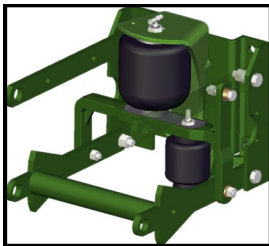




Down & Lift Control

JD Series: 7200, 7300, 1700, & DB

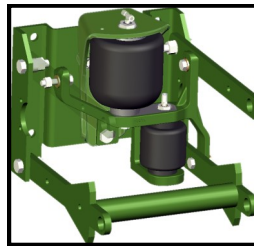


726005

Chain Driven

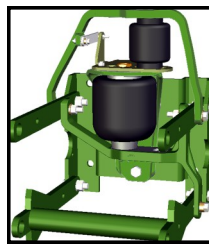


726315

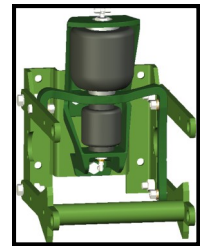


726190

Pro Shaft Driven



726320



Universal

726520

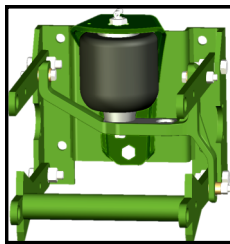
726075

726015

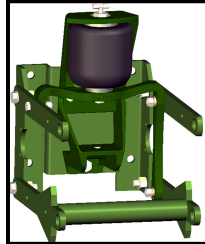
726195

726020

Down Only

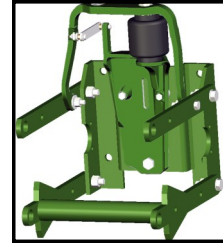


726200



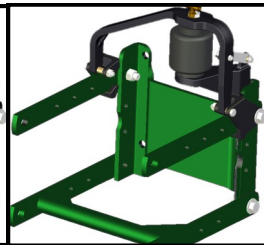
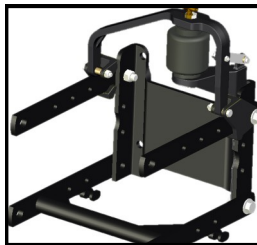
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Lift Only

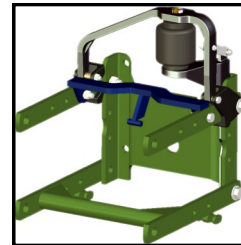


726040

Lift Only - Spring Compatible

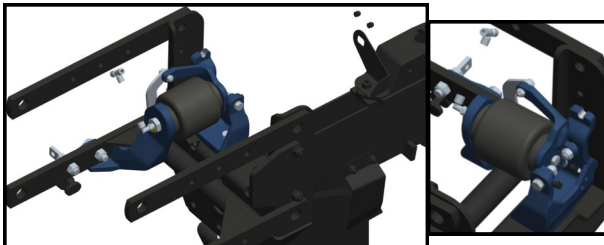


726025

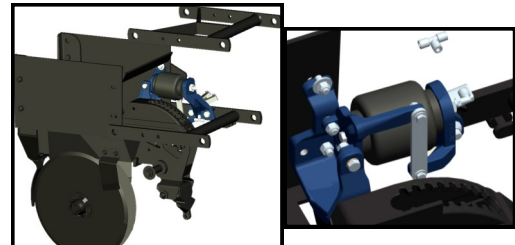


726210

Lift Only - Pneumatic & Spring Compatible

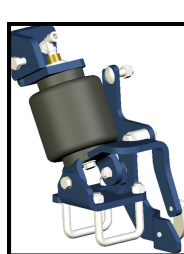
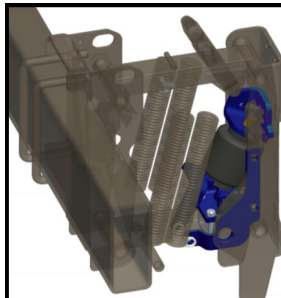


726540



726550

Lift Only



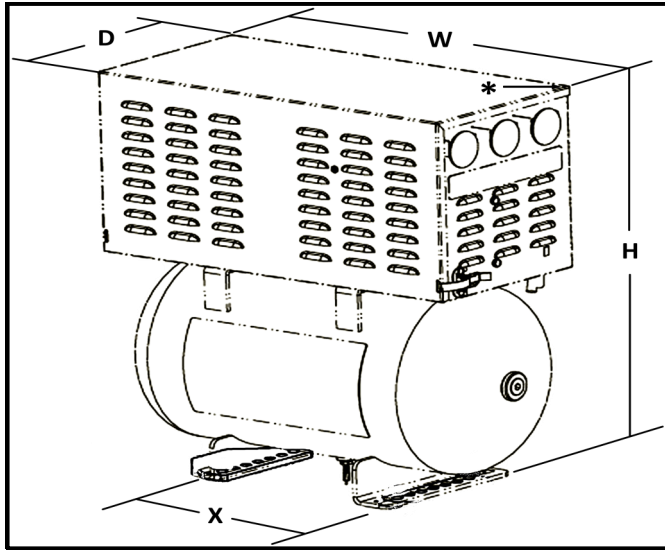
726575

Kinze Push-Rows Only

Kinze 2000 & 3000

Great Plains





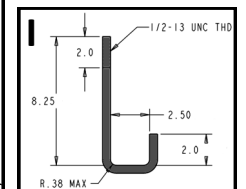
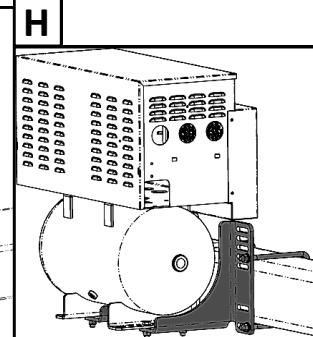
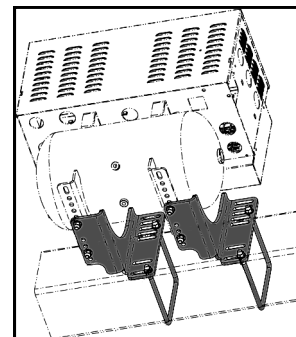
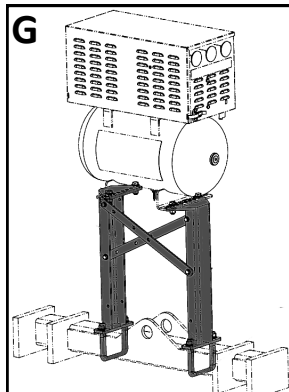
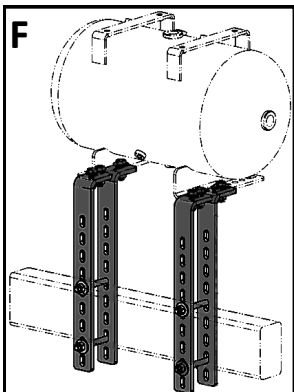
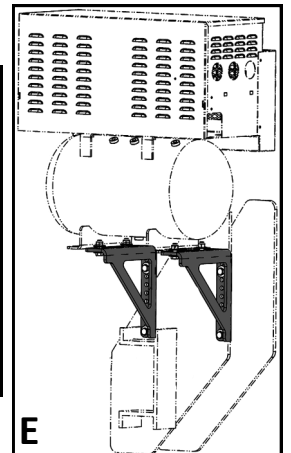
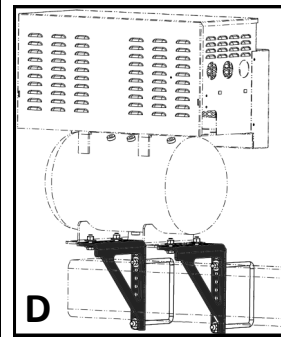
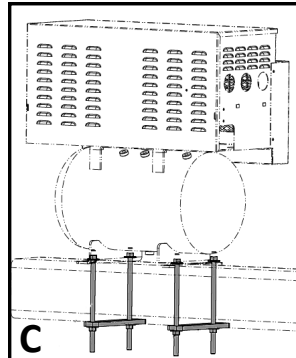
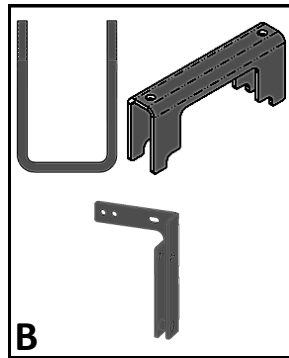
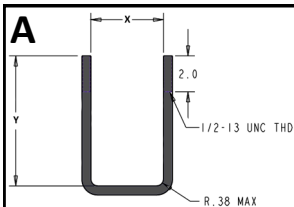
Use the diagram to identify possible mounting locations on your specific planter.

Remember to allow room for the lid to open properly.

The 'X' dimension is the spacing between the tank rail bolt holes, on center.

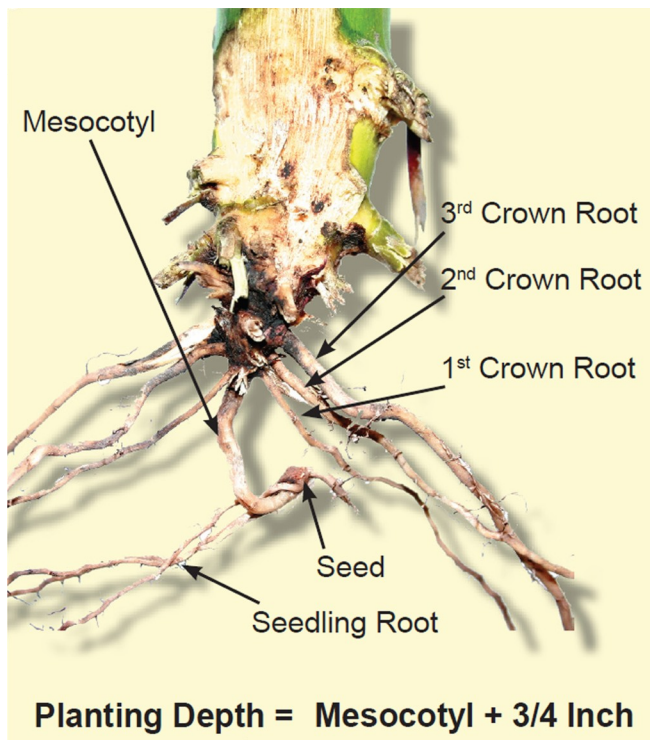
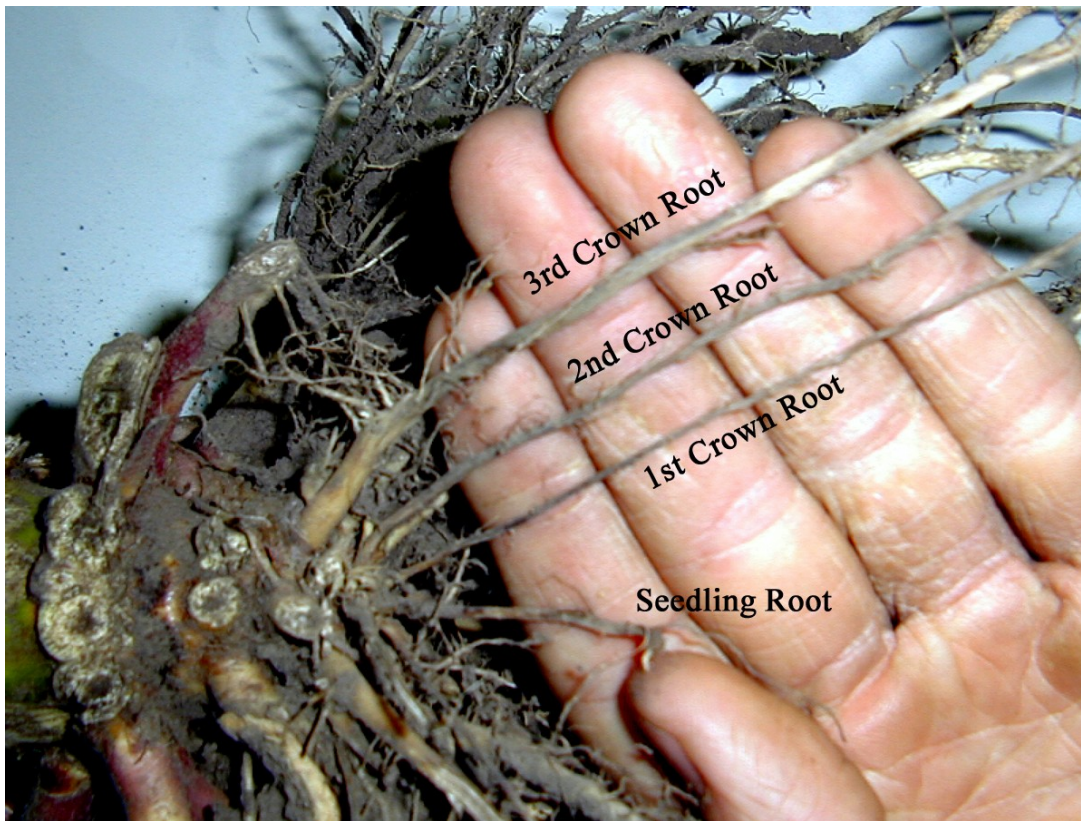
Dimensions (inches)				
	H	W	D	X
Hydraulic	28.5	28.0	15.5	12.0
12V Electric	26.0	24.0	12.0	12.0

Part Number	Image	Description	Dimensions (inches)	
			Width (X)	(Y)
726050	A	U-Bolt	3	5
726051			3	6
726052			3	8
726053			4	6
726054			4	7
726055			5	7
726057			8	10
726397			4	4
726490			8	12
726059	N/A	Bolts Only	3/8 X 1-1/8	
726450	B	Universal (up to 9X10 Bars): Threaded Stud with Brackets		
726056	C	U-Bolt w/ Spacer Bracket	7	7
726058			8	8
726455			10	10
726500			7	4
726060	D	Angle Bracket	Kinze 3800	
726435	E		Kinze 3700	
726470	F	High Above Tube	N/A	
726515	G	Stand - Above Crossbar	N/A	
726612	H	Low, Side Mount	7	7
726613			8	8
726614			10	10
726398	I	J - Bolt	See Image	



Importance of Early Growth Stages

Growth Stage



Yield Estimate Calculation Formula

Ears per 1/1000th acre

X Average Kernels around

X Average Kernels Long

Row Length of 1/1,000th
acre for Row Widths:

Row width	Length
38	13'9"
36	14'6"
30	17'5"
22	23'9"
20	26'2"
19	27'6"
15	34'10"

Two ears per 1/1000th acre impacts yield by 14 bushels per acre.



2009-2010

20/20 AirForce Training Workbook

Day 3

Component Review, Advanced Use, & Troubleshooting

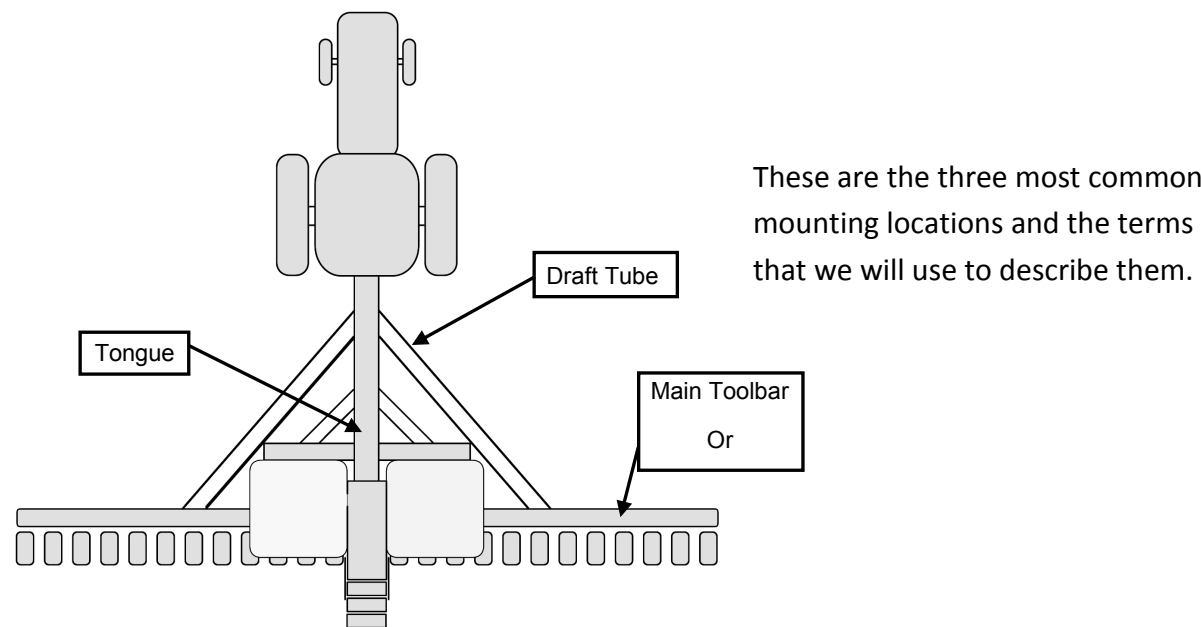
In this session, we will cover the basic functionality and installation of the 20/20 AirForce Sys-

Remember these 3 points when choosing a mounting location:

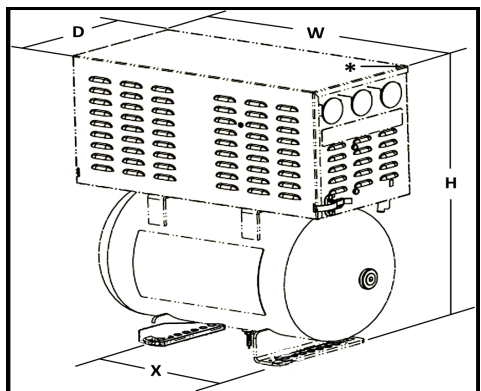
Safety — System is free of clearance issues and able to be securely fastened to the planter

Access to Power — 12V systems: located within 26 feet of the battery/starter.

Hyd systems: located with access to Closed Center circuit, with >200psi and 4gpm flow



Utilize the Compressor Mounting Bracket Guide to select the correct bracket. First familiarize yourself with the options as well as the size of location you will need.



Dimensions (inches)				
	H	W	D	X
Hydraulic	28.5	28.0	15.5	12.0
12V Electric	26.0	24.0	12.0	12.0

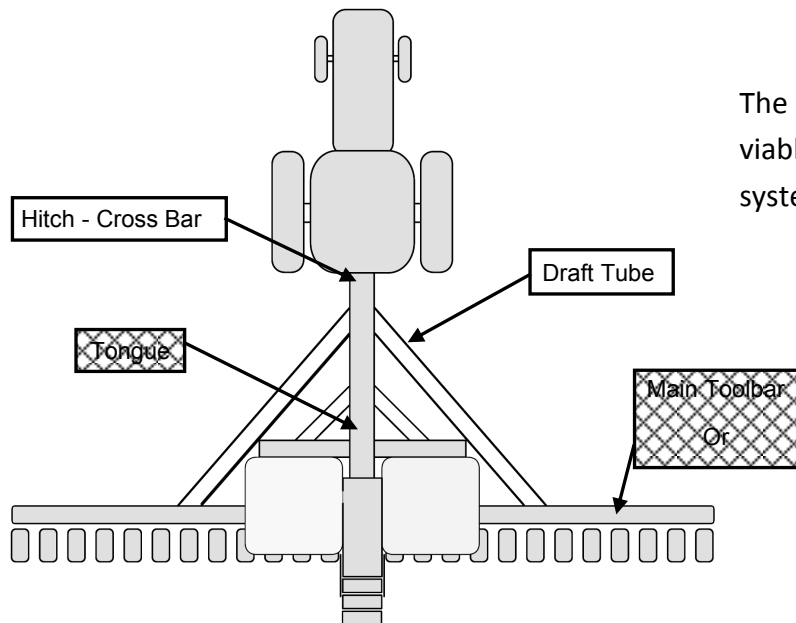
Part Number	Image	Description	Dimensions (inches)	
			Width (X)	(Y)
726050		U-Bolt	3	5
726051			3	6
726052			3	8
726053			4	6
726054			4	7
726055			5	7
726057			8	10
726397			4	4
726490			8	12

Example: 1

Find an appropriate mounting location and brackets for: JD 1770 16 row NT

Excerpt:

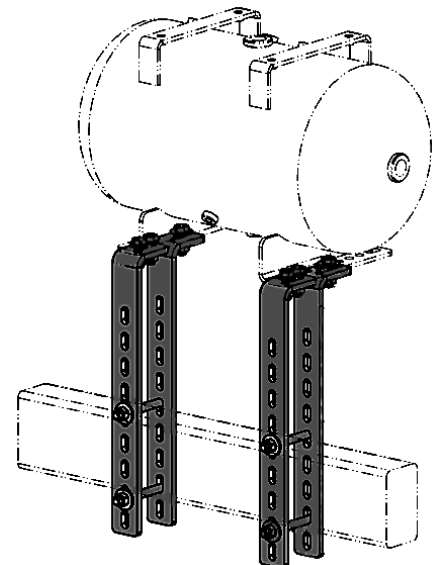
JD1770	30' front fold	Preference - 1 - Above Draft Tube	726052
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
	40 or 60' wide front fold	Preference - 1 - Above Draft Tube	726050
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470



The main toolbar and tongue are not viable mounting options with the 12V system (with standard cables) due to

When folded, the 16 row NT model leaves very little room on each side of the compressor module. For safety reasons, let's assume the 726050 option to be off the table. Of the remaining options, let's assume the grower is concerned with visibility around the module when mounting on the Hitch-Cross Bar.

This leaves the 726470 - High Mount preference. This mounting kit will utilize the same location as the 726050 above the Draft

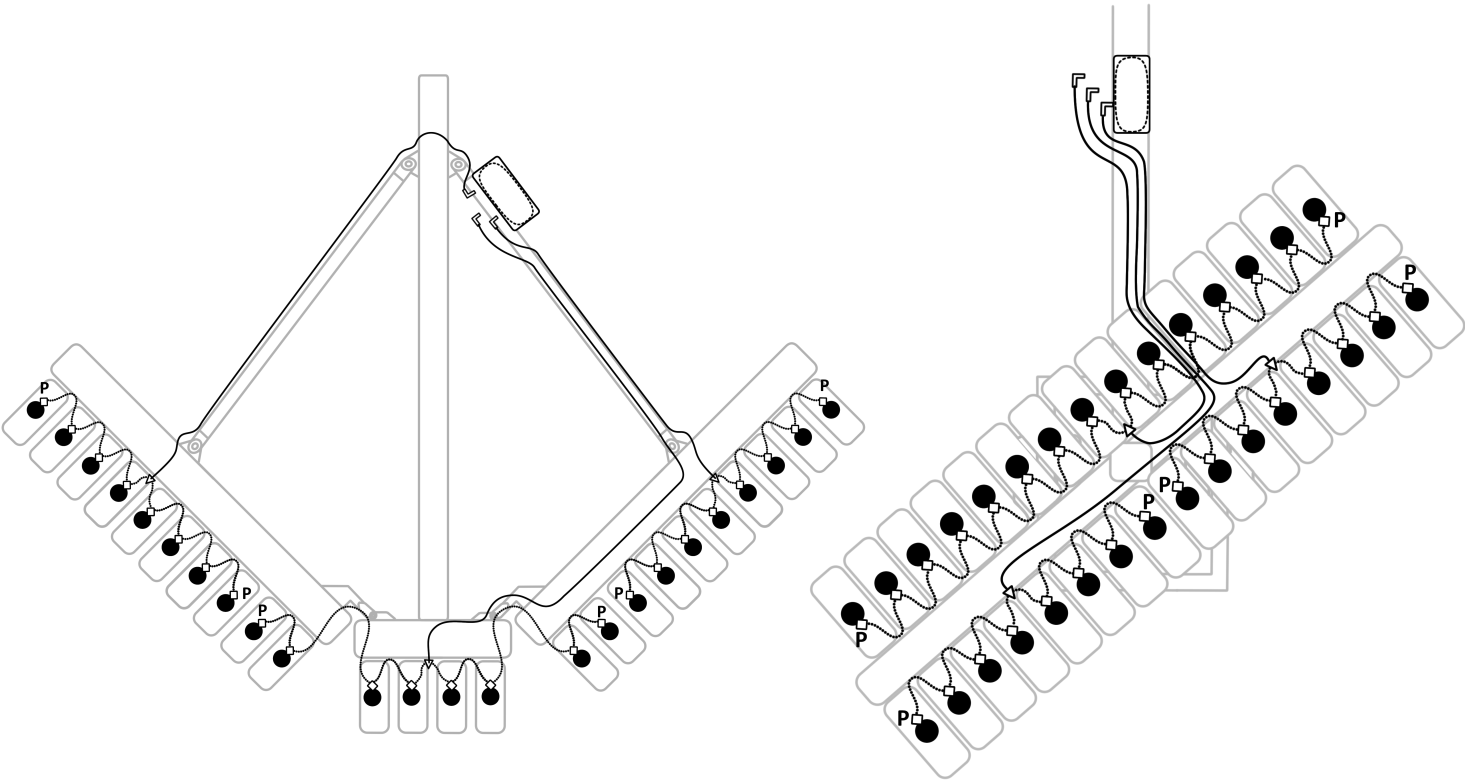


Down and Lift Circuit Review

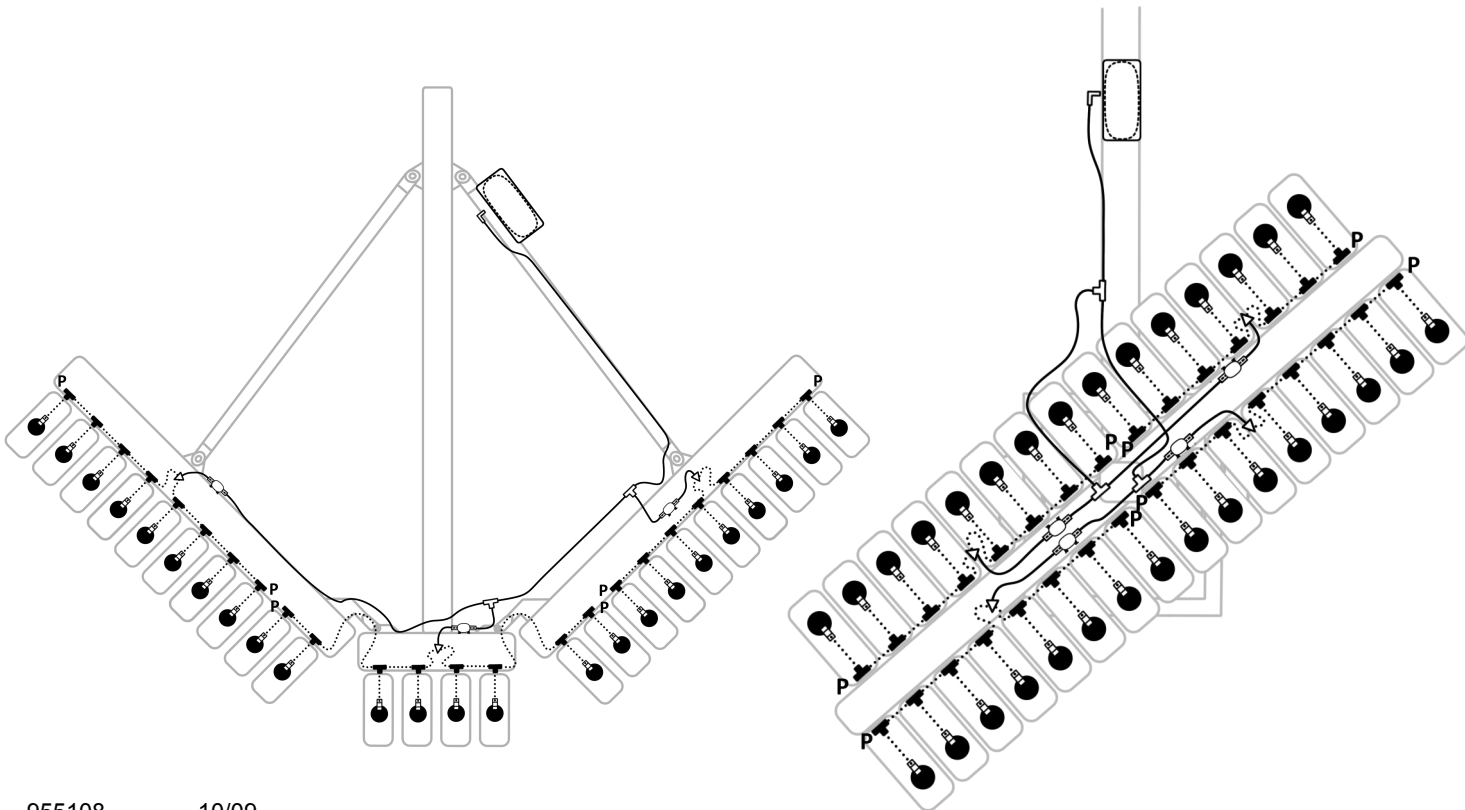
JD 24 row NT

Kinze 16/31 row
Lift & Twist

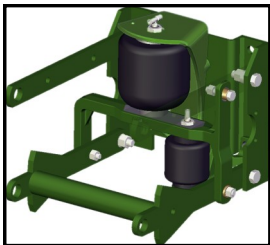
Down Circuits



Lift Circuits



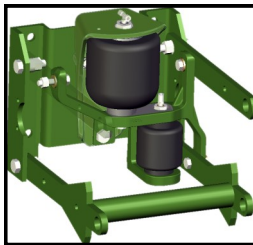
Down & Lift Control



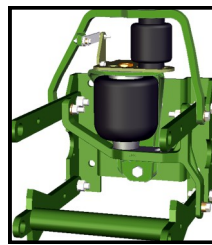
726005



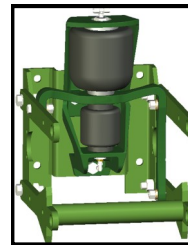
726315



726190



726320



Universal
726520

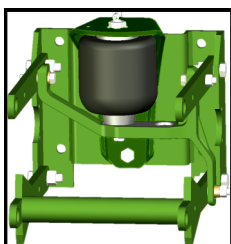
726075

726015

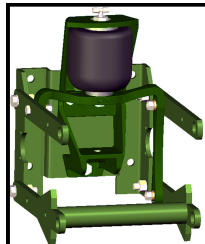
726195

726020

Down Only

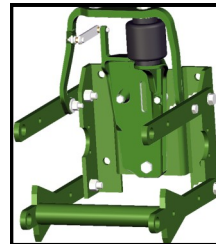


726200



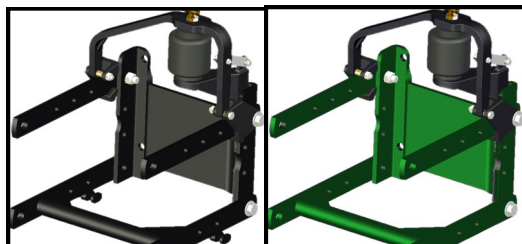
726585

Lift Only

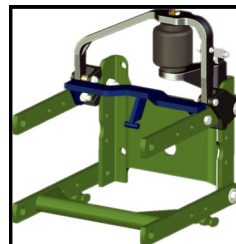


726040

Lift Only - Spring Compatible

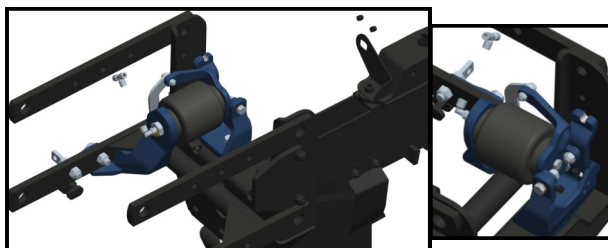


726025

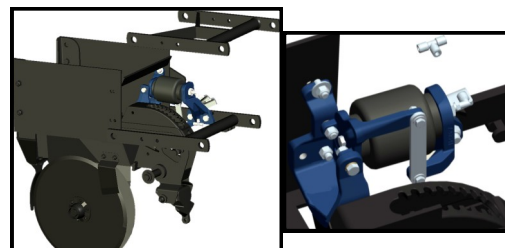


726210

Lift Only - Pneumatic & Spring Compatible



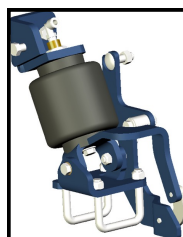
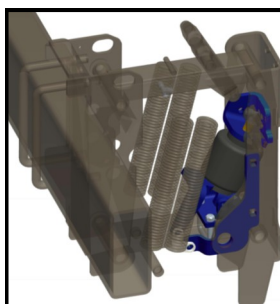
726540



726550

Kinze Push-Rows Only

Lift Only



726575

JD Series: 7200, 7300, 1700, & DB

Kinze 2000 & 3000

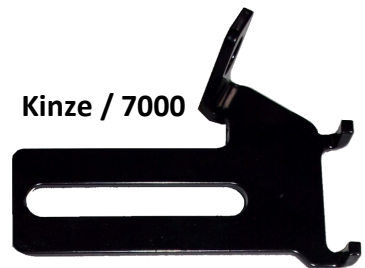
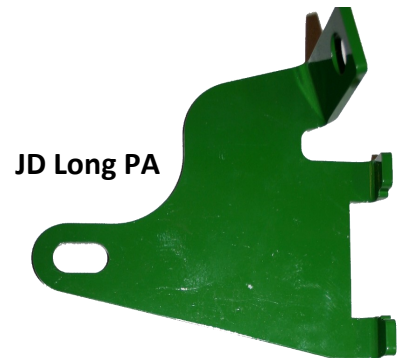
Great Plains

Lift Switch Review

Universal Components



Standard Brackets

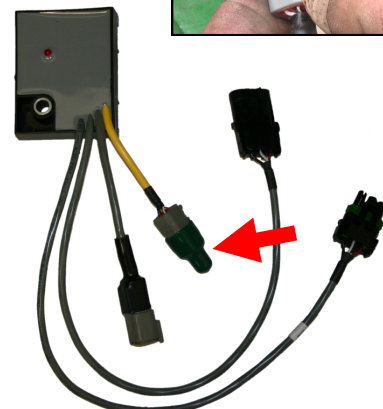
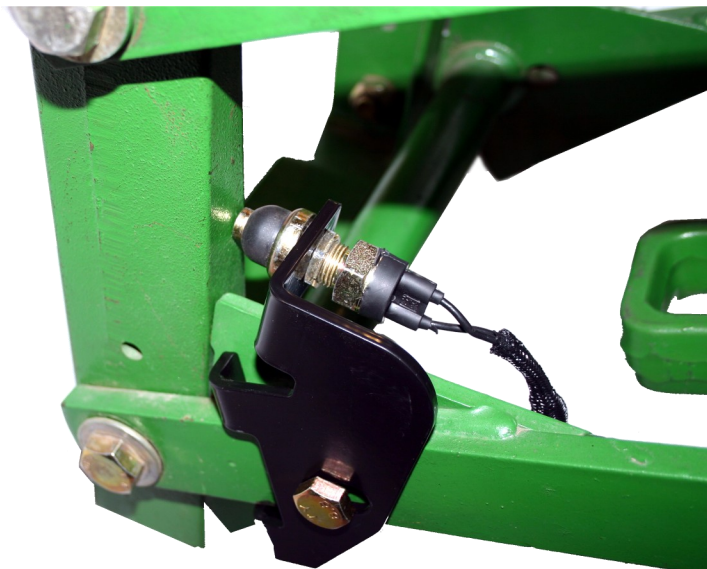


Must go on a row with a R.U.M. - without a vacuum sensor

Placement (when standing behind the planter):

JD 7200/1700 Brackets - Lower right hand parallel arm towards the row unit

Kinze / 7000 Brackets - Lower left hand parallel arm



Basic System Overview

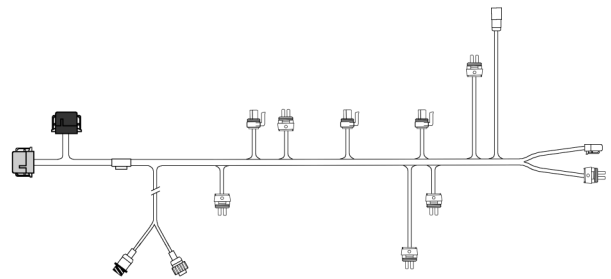
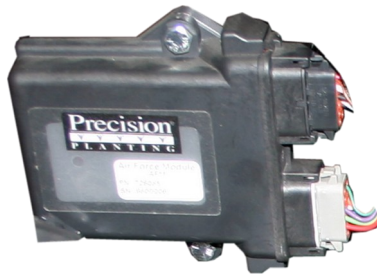
Tank



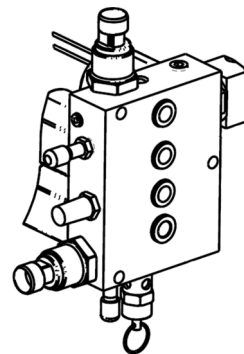
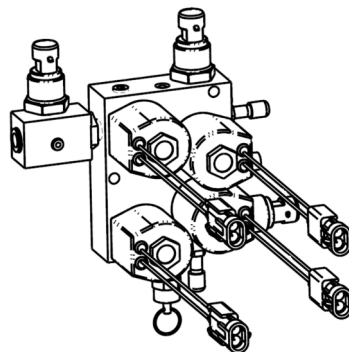
Compressor



AFM &

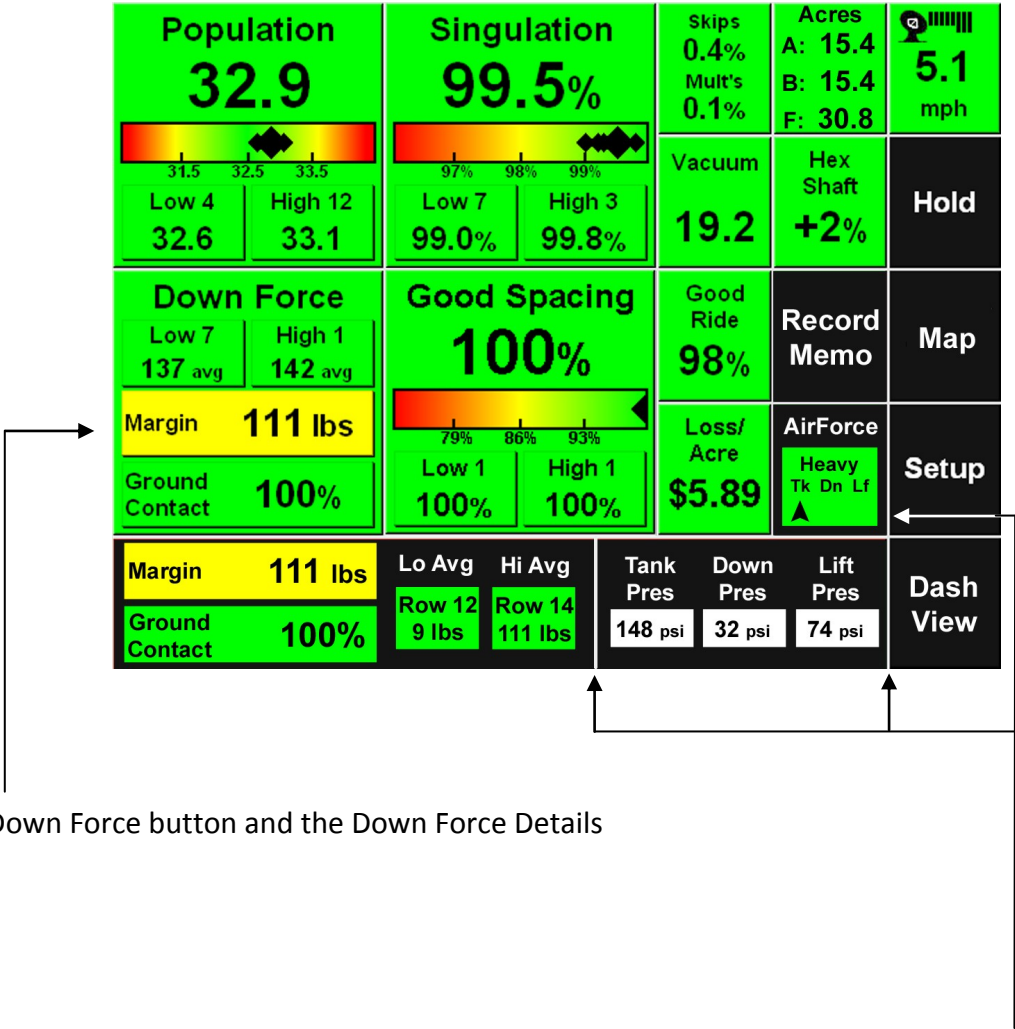


Manifold
& Circuits

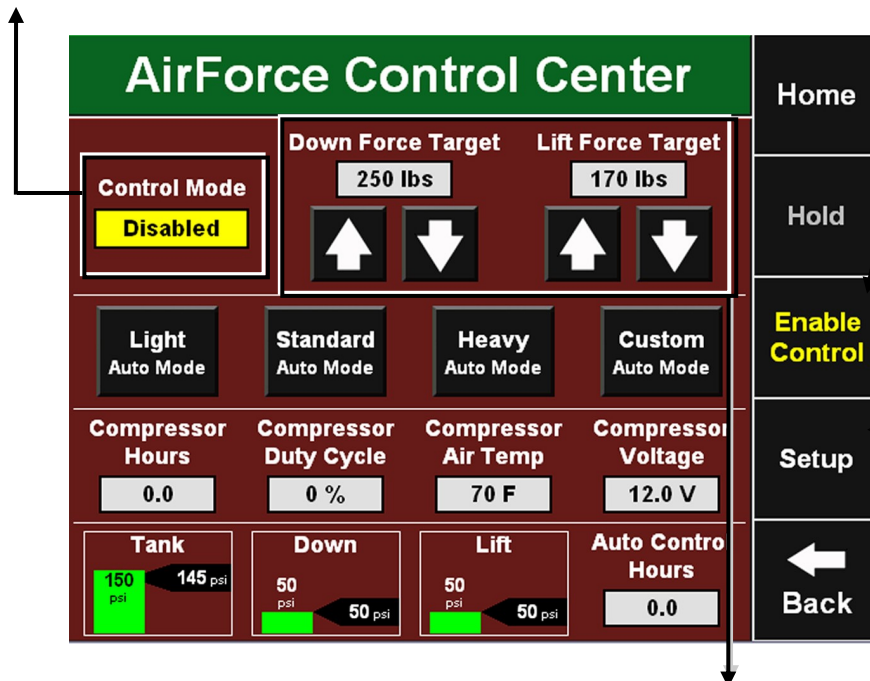


Managing AirForce

2010 Home Screen



The active Control Mode will be displayed in the upper left corner of the Display. The status of AirForce will be displayed in yellow when disabled. This view will switch to green highlighting when displaying the active control mode.



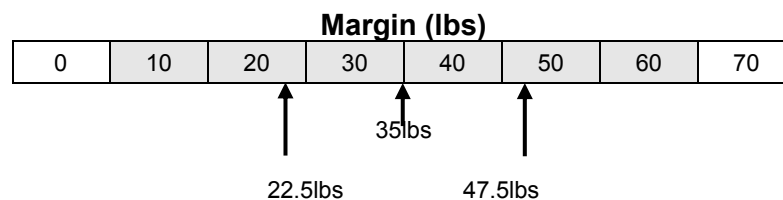
Control Mode
Standard

The *Enable Control* button toggles on and off AirForce Control. The default state for AirForce is disabled (as shown). This is for safety reasons; human release prior to automated control.

Additional system settings and configurations are available by pressing the *Setup* button.

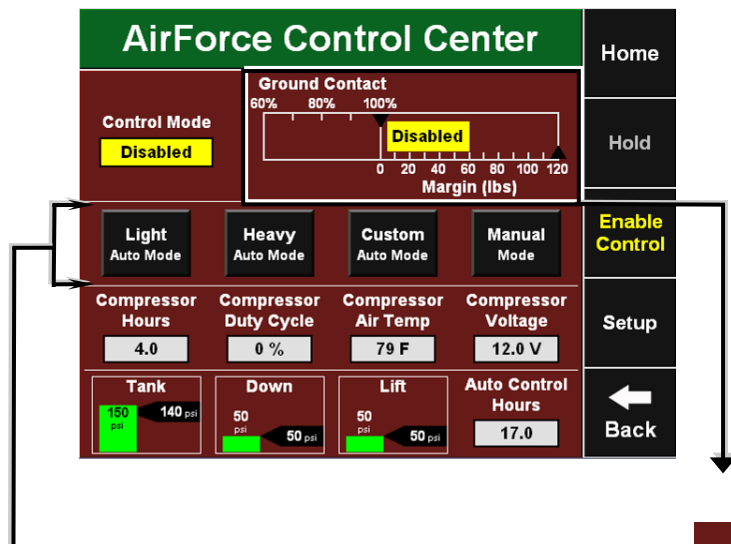
The target zone bar graph displays the percent of Ground Contact to the left of the median and the pounds of Margin to the right. The target zone is displayed by the green bar, the actual values are represented by the black triangles along the top and bottom.

All automatic modes will attempt to control to the median of the target zone. As the actual value moves away from the median of the target zone the system will take action once the value has passed half-way towards either extreme. Using the example below, the system is in Standard Automatic mode with a target zone between 10 & 60lbs of Margin. The arrow from 35lbs designates the median value. The arrows from 22.5 and 47.5lbs designate the point at which AirForce will take action to return the actual value to the median.

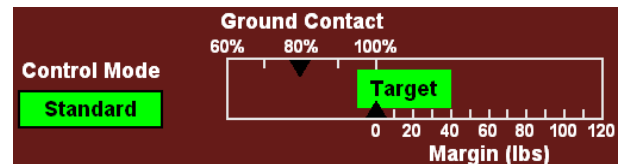


This becomes important as the control modes change, especially within the Custom Automatic mode. This allows the user an additional means of controlling the reactivity of the system. A wider target zone should have fewer reactions moving a larger force. A tighter target zone should have more reactions moving a smaller force.

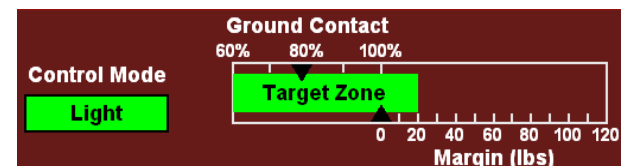
Notes



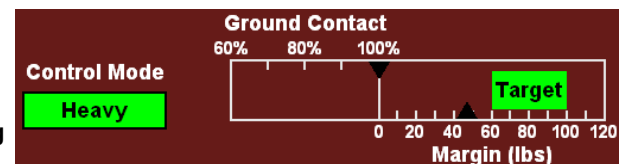
Standard Automatic: This is the most common setting for AirForce. The target range for this mode is set for 10-60 lbs of Margin with 100% Ground Contact.



Light Automatic: This control mode moves the target range from 20lbs of Margin to a low of 60% Ground Contact. **This control mode will sacrifice Ground Contact - potential seeding depth - to ensure a minimum Margin!** Use this mode when uniform seeding depth and/or moisture are not as yield limiting as potential row compaction. Rarely used over an entire field, most commonly used for spot controlling small wet areas



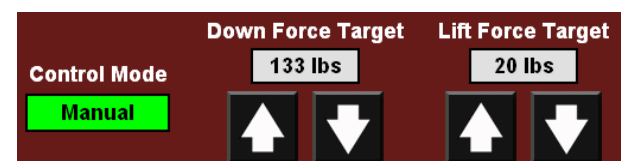
Heavy Automatic: This control mode moves the target range to 60-100lbs of Margin with 100% Ground Contact. Use this control mode when extra Down Force is required; dry conditions or cloddy seed-bed. **Note: crushing clods and minimizing Margin are opposing ideas!!** Ensuring good seed to soil contact in dry or cloddy field conditions will outweigh any additional Margin concerns.



Custom Automatic: This control mode allows the user to create their own target zone within an automatic control. Once this mode is selected you will notice the addition of four buttons surrounding the target zone graph. To the upper right hand side are Right/Left buttons, used to move the zone back and forth across the graph. To the lower left hand side are Stretch/Squeeze buttons; used to control the size of the target zone.



Manual Mode: This control mode allows the user to designate a pressure or desired force for the system to maintain. This is a static setting that will not fluctuate throughout the field in response to soil-type or tillage changes. The units are selectable under the *Setup* button to view Pounds or Psi.



The AirForce Control Center is where you will choose the active control mode. The four available (not selected) control modes will be shown in the black boxes across the center of the page. Selecting any one of these will alter the display at the top right to reflect the target parameters of the new control mode.

Load Sensor details

Down Force Calibration					Home
Row 1	Pin Reading	Cal Factor	Reference Value	Load Sensor	Zero All
	-42	85.0	32.69	Active	↑
Row 7	Pin Reading	Cal Factor	Reference Value	Load Sensor	↓
	-38	85.0	32.53	Active	← Back
Row 15	Pin Reading	Cal Factor	Reference Value	Load Sensor	
	-25	85.0	32.73	Active	

Pin Reading: this column is simply a display of the current Down Force value - weight being carried by the gauge wheels - for the given sensor. It is not modifiable or editable.

Cal Factor: this column displays the Calibration Factor for each sensor. These values are used to cali-



Kinze
2008 version
125



Kinze
2009 version
65



5/8" pin
85



1/2" pin
85



White Link
65



CNH Link

Notes

Load Sensor details cont'd

Reference Values: this column displays a reference value for the system's use of the Calibration Factor. Normal operating values should vary between 28 and 38. This column is modifiable, however should be done so under direction from Precision Planting during advanced technical service.

Load Sensor: this column displays the status of the load sensor for the given row. If an individual load sensor fails, or is producing readings that are statistically out of range, it is possible to 'Ignore' a row on -the-go. Simply press on the *Active* for the given row. A warning pop-up will appear asking the user to verify this choice. Pressing 'Yes' will highlight the entire row and change the wording to 'Ignored'. While a load sensor is ignored, data from this sensor will be recorded and mapped, however will not be included in dashboard averages or AirForce Control.

Zero All: This button is located on the right hand side of the page in the black column and is used to 'tare' the load sensors. This will return the load sensor values to zero. To properly zero the load sen-

Modifying the Cal Factor

If it becomes necessary to modify the Calibration Factor to a custom value follow this process:

Step 1: Raise the planter. Place blocks under the gauge wheels (and only the gauge wheels) of the rows to be calibrated.

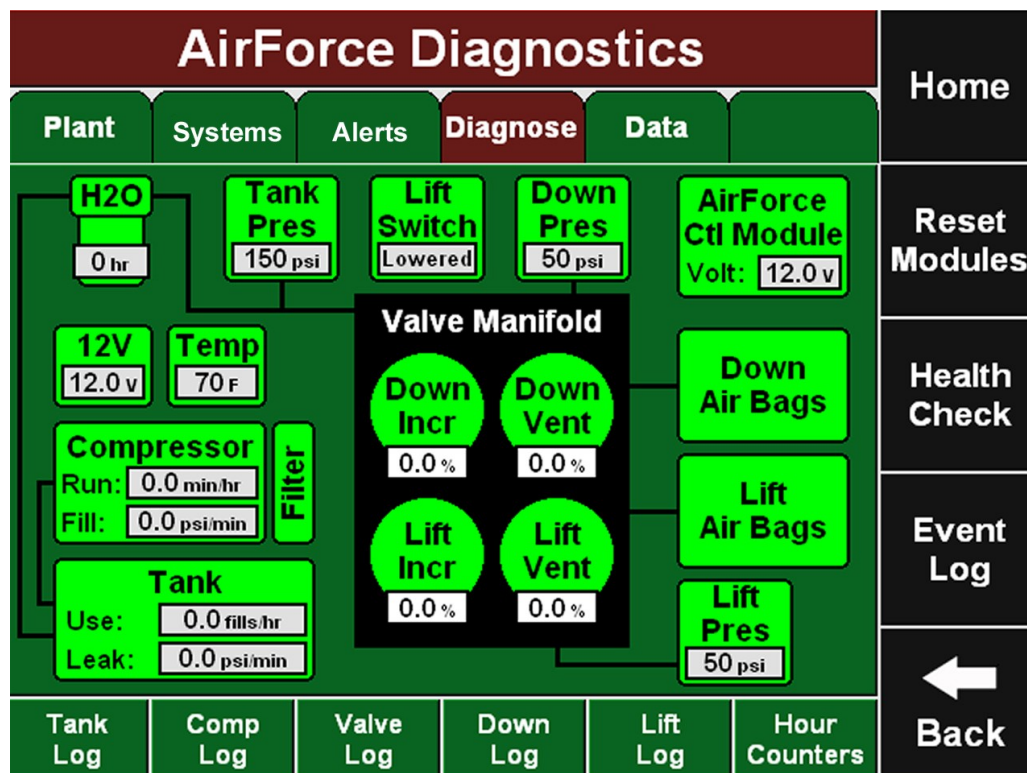
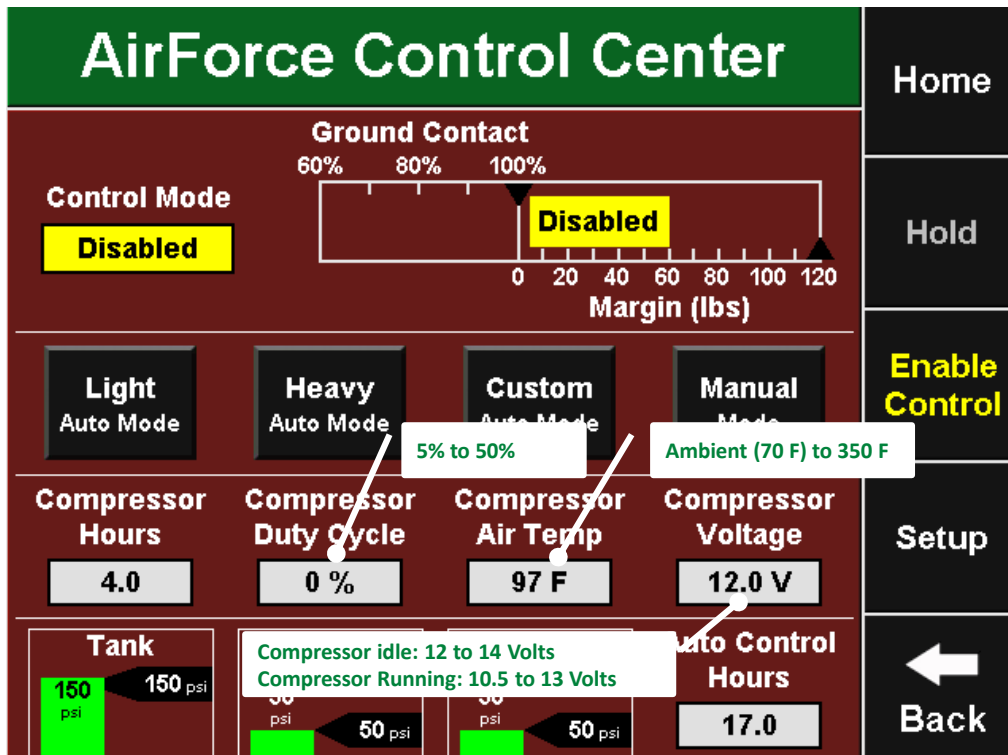
Step 2: Lower the planter until the parallel arms are level. Settle the row unit(s) by shaking them. Press the *Zero All* button to 'tare' the values.

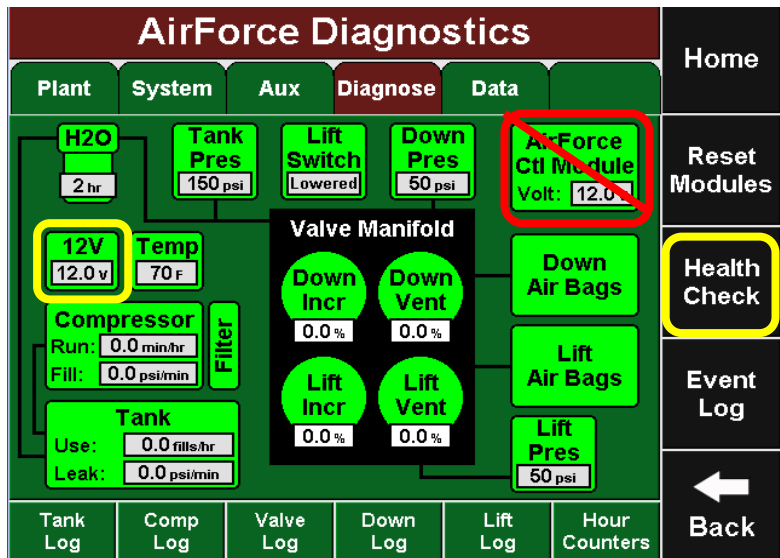
Step 3: Add a 'known' weight (any object - or human - that has a determined weight and is greater than 75lbs) then 'settle' the row unit by shaking or wiggling the row unit.

Step 4: Compare the Pin Reading to the known weight (within 20% tolerance). To calculate the corrected Cal. Factor: Multiply the original Cal. Factor by the known weight added, then divide by the value of change reflected on the monitor. Adjust the Cal Factor accordingly.

Notes

AirForce Typical Values





Compressor voltage drop:

IS: the difference between the compressor voltage when the compressor is idle and the voltage when it is running

IS NOT: the difference between the **AirForce Ctrl Module Voltage** and the Compressor Voltage in the **12V** box.

Run the Compressor Health Check for voltage drop and build rate measurement

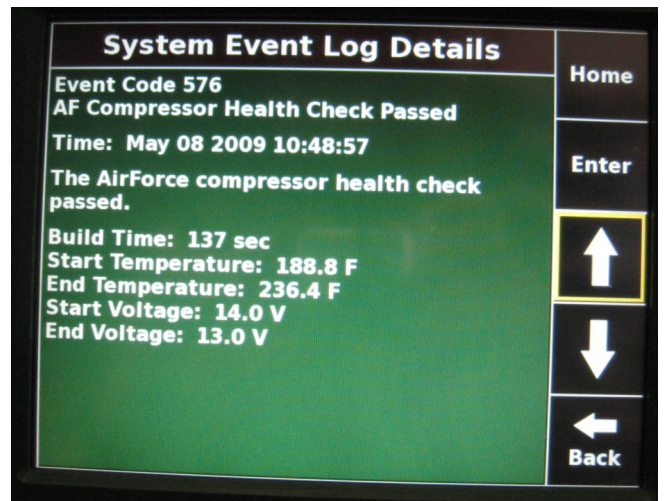
> Voltage drop is the difference between the Start Voltage and the End Voltage

> Start Voltage is the compressor voltage when the compressor is idle

> End Voltage is the compressor voltage when the compressor is running

> Build time is the time required to build pressure from 100 psi to 130 psi. Typical

build time is between 80 to 140 seconds.



Health Check

Step 1	Compressor Check	Setting up Compressor Check	Tank Pressure will drop to or below 100psi
Step 2		Building Tank Pressure to 130psi	System will verify build rate to 130psi
Step 3	Wiring and Plumbing Check - Down	Checking Down Circuit	System will build and release pressure between 20 & 100psi
Step 4	Wiring and Plumbing Check - Lift	Checking Lift Circuit	System will build and release pressure between 20 & 100psi
Step 5	Leak Check Tank	Checking Tank pressure	System will build pressure >120psi, measure decay
Step 6	Leak Check - Down	Checking Down Circuit Pressure	System will build pressure >100psi, measure decay
Step 7	Leak Check - Lift	Checking Lift Circuit Pressure	System will build pressure >100psi, measure decay
Step 8		Verify Gauges	System will prompt user to verify that Display Unit and Analog Gauges are within 5psi of each other

In a healthy system, no individual step or check should take longer than 7 minutes.

AirForce Compressor Log						Home
Plant	System	Aux	Diagnose	Data		
Planting Hours	Voltage Drop (V)	Duty Cycle	Max Temp (F)	Min Temp (F)		Enter
9	1.1	15.8	293	65		
8	1.1	2.0	281	66		
Hydraulic Compressor: -- (not applicable) Electric Compressor: 1 – 2 volts	1.2	Hydraulic Comp: Up to 300 deg F Electric Comp: Up to 300 deg F Expect higher temps with higher duty cycles	277	Hydraulic Comp: Ambient to 250 Electric Comp: Ambient to 250		
5	1.2		283	72		
4	1.2	24.4	278	74		
3	1.2	22.5	282	71		
2	1.2	17.2	291	70		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Tank Log						Home
Plant	System	Aux	Diagnose	Data		
Planting Hours	Avg Press (psi)	Leak Rate (psi/min)	Fill Rate (psi/min)	Usage Rate (min/tank)		Enter
9	131	0.4	24.5	6.4		
8	131	0.3	21.6	6.1		
Hydraulic Compressor: Tank Target – 5 psi Electric Compressor: Tank target – 10 psi	131	Hydraulic Comp: 50 to 80 psi/min Electric Comp: 10 to 24 psi/min	20	Hydraulic Comp: 0.5 to 5 min/tank Electric Comp: 1 to 10 min/tank Larger planters will have lower values than small planters		
5	132	0.5	22			
4	132	0.5	20			
3	132	0.5	21.7	6.6		
2	131	0.4	24.1	6.5		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Valve Log						Home
Plant	System	Aux	Diagnose	Data		
Planting Hours	Down Inc Duty Cycle	Down Vent Duty Cycle	Lift Inc Duty Cycle	Lift Vent Duty Cycle		Enter
9	0.0	0.0	0.0	0.0		
8	0.0			0.0		↑
7	0.0			0.0		↓
6	0.0			0.0		←
5	0.0	0.0	0.0	0.0		
4	0.0	0.0	0.0	0.0		
3	0.0	0.0	0.0	0.0		
2	0.0	0.0	0.0	0.0		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

Down and Lift or lift only:

- Lift Vent and Inc: 0 to 10%
- Down Vent and Inc: 0 to 3 %

Down Only:

Down Vent and Increase 0 to 10%

AirForce Hour Counters						Home
Planting Hours	Tank Fills	Compressor On Time	Tank Limited Hours	Auto Control Hours		Enter
19.0	160	4.0	1.5	17.0		
Total Control Hours						↑
Standard	Light	Heavy	Custom	Manual		
10.0	2.0	4.0	1.0	2.0		↓
Stable Control Hours						
Standard	Light	Heavy	Custom			
9.0	1.5	3.5	1.0			←
Service Counters (Select to Reset)						Back
H2O Filter		Compressor				
1.5		4.0				
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	

AirForce Troubleshooting

This guide should be your first avenue for problem solving and troubleshooting your AirForce system. Before continuing through detailed diagnostics, please verify the following:

- ☐ 20/20 SeedSense Monitor is on
- ☐ AirForce is 'Enabled'
- ☐ 60A Fuse on Tractor Battery Cable is not blown (12V Compressors only)
- ☐ Tank Pressure is >20psi (12V) or >10psi (HYD) below Target Tank Pressure
- ☐ Compressor Air Temp. is below 400° F
- ☐ Hydraulic hoses are connected & engaged with sufficient flow (HYD. Compressors only)
- ☐ Drive belt is tensioned and in good condition (HYD. Compressors only)
- ☐ Lift Switch is green on AF Diagnostics page, and reacts correctly as the planter is raised & lowered
- ☐ Harnesses: **Check** and **recheck** all harnesses, connections, and wires for loose, corroded, or otherwise poor conductivity. In addition, thoroughly check for pinches, cuts, or any other form of physical damage to the wiring.

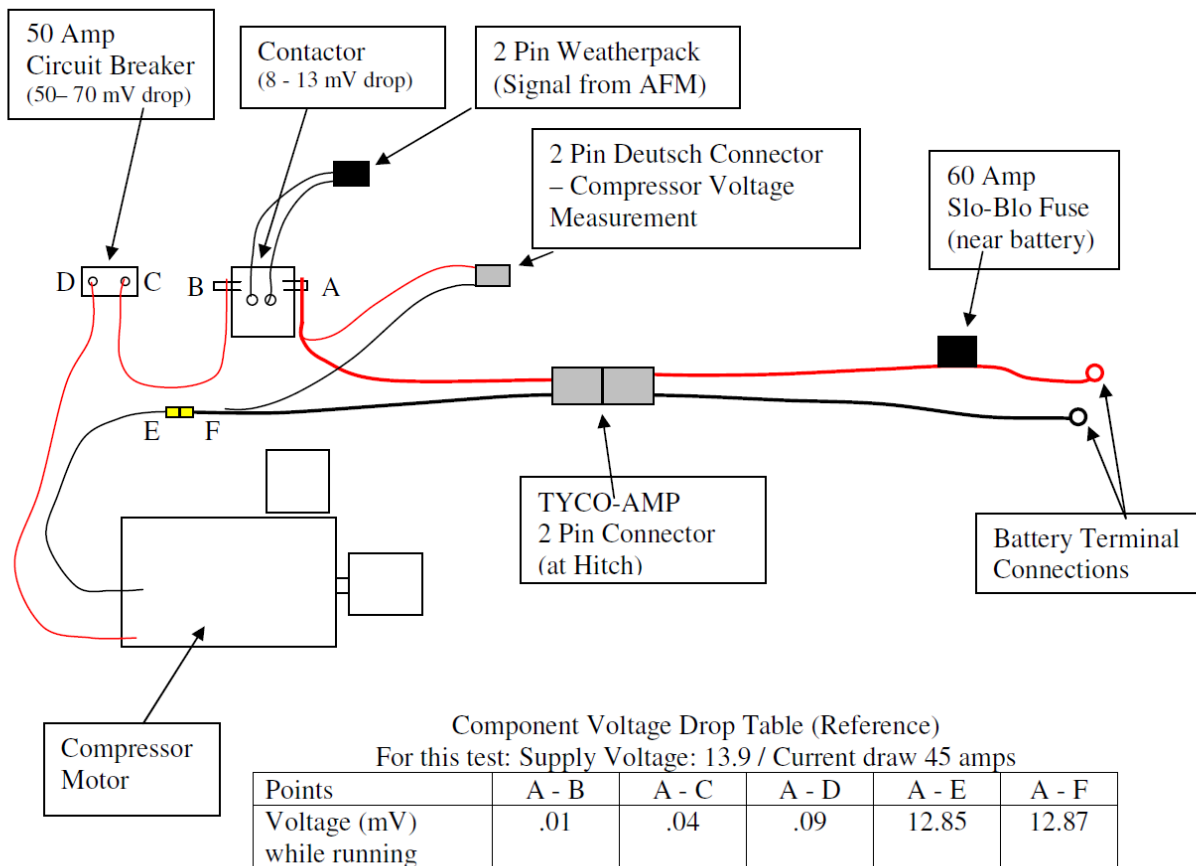
****This is especially important for 12V compressors and will account for the majority of compressor issues****

- ☐ Mode Compatibility:

Manual Mode:

Compressor: 12V - will run Raised or Lowered
HYD - will run only with the planter Lowered

AirForce Electric Compressor System Operation / Troubleshooting



The vast majority of problems will be traced to poor connections or excess resistance in the power/tractor cable and connections.

The compressor can be run manually using the “Diagnostic Connector” which is a 2 pin Weatherpack connector that is provided in the center of the enclosure. Unplug the 2 pin connector at the contactor and plug in the diagnostic connector in order to manually run the compressor. Do not leave it plugged in for long periods or leave it unattended. If the compressor runs properly in this manual mode, then you know that all power cabling, the connections, the fuse, the circuit breaker, and the motor are operating properly.

The 2 pin Deutsch connector is where the AFM gets its measure of compressor voltage. This is the voltage reported above and to the left of the compressor on the Setup/Diagnose/AirForce tab of 20/20. If there is excess resistance or voltage drop in the power cables, the AFM will sense the voltage drop when the compressor tries to run and will shut it off to avoid damaging the compressor. Proper voltage at this point when the compressor is off only tells you that the fuse is not blown and the connectors are plugged in. The voltage while the compressor is running tells you about the quality of the connections.

The contactor is powered by the AFM. The AFM is always putting out 12 volts to the coil and it switches the ground side when the compressor needs to run. This means that you cannot tell what the AFM is doing with an idiot light unless you remove one of the leads of the pigtail and put the light in series or connect the idiot light between the two small posts of the contactor. Connecting an idiot light to planter ground and then probing the leads will show power all the time.

The circuit breaker will trip at currents above 50 amps and will auto-reset in 20 seconds to 2 minutes, depending upon temperature. Troubleshooting this is easy to do as you can connect both leads to a single post and bypass it easily. This will cause no harm to the system, but it should be replaced at earliest convenience as a further problem in the compressor would then blow the fuse rather than tripping the breaker.

A spare 60 amp fuse was included in the burgundy service kit inside the enclosure. If more are needed, they should be

Normal operating ranges:

- Down Pressure Bags: 8psi to 120psi
- Lift Pressure Bags: 8psi to 120psi

Note: The Lift Circuit may spike in pressure at the end of passes as the planter is lifted.

- Tank Pressure: 0psi to 150psi (>120psi preferred)

The tank has a relief valve that will automatically lower the pressure any time it reaches above 165psi.

- Compressor Temperature: Ambient to 350°F

User will receive a warning message when the compressor head temperature reaches 350°F; the system will disable itself when the temperature reaches 400°F.

System capacities (in cubic feet per minute - CFM)

Compressor Model	0 psi	100 psi	125 psi	150 psi
12V	6	1.7	1.5	1
HYD	9.2	7.8	7.5	7

Air Force has two basic control situations: Manual

Automatic (any one of *Standard, Light, Heavy, or Custom*)

Manual Mode

Compressor: 12V - will run with the planter Raised or Lowered

Hyd - will run only with the planter Lowered (assuming standard plumbing of hydraulic lines)

Solenoids Will activate only when the planter is Lowered

Automatic Modes

Compressor & Solenoids will activate only when actually planting. This requires the system to recognize:

- 1) the planter is in the **Lowered** position

Basic Hydraulic Requirements: Flow: 3.5 gpm

System Pressure: 2000 psi

System Type: Closed Center

Hydraulic Compressor Maintenance Guidelines

LUBRICATION

The compressor has been filled with 20 WT oil at the factory. Before beginning operation, check that the oil level is still correct. The oil sight gauge should be filled $\frac{3}{4}$ full. You should be able to see a small bubble at the top of the sight gauge. Be sure not to fill above the indicated level.

DO NOT USE A DETERGENT OIL!

All models are splash lubricated by means of dippers on the connecting rods. The pump must be operated in a level position for proper lubrication.

Oil Capacity 15 oz ($<\frac{1}{2}$ quart)

Oil type 32-55 Deg F ambient

20 WT Non-Detergent

56 Deg F & above

30 WT Non-Detergent

Always check when cool

BELTS

Belt tension should be adjusted to allow $\frac{3}{8}$ " to $\frac{1}{2}$ " deflection with normal thumb pressure.

GUARDS

Always ensure that guard is in place before operating the compressor.

FILTER

Monitor the pre-cleaner for blockage. A torn or damaged pre-cleaner should be replaced. In normal use the pre-cleaner will prevent the paper element filter from becoming plugged even in dusty conditions.

Basic Electrical Requirements: > 25 free amps on alternator

The compressor will draw between 40 and 50 amps at 12 volts. The 12V compressor is sized to run 50% of the time or less, so in order to have adequate power generation on the alternator, you should have 25 amps of spare alternator capacity and a good battery. If testing this with an amp

For situations requiring the Compressor Module to be mounted farther than the provided cabling, a 12 foot 2-gauge extension is available (PN 726224). For distances greater than this, see the Voltage Drop

20/20 AirForce Voltage Drop Table—50 amp current

	One way distance						
Wire	12	20	30	40	50	60	80
0	0.12	0.20	0.29	0.39	0.49	0.59	0.79
1	0.15	0.25	0.37	0.50	0.62	0.74	0.99
2	0.19	0.31	0.47	0.63	0.78	0.94	1.25
3	0.24	0.39	0.59	0.79	0.99	1.18	1.58
4	0.30	0.50	0.75	0.99	1.24	1.49	1.99
6	0.47	0.79	1.19	1.58	1.98	2.37	3.16

Values above are voltage lost for the round trip - twice the length of cable shown

The above values represent the voltage drop through any **extension cables only**. There is an additional 1.2 volt drop through the standard tractor cable.

725554 - Kit that includes 2 housings & 4 contacts to use with #2 or smaller diameter wire gage. Larger wire may require trimming of some strands to fit in terminal. Crimper is not included in this kit, it can be done

Electric Compressor Maintenance Guidelines

ELECTRICAL POWER

This compressor is a high-amperage 12 Volt motor. It is important that you have good connections between the tractor battery and the motor. The compressor is protected by a 60 amp fuse located where the power cable connects to the tractor battery.

LUBRICATION

This compressor is dry and permanently lubricated, there is no oil in the crankcase. No lubrication of this compressor is required.

FITTINGS

The pre-installed fittings in the cylinder head should not be further-tightened. In the case that fittings must be removed, exercise caution when re-installing as over tightening these fittings will result in cracking of the head. High temperature liquid sealants have proven more effective than Teflon tape on these fittings.

FILTER

Monitor the pre-cleaner for blockage. A torn or damaged pre-cleaner should be replaced. In normal use the pre-cleaner will prevent the paper element filter from becoming plugged even in dusty conditions.

MAINTENANCE SCHEDULE

DAILY

Electric Compressor Piston Rebuild Instructions



Part# 726578

Due to the potential manufacturer defect of the original filter, we are supplying you with a compressor rebuild kit. While the periodic replacement of the piston and sleeve is a part of the general maintenance, the filter defect may have caused premature wear to these parts. Please use the following instructions to rebuild your compressor.

Parts List

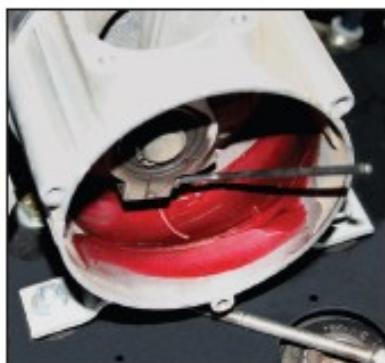
1. Cylinder
2. Piston
3. Header Gasket
4. Cylinder Gasket
5. Piston Gauge
6. Header Plate



- 1 Loosen the four screws on the Header with a 5mm Allen wrench. Remove Header and pull cylinder off the piston. You might have to remove the Header plate from the cylinder because there is a heat sensitive gasket between them. Loosen the three screws on the end plate with 4mm Allen wrench and remove end plate.

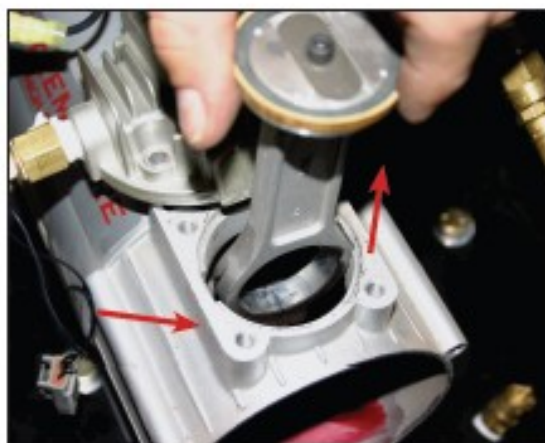


- 2 Once the end plate is removed you will see the piston clamp with a set screw. Loosen set screw with 3mm Allen wrench and move piston clamp off of main drive shaft.



726578 Rebuild Kit (Continued)

- 3 Remove the piston by aligning the clamp with the slots in the compressor housing. Now you can pull piston up and out.
- 4 Insert new piston into new cylinder and make sure you go from the short ridge to tall ridge on the cylinder. Work the piston down until it is seated in the cylinder. Place the new piston in compressor housing the same way the old one was removed. Line the slots up and let the piston slide down between them.



- 5 Insert the piston gauge and line it up with the four screw holes. Work the piston back and forth until it is seated center with the gauge. You do not want it to be rubbing on either side of the gauge. Tighten the set screw and check to see if piston is rubbing. Repeat the process till piston is clear and set screw is tight. Remove the gauge and discard it.



- 6 Place the blue gasket on the header plate. Move cylinder down and line it up with the four screw holes. Place the header plate on the cylinder and place header gasket on header plate. Replace the header top and tighten the four screws in a basic cross pattern. **Do not overtighten.** Replace the end plate and tighten the screws. Reconnect any wires or plugs that you might have undone during this process.



Discussion Questions

What symptoms would be evident if:

1) Loose 50A TYCO Amp connector to 12V Compressor

2) Leak in Lift / Down Circuit

3) Bad Lift Switch

4) Loose/damaged/disconnected wire inside enclosure

5) Leak in Tank Circuit

Check Valve in HYD compressor module

Leak within Tru-Count Clutch system



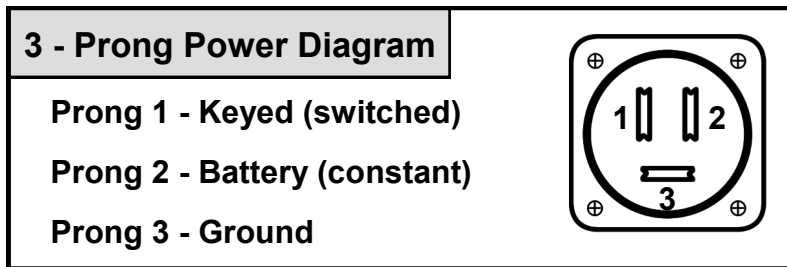
Owners Manual



System Requirements

Power Supply

The 20/20 system uses both a switched power source and a constant un-switched power source. By using the constant source, the system will maintain power to save data and safely shut down if the ignition is suddenly shut off. By using the switched or keyed source, the 20/20 will turn itself off to keep from draining the battery if the system is left on after the ignition is shut off. If you are only supplying switched power, when you turn on the 20/20 you will only see a blank grey screen. If this happens, you have two options. One, you can correct the problem by fixing the switched power leg of the 12V receptacle, or two, you can move the terminal plug on the 20/20 tractor harness from the white to the red spade. By doing this, your 20/20 will shut itself down automatically when you turn the ignition off, and will have to rely on the battery to power itself off.



Fuse Protection

To protect the 20/20 from damage, always use a minimum of a 30 Amp fuse or circuit breaker on the power supply circuit.

To protect the AirForce system from damage:

Always ensure the integrity of the integrated 60 amp fuse at the tractor cable where connected to the battery in case of short or over-circuit

There is a 7.5 amp fuse located in the AF control harness located within the enclosure to protect the AirForce Module and all other enclosure components except the compressor.

Seed Tube Sensors

In order to collect accurate and precise data, 20/20 requires 3/4" Dickey John or John Deere three eyed sensors. The 1/2" sensors used on some older planters have only two eyes and do not provide consistent data.

Quick Start Guide

Step 1: Compressor Module Installation

Begin the installation of your 2020 AirForce upgrade by mounting the Compressor Module (CM) combination onto the planter. Placement of the CM will vary on the make and model of the planter.

Note: Be sure to check clearance of CM in all locations, especially noting tractor tires and folding/unfolding the planter for transport mode.

Step 2: 12V Power / Hydraulic Connection

Now that the CM is mounted, connect the air compressor power source. For hydraulic models the power source will be the hydraulic system from the tractor. The two most common points to tap into the hydraulic system will be: 1. using a separate dedicated remote for the CM. 2. Tapping into the 'CCS' circuit on Pro-Series planters. Electrically powered models will require a 12V line run to a power source on the primary planting tractor. This line should be routed in a manner that protects the line from excessive wear and heat as well as any pinch points. One of two power sources may be used: the tractor battery (s) or the tractor starter. This line must be connected directly to the power source, not through another item.

Step 3: Row Unit Installation/ Conversion

With the CM mounted on the planter and the power source provided for, it is time to begin installing the individual row unit conversions. Release tension on existing down force system before disassembly. Remove completely or in portion as needed your current down force system and begin installation of conversion components. Take care not to over-tighten Air Bags. Once the installation/conversion is complete, check for free range of motion of all components as well as row cleaners etc...

Step 4: Plumbing Installation

Now with the Tank Module and the individual row unit airbags installed the system can be plumbed. The system will be plumbed in series (plumb directly from Air Bag to Air Bag with no return line). The Lift Bag system will be plumbed from the bottom-most (RED) port in the manifold on the Tank/Enclosure Module. The remaining three ports (BLACK) are available for Down force Air Bags.

Step 5: Lift Switch Installation

Once the system is installed the final hardware component to install is the Lift switch. Return to one of the rows that has been outfitted with a Row Unit Module (RUM); mount the lift switch and bracket on the parallel arm, and connect the lift switch to the RUM.

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General

- Legal & Safety
- System Requirements
- Quick Start Guide
- FAQ's

Component installation

- Mounting the CM

Compressor Module

- Overview
- Connecting Power
- Schematic
- Parts list
- Maint. Guidelines
- Harnesses
 - Connecting Communication
- Row Unit Conversions
- Air Lines & Fittings Plumbing
 - Air Lines info and P/N's
 - Air Fittings info and P/N's
- Lift Switch

Initial Start-Up

- AFM Serial #
- Declaring Compressor type
- Declaring Air Bag Type
- Running Health Check

Walkthrough

- DownForce Details
- AirForce Control Center
- AirForce Setup
- AirForce Diagnostics
- AirForce Logs

Troubleshooting

- Compressor not running
 - AFM light blinking once per second = Good power & communication
 - No Red light on AFM = AFM not receiving 12V power nor communication from Display Unit
 - Solid Red Light on AFM = AFM has power, is booting up, updating firmware, or stuck in boot process
 - Red Light present, blinking fast, >1 blink per second = AFM has power, no communication
- Compressor running weak
- Compressor running intermittently
- Compressor running OK

Reference info

Legal & Safety Warnings

This product is warranted for one (1) year from date of purchase. If the system fails the first time the system is tested in the second season, there may be policy decisions to cover those failures covered on a case by case basis.



Precision Planting is not liable for any failures to the system or planting loss due to decisions made from the information presented on the 20/20 SeedSense.

The display unit contains some high voltage components and should be kept dry and closed. There are no serviceable components in this unit. Do not open this display unit, the AirForce Module, or the Smart Connector. Opening of the covers should be done by, or with guidance from trained personnel.

Before activating the Air Force system, ensure that no person is near the row units and that **all** components are in place and properly tightened and adjusted.

- Use extreme caution; Airbags exert large forces.
- **DO NOT** remove Air Lines when under pressure; may cause severe injury.
- **DO NOT** touch air compressor while running or shortly after, may cause severe burns.
- **DO NOT** leave compressor running unattended.
- Follow all maintenance schedules and recommendations.

Quick Start Guide

Step 6: Update the AirForce Software

When installing your AirForce system, you should update your 20/20 display unit software to the most recent version. Go to www.precisionplanting.com, click on “20/20 SeedSense”, and then click on “Technical Support”. Scroll down to the section labeled “20/20 Display Software”. There are two links. Select the appropriate software link based on your current software version. Click on the link, click on save, and then save the file to your USB drive. Once the download is complete, take the USB drive to your 20/20 Display Unit. If you have 2008 software on your display unit (version 2.x.x), insert the USB drive and turn the display unit on. The software will update as part of the boot process. If you have an earlier version of 2009 software (version 3.x.x or 4.x.x), then power up your display unit, insert your USB drive, press SETUP, then DATA, then SOFTWARE UPDATE. Select the software version you just downloaded and press enter. Follow any on-screen prompts. You should check the website regularly for new software upgrades.

Step 7: Setup the AirForce System

Once your software is updated and the 20/20 AirForce is connected to the 20/20 SeedSense system, you will need to set up your display unit for AirForce operations. You will be prompted to enter the serial number of your AirForce System. This seven digit number is printed on a sticker located inside the compressor enclosure. From the dashboard screen, press SETUP, then select the AUX tab at the top of the screen, and then press the AIRFORCE button. You are now on the AirForce Setup screen. In the second row of buttons, press AIR BAG TYPE, select your down force system, and then select your lift system. Next, press COMPRESSOR TYPE and select ELECTRIC or HYDRAULIC.

Now press the PLANT tab at the top of the screen and press PLANTER. Make sure that your planter is properly configured on this screen, particularly number of rows. This information will be used in the next step.

Step 8: Perform a Health Check

Now that the AirForce system is set up, perform a Health Check of the system. Before performing a health check, make sure to fully unfold your planter. If you have a 12 volt electric compressor, you may perform the health check while your planter is lifted or while it is lowered. However, if you have a hydraulic compressor, you must perform the health check with the planter lowered. To begin the health check, press the DIAGNOSE tab at the top of the screen and then press the light green button labeled “AirForce”. This brings up the AirForce Diagnostics page. On the right side of the screen, press the HEALTH CHECK button. Select the ALL button to begin a Compressor Check, Wiring and Plumbing Check, and a Leak Check on your AirForce system.

Step 9: Enabling Control

When you are ready to use the AirForce system in the field, press the AIRFORCE button on the dashboard screen to enter the AirForce Control Center. Select your control mode. Press the ENABLE CONTROL button on the left side of the screen.

Frequently Asked Questions

“How much Down/Lift Pressure should I be running?”

That depends. The amount of Down/Lift Pressure will vary greatly across soil types, tillage practices, soil moisture, row unit weight... and many other variables. In the Standard Mode, AirForce will manage the pressures in the Down and/or Lift circuits in order to maintain 98%+ Ground Contact while keeping the Margin between 10-60lbs. See the Normal Operating Ranges below for safe operating pressures.

“Why does my Lift Circuit Pressure jump up or spike?”

This situation is most likely to happen as the planter is raised at the end of a pass or while crossing waterways. This is due to the transfer of weight – downward force – including the weight of the row unit, seed, insecticide, row cleaners, coulters, as well as the amount of down or spring force being applied. As the planter is raised and the row unit lowers to a ‘hanging’ position, all of this force is applied to the Lift Circuit, squeezing the bags, and causing a spike in pressure. This is the reason for the installation of the 80ci Lift Air Receiver Assemblies on the planter, to help distribute the increased pressure across a greater volume.

“Why is my AirForce constantly disabled?”

The AirForce Module components will be disabled upon startup and will automatically disable itself anytime power or communication to the system is reset or fluctuated. This is because the system will be controlling moving parts on the planter. It is a safety feature of the system and cannot be bypassed.

“What Control Mode should I run the AirForce in?”

The most common control mode utilized, and also the best setting to start with, will be the *Standard Mode*. In this setting, the 20/20 will control AirForce to maintain 95%+ Ground Contact and keep the Margin in the range between 10 – 60lbs. Starting in the Standard setting, make a pass or two through the field to allow the system to acclimate itself to your individual planter. Once you are comfortable with the responsiveness of the system, feel free to experiment with the *Light*, *Heavy*, and *Custom* control modes. After any change, allow the system to move to the new settings, always dig behind the planter to verify and inspect the results. Repeat as necessary.

“Why do the ‘Down’ and ‘Lift’ numbers on the monitor not match the gauges on the enclosure?”

In its Default configuration, AirForce will display on the *Home* screen the Tank pressure in psi, and the Down and Lift circuits in pounds of applied force. The gauges on the enclosure are readings in psi of the respective circuits. The home screen uses the pounds of applied force because it is more intuitive and equates more fluently to the margin readings. To read the Down and Lift circuit pressures simply touch the AirForce icon on the Home screen to enter the AirForce Control Center. At the bottom of the AirForce Control Center page, the target (black line) and actual (green bar) pressures are displayed in psi for each circuit.

Normal operating ranges:

- Down Pressure Bags: 8psi to 120psi
- Lift Pressure Bags: 8psi to 120psi

Note: The Lift Circuit may spike in pressure at the end of passes as the planter is lifted.

- Tank Pressure: 0psi to 150psi (>120psi preferred)

The tank has a relief valve that will automatically lower the pressure any time it reaches above 165psi.

- Compressor Temperature: Ambient to 350°F

User will receive a warning message when the compressor head temperature reaches 350°F; the system will disable itself when the temperature reaches 400°F.

- AirForce Control Module (AFM) Voltage: 11.5 to 14.0volts
- 12V Compressor Voltage: 11.5 to 14.0 Volts
- Compressor Duty Cycle: 0-80%

“I can’t get any air to the bags without running a Health Check.”

This is most likely a confusion surrounding the Control modes and planter status. AirForce has two basic control situations: Manual and Automatic (any one of *Standard*, *Light*, *Heavy*, or *Custom*).

Manual Mode:

Compressor: 12V - will run with the planter Raised or Lowered

HYD - will run only with the planter Lowered (assuming standard plumbing of hydraulic lines)

Solenoids (to Down & Lift Circuits): Will activate only when the planter is Lowered

Automatic Modes:

Compressor & Solenoids will activate only when **actually planting**. This requires the system to recognize that the system is:

- 1) in the Lowered position
- 2) moving forward – speed/GPS information
- 3) seed tube data

Note: once the system recognizes it is in a planting situation, you may notice the compressor running while lifted, or not moving (at the end of a pass or while filling the planter)

Compressor: 12V - will run with the planter Raised or Lowered

HYD - will run only with the planter Lowered (assuming standard plumbing of hydraulic lines)

“How can I be running Margin and less than 100% Ground Contact at the same time?”

This situation can exist if one or more of the SmartPins are reading a loss of Ground Contact while others are reading levels of Margin. AirForce makes many calculations based on the data it receives from the SmartPins, including entire planter averages. Because of this, it is possible for the planter averages to display both a Margin reading and a loss of 100% Ground Contact

“Do I really need a new lift switch or can I use my existing one?”

You need to install a new lift switch. Our switch is wired directly into the RUM auxiliary port. Combining an existing lift switch into both the JD planter system and our RUM *might* be able to be made to work, but is unadvisable. Installing a separate one keeps the systems separate, simple, and robust.

“How much power is required for the 12V compressor?”

The compressor will draw between 40 and 50 amps at 12 volts. The 12V compressor is sized to run 50% of the time or less, so in order to have adequate power generation on the alternator, you should have 25 amps of spare alternator capacity and a good battery. If testing this with an amp meter, be sure to have all lights and accessories powered.

“Will my tractor be able to handle the Hydraulic compressor?”

Basic Hydraulic Requirements: Flow: 3.5 gpm

System Pressure: 2000 psi

System Type: Closed Center

No case drain is required for this hydraulic motor

“What is the flow rate of the two different compressors?”

The following table shows nominal flow rates in Cubic Feet per Minute (CFM) for each option

Compressor Model	0 psi	100 psi	125 psi	150 psi
12V	6	1.7	1.5	1
HYD	9.2	7.8	7.5	7

Compressor Module Mounting



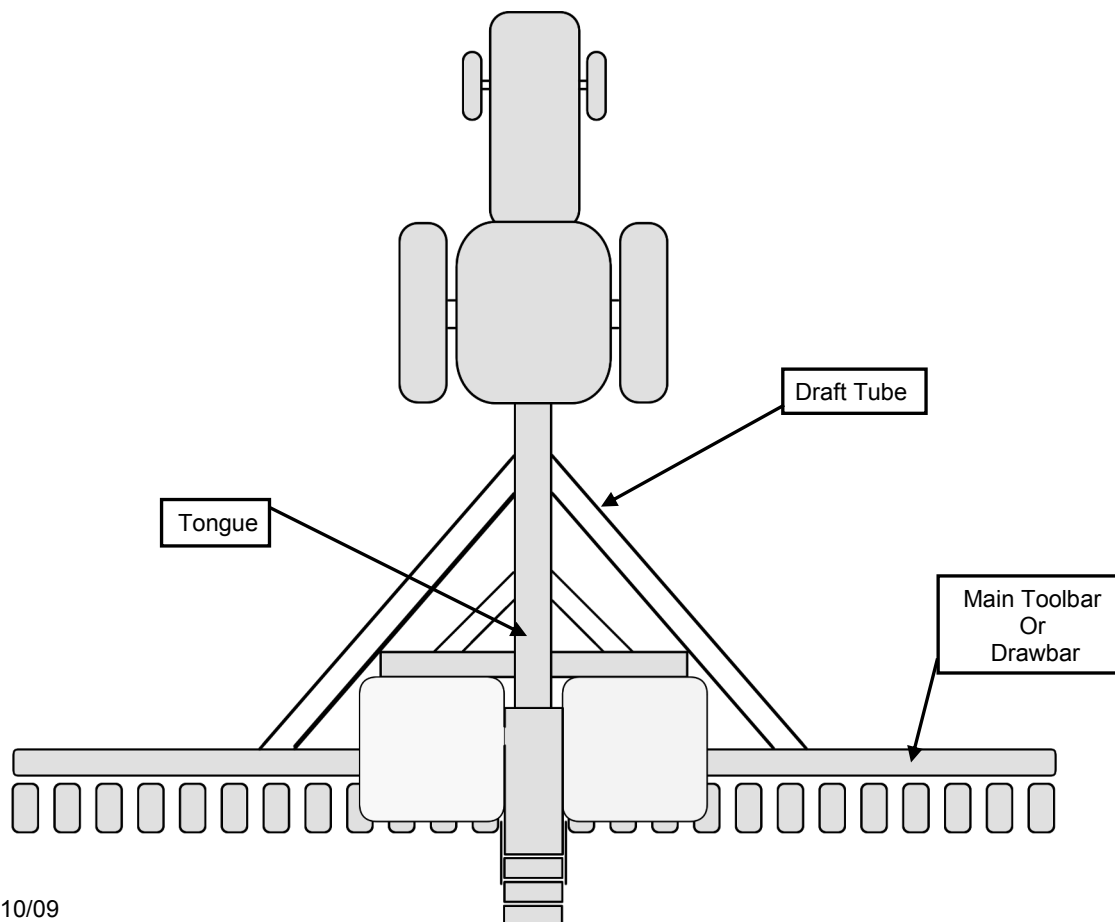
- ◆ Every planter will contain it's own unique situations in regard to mounting the Compressor Module for clearance and accessibility. **YOU SHOULD EXERCISE YOUR OWN BEST JUDGMENT TO FIT YOUR SITUATION.**
- ◆ 12V Compressors require mounting within 26' of the power source (tractor battery or starter post).
- ◆ Hydraulic Compressors require mounting with access to a Closed Center system with 2000 psi and 4.0gpm.

First, locate a possible mounting location. The image below shows the three most common mounting locations and the terms by which we refer to them. Use the diagram on the following page for dimensions and clearance requirements.

Second, visually inspect the proposed mounting location for structural stability and to find signs of wear in that location. Possible obstructions to be aware of include marker arms, liquid fertilizer tanks, rear tires (duals especially) during tight turns, etc...

Mark out the position of the Compressor then complete a thorough cycle of folding/unfolding to transport mode and raising/lowering of the planter; as well as, driving in a tight circle in one or both directions, in planting position, to verify or identify obstructions.

Once the CM is mounted, repeat the previous process very cautiously to once again verify that the CM is clear of obstructions.



Compressor Mounting Bracket Guide

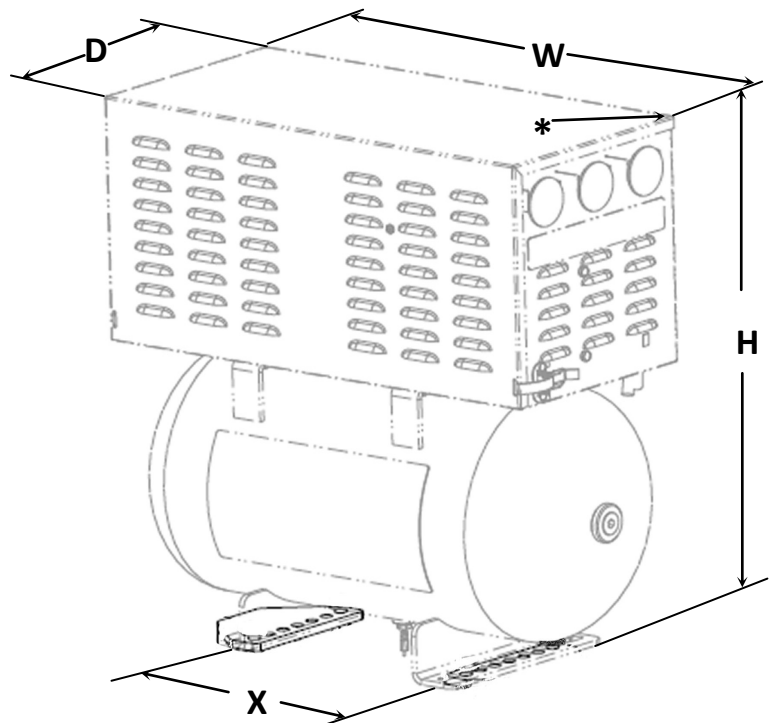
Mossor Mounting Bracket Guide			Dimensions (inches)	
Part Number	Image	Description	Width (X)	Height (Y)
726050	A	U-Bolt	3	5
726051			3	6
726052			3	8
726053			4	6
726054			4	7
726055			5	7
726057			8	10
726397			4	4
726490			8	12
726059	N/A	Bolts Only	3/8 X 1-1/8	
726450	B	Universal (up to 9X10 Bars): Threaded Stud		
726056	C	U-Bolt w/ Spacer Bracket	7	7
726058			8	8
726455			10	10
726500			7	4
726435	D	Angle Bracket	Kinze 3700	
726060	E		Kinze 3800	
726470	F	High Above Tube	N/A	
726515	G	Stand - Above Crossbar	N/A	
726612	H	Low, Side Mount	7	7
726613			8	8
726614			10	10
726398	I	J - Bolt	See Image	

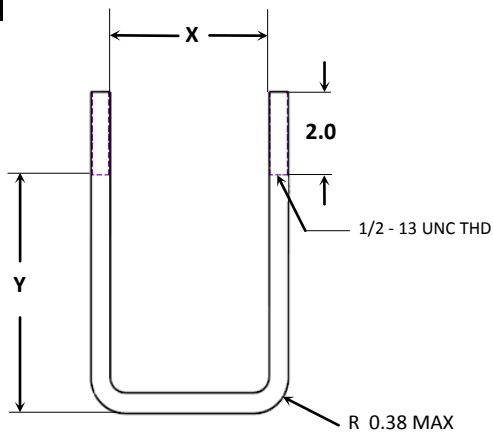
Use the diagram to the right to identify possible mounting locations on your specific planter.

*Remember to allow room for the lid to open properly. Measure 15" vertically and 8" to the right of this point. *

The 'X' dimension is the spacing between the

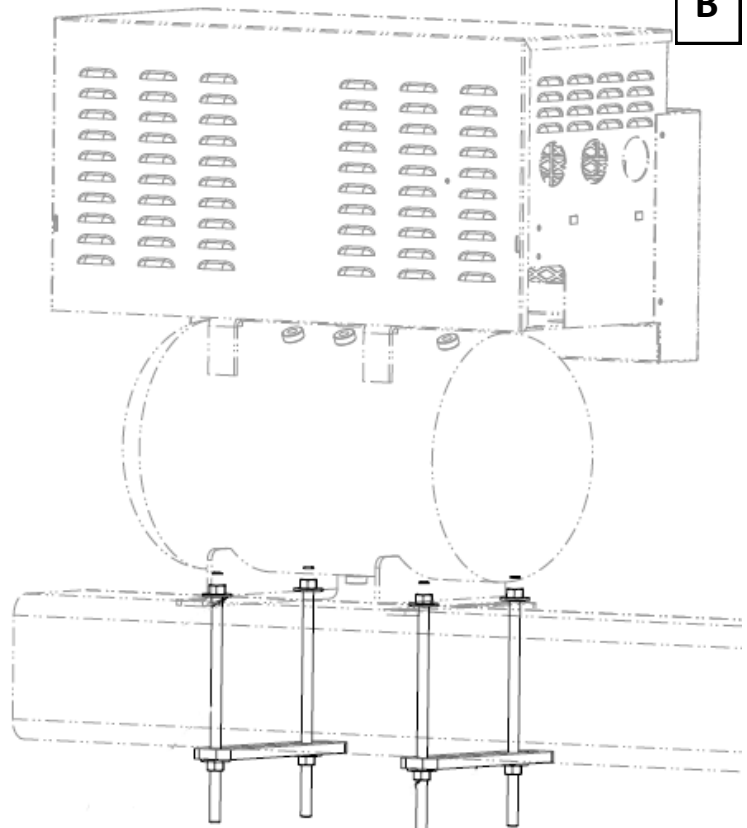
	Dimensions (inches)			
	H	W	D	X
Hydraulic	28.5	28.0	15.5	12.0
12V Electric	26.0	24.0	12.0	12.0

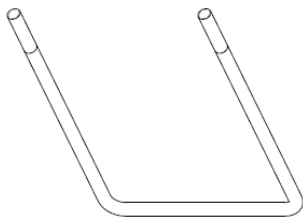


A

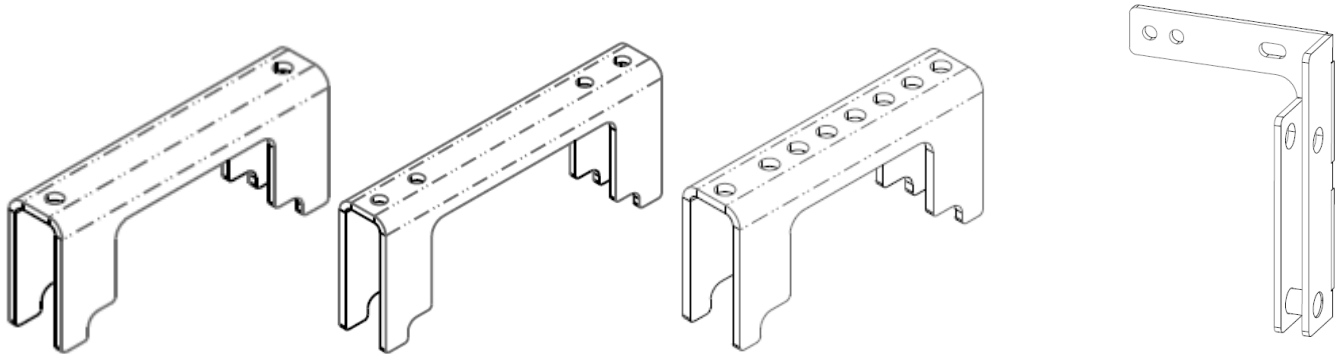
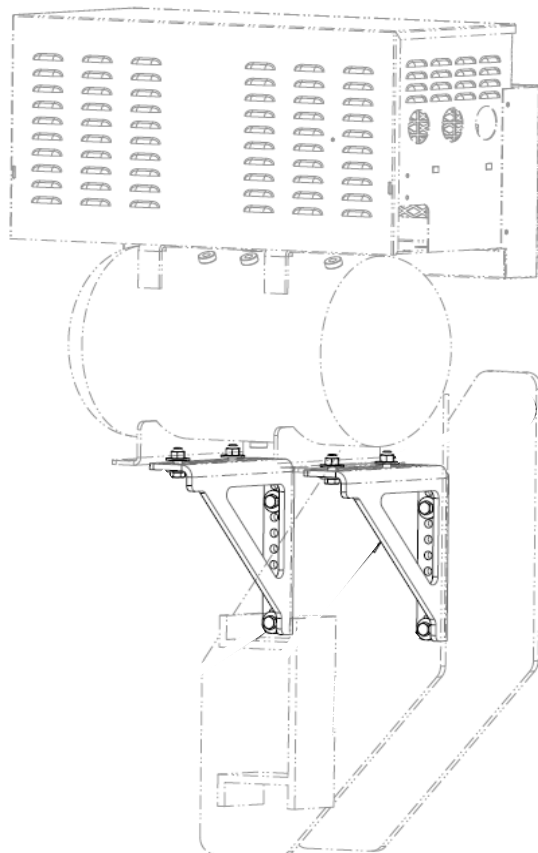
This will be the most common and simple means of mounting the compressor to your planter. Two U-bolts and hardware will be supplied. These will be wrapped around the chosen draft bar, toolbar or tongue location and fix the compressor in place through the base feet on the tank.

The Universal mounting bracket will work the same as U-bolts. Four lengths of threaded studs, two brackets, and hardware will be supplied to take the place of the U-bolt. This will be commonplace for non-standard mounting locations and bar sizes, up to 9"X10".

B

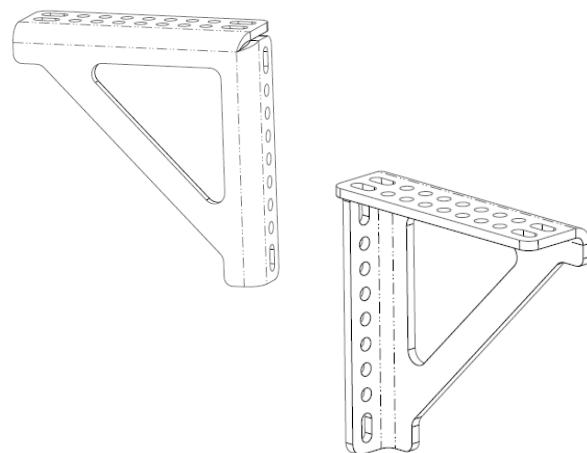
C

This group of mounting brackets will be most common on Kinze and stack-fold planters and may require the removal of the jack stand mounting bracket. Three U-bolts, three brackets, and the necessary hardware will be provided. Two of the brackets, similar to those shown below, will be used to space the tank above hoses and communication lines on the tongue or toolbar. The remaining U-bolt and bracket will be used to relocate the jack stand on Kinze planters to the vertical riser.

**D**

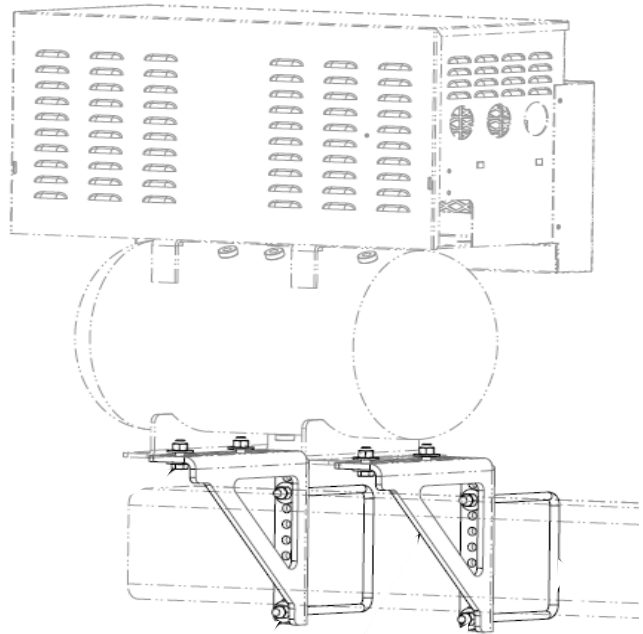
This mounting kit will offer a side mounted position for the Compressor Module. Shown at left mounted on the forward portion of the tongue on a Kinze 3700. Two brackets and hardware will be supplied and some drilling may be necessary.

The brackets are shown in greater detail below.



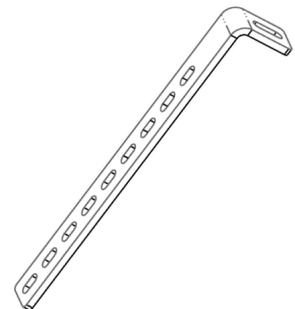
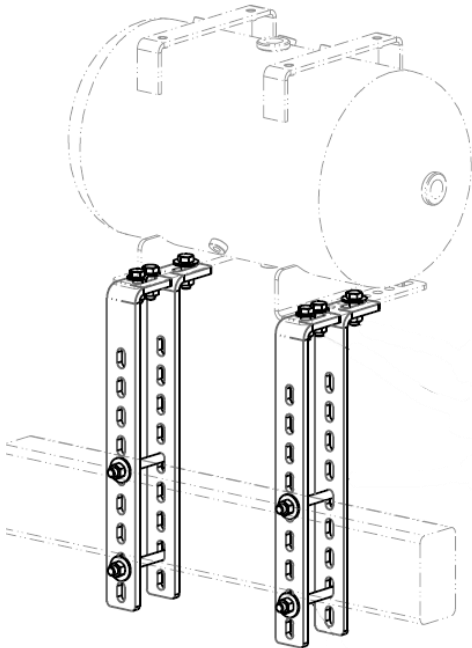
E

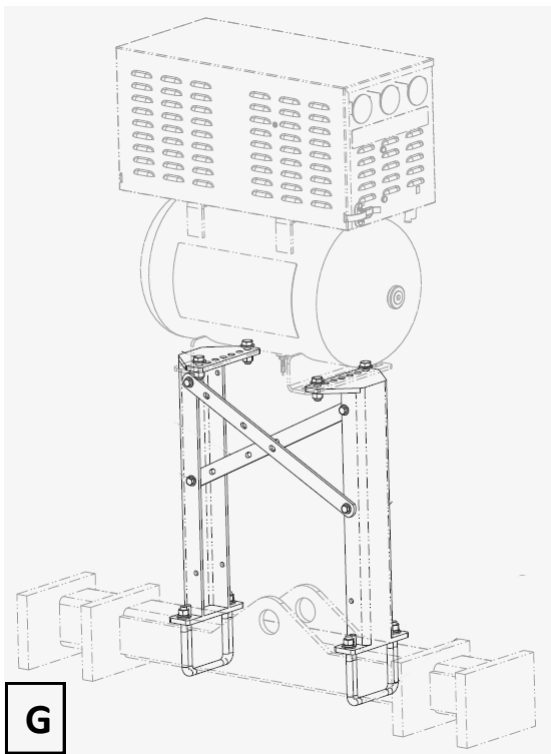
This mounting kit will be very similar to the previous mounting kit. The same brackets will be provided, however there will also be two U-bolts, removing the need for a drilling operation.



F

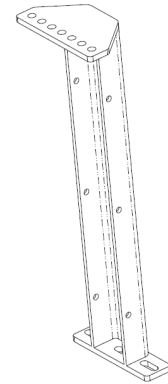
The most common mounting location for larger planters will be on the draft bar. Use this mounting kit for situations that do not provide enough clearance for the compressor to rest directly on the draft bar. Four of the straps shown below as well as hardware will be provided. This will allow the compressor to be elevated and set back (or forward) to avoid clearance issue.



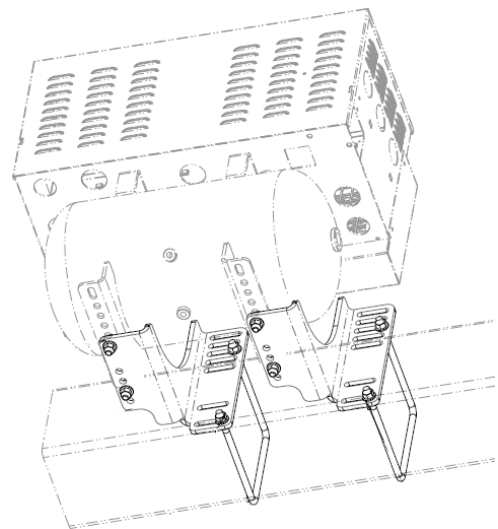


G

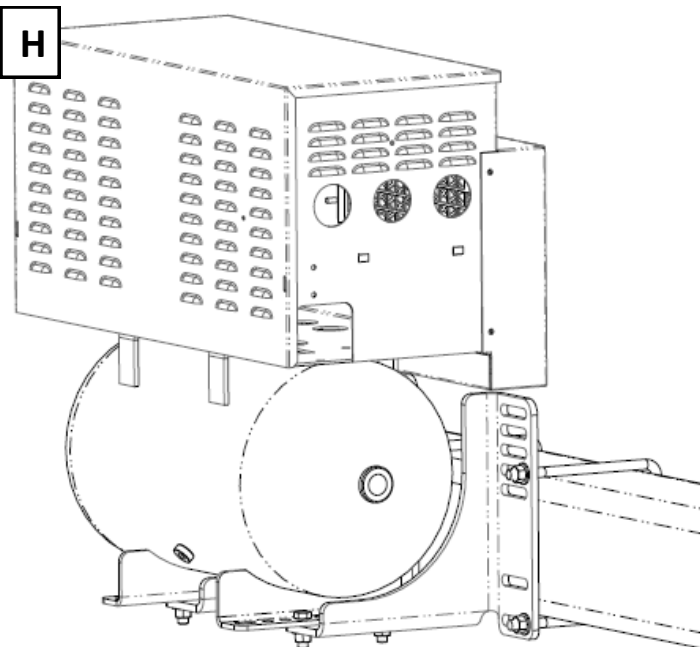
This mounting kit is designed for situations that do not allow mounting on the planter, or require greater elevation of the compressor for clearance reasons. Two of the brackets (shown below right), two straps, two U-Bolts, and hardware will be supplied. The image at left shows the compressor mounted above the 2 point cross-hitch.



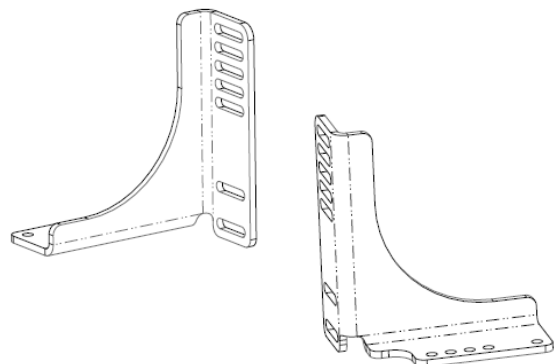
This mounting kit will locate the Compressor low and to the side of the main tongue. Used primarily for Kinze planters to provide clearance under the Lift and Twist transport. Two brackets, two U-bolts, and hardware will be supplied with this kit.

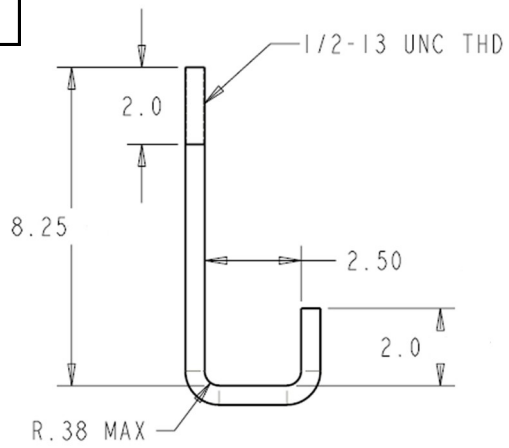


Shown from below.



H





This mounting kit has the same concept as the basic U-bolt, that is adapted for non-standard tubes or channels that comprise the tongue of some planters.

John Deere

Planter Model	Description	Comments	Part Number
JD7000	Drawn Rigid Tongue - <20'		726055
	Drawn Folding Tongue		726059
	30' front fold	Preference - 1 - Above Draft Tube	726052
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
	40 or 60' wide front fold	Preference - 1 - Above Draft Tube	726050
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
JD7100	3pt Mounted		726056
JD7200	Drawn, folding tongue < 20'		726055
	Drawn Folding Tongue		726059
	30' front fold	Preference - 1 - Above Draft Tube	726052
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
	40 or 60' wide front fold	Preference - 1 - Above Draft Tube	726050
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
JD7240	Drawn, folding tongue < 20'		726059
JD7300	3pt Vertical fold or rigid frame		726056
	3pt Stacker	Preference - 1 - Above the 7x7 Bar	726056
		Preference - 2 - In front of 7x7 bar	726060
		Preference - 3 - Non-standard/Custom	726450
JD1700/1710	3pt Rigid & Vertical Fold	Preference - 1 - Above the 7x7 Bar	726056
		Preference - 2 - In front of 7x7 bar	726060
JD1720	3pt Stack Fold	Preference - 1 - Above 7x4 bar	726500
		Preference - 2 - Above 7x7 bar	726056
		Preference - 3 - Non-standard/Custom	726450
JD1730	Rigid Narrow Row		None
JD1750	Drawn, folding tongue < 20'		726059
JD1760	Wing Fold		726057
JD1770	30' front fold	Preference - 1 - Above Draft Tube	726052
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
	40 or 60' wide front fold	Preference - 1 - Above Draft Tube	726050
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
JD1770NT	Front Fold	Preference - 1 - High Mount	726470
		Preference - 1 - Rear Center Mount	726490
		Preference - 2 - Above 3x5 bar	726050
		Preference - 3- Above cross bar	726515

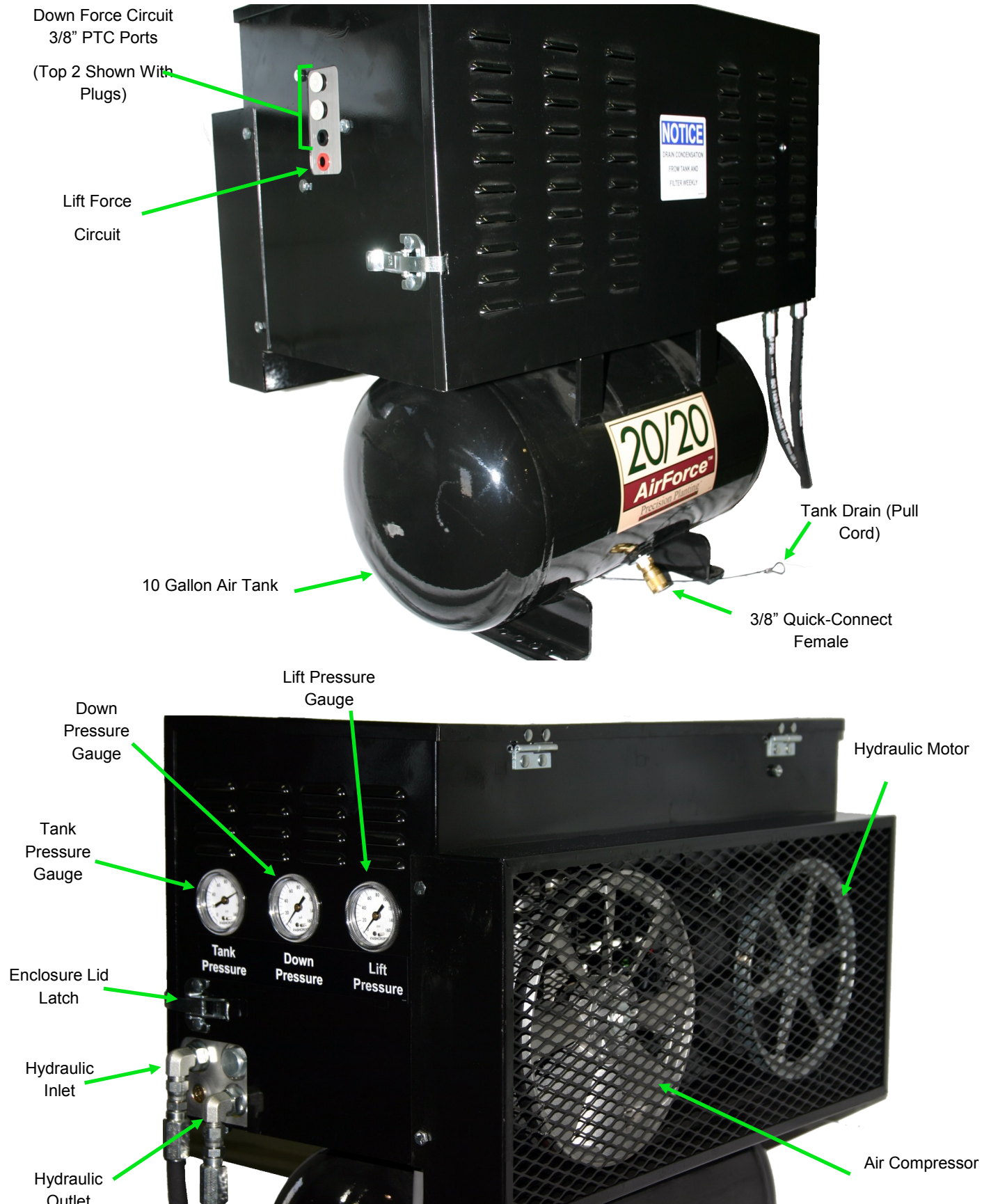
John Deere

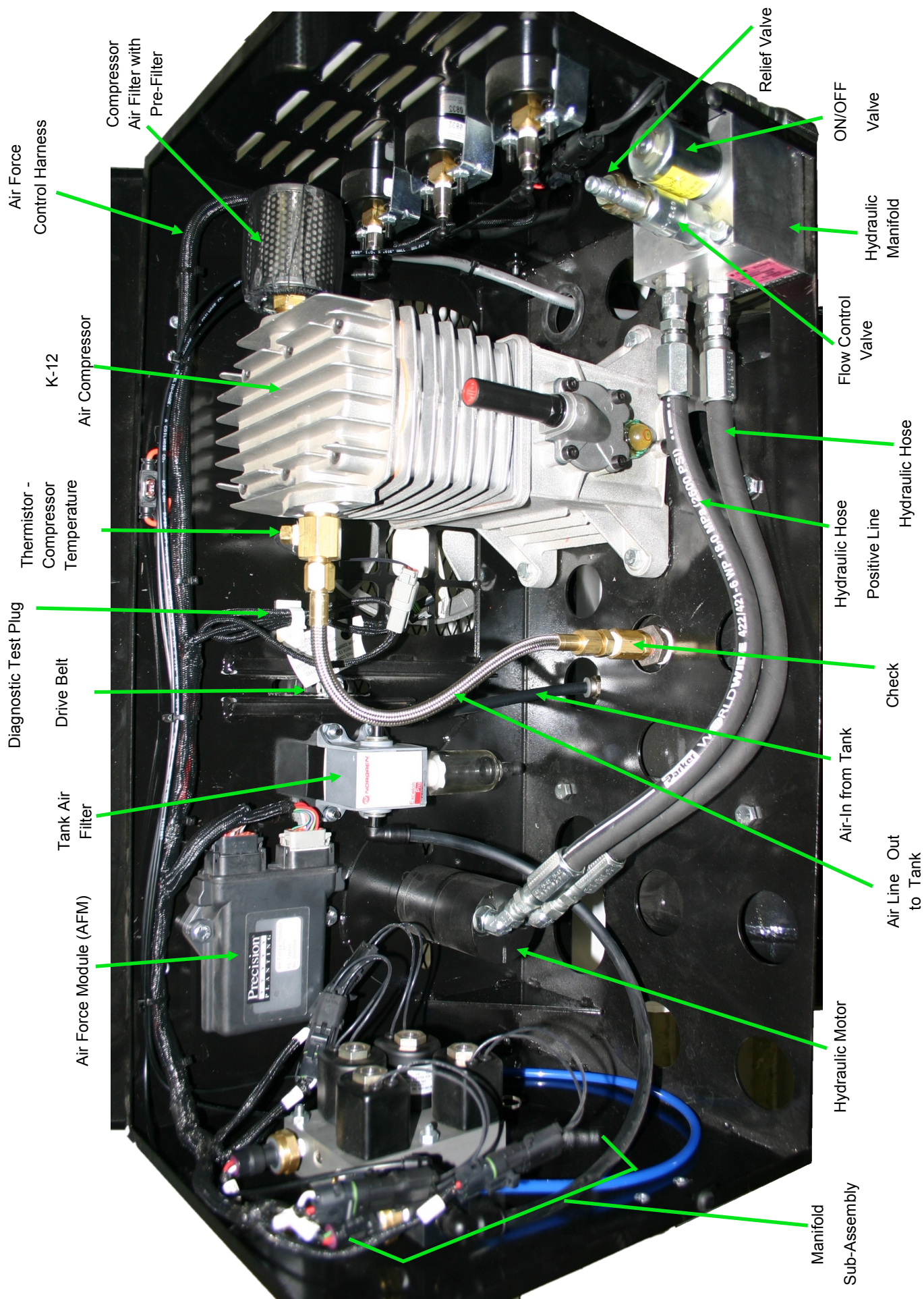
Planter Model	Description	Comments	Part Number
JD1780	Drawn, folding tongue < 20'		726059
	30, 40, or 60' wide front fold	Preference - 1 - Above Draft Tube	726053
		Preference - 2 - High Mount	726470
JD1790	12V 30, 40, or 60' wide front fold	Preference - 1 - Above Draft Tube	726050
		Preference - 2 - Above Cross Bar	726515
		Preference - 3 - High Mount	726470
	HYD 30, 40, or 60' wide front fold	Preference - 1 - Rear Center Mount	726490
		Preference - 2 - Above Draft Tube	726050
		Preference - 3 - Above Cross Bar	726515
		DB44, 58, 60, 66, & 80 Prior to 2010	Preference - 1 - Above Draft Tube
Preference - 1 - Rear Center Mount	726490		
Preference - 2 - High Mount	726470		
DB88, 90, & 120 Prior to 2010 ALL 2010+ DB models	Preference - 1 - Above Draft Tube	726053	
	Preference - 1 - Rear Center Mount	726490	
	Preference - 2 - High Mount	726470	

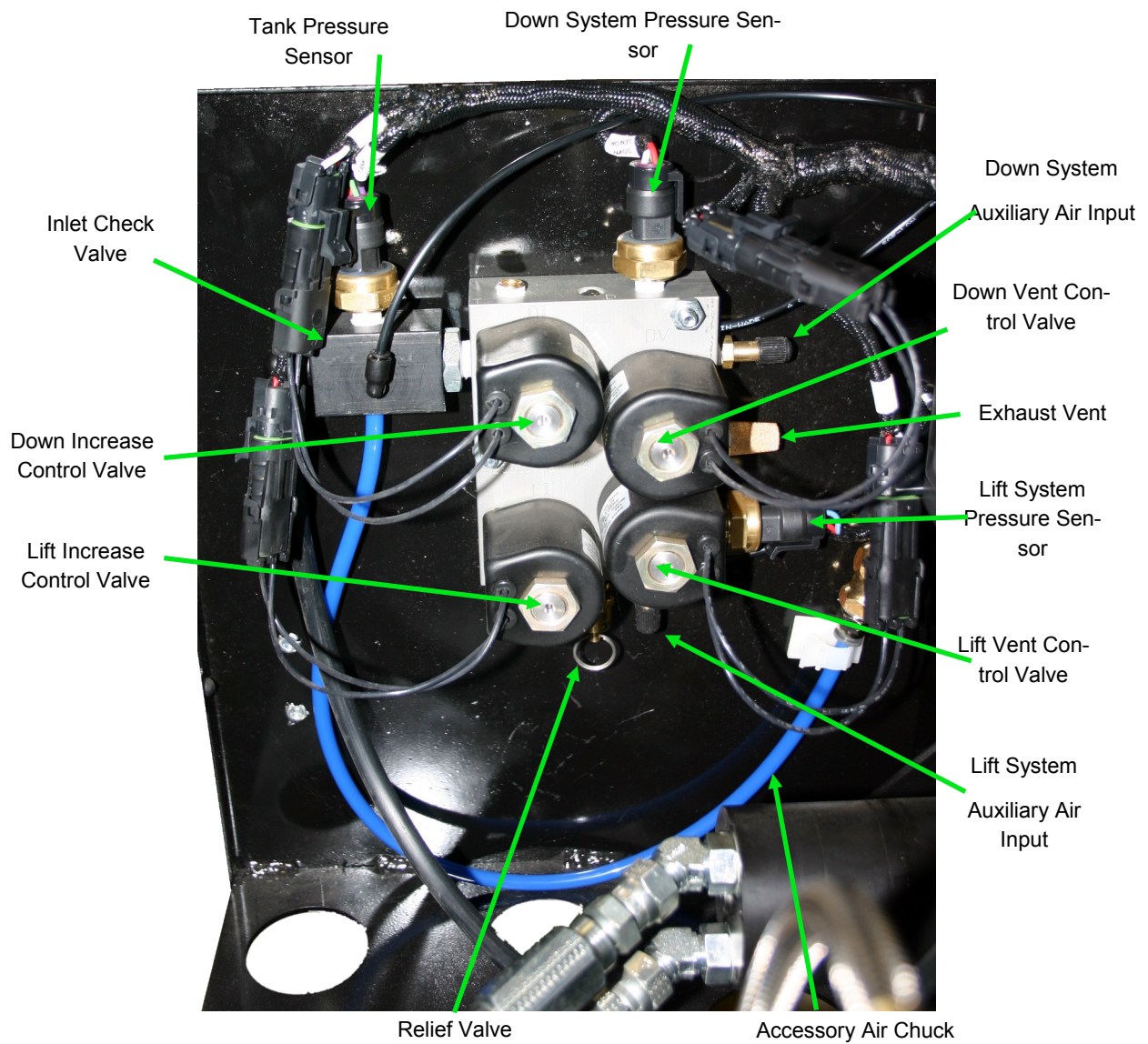
Kinze

Planter Model	Description	Comments	Part Number
Rear Fold	Rear Fold		726397
2000, 3000	2 tube tongue		726398
2100, 3110	Rigid		726056
2200, 3200	Wing Fold		726054
2300, 2500 3400, 3500	Twinline	Preference - 1 - Above 7x7 bar	726056
		Preference - 2 - Offset from 7x7 bar	726612
2600, 3600, 3650, 3660	Twinline 30' Bar	Preference - 1 - Above 8x8 bar	726058
		Preference - 2 - Offset from 8x8 bar	726613
	Twinline 40' Bar	Preference - 1 - Above 10x10 bar	726455
		Preference - 2 - Offset from 10x10 bar	726614
2700, 3700	Front Fold		726435
3800	Front Fold		726060
3120, 3140	3pt Vertical & Stack Fold	Preference - 1 - Above 7x7 bar	726056
		Preference - 2 - Offset from 7x7 bar	726060

Hydraulic Compressor Module



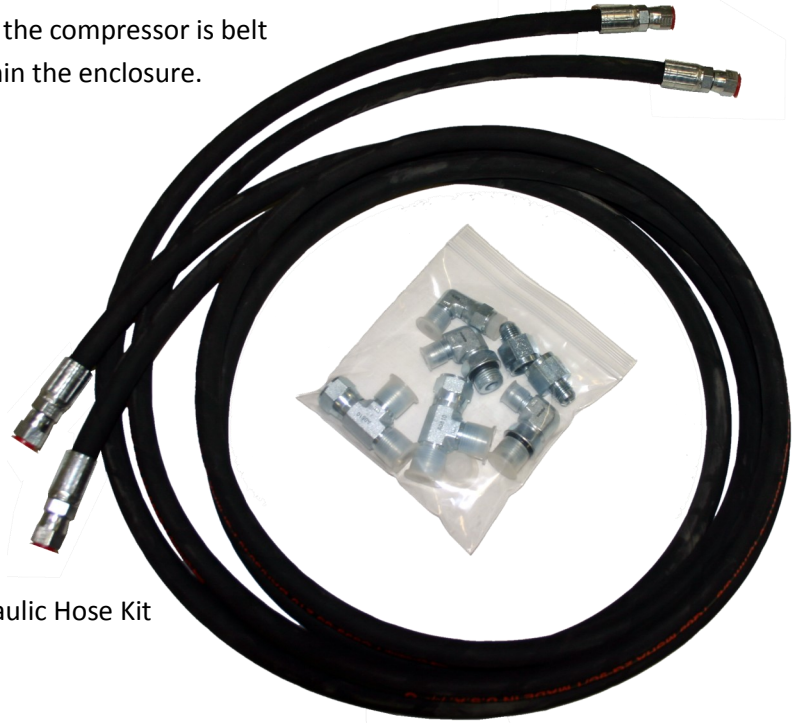




Connecting Power to the Compressor

For Hydraulic Compressor Modules, the compressor is belt driven from an hydraulic motor within the enclosure.

Hydraulic Hose Kit



726400*	726405+	726410^	Part Number	Part Name	Description	Note
2	-	-	726401	TEE	-8 STOR TEE	A
4	2	2	726402	ELBOW	-8 STOR X -6 JIC 90 DEG ELBOW	B
-	-	2	726404	ADAPTER	-8 STOR X -6 JIC	C
2	2	2	726406	HOSE AS	ENCLOSURE TO TRACTOR	D
-	2	-	726421	REDUCER	-8 JIC X '6 JIC REDUCER	E
-	1	-	726424	ELBOW	-6 JIC 90 DEG SWIVEL ELBOW	E
-	2	-	726427	TEE	-8 JIC RUN TEE	E
-	-	2	726439	COUPLER	PIONEER COUPLING - POPPET STYLE	C

* THIS KIT IS INTENDED FOR INSTALLING IN CCS CIRCUIT OF DEERE PLANTERS

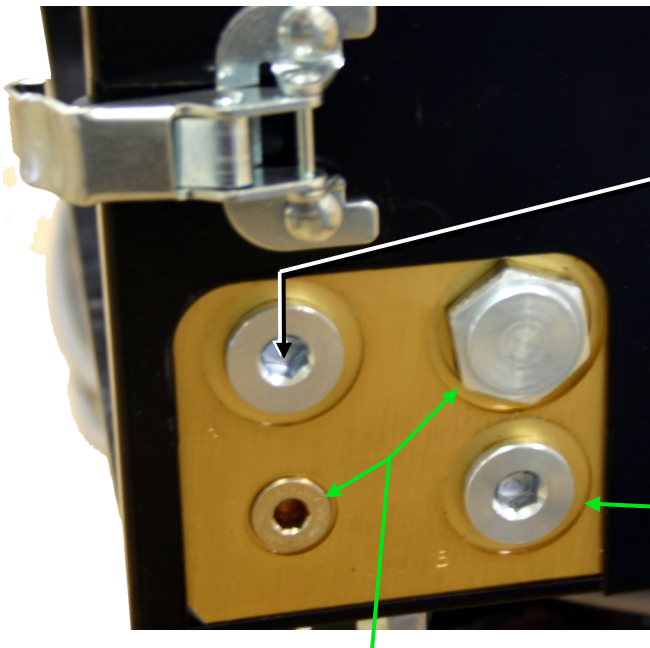
+ THIS KIT IS INTENDED FOR INSTALLING IN CCS CIRCUIT OF DB PLANTERS

^ THIS KIT INTENDED WHEN USING A SEPARATE DEDICATED CIRCUIT FOR AIRFORCE COMPRESSOR

Note:	
A	Install between Pioneer quick couplers and existing hoses of planter
B	2 get installed at manifold on enclosure, 2 install into Tee's at hydraulic coupler
C	Install at end of hose which plugs into tractor
D	Enclosure to Tractor, approx. 10' lengths
E	Install at bulkhead fittings on planter hitch
E	
E	
C	

Standard Installation:

Compressor Module mounted on Draft Bar at the front of the planter
Plumbing to CCS Circuit / Planter Raise-Lower Circuit



Port A
Oil Inlet

Hydraulic Connections will be made to the front of the compressor module to the gold colored manifold in the lower left corner. Port A will be the oil inlet port - requires oil supplied to it. Port B will be the oil return port - oil is plumbed to return to the tractor. The lower left and top right ports are construction ports and will remain plugged.

Port B
Oil Return

Construction Ports; these remain plugged

Locate the hydraulic circuit on the planter marked Frame or Lift. This should be the largest set of hoses leading to the planter and is the circuit responsible for raising and lowering the planter. Most planter manufacturers label these hoses with a colored cable in the context of '**Raising**' the planter; such as "Pressure" and "Return". The compressor module will be plumbed in reverse of this condition; or requires flow when '**Lowering**' the planter.

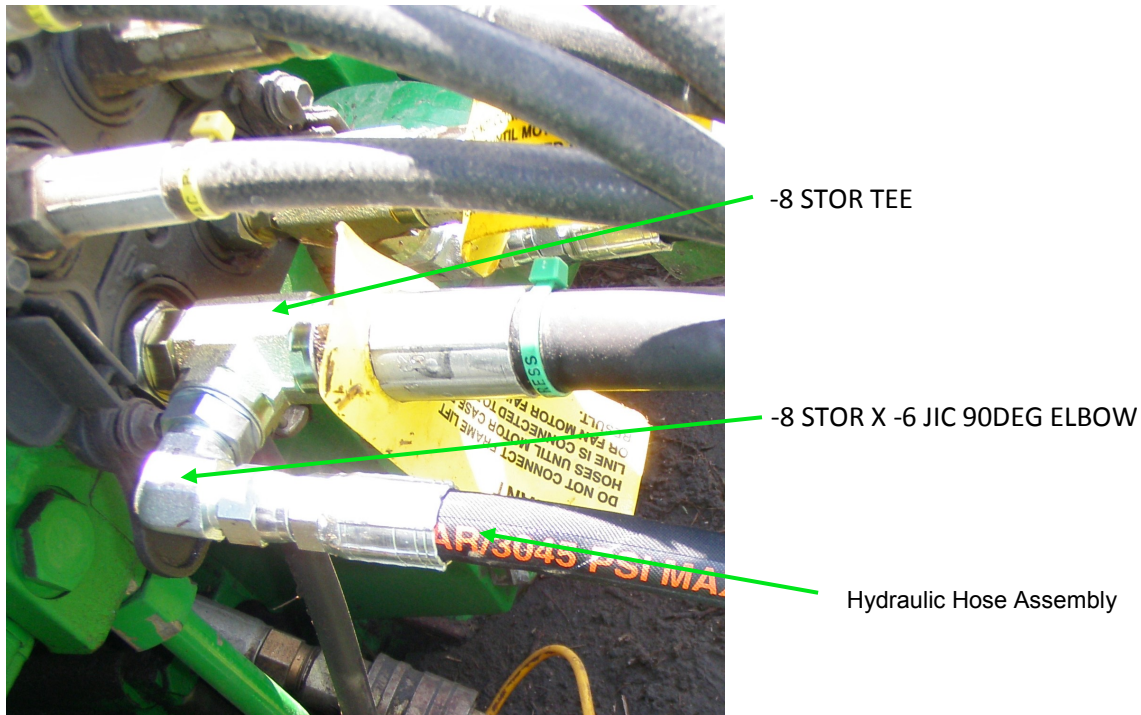
⇒ ⇒ Connect port **A** to the hose marked "Return"

⇒ ⇒ Connect port **B** to the hose marked "Pressure"

The image at right shows this connection made to the rear of the fixed plate on the front of **John Deere DB series** planters. Verify on your planter which hose is Pressure and which is Return.



For non-DB series planters, this connection should be made just behind the Pioneer couplers that plug into the tractor remotes. The images below show examples of this connection.

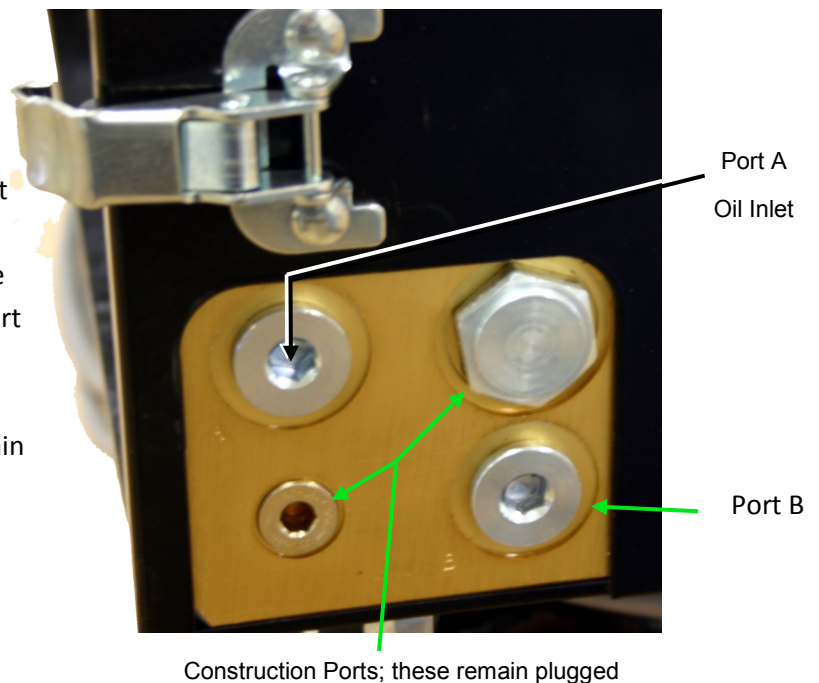


Non-Standard Installation:

Compressor Module installed at rear of planter

Plumbing to CCS Circuit / Planter Raise-

Hydraulic Connections will be made to the front of the compressor module to the gold colored manifold in the lower left corner. Port A will be the oil inlet port - requires oil supplied to it. Port B will be the oil return port - oil is plumbed to return to the tractor. The lower left and top right ports are construction ports and will remain plugged.



When installing the Compressor Module at the rear of the planter (most often on the tongue of the planter in front of the CCS blower or Refuge tank) hydraulic oil will need to be supplied from the planter's main hydraulic line or manifold. This is usually located at the center of the planter, under the CCS tanks or catwalks. You will need to locate the Frame/Planter 'Raise' and 'Lower' circuit lines or trace backwards from the CCS blower motor to the manifold to find the appropriate ports to tie into.

We **strongly discourage** getting the oil supply for the Compressor Module directly from the CCS blower hoses, This will add restriction to the line and could negatively affect CCS blower operation if done incorrectly.

Once the correct ports/hoses have been identified, you can 'T' into the lines just as with a standard installation. The required fittings for this installation may vary, but the most common fittings required are listed below. These may be obtained locally or through Precision Planting using the part numbers referenced.

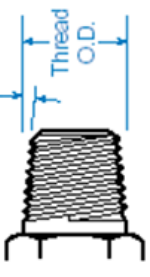
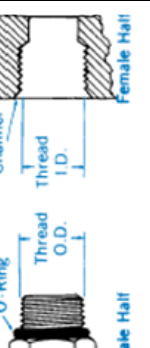
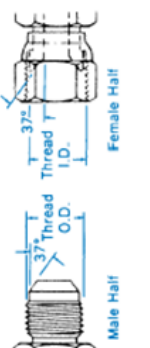
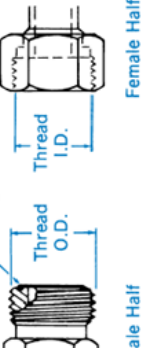
Quantity	Part Number	Description
2	726428	-10 JIC TEE
2	726422	-10 JIC X -6 JIC REDUCER
2	726402	-8 SAE X -6 JIC ELBOW
2	726430	HYD HOSE (approx. 100" long)
2	726440	-6 JIC Straight Coupling (for use with 726430 hose only)

Quick Checks for Hydraulic Compressors

Common reasons Hydraulic Compressor will not operate:

- ⇒ Planter must be lowered
- ⇒ Hydraulic Circuit must be connected **and** engaged
- ⇒ Tank Pressure is within 25psi of target (ie; target tank pressure is 150psi, actual tank pressure must be <125psi before compressor will engage)
- ⇒ Verify that circuit is plumbed correctly: the hose into Port **A** should visibly pulse when the circuit is energized.
- ⇒ AirForce System must be "Enabled" within the 20/20 SeedSense monitor.
- ⇒ To test the system, the AirForce system must be in 'Manual' mode (selected on the monitor through

Chart for identifying size and type of common hydraulic system threads

																	
Nominal Size	Dash Size	Nominal Thread	Male OD	Female Thd ID	Nominal Thread	Male Thd OD	Female Thd ID	Nominal Thread	Male OD	Female Thd ID	Nominal Thread	Male Thd OD	Female Thd ID	Nominal Thread	Male OD	Female Thd ID	
1/8	02	1/8-27	0.41	0.38	5/16-24	0.31	0.27	5/16-24	0.31	0.27	5/16-24	0.31	0.27	N/A	N/A		
3/16	03		N/A		3/8-24	0.38	0.34	3/8-24	0.38	0.34	3/8-24	0.38	0.34	N/A	N/A		
1/4	04	1/4-18	0.54	0.49	7/16-20	0.44	0.39	7/16-20	0.44	0.39	7/16-20	0.44	0.39	9/16-18	0.56	0.51	
5/16	05		N/A		1/2-20	0.50	0.45	1/2-20	0.50	0.45	1/2-20	0.50	0.45	N/A	N/A		
3/8	06	3/8-18	0.68	0.63	9/16-18	0.56	0.51	9/16-18	0.56	0.51	9/16-18	0.56	0.51	11/16-16	0.69	0.63	
1/2	08	1/2-14	0.84	0.77	3/4-16	0.75	0.69	3/4-16	0.75	0.69	3/4-16	0.75	0.69	13/16-16	0.82	0.75	
5/8	10		N/A		7/8-14	0.88	0.81	7/8-14	0.88	0.81	7/8-14	0.88	0.81	1-14	1.00	0.93	
3/4	12	3/4-14	1.05	0.98	1 1/16-12	1.06	0.98	1 1/16-12	1.06	0.98	1 1/16-12	1.06	0.98	1 3/16-12	1.19	1.11	
7/8	14		N/A		1 13/16-12	1.19	1.10	1 13/16-12	1.19	1.10	1 13/16-12	1.19	1.10	N/A	N/A		
1	16	1 - 11 1/2	1.32	1.24	1 5/16-12	1.31	1.23	1 5/16-12	1.31	1.23	1 5/16-12	1.31	1.23	1 7/16-12	1.44	1.36	
1 1/4	20	1 1/4 - 11 1/2	1.66	1.58	1 5/8-12	1.63	1.54	1 5/8-12	1.63	1.54	1 5/8-12	1.63	1.54	1 11/16-12	1.69	1.61	
1 1/2	24	1 1/2 - 11 1/2	1.90	1.82	1 7/8-12	1.88	1.79	1 7/8-12	1.88	1.79	1 7/8-12	1.88	1.79	2-12	2.00	1.92	
2	36	2 - 11 1/2	2.38	2.30	2 1/2-12	2.50	2.42	2 1/2-12	2.50	2.42	2 1/2-12	2.50	2.42	N/A	N/A		

These four different types of threads can often be mismatched due to common threads but will not seal properly and may result in dangerous leaks.

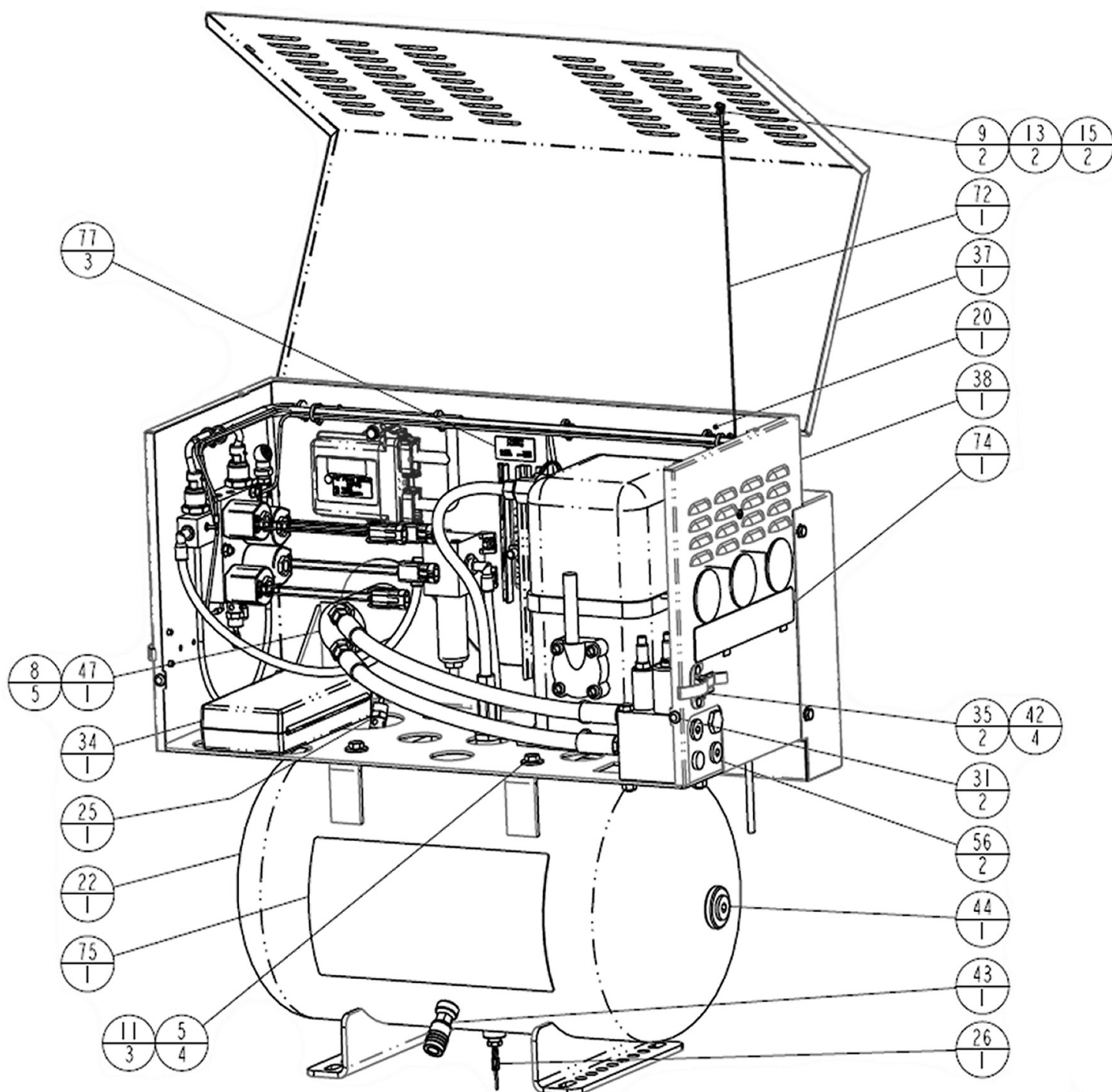
When ordering replacement fittings, verify which style and speak in terms of -Dash size to prevent confusion.

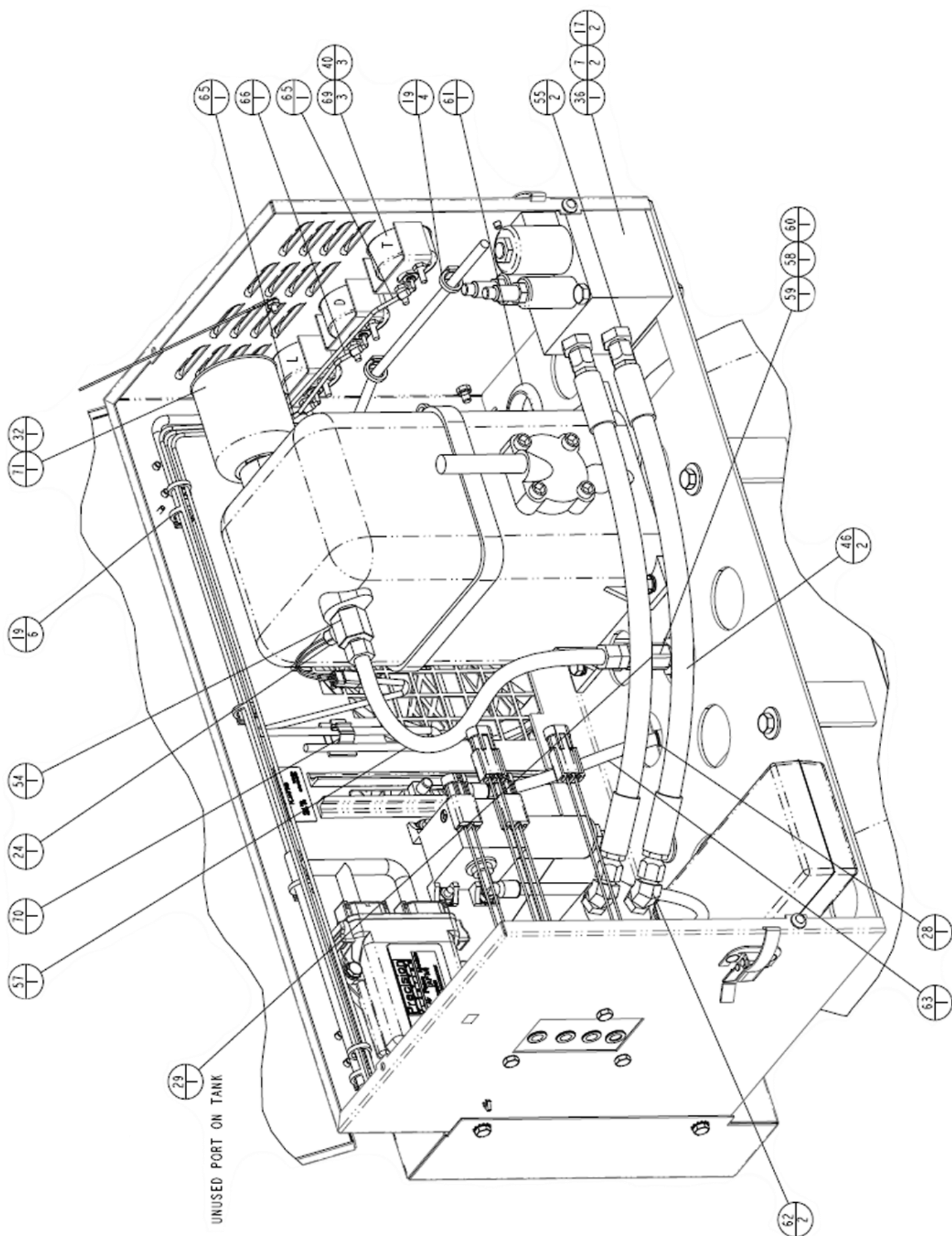
NPTF is easily recognizable and looks like regular pipe threads. It is not recommended for hydraulic systems but does exist on some ag equipment.

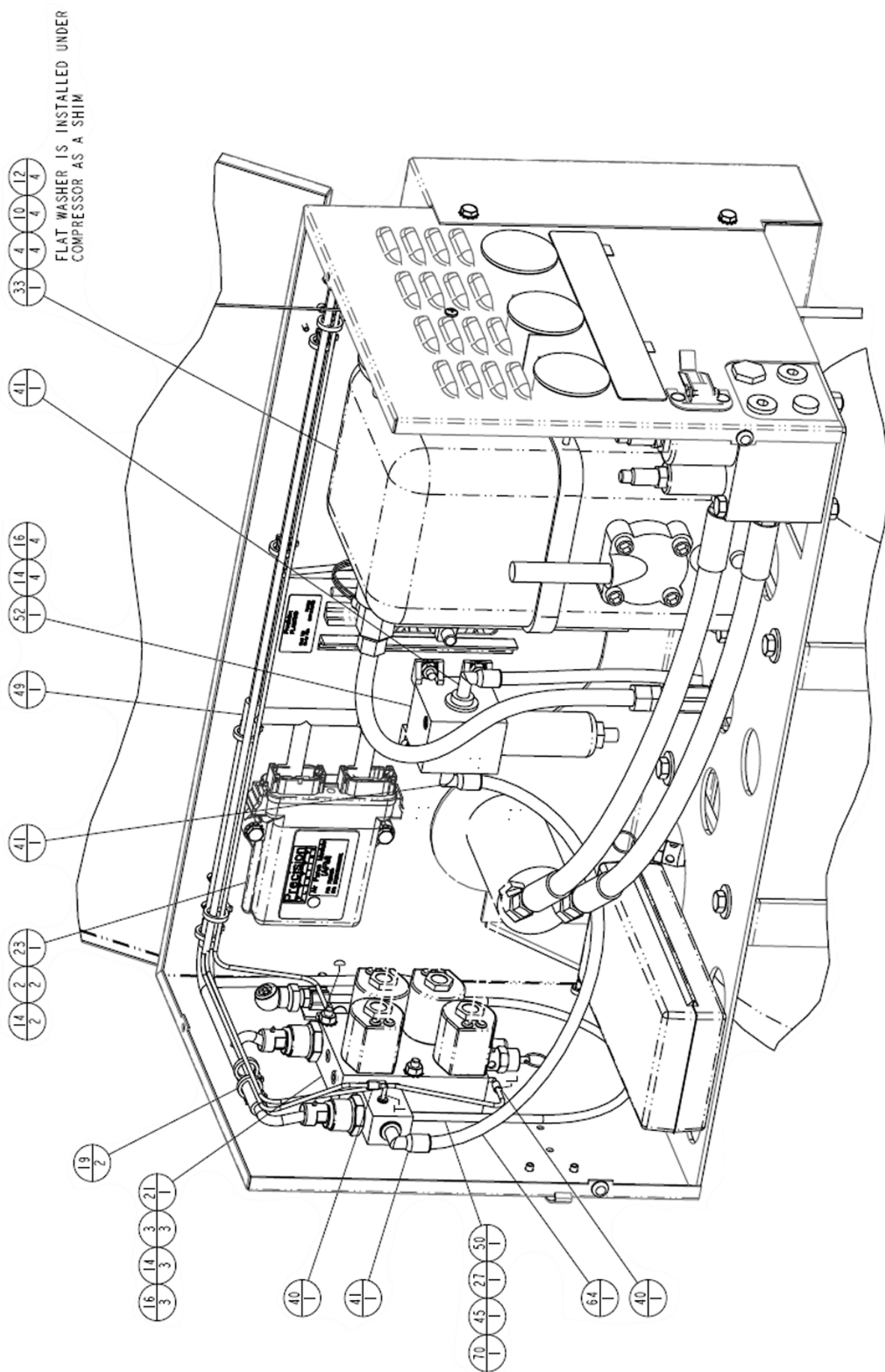
SAE ORB is a common and reliable thread type used in ports on valves, pumps, and cylinders. It utilizes an O-ring for sealing and the port can be recognized by a spot face and nice chamfer at the top of the port.

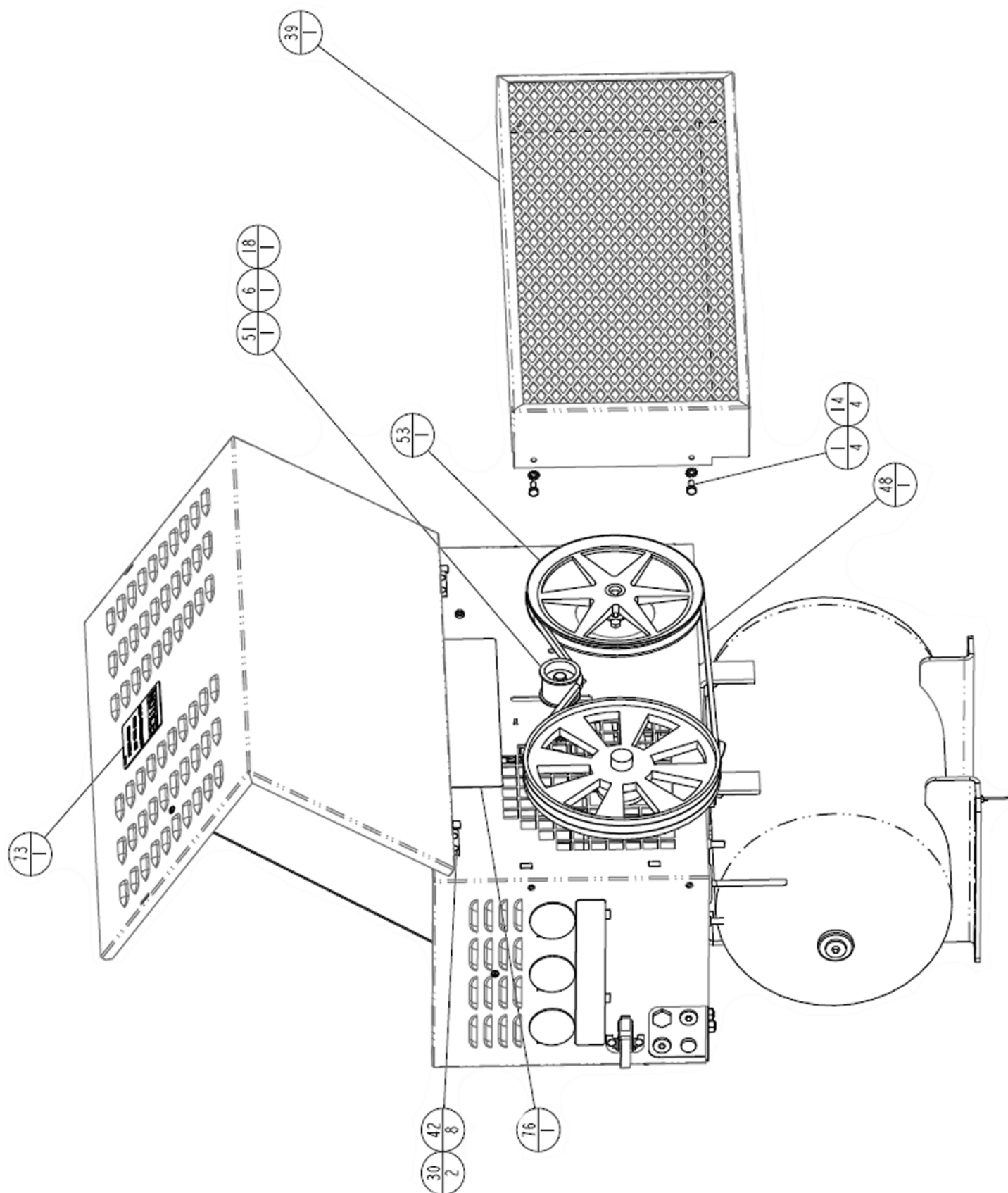
JIC 37 Deg FLARE is the common thread type used on hoses. The fitting has a taper on the end and the coupling of the hose has an internal taper. The taper is the sealing surface. ORFS (O-Ring Face Seal) is a newer style of fitting used on hoses. It uses an O-ring at the face of the seal instead of relying on a metal-to-metal seal on the taper.

Hydraulic Compressor Module





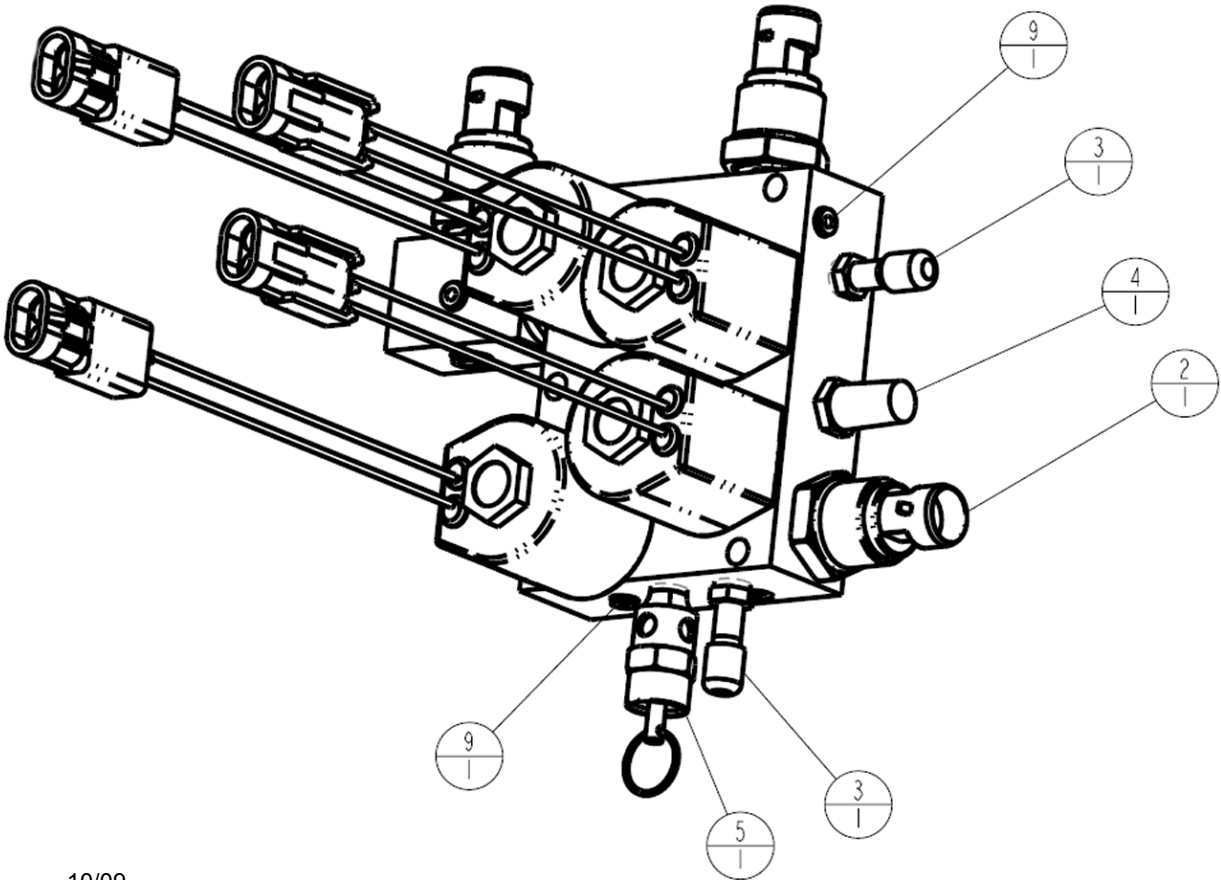
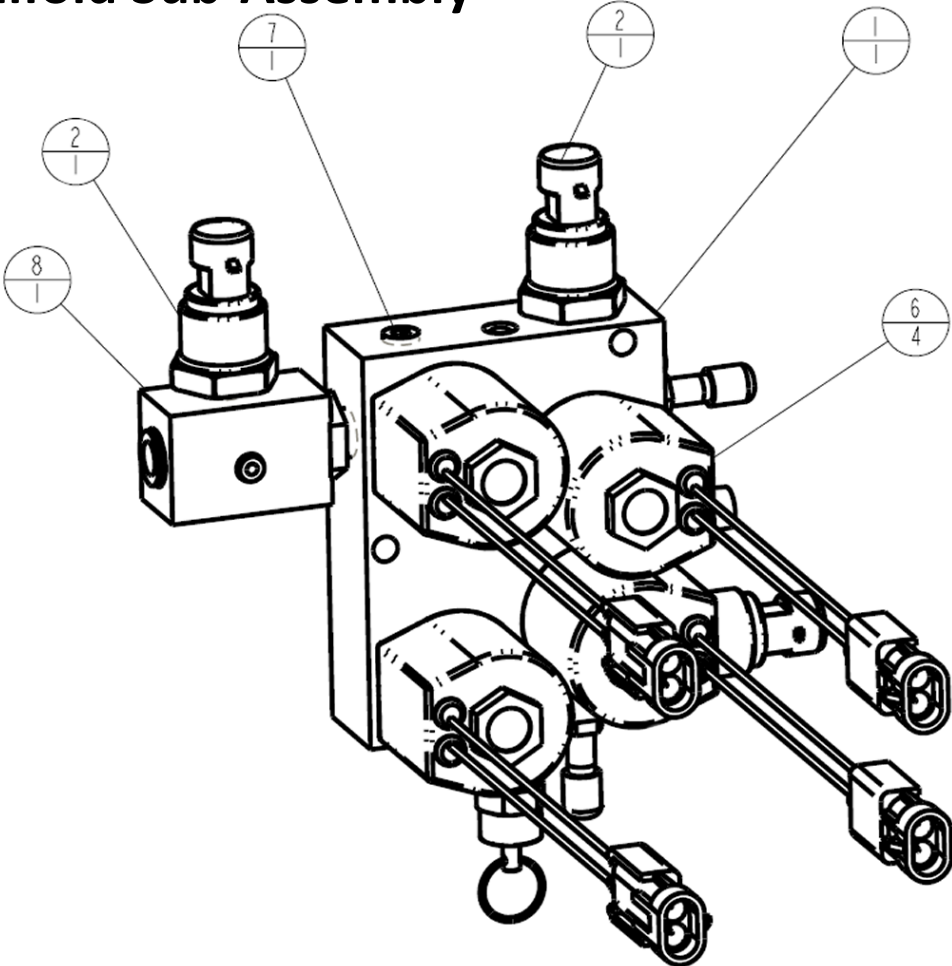


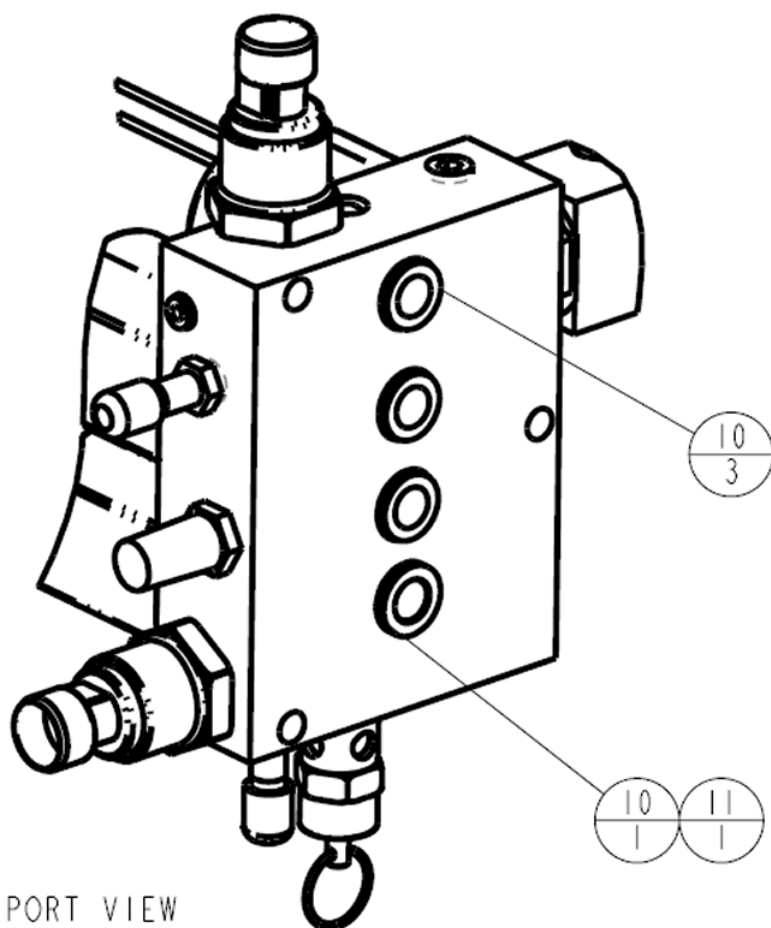


Item	Quantity	Part Number	Part Name	Description
1	4	13002	Bolt	1/4-20 X 5/8" GRD5 Zinc
2	2	13005	Bolt	1/4-20 X 1 GRD5 Zinc
3	3	13010	Bolt	1/4X1.75 HCS
4	4	13059	Bolt	5/16X1.5 GRD5 Zinc
5	4	13103	Bolt	3/8-16X2 GRD5 Zinc
6	1	13111	Bolt	3/8-16 X 2 HHCS GRD5 Zinc
7	2	13117	Bolt	3/8-16 X 3.5 HCS
8	5	17002	Bolt	1/4-28 X 5/8 LG GRD5 ZN
9	2	28957	Screw	10-24 X 1/2 Pan Phillips m/s steel Zinc
10	4	33006	Washer	5/16 USS Flat
11	3	33008	Washer	3/8 USS Flat ZN
12	4	33620	Lock Washer	
13	2	33735	Washer	#10 External Tooth Lock
14	13	33737	Washer	1/4" External Tooth Lock
15	2	36028	Nut	10-24 Zinc Hex Nut
16	7	36302	Nut	1/4-20 GRD5 Zinc Hex Nut
17	2	36306	Nut	3/8-16 Z5 Hex Nut
18	1	37624	Nut	3/8-16 Square STL Zinc
19	12	63124	Cable Tie	6" UV Black Cable Tie 30# Tensile
20	1	720068	Screw	6-32 X 5/16" Pan Phillips T/F Zinc
21	1	726033	Manifold Group	Pneumatic Down and Lift
22	1	726037	Air Tank	10 Gallon Air Tank Assembly
23	1	726085	Control Module	AirForce Module
24	1	726093	Sensor	Thermistor, Compressor Temperature Sensor
25	1	726095	Valve	Relief Valve (175psi)
26	1	726096	Drain Cock	Tank Condensate Drain
27	1	726107	Fitting	1/4"NPT X 1/4" PTC Straight Male Fitting
28	1	726108	Fitting	1/4"NPT X 3/8" PTC Straight Male Fitting
29	1	726176	Fitting	1/4"NPT Brass Plug
30	2	726194	Hinge	Enclosure Lid Hinge
31	2	726196	Bumper	Rubber Enclosure Lid
32	1	726198	Filter	Compressor Pre-Filter
33	1	726209	Compressor	Hydraulic Compressor Assembly
34	1	726214	Service Kit	Service Kit Assembly
35	2	726231	Latch	Enclosure Lid Latch
36	1	726235	Manifold	Hydraulic Manifold
37	1	726254	Cover	Hydraulic Enclosure
38	1	726255	Enclosure	Hydraulic Enclosure Assembly

Item	Quantity	Part Number	Part Name	Description
1	4	13002	Bolt	1/4-20 X 5/8" GRD5 Zinc
39	1	726256	Guard	Hydraulic Assembly
40	5	726271	Fitting	1/8"PTC 90degree Elbow
41	3	726273	Fitting	3/8"PTC 90degree Elbow
42	12	726276	Rivet	7/32" Tubular Rivet
43	1	726301	Fitting	1/4" NPT Coupler - Quick Disconnect
44	1	726302	Fitting	3/4" NPT Plug
45	1	726307	Chuck	Air Chuck
46	2	726362	Hose Assembly	Hydraulic Motor, Hose Assembly
47	1	726364	Motor	Hydraulic Motor
48	1	726366	V Belt	Drive Belt (A-57)
49	1	726367	Harness	Hydraulic Control Harness
50	1	726372	Hose Assembly	Accessory Hose
51	1	726373	Idler	Flat Idler
52	1	726382	Filter	Tank Filter (Hydraulic)
53	1	726383	Sheave	
54	1	726387	Adapter	Compressor Outlet
55	2	726404	Adapter	-8 SAE Boss X -6 JIC Straight Adapter
56	2	726417	Plug	-8 JIC Plug
57	1	726454	Hose Assembly	Hydraulic Compressor
58	1	726456	Bushing	3/4"NPT X 3/8"NPT
59	1	726457	Valve	Unloading Check Valve
60	1	726458	Adapter	3/8"NPT X 3/8" JIC
61	1	726459	Grommet	Wire Harness Grommet
62	2	726461	Fitting	-6SAE Boss X -6JIC 45degree Elbow
63	1	726462	Tubing	3/8" Tank to Filter
64	1	726463	Tubing	3/8" Filter to Manifold
65	2	726464	Tubing	1/8" Sensor to Guage (Tank & Lift)
66	1	726466	Tubing	1/8" Sensor to Guage (Down)
67	0.13	726467	Oil (gal)	Compressor 20WT
68	0.13	726468	Oil (gal)	Hydraulic 10WT
69	3	726572	Gauge	160 psi Panel Mount
70	2	726573	Clamp	Push Mount 2-Stage Lock
71	1	726579	Filter	Compressor Inlet
72	1	726598	Lanyard	Enclosure Lid
73	1	956047	Label	"Drain Condensation"
74	1	956048	Label	Guages'
75	1	956049	Label	Tank and Enclosure'
76	1	956050	Label	Hydraulic Enclosure AirForce
77	3	956054	Label	Serial Number

Manifold Sub-Assembly



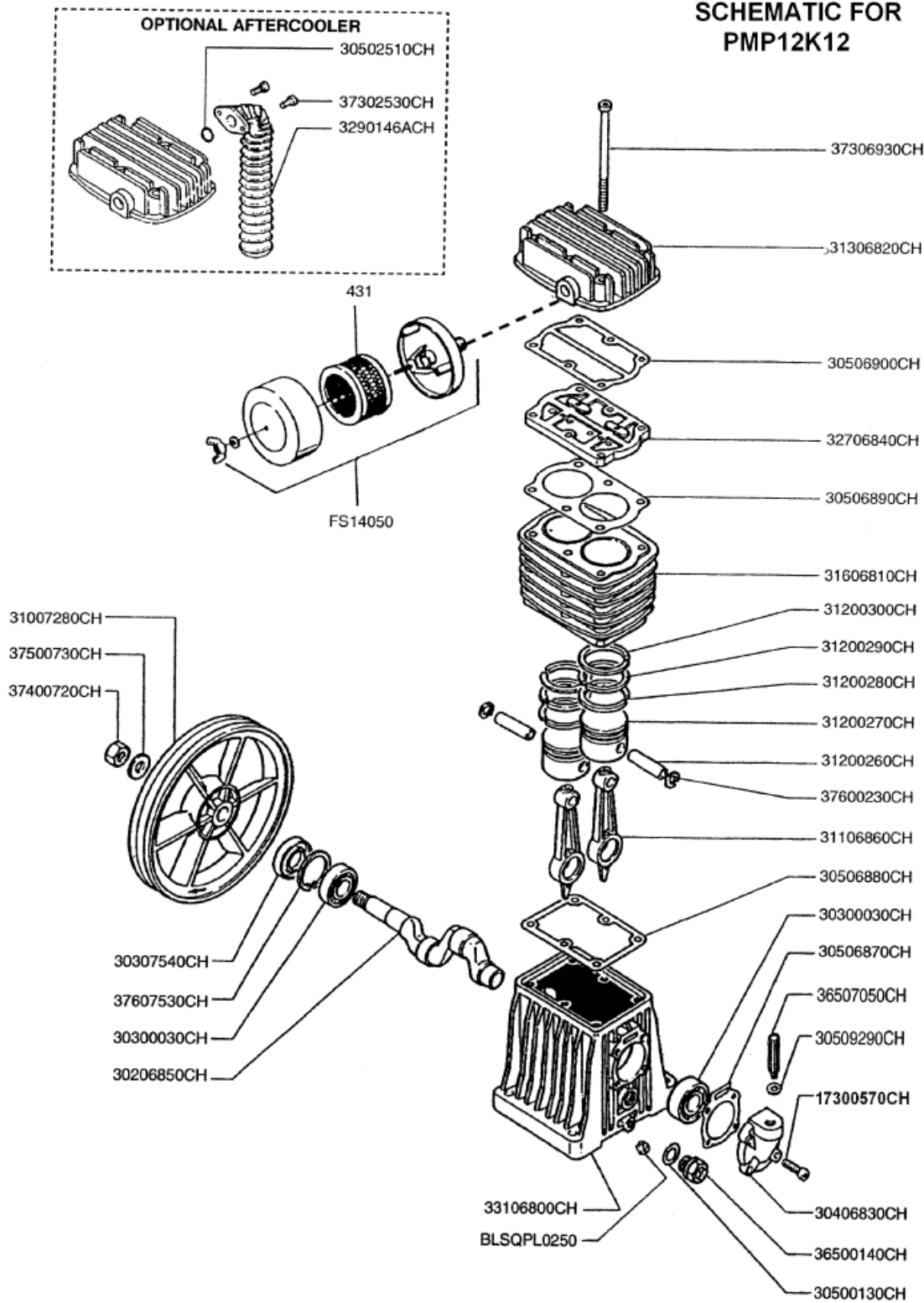


REAR PORT VIEW

Item	Quantity	Part Number	Part Name	Description
1	1	726032	Manifold Assembly	Machined Cast Aluminum Manifold Block
2	3	726077	Sensor	Pressure
3	2	726079	Valve	Schrader
4	1	726080	Vent	Exhaust Vent
5	1	726081	Valve	Relief Valve
6	4	726162	Valve Assembly	
7	1	726175	Fitting	1/8"NPT Plug
8	1	726245	Valve Assembly	Inlet Check
9	2	726268	Fitting	1/8" PTC Cartridge
10	4	726270	Fitting	3/8" PTC Cartridge
11	1	726274	Cap	Red 3/8 PTC

Compressor Sub-Assembly

ROLAIR
SCHEMATIC FOR
PMP12K12





ROLAIR SYSTEMS

606 S. Lake Street, P.O. Box 346

Hustisford Wisconsin 53034-0346

Phone: 920-349-3281

Sales Fax: 920.349.3691

Service Fax: 920.349.8861

www.rolair.com

PARTS LIST FOR PMP12K12

Description	Part #	Qty.
Crankshaft	30206850CH	1
Bearing	30300030CH	2
Oil Seal	30307540CH	1
Bearing Carrier	30406830CH	1
Gasket	30500130CH	1
Gasket	30506870CH	1
Gasket	30501910CH	1
Gasket	30506890CH	1
Gasket	30506900CH	1
O-Ring	30509290CH	1
Flywheel	31007280CH	1
Connecting Rod w/Upper Bushing	31106860CH	2
Piston Pin	31200260CH	2
Piston	31200270CH	2
Ring	31200280CH	2
Ring	31200290CH	2
Ring	31200300CH	2
Head	31306820CH	1
Cylinder	31606810CH	1
Valve Plate Assembly	32706840CH	1
Crankcase	33106800CH	1
Sight Gauge	36500140CH	1
3/8" Breather/Oil Fill Plug	36507050CH	1
Bolt	17300570CH	4
Bolt	37306930CH	6
Nut	37400720CH	1
Washer	37500730CH	1
Snap Ring	37600230CH	4
Snap Ring	37607530CH	1
Plug	BLSQPL0250	1
Ring Set	K12RINGS	1
Gasket Set	K12GASKETS	1
Silencer/Filter Assembly	FS14050	1
Filter Element	431	1
OPTIONS- O-Ring	30502510CH	1
Aftercooler	3290146ACH	1
Bolt	37302530CH	2
NOTE: Gasket for "old-style" option	30501490CH	1

Hydraulic Compressor Maintenance Guidelines

LUBRICATION

The compressor has been filled with 20 WT oil at the factory. Before beginning operation, check that the oil level is still correct. The oil sight gauge should be filled $\frac{3}{4}$ full. You should be able to see a small bubble at the top of the sight gauge. Be sure not to fill above the indicated level.

DO NOT USE A DETERGENT OIL!

All models are splash lubricated by means of dippers on the connecting rods. The pump must be operated in a level position for proper lubrication.

Oil Capacity 15 oz (<½ quart)

Oil type 32-55 Deg F ambient 20 WT Non-Detergent

56 Deg F & above 30 WT Non-Detergent

Always check when cool

BELTS

Belt tension should be adjusted to allow 3/8" to 1/2" deflection with normal thumb pressure.

GUARDS

Always ensure that guard is in place before operating the compressor.

FILTER

Monitor the pre-cleaner for blockage. A torn or damaged pre-cleaner should be replaced. In normal use the pre-cleaner will prevent the paper element filter from becoming plugged even in dusty conditions.

MAINTENANCE SCHEDULE

DAILY

Drain condensation from water separator and tank.

Check oil level and fill as needed.

(Change compressor oil after first 50 compressor hours)

SEASONALLY / 200 COMPRESSOR HOURS

Change compressor oil.

Examine compressor inlet filter and change if dirty.

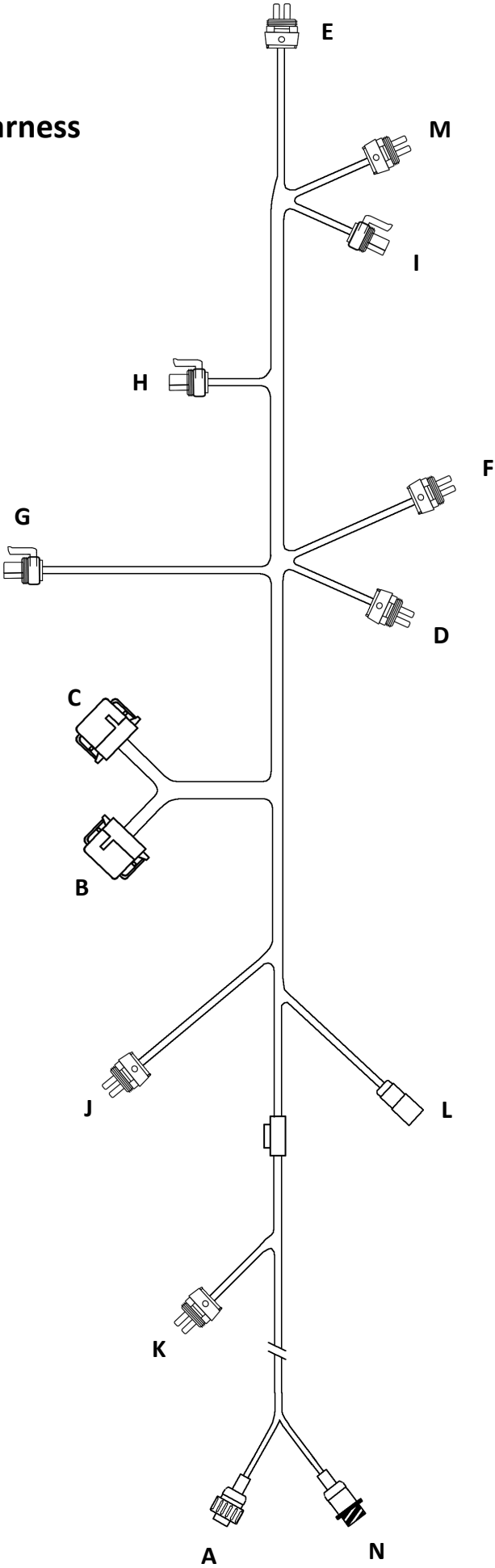
Check drive belt and adjust if necessary.

Check for air and oil leaks and correct.

726367

Hydraulic Compressor Control Harness

Connector "A"				
4 Pin AMP Receptacle		From Display		
PIN NO.	COLOR	FUNCTION	TO	
1	Black	Ground	C4, JB, N1	
2	Brown	RS 485 (+)	C7, N2	
3	Pink	RS 485 (-)	C6, N3	
4	Red	12 Volt Power	B8, DB, EB, FB, JA, KA, MB, N4	



Connector "B"			
12 Pin Deutsch Gray Plug AFM			
PIN	COLOR	FUNCTION	TO
1	Green	Compressor Temp (-)	L2
2		Not used	
3	Orange	Compressor Temp (+)	L1
4	White	Down PSI Signal	HC
5	Blue	Lift PSI Signal	GC
6	Red	Analog (+) 5 Volt	GB, HB, IB
7		Not Used	
8	Red	12 Volt Power	A4, DB, EB, FB, JA, KA, MB, N4
9	Green	Sensor Ground	GA, HA, IA
10	Purple	Tank PSI Signal	IC
11		Not Used	
12		Not Used	

Connector "C"			
12 Pin Deutsch Black Plug AFM			
PIN	COLOR	FUNCTION	TO
1		Not Used	
2		Not Used	
3		Not Used	
4	Black	Ground	A1, JB, N1
5	White	Down Vent (DV)	FA
6	Pink	RS 485(-)	A3, N3
7	Brown	RS 485 (+)	A2, N2
8	White	Down Increase (DI)	MA
9	White	Lift Vent (LV)	DA
10	White	Lift Increase (LI)	EA
11	Black	Compressor (-)	KB
12		Not Used	

Connector "D"			
2 Pin Weather Pack Female Lift Vent Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Lift Vent (LV)	C9
B	Red	Lift Vent (LV) Power	A4, B8, EB, FB, JA, KA, MB, N4

Connector "E"			
2 Pin Weather Pack Female Lift Increase Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Lift Increase (LI)	C10
B	Red	Lift Increase (LI) Power	A4, B8, DB, FB, JA, KA, MB, N4

Connector "F"			
2 Pin Weather Pack Female Down Vent Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Down Vent (DV)	C5
B	Red	Down Vent (DV) Power	A4, B8, DB, EB, JA, KA, MB, N4

Connector "G"			
Packard Plug Lift Pressure Sensor			
PIN	COLOR	FUNCTION	FROM
A	Green	Sensor Ground.	C9, HA, IA
B	Red	Analog (+) 5 Volt	B6, HB, IB
C	Blue	Lift PSI Signal	B5

Connector "H"			
Packard Plug Down Pressure Sensor			
PIN	COLOR	FUNCTION	FROM
A	Green	Sensor Ground	C9, GA, IA
B	Red	Analog (+) 5 Volt	B6, GB, IB
C	White	Down PSI Signal	B4

Connector "I"			
Packard Plug Tank Pressure Sensor			
PIN	COLOR	FUNCTION	From
A	Green	Sensor Ground	C9, GA, HA
B	Red	Analog (+) 5 Volt	B6, GB, HB
C	Purple	Tank PSI Signal	B10

Connector "J"			
2 Pin Weather Pack Female Diagnostic Connector 12 Volt			
PIN	COLOR	FUNCTION	FROM
A	Red	12 Volt Power	A4, B8, DB, E8, FB, KA, MB, N4
B	Black	Ground	A1, C4, N1

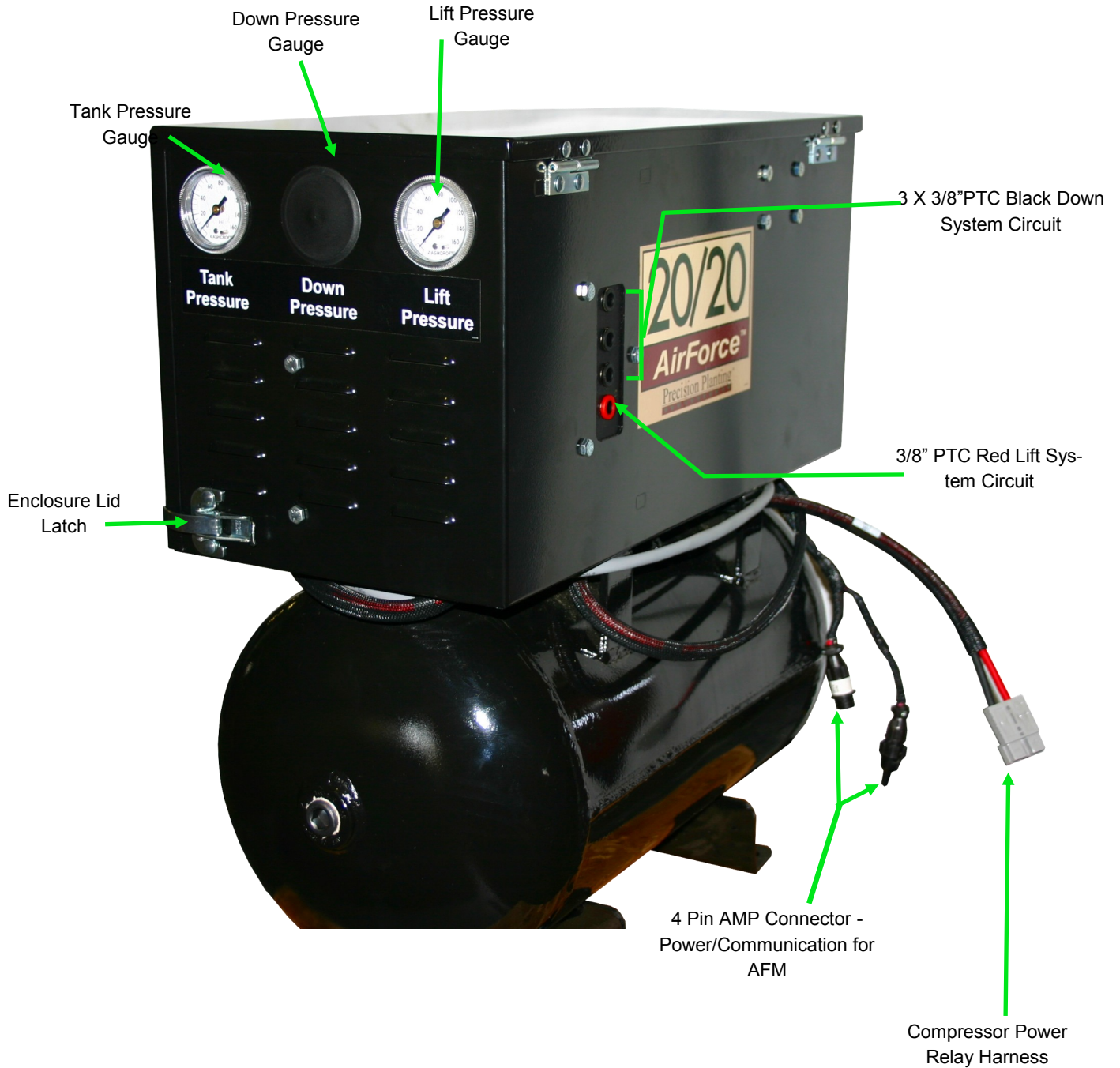
Connector "K"			
2 Pin Weather Pack Female Compressor Relay			
PIN	COLOR	FUNCTION	FROM
A	Red	Compressor Relay +12	A4, B8, DB, EB, FB, JA, MB, N4
B	Black	Compressor (-)	C11

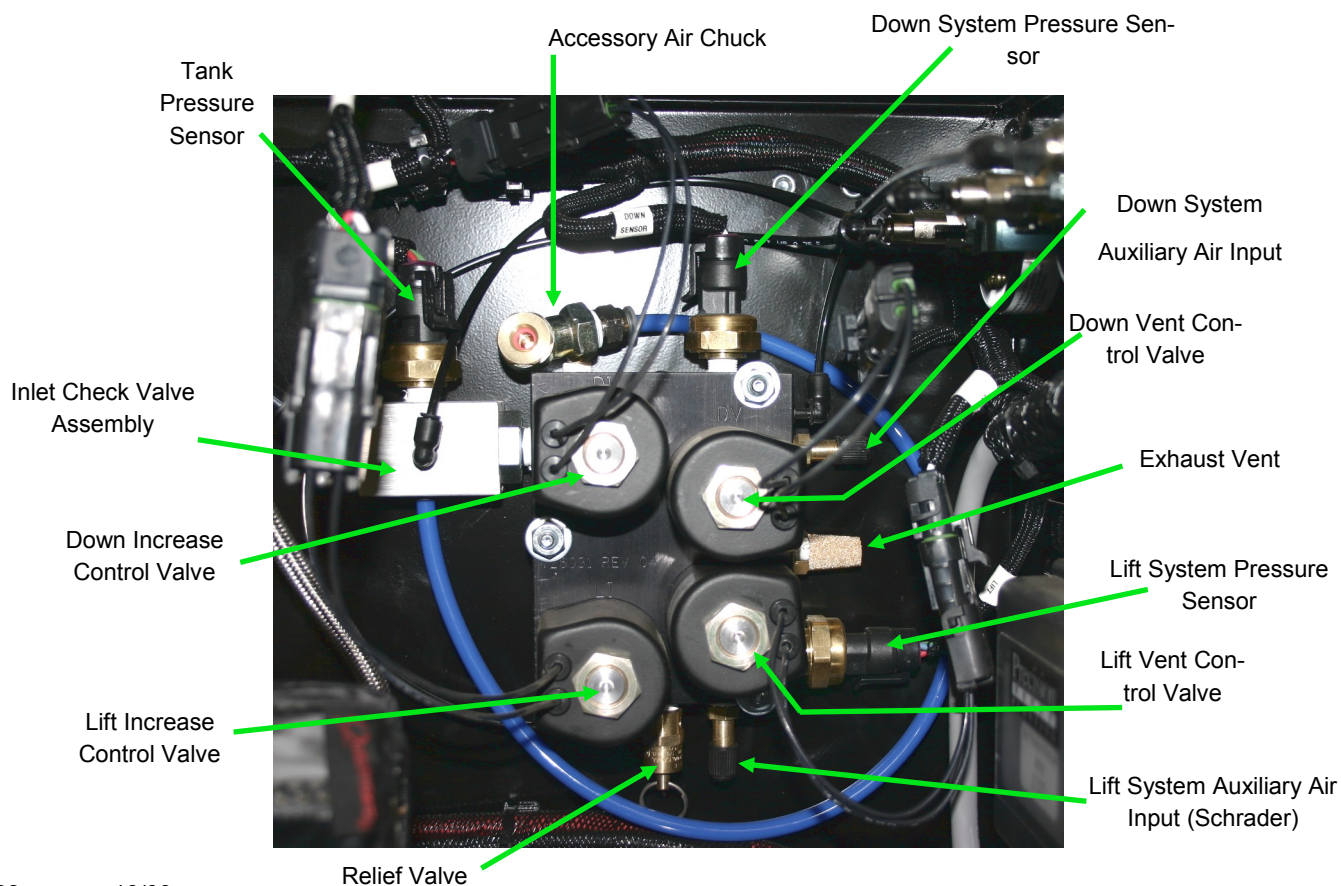
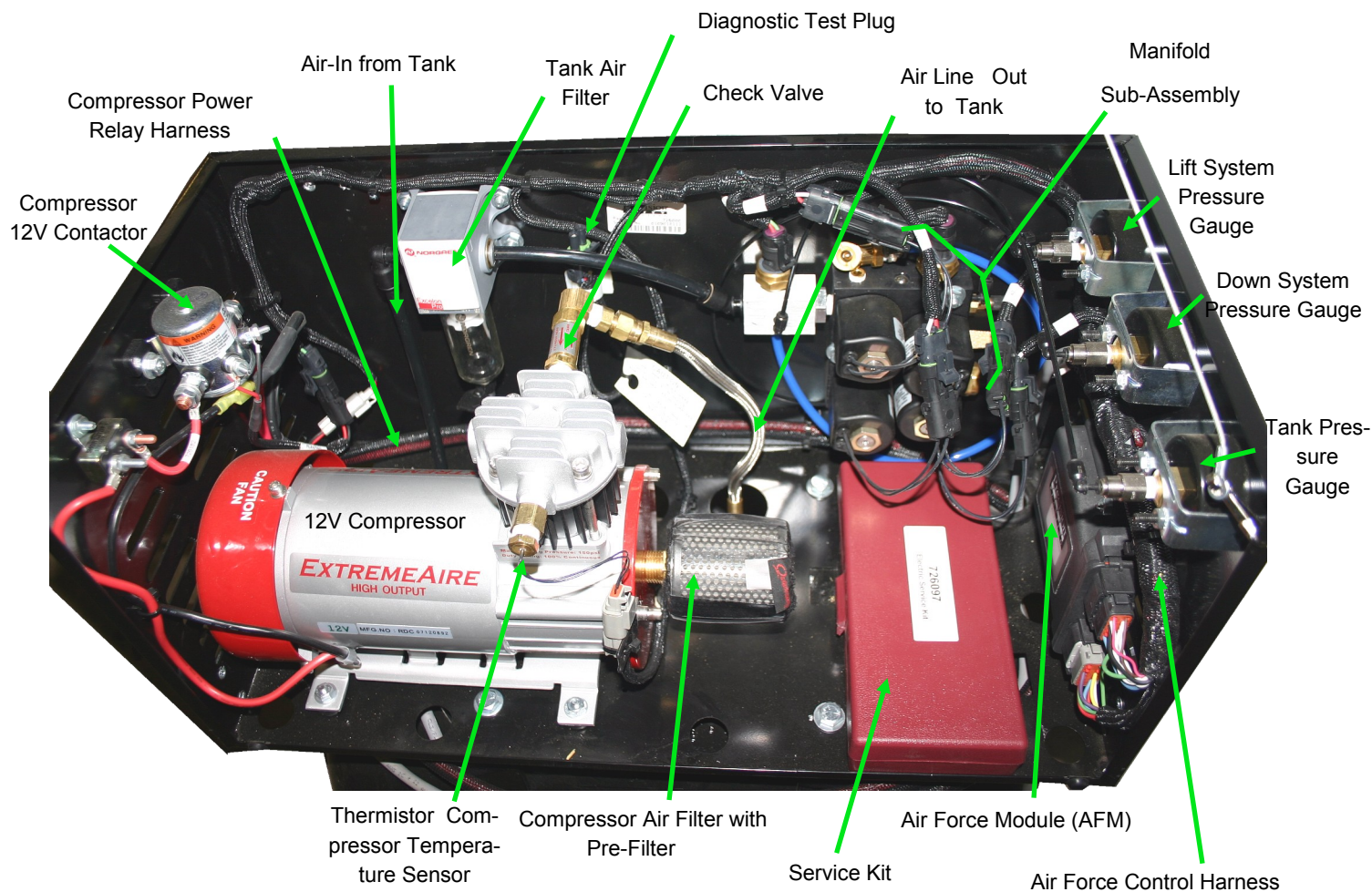
Connector "L"			
2 Pin Deutsch Gray Receptacle Compressor Temperature Sensor			
PIN	COLOR	FUNCTION	FROM
1	Orange	Compressor Temperature (+)	B3
2	Green	Compressor Temperature (-)	B1

Connector "M"			
2 Pin Weather Pack Female Down Increase Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Down Increase (DI)	C8
B	Red	Down Increase (DI) Power	A4, B8, DB, EB, FB, JA, KA, N4

Connector "N"			
4 Pin AMP Plug Auxiliary Power Connector			
PIN	COLOR	FUNCTION	FROM
1	Black	Ground	A1, C4, JB
2	Brown	RS 485 (+)	A2, C7
3	Pink	RS 485 (-)	A3 C6
4	Red	12 Volt Power	A4, B8, DB, EB, FB, JA, KA,MB

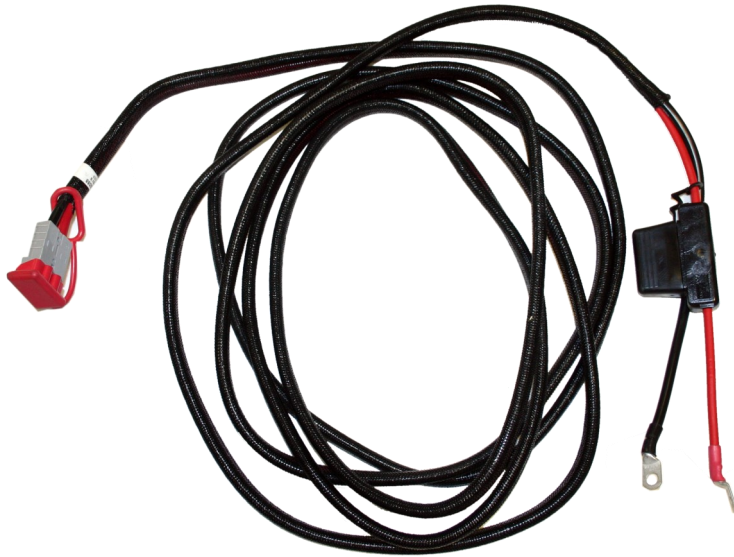
12V Compressor Module





Connecting Power to the Compressor

For electric Compressor Modules power is supplied via a direct connection to the electric power source on the tractor. A Tractor Power Cable (PN: 726088 - shown below must be routed from the planter attachment point through the under-carriage of the tractor forward. The cable can be connected directly to either the battery or starter to provide a stable and direct 12 Volt power source. Connect the ground cable to the post of the battery or starter, not randomly on the frame of the tractor.



For situations requiring the Compressor Module to be mounted farther than the provided cabling, a 12 foot 2-gauge extension is available (PN 726224). For distances greater than this, see the Voltage Drop Table for recommendations on wire gauges and distances for custom applications.

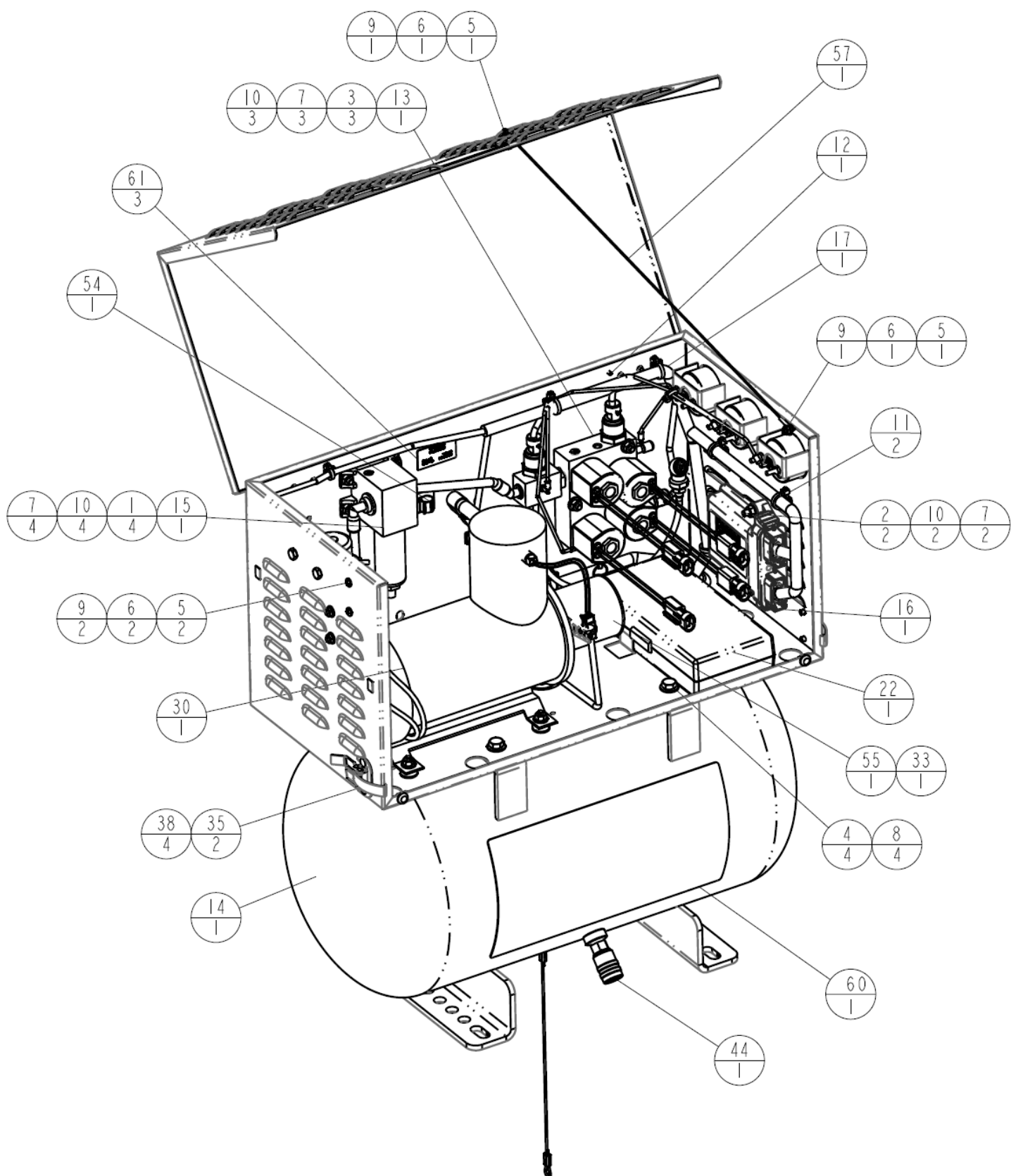
20/20 AirForce Voltage Drop Table—50 amp current

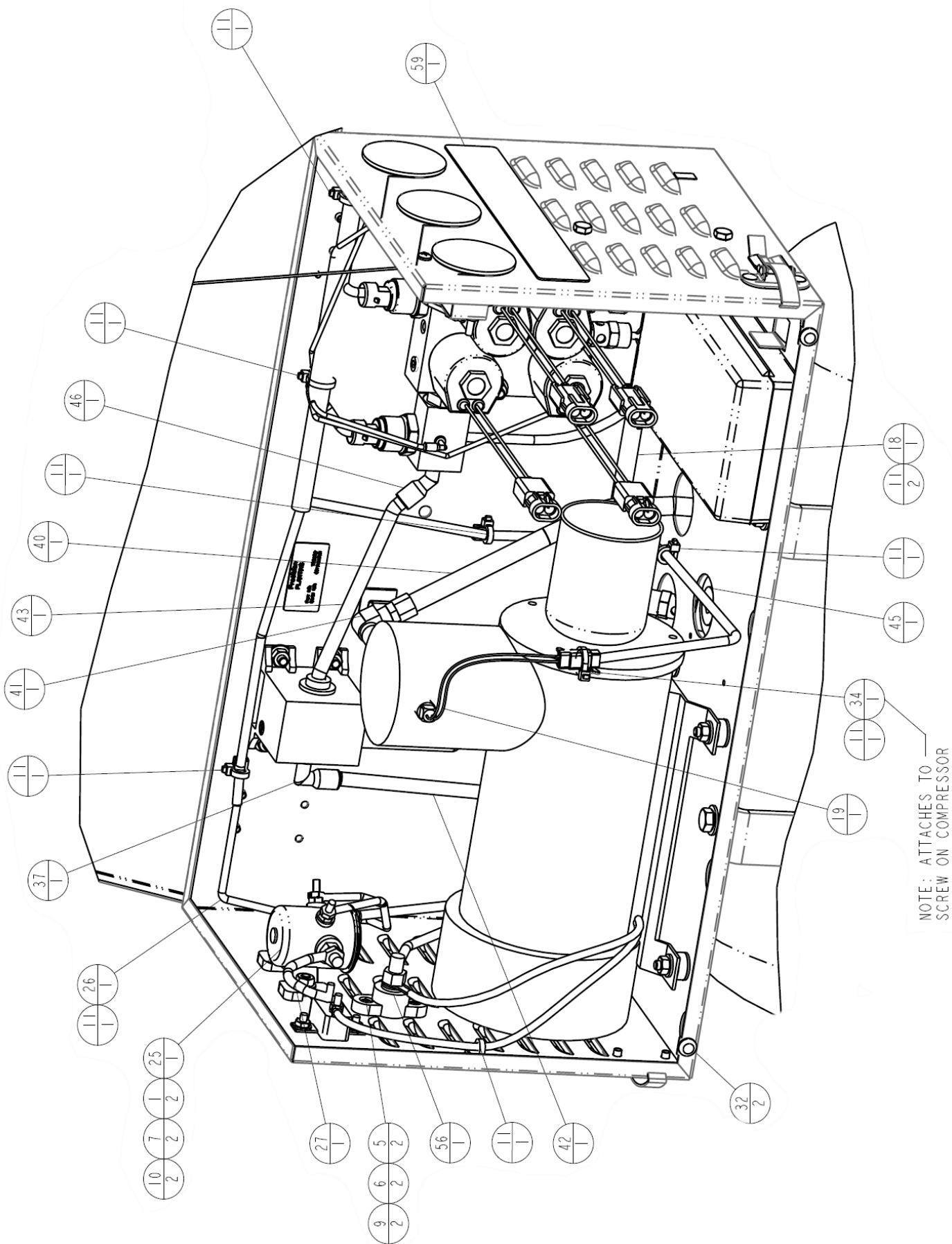
	One way distance						
Wire Gage	12	20	30	40	50	60	80
0	0.12	0.20	0.29	0.39	0.49	0.59	0.79
1	0.15	0.25	0.37	0.50	0.62	0.74	0.99
2	0.19	0.31	0.47	0.63	0.78	0.94	1.25
3	0.24	0.39	0.59	0.79	0.99	1.18	1.58
4	0.30	0.50	0.75	0.99	1.24	1.49	1.99
6	0.47	0.79	1.19	1.58	1.98	2.37	3.16

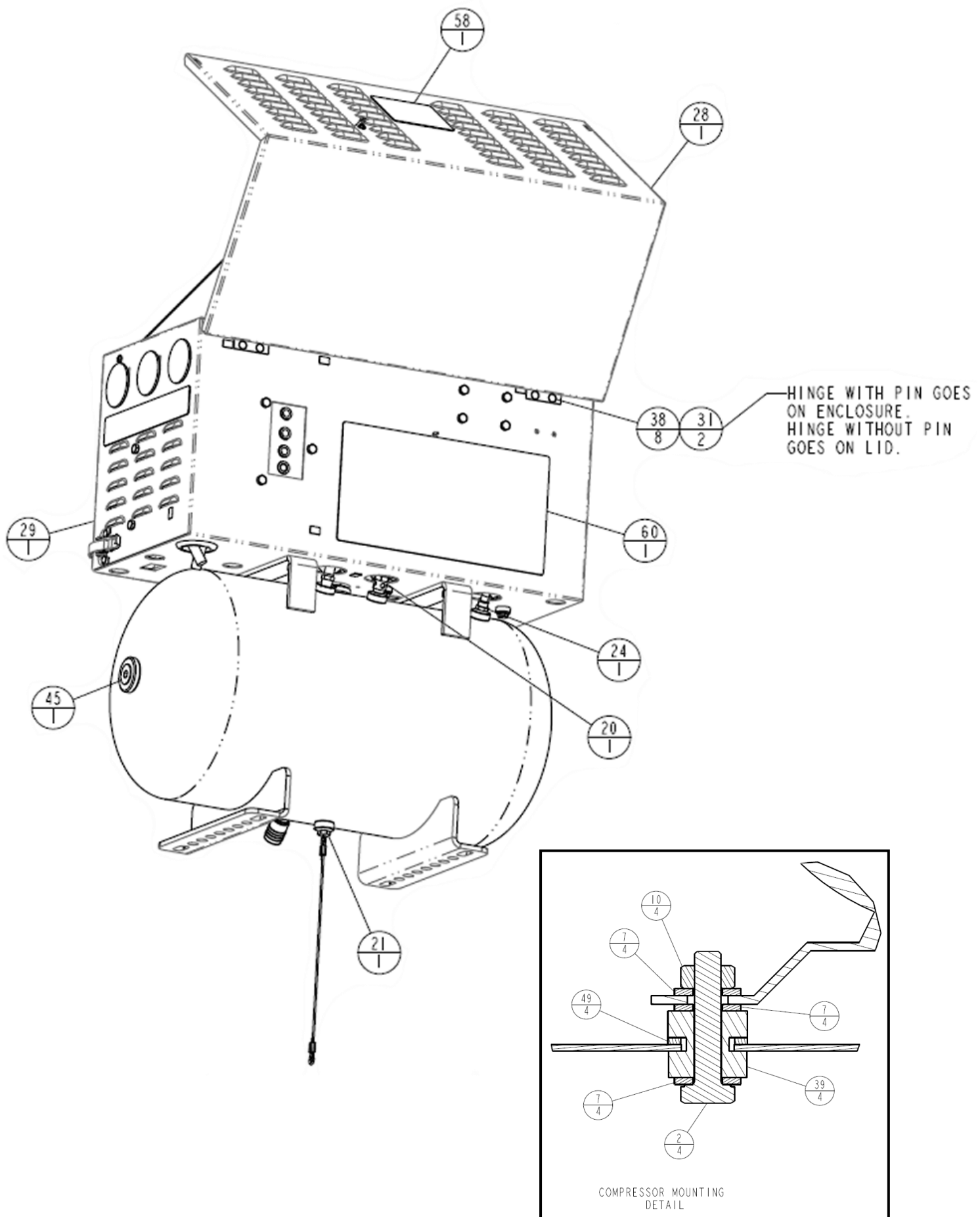
Values above are voltage lost for the round trip - twice the length of cable shown

The above values represent the voltage drop through any **extension cables only**. There is an additional 1.2 volt drop through the standard tractor cable.

725554 - Kit that includes 2 housings & 4 contacts to use with #2 or smaller diameter wire gage. Larger wire may require trimming of some strands to fit in terminal. Crimper is not included in this kit, it can be done with most large crimpers



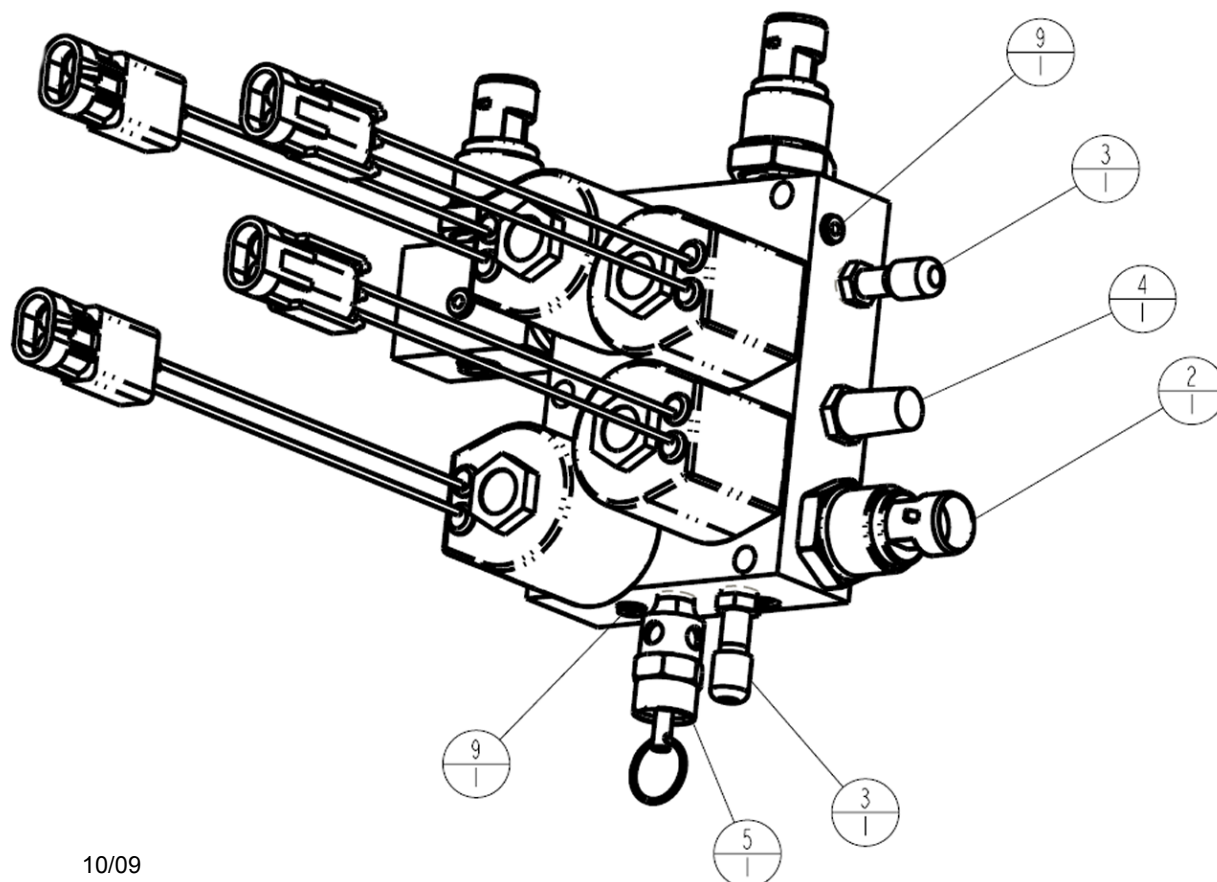
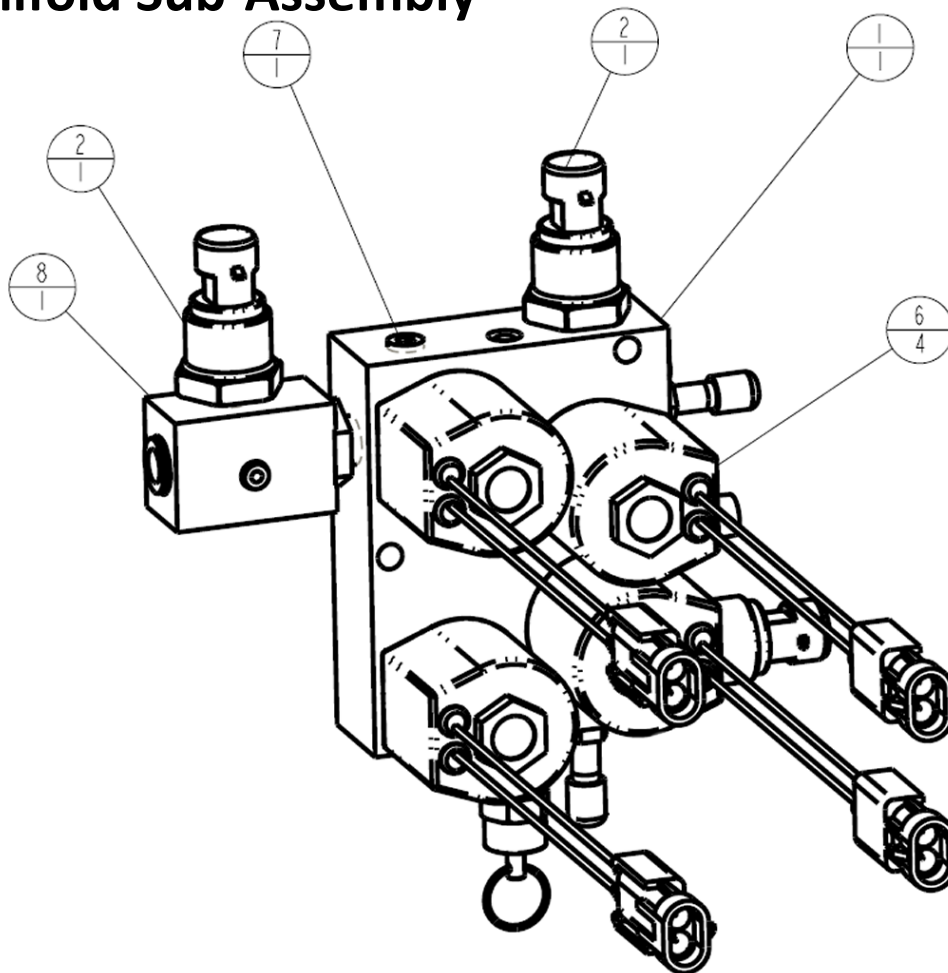


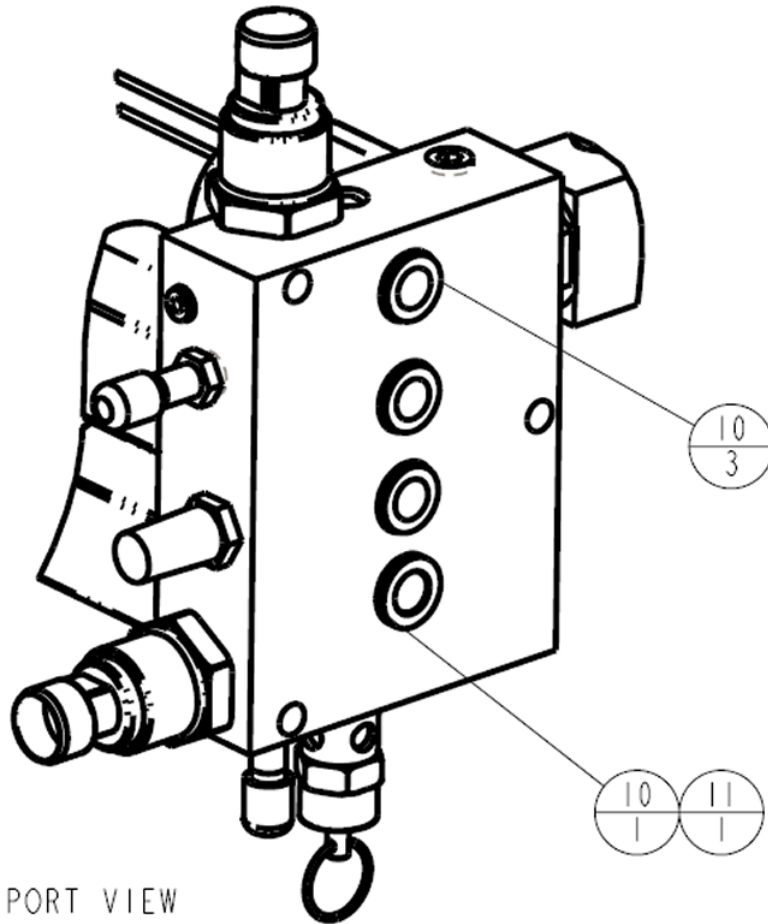


Item	Quantity	Part Number	Part Name	Description
1	6	13002	Bolt	1/4 X 5/8 GRD 5 Hex Bolt Zinc
2	6	13007	Bolt	1/4 X 1.25 GRD 5 Hex Bolt Zinc
3	3	13010	Bolt	1/4 X 1.75 GRD 5 Hex Bolt Zinc
4	4	13103	Bolt	3/8 X 0.75 GRD 5 Bolt Zn
5	6	28957	Screw	10 X 1/2 Pan Head Machine Screw
6	6	33074	Washer	#10 SAE Flat Zn
7	23	33078	Washer	1/4 SAE Flat Zn
8	4	33082	Washer	3/8 SAE Flat Zn
9	6	36028	Hex Nut	10 X 0.13 Hex Machine Screw Nut Zn
10	15	36302	Hex Nut	1/4 Hex Nut Zn
11	14	63124	Cable Tie	6" X 1-3/8 DIA. UV Black
12	1	720068	Screw	6-32 X 5/16" Pan Phillips T/F Zinc
13	1	726033	Manifold GP	Pneumatic Down & Lift
14	1	726037	Air Tank Assembly	10 Gallon
15	1	726084	Filter	Tank Filter
16	1	726085	AFM	Air Force Module
17	1	726086	Harness	Air Force Control Harness
18	1	726087	Relay Harness	Compressor Power Cable Assembly
19	1	726093	Sensor	Thermistor - Compressor Head Temperature
20	1	726095	Relief Valve	175 PSI Relief Valve
21	1	726096	Drain	Tank Condensate Drain
22	1	726097	Service Kit	Service Kit Assembly
23	1	726107	Air Fitting	1/4 NPT X 1/4 PTC
24	1	726108	Air Fitting	1/4 NPT X 3/8 PTC
25	1	726180	Contactor	Compressor Power Relay Contactor
26	1	726181	Pig Tail	Contactor Diagnostic Pig Tail
27	1	726182	Cable	Contactor to Compressor Circuit Breaker
28	1	726189	Cover	Control Enclosure Cover
29	1	726192	Enclosure	Control Enclosure
30	1	726193	Compressor	12V Air Force Compressor
31	2	726194	Hinge	Enclosure Hinge
32	2	726196	Bumper	Rubber Enclosure Lid Bumper
33	1	726198	Pre-Filter	Compressor Pre-Filter
34	1	726201	Clip	Ladder Clip
35	2	726231	Latch	Enclosure Latch
36	6	726271	1/8" Elbow	Plug in PTC Elbow
37	1	726273	3/8" Elbow	Plug in PTC Elbow
38	12	726276	Rivet	Tubular Rivet
39	4	726277	Mount	Rubber Compressor Mount
40	1	726282	Hose	Compressor Hose
41	1	726292	Elbow	1/4" NPT Brass
42	1	726293	Hose	3/8" Tank to Filter

Item	Quantity	Part Number	Part Name	Description
43	1	726294	Hose	3/8" Filter to Manifold
44	1	726301	Disconnect	1/4" NPT Coupler
45	2	726302	Plug	3/4" NPT
46	1	726303	3/8" 45 Degree Elbow	Plug in PTC Elbow
47	1	726307	Chuck	Air Chuck
48	1	726308	Grommet	Wire Harness Grommet
49	4	726309	Washer	Mount Spacer
50	2	726344	Tubing	1/8" Tank & Lift to Analog Gauge
51	1	726345	Tubing	1/8" Down to Analog Gauge
52	1	726372	Tubing	Accessory Hose
53	3	726572	Gauge	160 psi Analog Panel Mount Gauge
54	1	726573	Clamp	Push Mount 2-Stage Lock
55	1	726579	Filter	Compressor Inlet
56	1	726588	Terminal	Ground Terminal Block
57	1	726598	Lanyard	Cable to Enclosure Lid
58	1	956047	Sticker	Drain Condensation
59	1	956048	Sticker	Gauge Sticker
60	2	956049	Sticker	Tank and Enclosure Sticker
61	3	956052	Sticker	Serial Number

Manifold Sub-Assembly



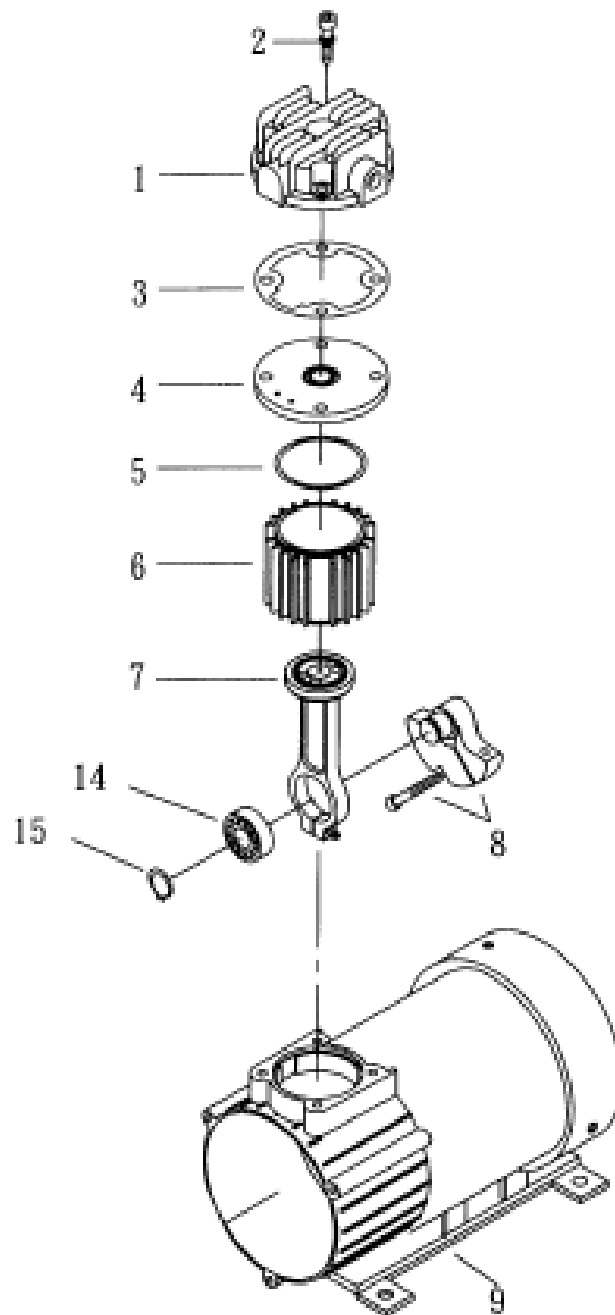


REAR PORT VIEW

Item	Quantity	Part Number	Part Name	Description
1	1	726032	Manifold Assembly	Machined Cast Aluminum Manifold Block
2	3	726077	Sensor	Pressure
3	2	726079	Valve	Schrader
4	1	726080	Vent	Exhaust Vent
5	1	726081	Valve	Relief Valve
6	4	726162	Valve Assembly	
7	1	726175	Fitting	1/8"NPT Plug
8	1	726245	Valve Assembly	Inlet Check
9	2	726268	Fitting	1/8" PTC Cartridge
10	4	726270	Fitting	3/8" PTC Cartridge
11	1	726274	Cap	Red 3/8 PTC

ExtremeAire

007-000



SPARE PARTS LIST

NO : WP-0906

REF. NO.	DESCRIPTION	PART NO.	QTY.	REF. NO.	DESCRIPTION	PART NO.	QTY.
1	Cylinder head	3101096N	1	9	Motor set	3B8-DC0712V	1
2	Allen bolt set	2B01-W06*080V	4	10			
3	Cylinder head gasket	2G01-023	1	11			
4	Exhaust valve seat set	3B11-A9000	1	12			
5	Valve seat gasket	2G03-017	1	13			
6	Cylinder	3201065	1	14	Bearing	2N35-620ZZC3	1
7	Rod set	3B3-A9000	1	15	Circlip	2N42-S15	1
8	Crankshaft set	3304079	1				

Electric Compressor Maintenance Guidelines

ELECTRICAL POWER

This compressor is a high-amperage 12 Volt motor. It is important that you have good connections between the tractor battery and the motor. The compressor is protected by a 60 amp fuse located where the power cable connects to the tractor battery.

LUBRICATION

This compressor is dry and permanently lubricated, there is no oil in the crankcase. No lubrication of this compressor is required.

FITTINGS

The pre-installed fittings in the cylinder head should not be further-tightened. In the case that fittings must be removed, exercise caution when re-installing as over tightening these fittings will result in cracking of the head. High temperature liquid sealants have proven more effective than Teflon tape on these fittings.

FILTER

Monitor the pre-cleaner for blockage. A torn or damaged pre-cleaner should be replaced. In normal use the pre-cleaner will prevent the paper element filter from becoming plugged even in dusty conditions.

MAINTENANCE SCHEDULE

DAILY

Drain condensation from water separator and tank.
Monitor inlet filter precleaner for excessive build up.

SEASONALLY

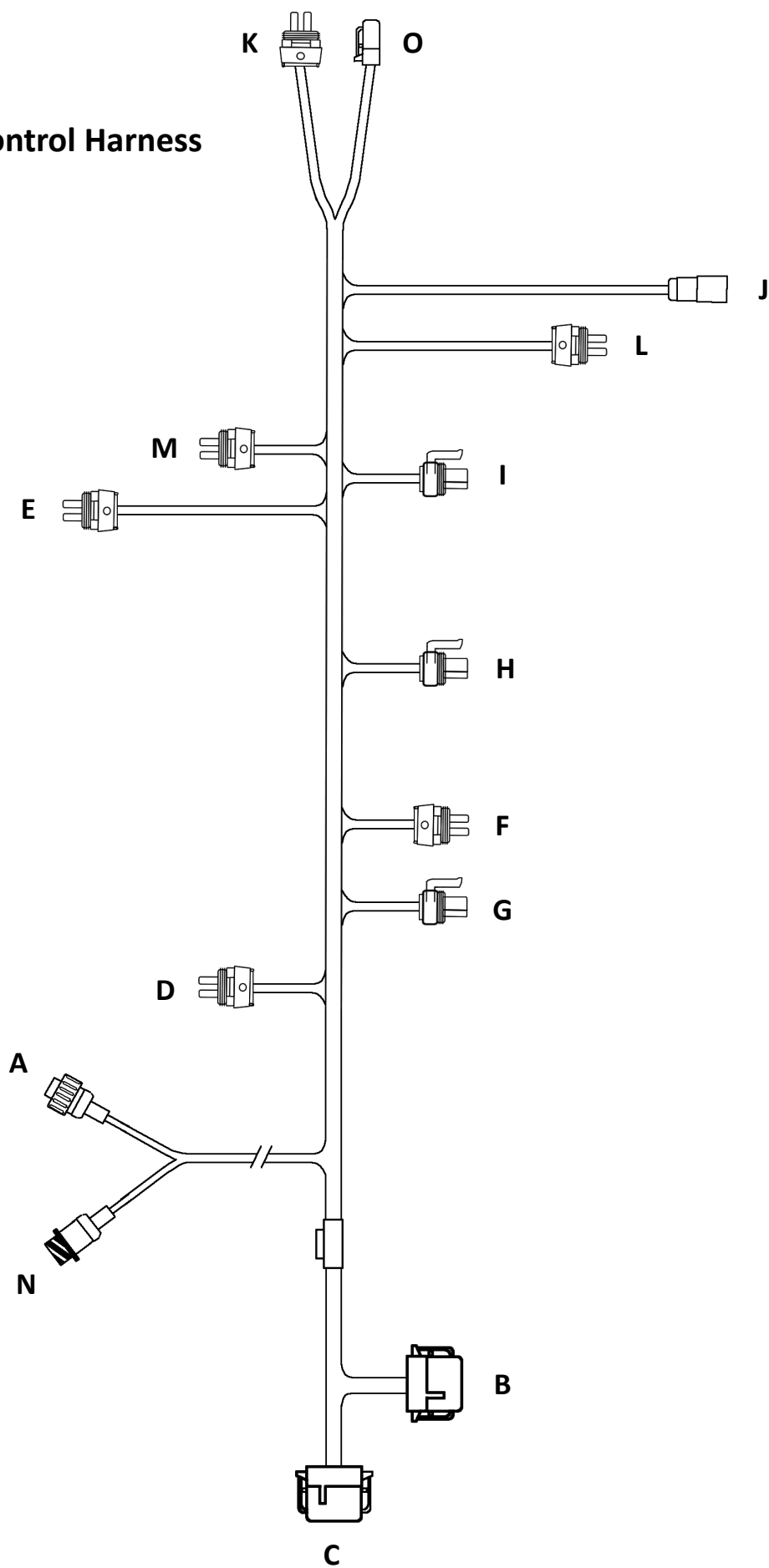
Examine compressor inlet filter and replace if dirty.
Check for air and oil leaks and correct.

200 COMPRESSOR HOURS

Examine/Replace the piston and cylinder
Kit # 726222

726086

12V Compressor Control Harness



Connector "A"			
4 Pin AMP Receptacle From Display			
PIN	COLOR	FUNCTION	TO
1	Black	Ground	C4, JB, N1
2	Brown	RS 485 (+)	C7, N2
3	Pink	RS 485(-)	C6, N3
4	Red	12 Volt Power	B8, DB, EB, FB, JA, KA, MB, N4

Connector "B"			
12 Pin Deutsch Gray Plug AFM			
PIN	COLOR	FUNCTION	TO
1	Green	Compressor Temp (-)	L2
2		Not used	
3	Orange	Compressor Temp (+)	L1
4	White	Down PSI Signal	HC
5	Blue	Lift Pressure Signal	GC
6	Red	Analog (+) 5 Volt	GB, HB, IB
7		Not Used	
8	Red	12 Volt Power	A4, DB, EB, FB, JA, KA, MB, N4
9	Green	Sensor Ground	GA, HA, IA
10	Purple	Tank PSI Signal	IC
11		Not Used	
12		Not Used	

Connector "C"			
12 Pin Deutsch Black Plug AFM			
PIN	COLOR	FUNCTION	TO
1	Blue	Compressor Volt Detection	O1
2		Not Used	
3		Not Used	
4	Black	Ground	A1, JB, N1
5	White	Down Vent (DV)	FA
6	Pink	RS 485(-)	A3, N3
7	Brown	RS 485 (+)	A2, N2
8	White	Down Increase (DI)	MA
9	White	Lift Vent (LV)	DA
10	White	Lift Increase (LI)	EA
11	Black	Compressor (-)	KB
12	Gray	Compressor Volt Detection	O2

Connector "D"			
2 Pin Weather Pack Female Lift Vent Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Lift Vent (LV)	C9
B	Red	Lift Vent (LV) Power	A4, B8, EB, FB, JA, KA, MB, N4

Connector "E"			
2 Pin Weather Pack Female Lift Increase Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Lift Increase (LI)	C10
B	Red	Lift Increase (LI) Power	A4, B8, DB, FB, JA, KA, MB, N4

Connector "F"			
2 Pin Weather Pack Female Down Vent Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Down Vent (DV)	C5
B	Red	Down Vent (DV) Power	A4, B8, DB, EB, JA, KA, MB, N4

Connector "G"			
Packard Plug Lift Pressure Sensor			
PIN	COLOR	FUNCTION	FROM
A	Green	Sensor Ground.	C9, HA, IA
B	Red	Analog (+) 5 Volt	B6, HB, IB
C	Blue	Lift PSI Signal	B5

Connector "H"			
Packard Plug Down Pressure Sensor			
PIN	COLOR	FUNCTION	FROM
A	Green	Sensor Ground	C9, GA, IA
B	Red	Analog (+) 5 Volt	B6, GB, IB
C	White	Down PSI Signal	B4

Connector "I"			
Packard Plug Tank Pressure Sensor			
PIN	COLOR	FUNCTION	From
A	Green	Sensor Ground	C9, GA, HA
B	Red	Analog (+) 5 Volt	B6, GB, HB
C	Purple	Tank PSI Signal	B10

Connector "J"			
2 Pin Weather Pack Female Diagnostic Connector 12 Volt			
PIN	COLOR	FUNCTION	FROM
A	Red	12 Volt Power	A4, B8, DB, E8, FB, KA, MB, NA
B	Black	Ground	A1, C4, N1

Connector "K"			
2 Pin Weather Pack Female Compressor Relay			
PIN	COLOR	FUNCTION	FROM
A	Red	Compressor Relay +12	A4, B8, DB, EB, FB, JA, MB, N4
B	Black	Compressor (-)	C11

Connector "L" 2 Pin Deutsch Gray Receptacle Compressor Temperature Sensor			
PIN	COLOR	FUNCTION	FROM
1	Orange	Compressor Temperature (+)	B3
2	Green	Compressor Temperature (-)	B1

Connector "M" 2 Pin Weather Pack Female Down Increase Solenoid			
PIN	COLOR	FUNCTION	FROM
A	White	Down Increase (DI)	C8
B	Red	Down Increase (DI) Power	A4, B8, DB, EB, FB, JA, KA, N4

Connector "N" 4 Pin AMP Plug Auxiliary Power Connector			
PIN	COLOR	FUNCTION	FROM
1	Black	Ground	A1, C4, JB
2	Brown	RS 485 (+)	A2, C7
3	Pink	RS 485 (-)	A3, C6
4	Red	12 Volt Power	A4, B8, DB, EB, FB, JA, KA, MB

Connector "O" 2 Pin Deutsch Gray Plug Compressor Voltage Detection			
PIN	COLOR	FUNCTION	FROM
1	Blue	Compressor Voltage Detection	C1
2	Gray	Compressor Voltage Detection	C12

Connecting Communication to the Compressor Module



The Compressor Module communication cable ends in a 'Y' with a 4 pin MALE and a 4 pin FEMALE connection. This cable is used to connect the AirForce Module that monitors and controls the Compressor Module to the 20/20 SeedSense monitor. The Compressor Module can be connected in **SERIES** between the SeedSense monitor and the Smart Connector **OR** in **PARALLEL** with the Smart Connector directly to the SeedSense monitor.

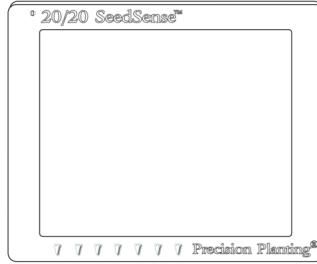
Most connections will be made in SERIES using the 725206 and 725499 Tractor Harnesses.

Some connections will be made in PARALLEL and will most often occur (but are not limited to) configurations using the 725207 Tractor Harness.

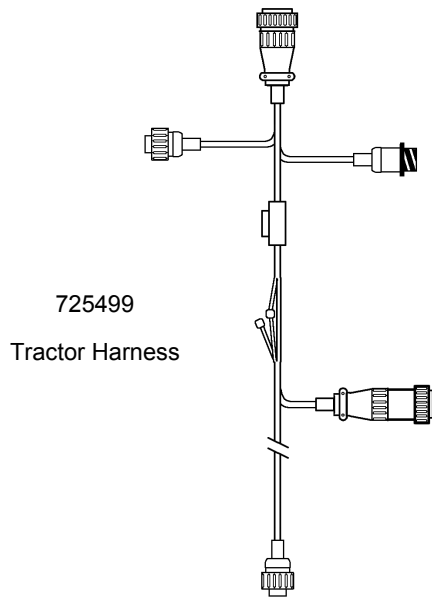
See following pages

Connecting Communication in Series

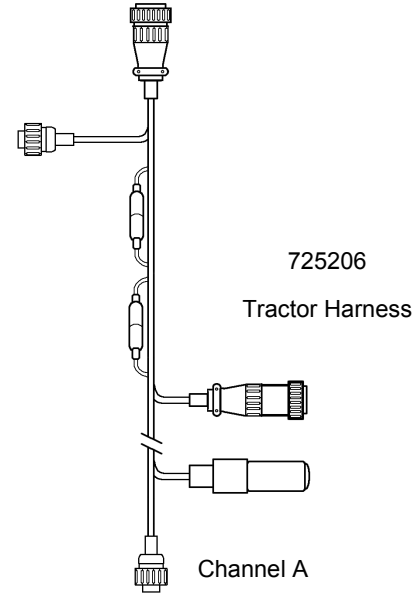
This configuration will apply to the majority of the systems sold from October 2008 on.



20/20 SeedSense Monitor



OR

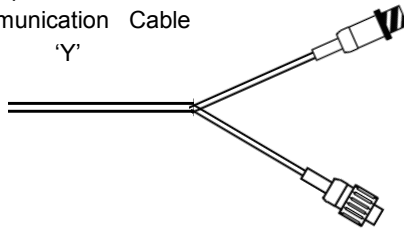


Channel A

CONNECT TO



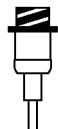
Compressor Module
Communication Cable
'Y'



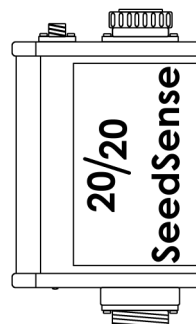
CONNECT TO



4 Pin Male
Extension to Smart
Connector



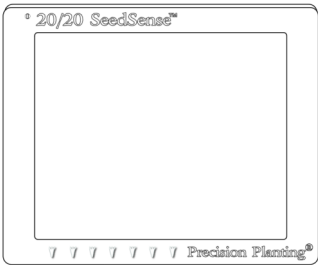
OR



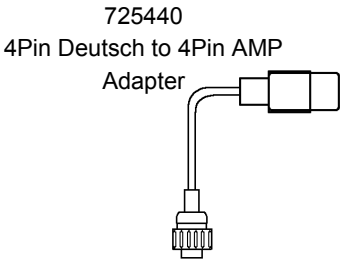
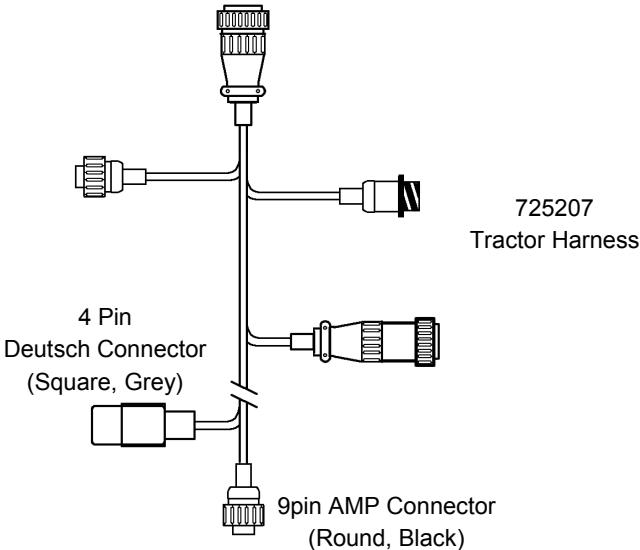
725201
Smart Connector

Connecting Communication in Parallel

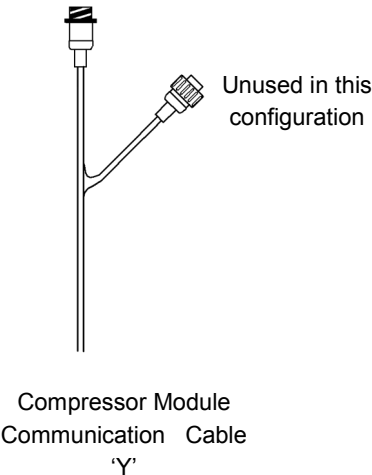
This configuration will apply primarily to systems sold prior to March 2009 using a Seed Star Monitor.



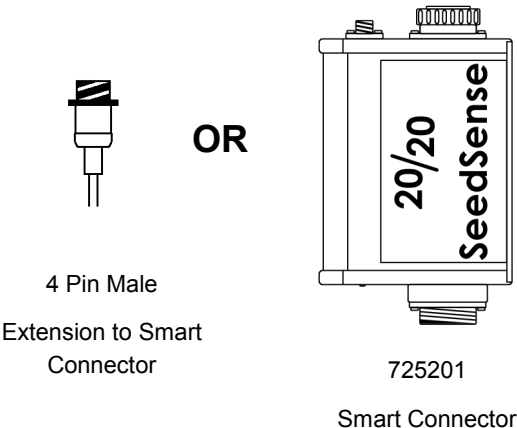
20/20 SeedSense Monitor



CONNECT TO:
AIRFORCE COMPONENTS



CONNECT TO:
SEEDSENSE COMPONENTS



Row Unit Conversion Instructions

for:

planter models:JD17XX / 7200

to convert from **Existing Springs:**.....JD HD Adj. Center Springs

to **Resulting Forces Controlled:**.....Down & Lift

with **Conversion Kits:**.....726005

Existing Springs



This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** driven meters. The examples shown below are diagrams for a planter with long parallel arms that is Pro Shaft driven; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating the completed conversion of these are located at the end of these instructions.

Conversion Kit Components

726005	726075	726190	726195	Part Number	Part Name	Description
1	1	1	1	726001	Support	Down Force Spring Support
1	1	1	1	726100	Spring	Down Air Bag
1	1	1	1	726101	Spring	Lift Air Bag
1		1		726137	Support	Lift Spring Support Reg. PA
	1		1	726179	Support	Lift Spring Support Long PA
1	1			726187	Support	Air Spring Support Chain
		1	1	726188	Support	Air Spring Support Pro-Shaft
1		1		726339		**Hardware Pack
	1		1	726349		** Hardware Pack

Quantities are given per row

Hardware Pack Components

726339	726349	PART	PART NAME	DESCRIPTION
1	1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
1	1	36266	Hex Jam Nut	3/4-16 Nut ZN CL
	2	38671	Bolt	M10-1.5 x 130 ZN CL
	1	38772	Bolt	M16-2.0 x 130 ZN CL
2		162348	Bolt	M10-1.5 x 55 ZN Y
1		162361	Bolt	M16-2.0 x 60 ZN Y
1	1	95054	Bolt	5/16-18 x .88 GRD 5 ZN Y
1	1	95209	Bolt	1/2-13 x 1.5 GRD 5 ZN Y
2	2	128789	Bolt	M12-1.75 x 55 Class 10.9 ZN Y
1	1	154005	Bolt	M12-1.75 x 50 Class 10.9 ZN CL
2	2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	1	726106	Male Fitting	1/8 NPT x 1/4 PTC Straight
1	1	726113	Male Tee	1/8 NPT x 1/4 PTC Tee
1	1	726115	Tee	1/4 PTC Tee
1	1	726178	Insert	Lift Spring Mount Insert
3	3	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
1	1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
1	1	726386	Note	Hardware Kit Note
2	2	MN260000	Hex Nut	M10-1.5 Nut ZN Y

Quantities are given per row

Recommended tools (not provided):

Open end wrenches: 3/8", 7/16" 1/2", 3/4", 15/16", 1-1/8", 10MM, 16MM, 19MM, & 24MM

- or suitable crescent wrench (s)

Sockets (Deep well recommended): 1/2" 3/4", 10MM, 16MM, 19MM, & 24MM

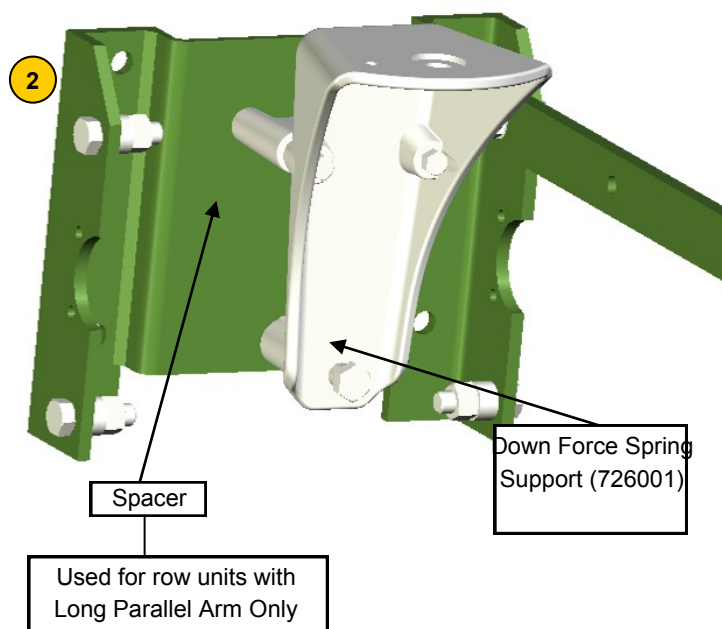


1. Begin installation by removing tension from the JD HD Adj. springs. Once the tension is removed, remove the spring assembly by removing the two M10 bolts (top) and one M16 bolt (bottom). This should release the spring assembly from the mounting support plate. Set aside.



Note: For planters with **Long** parallel arms, retain the spacer for use between the mounting support plate and Down Force assembly.

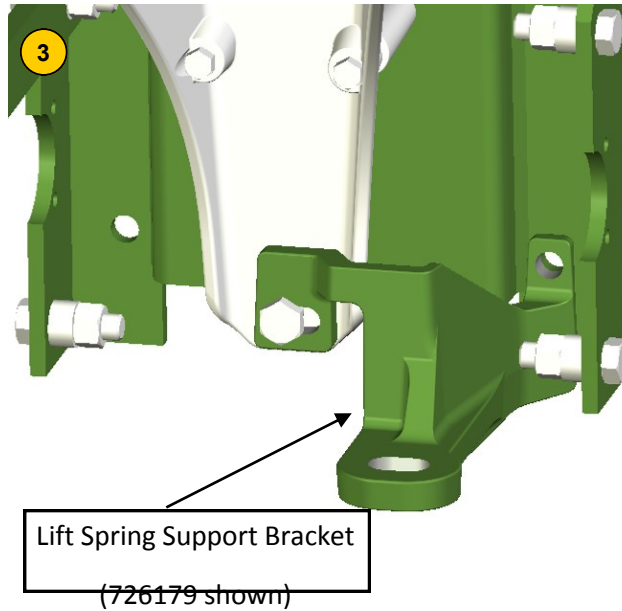
Units with long parallel arms may require the bolts to be cut/torched off in order to remove the existing M10 bolts. When installing the new bolts, install them from the rear for ease of future serviceability.



2. Install the Down Force Spring Support (726001) against the mounting support plate as shown. Install only the top two M10 Bolts at this time.

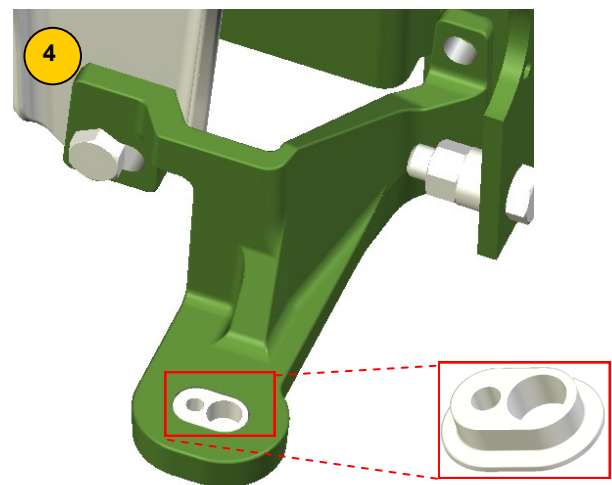


Note: For Vacuum planters with **Long** parallel arms, reinstall the vacuum blower manifold bracket in between the spacer and the mounting plate. For planters with **Regular** parallel arms, position bracket between Down Force Support and mounting plate. For non-vacuum planters, re-install M10 spacer washers.

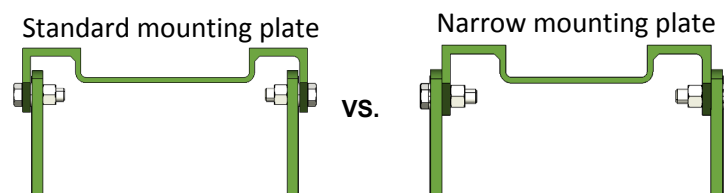


3. Install the Lift Spring Support Bracket (part # 72137 for Reg. PA, #726179 for Long PA): Remove the lower right nut on the frame U-bolt. Position the Lift Spring Support on the U-Bolt and align the left side of the support with the bottom hole of the Down Force Support (Note: some situations may require loosening of the whole U-bolt). Affix the components using the M16 bolt and lock nut and

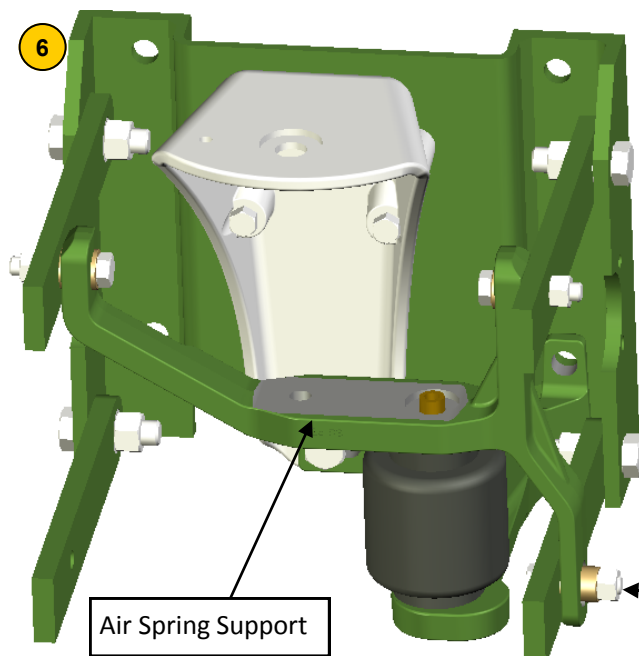
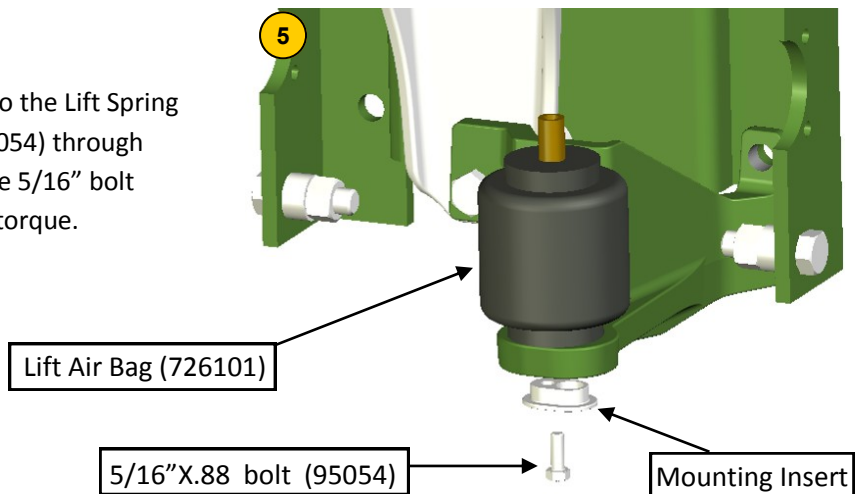
4. Place the Air Spring Mounting Insert (726178) into the bottom side of the Lift Spring Support. Orient the Insert with the larger hole towards the right-hand (outside) of the row unit.



Exception: For planters with narrow mounting plates reverse this orientation. Narrow mounting plates are discerned by location of the parallel arms (long or short) to the **outside** of the mounting plate. See below.



5. Place the Lift Air Bag (726101) onto the Lift Spring Support using the 5/16"X.88 bolt (95054) through the underside of the Lift Support. The 5/16" bolt should be tightened to 50-60lb-in of torque.



6. Install the Air Spring Support (726187 for Chain driven, 726188 for Pro Shaft driven). This will require the use of two M12X55 bolts (0128789), one Clear Zinc coated M12X50 (0154005), two 1/2" ID X 1" OD sleeve bearings (726098), one 1/2" ID X 7/8" OD sleeve bearing (726099) - to be installed in the slotted opening on the Spring Support, and three M12-1.75 lock nuts (726205). The Air Bag should be aligned vertically between the Spring Support and the Lift Support; if not, check orientation of the Mounting insert.



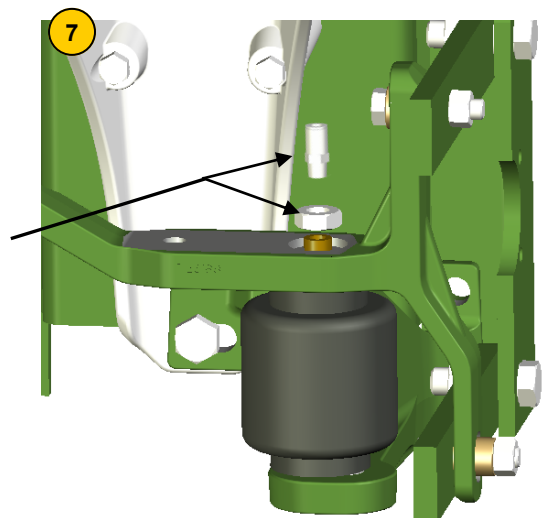
Caution: Install the lower right parallel arm bolt using the Clear Zinc coated M12X50 (0154005) bolt.

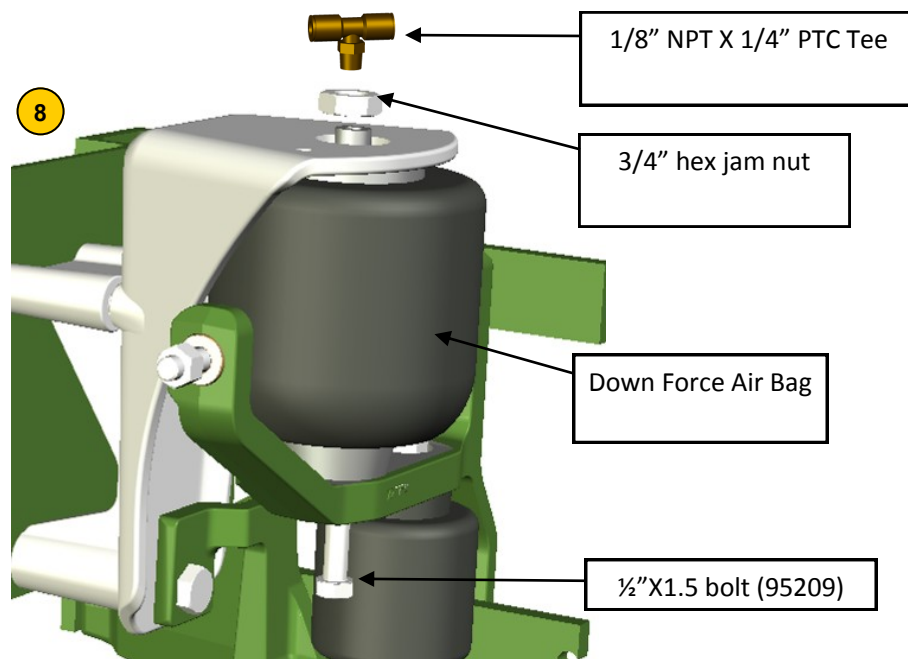
Air Spring Support

726188 for Pro Shaft Shown

See completed conversion on the last page for an example of 726187 for Chain driven meters

7. Affix the Air Bag in place using the 5/8 hex jam nut (36214) to the top side of the Air Bag Support bracket. The 5/8" nut should be tightened to 10-12lb-ft of torque. Install the 1/8NPTX1/4PTC Straight (726106) into the top of the Lift Air B. Torque to hand tight +1 Turn.

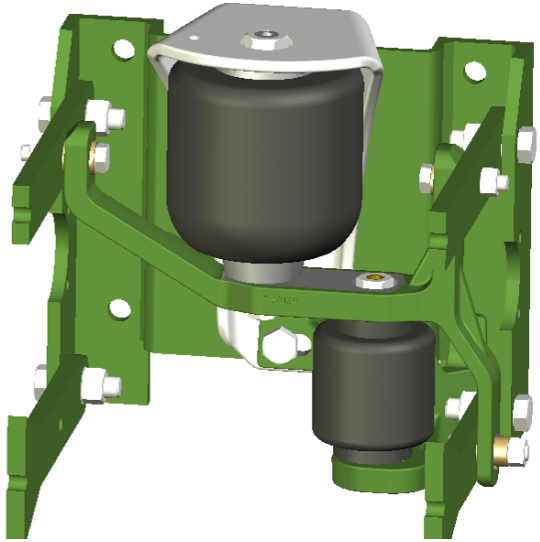




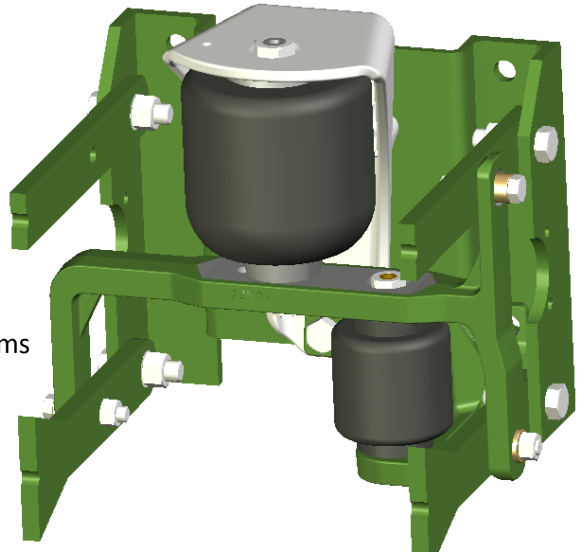
8. Manually compress the Down Force Air Bag (726100) and position it between the Down Force Spring Support and the Air Spring Support. Align the Down Force Bag as shown then fix in place using the 3/4" hex jam nut (36266) on top of the Down Force Support and inserting the 1/2"X1.5 bolt (95209) through the Air Spring Support to the base of the Air Bag. 3/4" hex nut and 1/2" bolt should be tightened to 30lb-ft of torque. Finish by installing the 1/8"NPTX1/4"PTC Tee (726113) into the top of the Down Air Bag. Torque to hand-tight + 1 turn.

9. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.

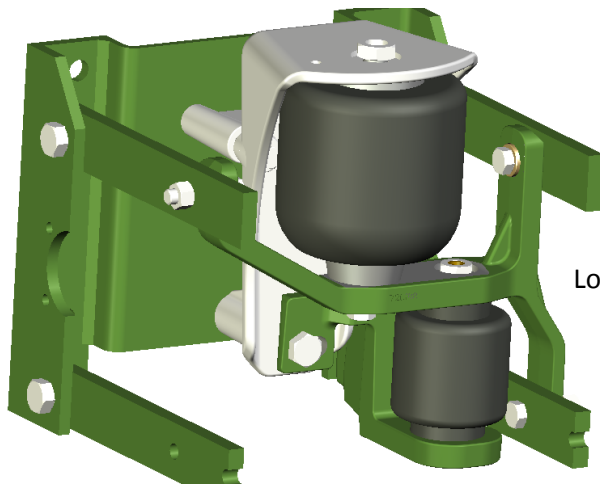
Completed Row Unit Conversions



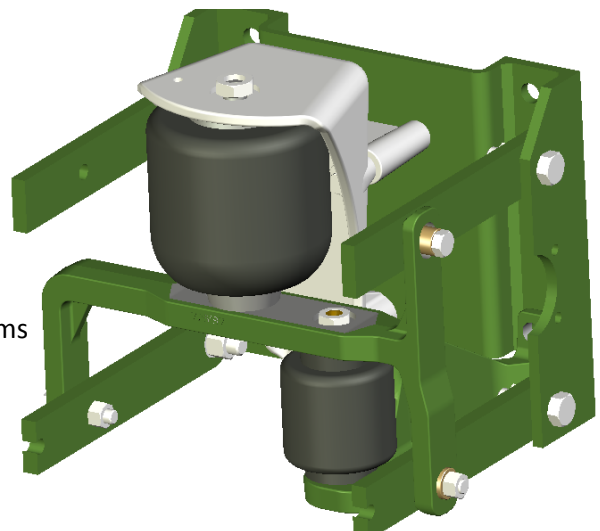
726190
Regular Parallel Arms



726005
Regular Parallel Arms



726195
Long Parallel Arms



726075
Long Parallel Arms

Row Unit Conversion Instructions

for:

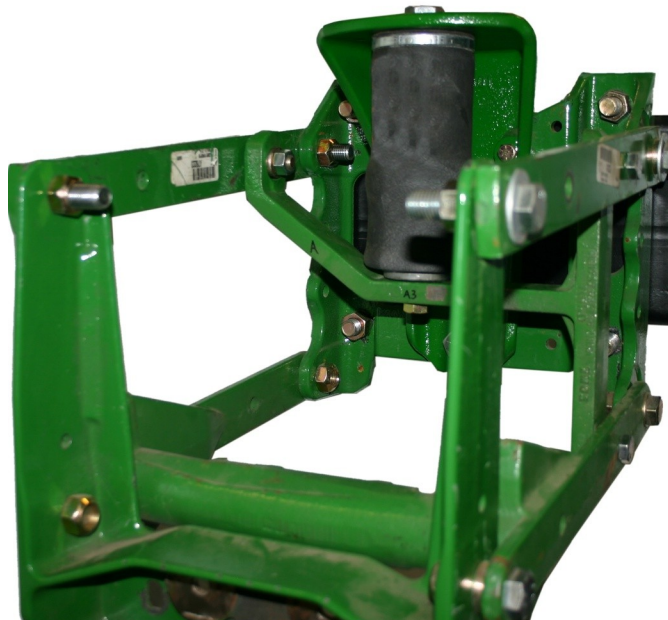
planter models:JD17XX / 7200

to convert from **Existing Springs:**.....JD Single Pneumatic Spring Assembly

to **Resulting Forces Controlled:**.....Down & Lift

with **Conversion Kits:**.....726015

Existing Springs



This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** Driven meters. The examples shown below are diagrams for a planter with Long parallel arms that is Pro Shaft driven; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating the completed conversion of these are located at the end of this instruction.

Conversion Kit Components

726015	726020	726030	726035	Part Number	Part Name	Description
1	1	1	1	726101	Spring	Lift Air Bag
1	1			726137	Support	Lift Spring Support Reg. PA
		1	1	726179	Support	Lift Spring Support Long PA
1		1		726187	Support	Air Spring Support Chain
	1		1	726188	Support	Air Spring Support Pro-Shaft
1	1			726342		**Hardware Pack
		1	1	726350		** Hardware Pack

Quantities are given per row

Hardware Pack Components

726342	726350	PART	PART NAME	DESCRIPTION
1	1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
	1	38772	Bolt	M16-2.0 x 130 ZN CL
1		162361	Bolt	M16-2.0 x 60 ZN Y
1	1	95054	Bolt	5/16-18 x .88 GRD 5 ZN Y
1	1	95209	Bolt	1/2-13 x 1.5 GRD 5 ZN Y
2	2	128789	Bolt	M12-1.75 x 55 Class 10.9 ZN Y
1	1	154005	Bolt	M12-1.75 x 50 Class 10.9 ZN CL
2	2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	1	726106	Male Fitting	1/8 NPT x 1/4 PTC Straight
1	1	726115	Tee	1/4 PTC Tee
1	1	726178	Insert	Lift Spring Mount Insert
3	3	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
1	1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
1	1	726386	Note	Hardware Kit Note

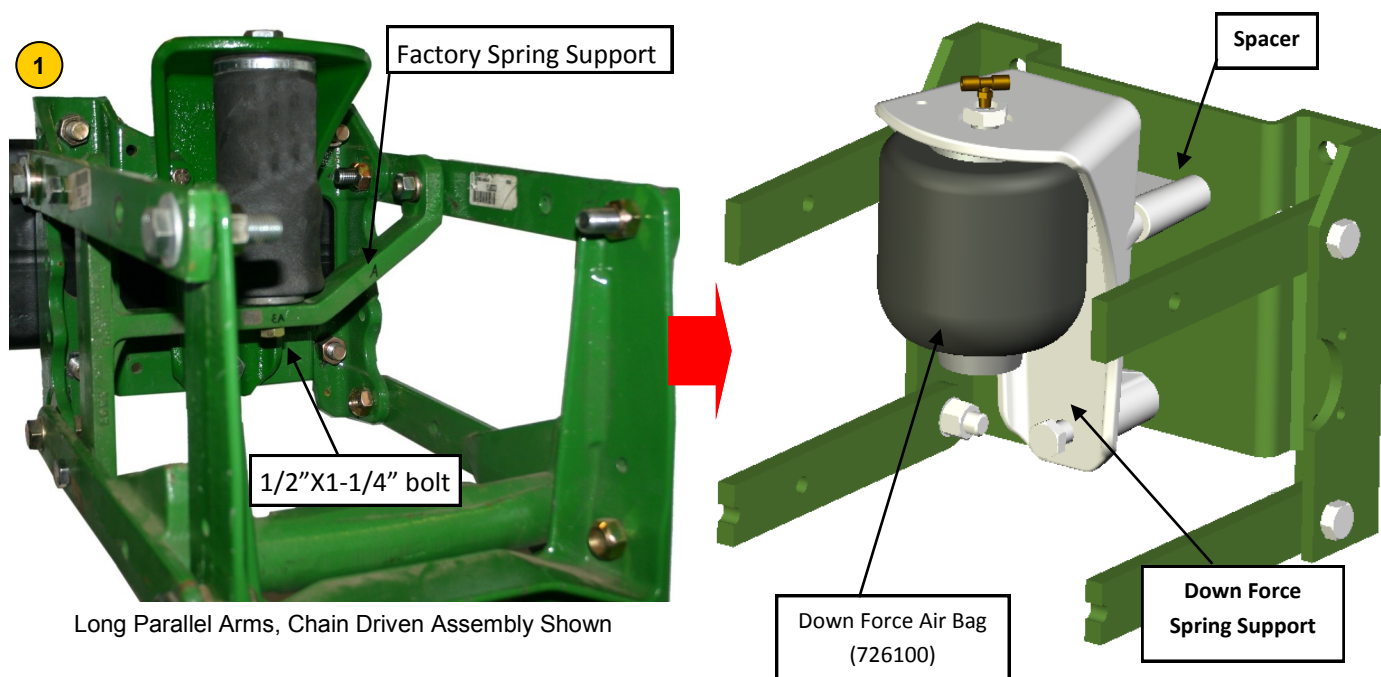
Quantities are given per row

Recommended tools (not provided):

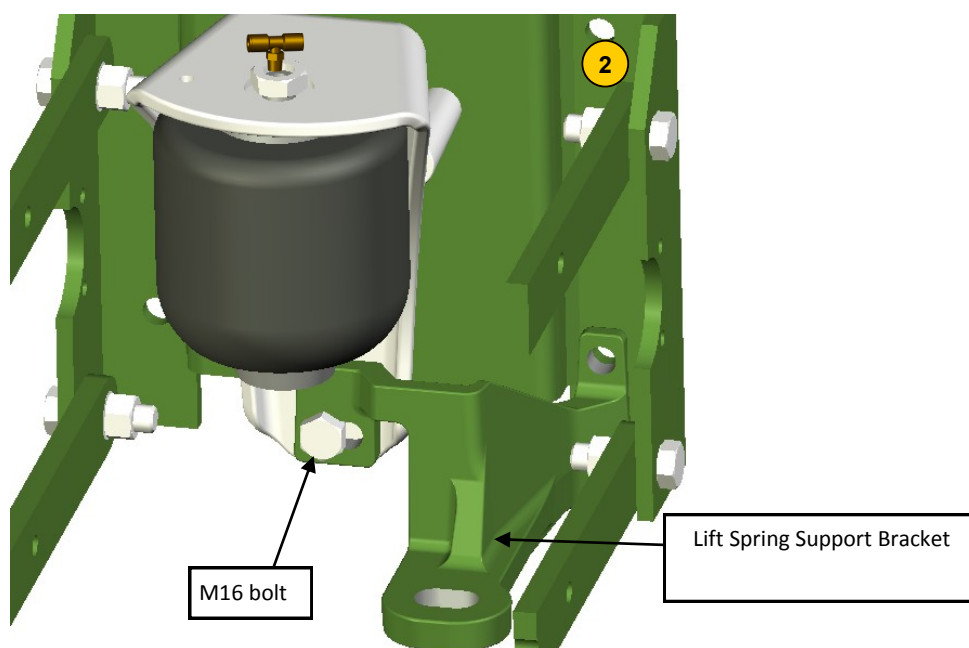
Open end wrenches: 3/8", 7/16" 1/2", 3/4", 15/16", 19MM, & 24MM

- or suitable crescent wrench (s)

Sockets (Deep well recommended): 1/2" 3/4", 19MM, & 24MM

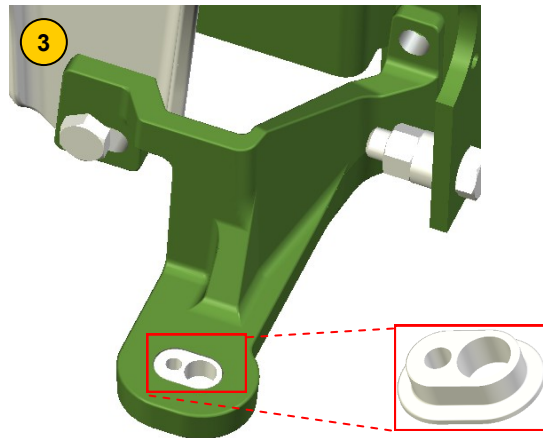


1. Begin the conversion process by removing the factory Spring Support. First remove the 1/2"X1-1/4" bolt from the underside of the support to release the Air Bag from the Spring Support. Loosen and remove the

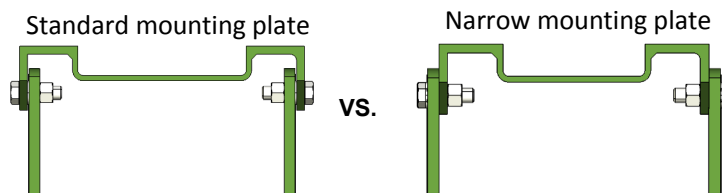


2. Install the Lift Spring Support Bracket (part # 72137 for Reg. PA, #726179 for Long PA): Remove the lower right nut on the frame U-bolt and the M16 bolt from the Down Force Spring Support. (Note: some situations may require loosening of the whole U-bolt) Position the Lift Spring Support on the U-Bolt and align the left side of the support with the bottom hole of the Down Force Support. Affix the components

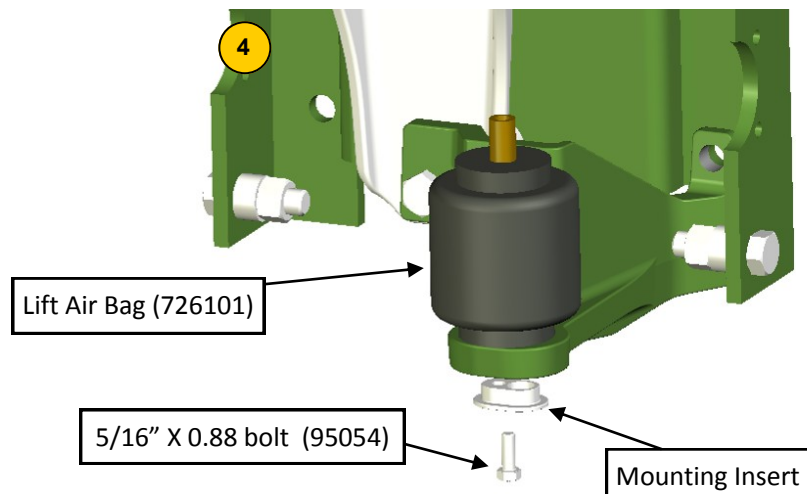
3. Place the Air Spring Mounting Insert (726178) into the bottom side of the Lift Spring Support. Orient the Insert with the larger hole towards the right-hand (outside) of the row unit.



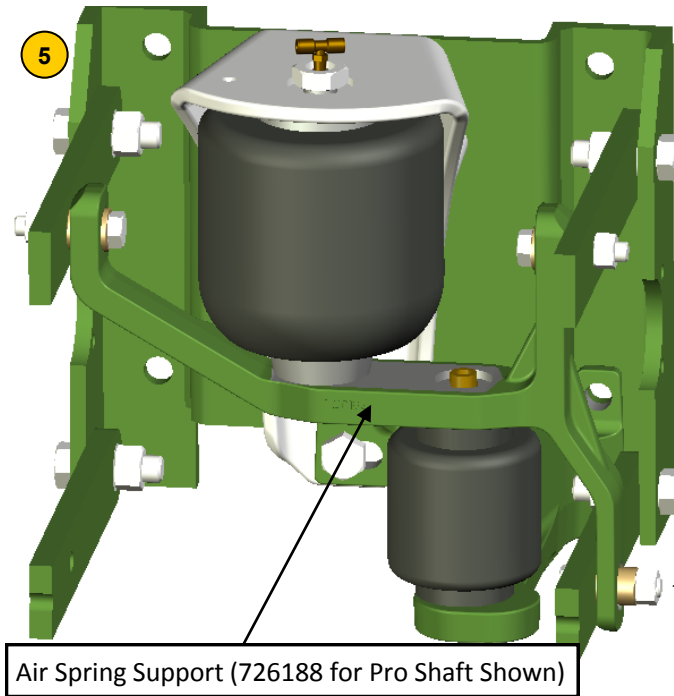
Exception: For planters with narrow mounting plates, reverse this orientation. Narrow mounting plates are discerned by the location of the parallel arms (long or short) to the **outside** of



4. Place the Lift Air Bag (726101) onto the Lift Spring Support using the 5/16" 18X.88 bolt (95054) through the underside of the Lift Support. The 5/16" bolt should be tightened to 4-5lb-ft of torque.



5. Install the Air Spring Support (726187 for Chain driven, 726188 for Pro Shaft driven). Manually compress the Down Force Air Bag to enable fitting of the Spring Support. The Lift Air Bag should be aligned vertically between the Spring Support and the Lift Support; if not, check orientation of the Mounting insert.



Components:

- 1— M12X55 bolts (0128789)
- 1— Clear Zinc coated M12X50 (0154005)
- 2— ½" ID X 1" OD sleeve bearings (726098)
- 3— M12 lock nuts (726205)

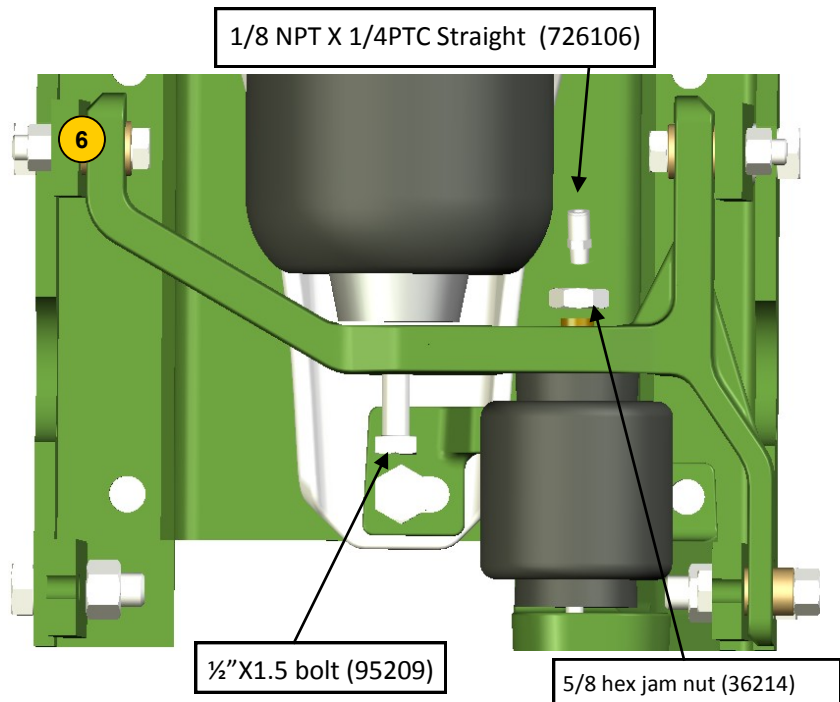


Caution: Install the lower right parallel arm bolt using the Clear Zinc coated M12X50 (0154005) bolt.

6. Affix the Lift Air Spring in place using the 5/8 hex jam nut (36214) to the top side of the Air Spring Support bracket. Align the Down Force Bag as shown then fix in place using the 3/4" hex jam nut (36266) on top of the Down Force Support and inserting the ½"X1.5 bolt (95209) through the Air Spring Support to the base of the Air Bag.

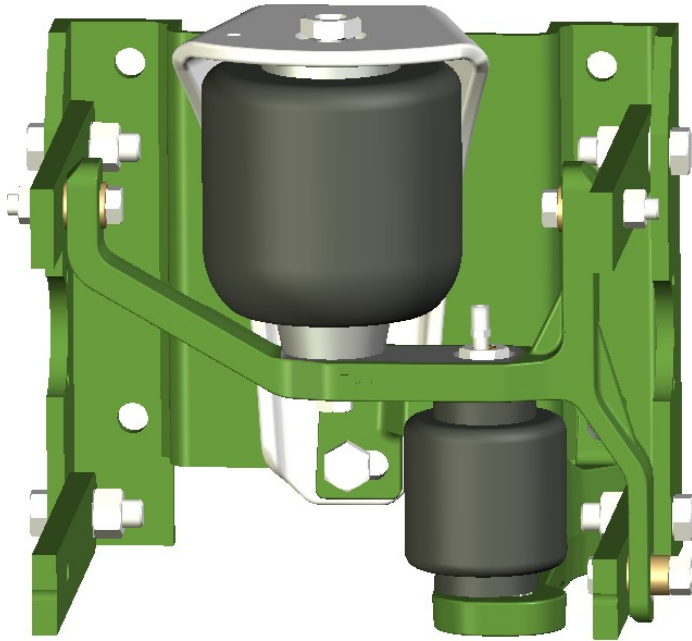
The 5/8" nut should be tightened to 10-12 lb-ft of torque. 1/2" bolt should be tightened to 30 lb-ft of torque.

Install the 1/8NPT X 1/4PTC Straight fitting (726106) into the Lift Air Bag at this time, torque to hand-tight + 1 turn.



7. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.

Completed Row Unit Conversions

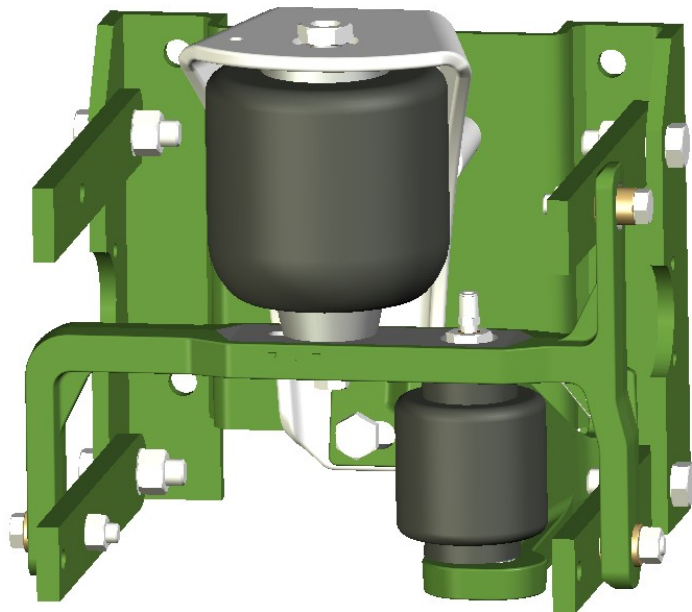


Row Unit Conversion

for kits: 726020

726035

with Regular & Long Parallel Arms



Row Unit Conversion

for kits: 726015

726030

with Regular & Long Parallel Arms

Row Unit Conversion Instructions

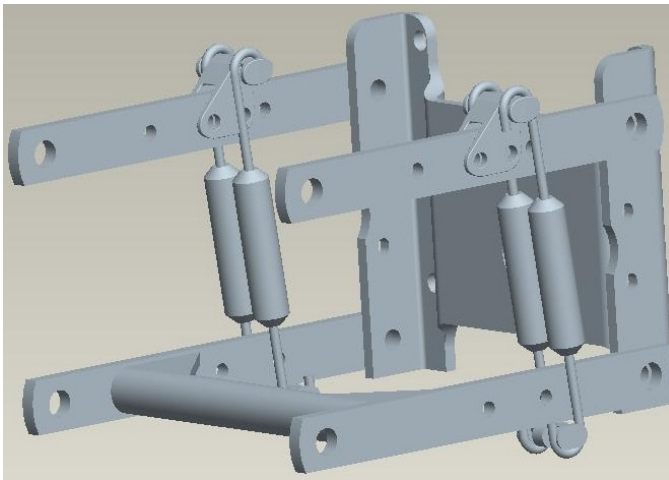
for:

planter models:JD7000/7100 & Kinze

to convert from **Existing Springs**:.....JD/Kinze Side Springs

HD Spring Attachment

Existing Springs



This conversion process applies to planters with **Regular** parallel arms (with or without the Kinze or Yetter row unit extension) and **Chain** Driven meters. The examples shown below are diagrams for a **Kinze** planter with regular parallel arms that is Chain driven. Some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. An image illustrating the completed conversion is located at the end of this instruction.

Conversion Kit Components

726025	726210	Part Number	Part Name	Description
1	1	726101	Spring	Lift Air Bag
1	1	726064	Support	Lift Spring Bar
1	1	726155	Support	Lift Spring Support
1	1	726186	Support	Lift Bar Attachment Bracket - Left Hand
1	1	726202	Support	Lift Bar Attachment Bracket - Right Hand
	1	726134	Guide	Spring Guide Assembly
1		726355		**Hardware Pack
	1	726384		** Hardware Pack

Quantities are given per row

Hardware Pack Components

726355	726384	PART NUMBER	PART NAME	DESCRIPTION
1	1	13007	Bolt	1/4-20 x 1.25 GRD 5 Bolt ZN CL
1	1	13010	Bolt	1/4-20 x 1.75 GRD 5 Bolt ZN CL
1	1	13111	Bolt	3/8-16 x 2 GRD 5 Bolt ZN CL
1	1	13113	Bolt	3/8-16 x 2.5 GRD 5 Bolt ZN CL
	2	13210	Bolt	1/2 - 13 x 1.75 GRD 5 Bolt ZN Y
1		17311	Bolt	5/8-18 x 2.0 GRD 5 Bolt ZN CL
1	1	17313	Bolt	5/8-18 x 2.5 GRD 5 Bolt ZN CL
1	2	17315	Bolt	5/8-18 x 3.0 GRD 5 Bolt ZN CL
2	2	33078	Washer	1/4 SAE Flat ZN CL
3	3	33090	Washer	5/8 SAE Flat ZN CL
2	2	37260	Hex Nut	1/4-20 Top Lock Nut ZN CL
1	1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
2	2	37264	Hex Nut	3/8-16 Top Lock ZN CL
3	3	37312	Hex Nut	5/8-18 Top Lock ZN CL
1	1	95055	Bolt	5/16-18 x 1 GRD 5 Bolt ZN Y
1	1	726066	Link	Positioning Link
1	1	726069	Bushing	3/8 - 5/8 x .68 Sleeve Bearing
2	2	726070	Bushing	1/4 - 1/2 x .5 Sleeve Bearing
1	1	726071	Bushing	3/8 - 5/8 x 1.18 Sleeve Bearing
2	2	726072	Bushing	5/8 - 7/8 x 1 Sleeve Bearing
	2	726379	Bushing	1/2-3/4 x .5 Sleeve Bearing
1	1	726113	Male Tee	1/8 NPT x 1/4 PTC Tee

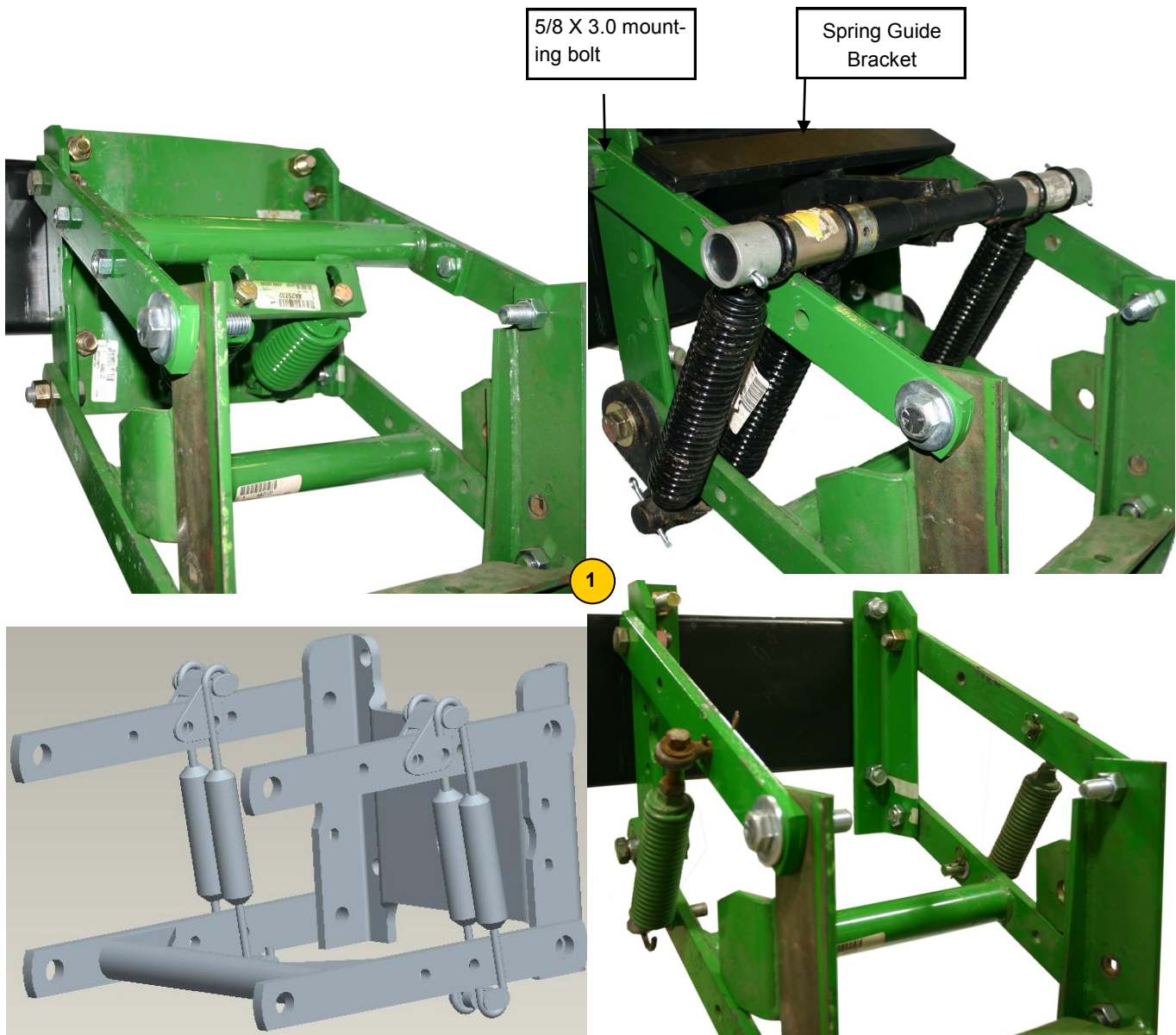
Quantities are given per row

Recommended tools (not provided):

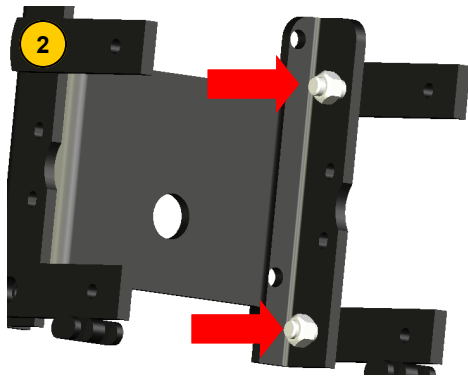
Open end wrenches: 3/8", 7/16" 9/16", 1/2", 3/4", & 15/16"

- or suitable crescent wrench

1. Begin the conversion process by loosening springs or removing the top/bottom bolt to release

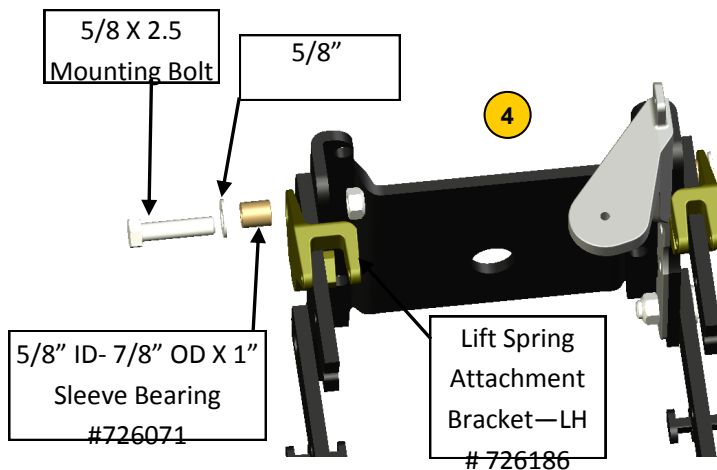
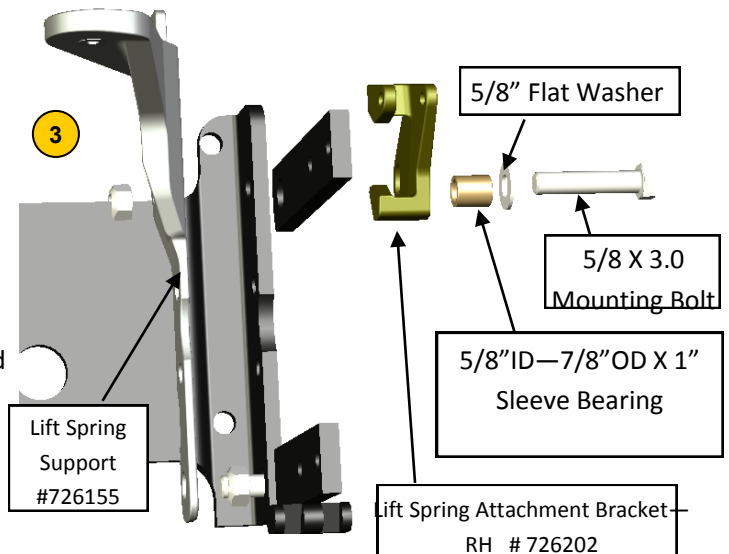


Note: For JD 7000 planters with the HD Spring Assembly Part# 726210 (Used on planters after 1995 with unit mounted coulter; *shown above top right*) remove the Spring Guide Bracket by extracting the 5/8 X 3.0 bolts that connect the parallel arms to the mounting



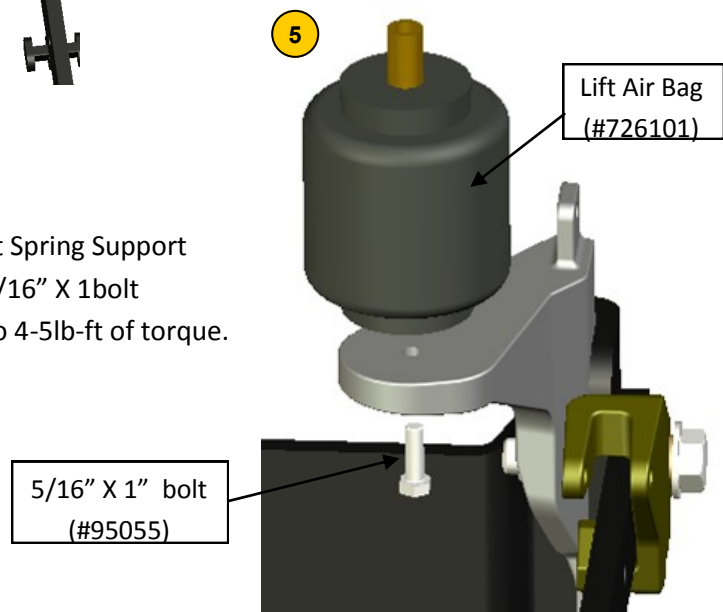
2. From the rear of the planter, facing row unit: Remove the bolt & bushing from the top and bottom right parallel arm at the mounting point; only the bushing from the lower right hand attachment point

3. Next, install the Lift Spring Support (#726155) and the Lift Spring Attachment bracket –Right Hand (#726202). From right to left, the components will be placed: Lift Spring Attachment bracket-RH and parallel arm (Use the supplied bushing # 726070), mounting plate or angle, and

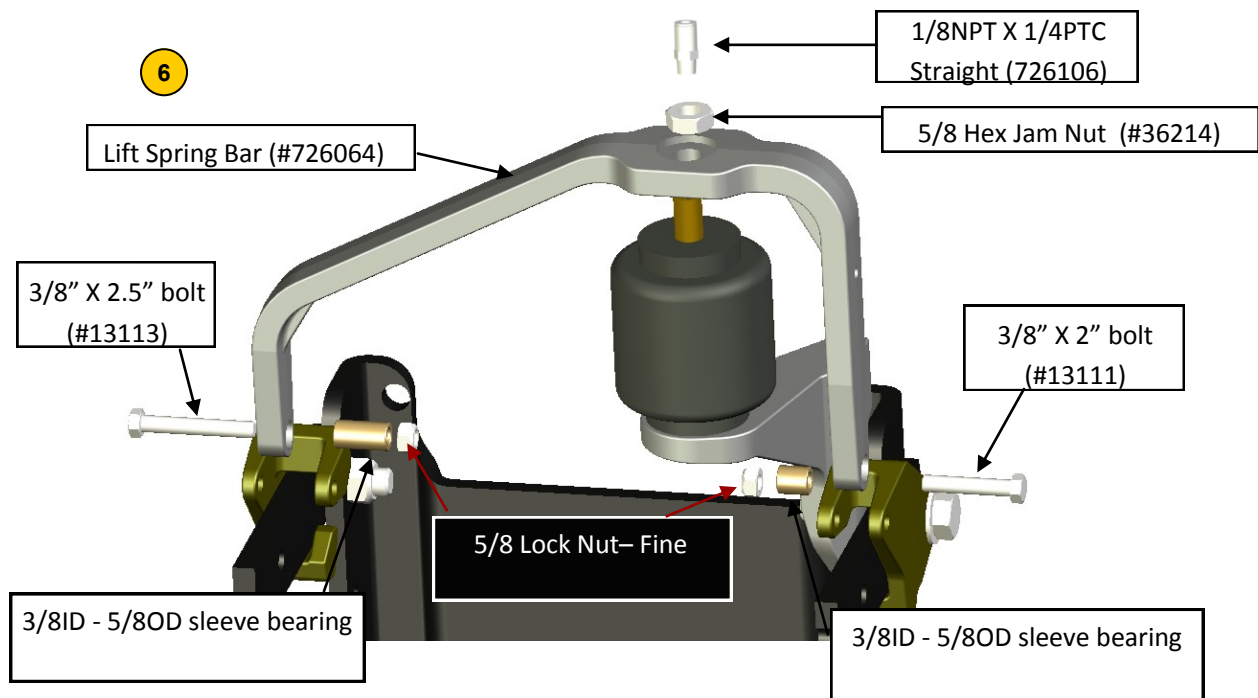


4. Remove bolt and bushing from the upper left parallel arm. Install the Lift Bar Attachment bracket-Left (#720186) outside the parallel arm using the supplied

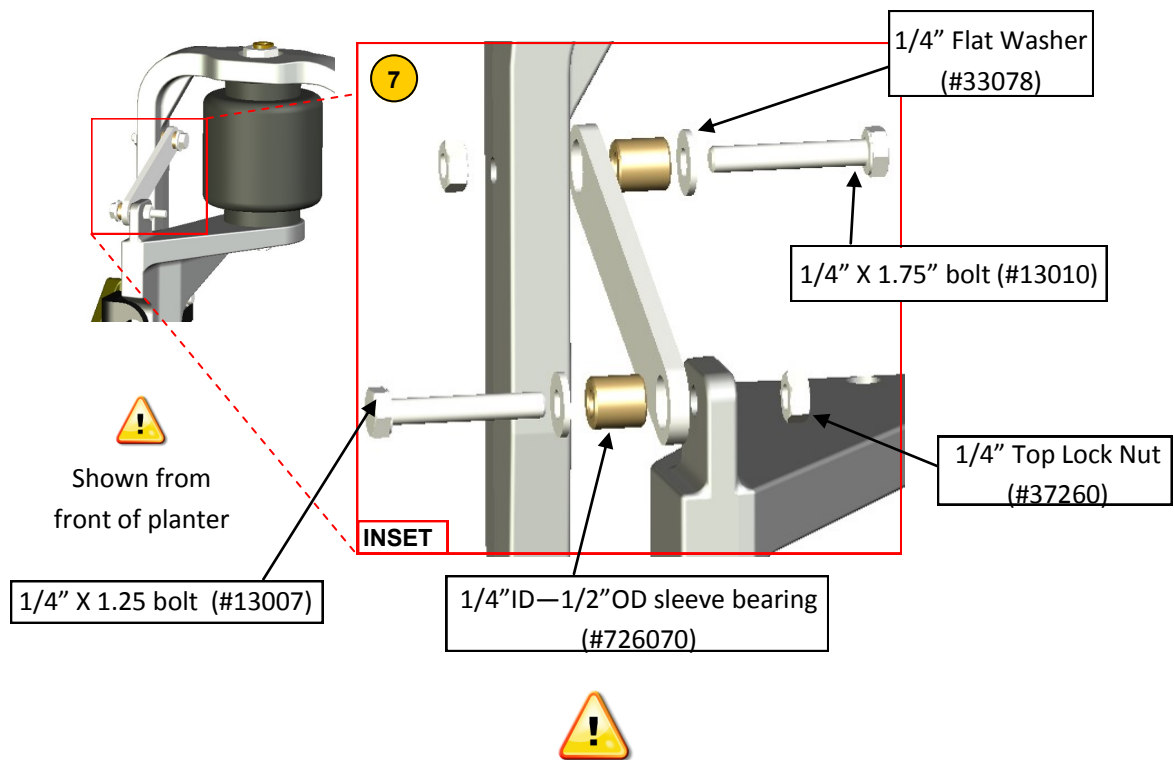
5. Place the Lift Air Bag (#726101) on the Lift Spring Support (#726155) as shown. Fix in place using the 5/16" X 1" bolt (#95055). The 5/16" bolt should be tightened to 4-5lb-ft of torque.



6. Position the Lift Spring Bar (#726064) on the Lift Air Bag as shown and fix in place using the 5/8 Hex Jam Nut (#36214). The 5/8" nut should be tightened to 10-12lb-ft of torque. Manually compress the Lift Air Bag by pressing down on the Spring Bar to align it with the attachment brackets. Fix the assembly to the Left Hand parallel arm using the 3/8" X 2.5" bolt (#13113), 3/8"ID - 5/8"OD sleeve bearing 1 1/8" length (#726071), and 5/8" Lock Nut- Fine (#37312). Using the 3/8"—16 X 2" bolt (#13111), 3/8ID - 5/8OD sleeve bearing 0.68" length (#726069), and 5/8"—18" Lock Nut- Fine (#37312) fix the assembly to the Right Hand Parallel arm. Lastly, install the 1/8"NPT X 1/4"PTC Straight Fitting (726106) into the top of the Lift Air Bag, torque to hand-tight+ 1 turn.

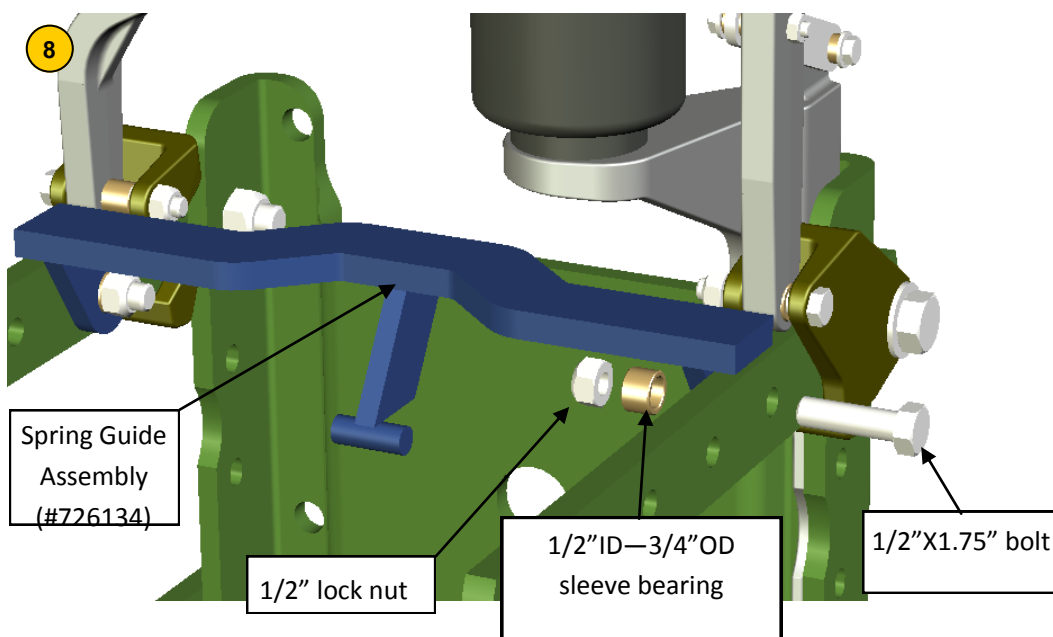


7. Next place the Positioning Link (#726066) between the Lift Spring Support and the Lift Spring Bar as shown (Far left image). Fix the Positioning Link in place using two 1/4" X 1.5" bolts (#13009), two 1/4"ID—1/2"OD sleeve bearings(#726070), 1/4" X .193 hex machine nut (#36036), and two 1/4" Flat Washers (#33078)



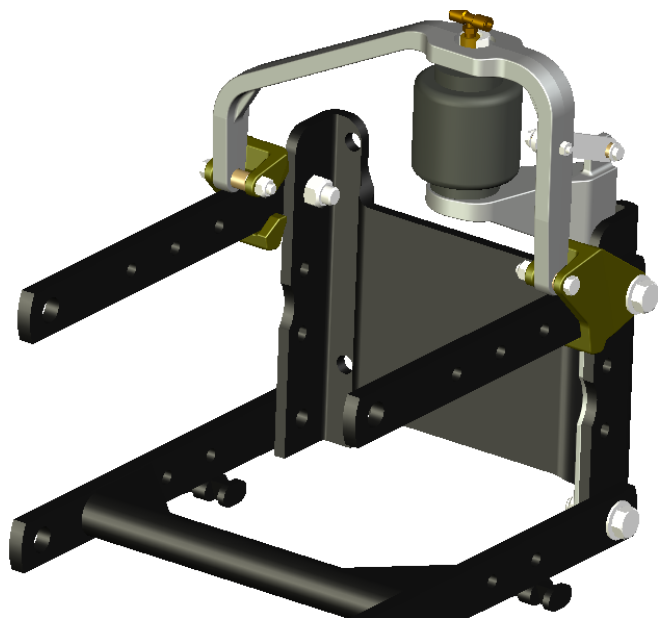
Note: The following step is for **ONLY** JD 7000 planters with the HD Spring Assembly Part# 726210 (Used on planters after 1995 with unit mounted coulters). All other configurations should skip to step #9.

8. Install the Spring Guide Assembly (#726134) as shown using two 1/2" X 1.75" bolts (13210), two 1/2" lock nuts, and two 1/2" ID—3/4" OD sleeve bearings (#726379)



9. To complete the conversion process return the springs to their original positions. Check tightness of

Completed Row Unit Conversions

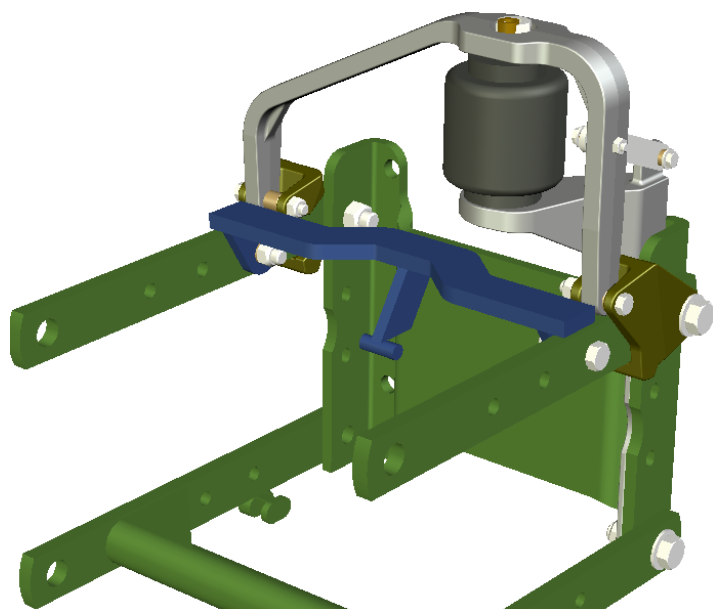


Row Unit Conversion

for kits: 726025

JD 7000 & Kinze

Side Springs



Row Unit Conversion

for kits: 726210

JD 7000 1995 and newer

HD Spring Assembly

Row Unit Conversion Instructions

for:

planter models:JD17XX CCS Pro-Series (Mini-Hoppers)

to convert from **Existing Springs:**.....JD HD Adj. Center Springs

Existing Springs



This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** Driven meters. The examples shown below are diagrams for a planter with long parallel arms that is Pro Shaft driven; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating the completed conversion of these are located at the end of this instruction.

Conversion Kit Components

726200	Part Number	Part Name	Description
1	726001	Support	Down Force Spring Support
1	726100	Spring	Down Air Bag
1	726188	Support	Air Spring Support
1	726351		** Hardware Pack

Quantities are given per row

Hardware Pack Components

726351	PART NUMBER	PART NAME	DESCRIPTION
1	36266	Hex Jam Nut	3/4-16 Nut ZN CL
2	38671	Bolt	M10-1.5 x 130 ZN CL
1	38772	Bolt	M16-2.0 x 130 ZN CL
1	95209	Bolt	1/2-13 x 1.5 GRD 5 ZN Y
3	0128789	Bolt	M12-1.75 x 55 Class 10.9 ZN Y
2	0162348	Bolt	M10-1.5 x 55 ZN Y
1	0162361	Bolt	M16-2.0 x 60 ZN Y
2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	726113	Male Tee	1/8 NPT x 1/4 PTC Tee
3	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
2	MN2600000 YZ0000	Hex Nut	M10-1.5 Nut ZN Y

Quantities are given per row

Note: 38671 & 38772 used ONLY with Long Parallel Arms

Recommended tools (not provided):

Open end wrenches: 3/8", 7/16", 3/4", 1-1/8", 16MM, 19MM, & 24MM

- or suitable crescent wrench(s)

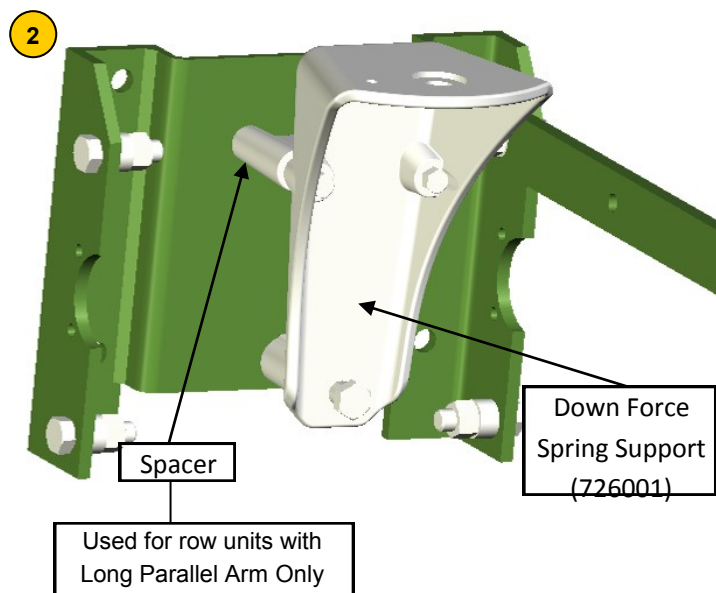
1. Begin installation by removing tension from the JD HD Adj. springs. Once the tension is removed, remove the spring assembly by removing the two M10 bolts (top) and one M16 bolt (bottom). This should release the spring assembly from the mounting support plate; set aside.



Note: For planters with **Long** parallel arms retain the spacer for use between the mounting support plate and Down Force assembly.

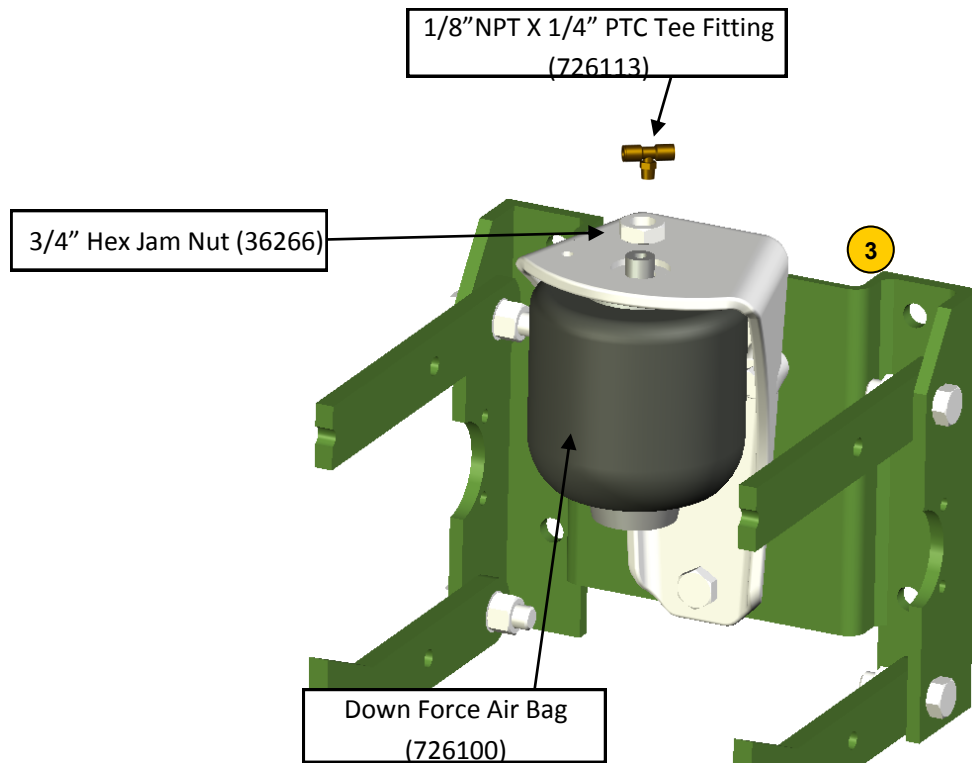
Units with long parallel arms may require the bolts to be cut/torched off in order to remove the existing M10 bolts. When installing the new bolts, install them from the rear for ease of future serviceability.

2. Install the Down Force Spring Support (726001) against the mounting support plate as shown. Replace the spacer (Long Parallel arms only) and re-install and tighten the M10 & M16 bolts.



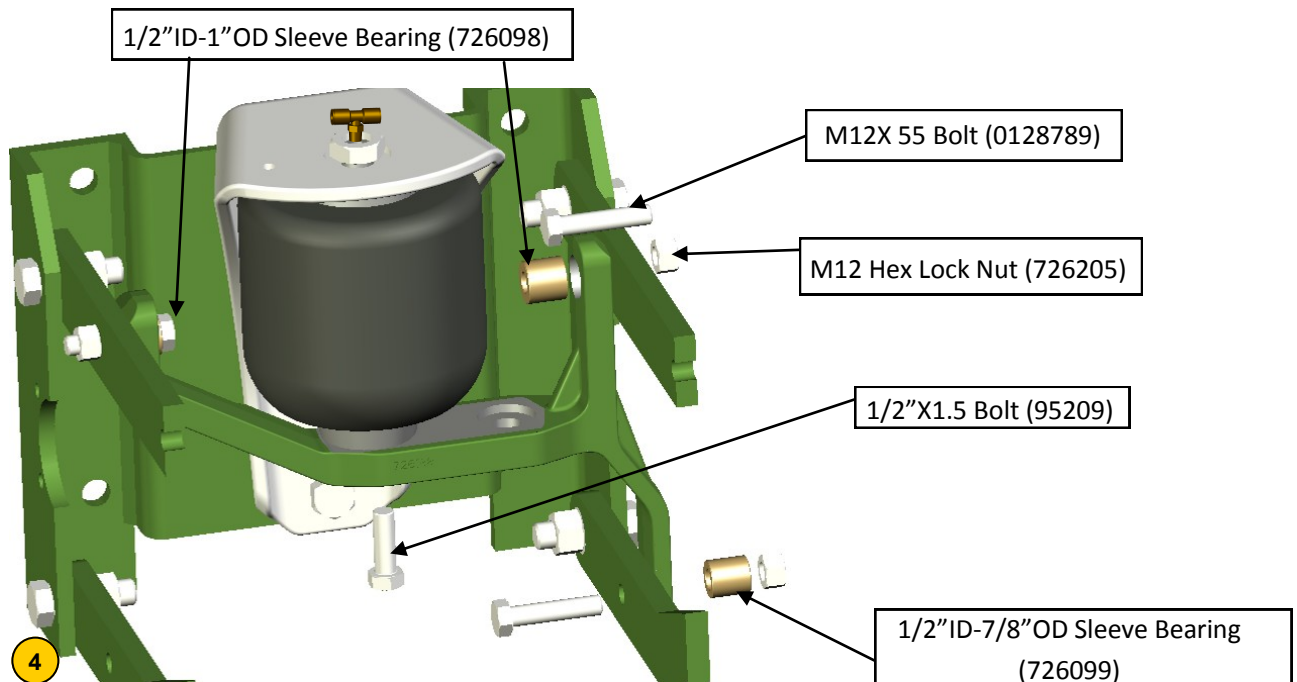


Note: For Vacuum planters with **Long** parallel arms reinstall the vacuum blower manifold bracket in between the spacer and the mounting plate. For planters with **Regular** parallel arms, position bracket between Down Force Support and mounting plate. For non-vacuum planters, re-install the M10 spacer washers.



3. Align and place the Down Force Air Bag (#726100) as shown at right on the under side of the Down Force Support Bracket. Fix in place using 3/4" hex jam nut (36266). 3/4" hex nut should be tightened to 15lb-ft of torque.
 4. Install the Air Spring Support (726188) as shown above. Manually compress the Down Air Bag and secure it using the 1/2"X1.5 Bolt (95209) through the Spring Support. 1/2" bolt should be tightened to 30 lb-ft of torque.
- Fix the Spring Support to the parallel arms using three M12-1.75X55 Bolts (0128789), three M12 Hex Lock Nuts (726205), two 1/2"ID-1"OD Sleeve Bearings (726098) for use in the top parallel arms, and one 1/2"ID-7/8"OD Sleeve Bearing (726099) for use in the slotted opening of the Spring Support on the lower parallel arm.

See illustration on following page



5. To complete the conversion process, return the springs to their original positions. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components

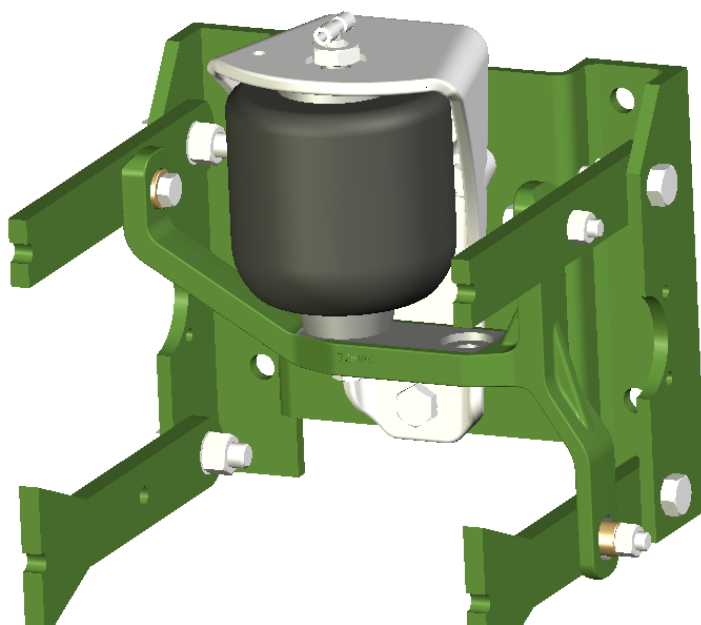
Completed row unit conversion image on following page.

Completed Row Unit Conversions

Row Unit Conversion

for kits: 726200

JD 17XX CCS w/ Pro-Series (Mini-Hoppers)



Row Unit Conversion Instructions

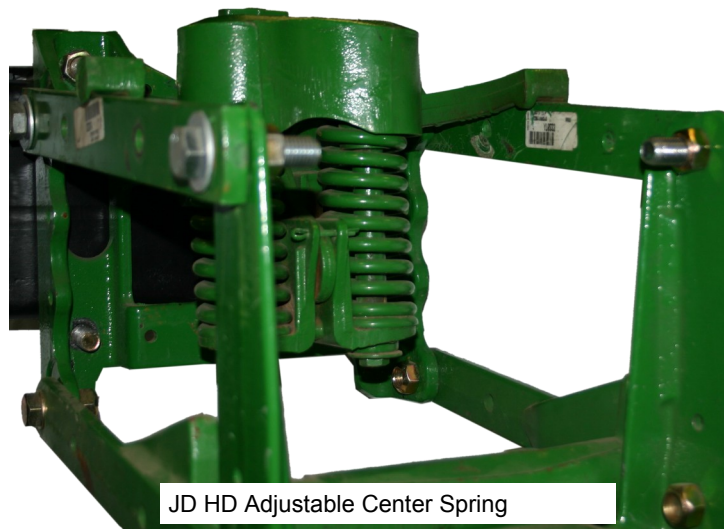
for:

planter models:JD17XX / 7200 / 7300

to convert from **Existing Springs:**.....JD HD Adj. Center Springs

to **Resulting Forces Controlled:**.....Down & Lift

Existing Springs



JD HD Adjustable Center Spring

This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** Driven meters. Some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating the completed conversion of these are located at the end of this instruction.



Caution: After completion of the Conversion and Plumbing processes
verify clearance of all components.

Conversion Kit Components

726315	726320	Part Number	Part Name	Description
1	1	726001	Support	Down Force Spring Support
1	1	726100	Spring	Down Air Bag
1	1	726101	Spring	Lift Air Bag
1		726187	Support	Air Spring Support - Chain
	1	726188	Support	Air Spring Support - Pro Shaft
1	1	726225	Bracket	Lift Spring Mounting Bracket
1		726266	Bar	Lift Spring Bar
	1	726226	Bar	Lift Spring Bar
1		726312		**Hardware Pack
	1	726313		** Hardware Pack

Quantities are given per row

Hardware Pack Compo-

726312	726313	PART NUMBER	PART NAME	DESCRIPTION
1	1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
6	2	38403	Washer	M6 Flat ZN CL
2	2	38568	Bolt	M6-1.0 x 35 ZN CL
2	2	*38671	Bolt	M10-1.5 x 130 ZN CL
1	1	*38772	Bolt	M16-2.0 x 130 ZN CL
2	2	90680	Hex Nut	M6-1.0 Top Lock Nut ZN CL
1	1	95209	Bolt	1/2-13 x 1.5 GRD 5 ZN Y
2	1	128789	Bolt	M12-1.75 x 55 Class 10.9 ZN Y
1	1	23332	Hex Nut	M8-1.25 Top Lock Nut ZN Y
1		726508	Bolt	M12-1.75 x 50 Class 10.9 ZNY
2	2	162348	Bolt	M10-1.5 x 55 ZN Y
1	2	32599	Bolt	M12-1.75 x 70 ZN Y
1	1	162403	Bolt	M8-1.25 x 25 ZN Y
1	1	162436	Bolt	M16-2.0 x 45 ZN Y
1	1	726066	Link	Positioning Link
2	2	726070	Bushing	1/4 - 1/2 x .5 Sleeve Bearing
2	2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	1	726106	Male Fitting	1/8 NPT x 1/4 PTC Straight
1	1	726113	Male Tee	1/8 NPT x 1/4 PTC Tee
1	1	726115	Tee	1/4 PTC Tee
4	3	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
1	1	726227	Hex Nut	3/4-16 Collar Nut
2	2	726258	Bushing	1/2 - 1 x .69 Sleeve Bearing
1	1	726261	Bolt	5/16 x 18 FH (Fastenal 94253)
1	1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
1	1	726374	Adapter	1/8 NPT Male x 1/8 NPT Female
2	1	726388	Washer	M12 Flat ZN
2		726453	Washer	1" Flat Spacer-Washer
2	2	MN2600000 YZ0000	Hex Nut	M10-1.5 Nut ZN Y

Quantities are given per row

* Note: 38671 & 38772 used ONLY with Long Parallel Arms

Recommended tools

(not provided):

Open end wrenches:

3/8", 7/16" 1/2", 3/4",
15/16", 1-1/8", 10MM,
13MM, 16MM, 19MM, &
24MM

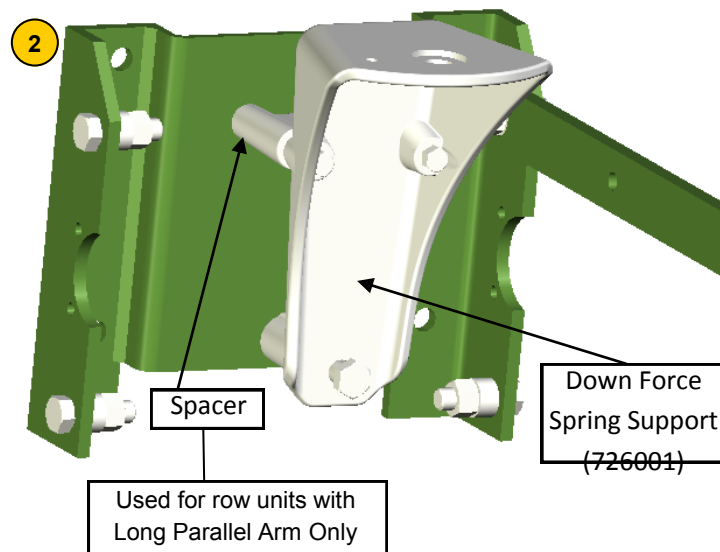
- or suitable crescent wrench(s)

1. Begin installation by removing tension from the JD HD Adj. springs. Once the tension is removed, remove the spring assembly by removing the two M10 bolts (top) and one M16 bolt (bottom). This should release the spring assembly from the mounting support plate; set aside.



Note: For planters with **Long** parallel arms, retain the spacer for use between the mounting support plate and Down Force assembly. Units with long parallel arms may require the bolts to be cut/torched off in order to remove the existing M10 bolts. When installing the new bolts, install them from the rear for ease of future serviceability.

2. Install the Down Force Spring Support (726001) against the mounting support plate as shown. Assemble, but do not tighten the M10 and M16 bolts.

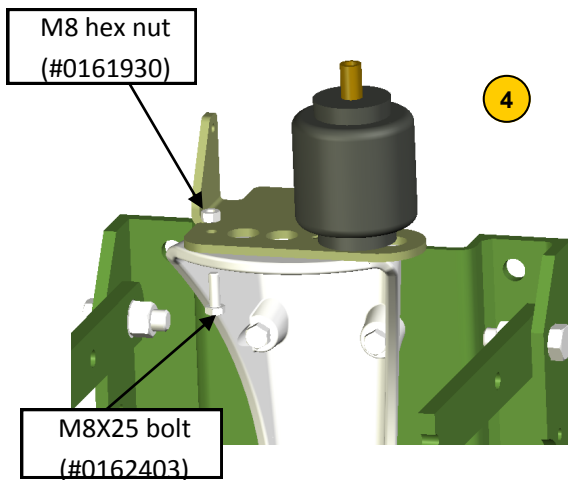
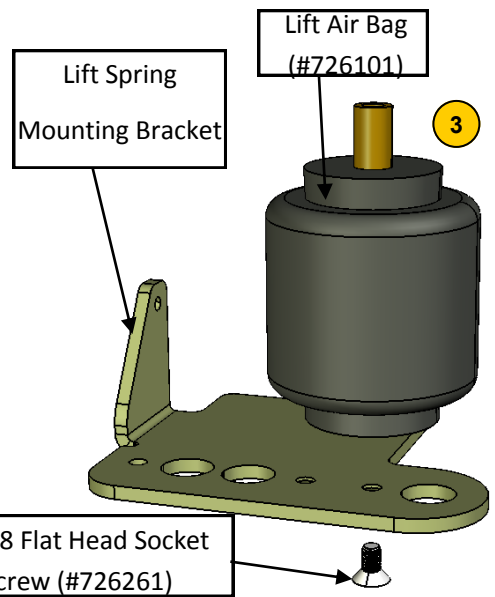


Note: For Vacuum planters with **Long** parallel arms, reinstall the vacuum blower manifold bracket in between the spacer and the Down Force Spring Support. For planters with **Regular** parallel arms, position bracket between Down Force Spring Support and mounting plate. For non-vacuum planters, re-install the M10 spacers washers.

3. Assemble separately: Position the Lift Air Bag (#726101) on the Lift Spring Mounting Bracket (#726225) as shown at right. Fix the Lift Air Bag in place from the underside of the Mounting Bracket using the 5/16 x 5/8 Flat Head Socket Cap Screw (#726261). This will require the use of a 3/16" Allen wrench. The 5/16" Cap Screw should be tightened to 4-5

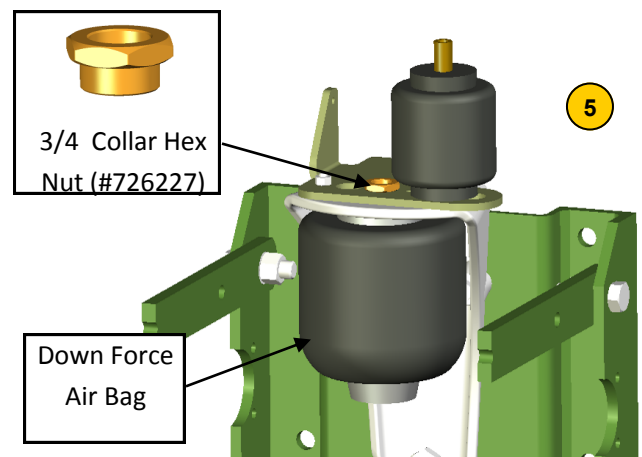


Note: This is a universal mounting bracket,



4. Place the Lift Air Bag and Mounting Bracket on top of the Down Force Support Bracket as shown at left. Align and fix in place using the M8-1.25X25 bolt (#0162403) and M8 hex nut (#0161930) through the

5. Align and place the Down Force Air Bag (#726100) as shown at right on the under side of the Down Force Support Bracket. Fix in place using 3/4 Collar Hex Nut (#726227). 3/4" collar nut should be tightened to 15lb

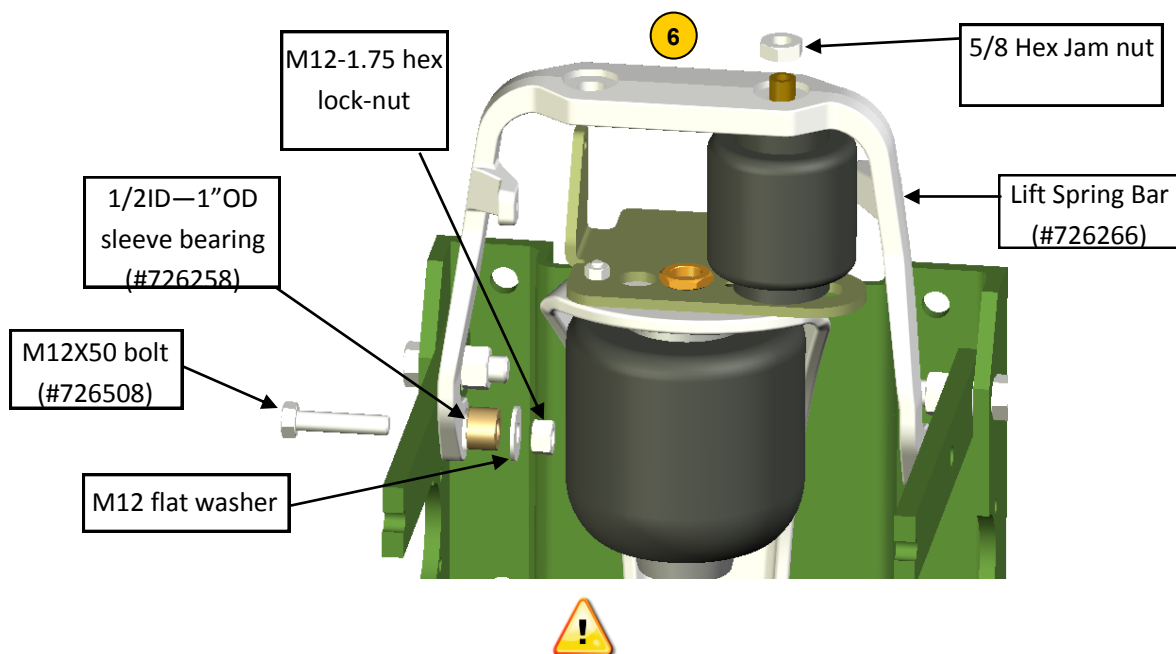


Once the Down Air Bag has been fixed in place with the Collar Nut, tighten the M10 & M16 bolts to secure the Down Force Spring Support.



For Pro Shaft Driven planters (Parts Kit 726320) skip to Step 9. Chain driven planters (Parts Kit 726315) should continue through Step 6.

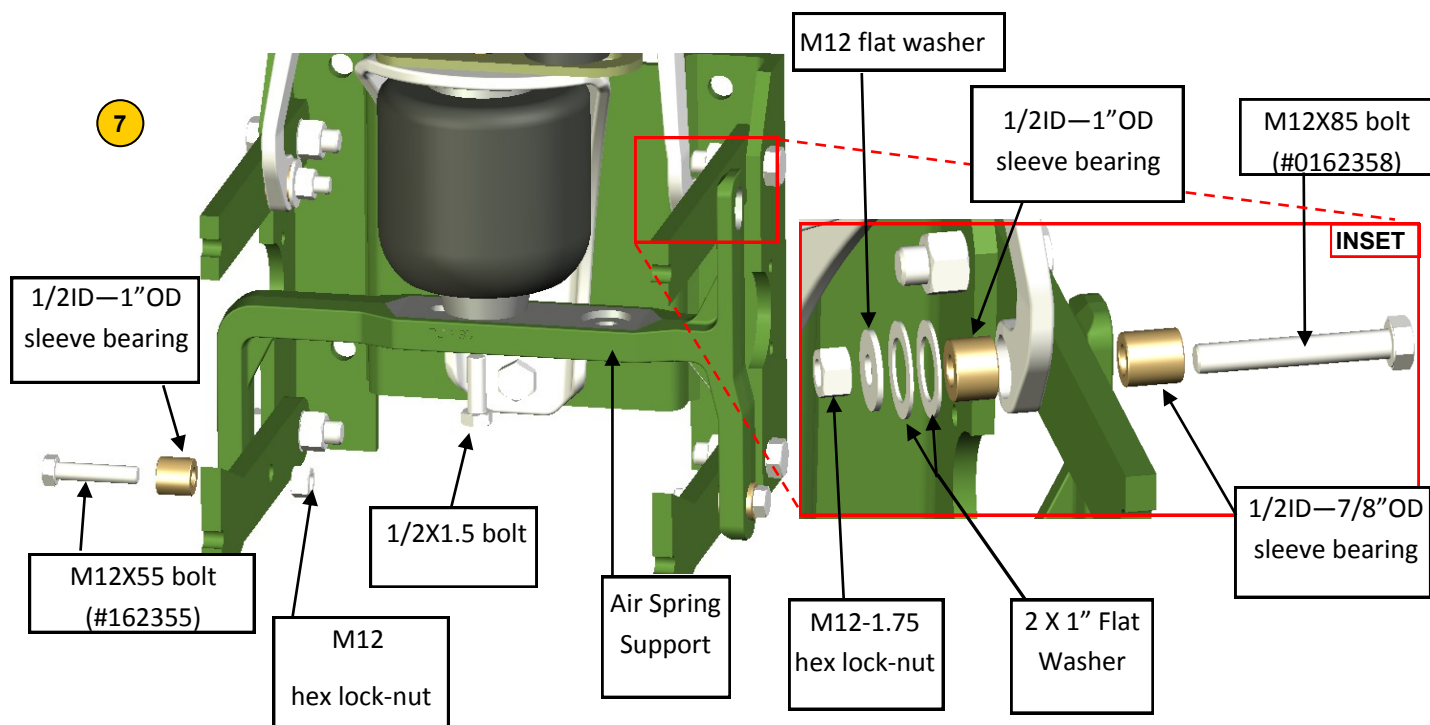
6. Align and place the Lift Spring Bar (#726266) over the Lift Air Spring and with the arms down and on the **inside** of the parallel arms as shown. Fix the Spring Bar in place using the 5/8 Hex Jam nut (#36214) to the top of the Lift Air Bag. The 5/8" nut should be tightened to 10-12lb-ft of torque. Fix the Lift Spring Bar to the top left parallel arm using the M12X50 bolt (#726508), 1/2ID—1"OD sleeve bearing (#726258), M12 hex lock-nut (#726205), and one M12 flat washer.



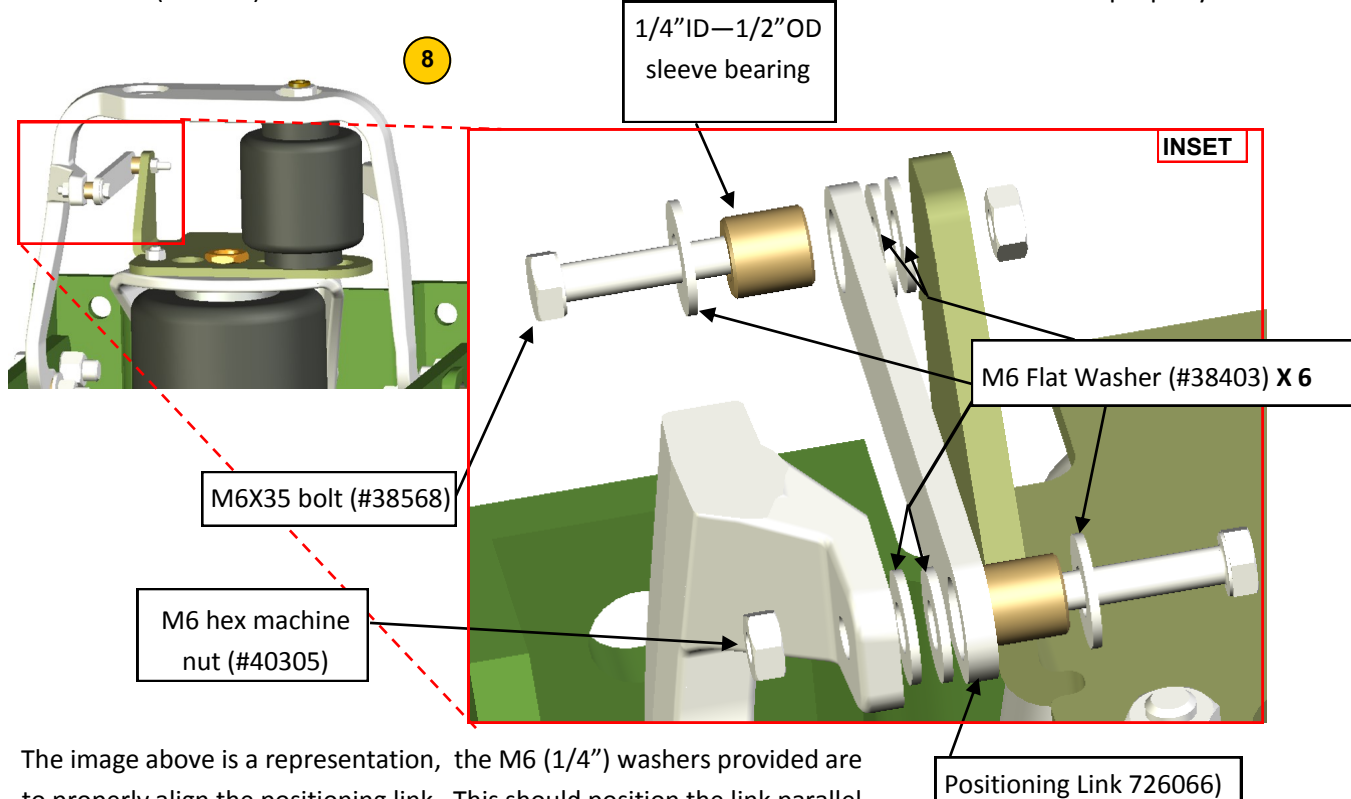
DO NOT fasten the right arm of the Lift Spring Bar to the parallel arms at this time.

7. •Next, install the Air Spring Support (726187) as shown . You may need to manually compress the Down Air Bag to place the Spring Support. Fix the Spring Support to the Air Bag using the 1/2"X1.5" bolt (95209) through the support to the base of the spring. 1/2" bolt should be tightened to 15lb-ft of torque.
- Secure the Spring Support to the lower two parallel arms using M12X55 bolt (#162355), 1/2"ID—1"OD sleeve bearing (#726098), and an M12 hex lock-nut (#726205)
 - Secure the Spring Support and Lift Spring Bar together to the top right parallel arm from, right to left, using the M12X85 bolt (#0162358), 1/2ID—7/8"OD sleeve bearing (#726099), *parallel arm,*

See illustration on following page.



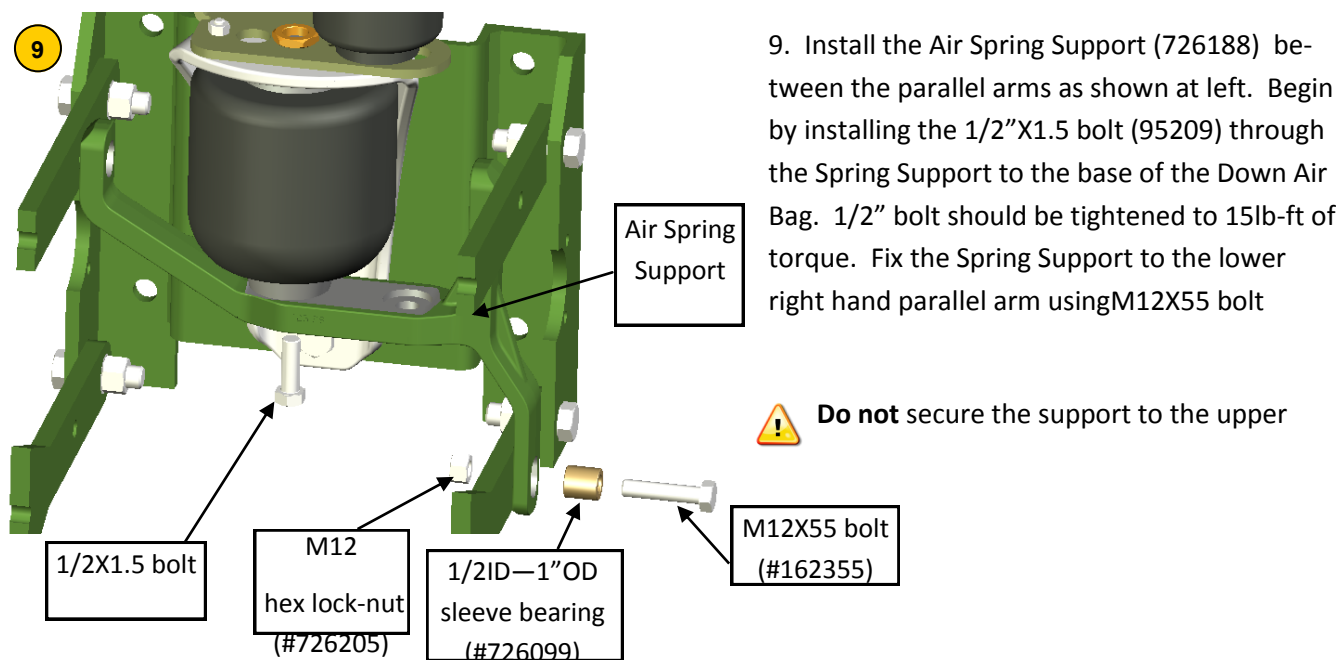
8. Next place the Positioning Link (#726066) between the Lift Spring Mounting Bracket and the Lift Spring Bar as shown (above left). Fix the Positioning Link in place using two M6 X 35 bolts (#38568), two 1/4"ID—1/2"OD sleeve bearings(#726070), two M6 hex machine nut (#40305), and six M6 Flat Washers (#38403). Install the washers as shown in the inset to properly



The image above is a representation, the M6 (1/4") washers provided are to properly align the positioning link. This should position the link parallel with the row unit (does not rest at an angle) and allow the link to move

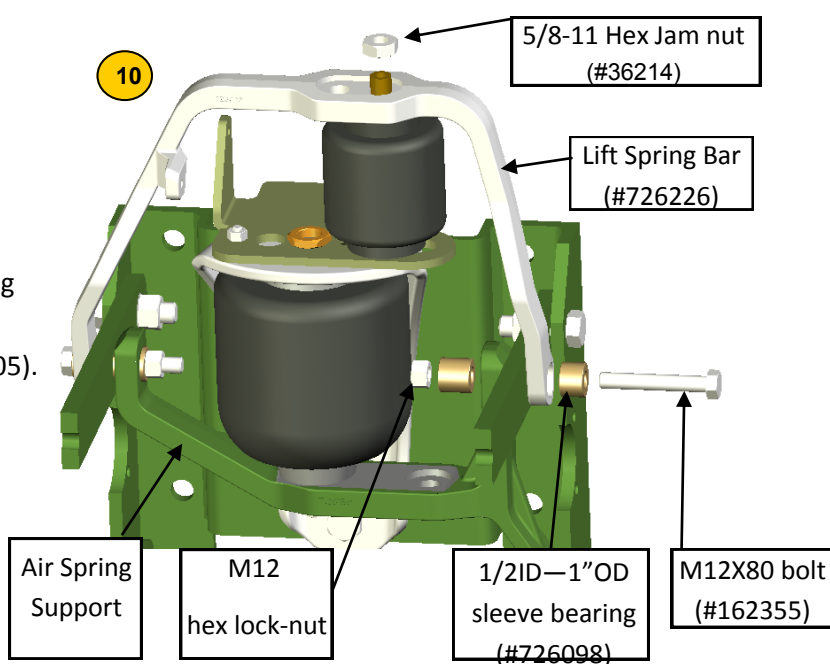


Pro Shaft Driven planters (Parts Kit 726320) should begin again with Step 9 here. Chain driven planters (Parts Kit 726315) should skip ahead to Step 12.

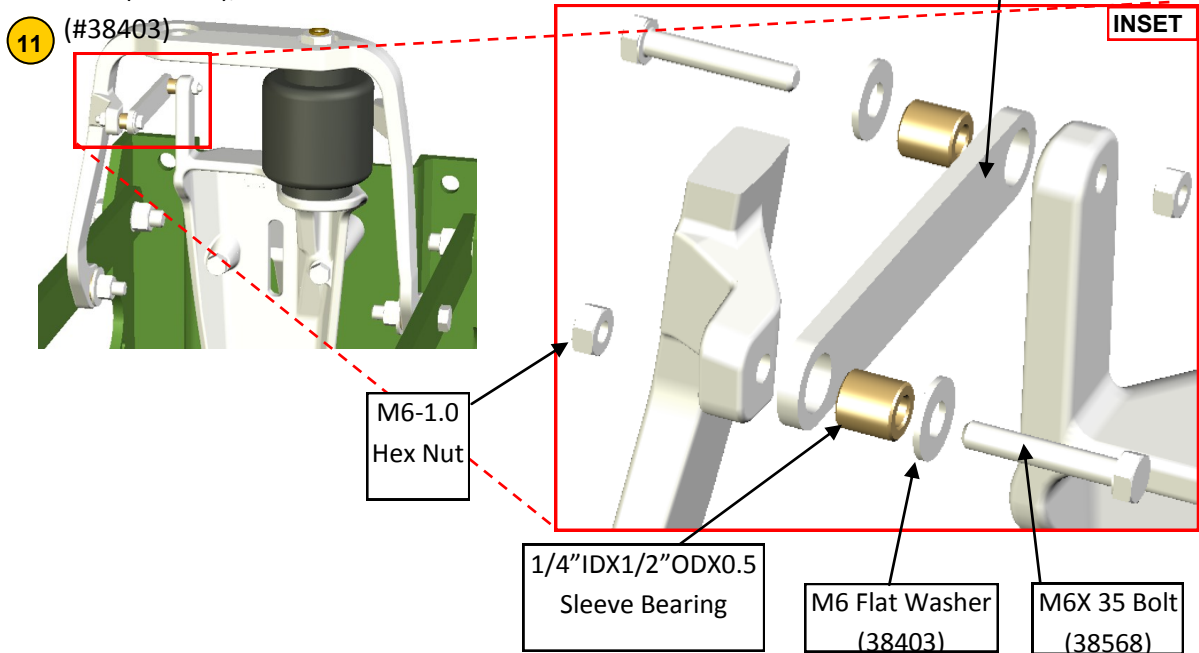


10. Next, align the Lift Spring Bar (#726226) over the Lift Air Bag and outside the top parallel arms as shown at left. First fasten the Spring Bar to the Air Bag using the 5/8" hex jam nut (#36214), this will help anchor the Spring Bar during the next step. The 5/8" nut should be tightened to 10-12lb-ft of torque.

Secure the Lift Spring Bar to the Air Bag Support **through** the top parallel arms using M12X80 bolt (162355), 1/2ID-1"OD sleeve bearing (726098), M12 hex lock-nut (726205).

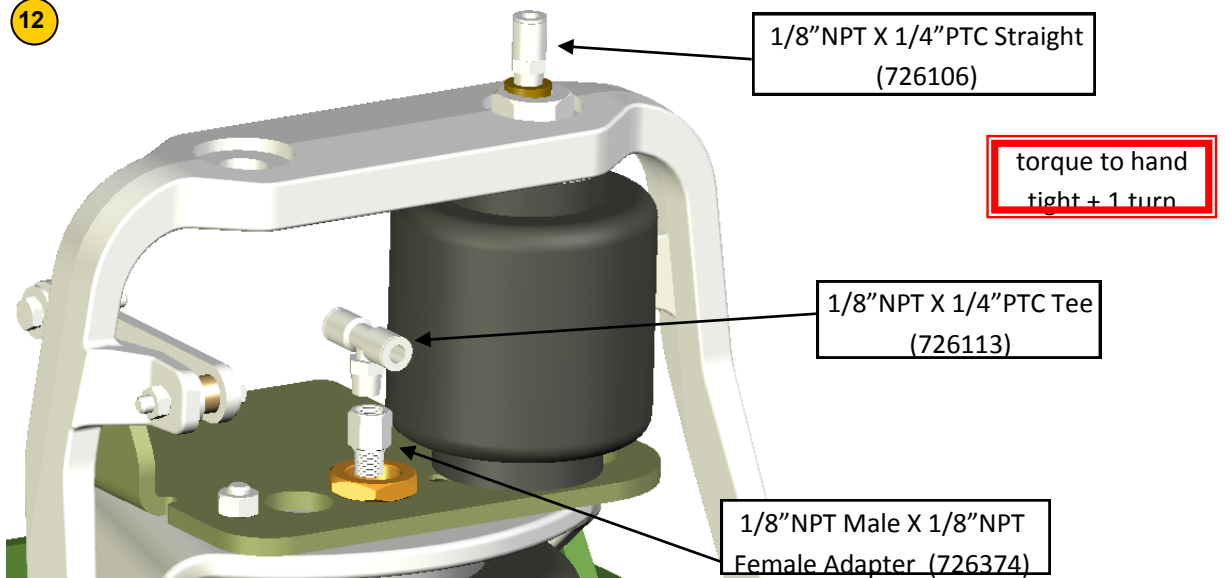


11. Next place the Positioning Link (#726066) between the Lift Spring Support Bracket and the Lift Spring Bar as shown. Fix the Positioning Link in place using two M6 X 35 bolts (#38568), two 1/4"ID—1/2"OD sleeve bearings(#726070), M6 hex machine nut (#40305), and two M6 Flat Washers (#38403)



The following steps apply to both Pro Shaft Driven planters (Parts Kit 726320), and Chain driven planters (Parts Kit 726315).

12



12. Install the air fittings into the air Bags. Begin with the 1/8" NPT Male X 1/8" NPT Female Adapter (726374) into the Collar Nut for the Down Air Bag. The 1/8" NPT X 1/4" PTC Tee (726113) will be threaded into this adapter, see above. Finish the installation with the 1/8" NPT X 1/4" PTC Straight fitting (726106) into the Lift Air Bag. All three fittings should be torque to hand tight + 1 turn. Check tightness of all bolts and nuts, and freedom of motion/ clearance of all components. Please see the following page for clearance details.

Checking for Clearance Around Lift Air Bags

This kit is designed to have plenty of clearance around the lift airbag. However, it may be possible, with incorrect installation or exceptionally worn row unit equipment, for the Lift Spring Bar to come in contact with the Lift Air Bag (726101).

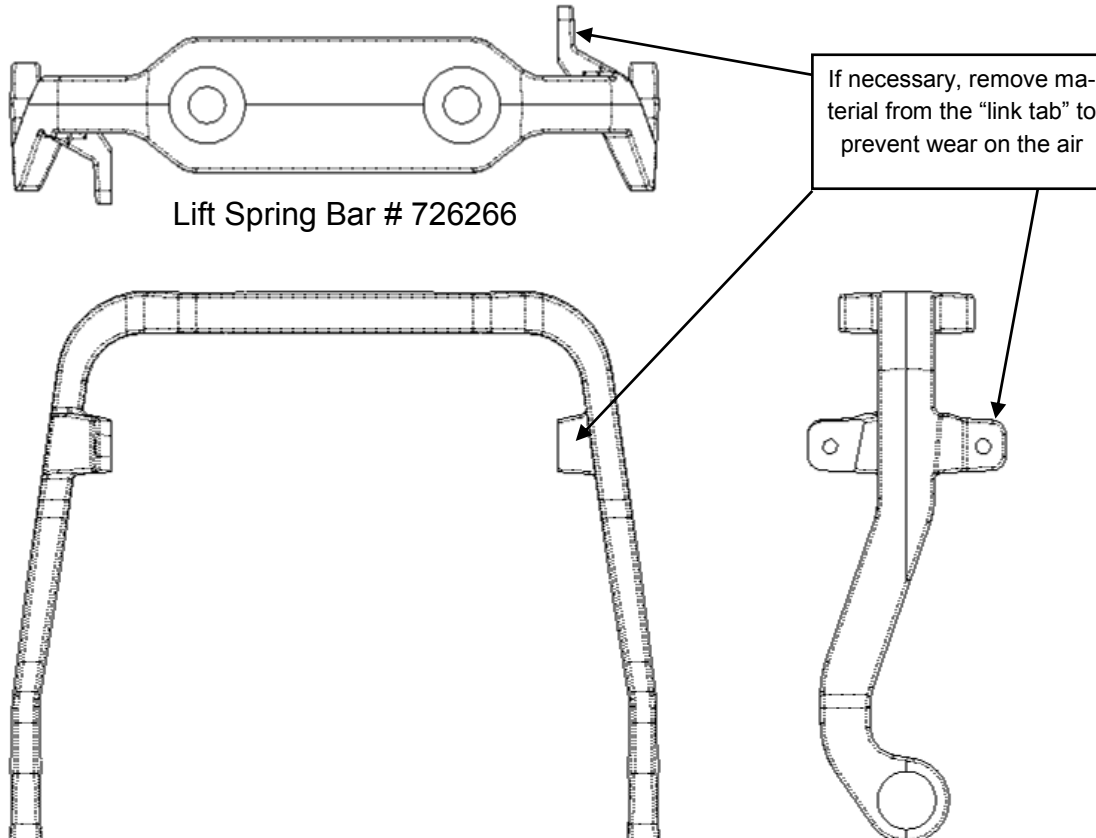
To confirm clearance around the Lift Air Bag:

- ◆ Make sure all the AirForce equipment is properly installed, including row unit conversion kits, air lines, 20/20 monitor systems, and the Compressor Module .
- ◆ Power up the tractor and 20/20 system.
- ◆ Lower the planter to planting depth.
- ◆ Using the 20/20 AirForce Manual Control functionality, inflate the Lift system to 100 psi. (specific instruction for manual controls can be found on page 9).

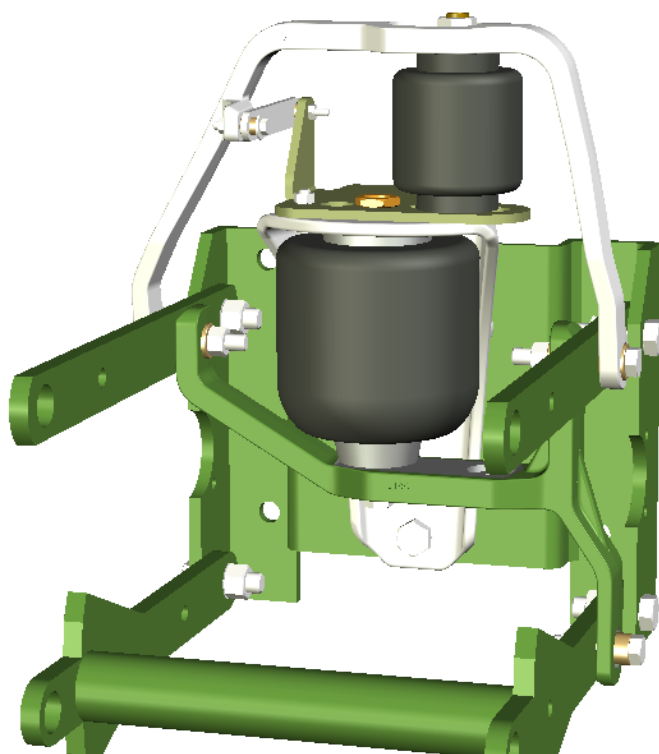
- ◆ Raise the planter so that the row units are com-

What to do if the airbag is not clear all the way around:

- ◆ If the air Bag does not have complete clearance, first double check that the AirForce row unit parts were installed correctly. Particularly, watch for loose hardware and misplaced 1" spacer/shim washers (726453).
- ◆ If all AirForce row unit parts have been installed correctly, it may be necessary to remove some material from the Lift Spring Bar. Prior disassembling anything, be sure to relieve pressure from the system, and disable the 20/20 AirForce control.
- ◆ Material will probably need to be removed from the "link tab" which is closest to the airbag.



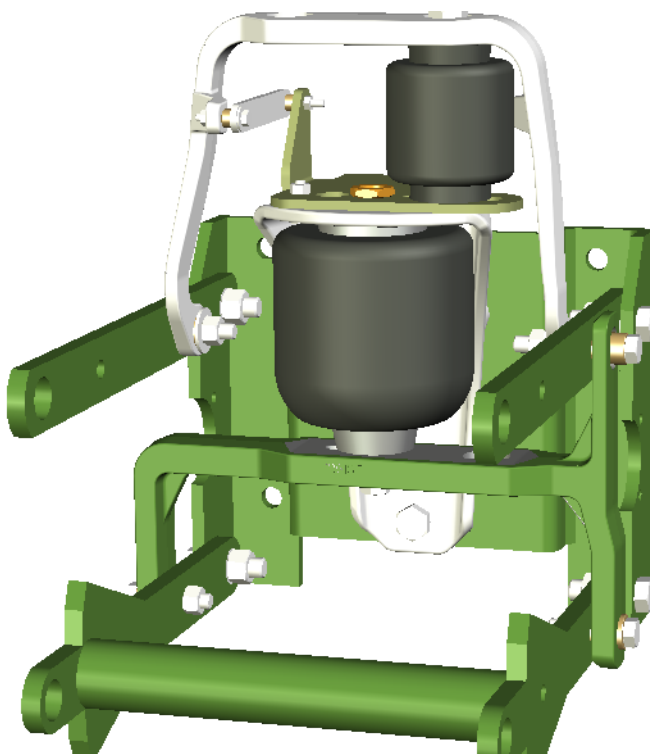
Completed Row Unit Conversions



Row Unit Conversion

for kits: 726320

Regular or Long Parallel Arms



Row Unit Conversion

for kits: 726315

Regular or Long Parallel Arms

Row Unit Conversion Instructions

for:

planter models:JD17XX / 7200 / 7300

to convert from **Existing Spring:.....JD Single/ Dual Pneumatic Spring Assembly**



JD Center Single Pneumatic Bag

Existing Springs



JD Center Dual Pneumatic Bags

This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** Driven meters. Some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating the completed conversion of these are located at the end of this instruction.

Conversion Kit Components

726325	Part Number	Part Name	Description
1	726101	Spring	Lift Air Bag
1	726225	Bracket	Lift Spring Mounting Bracket
1	726242	Plate	*Positioning Plate
1	726226	Bar	Lift Spring Bar
1	726352		Hardware Pack

* Only to be installed on row units WITHOUT vacuum brackets

Quantities are given per row

Hardware Pack Components

QTY	PART	PART NAME	DESCRIPTION
2	33094	Washer	**7/8 SAE Flat ZN
1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
2	38403	Washer	M6 Flat ZN CL
2	38568	Bolt	M6-1.0 x 35 ZN CL
2	90680	Hex Nut	M6-1.0 Top Lock Nut ZN CL
1	23332	Hex Nut	M8-1.25 Top Lock Nut 10.9 ZN CL
1	32443	Bolt	M12-1.75 X 45 Class 10.9 ZN Y
1	726066	Link	Positioning Link
2	726070	Bushing	1/4 - 1/2 x .5 Sleeve Bearing
2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	726106	Male Fitting	1/8 NPT x 1/4 PTC Straight
1	726115	Tee	1/4 PTC Tee
2	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
2	726227	Hex Nut	**3/4-16 Collar Nut
2	726258	Bushing	1/2 - 1 x .69 Sleeve Bearing
1	726261	Bolt	5/16 x 18 FH (Fastenal 94253)
2	726374	Adapter	1/8 NPT Male x 1/8 NPT Female
2	32599	Bolt	M12-1.75 X 70 Class 10.9 ZN Y
1	0162403	Bolt	M8-1.25 X 25 ZN Y

Quantities are given per row

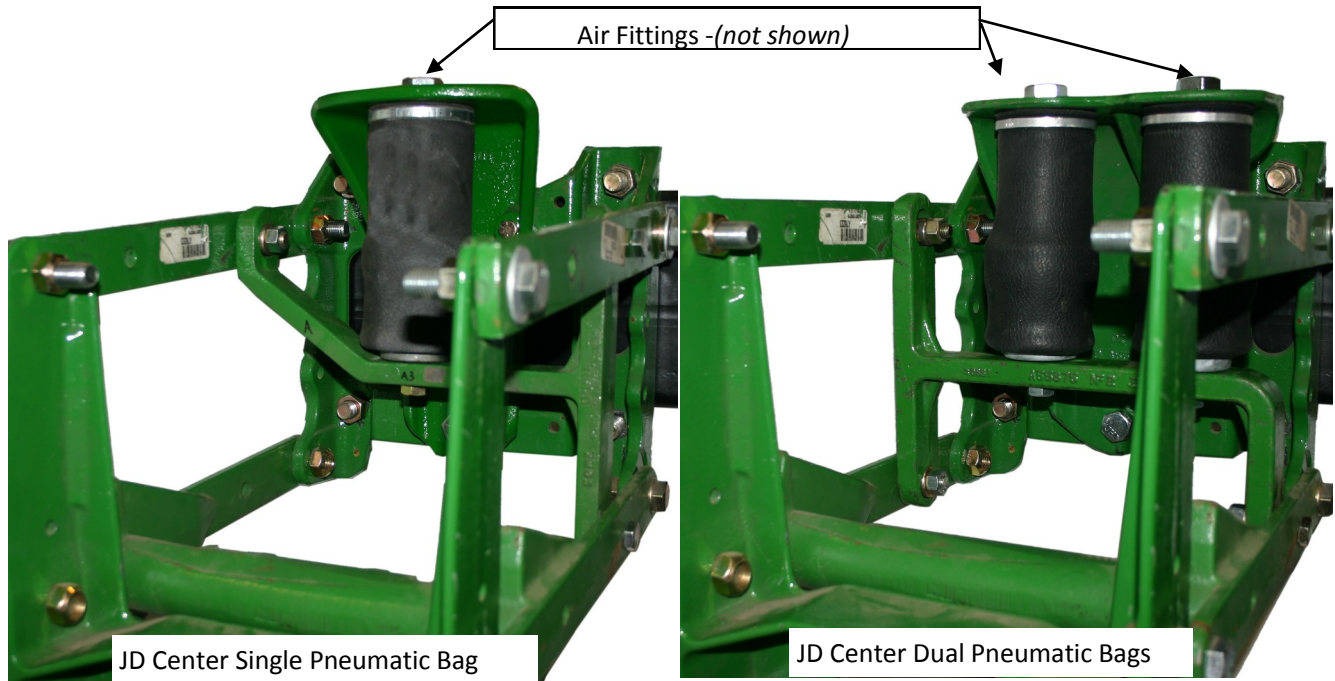
NOTE: **Some extra hardware included for use ONLY
with Dual Pneumatic Down Force Systems

Recommended tools (not provided):

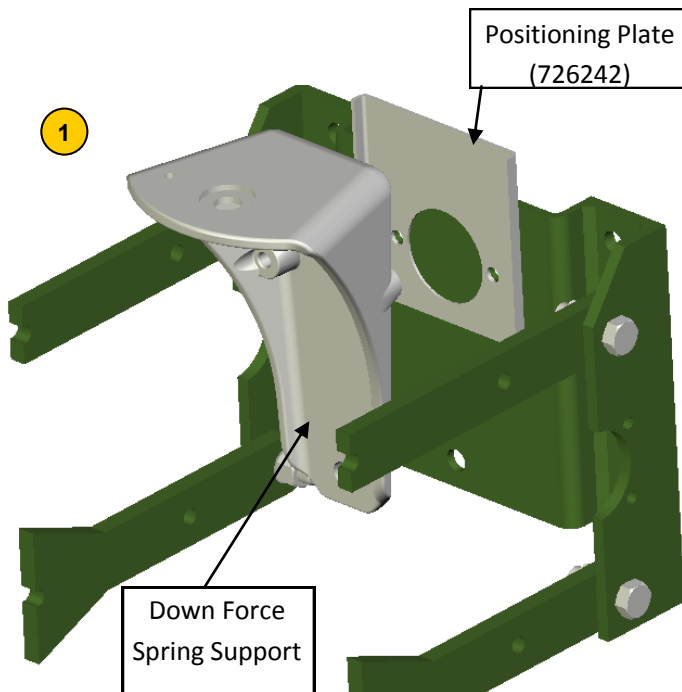
Open end wrenches: 3/8", 7/16" 1/2", 3/4", 15/16",

1-1/8", 10MM, & 19MM

- or suitable crescent wrench



Before beginning the conversion process, release all pressure from your existing Air Bags. Remove the air fitting (s)



1. For planters without a vacuum tube bracket, a positioning plate has been included. Remove the two M10 bolts from the top of the Down Force Spring Support and back out the M16 bolt at the bottom center of the bracket. Align the Positioning Plate(726242) as shown at left. When re-installing the bolts, leave them loose to facilitate alignment of further items.

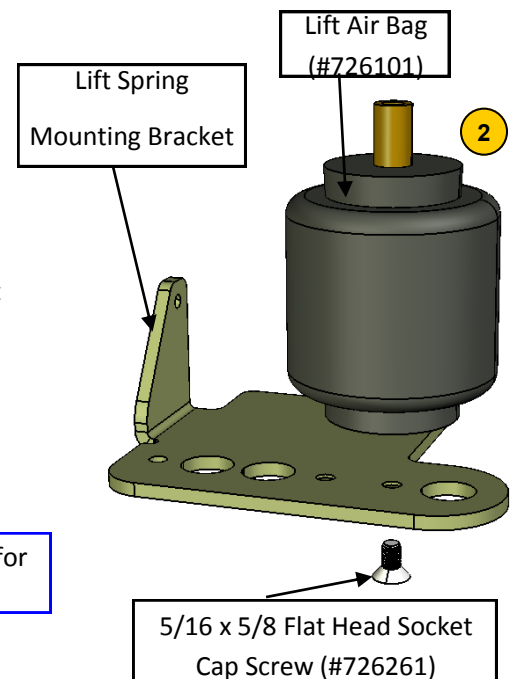
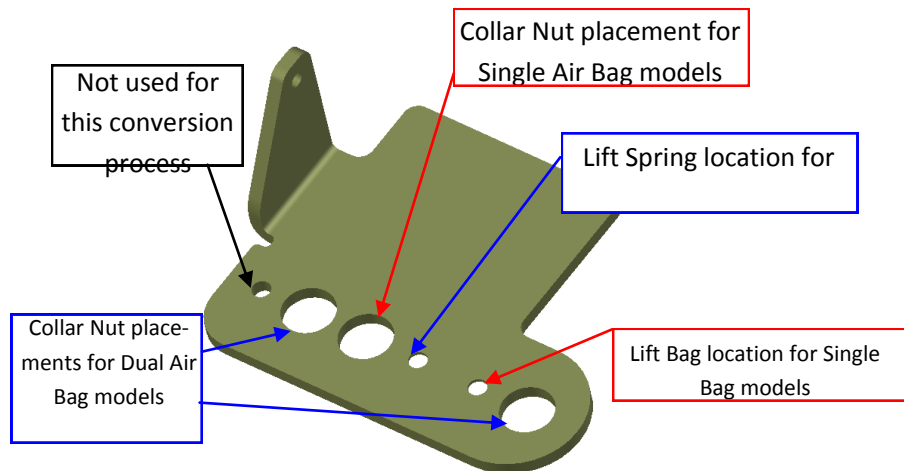


For planters with a vacuum tube bracket simply loosen all three bolts at this point but do not remove.

2. Assemble separately: Position the Lift Air Bag (#726101) on the Lift Spring Mounting Bracket (#726225) as shown at right. Fix the Lift Air Bag in place from the underside of the Mounting Bracket using the 5/16 x 5/8 Flat Head Socket Cap Screw (#726261). This will require the use of a 3/16" Allen wrench. The 5/16" Cap Screw

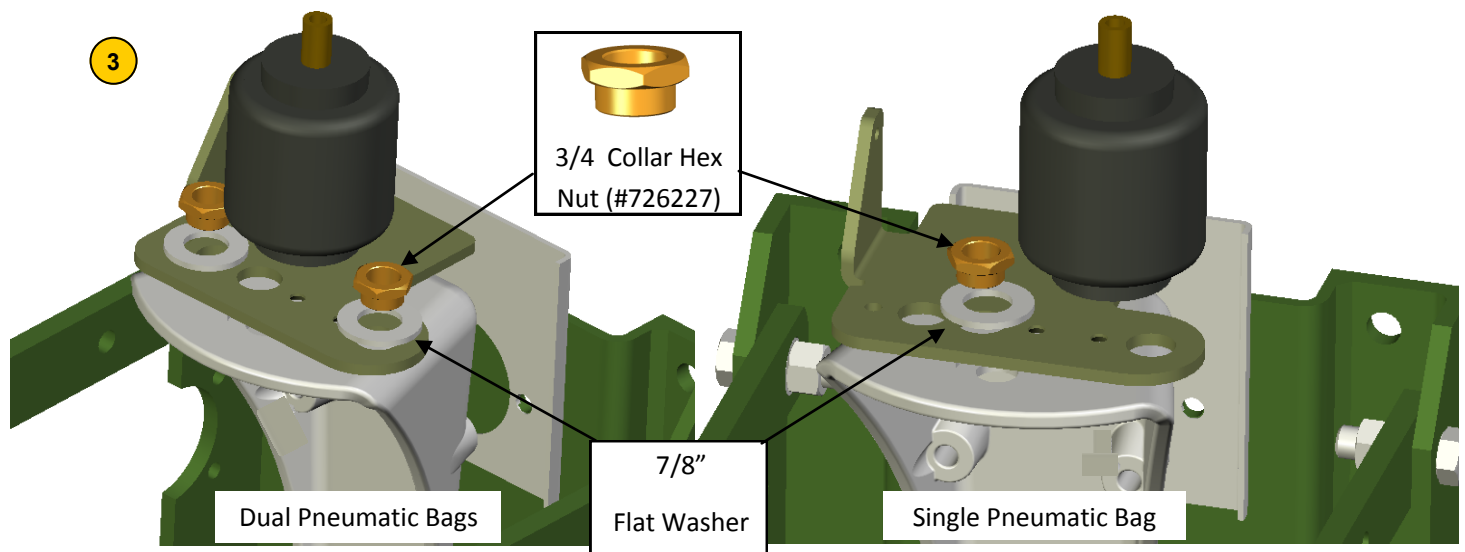


Note: This is a universal mounting bracket, not



3. Place the Lift Spring assembly on top of the Down Force Spring Support and align according to your model needs. Fix in place through the Down Force Support to the Down Force Air Bags using the Collar nut(s) (#726227) and 7/8" flat washer(s) (33094) — Note: not all configurations will require the use of the 7/8" washer, ensure a good snug fit of collar nut with or without the use of the washer. Tighten Collar Nuts to 15lb-ft of torque.

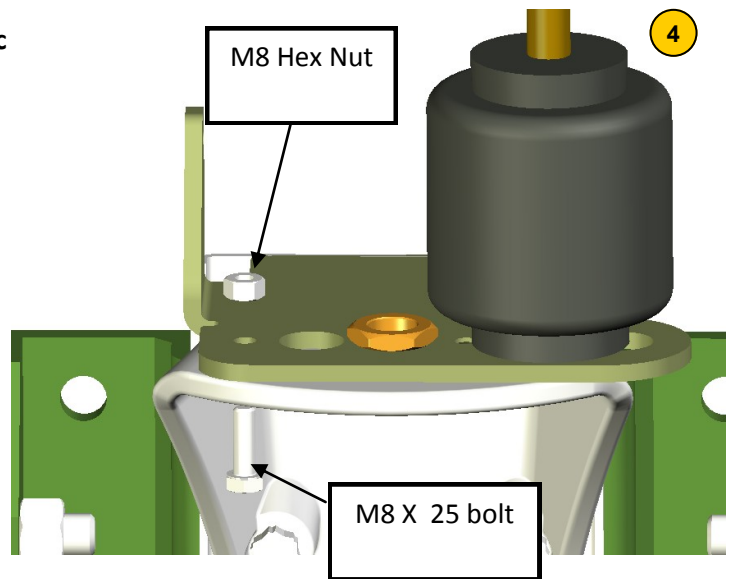
Next, tighten the M10 and M16 bolts through the Down Force Support Bracket. Note: the configuration will likely





The following step is for Single Pneumatic systems ONLY! If your planter has Dual Pneumatic down bags, skip the following

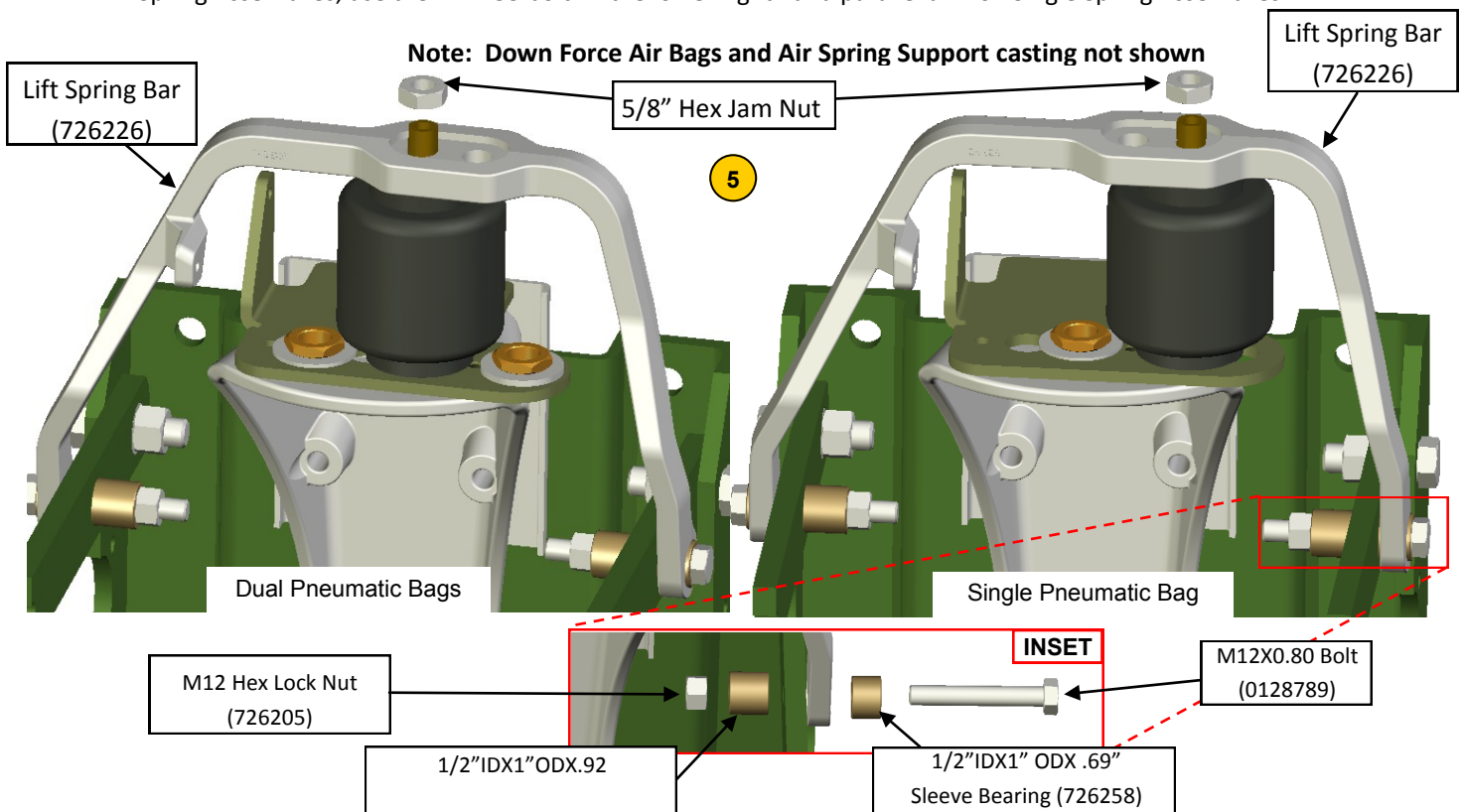
4. Using the left most hole on the Lift Spring Mounting Bracket as a guide, drill through the down Force Spring Support using a 21/64 drill (or next largest if not equipped). Be careful not to damage the Down Force air bag in the process. Install the M8 bolt



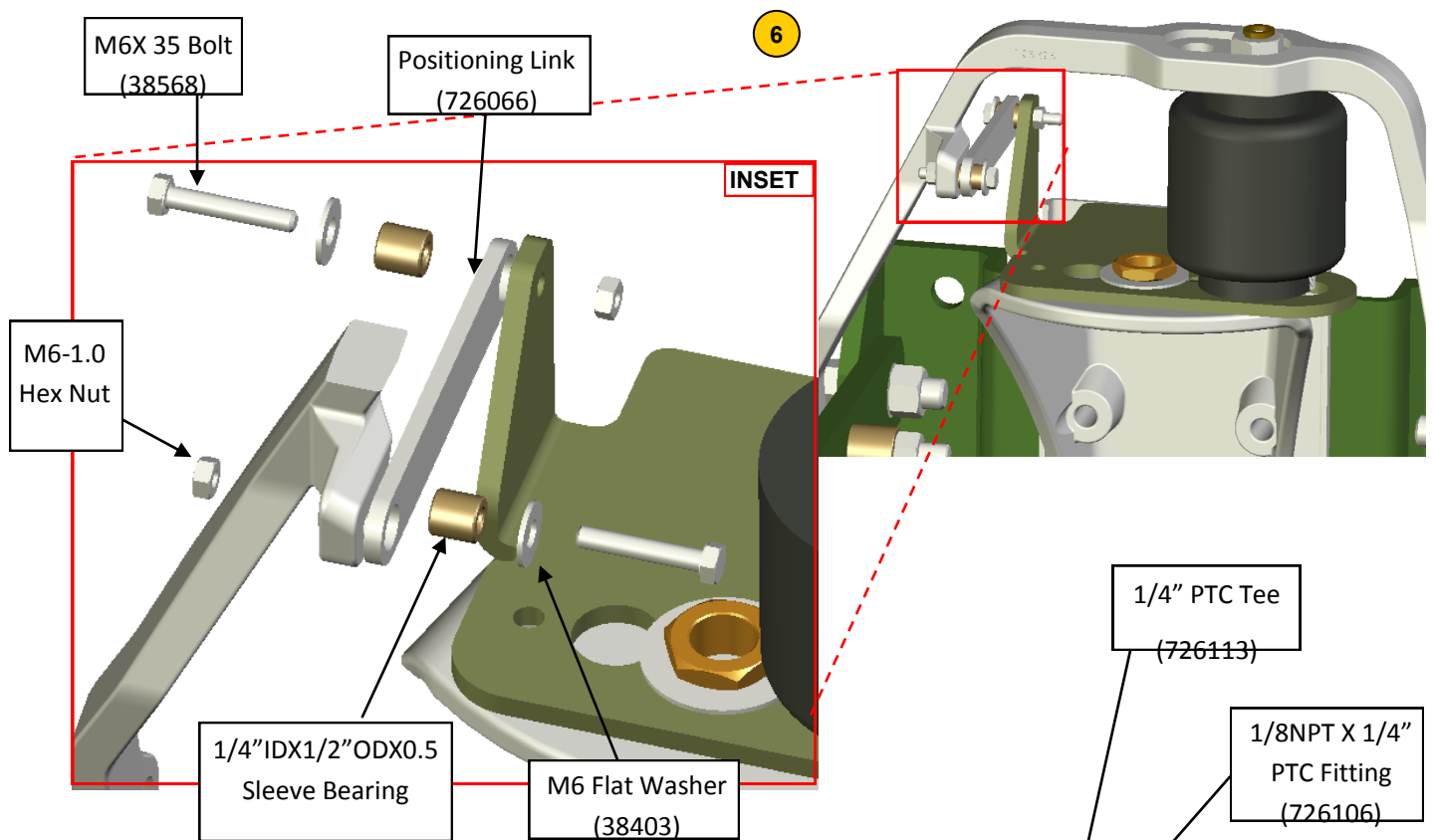
5. Next, align the Lift Spring Bar (#726226) over the Lift Air Bag and on the top parallel arms. First fasten the Spring Bar to the Air Bag using the 5/8" hex jam nut (#36214), this will help anchor the Spring Bar during the next step. The 5/8" nut should be tightened to 10-12 lb-ft in of torque.

Secure the Lift Spring Bar to the top parallel arms using (in order from outside the parallel arms to the inside) two M12X80 bolts (0128789), two 1/2" ID X 1" OD X 0.69" Sleeve Bearings (726258), *-the parallel arms-* then, two 1/2ID-1"OD X 0.98" sleeve bearings (726098), and finally two M12 hex lock-nuts (726205). See INSET from illustration 5 below. The Lift Air Bag may need to be manually compressed to align with the holes on the parallel arms.

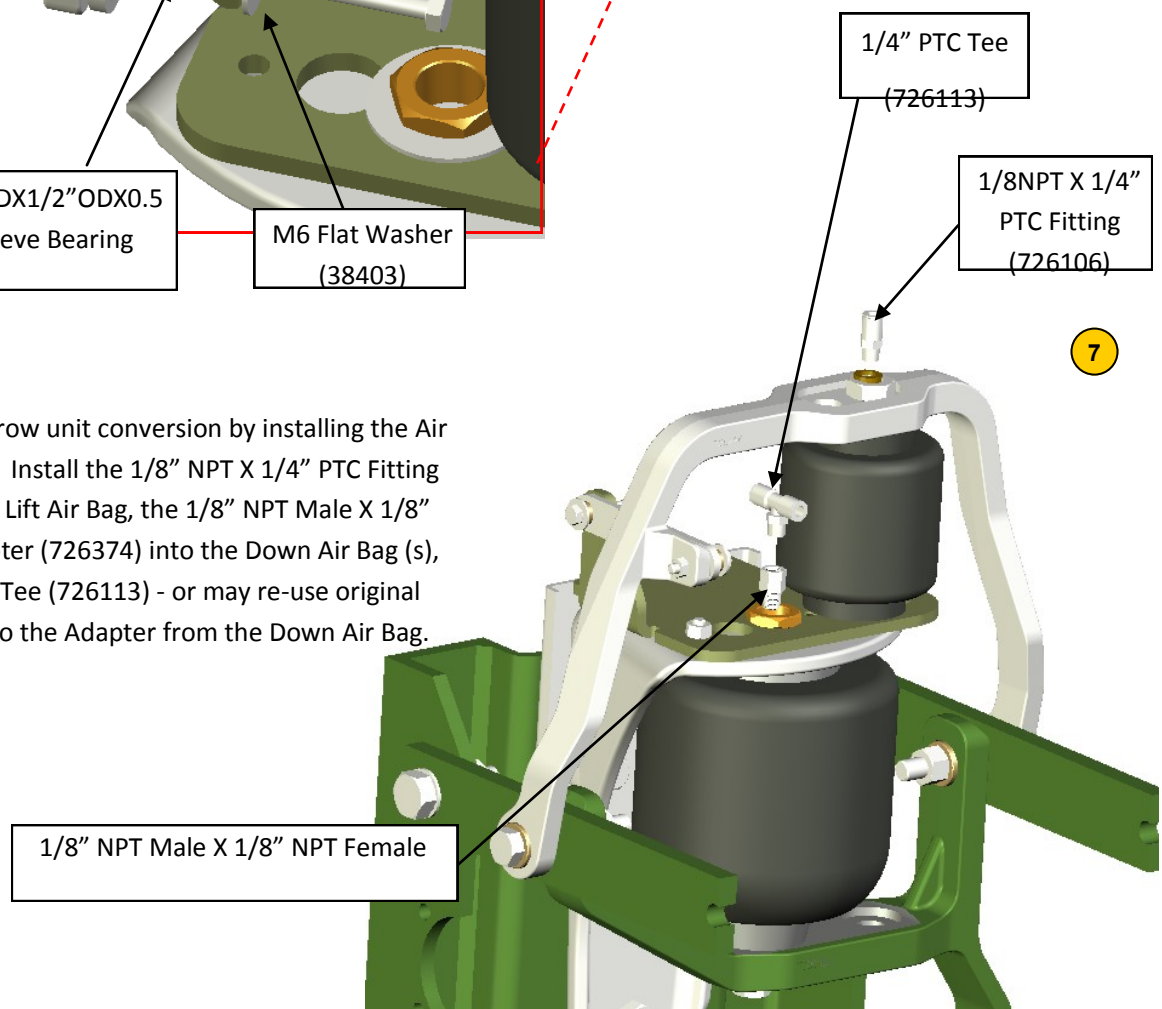
Note: The M12X55 bolt (0128789) should be installed in the upper right hand parallel arm on Dual Spring Assemblies, use the M12X55 bolt in the lower right hand parallel arm on Single Spring Assemblies.



6. Next place the Positioning Link (#726066) between the Lift Spring Mounting Bracket and the Lift Spring Bar as shown (above left). Fix the Positioning Link in place using two M6 X 35 bolts (#38568), two 1/4" ID—

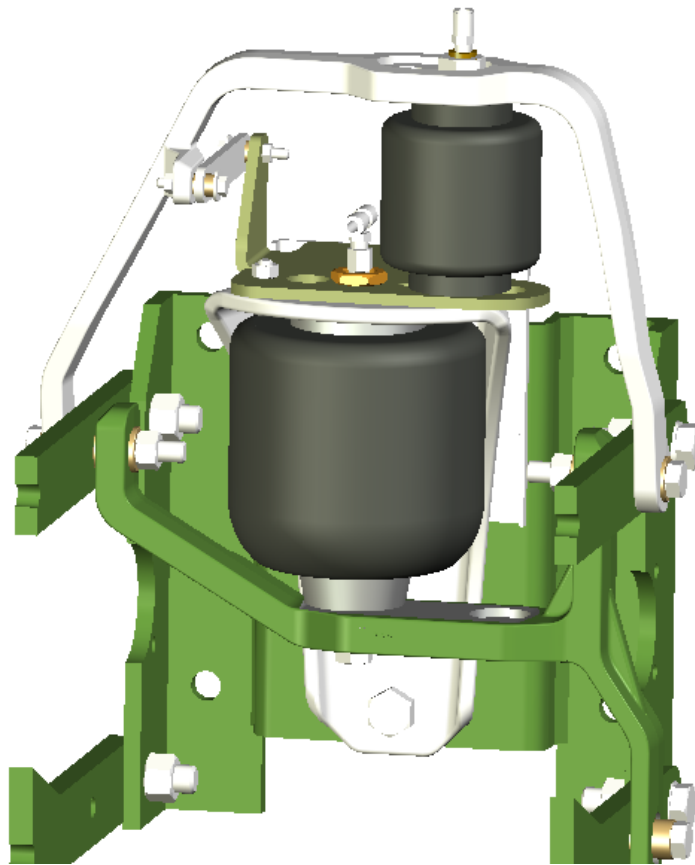


7. Complete the row unit conversion by installing the Air fittings as shown. Install the 1/8" NPT X 1/4" PTC Fitting (726106) into the Lift Air Bag, the 1/8" NPT Male X 1/8" NPT Female Adapter (726374) into the Down Air Bag (s), and the 1/4" PTC Tee (726113) - or may re-use original factory fitting, into the Adapter from the Down Air Bag.



8. Check tightness / torque recommendations of all connection points and freedom of motion / clearance of

Completed Row Unit Conversions



Row Unit Conversion

for kits: 726325

Regular or Long Parallel Arms

Row Unit Conversion Instructions

for:

planter models:JD17XX / 7200 / 7300

to convert from Existing Springs:.....JD HD Adj. Center Springs,
JD Light & HD Side Springs
JD HD Springs (Center Quad)

Existing Springs



This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** driven meters. The examples shown below are diagrams for a planter with regular parallel arms; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating a completed row unit conversion are located at the end of these instructions.

Conversion Kit Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	726100	Spring	Air Bag (Down)
1	726101	Spring	Air Bag (Lift)
1	726549	Support	Air Spring Base
1	726551	Bracket	Air Spring Head Mount

Quantities are given per row

Hardware Pack Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	13005	Bolt	1/4-20 x 1 GRD 5 BOLT ZN
1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
1	36266	Hex Jam Nut	3/4-16 Nut ZN CL
2	38671	Bolt	M10-1.5 x 130 ZN CL
1	38772	Bolt	M16-2.0 x 130 ZN CL
2	90702	Flange Nut	M10-1.5 HEX NUT
2	162348	Bolt	M10-1.5 x 55 ZN Y
1	162436	Bolt	M16-2.0 x 45 ZN Y
2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	726112	Elbow	1/8" NPT x 1/4" PTC
1	726113	Male Tee	1/8 NPT x 1/4 PTC Tee
1	726115	TEE	1/4 PTC
1	726135	Stud	Air Spring Base Connector
3	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
3	726508	Bolt	M12-1.75 x 50 Class 10.9 ZN Y
1	726631	TIE STRAP	17" x 3/16" UV BLACK

Quantities are given per row

Recommended tools (not provided):

Open end wrenches: 7/16", 15/16", 1-1/8", 15MM, 16MM, 19MM, & 24MM

- or suitable crescent wrench (s)

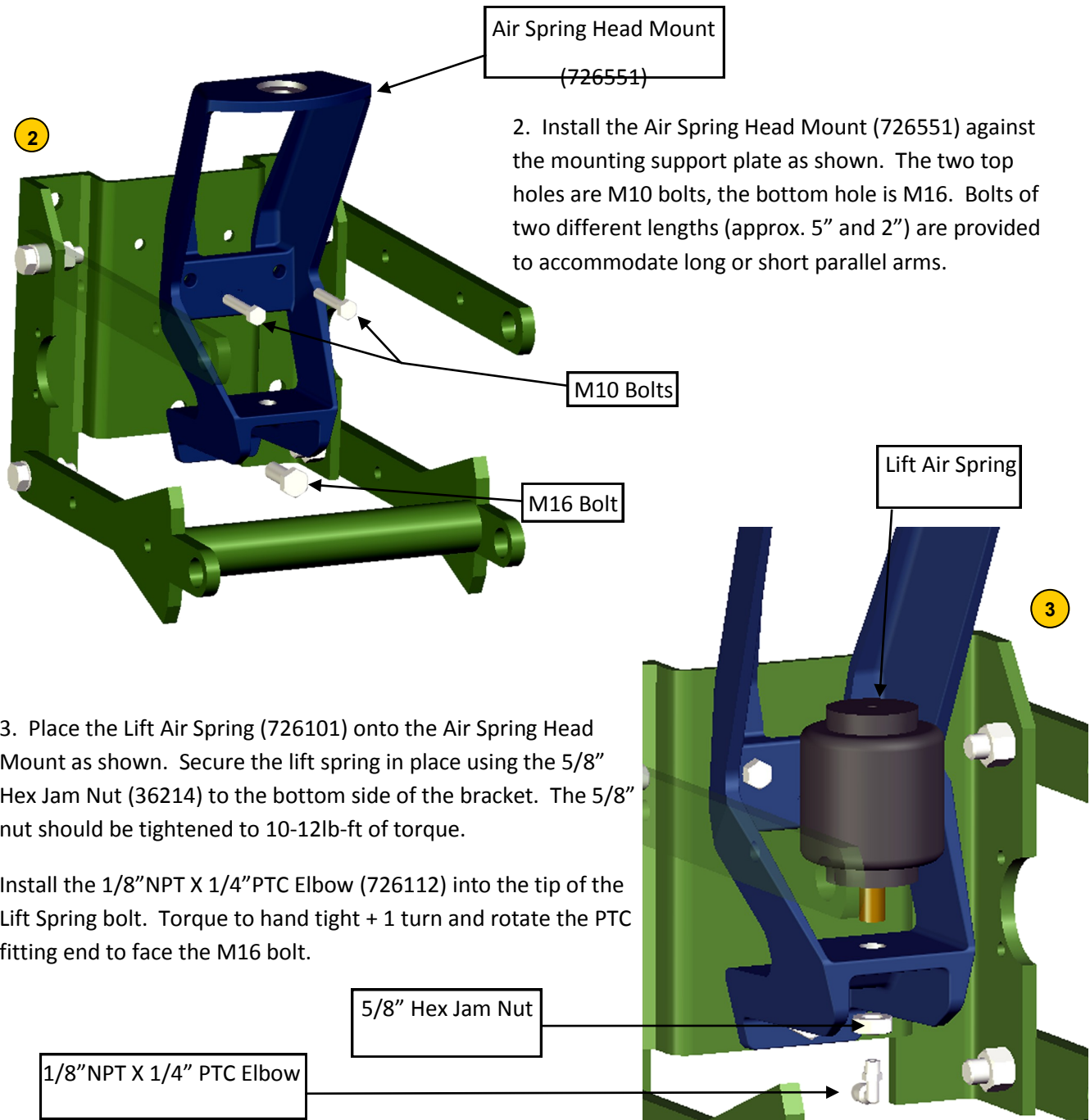
Sockets (Deep well recommended): 3/4", 16MM, 17MM, 19MM, & 24MM

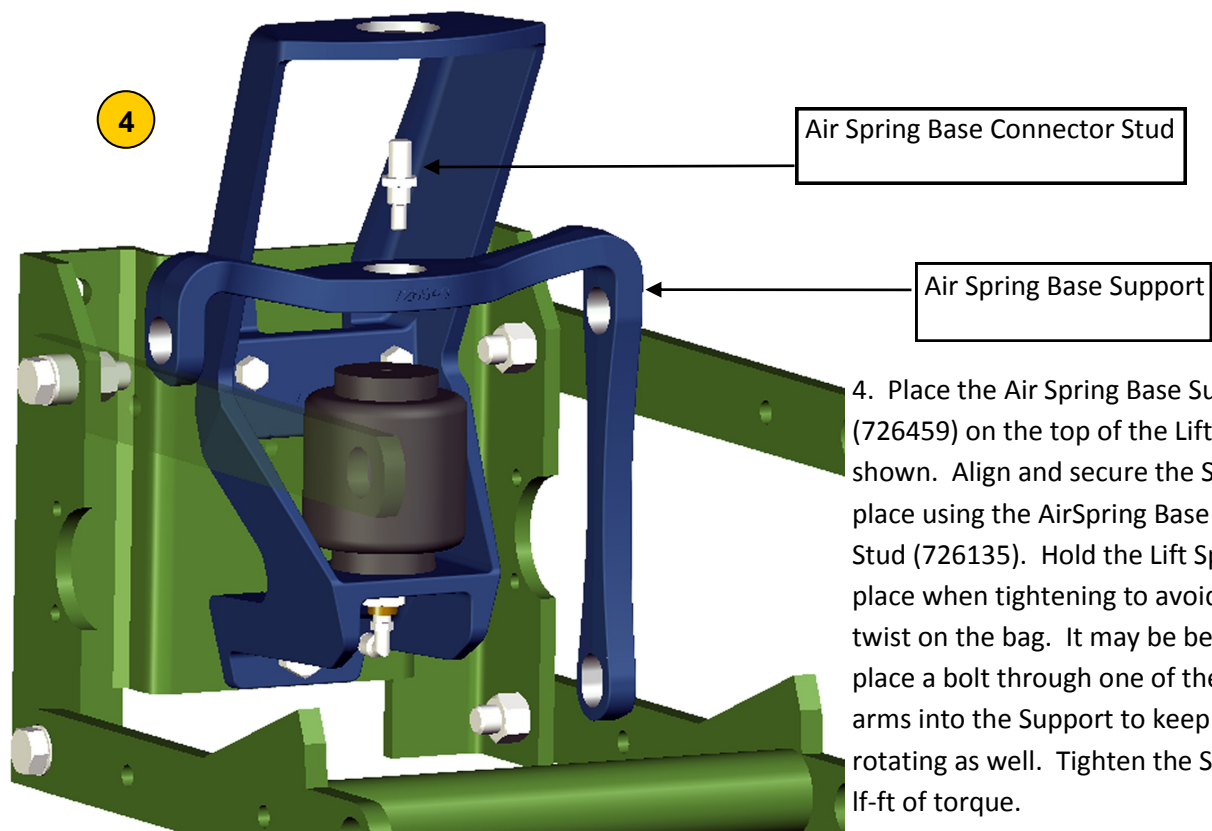
1. Begin installation by removing tension from the existing springs. Once the tension is removed, remove the existing spring assembly and set aside.



Note: For planters with **Long** parallel arms, retain the spacer for use between the mounting support plate and Down Force assembly.

Units with long parallel arms may require the bolts to be cut/torched off in order to remove the existing M10 bolts. When installing the new bolts, install them from the rear of the planter for ease of future serviceability.



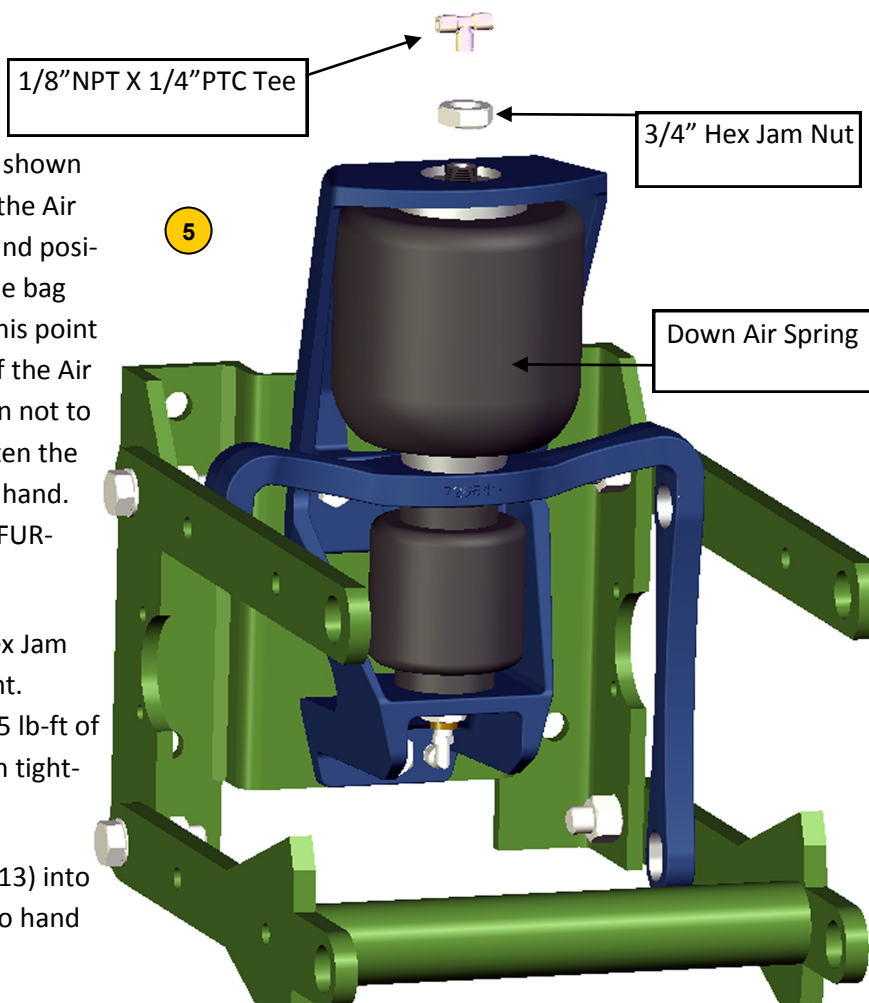


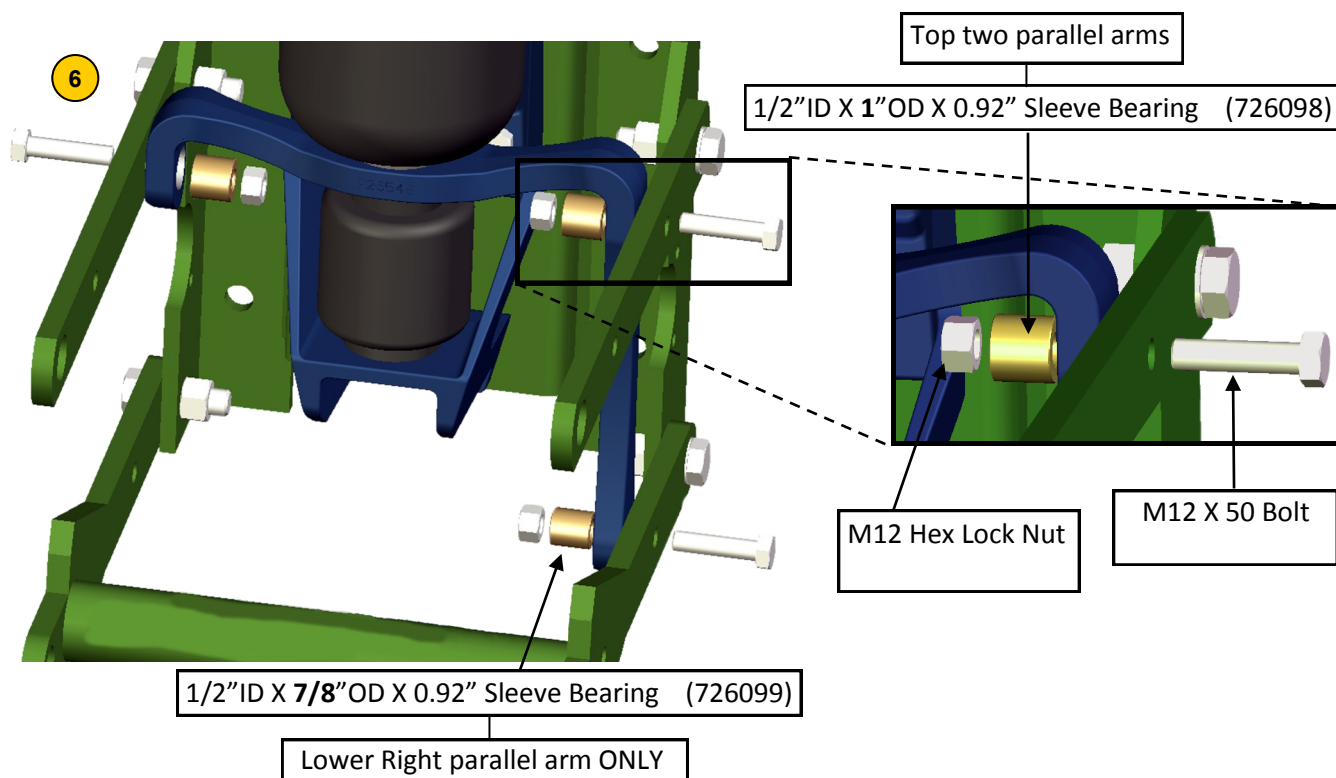
4. Place the Air Spring Base Support (726459) on the top of the Lift Spring as shown. Align and secure the Support in place using the AirSpring Base Connector Stud (726135). Hold the Lift Spring in place when tightening to avoid placing a twist on the bag. It may be beneficial to place a bolt through one of the parallel arms into the Support to keep it from rotating as well. Tighten the Stud to 5-6 lf-ft of torque.

5. Place the Down Air Spring (726100) as shown between the Air Spring Head Mount and the Air Spring Base Support. Compress the bag and position the threaded casting on the top of the bag through the top of the Head Mount. At this point thread the bag onto the remaining side of the Air Spring Base Connector Stud taking caution not to cross-thread the bag onto the stud. Tighten the bag onto the stud as much as possible by hand. **DO NOT ATTEMPT TO TIGHTEN THE BAG FURTHER WITH ANY TYPE OF WRENCH.**

Next fix the bag in place using the 3/4" Hex Jam Nut (36266) on the top of the Head Mount. Tighten the jam nut to **NO MORE THAN 15 lb-ft** of torque. Hold the Lift Spring in place when tightening to avoid placing a twist on the bag.

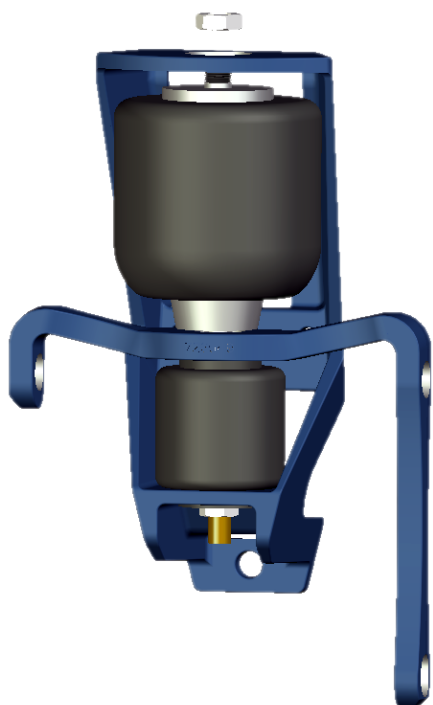
Thread the 1/8"NPT X 1/4"PTC Tee (726113) into the top of the Down Air Spring. Tighten to hand tight + 1 turn.





6. Fix the Air Spring Base Support into place using the three - M12 X 50 Bolts (726508), and three - M12 Hex Lock Nuts (726205), along with three sleeve bearings. Use the two - 1/2"ID X 1"OD X 0.92" Sleeve bearings (726098) for the top two parallel arms and the one - 1/2"ID X 7/8"OD X 0.92" Sleeve Bearing (726099) in the lower right parallel arm.

7. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.



Alternatively, the Air Spring Head Mount, both Air Springs, and the Air Spring Base Support can be pre-assembled outside of the row unit as shown. The conversion can then be completed by fixing the assembly to the mounting plate and parallel arms of the row unit. If assembled in this fashion, it is recommended to only hand tighten the components until the conversion is completed. Then tighten all bolts and nuts to proper torque.



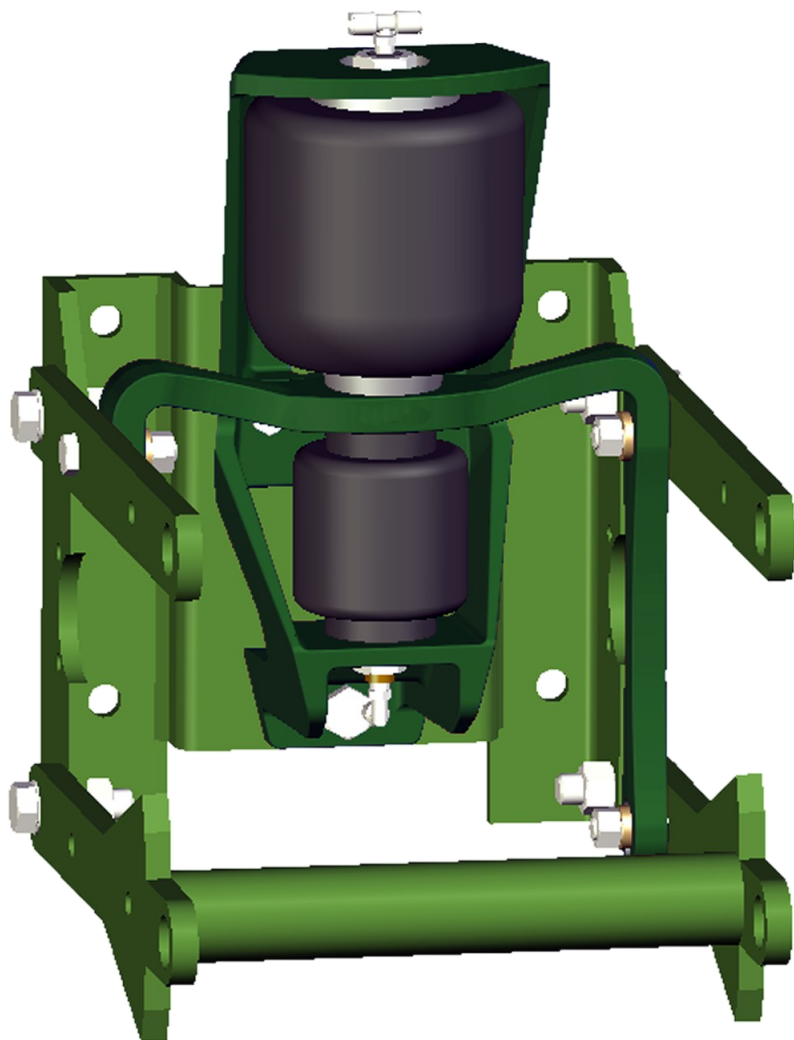
Planters equipped with Tru Count Air Clutch®

Also included in the hardware pack for each row is one - 17" zip tie-strap, and one - 1/4" X 1" Bolt. If you planter is equipped with Tru Count Air Clutches®, it may be necessary to either simply adjust the anti rotation bolt, or possibly replace it with a shorter one which is provided. Check to ensure that the clutch is oriented with the air cylinder vertical or leaning slightly forward. If this is not the case, thread the existing anti-rotation bolt in, but be careful not to tighten it too far. It may be threaded in such that the bolt protrudes from the clutch NO LESS THAN 1". Tightening more than this will cause the bolt to penetrate the clutch housing, possibly resulting in permanent damage. If the clutch still leans back, replace the existing anti-rotation bolt with the shorter bolt that is provided. With this bolt, do not thread it in more than 5/8". Don't forget to re-install the locking nut. (Refer to your tru-count installation instruction manual for complete instructions.)



This must be done to prevent the tru-count clutch from interfering with the air spring base support and vice versa. The zip-tie included in the pack may be used to further secure the air clutch. Loop the tie-strap around the clutch and forward, so that the clutch is held firmly against the anti rotation bolt.

Completed Row Unit Conversion



726520

Regular or Long Parallel Arms

Row Unit Conversion Instructions

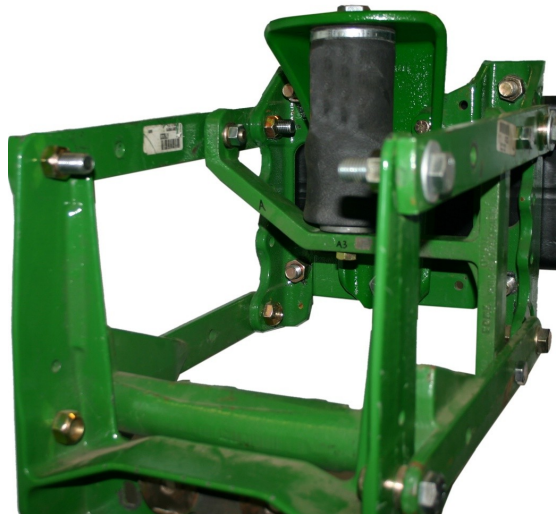
for:

planter models:JD17XX / 7200 / 7300

to convert from **Existing Springs:**.....JD Single Pneumatic Spring

to **Resulting Forces Controlled:**.....Lift Only

Existing Springs



This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** driven meters. The examples shown below are diagrams for a planter with regular parallel arms; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating a completed row unit conversion are located at the end of these instructions.

Conversion Kit Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	726101	Spring	Air Bag (Lift)
1	726549	Support	Air Spring Base
1	726551	Bracket	Air Spring Head Mount

Quantities are given per row

726590

Hardware Pack Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	13005	Bolt	1/4-20 x 1 GRD 5 BOLT ZN
1	36214	Hex Jam Nut	5/8-11 Nut ZN CL
2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	726112	Elbow	1/8" NPT x 1/4" PTC
1	726115	TEE	1/4 PTC
1	726135	Stud	Air Spring Base Connector
1	726631	TIE STRAP	17" x 3/16" UV BLACK

Quantities are given per row

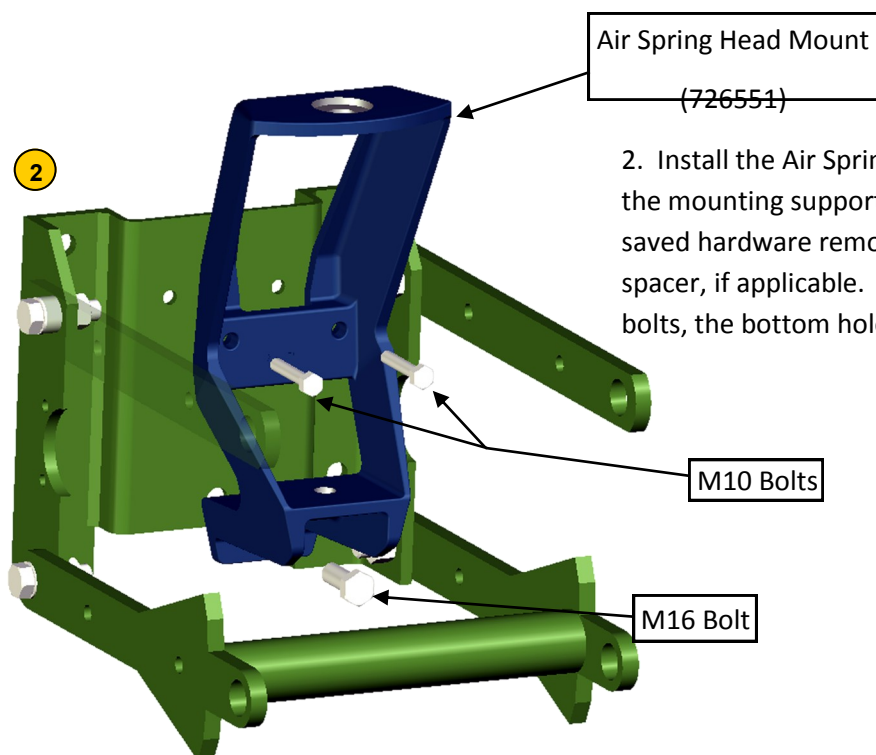
Recommended tools (not provided):

Open end wrenches: 7/16" 15/16", 1-1/8", 15MM, 16MM, 19MM, & 24MM

- or suitable crescent wrench (s)

Sockets (Deep well recommended): 3/4", 16MM, 17MM, 19MM, & 24MM

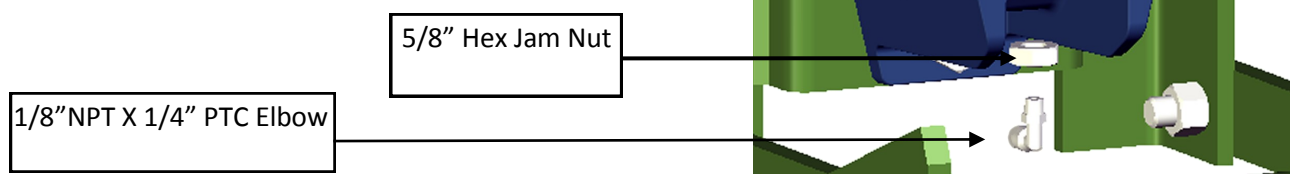
1. Begin installation by removing pressure from the existing Air Bags. Once the pressure is removed, remove the existing spring assembly and set aside. Retain all hardware from the mounting support plate and parallel arms for use in re-assembly.

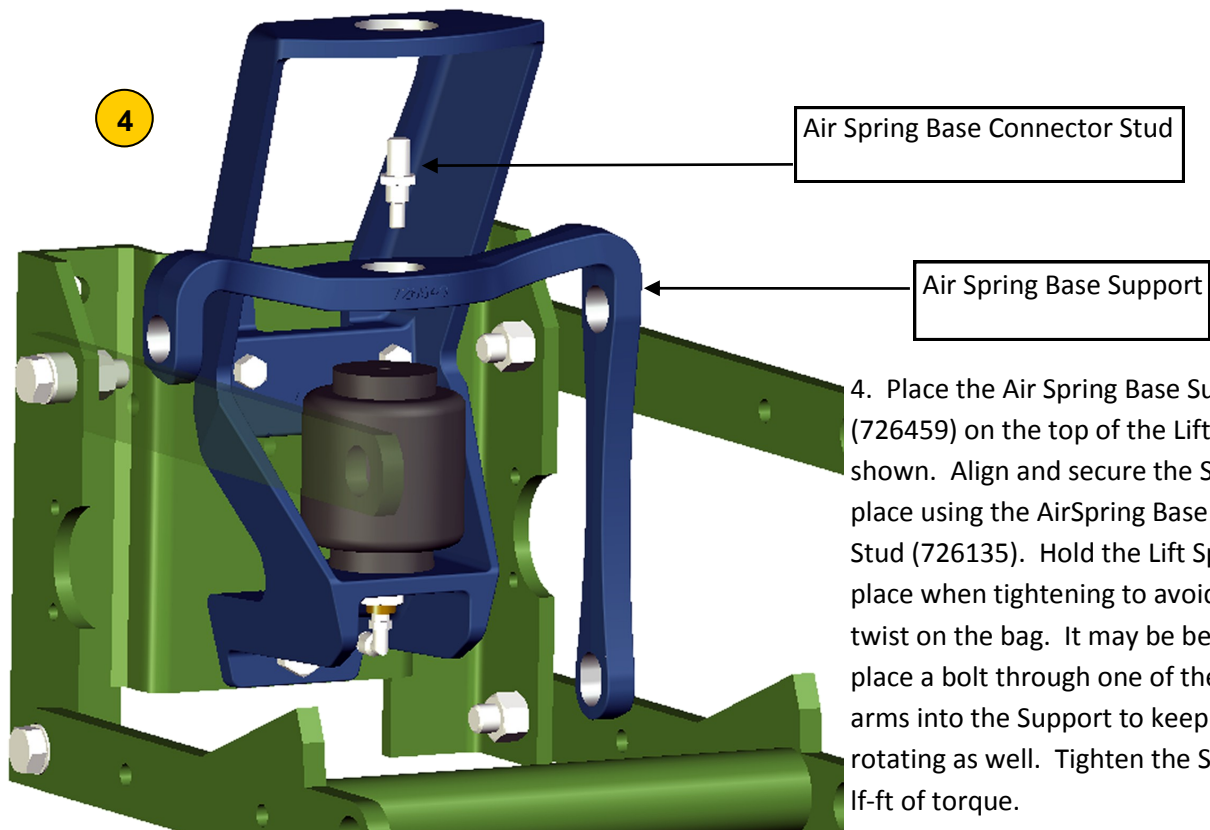


2. Install the Air Spring Head Mount (726551) against the mounting support plate as shown. Re-install the saved hardware removed in step one; as well as the spacer, if applicable. The two top holes are M10 bolts, the bottom hole is M16.

3. Place the Lift Air Spring (726101) onto the Air Spring Head Mount as shown. Secure the lift spring in place using the 5/8" Hex Jam Nut (36214) to the bottom side of the bracket. The 5/8" nut should be tightened to 10-12lb-ft of torque.

Install the 1/8" NPT X 1/4" PTC Elbow (726112) into the tip of the Lift Spring bolt. Torque to hand tight + 1 turn and rotate the PTC fitting end to face the M16 bolt.



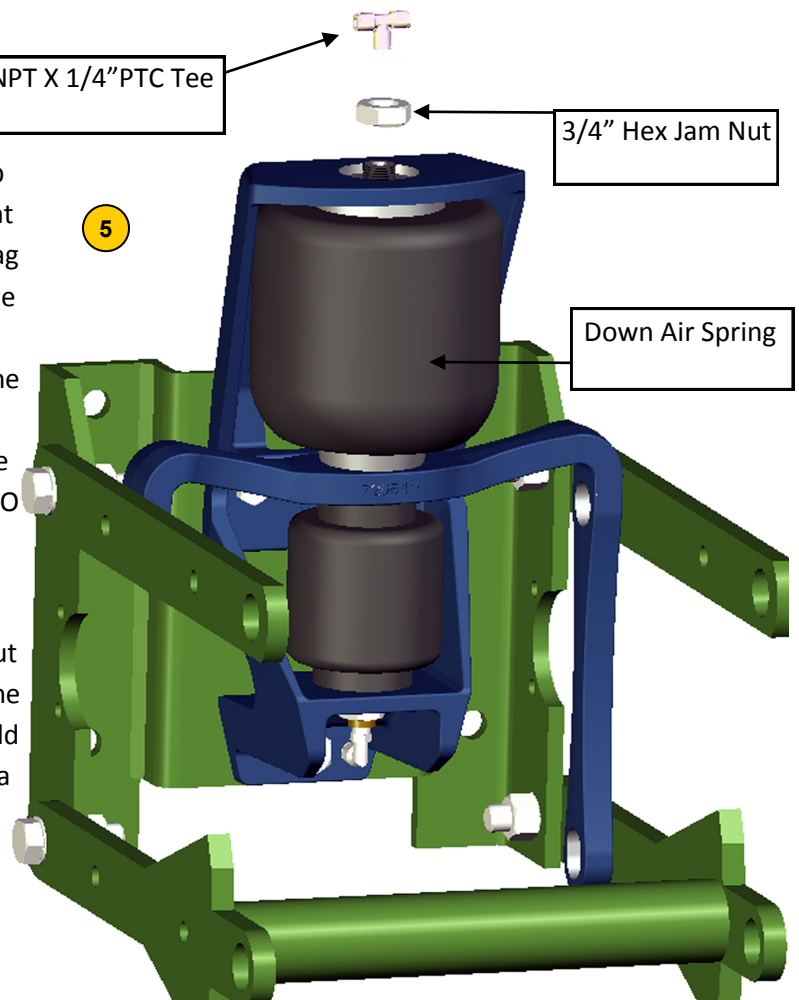


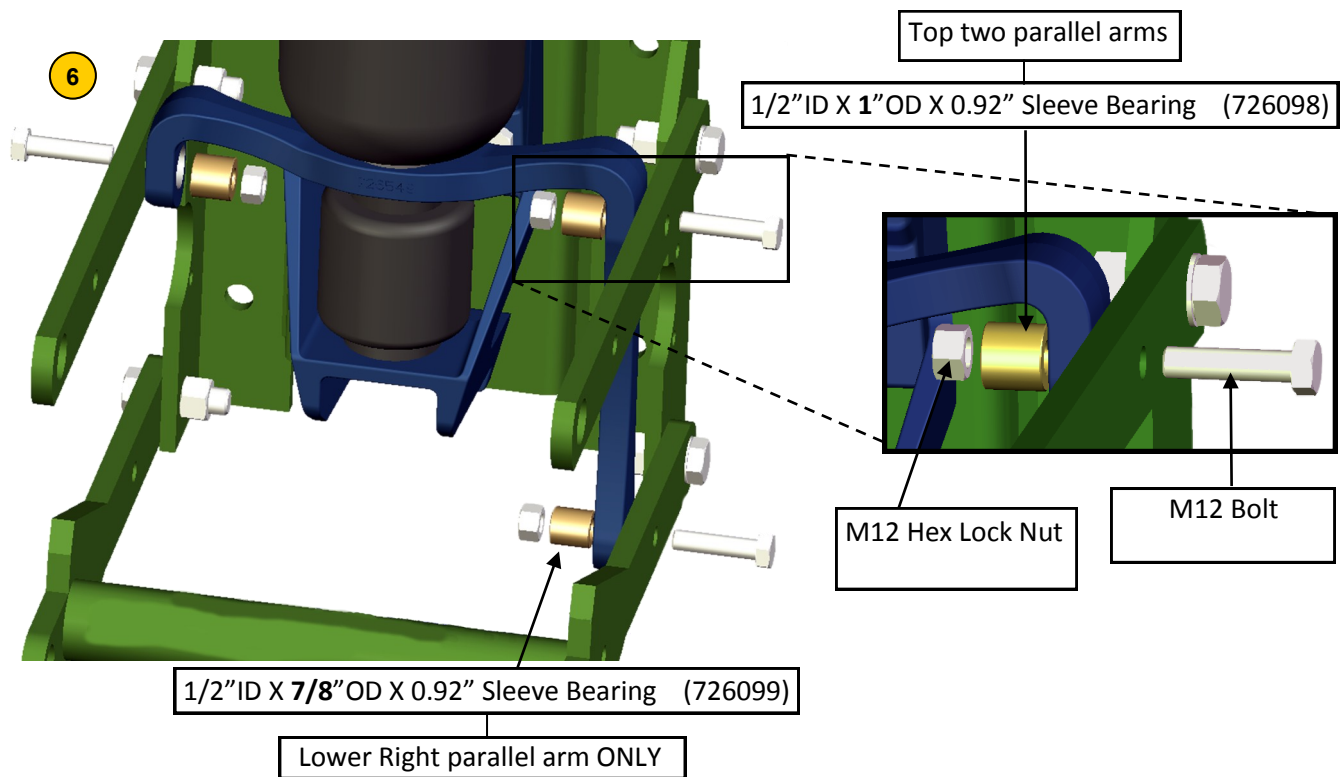
4. Place the Air Spring Base Support (726459) on the top of the Lift Spring as shown. Align and secure the Support in place using the AirSpring Base Connector Stud (726135). Hold the Lift Spring in place when tightening to avoid placing a twist on the bag. It may be beneficial to place a bolt through one of the parallel arms into the Support to keep it from rotating as well. Tighten the Stud to 5-6 lf-ft of torque.

5. Re-install the Down Air Spring, removed in step one, as shown between the Air Spring Head Mount and the Air Spring Base Support. Compress the bag and position the threaded casting on the top of the bag through the top of the Head Mount. At this point thread the bag onto the remaining side of the Air Spring Base Connector Stud taking caution not to cross-thread the bag onto the stud. Tighten the bag onto the stud as much as possible by hand. **DO NOT ATTEMPT TO TIGHTEN THE BAG FURTHER WITH ANY TYPE OF WRENCH.**

Next fix the bag in place using the 3/4" Hex Jam Nut (36266) on the top of the Head Mount. Tighten the jam nut to **NO MORE THAN 15 lb-ft of torque**. Hold the bag in place when tightening to avoid placing a twist on the bag.

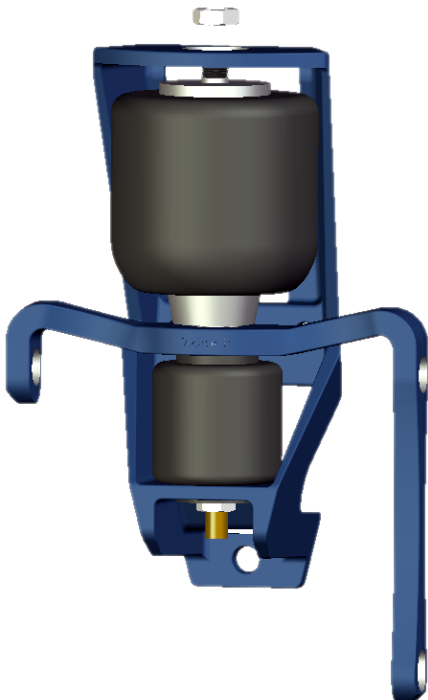
Thread the 1/8" NPT X 1/4" PTC Tee (726113) into the top of the Down Air Spring. Tighten to hand tight + 1 turn.





6. Fix the Air Spring Base Support into place by re-using the three - M12 Bolts and three - M12 Hex Lock Nuts removed in step one, along with the three supplied sleeve bearings. Use the two - 1/2"ID X 1"OD X 0.92"Sleeve bearings (726098) for the top two parallel arms and the one - 1/2"ID X 7/8"OD X 0.92" Sleeve Bearing (726099) in the lower right parallel arm.

7. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.



Alternatively; the Air Spring Head Mount, both Air Springs, and the Air Spring Base Support can be pre-assembled outside of the row unit as shown. The conversion can then be completed by fixing the assembly to the mounting plate and parallel arms of the row unit. If assembled in this fashion, it is recommended to only hand tighten the components until the conversion is completed. Then tighten all bolts and nuts to proper torque.



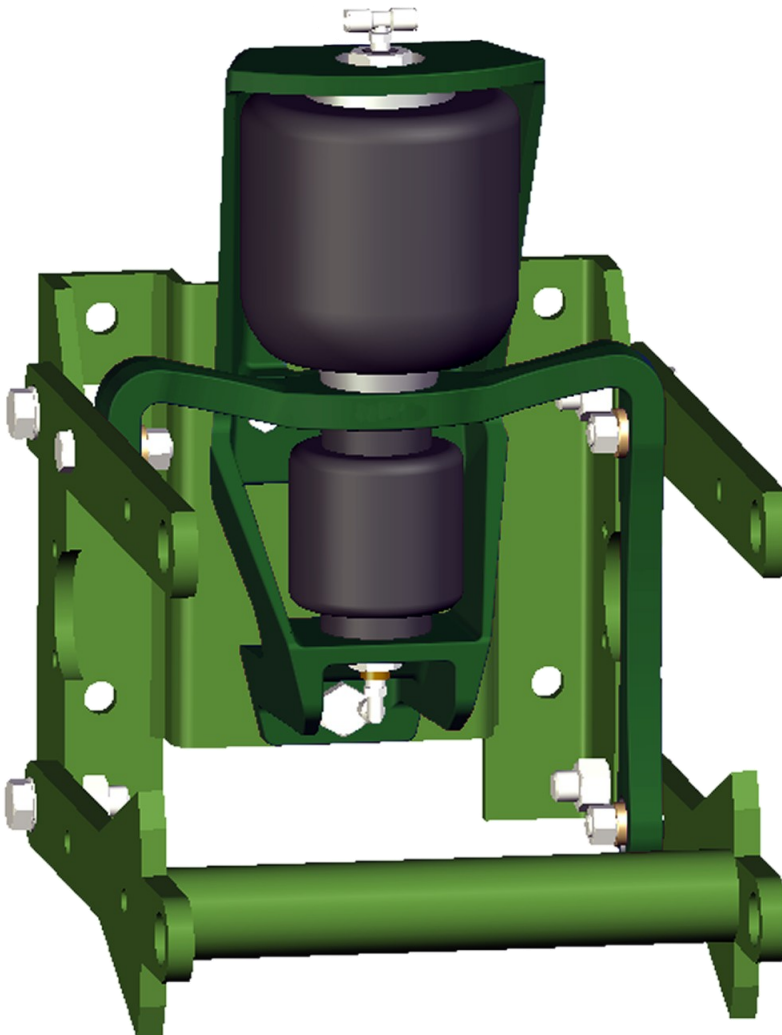
Planters equipped with Tru Count Air Clutch®

Also included in the hardware pack for each row is one - 17" zip tie-strap, and one - 1/4" X 1" Bolt. If you planter is equipped with Tru Count Air Clutches®, it may be necessary to either simply adjust the anti rotation bolt, or possibly replace it with a shorter one which is provided. Check to ensure that the clutch is oriented with the air cylinder vertical or leaning slightly forward. If this is not the case, thread the existing anti-rotation bolt in, but be careful not to tighten it too far. It may be threaded in such that the bolt protrudes from the clutch NO LESS THAN 1". Tightening more than this will cause the bolt to penetrate the clutch housing, possibly resulting in permanent damage. If the clutch still leans back, replace the existing anti-rotation bolt with the shorter bolt that is provided. With this bolt, do not thread it in more than 5/8". Don't forget to re-install the locking nut. (Refer to your Tru Count installation instruction manual for complete instructions.)



This must be done to prevent the trucount clutch from interfering with the air spring base support and vice versa. The zip-tie included in the pack may be used to further secure the air clutch. Loop the tie-strap around the clutch and forward, so that the clutch is held firmly against the anti rotation bolt.

Completed Row Unit Conversion



726525

Regular or Long Parallel Arms

Row Unit Conversion Instructions

for:

planter models:JD17XX / 7200 / 7300

to convert from **Existing Springs**:.....JD HD Adj. Center Springs,
JD Light & HD Side Springs

JD HD Springs (Center Quad)

Existing Springs



This conversion process applies to planters with **Regular** or **Long** parallel arms and **Chain** or **Pro Shaft** driven meters. The examples shown below are diagrams for a planter with regular parallel arms; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating a completed row unit conversion are located at the end of these instructions.

Conversion Kit Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	726100	Spring	Air Bag (Down)
1	726549	Support	Air Spring Base
1	726551	Bracket	Air Spring Head Mount

Quantities are given per row

Hardware Pack Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	13005	Bolt	1/4-20 x 1 GRD 5 BOLT ZN
1	36266	Hex Jam Nut	3/4-16 Nut ZN CL
2	38671	Bolt	M10-1.5 x 130 ZN CL
1	38772	Bolt	M16-2.0 x 130 ZN CL
2	90702	Flange Nut	M10-1.5 HEX NUT
1	95207	Bolt	1/2"-13 X 1.25 GRD5 ZNY
2	162348	Bolt	M10-1.5 x 55 ZN Y
1	162436	Bolt	M16-2.0 x 45 ZN Y
2	726098	Bushing	1/2 - 1 x .92 Sleeve Bearing
1	726099	Bushing	1/2 - 7/8 x .92 Sleeve Bearing
1	726113	Male Tee	1/8 NPT x 1/4 PTC Tee
1	726115	TEE	1/4 PTC
3	726205	Hex Nut	M12-1.75 Top Lock Nut ZN Y
1	726291	Hex Nut	M16-2.0 Top Lock Nut ZN Y
3	726508	Bolt	M12-1.75 x 50 Class 10.9 ZN Y
1	726631	TIE STRAP	17" x 3/16" UV BLACK

Quantities are given per row

Recommended tools (not provided):

Open end wrenches: 7/16", 15/16", 1-1/8", 15MM, 16MM, 19MM, & 24MM

- or suitable crescent wrench (s)

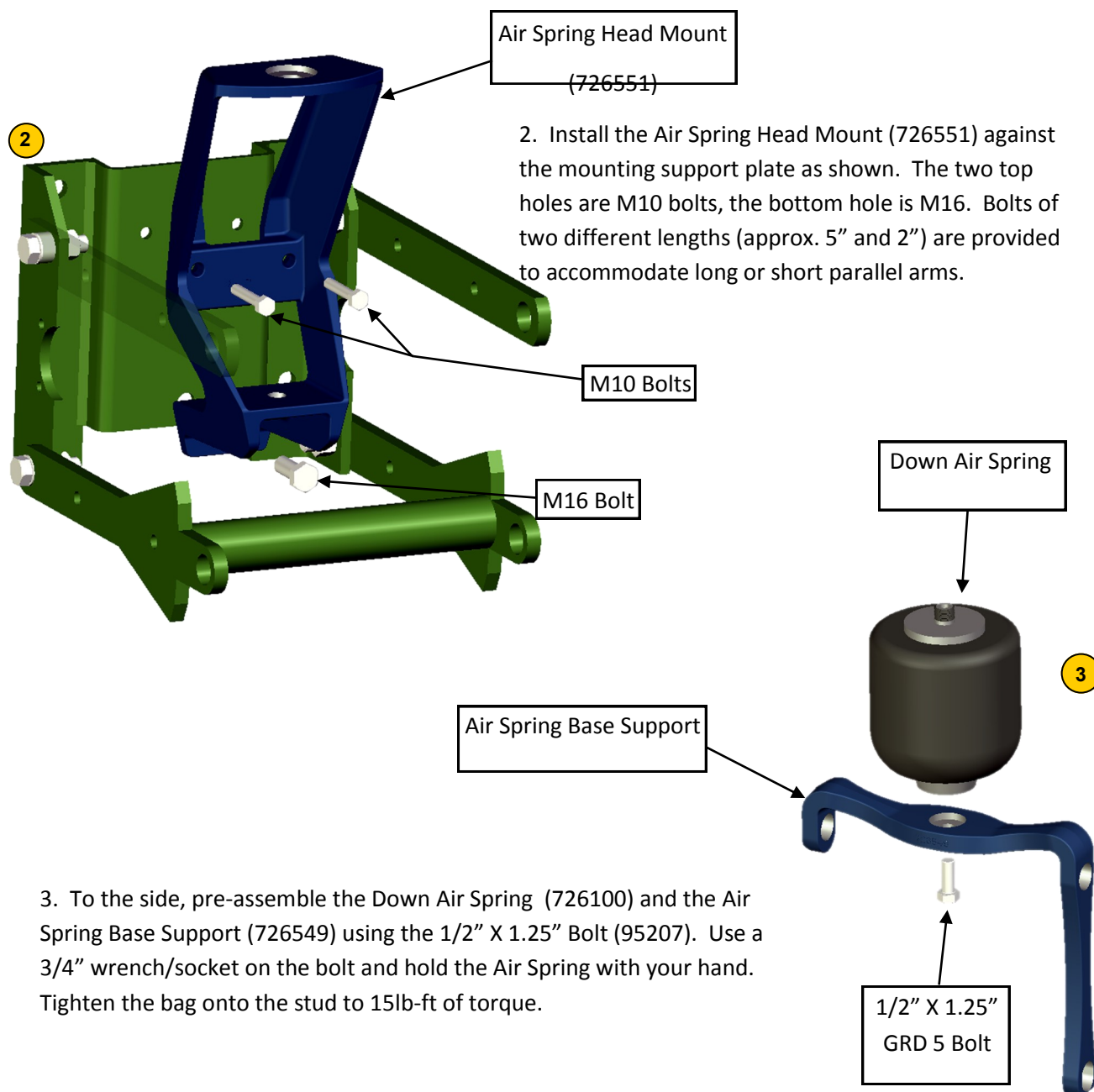
Sockets (Deep well recommended): 3/4", 16MM, 17MM, 19MM, & 24MM

1. Begin installation by removing tension from the existing springs. Once the tension is removed, remove the existing spring assembly and set aside.



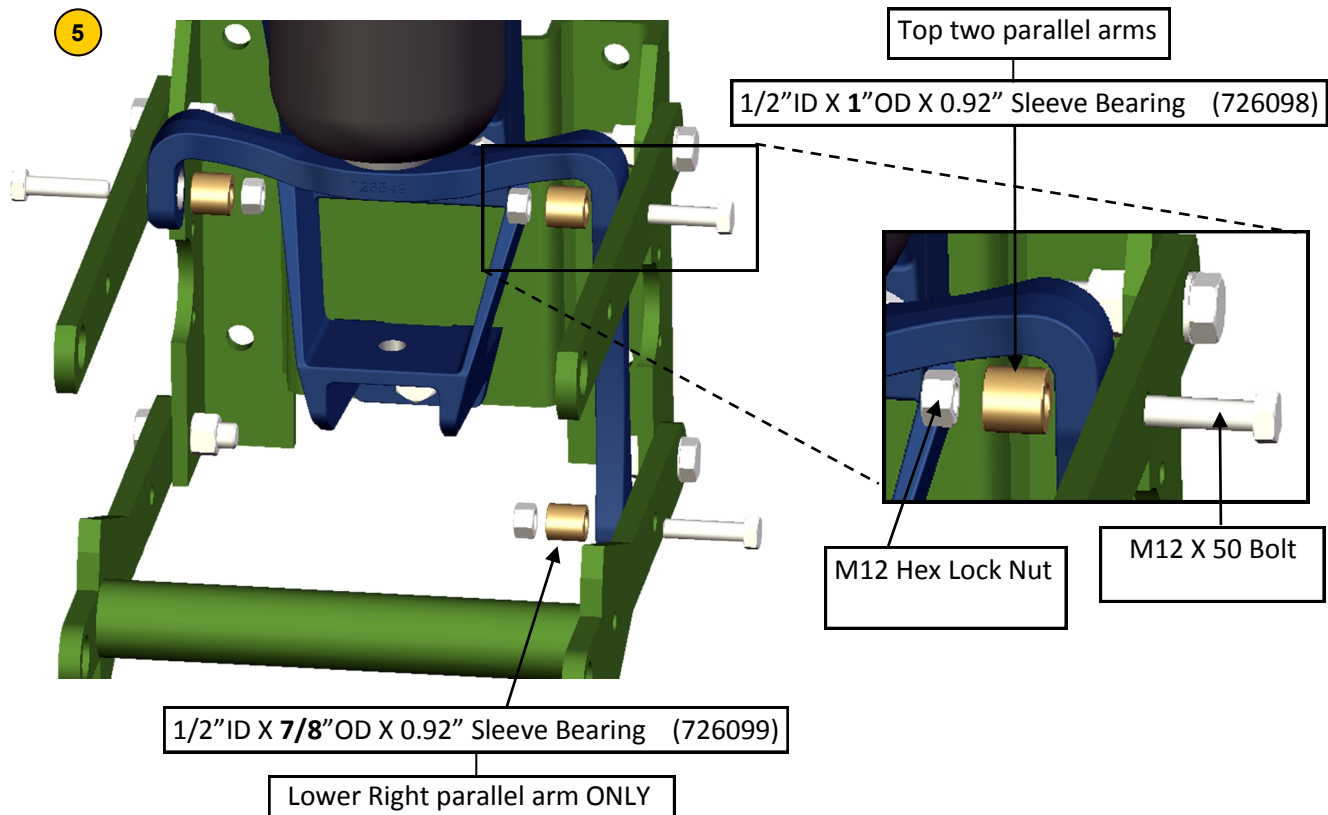
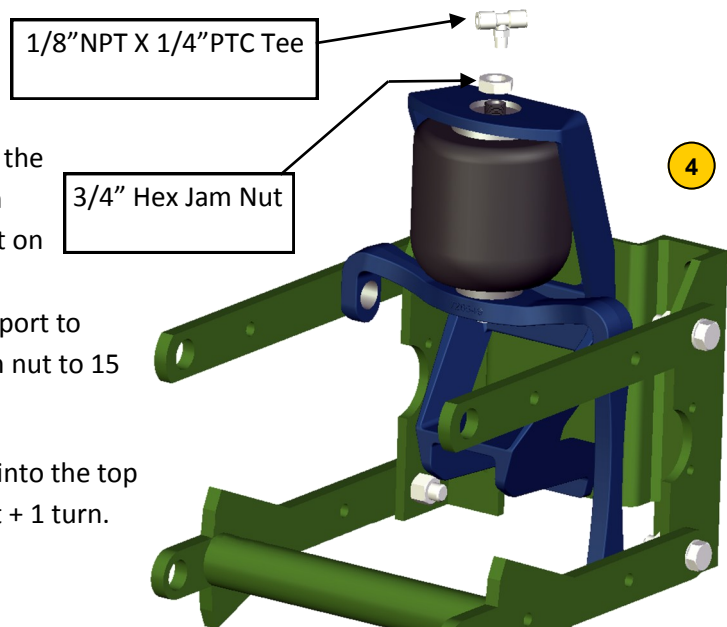
Note: For planters with **Long** parallel arms, retain the spacer for use between the mounting support plate and Down Force assembly.

Units with long parallel arms may require the bolts to be cut/torched off in order to remove the existing M10 bolts. When installing the new bolts, install them from the rear of the planter as shown for ease of future serviceability.



4. Place the pre-assembled components from Step 3 into the AirSpring Head Mount as shown. Fix the components together with the 3/4" Hex Jam Nut (36266). Hold the Spring in place when tightening to avoid placing a twist on the bag. It may be beneficial to place a bolt through one of the parallel arms into the Support to keep it from rotating as well. Tighten the jam nut to 15 lbf-ft of torque.

Thread the 1/8"NPT X 1/4"PTC Tee (726113) into the top of the Down Air Spring. Tighten to hand tight + 1 turn.



5. Fix the Air Spring Base Support into place using the three - M12 X 50 Bolts (726508), and three - M12 Hex Lock Nuts (726205), along with three sleeve bearings. Use the two - 1/2"ID X 1"OD X 0.92"Sleeve bearings (726098) for the top two parallel arms and the one - 1/2"ID X 7/8"OD X 0.92" Sleeve Bearing (726099) in the lower right parallel arm.

6. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.



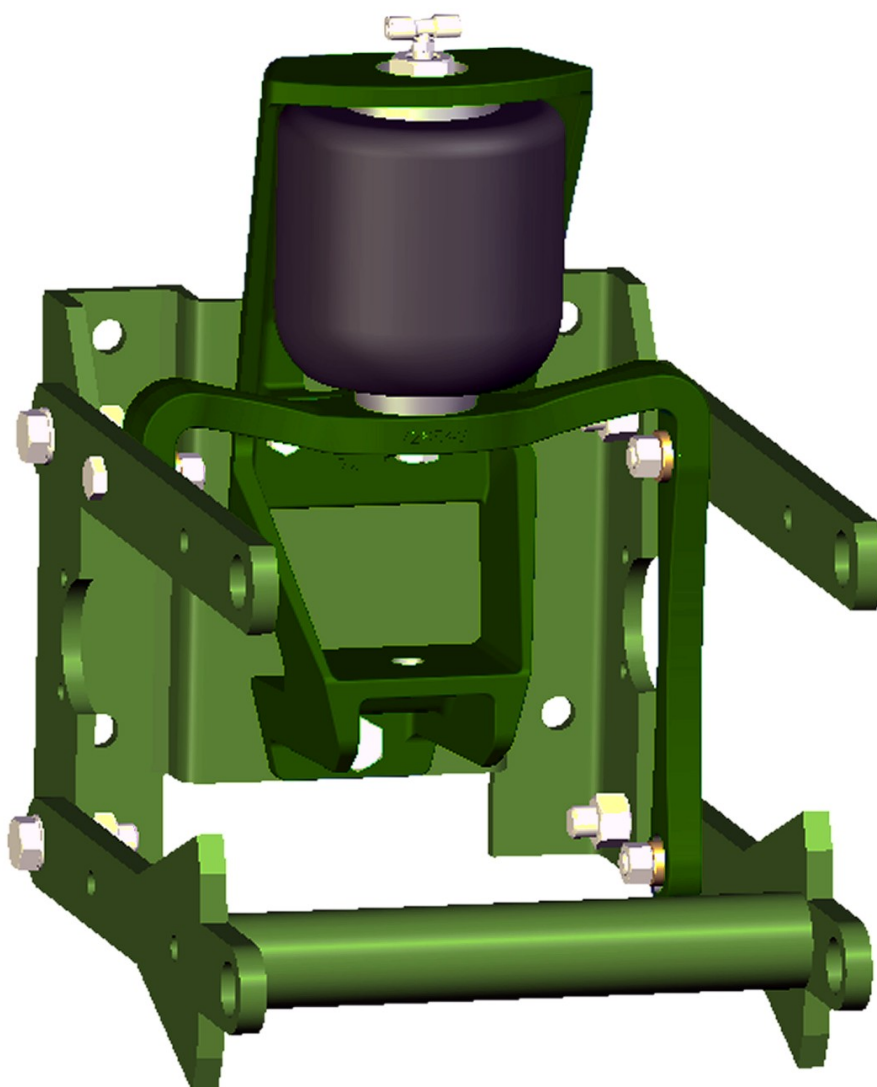
Planters equipped with Tru Count Air Clutch®



Also included in the hardware pack for each row is one - 17" zip tie-strap, and one - 1/4" X 1" Bolt. If you planter is equipped with Tru Count Air Clutches®, it may be necessary to either simply adjust the anti rotation bolt, or possibly replace it with a shorter one which is provided. Check to ensure that the clutch is oriented with the air cylinder vertical or leaning slightly forward. If this is not the case, thread the existing anti-rotation bolt in, but be careful not to tighten it too far. It may be threaded in such that the bolt protrudes from the clutch NO LESS THAN 1". Tightening more than this will cause the bolt to penetrate the clutch housing, possibly resulting in permanent damage. If the clutch still leans back, replace the existing anti-rotation bolt with the shorter bolt that is provided. With this bolt, do not thread it in more than 5/8". Don't forget to re-install the locking nut. (Refer to your Tru Count installation instruction manual for complete instructions.)

This must be done to prevent the trucount clutch from interfering with the air spring base support and vise versa. The zip-tie included in the pack may be used to further secure the air clutch. Loop the tie-strap around the clutch and forward, so that the clutch is held firmly against the anti rotation bolt.

Completed Row Unit Conversion



726520

Regular or Long Parallel Arms

Row Unit Conversion Instructions

for:

planter models:Kinze / JD7000 / 7100

to convert from **Existing Springs**:.....Kinze Pneumatic Springs,
Kinze Side Springs,
JD Light & HD Side Springs,
HD Spring Attachment

to **Resulting Forces Controlled**:.....Kinze Pneu-
Existing Springs



This conversion process applies to planters with **Regular** parallel arms with **Chain** driven meters. The examples shown below are diagrams for a planter with regular parallel arms; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating a completed row unit conversion are located at the end of these instructions.

Conversion Kit Components

QTY	Part Number	Part Name	Description
1	726101	Spring	Air (Lift)
1	726538	Mount	Lift Airspring Head
1	726553	Mount	Lift Airspring Base
1	726571	Pivot	Lift Airspring Base

Quantities are given per row

Hardware Pack Components

QTY	Part Number	Part Name	Description
2	13005	Bolt	1/4 X 1 GRD 5 ZN
2	13108	Bolt	3/8 X 1.375 GRD 5 ZN
1	13209	Bolt	1/2 X 1.5 GRD 5 ZN
1	13210	Bolt	1/2 X 1.75 GRD5 ZN
1	15064	Bolt	5/16 X 2.75 GRD8 ZN
1	15108	Bolt	3/8 X 1.375 GRD8 ZN
1	15114	Bolt	3/8 X 2.75 GRD8 ZNY
4	33078	Washer	1/4" SAE Flat ZN
1	33626	Lock Washer	1/2" Med. Split Lock ZN
2	33858	Washer	5/16 USS Flat Hi strength ZNY
1	33859	Washer	3/8 USS Flat Hi strength ZNY
1	36214	Hex Jam Nut	5/8" Nut ZN
2	37260	Hex Nut	1/4" Top Lock Nut ZN
1	37262	Hex Nut	5/16" Top Lock Nut ZN
4	37264	Hex Nut	3/8" Top Lock Nut ZN
1	37268	Hex Nut	1/2" Top Lock Nut
1	726112	Elbow	1/8"NPT X 1/4"PTC
1	726115	Tee	1/4"PTC
2	726574	Bushing	1/4"ID X 1/2"OD X 0.23"
1	726584	Bushing	3/8"ID X 5/8"OD X 3/4"
2	726586	Bushing	3/8"ID X 5/8"OD X 9/16"
1	726587	Spade Bolt	1/2" X 1.5X GRD5 ZN
1	879112	Bolt	5/16" X 0.88" GRD5 ZNY (w/ Nylon)
1	726611	Link	Stabilizer (L-Shaped)

Quantities are given per row

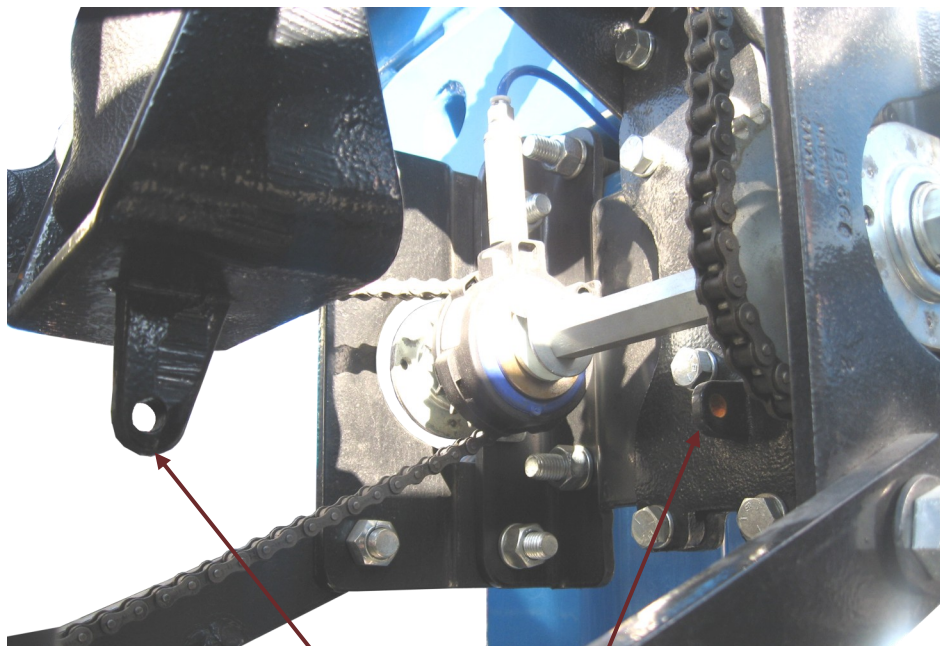
Recommended tools (not provided):

Open end wrenches: 7/16", 1/2", 9/16", 3/4", 15/16", 1-1/8"

- or suitable crescent wrench (s)

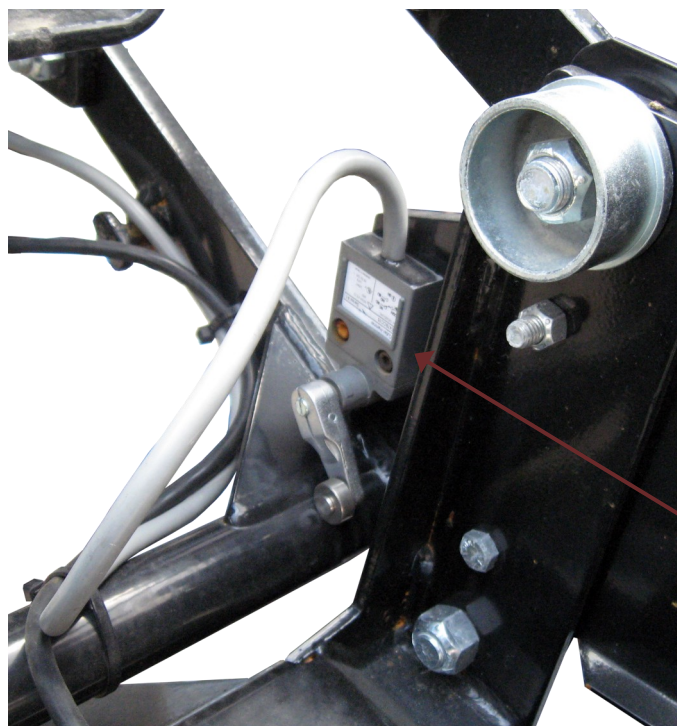
Sockets (Deep well recommended): 7/16", 9/16", 1/2", 3/4",

1. Begin installation by removing tension from the existing springs. Next, remove the hopper and meter from the row unit and set aside.



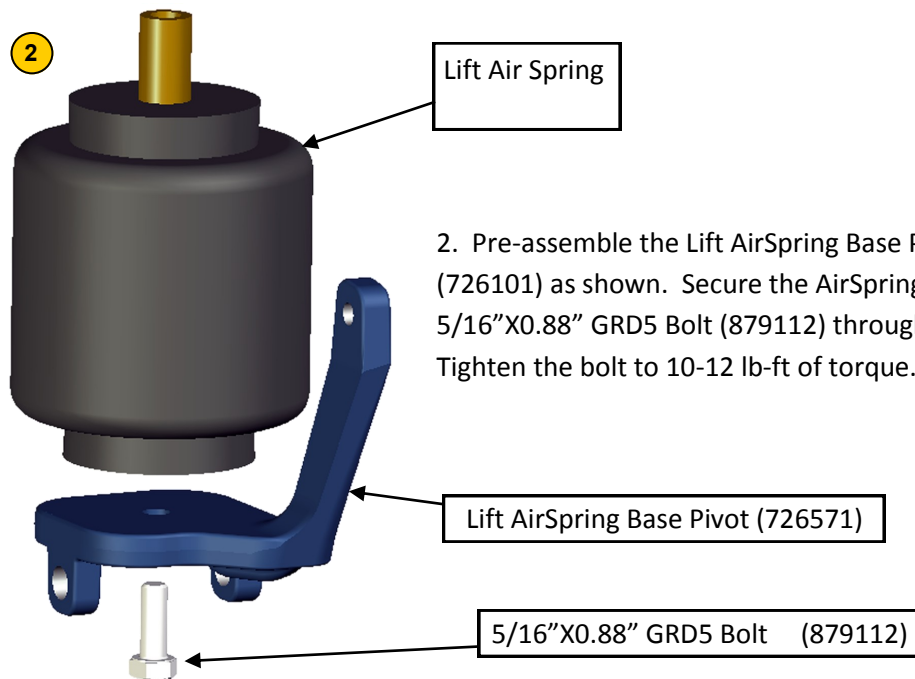
Mounting points for Positioning Link

For planters with OEM pneumatic down springs, remove the positioning link (if present) from the row unit mounting plate to the bottom of the down pneumatic spring bracket. This may not be present on all row units, those with set-back extensions (shown) commonly do not have this link.

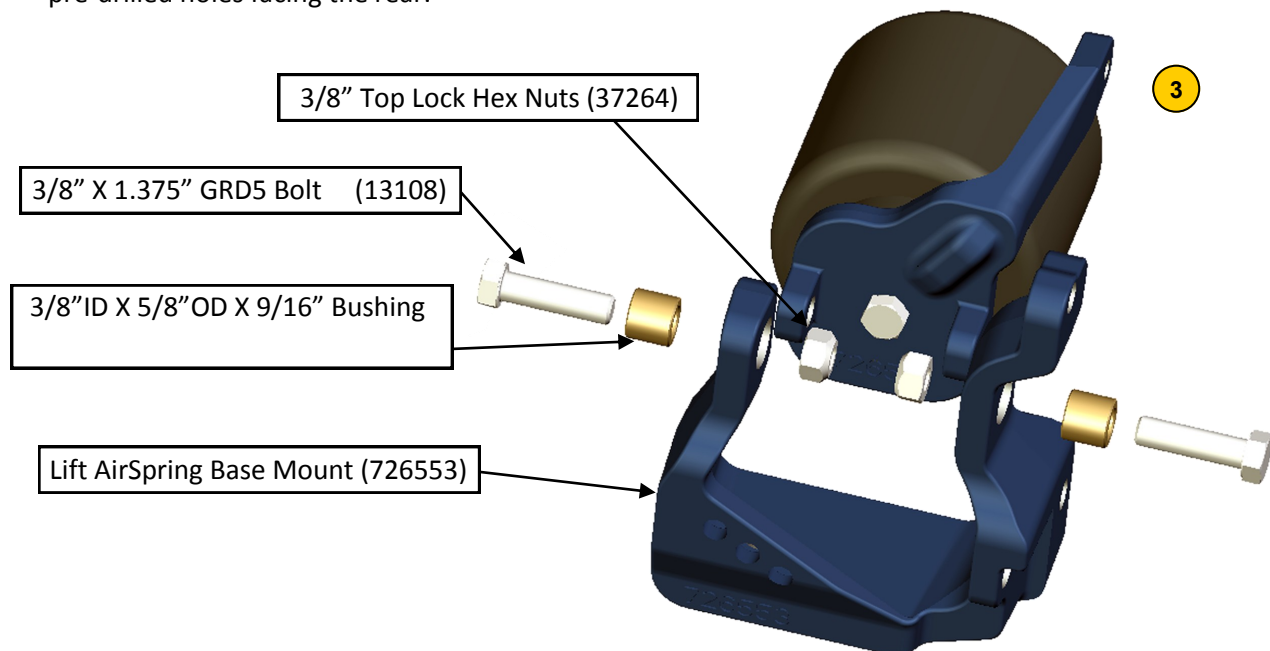


For planters with hydraulic drive motors, the OEM height sensor will need to be removed. Locate and remove the existing height sensor installed on a row unit. The Lift Air Spring will occupy this location upon installation. The sensor will need to be replaced with a Kinze Hydraulic Drive Lift Switch, part number 726620

Existing Height Sensor



3. Next, assemble the AirSpring and Pivot from Step 1 to the Lift AirSpring Base Mount (726553). Secure in place as shown using two 3/8" X 1.375" GRD5 Bolts (13108), through two 3/8"ID X 5/8" OD X 9/16" Bushings (726586), with two 3/8" Top Lock Hex Nuts (37264). Make sure to align the components as shown, with the Pivot arm facing forward and the flange with pre-drilled holes facing the rear.



4. When standing behind the row unit, place the completed assembly in the lower right hand corner of the top plate and upright of the row unit shank. Begin by removing the existing bolt from the upright/hopper panel. The assembly will be fixed in place vertically through the top plate of the shank and horizontally through the side of the shank upright.

Top Plate:

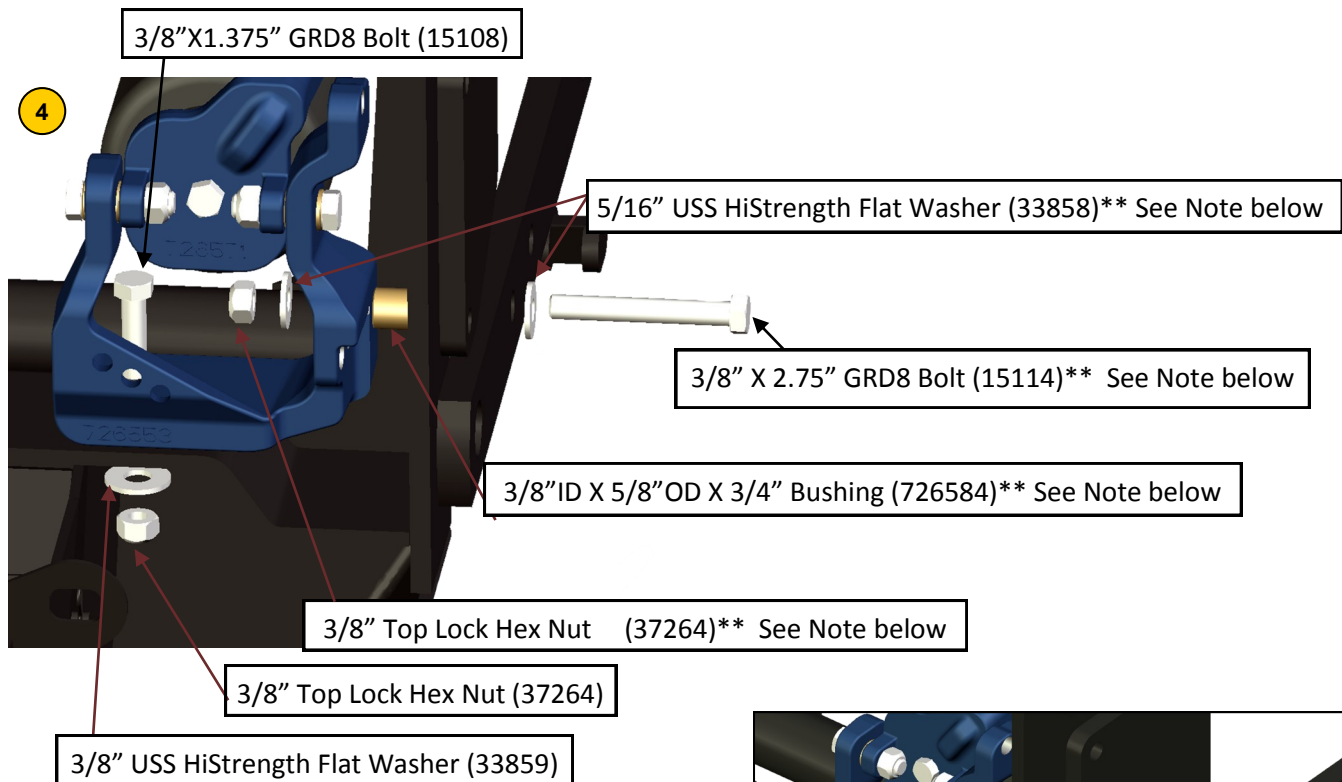
3/8"X1.375" GRD8 Bolt (15108)

3/8" USS HiStrength Flat Washer (33859)

Upright:

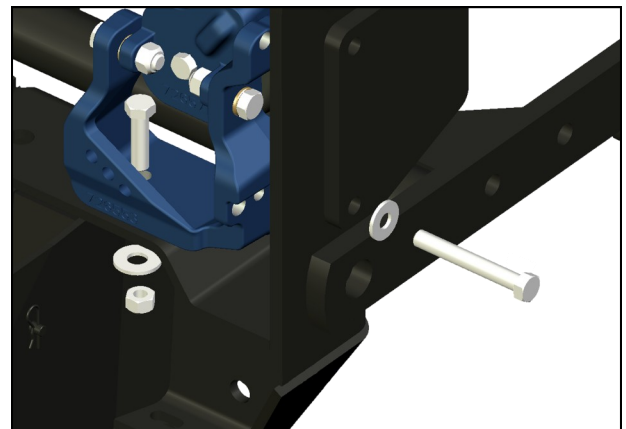
3/8" X 2.75" GRD8 Bolt (15114) **OR** 5/16" X 2.75 GRD8 ZN Bolt (15064)**See Note

5/16" USS HiStrength Flat Washer (33858) Use only on Rum Rows**See Note



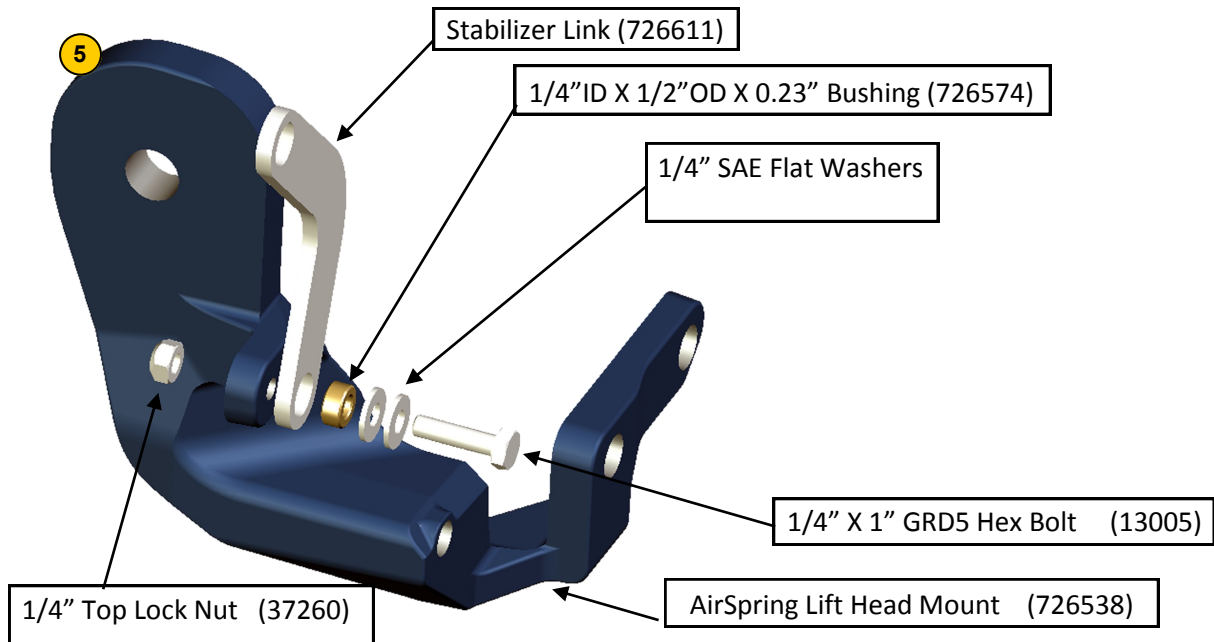
Note: For row units equipped with a R.U.M., use the 5/16" bolt, nut, and washers provided in place of the 3/8" hardware. The RUM has a built in bushing that makes the supplied bushing unnecessary.

Use caution not to pinch any RUM wires between the RUM and the Base Mount.



Alternate View

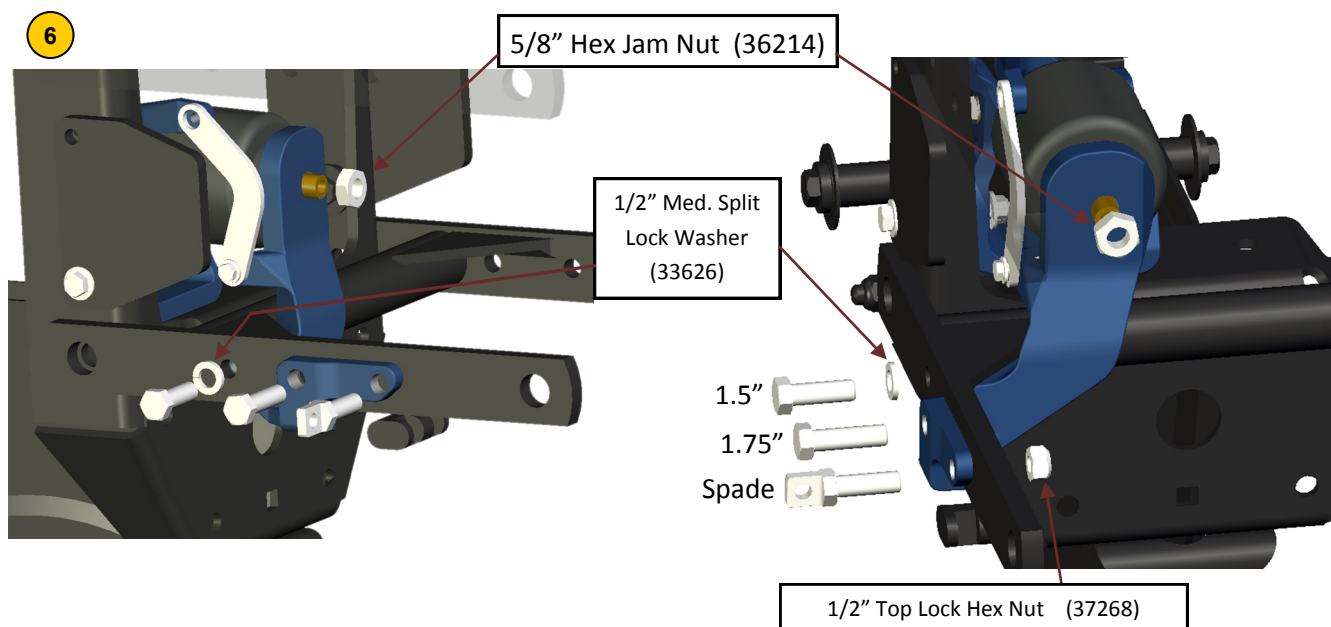
5. Next, pre-assemble the AirSpring Lift Head Mount (726538) to the Stabilizer Link (726611) as shown using a 1/4" X 1" GRD5 Hex Bolt (13005), 1/4" SAE Flat Washer (33078)**, a 1/4"ID X 1/2"OD X 0.23" Bushing (726574), and one 1/4" Top Lock Nut (37260).



Note: The 1/4" Washers here and in Step #7 are used to provide freedom of motion of the Stabilizer Link. Extra washers may be used to vertically align the Stabilizer Link. It may be necessary to modify the number of washers installed in order to properly align the link vertically with a free range of motion.

6. Place the pre-assembled Head Mount / Stabilizer in place over the stud of the Lift Bag and align both the Stabilizer Link, with the Base Pivot; and the forward portion of the Mount with holes in the lower right parallel arm. Secure the Head Mount to the Lift AirSpring using the 5/8" Hex Jam Nut (36214). Tighten to 10-12lb-ft of torque.

The row unit images below are generalized to show different bolting patterns available. **Secure the Head Mount to the parallel arm using *TWO* of the *THREE* 1/2" bolt options.** Detailed images of the Spade bolt



Hole 1:

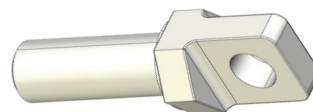
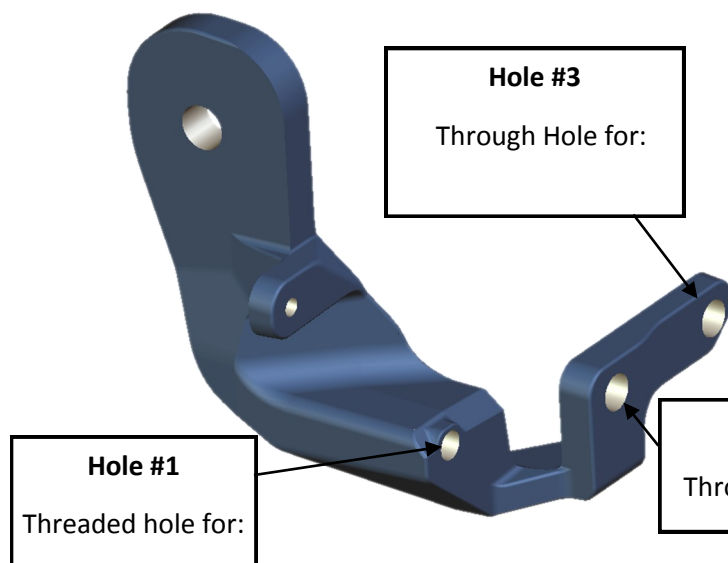
Threaded,
Used in all configurations,

Hole 2:

Through Hole,
Used on **Kinze** row units,

Hole 3:

Through Hole,
Used on **John Deere** row units,
Use the 1/2" X 1.75" GRD5 Bolt (13210) **OR** the 1/2" X 1.5" GRD5 Spade Bolt (726587) &, the



Spade Bolt (726587)

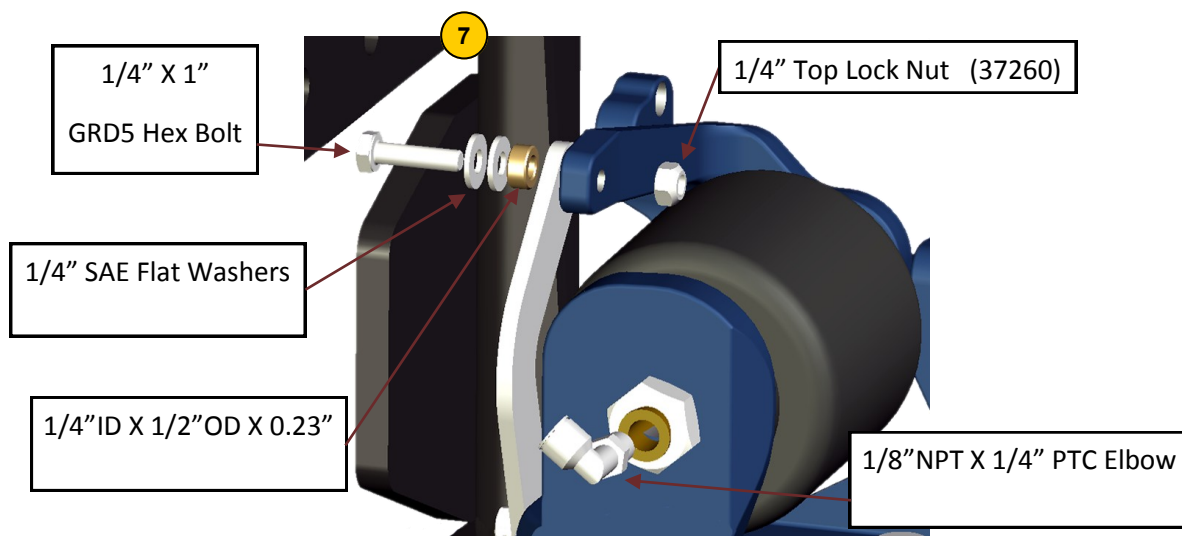
For use **ONLY** on John Deere row units **with** side springs

Disconnect the side springs and remove the existing eye-bolt. Replace this with the spade bolt and re-attach the side springs.

Be sure to align the flat portion of the



Note: The 1/4" Washers here and in Step #7 are used to provide freedom of motion of the Stabilizer Link. Extra washers may be used to vertically align the Stabilizer Link. It may be necessary to modify the number of washers installed in order to properly align the link vertically with a free range of motion.



7. Complete the conversion by fixing the upper half of the Stabilizer Link (726611) to the forward arm of the Lift AirSpring Base Pivot (726571) as shown. Secure the Stabilizer Link using 1/4" X 1" GRD5 Hex Bolt (13005), two** 1/4" SAE Flat Washer (33078), a 1/4"ID X 1/2"OD X 0.23" Bushing (726574), and one 1/4" Top Lock Nut (37260). Pay special attention to the Note at the top of the page to ensure a complete range of motion of the link without binding.

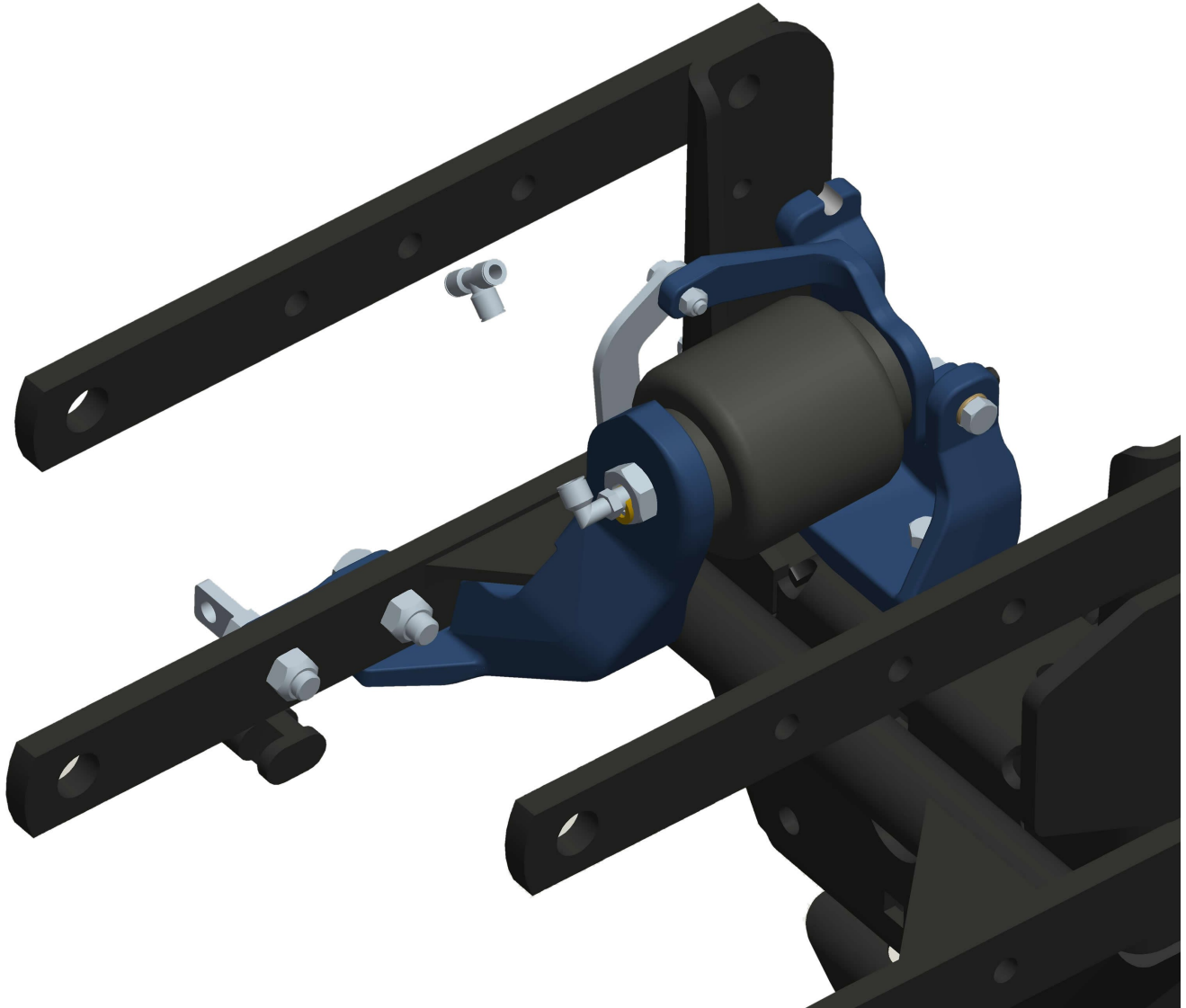
8. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.

Completed Row Unit Conversion

726540

Kinze or John Deere 7000

Pneumatic or Spring Downforce



Row Unit Conversion Instructions

for:

planter models:Kinze Push Row units ONLY

to convert from **Existing Springs**:.....Kinze Pneumatic Springs,
Kinze Side Springs,

to **Resulting Forces Controlled**:.....Kinze Pneumatics = Down & Lift

Existing Springs



This conversion process applies to **Kinze** planters **PUSH ROW UNITS ONLY**. The examples shown below are generic diagrams; some components shown here may not apply to your particular planter. Special notes will be made throughout the following instructions to encompass individual model needs. Images illustrating a completed row unit conversion are located at the end of these instructions.

Conversion Kit Components

Quantity	Part Number	Part Name	Description
1	726101	Spring	Lift Air Spring
1	726541	Mount	Lift Air Spring Head Mount (Push)
1	726553	Mount	Lift Air Spring Base Mount
1	726571	Pivot	Lift Air Spring Base Pivot
1	726602	Lock-Up	Kinze Push Row Unit Lock Up (2000)**
1	726603	Lock-Up	Kinze Push Row Unit Lock Up (2000)**

Quantities are given per row

** Note: Only ONE Lock-Up will be used per row

Hardware Pack Components

Quantity	Part Number	Part Name	Description
2	13005	Bolt	1/4" X 1" GRD5 Hex ZN
2	13108	Bolt	3/8" X 1.375" GRD5 ZN
1	13109	Bolt	3/8" X 1.5" GRD5 ZN
1	13208	Bolt	1/2" X 1.375" GRD5 ZN
1	13210	Bolt	1/2" X 1.75" GRD5 ZN
1	13211	Bolt	1/2" X 2" GRD5 ZN
1	15110	Bolt	3/8" 1.75" GRD8 ZNY
2	33078	Flat Washer	1/4" SAE Flat ZN
1	33086	Flat Washer	1/2" SAE Flat ZN
1	33622	Lock Washer	3/8" Med. Split Lock ZN
1	33626	Lock Washer	1/2" Med. Split Lock ZN
2	33859	Flat Washer	3/8" USS Flat Hight-Strength ZNY
1	36214	Hex Jam Nut	5/8" Nut ZN
2	37260	Hex Nut	1/4" Top Lock ZN
3	37264	Hex Nut	3/8" Top Lock ZN
2	37268	Hex Nut	1/2" Top Lock ZN
1	726112	Elbow	1/8" NPT X 1/4" PTC Elbow
1	726115	Tee	1/4" PTC Tee
2	726574	Bushing	1/4"ID X 1/2"OD X 0.23" Sleeve Bearing
2	726586	Bushing	3/8"ID X 5/8"OD X 9/16" Sleeve Bearing
1	726604	Bushing	1/2"ID X 5/8"OD X 0.294" Sleeve Bearing
1	726627	Wave Washer	5/8" Spring Washer
1	879112	Bolt	5/16" X 0.88" ZNY with Nylon
1	726066	Link	Positioning Link

Quantities are given per row

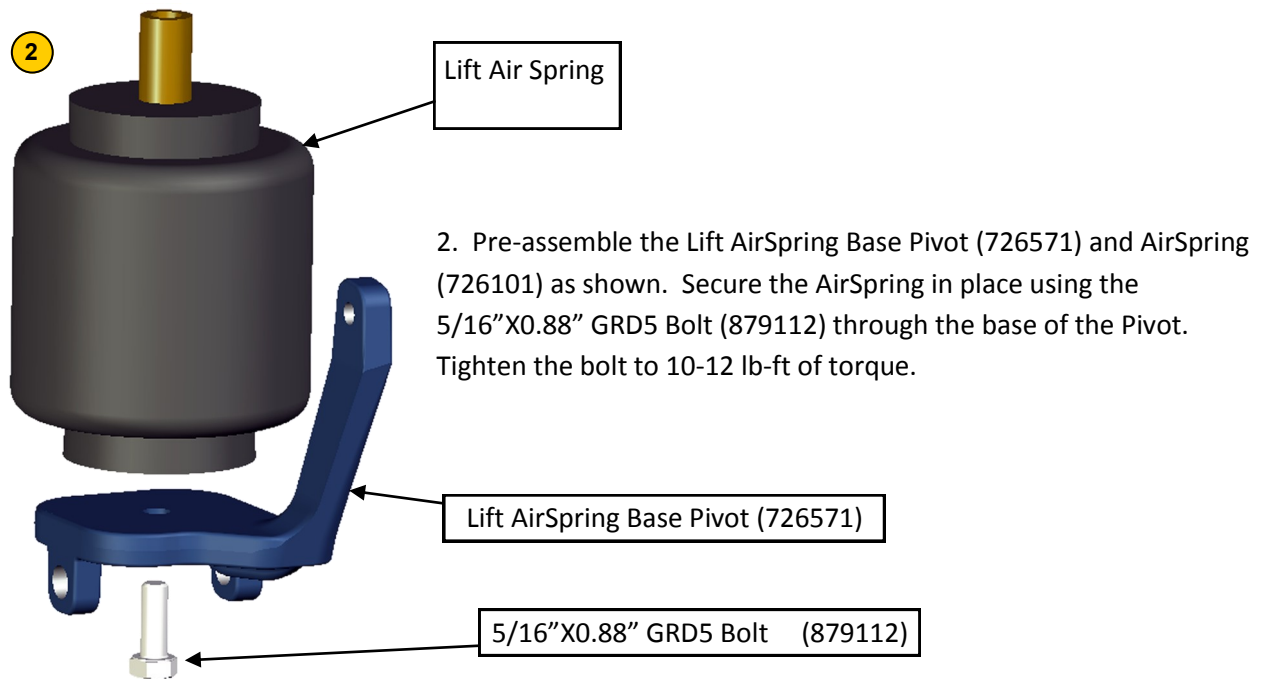
** Note: Some parts and hardware are exclusively for 2000 series row units, while others for 3000 series row units.

Recommended tools (not provided):

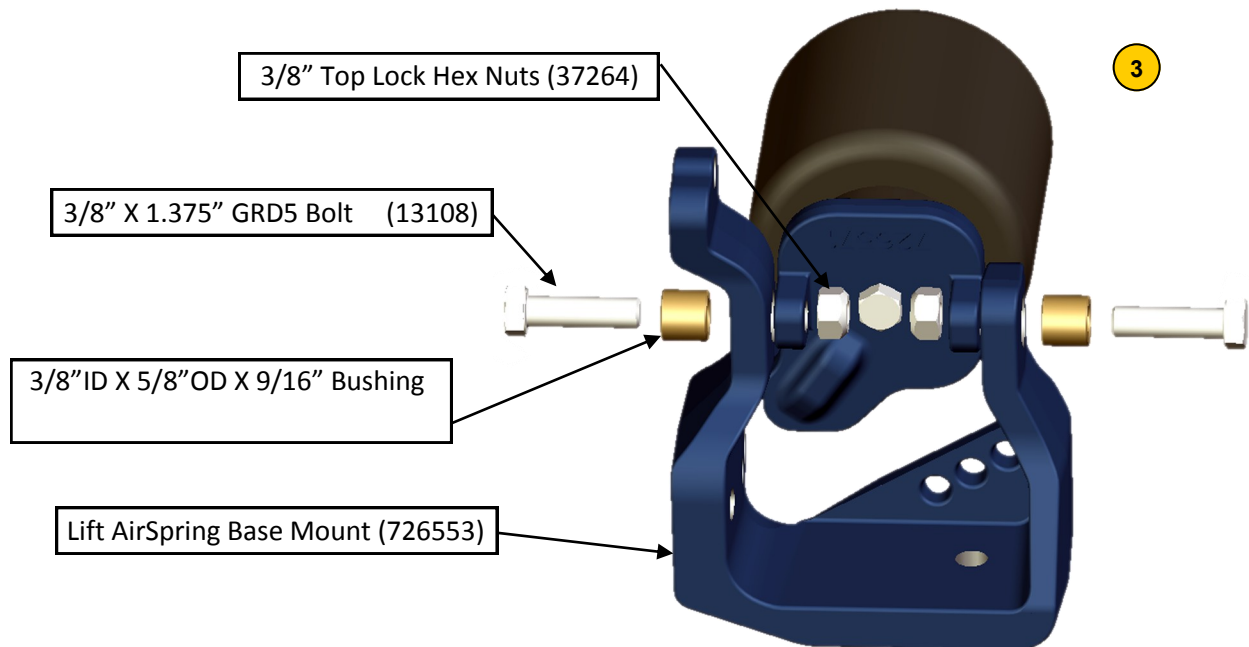
Open end wrenches: 7/16", 1/2", 9/16", 3/4", 15/16"

- or suitable crescent wrench (s)

1. Begin installation by removing tension from the existing springs (It may help to remove the weight of the row unit from the parallel arms by lowering the planter). Next, remove the hopper and meter from the row unit and set aside.



3. Next, assemble the AirSpring and Pivot from Step 1 to the Lift AirSpring Base Mount (726553). Secure in place as shown using two 3/8" X 1.375" GRD5 Bolts (13108), through two 3/8"ID X 5/8" OD X 9/16" Bushings (726586), with two 3/8" Top Lock Hex Nuts (37264). Make sure to align the components as shown, with both the Pivot arm and the flange with pre-drilled holes facing forward.



4. When standing in front of the row unit, place the completed assembly in the lower left hand corner of the top plate and upright side panel. The assembly will be fixed in place horizontally through the side of the shank upright approximately 1.75" above the top plate of the shank. The hardware for the top bolt hole will be universal across all Kinze models. The hardware for the bottom hole location will be different for 2000 vs. 3000 series Kinze planters. See below.

Top Bolt Hole:

3/8" X 1.75" GRD8 ZNY Bolt (15110)

2 - 3/8" USS Hi-Strength ZNY Flat Washer (33859)

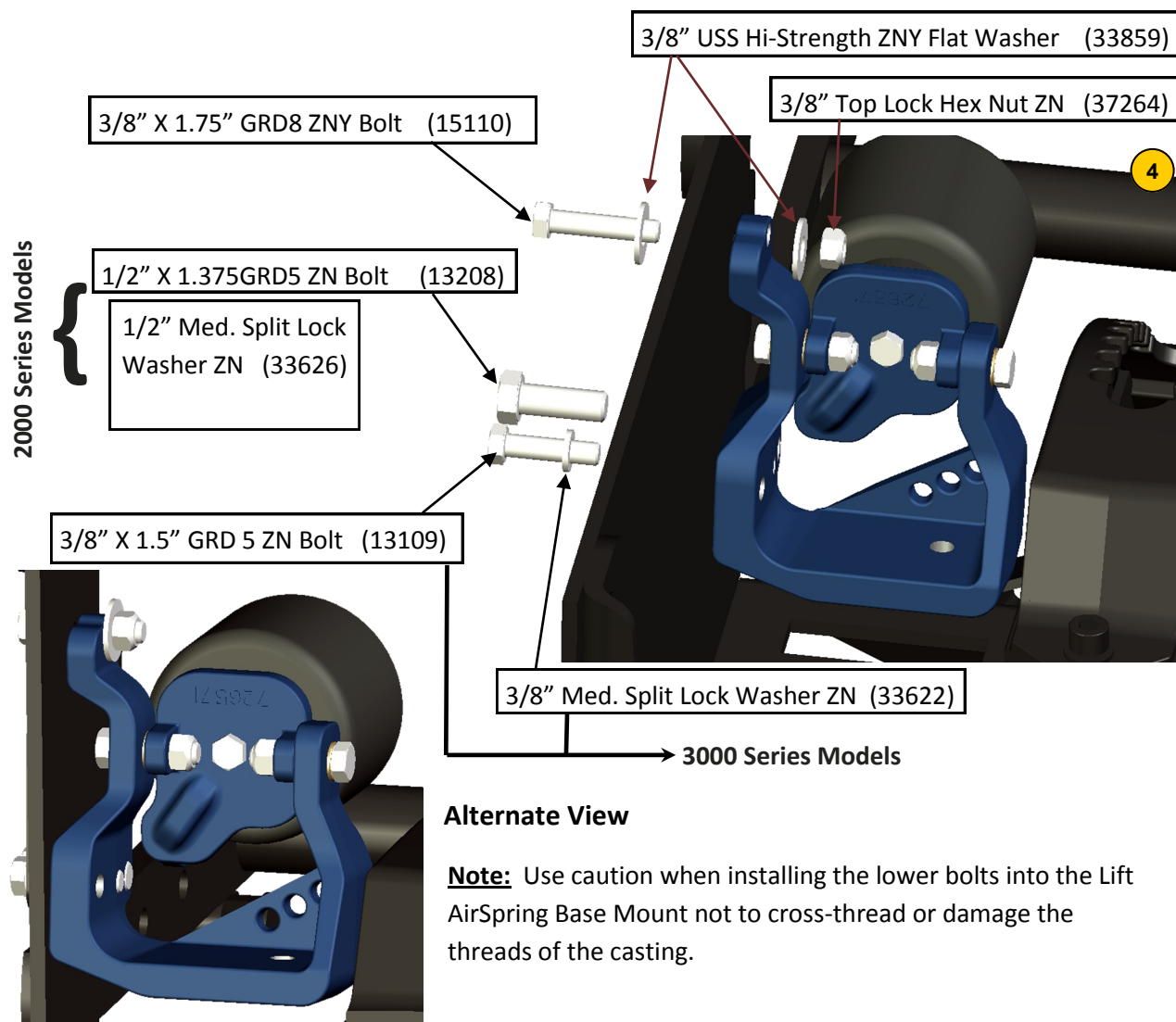
3/8" Top Lock Hex Nut ZN (37264)

Bottom Bolt Hole:

} 3000 Series Models

3/8" X 1.5" GRD 5 ZN Bolt (13109)

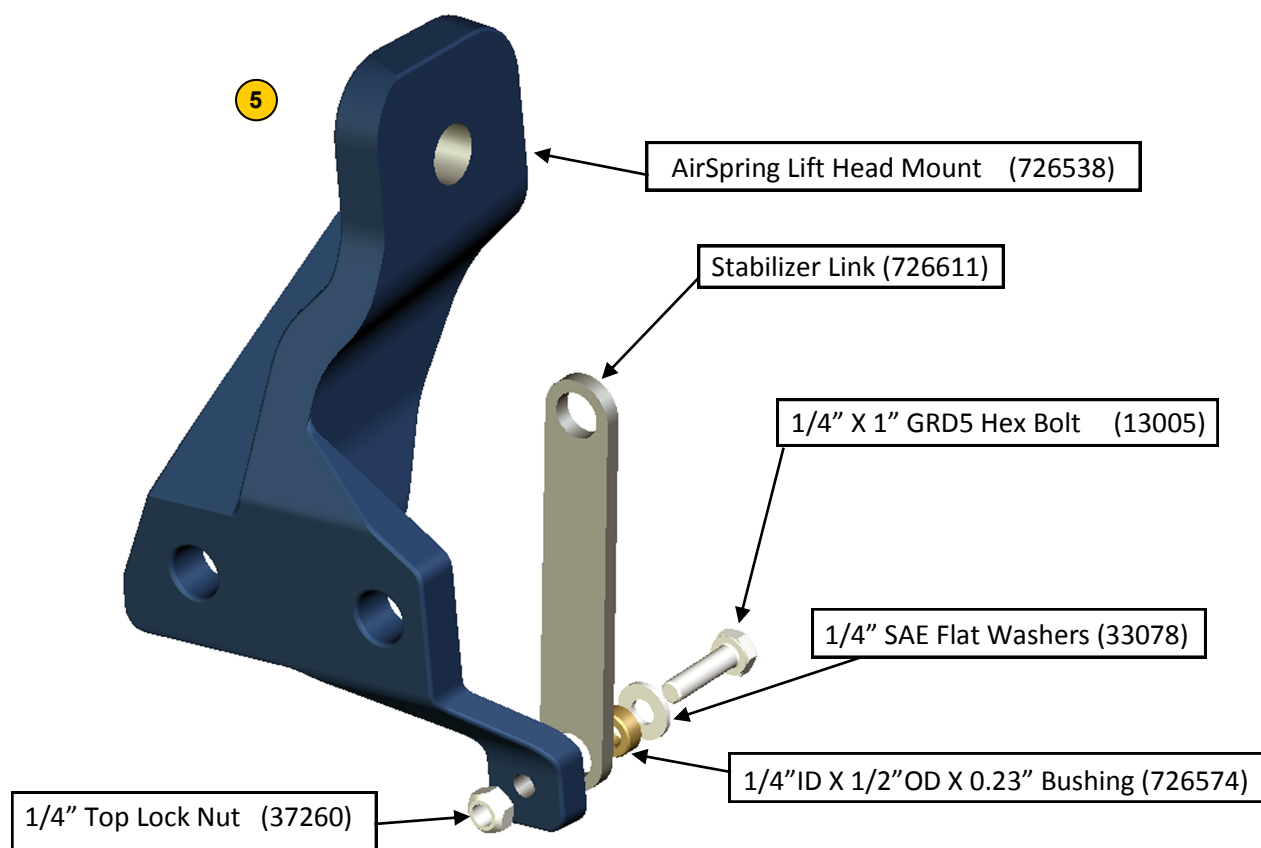
3/8" Med. Split Lock Washer ZN (33622) } 2000 Series Models



Alternate View

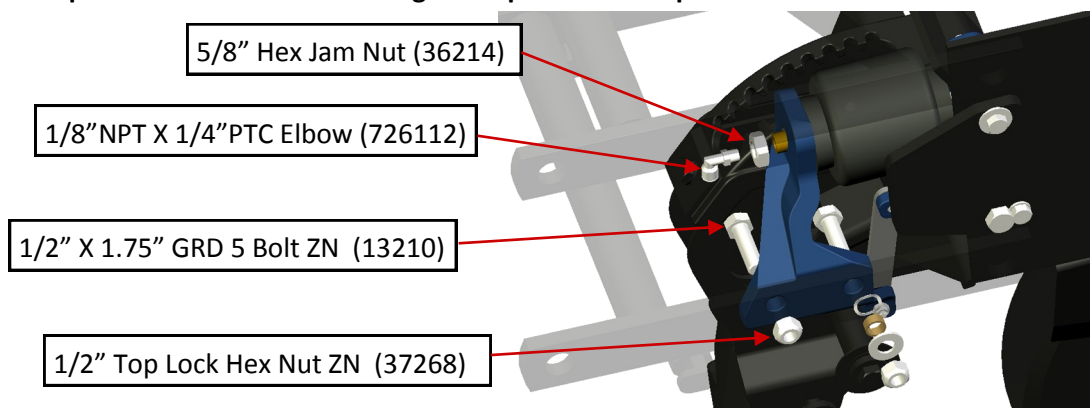
Note: Use caution when installing the lower bolts into the Lift AirSpring Base Mount not to cross-thread or damage the threads of the casting.

5. Next, pre-assemble the AirSpring Lift Head Mount (726541) to the Positioning Link (726066) as shown using a 1/4" X 1" GRD5 Hex Bolt (13005), 1/4" SAE Flat Washer (33078), a 1/4"ID X 1/2"OD X 0.23" Bushing (726574), and one 1/4" Top Lock Nut (37260).



Continue to the following page.

- 6 This will require the removal the existing lock-up mechanism prior to installation.



6. Place the pre-assembled Head Mount / Positioning Link in place over the stud of the Lift Bag and align both the Positioning Link, with the Base Pivot; and the forward portion of the Mount with holes in the lower left parallel arm (when standing in front of the push row unit). Secure the Head Mount to the Lift AirSpring using the 5/8\" Hex Jam Nut (36214). Tighten to 10-12lb-ft of torque.

Install the 1/8\"NPT X 1/4\"PTC Elbow (726112) into the top of the Lift Air Spring. Tighten to Hand Tight + 1 turn.

Forward Bolt

1/2\" X 2\" GRD5 ZN Bolt (13211)

1/2\" Top Lock Hex Nut ZN (37268)

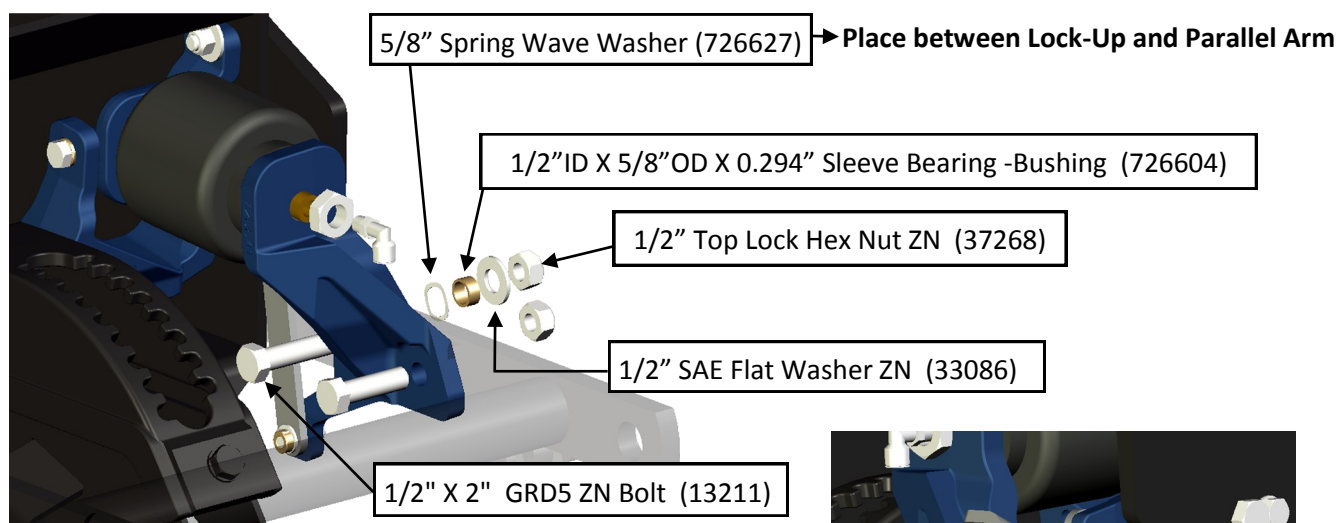
1/2\"ID X 5/8\"OD X 0.294\" Sleeve Bearing—
Bushing (726604)

5/8\" Spring Wave Washer (726627) ** See Note

1/2\" SAE Flat Washer ZN (33086)

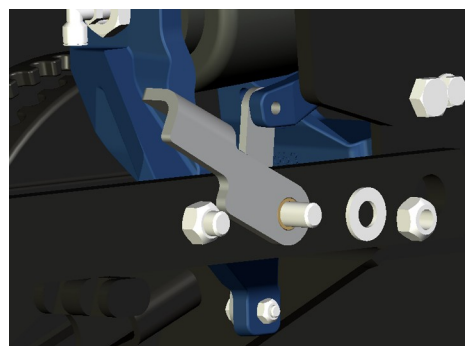
Rear Bolt

1/2\" X 1.75\" GRD 5 Bolt ZN (13210)

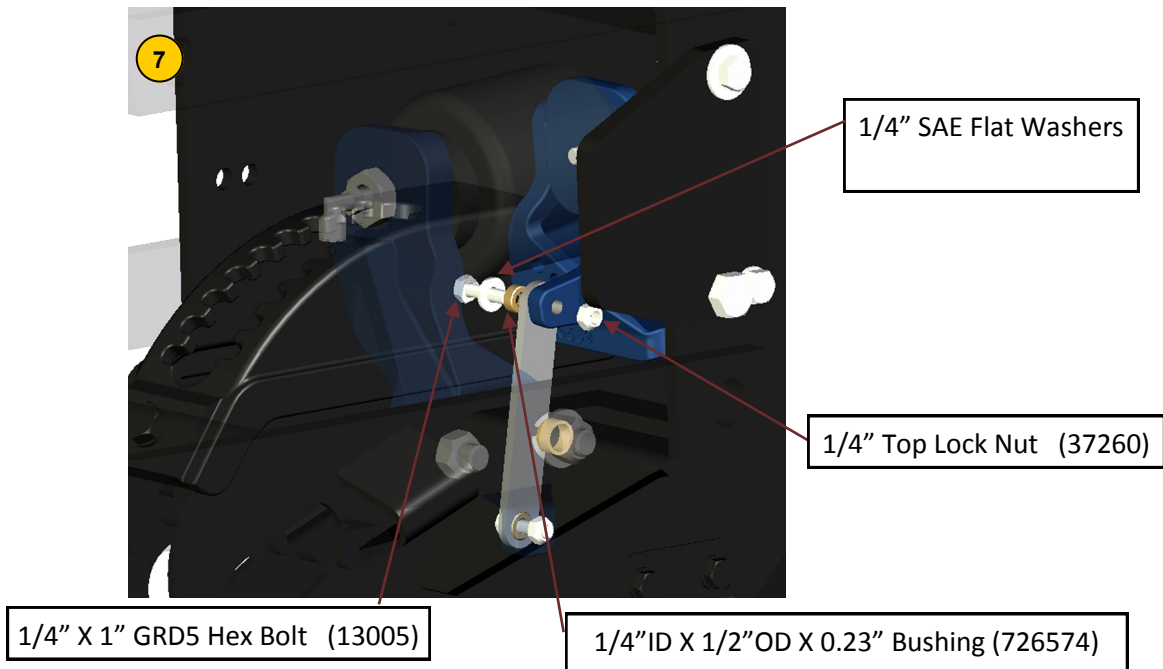


Note the Placement of the Lock-Up **over the bushing** on the rear bolt, between the spring wave washer and the flat washer. Two Lock-Up's are provided, only **ONE** will be used.

Kinze 3000: use the 4.425\" long Lock-Up



7. Complete the conversion by fixing the upper half of the Positioning Link (726066) to the forward arm of the Lift AirSpring Base Pivot (726571) as shown. Secure the Stabilizer Link using a 1/4" X 1" GRD5 Hex Bolt (13005), 1/4" SAE Flat Washer (33078), a 1/4"ID X 1/2"OD X 0.23" Bushing (726574), and one 1/4" Top Lock Nut (37260). Pay special attention to the Note below to ensure a complete range of motion of the link without binding.



8. Check tightness of all bolts and nuts, and freedom of motion/clearance of all components.

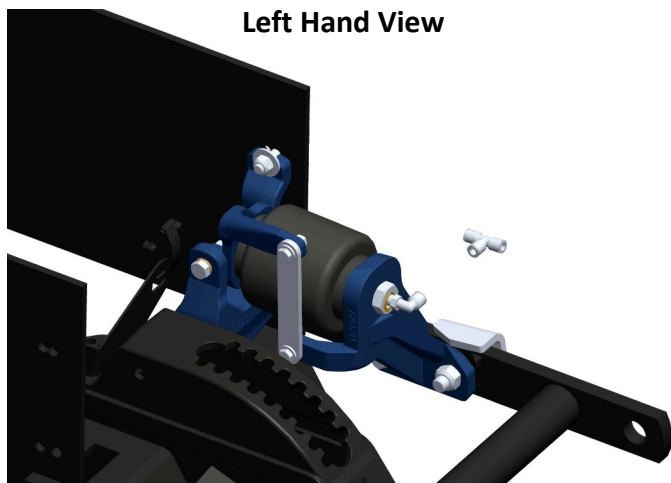
See the following page for Completed Row Unit Conversion images.

Completed Row Unit Conversion

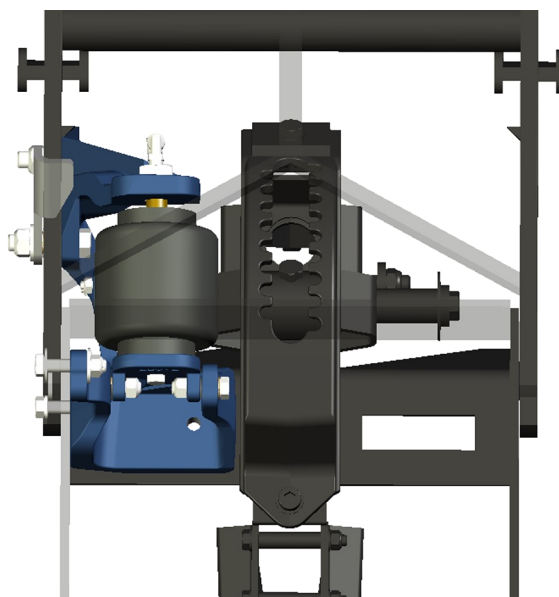
726550

Kinze Push Row Units

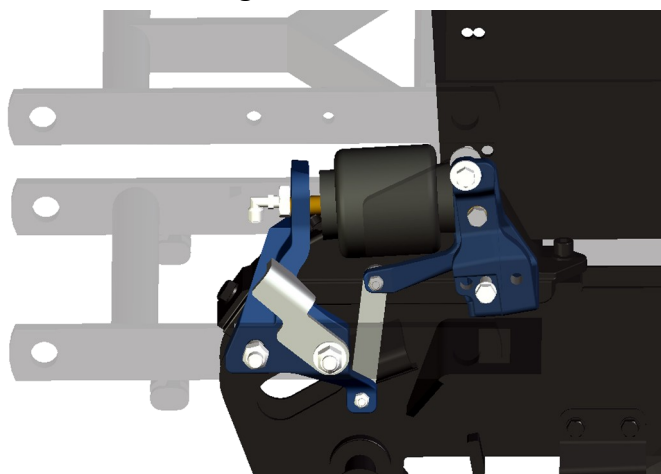
Left Hand View



Top View



Right Hand View



Row Unit Conversion Instructions

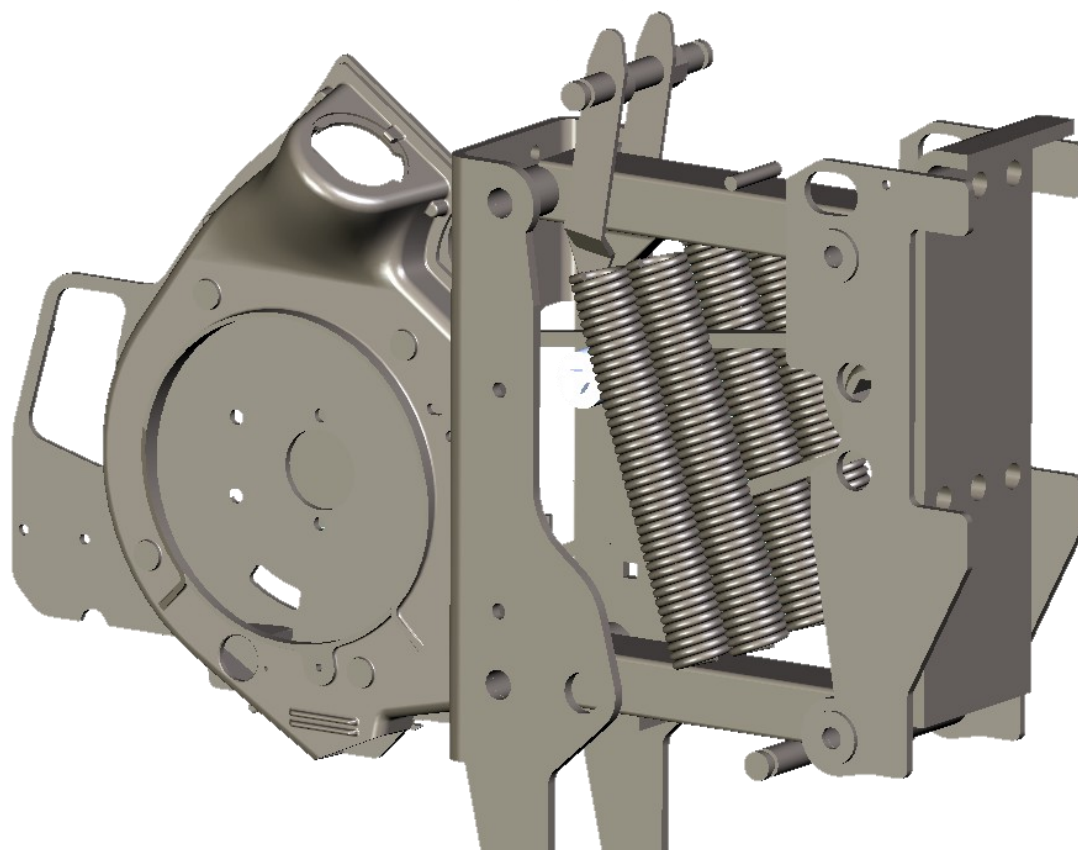
for:

planter models:Great Plains YP series planters

to convert from **Existing Springs:**.....Great Plains Light & Heavy Duty Springs

to **Resulting Forces Controlled:**.....Lift Only

Existing Springs



Illustrations of completed row unit and assembled components on last page.

Conversion Kit Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
1	726101	Spring	Air Spring (Lift)
1	726589	Bracket	Lift Airspring Head Mount
1	726593	Bracket	Lift Airspring Base Mount
1	726594	Pivot	Lift Airspring Pivot Base
1	726597	Plate	Lift Airspring Link Plate
1	726607	Pack	Hardware Pack

Quantities are given per row

Hardware Pack Components

QTY	PART	PART NAME	DESCRIPTION
1	13059	Bolt	5/16" X 1.5" GRD5 Bolt ZN
1	1317	Bolt	3/8" X 1.25" GRD5 Bolt ZN
2	15055	Bolt	5/16" X 1" GRD8 Bolt ZN
1	19915	Flange Bolt	5/16" X 5/8" Serrated Head ZNY
2	21818	Carriage Bolt	3/8" X 1.25" GRD5 ZN
2	33078	Washer	1/4" SAE Flat ZN
1	33080	Washer	5/16" SAE Flat ZN
1	36214	Hex Jam Nut	5/8" Hex Jam Nut ZN
3	37262	Hex Nut	5/16" Top Lock Nut ZN
7	37264	Hex Nut	3/8" Top Lock Nut ZN
1	726112	Elbow	1/8"NPT X 1/4" PTC Elbow
1	726115	Tee	1/4"PTC TEE
2	726522	U-Bolt	for 2" X 1.5" Tube
2	726532	Bushing	5/16"ID X 5/8"OD X 0.323"Length
2	726574	Bushing	1/4"ID X 1/2"OD X 0.23" Length
1	726596	Link	Airspring Base Stabilizer
1	726618	Spool	Great Plains Idler Spool
1	726619	Bushing	5/16"ID X 1/2"OD X 0.844"Length
1	726621	Collar Nut	3/8" UNC 5/8" Hex
2	13002N	Bolt	1/4" X 5/8" GRD5 Hex Bolt ZN w/ Nylon
1	13104N	Bolt	3/8" X 7/8" GRD5 Bolt ZN w/Nylon

Quantities are given per row

Recommended tools (not provided):

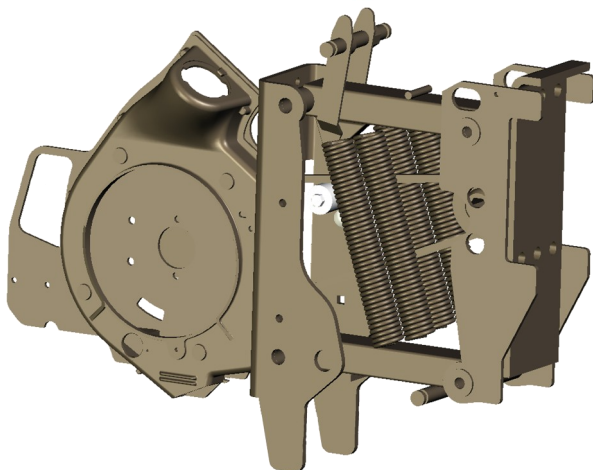
Open end wrenches: 7/16" 1/2", 9/16", 15/16"

- or suitable crescent wrench (s)

Sockets (Deep well recommended): 7/16", 1/2", 9/16", 5/8", 15/16"

- 1 Begin installation by removing tension from the existing springs. Next, remove the hopper (if present) and meter from the row unit.

Continue by removing the Latch Plate the meter mounts to and removing the drive chain as well.

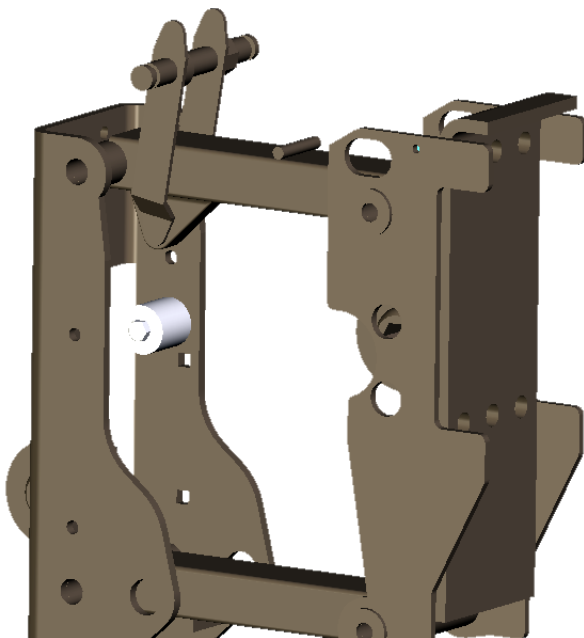


Standard Great Plains Row Unit

Complete the row unit preparations by dis-engaging and removing the existing springs. Raise the planter to remove the springs, then lower the planter until the parallel arms are level to continue the installation.

Set all components aside in an orderly fashion to assist reassembly.

Refer to the planter manufacturer's Owner's Manual for detailed instructions on the disassembly of these row unit components.



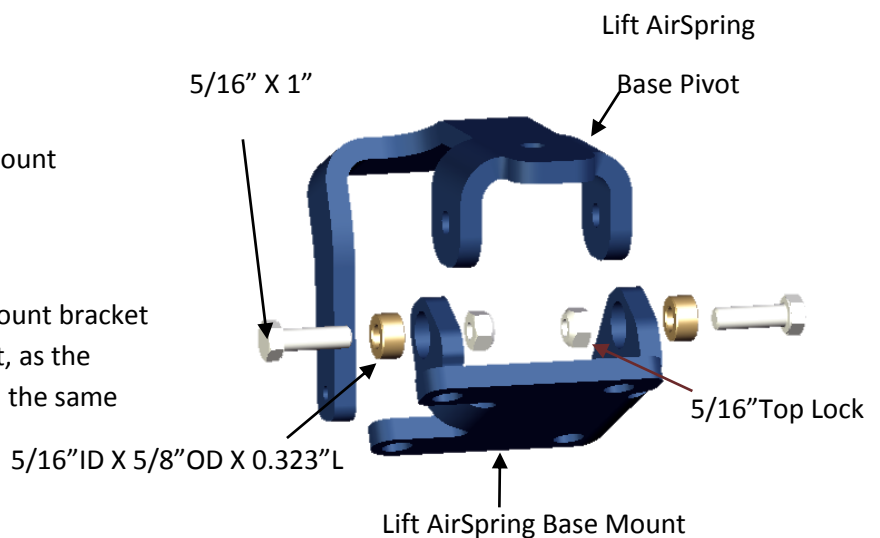
Row unit after completed Step 1; prepared for new component installation.

1

Assemble the Lift AirSpring Base Mount and Pivot brackets.

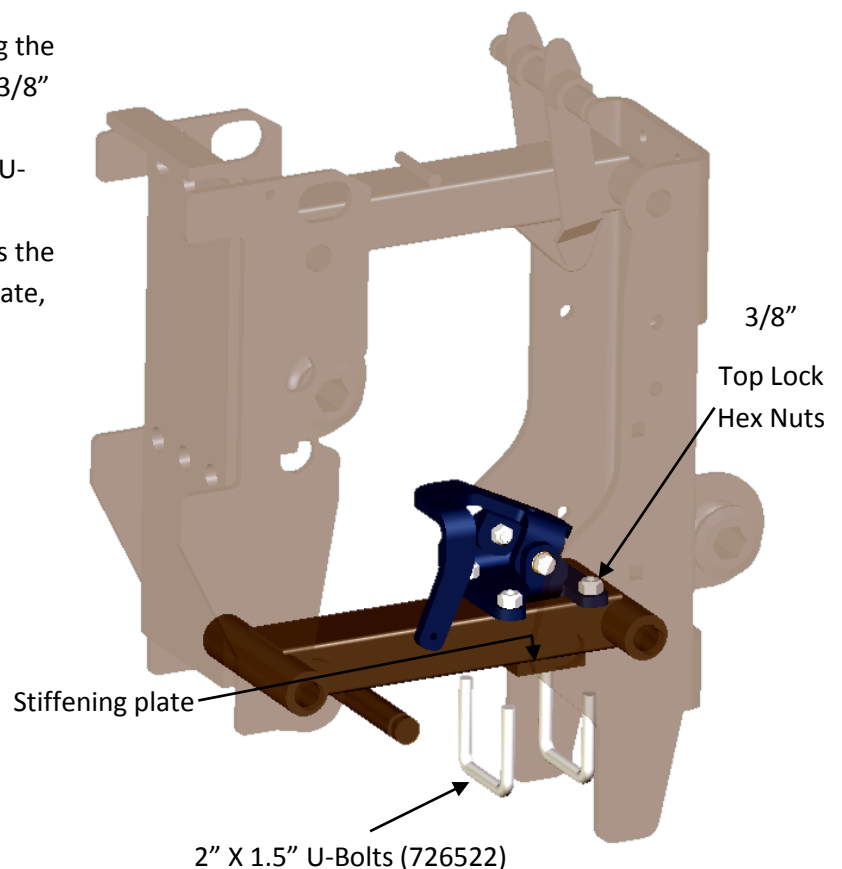
Refer to the illustration provided.

Note the orientation of the Base Mount bracket in relation to the Base Pivot bracket, as the Pivot arm will need to be aligned to the same



2 Position the Lift AirSpring Mounts assembly as shown in the illustration.

Secure the entire assembly in place using the supplied 2" X 1.5" U-Bolts (726522) and 3/8" Top Lock Hex Nuts (37264). It may be beneficial to install, but not tighten, the U-Bolts prior to aligning the assembly. Proper placement of the assembly places the U-bolts on either side of the stiffening plate, bottom side of lower parallel arm.



3

Continue the installation of new components with the assembly and placement of the Lift AirSpring Link-Plate (726597). Prior to mounting the Plate on the row unit, assemble the Great Plains Idler Spool and Base Stabilizer to the Plate.

Install the Idler assembly using:

5/16" X 1.5" GRD5 Bolt (13059)

Great Plains Idler Spool (726618)

5/16" Top Lock Hex Nut (37262)

5/16" SAE Flat Washer (33080)

5/16" ID X 1/2" OD X 0.844" L Bushing (726619)

Install the Stabilizer Assembly using:

AirSpring Base Stabilizer (726596)

1/4" ID X 1/2" OD X 0.844" L Bushing (726619)

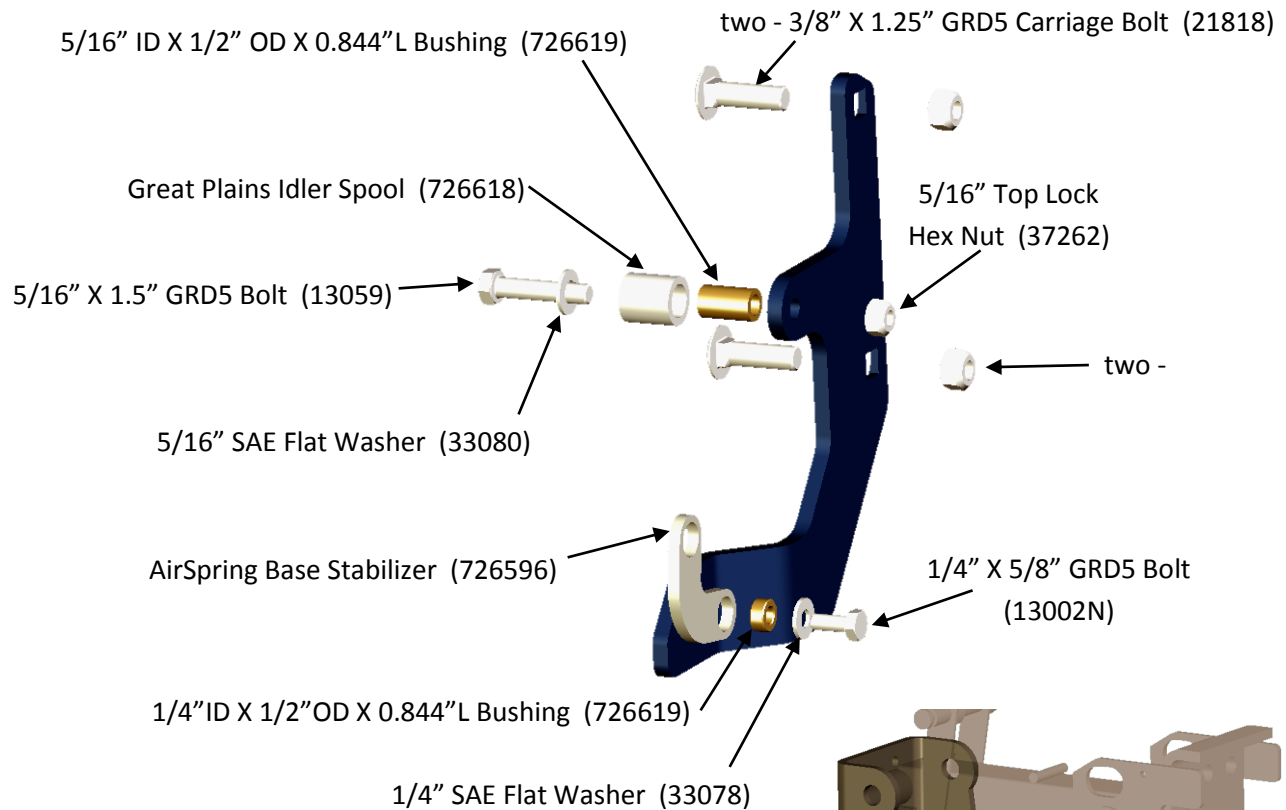
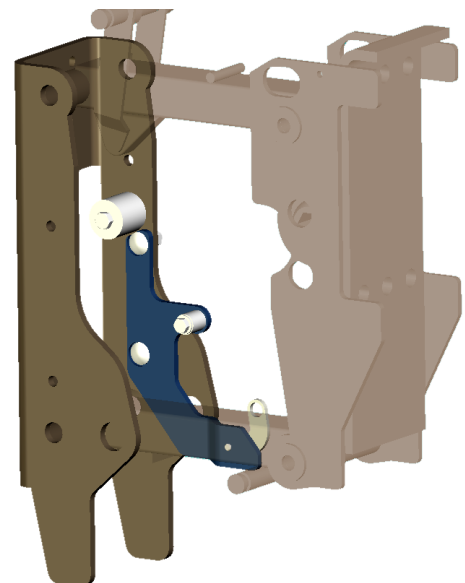


Illustration showing the Link-Plate as installed on the row unit.

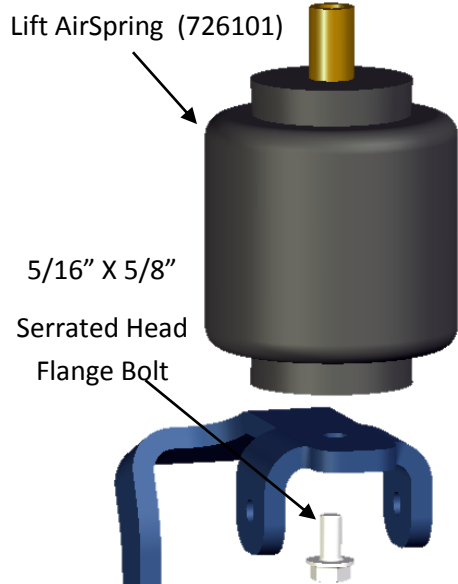
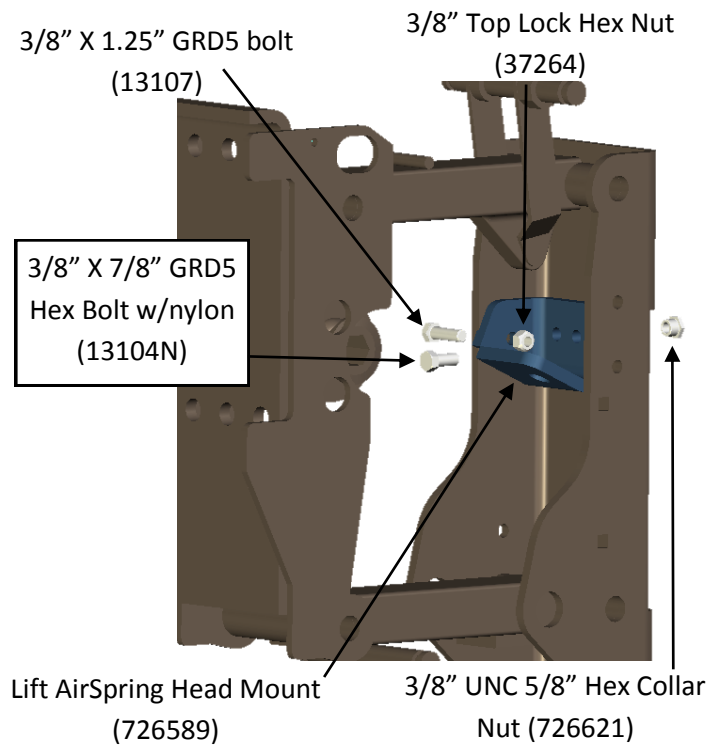


4

Next, install the Lift AirSpring Head Mount bracket (726589) in the right rear corner of the row unit when standing behind the planter facing forward.

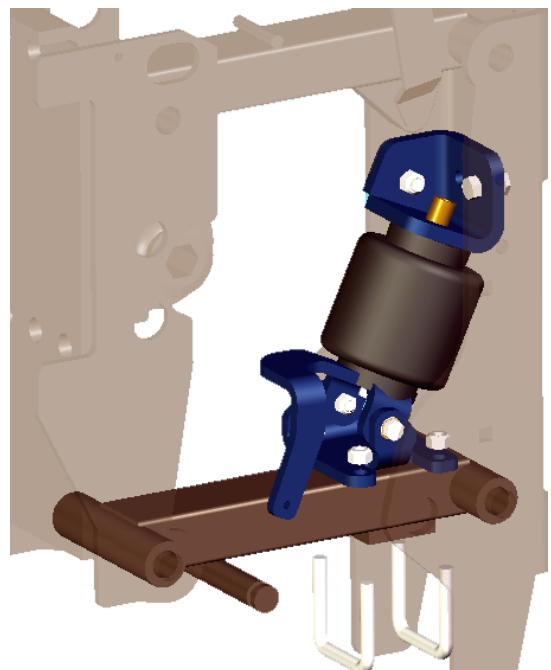
This will be done using the 3/8" X 7/8" GRD5 Hex Bolt w/nylon (13104N) and the 3/8" UNC 5/8" Hex Collar Nut (726621) installed parallel with the row unit. Note the two holes in the bracket for this bolt location. These are provided to line up with a variety of row units, use only one of these holes that correspond to your row unit.

Perpendicular to the row unit, fix the bracket in place using a 3/8" Top Lock Hex Nut (37264) and 3/8" X 1.25" GRD5 bolt (13107).



5

Route the brass fitting on the top of the air bag into the Lift AirSpring Head Mount. Adjust the assembly until the Base Mount is level and square against the lower parallel arm at the same time that the top surface of the air bag is squarely seated against the bottom surface of the Head Mount.



**** Tighten the Flange Bolt into the base of the air bag to 10-12 lb-ft of torque.**

6

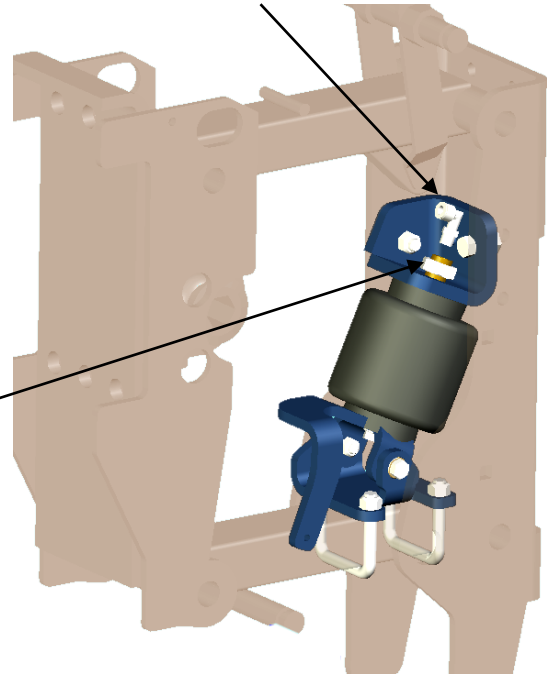
Fix the top of the assembly in place using the 5/8" Hex Jam Nut (36214).

Tighten the Jam Nut to 10-12 lb-ft of torque.

Install the 1/8" NPT X 1/4" PTC 90° Elbow (726112)

5/8" Hex Jam Nut (36214)

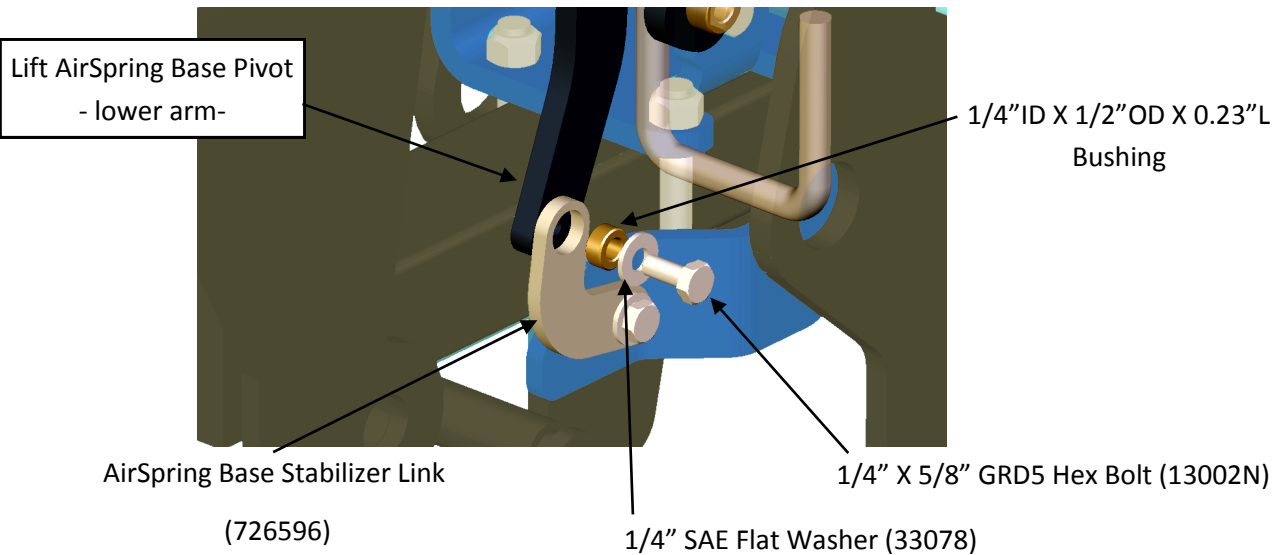
1/8" NPT X 1/4" PTC 90° Elbow



7

Complete the new component installation by fixing the forward arm of the Plate-Link to the lower arm of the Lift AirSpring Base Pivot.

Arrange the 1/4" SAE Flat Washer (33078) and the 1/4" ID X 1/2" OD X 0.23" L Bushing (726574) onto the 1/4" X 5/8" GRD5 Hex Bolt (13002N). Position this assembly in the AirSpring Base Stabilizer Link (726596) and thread the bolt into the lower arm of the Lift AirSpring Base Pivot.



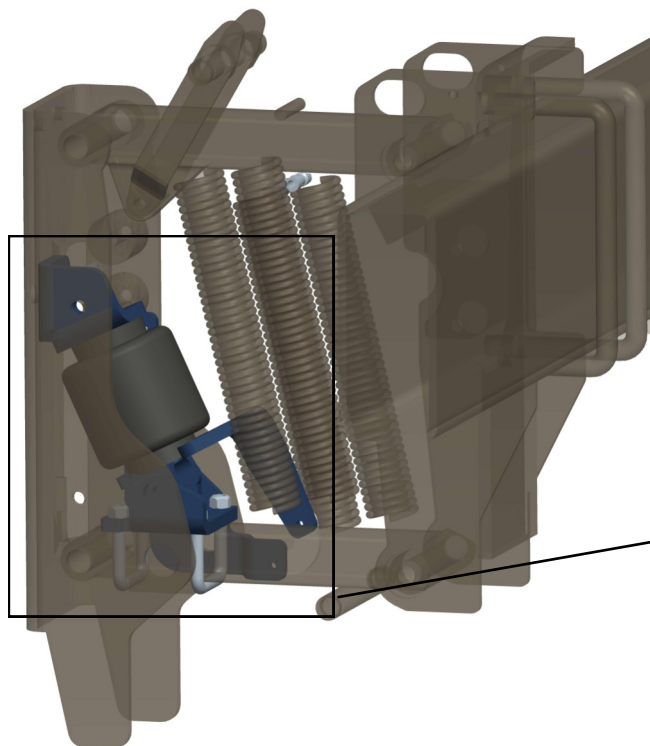
Check tightness of all bolts and nuts.

Check freedom of motion/clearance of all components.

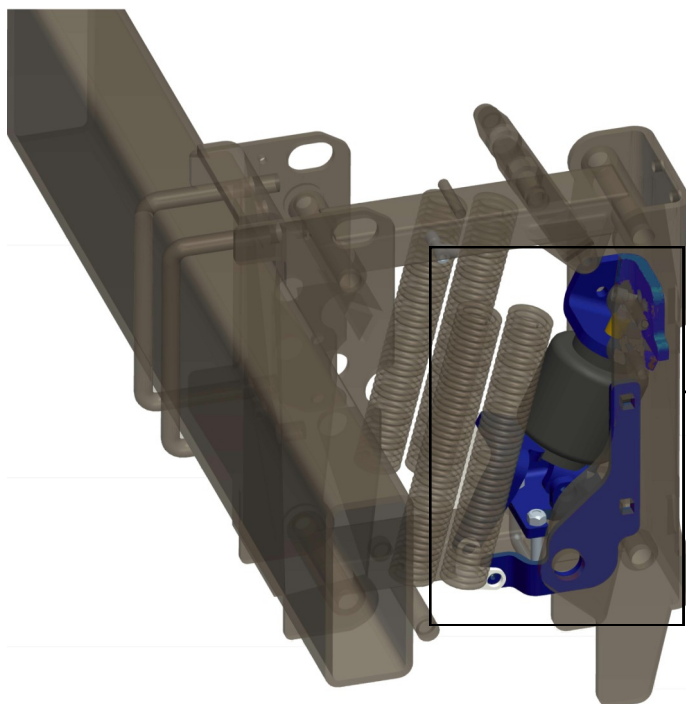
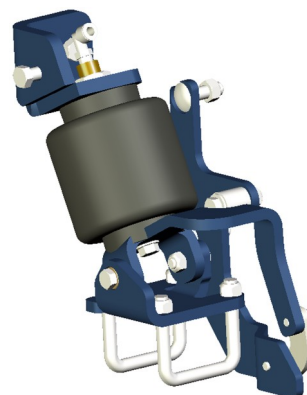
Completed Row Unit Conversion

726575

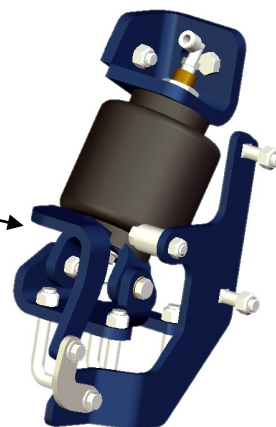
Lift Only Control



As viewed from the front Right



As viewed from the front Left



Supplemental Components - Ordered Separately

726623

Row Unit Lock-Up

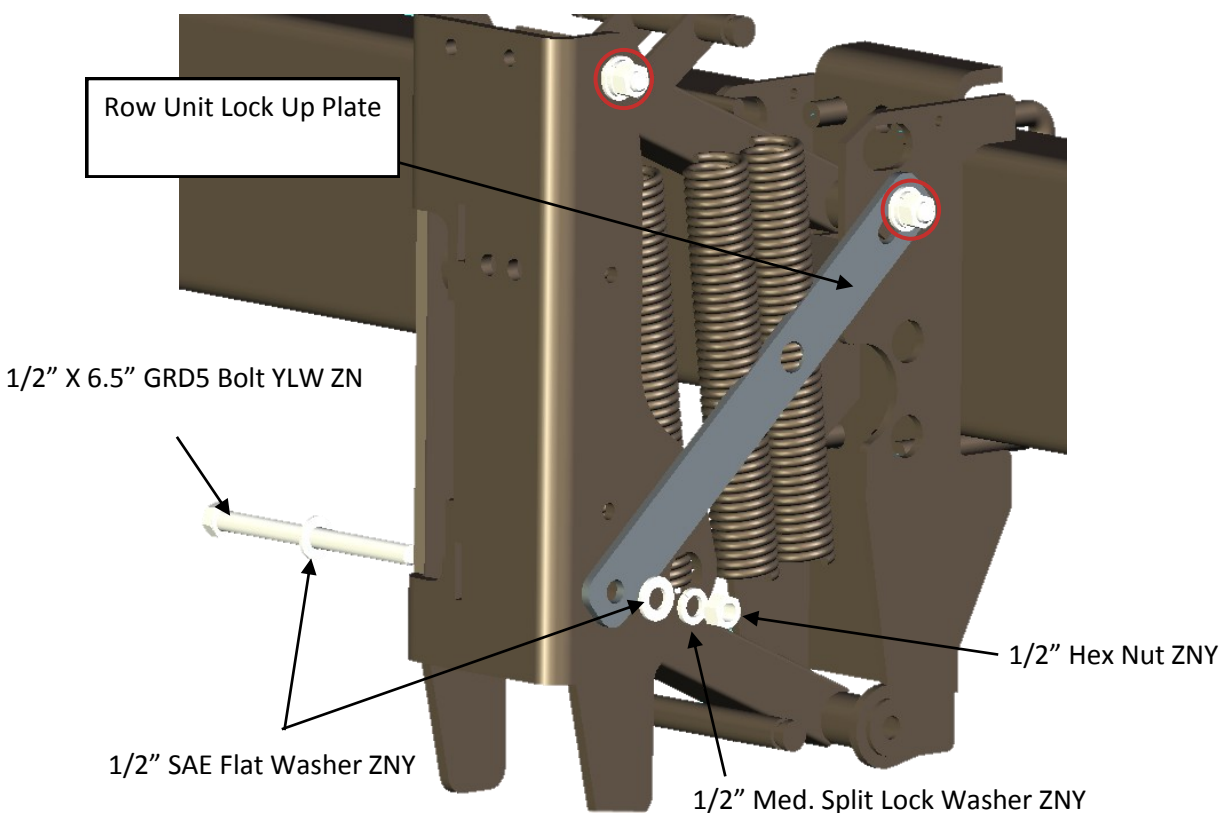
Row Unit Lock-Up Kit Components

QTY	PART NUMBER	PART NAME	DESCRIPTION
3	95226	Bolt	1/2" X 6.5" GRD5 Bolt ZNY
3	95864	Hex Nut	1/2" Hex Nut ZNY
6	96057	Washer	1/2" SAE Flat Washer ZNY
3	0123498	Lock Washer	1/2" Med. Split Lock Washer
1	726622	Plate	Great Plains Row Unit Lock-Up

Quantities are given per row

With the addition of AirForce to the row units, the traditional row unit lock-up mechanism will no longer be functional. This kit provides the means to still lock row units up.

Installation will require the replacement of three of the main bolts connecting the frame components to the parallel arms. The lower bolt hole of the Plate will be held in place when assembled as shown. The upper bolt hole of the Plate is a keyway that will be moved over the bolt heads, from forward to rear positions as required.



726275

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726331	TUBING	3/8 BLACK 25'	A
1	726321	TUBING	1/4 BLACK 50'	B
1	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
4	726103	PLUG	1/4 PTC	D
12	63128	TIE STRAPS	12" UV BLACK	E
1	726273	ELBOW	3/8 PTC	F
3	726104	PLUG	3/8 PTC	F

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of down force air bags
E	Use as required to secure tubing
F	Use between fitting on rear of enclosure / pneumatic manifold and 3/8 tubing

LEGEND

	Pneumatic Spring; Down or Lift
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee
	1/8" NPT X 1/4" PTC Tee
	1/4" Brass PTC Tee
	3/8" X 1/4" X 1/4" PTC Tee
	3/8" PTC Tee
	3/8" PTC 90° Elbow
	1/4" NPT Male X 3/8" PTC Straight
	80 cubic inch Lift Circuit Receiver tank
	PTC plug; 3/8" or 1/4"
	3/8" Line (Black or Red/Silver)
	1/4" Line (Black or Red/Silver)

Plumbing Installation



This process should be done with the planter raised, half folded for transport, and the row units fully extended down.

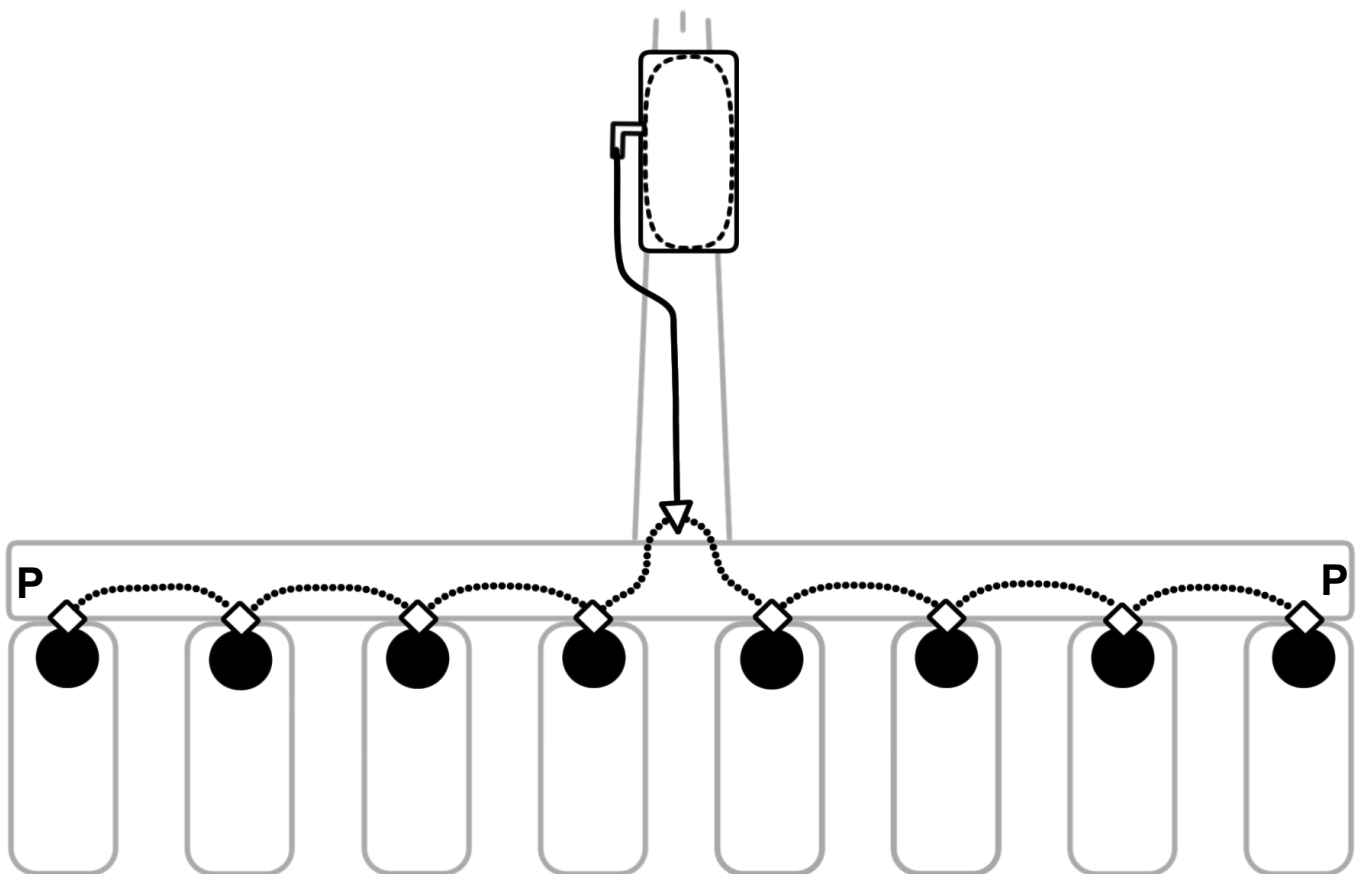
The following pages contain images of suggested methods of routing the air lines for your new 20/20 Air-Force. Due to the wide variety of planter/row unit configurations and accessories available, you should adapt the installation as necessary for your planter. The primary concern is the security of the lines themselves. The lines should be fastened to the planter in a manner that allows full range of motion/clearance of the row unit. Special caution should be taken around rows at break or fold points of the planter as it

- ◆ The supplied fittings should have pre-existing thread sealant - ready to install - for ease of installment. Always use Thread Tape when installing air fittings that do not have this
- ◆ Black Tubing - used for the Down Force Circuit
- ◆ Red / Silver Tubing - used for the Lift Force Circuit
- ◆ 3/8" lines (Black or Red/Silver) - used for the main line **from** the Compressor Module **to** groups of rows, usually on the main draw bar of the planter
- ◆ 1/4" lines (Black or Red/Silver) - used **from** the main line **to** and **between** the individual row unit Air Bags
- ◆ Secure the Air Lines using the supplied zip tie-straps - do not pinch the line closed when cinching tight
- ◆ The 1/4" lines should be routed back to and secured to the main bar or to existing bundles of wires/hoses of the planter between row units
- ◆ Most 30" row configurations should need between 34 to 42 inches of 1/4" line between Down Force Air Bags. **Do not** pre-cut the line, measure lay-out each length individually.
- ◆ Lift Circuit kits containing 1 extra brass 1/4" PTC Tee per row will require lengths of the 1/4" line from the connector on top of the Lift Bag to the 1/4"PTC Tee placed on the main Draw Bar.
- ◆ All Lift Circuits will require the use of one or multiple 80 cubic inch Air Receiver Assem-

After completion of the **FIRST** row and **PRIOR** to continuing to other rows, check for clearance of, and lack of pinch points on all lines and fittings. This should be done by completely raising and lowering the

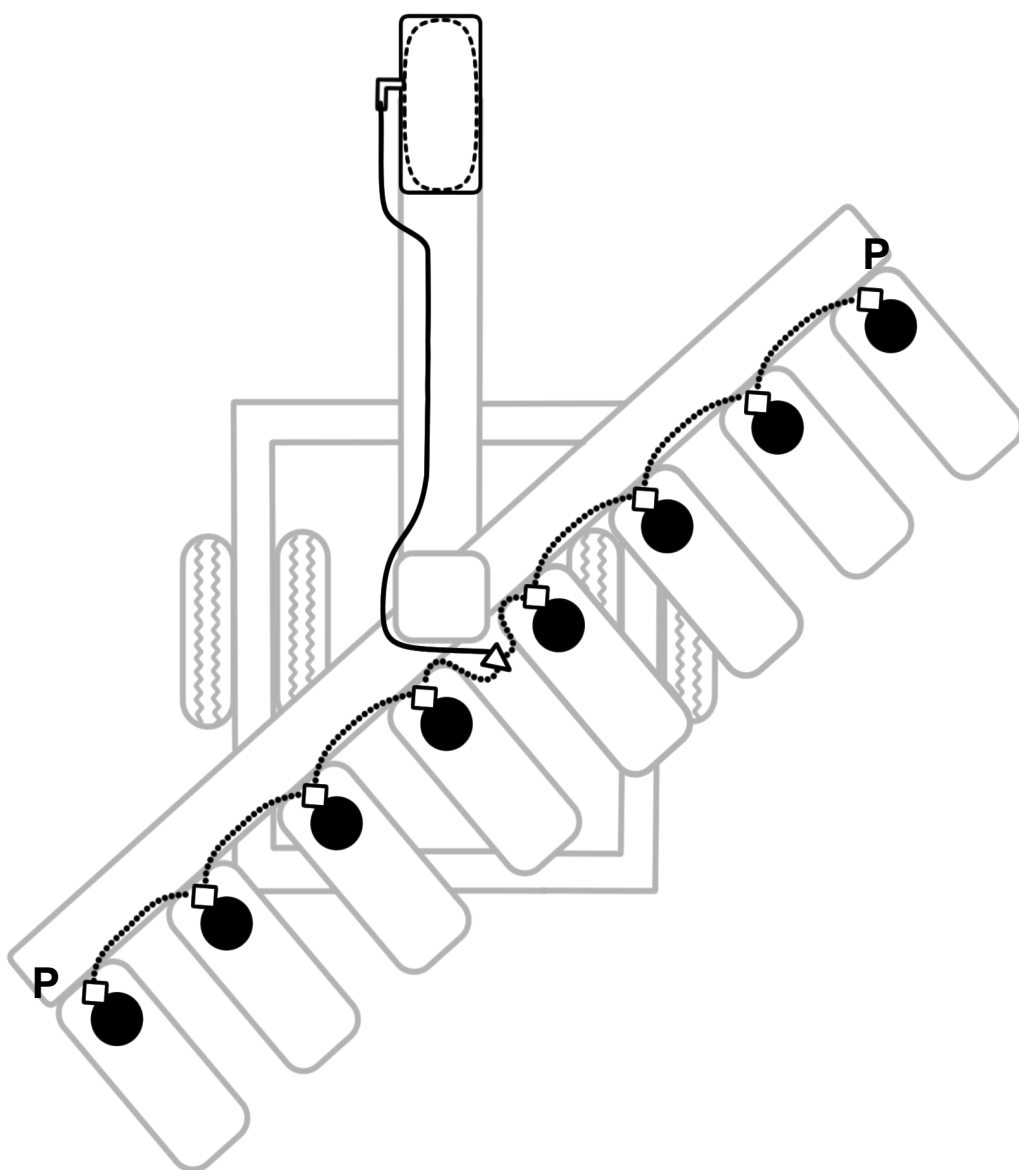
Row Configuration: 8 Row, any spacing

Transport/ Fold:



Row Configuration: 8 Row, any spacing

Transport/ Fold:



726280

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726333	TUBING	3/8 BLACK 100'	A
1	726322	TUBING	1/4 BLACK 100'	B
2	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
4	726103	PLUG	1/4 PTC	D
24	63128	TIE STRAPS	12" UV BLACK	E
2	726273	ELBOW	3/8 PTC	F
2	726104	PLUG	3/8 PTC	F
6	900120	TIE STRAPS	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of down force air bags
E	Use as required to secure tubing
F	Use between fittings on rear of enclosure / pneumatic manifold and 3/8 tubing

LEGEND

	Pneumatic Spring; Down or Lift
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee
	1/8" NPT X 1/4" PTC Tee
	1/4" Brass PTC Tee
	3/8" X 1/4" X 1/4" PTC Tee
	3/8" PTC Tee
	3/8" PTC 90° Elbow
	1/4" NPT Male X 3/8" PTC Straight
	80 cubic inch Lift Circuit Receiver tank
	PTC plug; 3/8" or 1/4"
	3/8" Line (Black or Red/Silver)
	1/4" Line (Black or Red/Silver)

Plumbing Installation



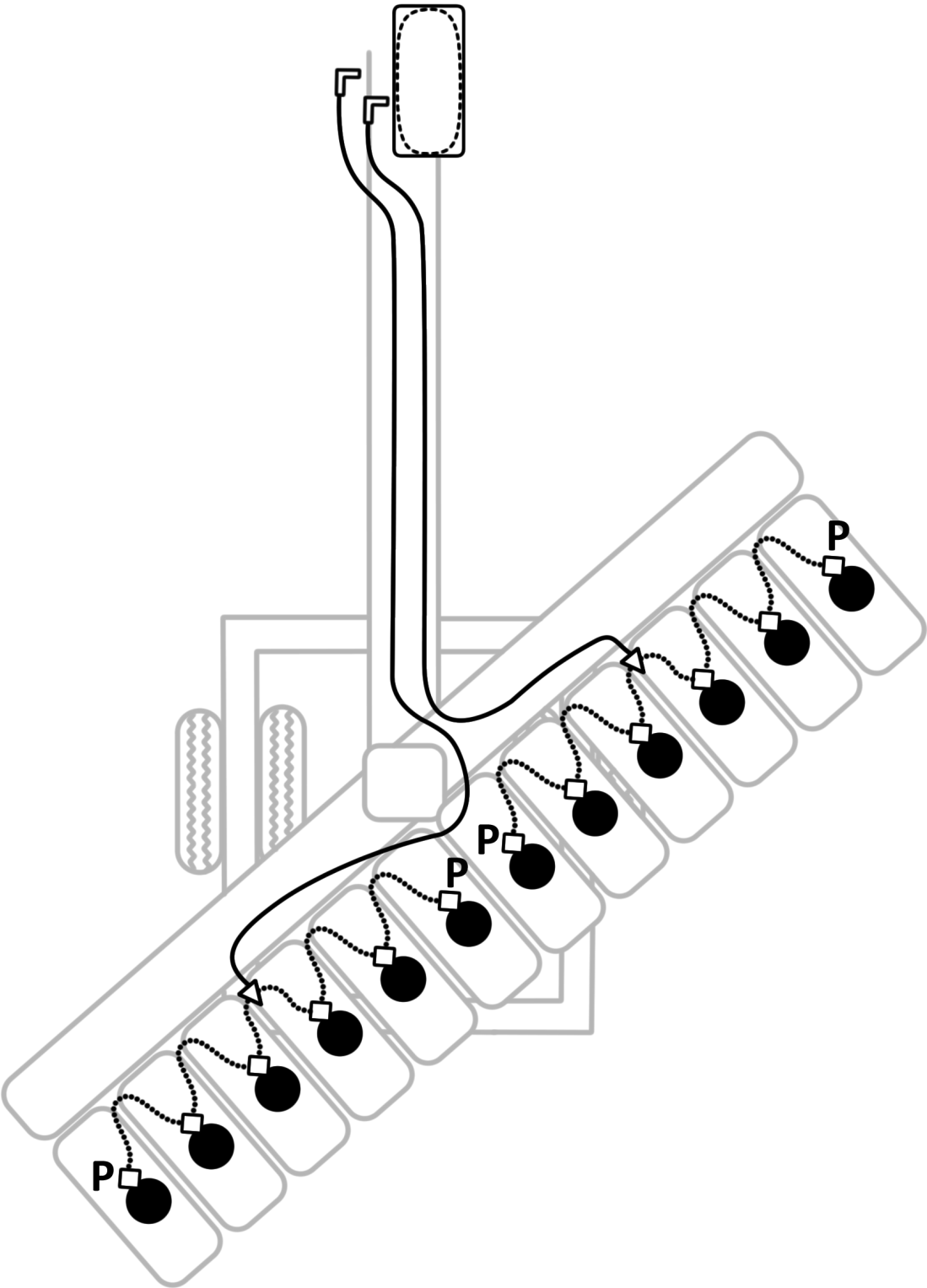
This process should be done with the planter raised, half folded for transport, and the row units fully extended down.

The following pages contain images of suggested methods of routing the air lines for your new 20/20 Air-Force. Due to the wide variety of planter/row unit configurations and accessories available, you should adapt the installation as necessary for your planter. The primary concern is the security of the lines themselves. The lines should be fastened to the planter in a manner that allows full range of motion/clearance of the row unit. Special caution should be taken around rows at break or fold points of the planter as it

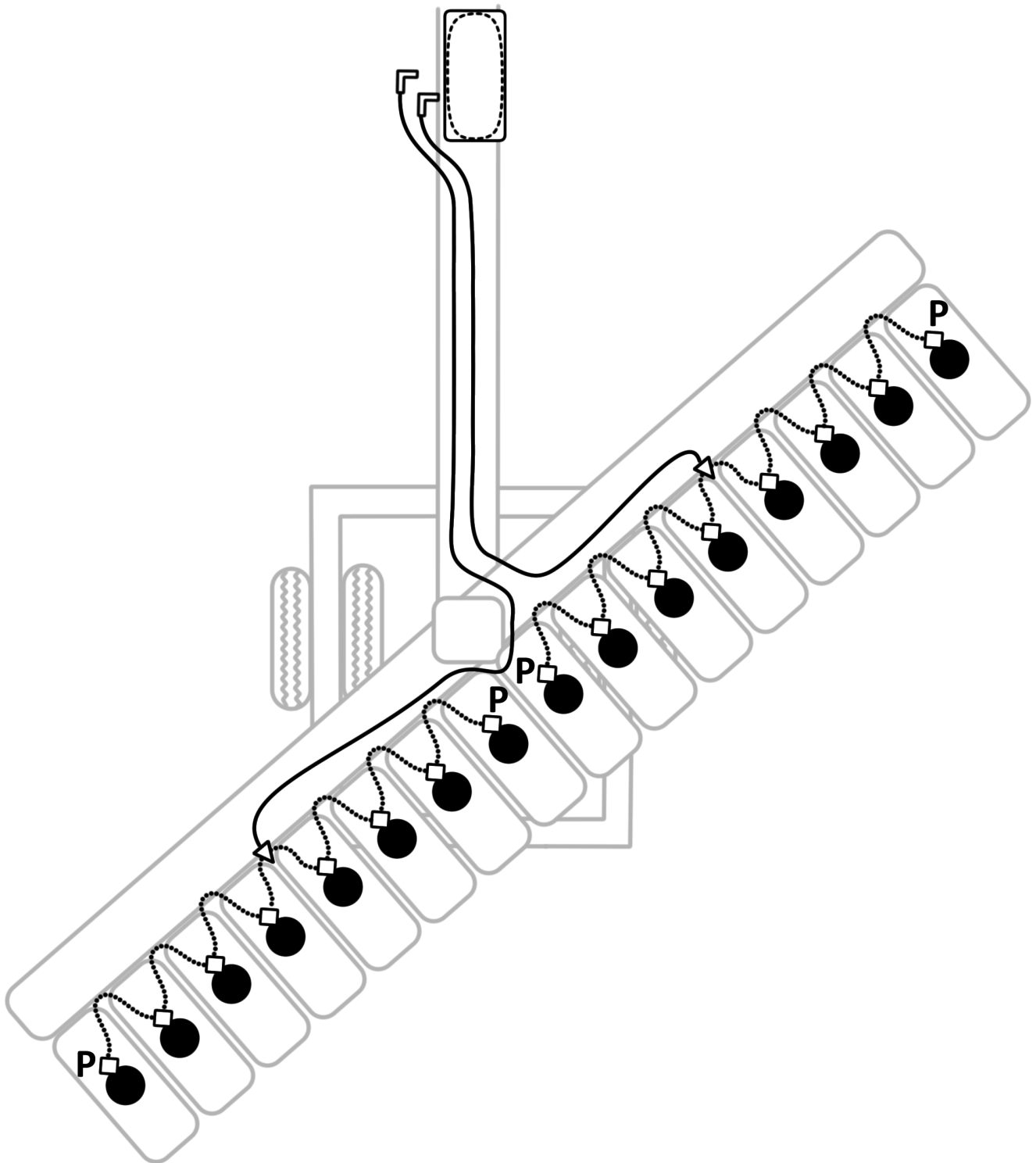
- ◆ The supplied fittings should have pre-existing thread sealant - ready to install - for ease of installment. Always use Thread Tape when installing air fittings that do not have this
- ◆ Black Tubing - used for the Down Force Circuit
- ◆ Red / Silver Tubing - used for the Lift Force Circuit
- ◆ 3/8" lines (Black or Red/Silver) - used for the main line **from** the Compressor Module **to** groups of rows, usually on the main draw bar of the planter
- ◆ 1/4" lines (Black or Red/Silver) - used **from** the main line **to** and **between** the individual row unit Air Bags
- ◆ Secure the Air Lines using the supplied zip tie-straps - do not pinch the line closed when cinching tight
- ◆ The 1/4" lines should be routed back to and secured to the main bar or to existing bundles of wires/hoses of the planter between row units
- ◆ Most 30" row configurations should need between 34 to 42 inches of 1/4" line between Down Force Air Bags. **Do not** pre-cut the line, measure lay-out each length individually.
- ◆ Lift Circuit kits containing 1 extra brass 1/4" PTC Tee per row will require lengths of the 1/4" line from the connector on top of the Lift Bag to the 1/4" PTC Tee placed on the main Draw Bar.
- ◆ All Lift Circuits will require the use of one or multiple 80 cubic inch Air Receiver Assem-

After completion of the **FIRST** row and **PRIOR** to continuing to other rows, check for clearance of, and lack of pinch points on all lines and fittings. This should be done by completely raising and lowering the

Row Configuration: 12 Row

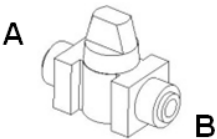


Row Configuration: 16 Row



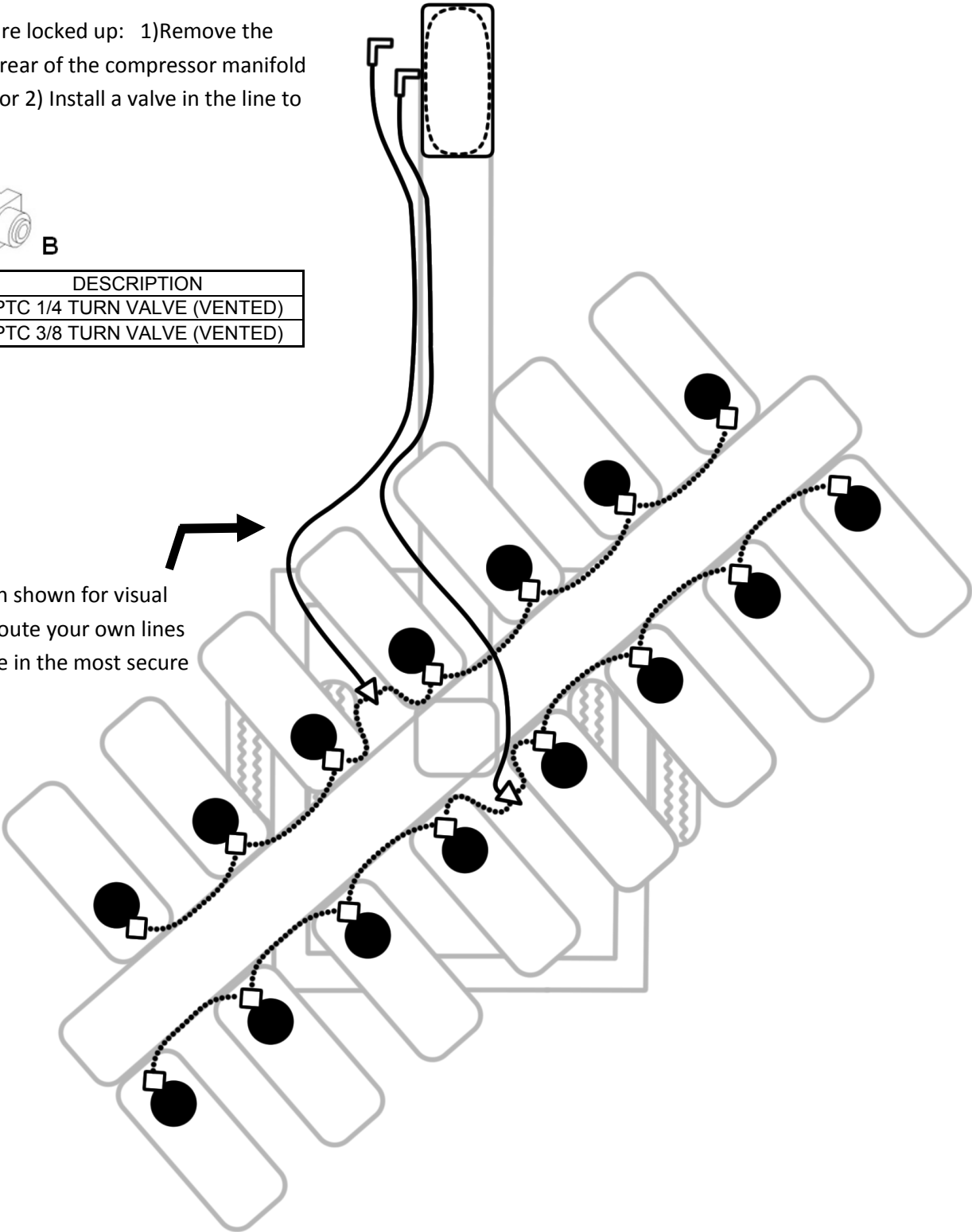
Row Configuration: 8/15 Row

When push-rows are locked up: 1)Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to

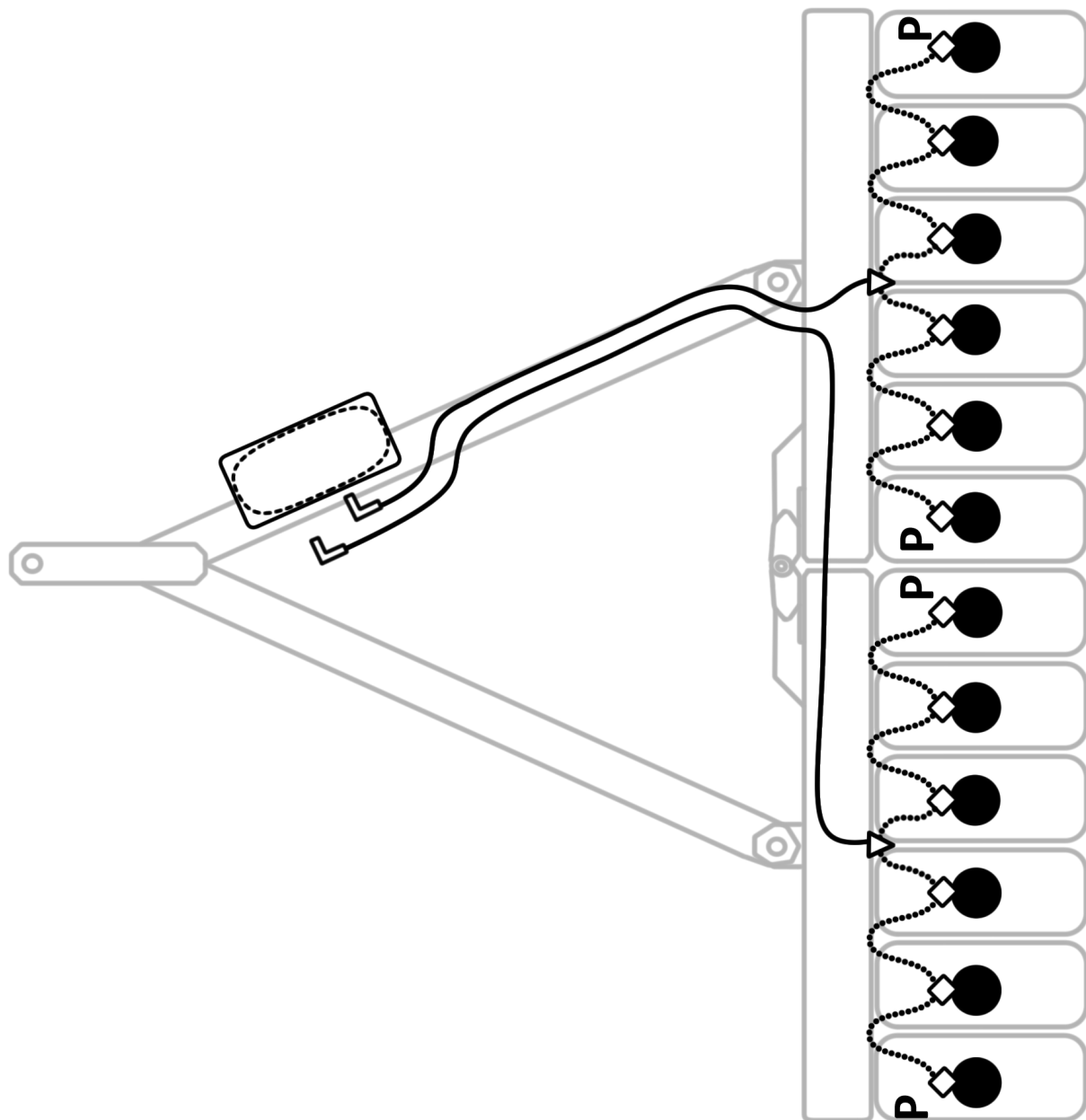


PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)

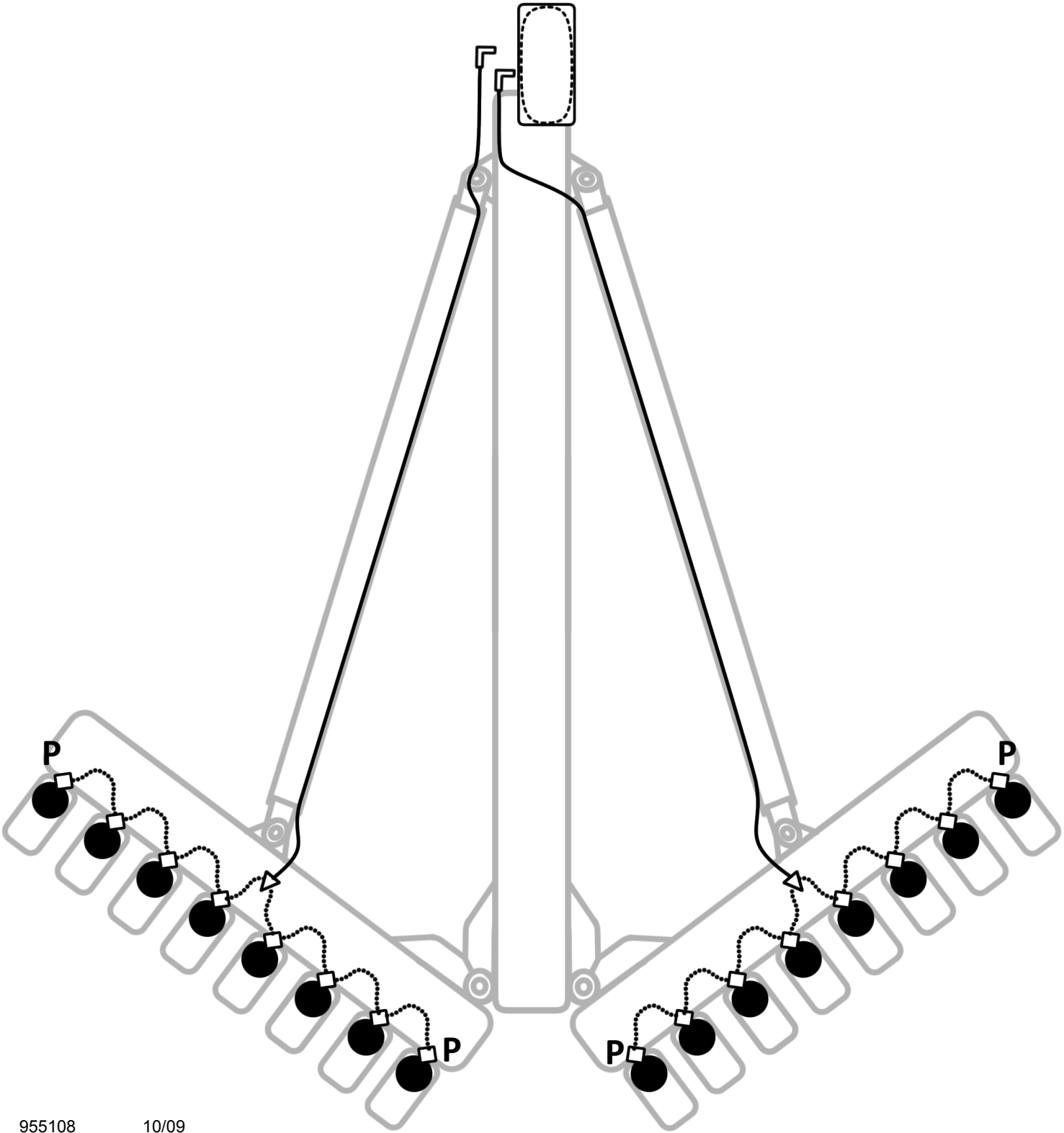
This routing path shown for visual reasons only! Route your own lines along the tongue in the most secure path available.



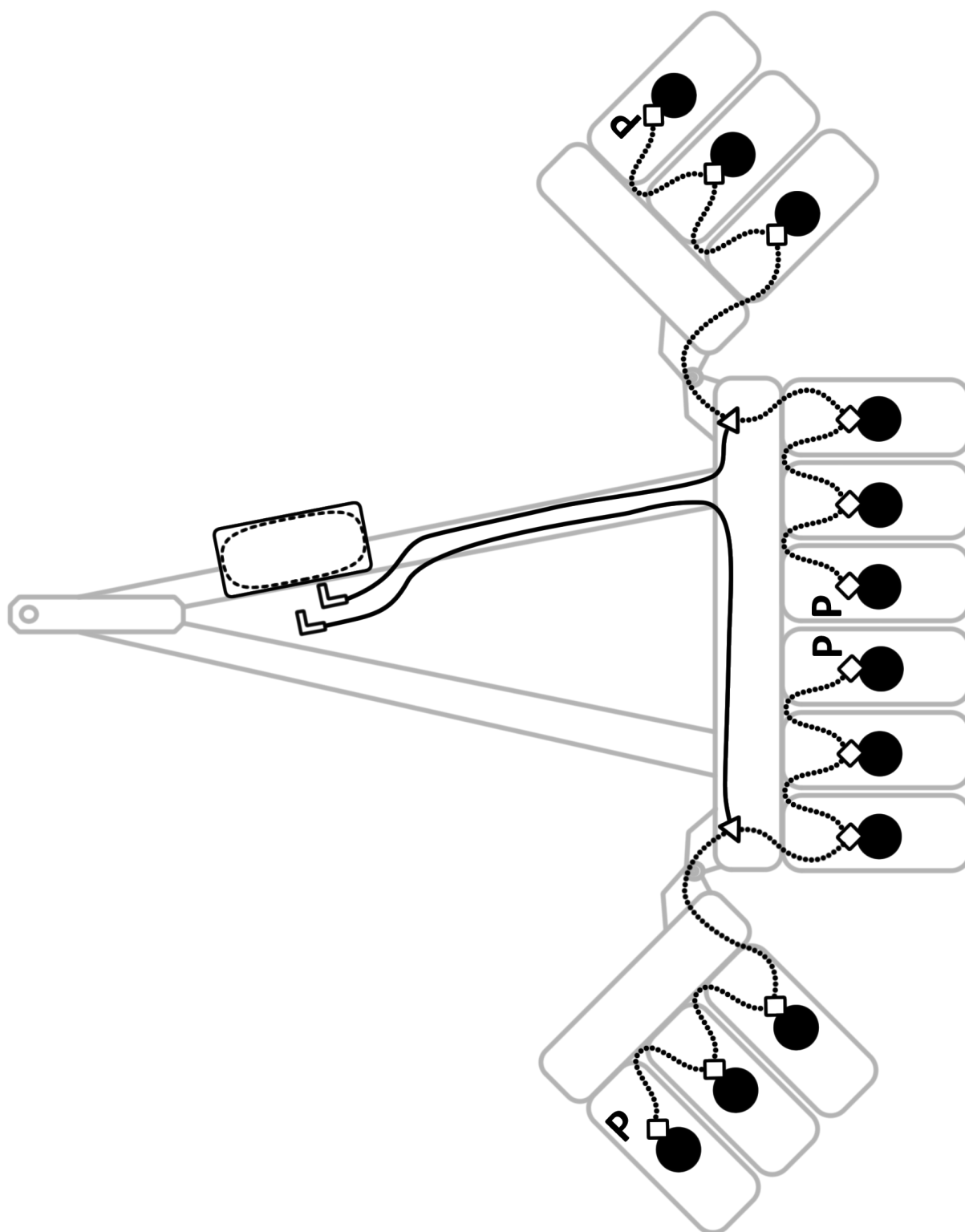
Row Configuration: 12 Row



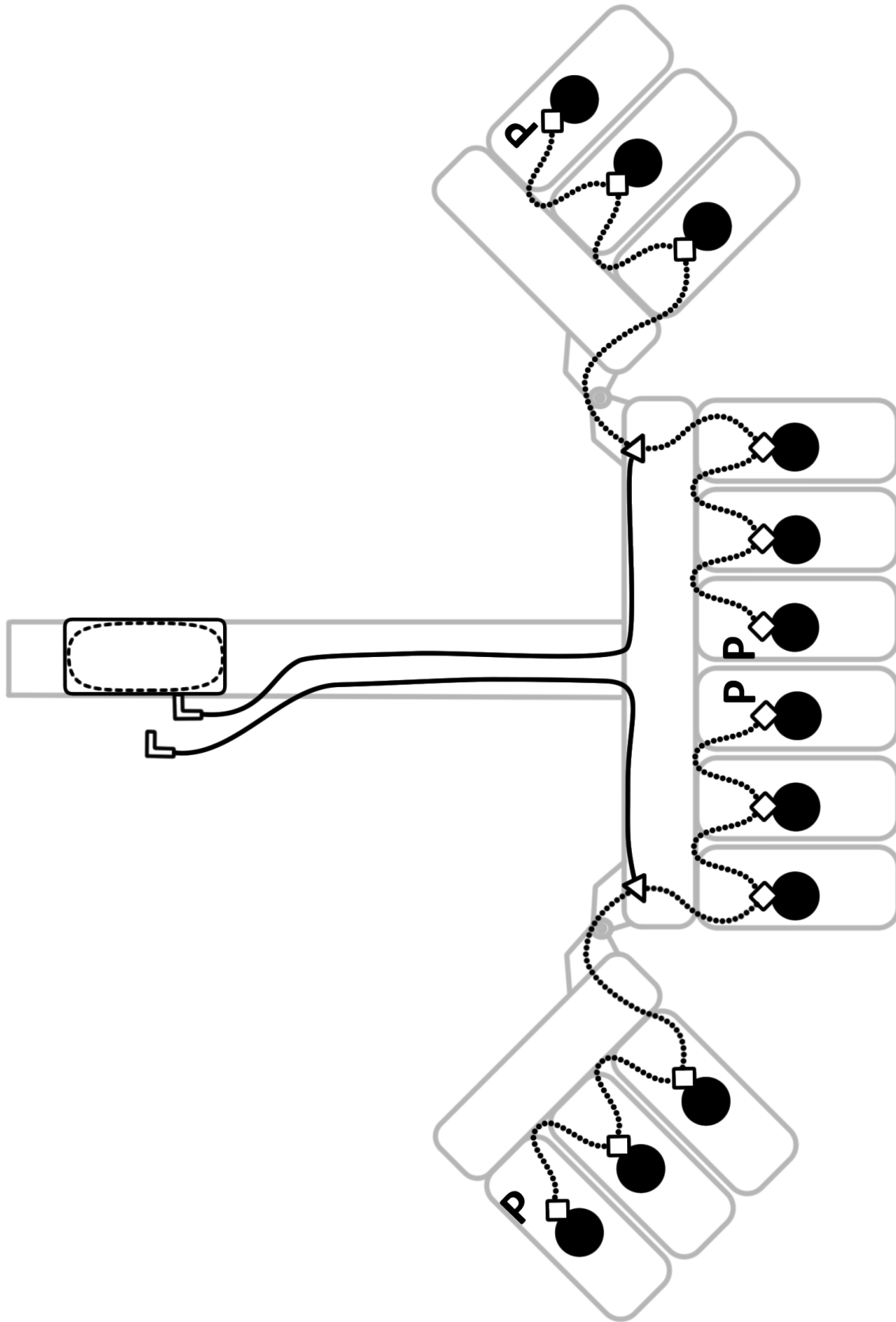
Row Configuration: 16 Row



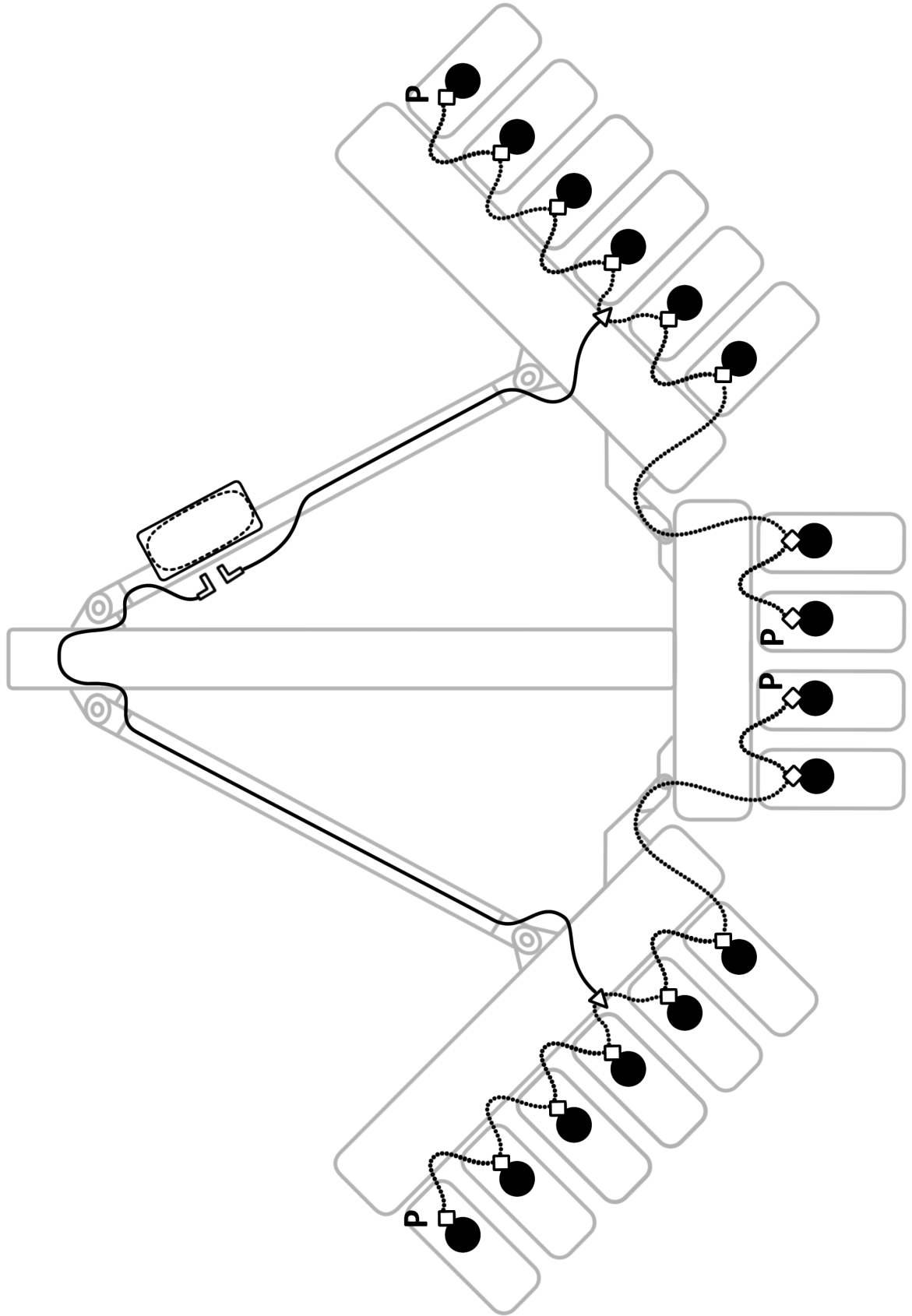
Row Configuration: 12 Row



Row Configuration: 12 Row

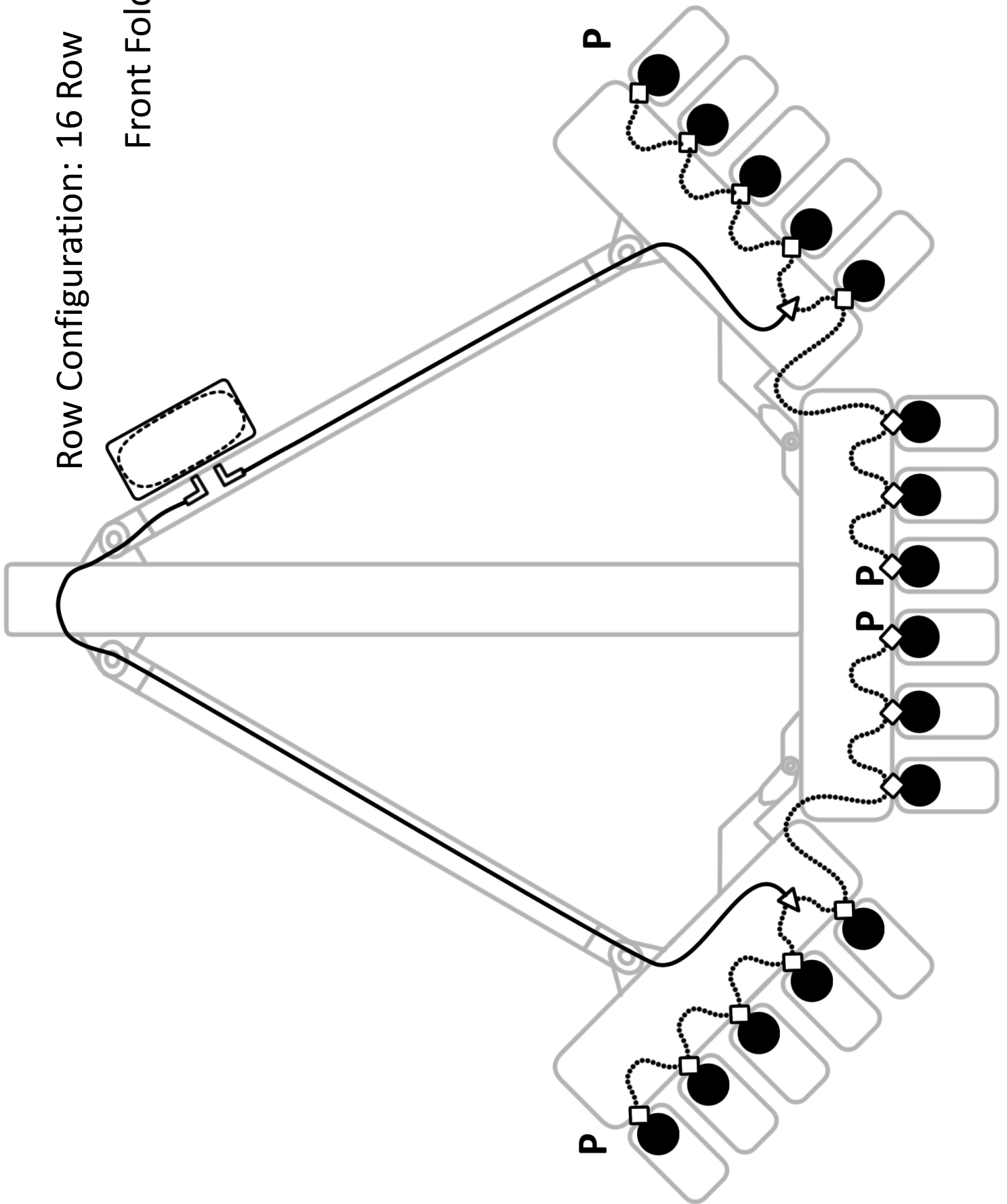


Row Configuration: 16 Row

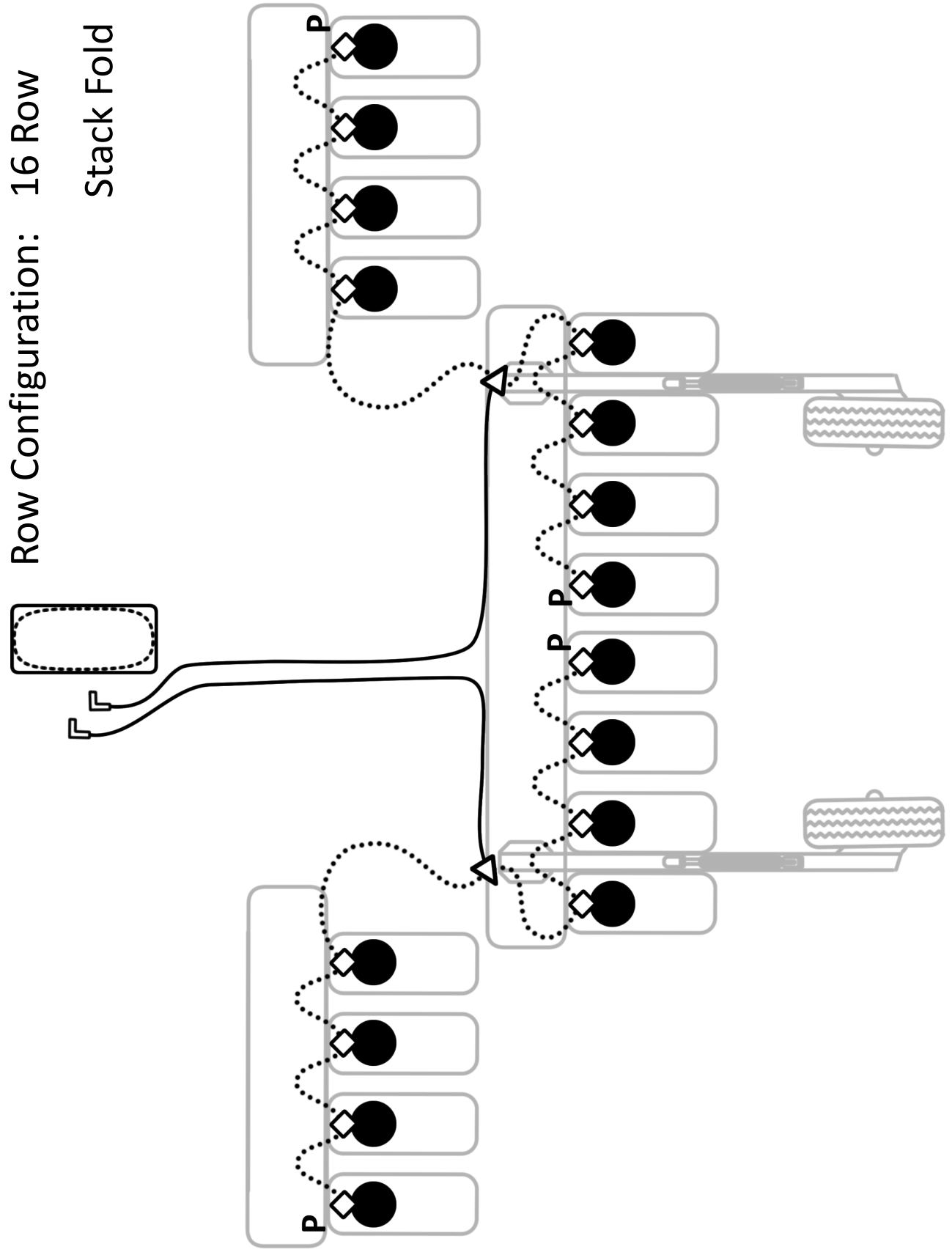


Row Configuration: 16 Row

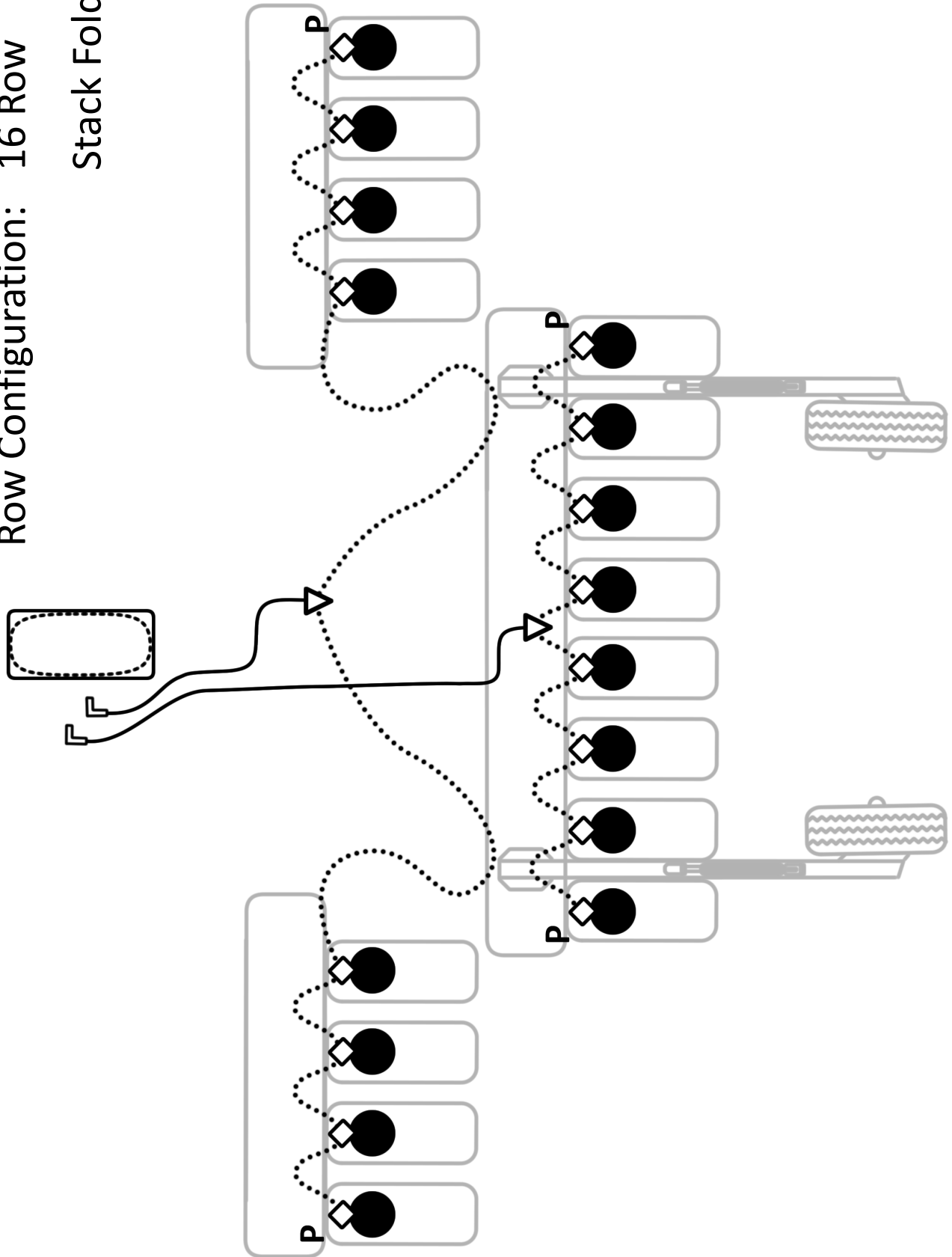
Front Fold



Row Configuration: 16 Row
Stack Fold



Row Configuration: 16 Row
Stack Fold



726285

LINES AND FITTINGS

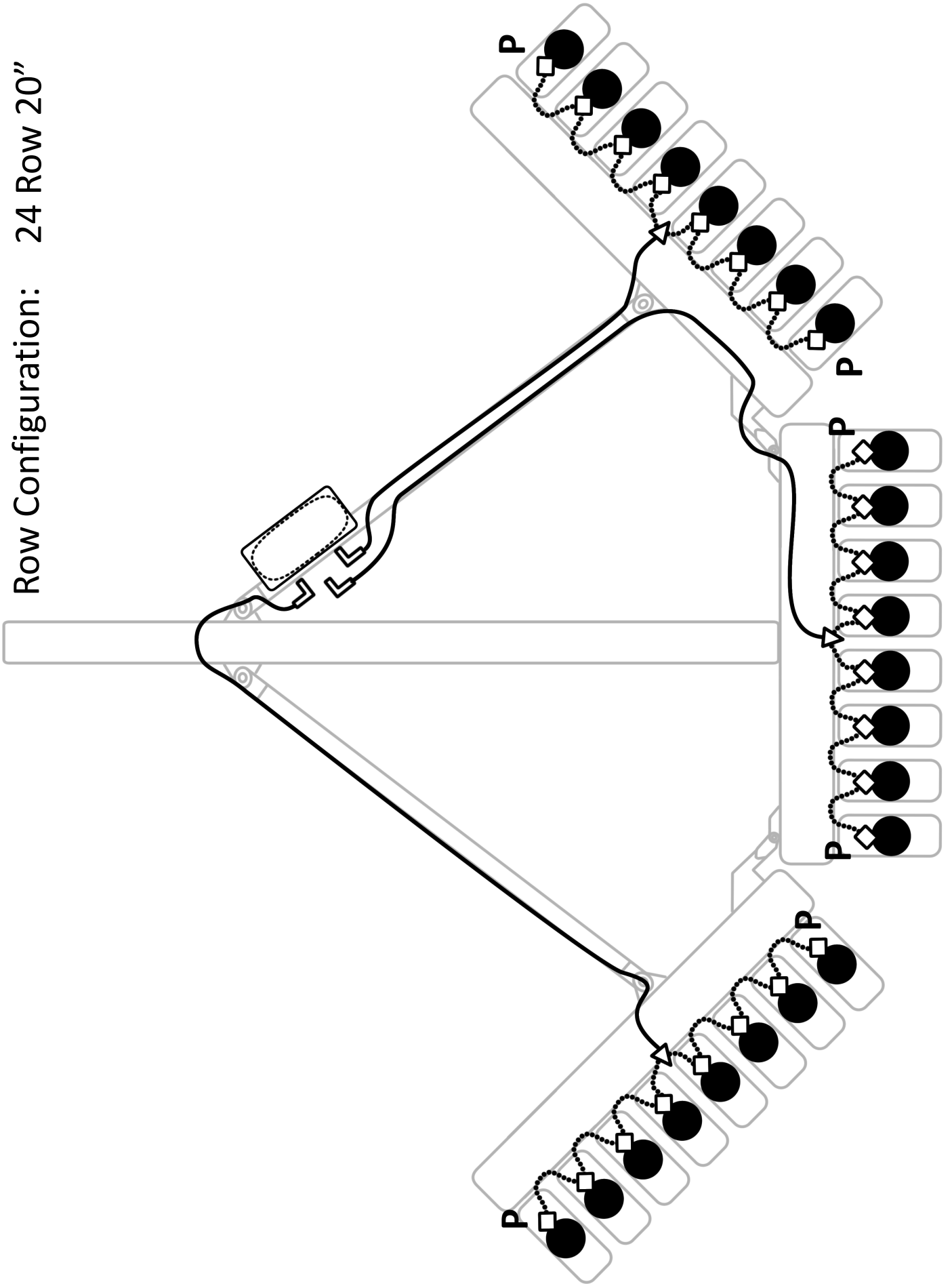
QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726474	TUBING	3/8 BLACK 150'	A
1	726322	TUBING	1/4 BLACK 100'	B
3	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
6	726103	PLUG	1/4 PTC	D
36	63128	TIE STRAPS	12" UV BLACK	E
3	726273	ELBOW	3/8 PTC	F
1	726104	PLUG	3/8 PTC	
6	900120	TIE STRAPS	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of down force air bags
E	Use as required to secure tubing
F	Use between fittings on rear of enclosure / pneumatic manifold and 3/8 tubing

LEGEND

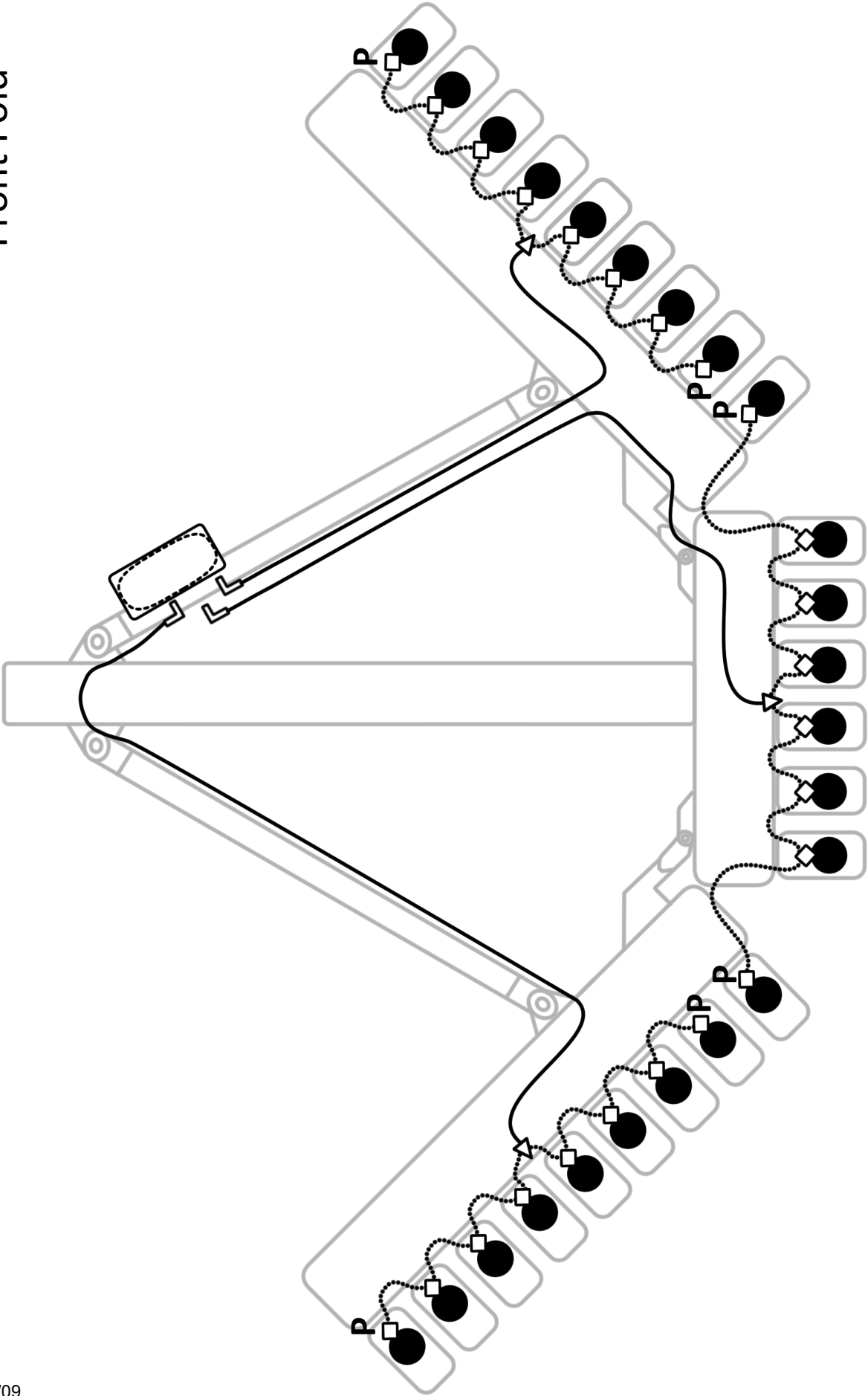
	Pneumatic Spring; Down or Lift
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee
	1/8" NPT X 1/4" PTC Tee
	1/4" Brass PTC Tee
	3/8" X 1/4" X 1/4" PTC Tee
	3/8" PTC Tee
	3/8" PTC 90° Elbow
	1/4" NPT Male X 3/8" PTC Straight
	80 cubic inch Lift Circuit Receiver tank
	PTC plug; 3/8" or 1/4"
	3/8" Line (Black or Red/Silver)
	1/4" Line (Black or Red/Silver)

Row Configuration: 24 Row 20"



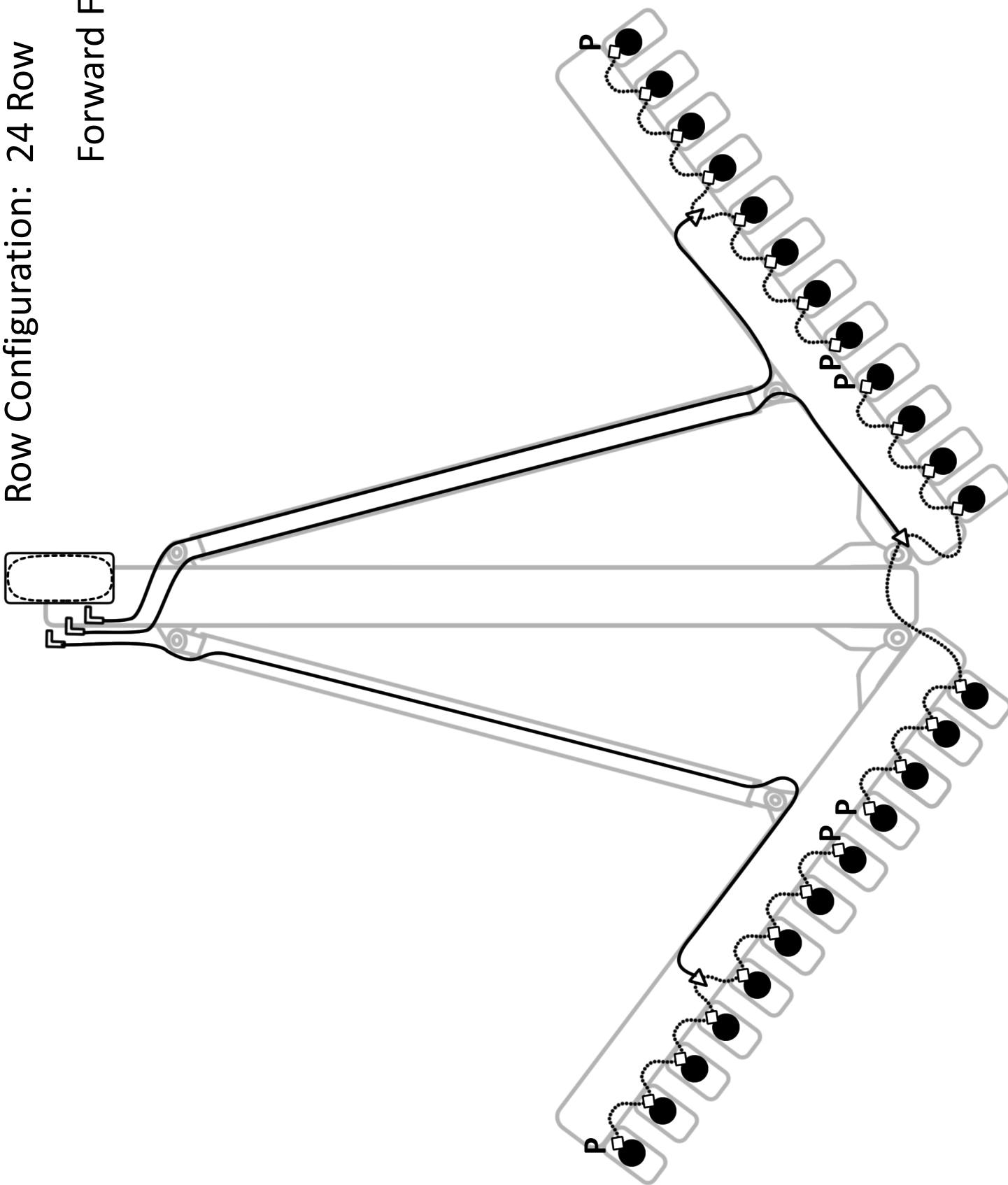
Row Configuration: 24 Row 30"

Front Fold



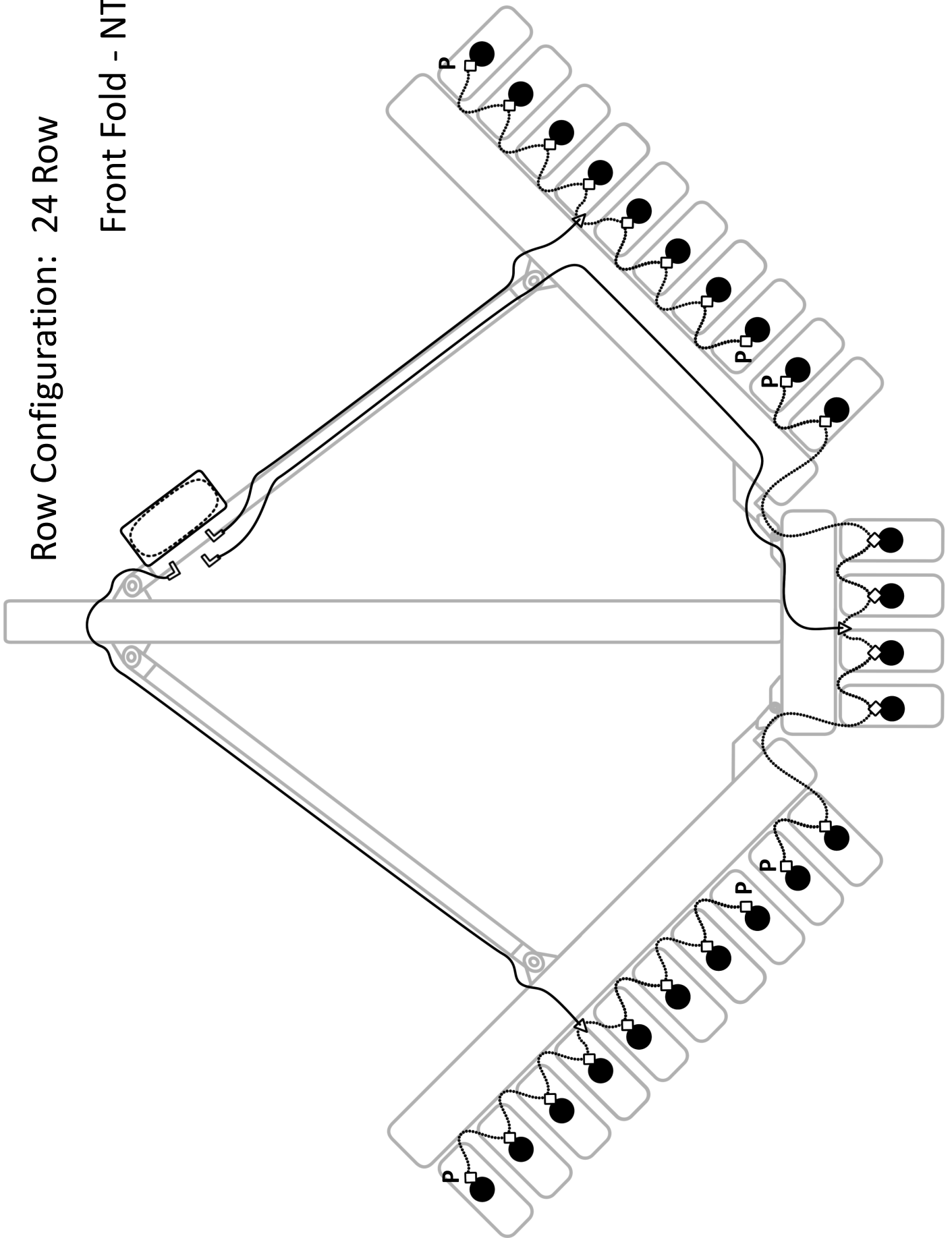
Row Configuration: 24 Row

Forward Fold



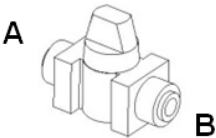
Row Configuration: 24 Row

Front Fold - NT

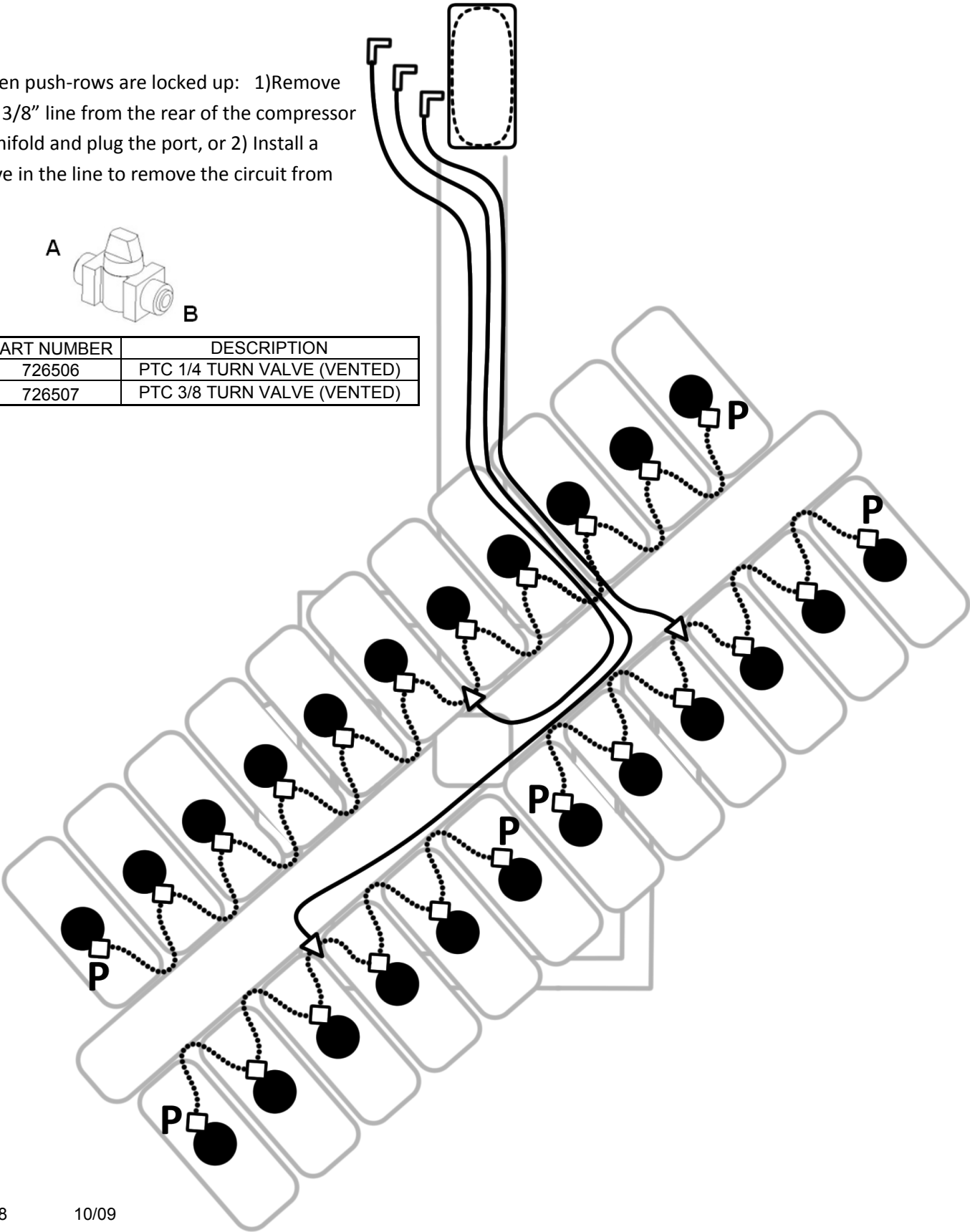


Row Configuration: 12/23-24 Row Lift & Twist

When push-rows are locked up: 1)Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to remove the circuit from

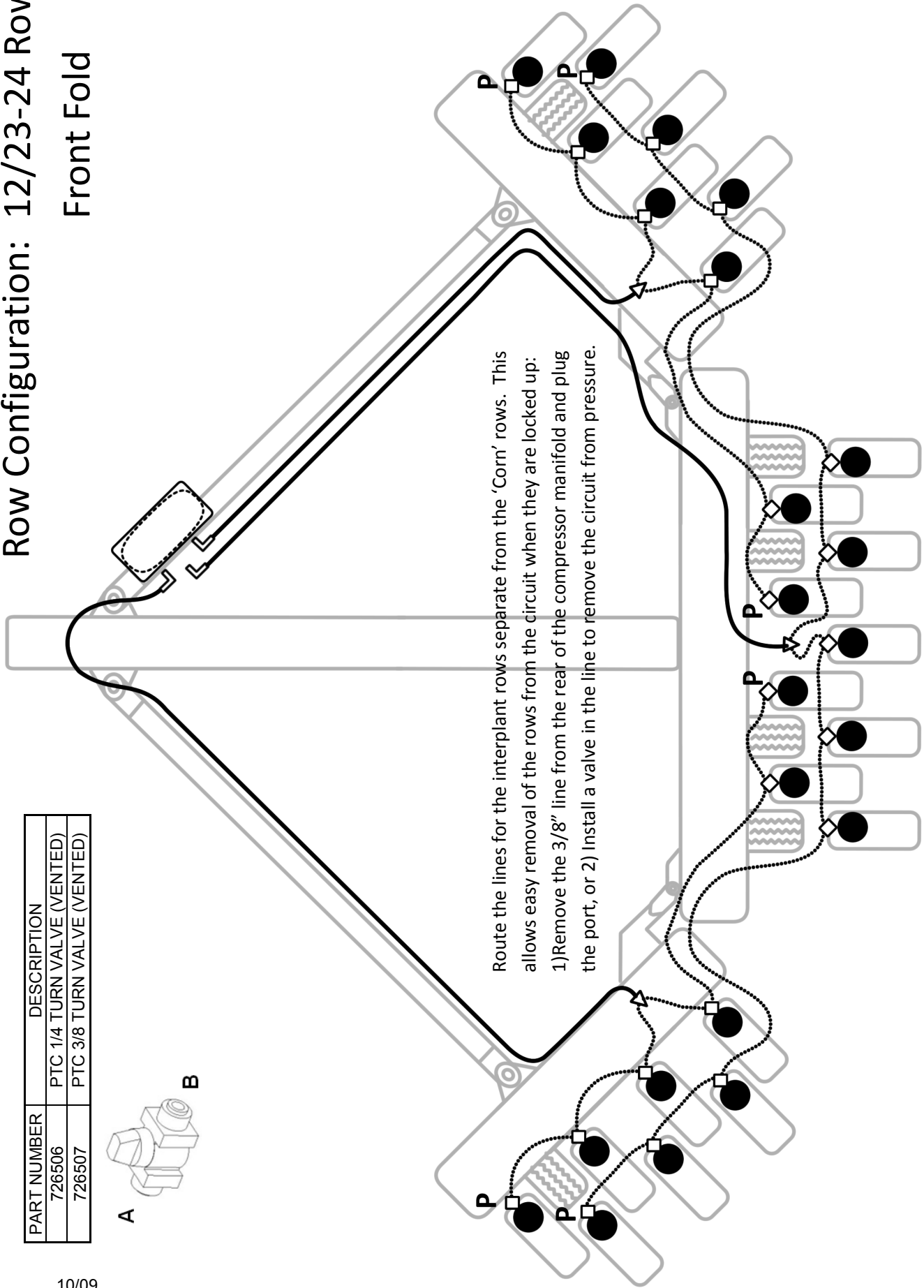
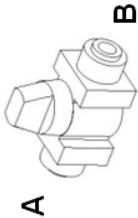


PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



Row Configuration: 12/23-24 Row
Front Fold

PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



726290

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726474	TUBING	3/8 BLACK 150'	A
1	726323	TUBING	1/4 BLACK 150'	B
3	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
6	726103	PLUG	1/4 PTC	D
36	63128	TIE STRAPS	12" UV BLACK	E
3	726273	ELBOW	3/8 PTC	F
1	726104	PLUG	3/8 PTC	
6	900120	TIE STRAPS	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of down force air bags
E	Use as required to secure tubing
F	Use between fittings on rear of enclosure / pneumatic manifold and 3/8 tubing

LEGEND

	Pneumatic Spring; Down or Lift
	1/8"NPT X 1/4" X 1/4" Brass PTC Tee
	1/8"NPT X 1/4" PTC Tee
	1/4" Brass PTC Tee
	3/8" X 1/4" X 1/4" PTC Tee
	3/8" PTC Tee
	3/8" PTC 90° Elbow
	1/4" NPT Male X 3/8" PTC Straight
	80 cubic inch Lift Circuit Receiver tank
	PTC plug; 3/8" or 1/4"
	3/8" Line (Black or Red/Silver)
	1/4" Line (Black or Red/Silver)

Plumbing Installation



This process should be done with the planter raised, half folded for transport, and the row units fully extended down.

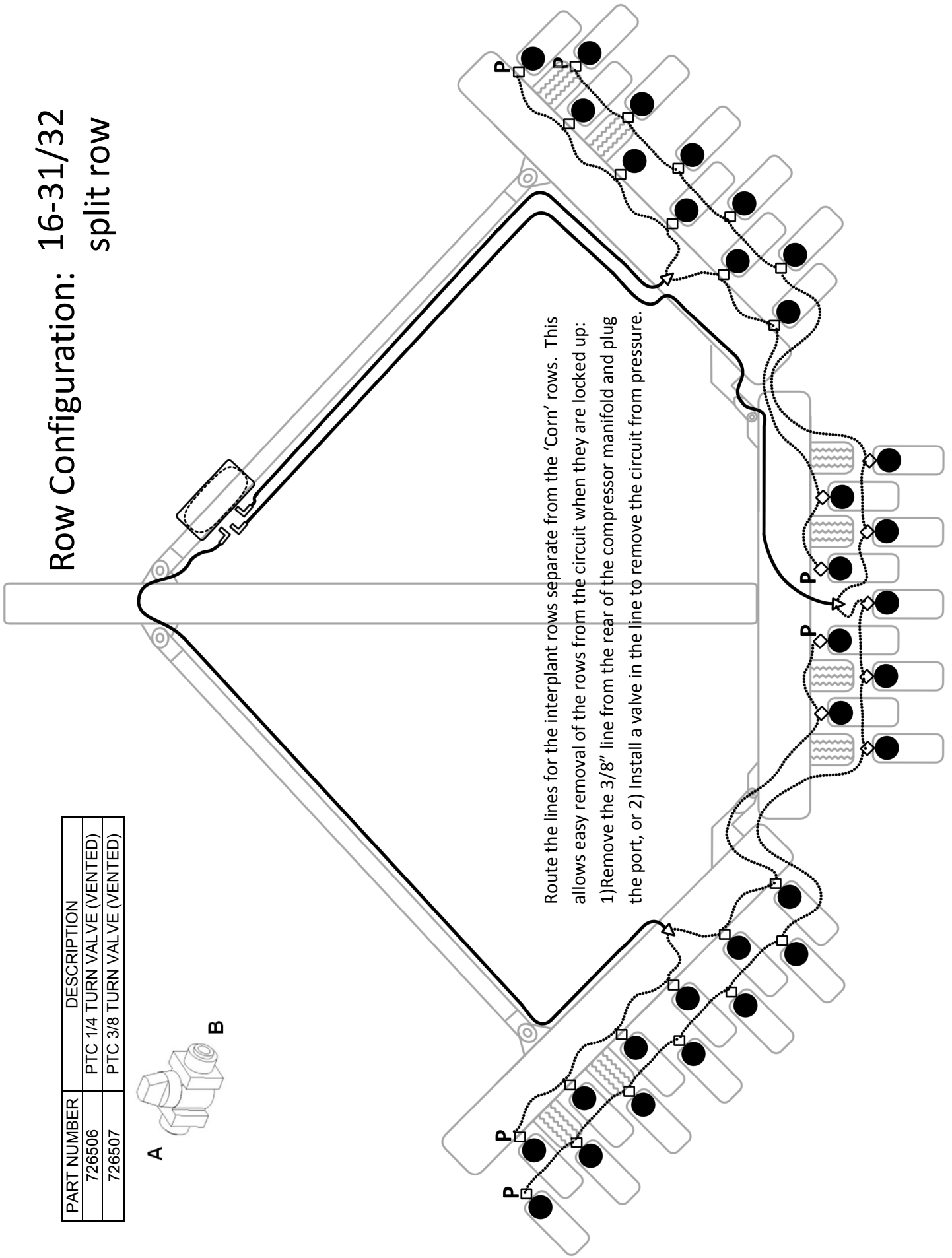
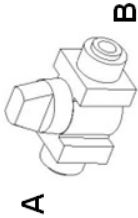
The following pages contain images of suggested methods of routing the air lines for your new 20/20 Air-Force. Due to the wide variety of planter/row unit configurations and accessories available, you should adapt the installation as necessary for your planter. The primary concern is the security of the lines themselves. The lines should be fastened to the planter in a manner that allows full range of motion/clearance of the row unit. Special caution should be taken around rows at break or fold points of the planter as it

- ◆ The supplied fittings should have pre-existing thread sealant - ready to install - for ease of installment. Always use Thread Tape when installing air fittings that do not have this
- ◆ Black Tubing - used for the Down Force Circuit
- ◆ Red / Silver Tubing - used for the Lift Force Circuit
- ◆ 3/8" lines (Black or Red/Silver) - used for the main line **from** the Compressor Module **to** groups of rows, usually on the main draw bar of the planter
- ◆ 1/4" lines (Black or Red/Silver) - used **from** the main line **to** and **between** the individual row unit Air Bags
- ◆ Secure the Air Lines using the supplied zip tie-straps - do not pinch the line closed when cinching tight
- ◆ The 1/4" lines should be routed back to and secured to the main bar or to existing bundles of wires/hoses of the planter between row units
- ◆ Most 30" row configurations should need between 34 to 42 inches of 1/4" line between Down Force Air Bags. **Do not** pre-cut the line, measure lay-out each length individually.
- ◆ Lift Circuit kits containing 1 extra brass 1/4" PTC Tee per row will require lengths of the 1/4" line from the connector on top of the Lift Bag to the 1/4"PTC Tee placed on the main Draw Bar.
- ◆ All Lift Circuits will require the use of one or multiple 80 cubic inch Air Receiver Assem-

After completion of the **FIRST** row and **PRIOR** to continuing to other rows, check for clearance of, and lack of pinch points on all lines and fittings. This should be done by completely raising and lowering the

Row Configuration: 16-31/32 split row

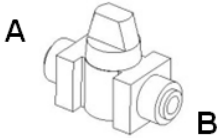
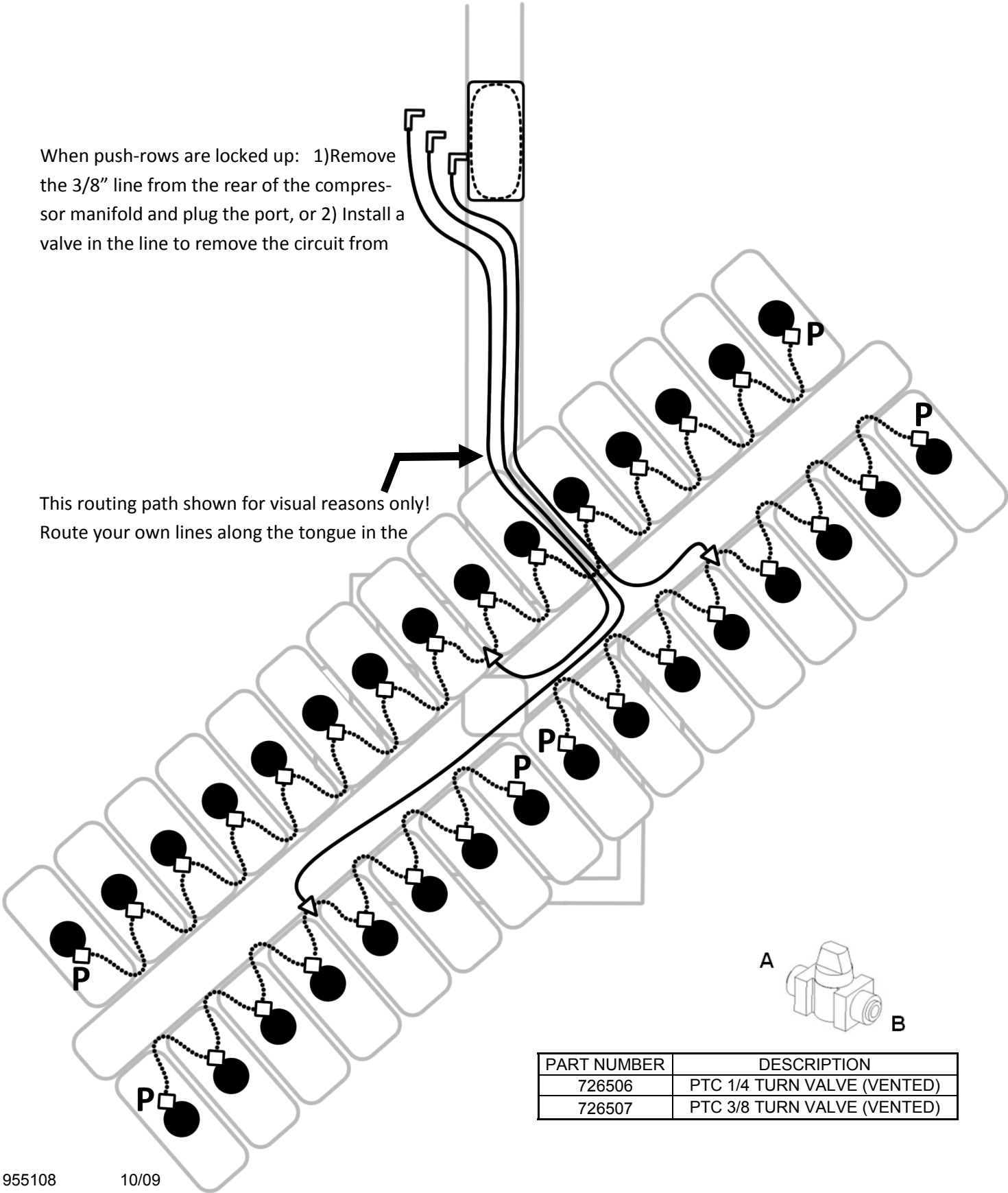
PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



Row Configuration: 16-31/32 split row

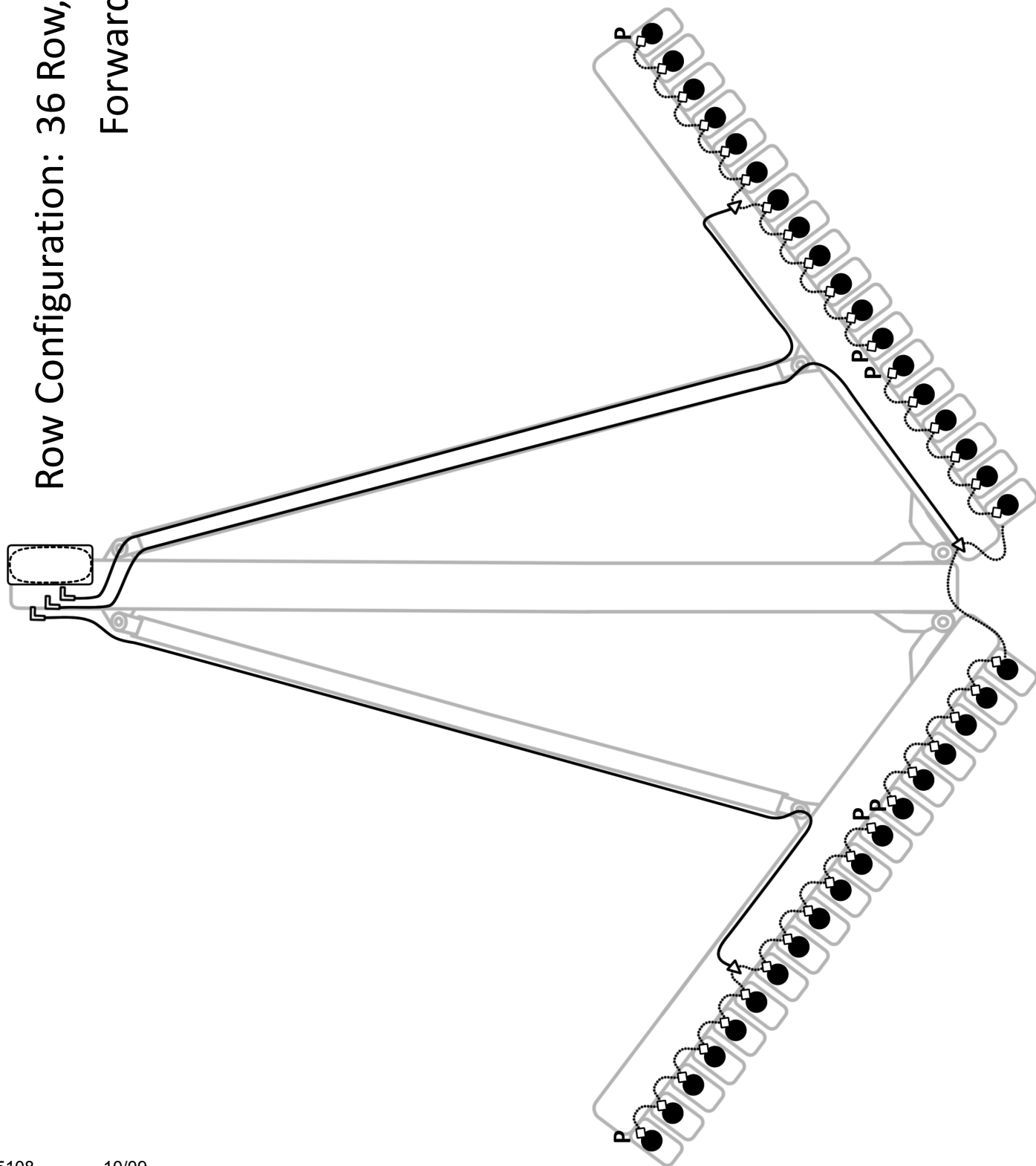
When push-rows are locked up: 1)Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to remove the circuit from

This routing path shown for visual reasons only!
Route your own lines along the tongue in the



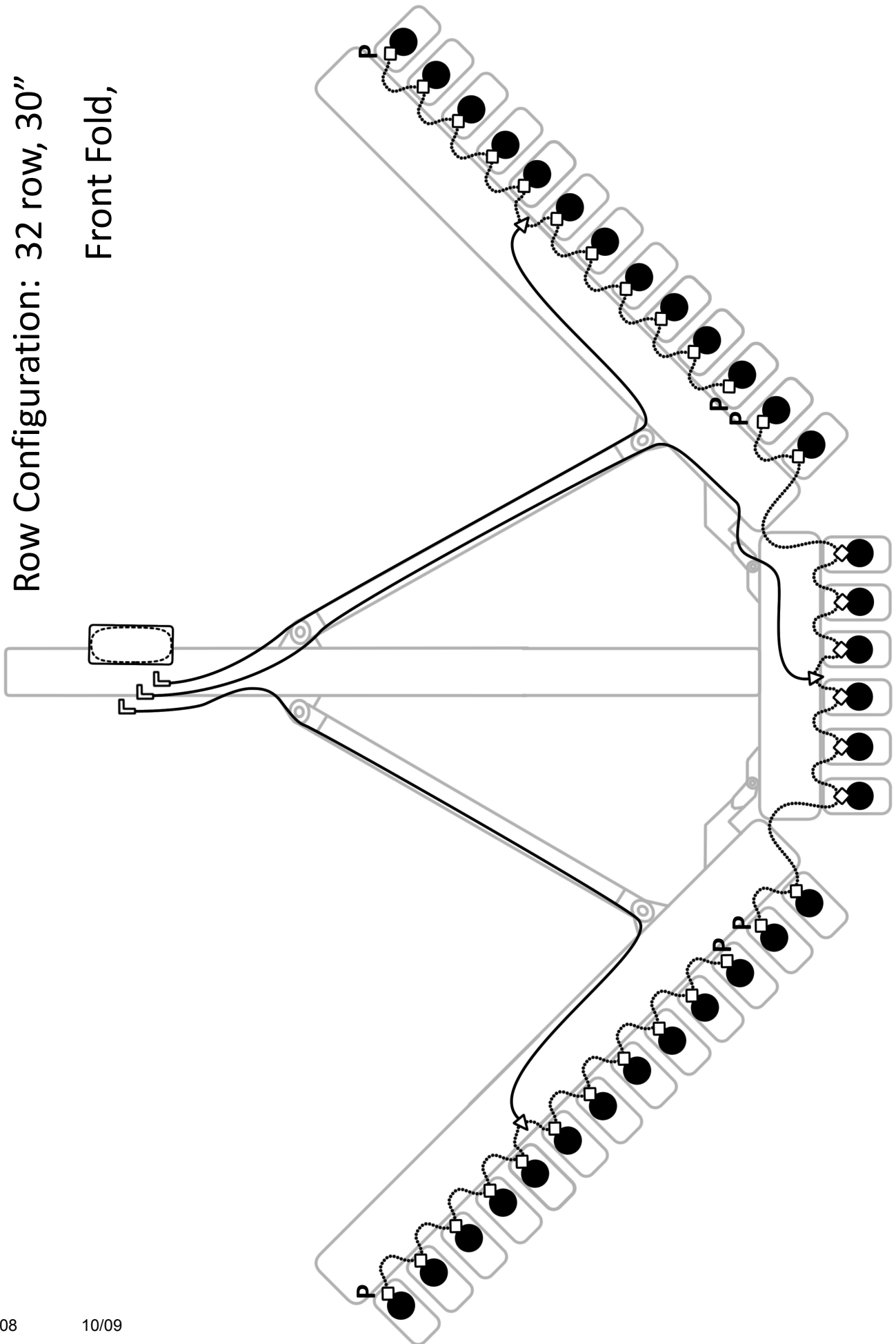
PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)

Row Configuration: 36 Row, any spacing
Forward Fold

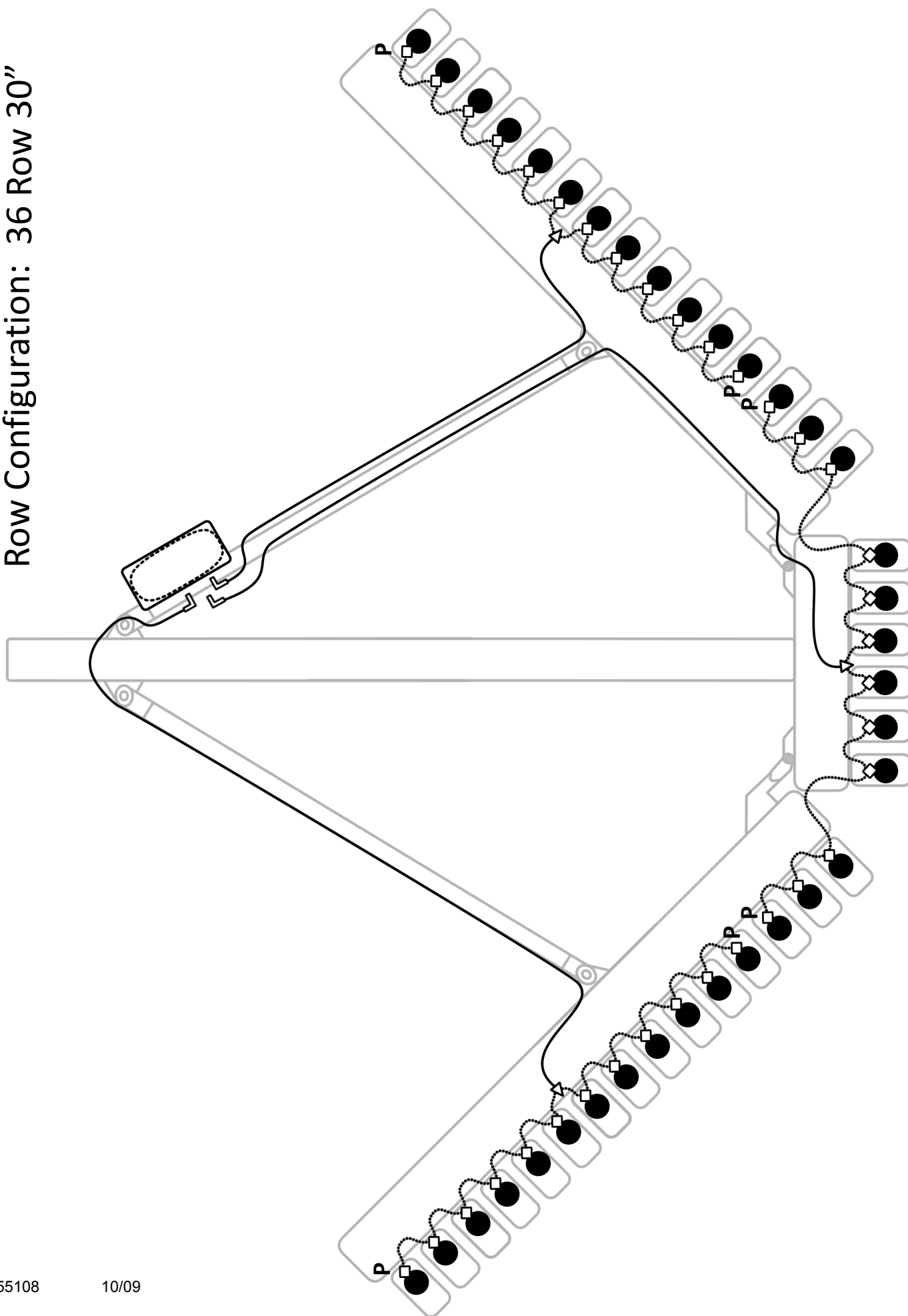


Row Configuration: 32 row, 30"

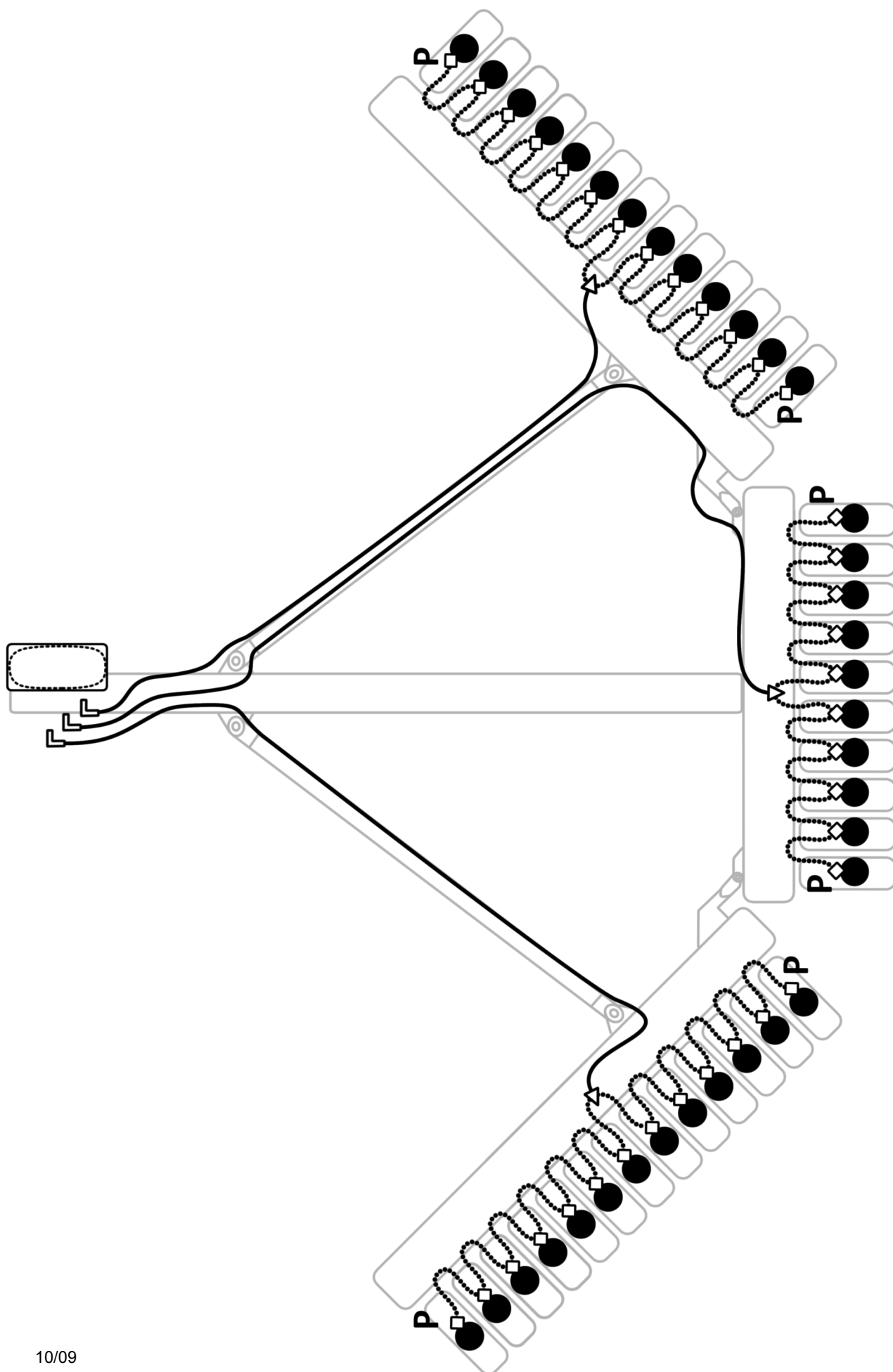
Front Fold,



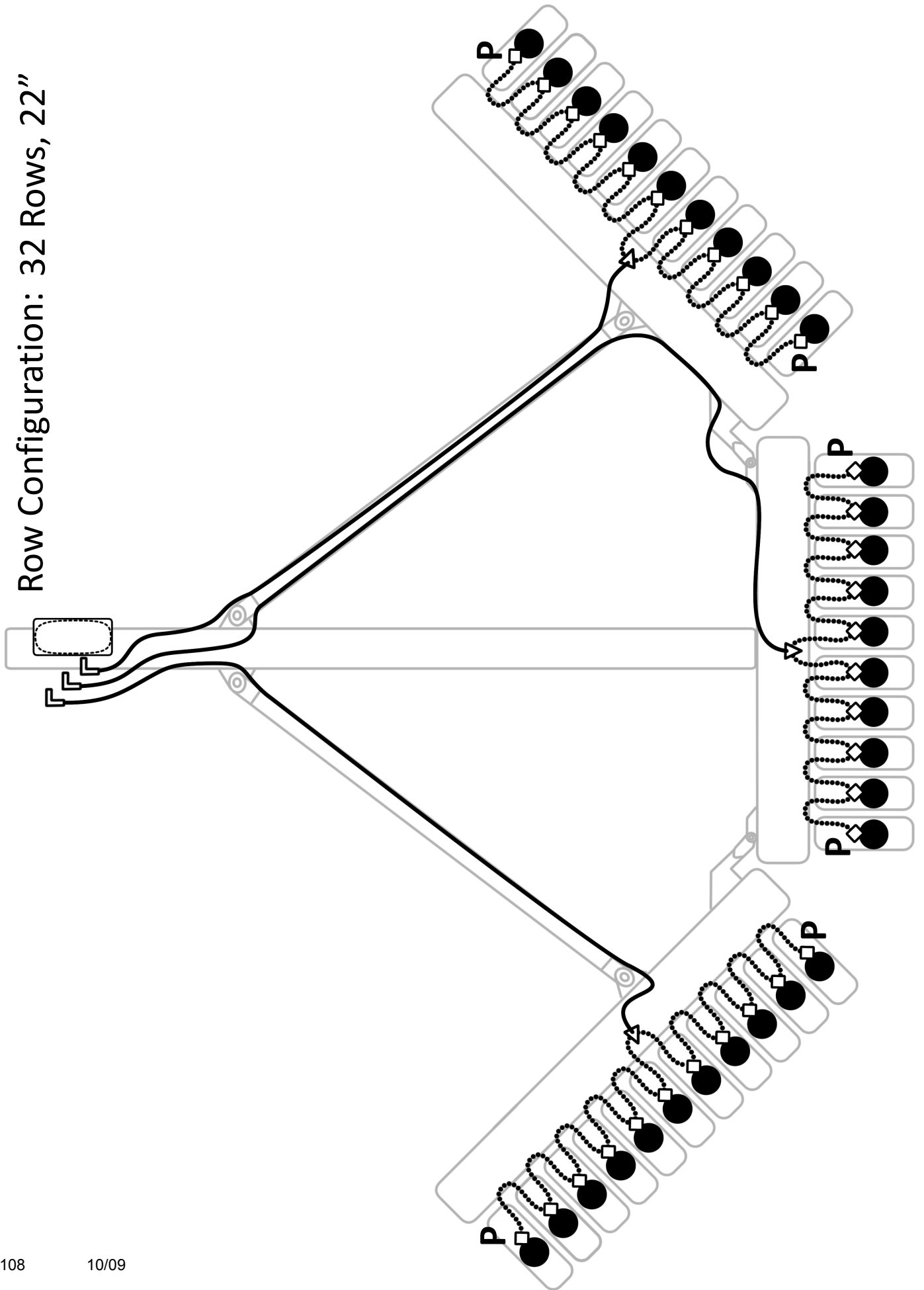
Row Configuration: 36 Row 30"



Row Configuration: 36 Row 20" or 22"



Row Configuration: 32 Rows, 22"



726295

LINES AND FITTINGS

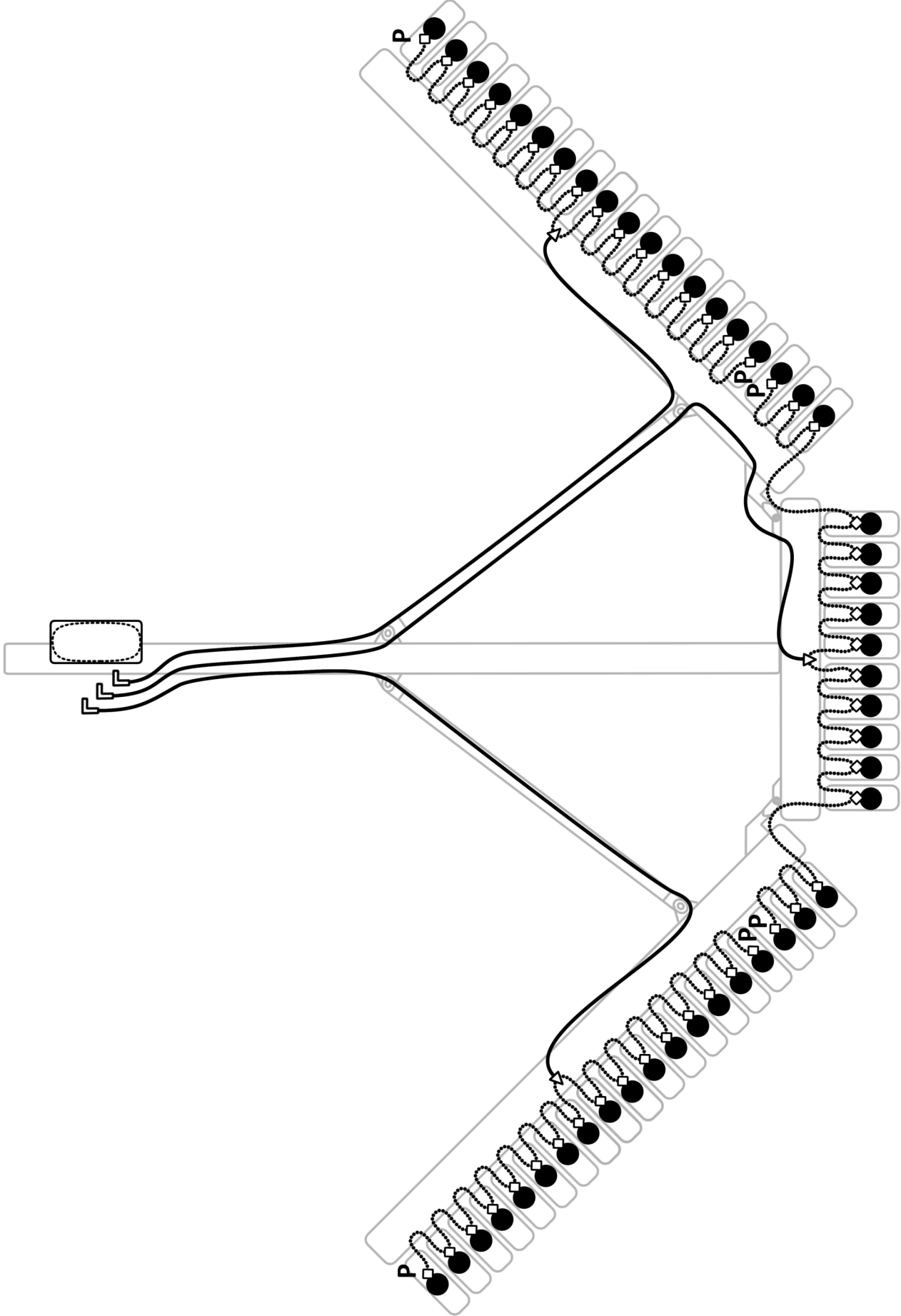
QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726474	TUBING	3/8 BLACK 150'	A
1	726324	TUBING	1/4 BLACK 200'	B
3	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
6	726103	PLUG	1/4 PTC	D
48	63128	TIE STRAPS	12" UV BLACK	E
3	726273	ELBOW	3/8 PTC	F
1	726104	PLUG	3/8 PTC	
6	900120	TIE STRAPS	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of down force air bags
E	Use as required to secure tubing
F	Use between fittings on rear of enclosure / pneumatic manifold and 3/8 tubing

LEGEND

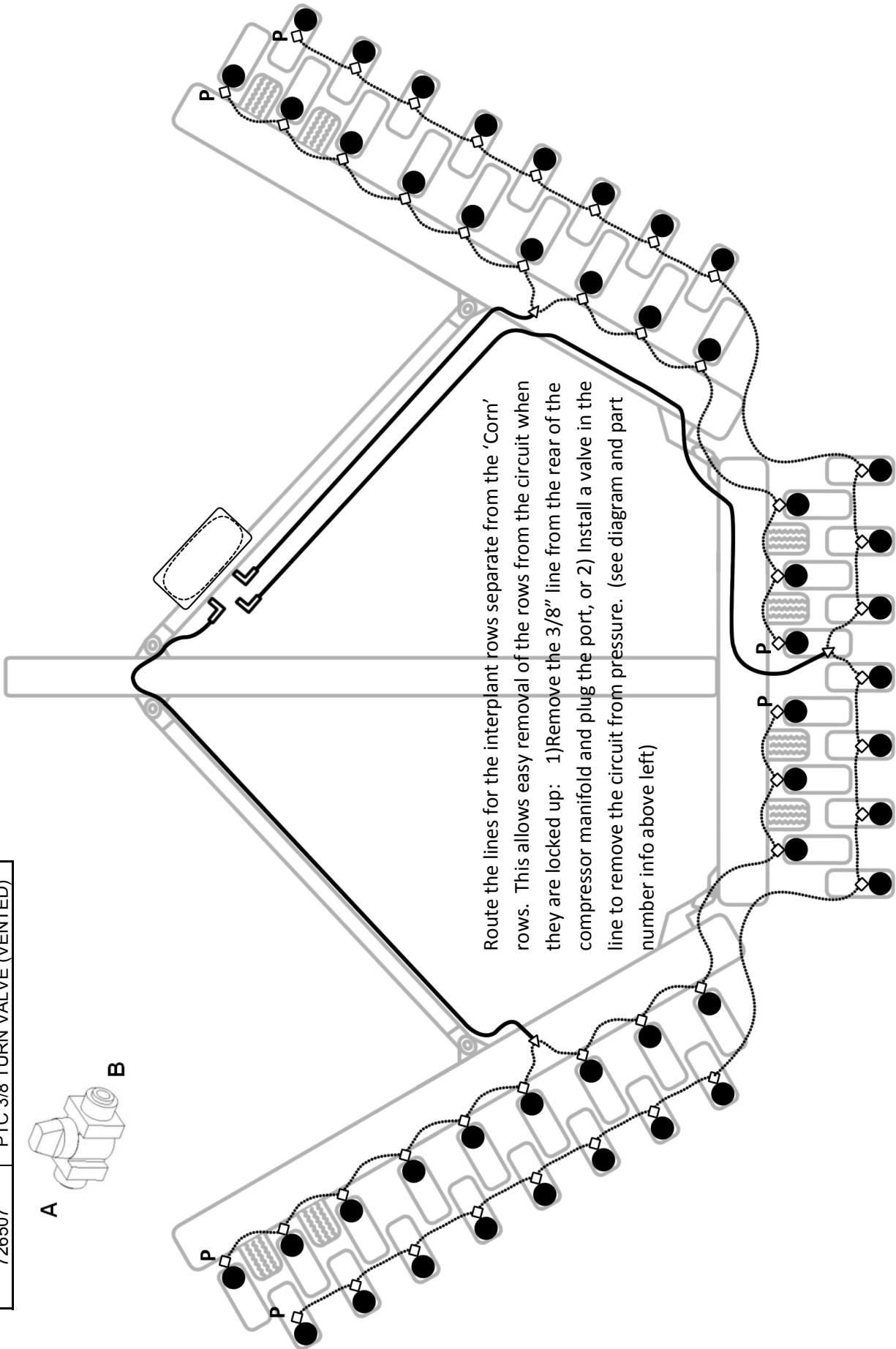
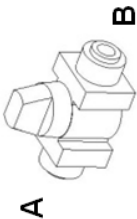
	Pneumatic Spring; Down or Lift
	1/8"NPT X 1/4" X 1/4" Brass PTC Tee
	1/8"NPT X 1/4" PTC Tee
	1/4" Brass PTC Tee
	3/8" X 1/4" X 1/4" PTC Tee
	3/8" PTC Tee
	3/8" PTC 90° Elbow
	1/4" NPT Male X 3/8" PTC Straight
	80 cubic inch Lift Circuit Receiver tank
	PTC plug; 3/8" or 1/4"
	3/8" Line (Black or Red/Silver)
	1/4" Line (Black or Red/Silver)

Row Configuration: 48+ row, any spacing



Row Configuration: 47Row, Split Row

PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



Route the lines for the interplant rows separate from the 'Corn' rows. This allows easy removal of the rows from the circuit when they are locked up: 1) Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to remove the circuit from pressure. (see diagram and part number info above left)

726300

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726326	TUBING	3/8 RED 25'	A
1	726314	TUBING	1/4 RED 50'	B
1	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
2	726103	PLUG	1/4 PTC	D
12	63128	TIE STRAP	12" UV BLACK	E
1	726617	RECEIVER	80 CUBIC INCH, LIFT	F
2	63461	TIE STRAP	31.5" UV BLACK	F
2	726110	ELBOW	1/4" NPT x 3/8 PTC SWIVEL 90	F
1	726273	ELBOW	3/8 PTC	A
3	726104	PLUG	3/8 PTC	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of lift air bags
E	Use as required to secure tubing
F	Fittings to be installed into reservoir during installation, large tie straps secure receiver to any available structural element of planter

LEGEND

	Pneumatic Spring; Down or Lift
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee
	1/8" NPT X 1/4" PTC Tee
	1/4" Brass PTC Tee
	3/8" X 1/4" X 1/4" PTC Tee
	3/8" PTC Tee
	3/8" PTC 90° Elbow
	1/4" NPT Male X 3/8" PTC Straight
	80 cubic inch Lift Circuit Receiver tank
	PTC plug; 3/8" or 1/4"
	3/8" Line (Black or Red/Silver)
	1/4" Line (Black or Red/Silver)

Plumbing Installation



This process should be done with the planter raised, half folded for transport, and the row units fully extended down.

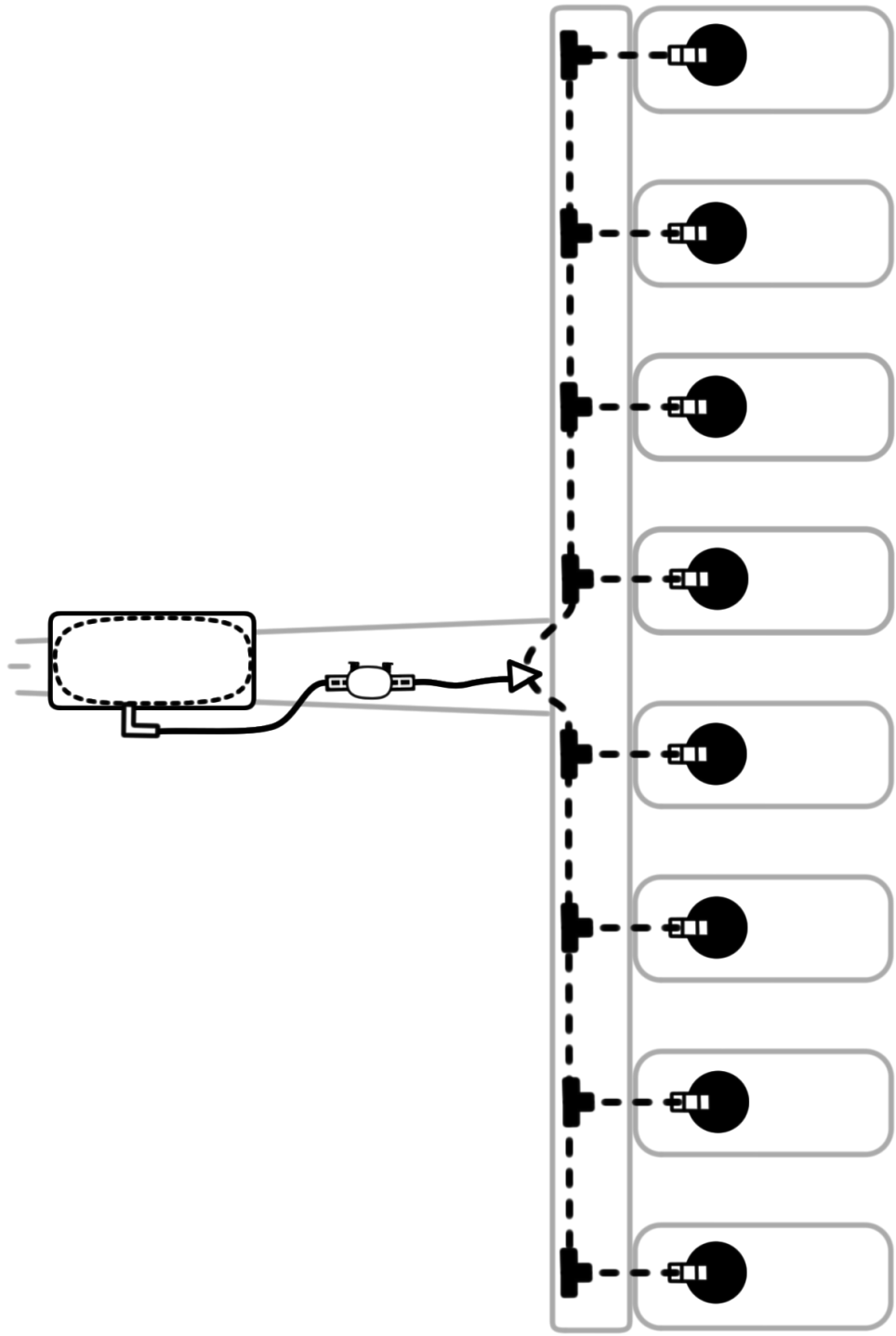
The following pages contain images of suggested methods of routing the air lines for your new 20/20 Air-Force. Due to the wide variety of planter/row unit configurations and accessories available, you should adapt the installation as necessary for your planter. The primary concern is the security of the lines themselves. The lines should be fastened to the planter in a manner that allows full range of motion/clearance of the row unit. Special caution should be taken around rows at break or fold points of the planter as it

- ◆ The supplied fittings should have pre-existing thread sealant - ready to install - for ease of installment. Always use Thread Tape when installing air fittings that do not have this
- ◆ Black Tubing - used for the Down Force Circuit
- ◆ Red / Silver Tubing - used for the Lift Force Circuit
- ◆ 3/8" lines (Black or Red/Silver) - used for the main line **from** the Compressor Module **to** groups of rows, usually on the main draw bar of the planter
- ◆ 1/4" lines (Black or Red/Silver) - used **from** the main line **to** and **between** the individual row unit Air Bags
- ◆ Secure the Air Lines using the supplied zip tie-straps - do not pinch the line closed when cinching tight
- ◆ The 1/4" lines should be routed back to and secured to the main bar or to existing bundles of wires/hoses of the planter between row units
- ◆ Most 30" row configurations should need between 34 to 42 inches of 1/4" line between Down Force Air Bags. **Do not** pre-cut the line, measure lay-out each length individually.
- ◆ Lift Circuit kits containing 1 extra brass 1/4" PTC Tee per row will require lengths of the 1/4" line from the connector on top of the Lift Bag to the 1/4" PTC Tee placed on the main Draw Bar.
- ◆ All Lift Circuits will require the use of one or multiple 80 cubic inch Air Receiver Assem-

After completion of the **FIRST** row and **PRIOR** to continuing to other rows, check for clearance of, and lack of pinch points on all lines and fittings. This should be done by completely raising and lowering the

Row Configuration: 8 Row, any spacing

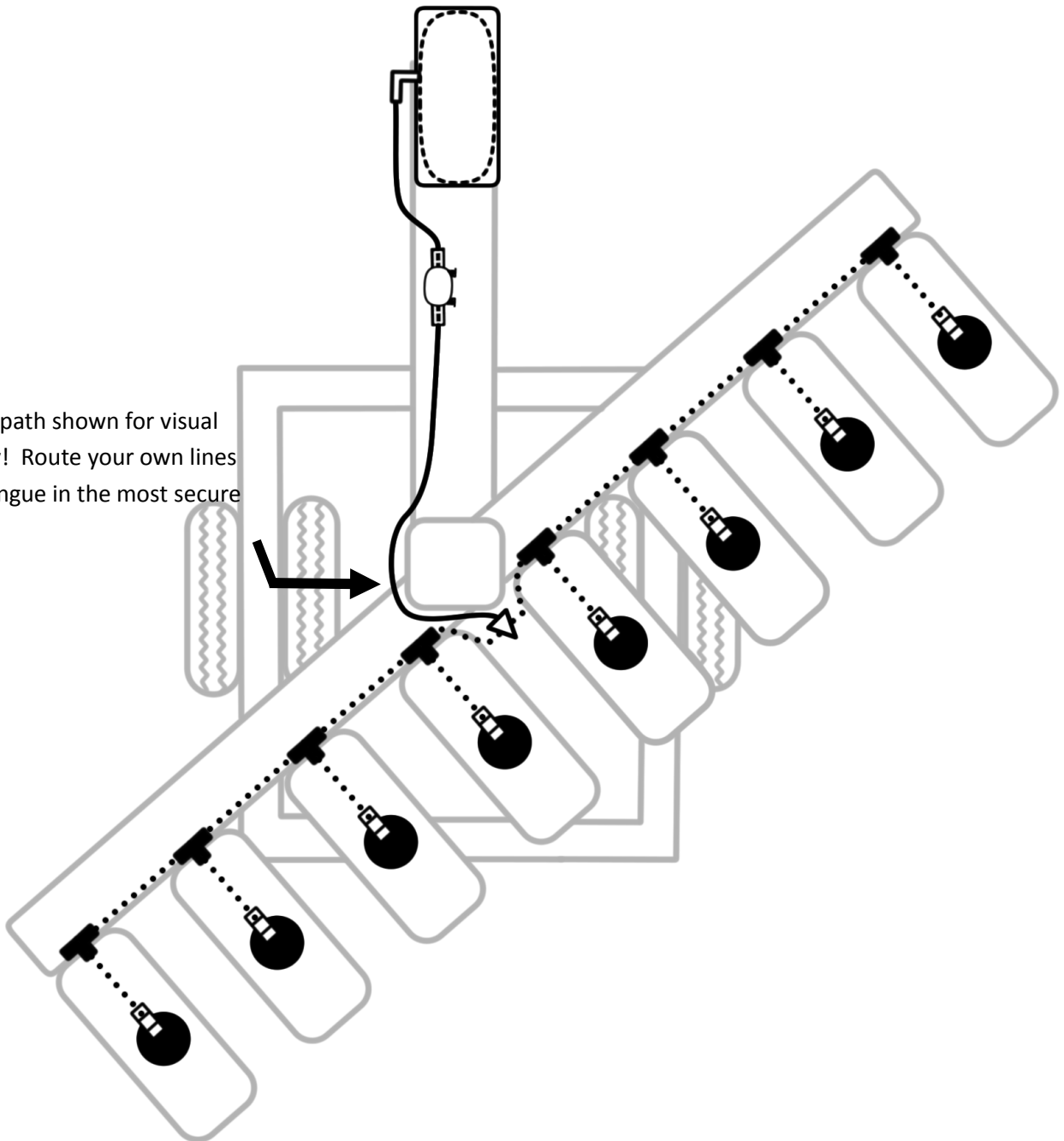
N/A



Row Configuration: 8 Row, any spacing

Lift & Twist

This routing path shown for visual reasons only! Route your own lines along the tongue in the most secure



726305

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726327	TUBING	3/8 RED 50'	A
1	726316	TUBING	1/4 RED 100'	B
2	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
4	726103	PLUG	1/4 PTC	D
24	63128	TIE STRAP	12" UV BLACK	E
2	726617	RECEIVER	80 CUBIC INCH, LIFT	F
4	63461	TIE STRAP	31.5" UV BLACK	F
4	726110	ELBOW	1/4" NPT x 3/8 PTC SWIVEL 90	F
1	726116	TEE	3/8 PTC	A
1	726273	ELBOW	3/8 PTC	A
3	726104	PLUG	3/8 PTC	
6	900120	TIE STRAP	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of lift air bags
E	Use as required to secure tubing
F	Fittings to be installed into reservoir during installation, large tie straps secure receiver to any available structural element of planter

LEGEND

	Pneumatic Spring; Down or Lift		3/8" PTC 90° Elbow
	1/8"NPT X 1/4" X 1/4" Brass PTC Tee		1/4" NPT Male X 3/8" PTC Straight
	1/8"NPT X 1/4" PTC Tee		80 cubic inch Lift Circuit Receiver tank
	1/4" Brass PTC Tee		PTC plug; 3/8" or 1/4"
	3/8" X 1/4" X 1/4" PTC Tee		3/8" Line (Black or Red/Silver)
	3/8" PTC Tee		1/4" Line (Black or Red/Silver)

Plumbing Installation



This process should be done with the planter raised, half folded for transport, and the row units fully extended down.

The following pages contain images of suggested methods of routing the air lines for your new 20/20 Air-Force. Due to the wide variety of planter/row unit configurations and accessories available, you should adapt the installation as necessary for your planter. The primary concern is the security of the lines themselves. The lines should be fastened to the planter in a manner that allows full range of motion/clearance of the row unit. Special caution should be taken around rows at break or fold points of the planter as it

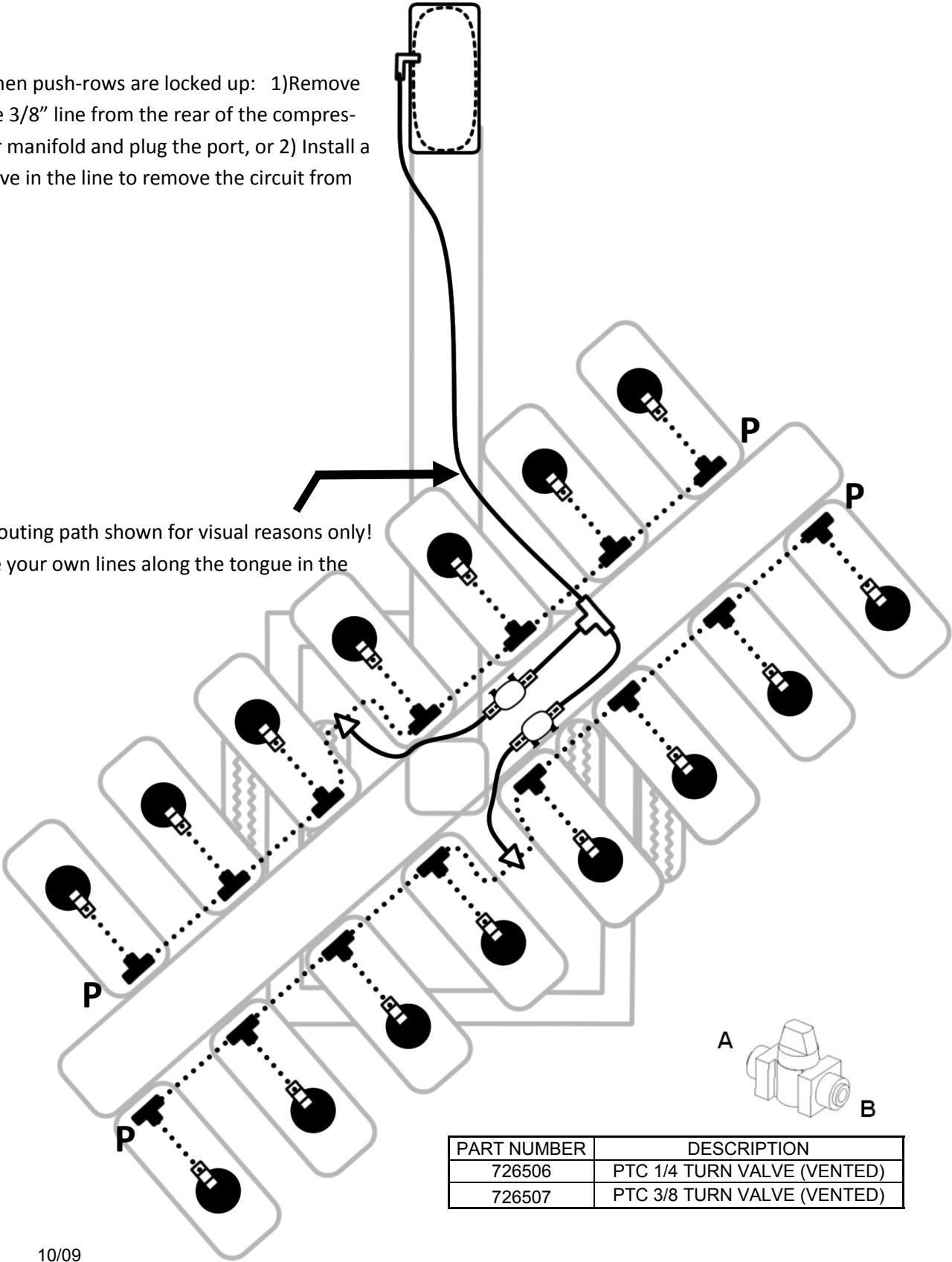
- ◆ The supplied fittings should have pre-existing thread sealant - ready to install - for ease of installment. Always use Thread Tape when installing air fittings that do not have this
- ◆ Black Tubing - used for the Down Force Circuit
- ◆ Red / Silver Tubing - used for the Lift Force Circuit
- ◆ 3/8" lines (Black or Red/Silver) - used for the main line **from** the Compressor Module **to** groups of rows, usually on the main draw bar of the planter
- ◆ 1/4" lines (Black or Red/Silver) - used **from** the main line **to** and **between** the individual row unit Air Bags
- ◆ Secure the Air Lines using the supplied zip tie-straps - do not pinch the line closed when cinching tight
- ◆ The 1/4" lines should be routed back to and secured to the main bar or to existing bundles of wires/hoses of the planter between row units
- ◆ Most 30" row configurations should need between 34 to 42 inches of 1/4" line between Down Force Air Bags. **Do not** pre-cut the line, measure lay-out each length individually.
- ◆ Lift Circuit kits containing 1 extra brass 1/4" PTC Tee per row will require lengths of the 1/4" line from the connector on top of the Lift Bag to the 1/4" PTC Tee placed on the main Draw Bar.
- ◆ All Lift Circuits will require the use of one or multiple 80 cubic inch Air Receiver Assem-

After completion of the **FIRST** row and **PRIOR** to continuing to other rows, check for clearance of, and lack of pinch points on all lines and fittings. This should be done by completely raising and lowering the

Row Configuration: 8-15/16 Row Lift & Twist

When push-rows are locked up: 1)Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to remove the circuit from

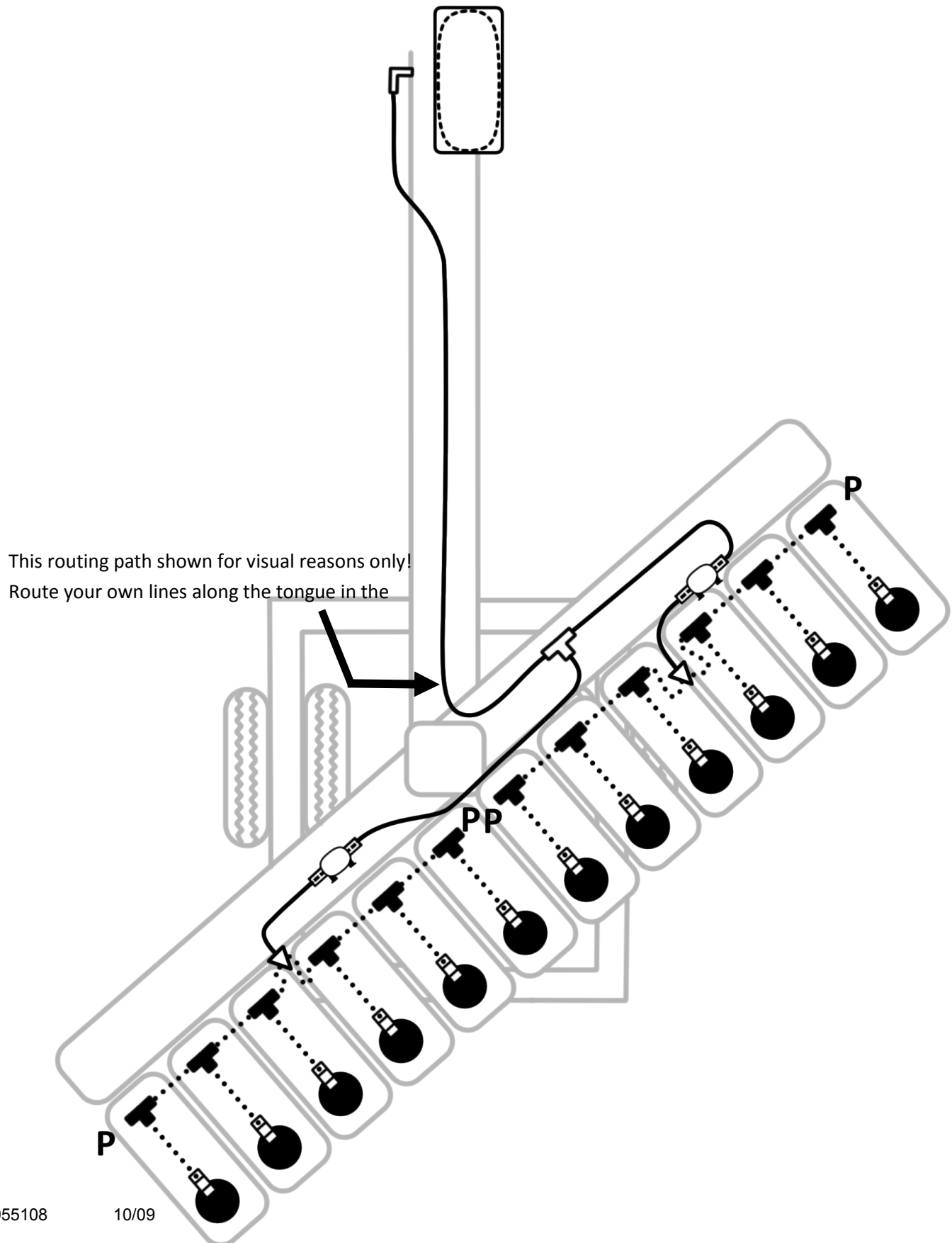
This routing path shown for visual reasons only!
Route your own lines along the tongue in the



PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)

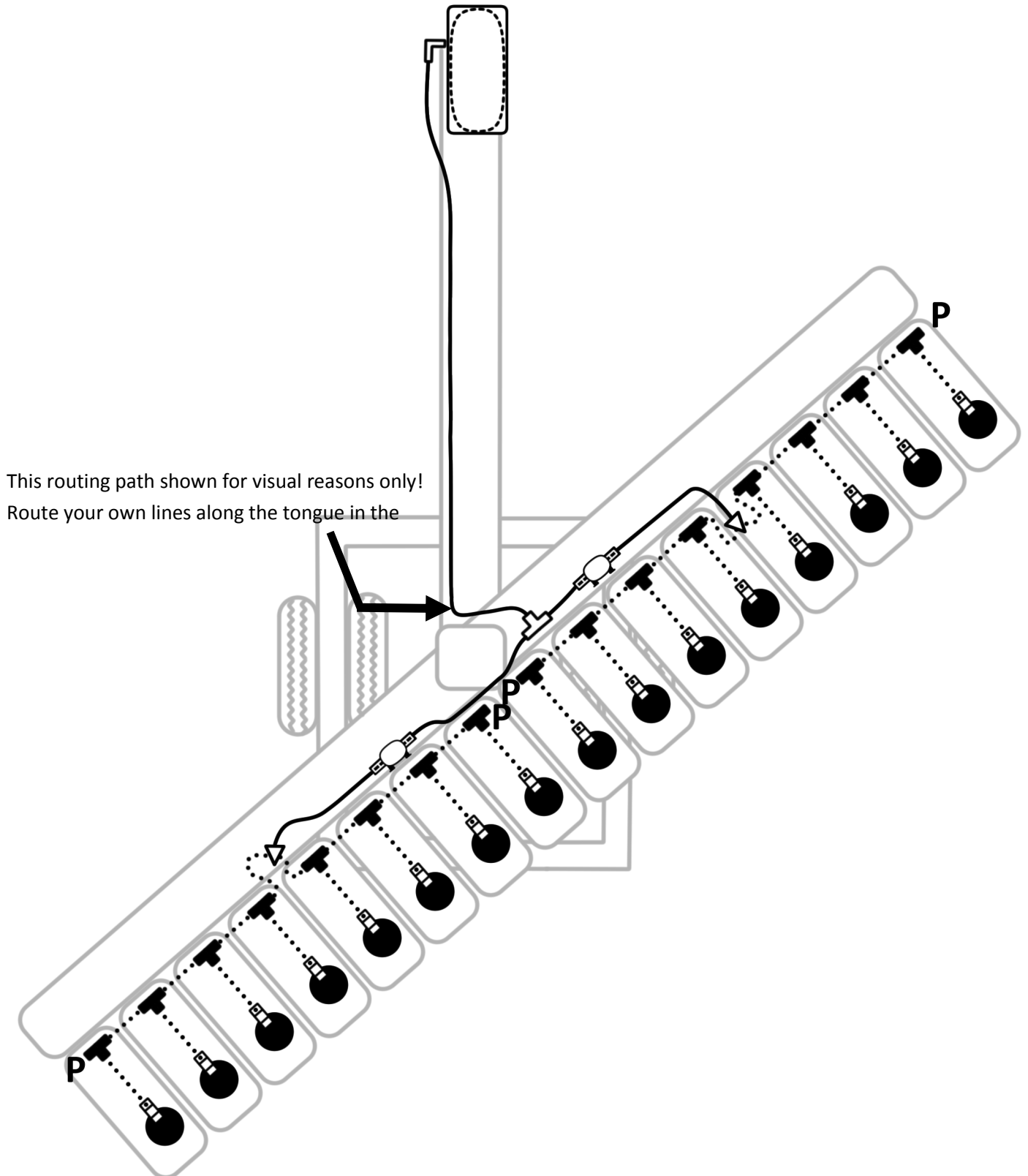
Row Configuration: 12 Row

Lift & Twist



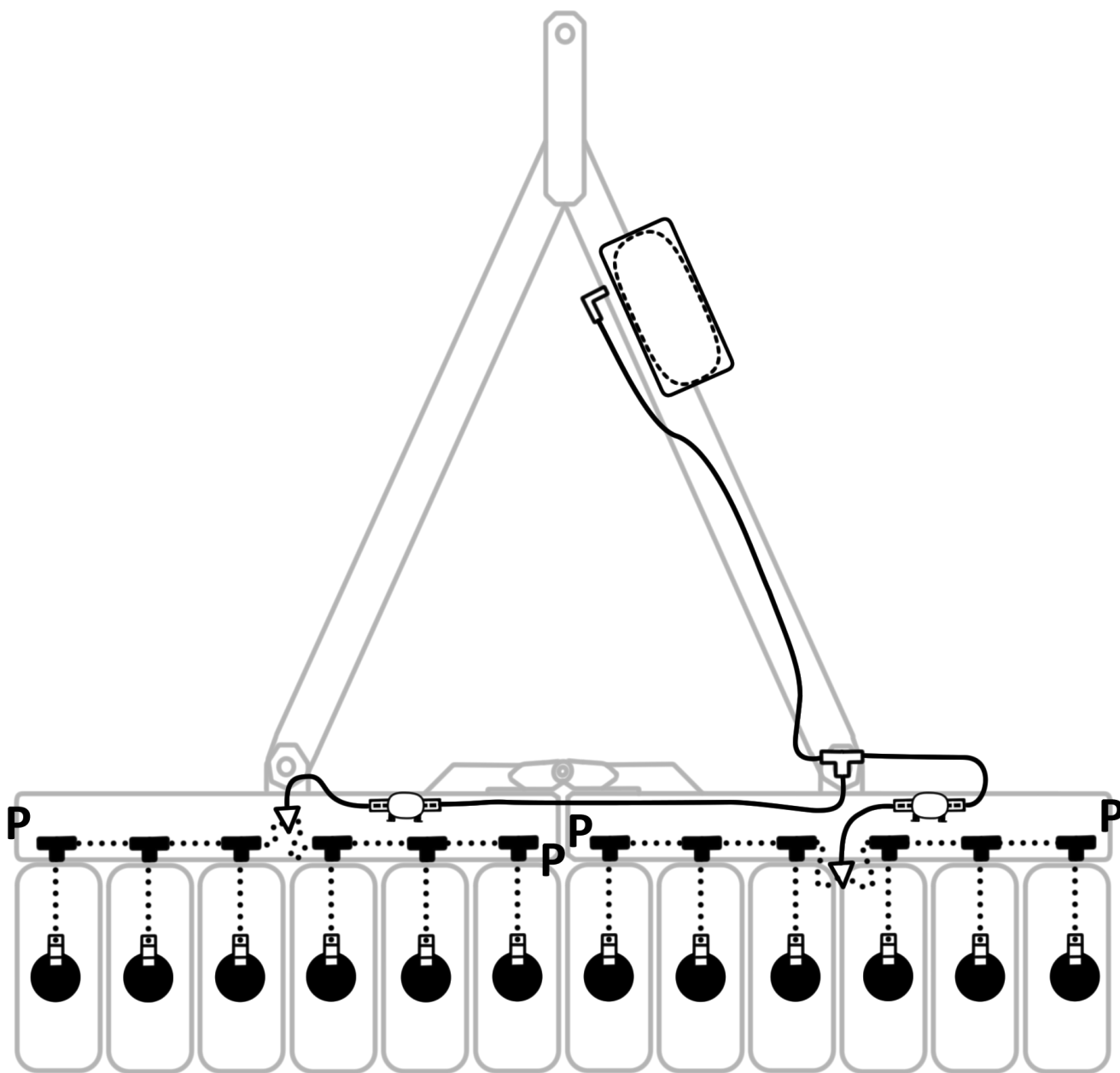
Row Configuration: 16 Row

Lift & Twist



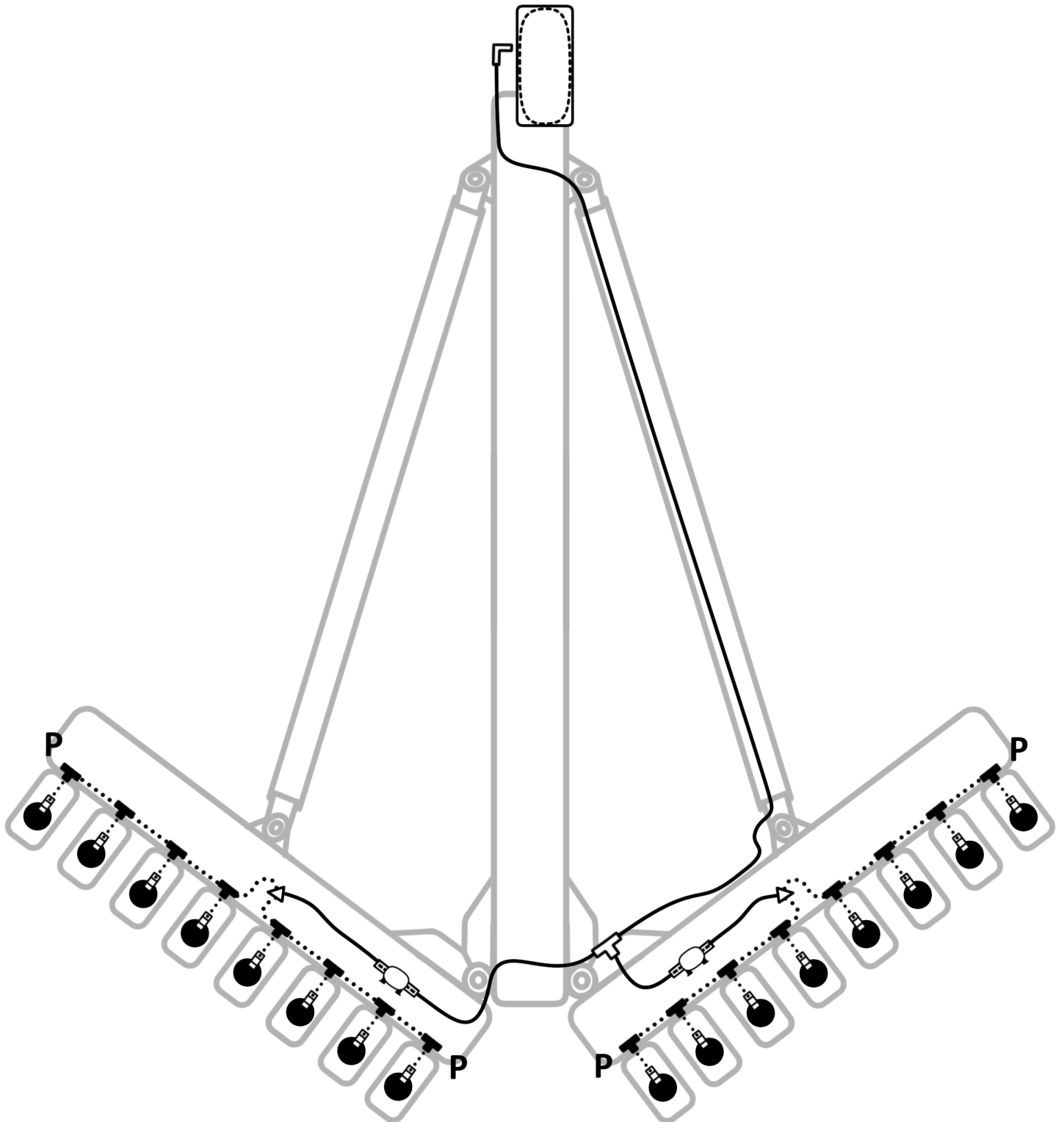
Row Configuration: 12 Row

Forward Fold



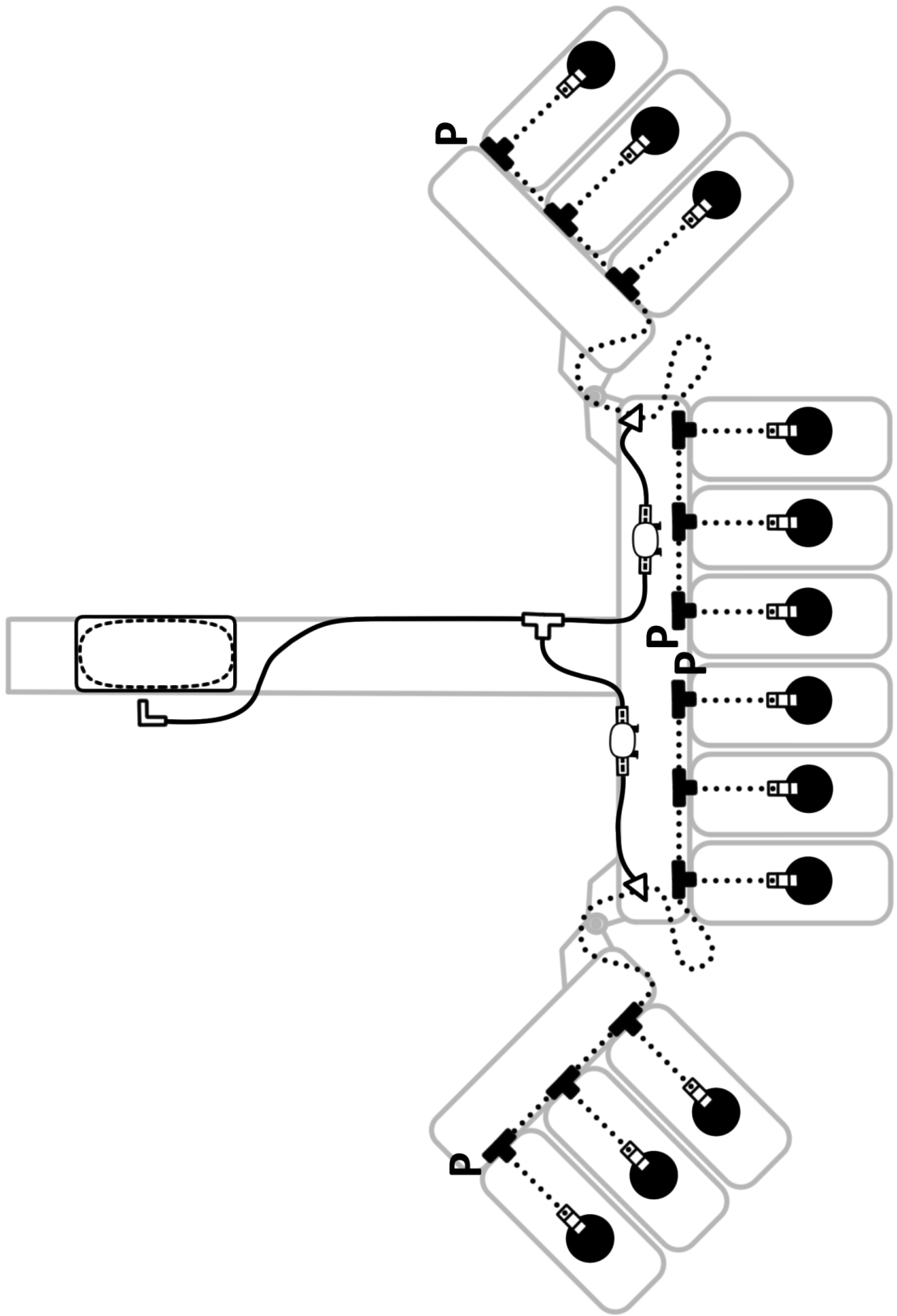
Row Configuration: 16 Row

Forward Fold



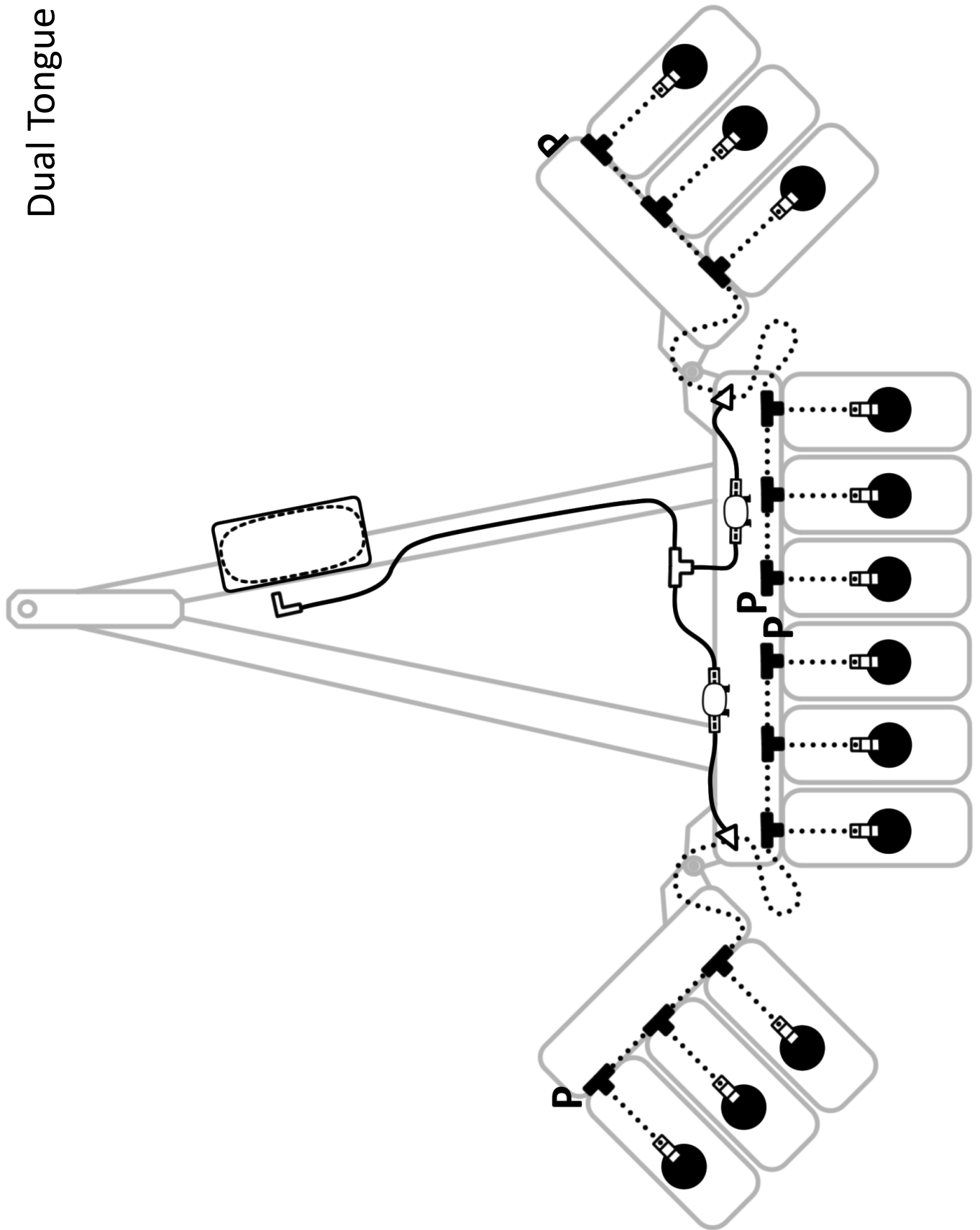
Row Configuration: 12 Row

Single Tongue



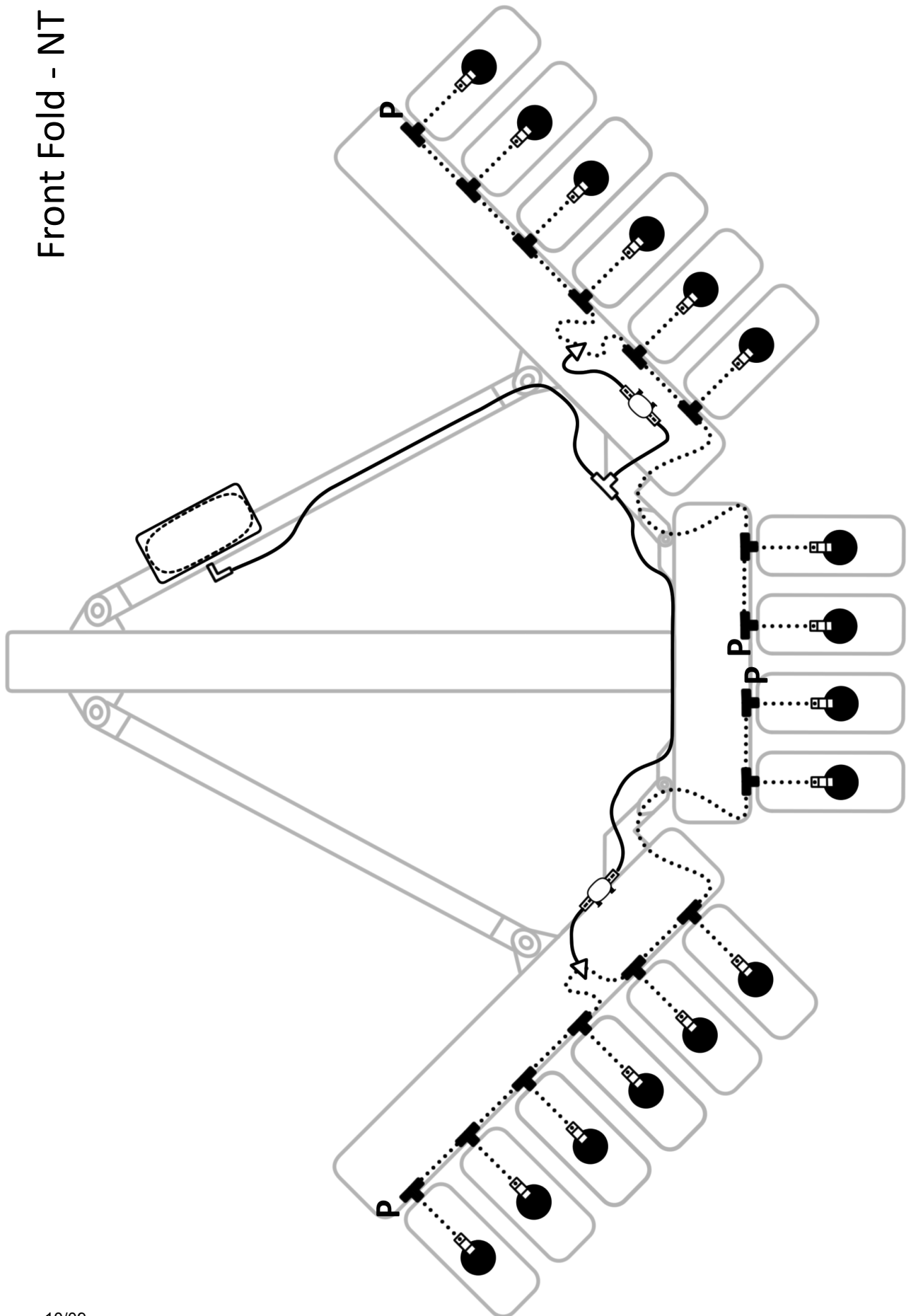
Row Configuration: 12 Row

Dual Tongue



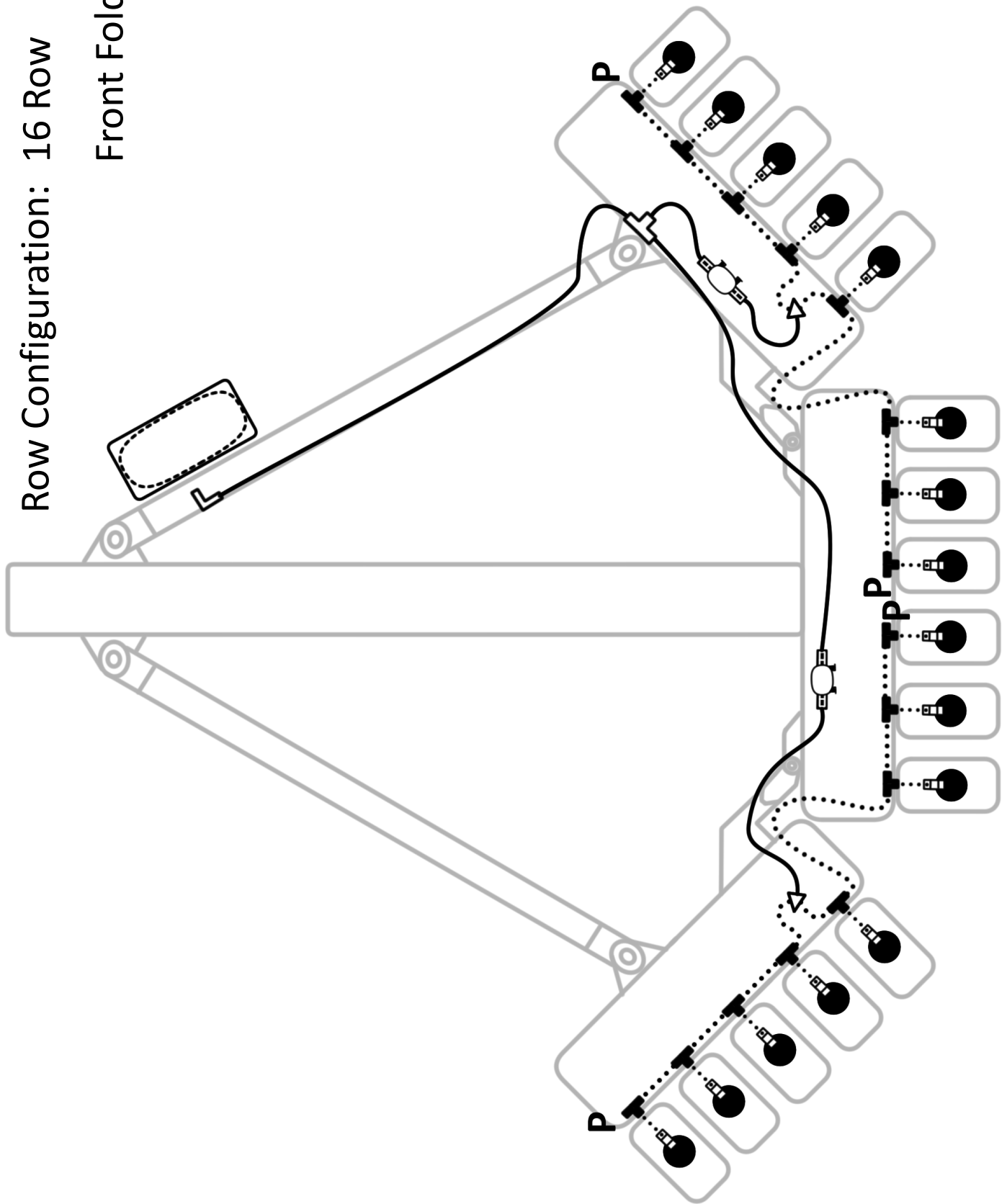
Row Configuration: 16 Row

Front Fold - NT



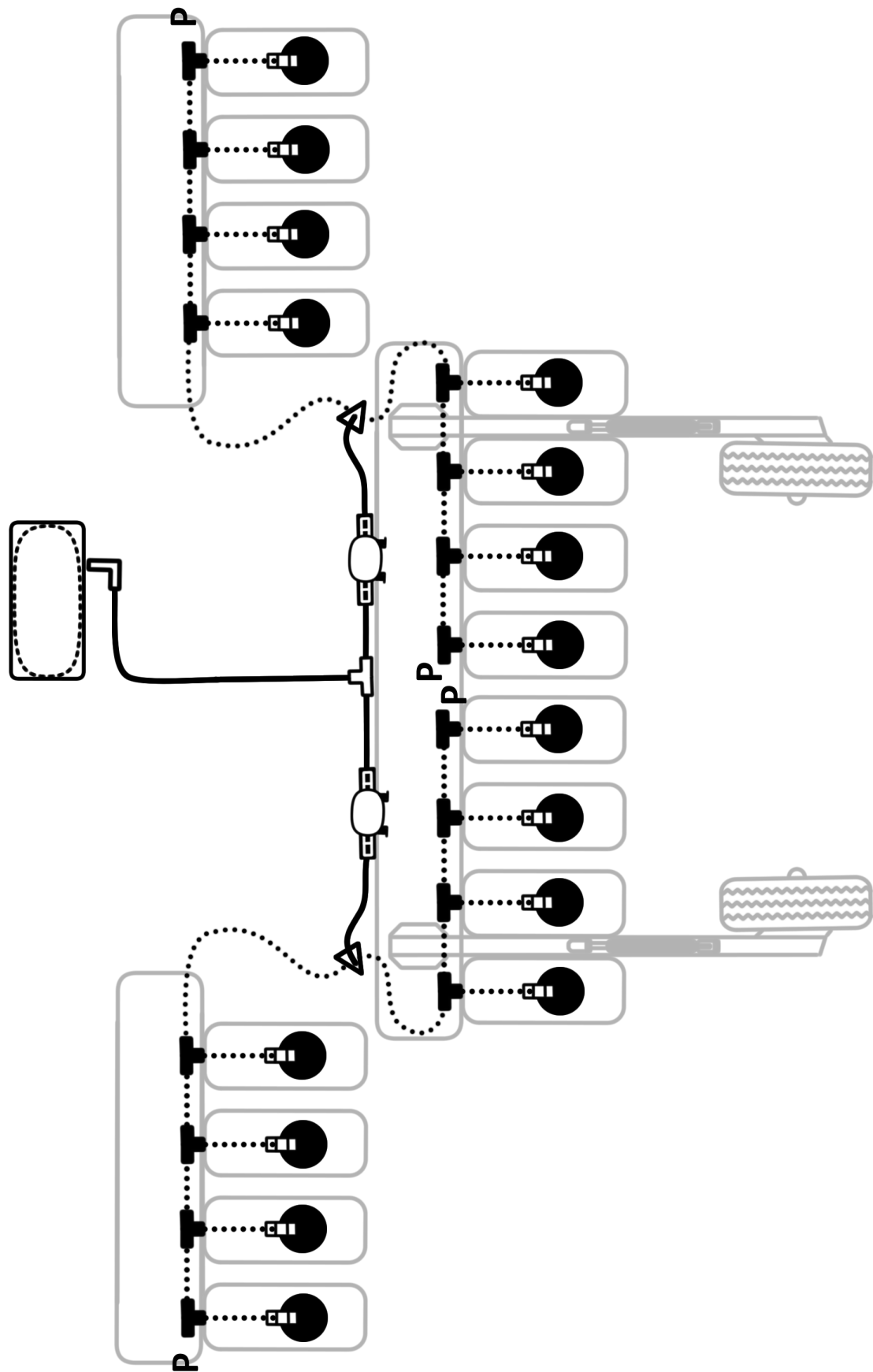
Row Configuration: 16 Row

Front Fold



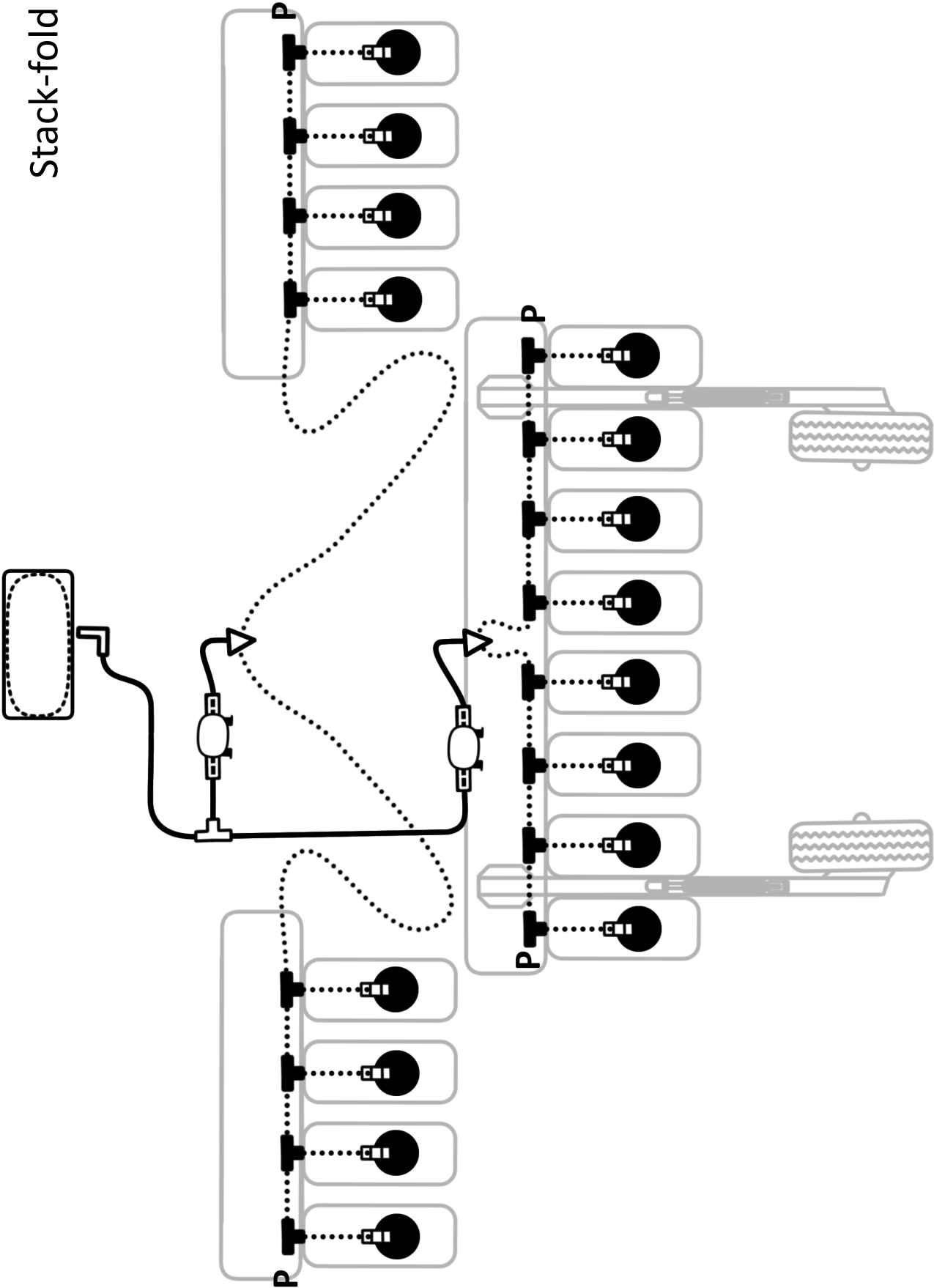
Row Configuration: 16 Row

Stack-fold



Row Configuration: 16 Row

Stack-fold



726310

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726326	TUBING	3/8 RED 25'	A
1	726327	TUBING	3/8 RED 50'	A
1	726317	TUBING	1/4 RED 150'	B
3	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
6	726103	PLUG	1/4 PTC	D
24	63128	TIE STRAP	12" UV BLACK	E
3	726617	RECEIVER	80 CUBIC INCH, LIFT	F
6	63461	TIE STRAP	31.5" UV BLACK	F
6	726110	ELBOW	1/4" NPT x 3/8 PTC SWIVEL 90	F
2	726116	TEE	3/8 PTC	A
1	726273	ELBOW	3/8 PTC	A
3	726104	PLUG	3/8 PTC	
6	900120	TIE STRAP	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of lift air bags
E	Use as required to secure tubing
F	Fittings to be installed into reservoir during installation, large tie straps secure receiver to any available structural element of planter

LEGEND

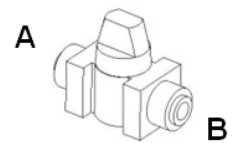
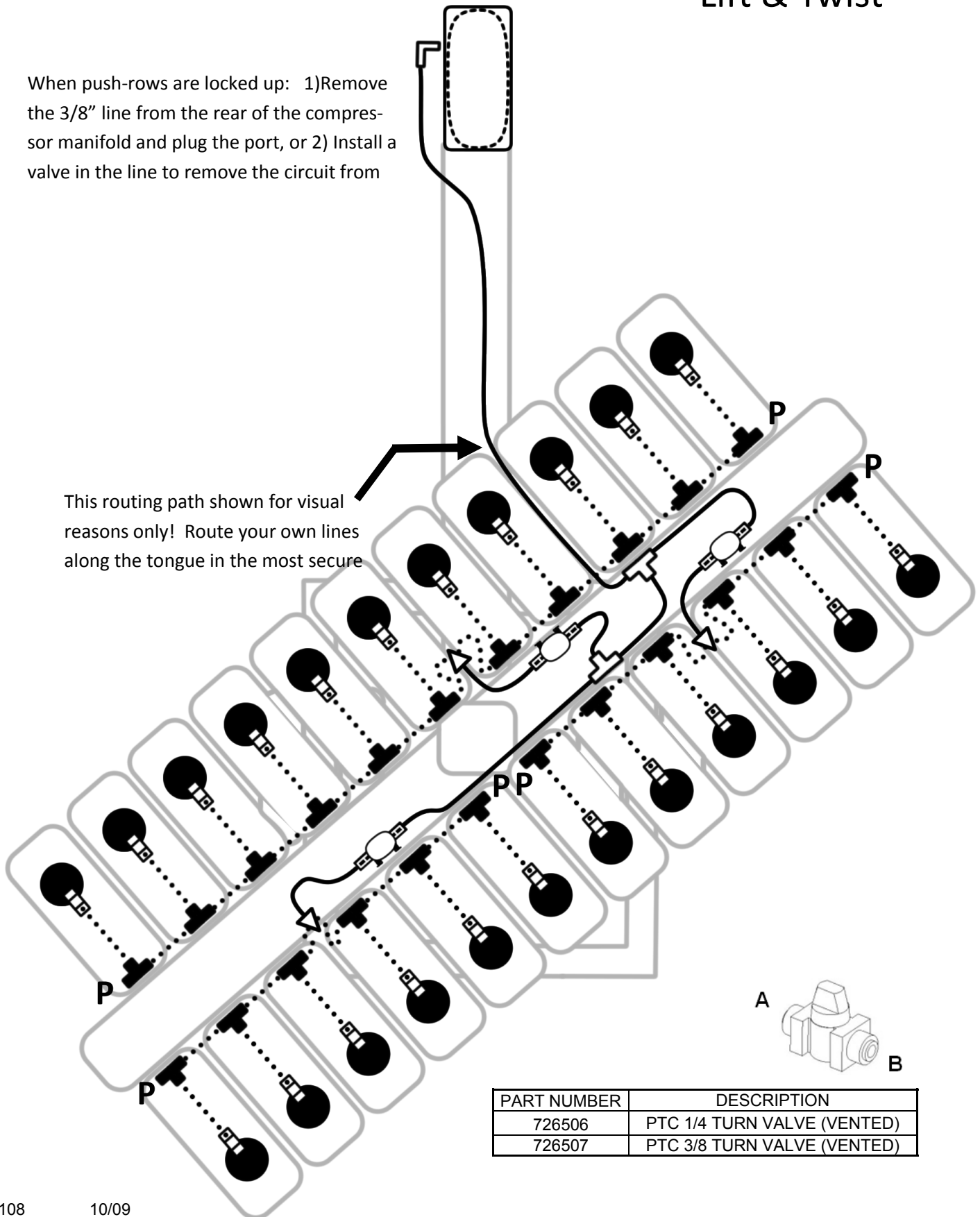
	Pneumatic Spring; Down or Lift		3/8" PTC 90° Elbow
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee		1/4" NPT Male X 3/8" PTC Straight
	1/8" NPT X 1/4" PTC Tee		80 cubic inch Lift Circuit Receiver tank
	1/4" Brass PTC Tee		PTC plug; 3/8" or 1/4"
	3/8" X 1/4" X 1/4" PTC Tee		3/8" Line (Black or Red/Silver)
	3/8" PTC Tee		1/4" Line (Black or Red/Silver)

Row Configuration: 12/23-24 Row

Lift & Twist

When push-rows are locked up: 1) Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to remove the circuit from

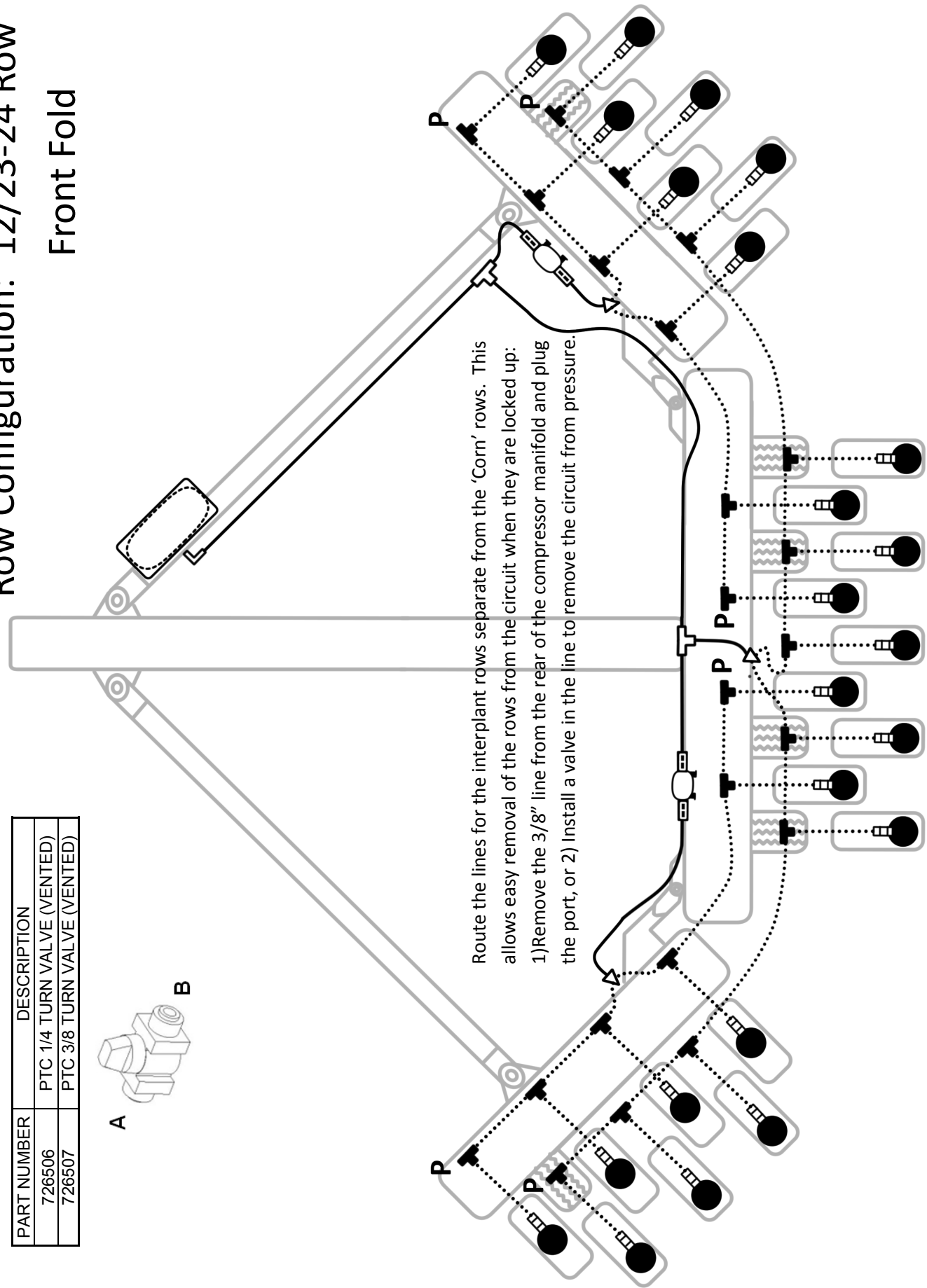
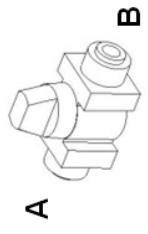
This routing path shown for visual reasons only! Route your own lines along the tongue in the most secure



PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)

Row Configuration: 12/23-24 Row Front Fold

PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)

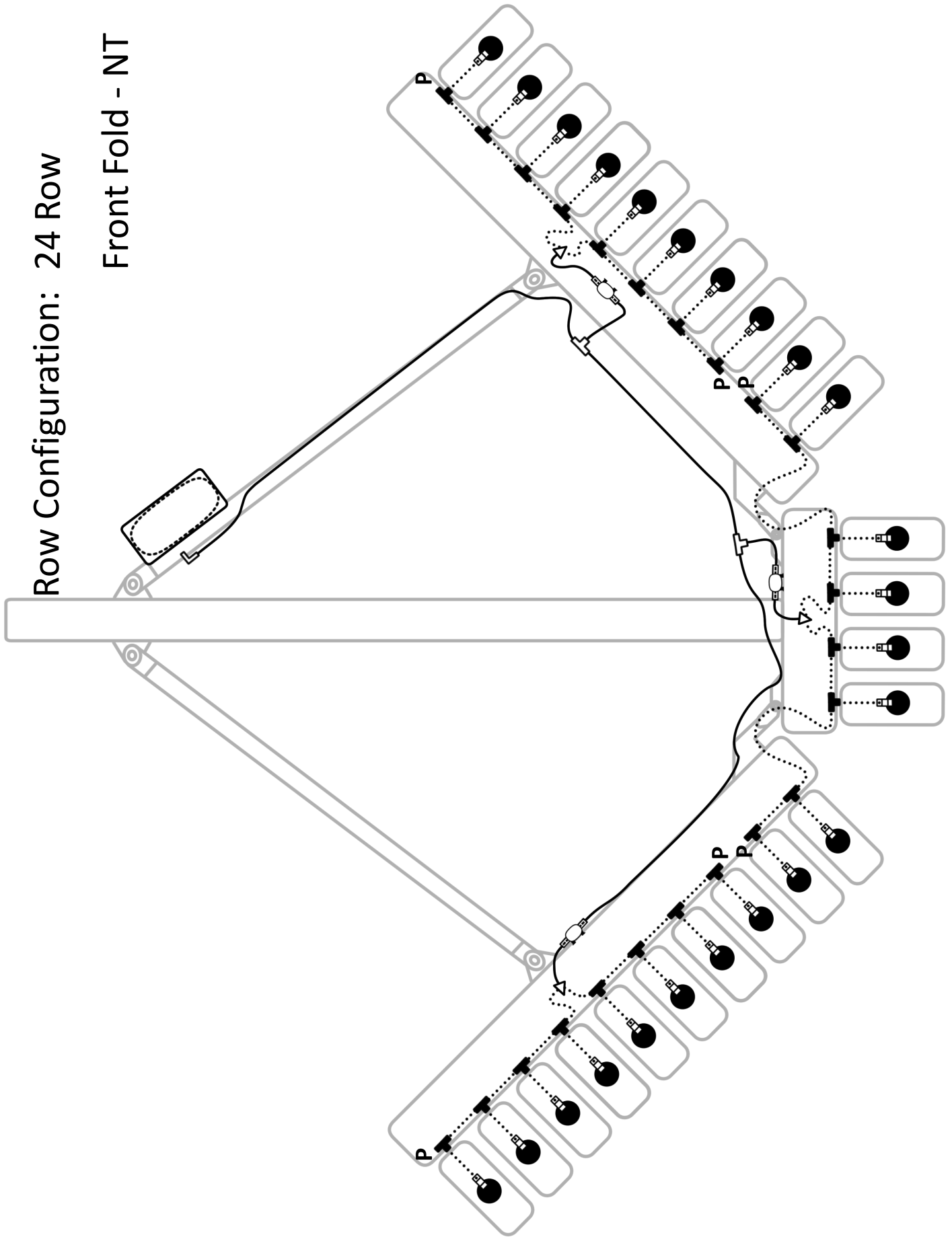


Route the lines for the interplant rows separate from the 'Corn' rows. This allows easy removal of the rows from the circuit when they are locked up:

- 1) Remove the 3/8" line from the rear of the compressor manifold and plug the port, or
- 2) Install a valve in the line to remove the circuit from pressure.

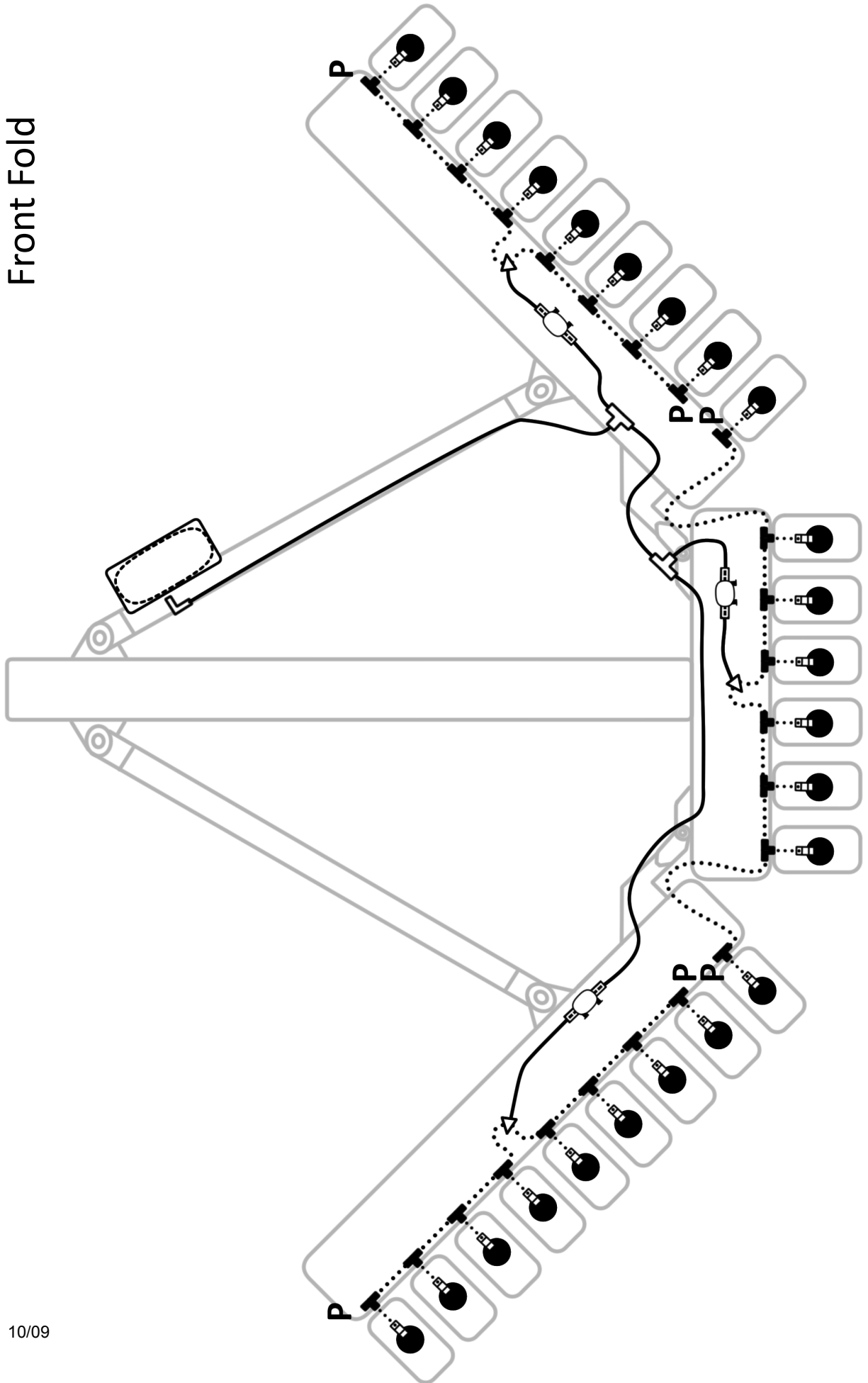
Row Configuration: 24 Row

Front Fold - NT



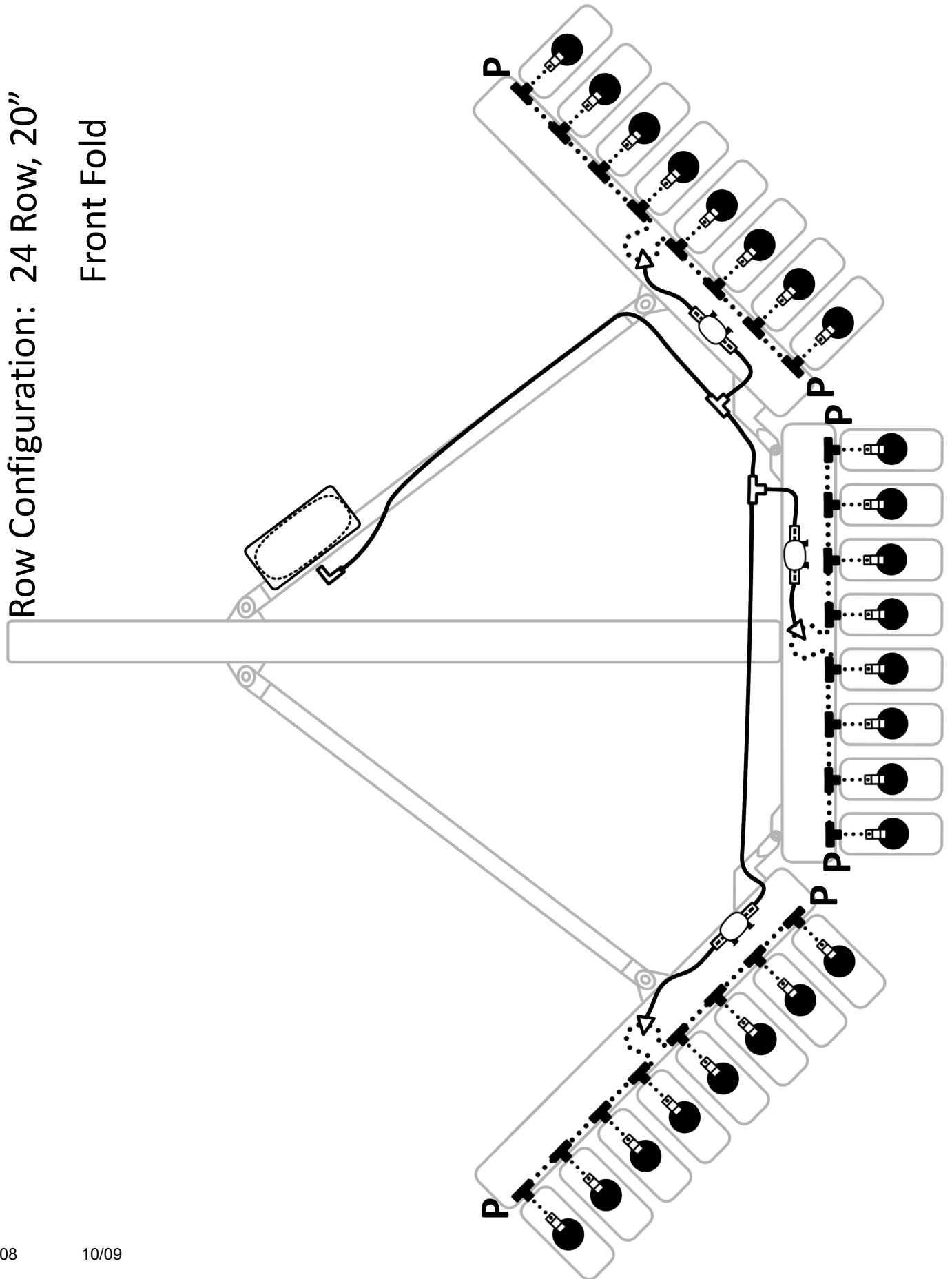
Row Configuration: 24 Row

Front Fold



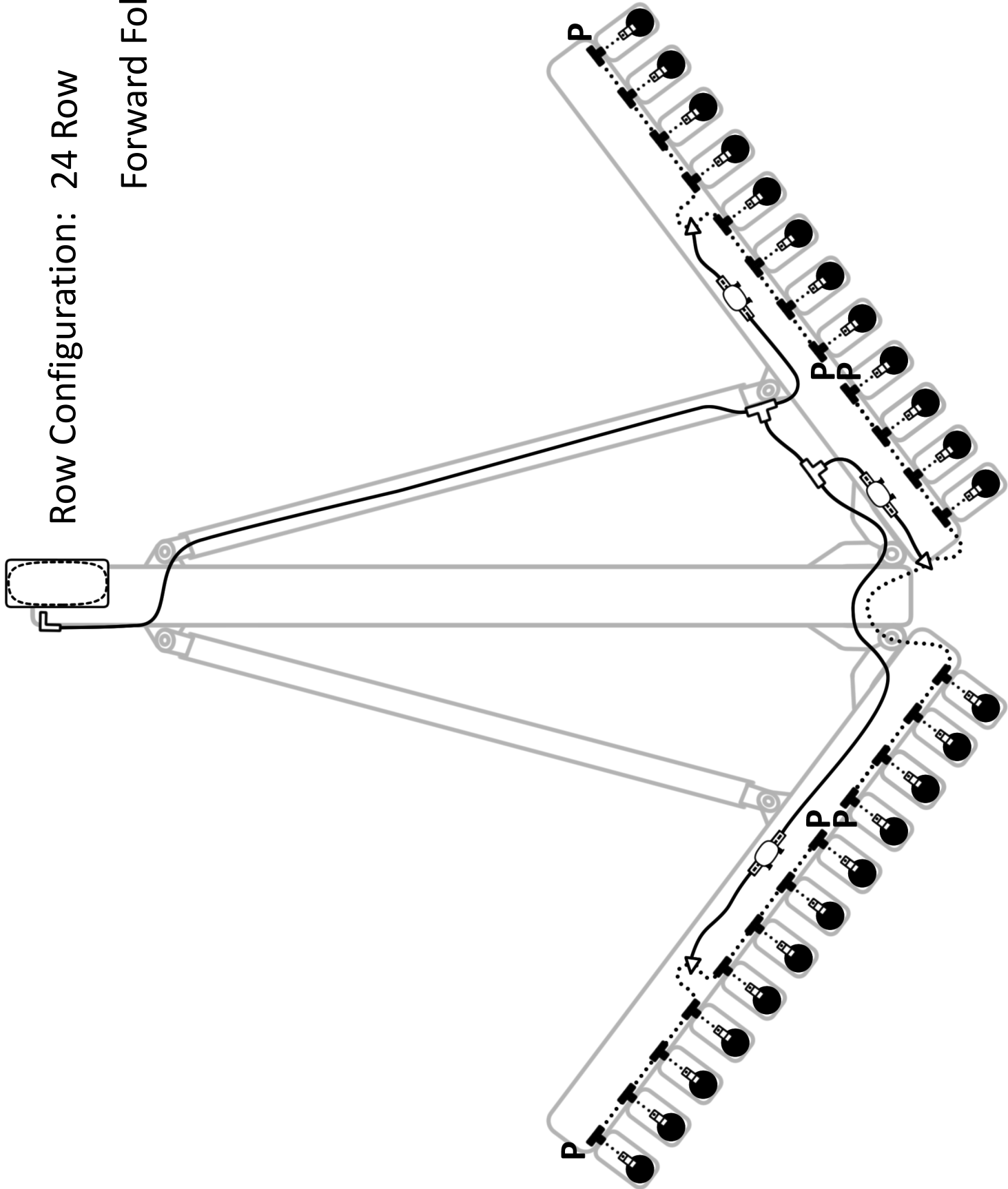
Row Configuration: 24 Row, 20"

Front Fold



Row Configuration: 24 Row

Forward Fold



726330

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726328	TUBING	3/8 RED 100'	A
1	726317	TUBING	1/4 RED 150'	B
4	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
8	726103	PLUG	1/4 PTC	D
36	63128	TIE STRAP	12" UV BLACK	E
4	726617	RECEIVER	80 CUBIC INCH, LIFT	F
8	63461	TIE STRAP	31.5" UV BLACK	F
8	726110	ELBOW	1/4" NPT x 3/8 PTC SWIVEL 90	F
3	726116	TEE	3/8 PTC	A
1	726273	ELBOW	3/8 PTC	A
3	726104	PLUG	3/8 PTC	
6	900120	TIE STRAP	21" UV BLACK	

NOTES:	
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of lift air bags
E	Use as required to secure tubing
F	Fittings to be installed into reservoir during installation, large tie straps secure receiver to any available structural element of planter

LEGEND

	Pneumatic Spring; Down or Lift		3/8" PTC 90° Elbow
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee		1/4" NPT Male X 3/8" PTC Straight
	1/8" NPT X 1/4" PTC Tee		80 cubic inch Lift Circuit Receiver tank
	1/4" Brass PTC Tee		PTC plug; 3/8" or 1/4"
	3/8" X 1/4" X 1/4" PTC Tee		3/8" Line (Black or Red/Silver)
	3/8" PTC Tee		1/4" Line (Black or Red/Silver)

Plumbing Installation



This process should be done with the planter raised, half folded for transport, and the row units fully extended down.

The following pages contain images of suggested methods of routing the air lines for your new 20/20 Air-Force. Due to the wide variety of planter/row unit configurations and accessories available, you should adapt the installation as necessary for your planter. The primary concern is the security of the lines themselves. The lines should be fastened to the planter in a manner that allows full range of motion/clearance of the row unit. Special caution should be taken around rows at break or fold points of the planter as it

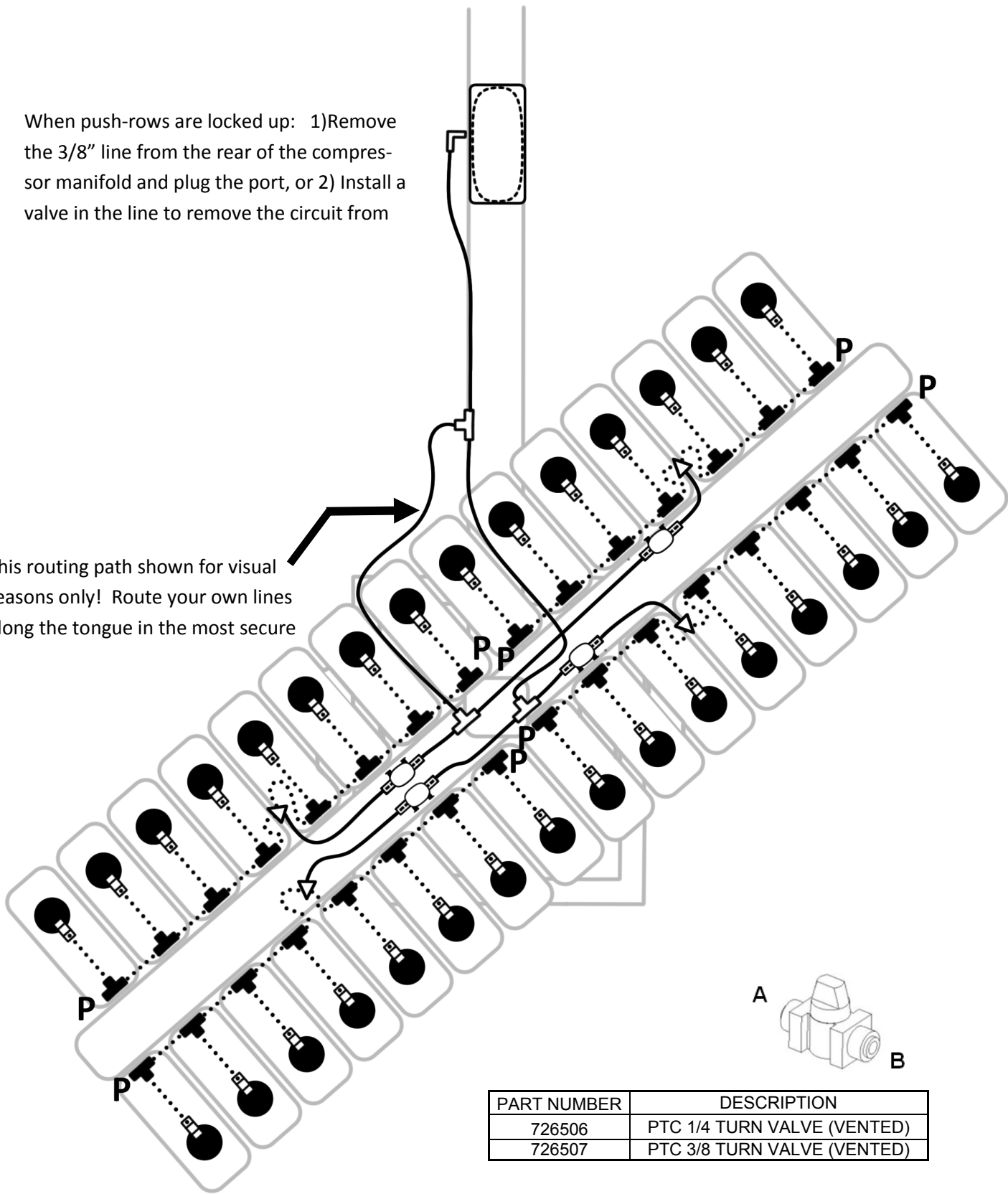
- ◆ The supplied fittings should have pre-existing thread sealant - ready to install - for ease of installment. Always use Thread Tape when installing air fittings that do not have this
- ◆ Black Tubing - used for the Down Force Circuit
- ◆ Red / Silver Tubing - used for the Lift Force Circuit
- ◆ 3/8" lines (Black or Red/Silver) - used for the main line **from** the Compressor Module **to** groups of rows, usually on the main draw bar of the planter
- ◆ 1/4" lines (Black or Red/Silver) - used **from** the main line **to** and **between** the individual row unit Air Bags
- ◆ Secure the Air Lines using the supplied zip tie-straps - do not pinch the line closed when cinching tight
- ◆ The 1/4" lines should be routed back to and secured to the main draw bar or to existing bundles of wires/hoses of the planter between row units
- ◆ Most 30" row configurations should need between 34 to 42 inches of 1/4" line between Down Force Air Bags. **Do not** pre-cut the line, measure lay-out each length individually.
- ◆ Lift Circuit kits containing 1 extra brass 1/4" PTC Tee per row will require lengths of the 1/4" line from the connector on top of the Lift Bag to the 1/4" PTC Tee placed on the main Draw Bar.
- ◆ All Lift Circuits will require the use of one or multiple 80 cubic inch Air Receiver Assem-

After completion of the **FIRST** row and **PRIOR** to continuing to other rows, check for clearance of, and lack of pinch points on all lines and fittings. This should be done by completely raising and lowering the

Row Configuration: 16-31/32 Split Row Lift & Twist

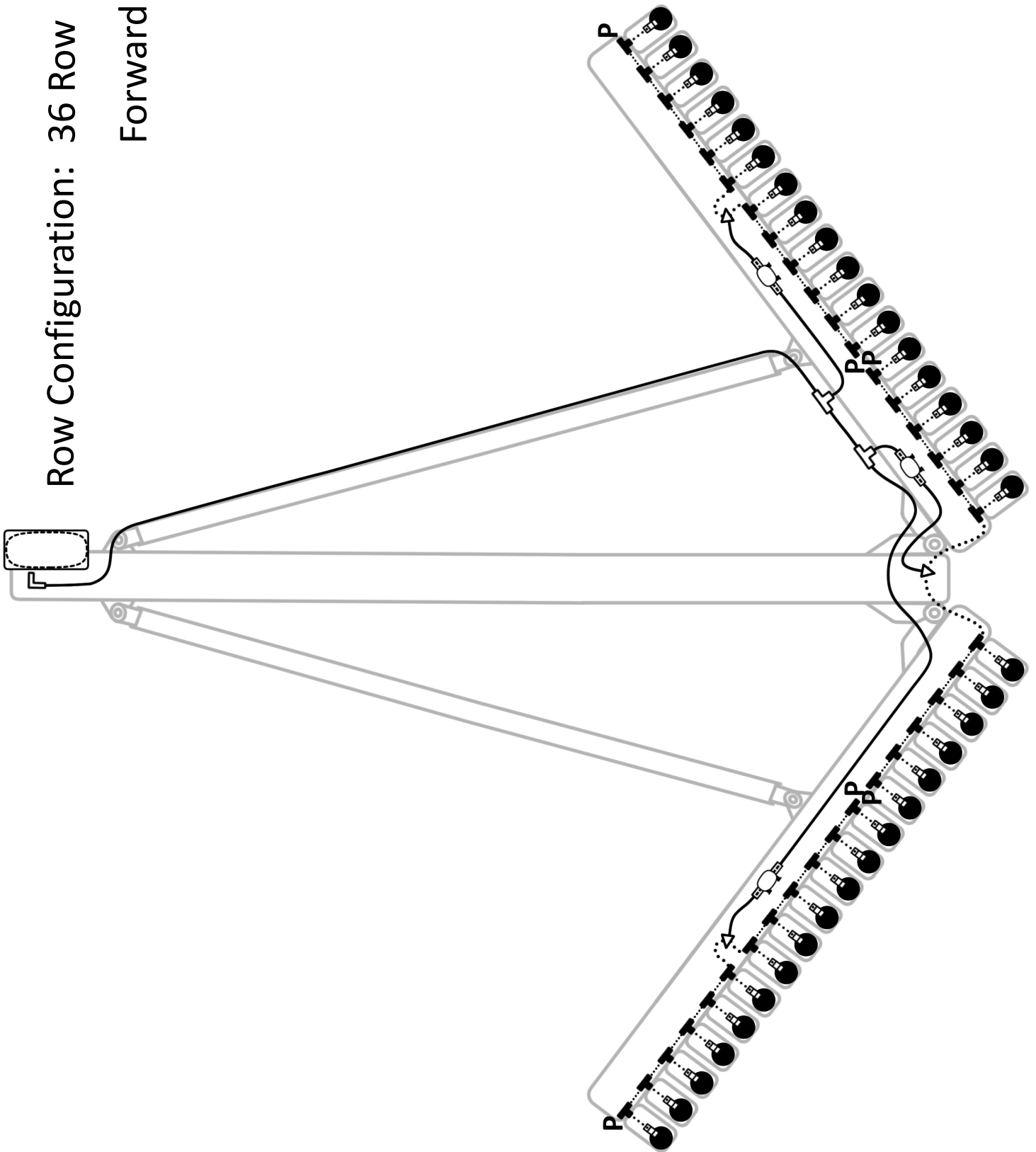
When push-rows are locked up: 1)Remove the 3/8" line from the rear of the compressor manifold and plug the port, or 2) Install a valve in the line to remove the circuit from

This routing path shown for visual reasons only! Route your own lines along the tongue in the most secure



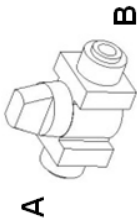
Row Configuration: 36 Row

Forward Fold

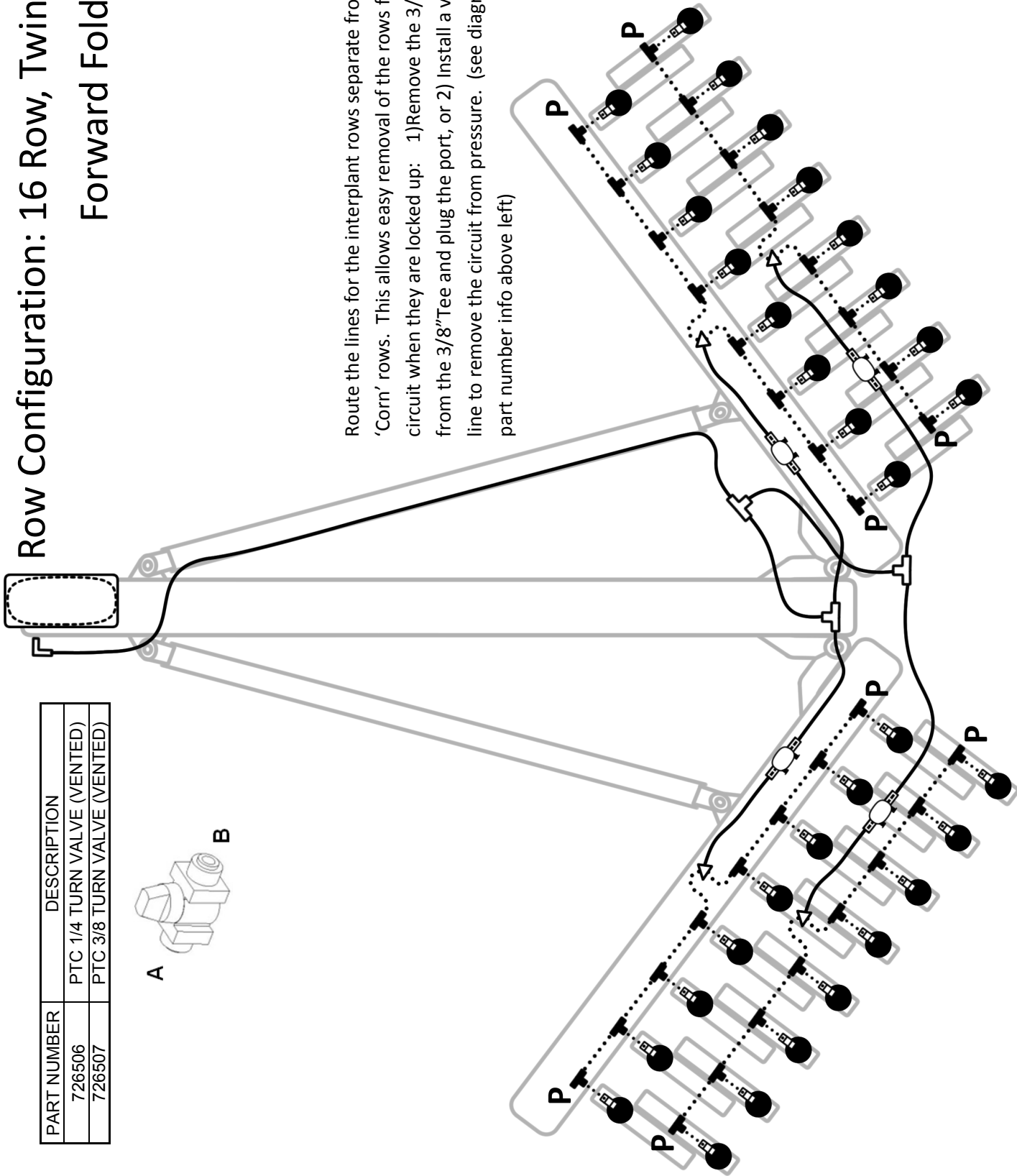


Row Configuration: 16 Row, Twin Row Forward Fold

PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



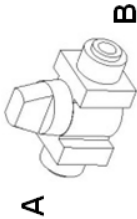
Route the lines for the interplant rows separate from the 'Corn' rows. This allows easy removal of the rows from the circuit when they are locked up: 1)Remove the 3/8" line from the 3/8" Tee and plug the port, or 2) Install a valve in the line to remove the circuit from pressure. (see diagram and part number info above left)



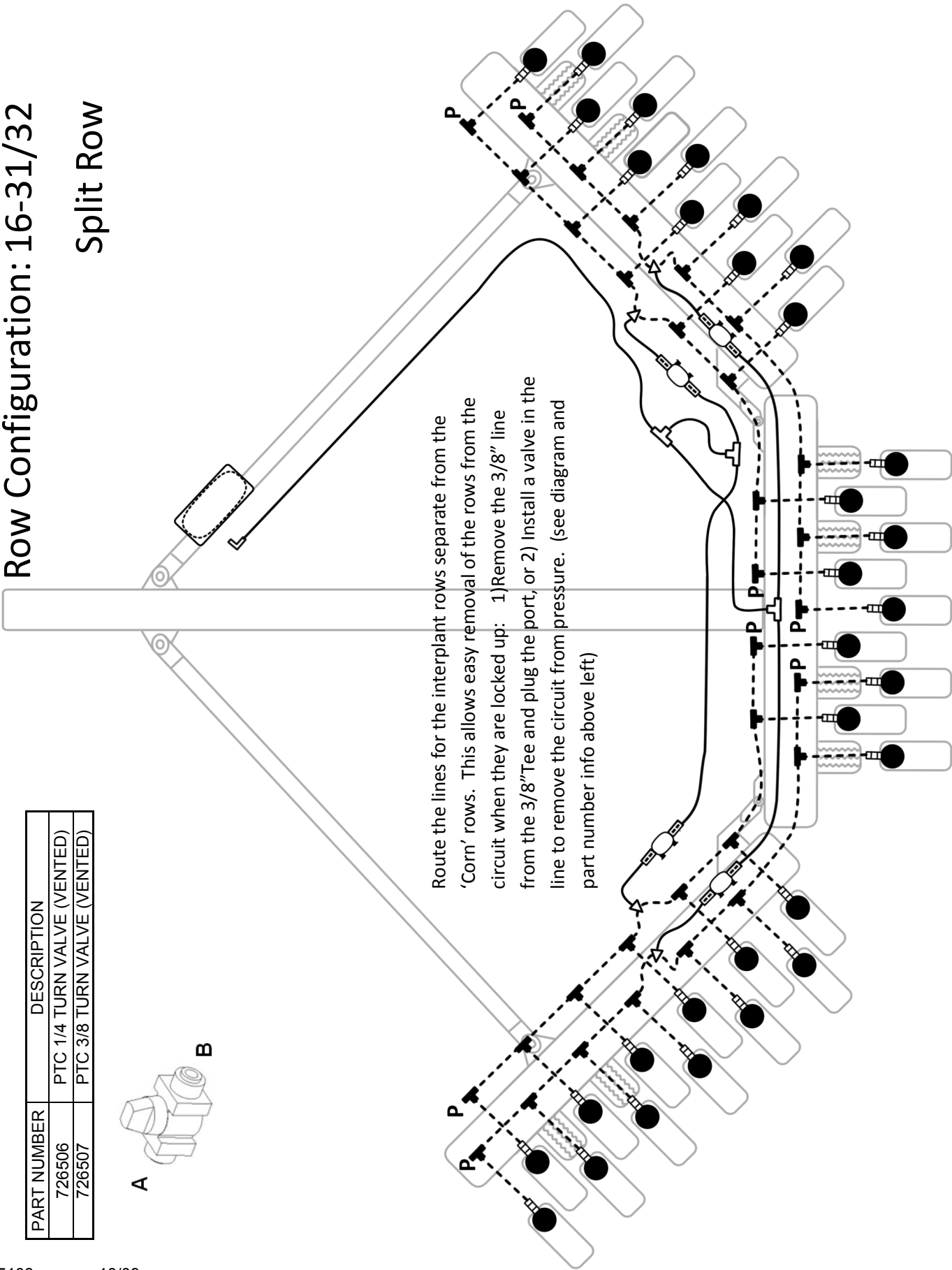
Row Configuration: 16-31/32

Split Row

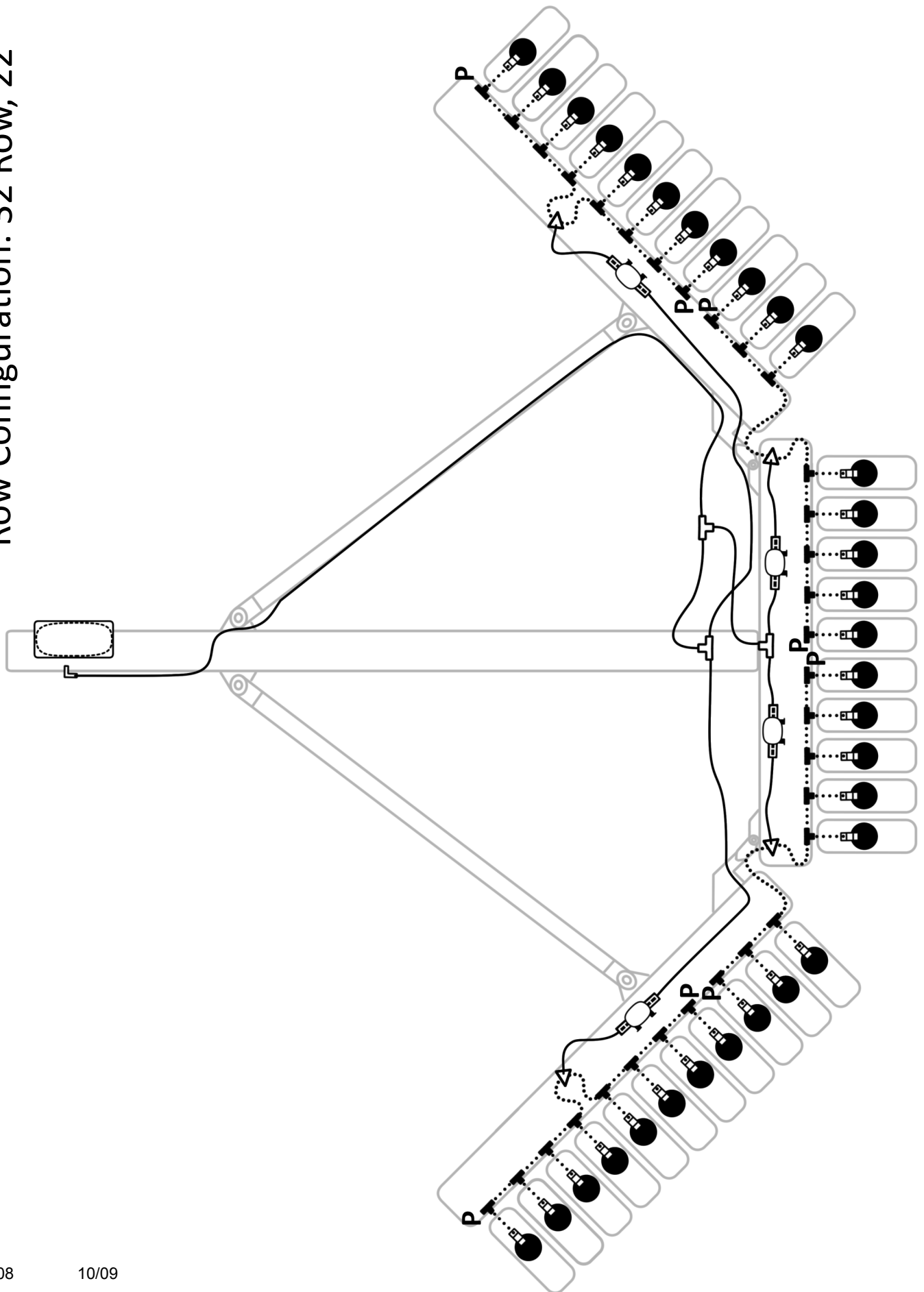
PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



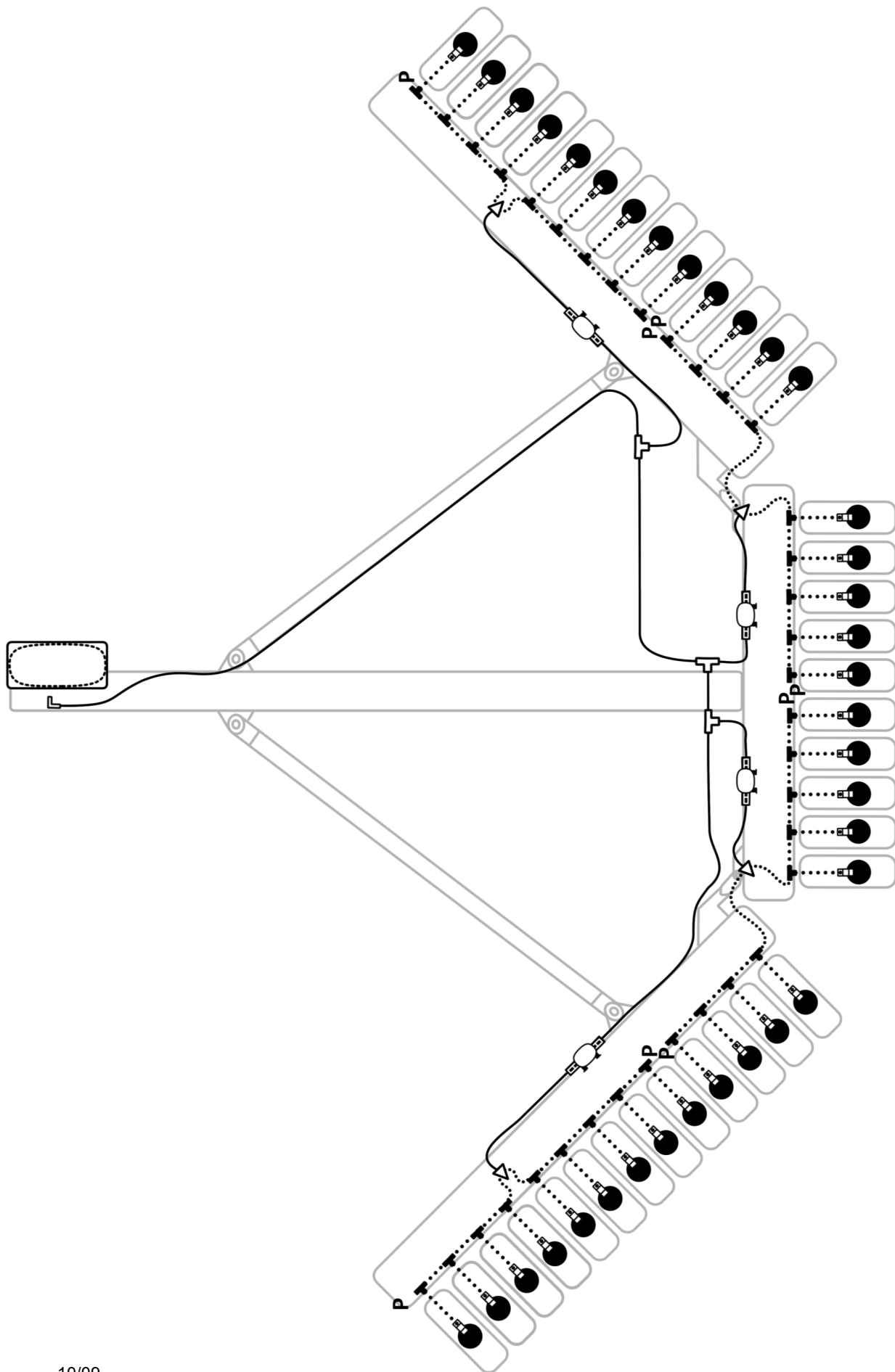
Route the lines for the interplant rows separate from the 'Corn' rows. This allows easy removal of the rows from the circuit when they are locked up: 1) Remove the 3/8" line from the 3/8" Tee and plug the port, or 2) Install a valve in the line to remove the circuit from pressure. (see diagram and part number info above left)



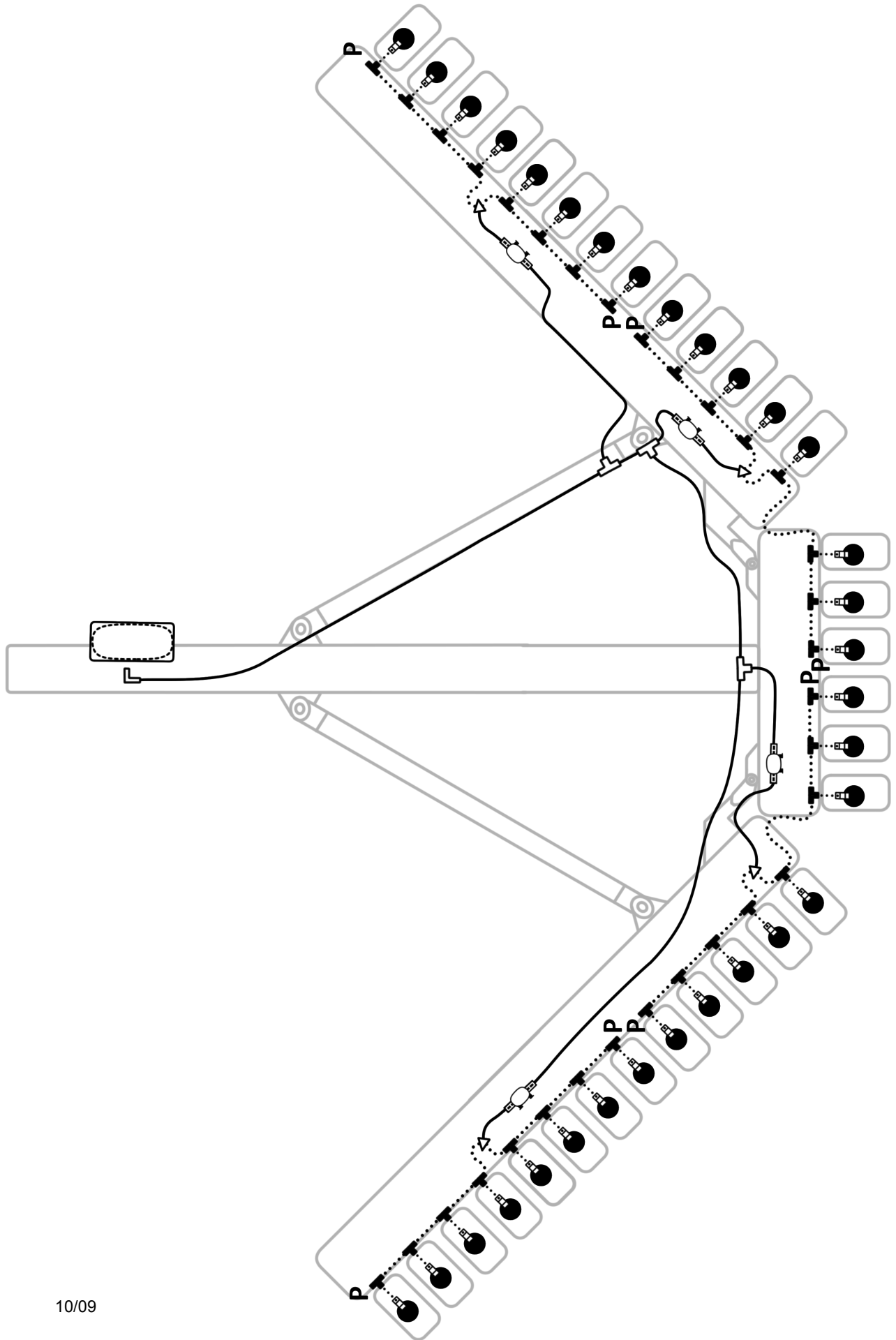
Row Configuration: 32 Row, 22"



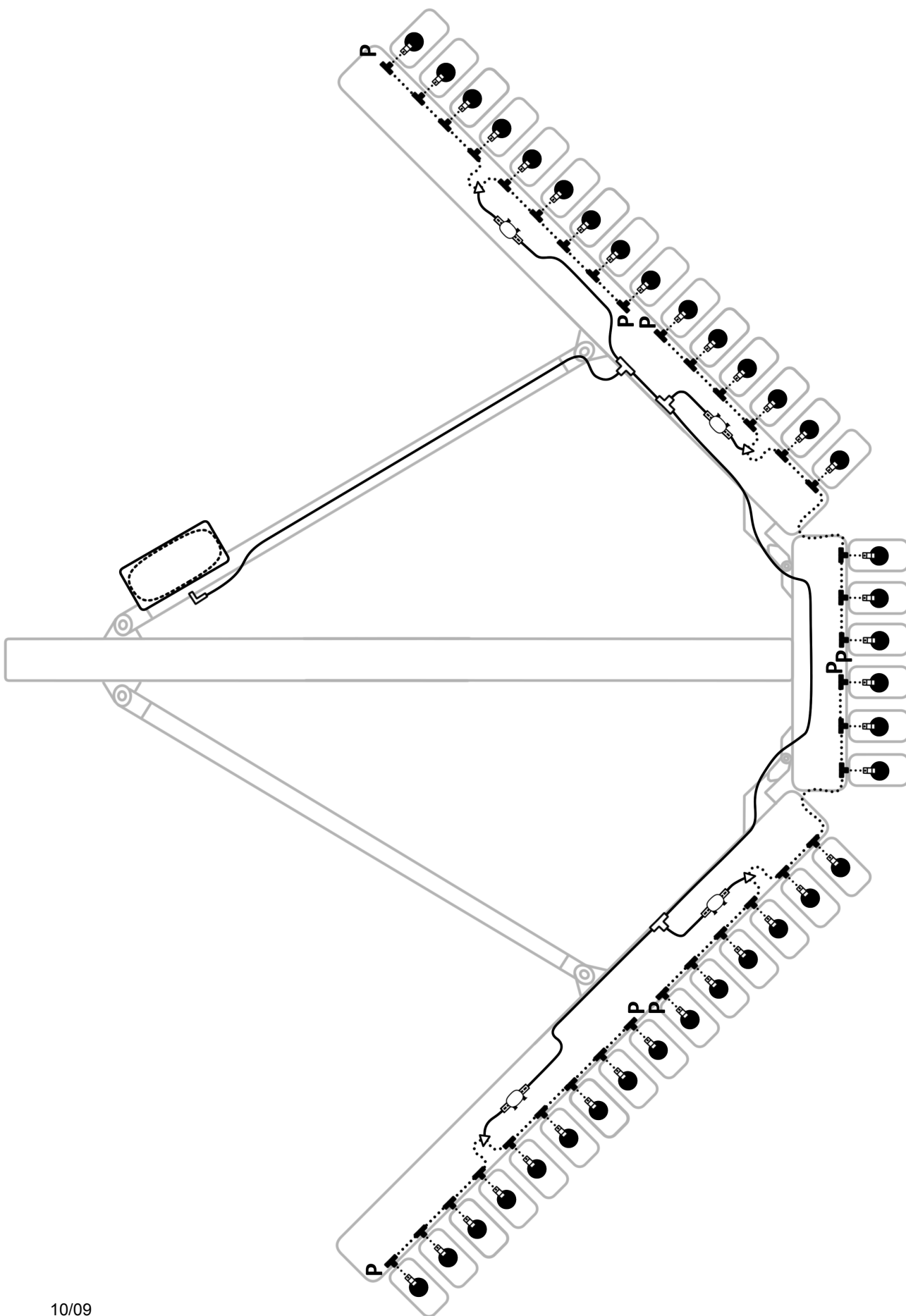
Row Configuration: 36 Row, 20 or 30"



Row Configuration: 32 Rows, 30"



Row Configuration: 36 Rows, 30"



726335

LINES AND FITTINGS

QTY	PART NUMBER	PART NAME	DESCRIPTION	Notes
1	726328	TUBING	3/8 RED 100'	A
1	726318	TUBING	1/4 RED 200'	B
5	726298	Y FITTING	3/8 x 1/4 x 1/4 PTC	C
10	726103	PLUG	1/4 PTC	D
48	63128	TIE STRAP	12" UV BLACK	E
5	726617	RECEIVER	80 CUBIC INCH, LIFT	F
10	63461	TIE STRAP	31.5" UV BLACK	F
10	726110	ELBOW	1/4" NPT x 3/8 PTC SWIVEL 90	F
4	726116	TEE	3/8 PTC	A
1	726273	ELBOW	3/8 PTC	A
3	726104	PLUG	3/8 PTC	
6	900120	TIE STRAP	21" UV BLACK	

NOTES:

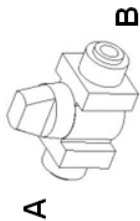
A	To be used between enclosure and "Y" fittings
B	To be cut to length as required during installation for use between row units
C	To be used between 3/8" tubing and 1/4" tubing, use as required
D	Use as required at end of planter sections in "T" fitting on top of lift air bags
E	Use as required to secure tubing
F	Fittings to be installed into reservoir during installation, large tie straps secure receiver to any available structural element of planter

LEGEND

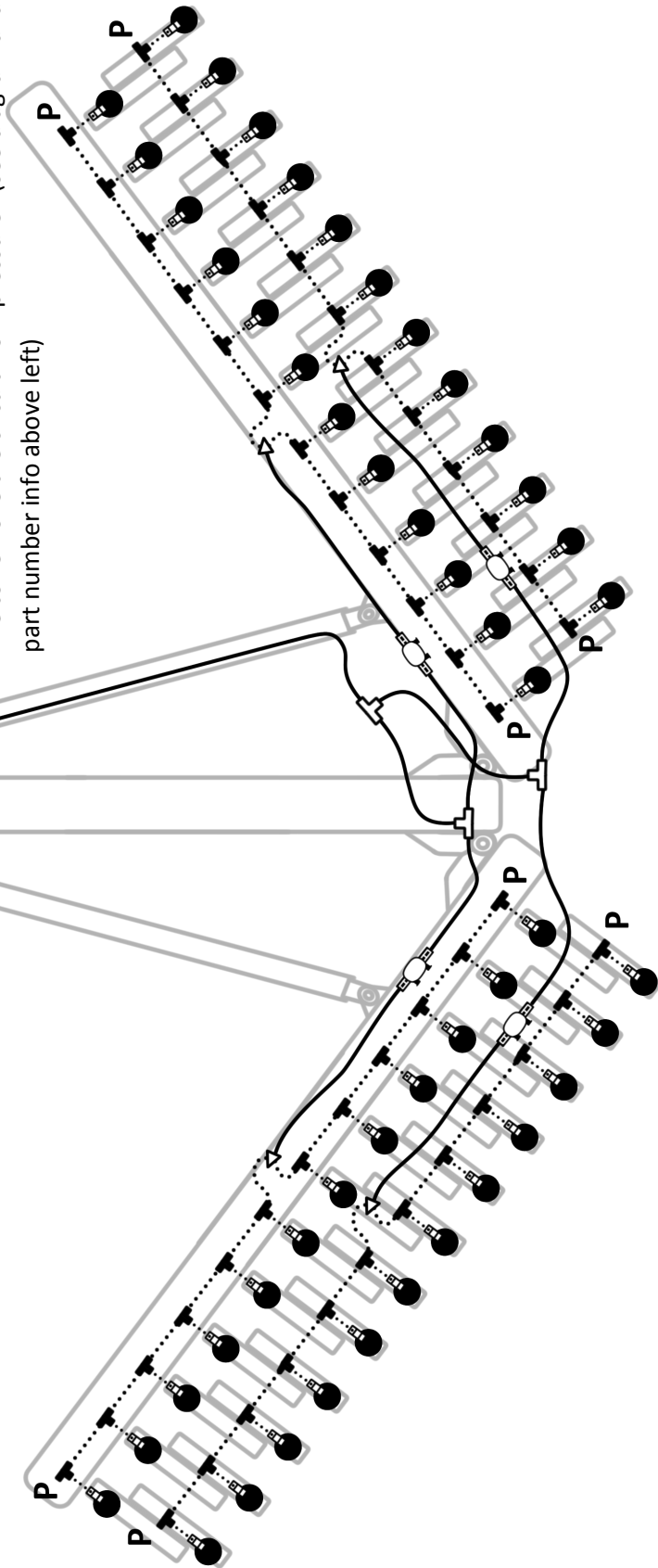
	Pneumatic Spring; Down or Lift		3/8" PTC 90° Elbow
	1/8" NPT X 1/4" X 1/4" Brass PTC Tee		1/4" NPT Male X 3/8" PTC Straight
	1/8" NPT X 1/4" PTC Tee		80 cubic inch Lift Circuit Receiver tank
	1/4" Brass PTC Tee		PTC plug; 3/8" or 1/4"
	3/8" X 1/4" X 1/4" PTC Tee		3/8" Line (Black or Red/Silver)
	3/8" PTC Tee		1/4" Line (Black or Red/Silver)

Row Configuration: 24 Row, Twin Row Forward Fold

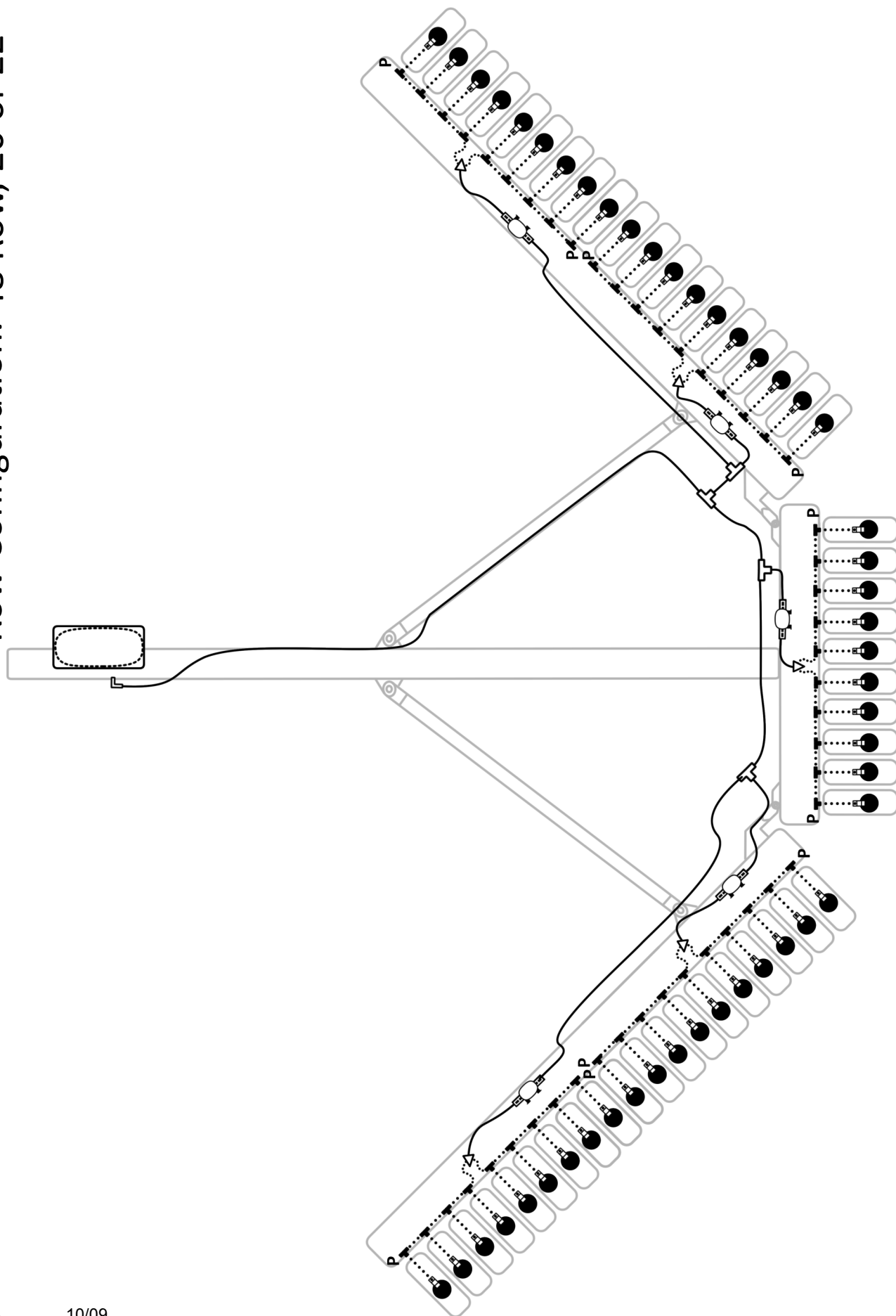
PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



Route the lines for the interplant rows separate from the 'Corn' rows. This allows easy removal of the rows from the circuit when they are locked up: 1)Remove the 3/8" line from the 3/8"Tee and plug the port, or 2) Install a valve in the line to remove the circuit from pressure. (see diagram and part number info above left)

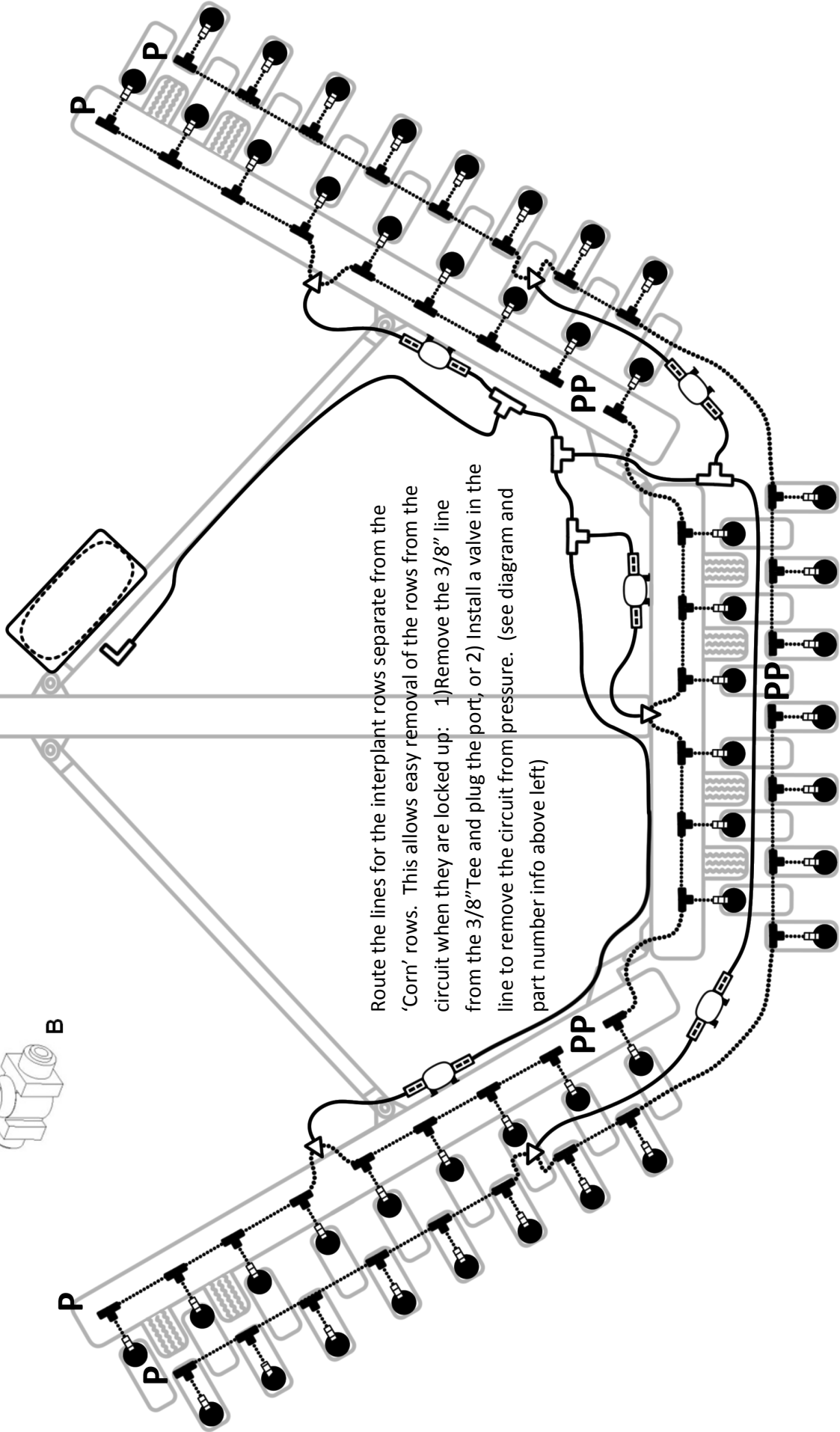


Row Configuration: 48 Row, 20 or 22"



Row Configuration: 47 Row 15" Split Row

PART NUMBER	DESCRIPTION
726506	PTC 1/4 TURN VALVE (VENTED)
726507	PTC 3/8 TURN VALVE (VENTED)



Route the lines for the interplant rows separate from the 'Corn' rows. This allows easy removal of the rows from the circuit when they are locked up: 1) Remove the 3/8" line from the 3/8" Tee and plug the port, or 2) Install a valve in the line to remove the circuit from pressure. (see diagram and part number info above left)

Air Lines Information and Ordering numbers

1/4" OD, .040" WALL D.O.T. TYPE A TUBING, SILVER, NY-LON		
PART NUMBER	QTY (FT)	PACKAGE
726314	50	COIL
726316	100	COIL
726317	150	COIL
726318	200	COIL
726319	250	COIL
726336	1	BULK

1/4" OD, .040" WALL NYLON 11 TUBING, BLACK		
PART NUMBER	QTY (FT)	PACKAGE
726473	25	COIL
726321	50	COIL
726322	100	COIL
726323	150	COIL
726324	200	COIL
726337	1	BULK

3/8" OD, .050" WALL D.O.T. TYPE B TUBING, SILVER, NY-LON		
PART NUMBER	QTY (FT)	PACKAGE
726326	25	COIL
726327	50	COIL
726328	100	COIL
726329	1	BULK

3/8" OD, .050" WALL NYLON 11 TUBING, BLACK		
PART NUMBER	QTY (FT)	PACKAGE
726331	25	COIL
726332	50	COIL
726333	100	COIL
726474	150	COIL
726334	1	BULK

1/8" OD, .016" WALL NYLON 11 TUBING, BLACK		
PART NUMBER	QTY (FT)	PACKAGE
726341	1	BULK

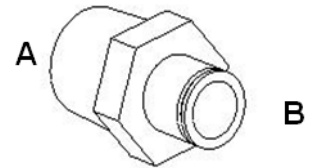
"COIL" PACKAGING IS LENGTH SPECIFIED +/- 1 FOOT, COILED AND EITHER TAPED, TIED, OR INSERTED INTO BAG TO ENSURE NEAT AND EASY HANDLING

" BULK" PACKAGING IS ON SPOOL OF LENGTH TO BE DETERMINED BY SUPPLIER, AND IS ORDERED BY THE FOOT

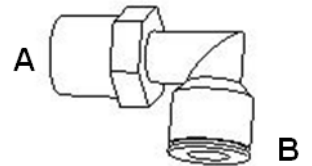
PART NUMBER	A	B	C	DESCRIPTION
726102	1/8			PTC PLUG
726103	1/4			PTC PLUG
726104	3/8			PTC PLUG



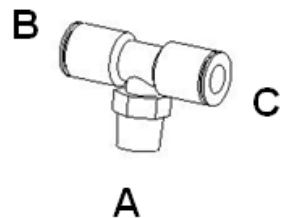
PART NUMBER	A	B	C	DESCRIPTION
726105	1/8 NPT	1/8 PTC		MALE NPT X PTC STRAIGHT
726106	1/8 NPT	1/4 PTC		MALE NPT X PTC STRAIGHT-BRASS
726107	1/4 NPT	1/4 PTC		MALE NPT X PTC STRAIGHT
726108	1/4 NPT	3/8 PTC		MALE NPT X PTC STRAIGHT



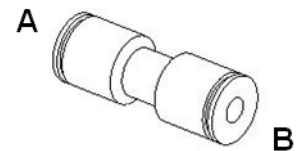
PART NUMBER	A	B	C	DESCRIPTION
726109	1/8 NPT	1/8 PTC		MALE NPT X PTC SWIVEL 90 ELBOW
726110	1/4 NPT	3/8 PTC		MALE NPT X PTC SWIVEL 90 ELBOW
726111	1/4 NPT	1/4 PTC		MALE NPT X PTC SWIVEL 90 ELBOW
726112	1/8 NPT	1/4 PTC		MALE NPT X PTC SWIVEL 90 ELBOW



PART NUMBER	A	B	C	DESCRIPTION
726113	1/8 NPT	1/4 PTC	1/4 PTC	MALE NPT X PTC SWIVEL TEE



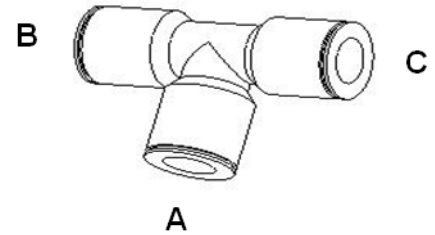
PART NUMBER	A	B	C	DESCRIPTION
726189	1/8 PTC	1/8 PTC		PTC UNION
726171	1/4 PTC	1/4 PTC		PTC UNION
726173	1/4 PTC	3/8 PTC		PTC UNION
726172	3/8 PTC	3/8 PTC		PTC UNION



PART NUMBER	A	B	C	DESCRIPTION
726506	1/4 PTC	1/4 PTC		PTC 1/4 TURN VALVE (VENTED)
726507	3/8 PTC	3/8 PTC		PTC 3/8 TURN VALVE (VENTED)



PART NUMBER	A	B	C	DESCRIPTION
726114	3/8 PTC	1/4 PTC	1/4 PTC	PTC TEE
726115	1/4 PTC	1/4 PTC	1/4 PTC	PTC TEE
726116	3/8 PTC	3/8 PTC	3/8 PTC	PTC TEE
726296	1/4 PTC	3/8 PTC	3/8 PTC	PTC TEE

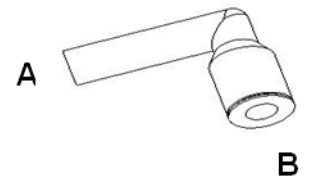


PART NUMBER	A	B	C	DESCRIPTION
726268	1/8 PTC			PTC CARTRIDGE FITTING
726269	1/4 PTC			PTC CARTRIDGE FITTING
726270	3/8 PTC			PTC CARTRIDGE FITTING

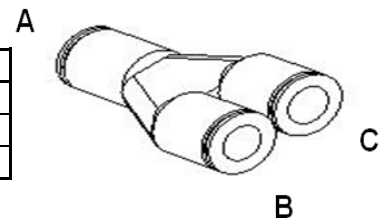
NOTE: THESE CARTRIDGE FITTINGS ARE NOT SERVICEABLE
ITEMS, USED IN PP PRODUCTION ONLY



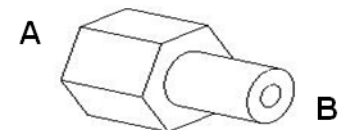
PART NUMBER	A	B	C	DESCRIPTION
726271	1/8	1/8 PTC		PLUG-IN ELBOW 90 DEGREE
726272	1/4	1/4 PTC		PLUG-IN ELBOW 90 DEGREE
726273	3/8	3/8 PTC		PLUG-IN ELBOW 90 DEGREE



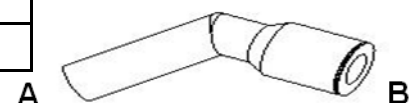
PART NUMBER	A	B	C	DESCRIPTION
726297	1/4 PTC	1/4 PTC	1/4 PTC	TUBE TO TUBE "Y"
726298	3/8 PTC	1/4 PTC	1/4 PTC	REDUCING "Y"
726299	3/8 PTC	3/8 PTC	3/8 PTC	TUBE TO TUBE "Y"



PART NUMBER	A	B	C	DESCRIPTION
726304	1/8 NPT	1/8 PTC		FEMALE CONNECTOR
726168	1/4 NPT	1/4 PTC		FEMALE CONNECTOR



PART NUMBER	A	B	C	DESCRIPTION
726303	3/8	3/8 PTC		PLUG-IN ELBOW 45 DEGREE



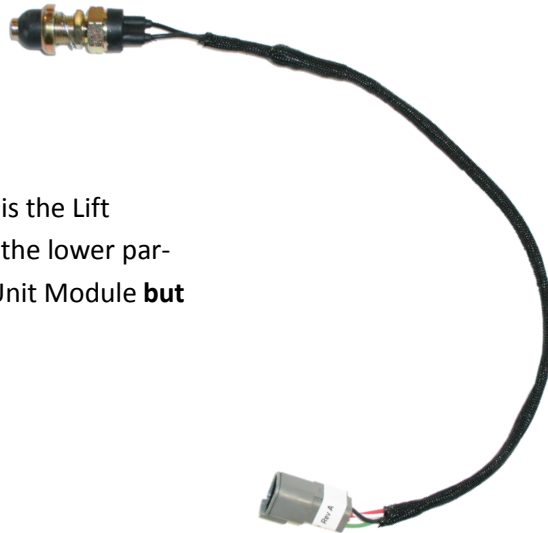
PART NUMBER	A	B	C	DESCRIPTION
726274				CAP - RED (LEGRIS)



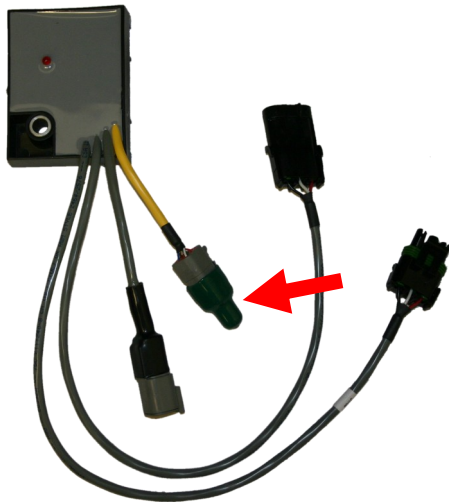
Lift Switch Installation

JD 1700 / 7200 Regular Parallel Arms

The final step of the Air Force installation is the Lift Switch. The Lift Switch will be located on the lower parallel arm of any row unit **that has** a Row Unit Module **but does not have** a Vacuum Sensor.



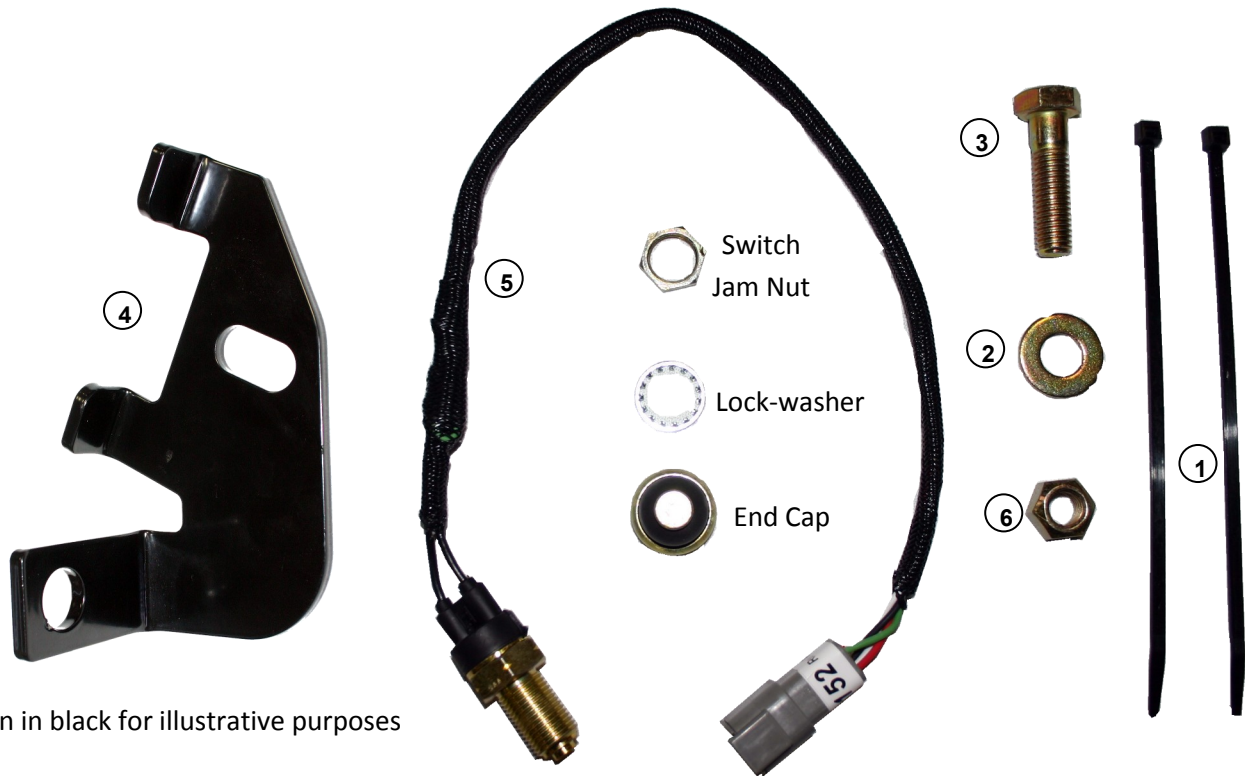
As a reminder, below are pictures of the Row Unit Module alone and shown as installed.



The Lift Switch has a 6-pin female receptacle that connects with the corresponding 6-pin Auxiliary male plug (shown above with yellow cable and green dust cap)

Lift Switch Installation

JD 1700 / 7200 Regular Parallel Arms



Shown in black for illustrative purposes

Item	Quantity	Part Number	Part Name	Description
1	2	63126	Cable Tie	8" UV Black
2	1	96057	Washer	1/2" SAE Flat YLW ZN
3	1	0162354	Bolt	M12X45 YLW ZN
4	1	726149	Bracket	
5	1	726608	Switch	
6	1	726205	Hex Nut	M12 Top Lock Nut YLW ZN

Install the nut and lock-washer on the threaded Switch Shaft and thread to the base. Insert the Switch through the hole in the provided bracket as shown at

Lock-washer
Separated for viewing, install along with



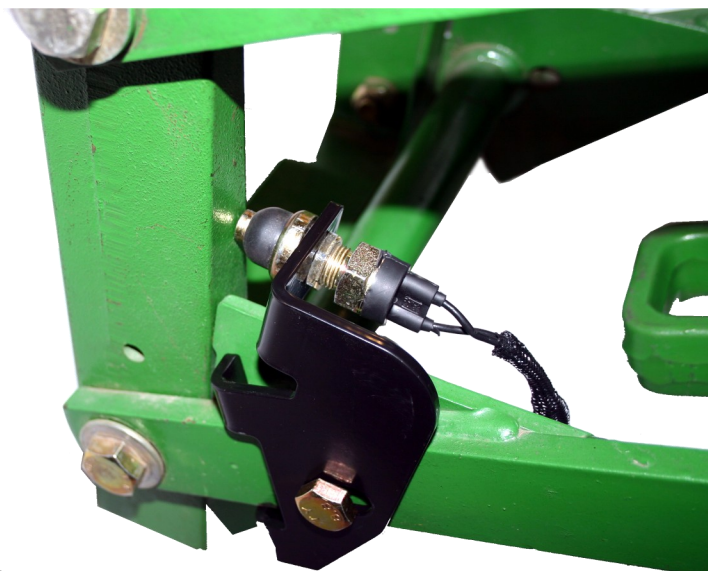
Lift Switch Installation

JD 1700 / 7200 Regular Parallel Arms



Once the Switch shaft is in place through the hole thread the End Cap fully onto shaft until finger tight. Fix in place by tightening the Nut/Lock-washer against the bracket using a

On a row unit with a R.U.M. and without a Vacuum/Pressure sensor, install the assembled Bracket/Switch onto the lower right hand (from rear) parallel arm towards the row unit. Align the assembly with the rear most hole in the parallel arms and hold in place using the provided M12X45 bolt, flat washer and hex nut. **Do not** fully tighten



The correct positioning of the Switch may be found with a raised planter by pushing against the assembly towards the rear of the row unit to depress the End Cap. Once the assembly has been properly positioned as shown at right, fix in place by tightening

Complete the installation by connecting the 6-Pin connector into the auxiliary port of R.U.M.



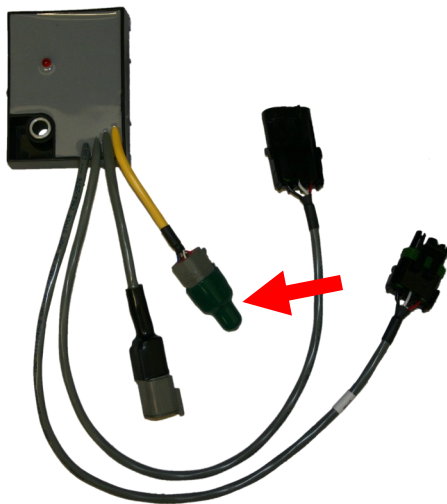
Lift Switch Installation

JD 1700 / 7200 Long Parallel Arms

The final step of the Air Force installation is the Lift Switch. The Lift Switch will be located on the lower parallel arm of any row unit **that has** a Row Unit Module **but does not have** a Vacuum Sensor.



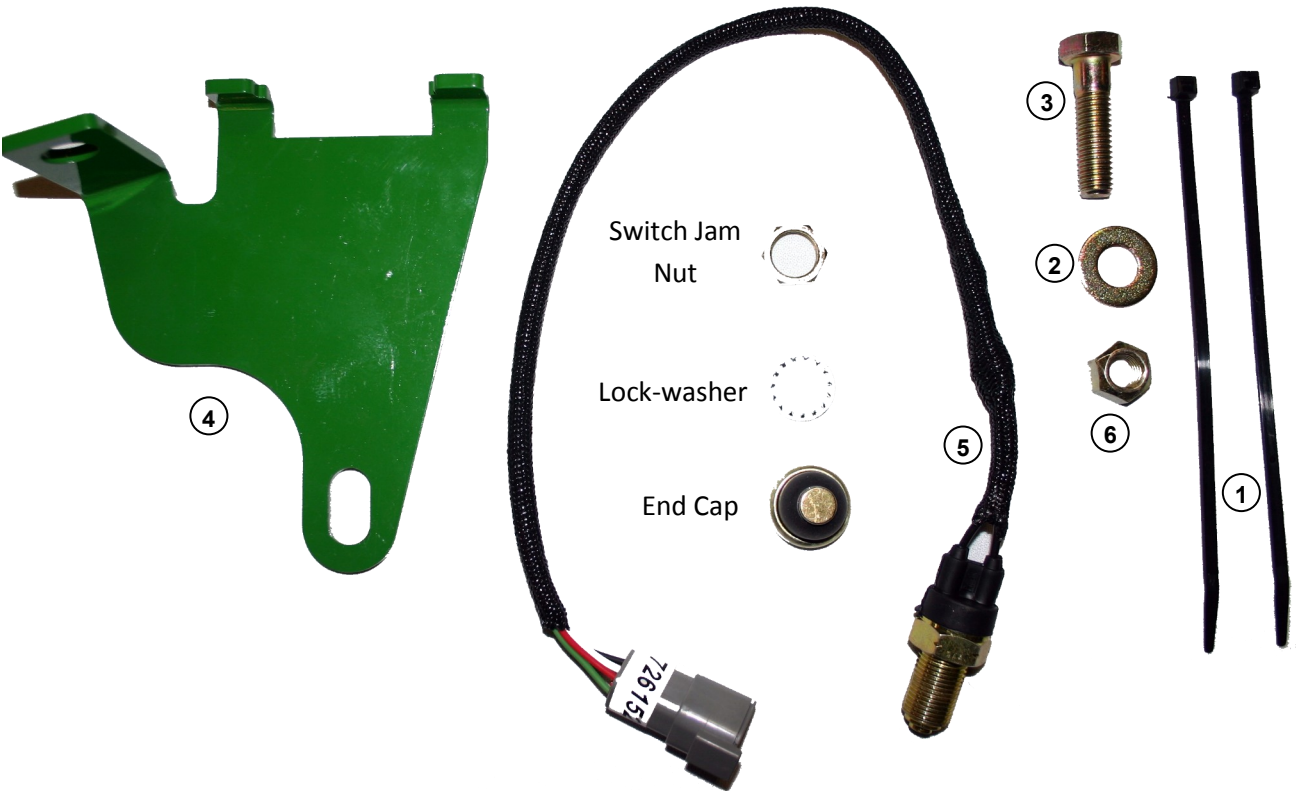
As a reminder, below are pictures of the Row Unit Module alone and shown as installed.



The Lift Switch has a 6-pin female receptacle that connects with the corresponding 6-pin Auxiliary male plug (shown above with yellow cable and green dust cap)

Lift Switch Installation

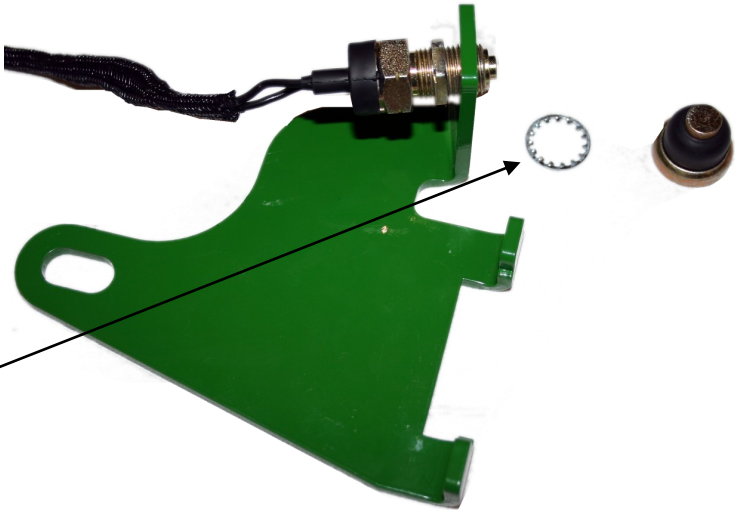
JD 1700 / 7200 Long Parallel Arms



Item	Quantity	Part Number	Part Name	Description
1	2	63126	Cable Tie	8" UV Black
2	1	96057	Washer	1/2" SAE Flat YLW ZN
3	1	0162354	Bolt	M12X45 YLW ZN
4	1	726151	Bracket	
5	1	726608	Switch	
6	1	726205	Hex Nut	M12 Top Lock Nut YLW ZN

Install the nut and lock-washer on the threaded Switch Shaft and thread to the base. Insert the Switch through the hole in

Lock-washer
Separated for viewing, install along with



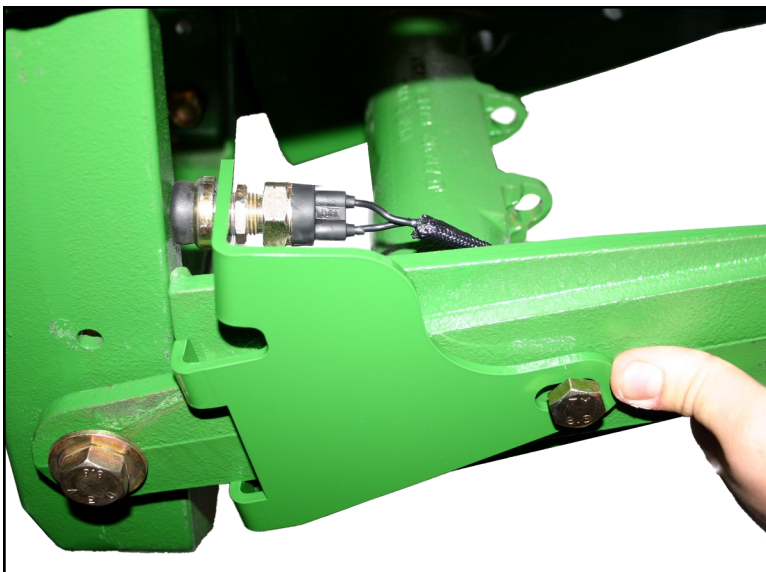
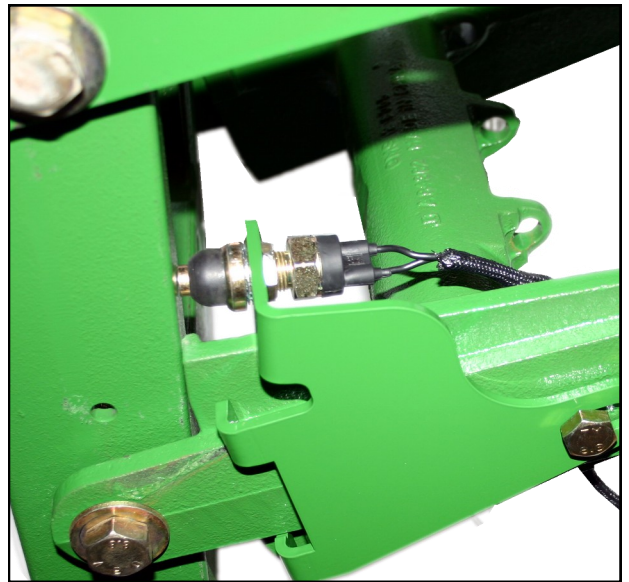
Lift Switch Installation

JD 1700 / 7200 Long Parallel Arms



Once the Switch shaft is in place through the hole thread the End Cap fully onto shaft until finger tight. Fix in place by tightening the Nut/Lock-washer against the bracket

On a row unit with a R.U.M. and without a Vacuum/Pressure sensor install the assembled Bracket/Switch onto the lower right hand parallel arm. Align the assembly with the rear most hole in the parallel arms and hold in place using the provided M12X45 bolt, flat washer and hex nut. **Do not** fully tighten the assembly until you have properly



The correct positioning of the Switch may be found with a raised planter by pushing against the assembly towards the rear of the row unit to depress the End Cap. Once the assembly has been properly positioned as shown at left,

Complete the installation by connecting the 6-Pin connector into the auxiliary port of R.U.M.



Lift Switch Installation

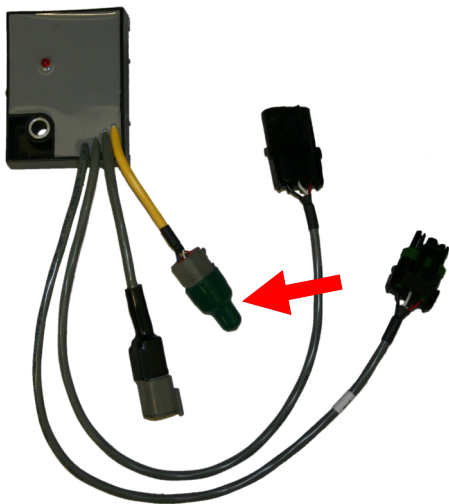
JD 7000 / Kinze

Regular Parallel Arms

The final step of the Air Force installation is the Lift Switch. The Lift Switch will be located on the lower parallel arm of any row unit **that has** a Row Unit Module **but does not have** a Vacuum Sensor.



As a reminder, below are pictures of the Row Unit Module alone and shown as installed.



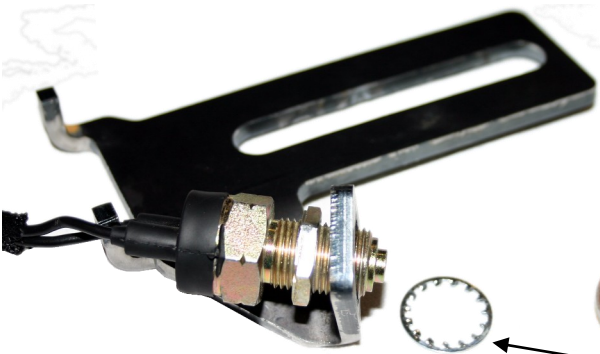
The Lift Switch has a 6-pin female receptacle that connects with the corresponding 6-pin Auxiliary male plug (shown above with yellow cable and green dust cap)

Lift Switch Installation

JD 7000 / Kinze Regular Parallel Arms



Item	Quantity	Part Number	Part Name	Description
1	2	63126	Cable Tie	8" UV Black
2	1	33086	Washer	1/2" SAE Flat YLW ZN
3	1	13210	Bolt	1/2"X1.75 GRD 5
4	1	726257	Bracket	
5	1	726608	Switch	
6	1	37268	Lock Nut	1/2" SAE Top GRD C



Install the nut and lock-washer on the threaded Switch Shaft and thread to the base. Insert the Switch through the hole in the provided bracket as

Lock-washer
Separated for viewing, install along with

Lift Switch Installation

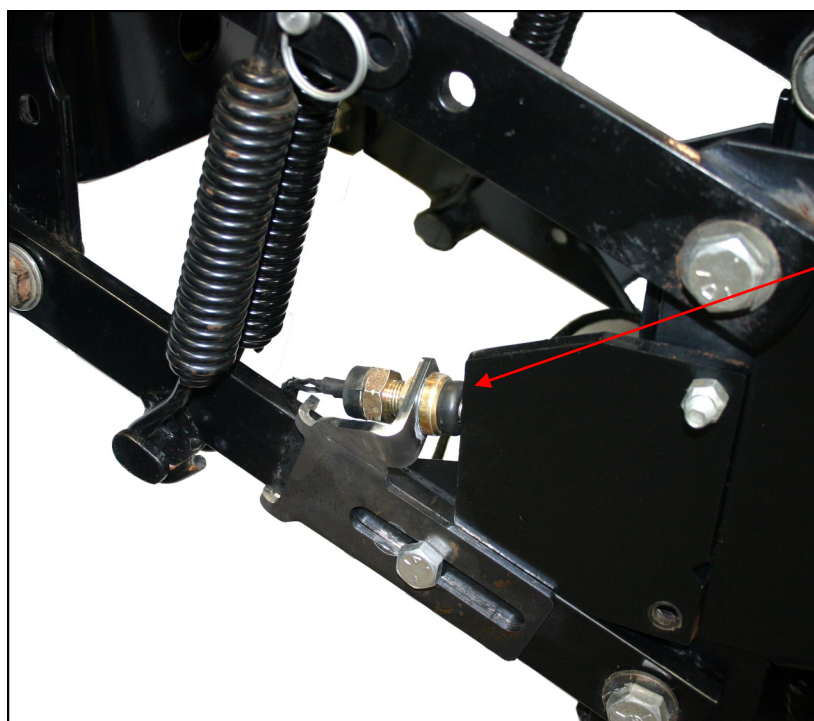
JD 7000 / Kinze

Regular Parallel Arms

Once the Switch shaft is in place through the hole thread the End Cap fully onto shaft until finger tight. Fix in place by tightening the Nut/Lock-washer against the bracket using a wrench. Completed assembly shown at right.



On a row unit with a R.U.M. and without a Vacuum/Pressure sensor install the assembled Bracket/Switch onto the lower left hand parallel arm. Align the assembly with the rear most hole in the parallel arms and hold in place using the provided 1/2" X 1.75 bolt, flat washer and hex nut. **Do not** fully tighten the assembly



The correct positioning of the Switch may be found with a raised planter by pushing against the assembly towards the rear of the row unit to depress the End Cap. Once the assembly has been properly positioned as shown at left, fix in place by tightening down the 1/2"



Complete the installation by connecting the 6-Pin connector into the auxiliary port of R.U.M.

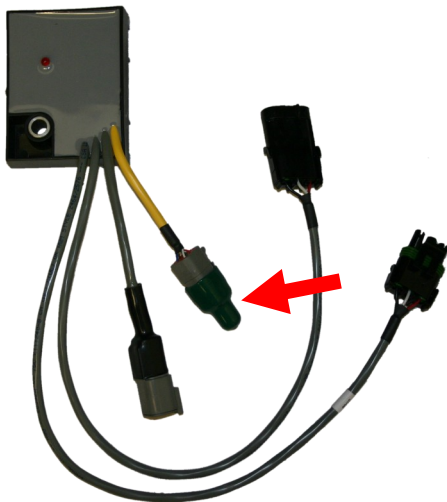
Lift Switch Installation

Great Plains YP Series Planters

The final step of the Air Force installation is the Lift Switch. The Lift Switch will be located on the lower parallel arm of any row unit **that has** a Row Unit Module **but does not have** a Vacuum Sensor.



As a reminder, below are pictures of the Row Unit Module alone and shown as installed.



The Lift Switch has a 6-pin female receptacle that connects with the corresponding 6-pin Auxiliary male plug (shown above with yellow cable and green dust cap)

Lift Switch Installation

Great Plains YP Series Planters



Item	Quantity	Part Number	Part Name	Description
1	2	37264	Hex Nut	3/8" Top Lock Nut
2	2	63126	Cable Tie	8" UV Black
3	1	726522	U-Bolt	For 2"X1.5" Tube
4	1	726608	Switch	
5	1	726624	Bracket	Great Plains Lift Switch

Install the nut and lock-washer on the threaded Switch Shaft and thread to the base. Insert the Switch through the hole in the provided bracket.



Lift Switch Installation

Great Plains YP Series Planters



Once the Switch shaft is in place through the hole thread the End Cap fully onto shaft until finger tight. Fix in place by tightening the Nut/Lock-washer against the bracket using a wrench. Completed assembly shown at left.

Complete this step with the planter raised.

On a row unit with a R.U.M. and without a Vacuum/Pressure sensor install the assembled Bracket/Switch onto the upper parallel arm. With the bracket on the underside of the upper parallel arm, rotate and position the assembly so that the End Cap of the switch is depressed against the stop bracket. Secure the assembly in place using the provided 2" X 1.5" U-bolt and two

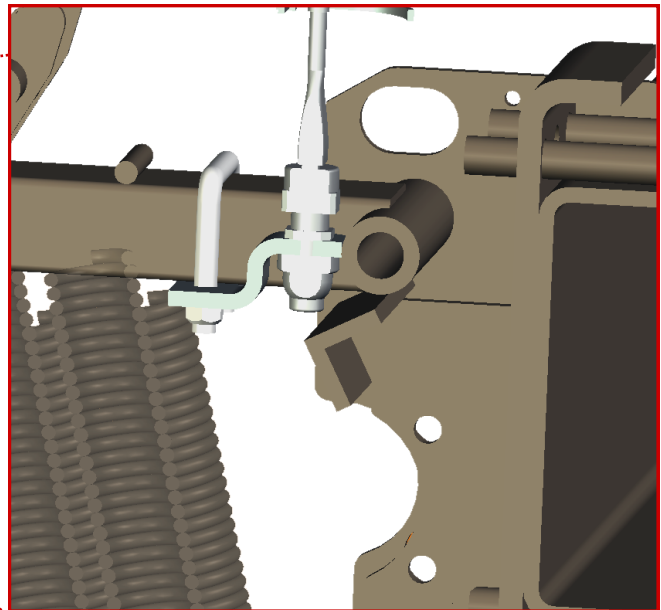
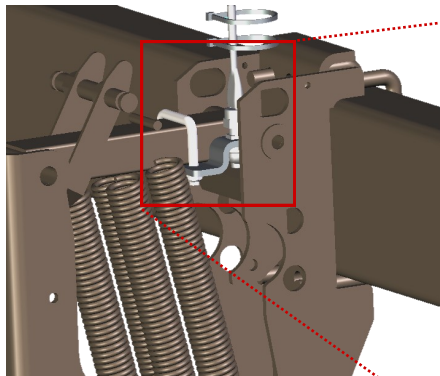


Image shown in Side profile

Align as necessary to fully depress the End Cap



Complete the installation by connecting the 6-Pin connector into the auxiliary port of R.U.M.

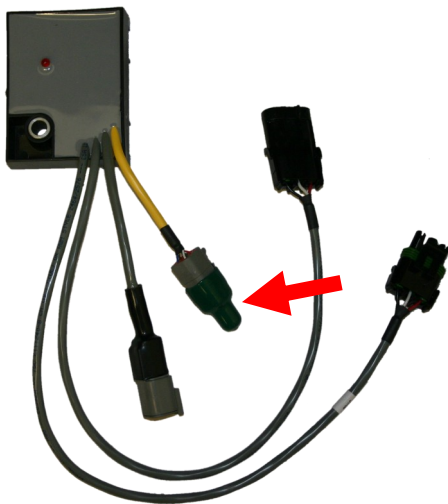
Lift Switch Installation

CNH - White

The final step of the Air Force installation is the Lift Switch. The Lift Switch will be located on the lower parallel arm of any row unit **that has** a Row Unit Module **but does not have** a Vacuum Sensor.



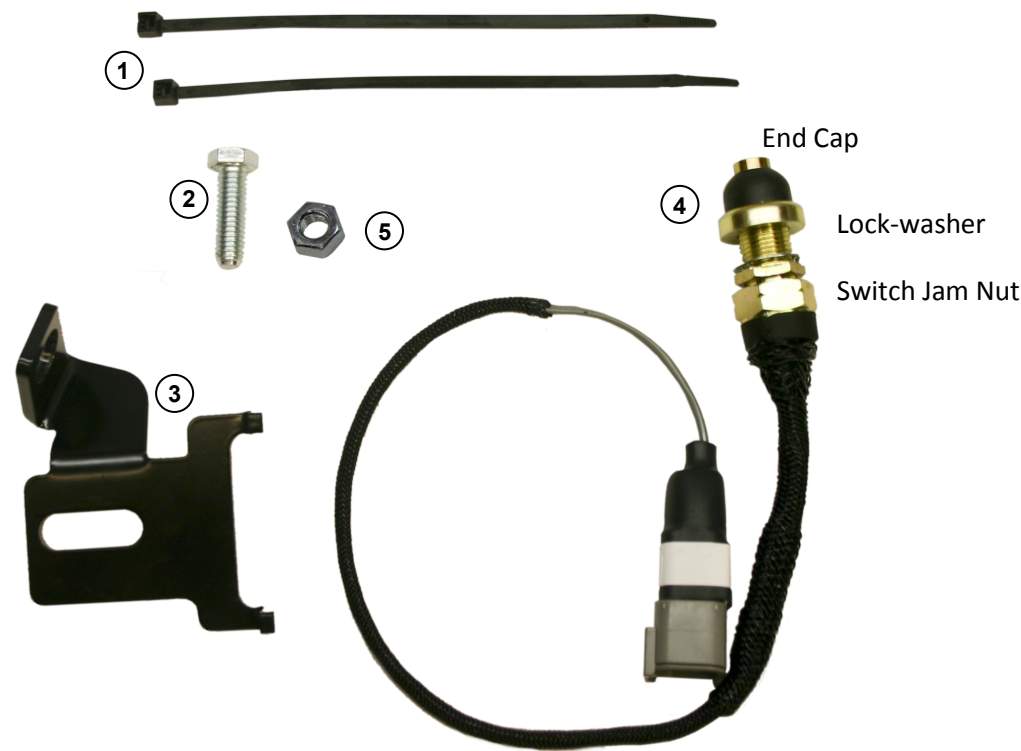
As a reminder, below are pictures of the Row Unit Module alone and shown as installed.



The Lift Switch has a 6-pin female receptacle that connects with the corresponding 6-pin Auxiliary male plug (shown above with yellow cable and green dust cap)

Lift Switch Installation

CNH - White



Item	Quantity	Part Number	Part Name	Description
1	2	63126	Cable Tie	8" UV Black
2	1	13107	Bolt	3/8" X 1.25 GRD 5
3	1	726636	Bracket	Mounting Bracket
4	1	726608	Switch	Lift Switch
5	1	37264	Hex Nut	3/8" Top Lock Nut



Install the nut and lock-washer on the threaded Switch Shaft and thread to the base. Insert the Switch through the hole in the provided bracket as

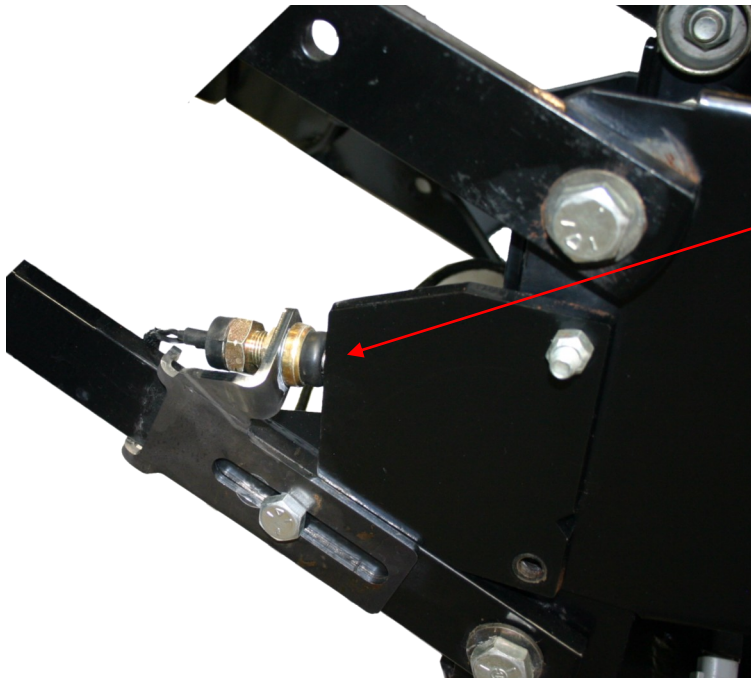
Lift Switch Installation

CNH - White

Once the Switch shaft is in place through the hole thread the End Cap fully onto shaft until finger tight. Fix in place by tightening the Nut/Lock-washer against the bracket using a wrench. Completed assembly shown at right.



On a row unit with a R.U.M. and without a Vacuum/Pressure sensor install the assembled Bracket/Switch onto the lower left hand parallel arm when standing behind the planter facing forward. Align the assembly with the rear most hole of the parallel arm and hold in place using the provided 1/2" X 1.75 bolt, flat washer and hex nut. **Do not** fully tighten the assembly until you have properly positioned the Switch.



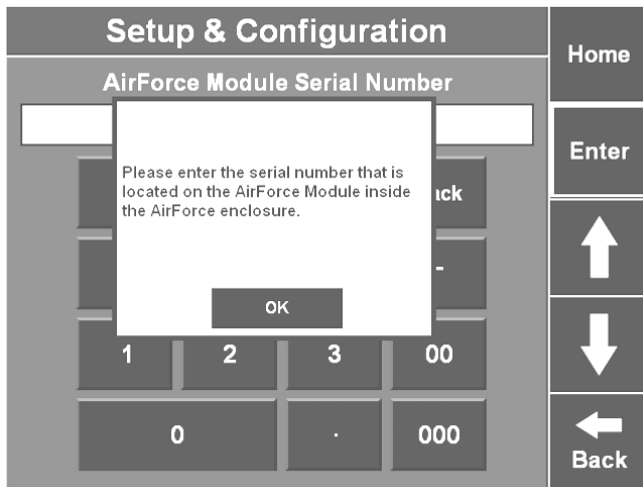
The correct positioning of the Switch may be found with a raised planter by pushing against the assembly towards the rear of the row unit to depress the End Cap. Once the assembly has been properly positioned as shown at left, fix in place by tightening down the 1/2"



Complete the installation by connecting the 6-Pin connector into the auxiliary port of R.U.M.

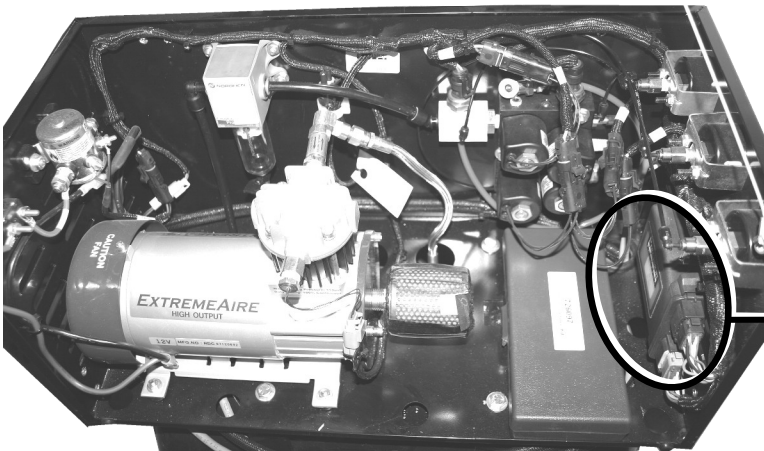
Initial Start-up

Now that you have the AirForce mounted, installed, and ready for use; let's walk through the initial set-up process.

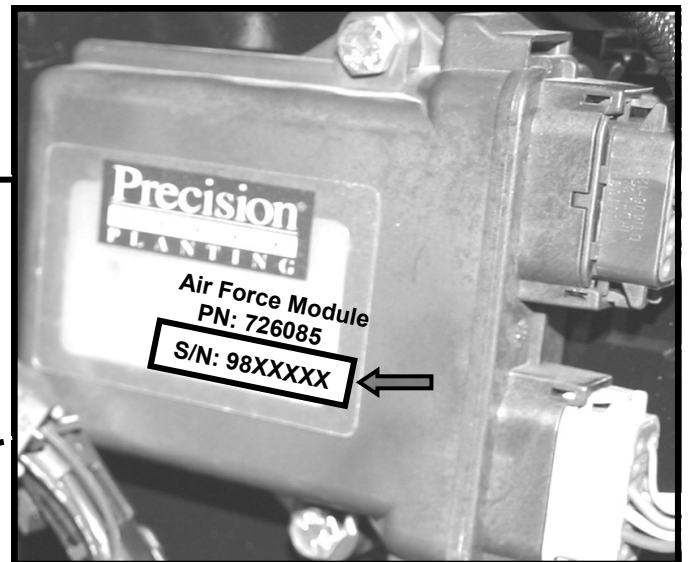
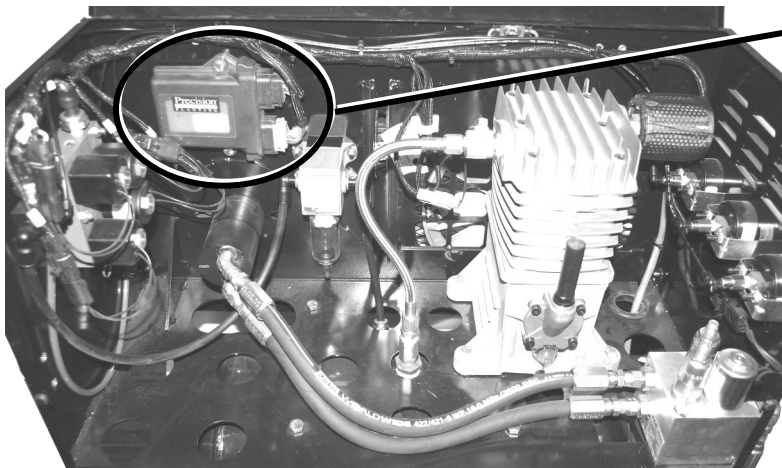


Upon installation of the AirForce - and more specifically communication with the AirForce Control Module (AFM) the SeedSense display unit will display the pop-up message shown at left. The system will request a serial number for the AFM in order to create a paired relationship between the two components. The serial number can be located on the outside of the AFM, shown below for both a 12V and Hydraulic compressor models.

12V Compressor



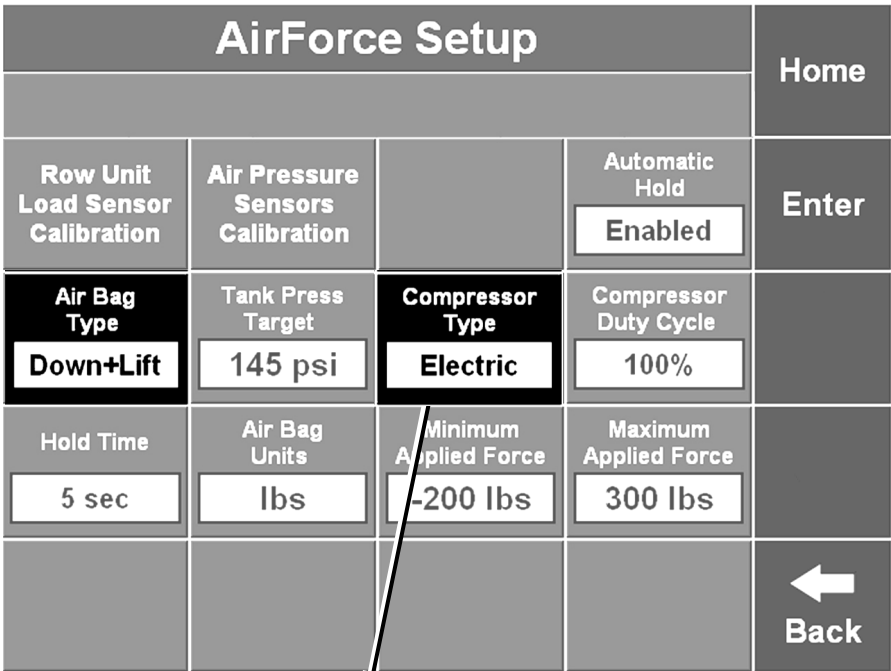
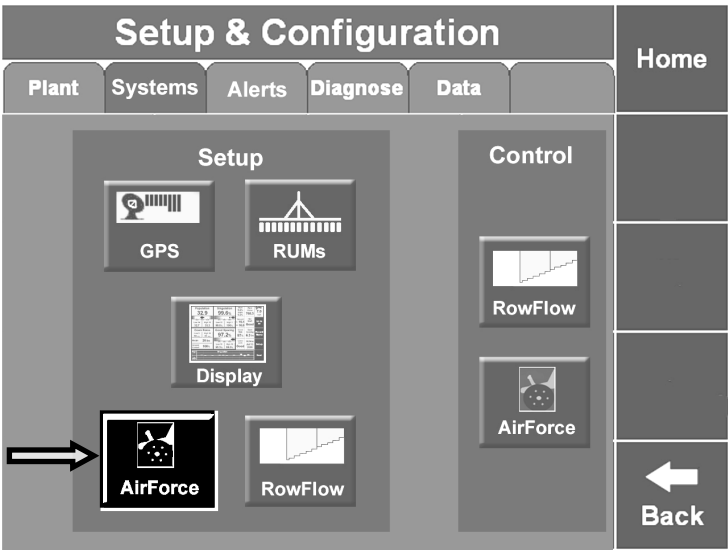
Hydraulic Compressor



Declaring Compressor Type

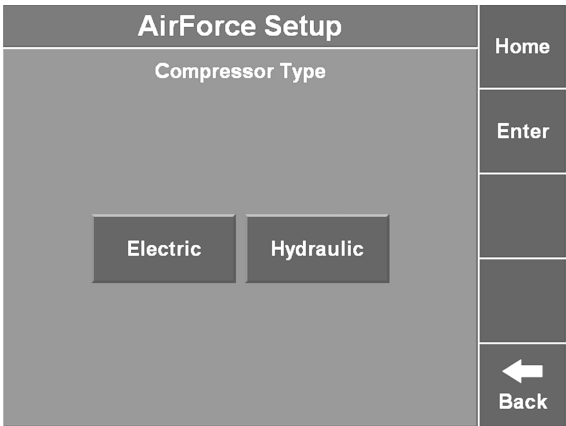
Once the AFM Serial Number has been entered and confirmed, the system will default to the *Setup & Configuration* page. Select the 'Systems' Tab, and then select the 'AirForce' button under the **Control** section as shown at right. This should bring you to the AirForce Setup Page.

You can also reach the AirForce Setup page from the Home Screen by pressing
Setup | Systems | AirForce,
or
AirForce | then the *Setup* button.



This page primarily contains settings and parameters that will outline the control of AirForce. At this time we need to focus only on assigning values for the **Air Bag Type** and **Compressor Type**.

We will return to this page in greater detail once the system is 100% operational.



First, select the Compressor Type icon as shown. This will bring you to another screen that will allow you to declare which type of compressor the installed AirForce system has. Simply select the correct choice and the system will return you to the *AirForce Setup* with your selection displayed in the box.

If you happen to touch the wrong compressor type, simply re-select the Compressor Type icon and repeat the process

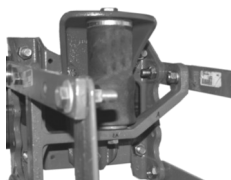
Declaring Air Bag Type

Once the Compressor Type has been set, the system will return you to the AirForce Setup page. The next step will be to declare the **Air Bag Type**. Select the Air Bag Type icon from this page.

AirForce Setup				Home
Row Unit Load Sensor Calibration	Air Pressure Sensors Calibration		Automatic Hold Enabled	Enter
Air Bag Type	Tank Press	Compressor	Compressor	
Down+Lift	145 psi	Electric	100%	
Hold Time	Air Bag Units	Minimum Applied Force	Maximum Applied Force	
5 sec	lbs	-200 lbs	300 lbs	
				← Back

AirForce Setup			Home
⇒ Down Force System			Enter
Single Factory Airbags	Dual Airbags	Prec. Planting Airbags	↑
Side Springs	Adj Heavy Duty Springs	Other	↓
			← Back

The first page of the Air Bag Type selection process is to declare which **DOWN FORCE SYSTEM** is on the planter. An example and description of the style of Down Force that each choice applies to are listed below.



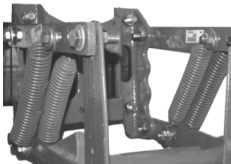
Single Factory Airbags: These are OEM / Dealer installed with a single Down Bag per row .



Dual Airbags: These are OEM / Dealer installed with **two** Down Air Bags per row



Precision Planting Airbags: These are Down Air Bags purchased from Precision Planting and installed by the customer or by a Precision Planting representative.



Side Springs: These are the springs that connect **to and alongside** the parallel arms of the row unit, and may be Single (two springs per row) or Dual Side Springs (four springs per row - shown).



Adjustable Heavy Duty Springs: This style of springs has two to four springs placed **in between** the parallel arms of the row unit.

Other : When choosing this option the system will bring up an entry window that will allow you to name the type of Down Force System that you have. NOTE: by selecting this option you will be limiting the control options of the system to LIFT ONLY.

Declaring Air Bag Type

Once the Down Force System has been selected, the system will continue to the next page where you will need to declare which Lift Force System the planter has installed on it.

AirForce Setup	
Lift Force System	
Prec. Planting Airbags None	
Home Enter Back	

If you have purchased and installed a system to control Down and Lift Forces, select :
Precision Planting Airbags.

If you have purchased and installed a system to control the Down Force only, select:
None.

Now that the Lift Force System has been selected the system will return to the AirForce Setup page. Review the Air Bag Type and Compressor Type selections you have made to ensure accuracy before moving forward. If you have made any mistakes, simply repeat the above process to make the appropriate changes.

Once you are satisfied with your choices, continue setting up your AirForce system by selecting the *Back* button in the lower right hand portion of the screen, followed by the Diagnose Tab on the following Page.

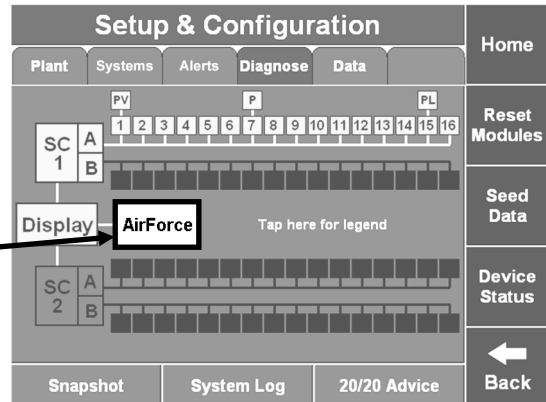
AirForce Setup			
Row Unit Load Sensor Calibration	Air Pressure Sensors Calibration		Automatic Hold Enabled
Air Bag Type Down+Lift	Tank Press Target 145 psi	Compressor Type Electric	Compressor Duty Cycle 100%
Hold Time 5 sec	Air Bag Units lbs	Minimum Applied Force -200 lbs	Maximum Applied Force 300 lbs
Back			

Setup & Configuration				
Plant	Systems	Alerts	Diagnose	Data
Home				
 GPS RUMs			 RowFlow	
 Display				
 AirForce		 AirFlow		
 RowFlow				
Back				

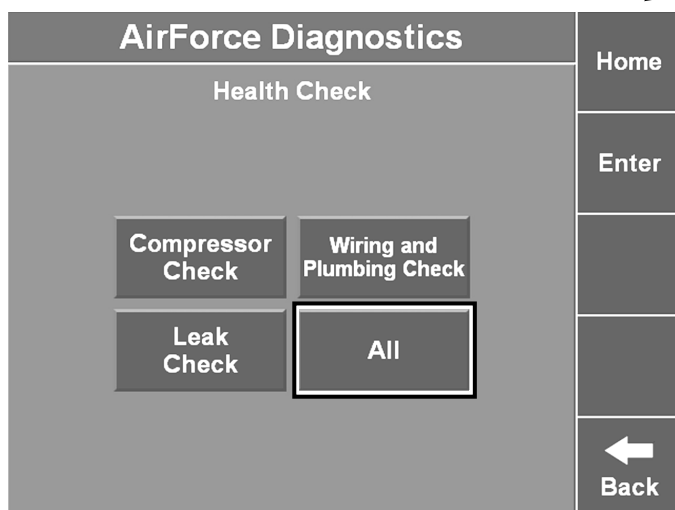
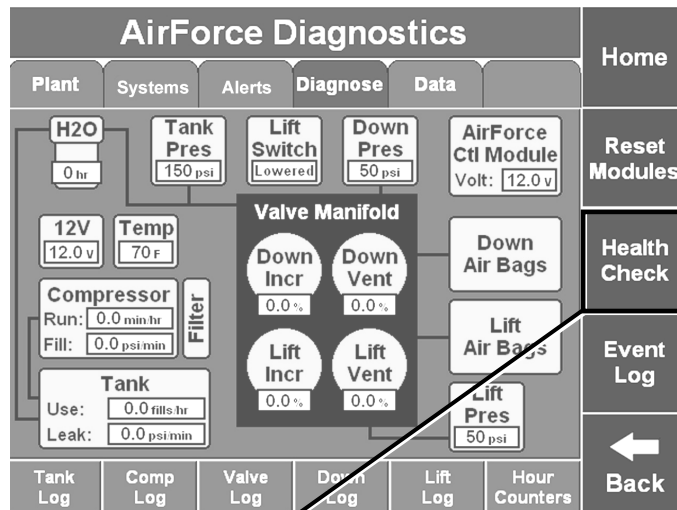
Running Health Check

The next steps require the tractor to be running, all power and communication cables connected, and the appropriate hydraulic circuit engaged (Hydraulic compressors only)

The Diagnose Tab will remain similar to the Base version of SeedSense, with the addition of an AirForce icon in the center of the screen, to the right of DISPLAY. This is an actionable icon that will open the AirForce Diagnostics page. Press this button to continue.



The AirForce Diagnostics screen, shown below, will be the primary destination for troubleshooting and system health updates. We will return to this page in greater detail once the system is 100% operational. For now, press the Health Check button on the right hand side of the page to continue.

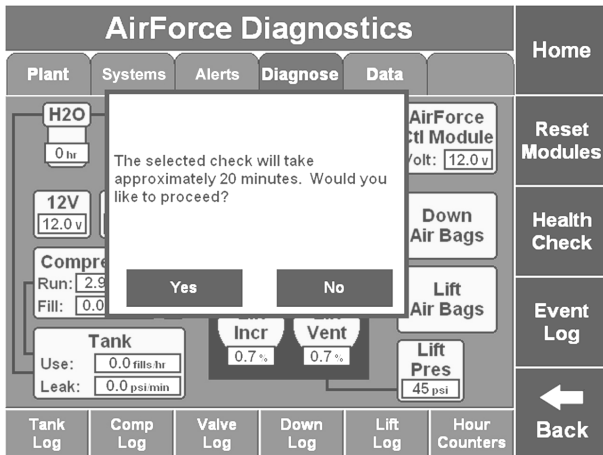


The system will direct you to the Health Check menu page. From here you can select to run individual or comprehensive system health checks. There are three main Health Checks. These may be performed individually by selecting the button for a specific check or all at once by selecting the 'ALL' button.

For the initial system set-up it is recommended to begin with the 'All' choice to check the entire system. Press the 'All' button to continue.

If the stability of the system is in question, the user can run a Health Check for the component in question, or re-run the 'All' Health Check at any time.

Running Health Check



Once you've selected which Health Check you'd like to run, a warning box will pop up asking you to verify your choice.

Note: The system will require the tractor to remain running and all circuits engaged for the entire duration of the test. Also, you will not be able to navigate away from the Diagnostics page until the test has completed.

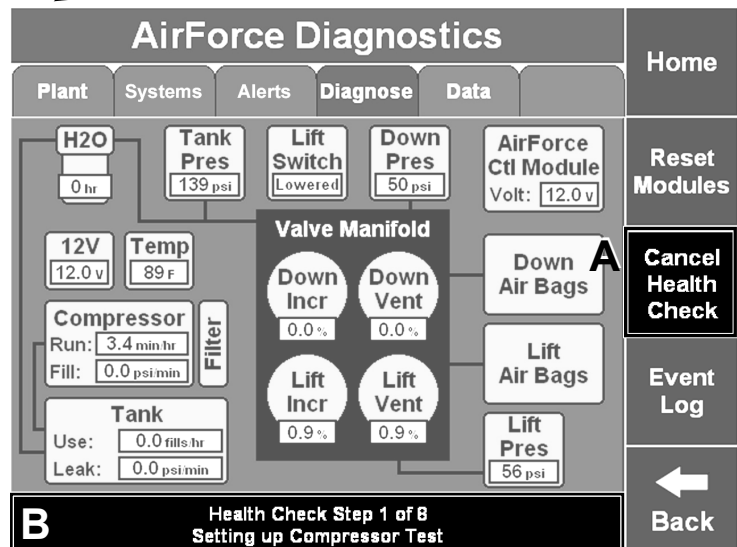
Press 'Yes' to continue and begin the Health Check.



Once the Health Check has begun you will note the appearance of two new icons present during the test.

A Cancel Health Check : If it becomes necessary to navigate away from the Diagnostic page or otherwise prematurely end a Health Check press this button. A dialog box will pop up asking you to verify your choice.

B Health Check Progress: This bar will state the progress of the Health Check (a full check has 8 steps, approximately 20 minutes) and a brief description of the current step. See below for a more detailed description of the individual Health Check steps.



Health Check

Step 1	Compressor Check	Setting up Compressor Check	Tank Pressure will drop to or below 100psi
Step 2		Building Tank Pressure to 130psi	System will verify build rate to 130psi
Step 3	Wiring and Plumbing Check - Down	Checking Down Circuit	System will build and release pressure between 20 & 100psi
Step 4	Wiring and Plumbing Check - Lift	Checking Lift Circuit	System will build and release pressure between 20 & 100psi
Step 5	Leak Check Tank	Checking Tank pressure	System will build pressure >120psi, measure decay
Step 6	Leak Check - Down	Checking Down Circuit Pressure	System will build pressure >100psi, measure decay
Step 7	Leak Check - Lift	Checking Lift Circuit Pressure	System will build pressure >100psi, measure decay
Step 8		Verify Gauges	System will prompt user to verify that Display Unit and Analog Gauges are within 5psi of each other

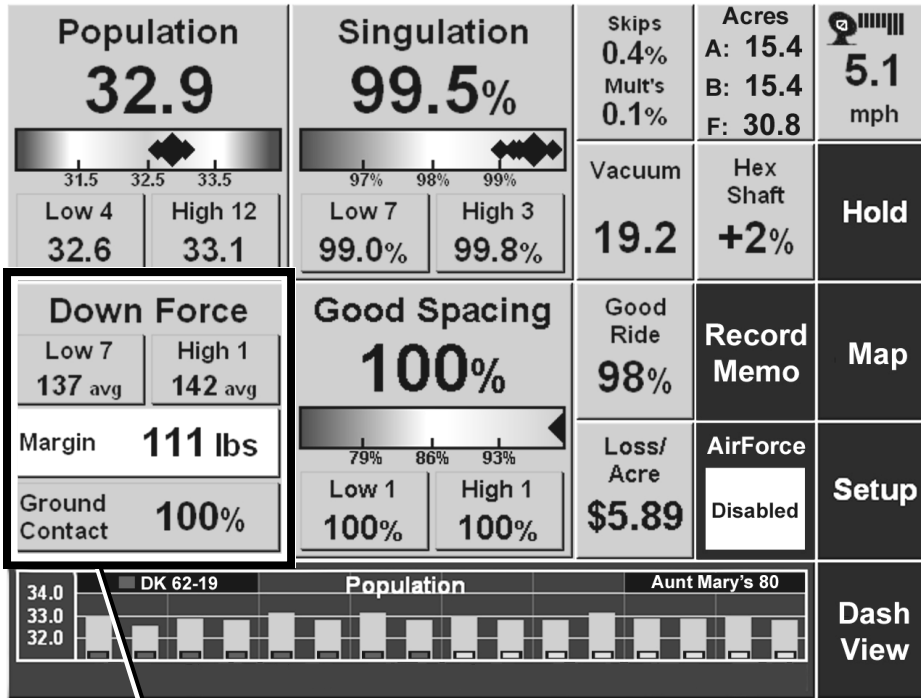
In a healthy system, no individual step or check should take longer than 7 minutes. If this happens, Cancel Health Check and press Reset Modules prior to a second attempt. After a second failed attempt, refer to the Troubleshooting index.

AirForce is now ready to use.

Please continue reading the Walk-through for more Operational training.

Walk-through

Press the Home button in the upper right hand corner to return to the Home screen and begin the Walk-through.



The AirForce system will be disabled upon startup and will automatically disable itself anytime power or communication to the system is reset or fluctuated. This is because the system will be controlling moving parts on the planter. It is a safety aspect of the system and cannot be bypassed.

In its Default configuration, AirForce will display on the *Home* screen with the Tank, Down, and Lift circuits displayed. The gauges on the enclosure are readings in psi of the respective circuits. The home screen uses the pounds of applied force because it is more intuitive and that it equates more fluently to the margin readings.

A note about the information displayed on the Home Screen as it pertains to AirForce:

The Down Force quadrant is primarily a display of the Input to AirForce. In other words, this is the information that AirForce will be basing its decisions upon.

The specific row unit and Smart-Pin readings are displayed for both the Highest and Lowest average readings over the past 3 seconds

This button displays the percent GROUND CONTACT, and MARGIN (in lbs) as a planter-wide average.



Pressing the Down Force button on the *Home* screen will open the *Down Force Details* page.



When operating an AirForce system, the Down Force details page will display additional information compared to the basic SeedSense. When AirForce control is **Enabled**, a new bar is added to the left side of the chart to show the target zone of the active control mode. The active control mode is displayed in the bottom left corner of the screen. Other new information displayed at the bottom of the screen includes Tank Pressure as well as Applied Net Force.

Let's look at the **Down Force Details** page in a little more detail:

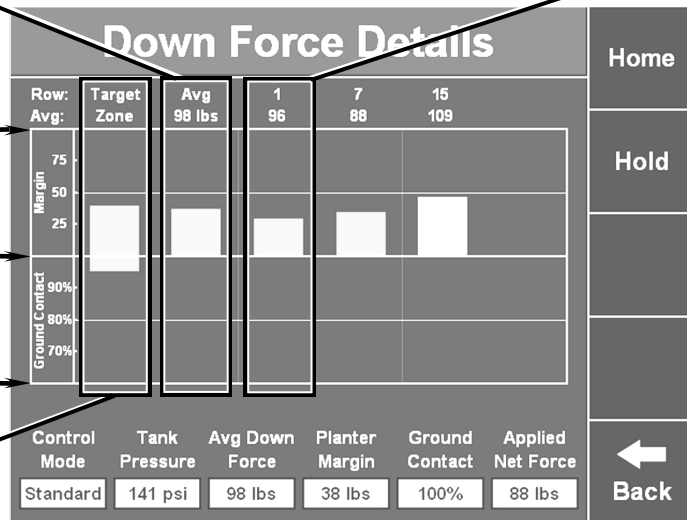
This column displays an average of the individual row units / Smart-Pins that are shown to the right. The actual value is displayed below the column title in addition to the bar graph for quick viewing while planting. **

This section of the bar graph represents the average **Margin** values for each row unit with a RUM & Smart-Pin.

This section of the bar graph represents the average **Percent Ground Contact** values for each row unit with a RUM & Smart-Pin.

The Target Zone is a graph of the Control Mode parameters that AirForce will attempt to manage the planter within. This graph will be present only when the system is *Enabled* and in an Automatic Control mode. This graph will disappear when AirForce is *Disabled* and while operating in the Manual Mode.

The bar graphs to the right of the Averaged view show the specific row (A) and the Smart-Pin readings (B) for each row unit that is equipped. The individual rows are also given a bar graph (C) for quick reference.



Control Mode: This box displays the active Control Mode of the system. The display will read *Manual* when the system is in the Manual mode **as well as** when the system is Disabled.

Tank Pressure: This box will display the current pressure in the Tank, displayed in psi. This reading should be within ± 7 psi of the Analog gauge on the front of the enclosure.

Average Down Force: This box will display the Down Force as a planter-wide average of the individual Smart-Pin readings. This information is mirrored by the graph above. **

Planter Margin: This box displays the Margin as a planter-wide value. This is determined as the amount of Down Force greater than that required by the opening discs to reach the prescribed planting depth. A simple means of interpreting this is simply; Margin = extra weight.

Ground Contact: This box displays the percentage Ground Contact of the planter as a whole. This is determined as the amount of time that the gauge wheels have 5lbs or greater weight registering on them. This will be displayed graphically above when the value is below 100%.

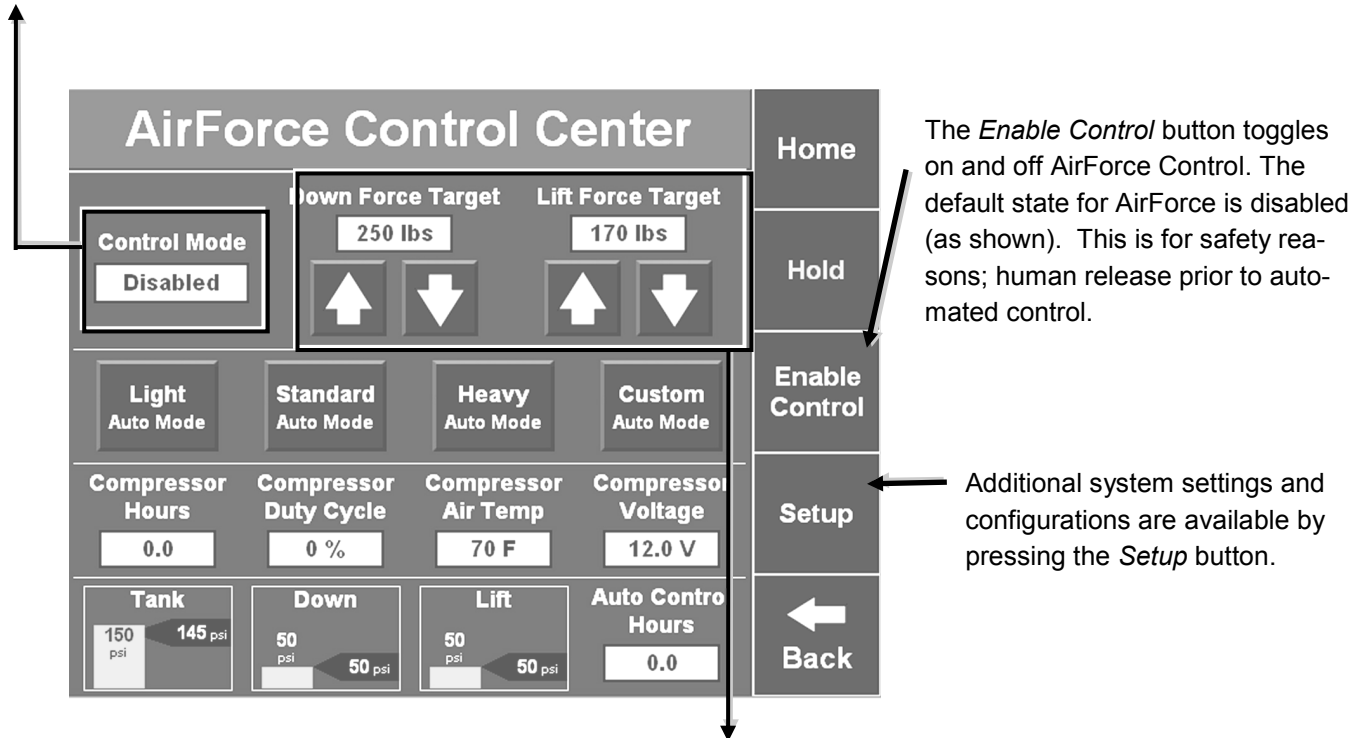
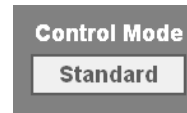
Net Applied Force: This box displays the net effect the system is placing on the row units (across the planter as a whole). This is based only on the forces being controlled, not the inherent weight of the row units themselves. The calculation for this is:

$$\begin{array}{r} \text{Down Force} \\ - \text{Lift Force} \\ \hline = \text{Net Applied Force} \end{array}$$

At this point, press the **Home** button to return the Home screen

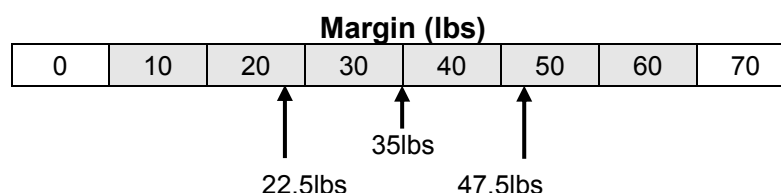
From here we will delve into the control of the AirForce system. Press on the AirForce button on the home screen to access the AirForce Control Center.

The active Control Mode will be displayed in the upper left corner of the Display. The status of AirForce will be displayed in yellow when disabled. This view will switch to green highlighting when displaying the active control mode.

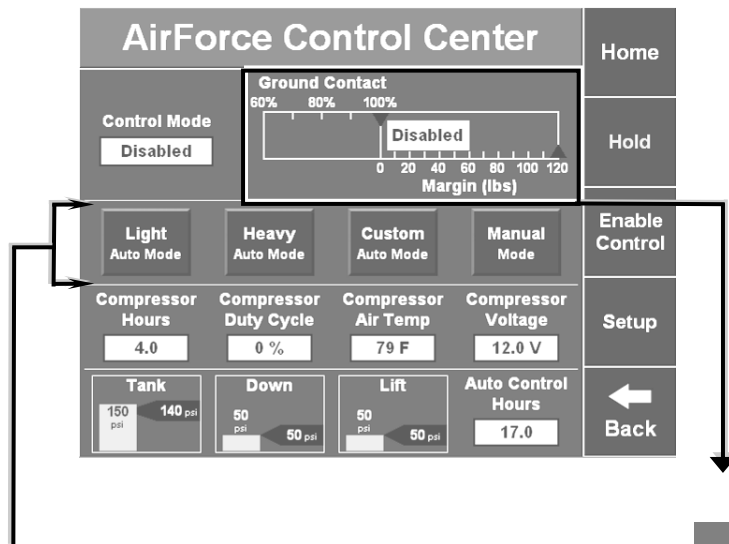


The target zone bar graph displays the percent of Ground Contact to the left of the median and the pounds of Margin to the right. The target zone is displayed by the green bar, the actual values are represented by the black triangles along the top and bottom.

All automatic modes will attempt to control to the median of the target zone. As the actual value moves away from the median of the target zone the system will take action once the value has passed half-way towards either extreme. Using the example below, the system is in Standard Automatic mode with a target zone between 10 & 60lbs of Margin. The arrow from 35lbs designates the median value. The arrows from 22.5 and 47.5lbs designate the point at which AirForce will take action to return the actual value to the median.

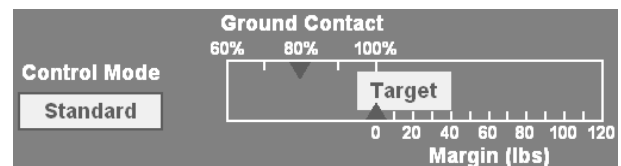


This becomes important as the control modes change, especially within the Custom Automatic mode. This allows the user an additional means of controlling the reactivity of the system. A wider target zone should have fewer reactions moving a larger force. A tighter target zone should have more reactions moving a smaller force.

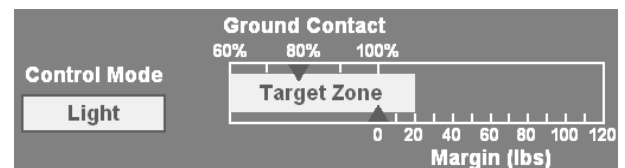


The AirForce Control Center is where you will choose the active control mode. The four available (not selected) control modes will be shown in the black boxes across the center of the page. Selecting any one of these will alter the display at the top right to reflect the target parameters of the new control mode.

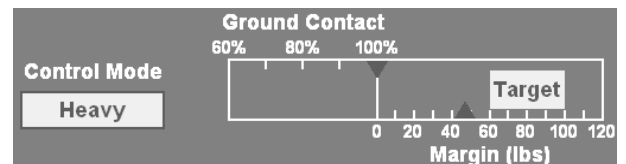
Standard Automatic: This is the most common setting for AirForce. The target range for this mode is set for 10-60 lbs of Margin with 100% Ground Contact.



Light Automatic: This control mode moves the target range from 20lbs of Margin to a low of 60% Ground Contact. **This control mode will sacrifice Ground Contact - potential seeding depth - to ensure a minimum Margin!** Use this mode when uniform seeding depth and/or moisture are not as yield limiting as potential row compaction. Rarely used over an entire field, most commonly used for spot controlling small wet areas



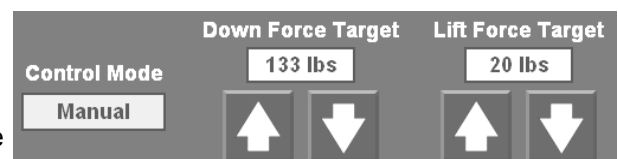
Heavy Automatic: This control mode moves the target range to 60-100lbs of Margin with 100% Ground Contact. Use this control mode when extra Down Force is required; dry conditions or cloddy seed-bed. **Note: crushing clods and minimizing Margin are opposing ideas!!** Ensuring good seed to soil contact in dry or cloddy field conditions will outweigh any additional Margin concerns.



Custom Automatic: This control mode allows the user to create their own target zone within an automatic control. Once this mode is selected you will notice the addition of four buttons surrounding the target zone graph. To the upper right hand side are Right/Left buttons, used to move the zone back and forth across the graph. To the lower left hand side are Stretch/Squeeze buttons; used to control the size of the target zone.



Manual Mode: This control mode allows the user to designate a pressure or desired force for the system to maintain. This is a static setting that will not fluctuate throughout the field in response to soil-type or tillage changes. The units are selectable under the *Setup* button to view Pounds or Psi.



Additional system information is displayed below the available control mode icons.

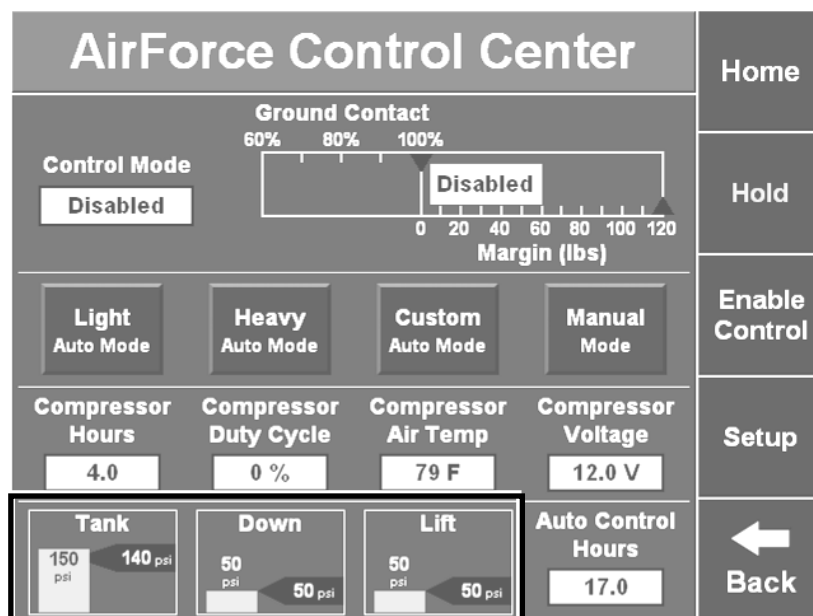
Compressor Hours - simply states running time of the compressor in hours

Compressor Duty Cycle - displays the run-time of the compressor figured as a percentage of time. The compressor is capable of sustaining a 100% duty cycle, however long periods of duty cycles $\geq 80\%$ will have lowered performance and should be investigated. This can be caused by: leaks in the system, a system setting too reactive for field conditions, or a lowered compressor build rate.

Compressor Air Temperature - displays the temperature of the compressor head in degrees Fahrenheit (Celsius display is available under the *Setup* button). Normal operating range is from ambient temperatures up to 350°F. The system will show an alert when the temperature rises into the range of 350-400°F and will disable the system once the temperature exceeds 400°F.

Compressor Voltage - displays the voltage that the 12V compressor is drawing. This should fluctuate as the 12V compressor cycles on and off. This display will be inactive on systems with a Hydraulic compressor.

Auto Control Hours - simply displays the number of hours that the AirForce system has operated in any of the Automatic Control Modes; Light, Standard, Heavy, or Custom.



The Hold button allows the user to order the system to ignore Margin and Ground Contact values for a certain period of time. Once pressed, a count down timer will appear under the button title representing the length and progress of the Hold action. The length of time to Hold is configurable under by pressing the *Setup* button.

An example of the uses of this button would be waterways or ditches within the field. By pressing the hold button prior to entering the waterway the system will simply maintain the current pressures until the end of the hold cycle - hopefully on the other side of the waterway.

At the bottom of the page are three boxes displaying the status of the Tank, Down Circuit, & Lift Circuit. Each one of these boxes will display the actual value—represented by the green bar graph; as well as the target value—represented by the black arrow. These values are given in psi units.

The difference in units used throughout the monitor, pounds or psi, represents a difference in focus. Pounds (of force applied) equates more readily to the force readings from the Weight Sensors on the row units, Down Force and Margin. Pressure (in psi) of the tank or circuits is used to better describe the forces being applied within the air lines, bags, and tank. This can be equated **to psi being used to determine the health of the system, and pounds to display the output of the system.**

At this point, press the *Setup* button on the right to continue the walk through.

The Air Bag Type and Compressor Type have been covered previously and will therefore be skipped at this point. Refer back to the initial start-up pages for further info on these buttons.

The *Hold Time* button was referenced within the AirForce Control Center and is the location where users can modify the default Hold Time

The *Tank Press. Target* button allows the user to designate the pressure the system will aim to maintain within the 10 gallon supply tank. This is defaulted to 150psi from the factory and should remain there unless problems arise.

AirForce Setup				Home
Row Unit Load Sensor Calibration	Air Pressure Sensors Calibration		Automatic Hold Enabled	Enter
Air Bag Type Down+Lift	Tank Press Target 145 psi	Compressor Type Electric	Compressor Duty Cycle 100%	
Hold Time 5 sec	Air Bag Units lbs	Minimum Applied Force -200 lbs	Maximum Applied Force 300 lbs	
				← Back

Air Bag Units

lbs

The *Air Bag Units* button allows the user to toggle between lbs or psi as the displayed units of measure.

The difference in units used throughout the monitor, pounds or psi, represents a difference in focus. Pounds (of force applied) equates more readily to the force readings from the Weight Sensors on the row units, Down Force and Margin. Pressure (in psi) of the tank or circuits is used to better describe the forces being applied within the air lines, bags, and tank. This can be equated to **psi being used to determine the health of the system, and pounds to display the output of the system.**

Automatic Hold

Enabled

The *Automatic Hold* button allows the user to toggle on/off this control feature. The AirForce system will automatically place itself in a 'Hold' situation during non-planting times and row failures. This is designed to minimize the impact of AirForce on planting issues that are not Down Force related. It may be useful in fields with many and long point rows with extended 'clutched' rows to disable the Automatic Hold.

Compressor Duty Cycle

100%

The *Compressor Duty Cycle* button allows the user to designate the maximum duty cycle of the compressor. AirForce is designed to run with ≤80%DC and will control the system to automatically optimize response time and duty cycle. This is defaulted to 100% from the factory and should remain there unless problems arise.

Minimum Applied Force

-200 lbs

The *Minimum Applied Force* button allows the user to control the amount of force to be applied in the Lift direction. The defaulted value of -200lbs is the maximum amount of force that the Lift Bags are able to remove from the row unit. This value would be changed only if the user wanted to limit the Lift capacity of the system.

Maximum Applied Force

300 lbs

The *Maximum Applied Force* button allows the user to control the amount of force to be applied in the Down direction. The defaulted value of 300 lbs is just short of the maximum amount of force that the Down Bags are capable of adding to the row unit. This value would be changed only if the user wanted to limit the Down capacity of the system. An example of this is a planter that weighs less than the force the system is able

to apply. 3000lb planter with 12 rows capable of a total of 3600pounds of force = the down bags will have the ability to physically lift the planter

The *Row Unit Load Sensor Calibration* button will take the user to the *Down Force Calibration* page. This page displays each Down Force sensor and relevant information/settings.

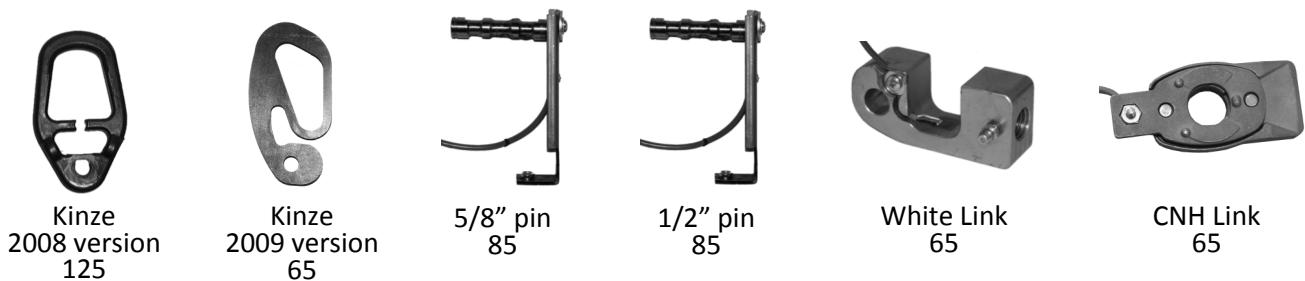
AirForce Setup				Home
Row Unit Load Sensor Calibration	Air Pressure Sensors Calibration		Automatic Hold Enabled	Enter
Air Bag Type Down+Lift	Tank Press Target 145 psi	Compressor Type Electric	Compressor Duty Cycle 100%	
Hold Time 5 sec	Air Bag Units lbs	Minimum Applied Force -200 lbs	Maximum Applied Force 300 lbs	
				Back

➔

Down Force Calibration					Home
Row 1	Pin Reading -42	Cal Factor 85.0	Reference Value 32.69	Load Sensor Active	Zero All
Row 7	Pin Reading -38	Cal Factor 85.0	Reference Value 32.53	Load Sensor Active	
Row 15	Pin Reading -25	Cal Factor 85.0	Reference Value 32.73	Load Sensor Active	
					↑
					↓
					Back

Pin Reading: this column is simply a display of the current Down Force value - weight being carried by the gauge wheels - for the given sensor. It is not modifiable or editable.

Cal Factor: this column displays the Calibration Factor for each sensor. These values are used to calibrate the sensor readings and are modifiable. Default values for different sensors are as follows:



If it becomes necessary to modify the Calibration Factor to a custom value follow this process:

Step 1: Raise the planter. Place blocks under the gauge wheels (and only the gauge wheels) of the rows to be calibrated.

Step 2: Lower the planter until the parallel arms are level. Settle the row unit(s) by shaking them. Press the *Zero All* button to 'tare' the values.

Step 3: Add a 'known' weight (any object - or human - that has a determined weight and is greater than 75lbs) then 'settle' the row unit by shaking or wiggling the row unit.

Step 4: Compare the Pin Reading to the known weight (within 20% tolerance). To calculate the corrected Cal. Factor: Multiply the original Cal. Factor by the known weight added, then divide by the value of change reflected on the monitor. Adjust the Cal Factor accordingly.

$$\text{Original Cal. Factor} \times \text{Known Weight} \div \text{Displayed Change} = \text{Corrected Cal Factor}$$

Example:

$$85 \quad \times \quad 150 \quad \div \quad 128 \quad = \quad 100$$

(weight of 3 bags of seed)
(new Cal. Factor)

Step 5: Remove the weight and raise the planter.

Step 6: Repeat steps 2-5 as necessary. Once calibrated, raise the planter, press the *Zero All* button, and remove the blocks from beneath the row units.

Down Force Calibration					Home
Row	Pin Reading	Cal Factor	Reference Value	Load Sensor	Zero All
1	-42	85.0	32.69	Active	
Row	Pin Reading	Cal Factor	Reference Value	Load Sensor	
7	-38	85.0	32.53	Active	↑
Row	Pin Reading	Cal Factor	Reference Value	Load Sensor	
15	-25	85.0	32.73	Active	↓
					←
					Back

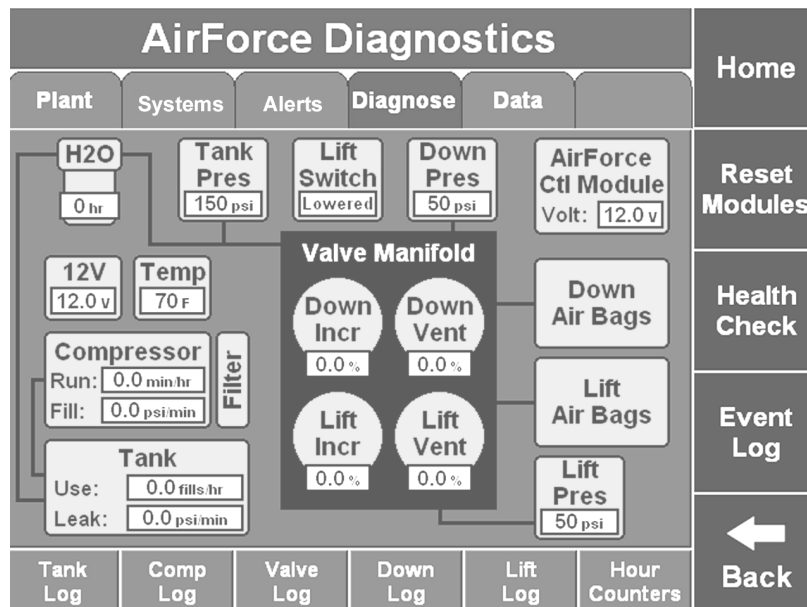
Reference Values: this column displays a reference value for the system's use of the Calibration Factor. Normal operating values should vary between 28 and 38. This column is modifiable, however should be done so under direction from Precision Planting during advanced technical service.

Load Sensor: this column displays the status of the load sensor for the given row. If an individual load sensor fails, or is producing readings that are statistically out of range, it is possible to 'Ignore' a row on -the-go. Simply press on the *Active* for the given row. A warning pop-up will appear asking the user to verify this choice. Pressing 'Yes' will highlight the entire row and change the wording to 'Ignored'. While a load sensor is ignored, data from this sensor will be recorded and mapped, however will not be included in dashboard averages or AirForce Control.

Zero All: This button is located on the right hand side of the page in the black column and is used to 'tare' the load sensors. This will return the load sensor values to zero. To properly zero the load sensors, raise the planter, wait 10 seconds for the readings to settle, then press *Zero All*. This should be done at the start of the season and periodically throughout the season. The system will monitor these values and will "Auto-Zero" the sensors occasionally to assist in maintaining accurate readings. This process is also the first action a user should take to correct/diagnose load sensor issues.

At this point we'll move to the AirForce Diagnostics page to continue the walkthrough. To access this page from the *Home* page press the *Setup* button, the *Diagnose* tab, and the *AirForce* icon in the center of the screen. The AirForce Diagnostics page will be the first and primary location for troubleshooting and monitoring the health of the AirForce system.

Overview: this page gives a visual representation of the AirForce components. The color of each item reflects the health or status of the component. A legend of the colors is available under the *Diagnose Tab*, disabled items will be displayed as grey instead of black due to background concerns.



H2O - displays the number of hours elapsed since the last time the water separator has been checked and cleared. If this is not green, check/clear the water separator then clear the prompt under the *Hour Counters* tab at the bottom of this page.

Tank Pressure - displays the current tank pressure. The value displayed here should be within ± 5 lbs from that displayed on the analog gauge at the front of the enclosure.

Lift Switch - this icon will display the current status of the Lift Switch; raised or lowered.

Down Pressure - displays the current pressure in the Down Circuit. The value displayed here should be within ± 5 lbs from that displayed on the analog gauge at the front of the enclosure.

Lift Pressure - displays the current pressure in the Lift Circuit. The value displayed here should be within ± 5 lbs from that displayed on the analog gauge at the front of the enclosure.

Down Air Bags - this icon displays the health status of the Down Circuit. The system will monitor the inputs/ outputs and static values of the circuit and gauge those readings against expected values to determine the status of the circuits.

Lift Air Bags - this icon will be similar to the Down Air Bags icon for reflecting Lift Circuit health.

Temperature - displays the temperature of the compressor head in degrees Fahrenheit (Celsius display is available under the *Setup* button). Normal operating range is from ambient temperatures up to 350°F. The system will show an alert when the temperature rises into the range of 350-400°F and will disable the system once the temperature exceeds 400°F.

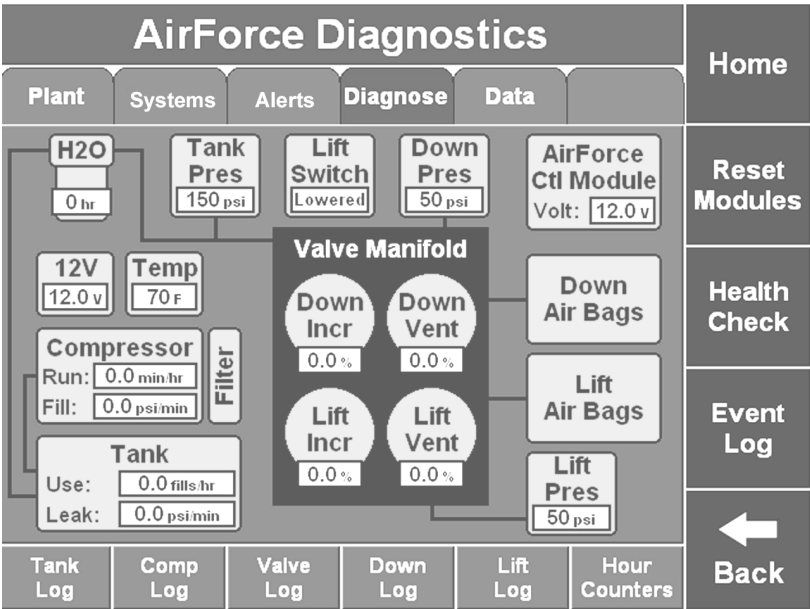
Voltages are displayed in two locations on the Diagnostics page; AirForce Control Module (AFM) voltage and 12V voltage. The AFM voltage will be displayed on all models however the 12V voltage will be displayed only on electric compressor models.

AirForce Control Module (AFM) - displays the voltage at the AFM. This voltage is keyed power through the SeedSense display unit and harness. Operating values for the AFM should be 11.5v to 14.0v and should not fluctuate greatly with the cycling of electric compressors.

12V - displays the voltage to the compressor through the tractor battery power cable (heavy 6ga wires), measured at the 80A contactor. AirForce will disable the system if this voltage does not remain **above** 11.5v when not running, 10.5v when the compressor is running.

Compressor - this icon displays the compressor status, using the color scheme, as well as displaying performance data on Run time and Fill rate. These values represent....

Tank - similar to the compressor icon, the tank will display health using a color scheme, in addition to performance data on Use and Leak rates. These values represent....



Valve Manifold - The center of this screen is a representation of the control valve manifold within the enclosure. Each solenoid will display a basic view of health using the color scheme, in addition to displaying the duty cycle of each solenoid. Duty cycles will vary according to field situations and AirForce settings. Situations to be wary of include; exceptionally high duty cycles (>15%), no duty cycle (0.0% after 1hr of Automatic control), and extreme variance between down Increase and Vent solenoids (variance >5%). These situations may be indicators of inefficient system settings, leaks, or failed hardware.

On the following pages, we will view the Log and Hour Counter pages available at the bottom of the AirForce Diagnostics.



The AirForce Logs are an historical look at the performance and statistics of the system. All of the AirForce Log pages will follow the same primary format displaying the Planting Hours in the left-most column. The hours will be displayed in reverse order to highlight the most recently completed hour of planting at the top of the list. These logs are useful in tracking system performance, identifying trends, and assisting troubleshooting.

AirForce Tank Log						Home
Planting Hours	Avg Press (psi)	Leak Rate (psl/min)	Fill Rate (psl/min)	Usage Rate (min/tank)		Enter
9	131	0.4	24.5	6.4		
8	131	0.3	21.6	6.1		
7	131	0.4	20.9	6.7		
6	134	0.4	22.7	6.8		
5	132	0.5	22.6	6.7		
4	132	0.5	20.7	6.9		
3	132	0.5	21.7	6.6		
2	131	0.4	24.1	6.5		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Down Circuit Log						Home
Planting Hours	Avg Press (psi)	Max Press (psi)	Min Press (psi)	Down Ratio		Enter
9	32	54	24	0.97		
8	32	51	18	0.97		
7	31	55	17	0.98		
6	37	56	20	0.98		
5	35	58	20	0.98		
4	34	60	16	0.98		
3	34	58	18	0.98		
2	33	55	23	0.97		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Compressor Log						Home
Planting Hours	Voltage Drop (V)	Duty Cycle	Max Temp (F)	Min Temp (F)		Enter
9	1.1	15.8	293	69		
8	1.1	12.0	281	66		
7	1.1	17.1	279	72		
6	1.2	18.7	286	73		
5	1.2	22.0	285	72		
4	1.2	24.4	278	74		
3	1.2	22.5	282	71		
2	1.2	17.2	291	70		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Lift Circuit Log						Home
Planting Hours	Avg Press (psi)	Max Press (psi)	Min Press (psi)	Lift Ratio		Enter
9	32	54	24	0.97		
8	32	51	18	0.97		
7	31	55	17	0.98		
6	37	56	20	0.98		
5	35	58	20	0.98		
4	34	60	16	0.98		
3	34	58	18	0.98		
2	33	55	23	0.97		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Valve Log						Home
Planting Hours	Down Inc Duty Cycle	Down Vent Duty Cycle	Lift Inc Duty Cycle	Lift Vent Duty Cycle		Enter
9	0.01	0.01	0.04	0.03		
8	0.01	0.01	0.03	0.03		
7	0.01	0.01	0.03	0.04		
6	0.02	0.02	0.04	0.04		
5	0.01	0.02	0.04	0.04		
4	0.01	0.02	0.03	0.04		
3	0.01	0.02	0.03	0.04		
2	0.01	0.01	0.04	0.03		
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Hour Counters						Home
Planting Hours	Tank Fills	Compressor On Time	Tank Limited Hours	Auto Control Hours		Enter
19.0	160	4.0	1.5	17.0		
Total Control Hours						Enter
Standard	Light	Heavy	Custom	Manual		
10.0	2.0	4.0	1.0	2.0		
Stable Control Hours						Enter
Standard	Light	Heavy	Custom			
9.0	1.5	3.5	1.0			
Service Counters (Select to Reset)						Enter
H2O Filter		Compressor				
1.5		4.0				
Tank Log	Comp Log	Valve Log	Down Log	Lift Log	Hour Counters	Back

AirForce Troubleshooting

This guide should be your first avenue for problem solving and troubleshooting your AirForce system. Before continuing through detailed diagnostics, please verify the following:

- ☐ 20/20 SeedSense Monitor is on
- ☐ AirForce is 'Enabled'
- ☐ 60A Fuse on Tractor Battery Cable is not blown (12V Compressors only)
- ☐ Tank Pressure is >20psi (12V) or >10psi (HYD) below Target Tank Pressure
- ☐ Compressor Air Temp. is below 400° F
- ☐ Hydraulic hoses are connected & engaged with sufficient flow (HYD. Compressors only)
- ☐ Drive belt is tensioned and in good condition (HYD. Compressors only)
- ☐ Lift Switch is green on AF Diagnostics page, and reacts correctly as the planter is raised & lowered
- ☐ Harnesses: **Check** and **recheck** all harnesses, connections, and wires for loose, corroded, or otherwise poor conductivity. In addition, thoroughly check for pinches, cuts, or any other form of physical damage to the wiring.

This is especially important for 12V compressors and will account for the majority of compressor issues

- ☐ Mode Compatibility:

Manual Mode:

Compressor: 12V - will run Raised or Lowered
 HYD - will run only with the planter Lowered

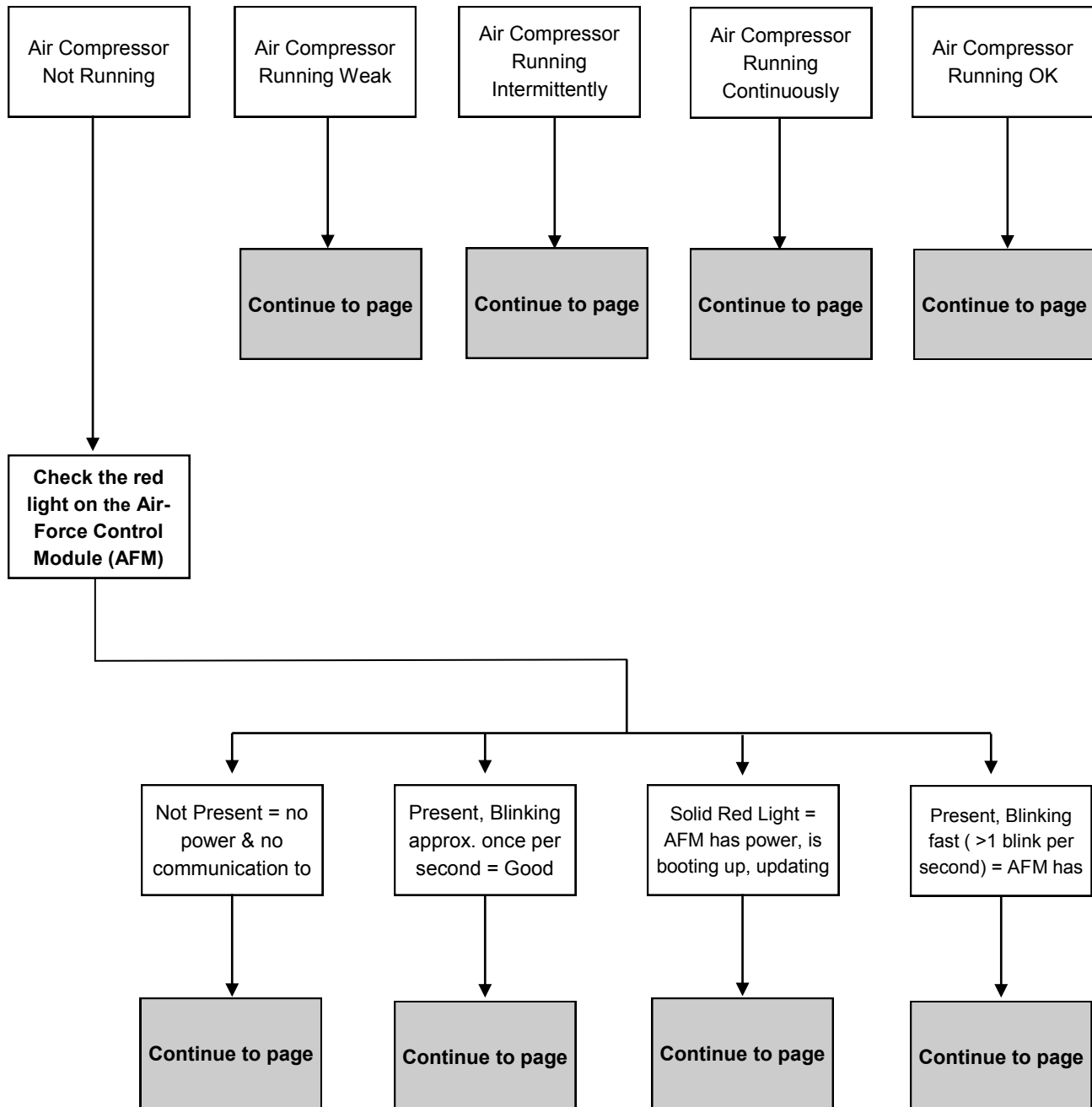
Solenoids (to Down & Lift Circuits):
 Will activate only when the planter is Lowered

Automatic Modes:

Compressor & Solenoids will activate only when **actually planting**. This requires the system to recognize that the system is:

- 1) in the Lowered position
- 2) moving forward – speed/GPS information
- 3) seed tube data

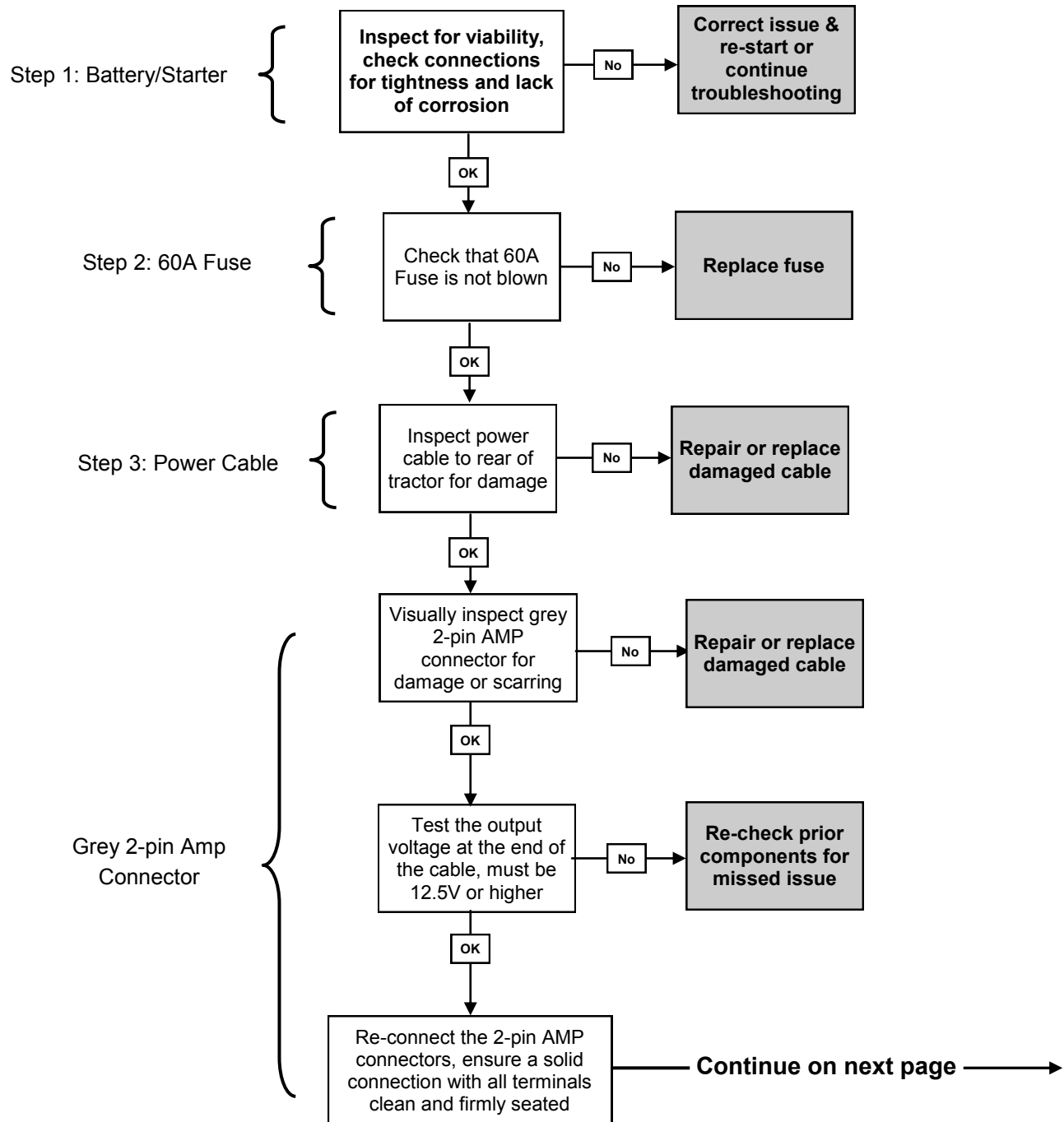
We will separate the AirForce Troubleshooting guide according to the operational state of the Air Compressor itself.



Compressor Not Running

AFM light blinking once per second = Good power & communication

Begin by verifying the situation is not dependent on signal from the AirForce Control Module (AFM). On the rear wall of the enclosure, locate and unclip the 12V Diagnostic Plug; refer to page ____ for an image detailing the plug's location. This plug has been provided for testing purposes only and should NEVER be left plugged into a circuit unattended. This plug has 12V power direct from the tractor, unimpeded by the AFM. Locate the 2-pin WeatherPack connector coming from the Contactor to the Control Harness. Disconnect the Control Harness and replace with the Diagnostic Plug. If the compressor fails to start (or attempt to start), return the plugs to their original connection and continue through the trouble shooting below.



Step 4: At Compressor

Ensure $\geq 12V$ to the compressor. Test on incoming lead on Contactor and ground side of power cable

No

Retrace towards tractor to find fault point

OK

Check the compressor ground lead

No

Repair/ replace as necessary

OK

Step 5: 80A Contactor



Inspect the 80A contactor for physical damage or poor connections

No

Repair/ replace as necessary

OK

Using a Voltmeter, test across the contactor, resistance should be ___ ohms

No

Resistance > ___ ohms, replace Contactor

OK

Step 6: 50A Circuit Breaker

Inspect the 50A Circuit Breaker for physical damage, poor connections, or loose posts

No

Repair/ replace as necessary

OK

Using a Voltmeter, test across the circuit breaker, resistance should be ___ ohms

No

Resistance > ___ ohms, replace Circuit Breaker

OK

Testing these components within the enclosure can be done in the absence of a voltmeter using the 12V diagnostic plug.

Reconnect the diagnostic plug into the lead coming from the Contactor. Next loosen and remove the red compressor power lead from the circuit breaker post. Then test/connect this lead to

- 1) the inlet side of the circuit breaker,
- 2) the outlet side of the contactor, and
- 3) the inlet side of the contactor.

This will only give a go/no go view of the components involved.

Contact Precision Planting for additional troubleshooting assistance

Compressor Not Running

No Red light on AFM = AFM not receiving 12V power nor communication from Display Unit

Begin at the Display Unit and trace the harness through the cab to the rear of the tractor; visually inspecting the cable for physical damage.

Check all in-line fuse as well as the 7.5A fuse in the AirForce enclosure.

Inspect the connections at the rear of the tractor for physical damage, solid connection, presence of water in the connector, etc...

No Red Light on AFM = AFM is not receiving 12V power nor communication from the Display Unit.

Starting at the Display Unit; trace the harness through the cab to the rear of the tractor visually inspecting the cable for physical damage.

Check all in-line fuses. Check the 7.5A fuse in AirForce enclosure.

Inspect connections at rear of tractor for physical damage, solid connection, presence of water in connector, etc...

Using a voltmeter, test the connection at the end of the tractor harness for power and communication:

Pin1 – Ground

Pin2 – Communication

Pin3 – Communication

Pin4 – Power 12V

Does the Smart Connector have good power and communication?

No = Turn to 20/20 SeedSense troubleshooting to continue

Yes ;

AirForce is wired in Series with the Smart Connector (power/communication connect to the one side of the 'Y' on the AirForce control harness with the other side connecting to the Smart Connector)

Disconnect from the tractor harness and connect to each module-one at a time-and perform a '*Reset Modules*' to re-evaluate the system.

Smart Connector ONLY connected - Not Working }

Air Force ONLY connected – Working }

Problem exists outside of AirForce components, turn to 20/20 SeedSense trouble shooting to continue

Smart Connector ONLY connected – Working }

AirForce ONLY Connected – Not Working }

Problem exists in AirForce components –

Inside the AirForce enclosure, locate the Diagnostic test plug (should be simply clipped to the rear wall of the enclosure, not connected to any other components) Use a voltmeter to test across the two pins

12V – Fuse is good, Replace AFM

Nothing – Check Fuse again, if fuse is ok, Replace Harness

Replace AirForce Control Harness & AFM one at a time to further diagnose. Call your Precision Planting Representative for further assistance.

Air Force is wired in Parallel with the Smart Connector (AirForce and SeedSense modules have independent lines connecting to the tractor harness)

Inside the AirForce enclosure, locate the Diagnostic test plug (should be simply clipped to the rear wall of the enclosure, not connected to any other components) Use a voltmeter to test across the two pins

12V – Fuse is good, Replace AFM

Nothing – Check Fuse again, if fuse is ok, Replace Harness

If problem persists, try replacing the remaining component or contact your Precision Planting Representative for further assistance.

Compressor Not Running

Solid Red Light on AFM = AFM has power, is booting up, updating firmware, or stuck in boot process

Allow more time for AFM to finish boot cycle or firmware update

Reboot the system: Home | Setup | System | Advanced Setup | Reboot Display Unit

Is Smart Connector and / or RUMs exhibiting similar symptoms?

Yes; Turn to 20/20 SeedSense troubleshooting to continue. Diagnose SeedSense problem first, then return to AirForce is problem continues

No;

Starting at the Display Unit; trace the harness through the cab to the rear of the tractor visually inspecting the cable for physical damage.

Check all in-line fuses. Check the 7.5A fuse in AirForce enclosure.

Inspect connections at rear of tractor for physical damage, solid connection, presence of water in connector, etc...

Using a voltmeter, test the connection at the end of the tractor harness for power and communication:

Pin1 – Ground

Pin2 – Communication (+)

Pin3 – Communication (-)

Pin4 – Power 12V

If Communication lines are shorted to ground or power – Replace Tractor Harness

Inside the AirForce Enclosure; check the control harness for continuity and communication: remove both the grey and black 12pin Deutsch connectors

Black 12 pin Connector

Pin 4 – Ground

Pin 6 – Communication (–)

Pin 7 – Communication (+)

Grey 12 pin Connector

Pin 8 – Power 12V

If Control Harness is good, replace AFM Module

If problem persists contact Precision Planting for further assistance.

Compressor Not Running

Red Light present, blinking fast, >1 blink per second = AFM has power, no communication

Is Smart Connector and / or RUMs exhibiting similar symptoms?

Yes; Turn to 20/20 SeedSense troubleshooting to continue. Diagnose SeedSense problem first, then return to AirForce is problem continues

No;

AirForce is wired in Series with the Smart Connector (power/communication connect to the one side of the 'Y' on the AirForce control harness with the other side connecting to the Smart Connector)

Disconnect from the tractor harness and connect to each module-one at a time-and perform a '*Reset Modules*' to re-evaluate the system.

Smart Connector ONLY connected - Not Working }

Air Force ONLY connected – Working }

Problem exists outside of AirForce components, turn to 20/20 SeedSense trouble shooting to continue

Smart Connector ONLY connected – Working }

AirForce ONLY Connected – Not Working }

Problem exists in AirForce components –

Inside the AirForce enclosure, locate the Diagnostic test plug (should be simply clipped to the rear wall of the enclosure, not connected to any other components) Use a voltmeter to test across the two pins

12V – Fuse is good, Replace AFM

Nothing – Check Fuse again, if fuse is ok, Replace Harness

Replace AirForce Control Harness & AFM one at a time to further diagnose. Call your Precision Planting Representative for further assistance.

Air Force is wired in Parallel with the Smart Connector (AirForce and SeedSense modules have independent lines connecting to the tractor harness)

Inside the AirForce enclosure, locate the Diagnostic test plug (should be simply clipped to the rear wall of the enclosure, not connected to any other components) Use a voltmeter to test across the two pins

12V – Fuse is good, Replace AFM

Nothing – Check Fuse again, if fuse is ok, Replace Harness

If problem persists, try replacing the remaining component or contact your Precision Planting Representative for further assistance.

Compressor running intermittently

Compressor Runs for 1-5seconds then off for 5-15 seconds

AFM detects a serious voltage drop – Shuts off compressor

Check harness and components for loose or poor connections between compressor and battery. Note: The display unit may show adequate voltage on the screen while the compressor is not running. To verify, at the display unit navigate to AirForce control Center. With AirForce Disabled, note the Compressor Voltage-wait 10 to 15 sec for consistent reading. Watching this reading closely for 60 sec, Enable AirForce. You should note a pattern of the compressor turning on and dropping the voltage significantly (usually well below 10.5V)

Runs for 1-30 seconds then off for 30-120 seconds or greater

Current is too high – Tripping 50A circuit breaker

Check harness and components for loose or poor connections between compressor and battery. Note: This is caused by a significant voltage drop in the system and should be treated the same as the above case. The component causing the shut-off is simply different.

System will pulse or run then off, both for less than 5 seconds

Update Software to newest version

Call Precision Planting for further assistance

Compressor running weak

Symptoms will be primarily audible –

Running at much slower speeds

Compressor has a drastically higher or lower pitch when running

Compressor sounds 'weak' or 'struggling'

Verify that sufficient power is available to the Compressor

12V: Display Unit; AirForce Control Center – Compressor voltage should be 12.5v or higher in standby mode, 11.5v or higher when running. To trace problem:

Begin at the battery/starter and inspect the connections for corrosion and tightness.

Check the 60A fuse.

Follow the cable to the rear of the tractor, visually inspecting for physical damage to the lines.

At the grey 2 pin TYCO-AMP connector test the voltage- should be 12.5v or higher with the tractor running.

Reconnect the TYCO-AMP, ensure a solid connection and that all terminals are clean and firmly seated.

Check 12V Contactor: Test by replacing the harness 2pin-WP connection to the contactor with the 12V Diagnostic Plug. A solid clicking noise should be audible. Ohms resistance across this component should be ____.

Check the 50A Circuit Breaker: Visually inspect the connections for tightness, and ensure that the posts are firmly set. Ohms resistance across this component should be ____.

Both vi. & vii. tests can be done without a voltmeter by loosening and removing the red compressor power lead from the Circuit Breaker post. Then testing/connecting to: 1) the inlet side of the Circuit Breaker, 2) the outlet side of the Contactor, and 3) the inlet side of the Contactor. This will give only a go/no go view of the components involved.

Check the yellow Spade connector on the Compressor Ground lead.

Initial setup on system

Run Compressor Health Check Home | Setup | Diagnose Tab | AirForce Icon | Health Check; on right hand side, middle button in black column

If problem persists contact Precision Planting

System has functioned properly prior to symptoms

At display unit – navigate to AF diagnostic page Home | Setup | Diagnose Tab | AirForce icon. AirForce Diagnostics - At the bottom of this page, select:

Compressor Log: Review Voltage Drop (V): values should be between 0.9-1.7volts. Consistent readings significantly above the operating range could have permanently damaged compressor.

Replace Compressor – Upon installation of the new compressor steps should be taken to verify voltage drop is within normal operating ranges through new compressor prior to running full time. Call your Precision Planting Dealer for additional assistance.

Compressor running continuously

Compressor is able to build tank pressure greater than 130psi – check with planter lowered, not moving in Std. Mode

Compressor reaches target pressure and stops while not moving, but problem persists while planting or in Manual Mode

Cause – Air use is greater than tank pressure build rate

Check for leaks in system (physically inspect and/or run a Leak check under Health Check menu)

Update software to newest available

If symptom persists while stationary, in Manual Mode, and passes leak check; contact Precision Planting for further assistance

Verify AirForce control gains

Try lowering Tank Target Pressure to 140psi – this is a short to moderate term fix that would allow the system to stay above the necessary air requirements while lowering duty cycles

If this is a new symptom caused by a change in fields or tillage practices, try modifying AirForce settings to lower air use/duty cycle

Tank pressure will build to 165+ (on analog gauge), then drop significantly and repeat

Problem exists in Tank Pressure sensor, disable AirForce and replace Tank Pressure sensor

A simple way to verify this fix is to unplug and swap the tank sensor with either the Down or Lift Pressure sensor and re-enable AirForce.

Compressor is unable to build tank pressure greater than 130psi

Initial setup on system

Run Compressor Health Check Home | Setup | Diagnose Tab | AirForce Icon |

Health Check; on right hand side, middle button in black column

If problem persists contact Precision Planting

System has functioned properly prior to symptoms

At display unit – navigate to AF diagnostic page Home | Setup | Diagnose Tab | AirForce icon. AirForce Diagnostics - At the bottom of this page, select:

Tank Log.

Verify Leak rate is below 1.0psi/mi

Look for a trend of gradually lower Average Tank Pressure (psi)

Compressor Log

Check Voltage Drop – should be 0.9 to 1.7 volts

Duty Cycle – Look for a trend of gradually increasing values that corresponds to the lower Avg. Tank Pressure

Max Temperature (F) – Look for a trend of gradually lowering maximum temperatures that correspond to the lower Avg. Tank Pressure

If the trends above exist in some form or another - Compressor head/piston are damaged – install the 12V Compressor rebuild kit as well as a new air filter (almost all compressor heads that go bad will be due to a compromised air filter allowing dust into the system)

Compressor Running OK

If the Compressor is running correctly, refer to the System Log (under the Diagnose Tab), the Even Log (within AirForce Diagnostics) for system information and failure causes. The tables below give the cause, warning text, and recommended

Event Code	Component	Warning Pop-Up Text	Recommendation
405	Lift Switch	A lift switch is not present, AirForce operation will be degraded.	A lift switch is not detected, AirForce will internally estimate lift. Ensure lift switch is connected. Check for pinched or cut wire.
406		A Row Unit Module has experienced multiple unexpected resets.	
407		A Row Unit Module has experienced multiple unexpected resets. Refer to the Device Status screen for more details.	
408		A Row Unit Module has experienced multiple unexpected resets.	
409	Lift Switch	The lift switch indicates the planter is always lowered. Disabling AirForce operation.	Confirm lift switch is correctly mounted and attached or replace the lift switch.
410	Lift Switch	Lift switch indicates the planter is always lifted. Disabling AirForce operation.	Confirm lift switch is correctly mounted and attached or replace the lift switch.
411	Load Pins	Row __ load sensor is reading a negative load. Lift planter and re-zero all sensors.	Load sensor reading is less than -10 lbs while planting. Lift planter and re-zero all sensors.
412	Load Pins	Row __ load sensor reading is greater than 800 lbs. Verify load sensor calibration factor.	Load sensor reading is greater than 800 lbs while planting. Verify load sensor calibration factor.
413	Load Pins	Excessive load variation on row __.	Load variation is greater than 300 lbs while planting. Check for a pinched load sensor wire or failed load sensor.
414	Load Pins	Low load variation on row __ while planting.	Load variation is less than 4 lbs while planting. Check for a pinched load sensor wire or failed load sensor.
415	Load Pins	Row __ load sensor reading is more than 100 lbs different from other rows.	Load difference compared to all other rows is greater than 100 lbs while planting. Verify load sensor calibration factor.
500	Air Force Module	The system was unable to update the firmware on the AirForce Module. After checking the planter harness for damage, perform a Reset Modules operation from the Diagnostics Tab.	The system was unable to update the firmware on the AirForce Module. After checking the planter harness for damage, perform a Reset Modules operation from the Diagnostics Tab.
501	Air Force Module	The system was unable to detect an AirForce Module. Do you want the system to assume that AirForce is not installed?	The system was unable to detect an AirForce Module. Check the connections and confirm the AirForce Module is connected correctly.
502	Air Force Module	The AirForce Module has experienced multiple unexpected resets. Refer to the Device Status screen for more details.	The AirForce Module has experienced multiple unexpected resets. Refer to the Device Status screen for more details.
503	Air Force Module	The AirForce Module system voltage is too low. The AFM will disable when voltage drops below 8.5 Volts. Check for high resistance in the wiring.	Check for high resistance in the wiring.
504	Air Force Module	The AirForce Module system voltage is too high.	Check power supply: harnesses, battery, alternator etc...

Event Code	Component	Warning Pop-Up Text	Recommendation
505	Air Force Module	The AirForce Module sensor supply voltage is low. Pressure sensor readings will be inaccurate. Check the supply voltage to the AFM.	Check the supply voltage to the AFM.
506	Air Force Module	The AirForce Module sensor supply voltage is high. Pressure sensor readings will be inaccurate. Check the supply voltage to the AFM.	Check the supply voltage to the AFM.
507	Compressor	The AirForce compressor voltage is too low. The compressor will be available when voltage is above 12 Volts.	Check for low battery voltage Check for high resistance in the compressor wiring.
508	Compressor	The AirForce compressor voltage is too high.	Check power supply: harnesses, battery, alternator etc...
509	Compressor	The AirForce compressor coil is not present. The system is unable to build tank pressure. Check for a disconnected connector or a loose terminal.	Check for disconnected connector. Check for loose terminal.
510	Compressor	The AirForce compressor voltage is too low when running. Check for high resistance in the compressor connections or wiring.	Check for high resistance in the compressor connections or wiring.
511	Compressor	The AirForce compressor power is intermittent. Check for a loose connector or terminal.	Check for loose connector. Check for loose terminal.
512	Compressor	The AirForce compressor is continuously running. Check if the compressor is connected to the diagnostic connector or if there is a shorted wire.	Check if the compressor is connected to the diagnostic connector. Check for shorted wire.
513	Temperature Sensor	The AirForce compressor temperature sensor is shorted. The system is unable to measure the compressor temperature. Check the resistance between the wires, repair the wiring, or replace the sensor.	Check the resistance between the wires. Repair the wiring. Replace the sensor.
514	Temperature Sensor	The AirForce compressor temperature sensor is open. The system is unable to measure the compressor temperature. Check for a cut wire or replace the sensor.	Check for a cut wire or replace the sensor.
515	Temperature Sensor	The AirForce compressor temperature sensor is intermittent. Check for a loose connection or cut in the wiring.	Check for a loose connection or cut in the wiring.
516	Temperature Sensor	The AirForce compressor temperature is too high.	Compressor temperature is > 400°F. Increase air flow to and around the compressor. Lower duty cycle. Remove dust/dirt buildup from compressor.
517	Temperature Sensor	The AirForce compressor is getting hot.	Compressor temperature is in upper ranges of operating temps; (350°-400° F) Increase air flow to and around the compressor. Lower duty cycle. Remove dust/dirt buildup from compressor.

Event Code	Component	Warning Pop-Up Text	Recommendation
569	Temperature Sensor	Unresponsive Compressor Temperature Sensor	Check for a loose compressor temperature sensor
518	Tank Pressure Sensor	The AirForce tank pressure sensor voltage is shorted low. Check for a disconnected sensor, short between sense wire and ground, a cut power wire, or a cut sense wire.	Check for disconnected sensor. Check for a short between sense wire and ground. Check for a cut power wire. Check for a cut sense wire.
519	Tank Pressure Sensor	The AirForce tank pressure sensor voltage is too high. Check for a short between sense wire and power or a cut ground wire.	Check for a short between sense wire and power. Check for a cut ground wire.
520	Tank Pressure Sensor	The AirForce tank pressure has exceeded its pressure limit.	Confirm enclosure gauge pressure equals the pressure on the 20/20. Confirm increase solenoids are closing properly. If pressure did not exceed 300 psi the sensor is not damaged. If pressure sensor exceeded 300 psi replace the sensor.
521	Tank Pressure Sensor	The AirForce tank pressure has fallen below its pressure range.	Confirm enclosure gauge pressure equals the pressure on the 20/20. Confirm increase solenoids are closing properly. Check for high resistance on the sense wire. Replace sensor if no wiring concerns.
522	Tank Pressure Sensor	The AirForce tank pressure is intermittent. Check for a loose pressure sensor connection, wire harness damage, or a loose terminal.	Check for a loose pressure sensor connection. Check for wire harness damage or a loose terminal.
523	Down Circuit Pressure Sensor	The AirForce down pressure sensor voltage is shorted low. Check for a disconnected sensor, short between sense wire and ground, a cut power wire, or a cut sense wire.	Check for disconnected sensor. Check for a short between sense wire and ground. Check for a cut power wire. Check for a cut sense wire.
524	Down Circuit Pressure Sensor	The AirForce down pressure sensor voltage is too high. Check for a short between sense wire and power or a cut ground wire.	Check for a short between sense wire and power. Check for a cut ground wire.
525	Down Circuit Pressure Sensor	The AirForce down pressure has exceeded its pressure limit.	Confirm that the enclosure gauge pressure equals the pressure on the 20/20. Confirm that the increase solenoid is closing properly. If pressure did not exceed 300 psi, the sensor is not damaged. If pressure sensor exceeded 300 psi, replace the sensor.

Event Code	Component	Warning Pop-Up Text	Recommendation
526	Down Circuit Pressure Sensor	The AirForce down pressure has fallen below its pressure range.	Confirm that the enclosure gauge pressure equals the pressure on the 20/20. Confirm that the vent solenoid is closing properly. Check for high resistance on the sense wire. Replace the sensor if no wiring concerns.
527	Down Circuit Pressure Sensor	The AirForce down pressure is intermittent. Check for a loose pressure sensor connection, wire harness damage, or a loose terminal.	Check for loose pressure sensor connection. Check for wire harness damage or loose terminal.
528	Lift Circuit Pressure Sensor	The AirForce lift pressure sensor voltage is shorted low. Check for a disconnected sensor, short between sense wire and ground, a cut power wire, or a cut sense wire.	Check for disconnected sensor. Check for a short between sense wire and ground. Check for a cut power wire. Check for a cut sense wire.
529	Lift Circuit Pressure Sensor	The AirForce lift pressure sensor voltage is too high. Check for a short between sense wire and power or a cut ground wire.	Check for a short between sense wire and power. Check for a cut ground wire.
530	Lift Circuit Pressure Sensor	The AirForce lift pressure has exceeded its pressure limit.	Confirm that the enclosure gauge pressure equals the pressure on the 20/20. Confirm that the increase solenoid is closing properly. If pressure did not exceed 300 psi, the sensor is not damaged. If pressure sensor exceeded 300 psi, replace the sensor.
531	Lift Circuit Pressure Sensor	The AirForce lift pressure has fallen below its pressure range.	Confirm that the enclosure gauge pressure equals the pressure on the 20/20. Confirm that the vent solenoid is closing properly. Check for high resistance on the sense wire. Replace the sensor if no wiring concerns.
532	Lift Circuit Pressure Sensor	The AirForce lift pressure is intermittent. Check for a loose pressure sensor connection, wire harness damage, or a loose terminal.	Check for loose pressure sensor connection. Check for wire harness damage or loose terminal.
533	Down Increase Solenoid	The AirForce down increase solenoid is not present. The system is unable to build down pressure. Check for a loose or disconnected solenoid pin or connector.	Check for a loose or disconnected solenoid pin or connector.
534	Down Increase Solenoid	The AirForce down increase solenoid power is intermittent. Check for a loose connector or terminal.	Check for loose connector. Check for loose terminal.
535	Down Increase Solenoid	Down pressure is increasing slowly or is unresponsive. Check for a leak in the circuit or blockage in the manifold.	Confirm the solenoid is energized and provides no pressure change. Check for a leak in the circuit. Check for blockage in the manifold.

Event Code	Component	Warning Pop-Up Text	Recommendation
536	Down Increase Solenoid	The system detected a down increase solenoid even though the AirForce System Type is LIFT ONLY. The system will be disabled until the problem is corrected.	Confirm the solenoid wire is connected correctly.
537	Down Vent Solenoid	The AirForce down vent solenoid is not present. The system is unable to control down pressure. Check for a loose or disconnected solenoid pin or connector.	Check for a loose or disconnected solenoid pin or connector.
538	Down Vent Solenoid	The AirForce down vent solenoid power is intermittent. Check for a loose connector or terminal.	Check for loose connector. Check for loose terminal.
539	Down Vent Solenoid	Down pressure is decreasing slowly or is unresponsive. Check for a leak in the circuit or blockage in the manifold.	Confirm the solenoid is energized and provides no pressure change. Check for blockage in the manifold.
540	Down Vent Solenoid	The system detected a down vent solenoid even though the AirForce System Type is LIFT ONLY. The system will be disabled until the problem is corrected.	Confirm the solenoid wire is connected correctly.
541	Lift Increase Solenoid	The AirForce lift increase solenoid is not present. The system is unable to build lift pressure. Check for a loose or disconnected solenoid pin or connector.	Check for a loose or disconnected solenoid pin or connector.
542	Lift Increase Solenoid	The AirForce lift increase solenoid power is intermittent. Check for a loose connector or terminal.	Check for loose connector. Check for loose terminal.
543	Lift Increase Solenoid	Lift pressure is increasing slowly or is unresponsive. Check for a leak in the circuit or blockage in the manifold.	Confirm the solenoid is energized and provides no pressure change. Check for a leak in the circuit. Check for blockage in the manifold.
544	Lift Increase Solenoid	The system detected a lift increase solenoid even though the AirForce System Type is DOWN ONLY. The system will be disabled until the problem is corrected.	Confirm the solenoid wire is connected correctly.
545	Lift Vent Solenoid	The AirForce lift vent solenoid is not present. The system is unable to control lift pressure. Check for a loose or disconnected solenoid pin or connector.	Check for a loose or disconnected solenoid pin or connector.
546	Lift Vent Solenoid	The AirForce lift vent solenoid power is intermittent. Check for a loose connector or terminal.	Check for loose connector. Check for loose terminal.
547	Lift Vent Solenoid	Lift pressure is decreasing slowly or is unresponsive. Check for a leak in the circuit or blockage in the manifold.	Confirm the solenoid is energized and provides no pressure change. Check for blockage in the manifold.
548	Lift Vent Solenoid	The system detected a lift vent solenoid even though the AirForce System Type is DOWN ONLY. The system will be disabled until the problem is corrected.	Confirm the solenoid wire is connected correctly.

Event Code	Component	Warning Pop-Up Text	Recommendation
549	Tank Pressure Circuit	A major leak was detected in the AirForce tank circuit. Check for a disconnected air line or fitting.	Check for a disconnected air line or fitting. Run the Leak Detection Health Check routine to confirm leak has been corrected.
550	Tank Pressure Circuit	A slow leak was detected in the AirForce tank circuit. Check for leaks in the air line connections or fittings. Check for loose or worn fittings.	Check for leaks in the air line connections or fittings. Check for loose or worn fittings. Run the Leak Detection Health Check routine to confirm leak has been corrected.
551	Tank Pressure Circuit	The AirForce system detected a pressure increase in the tank circuit when an increase was not commanded.	Check for shorted, or cross-connected wires. Check for a loose connector. Refer to the enclosure diagrams to verify solenoids are connected to the correct ports in the harness.
552	Tank Pressure Circuit	The AirForce tank pressure is unresponsive when the compressor is running. Check the tank for leaks.	Confirm the compressor is energized and provides no pressure change. Check the tank for leaks.
563	Tank Pressure Circuit	The AirForce tank pressure is building more slowly than expected. Check the tank for leaks.	Check the tank for leaks. Rebuild the compressor head to improve the pressure build rate of the compressor.
553	Tank Pressure Circuit	Drain the water separator and the water from the tank.	Drain water from the system every 4 hours of compressor run time.
554	Tank Pressure Circuit	The AirForce tank circuit pressure is excessively high. Confirm that the compressor is not connected to the jumper wire and check for a short on the compressor relay wire.	Confirm that the compressor is not connected to the jumper wire. Check for a short on the compressor relay wire.
564	Tank Pressure Circuit	The AirForce manifold check valve is leaking excessively.	
555	Down Pressure Circuit	A major leak was detected in the AirForce down circuit. Check for a disconnected air line or fitting.	Check for a disconnected air line or fitting. Run the Leak Detection Health Check routine to confirm leak has been corrected.
556	Down Pressure Circuit	A slow leak was detected in the AirForce down circuit. Check for leaks in the air line connections or fittings. Check for loose or worn fittings.	Check for leaks in the air line connections or fittings. Check for loose or worn fittings. Run the Leak Detection Health Check routine to confirm leak has been corrected.
557	Down Pressure Circuit	The AirForce system detected a pressure increase in the down circuit when an increase was not commanded.	Run the Plumbing and Wiring Health Check Routine to confirm plumbing is not crossed
558	Down Pressure Circuit	The AirForce down circuit pressure is excessively high. Confirm that the increase solenoid is not connected to the jumper wire and is not shorted.	Confirm that the increase solenoid is not connected to the jumper wire. Check for a short on the increase solenoid wire.

Event Code	Component	Warning Pop-Up Text	Recommendation
559	Lift Pressure Circuit	A major leak was detected in the AirForce lift circuit. Check for a disconnected air line or fitting.	Check for a disconnected air line or fitting. Run the Leak Detection Health Check routine to confirm leak has been corrected.
560	Lift Pressure Circuit	A slow leak was detected in the AirForce lift circuit. Check for leaks in the air line connections or fittings. Check for loose or worn fittings.	Check for leaks in the air line connections or fittings. Check for loose or worn fittings. Run the Leak Detection Health Check routine to confirm leak has been corrected.
561	Lift Pressure Circuit	The AirForce system detected a pressure increase in the lift circuit when an increase was not commanded.	Run the Plumbing and Wiring Health Check Routine to confirm plumbing is not crossed
562	Lift Pressure Circuit	The AirForce lift circuit pressure is excessively high. Confirm that the increase solenoid is not connected to the jumper wire and is not shorted.	Confirm that the increase solenoid is not connected to the jumper wire. Check for a short on the increase solenoid wire.
565	Down Pressure Circuit	The desired applied down force from the AirForce system is exceeding the weight of the planter bar. Increase the weight of the planter bar or limit the max applied down force setting on the AirForce Setup screen.	Increase the weight of the planter bar Limit the max applied down force setting on the AirForce Setup screen.
566	Lift Pressure Circuit	The AirForce lift air bag pressure is consistently high through 90% of the last 2 passes. Consider decreasing the down spring force.	Consider decreasing the down spring force.
567	Lift Pressure Circuit	The AirForce lift air bag pressure is consistently low through 90% of the last 2 passes. Consider increasing the down spring force.	Consider increasing the down spring force.
568	Compressor	Compressor disabled: Duty Cycle is greater than the MAX Limit	Confirm Max Duty Cycle is set correctly Run the system in manual mode until the compressor duty cycle has decreased
575		<i>The AirForce enclosure pressure gauges do not match the pressure sensor readings.**</i>	These are simply notification of events and will not prompt a Pop-up text. To view these event codes navigate to <i>Setup Diagnose AirForce Event Log</i>
576		<i>The AirForce compressor health check passed.**</i>	
577		<i>The AirForce compressor health check failed.**</i>	
578		<i>The AirForce wiring and plumbing health check passed.**</i>	
579		<i>The AirForce wiring and plumbing health check failed.**</i>	
580		<i>The AirForce leak health check passed.**</i>	
581		<i>The AirForce leak health check failed.**</i>	
582		<i>The AirForce tank drain health check passed.**</i>	
583		<i>The AirForce tank drain health check failed.**</i>	

Event Code	Component	Warning Pop-Up Text	Recommendation
559	Lift Pressure Circuit	A major leak was detected in the AirForce lift circuit. Check for a disconnected air line or fitting.	Check for a disconnected air line or fitting. Run the Leak Detection Health Check routine to confirm leak has been corrected.
560	Lift Pressure Circuit	A slow leak was detected in the AirForce lift circuit. Check for leaks in the air line connections or fittings. Check for loose or worn fittings.	Check for leaks in the air line connections or fittings. Check for loose or worn fittings. Run the Leak Detection Health Check routine to confirm leak has been corrected.
561	Lift Pressure Circuit	The AirForce system detected a pressure increase in the lift circuit when an increase was not commanded.	Run the Plumbing and Wiring Health Check Routine to confirm plumbing is not crossed
584	Air Force Module	The planter AirForce system settings indicate that neither down nor lift airbags are present. From the main screen, select Setup / Aux / AirForce to set up the Air bag type.	From the main screen, select Setup / Aux / AirForce to set up the Air bag type.
585	Air Force Module	The AirForce Module has experienced an unexpected reset.	These are simply notification of events and will not prompt a Pop-up text. To view these event codes navigate to Setup Diagnose AirForce Event Log
586	Tank Pressure Circuit	User reset water filter service counter.	
587	Compressor	User reset compressor service counter.	
588	Air Force Module	Continue planting with AirForce disabled?	

Pneumatic Springs

When storing machine:

IMPORTANT: Do not remove air from system, air springs should be pressurized and may be allowed to leak down slowly to 0 psi. Park machine with a minimum of 6 psi of air pressure in the system.

When removing from storage:

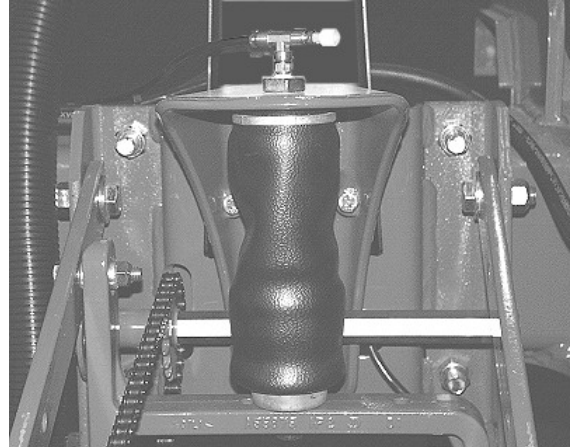
CAUTION: Avoid serious injury from exploding parts due to over-pressurization or operating the system without all components in place.

Do not inflate system above 120 psi.

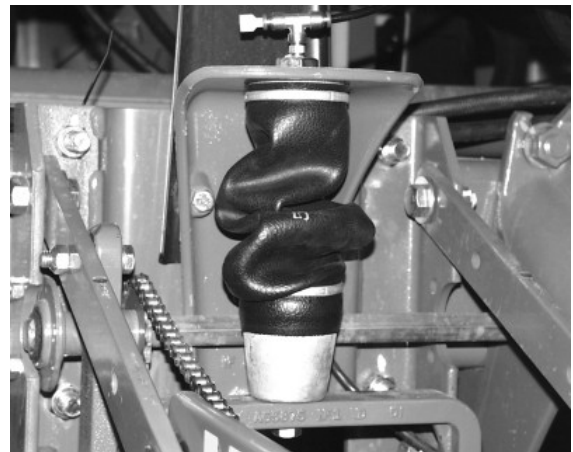
Do not remove pressure relief valve.

Do not pressurize system unless all row unit components are in place.

IMPORTANT: Do not operate a pinched or unrolled air spring. Should this occur, lower system pressure until springs can be rolled by hand. Roll spring back over lower piston. Incremental lowering of machine may be required to get rubber started rolling over the lower piston.



Properly Rolled Air Bag



Improperly Rolled Air Bag

Down Force Applied by Spring Type and Position

Model	Spring Type	Position	Down Force (in lbs)
Kinze	"K"	None	0
		1	60
		2	120
		3	245
		4	380
JD 7000	"A"	None	0
		2.5"	60
		2.0"	80
		1.5"	90
		1.0"	110
		Tight	125
	"B"	Loose	160
		Tight	360
	"C"	No Bolt	80
		1	145
		2	220
		3	270
JD 7200	"D"		70
	"E"		220
	"G"	1	340
		2	240
		3	160
		4	95
	"L"	1	90
		2	150
		3	205
		4	270
		5	345

Spring type referenced by system selection guide front page designations

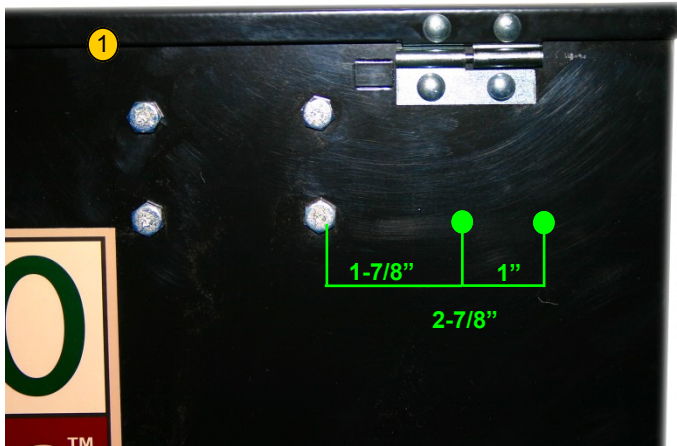
Tru-Count Pressure Regulator Kit



Item	QTY	PART NUMBER	PART NAME	DESCRIPTION
A	1	726445	REGULATOR	PRESSURE
B	2	28957	SCREW	#10-24 x 1/2 PAN HEAD SCREW
C	2	33074	WASHER	#10 SAE
D	2	36026	NUT	#10-24
E	1	726296	TEE	3/8 X 1/4 PTC
F	1	726473	TUBING	1/4" BLACK 25' COIL
G	2	726111	ELBOW	1/4" MALE NPT X 1/4" PTC 90 DEG
H	1	726107	ADAPTER	1/4" MALE NPT X 1/4" PTC
I	1	726472	GROMMET	12V
J	1	726459	GROMMET	Hydraulic
K	1	726115	TEE	1/4" PTC Tee

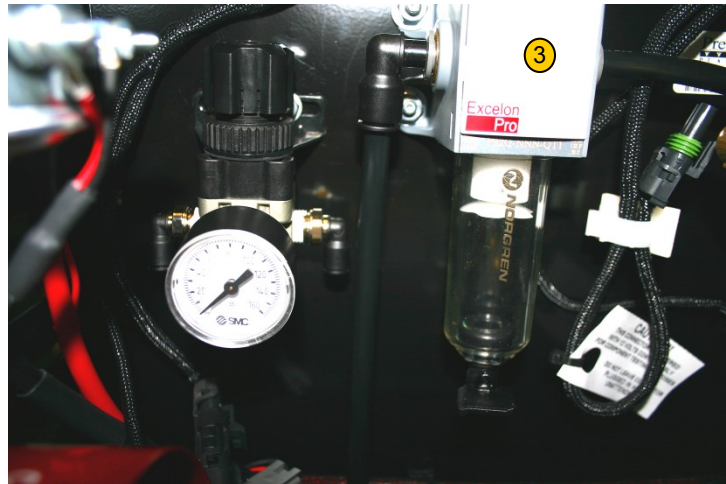
Note: This is a universal Conversion kit for use with both Hydraulic and 12V Compressor Modules, therefore some fittings may not be used in all instances.

For 12V Compressor Modules



Begin the installation of the Tru-Count Regulator Adapter Kit by locating and drilling holes for the placement of the regulator assembly. On the rear of the Compressor Module, in the upper right hand corner locate the 4 bolt heads that fix the water separator inside the CM. From the lower right hand bolt head measure and mark 1-7/8" and 2-7/8" center to center. Drill mounting holes using a 1/4" drill bit. See Figure 1.

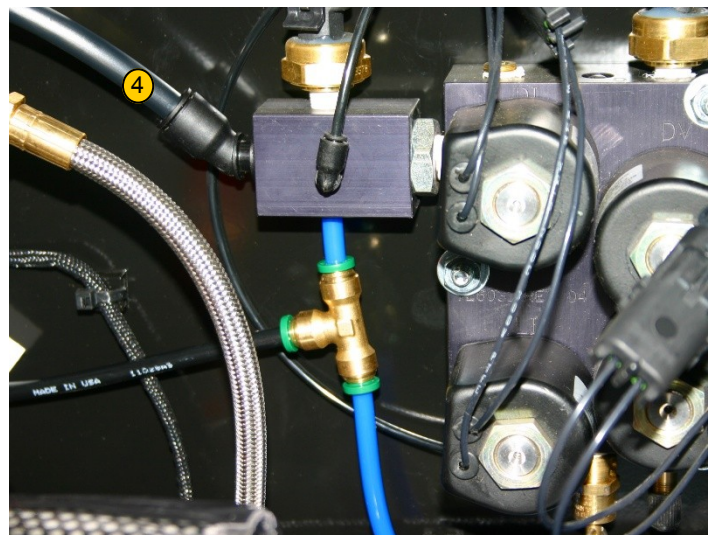
Assemble the regulator with two 1/4"MALE NPT X 1/4"PTC elbows as shown at right. Tighten to finger tight + 1 turn.



Inside the CM, position and mount the regulator assembly to the left of the water separator using the #10SAE X 1/2" and corresponding #10 nuts and washers.

Caution: Drain the Air Tank of all pressure prior to proceeding to the following step.

Using the tubing cutter supplied in the Service Kit Assembly cut approximately 14" of the supplied 1/4" OD black tubing supplied with the kit to be use as the regulator supply line. Next, measure down 1-1/2" to 3" down from the inlet check valve assembly and cut the blue line leading to the accessory air chuck. Re-connect the blue accessory line with the addition of the regulator supply line using the provided 1/4" PTC Tee. Connect the opposite end of the supply line to the regulator air outlet fitting.



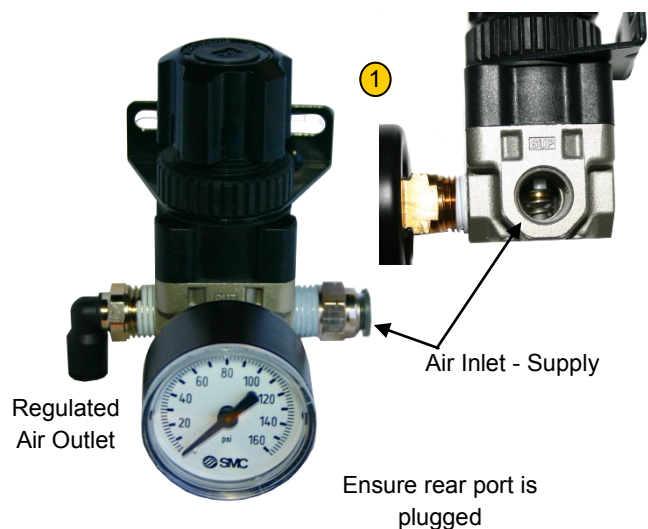
If it becomes necessary to remove the accessory line from the inlet check valve, make a mark flush with the assembly body (or 7/16" from the end). Re-install the accessory line no further than this mark to prevent air flow disruption.

Complete the upgrade process by installing the rubber grommet (Item J on initial page) into the cutout in the base of the enclosure directly below the regulator. Next, connect the regulated air supply fitting to your existing Tru-Count Pneumatic system using the supplied 1/4" OD tubing.

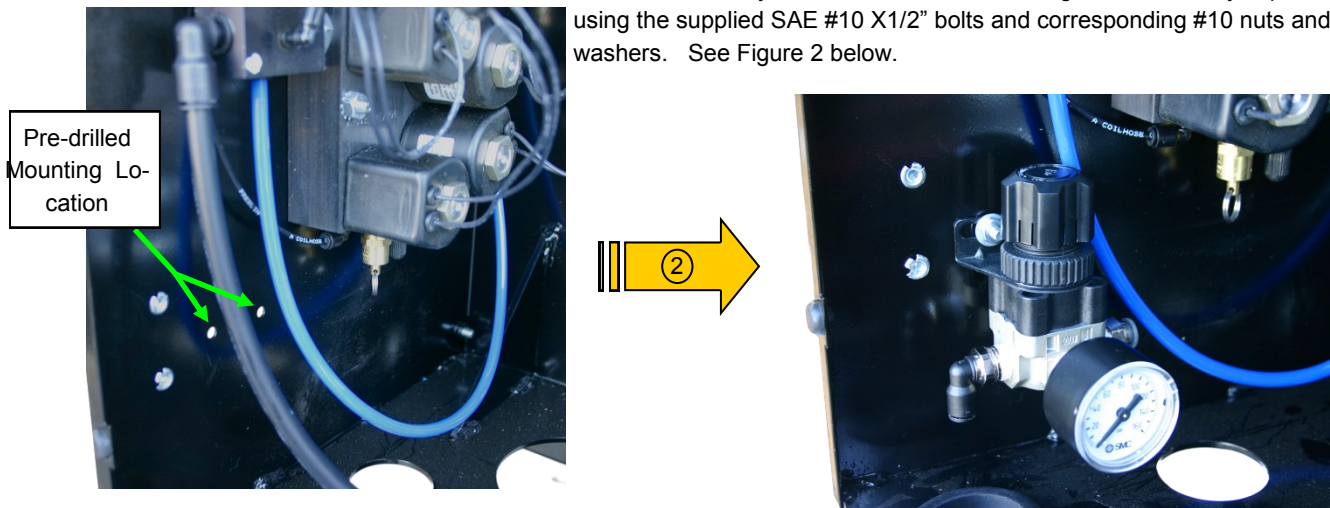


For Hydraulic Compressor Modules

Begin the upgrade process by assembling the regulator with the 1/4"MALE NPT X 1/4"PTC adapter on the air inlet - supply side, and the 1/4"MALE NPT X 1/4"PTC Elbow on the regulated air - outlet side. See Figure 1 at right. Tighten to finger tight + 1 turn.



Next, locate the two pre-drilled holes on the left hand panel when looking inside the Compressor Module below the manifold assembly. Position and mount the regulator assembly in place using the supplied SAE #10 X1/2" bolts and corresponding #10 nuts and washers. See Figure 2 below.

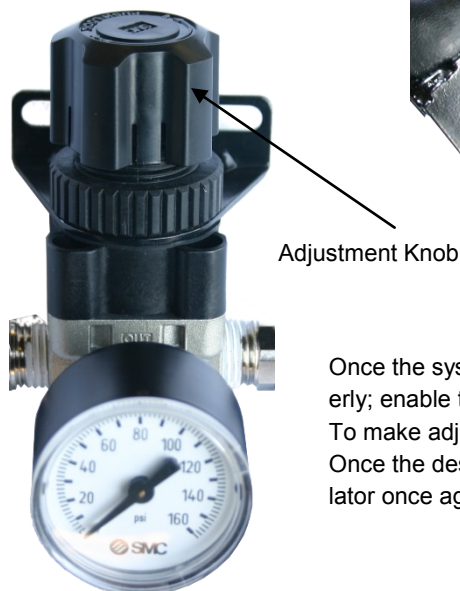
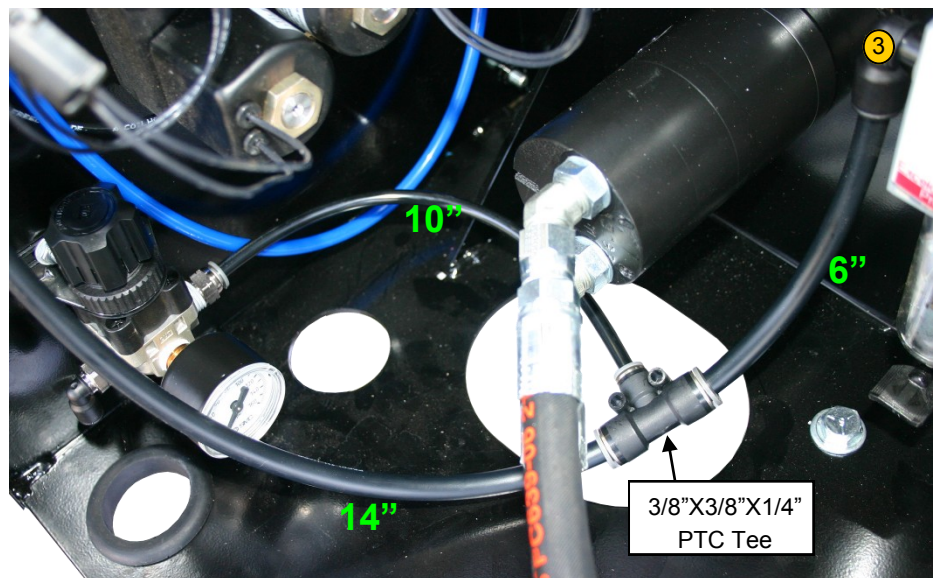


Caution: Drain the Air Tank of all pressure prior to proceeding to the following step.

Continue the installation by plumbing the regulator into the 3/8" supply line from the water separator to the manifold assembly. Lengths given in the image at right are approximate values given for reference. Adjust hose lengths as necessary.

Install the rubber grommet (Item K on initial page) into the cutout in the enclosure below the regulated air outlet fitting.

Next, connect the regulated air supply fitting on the regulator to your existing Tru-Count Pneumatic system using the supplied 1/4" OD tubing.



Once the system has been updated completely and all components are connected properly; enable the compressor and allow the tank pressure to build to greater than 125psi. To make adjustments to the regulator pressure, lift the adjustment knob to allow it to turn. Once the desired pressure has been reached, snap the knob back down to lock the regulator once again.