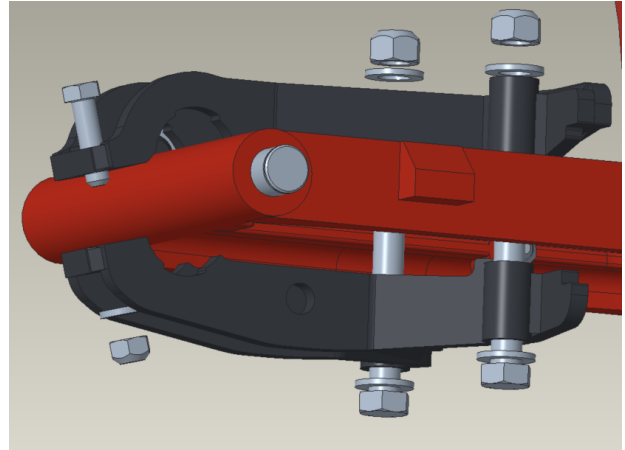
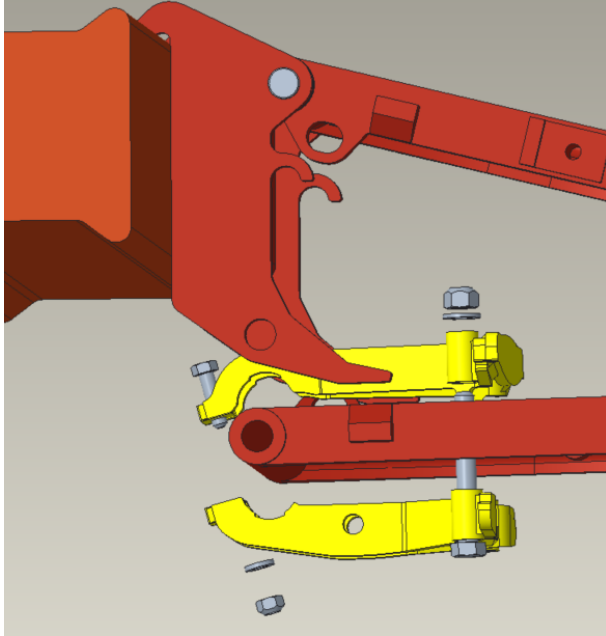
**Step 4:**

This step may require two people. Unhook the row unit from the toolbar and lower it. Disengage the lower parallel arm from the W-bracket by pivoting the W-bracket and pulling the row unit forward. Once the lower arm is free from the W-bracket, re-hook the W-bracket onto the bar. It is not necessary to remove the upper parallel arm during this process. Remove the downforce spring from the lower parallel arm (part C with red X).

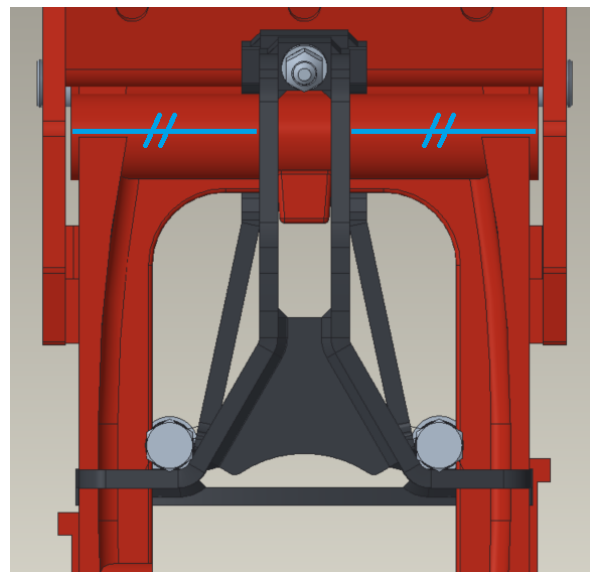


Step 5:

Install the lower parallel arm brackets, one above and one below the crossbeam on the lower parallel arm. Use the two provided M16 bolts, nuts, and washers and one M12 bolt, nut, and washer to install the brackets. The lower of the two brackets has the DeltaForce cylinder pin hole.

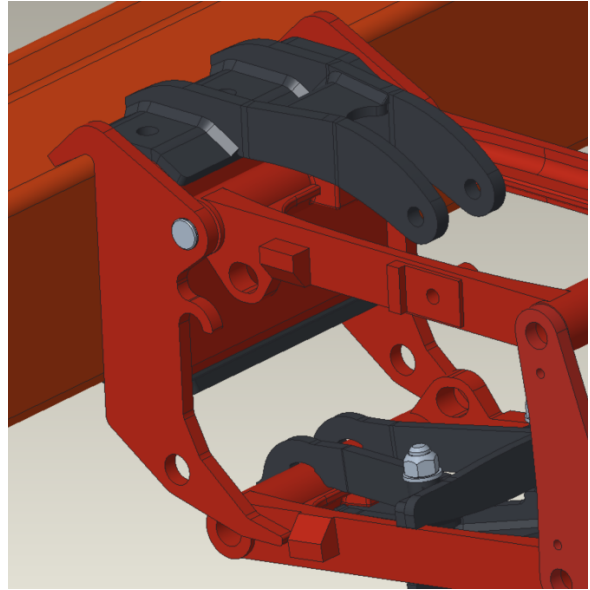


To the right is an overhead picture of the brackets. Make sure both brackets are centered and then tighten all bolts.

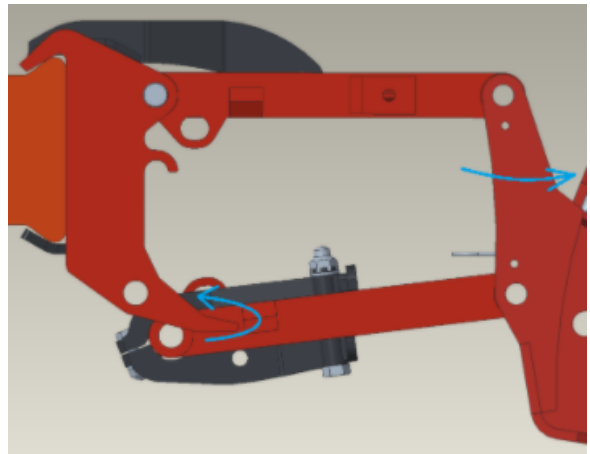


Step 6:

The top flange (shown in step 3) will be replaced by the upper cylinder bracket (Part Number 712447). The lower bracket that was originally on the planter can be reused.

**Step 7:**

Reinstall the lower parallel arm rod. Pull the lower parallel arm closer to the bar to do so.

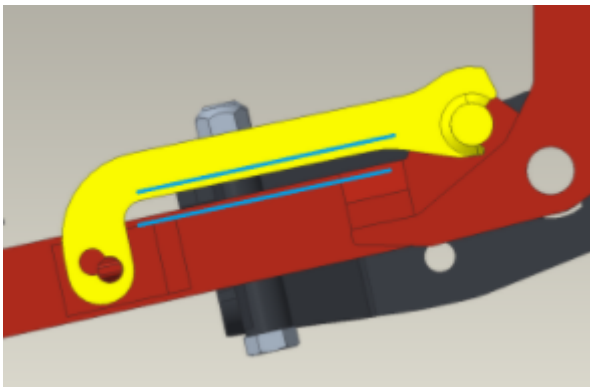


Step 8:

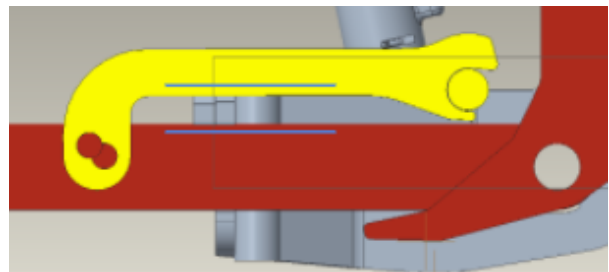
Using an M22 washer and a cotter pin, install the Top Stop bracket on the right hand side of the lower parallel arm. Secure the bracket with a M12 bolt in the end closer to the rear of the row unit. The bracket must be parallel with the lower arm as shown below.



Note: For 2016 and older row units use the lower bracket hole. Newer row units (post 2016) will use the upper hole. See pictures for reference.



2016 and Older

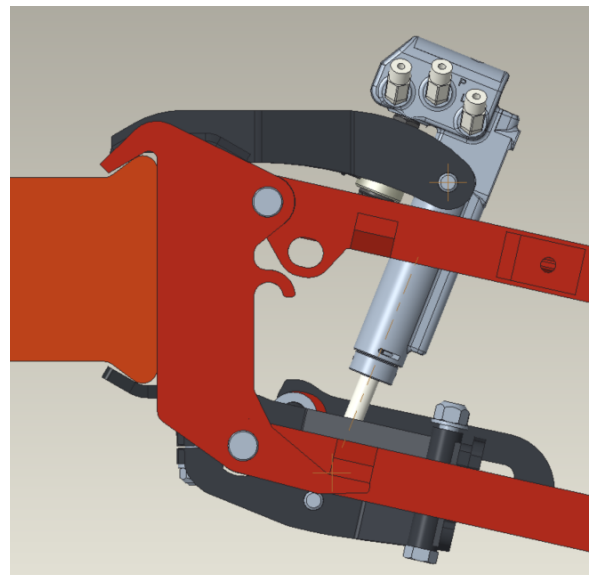


Post 2016

Step 9:

Install the DeltaForce cylinder, fittings, and upper cylinder pin and cotter pin. The lower cylinder pin and cotter pin will be installed after the completion of the Air Purge Test.

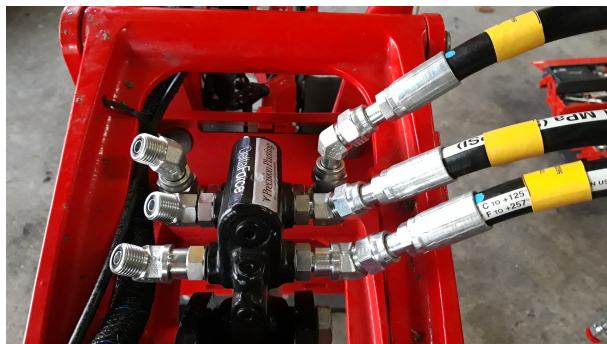
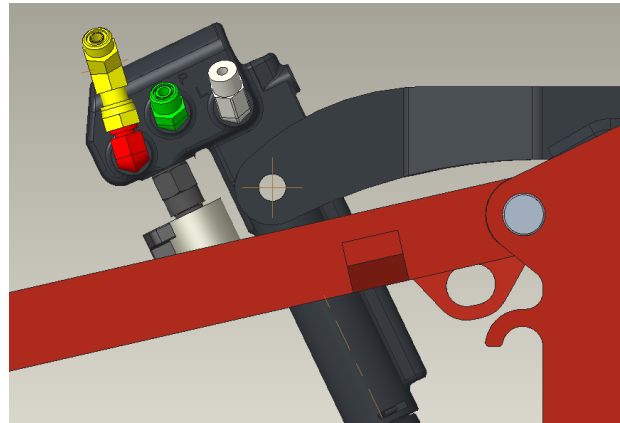
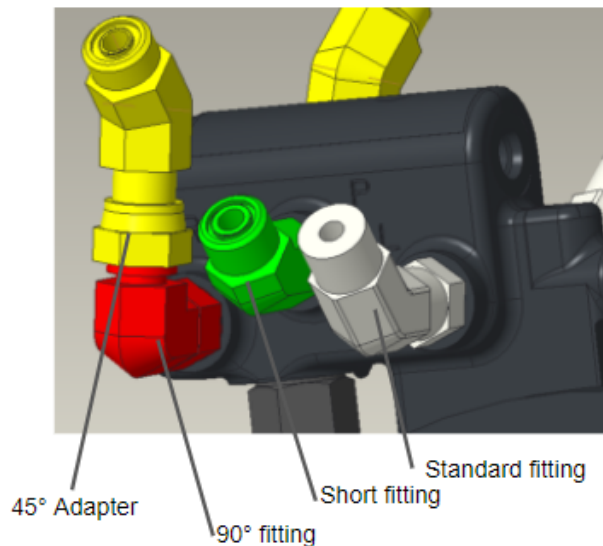
Note: If unable to install the cylinder due to interference with the Vaderstad air pressure system, see Step 10.



Step 10:

Note: Skip this step if there are no issues mounting the DeltaForce cylinder.

Using the 729764 Vaderstad Tempo Tight Clearance Fitting Kit, use a 90 fitting with a 45 adapter on both sides of the cylinder in the rear most hole. Then use a short fitting in the middle hole on both sides as pictured. The forward most hole will remain a standard fitting.



Step 11:

After the DeltaForce cylinder and brackets have been installed on all rows and all hydraulic lines connected, the Air Purge Test can be completed. After the completion of the test, the bottom of the DeltaForce cylinder can be pinned with the remaining 712174 cylinder pin and two cotter pins. For more information on the Air Purge Test see the note below.

Note: The Air Purge Test is a health check that is performed with the 20/20 monitor to verify all the air bubbles are purged from the hydraulic system. After the test is complete, the second cylinder pin and cotter pin can be installed. These are the final two steps of the install. Information on how to perform this test can be found in Section 9.

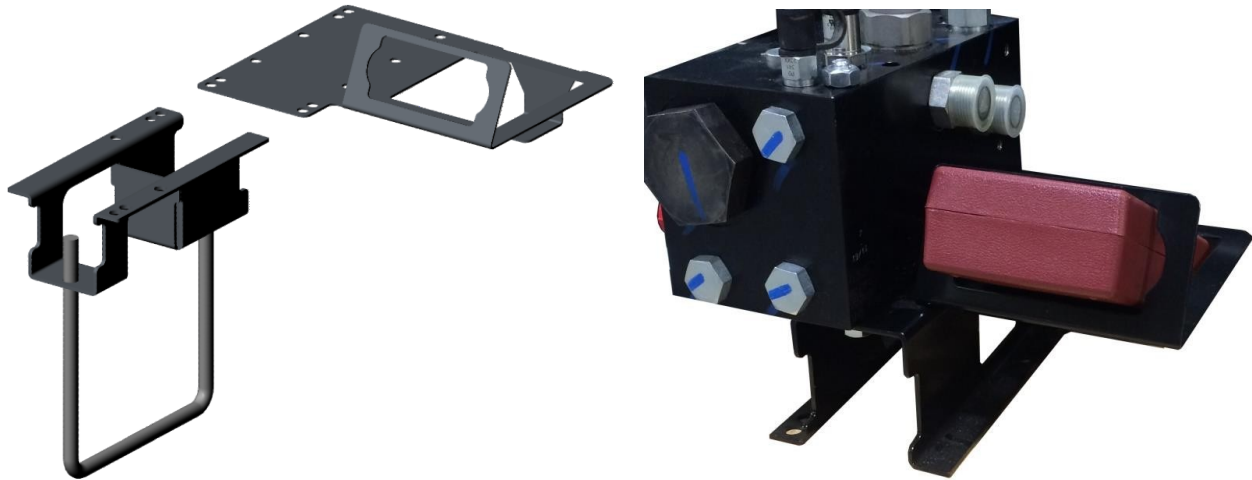
Section 5 - Install the Load Cell

Please refer to Document [955961](#) for the load cell install guide on domestic row units and Document [955962](#) for load cell install instruction on international row units.

Section 6 - Lift Manifold and Spare Parts Mounting

Step 1:

A maroon case labeled “DeltaForce Spare Kit” was included in the DeltaForce base kit. It contains caps and a diagnostic gauge. A bracket, indicated in the picture below, is sent that will mount with the lift manifold to hold this case. The flat portion of the bracket will be sandwiched between the lift manifold and the mounting bracket so that the bolt holes in all three align.



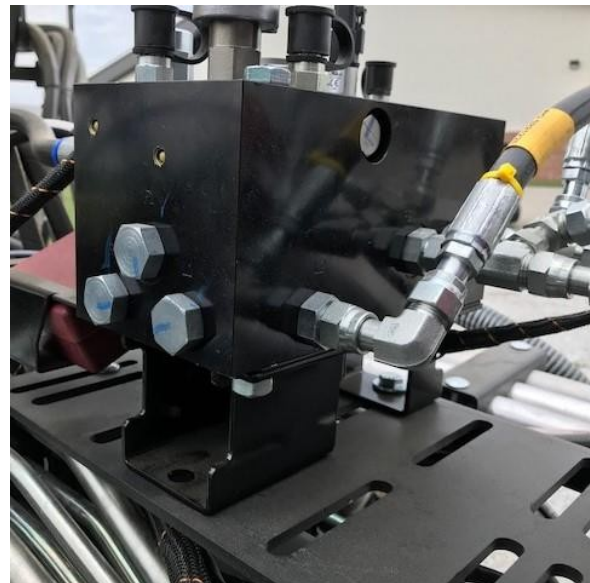
Note: The inlet ports are a -10 (5/8”) for a -6 (3/8”), -8 (1/2”) or a -10 (5/8”) hose. The outlet ports are -8 (1/2”) for -6 (3/8”) hose. Do not remove the caps from the Lift Manifold until you are ready to install hoses.

Step 2:

Use the provided hardware and bracket to mount the Lift Manifold. The hardware kit should allow mounting to a 7X7 inch frame or a 5X7 inch frame. The Lift Manifold should be within 3 feet of the PDM.

Note: A Lift Manifold extension harnesses is available if the PDM and Lift Manifold are mounted more than 3 feet away.

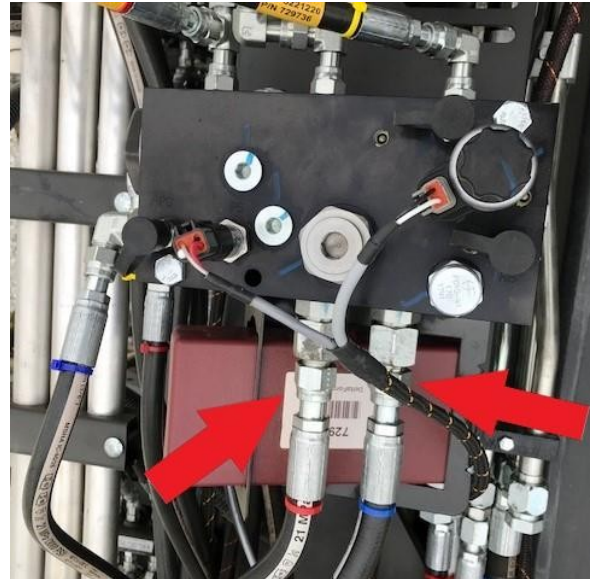
Note: If necessary, a plate can be fabricated to mount the lift manifold in a safe location. The lift manifold must be rigid.



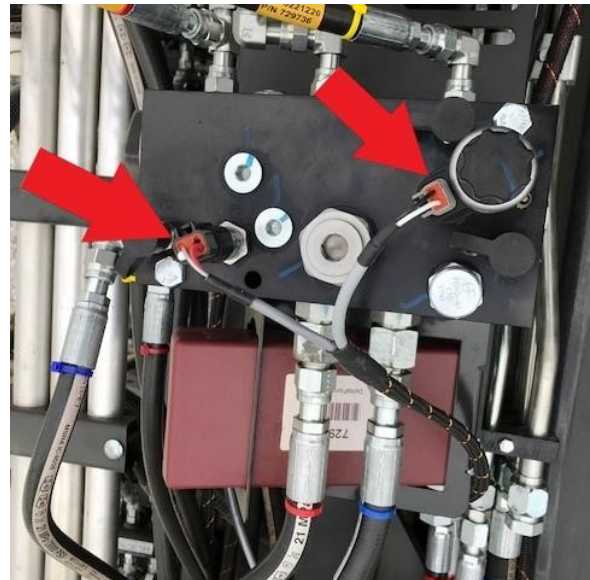
Step 3:

Connect the pressure and return ports from the tractor to the ports labeled 'P' and 'R'. Pressure and Return hoses coming from the tractor will need to be custom made. Leave the caps in the Lift Manifold until the hoses are installed. See section 6 for information on making custom hoses.

Note: Adapters may be necessary to connect to the hydraulic hose fittings into the Lift Manifold. Some common adapters are provided in the base kit.

**Step 4:**

Connect the PDM pressure sensor connection and the Lift PWM connection from the PDM harness into the respective connection on the Lift Manifold.

**Step 5:**

Connect the Alternator (if applicable) and DeltaForce section hoses to the remaining Pressure (P), Lift (L), and Return (R) ports. Each available side of the Lift manifold is labeled with a side number (P1, P2, etc). Refer to the Hydraulic System Overview and the Hydraulic Hose Layout and Routing (section 4) of this manual for further details.

Section 7 - Hydraulic Hose Layout and Routing

Now that the PDM has been mounted, try to plan out where hoses will be routed to the various sections of the planter. One side of the lift manifold will be fed with the pressure and return from the tractor. The other three sides are labeled with a P, R, and L which are to be used to supply hydraulics to the 3 sections of the planter.

Each cylinder will be connected by three inter-row hoses that Precision Planting offers. The custom section hoses that run from the Lift Manifold mentioned above will need to be “T”d in between one set of inter-row hoses and cylinder. Generally this is done into the center of each section.

Step 1:

Determine where the section hoses will “T” will into each section of the planter.

Note: Hoses that run from the Lift manifold to each section of the planter will need to be custom made. For more information about how Precision Planting requires hoses to be made please refer to the Hose cutting section in Section 8.

Step 2:

Determine how many sides of the lift manifold will be used. Generally, two sides are used for clean hose routing. The union adapters will need to be installed into the lift manifold block for the outputs that will be used.

Note: It is recommended that one side of the lift manifold feed the left side of the planter and one side feeds the center and right wing of the planter. To accomplish this it will be necessary to use two “T”s on the center section. The picture below shows the center section of a planter with two “T”s branching off of it.



Note: Make sure that all plumbing decisions are still within the specifications laid out in the Hydraulic Specifications section of this document (Section 2).

Step 3:

Once all the locations of the “T”s and how many sides of the Lift Manifold to use has been determined, it is time to proceed to Making the Section Hoses in Section 6. However, before doing so read through the following recommendations to make the installation process go smoothly:

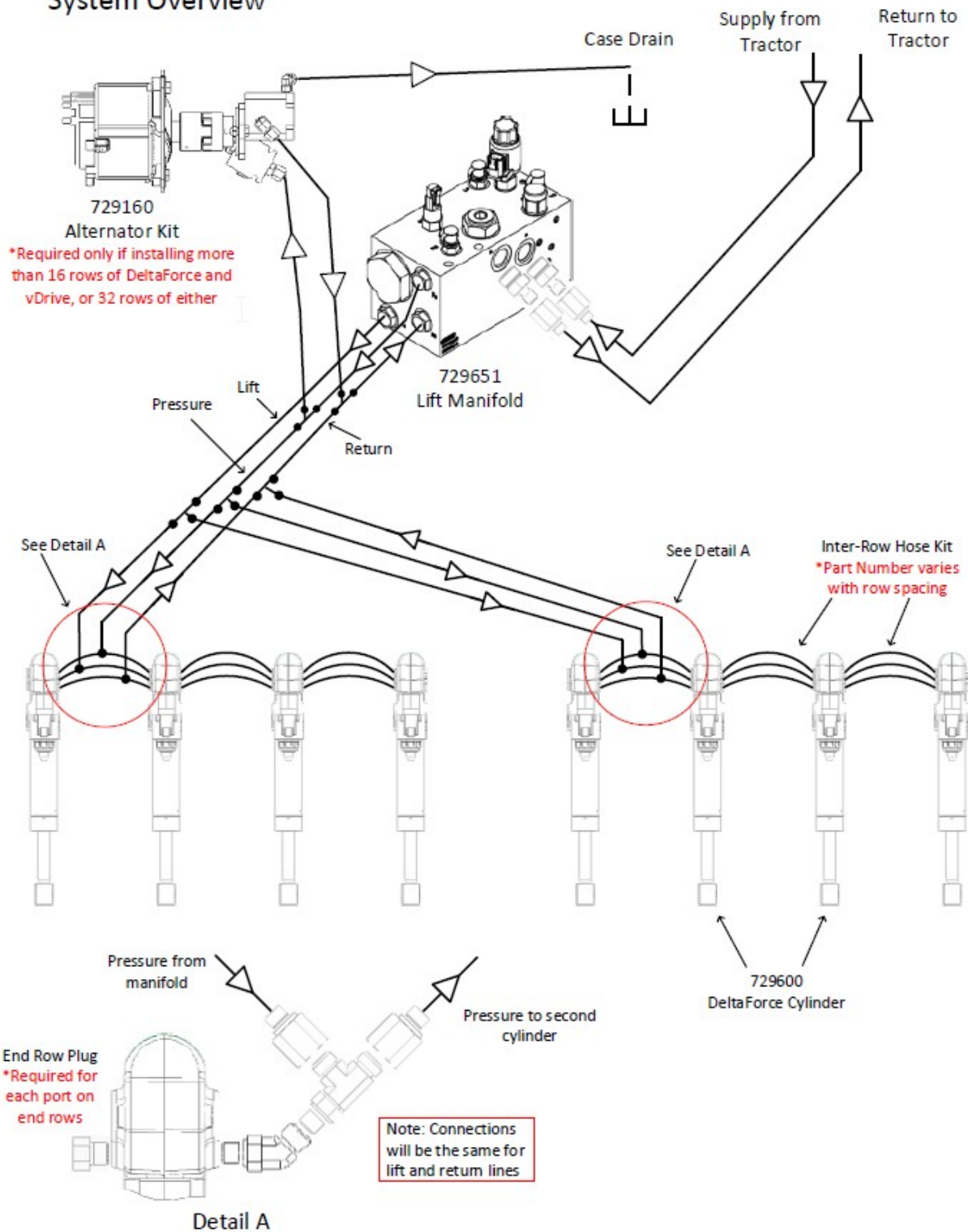
- Continue with Section 7 and install the Inter Row hoses and section “T”s before measuring for and cutting section hoses. Doing so will help get an exact measurement for the section hoses.
- When measuring for the length of the section hoses, be aware of flex and pinch points. Make sure to make hoses long enough so they are not stretched when the planter folds.
- Be careful not to cut section hoses too long so they do not get pinched at fold or flex points.

Note: It is important for the installer to consider these factors before installing inter-row hoses. However, Precision Planting would recommend installing the inter-row hoses (complete Section 7) before connecting and installing section hoses. When installing section hoses, utilize the colored zip ties that are included in the DeltaForce base kit. The red zip ties should be used on the pressure or “P” hose. The blue zip ties should be used on the return or “R” hose. The yellow zip ties should be used on the lift or “L” hose.

A system overview is provided below to help illustrate the hydraulic plumbing layout of the system and how it is recommended to plumb an alternator in if necessary.

Hydraulic System Overview

DeltaForce Hydraulic System Overview



Connecting Inter-row Hoses

Step 1:

Loosen all the caps on the DeltaForce cylinders. Then, one port at a time, replace the cap with the proper fitting (In most instances the 45 fitting works but 90 fittings are also provided if needed). Oil will leak when the caps are removed. End row caps (provided in the frame fitting kit) will be installed on the outer side of the furthest left hand and right hand rows of a section.



Note: The paint on the caps will crack and peel. Begin by loosening the caps and then use an air gun or a clean brush to remove the loose paint chips and avoid contaminating the cylinder.

Note: It is important to install inter-row hosing and fittings one row at a time to avoid any contamination. Due to the close proximity of the fittings it may be difficult to tighten all of the fittings in exact order. Leave the dust caps on the fittings and hoses until you are ready to connect them.

Note: The cylinder may rotate when tightening fittings. It may be necessary to zip tie the cylinder in place through the hole in the bottom of the cylinder and pinning hole on the DeltaForce bracket.

Step 2:

Install the inter-row hoses between each row. Ensure that the line from "P" on the first cylinder goes to "P" on the second cylinder. Ensure that the line from "R" on the first cylinder goes to "R" on the second cylinder. Ensure that the line from "L" on the first cylinder goes to "L" on the second cylinder. Continue this practice down the planter. Where necessary, install "T"s where section hoses will connect in.

Section 8 - Hose Making Requirements

Hydraulic Hose Sizing Chart:

DeltaForce: 1/4 GPM Per Row

Alternator (See order guide to know when necessary): 6 GPM

Gallon Per Minute	Hose Size	ORB/ORFS Fitting Size
2–6	3/8"	-6
6–12	1/2"	-8
12–20	5/8"	-10
20–30	3/4"	-12

Note: *See Hydraulic Hose Sizing Guide in Tech Docs for further hose sizing recommendations

Proper Hose Making Practices

It will be necessary to make custom hoses to go from the lift manifold to each section of the planter. Depending on the mounting location of the Lift Manifold, one section of the planter can likely be plumbed using an inter-row hose kit. Supply hoses from tractor to lift manifold will also be custom made.

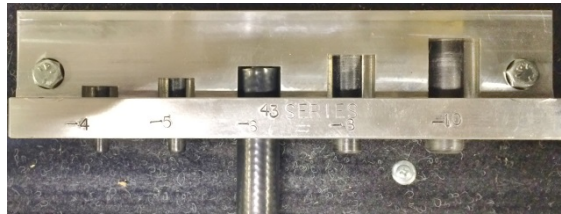
The greatest risk to hydraulic systems is during the hose making process and installation. Contamination risk can be greatly reduced by proper hose making techniques and cleaning hydraulic hose with Projectiles.

Tools Needed	
Hydraulic Hose Cutting Saw: Below are two examples. Any saw designed to cut hydraulic hose will work.	
	
Hydraulic Hose Cutting Blade (Knife): Two examples are listed below. There are more styles of blades designed to cut hydraulic hose that are acceptable.	
Smooth or Scalloped	Abrasive cut off wheels are NOT to be used
	
Projectile Kit: Launcher and Projectiles	



Insertion Depth Block:

#1 field failure of hoses is fitting not being fully seated



Proper practice for making hydraulic hose

Step 1:

Use a saw and blade designed to cut hydraulic hose and cut to length. It is important that the hose is pulled apart by the bracket that is holding the hose to reduce heat.

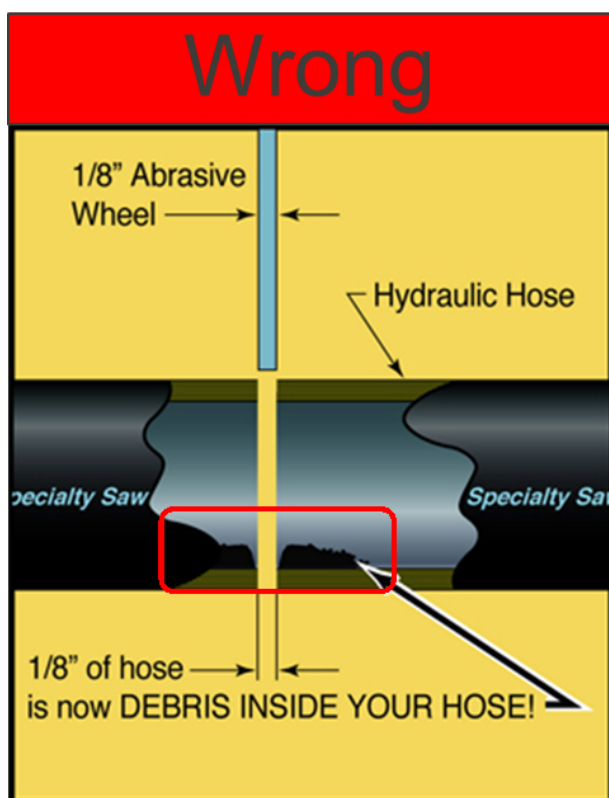


Figure 3.

Chop saw abrasive cut off wheel

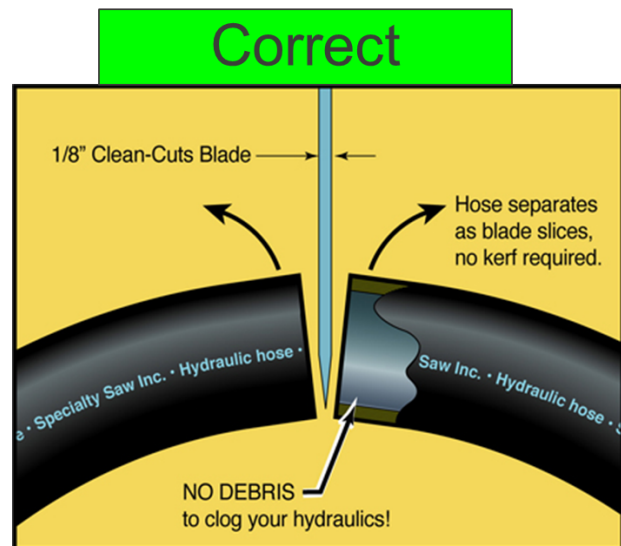


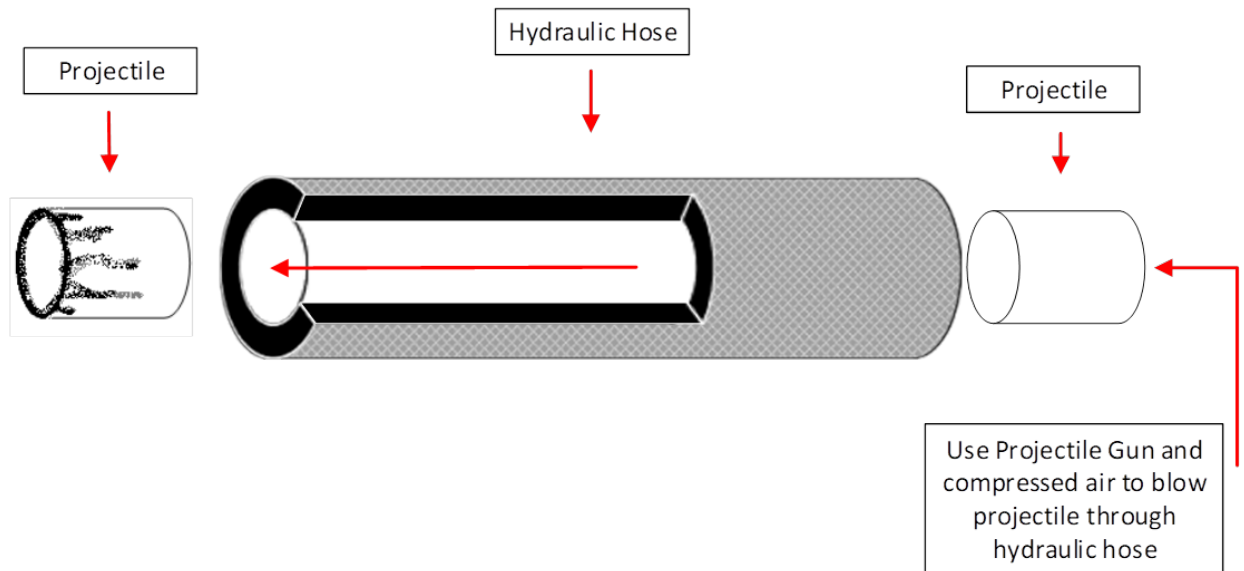
Figure 4.

Saw designed to cut hydraulic hose with proper blade

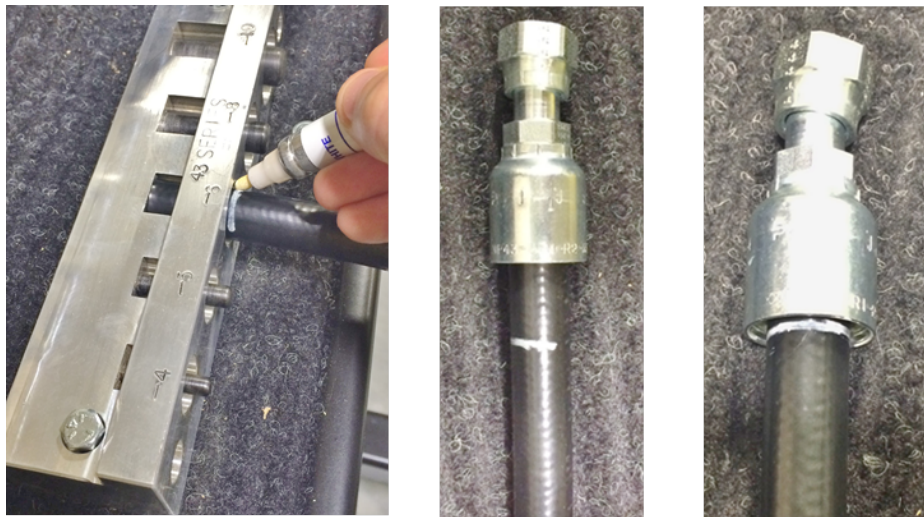
Note: *Using a saw/blade not designed to cut hydraulic hose creates contaminants that greatly increase the risk of valve failure in a DeltaForce System.*

Step 2:

After the hose has been cut, use compressed air and the projectile launcher to run a projectile (sized accordingly to hydraulic hose) through the hose. Repeat this process on both ends of the hydraulic hose.

**Step 3:**

Using insertion depth block, insert the hose to the proper depth stop and mark hose. This mark gives a visual of where the fitting needs to be to be completely seated on the hose.

**Step 4:**

Install fitting onto hose. Make sure the fitting is fully seated by using the mark made in step 3. (See Above)

Step 5:

Using corresponding dye, crimp fitting onto end of hydraulic hose.

Step 6:

Run projectile through fitting and hose from the un-crimped end to the crimped end completed on setup 5. This helps eliminate any burrs or debris that may have entered hose as a result of putting fitting on end of hose.

Step 7:

Mark other end of hose in insertion depth block.

Step 8:

Install fitting on end of hydraulic hose.

Step 9:

Crimp fitting on end of hose.

Step 10:

Run projectile through second fitting & hose from the previously installed fitting on step 5 through the new fitting.

Step 11:

CAP ENDS UNTIL INSTALLATION.

Section 9 - Air Purge Test and Pinning the Cylinder

Connecting Hydraulics to the Tractor

Before performing the air purge test, it is recommended to connect the hydraulics to the tractor and pressurize the system to check for leaks. Ensure all plastic caps have been removed from the lift manifold and cylinders and properly capped. As you pressurize the system take the following steps:

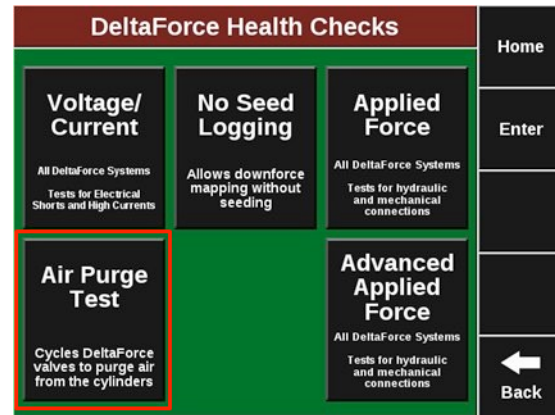
1. Ensure all fittings are tight.
2. Connect the supply hydraulics to a SCV. Turn the flow on the SCV to 10%.
3. Gently engage hydraulics. Check for leaks.
4. If leaks are found, tighten fittings. Repeat test.
5. If no leaks are found, turn the flow on the SCV to 100%. Check for leaks.
6. If leaks are found, tighten fittings. Repeat test.

Performing the Air Purge Test

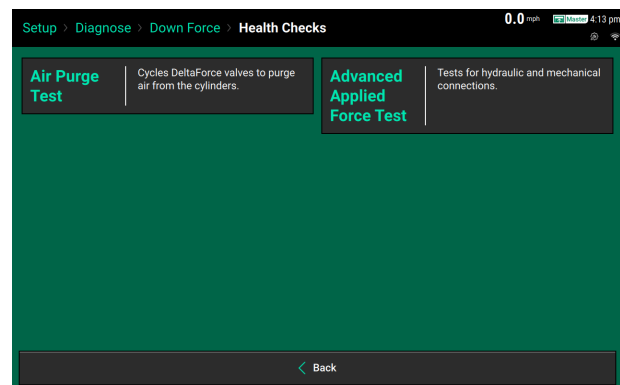
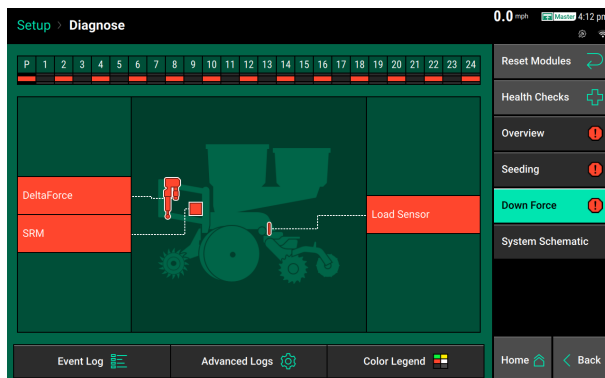
Note: Before proceeding, ensure that the system electronics are properly functioning. Refer to the “vDrive and DeltaForce Harness Installation Manual.”

Step 1:

Select “Setup,” “Diagnose,” “DeltaForce,” “Health Check,” “Air Purge Test” from the home screen on the 20/20 Display.



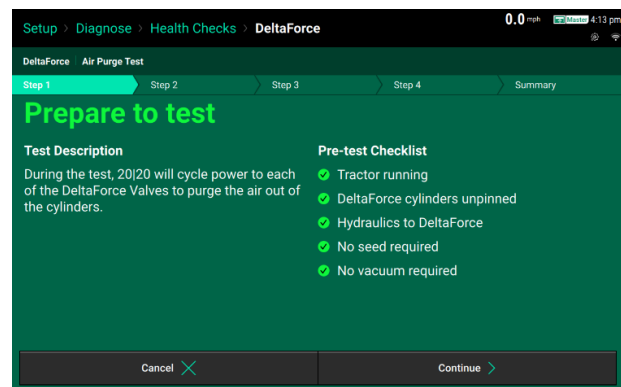
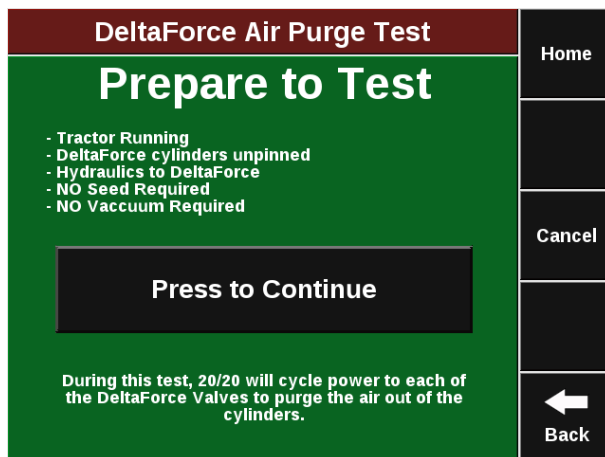
Note: On a Generation 3 monitor the button presses to get to the Air Purge Test are “Setup,” ”Diagnose,” “Health Checks,” and then scroll down to the DeltaForce Health Checks and select “Air Purge Test”. The rest of the test should run the same as a Gen 2.



Step 2:

Confirm the requirements are met. Press the “Press to Continue” button. For the Air Purge Test to work the following requirements must be met:

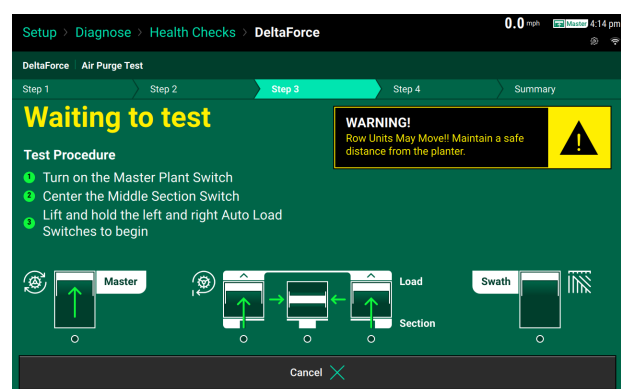
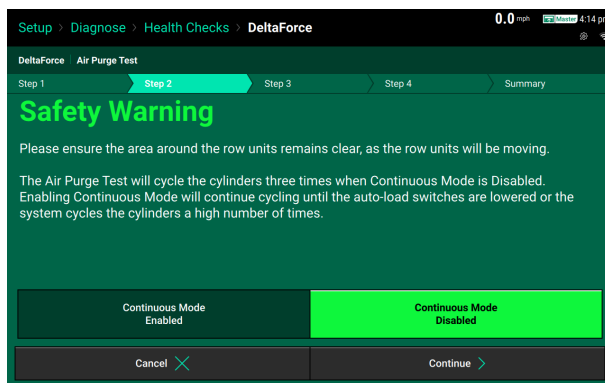
1. The Master Plant switch On or up.
2. Tractor Running
3. DeltaForce cylinders unpinned.
4. Hydraulics to Deltaforce engaged.



Step 3:

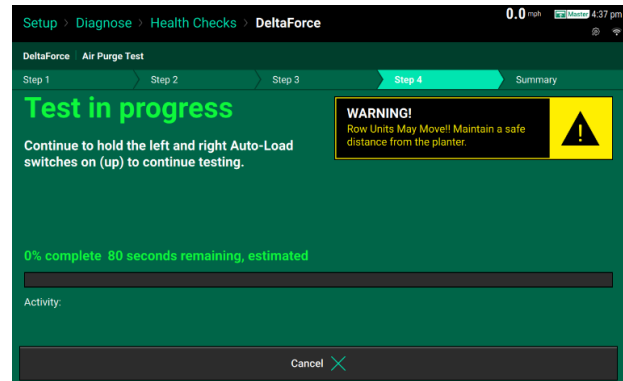
Turn the “Master Plant” switch on the Cab Control Module. Lift and hold the left and right auto— load switches to begin the test.

Note: On a Generation 3 monitor you can choose between continuous mode or a regular three cycle test



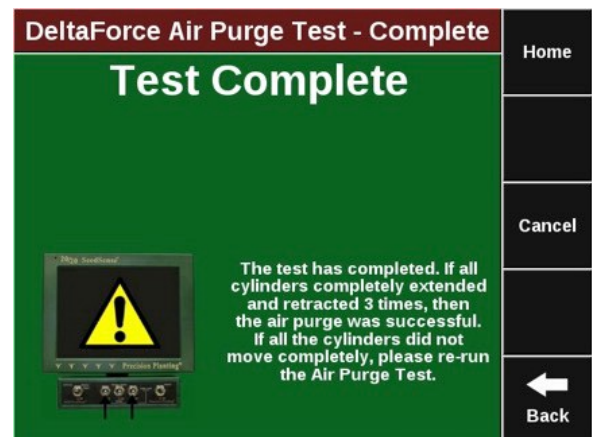
Step 4:

The percent complete will be displayed on the top of the screen. If there are any hydraulic leaks, stop the test by letting go of the toggle switches and tighten the fittings.



Step 5:

The operator will be informed when the test is complete. The cylinders should have extended and retracted 3 times. If the cylinders do not finish in a completely extended position, confirm hose routing is correct. Re-run the Air Purge Test.



Step 6:

Change the supply hydraulics from the SCV to the connection that will be used when planting.

Pin the Cylinder

Step 1:

Engage the SCV into the “Float” position. Power Beyond is also acceptable.

Step 2:

Tap on the cylinder to align the cylinder with the tabs on the lower parallel arm bracket.

Step 3:

Pin the bottom cylinder with the remaining cylinder and cotter pin.



Step 4:

Completely bend both sides of the cotter pin on the top and bottom cotter pin as shown.

