

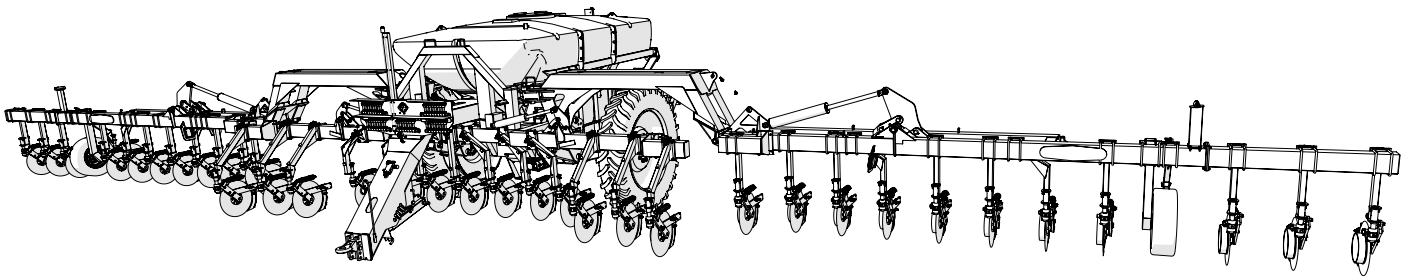


Manual



MODEL

6018



Rev. 1.23.2020

J&M Manufacturing Co, Inc

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www.jm-inc.com

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To The Dealer

TO THE DEALER

Read manual instructions and safety rules. Make sure all items on the Dealer's Pre-Delivery and Delivery Check Lists are completed before releasing equipment to the owner.

The dealer must complete the Warranty Registration found on the Dealer Portal website located at dealer.jm-inc.com and return it to J&M Mfg. Co., Inc. at the address indicated on the form. Warranty claims will be denied if the Warranty Registration has not been submitted.

EXPRESS WARRANTY:

J&M Mfg. Co., Inc. warrants against defects in construction or materials for a period of ONE year. We reserve the right to inspect and decide whether material or construction was faulty or whether abuse or accident voids our guarantee.

Warranty service must be performed by a dealer or service center authorized by J&M Mfg. Co., Inc. to sell and/or service the type of product involved, which will use only new or remanufactured parts or components furnished by J&M Mfg. Co., Inc. Warranty service will be performed without charge to the purchaser for parts or labor based on the Warranty Labor Times schedule. Under no circumstance will allowable labor times extend beyond the maximum hours indicated in the Warranty Labor Times schedule for each warranty procedure. The purchaser will be responsible, however, for any service call and/or transportation of the product to and from the dealer or service center's place of business, for any premium charged for overtime labor requested by the purchaser, and for any service and/or maintenance not directly related to any defect covered under the warranty. Costs associated with equipment rental, product down time, or product disposal are not warrantable and will not be accepted under any circumstance.

Each warranty term begins on the date of product delivery to the purchaser. Under no circumstance will warranty be approved unless (i) the product warranty registration card has been properly completed and submitted to the equipment manufacturer, and (ii) a warranty authorization number has been issued by the equipment manufacturer. This Warranty is effective only if the warranty registration card is returned within 30 days of purchase.

This warranty does not cover a component which fails, malfunctions or is damaged as a result of (i) improper modification or repair, (ii) accident, abuse or improper use, (iii) improper or insufficient maintenance, or (iv) normal wear or tear. This warranty does not cover products that are previously owned and extends solely to the original purchaser of the product. Should the original purchaser sell or otherwise transfer this product to a third party, this warranty does not transfer to the third party purchaser in any way. J&M Mfg. Co., Inc. makes no Warranty, express or implied, with respect to tires or other parts or accessories not manufactured by J&M Mfg. Co., Inc. Warranties for these items, if any, are provided separately by their respective manufacturers.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

In no event shall J&M Mfg. Co., Inc. be liable for special, direct, incidental or consequential damages of any kind. The exclusive remedy under this Warranty shall be repair or replacement of the defective component at J&M Mfg. Co., Inc.'s option. This is the entire agreement between J&M Mfg. Co., Inc. and the Owner about warranty and no J&M Mfg. Co., Inc. employee or dealer is authorized to make any additional warranty on behalf of J&M Mfg. Co., Inc.

The manufacturer reserves the right to make product design and material changes at any time without notice. They shall not incur any obligation or liability to incorporate such changes and improvements in products previously sold to any customer, nor shall they be obligated or liable for the replacement of previously sold products with products or parts incorporating such changes.

SERVICE:

The equipment you have purchased has been carefully manufactured to provide dependable and satisfactory use. Like all mechanical products, it will require cleaning and maintenance. Lubricate the unit as specified. Observe all safety information in this manual and safety signs on the equipment.

For service, your authorized J&M dealer has trained mechanics, genuine J&M service parts, and the necessary tools and equipment to handle all your needs.

Use only genuine J&M service parts. Substitute parts may void warranty and may not meet standards required for safety and satisfactory operation. Record the model number and serial number of your equipment in the spaces provided:

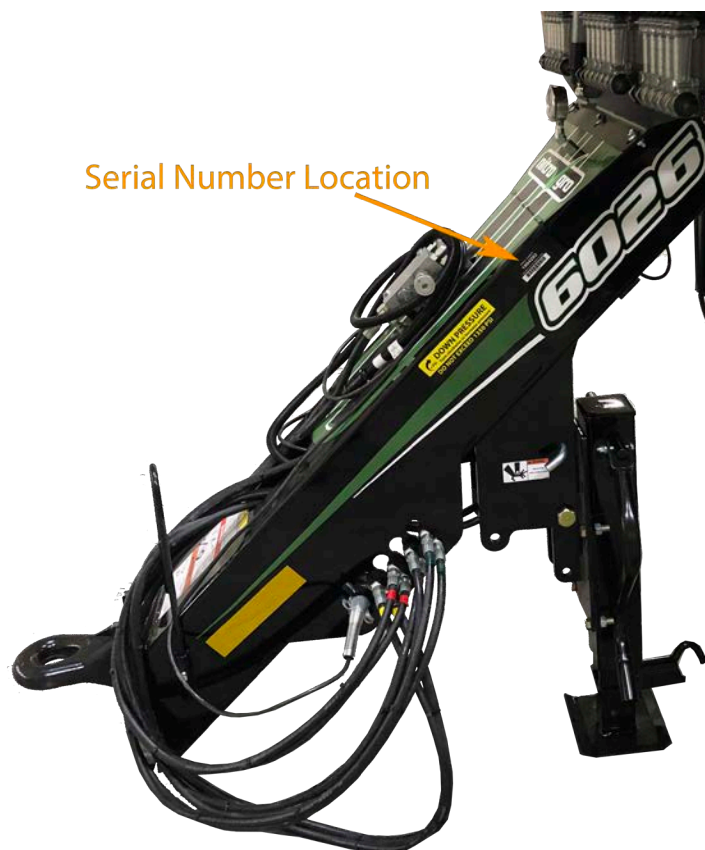
Model No: 6018 NitroGro Applicator **Serial No:** _____ **Date of Purchase:** _____

Purchased From: _____

Provide this information to your dealer to obtain correct repair parts.



Serial Number



Serial Number _____
Model Number _____ 6018

Standard practice when ordering parts or obtaining information from your dealer requires the serial number and model number. Have numbers available before making contact.

Dealer Set-Up

- Run water into the tank, turn pump on, and check for leaks. Ensure agitation valve is open to allow pump to prime.
- If temperatures are below freezing, store NitroGro applicator in heated storage until it has been properly winterized. See "Storage" on page 34 for winterizing instructions.
- See set-up instructions in the ACE pump manual.
- Turn on 5-section valves and check for flow to each row.
- Inspect the unit for loose nuts, bolts, and fasteners. Refer to "Bolt Torque Chart" on page 8 for torque values.
- Check all bearings and grease fittings for proper lubrication.
- Ensure that working parts move freely and function as intended.
- Check the hydraulic cylinders, hydraulic hoses, fertilizer fittings, and seals for leaks.
- **⚠ WARNING - Use cardboard or wood to check for leaks.**
- Ensure lug nuts are tightened and all tires are inflated properly. Refer to "Stud and Wheel Nut Torque Specifications" on page 8 for torque specifications and "Operation" on page 18 for tire pressure information.
- Check that safety decals, reflective decals, and the slow moving vehicle sign are properly located. Refer to "Decals" on page 36 for proper placement of decals.
- Ensure all lights function properly.
- Examine paint for defects and scratches.

General Information

TO THE OWNER:

The purpose of this manual is to assist you in operating and maintaining your seed tender in a safe manner. Read it carefully. It furnishes information and instructions that will help you achieve years of dependable performance and help maintain safe operating conditions. If this machine is used by an employee or is loaned or rented, make certain that the operator(s), prior to operating:

1. Is instructed in safe and proper use.
2. Reviews and understands the manual(s) pertaining to this machine.

Throughout this manual, the term **IMPORTANT** is used to indicate that failure to observe can cause damage to equipment. The terms **CAUTION**, **WARNING** and **DANGER** are used in conjunction with the Safety-Alert Symbol, (a triangle with an exclamation mark), to indicate the degree of hazard for items of personal safety. When you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or death.



This Safety-Alert symbol indicates a hazard and means
ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!



DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed.



CAUTION

Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

IMPORTANT

Indicates that failure to observe can cause damage to equipment.

NOTE

Indicates helpful information.

Safety Rules



Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be erased by an operator's single careless act. In addition, hazard control and accident prevention are dependent upon the awareness, concern, judgment, and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

Make certain that the operator(s), prior to operating is instructed in safe and proper use and reviews and understands the manual(s) pertaining to this machine. Also make certain that the operator(s) reviews and understands the operator's manual of the tow vehicle prior to hooking up or operating the NitroGro Applicator.

Read this manual before you operate this machine. If you do not understand any part of this manual, or need more information, contact the manufacturer or your authorized dealer.

Note: The right and the left hand sides of the implement are determined by facing the same direction that the applicator will travel when moving forward.



Understand that your safety and the safety of other persons is measured by how you service, and operate this machine. Know the positions and functions of all controls before you try to operate them. Make sure to check all controls in a safe area before starting your work.

The safety information given in this manual does not replace safety codes, federal, state or local laws. Make certain your machine has the proper equipment as designated by local laws and regulations.

A frequent cause of personal injury or death is from persons falling off equipment and being run over. Do not permit persons to ride on this machine.

Travel speeds should be such that complete control and machine stability is maintained at all times. Where possible, avoid operating near ditches, embankments and holes. Reduce speed when turning, crossing slopes and rough, slick or muddy surfaces.

Collision of high speed road traffic and slow moving machines can cause personal injury or death. On roads, use flasher lights according to local laws. Keep slow-moving-vehicle emblem visible. Pull over to let faster traffic pass.

Keep all safety shields in place.

Keep hands, feet, hair and clothing away from moving parts while unit is in operation.

Make sure that everyone is clear of equipment before applying power or moving the machine.

Make sure that the implement is fastened securely to the tractor by using the proper hitch pin, clip and safety chains.

Do NOT exceed speeds in excess of 20 MPH. Also be sure slow moving vehicle emblem is attached to rear of transport.

Before unhooking the implement from the towing unit, be sure to properly block the wheels to prevent the implement from moving. Be sure the jack assembly is positioned in the park position and the weight has been transferred to the jack assembly before unhooking the implement.

Avoid high pressure fluids. Escaping fluid under pressure can penetrate the skin causing serious injury. Always relieve pressure before disconnecting hydraulic lines. Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands. Keep all components in good repair.



Bolt Torque Chart

Always tighten hardware to these values unless a different torque or tightening procedure is listed for specific application. Fasteners must always be replaced with the same grade as specified in the manual parts list. Always use the proper tool for tightening hardware. Make sure fastener threads are clean and you start thread engagement properly. **Use these values when tightening all bolts and nuts with the exception of wheel nuts.**

SAE Fasteners

Coarse Thread Series				
	Grade 5		Grade 8	
Diameter and Pitch (Inches)	Dry	Oiled	Dry	Oiled
1/4"-20	8 ft-lbs	6 ft-lbs	12 ft-lbs	9 ft-lbs
5/16"-18	17	13	25	18
3/8"-16	31	23	44	33
7/16"-14	49	37	70	52
1/2"-13	75	57	106	80
9/16"-12	109	82	154	115
5/8"-11	150	113	212	159
3/4"-10	267	200	376	282
7/8"-9	429	322	606	455
1"-8	644	483	909	681
Fine Thread Series				
Diameter and Pitch (Inches)	Dry	Oiled	Dry	Oiled
1/4"-28	10 ft-lbs	7 ft-lbs	14 ft-lbs	10 ft-lbs
5/16"-24	19	15	27	20
3/8"-24	35	26	49	37
7/16"-20	55	41	78	58
1/2"-20	85	64	120	90
9/16"-18	121	91	171	128
5/8"-18	170	127	240	180
3/4"-16	297	223	420	315
7/8"-14	474	355	669	502

Stud and Wheel Nut Torque Specifications

Always tighten hardware to these values unless a different torque or tightening procedure is listed for specific application. Fasteners must always be replaced with the same grade as specified in the manual parts list. Always use the proper tool for tightening hardware. Make sure fastener threads are clean and you start thread engagement properly. **Use these values when tightening all studs and wheel nuts.**

Stud	Tightening Torque
1/2"-20	80 ft-lbs
9/16"-18	170 ft-lbs
5/8"-18	350 ft-lbs
3/4"-16	400 ft-lbs
20mm	475 ft-lbs
22mm	640 ft-lbs

TIGHTENING WHEEL NUTS: During initial operation of the NitroGro applicator, **tighten standard 3/4" wheel studs and nuts to torque 400 ft-lbs and tighten 1/2"-20 gauge wheel studs and nuts to torque 80 ft-lbs.** Check for proper torque after every 10 hours of use. Failure to do so may damage wheel nut seats. Once seats are damaged, it will become impossible to keep nuts tight.

Specifications

SPECIFICATIONS 6000 Series Applicators



Tank Size	1,850 Gallon
Base Width	60'
Ground Clearance	40"
Row Spacing*	20", 22", 30"
Number of Coulters	23, 25, 35, 37
Coulter Style	Grove Engineered Products (GEP) or J&M ParaLinkage
Fertilizer Delivery	Knife or Injection
Wing Flex	Standard 15° Flex Up - 10° Flex Down Can be operated rigidly
Wing Kick	Standard
Coulter Frame Tubing	5" x 7" Double Toolbar
Hydraulic Down Pressure	Standard
Standard Hydraulic Driven Pump	Ace Pump
Wheels	VF 380/90R46 Alliance 354 or VF320/105R46 Alliance 354
Transport Width	11'-9"
Transport Height	11'-10"
Transport Length	25'-0"
Pin To Axle	14'-0"
Flow Monitors	Standard - Wilger
Depth Control Spools	Optional
Quick Fill	3" Fill Standard
Wash Tank	Standard 9 Gallon Wash Tank
Empty Weight	16,000 lbs.

* Other Row Spacing Available Upon Request

With toolbar unfolded and up (knives not in ground):

	Total Weight	Weight on Axle*	Tongue Weight*
Tank Empty	16,000 lbs	11,229.2 lbs	4,770.8 lbs
Tank Full	37,000 lbs	31,244.9 lbs	5,755.1 lbs

With toolbar folded and down (knives in ground):

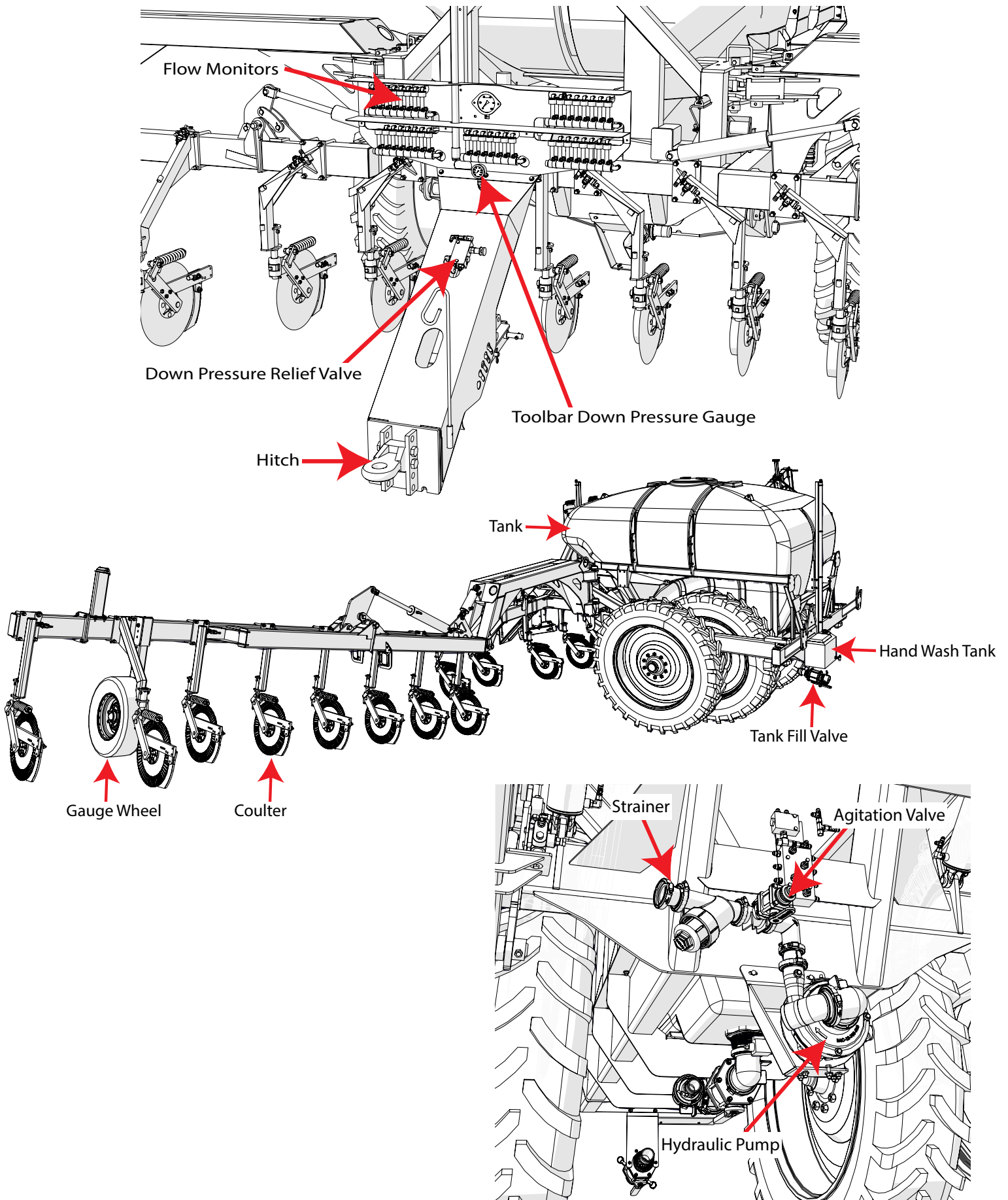
	Total Weight	Weight on Axle*	Tongue Weight*
Tank Empty	16,000 lbs	6,215.4 lbs	1,034.6 lbs
Tank Full	37,000 lbs	2,6231.2 lbs	2,018.8 lbs

*These values assume moderate soil hardness and 25 coulters.

Tires	Ground Compaction
VF320/105R46 (Alliance) (172D) - Single Wheels	71 psi
VF380/90R46 (Alliance) (173D) - Single Wheels	57 psi
VF480/80R50 (Alliance) (179D) - Single Wheels	31 psi
VF320/105R46 (Alliance) (172D) - Dual Wheels	20 psi
VF380/90R46 (Alliance) (173D) - Dual Wheels	17 psi
VF480/80R50 (Alliance) (179D) - Dual Wheels	12 psi



NitroGro Components



Flow Monitors

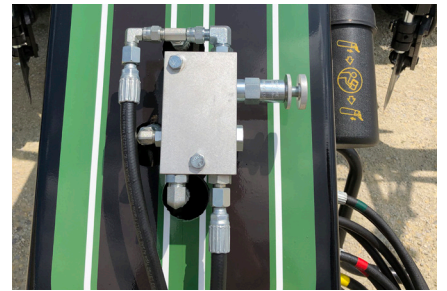
Flow monitors allow the operator to see the rate of flow to each coulter through a floating ball inside the transparent inspection tube. Each coulter is connected with a separate supply hose.



Down Pressure Relief Valve

The down pressure relief valve provides adjustable hydraulic pressure to force the coulters on the wings into the ground while allowing the wing to flex up and down as needed to follow the contour of the ground.

- Turn clockwise to increase down pressure.
- Turn counter clockwise to decrease down pressure.



Toolbar Down Pressure Gauge

⚠ IMPORTANT - Do not exceed 1,350 psi on the down pressure gauge.

It is **VERY IMPORTANT NOT TO EXCEED 1,350 psi** of pressure on the down pressure gauge. Doing so may cause damage to the inner wing fold cylinders.



Hydraulic Pump

The standard pump for your NitroGro applicator is the Ace FMC-150-HYD-206. The maximum hydraulic fluid input pump for this pump is 7 gallons per minute. The optional, larger pump available for your applicator is the Ace FMC-750-HYD pump. The maximum hydraulic fluid input pump for this pump is 18 gallons per minute.

IMPORTANT - Do not exceed 7 gallons per minute hydraulic fluid input when using the Ace FMC-150-HYD-206 pump or 18 gallons per minute when using the Ace FMC-750-HYD pump.

The hydraulic pump is located below the tank and near the tank outlet to prevent cavitation and provide faster pump priming.

Depending on the pump used in your applicator, set the hydraulic flow of the tractor to 7 or 18 gallons per minute before you put the hydraulic fertilizer pump into use. If you don't turn down the tractor hydraulic flow to the pump, damage will occur (refer to set up Instructions in the pump manual).



Coulter

The number of coulters is determined by the number of rows (usually one less or one more). So the number of rows will be even, and the number of coulters will be odd, since you are placing the nitrogen between the rows. For example, a 24 row unit will have either 23 or 25 coulters. A 24 row applicator with 23 coulters is considered a "one-down" unit. Similarly, a 24 row applicator with 25 coulters is considered a "one-up" unit.



Hand Wash Tank

Hand wash tank makes cleaning hands after chemical spills quick and easy.



Strainer

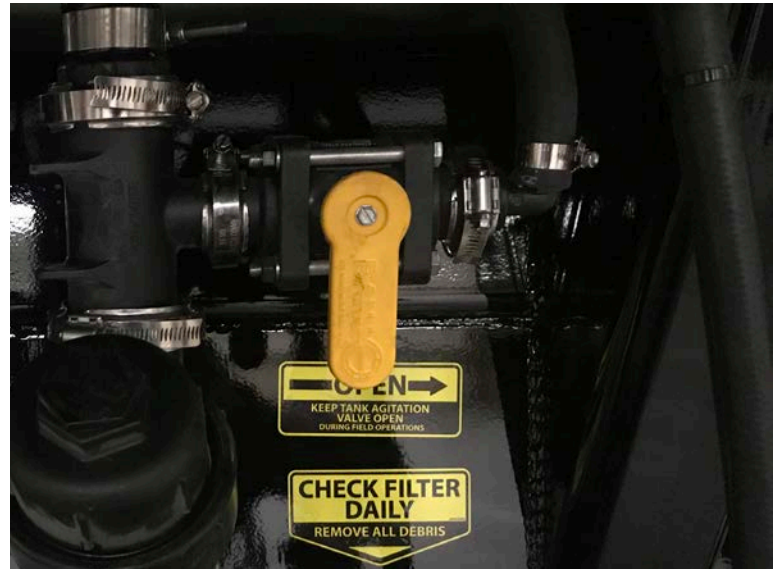
The NitroGro applicator is equipped with a strainer designed to remove dirt and debris from the fertilizer to prevent downstream clogs.



Agitation Valve

The agitation valve is designed to allow air to escape from the pump so it can easily prime. When you're running in the field, a little liquid runs through the agitation valve back to the tank. You will need to adjust the amount of agitation.

The agitation valve can also be opened and used to evenly mix additives by running the pump with the electronic control valves closed.



Counterbalance Valve

The counterbalance valve keeps the outside wings from creeping up. To tighten the counterbalance valve, turn the allen-head on the counter balance valve closest to the bottom end of the hydraulic cylinder (as shown in the picture to the right) counter-clockwise in 1/2 turn increments until the wings remain locked in place during operation.



Pre-Operation Checklist

Preparing the NitroGro Applicator:

IMPORTANT - Before putting the applicator into operation, check the machine for damaged or worn parts and replace as necessary.

Only use a tractor with sufficient power and weight to operate the applicator. For 24 rows, use a minimum of 275 hp tractor and for 36 rows use a minimum of 410 hp tractor. Be sure the applicator is properly attached to the tractor, the pin is properly secured, and the safety chain is properly installed. Inspect all safety decals for visibility and remove any debris.

Lights and SMV:

Position the SMV emblem with one point of the triangle upward and as near to the rear and centered or as near to the left of center of the unit as practicable. Secure the SMV emblem two to ten feet above the ground measured from the lower edge of the emblem. Before transporting, ensure that all lights, reflectors, and the SMV emblem are clean and visible.

Hardware:

Ensure all hardware is properly fastened according "Bolt Torque Chart" on page 8. Recheck all hardware for tightness after the unit has been operated for several hours. Check that all pins and retaining rings are in good condition. Replace any pins or retaining rings that are worn, damaged or missing.

Hydraulic Hoses:

Ensure hydraulic hoses are not kinked, twisted, or rubbing against sharp edges. Secure hoses to the applicator with nylon tie straps. Check hoses and fittings for hydraulic leaks. Tighten or replace hoses or fittings as necessary.

Lubrication:

Lubricate the NitroGro applicator according to the Lubrication Schedule outlined in "Service" on page 33.

Tires and Wheels:

Check the tire pressure in the transport and gauge wheel tires and make sure the tire pressure is equal for each tire. Refer to "Operation" on page 18 for tire pressure recommendations. Tighten standard 3/4" wheel studs and nuts on transport tires to torque 400 ft-lbs and tighten 1/2"-20 studs and nuts on gauge wheels to torque 80 ft-lbs. Check the wheel lug nuts before initial operation and after the unit has been operated for several hours to ensure the lug nuts remain tight.

Filling the tank:

⚠ Warning: Ensure the applicator is pinned to the tractor before filling tank. The applicator must be pinned to a tractor when any fluid is present in the tank.

Make sure the area is clear of bystanders when filling the tank. Always wear protective clothing, gloves, and masks when handling fertilizer/chemicals. Follow the fertilizer/chemical manufacturer's instructions when filling the tank. Keep the tank lid on at all times to keep out debris.

Fertilizer Pump:

Raise the toolbar with wings unfolded and turn on the fertilizer pump. Check if liquid is coming out of each knife/injector. Clean or replace knives/injectors if necessary.

Unfolding the Wings:

It is recommended to unfold the side wings in the field. Keep all bystanders away while unfolding the wings. See "Folding & Unfolding" on page 16.



Hitching and Unhitching the Applicator

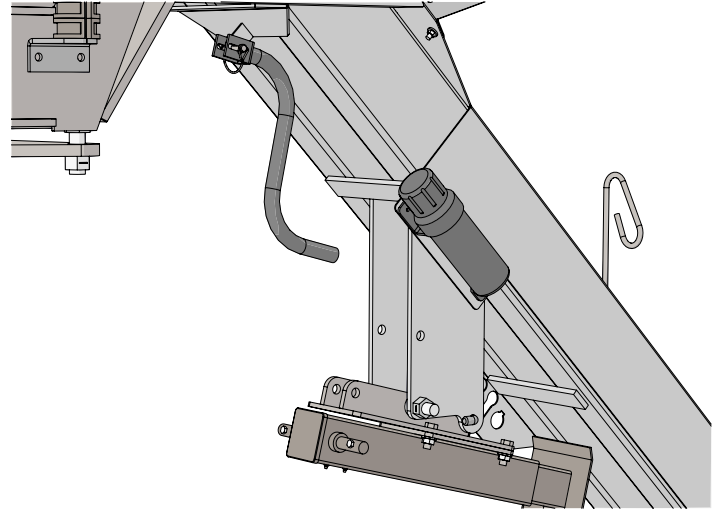
Connect the applicator to the tow vehicle using a hitch pin and make sure a retaining pin is secured in the hitch pin. Always attach the safety chains to the applicator and the tow vehicle.

⚠ WARNING – Before unhooking the applicator, empty contents from tank, unpin the jack from storage position, and lock it in the usage position. Lower the jack stand to the ground until the weight of the applicator is transferred to the jack. Keep hands and feet away from the jack stand when lowering.

Remove the hitch pin and unhook the safety chains.

⚠ WARNING – Always relieve hydraulic system pressure before disconnecting hoses from tractor or servicing hydraulic system. See the tractor's operating manual for proper procedures. Disconnect the hydraulic hoses. Install dust covers over the hose plugs and outlets.

When not in use, the jack handle is stored under the tongue, as pictured to the right.



Connecting the Hydraulic Hoses

Connect the hoses so the toolbar raises when the tractor control lever is pulled back and lowered when the control is pushed forward.

Hook up hydraulic lines as follows:

Set #1 - Green Hoses - Raise & Lower/ Wing Kick/ Down-pressure

Set #2 - Black Hoses (No Tape) - Main Fold

Set #3 - Red Hoses - Outside Wing Fold

Set #4 - Yellow Hoses - Hydraulic Pump

IMPORTANT - For the yellow hoses, hook the 1/2" return hose to a low pressure return port on the tractor.

Fertilizer Pump

The standard pump for your NitroGro applicator is an Ace FMC-150-HYD-206 pump. Ace FMC-750-HYD-M22-PWM is an optional pump used for the PWM system.

Note: Refer to the pump's operating manual to regulate the hydraulic flow to the pump.

Attach the pump hydraulic hoses to the tractor so the pump operates in the lower/retract position. The pump can then be turned off in the forward "float" position. Turning the pump off in "float" instead of "neutral" allows the hydraulic system pressure to equalize and prevents the occurrence of damaging pressure spikes.

Connect the return line to a low pressure return port, if available. The low pressure return port routes oil directly to the reservoir, minimizing return line pressure. Low return line pressure extends the motor seal life and increases operating efficiency.

⚠ WARNING- Failure to regulate oil flow will cause motor failure.

Note: Refer to the pump's operating manual to locate your tractor model and follow the appropriate setup instructions.

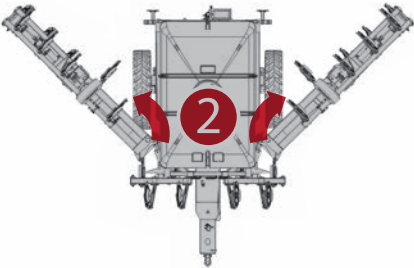
⚠ WARNING - Not a suitable pump for flammable liquids.



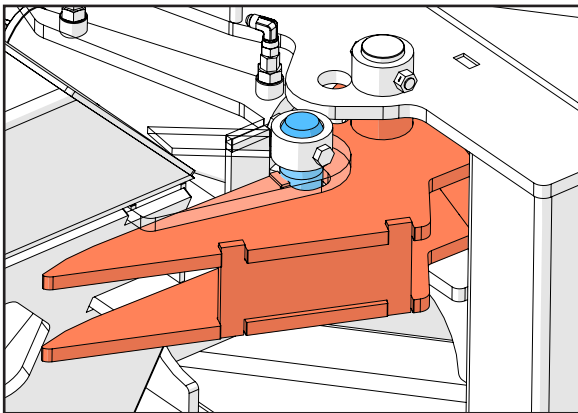
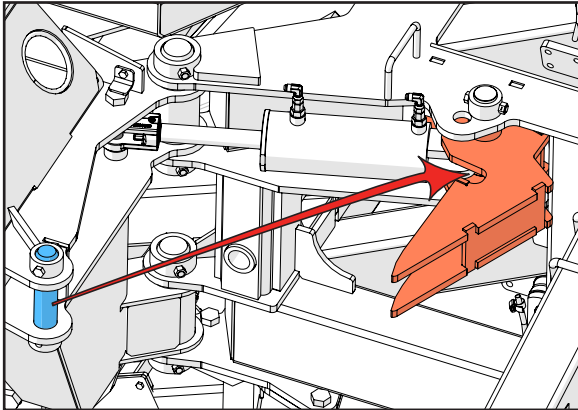
Folding & Unfolding

Unfolding

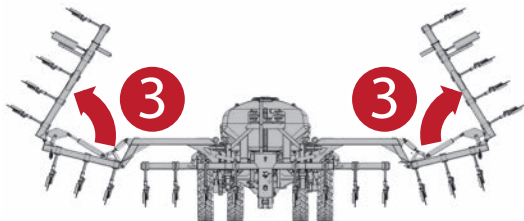
1. Toolbar Completely Up
(Down Pressure Circuit - Green Taped Hoses)
2. Main Toolbar Forward and **Allow Locks to Fully Engage**. Hold hydraulics for 5 seconds once wings fold completely forward.
(Toolbar Fold Circuit - Non-Taped Hoses)



WARNING: Failure to allow locks to fully engage can cause severe damage to the applicator as pictured below.

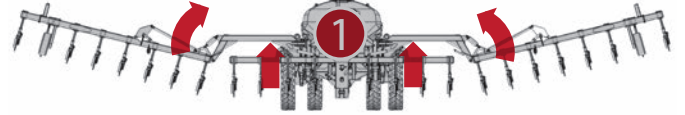


3. Flip Toolbars Out
(Toolbar Flip Circuit - Red Taped Hoses)

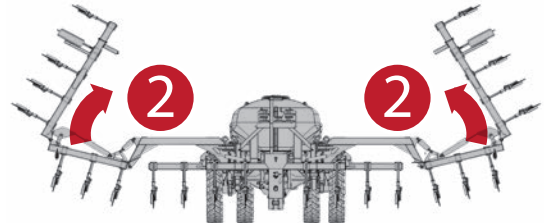


Folding

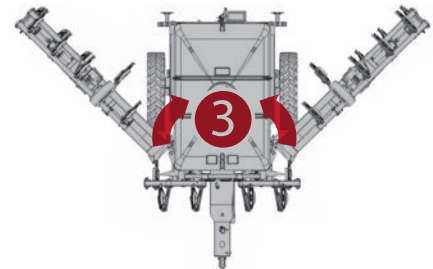
1. Toolbar Completely Up
(Down Pressure Circuit - Green Taped Hoses)



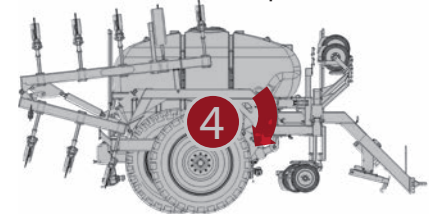
2. Flip Toolbar In
(Toolbar Flip Circuit - Red Taped Hoses)



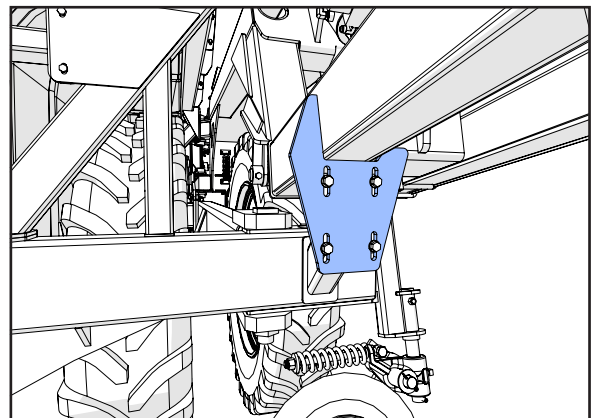
3. Main Toolbar Backwards
(Main Toolbar Fold Circuit - Non-Taped Hoses)



4. Main Toolbar Down
(Down Pressure Circuit - Green Taped Hoses)



WARNING: Ensure wings are resting in wing saddles before transport (as pictured below).



Adjusting the Field Depth

- Set the center section of coulters first. Spacers are included with the toolbar cylinders. Add or remove spacers until the center section is positioned at the appropriate depth. Lower the unit until the lift cylinders bottom out on the stroke control spacers. Add or remove stroke control spacers until the center toolbar section reaches desired application depth. For best results, move forward while lowering the toolbar.
- After the center toolbar is set with the cylinder spacers, adjust the wing gauge wheel setting until the wings are level with the base section and the entire toolbar is flat and even. Once the toolbar is set and leveled, further adjustment is typically not necessary.

Down Pressure

- Set the down pressure just high enough to keep the gauge wheels in contact with the ground. Excessive pressure can cause premature wear on wing pivots and gauge wheels.
- **⚠ IMPORTANT - DO NOT EXCEED 1,350 psi.**

Transporting

- Comply with ALL state and local laws governing highway safety and regulations when moving machinery on public roads.
- Be sure an SMV (Slow Moving Vehicle) emblem is in place and clearly visible on the rear of the applicator. Position the SMV emblem with one point of the triangle upward and as near to the rear and centered or as near to the left of center of the unit as practicable. Secure the SMV emblem two to ten feet above the ground measured from the lower edge of the emblem. Before transporting, ensure that all lights, reflectors, and the SMV emblem are clean and visible. Ensure the amber, red, and orange reflective tape on the implement is in place and clearly visible. Before transporting, ensure all lights, reflectors, and the SMV emblem are clean and visible.
- When transporting applicator, do not exceed 10 MPH in the field or over rough terrain. For highway transportation, do not exceed 20 MPH. Reduce transport speed when necessary to maintain full control. Never transport the applicator with contents in the tank.
- Tongue weight when NitroGro is folded and empty for road transport is 600-1,000 lbs depending on the configuration. Negative tongue weight (even intermittent) may cause instability when transporting. Add ballast to tractor as required. Never tow this implement with a motor vehicle. Tow only with a properly ballasted tractor.
- Be aware of overhead wires when transporting.
- Ensure the safety chain has a rating greater than the empty weight of the machine.
- Ensure wings are seated in the transport saddles before transporting.

Initial Operation

Follow these maintenance guidelines during the initial operation of your NitroGro applicator.

First 30 minutes of operation:

1. Ensure all coulters and nozzles are clean and working properly. Clean and adjust accordingly.
2. Check all hydraulic and chemical lines. Be sure none of them are kinked, pinched or leaking. Adjust lines accordingly.
3. Re-torque all of the wheel bolts.
4. Check all other fasteners and hardware. Adjust accordingly.
5. Lubricate all grease fittings.
6. Ensure that outside wings are not creeping up. If needed, adjust the counterbalance valves. Refer to "Counterbalance Valve" on page 13 for instructions.

After 4 hours of operation:

1. Ensure all coulters and nozzles are clean and working properly. Clean and adjust accordingly.
2. Check all hydraulic and chemical lines. Be sure none of them are kinked, pinched or leaking. Adjust lines accordingly.
3. Re-torque all of the wheel bolts.
4. Check all other fasteners and hardware. Adjust accordingly.

After 10 hours of operation:

1. Ensure all coulters and nozzles are clean and working properly. Clean and adjust accordingly.
2. Check all hydraulic and chemical lines. Be sure none of them are kinked, pinched or leaking. Adjust lines accordingly.
3. Re-torque all of the wheel bolts.
4. Check all other fasteners and hardware, especially the u-bolts that secure the coulters to the toolbar. Tighten if needed.

Upon completing the initial break-in period, begin the standard maintenance schedule as described in "Service" on page 33.



Operation

1. Hook tractor to NitroGro and adjust hitch so that frame on applicator is level or tilting forward slightly.
2. Connect hydraulic lines. See "Connecting the Hydraulic Hoses" on page 15.
3. Unfold the unit. See "Folding & Unfolding" on page 16.
4. Lower the unit until the lift cylinders bottom out on the stroke control spacers. Add or remove stroke control spacers until the center toolbar section reaches desired application depth. For best results, move forward while lowering the toolbar.
5. Adjust the wing gauge wheels so the coulters on the wings are the same depth and the toolbar is level when lowered.
6. Using the desired rate of application (GPA) and speed of application (MPH), reference the supplied sizing charts beginning on page 20 of this manual to determine which orifices or injectors will provide optimal application pressure. Install the orifices or injectors in the check valve unit above each row unit that is mounted on the coulters shaft.
NOTE – The unit will be either be set up to skip a row ("1 Down"), or re-apply the outside row ("1 Up").
 - If the unit is set up as "1 Down" (23 or 35 coulters), then the outside coulters on each end of the unit will be 1.5x the rate of the other coulters.
 - If the unit is set up as "1 Up" (25 or 37 coulters), then the outside coulters on each end of the unit will be 0.5x the rate of the other coulters.
7. Put water in the tank and check for leaks.
IMPORTANT - Before proceeding to the next step, ensure that both the maintenance valve under the tank and the agitation valve is open to allow the pump to prime. NEVER run the pump dry.
8. With the maintenance valve open, perform initial setup of the pump as outlined in the pump operator's manual. After pump set up, recheck the applicator for leaks.
9. In-field adjustment of hydraulic down-pressure: Adjust so that the coulters stay at desired depth with the least amount of hydraulic pressure necessary.
IMPORTANT - DO NOT exceed 1,350 psi.
10. Adjust hydraulic flow on the raise and lower/wing kick/down-pressure circuit with the least amount of hydraulic pressure necessary while maintaining a reasonable speed to raise and lower the toolbar. This will prevent excess heat in the hydraulic system as this circuit provides continuous toolbar down-pressure.
11. Fold the wings up for transport. See "Folding & Unfolding" on page 16.
IMPORTANT - Be sure to fully raise the toolbar before folding the wings up! Failure to do so will result in damage to the unit.
12. **TIRE PRESSURE:** The following is to be used as a **general guide** for tire inflation for cyclic use. Figures can vary depending on specific brand of tire used. **It is important that tires are inspected before and after operation. The tire should stand up with no side wall buckling or distress as the tire rolls. Do not exceed the tire pressure indicated below:**

Tires for Single Wheel Applicators	psi
VF320/105R46 (Alliance) (172D)	71
VF380/90R46 (Alliance) (173D)	57
VF480/80R50 (Alliance) (179D)	31

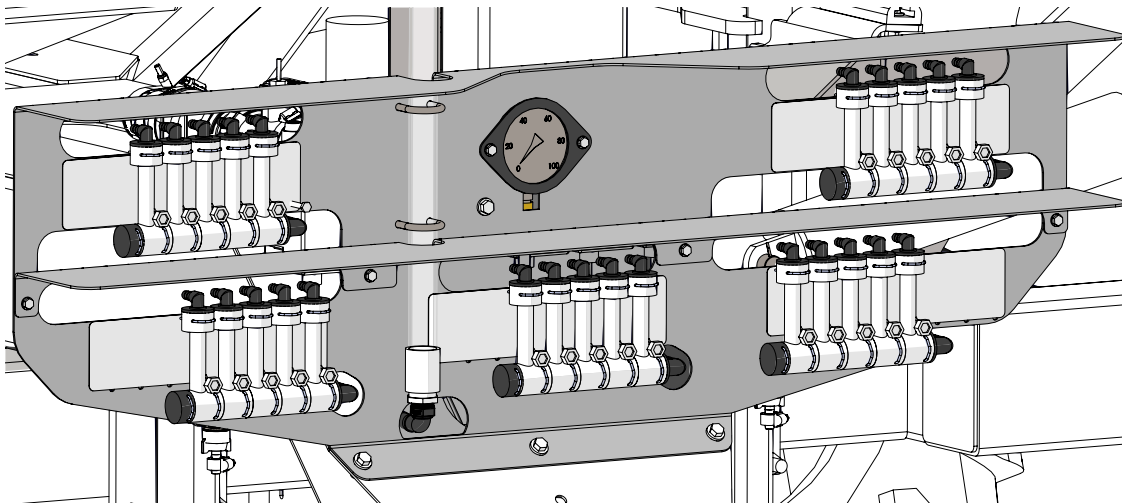
Tires for Walking Tandem Dual Wheel Applicators	psi
VF320/105R46 (Alliance) (172D)	20
VF380/90R46 (Alliance) (173D)	17
VF480/80R50 (Alliance) (179D)	12

Tires for Gauge Wheels	psi
ST215-75D14 Carlisle Sport Trail Tire	45



Flow Monitor Set Up

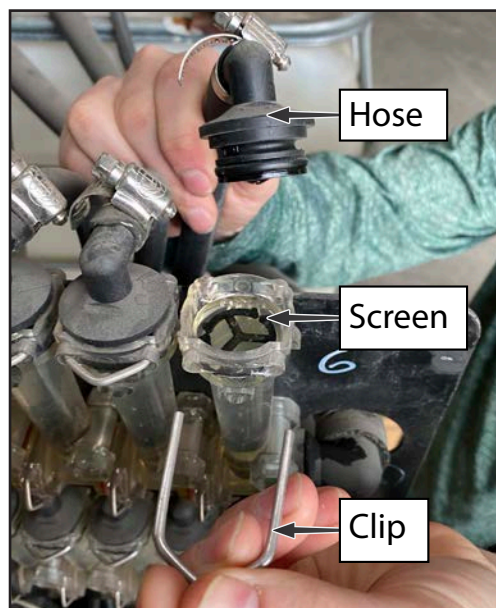
The NitroGro applicator offers row spacing options of 20", 22", or 30". The unit will be either be set up to or re-apply the outside row ("1 Up"), or skip a row ("1 Down"). Using your row spacing and whether your applicator is "1 Up" or "1 Down", refer to the chart below to determine the location and quantity of flow monitors for your applicator.



Row Spacing	Flow Monitor Manifold Set Up (1 Up)			Flow Monitor Manifold Set Up (1 Down)		
20"/22"	37 Coulters			35 Coulters		
	8		8	7		7
	7	7	7	7	7	7
30"	25 Coulters			23 Coulters		
	5		5	4		4
	5	5	5	5	5	5

Using the charts on pages 20-31v, decide which ball is best suited for your desired GPA and Speed. Only choose one ball for all flow monitors. Remove the balls that are not being used. The easiest way to remove the balls is to remove the flow monitors and dump the balls into a box. During this process, keep the hoses organized to ensure they are returned to their original locations when you reassemble the flow monitors.

To install a ball in the flow monitor, remove the clip and pop off the hose on top of the flow monitor. Remove the screen, insert the ball, and return the screen to its original position. **To prevent the ball from entering the hose, ensure the screen is above the ball.** Clip the hose back onto the flow monitor.



Injectors - 20" Row Spacing

Speed (MPH)	20 Gallons Per Acre										25 Gallons Per Acre									
	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12		
#10 Injector (psi)		1	7	10	15	19	24	29	33	2	6	13	18	24	29	36	41	47		
#15 Injector (psi)					3	6	9	12	16			2	5	9	13	17	20	25		
#20 Injector (psi)							2	4	7					2	4	8	10	13		
#30 Injector (psi)																		2		
#40 Injector (psi)																				
GPM (per nozzle)	0.34	0.43	0.52	0.60	0.69	0.77	0.86	0.95	1.03	0.43	0.54	0.64	0.75	0.86	0.97	1.07	1.18	1.29		
Flow Indicator 1/2" SS Level	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	0.9	1.3	1.7	2.0	2.4	2.8	3.1	3.5	3.9		
Flow Indicator 7/16" SS Ball						0.1	0.3	0.5	0.7					0.3	0.6	0.9	1.1	1.4		

Speed (MPH)	30 Gallons Per Acre										35 Gallons Per Acre									
	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12		
#10 Injector (psi)	6	12	20	26	33	39	47	53	61	11	17	27	33	42	49	58	66	74		
#15 Injector (psi)		1	6.3	10	15	19	24	29	34	1	5	11	15	21	26	32	37	43		
#20 Injector (psi)				2	6	9	13	16	20			3	6	11	14	19	22	27		
#30 Injector (psi)							1	4	6					1	3	5	8	11		
#40 Injector (psi)																	1	3		
GPM (per nozzle)	0.52	0.64	0.77	0.90	1.03	1.16	1.29	1.42	1.55	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.66	1.81		
Flow Indicator 1/2" SS Level	1.2	1.7	2.1	2.5	3.0	3.4	3.9	4.3	4.7	1.5	2.0	2.5	3.0	3.6	4.1	4.6	5.1	5.6		
Flow Indicator 7/16" SS Ball			0.1	0.4	0.7	1.1	1.4	1.8	2.1			0.4	0.8	1.2	1.6	2.0	2.4	2.8		

Speed (MPH)	40 Gallons Per Acre										45 Gallons Per Acre									
	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12		
#10 Injector (psi)	15	23	33	41	50	59	70	78	88	20	28	40	48	59	69	81	90	102		
#15 Injector (psi)	4	8	15	20	28	33	39	45	52	7	12	20	26	34	40	47	53	61		
#20 Injector (psi)		1	6	10	15	19	25	29	33		3	10	14	20	24	30	35	40		
#30 Injector (psi)					4	6	9	12	15				2	7	9	13	16	20		
#40 Injector (psi)							2	4	6						2	4	7	10		
GPM (per nozzle)	0.69	0.86	1.03	1.20	1.38	1.55	1.72	1.89	2.06	0.77	0.97	1.16	1.35	1.55	1.74	1.93	2.13	2.32		
Flow Indicator 1/2" SS Level	1.8	2.4	3.0	3.6	4.1	4.7	5.3	5.9	6.5	2.1	2.8	3.4	4.1	4.7	5.4	6.1	6.7			
Flow Indicator 7/16" SS Ball		0.3	0.7	1.2	1.6	2.1	2.5	3.0	3.4	0.1	0.6	1.1	1.6	2.1	2.6	3.1	3.6	4.1		

NOTES:

- The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 20 inches.
- Density or viscosity of the liquid can effect operating range.
- A displayed pressure higher than the calculated pressure may be due to a pressure drop in the fertilizer hoses.
- With #10 on the center, use #15 for one and a half rate outside, (35 knife).
- With #15 on the center, use #8 for half rate outside, (37 knife), and #20 for one and a half rate outside, (35 knife).
- With #20 on the center, use #10 for half rate outside, (37 knife), and #30 for one and a half rate outside, (35 knife).
- With #30 on the center, use #15 for half rate outside, (37 knife), and #40 for **one and a third** rate outside, (35 knife).
- With #40 on the center, use #20 for half rate outside, (37 knife), and #60 for one and a half rate outside, (35 knife).

For replacement injectors, see "Coulter Injector Assembly" on page 57.



Injectors - 20" Row Spacing

Speed (MPH)	50 Gallons Per Acre										55 Gallons Per Acre									
	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	24	33	47	56	68	79	93	103	115		29	39	54	64	77	89	104	115	129	
#15 Injector (psi)	10	16	24	31	40	46	54	61	70		13	19	29	36	46	53	61	69	79	
#20 Injector (psi)	2	6	13	18	24	29	36	41	47		4	9	17	22	29	34	41	47	54	
#30 Injector (psi)			2	5	10	13	17	20	24				4	8	13	16	21	25	29	
#40 Injector (psi)					2	4	7	10	13						4	7	10	13	17	
GPM (per nozzle)	0.86	1.07	1.29	1.50	1.72	1.93	2.15	2.36	2.58		0.95	1.18	1.42	1.66	1.89	2.13	2.36	2.60	2.84	
Flow Indicator 1/2" SS Level	2.4	3.1	3.9	4.6	5.3	6.1	6.8				2.7	3.5	4.3	5.1	5.9	6.7				
Flow Indicator 7/16" SS Ball	0.3	0.9	1.4	2.0	2.5	3.1	3.7	4.2	4.8		0.5	1.1	1.8	2.4	3.0	3.6	4.2	4.8	5.5	

Speed (MPH)	60 Gallons Per Acre										65 Gallons Per Acre									
	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	33	44	60	71	86	99	115	128	143		38	50	67	79	94	109	127	140	156	
#15 Injector (psi)	16	23	33	41	53	60	69	78	88		19	26	38	47	59	67	76	86	97	
#20 Injector (psi)	6	12	20	26	33	39	47	53	60		8	14	23	30	38	44	53	59	67	
#30 Injector (psi)		1	6	10	16	20	25	29	33			3	8	13	19	23	29	33	38	
#40 Injector (psi)				2	6	9	13	16	20				1	4	8	12	16	19	23	
GPM (per nozzle)	1.03	1.29	1.55	1.81	2.06	2.32	2.58	2.84	3.10		1.12	1.40	1.68	1.96	2.24	2.52	2.79	3.07	3.35	
Flow Indicator 1/2" SS Level	3.0	3.9	4.7	5.6	6.5						3.3	4.2	5.2	6.1						
Flow Indicator 7/16" SS Ball	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.1		1.0	1.7	2.4	3.2	3.9	4.6	5.3	6.1	6.8	

Speed (MPH)	70 Gallons Per Acre										75 Gallons Per Acre									
	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	42	55	74	87	103	118	138	152	170		47	60	80	94	112	128	149	165	184	
#15 Injector (psi)	22	30	42	52	65	74	84	94	106		25	34	47	57	71	80	91	102	115	
#20 Injector (psi)	11	17	27	33	42	49	58	65	74		13	20	30	37	47	54	64	71	80	
#30 Injector (psi)	1	5	11	15	22	26	32	37	42		2	6	13	18	25	30	36	41	47	
#40 Injector (psi)			3	6	11	14	19	22	27				5	8	13	17	22	26	30	
GPM (per nozzle)	1.20	1.50	1.81	2.11	2.41	2.71	3.01	3.31	3.61		1.29	1.61	1.93	2.26	2.58	2.90	3.22	3.55	3.87	
Flow Indicator 1/2" SS Level	3.6	4.6	5.6	6.6							3.9	5.0	6.1							
Flow Indicator 7/16" SS Ball	1.2	2.0	2.8	3.5	4.3	5.1	5.9	6.7			1.4	2.3	3.1	3.9	4.8	5.6	6.5			

NOTE - The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 20 inches.

Injectors - 22" Row Spacing

	15 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12
#10 Injector (psi)			2	5	9	12	17	20	24
#15 Injector (psi)						1	4	7	9
#20 Injector (psi)									2
#30 Injector (psi)									
#40 Injector (psi)									
GPM (per nozzle)	0.25	0.31	0.38	0.44	0.50	0.57	0.63	0.69	0.75
Flow Indicator Red Glass Level	1.1	1.7	2.2	2.8	3.3	3.8	4.4	4.9	5.5
Flow Indicator 1/2" SS Level	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.8	2.0

	20 Gallons Per Acre									25 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
#10 Injector (psi)		3	9	13	19	23	29	34	39	4	9	17	22	28	34	41	47	54
#15 Injector (psi)				2	5	8	12	15	19			4	7	12	16	21	24	29
#20 Injector (psi)						1	4	7	9					4	7	10	13	17
#30 Injector (psi)																	2	4
#40 Injector (psi)																		
GPM (per nozzle)	0.38	0.47	0.57	0.66	0.76	0.85	0.95	1.04	1.14	0.47	0.59	0.71	0.83	0.95	1.06	1.18	1.30	1.42
Flow Indicator 1/2" SS Level	0.8	1.1	1.4	1.7	2.0	2.4	2.7	3.0	3.3	1.1	1.5	1.9	2.3	2.7	3.1	3.5	3.9	4.3
Flow Indicator 7/16" SS Ball					0.0	0.3	0.5	0.8	1.0				0.2	0.5	0.8	1.1	1.4	1.8

	30 Gallons Per Acre									35 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
#10 Injector (psi)	9	15	24	30	38	45	54	61	69	14	21	31	39	48	56	66	74	84
#15 Injector (psi)		3	9	13	19	23	29	33	39	3	7	14	19	26	31	37	42	49
#20 Injector (psi)			2	5	9	12	17	20	24			5	9	14	18	23	27	31
#30 Injector (psi)						1	4	6	9					3	5	8	11	14
#40 Injector (psi)									2							1	3	5
GPM (per nozzle)	0.57	0.71	0.85	0.99	1.14	1.28	1.42	1.56	1.70	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.82	1.99
Flow Indicator 1/2" SS Level	1.4	1.9	2.4	2.8	3.3	3.8	4.3	4.8	5.3	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.7	6.2
Flow Indicator 7/16" SS Ball			0.3	0.6	1.0	1.4	1.8	2.1	2.5		0.2	0.6	1.1	1.5	1.9	2.4	2.8	3.2

NOTES:

- The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 22 inches.
- Density or viscosity of the liquid can effect operating range.
- A displayed pressure higher than the calculated pressure may be due to a pressure drop in the fertilizer hoses.
- With #10 on the center, use #15 for one and a half rate outside, (35 knife).
- With #15 on the center, use #8 for half rate outside, (37 knife), and #20 for one and a half rate outside, (35 knife).
- With #20 on the center, use #10 for half rate outside, (37 knife), and #30 for one and a half rate outside, (35 knife).
- With #30 on the center, use #15 for half rate outside, (37 knife), and #40 for **one and a third** rate outside, (35 knife).
- With #40 on the center, use #20 for half rate outside, (37 knife), and #60 for one and a half rate outside, (35 knife).

For replacement injectors, see "Coulter Injector Assembly" on page 57.



Injectors - 22" Row Spacing

	40 Gallons Per Acre										45 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	19	27	39	47	57	67	79	88	99		24	33	46	55	67	78	91	102	114	
#15 Injector (psi)	6	11	19	25	33	38	45	51	59		9	15	24	30	40	46	53	60	69	
#20 Injector (psi)		3	9	13	19	23	29	34	39		1	6	13	18	24	29	35	40	46	
#30 Injector (psi)				2	6	9	12	15	19				1	5	9	12	17	20	24	
#40 Injector (psi)						1	4	6	9						1	4	7	10	13	
GPM (per nozzle)	0.76	0.95	1.14	1.32	1.51	1.70	1.89	2.08	2.27		0.85	1.06	1.28	1.49	1.70	1.92	2.13	2.34	2.55	
Flow Indicator 1/2" SS Level	2.0	2.7	3.3	4.0	4.6	5.3	5.9	6.6			2.4	3.1	3.8	4.5	5.3	6.0	6.7			
Flow Indicator 7/16" SS Ball		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0		0.3	0.8	1.4	1.9	2.5	3.0	3.6	4.2	4.7	

	50 Gallons Per Acre										55 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	29	39	54	64	77	89	104	115	129		34	45	61	72	87	100	116	129	144	
#15 Injector (psi)	13	19	29	36	46	53	61	69	79		16	23	34	42	53	61	70	78	89	
#20 Injector (psi)	4	9	17	22	29	34	41	47	54		6	12	20	26	34	40	48	54	61	
#30 Injector (psi)			4	8	13	16	21	25	29			1	6	10	16	20	25	29	34	
#40 Injector (psi)					4	7	10	13	17					3	6	9	13	16	20	
GPM (per nozzle)	0.95	1.18	1.42	1.66	1.89	2.13	2.36	2.60	2.84		1.04	1.30	1.56	1.82	2.08	2.34	2.60	2.86	3.12	
Flow Indicator 1/2" SS Level	2.7	3.5	4.3	5.1	5.9	6.7					3.0	3.9	4.8	5.7	6.6					
Flow Indicator 7/16" SS Ball	0.5	1.1	1.8	2.4	3.0	3.6	4.2	4.8	5.5		0.8	1.4	2.1	2.8	3.5	4.2	4.8	5.5	6.2	

	60 Gallons Per Acre										65 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	39	51	68	80	96	110	129	143	159		44	57	76	89	106	121	141	156	174	
#15 Injector (psi)	19	27	39	48	60	68	78	87	99		23	31	44	53	67	76	86	96	109	
#20 Injector (psi)	9	15	24	30	39	45	54	60	68		11	18	28	35	44	51	60	67	76	
#30 Injector (psi)		3	9	13	19	24	29	34	39		1	5	11	16	23	27	34	38	44	
#40 Injector (psi)			2	5	9	12	16	20	24				4	7	11	15	20	23	28	
GPM (per nozzle)	1.14	1.42	1.70	1.99	2.27	2.55	2.84	3.12	3.41		1.23	1.54	1.84	2.15	2.46	2.77	3.07	3.38	3.69	
Flow Indicator 1/2" SS Level	3.3	4.3	5.3	6.2							3.7	4.7	5.7	6.8						
Flow Indicator 7/16" SS Ball	1.0	1.8	2.5	3.2	4.0	4.7	5.5	6.2	6.9		1.3	2.1	2.9	3.7	4.5	5.3	6.1	6.9		

	70 Gallons Per Acre										75 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
#10 Injector (psi)	49	63	83	97	116	132	154	170	189		54	68	91	106	125	143	166	183	204	
#15 Injector (psi)	26	35	49	59	74	83	94	105	119		29	39	54	65	81	91	102	114	129	
#20 Injector (psi)	14	21	32	39	49	56	66	74	83		16	24	35	43	54	62	72	81	91	
#30 Injector (psi)	3	7	14	19	26	31	38	43	49		4	9	16	22	29	35	42	47	54	
#40 Injector (psi)			5	9	14	18	23	27	32			2	7	11	16	21	26	30	35	
GPM (per nozzle)	1.32	1.66	1.99	2.32	2.65	2.98	3.31	3.64	3.97		1.42	1.77	2.13	2.48	2.84	3.19	3.55	3.90	4.26	
Flow Indicator 1/2" SS Level	4.0	5.1	6.2								4.3	5.5	6.7							
Flow Indicator 7/16" SS Ball	1.5	2.4	3.2	4.1	5.0	5.8	6.7				1.8	2.7	3.6	4.5	5.5	6.4				

NOTE - The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 22 inches.

Injectors - 30" Row Spacing

	15 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12
#10 Injector (psi)		4	10	14	20	24	30	35	40
#15 Injector (psi)				2	6	9	13	16	20
#20 Injector (psi)						2	5	7	10
#30 Injector (psi)									
#40 Injector (psi)									
GPM (per nozzle)	0.34	0.43	0.51	0.60	0.68	0.77	0.86	0.94	1.03
Flow Indicator Red Glass Level	1.9	2.7	3.4	4.1	4.9	5.6	6.4		
Flow Indicator 1/2" SS Level	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
Flow Indicator 7/16" SS Ball						0.1	0.3	0.5	0.7

	20 Gallons Per Acre									25 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
#10 Injector (psi)	6	12	20	26	33	39	47	53	61	13	20	30	37	46	54	64	72	81
#15 Injector (psi)		1	6	10	15	19	24	29	34	2	6	13	18	25	30	35	41	47
#20 Injector (psi)				2	6	9	13	16	20			5	8	13	17	22	26	30
#30 Injector (psi)							1	4	6					2	4	7	10	13
#40 Injector (psi)																	2	5
GPM (per nozzle)	0.52	0.64	0.77	0.90	1.03	1.16	1.29	1.42	1.55	0.64	0.81	0.97	1.13	1.29	1.45	1.61	1.77	1.93
Flow Indicator 1/2" SS Level	1.2	1.7	2.1	2.5	3.0	3.4	3.9	4.3	4.7	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5	6.1
Flow Indicator 7/16" SS Ball			0.1	0.4	0.7	1.1	1.4	1.8	2.1		0.2	0.6	1.0	1.4	1.8	2.3	2.7	3.1

	30 Gallons Per Acre									35 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
#10 Injector (psi)	20	28	40	48	59	69	81	90	102	27	36	50	60	72	84	98	109	122
#15 Injector (psi)	7	12	20	26	36	40	47	53	61	11	17	27	34	43	50	58	65	75
#20 Injector (psi)		3	10	14	20	24	30	35	40	3	8	15	20	27	32	39	44	50
#30 Injector (psi)				2	7	9	13	16	20			3	6	11	15	19	22	27
#40 Injector (psi)						2	4	7	10					3	5	9	11	15
GPM (per nozzle)	0.77	0.97	1.16	1.35	1.55	1.74	1.93	2.13	2.32	0.90	1.13	1.35	1.58	1.81	2.03	2.26	2.48	2.71
Flow Indicator 1/2" SS Level	2.1	2.8	3.4	4.1	4.7	5.4	6.1	6.7		2.5	3.3	4.1	4.8	5.6	6.4			
Flow Indicator 7/16" SS Ball	0.1	0.6	1.1	1.6	2.1	2.6	3.1	3.6	4.1	0.4	1.0	1.6	2.2	2.8	3.4	3.9	4.5	5.1

NOTES:

- The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 30 inches.
- Density or viscosity of the liquid can effect operating range.
- A displayed pressure higher than the calculated pressure may be due to a pressure drop in the fertilizer hoses.
- With #10 on the center, use #15 for one and a half rate outside, (23 knife).
- With #15 on the center, use #8 for half rate outside, (25 knife), and #20 for one and a half rate outside, (23 knife).
- With #20 on the center, use #10 for half rate outside, (25 knife), and #30 for one and a half rate outside, (23 knife).
- With #30 on the center, use #15 for half rate outside, (25 knife), and #40 for **one and a third** rate outside, (23 knife).
- With #40 on the center, use #20 for half rate outside, (25 knife), and #60 for one and a half rate outside, (23 knife).

For replacement injectors, see "Coulter Injector Assembly" on page 57.



Injectors - 30" Row Spacing

	40 Gallons Per Acre										45 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12		
#10 Injector (psi)	33	44	60	71	86	99	115	128	143	40	52	70	83	99	113	132	146	163		
#15 Injector (psi)	16	23	33	41	53	60	69	78	88	20	28	40	49	62	70	80	90	102		
#20 Injector (psi)	6	12	20	26	33	39	47	53	60	10	16	25	32	40	47	55	62	70		
#30 Injector (psi)		1	6	10	16	20	25	29	33		4	10	14	20	25	31	35	40		
#40 Injector (psi)				2	6	9	13	16	20			2	5	10	13	17	21	25		
GPM (per nozzle)	1.03	1.29	1.55	1.81	2.06	2.32	2.58	2.84	3.10	1.16	1.45	1.74	2.03	2.32	2.61	2.90	3.19	3.48		
Flow Indicator 1/2" SS Level	3.0	3.9	4.7	5.6	6.5					3.4	4.4	5.4	6.4							
Flow Indicator 7/16" SS Ball	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.1	1.1	1.8	2.6	3.4	4.1	4.9	5.6	6.4			

	50 Gallons Per Acre										55 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12		
#10 Injector (psi)	47	60	80	94	112	128	149	165	184	54	68	91	106	125	143	166	183	204		
#15 Injector (psi)	25	34	47	57	71	80	91	102	115	29	39	54	65	81	91	102	114	129		
#20 Injector (psi)	13	20	30	37	47	54	64	71	80	16	24	35	43	54	62	72	81	91		
#30 Injector (psi)	2	6	13	18	25	30	36	41	47	4	9	16	22	29	35	42	47	54		
#40 Injector (psi)			5	8	13	17	22	26	30		2	7	11	16	21	26	30	35		
GPM (per nozzle)	1.29	1.61	1.93	2.26	2.58	2.90	3.22	3.55	3.87	1.42	1.77	2.13	2.48	2.84	3.19	3.55	3.90	4.26		
Flow Indicator 1/2" SS Level	3.9	5.0	6.1							4.3	5.5	6.7								
Flow Indicator 7/16" SS Ball	1.4	2.3	3.1	3.9	4.8	5.6	6.5			1.8	2.7	3.6	4.5	5.5	6.4					

	60 Gallons Per Acre									65 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
#10 Injector (psi)	60	77	101	117	138	158	183	202	224	67	85	111	128	152	173	200	221	245
#15 Injector (psi)	34	45	60	73	90	101	113	127	142	38	50	67	81	100	111	124	139	156
#20 Injector (psi)	20	28	40	49	60	69	81	90	101	23	32	46	55	67	77	89	99	111
#30 Injector (psi)	7	12	20	26	34	40	48	54	60	9	15	23	30	38	45	54	60	67
#40 Injector (psi)		4	10	14	20	24	30	35	40	1	6	12	17	23	28	34	40	46
GPM (per nozzle)	1.55	1.93	2.32	2.71	3.10	3.48	3.87	4.26	4.64	1.68	2.10	2.52	2.93	3.35	3.77	4.19	4.61	5.03
Flow Indicator 1/2" SS Level	4.7	6.1																
Flow Indicator 7/16" SS Ball	2.1	3.1	4.1	5.1	6.1					2.4	3.5	4.6	5.7	6.8				

	70 Gallons Per Acre										75 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12		
#10 Injector (psi)	74	93	121	140	165	188	217	239	265	81	101	131	151	178	203	234	258	286		
#15 Injector (psi)	43	55	74	89	109	121	136	151	170	48	61	81	96	118	131	147	163	183		
#20 Injector (psi)	27	36	51	61	74	84	98	108	121	30	40	56	67	81	92	106	117	131		
#30 Injector (psi)	11	17	27	34	43	50	60	66	74	13	20	30	38	48	55	66	73	81		
#40 Injector (psi)	3	8	15	20	27	32	39	44	51	5	10	18	23	30	36	43	49	56		
GPM (per nozzle)	1.81	2.26	2.71	3.16	3.61	4.06	4.51	4.97	5.42	1.93	2.42	2.90	3.39	3.87	4.35	4.84	5.32	5.80		
Flow Indicator 7/16" SS Ball	2.8	3.9	5.1	6.3						3.1	4.4	5.6	6.9							

NOTE - The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 30 inches.

Knife - 20" Row Spacing

Speed (MPH)	10 Gallons Per Acre									15 Gallons Per Acre								
	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)				3	6	10	13	17	20		5	10	15	20	25	31	36	41
0.107 Orifice Pressure (psi)																2	4	7
0.132 Orifice Pressure (psi)																		
0.161 Orifice Pressure (psi)																		
GPM (per nozzle)	0.15	0.19	0.23	0.27	0.30	0.34	0.38	0.42	0.46	0.23	0.29	0.34	0.40	0.46	0.51	0.57	0.63	0.68
Flow Indicator Red Glass Level	0.3	0.6	0.9	1.3	1.6	1.9	2.2	2.6	2.9	0.9	1.4	1.9	2.4	2.9	3.4	3.9	4.4	4.9
Flow Indicator 1/2" SS Level		0.1	0.2	0.4	0.5	0.6	0.8	0.9	1.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8

Speed (MPH)	20 Gallons Per Acre									25 Gallons Per Acre								
	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	6	13	20	27	34	41	48	55	62	13	22	31	39	48	57	65	74	82
0.107 Orifice Pressure (psi)					4	7	10	14	17				6	10	15	19	23	27
0.132 Orifice Pressure (psi)									5						3	6	9	12
0.161 Orifice Pressure (psi)																		
GPM (per nozzle)	0.30	0.38	0.46	0.53	0.61	0.68	0.76	0.84	0.91	0.38	0.48	0.57	0.67	0.76	0.86	0.95	1.05	1.14
Flow Indicator Red Glass Level	1.6	2.2	2.9	3.6	4.2	4.9	5.5	6.2	6.9	2.2	3.1	3.9	4.7	5.5	6.4			
Flow Indicator 1/2" SS Level	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.3	2.6	0.8	1.1	1.4	1.7	2.1	2.4	2.7	3.0	3.3
Flow Indicator 7/16" SS Ball								0.2	0.4						0.3	0.5	0.8	1.0

Speed (MPH)	30 Gallons Per Acre									35 Gallons Per Acre								
	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	20	31	41	51	62	72	82	93	103	27	39	51	63	76	88	100	112	124
0.107 Orifice Pressure (psi)		2	7	12	17	22	27	32	37		6	12	18	24	30	36	42	48
0.132 Orifice Pressure (psi)					5	8	12	15	18				6	9	13	17	21	25
0.161 Orifice Pressure (psi)								3	5							5	7	10
GPM (per nozzle)	0.46	0.57	0.68	0.80	0.91	1.03	1.14	1.26	1.37	0.53	0.67	0.80	0.93	1.07	1.20	1.33	1.46	1.60
Flow Indicator Red Glass Level	2.9	3.9	4.9	5.9	6.9													
Flow Indicator 1/2" SS Level	1.0	1.4	1.8	2.2	2.6	3.0	3.3	3.7	4.1	1.3	1.7	2.2	2.6	3.1	3.5	4.0	4.5	4.9
Flow Indicator 7/16" SS Ball				0.1	0.4	0.7	1.0	1.3	1.6			0.1	0.5	0.8	1.2	1.5	1.9	2.2

NOTES:

- Values highlighted in green indicate pressures that are within the optimal range of 20 - 50 psi. The row spacing is 20 inches.
- Density or viscosity of the liquid can effect operating range.
- A displayed pressure higher than the calculated pressure may be due to a pressure drop in the fertilizer hoses.
- With .075 on the center, use .054 for half rate outside (37 knife) and .093 for one and a half rate outside (35 knife).
- With .107 on the center, use .075 for half rate outside (37 knife) and .132 for one and a half rate outside (35 knife).
- With .132 on the center, use .093 for half rate outside (37 knife) and .161 for one and a half rate outside (35 knife).
- With .161 on the center, use .107 for half rate outside (37 knife) and .196 for one and a half rate outside (35 knife).

For replacement orifices, see "Check Valve" on page 54.

Kit						
	0.075	0.093	0.107	0.132	0.161	0.196
35 Knife	0	0	33	33	33	2
37 Knife	2	2	35	35	35	0



Knife - 20" Row Spacing

	40 Gallons Per Acre									45 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	34	48	62	76	89	103	117	131	145	41	57	72	88	103	119	134	150	165
0.107 Orifice Pressure (psi)	4	10	17	24	31	37	44	51	58	7	15	22	30	37	45	53	60	68
0.132 Orifice Pressure (psi)			5	9	14	18	23	27	31		3	8	13	18	23	28	33	38
0.161 Orifice Pressure (psi)						5	8	11	14					5	9	12	15	18
GPM (per nozzle)	0.61	0.76	0.91	1.07	1.22	1.37	1.52	1.67	1.83	0.68	0.86	1.03	1.20	1.37	1.54	1.71	1.88	2.05
Flow Indicator 1/2" SS Level	1.5	2.1	2.6	3.1	3.6	4.1	4.6	5.2	5.7	1.8	2.4	3.0	3.5	4.1	4.7	5.3	5.9	6.5
Flow Indicator 7/16" SS Ball			0.4	0.8	1.2	1.6	2.0	2.4	2.8		0.3	0.7	1.2	1.6	2.1	2.5	3.0	3.4

	50 Gallons Per Acre									55 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	48	65	82	100	117	134	152	169	186	55	74	93	112	131	150	169	188	207
0.107 Orifice Pressure (psi)	10	19	27	36	44	53	61	70	78	14	23	32	42	51	60	70	79	88
0.132 Orifice Pressure (psi)		6	12	17	23	28	33	39	44		9	15	21	27	33	39	45	51
0.161 Orifice Pressure (psi)				5	8	12	16	19	23			3	7	11	15	19	23	27
GPM (per nozzle)	0.76	0.95	1.14	1.33	1.52	1.71	1.90	2.09	2.28	0.84	1.05	1.26	1.46	1.67	1.88	2.09	2.30	2.51
Flow Indicator 1/2" SS Level	2.1	2.7	3.3	4.0	4.6	5.3	5.9	6.6		2.3	3.0	3.7	4.5	5.2	5.9	6.6		
Flow Indicator 7/16" SS Ball	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	0.2	0.8	1.3	1.9	2.4	3.0	3.5	4.1	4.6

	60 Gallons Per Acre									65 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	62	82	103	124	145	165	186	207	228	69	91	114	136	158	181	203	226	248
0.107 Orifice Pressure (psi)	17	27	37	48	58	68	78	88	99	21	32	43	54	65	76	87	98	109
0.132 Orifice Pressure (psi)	5	12	18	25	31	38	44	51	58	7	14	21	29	36	43	50	57	64
0.161 Orifice Pressure (psi)			5	10	14	18	23	27	32			7	12	17	22	27	31	36
GPM (per nozzle)	0.91	1.14	1.37	1.60	1.83	2.05	2.28	2.51	2.74	0.99	1.24	1.48	1.73	1.98	2.23	2.47	2.72	2.97
Flow Indicator 1/2" SS Level	2.6	3.3	4.1	4.9	5.7	6.5				2.8	3.7	4.5	5.4	6.2				
Flow Indicator 7/16" SS Ball	0.4	1.0	1.6	2.2	2.8	3.4	4.0	4.6	5.2	0.6	1.3	1.9	2.6	3.2	3.9	4.5	5.1	5.8

	70 Gallons Per Acre									75 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	76	100	124	148	172	196	221	245	269	82	108	134	160	186	212	238	264	290
0.107 Orifice Pressure (psi)	24	36	48	60	71	83	95	107	119	27	40	53	66	78	91	104	116	129
0.132 Orifice Pressure (psi)	9	17	25	32	40	48	55	63	71	12	20	28	36	44	53	61	69	77
0.161 Orifice Pressure (psi)		5	10	15	20	25	30	35	40		6	12	17	23	28	34	39	45
GPM (per nozzle)	1.07	1.33	1.60	1.86	2.13	2.40	2.66	2.93	3.20	1.14	1.43	1.71	2.00	2.28	2.57	2.85	3.14	3.42
Flow Indicator 1/2" SS Level	3.1	4.0	4.9	5.8	6.7					3.3	4.3	5.3	5.3	6.3				
Flow Indicator 7/16" SS Ball	0.8	1.5	2.2	2.9	3.6	4.3	5.0	5.7	6.4	1.0	1.8	2.5	3.3	4.0	4.7	5.5	6.2	7.0

NOTE - The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 20 inches.

Knife - 22" Row Spacing

	10 Gallons Per Acre									15 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)			2	5	9	13	17	21	24	2	7	13	19	24	30	36	41	47
0.107 Orifice Pressure (psi)															2	4	7	10
0.132 Orifice Pressure (psi)																		
0.161 Orifice Pressure (psi)																		
GPM (per nozzle)	0.17	0.21	0.25	0.29	0.33	0.38	0.42	0.46	0.50	0.25	0.31	0.38	0.44	0.50	0.57	0.63	0.69	0.75
Flow Indicator Red Glass Level	0.4	0.8	1.1	1.5	1.8	2.2	2.6	2.9	3.3	1.1	1.7	2.2	2.8	3.3	3.8	4.4	4.9	5.5
Flow Indicator 1/2" SS Level		0.2	0.3	0.5	0.6	0.7	0.9	1.0	1.2	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.8	2.0

	20 Gallons Per Acre									25 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	9	17	24	32	40	47	55	62	70	17	26	36	45	55	64	74	83	93
0.107 Orifice Pressure (psi)					6	10	14	17	21			4	9	14	18	23	28	32
0.132 Orifice Pressure (psi)								5	8					3	6	9	12	15
0.161 Orifice Pressure (psi)																		3
GPM (per nozzle)	0.33	0.42	0.50	0.59	0.67	0.75	0.84	0.92	1.00	0.42	0.52	0.63	0.73	0.84	0.94	1.05	1.15	1.26
Flow Indicator Red Glass Level	1.8	2.6	3.3	4.0	4.8	5.5	6.2	6.9	7.7	2.6	3.5	4.4	5.3	6.2				
Flow Indicator 1/2" SS Level	0.6	0.9	1.2	1.5	1.7	2.0	2.3	2.6	2.9	0.9	1.2	1.6	2.0	2.3	2.7	3.0	3.4	3.7
Flow Indicator 7/16" SS Ball							0.2	0.5	0.7					0.2	0.5	0.8	1.1	1.3

	30 Gallons Per Acre									35 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	24	36	47	59	70	81	93	104	116	32	45	59	72	85	98	112	125	138
0.107 Orifice Pressure (psi)		4	10	16	21	27	32	38	44		9	16	22	29	35	42	48	55
0.132 Orifice Pressure (psi)				4	8	11	15	18	22			4	8	12	17	21	25	29
0.161 Orifice Pressure (psi)							3	5	8						4	7	10	13
GPM (per nozzle)	0.50	0.63	0.75	0.88	1.00	1.13	1.26	1.38	1.51	0.59	0.73	0.88	1.03	1.17	1.32	1.46	1.61	1.76
Flow Indicator Red Glass Level	3.3	4.4	5.5	6.6														
Flow Indicator 1/2" SS Level	1.2	1.6	2.0	2.5	2.9	3.3	3.7	4.2	4.6	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.4
Flow Indicator 7/16" SS Ball				0.3	0.7	1.0	1.3	1.7	2.0			0.3	0.7	1.1	1.5	1.9	2.3	2.6

NOTES:

- Values highlighted in green indicate pressures that are within the optimal range of 20 - 50 psi. The row spacing is 22 inches.
- Density or viscosity of the liquid can effect operating range.
- A displayed pressure higher than the calculated pressure may be due to a pressure drop in the fertilizer hoses.
- With .075 on the center, use .054 for half rate outside (37 knife) and .093 for one and a half rate outside (35 knife).
- With .107 on the center, use .075 for half rate outside (37 knife) and .132 for one and a half rate outside (35 knife).
- With .132 on the center, use .093 for half rate outside (37 knife) and .161 for one and a half rate outside (35 knife).
- With .161 on the center, use .107 for half rate outside (37 knife) and .196 for one and a half rate outside (35 knife).

For replacement orifices, see "Check Valve" on page 54.

Kit						
	0.075	0.093	0.107	0.132	0.161	0.196
35 Knife	0	0	33	33	33	2
37 Knife	2	2	35	35	35	0



Knife - 22" Row Spacing

	40 Gallons Per Acre										45 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12	
0.075 Orifice Pressure (psi)	40	55	70	85	100	116	131	146	161	47	64	81	98	116	133	150	167	184	
0.107 Orifice Pressure (psi)	6	14	21	29	36	44	51	59	66	10	18	27	35	44	52	60	69	77	
0.132 Orifice Pressure (psi)			8	12	17	22	27	32	37		6	11	17	22	28	33	38	44	
0.161 Orifice Pressure (psi)					5	8	11	14	18				4	8	12	15	19	22	
GPM (per nozzle)	0.67	0.84	1.00	1.17	1.34	1.51	1.67	1.84	2.01	0.75	0.94	1.13	1.32	1.51	1.70	1.88	2.07	2.26	
Flow Indicator 1/2" SS Level	1.7	2.3	2.9	3.5	4.0	4.6	5.2	5.7	6.3	2.0	2.7	3.3	4.0	4.6	5.2	5.9	6.5		
Flow Indicator 7/16" SS Ball		0.2	0.7	1.1	1.5	2.0	2.4	2.9	3.3		0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.9	

	50 Gallons Per Acre									55 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	55	74	93	112	131	150	169	188	207	62	83	104	125	146	167	188	209	230
0.107 Orifice Pressure (psi)	14	23	32	42	51	60	70	79	88	17	28	38	48	59	69	79	89	100
0.132 Orifice Pressure (psi)		9	15	21	27	33	39	45	51	5	12	18	25	32	38	45	52	58
0.161 Orifice Pressure (psi)			3	7	11	15	19	23	27			5	10	14	19	23	28	32
GPM (per nozzle)	0.84	1.05	1.26	1.46	1.67	1.88	2.09	2.30	2.51	0.92	1.15	1.38	1.61	1.84	2.07	2.30	2.53	2.76
Flow Indicator 1/2" SS Level	2.3	3.0	3.7	4.5	5.2	5.9	6.6			2.6	3.4	4.2	5.0	5.7	6.5			
Flow Indicator 7/16" SS Ball	0.2	0.8	1.3	1.9	2.4	3.0	3.5	4.1	4.6	0.5	1.1	1.7	2.3	2.9	3.5	4.1	4.7	5.3

	60 Gallons Per Acre									65 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	70	93	116	138	161	184	207	230	252	78	102	127	152	176	201	226	250	275
0.107 Orifice Pressure (psi)	21	32	44	55	66	77	88	100	111	25	37	49	61	73	86	98	110	122
0.132 Orifice Pressure (psi)	8	15	22	29	37	44	51	58	66	10	18	26	34	41	49	57	65	73
0.161 Orifice Pressure (psi)		3	8	13	18	22	27	32	37		5	10	16	21	26	31	37	42
GPM (per nozzle)	1.00	1.26	1.51	1.76	2.01	2.26	2.51	2.76	3.01	1.09	1.36	1.63	1.90	2.18	2.45	2.72	2.99	3.26
Flow Indicator 1/2" SS Level	2.9	3.7	4.6	5.4	6.3					3.2	4.1	5.0	5.9	6.9				
Flow Indicator 7/16" SS Ball	0.7	1.3	2.0	2.6	3.3	3.9	4.6	5.3	5.9	0.9	1.6	2.3	3.0	3.7	4.4	5.1	5.9	6.6

	70 Gallons Per Acre									75 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	85	112	138	165	192	218	245	271	298	93	121	150	178	207	235	264	292	321
0.107 Orifice Pressure (psi)	29	42	55	68	81	94	107	120	133	32	46	60	74	88	102	116	130	144
0.132 Orifice Pressure (psi)	12	21	29	38	46	55	63	72	80	15	24	33	42	51	60	69	78	87
0.161 Orifice Pressure (psi)		7	13	18	24	30	35	41	47	3	9	15	21	27	33	39	45	51
GPM (per nozzle)	1.17	1.46	1.76	2.05	2.34	2.64	2.93	3.22	3.52	1.26	1.57	1.88	2.20	2.51	2.83	3.14	3.45	3.77
Flow Indicator 1/2" SS Level	3.5	4.5	5.4	6.4						3.7	4.8	5.9	6.9					
Flow Indicator 7/16" SS Ball	1.1	1.9	2.6	3.4	4.2	4.9	5.7	6.5		1.3	2.1	3.0	3.8	4.6	5.4	6.2		

NOTE - The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 22 inches.

Knife - 30" Row Spacing

	10 Gallons Per Acre									15 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)		5	10	15	20	25	31	36	41	10	18	25	33	41	49	57	64	72
0.107 Orifice Pressure (psi)							2	4	7				3	7	11	15	18	22
0.132 Orifice Pressure (psi)															1	3	6	8
0.161 Orifice Pressure (psi)																		
GPM (per nozzle)	0.23	0.29	0.34	0.40	0.46	0.51	0.57	0.63	0.68	0.34	0.43	0.51	0.60	0.68	0.77	0.86	0.94	1.03
Flow Indicator Red Glass Level	0.9	1.4	1.9	2.4	2.9	3.4	3.9	4.4	4.9	1.9	2.7	3.4	4.1	4.9	5.6	6.4		
Flow Indicator 1/2" SS Level	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
Flow Indicator 7/16" SS Ball															0.1	0.3	0.5	0.7

	20 Gallons Per Acre									25 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	20	31	41	51	62	72	82	93	103	31	44	57	69	82	95	108	121	134
0.107 Orifice Pressure (psi)			7	12	17	22	27	32	37		8	15	21	27	34	40	46	53
0.132 Orifice Pressure (psi)					5	8	12	15	18			3	7	12	16	20	24	28
0.161 Orifice Pressure (psi)								3	5						4	6	9	12
GPM (per nozzle)	0.46	0.57	0.68	0.80	0.91	1.03	1.14	1.26	1.37	0.57	0.71	0.86	1.00	1.14	1.28	1.43	1.57	1.7
Flow Indicator Red Glass Level	2.9	3.9	4.9	5.9	6.9					3.9	5.1	6.4						
Flow Indicator 1/2" SS Level	1.0	1.4	1.8	2.2	2.6	3.0	3.3	3.7	4.1	1.4	1.9	2.4	2.9	3.3	3.8	4.3	4.8	5.3
Flow Indicator 7/16" SS Ball				0.1	0.4	0.7	1.0	1.3	1.6			0.3	0.7	1.0	1.4	1.8	2.1	2.5

	30 Gallons Per Acre									35 Gallons Per Acre								
Speed (MPH)	4	5	6	7	8	9	10	11	12	4	5	6	7	8	9	10	11	12
0.075 Orifice Pressure (psi)	41	57	72	88	103	119	134	150	165	51	69	88	106	124	142	160	178	196
0.107 Orifice Pressure (psi)	7	15	22	30	37	45	53	60	68	12	21	30	39	48	57	66	74	83
0.132 Orifice Pressure (psi)		3	8	13	18	23	28	33	38		7	13	19	25	30	36	42	48
0.161 Orifice Pressure (psi)					5	9	12	15	18				6	10	13	17	21	25
GPM (per nozzle)	0.68	0.86	1.03	1.20	1.37	1.54	1.71	1.88	2.05	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40
Flow Indicator Red Glass Level	4.9	6.4																
Flow Indicator 1/2" SS Level	1.8	2.4	3.0	3.5	4.1	4.7	5.3	5.9	6.5	2.2	2.9	3.5	4.2	4.9	5.6	6.3	6.9	
Flow Indicator 7/16" SS Ball		0.3	0.7	1.2	1.6	2.1	2.5	3.0	3.4	0.1	0.7	1.2	1.7	2.2	2.7	3.3	3.8	4.3

NOTES:

- Values highlighted in green indicate pressures that are within the optimal range of 20 - 50 psi. The row spacing is 30 inches.
- Density or viscosity of the liquid can effect operating range.
- A displayed pressure higher than the calculated pressure may be due to a pressure drop in the fertilizer hoses.
- With .075 on the center, use .054 for half rate outside (25 knife) and .093 for one and a half rate outside (23 knife).
- With .107 on the center, use .075 for half rate outside (25 knife) and .132 for one and a half rate outside (23 knife).
- With .132 on the center, use .093 for half rate outside (25 knife) and .161 for one and a half rate outside (23 knife).
- With .161 on the center, use .107 for half rate outside (25 knife) and .196 for one and a half rate outside (23 knife).

For replacement orifices, see "Check Valve" on page 54.

Kit						
	0.075	0.093	0.107	0.132	0.161	0.196
23 Knife	0	0	21	21	21	2
25 Knife	2	2	23	23	23	0



Knife - 30" Row Spacing

	40 Gallons Per Acre										45 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
0.075 Orifice Pressure (psi)	62	82	103	124	145	165	186	207	228		72	95	119	142	165	189	212	235	259	
0.107 Orifice Pressure (psi)	17	27	37	48	58	68	78	88	99		22	34	45	57	68	80	91	102	114	
0.132 Orifice Pressure (psi)	5	12	18	25	31	38	44	51	58		8	16	23	30	38	45	53	60	67	
0.161 Orifice Pressure (psi)			5	10	14	18	23	27	32			4	9	13	18	23	28	33	38	
GPM (per nozzle)	0.91	1.14	1.37	1.60	1.83	2.05	2.28	2.51	2.74		1.03	1.28	1.54	1.80	2.05	2.31	2.57	2.83	3.08	
Flow Indicator 1/2" SS Level	2.6	3.3	4.1	4.9	5.7	6.5					3.0	3.8	4.7	5.6	6.5					
Flow Indicator 7/16" SS Ball	0.4	1.0	1.6	2.2	2.8	3.4	4.0	4.6	5.2		0.7	1.4	2.1	2.7	3.4	4.1	4.7	5.4	6.1	

	50 Gallons Per Acre										55 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
0.075 Orifice Pressure (psi)	82	108	134	160	186	212	238	264	290		93	121	150	178	207	235	264	292	321	
0.107 Orifice Pressure (psi)	27	40	53	66	78	91	104	116	129		32	46	60	74	88	102	116	130	144	
0.132 Orifice Pressure (psi)	12	20	28	36	44	53	61	69	77		15	24	33	42	51	60	69	78	87	
0.161 Orifice Pressure (psi)		6	12	17	23	28	34	39	45		3	9	15	21	27	33	39	45	51	
GPM (per nozzle)	1.14	1.43	1.71	2.00	2.28	2.57	2.85	3.14	3.42		1.26	1.57	1.88	2.20	2.51	2.83	3.14	3.45	3.77	
Flow Indicator 1/2" SS Level	3.3	4.3	5.3	6.3							3.7	4.8	5.9	6.9						
Flow Indicator 7/16" SS Ball	1.0	1.8	2.5	3.3	4.0	4.7	5.5	6.2	7.0		1.3	2.1	3.0	3.8	4.6	5.4	6.2			

	60 Gallons Per Acre										65 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
0.075 Orifice Pressure (psi)	103	134	165	196	228	259	290	321	352		114	147	181	215	248	282	316	349	383	
0.107 Orifice Pressure (psi)	37	53	68	83	99	114	129	144	160		43	59	76	92	109	125	142	158	175	
0.132 Orifice Pressure (psi)	18	28	38	48	58	67	77	87	97		21	32	43	53	64	75	86	96	107	
0.161 Orifice Pressure (psi)	5	12	18	25	32	38	45	51	58		7	15	22	29	36	43	50	57	65	
GPM (per nozzle)	1.37	1.71	2.05	2.40	2.74	3.08	3.42	3.77	4.11		1.48	1.85	2.23	2.60	2.97	3.34	3.71	4.08	4.45	
Flow Indicator 1/2" SS Level	4.1	5.3	6.5																	
Flow Indicator 7/16" SS Ball	1.6	2.5	3.4	4.3	5.2	6.1	7.0				1.9	2.9	3.9	4.8	5.8	6.8				

	70 Gallons Per Acre										75 Gallons Per Acre									
Speed (MPH)	4	5	6	7	8	9	10	11	12		4	5	6	7	8	9	10	11	12	
0.075 Orifice Pressure (psi)	124	160	196	233	269	305	342	378	414		134	173	212	251	290	329	367	406	445	
0.107 Orifice Pressure (psi)	48	66	83	101	119	137	155	172	190		53	72	91	110	129	148	167	186	206	
0.132 Orifice Pressure (psi)	25	36	48	59	71	82	94	105	117		28	40	53	65	77	90	102	114	127	
0.161 Orifice Pressure (psi)	10	17	25	33	40	48	56	64	71		12	20	28	37	45	53	61	70	78	
GPM (per nozzle)	1.60	2.00	2.40	2.80	3.20	3.60	3.99	4.39	4.79		1.71	2.14	2.57	3.00	3.42	3.85	4.28	4.71	5.14	
Flow Indicator 7/16" SS Ball	2.2	3.3	4.3	5.3	6.4						2.5	3.6	4.7	5.9	7.0					

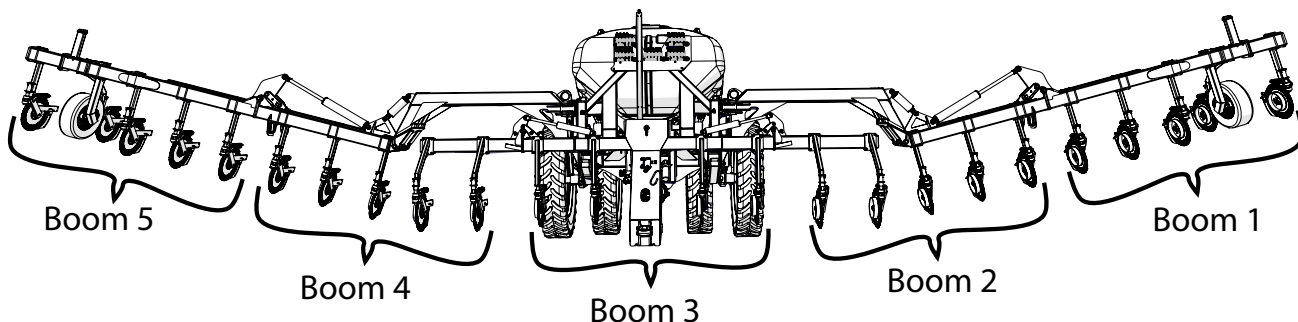
NOTE - The values highlighted in green indicate pressures that are in the optimal pressure range of 20 - 50 psi. The row spacing is 30 inches.

Quick Start for Raven 450 Controller

Initial Console Programming

- Select the unit of measurement by pressing the CE button until the desired selection appears in the display and press "ENTER".
NOTE - The unit of measurement for the United States is Volume per Acre.
- Select the type of sensor by pressing the CE button until the desired sensor type appears in the display and press "ENTER".
For Phoenix 10, select SP2.
For wheel drive sensor, select SP1.
- The message "CAL C-SD STANDARD VALVE" will appear in the console's display.
For standard pump with butterfly valve, press "ENTER".
For PWM pump, press CE until C-PC (PWM Close Valve) appears. If tank agitation is desired, select C-P (PWM Open Valve) to perform agitation. Make sure the agitation valve is partially open. Press "ENTER".
- The message "CAL SELF TEST 00" will appear in the console's display. Press the "BOOM CAL 1" button and enter the value shown in the table below. To store the values, press "ENTER" (the enter button will light up), input the value and then press "ENTER" to store your value. Repeat for Boom 2 through 5. Press the arrow keys to advance to the remaining booms.

Boom #	Value
Boom 1	135
Boom 2	150
Boom 3	150
Boom 4	150
Boom 5	135



- Press the "SPEED CAL" button and input the appropriate speed calibration value for the type of sensor being used and press "ENTER".
For Phoenix 10, the speed calibration is 785.
For wheel drive sensor, refer to the speed calibration steps in the Raven SCS 450 operator's manual.
- Press the "METER CAL" button and enter the meter calibration value stamped on the flow meter's identification tag.
The meter calibration value is approximately 1,340 gallons.
- Press the "VALVE CAL" button and input the calibration number that corresponds with the control valve being used and press "ENTER".
For standard pump with butterfly valve, the valve calibration is 2123.
For PWM Pump, the valve calibration is 0043 or 43.
- Press the "RATE 1 CAL" button and "ENTER" the Rate 1 value. Refer to the "Calculate the Rate 1 and Rate 2 Cal Values" section of the Raven SCS 450 manual and press "ENTER".
- Press the "RATE 2 CAL" button and "ENTER" the Rate 2 value. Refer to the "Calculate the Rate 1 and Rate 2 Cal Values" section of the Raven SCS 450 manual and press "ENTER".
- The initial console programming is now complete, and the flashing "CAL" in the console's display should turn off. If it does not, repeat the procedure starting from the first step above.
- These settings will be stored and the previous steps do not need to be repeated after powering off or on.

RESET: If an entry or selection error is made during any steps of this procedure, turn the POWER switch to the OFF position, press and hold CE while turning the POWER switch to the ON position to reset the console.

HINT: If you enter the wrong value when entering your data press "ENTER" then press "ENTER" again and re-enter your value again.

Setting Reaction Time for PWM Pump

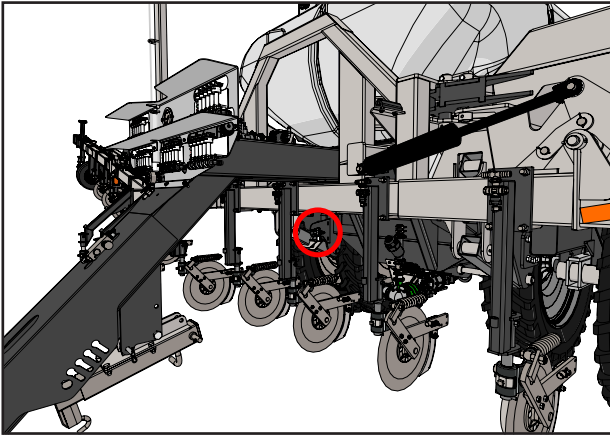
- To adjust rate reaction time in a PWM pump, navigate to "Data Menu" and set high PWM to 253 and low PWM to 1.
- To adjust high PWM setting, adjust rate #1 to 50 GPA and rate #2 to 30 GPA. Run a self-test with hydraulics pumping out fluid at 8 mph. To perform self-test, set 8.0 as speed using the "ENTER" button and turn on the master while stationary. Start on rate #1. Once the rate reaches 50 GPA, switch to rate #2. If it takes longer than desired to adjust to 30 GPA, adjust high PWM from 253 to 225 and try again. Continue lowering by 25 and repeat until the rate adjusts as desired. (If needed, fine tuning by less than 25 is allowed).
- To adjust low PWM setting, adjust rate #1 to 50 GPA and rate #2 to 30 GPA. Run a self-test with hydraulics pumping out fluid at 8 MPH. To perform self-test, set 8.0 as speed using the "ENTER" button and turn on the master while stationary. Start on rate #2. Once the rate reaches 30 GPA, switch to rate #1. If it takes longer than you desire to adjust to 50 GPA, adjust low PWM from 1 to 25 and try again. Continue raising by 25 and repeat until the rate adjusts as desired. (If needed, fine tuning by less than 25 is allowed).
- In "Data Menu", set PWM Frequency to 122 Hz.



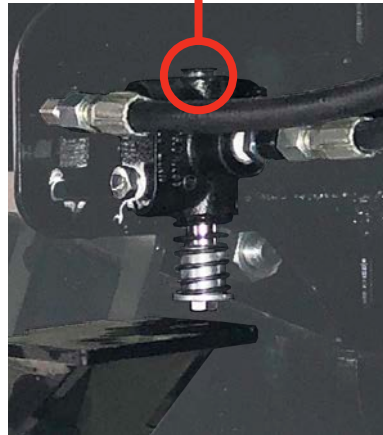
Service

To prolong the life of your NitroGro applicator, perform the following on a regular basis:

1. Every 10 hours, ensure the toolbar raise switch valve is functioning properly. Switch should return to the closed position when not triggered. The pictures below show the valve in the closed and open positions. If the switch does not return to the closed position, gently tap the plunger (circled in the pictures below) down with a hammer. Add lubrication to the plunger shaft and work the valve open and closed until the plunger returns to the closed position freely under its own spring pressure.



Location



Plunger

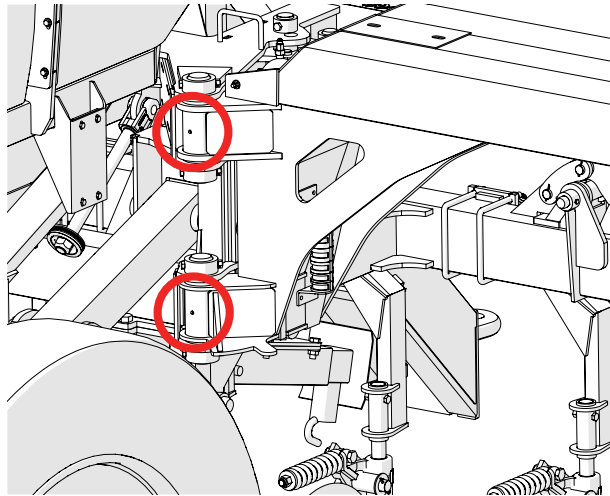
Closed



Plunger

Open

2. Grease coulters hubs with two pumps every 50 hours.
3. Grease main wing fold pivots every 50 hours as shown in the picture below. There are two grease points on each side of the main wing fold.

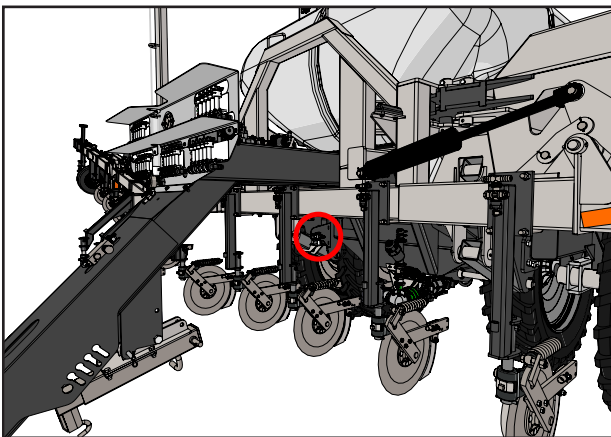


4. Check lighting before over the road transport. Make sure lights and SMV emblem are clean from dirt and field debris.
5. Check implement for damage, cracked welds, loosened hardware, etc. After the unit is repaired promptly repaint to prevent further damage.
6. Check hydraulic system for leaks and hose damage, twists or kinks and repair as needed.
7. Check fertilizer handling system for leaks and hose damage, twists or kinks and repair as needed.
8. Check tire pressures and lug nuts periodically and adjust as required.
9. Grease wheel hubs.
10. Grease jack.
11. Clean strainer daily.
12. Repack bearings for both the gauge wheels and main wheels each season.

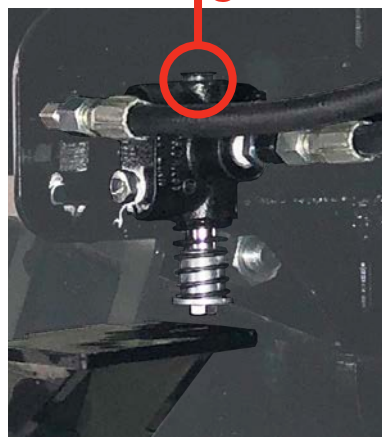
Storage

To prolong the life of your NitroGro applicator, hook the applicator to a tractor, unfold it, and perform the following before placing the implement in storage:

1. Pressure wash the NitroGro applicator to remove dirt and debris that may cause rusting.
2. Repaint any areas where the paint has been chipped, scratched or worn away.
3. Coat all earth-moving surfaces with a suitable rust preventative.
4. Inspect for damaged or worn parts and replace before next use. Examine all hydraulic hoses and fittings for wear and replace or tighten as necessary.
5. Grease coulters hubs.
6. Replace all worn, torn, or faded decals and reflectors.
7. Flush all fertilizer from the system and winterize the applicator if kept in cold storage.
IMPORTANT - To winterize your NitroGro drain the tank and all fertilizer hoses. Once the system is drained add approximately 50 gallons of RV antifreeze. Run the antifreeze thru the strainer, valves, check valves, and orifices.
8. Cover flow monitors from the sunlight. If flow monitors are exposed to the sun for a long period of time they will turn cloudy and become difficult to see through.
9. Store the implement inside and sheltered from inclement weather on an area that is dry, level, and clear of debris.
10. Fold up applicator and unhook from tractor.
11. Lubricate the plunger shaft. Ensure the toolbar raise switch valve is functioning properly. Switch should return to the closed position when not triggered. The pictures below show the valve in the closed and open positions. If the switch does not return to the closed position, gently tap the plunger (circled in the pictures below) down with a hammer. Add lubrication to the plunger shaft and work the valve open and closed until the plunger returns to the closed position freely under its own spring pressure.



Location



Closed



Open

Troubleshooting

⚠ WARNING - MAKE SURE THAT ALL POWER IS SHUT OFF BEFORE SERVICING THE APPLICATOR. MAINTENANCE AND REPAIR SERVICE WORK TO BE PERFORMED BY QUALIFIED SERVICEMEN ONLY.

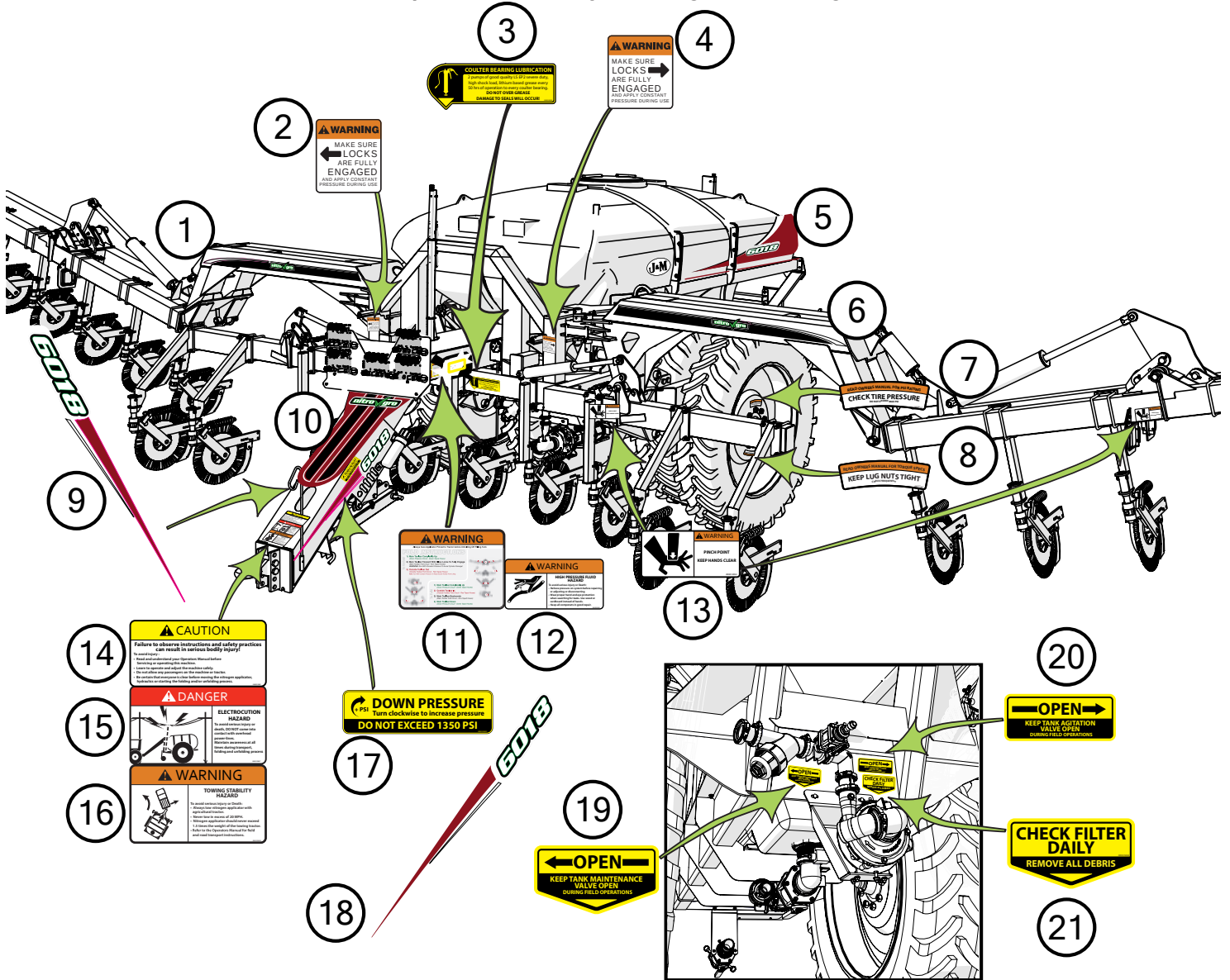
Trouble	Possible Cause	Possible Remedy
Outside tool bar wing creeps up over time	Counterbalance valve is too loose	Tighten counterbalance valve. See "Counterbalance Valve" on page 13 for instructions.
Toolbar will not raise or lower/ Wings will not fold out or unfold	Faulty hydraulic coupler	Replace with new coupler.
Center toolbar section too deep or too shallow	Lift cylinders have improper combination of cylinder spacers	Add or remove spacers as necessary.
Wings are tilted up from center toolbar section	Gauge wheels set too low	Move gauge wheels up.
	Hydraulic down pressure not set high enough	Increase pressure by turning adjustment knob clockwise. IMPORTANT: Do not exceed 1,350 psi.
	Center toolbar section set too deep	Add cylinder spacers to lift cylinders.
Wings are tilted down from center toolbar section	Gauge wheels set too high	Move gauge wheels down.
	Center toolbar section set too shallow	Remove cylinder spacers from lift cylinders.
Fertilizer pressure gauge showing high pressure when applying fertilizer	Orifices too small	Install larger orifices.
	Plugged knives	Clear debris.
	Kinked hoses	Adjust hoses as necessary.
	Speed too fast	Slow down.
	Flow monitor balls installed incorrectly	Intall flow monitor balls below plasitc grate under flow monitor cap.
Unable to maintain set application rate	Clogged strainer	Clean strainer.
	Orifices too small	Install larger orifices.
	Agitation valve too far open	Adjust valve as necessary.
Hydraulic pump will not prime	Tank valve closed	Open valve.
	Agitation valve closed	Open valve.

*Refer to the ACE hydraulic pump manual or Raven controller manual for additional troubleshooting information.

Decals

⚠ ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! ⚠

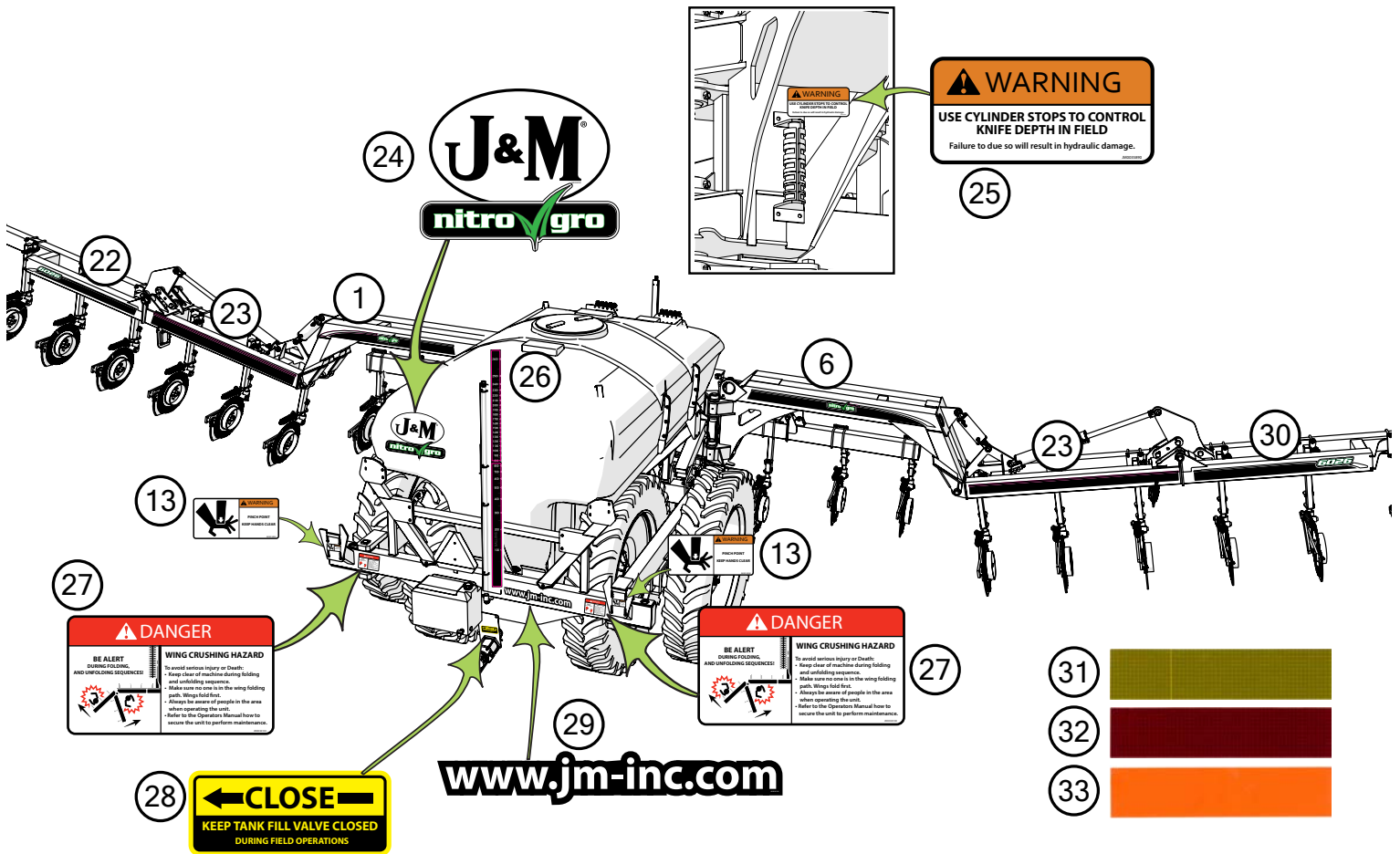
Replace Immediately If Damaged or Missing



Description	Part No.
1 NitroGro Wing Decal (Front Right, Rear Left)	JM0055012
2 Make Sure Locks are Fully Engaged Decal (Right)	JM0055013
3 Coulter Bearing Lubrication Decal	JM0038099
4 Make Sure Locks are Fully Engaged Decal (Left)	JM0055018
5 6018 Tank Stripes Red (Left)	JM0055208
5 6018 Tank Stripes Green (Left)	JM0055209
5 6018 Tank Stripes Red (Right)	JM0055210
5 6018 Tank Stripes Green (Right)	JM0055211
6 NitroGro Wing Decal (Front Left, Rear Right)	JM0055023
7 Check Tire Pressure NitroGro Decal	JM0038097
8 Tighten All Wheel Nuts NitroGro Decal	JM0035885
9 Tongue 6018 Stripe Red (Right)	JM0055212
9 Tongue 6018 Stripe Green (Right)	JM0055213
10 Tongue NitroGro Top Red Decal	JM0055027
10 Tongue NitroGro Top Green Decal	JM0055028

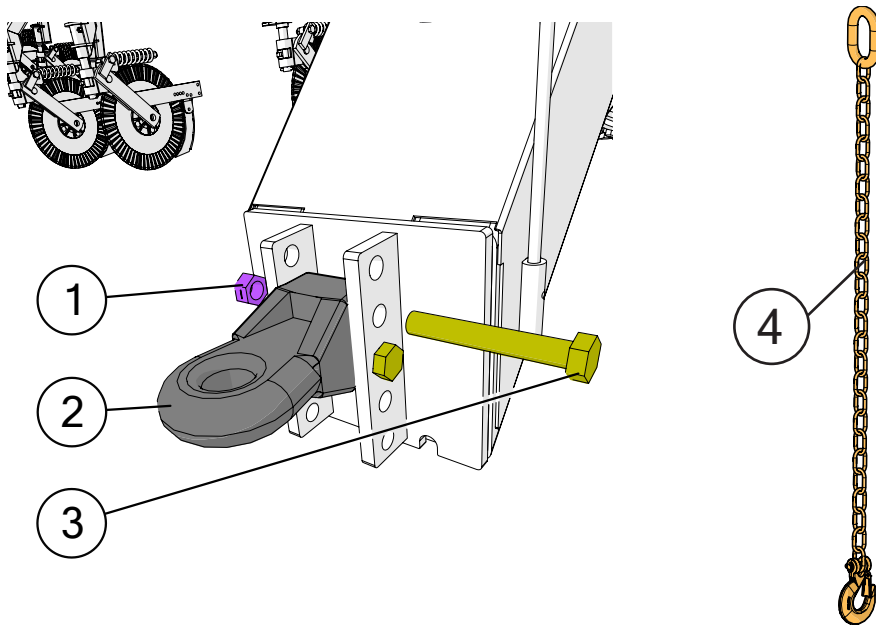


Decals



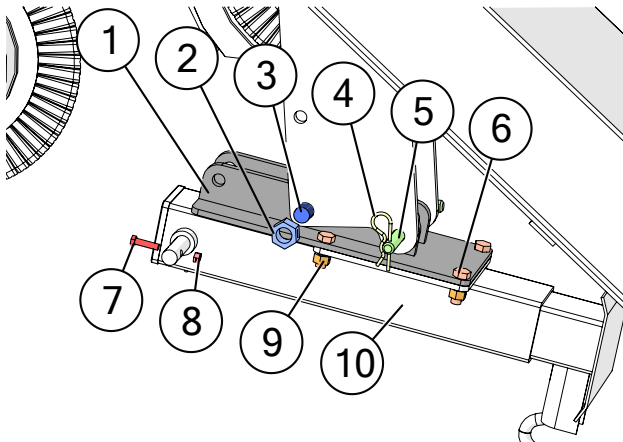
Description	Part No.
11 Fold Instructions Decal	JM0055029
12 High Pressure Fluid Hazard Decal	JM0035880
13 Pinch Point Keep Hands Clear Decal	JM0014994
14 Failure to Observe Instructions Decal	JM0035881
15 Electrocutation Hazard NitroGro Decal	JM0035887
16 Towing Stability Hazard NitroGro Decal	JM0035882
17 Down Pressure Do Not Exceed 1350 PSI Decal	JM0035892
18 Tongue 6018 Stripe Red (Left)	JM0055214
18 Tongue 6018 Stripe Green (Left)	JM0055215
19 Keep Tank Maintenance Valve Open NitroGro Decal	JM0039478
20 Keep Tank Agitation Valve Open Decal	JM0039479
21 Check Filter Daily Decal	JM0035884
22 6018 Back Wing Stripe (Left)	JM0055216
23 Back Wing Solid Stripe	JM0055033
24 J&M NitroGro Logo 14.375 x 12.125	JM0055034
25 Use Cylinder Stops Decal NitroGro	JM0035890
26 Gallon Marker for NitroGro	JM0055035
27 Wing Crushing Hazard Decal	JM0038100
28 Keep Tank Fill Valve Closed Decal	JM0035891
29 www.jm-inc.com Decal	JM0038108
30 6018 Back Wing Stripe (Right)	JM0055217
31 Yellow Reflector	JM0009946
32 Red Reflector	JM0009945
33 Orange Reflector	JM0009944

Hitch



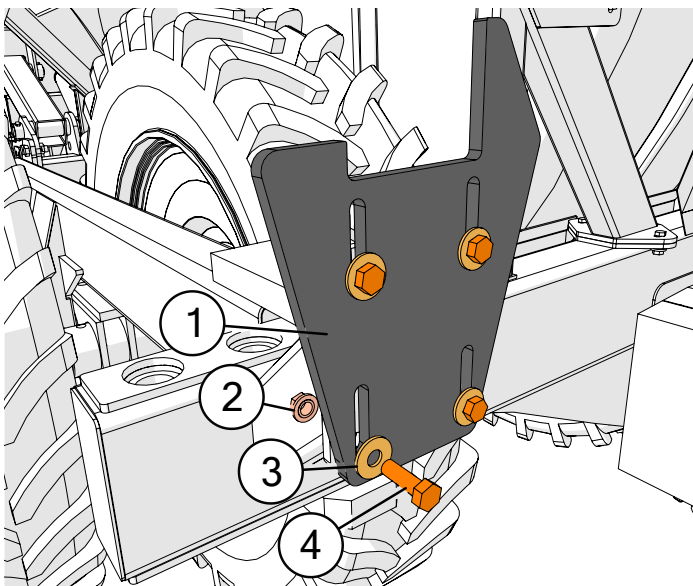
Description	Part No.
1 1"-8 Gr5 Z Centerlock Hex Nut	JM0002149
2 CTD Perfect Hitch (Circular Hole)	JM0038515
3 1"-8 x 6-1/2" Gr5 Z Hex Bolt	JM0014192
4 40k Lb Safety Chain	JM0029261

Jack Assembly



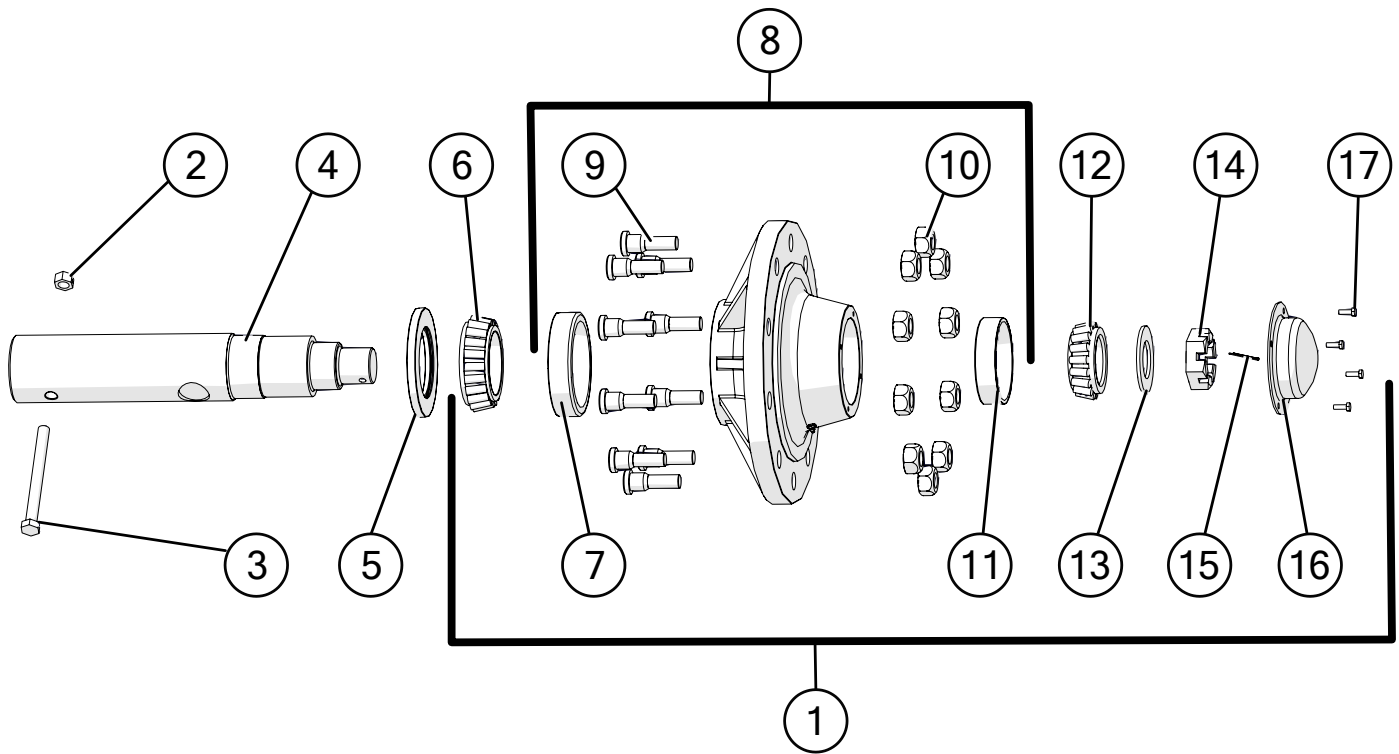
Description	Part No.
1 Jack Mounting Bracket (NitroGro)	JM0031545
2 1"-8 Gr5 Z Centerlock Hex Nut	JM0002149
3 1"-8 x 8" Gr5 Z Hex Bolt	JM0001487
4 3/16" Diameter Hair Pin	JM0028344
5 3/4" L Pin (10-9/32" Length)	JM0003076
6 5/8"-11 x 1-3/4" Gr5 Z Hex Bolt	JM0016681
7 3/8"-16 x 1-1/2" Gr5 Z Hex Bolt	JM0001659
8 3/8"-16 Gr5 Z Centerlock Hex Nut	JM0001512
9 5/8"-11 Gr5 Z Centerlock Hex Nut	JM0002146
10 Jack Assembly (NitroGro & 510ST)	JM0030054

Wing Rest



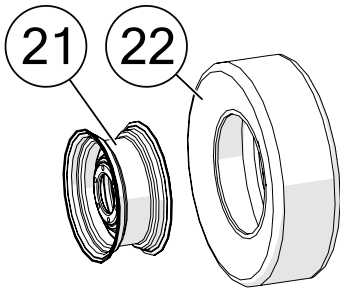
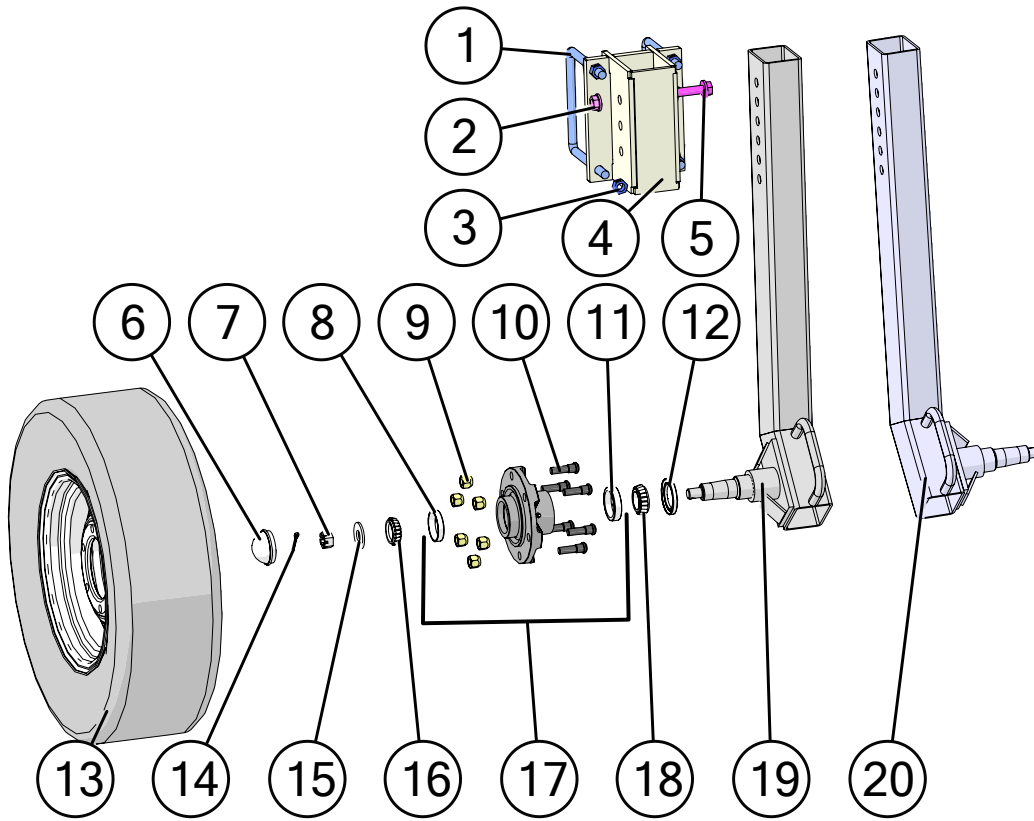
Description	Part No.
1 Wing Rest Plate (NitroGro)	JM0047598
2 1/2"-13 Gr5 Z SF Hex Nut	JM0002153
3 1/2" ID, 1-3/8" OD Z Flat Washer	JM0003082
4 1/2"-13 x 1-1/2" Gr5 Z Hex Bolt	JM0002100

Hub and Spindle Assembly



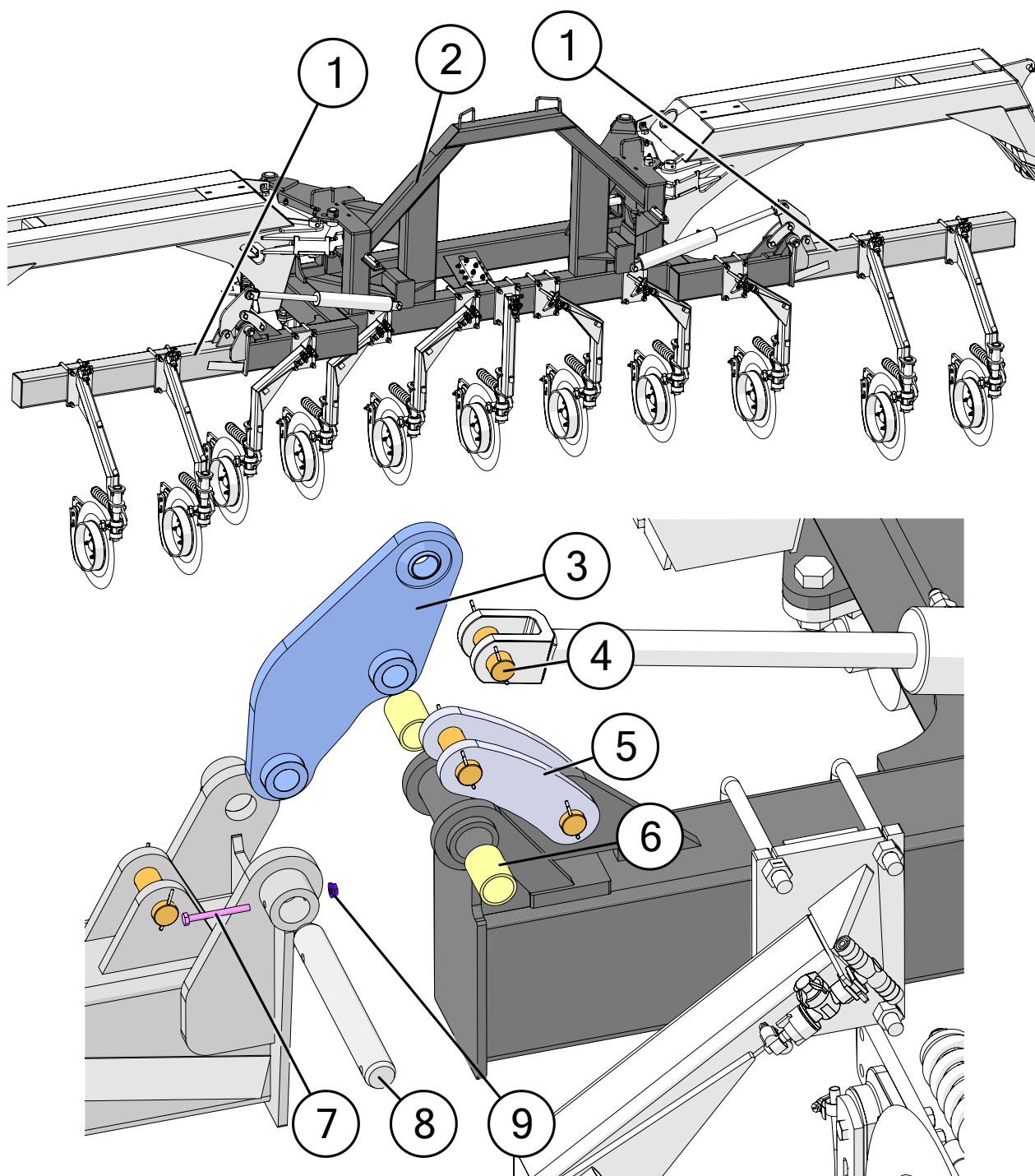
Description		Part No.
1	W-881 Hub Assembly Complete with 3/4" Studs and Nuts (Less Seal and Spindle)	JM0050402
2	1"-8 Gr5 Z Centerlock Hex Nut	JM0002149
3	1"-8 x 7" Gr5 Z Hex Bolt	JM0016689
4	Spindle, 4-1/2" x 22-3/4" - Applicator 6000	JM0048051
5	Seal (4-1/4" ID, 6" OD) for Hub (CR-43771)	JM0018955
6	Large Bearing (HM218248)	JM0018849
7	Large Race (HM218210)	JM0018848
8	W-881 Hub with Large and Small Races, 3/4" Studs & Nuts (11.13 Pilot)	JM0020510
9	Wheel Stud (3/4"-16 x 1-3/4") 913564	JM0018957
10	Wheel Nut 3/4"-16	JM0018958
11	Small Race (HM212011)	JM0018854
12	Small Bearing (HM212049)	JM0018852
13	2-1/8" ID, 3-3/4" OD Flat Washer (3/16")	JM0015900
14	2"-12 Gr5 Z Castle Hex Nut (912973)	JM0015899
15	3/8" x 2-3/4" Z Roll Pin (905945)	JM0018956
16	Dust Cap 6-1/4" OD (for W-881 & W-891 Hub) (909921)	JM0018954
17	1/4"-20 x 1" Gr5 Z Hex Bolt	JM0002095

Gauge Wheel Assembly



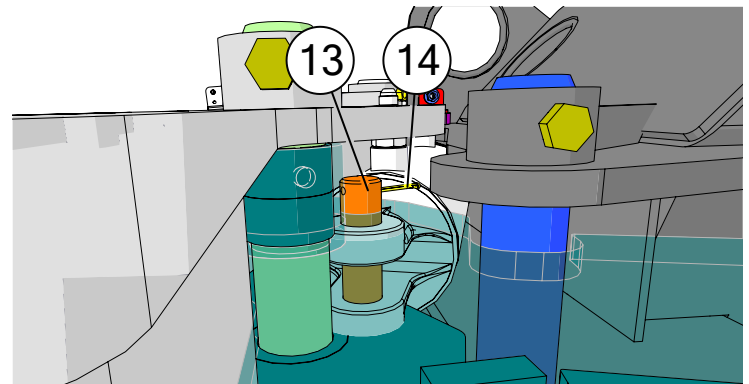
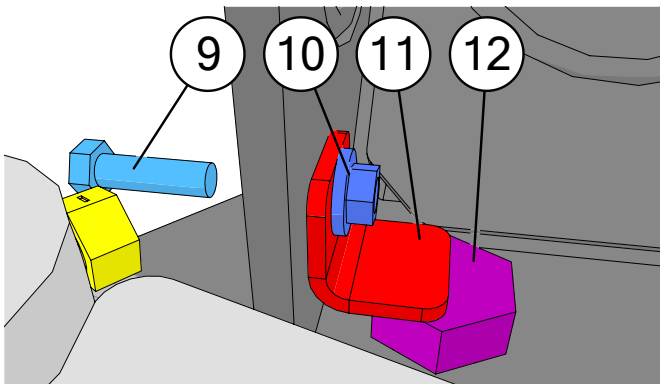
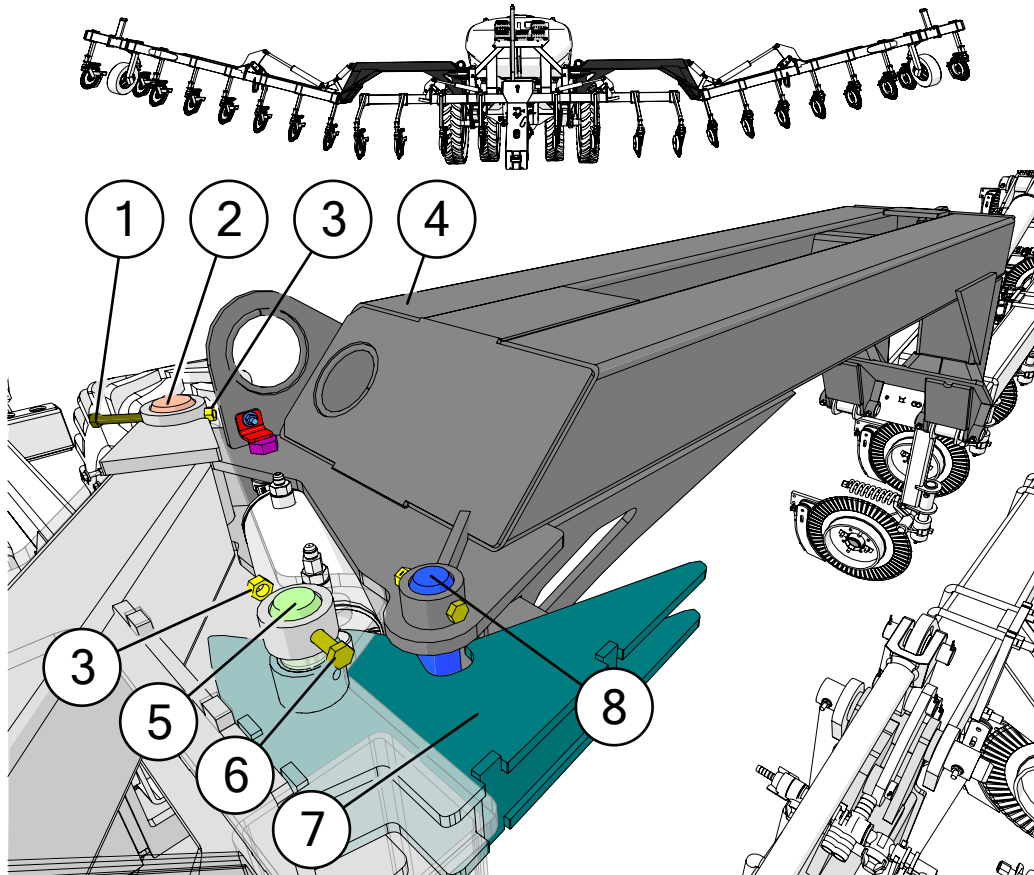
Description	Part No.
1 5/8"-11 x 7-1/8" x 8-11/16" Square U-Bolt	JM0020901
2 5/8"-11 Gr5 Z SF Hex Nut	JM0002151
3 5/8"-11 Gr5 Z Centerlock Hex Nut	JM0002146
4 Gauge Wheel Mounting Plate (6000 Series)	JM0047342
5 5/8"-11 x 4-1/2" Gr5 Z SF Hex Bolt	JM0047938
6 Dust Cap, 6-10 Ton (103969)	JM0026567
7 3/4"-16 Gr2 Castle Hex Nut	JM0002130
8 Small Outer Cone for 6-10 Ton (LM67048)	JM0019564
9 1/2"-20 Lug Nut, 6-8 Ton (5552)	JM0003062
10 Wheel Stud for Hub, 6-8 Ton (1/2"-20 x 1-7/8")(4187)	JM0019559
11 Large Cup for 6-8 Ton (LM48510) (104580)	JM0026565
12 Grease Seal, 6-8 Ton (103953)	JM0026572
13 ST215-75D14 Carlisle Sport Trail Tire and 14x6 - 6 Hole Wheel Rim	JM0019536
14 Cotter Pin 3/16" x 1-3/8" Long	JM0038286
15 3/4" USS Z Flat Washer	JM0010006
16 Small Outer Cone for 6-10 Ton (LM67048)	JM0019564
17 Hub with Races, Studs and Nuts, 7-8 Ton (105218)	JM0026566
18 Large Inner Bearing for 6-8 Ton (LM48548) (104579)	JM0019563
19 Gauge Wheel Assembly (Passenger Side)	JM0047918
20 Gauge Wheel Assembly (Driver Side)	JM0043199
21 14x6 - 6 Hole Wheel Rim	JM0019535
22 ST215-75D14 Carlisle Sport Trail Tire	JM0019529

Toolbar



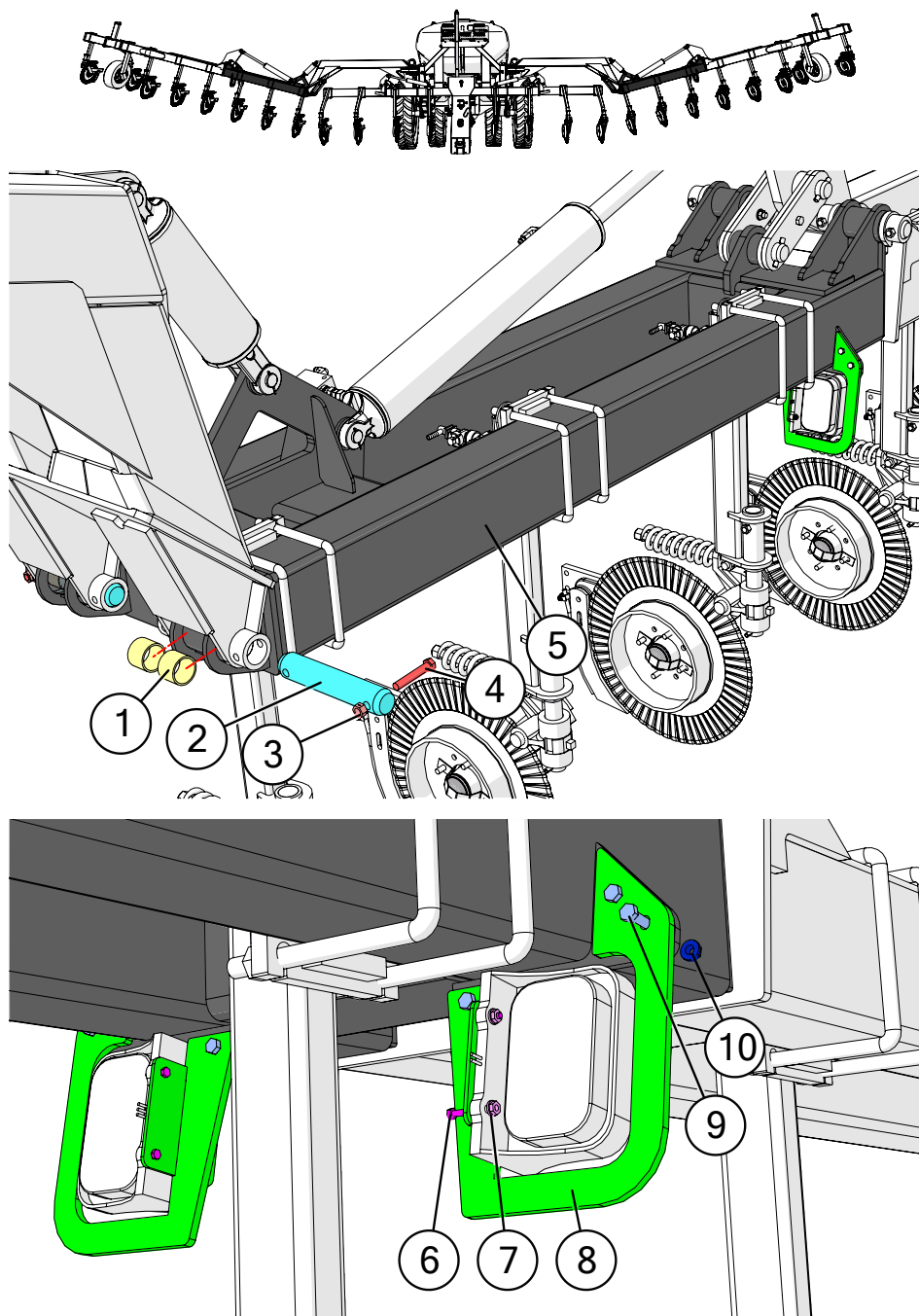
Description	Part No.
1 Stub Wing Weldment	JM0046687
2 Toolbar Center Section NitroGro 7000	JM0047104
3 Stub Wing Main Link Weldment	JM0047263
4 1" x 3-1/2" Clevis Pin with Cotter Pins	JM0001817
5 Stub Wing Small Linkage	JM0047264
6 1-1/4" ID x 1-1/2" OD x 2" Long Sleeve Composite Bushing	JM0021957
7 1/4"-20 x 2-1/2" Gr5 Z Hex Bolt	JM0001506
8 Applicator Stub Wing Pin	JM0047296
9 1/4"-20 Gr5 Z SF Hex Nut	JM0001630

Inside Wing and Connections



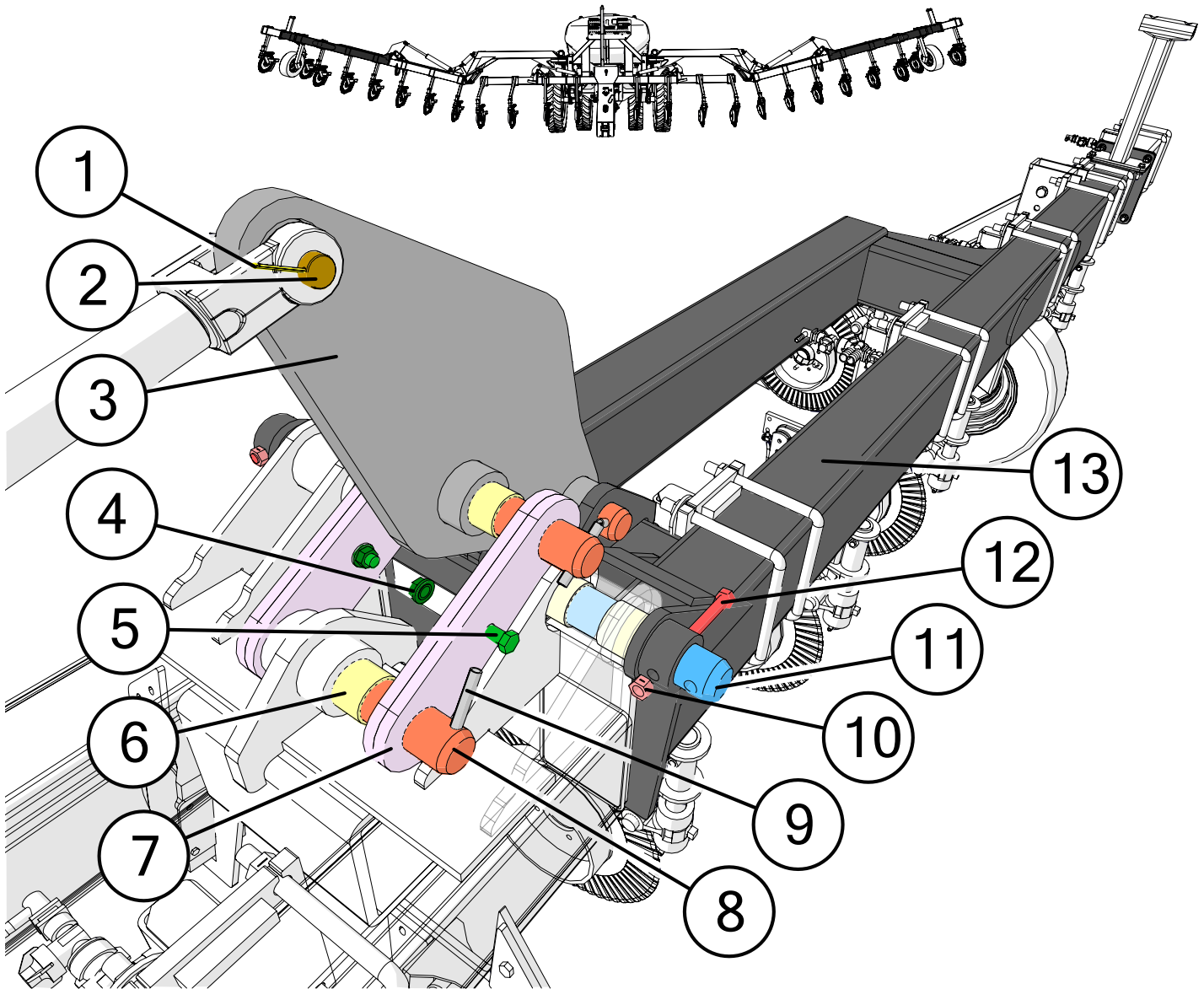
Description	Part No.
1 1/2"-13 x 4" Hex Bolt	JM0048014
2 11-1/4" Clevis Pin (2-1/2" Diameter)	JM0046032
3 1/2"-13 Gr5 Z Centerlock Hex Nut	JM0001511
4 Middle Wing Weldment (Driver's Side) (6018, 6026)	JM0047901
4 Middle Wing Weldment (Passenger's Side) (6018, 6026)	JM0045028
5 11-1/4" Clevis Pin (1-3/4" Diameter) - Latch Pin	JM0053933
6 1/2"-13 x 3" Gr5 Z Hex Bolt	JM0016678
7 Applicator Latch Weldment	JM0045354
8 9-1/4" Clevis Pin (1-3/4" Diameter)	JM0046030
9 3/8"-16 x 1-1/4" Gr5 Z Hex Bolt	JM0016675
10 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
11 Bolt Pin Keeper	JM0045972
12 1"-8 x 8" Gr5 Z Hex Bolt	JM0001487
13 5" Clevis Pin (1" Diameter)	JM0031496
14 Cotter Pin (for 1" x 3-2/5" Clevis Pin)	JM0003064

Middle Wing and Connections



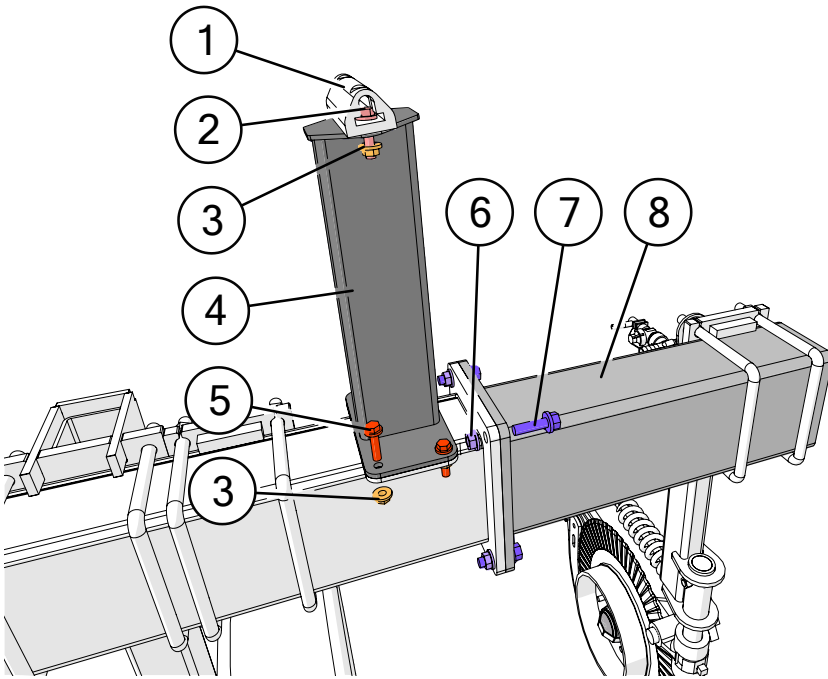
	Description	Part No.
1	1-3/4" ID x 2" OD x 1-1/2" Sleeve Composite Bearing	JM0030328
2	9-1/4" Clevis Pin (1-3/4" Diameter)	JM0046030
3	1/2"-13 Gr5 Z Centerlock Hex Nut	JM0001511
4	1/2"-13 x 3" Gr5 Z Hex Bolt	JM0016678
5	Middle Wing Weldment	JM0045238
6	#10-24 x 13/16" Gr5 Z Hex Bolt	JM0048013
7	#10-24 Gr5 Z SF Hex Nut	JM0009983
8	Tail Light Bracket Weldment	JM0047850
9	5/16"-18 x 1" Gr5 Z Hex Bolt	JM0001743
10	5/16"-18 Gr5 Z SF Hex Nut	JM0014049

Outside Wing and Connections



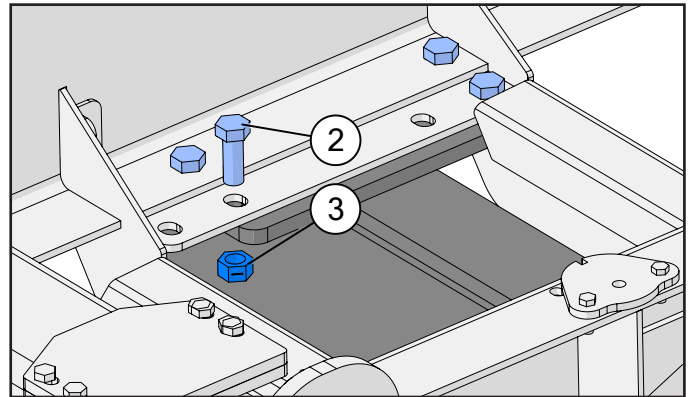
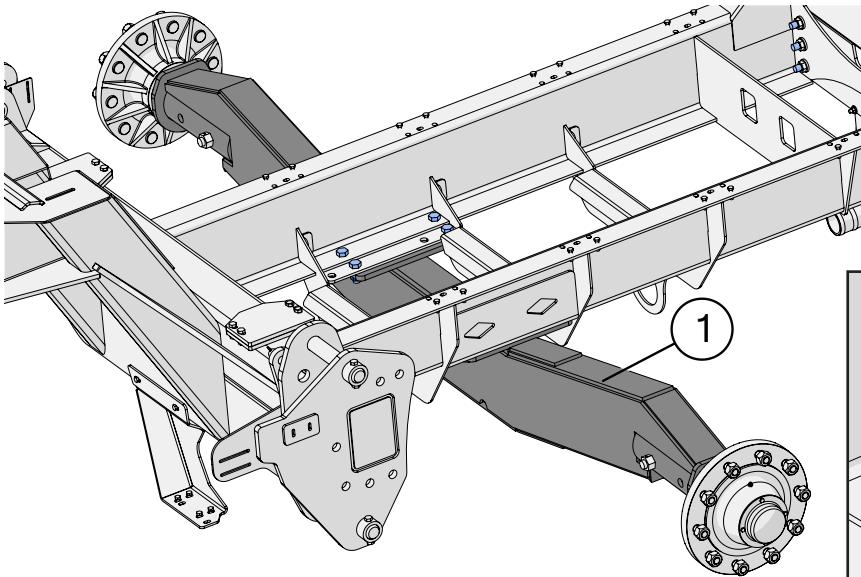
	Description	Part No.
1	Cotter Pin (for 1" x 3-2/5" Clevis Pin)	JM0003064
2	1" x 3-2/5" Clevis Pin	JM0001816
3	Long Fold Straight Auger Master Link Weldment	JM0046033
4	1/2"-13 Gr5 Z SF Hex Nut	JM0002153
5	1/2"-11 x 1-3/4" Gr5 Z SF Hex Bolt	JM0047937
6	1-3/4" ID x 2" OD x 1-1/2" Sleeve Composite Bearing	JM0030328
7	Outside Wing Slave Link	JM0047457
8	7-1/8" Clevis Pin (1-3/4" Diameter)	JM0047458
9	7/16" x 2-3/4" Z Roll Pin	JM0009895
10	1/2"-13 Gr5 Z Centerlock Hex Nut	JM0001511
11	9-1/4" Clevis Pin (1-3/4" Diameter)	JM0046030
12	1/2"-13 x 3" Gr5 Z Hex Bolt	JM0016678
13	Outside Wing Weldment (Driver Side)	JM0047908
13	Outside Wing Weldment (Passenger Side)	JM0045296

Wing End and Wing Prop



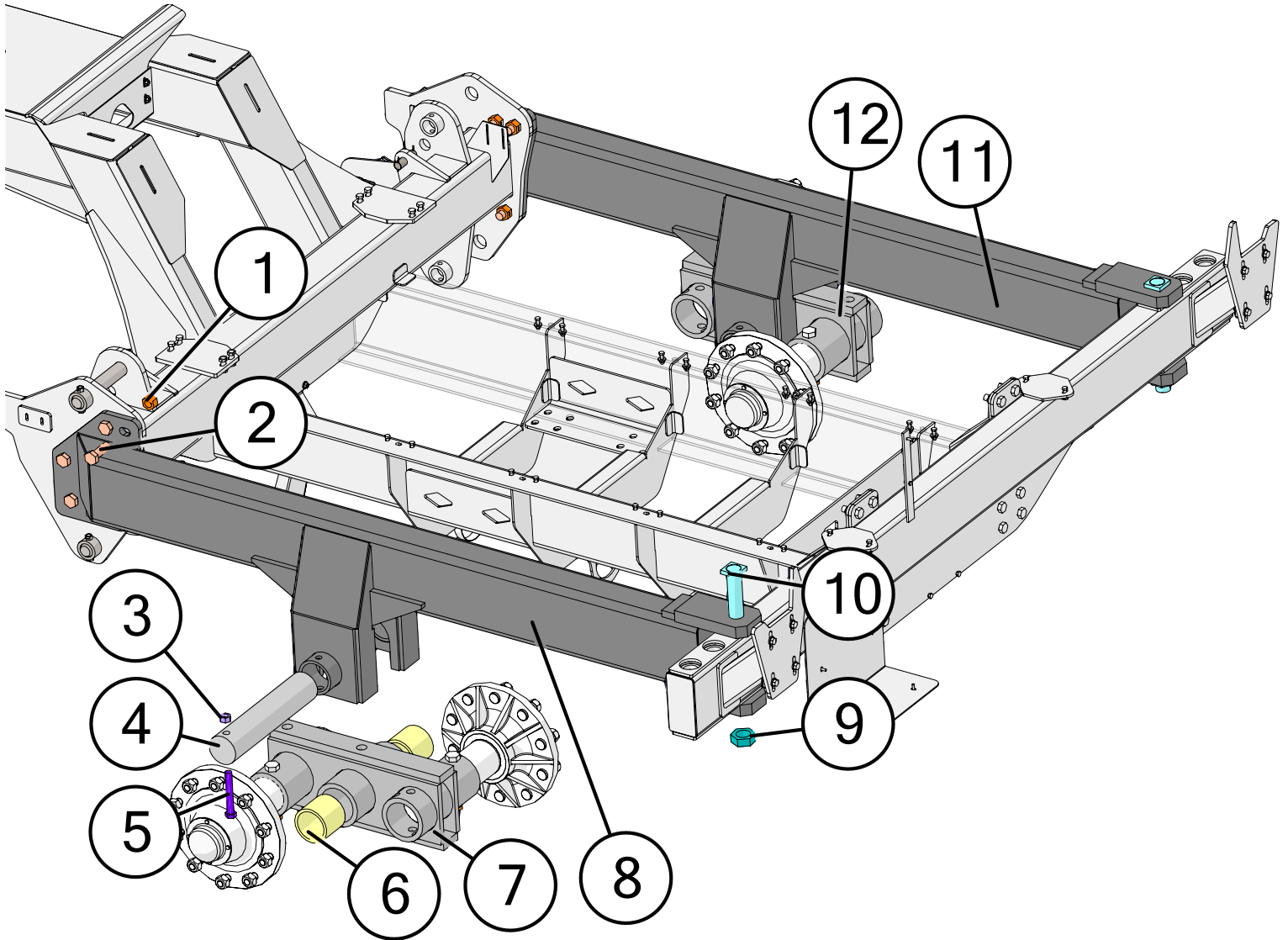
	Description	Part No.
1	6" x 1-7/8" Auger Rest Triangle Pad	JM0037644
2	3/8"-16 x 1" Gr5 Z SF Hex Bolt	JM0002092
3	3/8"-16 Gr5 Z SF Hex Nut	JM0002152
4	2600 Gallon Tank Wing Prop	JM0047490
5	3/8"-16 x 1-1/2" Gr5 Z SF Hex Bolt	JM0001633
6	1/2"-13 Gr5 Z SF Hex Nut	JM0002153
7	1/2"-11 x 1-3/4" Gr5 Z SF Hex Bolt	JM0047937
8	25 Row Wing Extension	JM0047462

Single Wheels Axle



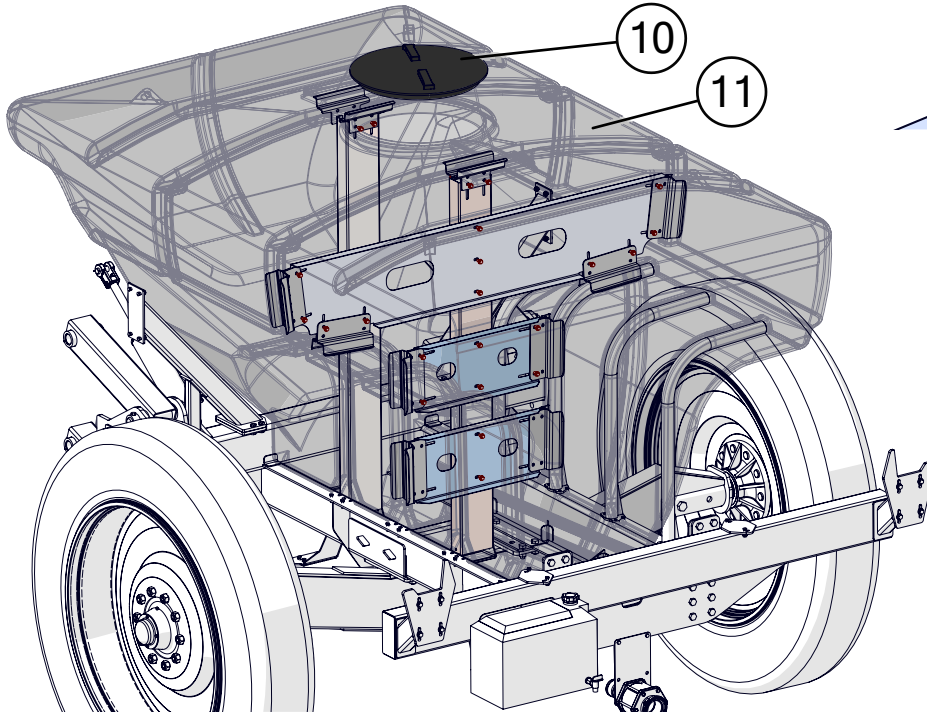
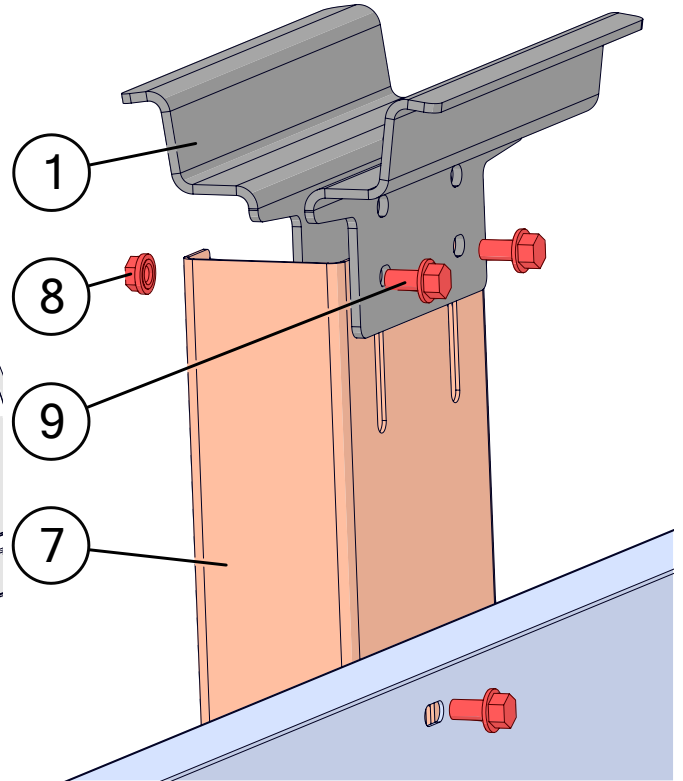
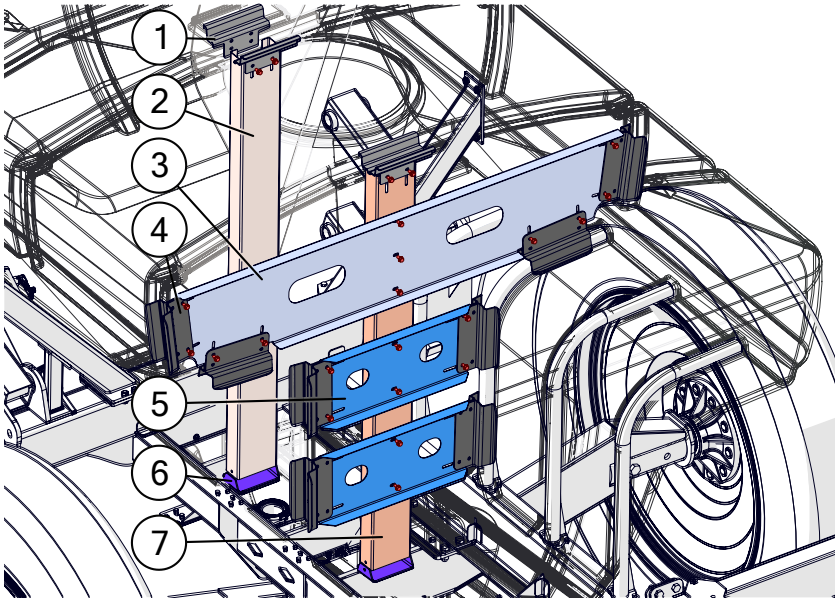
	Description	Part No.
1	6018 Single Axle Weldment	JM0049252
2	3/4"-10 x 2" Gr5 Z Hex Bolt	JM0002106
3	3/4"-10 Gr2 Z Centerlock Hex Nut	JM0002147

Walking Dual Wheel Assembly



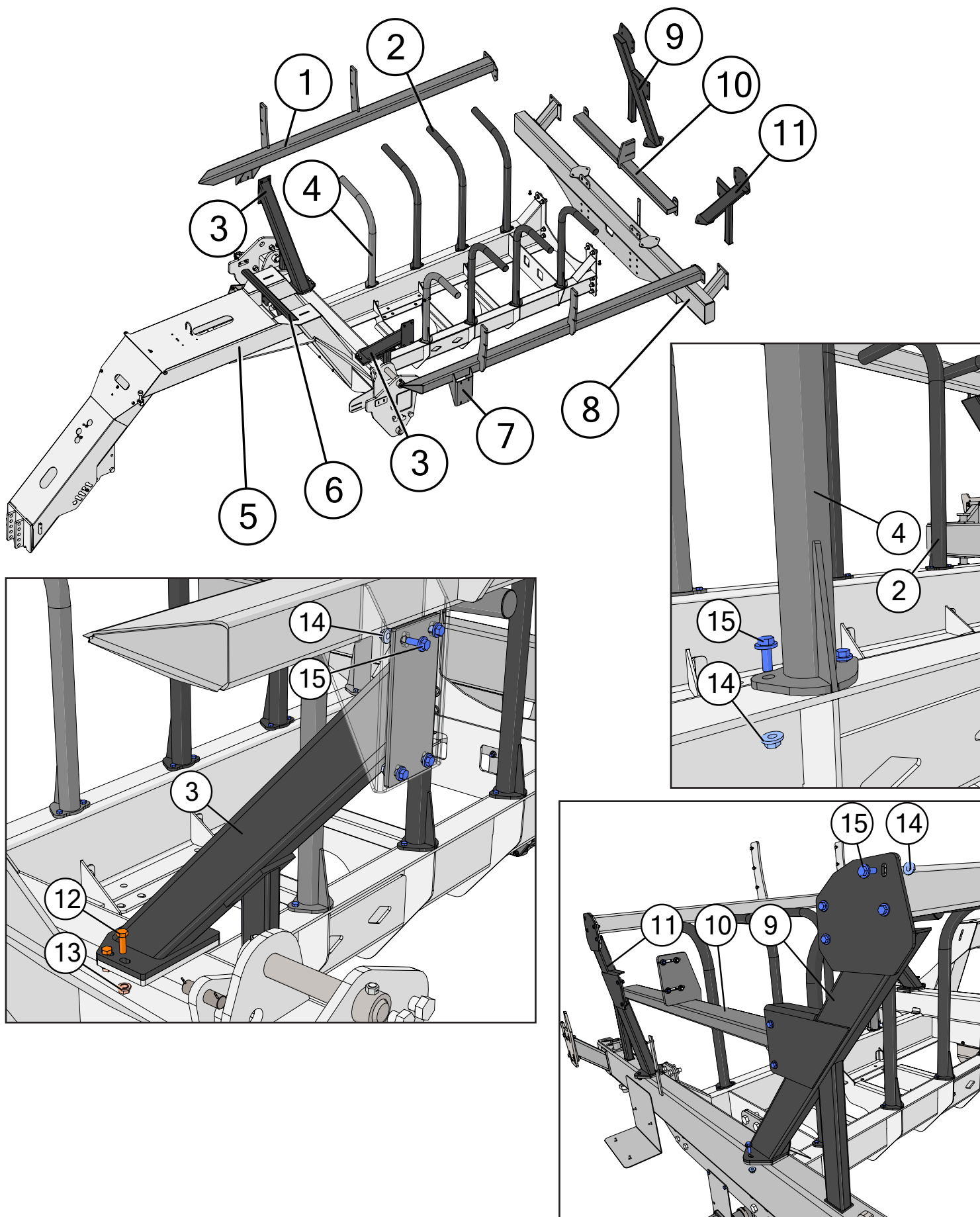
Description	Part No.
1 1"-8 Gr2 Z Centerlock Hex Nut	JM0002149
2 1"-8 x 3" Gr5 Z Hex Bolt	JM0016686
3 3/4"-10 Gr2 Z Centerlock Hex Nut	JM0002147
4 3-3/4" x 17-1/2" Pivot Pin (334PP)	JM0019928
5 3/4"-10 x 5-1/2" Gr5 Z Hex Bolt	JM0015522
6 3-3/4" ID, 4-1/2" OD Bronze Bushing (4" Lg) (BB-334)	JM0010570
7 Triple Pivot Weldment - Close Coupled Walker (Driver's Side)	JM0046012
8 Walking Axle Assembly (Driver's Side) - NitroGro (7,000 lbs.)	JM0045919
9 1-3/4"-12 Z Gr5 Hex Jam Nut	JM0009752
10 1-3/4" x 13" Gr5 Bolt	JM0020328
11 Walking Axle Assembly (Passenger's Side) - NitroGro (7,000 lbs.)	JM0045526
12 Triple Pivot Weldment - Close Coupled Walker (Passenger's Side)	JM0037521

Tank



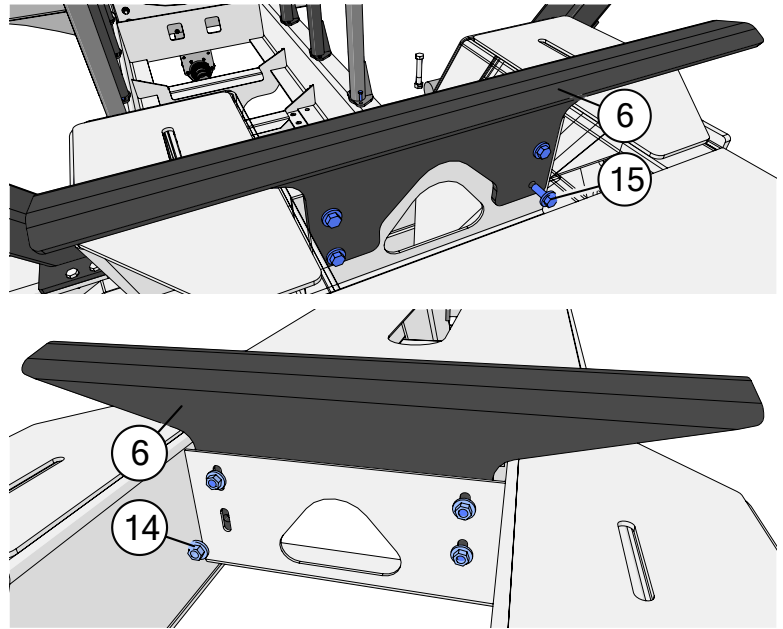
Description	Part No.
1 Applicator Poly Tank Baffle - Clamp for Center Pillar	JM0047726
2 1850 Gallon Tank Center Pillar Baffle 73-11/16"	JM0050336
3 Applicator Poly Tank Baffle - Large Lower Baffle	JM0046874
4 Applicator Poly Tank Baffle - Clamp for Baffle	JM0047722
5 Applicator Poly Tank Baffle - Small Baffle	JM0046873
6 Applicator Poly Tank Baffle - Pillar Foot	JM0047712
7 1850 Gallon Tank Center Pillar Baffle 69-5/8"	JM0047825
8 3/8"-16 SS SF Hex Nut	JM0048132
9 3/8"-16 x 3/4" SS SF Hex Bolt	JM0048129
10 Norwesco 22in Ventless Lid Assembly - 63863	JM0047873
11 1850 Gallon Rounded Tank	JM0047189

Tank Supports

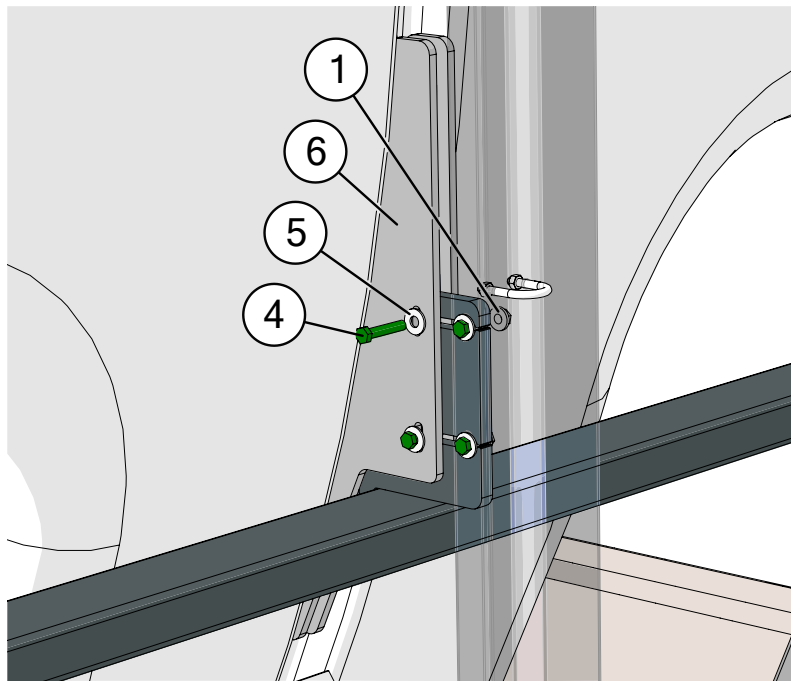
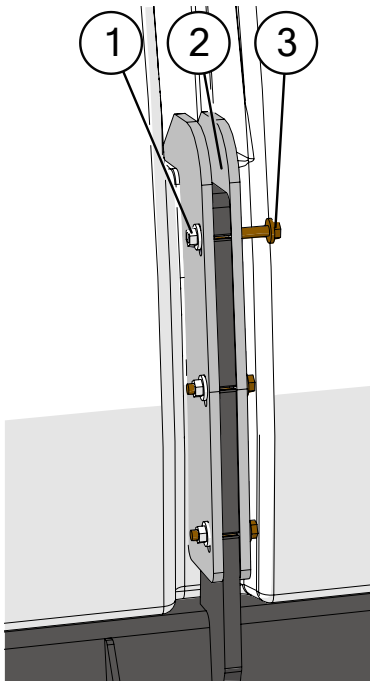


Tank Supports

Description	Part No.
1 Side Tank Support Tube Weldment	JM0046878
2 Tank Support Rib Weldment (37-7/8" Height)	JM0046594
3 Front Tank Support Tube Weldment	JM0046875
4 Tank Support Rib Weldment (33-5/32" Height)	JM0046591
5 Base Frame Weldment - NitroGro	JM0053865
6 Front Tank Support	JM0046600
7 Tank Support Tube Weldment	JM0047816
8 Uni-Frame Rear - Tandems Tube	JM0053810
8 Bolt on Axle Rear Cross Tube for Single Wheels	JM0053784
9 Tank Support Rear Tube Weldment (Passenger's Side)	JM0046880
10 Tank Rear Support Tube Weldment	JM0047584
11 Tank Support Rear Tube Weldment (Driver's Side)	JM0047819
12 1/2"-13 x 1-1/2" Gr5 Z Hex Bolt	JM0002100
13 1/2"-13 Gr5 Z SF Hex Nut	JM0002153
14 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
15 3/8"-16 x 1" Gr5 Z SF Hex Bolt	JM0002092

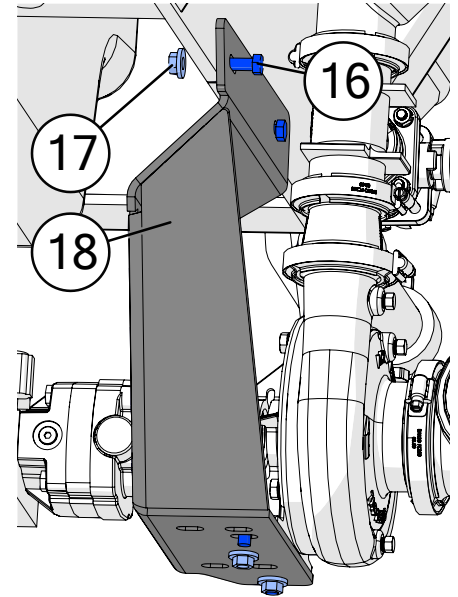
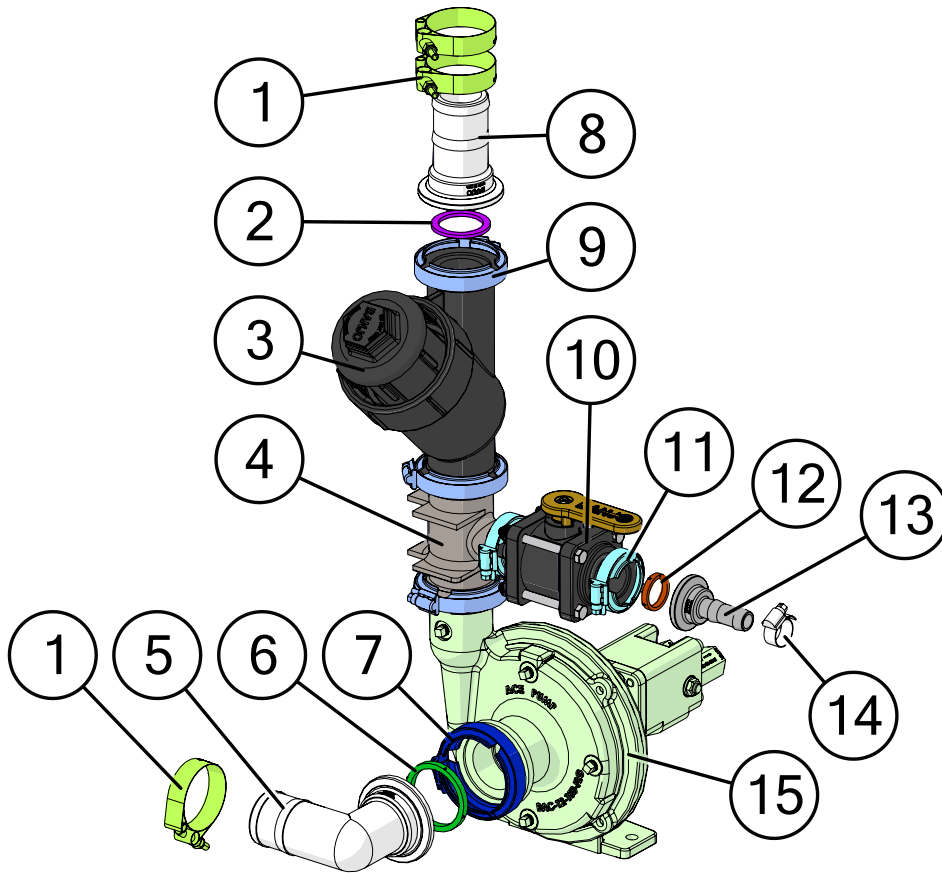


Tank Strap Down



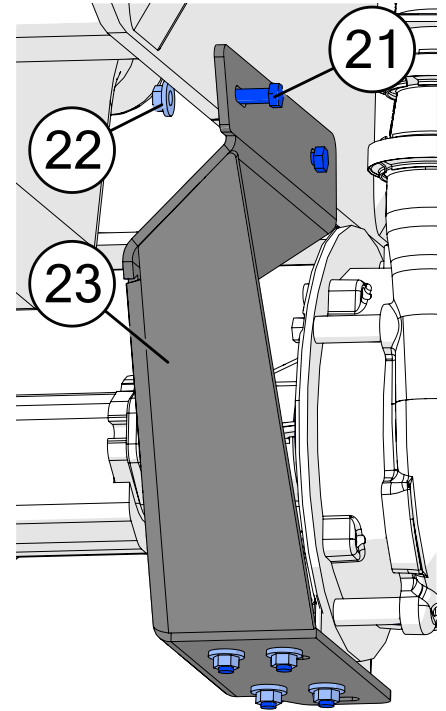
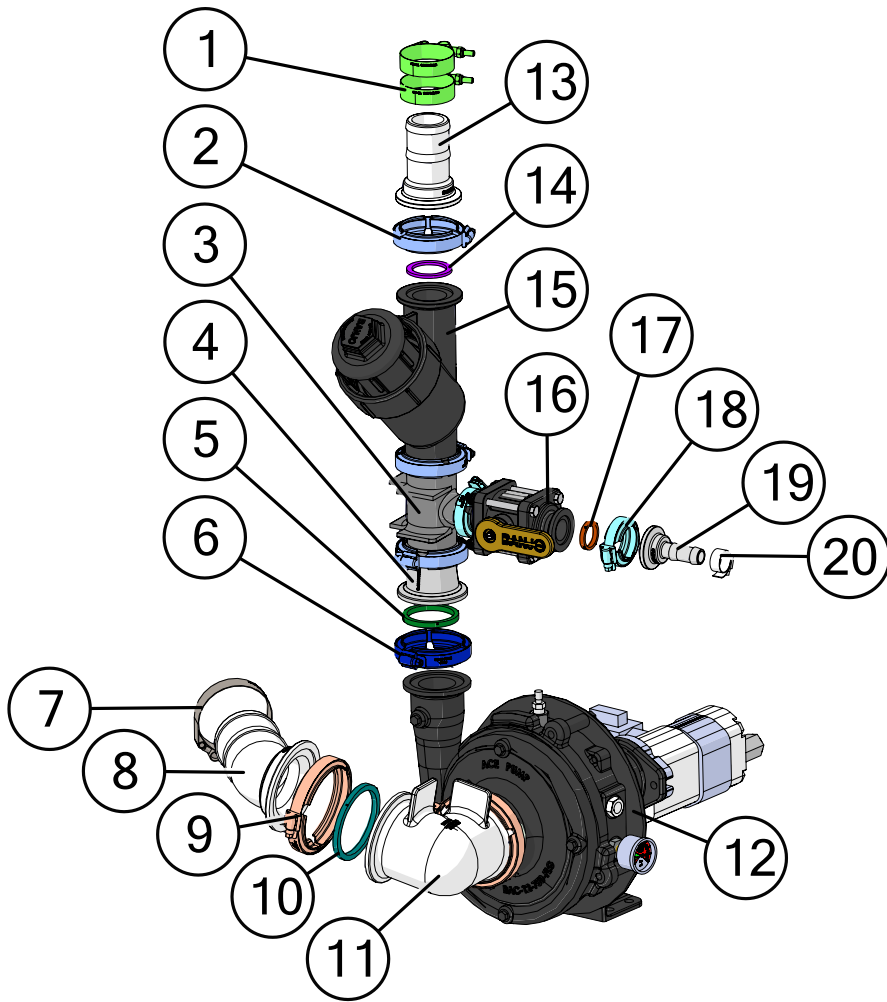
Description	Part No.
1 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
2 Vertical Bolt-on Tank Support	JM0047572
3 3/8"-16 x 2" Gr5 Z SF Hex Bolt	JM0016070
4 3/8"-16 x 2" Gr5 Z Hex Bolt	JM0001510
5 3/8" ID, 1" OD Z Flat Washer	JM0003061
6 Rear Vertical Tank Support Plate	JM0047583

Hydraulic 150 ACE Pump and Manifold



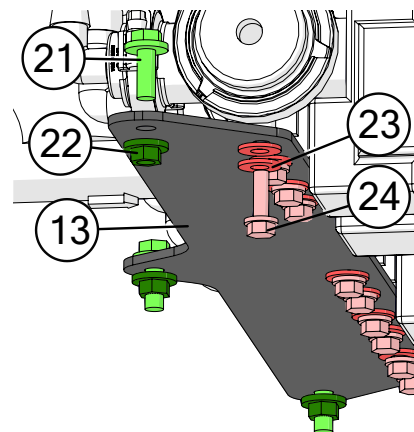
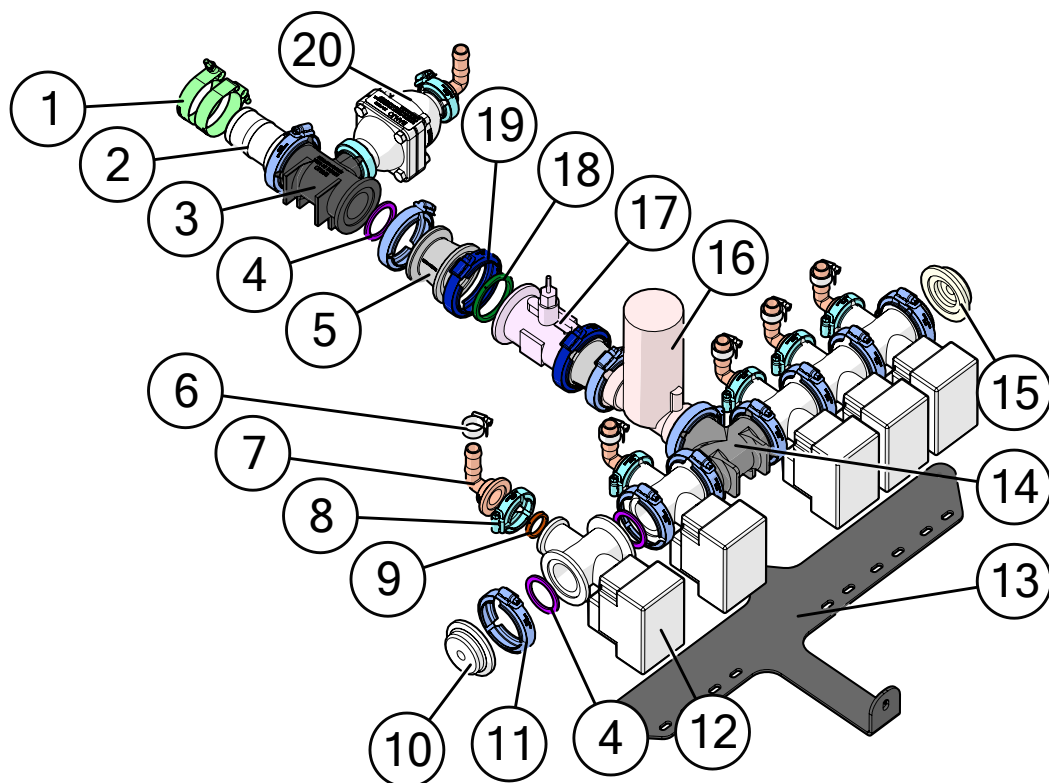
Description	Part No.
1 T-Bolt Hose Clamp 2" Hose, 2-5/16" Min OD	JM0035247
2 Manifold Gasket for M200 Fittings	JM0021145
3 Manifold Y Strainer - M200 Manifold Flange, 30 Mesh	JM0033803
4 M200 Manifold Flange x M200 Manifold Flange x M100 Manifold Flange; Tee	JM0035116
5 2" Hose Barb x M220 Manifold Flange; 90 Degree	JM0033807
6 Manifold Gasket for M220 Fittings	JM0035278
7 Manifold Flange Clamp for M220	JM0035238
8 2" Hose Barb x M200 Manifold Flange; Straight	JM0033796
9 Manifold Flange Clamp for M200 Fittings	JM0035251
10 Ball Valve with M100 Manifold Flange	JM0033824
11 Manifold Flange Clamp for M100 Fittings	JM0032496
12 Manifold Gasket for M100 Fittings with Rib	JM0035239
13 M100 Manifold Flange x 3/4" Hose Barb; Straight	JM0021401
14 3/4" Hose Clamp SS	JM0039205
15 FMSC-150F-HYD-206 Ace Pump	JM0038662
16 3/8"-16 x 1-1/4" Gr5 Z Hex Bolt	JM0016675
17 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
18 Applicator Pump Mounting Bracket	JM0050799

Hydraulic 750 ACE Pump and Manifold



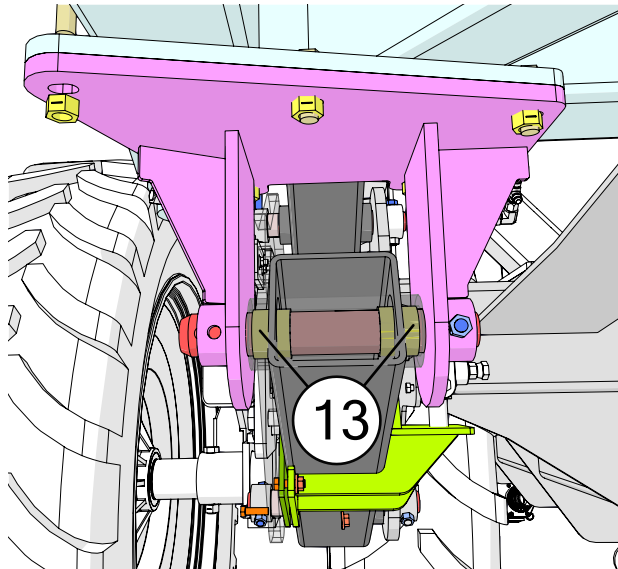
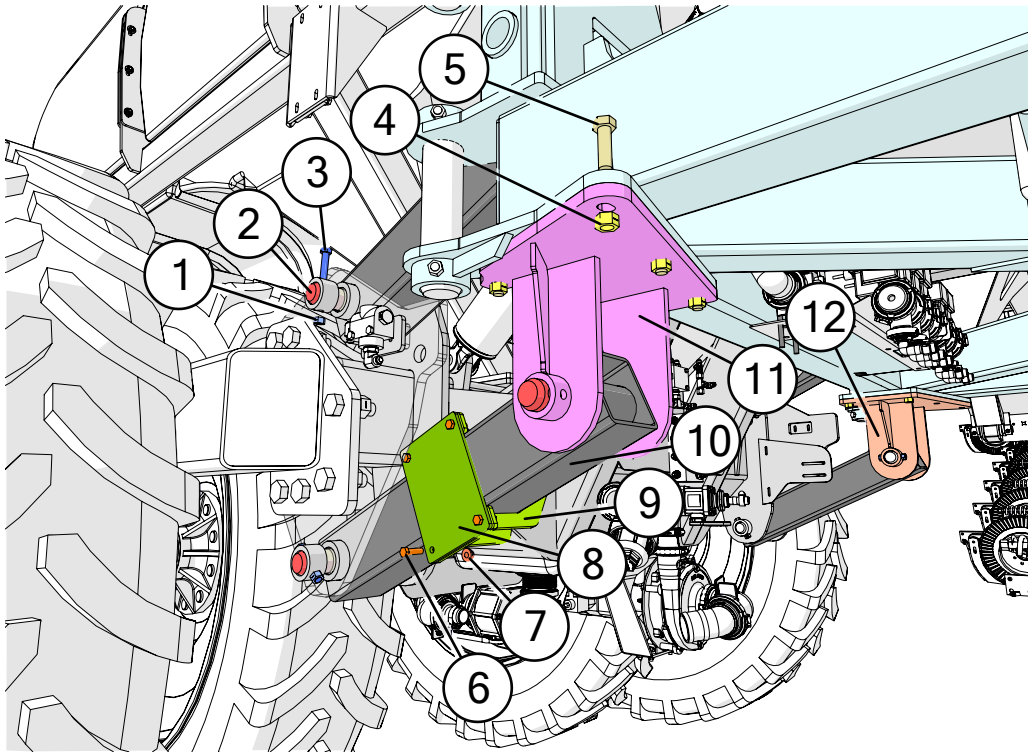
Description	Part No.
1 T-Bolt Hose Clamp 2" Hose, 2-5/16" Min OD	JM0035247
2 Manifold Flange Clamp for M200 Fittings	JM0035251
3 M200 Manifold Flange x M200 Manifold Flange x M100 Manifold Flange; Tee	JM0035116
4 2" Full Port Manifold x 2" Manifold Flange Reducer Coupling	JM0035131
5 Manifold Gasket for M220 Fittings	JM0035278
6 Manifold Flange Clamp for M220	JM0035238
7 T-Bolt Hose Clamp 3" Hose, 3-5/16" Min OD	JM0035248
8 3" Hose Barb x M300 Manifold Flange; 45°	JM0033989
9 Manifold Flange Clamp for M300 Fittings	JM0035237
10 Manifold Gasket for M300 Fittings with Rib	JM0021239
11 M300 Manifold Flange x M300 Manifold Flange; 90 Degree	JM0033979
12 FMC-750F-HYD-M22 Ace Pump	JM0050785
13 2" Hose Barb x M200 Manifold Flange; Straight	JM0033796
14 Manifold Gasket for M200 Fittings	JM0021145
15 Manifold Y Strainer - M200 Manifold Flange, 30 Mesh	JM0033803
16 Ball Valve with M100 Manifold Flange	JM0033824
17 Manifold Gasket for M100 Fittings with Rib	JM0035239
18 Manifold Flange Clamp for M100 Fittings	JM0032496
19 M100 Manifold Flange x 3/4" Hose Barb; Straight	JM0021401
20 3/4" Hose Clamp SS	JM0039205
21 3/8"-16 x 1-1/4" Gr5 Z Hex Bolt	JM0016675
22 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
23 Applicator Pump Mounting Bracket	JM0050799

Raven Manifold



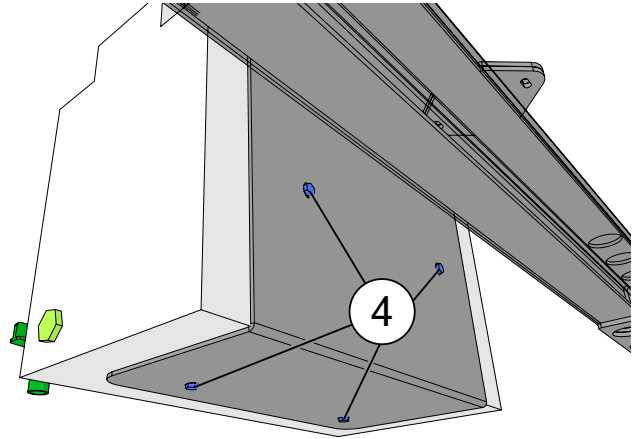
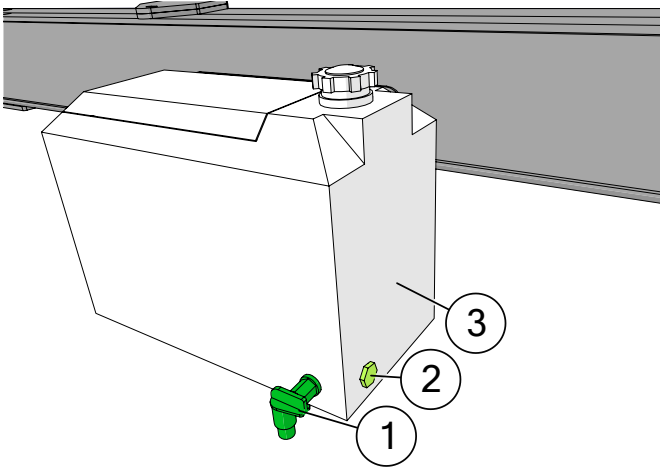
Description	Part No.
1 T-Bolt Hose Clamp 2" Hose, 2-5/16" Min OD	JM0035247
2 2" Hose Barb x M200 Manifold Flange; Straight	JM0033796
3 M200 Manifold Flange x M200 Manifold Flange x M100 Manifold Flange; Tee	JM0035116
4 Manifold Gasket for M200 Fittings	JM0021145
5 2" Full Port Manifold x 2" Manifold Flange Reducer Coupling	JM0035131
6 3/4" Hose Clamp SS	JM0039205
7 M100 Manifold Flange x 3/4" Hose Barb; 90 Degree	JM0032501
8 Manifold Flange Clamp for M100 Fittings	JM0032496
9 Manifold Gasket for M100 Fittings with Rib	JM0035239
10 Manifold Plug for M200 Fittings with 1/4" NPT for Gauge	JM0021147
11 Manifold Flange Clamp for M200 Fittings	JM0035251
12 Raven Boom Valve	JM0032478
13 Top Tongue Raven Mounting Bracket	JM0054334
14 M200 Manifold Flange x M200 Manifold Flange x M200 Manifold Flange; Tee	JM0021140
15 Manifold Plug for M200 Fittings	JM0021146
16 Raven Control Valve M200 Manifold Flange (1-1/2")	JM0038726
17 Raven Flow Meter M220 Manifold Flange (RFM100P)	JM0038727
18 Manifold Gasket for M220 Fittings	JM0035278
19 Manifold Flange Clamp for M220	JM0035238
20 100psi Spike Valve with M100 Manifold Flanges	JM0032499
21 3/8"-16 x 1" Gr5 Z SF Hex Bolt	JM0002092
22 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
23 1/4" ID, 3/4" OD Z Flat Washer	JM0003090
24 1/4"-20 x 3/4" Gr5 Z Hex Bolt	JM0001507

Parallel Linkage for Toolbar Height Adjustment



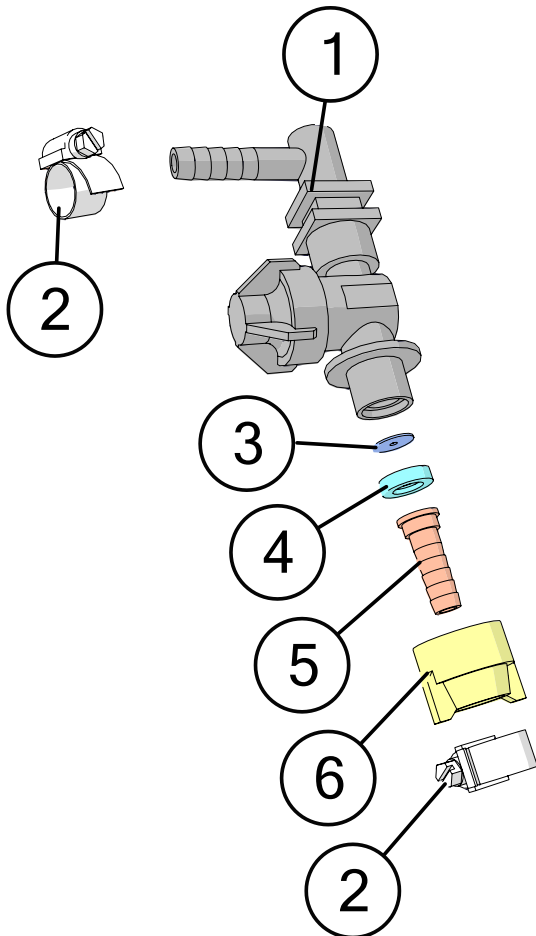
Description	Part No.
1 1/2"-13 Gr5 Z Centerlock Hex Nut	JM0001511
2 11-1/4" Clevis Pin (1-3/4" Diameter)	JM0045307
3 1/2"-13 x 3" Gr5 Z Hex Bolt	JM0016678
4 5/8"-11 Gr5 Z Centerlock Hex Nut	JM0002146
5 5/8"-11 x 2" Gr8 Z Hex Bolt	JM0001771
6 3/8"-16 x 1-1/4" Gr5 Z Hex Bolt	JM0016675
7 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
8 Diverter Valve Switch Mounting Plate	JM0047523
9 Diverter Valve Switch Trigger	JM0047518
10 Parallel Link Arm	JM0044847
11 Toolbar to Frame Connection Weldment (Passenger Side)	JM0050119
12 Toolbar to Frame Connection Weldment (Driver Side)	JM0050665
13 1-3/4" ID x 2" OD x 1-1/2" Sleeve Composite Bearing	JM0030328

Hand Wash Tank



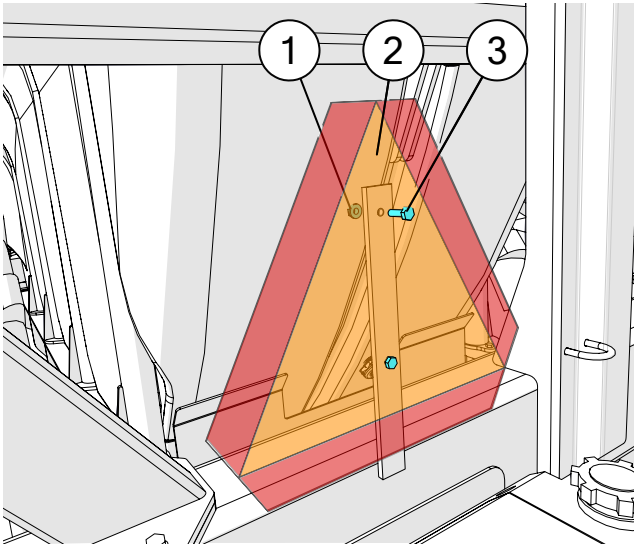
	Description	Part No.
1	9 Gallon Safety/Fresh Water Tank	JM0030587
2	3/4" NPT PVC Threaded Plug Schedule 40 (NitroGro)	JM0037251
3	Drum Faucet - 3/4" NPT	JM0039066
4	1/4"-20 x 3/4" Gr5 Z Hex Bolt	JM0001507

Check Valve



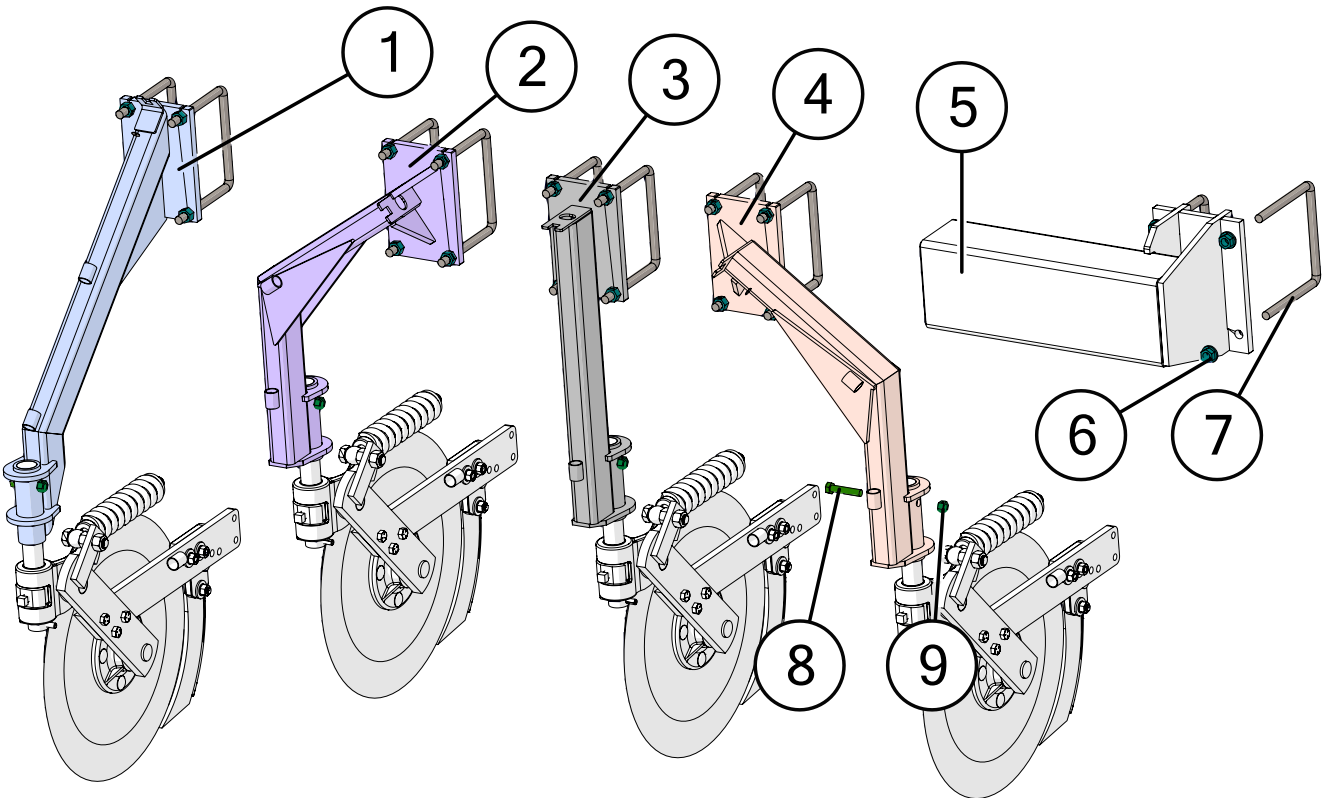
	Description	Part No.
1	Diaphragm Check Valve 3/8" Hose Single	JM0036383
2	3/8" Hose Clamp SS	JM0039206
3	.054 NitroGro Orifice	JM0036373
3	.075 NitroGro Orifice	JM0036374
3	.093 NitroGro Orifice	JM0036375
3	.107 NitroGro Orifice	JM0036376
3	.132 NitroGro Orifice	JM0036377
3	.162 NitroGro Orifice	JM0036378
3	.196 NitroGro Orifice	JM0051020
4	NitroGro Check Valve Seat Gasket	JM0036372
5	3/8" Hose Barb, Poly	JM0036368
6	Quickjet Cap, Black	JM0036371

Slow Moving Vehicle Sign



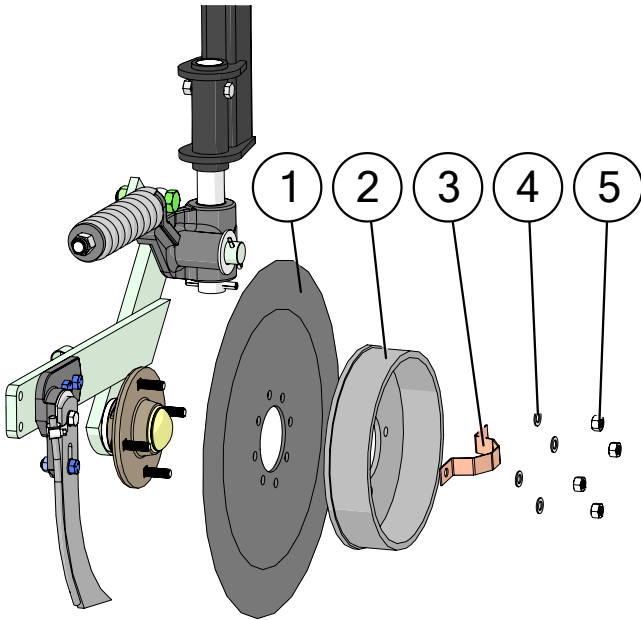
	Description	Part No.
1	1/4"-20 Gr5 Z SF Hex Nut	JM0001630
2	Slow Moving Vehicle Sign	JM0001616
3	1/4"-20 x 3/4" Gr5 Z Hex Bolt	JM0001507

Coulter Mounts



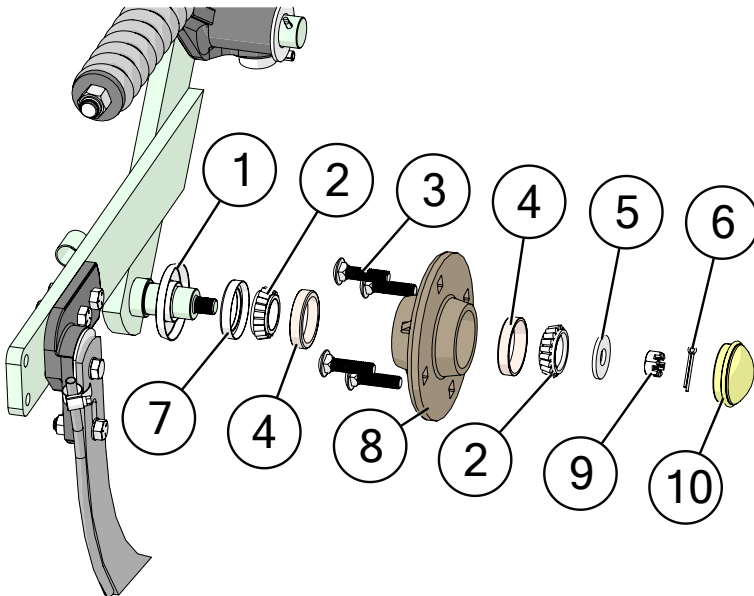
	Description	Part No.
1	Forward Offset Coulter Mount Weldment (NitroGro 6000 Series)	JM0047336
2	Right Offset Coulter Mount Weldment (NitroGro 6000 Series)	JM0047869
3	Standard Coulter Mount Weldment (NitroGro 6000 Series)	JM0036909
4	Left Offset Coulter Mount Weldment (NitroGro 6000 Series)	JM0047867
5	Offset Mount Weldment for Coulters (NitroGro 6000 Series)	JM0047874
6	5/8"-11 Gr5 Z SF Hex Nut	JM0002151
7	5/8"-11 x 7-1/8" x 7" Square U-Bolt	JM0043200
8	1/2"-13 x 2-1/2" Gr5 Z Hex Bolt	JM0001648
9	1/2"-13 Gr5 Z Centerlock Hex Nut	JM0001511

Coulter Depth Control



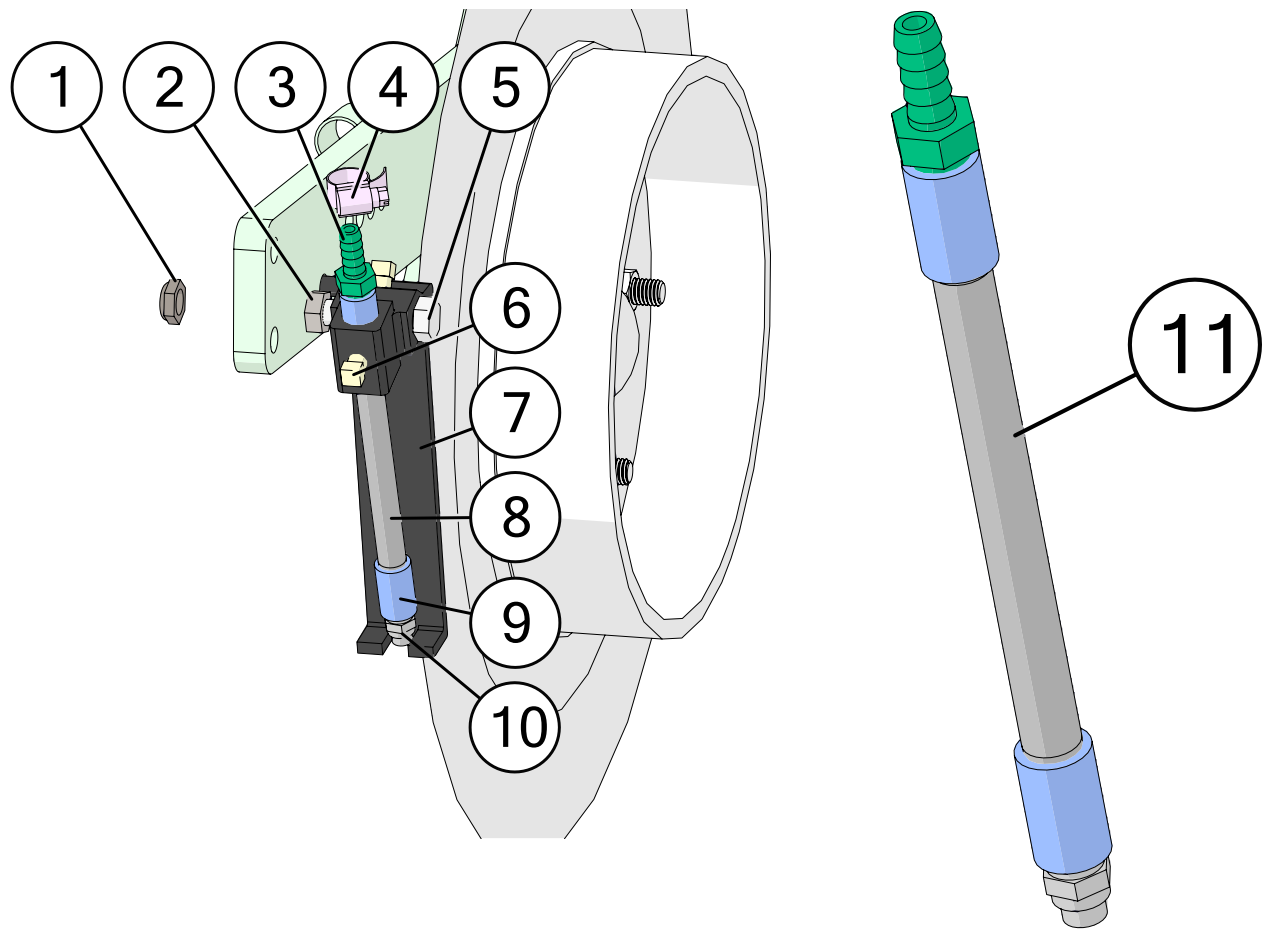
	Description	Part No.
1	20" Straight Coulter Blade with Ripple	JM0031269
1	20" Wavy Coulter Blade (5/8" Wave)	JM0038506
1	20" Wavy Coulter Blade (1-1/8" Wave)	JM0055196
2	GC5000 Depth Control Spool	JM0031281
3	Dust Cap Keeper for GEP Coulter	JM0038391
4	1/2" Gr2 Z Lock Washer	JM0019021
5	1/2"-13 Gr5 Z Hex Nut	JM0002124

Coulter Hub Assembly



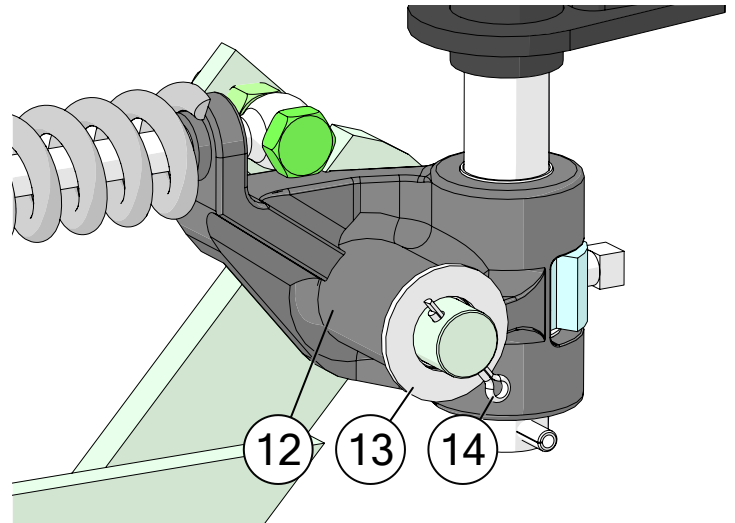
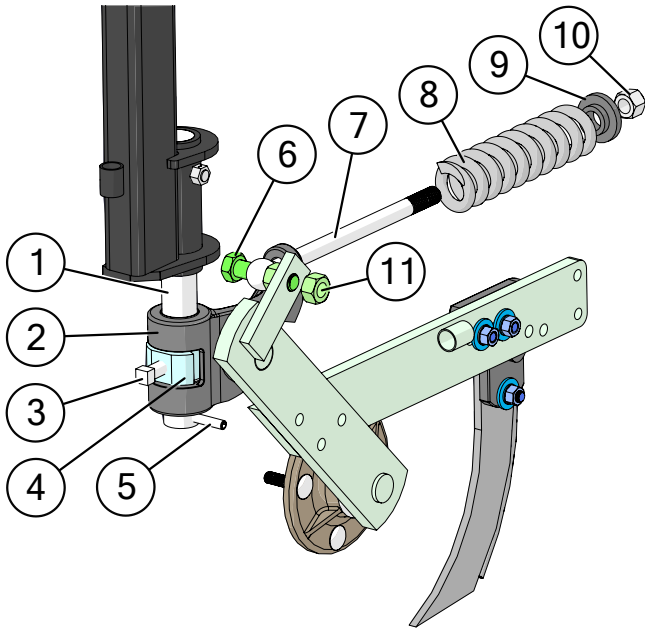
	Description	Part No.
1	Seal Protector for GEP Coulter	JM0038267
2	Small Outer Cone for 6-10 Ton (LM67048)	JM0019564
3	1/2"-13 x 2" Gr2 Z Carriage Bolt	JM0038410
4	LM67010 Cup (Small Race for 6-10 ton)(200500)	JM0026564
5	Hub Washer for GEP Coulter	JM0038278
6	Cotter Pin 1/8" Diameter x 1-1/2" Length	JM0004177
7	Grease Seal for GEP Coulter Hub	JM0038287
8	Hub for GEP Coulter	JM0038285
9	1/2"-13 Gr5 Z Castle Hex Nut	JM0002135
10	Dust Cap for GEP Coulter	JM0038288

Coulter Injector Assembly



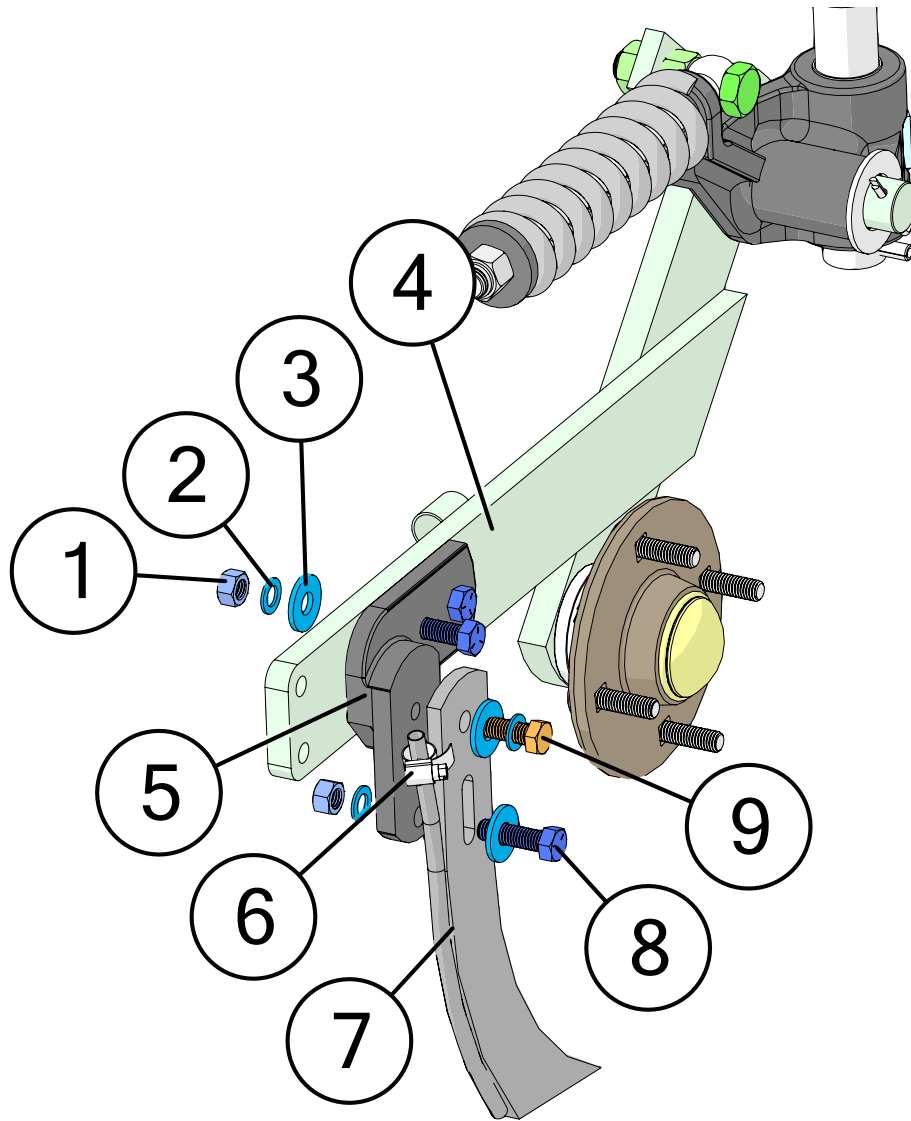
	Description	Part No.
1	1/2"-13 SS Nylon Locking Hex Jam Nut	JM0041792
2	1/2"-13 SS Hex Jam Nut	JM0041791
3	3/8" Hose Barb x 1/4" Male NPT SS	JM0036419
4	3/8" Hose Clamp SS	JM0039206
5	1/2"-13 x 3-1/2" SS Hex Bolt	JM0041790
6	3/8"-16 x 1/2" Square Head SS Bolt	JM0041793
7	GC3205 Injection Mount	JM0035055
8	6" SS Pipe with 1/4" Male NPT Fittings	JM0036445
9	1/4" NPT Merchant Coupling SS	JM0036441
10	#8 NitroGro Injector	JM0036457
10	#10 NitroGro Injector	JM0036459
10	#15 NitroGro Injector	JM0036460
10	#20 NitroGro Injector	JM0036462
10	#30 NitroGro Injector	JM0036463
10	#40 NitroGro Injector	JM0036464
10	#60 NitroGro Injector	JM0051069
11	Fertilizer Injector With Fittings	JM0041788

GEP Coulter Assembly



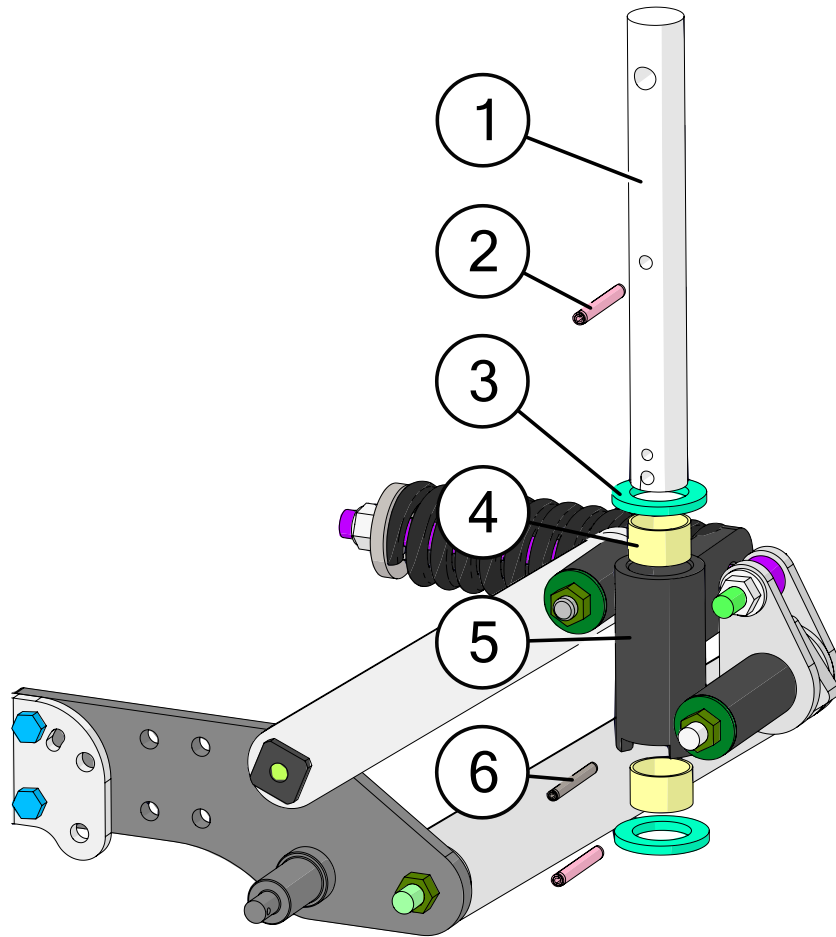
Description		Part No.
1	Shaft 13" - Coulter Mount	JM0043034
2	Cast Coulter Knuckle	JM0038257
3	5/8"-11 x 1" Square Head Bolt	JM0037259
4	Lock Collar for NitroGro	JM0038280
5	3/8" x 3" SS Roll Pin	JM0037162
6	3/4"-10 x 3" Gr5 Z Hex Bolt	JM0019201
7	Spring Rod for GEP Coulter	JM0038265
8	Spring for GEP Coulter	JM0038269
9	Spring Alignment Cast Washer for GEP Coulter	JM0038270
10	3/4"-10 Gr5 Z Nylon Locking Hex Nut	JM0026756
11	3/4"-10 Gr5 Z Hex Nut	JM0002125
12	Cast Coulter Knuckle	JM0038257
13	1-3/8" ID, 2-1/2" OD Washer	JM0038272
14	Cotter Pin 3/16" Diameter x 2" Long	JM0038266

GEP Coulter Knife Assembly



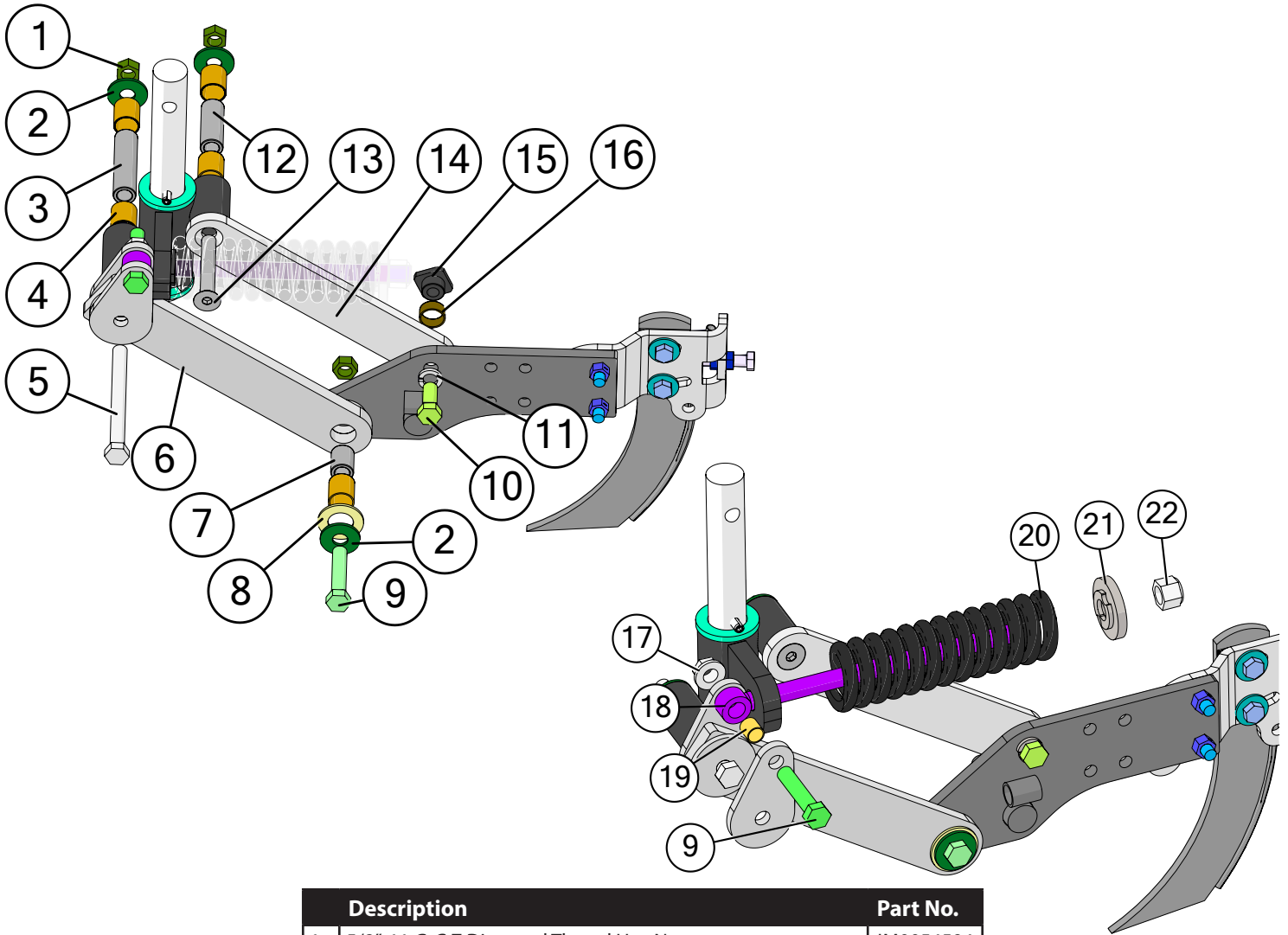
	Description	Part No.
1	1/2"-13 Gr5 Z Hex Nut	JM0002124
2	1/2" Gr2 Z Lock Washer	JM0019021
3	1/2" ID, 1-3/8" OD Z Flat Washer	JM0003082
4	Coulter Arm for GEP Coulter	JM0038397
5	Knife Bracket for GEP Coulter	JM0038279
6	3/8" Hose Clamp SS	JM0039206
7	C050 Wiese Knife	JM0031273
8	1/2"-13 x 1-3/4" Gr5 Z Hex Bolt	JM0002101
9	1/2"-13 x 1-1/4" Gr5 Z Hex Bolt	JM0001513

J&M ParaLinkage Coulter Rod Assembly



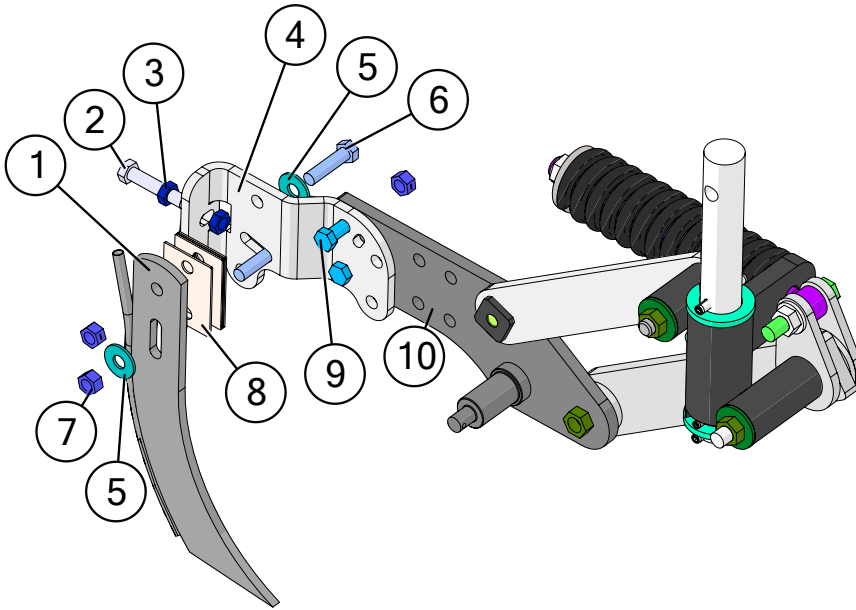
	Description	Part No.
1	13" Shaft - ParaLinkage Coulter Mount	JM0049094
2	3/8" x 2-1/2" SS Spirol Coiled Spring Pin	JM0049016
3	ParaLinkage Coulter Mount Washer	JM0049034
4	1-1/2" ID x 1-5/8 OD x 1" Length Sleeve Composite Bearing	JM0048949
5	ParaLinkage - Main Tube Mount Weldment	JM0048936
6	5/16" x 2-1/2" SS Spirol Coiled Spring Pin	JM0049015

J&M ParaLinkage Coulter Assembly



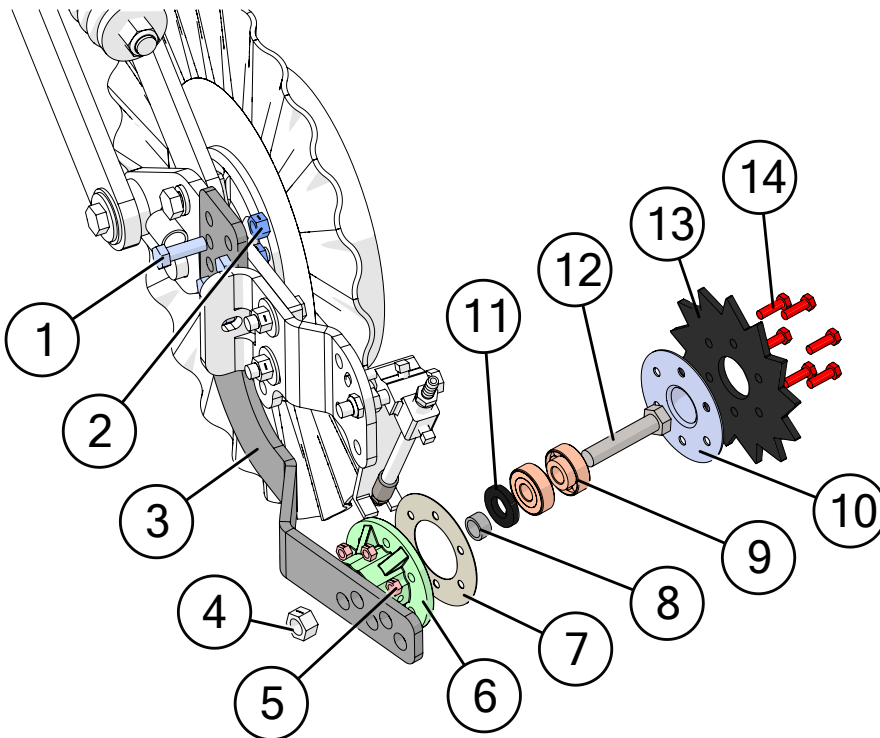
	Description	Part No.
1	5/8"-11 GrC Z Distorted Thread Hex Nut	JM0054594
2	5/8" USS Flat Washer	JM0003073
3	ParaLinkage Lower Arm Bushing Pivot	JM0051220
4	1" ID x 1-1/4" OD x 1-1/4" Length Sleeve Composite Bearing	JM0051195
5	5/8"-11 x 6-1/2" Gr5 Z Hex Bolt	JM0019979
6	ParaLinkage - Main Arm Weldment	JM0048944
7	Bottom Arm ParaLinkage Pivot	JM0051160
8	ParaLinkage Bushing Spacer	JM0051197
9	5/8"-11 x 3" Gr5 Z Hex Bolt	JM0002105
10	5/8"-11 x 1-1/2" Gr5 Z Hex Bolt	JM0002103
11	5/8" Gr2 Z Lock Washer	JM0051157
12	Paralinkage Top Arm Bushing Pivot	JM0051219
13	5/8"-11 x 4" Flat Head Socket Cap Screw	JM0048980
14	ParaLinkage Top Arm	JM0048940
15	Top Arm ParaLinkage Pivot	JM0051159
16	1" ID x 1-1/8" OD x 1/2" Length Sleeve Composite Bearing	JM0051196
17	5/8"-11 Gr5 Z SF Hex Nut	JM0002151
18	ParaLinkage Coulter Spring Rod	JM0049484
19	5/8" ID x 23/32" OD x 3/4" Length Sleeve Composite Bearing	JM0048955
20	0.562" Wire x 2-3/4" OD x 9-1/4" Length Compression Spring	JM0048712
21	ParaLinkage Coulter Spring Washer Weldment	JM0048967
22	3/4"-10 Gr5 Z Nylon Locking Hex Nut	JM0026756

J&M ParaLinkage Coulter Knife Assembly



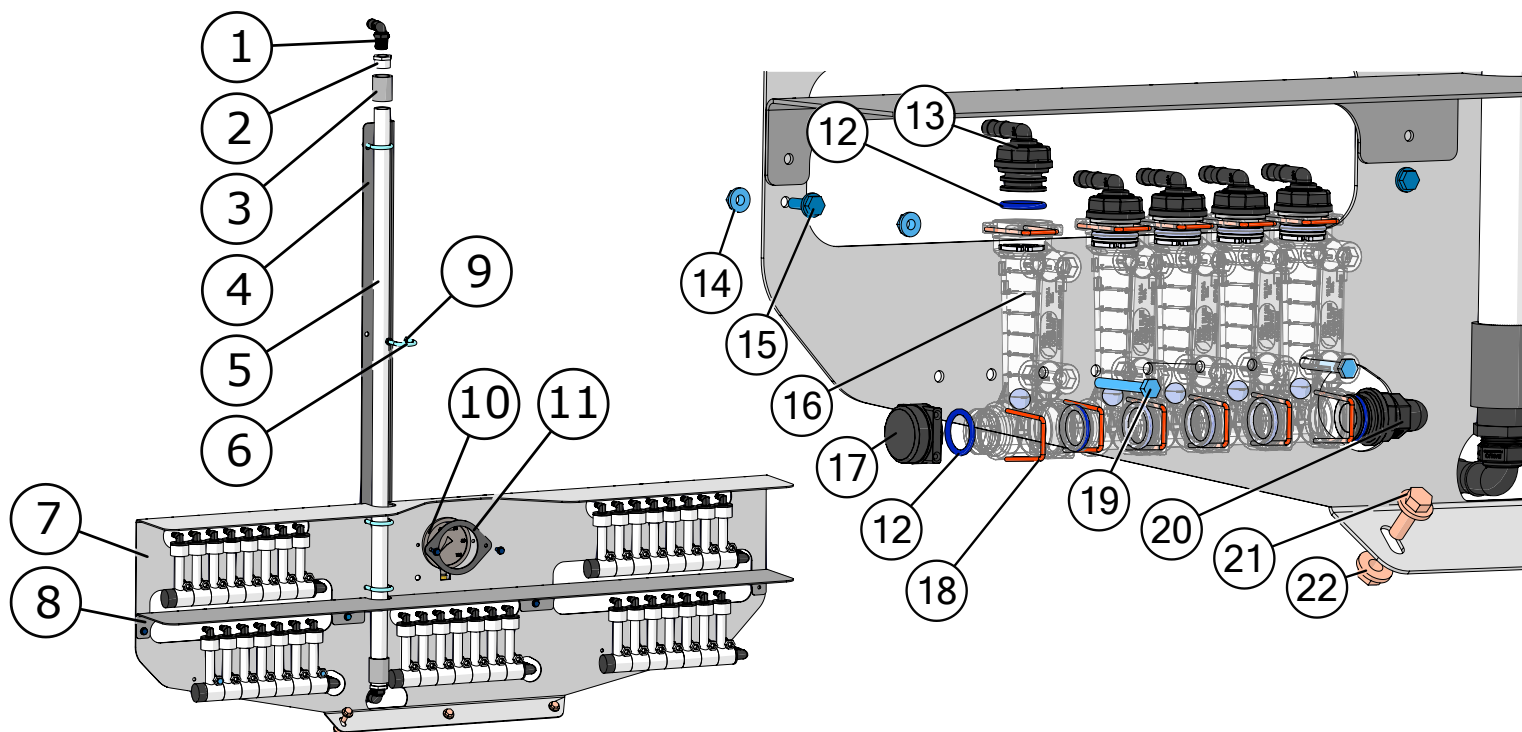
Description	Part No.
1 C050 Wiese Knife	JM0031273
2 1/2"-13 x 2-1/2" Gr5 Z Hex Bolt	JM0001648
3 1/2"-13 Z Gr5 Hex Jam Nut	JM0002157
4 ParaLinkage Coulter Knife/Injector Mount	JM0049010
5 1/2" ID, 1-3/8" OD Z Flat Washer	JM0003082
6 1/2"-13 x 2" Gr5 Z Hex Bolt	JM0001593
7 1/2"-13 Gr2 Z Centerlock Hex Nut	JM0001511
8 Knife Mount Spacer SS - .08"	JM0049033
9 1/2"-13 x 1-3/4" Gr5 Z Hex Bolt	JM0002101
10 ParaLinkage Spindle Mount Weldment	JM0048970

J&M ParaLinkage Coulter with Spiked Closer Assembly



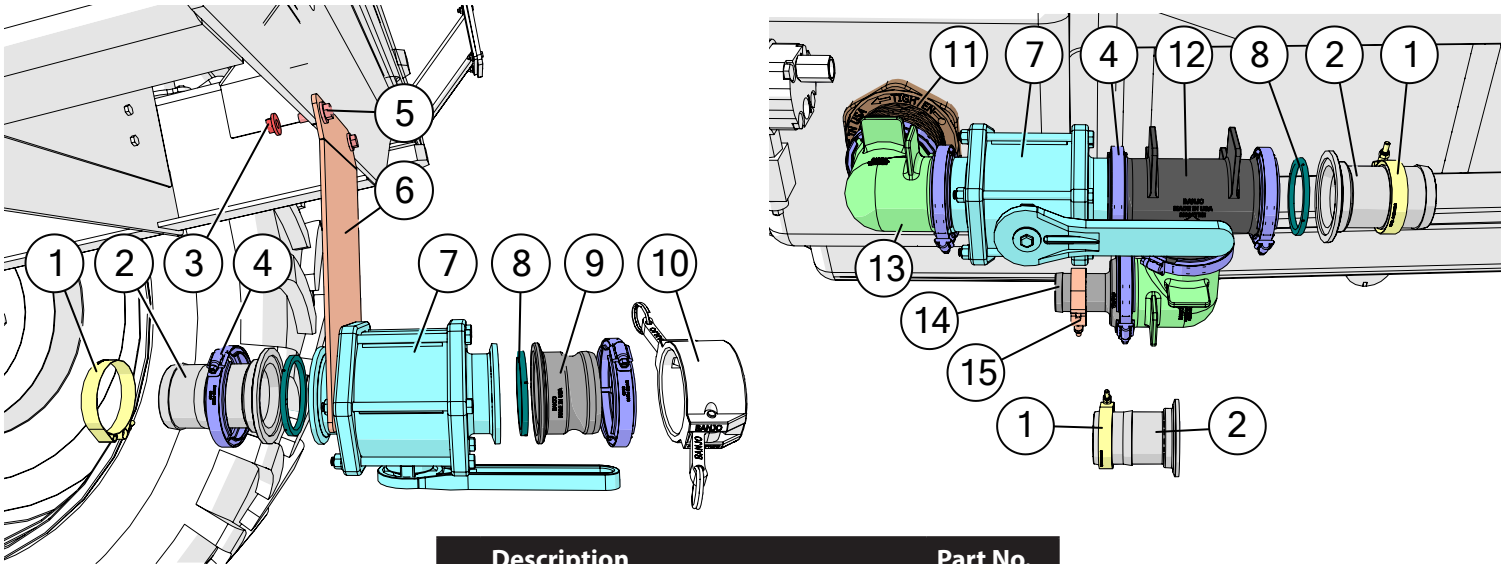
Description	Part No.
1 1/2"-13 x 1-1/2" Gr5 Z Hex Bolt	JM0002100
2 1/2"-13 Gr2 Z Centerlock Hex Nut	JM0001511
3 Spike Wheel Closer Mount	JM0049433
4 5/8"-11 Gr5 Z Centerlock Hex Nut	JM0002146
5 5/16"-18 Gr2 Z Centerlock Hex Nut	JM0002143
6 6-Hole, 3" Bolt Circle Sealer Hub	JM0049352
7 Gasket for G63204 Hub	JM0049390
8 Row Closer Hub Spacer	JM0049396
9 G63204 Hub Bushing - Radial Ball Bearing	JM0049389
10 Hub Cap for G63204 Hub	JM0049391
11 Seal for G63204 Hub	JM0049388
12 5/8"-11 x 3" Gr5 Z Hex Bolt	JM0002105
13 Spike Closing Wheel	JM0049432
14 5/16"-18 x 1" Gr5 Z Hex Bolt	JM0001743

Flow Monitor



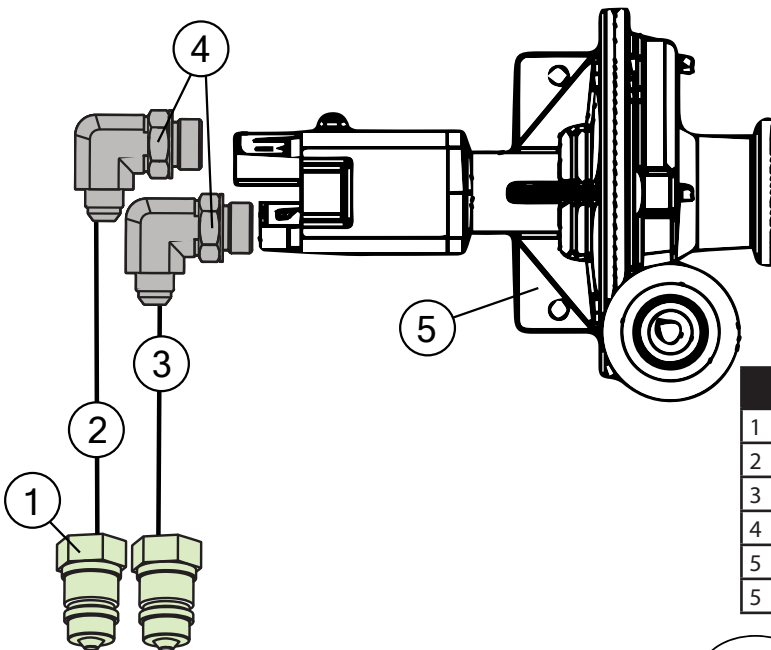
	Description	Part No.
1	3/4" Hose Barb x 3/4" Male NPT; 90 Deg	JM0035226
2	1" Male x 3/4" Female PVC Hex Bushing - Black	JM0047864
3	1" Slip x 1" FIPT PVC - Black	JM0047865
4	1800 Gallon Tank Front Sight Glass Bracket	JM0054195
5	1" Clear PVC Pipe - Front Sight Glass - NitroGro 6018	JM0047827
6	5/16" Round U-Bolt 1" Pipe Size	JM0047616
7	6000 Applicator Flow Monitor Mounting Plate	JM0054504
8	6000 Applicator Flow Monitor Mounting Plate - Hood	JM0054506
9	5/16"-18 Gr2 Z Centerlock Hex Nut	JM0002143
10	Pressure Gauge Stainless Steel 0-100psi, 1/4" NPT	JM0036636
11	6000 Nitrogro Flow Monitor Pressure Gauge Holder	JM0051516
12	O-Ring Seal for Wilger Flow Monitor	JM0055001
13	3/8" Hose Barb with O-Ring; 90 Degree	JM0024469
14	1/4"-20 Gr5 Z SF Hex Nut	JM0001630
15	1/4"-20 x 3/4" Gr5 Z SF Hex Bolt	JM0001642
16	Wilger Flow Indicator	JM0021569
17	Cap with O-Ring - Wilger Flow Indicator	JM0021579
18	U-Clip for Wilger Flow Monitor	JM0055000
19	1/4"-20 x 2" Gr5 Z Hex Bolt	JM0001591
20	3/4" Hose Barb with O-Ring; 90 Degree	JM0024468
21	3/8"-16 x 1" Gr5 Z SF Hex Bolt	JM0002092
22	3/8"-16 Gr5 Z SF Hex Nut	JM0002152
23	Green Polyurethane Ball for Wilger Flow Indicator	JM0055003
24	Red Polyurethane Ball for Wilger Flow Indicator	JM0055004
25	Red Glass Ball for Wilger Flow Indicator	JM0055005
26	1/2" SS Ball for Wilger Flow Indicator	JM0055006
27	7/16" SS Ball for Wilger Flow Indicator	JM0054824

Fill Valves



Description	Part No.
1 T-Bolt Hose Clamp 3" Hose, 3-5/16" Min OD	JM0035248
2 3" Manifold Flange x 3" Hose Barb	JM0021244
3 3/8"-16 Gr5 Z SF Hex Nut	JM0002152
4 Manifold Worm Screw Clamp 3"	JM0035237
5 3/8"-16 x 1" Gr5 Z SF Hex Bolt	JM0002092
6 Ball Valve Mount Plate 3" Banjo	JM0038663
7 Ball Valve - 3" Full Port Flange Manifold	JM0021230
8 3" Manifold Gasket with Rib EPDM	JM0021239
9 3" Manifold Flange x 3" QDC Male	JM0035205
10 3" Poly Cam Lever Cap	JM0035206
11 3" MNF x 3" FNPT Tank Fitting BTM DRN	JM0035114
12 3" Manifold Tee	JM0021232
13 3" Manifold Flange; 90° Coupling	JM0033979
14 3" Manifold Flange x 2" Hose Barb	JM0034333
15 T-Bolt Hose Clamp 2" Hose, 2-5/16" Min OD	JM0035247

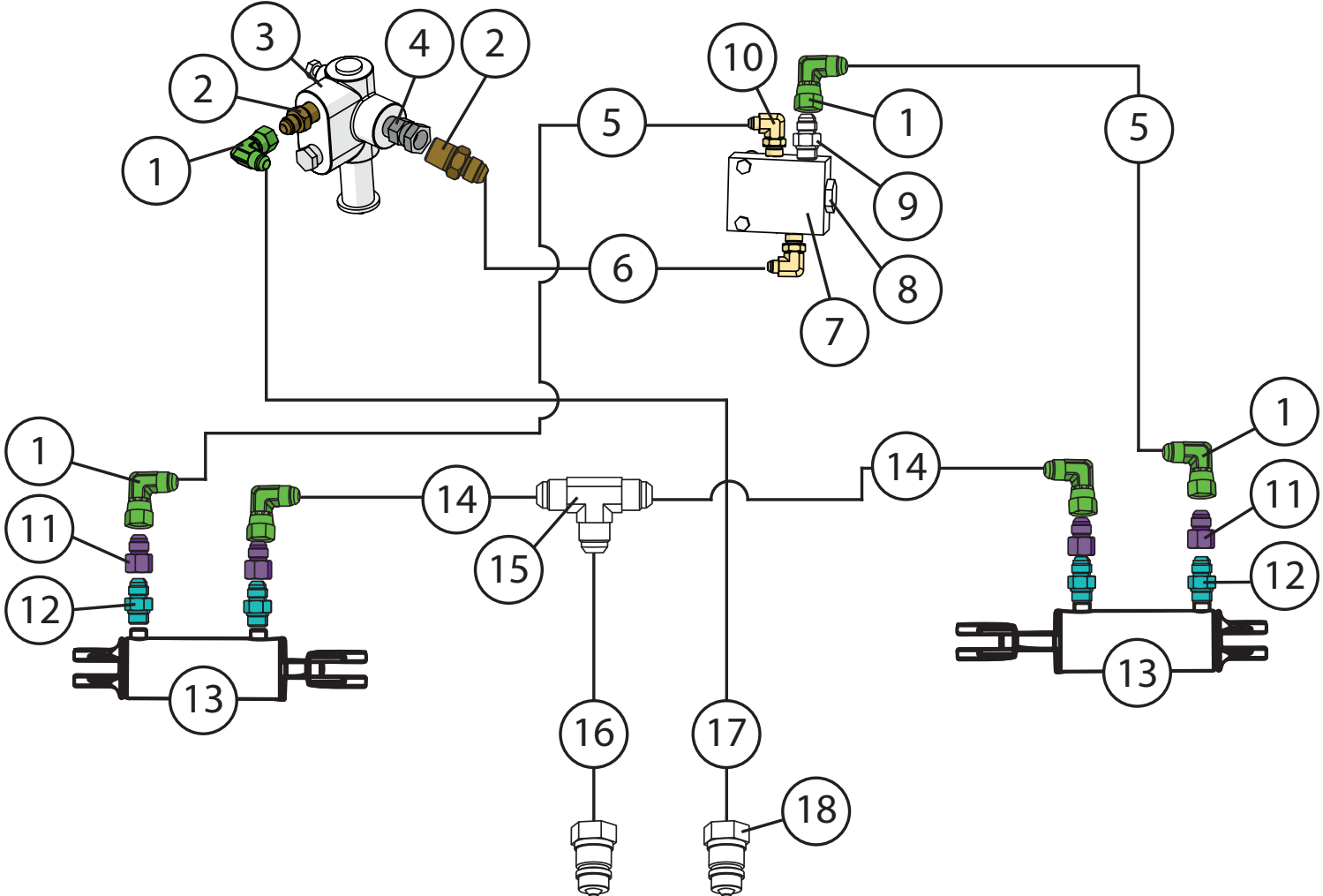
Hydraulic Pump Circuit Hydraulic Schematic



Description	Part No.
1 1/2" Female NPT Pioneer (PQC-1)	JM0018254
2 1/2" x 240" Hydraulic Hose 240inch8M3K-8G-8MP-8G-8MP	JM0049173
3 3/8" x 240" Hydraulic Hose 240inch6M3K-6G-8MP-6G-8MP	JM0049171
4 1/2" Male JIC x 5/8" Male ORB; 90 Degree Elbow	JM0039215
5 FMSC-150F-HYD-206 Ace Pump	JM0038662
5 FMC-750F-HYD-M22 Ace Pump	JM0050785

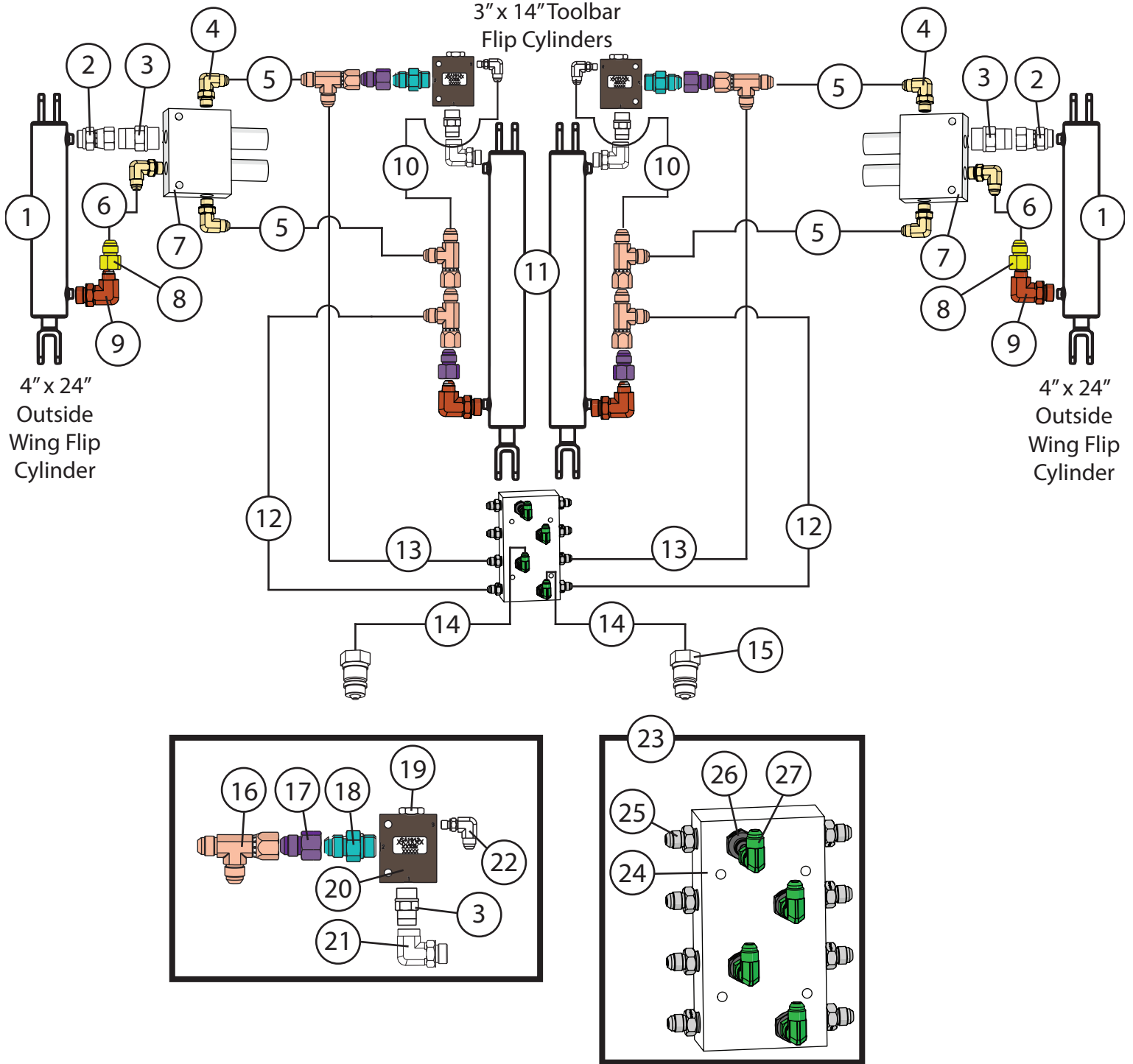


Main Wing Fold Circuit Hydraulic Schematic



	Description	Part No.
1	3/8" Male JIC x 3/8" Female JIC Swivel; 90 Degree Elbow	JM0010295
2	3/8" Male JIC x 3/8" Male NPT; Straight	JM0037167
3	Flow Diverter Valve	JM0018250
4	3/8" Male NPT x 3/8" Female NPT Swivel with .062 Orifice (Restrictor)	JM0018362
5	3/8" x 72" Hydraulic Hose 72inch6M3K-6G-6FJX-6G-6FJX	JM0049157
6	3/8" x 53" Hydraulic Hose 53inch6M3K-6G-6FJX-6G-6FJX	JM0049155
7	50 by 50 Flow Divider Valve	JM0047737
8	3/8" Male NPT Plug	JM0018261
9	3/8" Male JIC x 3/8" Male ORB; Straight	JM0043614
10	3/8" Male JIC x 3/8" Male ORB; 90 Degree Elbow	JM0026121
11	3/8" Male JIC x 3/8" Female JIC with .047 Orifice	JM0054918
12	3/8" Male JIC x 1/2" Male ORB; Straight	JM0010302
13	4" Bore, 8" Stroke Welded Hydraulic Cylinder	JM0030757
14	3/8" x 80" Hydraulic Hose 80inch6M3K-6G-6FJX-6G-6FJX	JM0049158
15	3/8" Male JIC x 3/8" Male JIC x 3/8" Male JIC; Tee	JM0055046
16	3/8" x 192" Hydraulic Hose 192inch6M3K-6G-8MP-6G-6FJX	JM0053803
17	3/8" x 210" Hydraulic Hose 210inch6M3K-6G-8MP-6G-6FJX	JM0053807
18	1/2" Female NPT Pioneer (PQC-1)	JM0018254

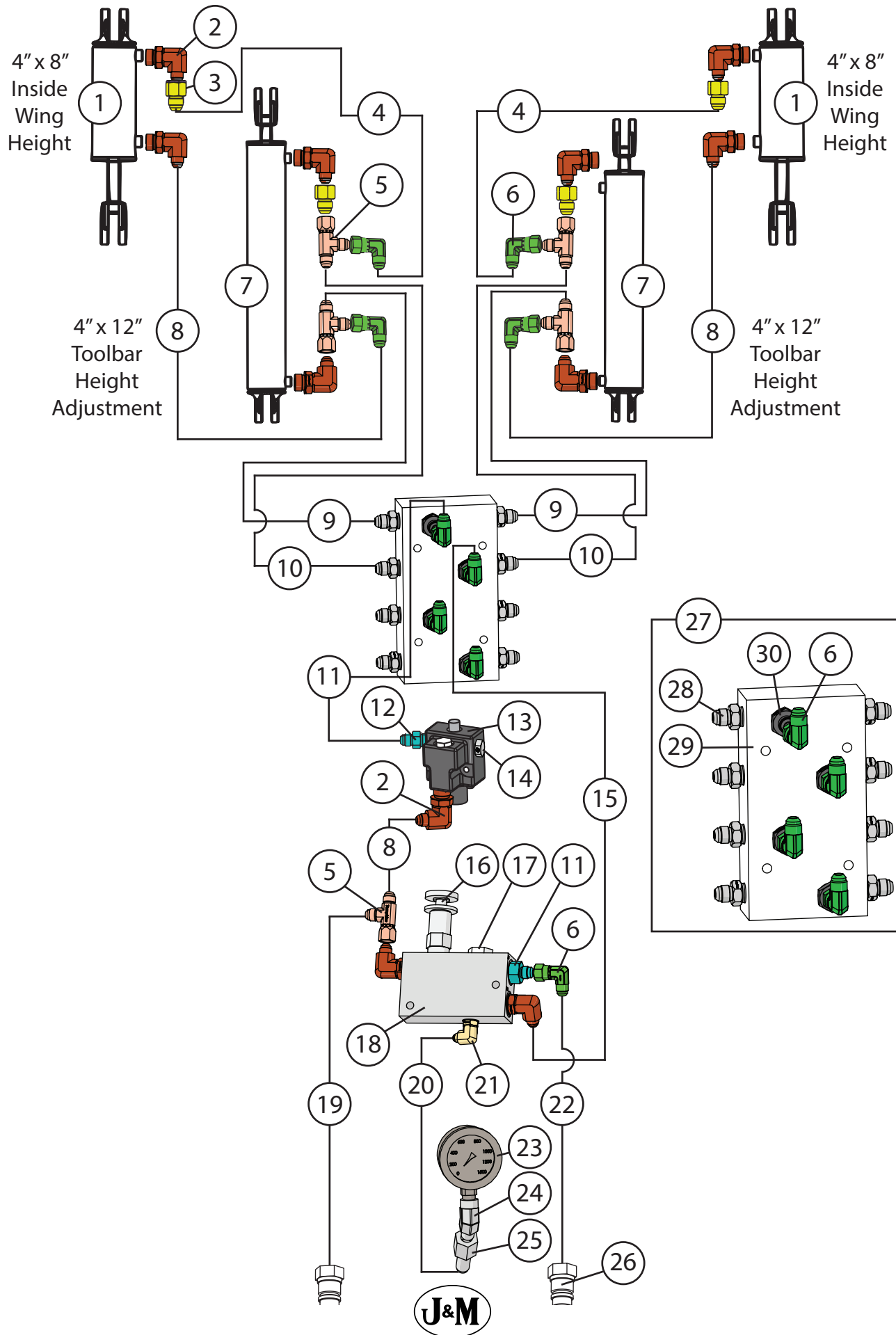
Wing Flip Circuit Hydraulic Schematic



Wing Flip Circuit Hydraulic Schematic

	Description	Part No.
1	4" Bore, 24" Stroke Welded Hydraulic Cylinder	JM0030730
2	1/2" Male ORB x 1/2" Female NPT Swivel; Straight	JM0026804
3	1/2" Male NPT x 1/2" Male O-Ring Hex Nipple	JM0048977
4	3/8" Male JIC x 3/8" Male ORB; 90 Degree Elbow	JM0026121
5	3/8" x 195" Hydraulic Hose 195inch6M3K-6G-6FJX-6G-6FJX	JM0049164
6	3/8" x 21" Hydraulic Hose 21inch6M3K-6G-6FJX-6G-6FJX	JM0049162
7	Dual Counter Balance Valve	JM0047740
8	3/8" Male JIC x 3/8" Female JIC with .094 Orifice	JM0047735
9	3/8" Male JIC x 1/2" Male ORB; 90 Degree Elbow	JM0037159
10	1/4" x 12" 12inch4M3K-4G-6FPX-4G-6FJX	JM0054920
11	3.5" x 14" Welded Non-Cushion JD Cylinder	JM0055022
12	3/8" x 36" Hydraulic Hose 36inch6M3K-6G-6FJX-6G-6FJX	JM0049163
13	3/8" x 53" Hydraulic Hose 53inch6M3K-6G-6FJX-6G-6FJX	JM0049155
14	3/8" x 192" Hydraulic Hose 192inch6M3K-6G-8MP-6G-6FJX	JM0053803
15	1/2" Female NPT Pioneer (PQC-1)	JM0018254
16	3/8" Male JIC x 3/8" Female JIC Swivel x 3/8" Male JIC; Tee	JM0037163
17	3/8" Male JIC x 3/8" Female JIC with .062 Orifice	JM0047738
18	3/8" Male JIC x 1/2" Male ORB; Straight	JM0010302
19	Pilot Check Valve Hyd (FA/VBBA-5) (FA/LNL)	JM0050870
20	Pilot Operated Check Valve Body, Single Cavity, SAE Ports	JM0054912
21	1/2" Male ORB x 1/2" Female NPT Swivel; 90 Degree Elbow	JM0047392
22	3/8" Male JIC x 1/4" Male ORB; 90 Degree Elbow	JM0054921
23	Main 6000 Series Manifold Block with Fittings	JM0054931
24	Main Manifold Block (NitroGro)	JM0028902
25	3/8" Male JIC x 3/8" Male NPT; Straight	JM0037167
26	3/8" Male JIC x 1/2" Male NPT; Straight	JM0037172
27	3/8" Male JIC x 3/8" Female JIC Swivel; 90 Degree Elbow	JM0010295

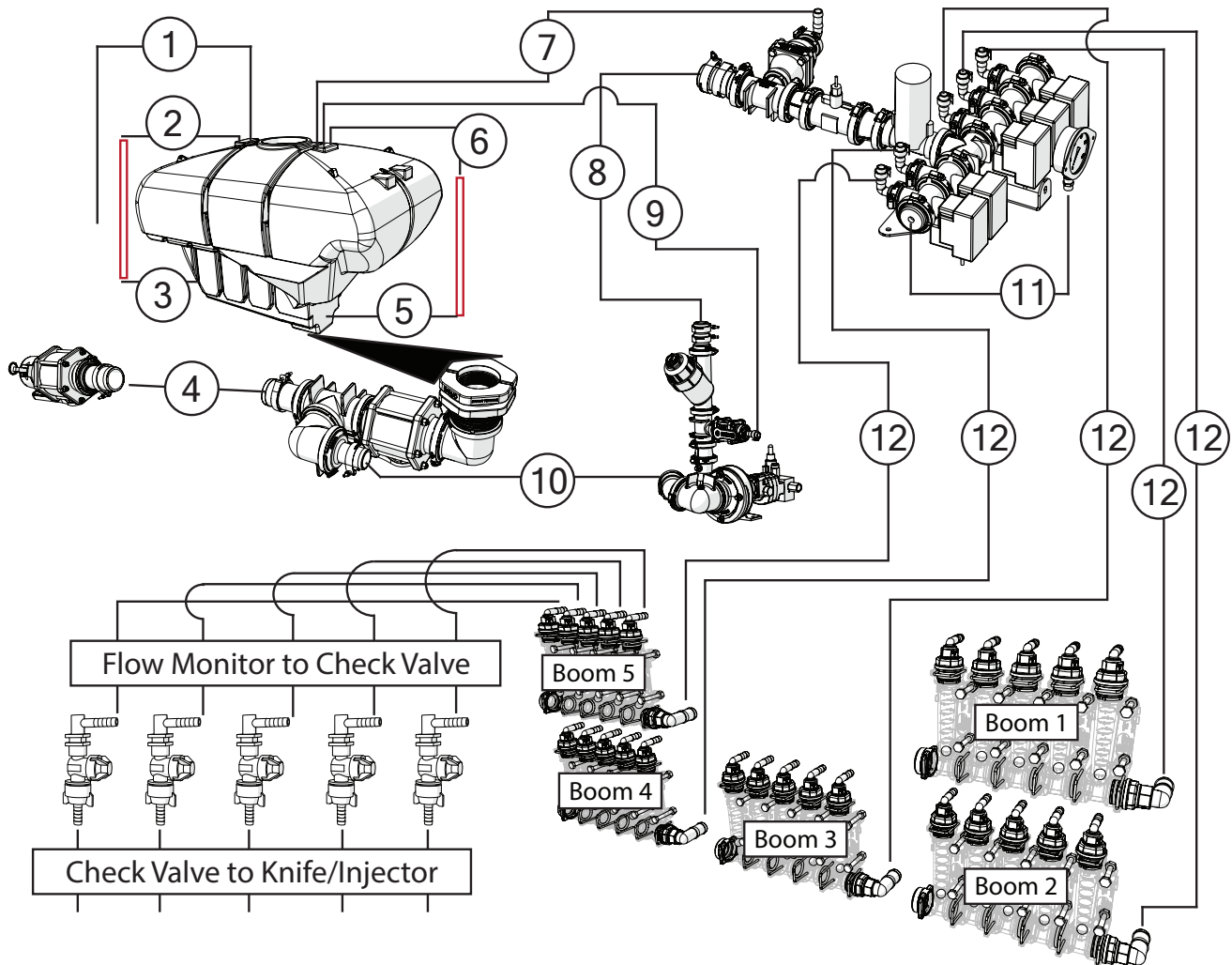
Down Pressure Circuit Hydraulic Schematic



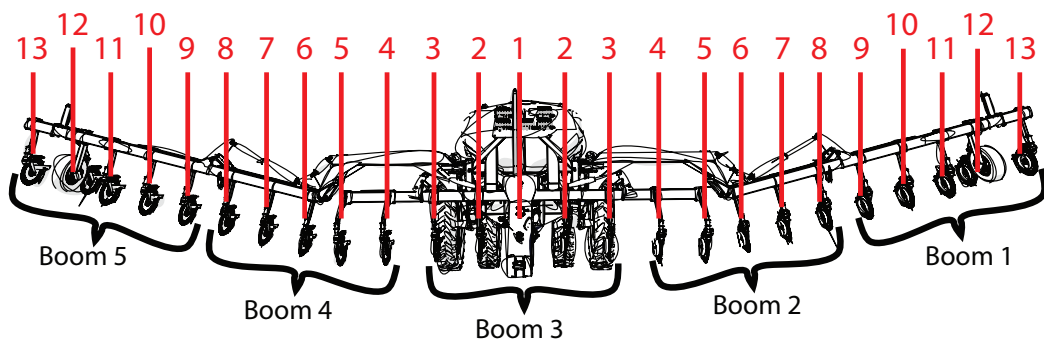
Down Pressure Circuit Hydraulic Schematic

	Description	Part No.
1	4" Bore, 8" Stroke Welded Hydraulic Cylinder	JM0030757
2	3/8" Male JIC x 1/2" Male ORB; 90 Degree Elbow	JM0037159
3	3/8" Male JIC x 3/8" Female JIC with .094 Orifice	JM0047735
4	3/8" x 155" Hydraulic Hose 155inch6M3K-6G-6FJX-6G-6FJX	JM0049161
5	3/8" Male JIC x 3/8" Female JIC Swivel x 3/8" Male JIC; Tee	JM0037163
6	3/8" Male JIC x 3/8" Female JIC Swivel; 90 Degree Elbow	JM0010295
7	4" Bore, 12" Stroke Welded Hydraulic Cylinder	JM0045585
8	3/8" x 180" Hydraulic Hose 180inch6M3K-6G-6FJX-6G-6FJX	JM0049160
9	3/8" x 36" Hydraulic Hose 36inch6M3K-6G-6FJX-6G-6FJX	JM0049163
10	3/8" x 53" Hydraulic Hose 53inch6M3K-6G-6FJX-6G-6FJX	JM0049155
11	3/8" x 80" Hydraulic Hose 80inch6M3K-6G-6FJX-6G-6FJX	JM0049158
12	3/8" Male JIC x 1/2" Male ORB; Straight	JM0010302
13	Cross Remote Stroke Control Valve	JM0051269
14	1/2" Male O-Ring Plug	JM0047733
15	3/8" x 115" Hydraulic Hose 115inch6M3K-6G-6FJX-6G-6FJX	JM0049169
16	Hydraforce Pressure Reducing/Relieving Valve	JM0034800
17	Hydraforce Check Valve 5psi Bias Spring	JM0034805
18	Manifold with 1/2" ORB Ports for PRV and CV (SFP26157)	JM0034773
19	3/8" x 87" Hydraulic Hose 87inch6M3K-6G-8MP-6G-6FJX	JM0053806
20	3/8" x 25" Hydraulic Hose 25inch6M3K-6G-6FJX-6G-6FJX	JM0049167
21	3/8" Male JIC x 3/8" Male ORB; 90 Degree Elbow	JM0026121
22	3/8" x 81" Hydraulic Hose 81inch6M3K-8G-6MP-6G-6FJX	JM0049168
23	Pressure Gauge 0-1500psi, 2" Face, 1/4" NPT Bottom Mount Donaldson	JM0037152
24	1/4" Male NPT x 1/4" Female NPT Rigid; 45 Degree Elbow	JM0037156
25	1/4" Female NPT x 3/8" Male JIC Compression Bulk Head Fitting	JM0037155
26	1/2" Female NPT Pioneer (PQC-1)	JM0018254
27	Main 6000 Series Manifold Block with Fittings	JM0054931
28	3/8" Male JIC x 3/8" Male NPT; Straight	JM0037167
29	Main Manifold Block (NitroGro)	JM0028902
30	3/8" Male JIC x 1/2" Male NPT; Straight	JM0037172

Fertilizer Hose Routing



	30" Row Spacing			
	Flow Monitor to Check Valve		Check Valve to Knife/Injector	
	Description	Part No.	Description	Part No.
Coulter 1	140" x 3/8" Fertilizer Hose	JM0050813	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 2	130" x 3/8" Fertilizer Hose	JM0050812	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 3	140" x 3/8" Fertilizer Hose	JM0050813	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 4	160" x 3/8" Fertilizer Hose	JM0050814	65" x 3/8" Fertilizer Hose	JM0050811
Coulter 5	190" x 3/8" Fertilizer Hose	JM0050815	65" x 3/8" Fertilizer Hose	JM0050811
Coulter 6	246" x 3/8" Fertilizer Hose	JM0050816	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 7	276" x 3/8" Fertilizer Hose	JM0050817	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 8	306" x 3/8" Fertilizer Hose	JM0050818	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 9	336" x 3/8" Fertilizer Hose	JM0050819	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 10	366" x 3/8" Fertilizer Hose	JM0050820	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 11	396" x 3/8" Fertilizer Hose	JM0050821	55" x 3/8" Fertilizer Hose	JM0050810
Coulter 12	426" x 3/8" Fertilizer Hose	JM0050822	65" x 3/8" Fertilizer Hose	JM0050811
Coulter 13	456" x 3/8" Fertilizer Hose	JM0050823	55" x 3/8" Fertilizer Hose	JM0050810

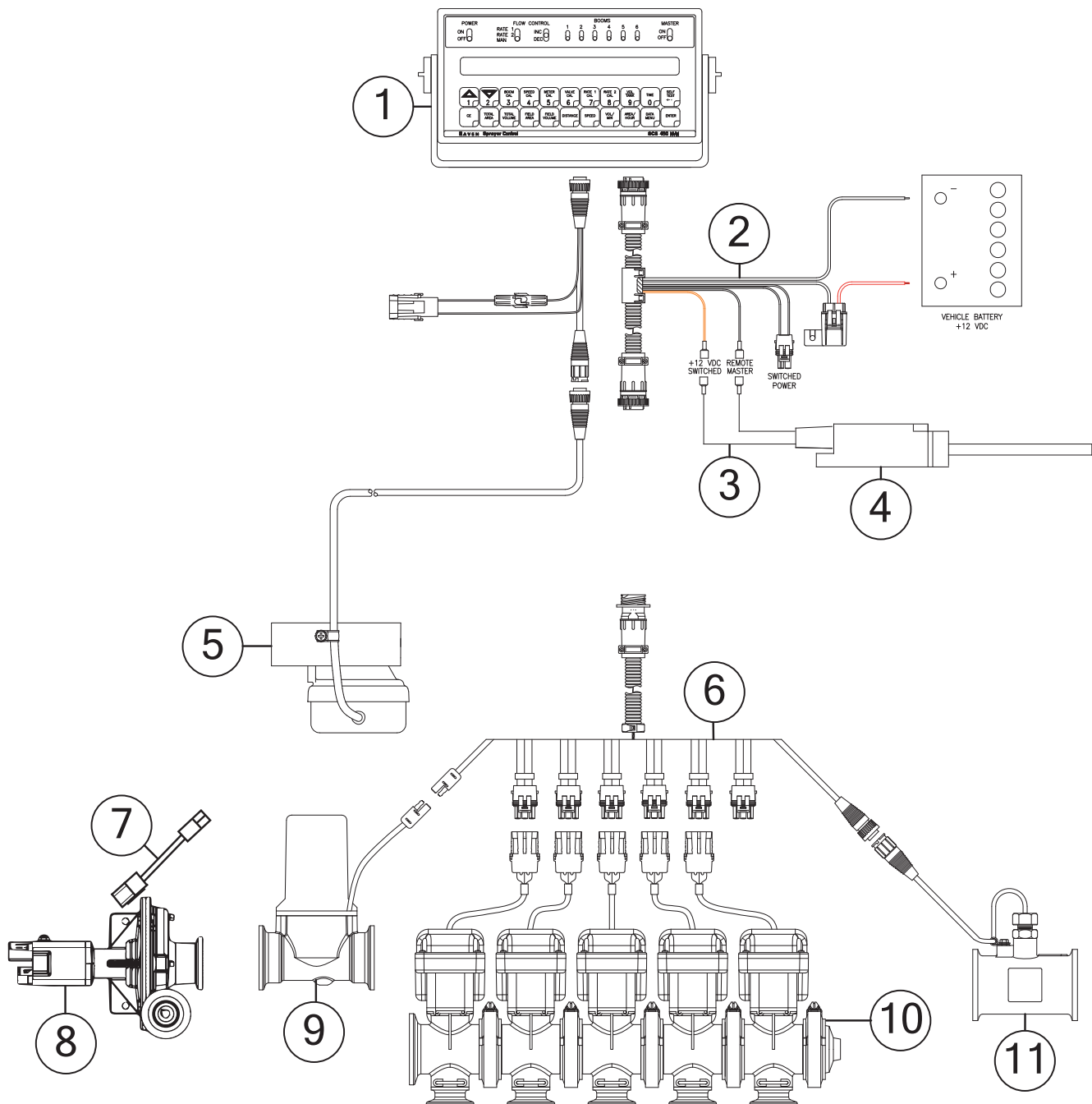


Fertilizer Hose Routing

	Description	Part No.
1	120" x 3/4" Fertilizer Hose	JM0050830
2	48" x 3/4" Fertilizer Hose	JM0050825
3	36" x 3/4" Fertilizer Hose	JM0050824
4	3" x 60" Fertilizer Suction Hose - 2600 Tank	JM0050836
5	96" x 3/4" Fertilizer Hose	JM0050826
6	60" x 3/4" Fertilizer Hose	JM0050827
7	53" x 3/4" Fertilizer Hose	JM0050829
8	2" x 96" Pump to Raven Flow Control Line	JM0050834
9	126" x 3/4" Fertilizer Hose	JM0050831
10	2" x 50" Tank to Pump Hose - 150 Pump	JM0050833
10	3" x 42" Tank to Pump Hose - 750 Pump	JM0050835
11	1/4" x 2' Hose - 1/4" Brass Fitting Each End	JM0047863
12	30" x 3/4" Fertilizer Hose	JM0050828
13	55" x 3/8" Fertilizer Hose	JM0050810
14	65" x 3/8" Fertilizer Hose	JM0050811
15	130" x 3/8" Fertilizer Hose	JM0050812
16	140" x 3/8" Fertilizer Hose	JM0050813
17	160" x 3/8" Fertilizer Hose	JM0050814
18	190" x 3/8" Fertilizer Hose	JM0050815
19	246" x 3/8" Fertilizer Hose	JM0050816
20	276" x 3/8" Fertilizer Hose	JM0050817
21	306" x 3/8" Fertilizer Hose	JM0050818
22	336" x 3/8" Fertilizer Hose	JM0050819
23	366" x 3/8" Fertilizer Hose	JM0050820
24	396" x 3/8" Fertilizer Hose	JM0050821
25	426" x 3/8" Fertilizer Hose	JM0050822
26	456" x 3/8" Fertilizer Hose	JM0050823

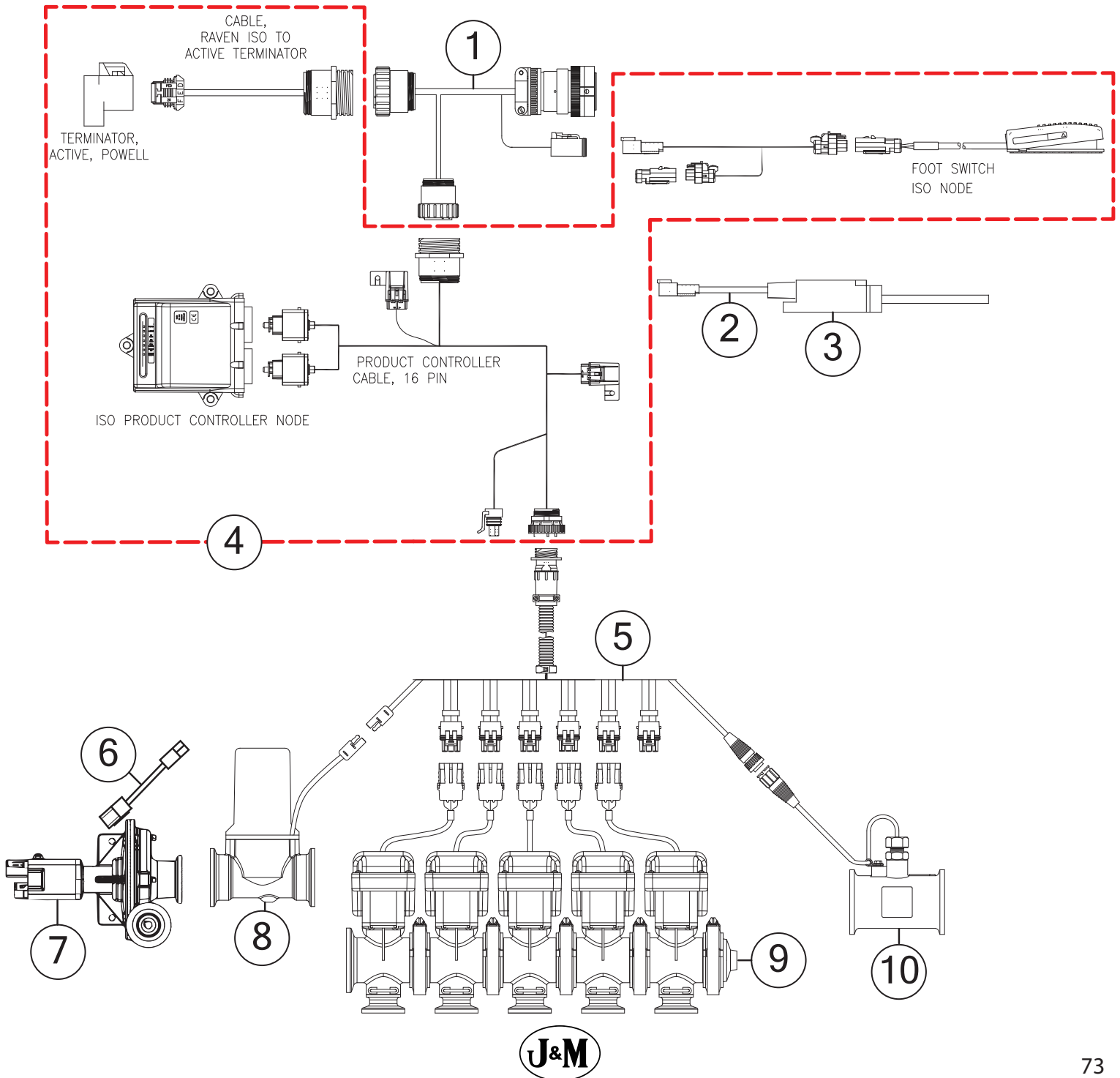
Raven SCS 450 Liquid Control System

Description	Part No.
1 Raven SCS450 Control Console	JM0039335
2 Raven Console Cable (10') SCS 440/450	JM0039337
3 Remote Switch Cable for Implement Engagement - Raven 450 Control	JM0050676
4 Mini Wisker Limit Switch	JM0050161
5 Phoenix GPS Speed Sensor	JM0039338
6 Raven Flow Cable - 6 Boom (12') - 3 Pin Weather Pack	JM0039336
7 PWM Extension Cable (12')	JM0050675
8 ACE 750 PWM Pump	JM0050925
9 Raven Control Valve M200 Manifold Flange (1-1/2")	JM0038726
10 Raven 5 Section Manifold	JM0038797
11 Raven Flow Meter M220 Manifold Flange (RFM100P)	JM0038727

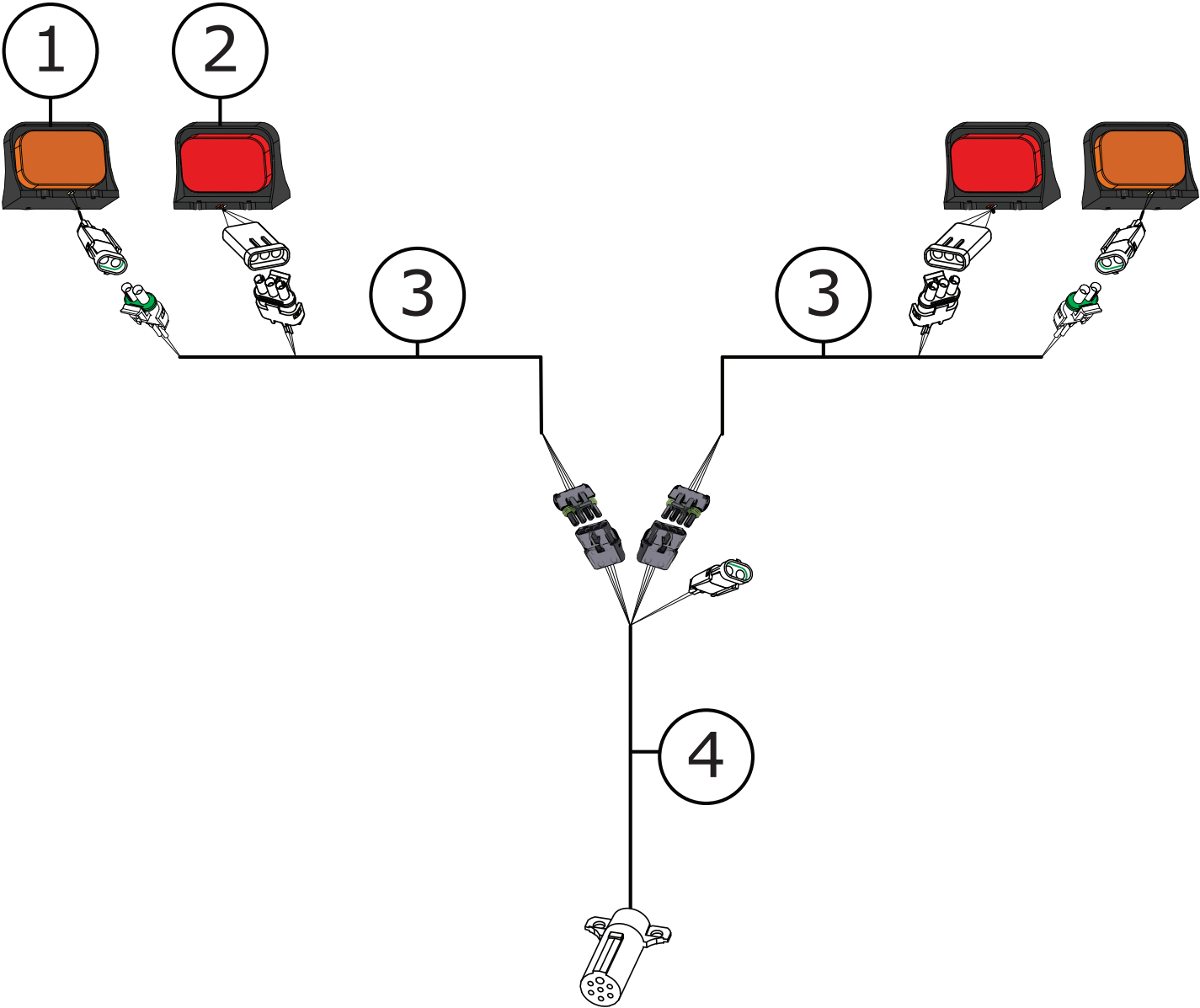


ISO Liquid Control System

Description	Part No.
1 Raven Cable ISOBUS Hitch to Raven ECU (12')	JM0039341
1 Raven Cable ISOBUS Hitch to Raven ECU (17')	JM0051018
2 Remote Switch Cable for Implement Engagement - ISO Control	JM0050677
3 Mini Wisker Limit Switch	JM0050161
4 Raven ISO Single Product Kit	JM0039339
5 Raven Flow Cable - 6 Boom (12') - 3 Pin Weather Pack	JM0039336
6 PWM Extension Cable (12')	JM0050675
7 ACE 750 PWM Pump	JM0050925
8 Raven Control Valve M200 Manifold Flange (1-1/2")	JM0038726
9 Raven 5 Section Manifold	JM0038797
10 Raven Flow Meter M220 Manifold Flange (RFM100P)	JM0038727



Lights and Wiring



	Description	Part No.
1	Amber Light (Soil Conditioner, NitroGro)	JM0009975
2	Red Light (Soil Conditioner, NitroGro)	JM0009976
3	NitroGro 6000-Series Rear Harness	JM0055138
4	NitroGro 6000-Series Front Harness	JM0055137