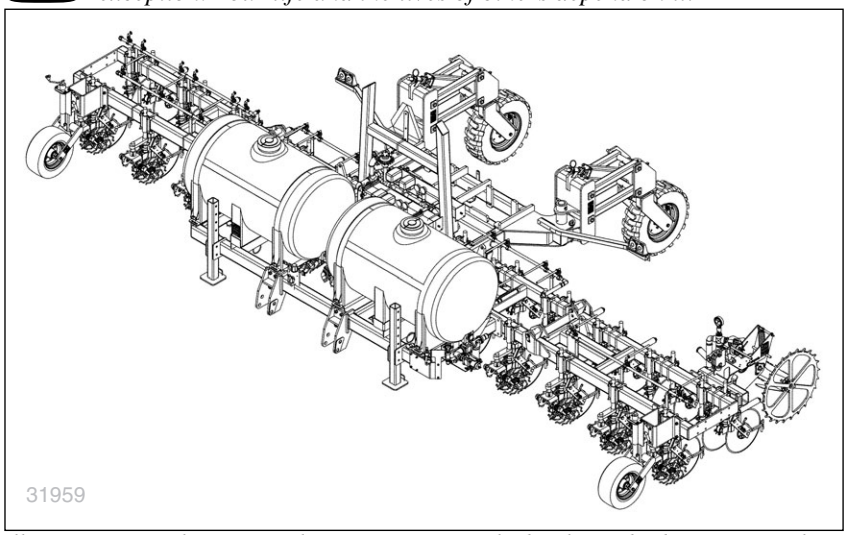
Operator Manual

Nutri-Pro® NP3000 and NP3000A
30-Foot Fertilizer Applicators

Great Plains
Manufacturing, Inc.
www.greatplainsmfg.com

Read the operator manual entirely. When you see this symbol, the subsequent instructions and warnings are serious - follow without exception. Your life and the lives of others depend on it!



Illustrations may show optional equipment not supplied with standard unit, or may show NP30, NP40 or NP4000 models where the topic function is identical.

EN

 Printed 2014-04-22 407-613M

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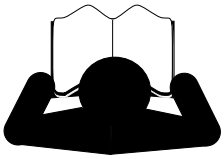
Important Safety Information

Anhydrous Ammonia Safety

The NP3000A Nutri-Pro® applicator includes several manuals in addition to this Operator manual that contain crucial safety information:

- 407-551M Using Anhydrous Ammonia Safely
- 016-0159-403 Raven AccuFlow™ Operator manual[a]
- 016-0159-831 Raven SCS-450 Installation, Operation and Service manual
- FVC062 Squibb-Taylor Flo-Max™ manual (breakaway coupler)[b]

Read all of these manuals. If you do not have the current edition of one or more, contact Great Plains for a replacement copy.



DANGER

EPA EHS (Extremely Hazardous Substance):
Despite the common odor, anhydrous ammonia properties are dramatically different from those of household ammonia cleaning solutions (dilute ammonium hydroxide).
An uncontrolled release of NH_3 anhydrous ammonia can easily be fatal or cause permanent disabling injury.

If you are new to NH_3 operations, study everything you can about this chemical and how to use it safely.

DANGER

Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:
Your life and health,
the lives and health of your workers and community,
the continued commercial availability of anhydrous ammonia,
*and continuation of agricultural NH_3 transport exceptions depend on you conducting **meticulously careful** operations.*

The diamond icons and decal image above appear in this manual whenever a topic deals with anhydrous ammonia safety. See the "**Using Anhydrous Ammonia Safely**" manual (407-551M) for details on these signs. These topics do not apply to NP3000 models configured only for conventional liquid fertilizer.

Read All Manuals

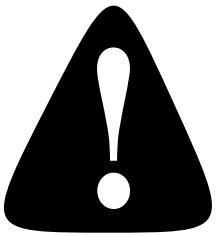
The Anhydrous Safety manual (407-551M), this manual, the meter manual and the breakaway coupler manual (FVC062) are required reading for safe operations. All operators of this equipment must read these manuals.

Even if you are an experienced anhydrous ammonia operator, read the "**Using Anhydrous Ammonia Safely**" manual (407-551M).

a. AccuFlow™ is a trademark of Raven Industries.
b. Flo-Max™ is a trademark of Squibb-Taylor, Inc.

Look for Safety Symbol

The SAFETY ALERT SYMBOL indicates there is a potential hazard to personal safety involved and extra safety precaution must be taken. When you see this symbol, be alert and carefully read the message that follows it. In addition to design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.



Be Aware of Signal Words

Signal words designate a degree or level of hazard seriousness.

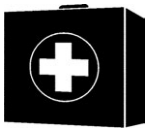
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

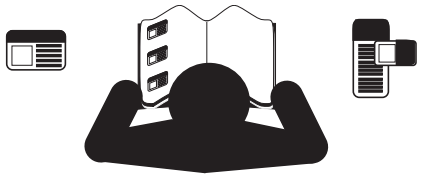
Prepare for Emergencies

- ▲ *Be prepared if a fire starts.*
- ▲ *Keep a first aid kit and fire extinguisher handy.*
- ▲ *Keep emergency numbers for doctor, ambulance, hospital and fire department near phone. Know the reporting requirement for spills or releases of the chemicals you are using. Have contact numbers available.*
- ▲ *For anhydrous ammonia operations, have additional contact information for:*
  - *national response center*
  - *regional (state) response center*
  - *local response center*
- ▲ *If a fire threatens an anhydrous ammonia tank, evacuate the area. The tank may heat up faster than the relief valve can vent the rising pressure, resulting in a catastrophic gas release and possibly an explosion.*



Be Familiar with Safety Decals

- ▲ *Read and understand "**Safety Decals**" on page 9, thoroughly.*
- ▲ *Read all instructions noted on the decals.*
- ▲ *Keep decals clean. Replace damaged, faded and illegible decals.*

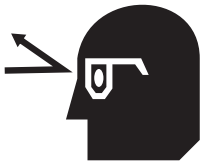


Wear Protective Equipment (PPE)

- ▲ *Wear clothing and equipment appropriate for the job. Avoid loose-fitting clothing.*
- ▲ *Waterproof, wide-brimmed hat*
- ▲ *Face shield, goggles or full face respirator.*
- ▲ *Prolonged exposure to loud noise can cause hearing impairment or loss. Wear suitable hearing protection such as earmuffs or earplugs.*
- ▲ *Avoid wearing entertainment headphones while operating machinery. Operating equipment safely requires the full attention of the operator.*
- ▲ *See manual 407-551M for specific requirements and recommendations for NH_3 PPE.*
- ▲ *Goggles with side shields or a full face respirator are required if handling or applying dusts, wettable powders, or granules or if being exposed to spray mist.*
- ▲ *Cartridge-type respirator approved for pesticide vapors unless conventional liquid fertilize label specifies another type of respirator.*
- ▲ *Waterproof, unlined gloves. Neoprene is recommended.*
- ▲ *Cloth coveralls/outer clothing changed daily; waterproof items if there is a chance of becoming wet with spray.*
- ▲ *Waterproof apron*
- ▲ *Waterproof boots or foot coverings*
- ▲ *Do not wear contaminated clothing. Wash protective clothing and equipment with soap and water after each use. Personal clothing must be laundered separately from household articles.*
- ▲ *Clothing contaminated with certain pesticides must be destroyed according to state and local regulations. Read chemical label for specific instructions.*

Avoid High Pressure Fluids

Escaping fluid under pressure can penetrate the skin, causing serious injury. This fertilizer applicator requires a Power-Beyond port, which is always under pressure when the tractor is running.



- ▲ *Avoid the hazard by relieving pressure before disconnecting hydraulic lines.*
- ▲ *Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks.*
- ▲ *Wear protective gloves and safety glasses or goggles when working with hydraulic systems.*
- ▲ *If an accident occurs, seek immediate medical attention from a physician familiar with this type of injury.*

Minimize Radiation Exposure

The optional DICKEY-john® RVS II and RVS III Radars are intentional radiators of RF energy. Although its radiated energy level is far below the limits set by EN 61010-1:1993 A2:1995-Chapter 12.4, it is advisable not to look directly into the face of the unit.

The radar must radiate toward the ground and at least 20 cm (8 inches) away from a human during use to comply with the RF human exposure limits as called out in FCC 47 CFR Sec.2.1091. DO NOT RE-MOUNT OR USE THE RADAR IN A MANNER INCONSISTENT WITH ITS DEFINED USE.

Keep Riders Off Machinery

Riders obstruct the operator's view. Riders could be struck by foreign objects or thrown from the machine.

- ▲ *Never allow children to operate equipment.*
- ▲ *Keep all bystanders away from machine during operation.*

Use Safety Lights and Devices

Slow-moving tractors and towed implements can create a hazard when driven on public roads. They are difficult to see, especially at night.

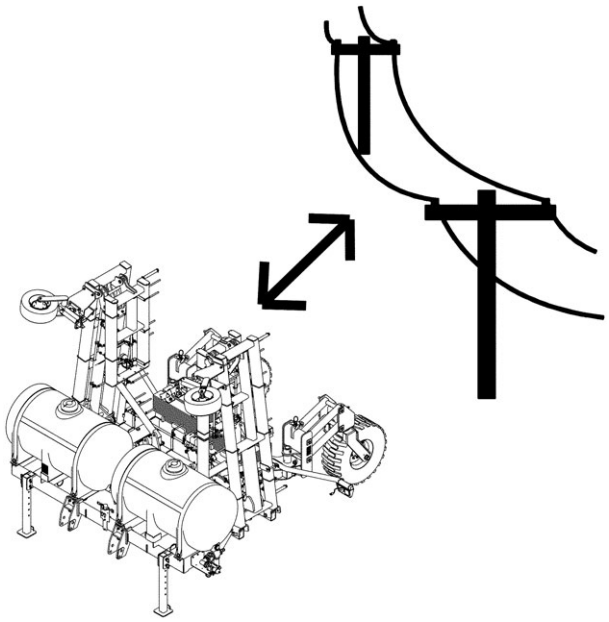
- ▲ *Use flashing warning lights and turn signals whenever driving on public roads.*
- ▲ *Use lights and devices provided with implement.*

Tires Not a Step

Do not use gauge wheel or lift-assist tires as steps. A tire could spin underfoot, resulting in a fall onto the applicator or ground, possibly causing serious injury.

- ▲ *The gauge wheel tires can be in poor ground contact at any time, even with the fertilizer applicator lowered in the field. They can appear to be in ground contact, and spin easily, in multiple conditions.*
- ▲ *The lift-assist tires can be in poor ground contact, or out of ground contact, whenever the fertilizer applicator is lowered.*

Remain Clear of Overhead Lines



- ▲ *If the fertilizer applicator contacts a power line, lethal voltage may be present on all metal parts. At higher voltage, the applicator does not need to be in line contact for the hazard to exist. Maintain at least 10 foot (3 m) clearance.*
- ▲ *Electrocution can occur without direct contact between the energized fertilizer applicator and a person near the fertilizer applicator.*
- ▲ *Watch for sagging, damaged or low electrical lines. The folded fertilizer applicator could contact lines lower than 13 feet 2 inches (4 m). Overhead lines at farm structures are a particular hazard.*
- ▲ *Watch for all electrical lines during folding and unfolding operations. Use a spotter during folding and unfolding. Know the location and height of all lines during transport and in fields.*
- ▲ *If an electrical hazard is observed while on the ground near the applicator, hop at least 100 feet (30 m) away with both feet together and summon professional help. At higher voltage, lethal voltage gradients can also be present at the soil surface.*
- ▲ *Consult your tractor manual for advice on how to respond to an electrical hazard event while in the cab.*

Transport Machinery Safely

Maximum transport speed for applicator is 20 mph (32 kph), 13 mph (22 kph) in turns. Some rough terrains require a slower speed. Sudden braking can cause a towed load to swerve and upset.

- ▲ *Do not transport an applicator that weighs over 20,000 pounds (9060 kg). Loading liquid fertilizer tanks or transporting with a nurse tank hitch to the applicator can easily exceed this limit.*
- ▲ *Tow nurse tank separately. Do not tow a nurse tank in train with the applicator on public roads.*
- ▲ *Never park an anhydrous ammonia tank on public roads or anywhere near sites with high occupancy or high-risk populations, such as shopping areas, events, schools, hospitals, retirement communities, etc.*
- ▲ *Avoid transporting an anhydrous ammonia tank through populated areas.*
- ▲ *Do not tow a lift-assisted 2-point applicator or nurse tank that, when fully loaded, weighs more than 1.5 times the weight of towing vehicle.*
- ▲ *Do not transport a 2-point applicator that exceeds the capacity or ballasting of the tractor. There may not be enough front wheel traction for safe steering.*
- ▲ *Carry reflectors or flags to mark fertilizer applicator in case of breakdown on the road.*
- ▲ *Keep clear of overhead power lines and other obstructions when transporting. Refer to transport dimensions under "**Specifications and Capacities**" on page 142.*
- ▲ *Do not exceed 20 mph (32 km/h). Never travel at a speed which does not allow adequate control of steering and stopping. Reduce speed if towed load is not equipped with brakes.*
- ▲ *Reduce speed on rough roads.*
- ▲ *Comply with national, regional and local laws.*
- ▲ *Do not fold or unfold the fertilizer applicator while the tractor is moving (other than field lift).*

Handle Chemicals Properly

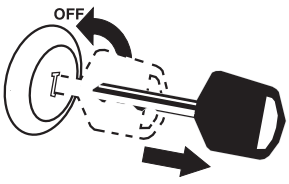
See manual 407-551M for specific requirements and recommendations for NH_3.

For Conventional Liquid Materials

Agricultural chemicals can be dangerous. Improper use can seriously injure persons, animals, plants, soil and property.

- ▲ *Read and follow chemical supplier instructions.*
- ▲ *Wear protective clothing.*
- ▲ *Handle all chemicals with care.*
- ▲ *Agricultural chemicals can be dangerous. Improper use can seriously injure persons, animals, plants, soil and property.*
- ▲ *Inhaling smoke from any type of chemical fire is a serious health hazard.*
- ▲ *Store or dispose of unused chemicals as specified by the chemical manufacturer.*
- ▲ *If chemical is swallowed, carefully follow the chemical manufacturer's recommendations and consult with a doctor.*
- ▲ *If persons are exposed to a chemical in a way that could affect their health, consult a doctor immediately with the chemical label or container in hand. Any delay could cause serious illness or death.*
- ▲ *Dispose of empty chemical containers properly. By law rinsing of the used chemical container must be repeated three times. Puncture the container to prevent future use. An alternative is to jet-rinse or pressure rinse the container.*
- ▲ *Wash hands and face before eating after working with chemicals. Shower as soon as application is completed for the day.*
- ▲ *Apply only with acceptable wind conditions. Wind speed must be below 5 mph (8 km/h). Make sure wind drift of chemicals will not affect any surrounding land, people or animals.*
- ▲ *Never wash out a tank within 100 feet (30 m) of any freshwater source or in a car wash.*

Shutdown and Storage



- ▲ *Lower fertilizer applicator, put tractor in park, turn off engine, and remove the key.*
- ▲ *Secure fertilizer applicator using locks and supports provided.*
- ▲ *Detach and store fertilizer applicator in an area where children normally do not play.*
- ▲ *Park an anhydrous ammonia applicator downwind of occupied areas until it is purged of NH_3 residues.*
- ▲ *Do not leave NH_3 nurse tanks unattended.*

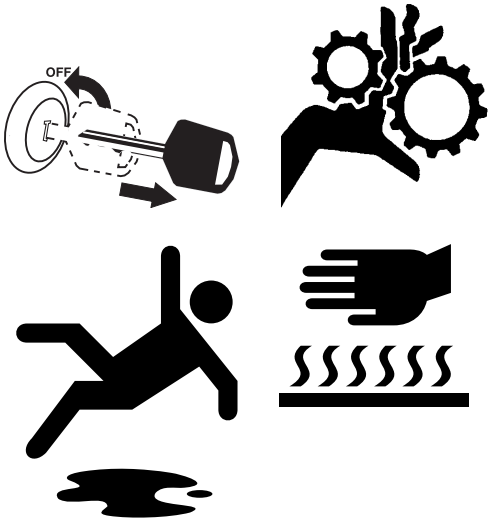
Tire Safety

Tire changing can be dangerous and should be performed by trained personnel using correct tools and equipment.

▲ *When inflating tires, use a clip-on chuck and extension hose long enough for you to stand to one side–not in front of or over tire assembly. Use a safety cage if available.*

▲ *When removing and installing wheels, use wheel-handling equipment adequate for weight involved.*

Practice Safe Maintenance



▲ *Understand procedure before doing work. Use proper tools and equipment. Refer to this manual.*

▲ *Work in a clean, dry area.*

▲ *Lower the fertilizer applicator, put tractor in park, turn off engine, and remove key before performing maintenance. If work must be performed with applicator raised, use blocks or jackstands rated for the fertilizer applicator weight.*

▲ *Make sure all moving parts have stopped and all system pressure is relieved.*

▲ *Allow applicator to cool completely.*

▲ *Disconnect battery ground cable (-) before servicing or adjusting electrical systems.*

▲ *Welding: Disconnect battery ground. Avoid fumes from heated paint.*

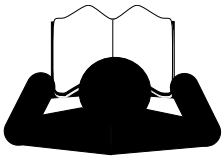
▲ *Inspect all parts. Make sure parts are in good condition and installed properly.*

▲ *Remove buildup of grease, oil or debris.*

▲ *Remove all tools and unused parts from fertilizer applicator before operation.*

Safety At All Times

Thoroughly read and understand the instructions in this manual before operation. Read all instructions noted on the safety decals.



▲ *Be familiar with all applicator functions.*

▲ *Operate machinery from the driver's seat only.*

▲ *Do not leave applicator unattended with tractor engine running.*

▲ *Do not stand between the moving tractor and applicator during hitching.*

▲ *Keep hands, feet and clothing away from power-driven parts.*

▲ *Wear snug-fitting clothing to avoid entanglement with moving parts.*

▲ *Make sure all persons are clear of working area.*

Safety Decals

Safety Reflectors and Decals

Your implement comes equipped with all lights, safety reflectors and decals in place. They were designed to help you safely operate your implement.

- ▲ *Read and follow decal directions.*
- ▲ *Keep lights in operating condition.*
- ▲ *Keep all safety decals clean and legible.*
- ▲ *Replace all damaged or missing decals. Order new decals from your Great Plains dealer. Refer to this section for proper decal placement.*
- ▲ *When ordering new parts or components, also request corresponding safety decals.*

To install new decals:

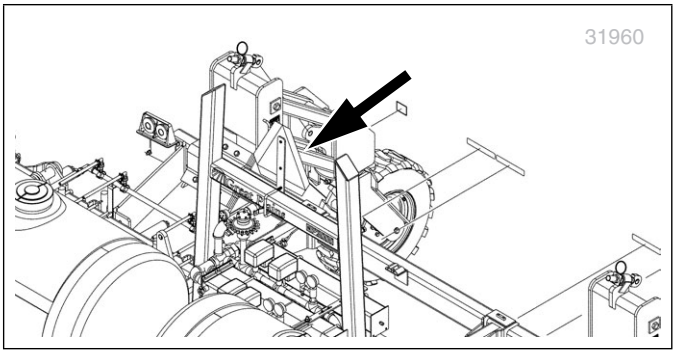
1. Clean the area on which the decal is to be placed.
2. Peel backing from decal. Press firmly on surface, being careful not to cause air bubbles under decal.

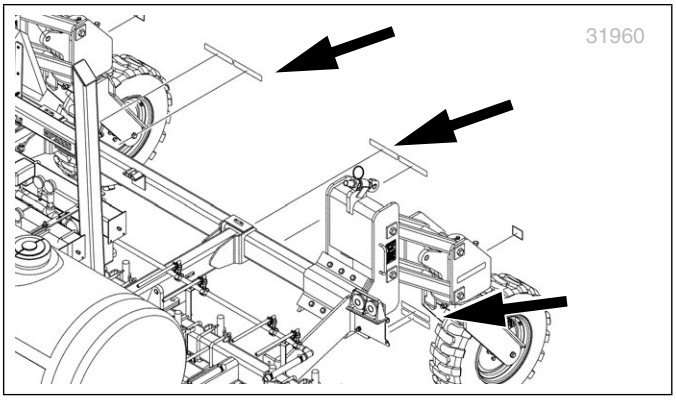
818-055C
Slow Moving Vehicle Reflector

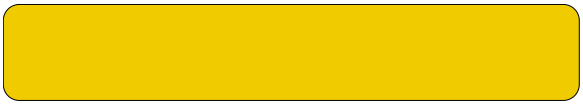
On a mount attached to the transport rest assembly;
1 total

838-266C
Red Reflectors

On the rear face light bracket, and
rear face of lift assist mount carrier tube;
4 total

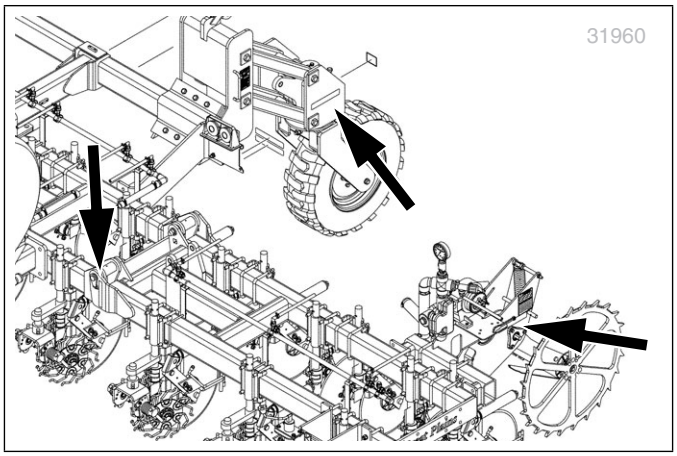






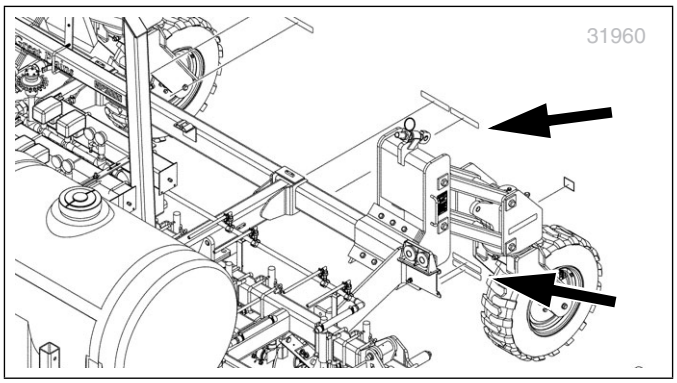
838-265C
Amber Reflectors

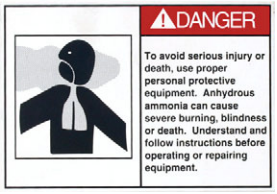
On the outside faces of casters,
on the outside faces of lift assist braces,
Option: on the outside face of each ground drive pump;
4, 5 or 6 total



838-267C
Daytime Reflectors

On the rear face of light bracket (below reds),
rear face of lift assist mount carrier tube (outboard of reds);
4 total





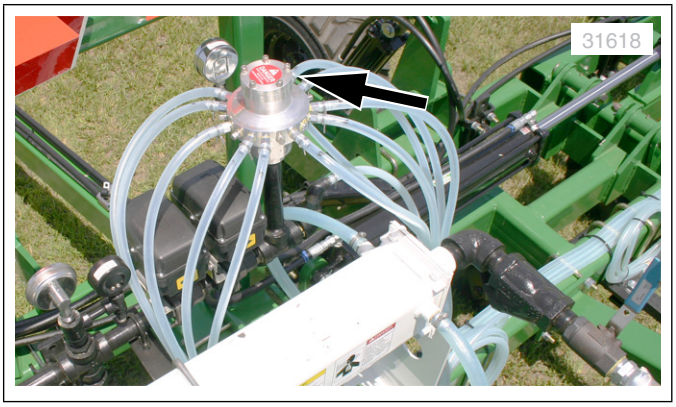
Raven 039-0159-034 (Option)
Danger: Ammonia

On front or back side of Raven AccuFlow™;
2 or 4 total

Order replacement from Raven Industries.

115527-01 (Option)
Danger: Bleed System

On top of CDS-John Blue Impellicone® flow divider;
1 total



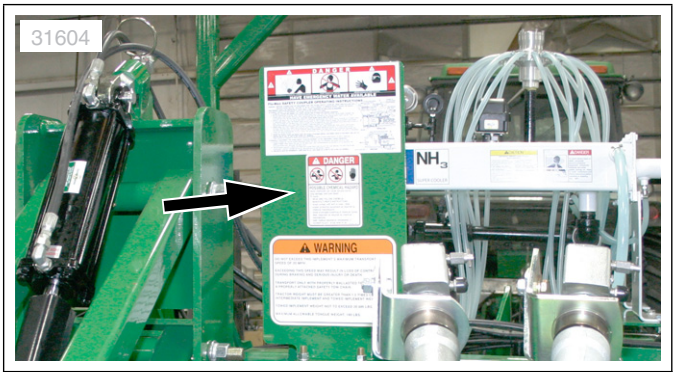
818-323C
Danger: Possible Chemical Hazard

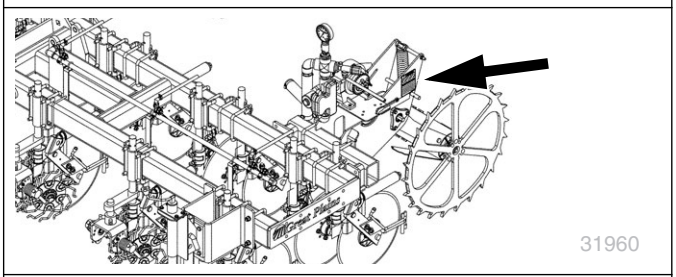
NH_3 models: On decal mount near Flo-Max™ coupler:
1 total

See "**NH3 Operations**" on page 55 and separate manual "**Using Anhydrous Ammonia Safely**" (407-551M).

Conventional Models: On left face of ground drive pump mount;
1 total

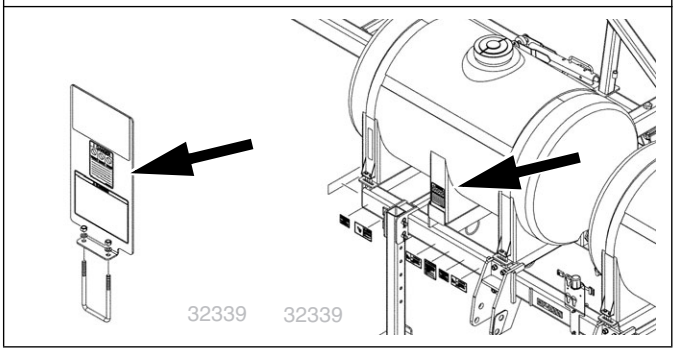
See "**Liquid Operations**" on page 68.





Conventional Models: On decal mount at optional rear hitch and/or on front face of each center tank leg;
1 total

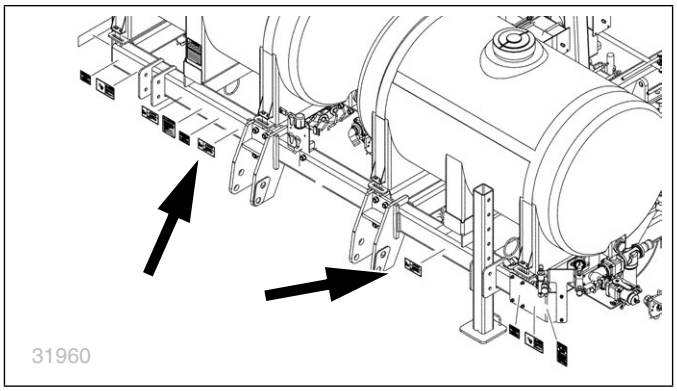
See "**Liquid Operations**" on page 68.

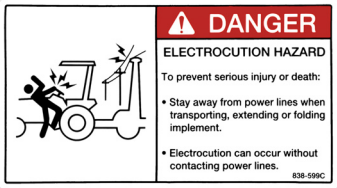


.eps
35.8%

818-590C
Danger: Hitch Crush

On front of frame tube, both sides of hitch;
2 total

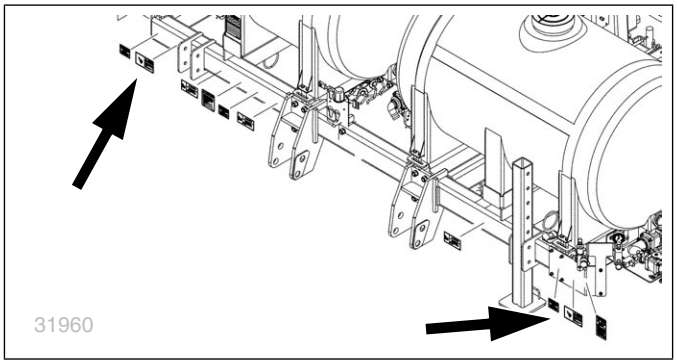




.eps
30.7%

838-599C
Danger: Electrocution

On frame tube, outside parking stands;
2 total



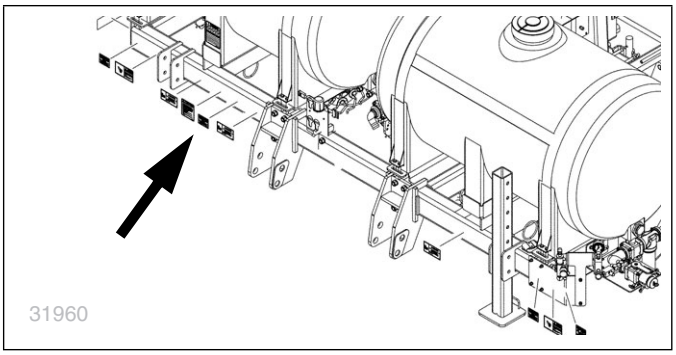
848-534C
(Squibb-Taylor FM125-2000)
Danger: Safety Coupler (Option)

On decal mount near Flo-Max™ coupler;
1 total

This decal summarizes the mechanical procedure for coupler re-connection after a breakaway event. Rely on these instructions only if the Squibb-Taylor Flo-Max™ manual is not available. See “**NH3: Breakaway Event**” on page 65.

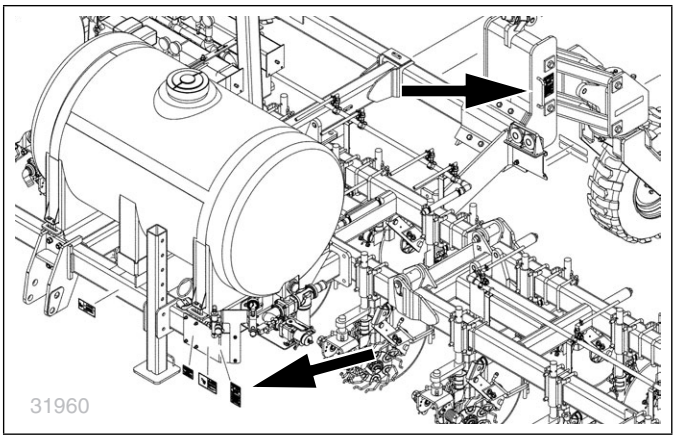
818-337C
Warning: Speed

On front face of front tool bar, right of center;
1 total



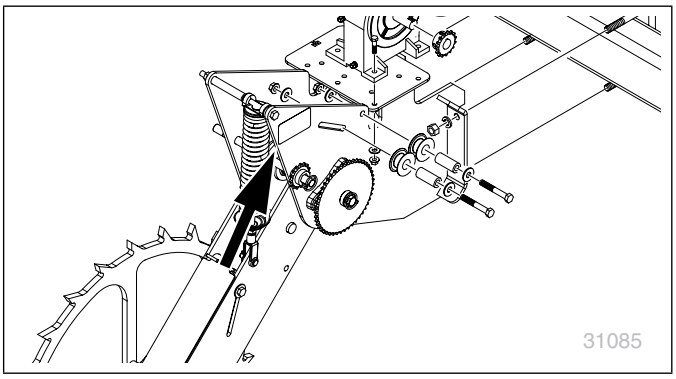
818-437C
Warning: High Pressure Fluid Hazard

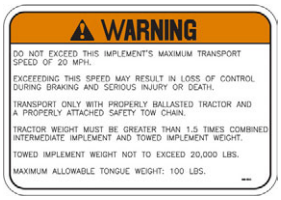
on front face of front tool bar, left end,
on each lift-assist mount;
3 total



818-860C (Option)
Warning: Moving Parts

Option: on mount of each ground drive,
0, 1 or 2 total

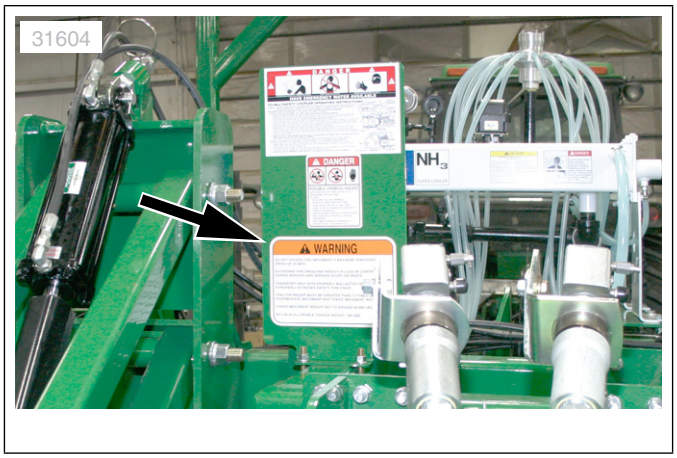




848-551C
Warning: Towing

On decal mount near Flo-Max™ coupler:
1 total

See “**Transport**” on page 53 and “**Liq: Hitching Conventional Nurse Tank**” on page 70 for further information.

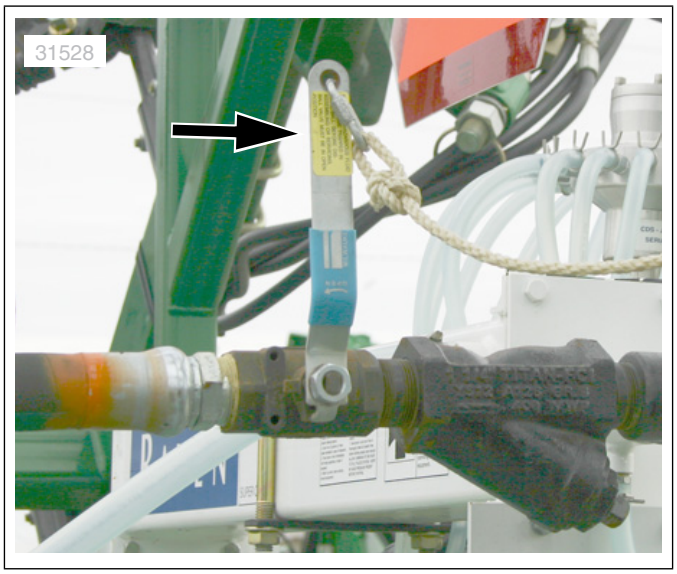


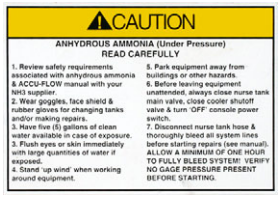
WARNING: HAZARDOUS FLUID CAN BECOME TRAPPED IN VALVE BALL. BEFORE DISASSEMBLING OR SERVICING, BALL VALVE MUST BE IN OPEN POSITION.

(no part number)
Warning: Ball Valve (Option)

This decal should not apply to 2013+ NP3000A applicators, but might be encountered on nurse tank valves, or if repairs are made with old-stock after-market parts. See “**Avoid Ball Traps**” on page 107.

Older unvented ball valves can trap fluid inside the ball if closed with the line fully charged. Great Plains ball valves shipped in 2011 and later have a bleed orifice on the downstream side of the valve ball and do not require this decal.

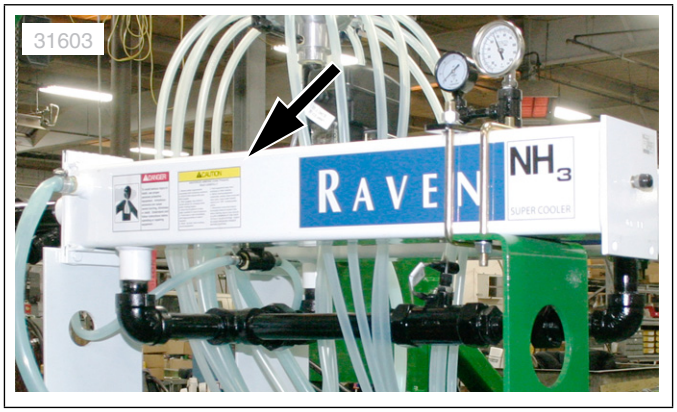




Raven 039-0159-035
Caution: Ammonia (Option)

On front or back side of Raven AccuFlow™;
2 or 4 total

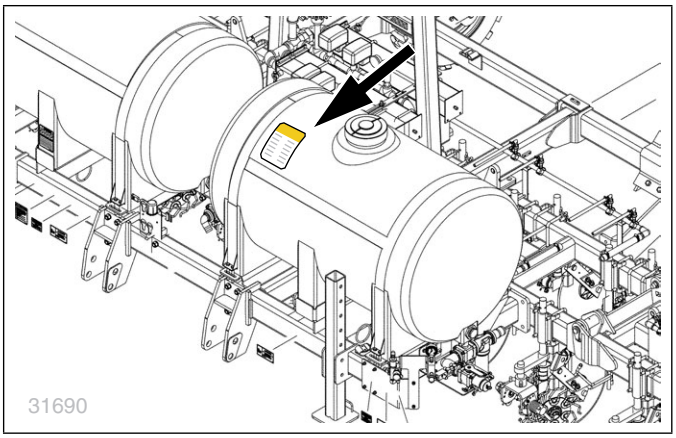
Order replacement from Raven Industries.



Snyder 997176 (Option)
Warning: Tank Installation and Use

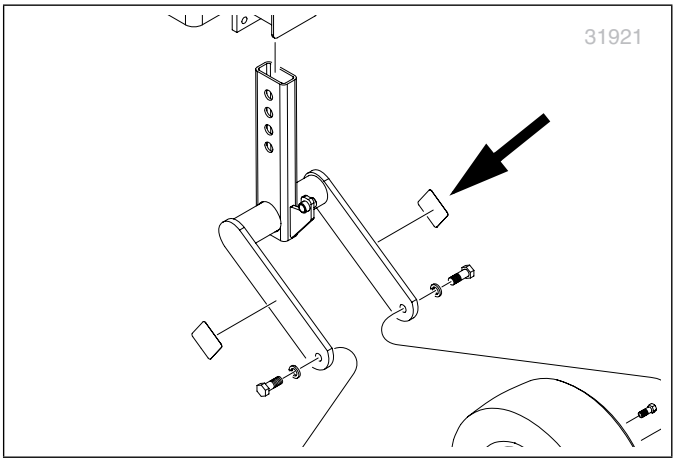
On upper front face of each tank:
0 or 2 total

Replacement decals available from Snyder Industries:
www.snydernet.com



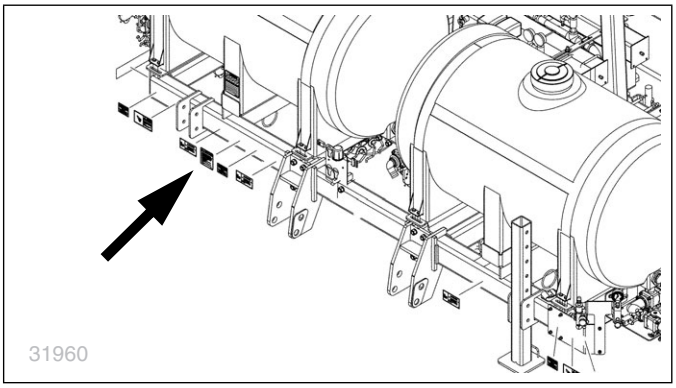
818-398C
Caution: Tires Not a Step

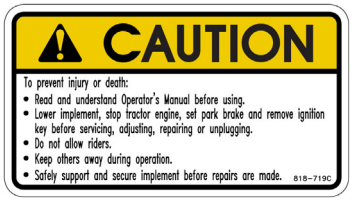
Outside faces of manual gauge wheel arms;
2 total



818-587C
Caution: Read Operator's Manual

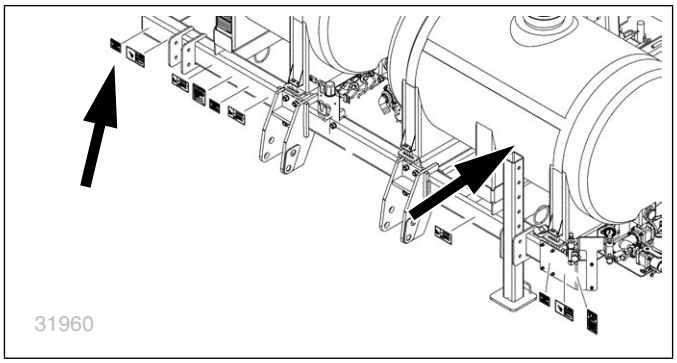
On front face of front tool bar, right of center;
1 total

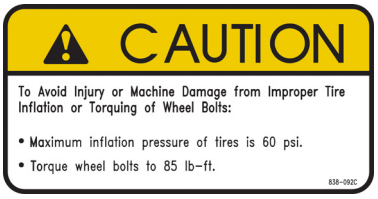




818-719C
Caution: Read Operator's Manual

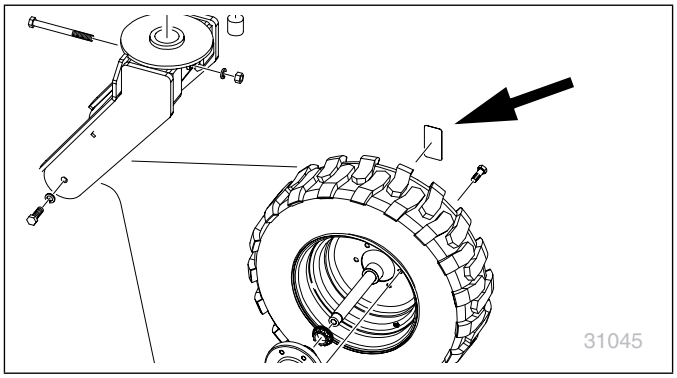
On front face of front tool bar, right of center;
1 total

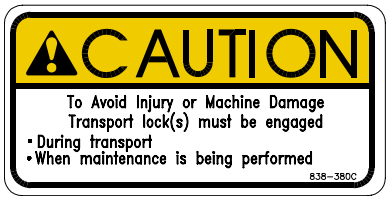




838-092C
Caution: Tire Pressure and Bolt Torque

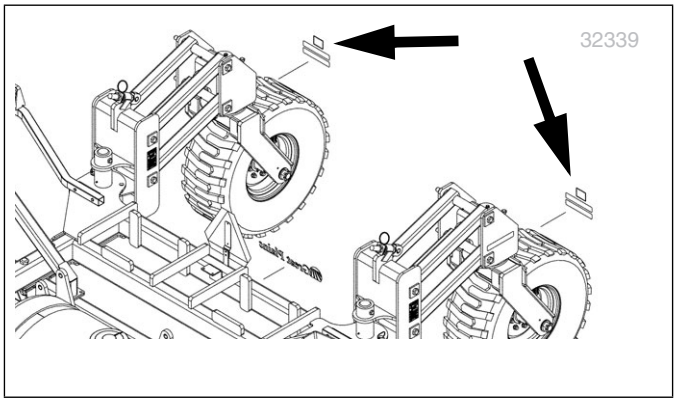
Each lift-assist tire rim;
2 total



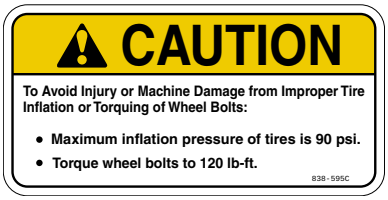


838-380C
Caution: Transport Locks

On rear face of caster weldments, above red reflectors;
2 total

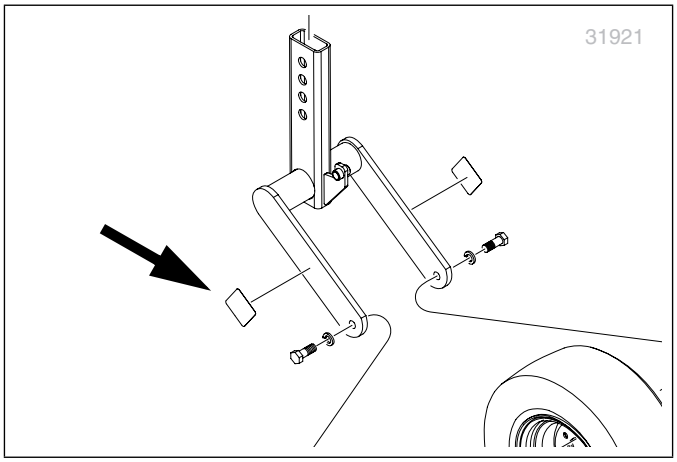


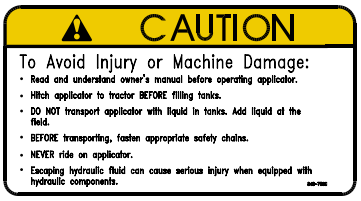
See "**Important Safety Information**" on page 1.



838-595C
Caution: Tire Pressure and Bolt Torque

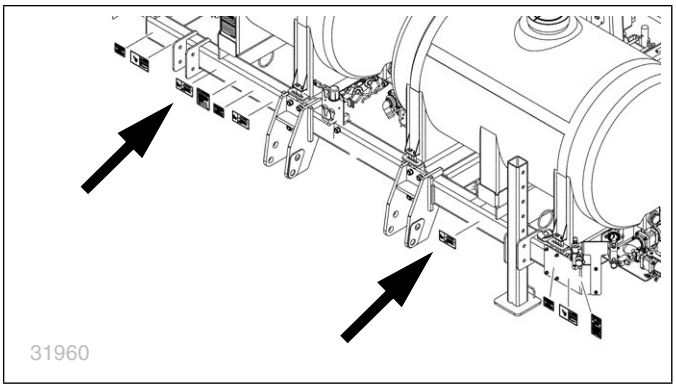
Inside faces of manual gauge wheel arms;
2 total





848-736C
Caution: General

On front face of front tool bar, both sides;
2 total



848-539C
General Safety: First Aid Water (Option)

On left and right sides of the wash water tank;
2 total

See “**Ammonia Emergency Action**” in the “**Using Anhydrous Ammonia Safely**” manual (407-551M), and “**Wash Water**” on page 46.

Introduction

Great Plains welcomes you to its growing family of new product owners. The 30-Foot Fertilizer Applicator (NP3000 and NP3000A) has been designed with care and built by skilled workers using quality materials. Proper setup, maintenance, and safe operating practices will help you get years of satisfactory use from the machine.

Description of Unit

The Nutri-Pro® is an applicator implement for conventional liquid fertilizer, anhydrous ammonia (NH_3) or both. It has a working width (swath) of 30 feet (9.1 m). The applicator has single or triple coulters with tines for sub-soil application from optional on-board or user-provisioned tanks.The NP3000/A has a lift-assisted 2-point hitch.

When configured for conventional liquid fertilizer, the NP3000 model is designed for use with an optional ground-drive CDS-John Blue® piston pump, an optional variable-rate Ace hydraulic drive pump, or a user-provisioned pump.

When configured for anhydrous ammonia the NP3000A model relies on NH_3 vapor pressure from a separately provisioned trailing nurse tank.

A Raven SCS 450 console is available for sectional and variable-rate control.

Models Covered

Conventional Liquid Fertilizer Models

NP3000-1230	30-Foot, 12-Row, 30 inch
NP3000-1230+SD	32.5-Foot, 13-Row, 30-inch

Anhydrous Model (configurable for two materials)

NP3000A-12C30	30-Foot, 12-Row, 30 inch
NP3000A-12C30+SD	32.5-Foot, 13-Row, 30-inch

Intended Usage

Use the NP3000/A Fertilizer Applicator to apply compatible fertilizers. Do not modify Great Plains-provisioned components, or install user-provisioned components, except as authorized or recommended by Great Plains.

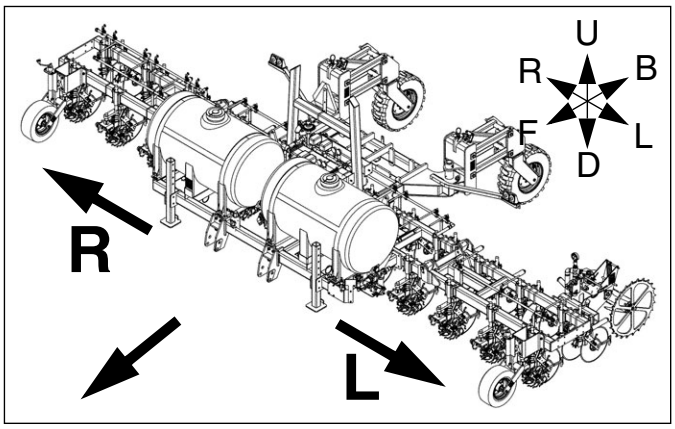


Figure 1 31959
NP3000/A Fertilizer Applicator

Document Family

407-613M	NP3000/A[a] Operator/Rate Manual (this document)
407-613P	NP3000 and NP3000A Parts manual
407-613Q	NP3000/A Pre-Delivery manual

Manuals for Options:

407-551M	Using Anhydrous Ammonia Safely
12-M-29	CDS-John Blue® IP-1300/1800 Impellicone® parts
016-0159-403	Raven AccuFlow™ Operator manual
016-0159-831	Raven SCS-450 Installation, Operation and Service manual
FVC062	Squibb-Taylor Flo-Max™ manual
12-M-43	CDS-John Blue NGP Pump Parts and Instructional manual
HYD-MAN[b]	Ace Pump Instruction manual

a. For NP30A and NP40A, see manual 407-502M.
For NP30L and NP40L, see manual 407-313M.
For 2012- NP4000, see manual 407-776M.
For 2013+ NP4000/A, see manual 417-199M.
b. Available from Ace Pump Corporation:
http://www.acepumps.com

Using This Manual

This manual familiarizes you with safety, assembly, operation, adjustments, troubleshooting, and maintenance. Read this manual and follow the recommendations to help ensure safe and efficient operation.

The information in this manual is current at printing. Some parts may change to assure top performance.

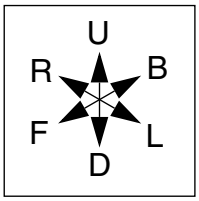
"Option" refers to components not part of the standard product, and not "optional" steps. If the component is installed, the instructions apply.

NOTICE

Identifies an Economic (not a Safety) Risk:
NOTICE provides a crucial point of information related to the current topic. Read and follow the instructions to avoid damage to equipment and ensure desired field results.

Note: This form sets off useful information about the current topic, or forestalls possible misunderstanding.

Right-hand and left-hand as used in this manual are determined by facing the direction the machine will travel while in use unless otherwise stated. An orientation rose in some line crt illustrations shows the directions of: Up, Back, Left, Down, Front, Right.



① Single-digit and single-letter callouts refer to local illustrations. The callout numbers/letters may be re-used for different items on other pages.

A00 Two-digit callouts in the range A11 to A36 and L11 to L00 L51 refer to the same tank and Nutri-Pro® plumbing system components throughout this manual. "A00" references are for Anhydrous. "L00" references are for conventional Liquid.

24 Callouts 24 and above refer to parts of Options (see Appendix C).

Owner Assistance

If you need customer service or repair parts, contact a Great Plains dealer. They have trained personnel, repair parts and equipment specially designed for Great Plains products.

Refer to Figure 2 or Figure 3

Your machine's parts were specially designed and should only be replaced with Great Plains parts. Always use the serial and model number when ordering parts from your Great Plains dealer.

For 2013 and later applicators, the serial number plate is located on the center section, on the front face of the left front fold cylinder mount.

For 2012 and earlier applicators, the serial-number plate is located on the rear face of the center frame, ahead of the left caster pivot.

Record your fertilizer applicator model and serial number here for quick reference:

Model Number:_____

Serial Number: _____

Your Great Plains dealer wants you to be satisfied with your new machine. If you do not understand any part of this manual or are not satisfied with the service received, please take the following actions.

1. Discuss the matter with your dealership service manager. Make sure they are aware of any problems so they can assist you.
2. If you are still unsatisfied, seek out the owner or general manager of the dealership.

For further assistance write to:

Product Support

Great Plains Mfg. Inc., Service Department
PO Box 5060
Salina, KS 67402-5060

gp_web_cs@greatplainsmfg.com
785-823-3276

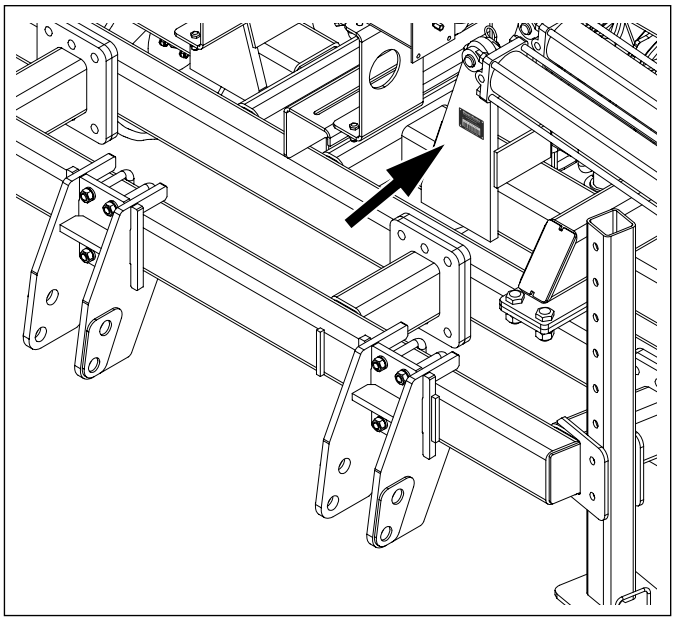


Figure 2 36030
2013+ Serial Number Location

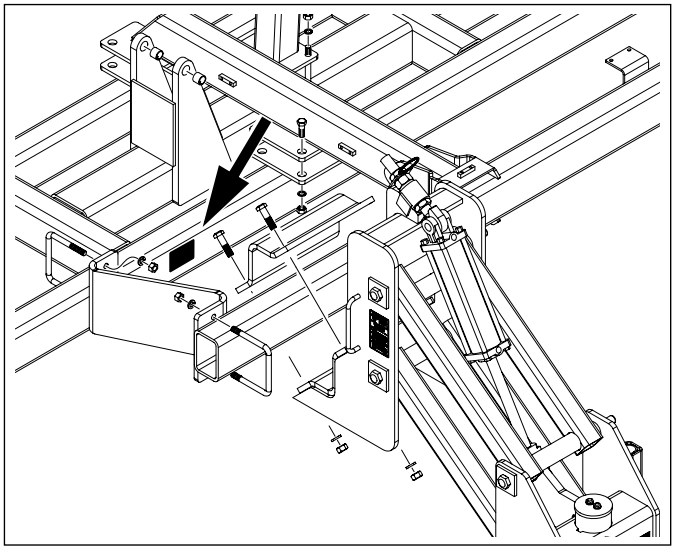


Figure 3 31885
2012- Serial Number Plate

Application Overview

Tank, plumbing and setup requirements differ for anhydrous (A) and conventional systems (L). The next few pages provide an overview of both systems.

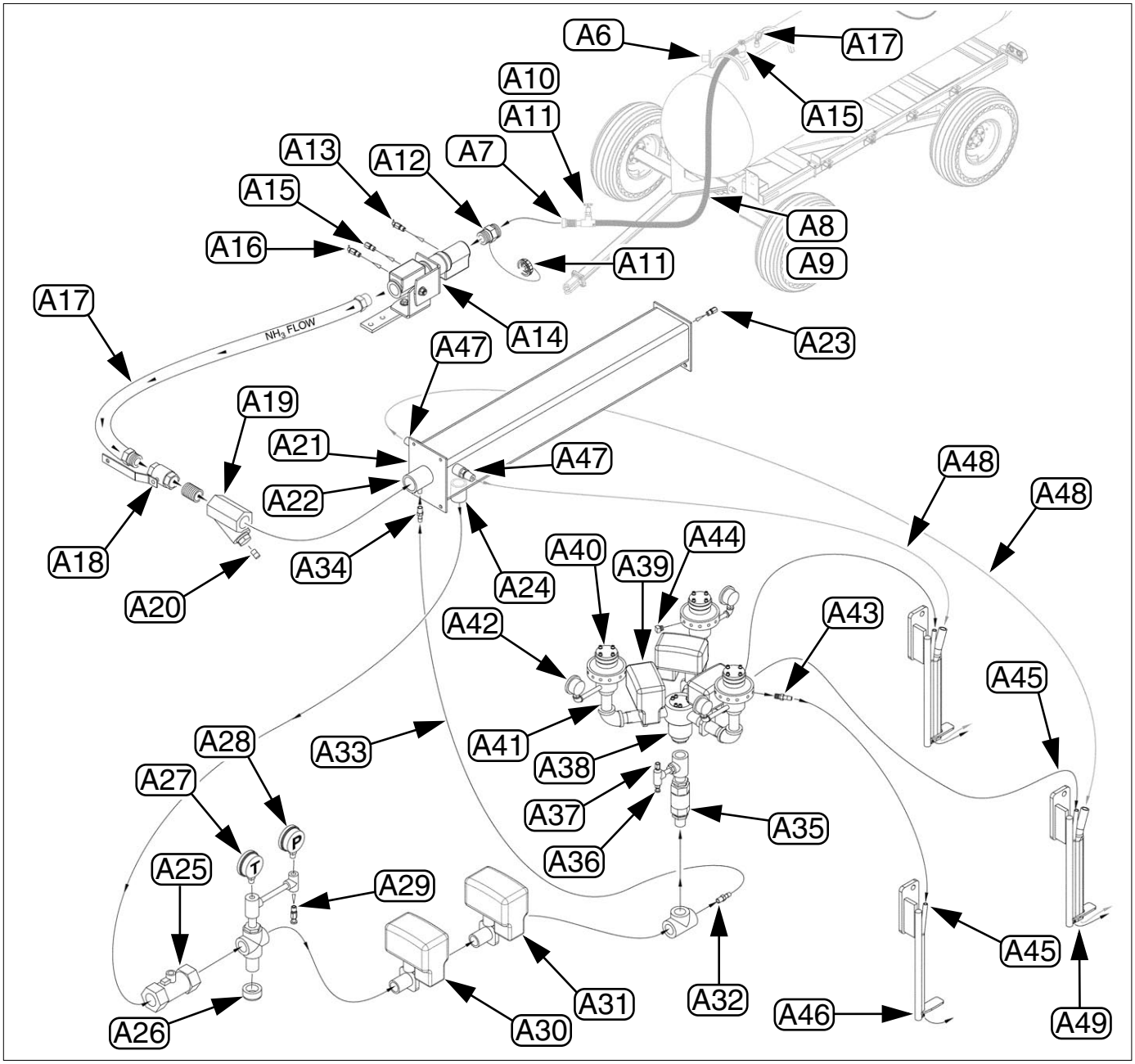
Anhydrous: System Components

Single-Cooler Section Control Configuration - see page 146 through page 150 for alternates.

Legend:

- Liquid NH_3
- NH_3 Vapor
- Direction of Flow
- Liquid Flow
- Vapor Flow
- Exception Flow

Callout numbers A11 through A36 identify the same applicator and tank components throughout this manual.



34958

Figure 4
Anhydrous Ammonia (NH_3) Plumbing (Single-Cooler w/ Section Control)

NH_3 System Narrative

This list describes a single-cooler anhydrous system with section control. A dual-cooler system has two of components A11 through A24, and two additional dual-tube tines A49. A single-section system lacks components A35 through A39 and has only one of A40.

Refer to Figure 6 on page 29

A11. Acme cap

Suffocation, Blinding and Burning Hazards:
*See "**NH3: Safing Applicator Before Cart Hitch**" on page 55, for safe opening procedure.*

This captive cap protects the inlet when no nurse tank is connected. NH_3 might be sealed behind this cap.

A12. Acme inlet

The nurse tank hose coupler A7 connects here and must have $1\frac{3}{4}$-4 female Acme[a] swivel coupler. See page 58 for nurse tank connection.

A13. Coupler Inlet Bleed Valve

Suffocation, Blinding and Burning Hazards:
*See "**About Bleed Valves:**" on page 38.*

This fitting is carefully opened at normal and abnormal disconnects, to bleed NH_3 liquid and vapor from the hoses (or to bleed just the nurse tank hose upon breakaway). It is also opened prior to Acme cap removal to verify that the line is discharged. See "**NH3: Making Nurse Tank Connections**" on page 58, "**NH3: Unhitching Nurse Tank**" on page 67 and "**NH3: Breakaway Event**" on page 65.

A14. Breakaway Coupler

Upon Event: Probable Chemical Hazard:
*See "**NH3: Breakaway Event**" on page 65.*

This assembly is designed to separate and seal the lines if between 300 to 400 pounds of pull force is applied to the nurse tank hose. In normal operations, this does not happen.

Should the hitch fail, and both safety chains fail, or an operator makes serious basic safety errors, the breakaway separates to protect the hoses from rupture. Spring-loaded checks inside the breakaway seal both ends of the now-broken connection. If the line was charged, 60 cc of liquid NH_3 is released on breakaway.

Resetting a parted breakaway coupler is a complex operation requiring tools. Consult the breakaway manual for details. More significant matters are safing the applicator and nurse tank, then correcting the cause of the breakaway. See "**NH3: Breakaway Event**" on page 65.

A15. Breakaway Hydrostatic Relief Valve

In normal operation, this valve does not activate. It is designed to open at 375 psi, well above the 250-265 psi operating pressure of the nurse tank's main pressure relief valve.

Operator action is periodic inspection, and to replace this hydrostatic relief valve, a time-dated part, when it reaches the end of its operating life (see page 114). See "**Hydrostatic Relief Valve Maintenance**" on page 112 for maintenance.

Valve function: when operating valves are closed on both sides of the breakaway (or on just the applicator side upon a breakaway event), NH_3 can be trapped in the breakaway coupler. As the NH_3 warms, it could create dangerously high pressure. This relief valve opens to vent excess pressure.

a. Acme refers to the ANSI/ASME B1.5-1997 screw thread, which has a trapezoidal thread profile.

A16. Coupler Outlet Bleed Valve

Suffocation, Blinding and Burning Hazards:
*See "**About Bleed Valves:**" on page 38.*

This fitting is kept closed in normal operations. When the breakaway is properly coupled, the inlet bleed valve A13 bleeds the entire assembly, and applicator supply hose. On breakaway, this valve is used to bleed the applicator side of the disconnection. See "**NH3: Breakaway Event**" on page 65.

A17. Supply Hose

This connects the breakaway coupler to the emergency shut-off valve. Operator action is to replace this hose, a time-dated part, when it reaches the end of its operating life (see page 114).

A18. Emergency Shut-off Valve

The handle of this is valve has a rope which is routed to the tractor cab (see page 38). Closing this valve stops NH_3 flow to the cooler, metering system and tines. There can still be a substantial amount of NH_3 in the system, for some time, with this valve closed. See the "**Using Anhydrous Ammonia Safely**" manual (407-551M) for emergency operation.

A19. Strainer

This filter contains a 20 mesh screen and two ceramic magnets to remove debris from the NH_3 flow.

A20. Strainer Magnets

These capture ferrous metal debris of any size. They need to be cleaned every 4 to 5 tank loads. See page 117.

A21. AccuFlow™ Super Cooler (Heat Exchanger)

For effective application, NH_3 needs to remain in the liquid state until released underground. This is accomplished by refrigeration. Some of the flow is tapped A32, fed back to the cooler at A34, vaporized and used to chill the fluid passing from A22 to A24.

A22. Cooler Intake

Liquid NH_3 enters the cooler here.

A23. Cooler Hydrostatic Relief Valve

In normal operation, this valve never activates. NH_3 can get trapped in the system between the emergency shut-off valve A18 and the On/Off valve A31, if both valves are closed while the system is charged. As the liquid warms and pressure rises, this valve protects the system with periodic releases.

This valve is set to activate at 350 psi, higher than the nurse tank's relief valve.

Operator action is periodic inspection, and to replace this hydrostatic relief valve, a time-dated part, when it reaches the end of its operating life (see page 115). See "**Hydrostatic Relief Valve Maintenance**" on page 112 for maintenance.

A24. Cooler Outlet

Chilled liquid NH_3 exits the cooler here.

A25. Flow Meter

This fitting converts fluid flow to pulses for the SCS 450 controller. It has a range of 1-60 gpm. A tag on the cable lead provides a "METER CAL" number specific to the installed meter (and accurate only for NH_3 fluid flow, and not NH_3 vapor flow).

A26. Drain Cap

The plumbing cross and lower cap below the temperature gauge are provided to allow the gauge probe to be exposed to the full NH_3 stream. This cap does not require periodic clean-out.

A27. Temperature Gauge

This gauge reports the temperature of the chilled, flowing, NH_3. When NH_3 is not flowing, this gauge slowly drifts up to ambient temperature.

Checking the temperature and pressure A28 gauges against the chart in the "**Using Anhydrous Ammonia Safely**" manual (407-551M), or in the Raven AccuFlow™ manual, indicates whether the flowing NH_3 is in a liquid state.

Normal field temperatures of the chilled flowing NH_3 are in the range 20 to 83°F (-7 to 28°C).

A28. Pressure Gauge

This gauge reports the pressure of the NH_3 after it exits the cooler. If line valves are closed, a pressure reading above zero indicates NH_3 is present between the emergency shut-off valve (A18) and the On/Off solenoid valve (A31) (the Control Valve (A30) does not completely close).

Checking the pressure and temperature (A27) against the chart in the "**Using Anhydrous Ammonia Safely**" manual (407-551M), or in the Raven AccuFlow™ manual, indicates whether the flowing NH_3 is in a liquid state.

When valves are open but NH_3 is not flowing, this gauge normally reads within 5 psi of the nurse tank pressure gauge (A17). If they are materially different at zero flow, one of the gauges may be defective.

When NH_3 is flowing, the pressure reported by this gauge (A28) is lower than the tank pressure.

A29. Cooler Bleed Valve

Suffocation, Blinding and Burning Hazards:
*See "**About Bleed Valves:**" on page 38.*

This valve is normally closed. It is used to bleed trapped NH_3 from the cooler system when valves are closed. It can also be used to accelerate clearing the cooler system for maintenance.

A30. Control Valve

This is a variable electronic valve controlled by the SCS 450. It is the primary control point for application rate. When power is off, this valve remains at its most recent setting.

This valve has a visible indicator above the valve ball casing, indicating whether open, closed or in between.

When commanded to a rate of zero, this valve does not completely close. Use shut-off valves to completely stop flow. A full slew from fully open to minimum takes approximately 9 seconds.

A31. Master Shut-Off Valve

This is the normal control for starting and stopping total application flow in the field (for turns, etc.). This component is an open/close solenoid valve controlled by the "MASTER" switch on the SCS 450. When power is off, this valve remains at its most recent setting.

This valve has a visible indicator above the valve ball casing, indicating whether open or closed.

Operation of this valve is essentially instantaneous. Its valve ball is equipped with a downstream relief orifice.

A32. Refrigerant Tap

A small amount of the NH_3 flow is taken at this point to provide refrigeration at the cooler. There are no operational items for this fitting.

A33. Refrigerant Line

This tubing passes tapped refrigerant NH_3 to the cooler. Operator action is to replace this tubing, a time-dated part, when it reaches the end of its operating life. See page 115.

A34. Cooler Refrigerant Inlet

Tapped refrigeration flow enters the cooler at this fitting, and is vaporized to chill the liquid entering at fitting (A22). There are no operational items for this fitting.

A35. Section Control Check Valve

(Section Control Option Only)
This prevents back flow when section shut-off valves (A39) are off with NH_3 present. There are no operational items for this fitting.

A36. Section Control Bleed Valve

Suffocation, Blinding and Burning Hazards:
*See "**About Bleed Valves:**" on page 38.*

(Section Control Option Only)
This valve is normally closed. It is used to bleed trapped NH_3 from the section control system if all section valves (A39) are closed.

A37. Section Control Relief Valve

(Section Control Option Only)
In normal operation, this valve never activates. NH_3 can get trapped in the system between the section control check valve (A35) and the section shut-off valves (A39), if all section valves are closed while the system is charged. As the liquid warms and pressure rises, this relief valve protects the system with periodic releases.

This valve is set to activate at 350 psi.

Operator action is periodic inspection, and to replace this hydrostatic relief valve, a time-dated part, when it reaches the end of its operating life (see page 115). See "**Hydrostatic Relief Valve Maintenance**" on page 112 for maintenance.

A38. Section Flow Divider

(Section Control Option Only)
This is a CDS-John Blue® Impellicone® manifold. It evenly splits the NH_3 flow for distribution through the row flow dividers (A40). There are no operational items for this component.

A39. Section Shut-Off Valves

(Section Control Option Only)
These are the normal controls for suspending per-section application flow in the field (for point rows, pass overlap, etc.). These are open/close solenoid valves controlled by the "BOOMS" switches on the SCS 450.

When used with the SCS 450 or other suitable sectional application controller, shutting off a section causes the total flow to be reduced by $\frac{1}{3}$ of the all-sections-on rate, keeping the rate constant for the section(s) still active.

Each section valve has a visible indicator above the valve ball casing, indicating whether open or closed.

Operation of each section valve is essentially instantaneous. However, there is considerable residual NH_3 in the section flow divider and delivery tubes after shut-off. When console power is off, the valves remain at their most recent setting.

The valve balls are equipped with a downstream relief orifice.

A40. Row Flow Divider(s)

This is a CDS-John Blue® Impellicone® manifold. It evenly splits the NH_3 flow for distribution through the delivery tubes (A45). There are no operational items for this component.

A41. Flow Divider Manifold Inlet

NH_3 liquid flow enters the flow divider here.

A42. Flow Divider Pressure Gauge

This gauge reports the pressure prior to flow division. It normally reads lower than the cooler and nurse tank pressure gauges.

A43. Flow Divider Outlet

Each of these ports receives an equal fraction of the NH_3 liquid flow.

A44. Flow Divider Plug

Unused ports are plugged with a steel NPT plug. Unused ports do not affect flow balance at the other ports.

A45. Delivery Tube

This tubing passes NH_3 liquid flow to the tines. Operator action is to replace this tubing, a time-dated part, when it reaches the end of its operating life. See page 116.

A46. Coulter Tine (Single)

Tines inject the liquid NH_3. All but two (or four) of the rows are equipped with tines having a single smaller liquid delivery tube. Tines need frequent inspection for wear and damage.

A47. Cooler Vapor Outlets (2)

Two vapor outlets direct the now-gaseous refrigerant flow (that entered at (A34)) to two special tines (A49) per cooler.

A48. Vapor Tube

This tubing passes NH_3 vapor flow to the dual tines. Operator action is to replace this tubing, a time-dated part, when it reaches the end of its operating life. See page 116.

A49. Coulter Tine (Dual)

There are two of these special tines per cooler (four total on a dual-cooler applicator). They direct the vaporized refrigerant NH_3 gas into the soil at the larger rear vapor tube. They are otherwise identical to the single-tube tines (A46).

The following callouts are for trailing nurse tank cart components. See the "**Using Anhydrous Ammonia Safely**" manual (407-551M) for all nurse tank callouts (A1 - A36). The present manual lists only those required for applicator field operations.

A6.Acme Parking Plug

A threaded stud (or other means) for storage of the outlet hose when not coupled to the applicator.

CAUTION

Excess NH_3 Release Hazard:
If the outlet hose is entirely dismounted (both ends free) for transport and storage, and both ends are $1^3/_4$-4 Acme, be sure about which end is which. Installing a hose backwards can result in needless excess NH_3 release at unhitching, or a line segment unprotected by bleed and/or relief valves.

A7.Acme Female Hose Coupler

This end of the hose connects the tank withdrawal valve A13 to the leading applicator inlet A12 at the breakaway coupler. For use with a Nutri-Pro® applicator, the outlet end of the hose must be equipped with a $1^3/_4$-4 female Acme fitting.

The outlet end of the hose has a swivel collar[a] or shroud containing the female Acme fitting. This allows connection without needing to twist the hose.

Acme hose couplers are intended for hand tightening only. Do not use tools to make the cart-applicator connection. A liquid-tight seal is made by the gasket in the male Acme fitting on the applicator break-away coupler.

For dual-tank carts, each tank usually has its own hose.

A8.Outlet Hose Assembly

The hose may have zero, one or two operating valves A10, one or more bleed valves A11, and a hydrostatic relief valve A12. The outlet end may have an Acme. plug.

Hose valves are typically hand wheel valves, or lever valves. Read any documents provided for the valves. Have the terminal or dealer explain how the valves work.

WARNING

Suffocation, Blinding and Burning Hazards:
Never test an anhydrous ammonia hose valve unless you are absolutely certain the hose and valve bodies are empty, or both hose ends are securely connected to sealed systems.

- *A two-valve hose can contain a substantial amount of NH_3 even when completely disconnected. See "**Avoid Line Traps**" on page 106.*
- *Older ball valves can contain NH_3 inside the ball when closed, even though disconnected at both ends. See "**Avoid Ball Traps**" on page 107.*

Follow instructions for bleeding and checking. Never use a valve handle as a carrying handle. Keep hands clear of bleed valves when carrying a hose.

A9.Nurse Tank Hose Body

NH_3 hoses are time-dated components. Operator action is to replace the assembly A8 when it reaches the end of its operating life.

A10.Hose Valve(s)

The hose may have zero, one or two operating valves A10.

CAUTION

Excess NH_3 Release and Trapping Hazards:
Understand hose and tank withdrawal valve functions and sequencing. This manual presumes a hose with a single outlet-end shut-off valve A10, and a tank outlet with a withdrawal valve A15. If the hose in use is different, have the hose provider explain the correct order for operations.

a. Acme collars may be aluminum, but all internal coupler components must be NH_3-safe, typically stainless steel.

A11.Bleed Valve(s)

Suffocation, Blinding and Burning Hazards:
*See "**About Bleed Valves:**" on page 38.*

Hose valves typically have bleed valves. Have the hose provider explain exactly what is bled by each bleed valve.

The purpose of a bleed valve is to perform a controlled release, via an orifice, of any fluid or gas trapped in the *closed line* prior to disconnect at a nearby Acme fitting.

A single bleed valve may be located on the inlet or outlet side of the valve, and only protects that side of the circuit when the valve is closed. More rarely, a shut-off valve has bleed valves on both sides of the valve. An older ball valve may have a bleed valve for the ball itself.

A15.Withdrawal Valve

In field operations, this valve is *opened first*, and *closed first*.

Ammonia Release Hazard:
Never open the withdrawal valve unless:
a. all other valves and bleed valves, are closed, or;
b. the applicator is configured and ready for use.
Always be on the up-wind side for valve operation.
Always open slowly.
Always check for signs of release when opening this valve.

The withdrawal valve is the application outlet valve. It is usually located on the tank top, but may be located on the bottom. It is color coded red or orange.

A17.Pressure Gauge

This gauge reports the pressure (usually in psi) of the NH_3 gas at the top of the tank. The reading varies with tank and ammonia temperature.

Conventional Liquid: Applicator System Components

Hydraulic Drive System Components (Options)

See page 30 to page 32 for callout descriptions.

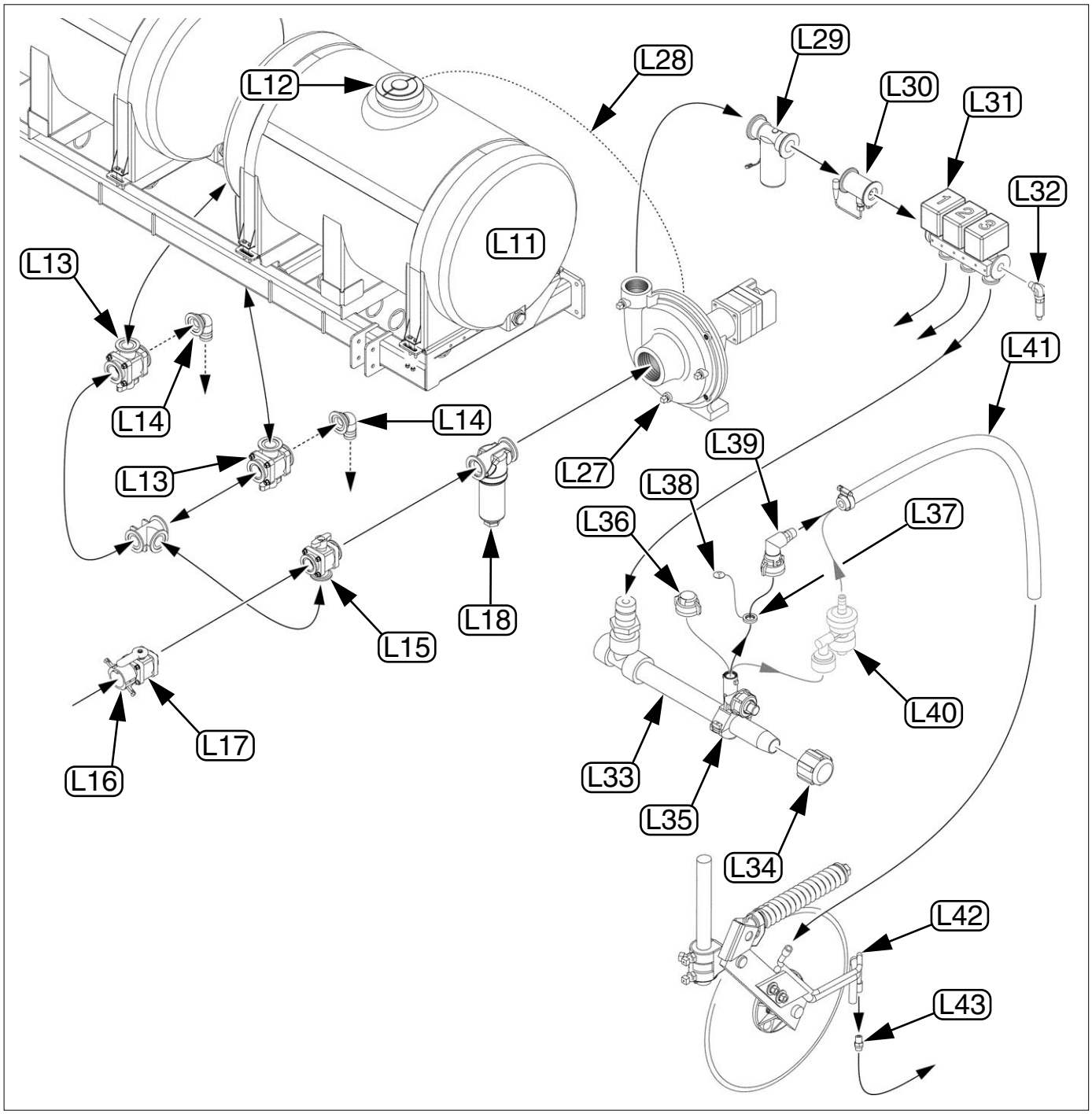


Figure 5
Options: Hydraulic Drive Plumbing with On-Board Tanks, Boom and Coulter Attachment

Ground Drive System Components (Options)

See page 30 to page 32 for callout descriptions

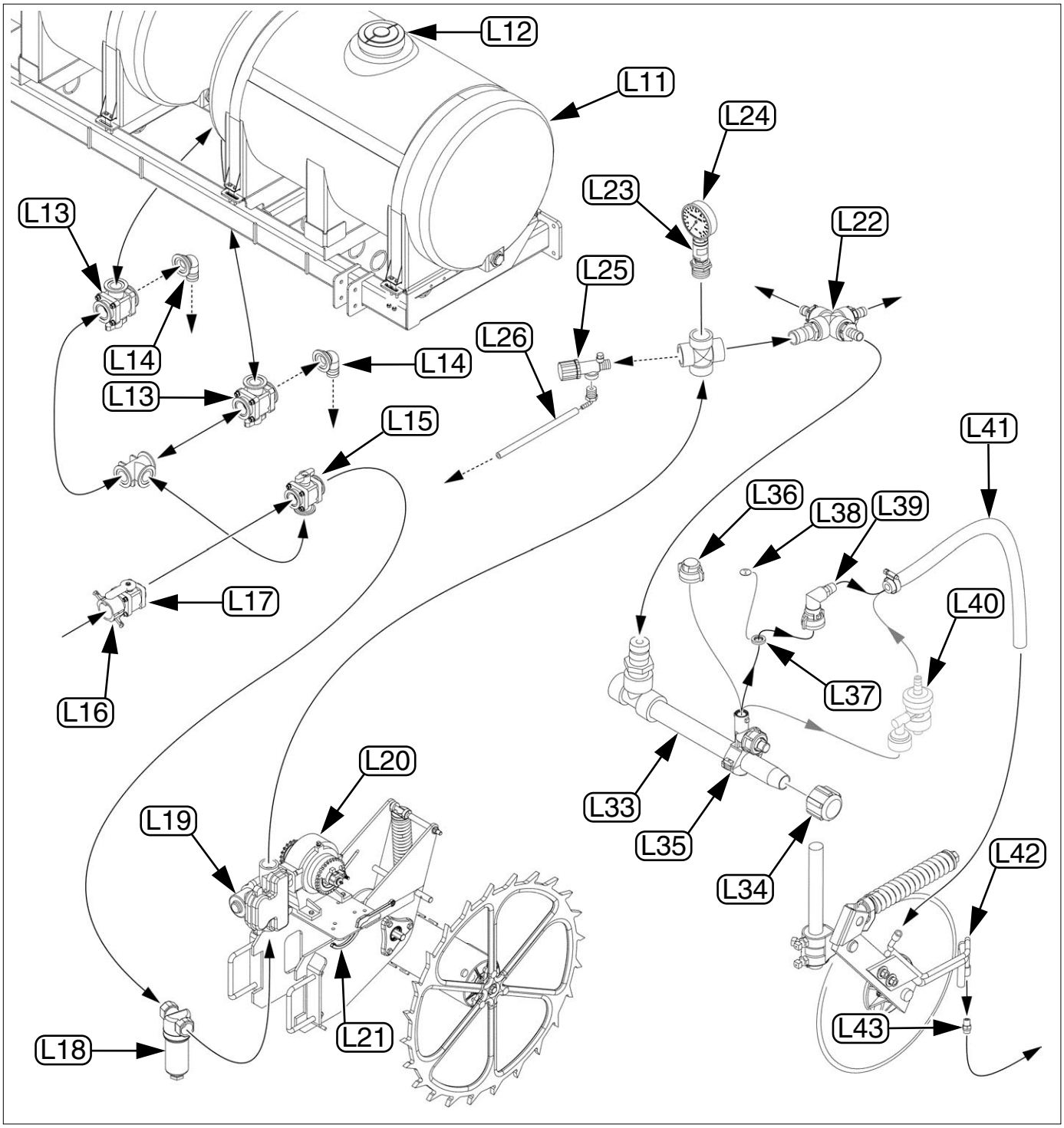


Figure 6
Options: Ground Drive Plumbing with On-Board Tanks, Boom and Coulter Attachment

Liquid System Narrative

Tank, plumbing and setup requirements differ for ground drive and hydraulic drive applicators. The next few pages provide an overview of both systems.

Refer to Figure 6 on page 29 and Figure 5 on page 28

Note: Callouts L11 to L51, correspond to the items beginning below, and identify the same components throughout this manual.

This list presumes that the applicator has system components factory-installed by Great Plains. The list includes all components for either the preset or hydraulic drive pumping system.

If the applicator has aftermarket components, part or all of this information may not apply to your operations. Consult the manual or other documentation for your tank or pump.

L11. Application Tank

Tank Option: The system depicted shows the optional twin 300 gallon tanks, which includes the quick-fill inlet assembly. A user-provisioned fertilizer supply tank may be a trailing nurse tank cart, or may be tractor-mounted.

A trailing nurse tank cart requires the optional nurse tank hitch (page 139) on the applicator. The cart must be full-trailering, and not semi-mounted. The Great Plains plumbing systems are not pre-configured for user-provisioned tanks.

NOTICE

System Clogging Risk:

Use only pre-mixed liquid fertilizer. Regardless of the tank type used, or its capabilities, do not use dry fertilizer mixes with the Nutri-Pro® applicator.

L12. Vented Tank Lid

Tank Option: A fully sealed tank must be vented during operation. If the tank has a control for this, it may be part of the top tank lid, or a separate valve.Each on-board tank has a 10 inch vented screw-on lid. Tanks may be filled at the top or via the quick fill L16.

L13. Tank Discharge Valves

Tank Option: Each on-board tank has its own valve, which switches the tank discharge port between these states:

tank connected to selector valve L15
tank discharge closed (shut off at valve)
tank connected to tank drain elbow L14

Discharge valves are normally open to the selector. The may be closed individually to prevent tank-to-tank transfer on slopes.

L14. Tank Drain Elbow

Tank Option: This open elbow fitting is used for material recovery and tank wash-out (page 118).

L15. Selector Valve

Tank Option: This valve is included with the optional on-board tank system. The valve switches the tank plumbing between three states:

tank plumbing connected to inlet L16
tank plumbing shut off at valve
tank connected to pump system (L19, L27)

L16. Supply Inlet

Tank Option: With the optional on-board tanks, or without the tanks, but with the trailer hitch option, the inlet of the NP3000 applicator is a 2 inch cam-lock quick coupler receptacle (female, FCL). The tank supply hose fitting must be, or be adapted to 2 inch MCL.

L17. Inlet Shut-Off Valve

Tank Option: This valve is open only during tank filling with on-board tanks. This valve is customer-provisioned for tractor-mounted or trailing nurse tank configurations.

L18. Strainer

Tank Option: This fitting contains an 80 mesh screen for filtering large particles and coagulates in the fertilizer, preventing blockage at the orifice plates L38. See page 91 for alternative screen sizes and page 119 for maintenance.

L19. Ground Drive Pump

Ground Drive Option: The CDS-John Blue NGP-7055-K has a capacity of 34 gallons/minute (129 liters/minute). See the 12-M-43 CDS-John Blue NGP Pump Parts and Instructional manual for maintenance.

L20. Pump Adjustment Dial

Ground Drive Option: This 0-to-10 adjustment sets the percentage of rated gpm/lpm to use. Settings below 2 are not recommended.

Pump and application rate are set by a combination of ground drive sprockets (not shown) and dial setting. See page 88 for ground drive rate setting.

L21. Pump Adjustment Tool

Ground Drive Option: Adjusting the setting dial may require some mechanical assistance. A slot is provided to store the tool at the pump when not being used for adjustments.

L22. Passive Manifold

Ground Drive Option:

The factory configuration of this fitting has two outlets capped. The third is plumbed to the optional front boom.

With user-provisioned fittings and hoses, this manifold can split the flow across two booms, or across three sections of a single boom.

However configured, equal flow is assured by the orifice plates (L38).

L23. Gauge Protector

Ground Drive Option: This fitting transmits manifold pressure to the pressure gauge (L24), and protects the gauge from direct contact with corrosive fertilizer.

L24. Pressure Gauge

Ground Drive Option: This 0-to-100 psi gauge reports the pressure in the manifold, which is typically 15-to-40 psi during application. The pressure should be above zero only when fertilizer is flowing. The back-pressure at the nozzle orifices (L38) falls quickly when the pump stops.

Check the pressure periodically during application. If it rises to over 65 psi, the relief valve (L25) may be activating. See also pressure sensor (L32).

L25. Relief Valve

Ground Drive Option: Adjust this valve to activate at 65 psi (page 94). This valve protects the manifold against blockages, and from over-pressure due to orifice sizes too small for the application rate or the material viscosity.

L26. Dump Line

Ground Drive Option: If the relief valve (L25) operates, material is jettisoned at this tube. If you observe dumping, check the pressure and review the orifice plate (L38) configuration.

L27. Hydraulic Drive Pump

Hydraulic Drive Option: The Ace FMC-150F-HYD-206 has a capacity of up to 150 gallons/minute (560 liters/minute). See the HYD-MAN Ace Pump Instruction manual for maintenance.

L28. Air Bleed Line

This line to the tank enabled pump priming by bleeding off air. If using an off-applicator tank, a user-provisioned bleed line or bleed valve must be provided for pump priming.

L29. Flow Control Valve

Hydraulic Drive Option: Under the control of the console (not shown) this valve is being constantly adjusted to regulate pump output to the current application rate (as reported by the flow meter (L30)). Only one flow control valve can be controlled by a single Raven SCS 450 console.

L30. Flow Meter

Hydraulic Drive Option: This sensor reports the actual material rate entering the hydraulic drive manifold. As it detects variations from your desired rate, it signals the console to adjust the control valve (L29). Only one flow meter can be monitored by a single Raven SCS 450 console.

L31. Section Valves

Hydraulic Drive Option:
There are three On/Off solenoid valves (1, 2 & 3).

The factory configuration uses only valve 1. Valves 2 and 3 have their outlets capped.

The valves open and close under the control of BOOMS switches on the Raven SCS 450[a] or other compatible console.

L32. Pressure Sensor

Hydraulic Drive Option: The optional Raven SCS 450 console displays the manifold pressure during operation. This is measuring essentially the same pressure as the mechanical pressure gauge (L24). Only one pressure sensor can be monitored by a single Raven SCS 450 console.

L33. Boom

Boom Option: There is one boom assembly per applicator section. Booms may be different lengths, and have different drop counts at center and on wings.

The factory configuration provides the booms interconnected as a single section.

L34. End Cap

Boom Option: In the factory configuration, the wing booms each have a cap. These caps are removed for clean-out (see page 118).

a. Although the Raven SCS 450 has six section valves, the harness provided has only four Valve leads. Controlling more than three valves with a single SCS 450 would require the purchase of an alternate harness from Raven.

L35. Boom Clamp

Boom Option: This fitting taps the boom for delivery to the row. it contains an 8 psi check valve, which prevents dribbling when the system is idle. Seasonal clean-out (page 118) is necessary to prevent over-winter freezing of residual material.

Booms typically have more boom clamps than applicator rows (the same boom assembly is used on multiple applicator models). Active rows have nozzle bodies L39. Inactive stations have shutoff caps L36.

L36. Shutoff Cap

Boom Option: Unused boom clamp stations are capped. Use a gasket (with or without plate) under a cap.

L37. Gasket

Boom Option: This flat O-ring seals the nozzle body L39 or shutoff cap L36 to the boom clamp L35. The inside diameter of the gasket is grooved to accept an orifice plate L38. Do not operate without a gasket.

L38. Orifice Plate

Boom Option: These stainless steel plates restrict the flow to the row. Their function is to create back-pressure to the pump, and ensure equal flow at all rows.

The standard boom option includes complete sets of plates at three sizes. Additional plate sizes are available. The orifice size must be matched to the rate and viscosity of the material being applied. See page 92 for plate selection and installation.

L39. Nozzle Body

Boom Option: This fitting adapts the boom clamp to tubing, and may be positioned for forward or rear tubing direction.

L40. VeriFlow Nozzle (Option)

This accessory replaces components L37, L38 and L39 with a spring-regulated valve nozzle that requires no adjustment (or orifice plate changes) over a wide range of flow rates.

L41. Drop Tubing

Boom Option: This tubing carries the material to the row.

L42. Coulter Arm and Tubing

Coulter Option: The tubing is protected behind arm structure. The arm may be adjusted for release depth relative to coulter depth (page 83).

L43. Tine Nozzle

Coulter Option: This stainless steel fitting (part number 828-046C) delivers the material to the trench opened by the coulters. It has an 0.040 in. orifice port.

Trailing Nurse Tank Components

Refer to Figure 7 on page 34

Application Tank (user provisioned)

Consult tank documents for details of tank operation. This manual presumes only that the tank has a compatible coupler and shut-off valve. This manual also presumes that an applicator-mounted pump is in use.

L12. Vented Tank Lid (user provisioned)

L16. Supply Inlet (user provisioned)

Great Plains supplies an inlet coupler, valve and hose only with the on-board tank Option. In all other configurations, the inlet connection (which might be to pump or directly to boom) is field-installed.

L17. Inlet Shut-Off Valve (user provisioned)

Nutri-Pro® Rear Hitch (Option)

Refer to Figure 7 on page 34

Items L44 through L46 are part of the rear hitch Option (page 139).

L44. Tongue Release Handle

Frees rear hitch tongue L46 for alignment with nurse tank tongue. See "**Liq: Hitching Conventional Nurse Tank**" on page 70.

L45. Chain Anchor

Two anchor points are provided for nurse tank safety chains.

L46. Rear Hitch Tongue

Accepts a 1 inch (2.6 cm) hitch pin.

L47. Cart Hitch

A nurse tank cart must have a clevis hitch with a 1 inch locking pin. The tongue must be able to elevate to a hitch height of 48 inches (122 cm) above ground with the high clearance rear hitch, and 38½ inches (97.7 cm) with the drop hitch.

L48. Safety Chain

A minimum of one safety chain is required. Each chain must be rated for the total weight of a fully loaded cart. The optional nurse cart hitch on the applicator has anchor points for two chains.

L49. Tank Supply Hose Quick-Coupler

The supply inlet of the NP3000 applicator is a 2 inch male cam-lock quick coupler (MCL). The tank supply hose fitting must be, or be adapted to 2 inch FCL.

L50. Tank Supply Hose Shut-off Valve

This Nutri-Pro® manual mentions only a single shutoff valve for the tank supply hose. Your tank may have additional shutoff and/or flow management valves. Consult your tank manual.

L51. Tank Supply Hose

The tank supply hose must be large enough to support the application rates intended. A hose ID of 1½ inch or larger suffices.

Hitch (Option) and Nurse Tank Components (User-Provisioned)

See page 33 for callout descriptions

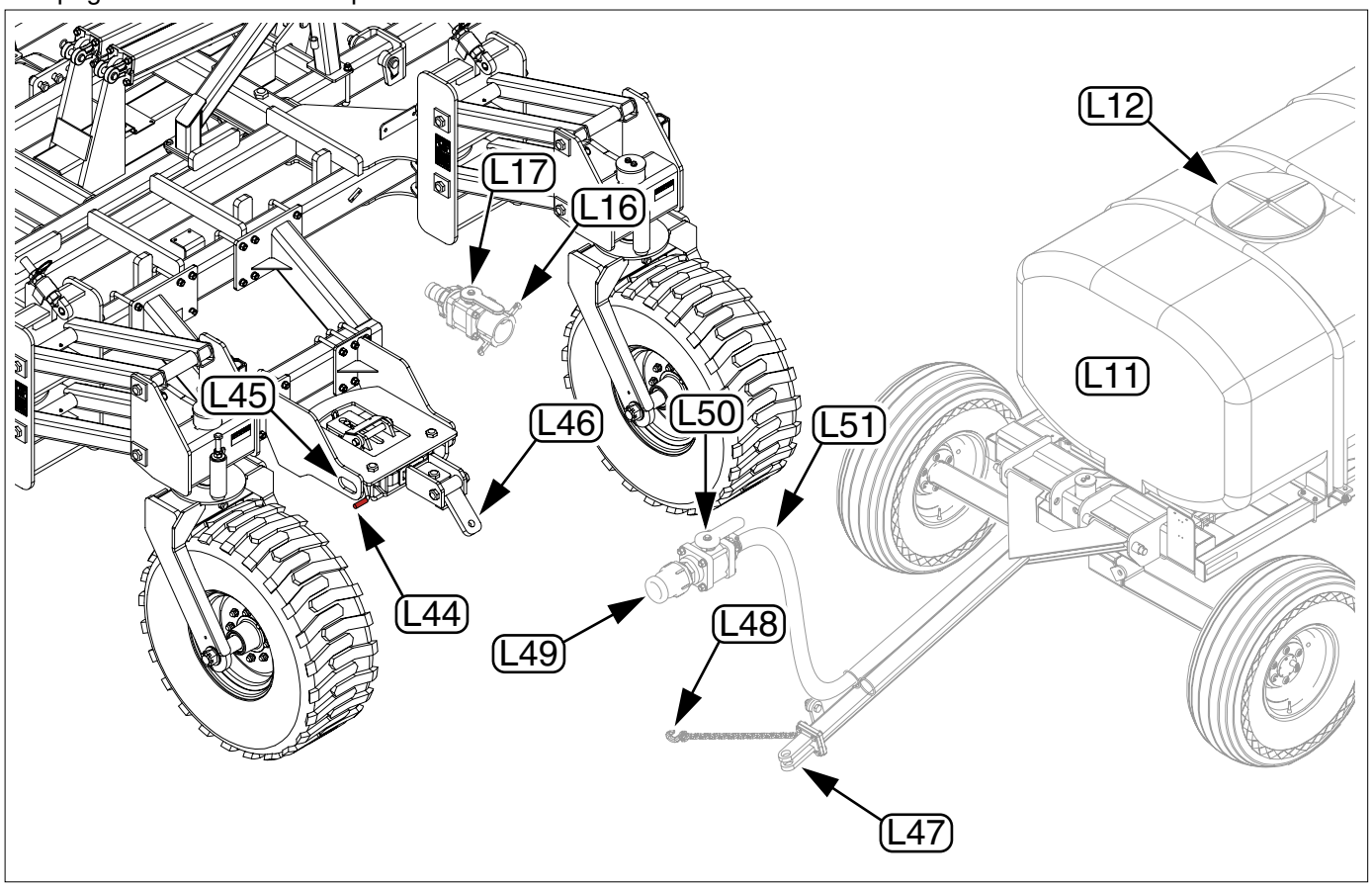


Figure 7
Trailing Nurse Tank Hitch

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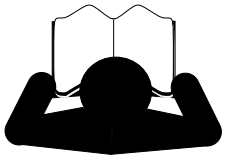
Preparation and Setup

This section helps you prepare your tractor and fertilizer applicator for use, and covers tasks that need to be done seasonally, or when the tractor/fertilizer applicator configuration changes.

Before using the applicator in the field, you must hitch it to a suitable tractor, inspect systems, level the applicator, and then hitch a suitable nurse tank to the applicator. Before using the fertilizer applicator for the first time, and periodically thereafter, certain adjustments and calibrations may be required.



DANGER

Anhydrous Ammonia Exposure Hazard:
NP3000A models: Do not modify the NH_3 system of this applicator. Designing NH_3 systems, selecting and installing components is serious engineering. Testing a custom system could be extremely hazardous (and field PPE[a] is inadequate for such testing). Malfunction of a custom system could result in a major release of NH_3 gas or liquid.

DANGER

Anhydrous Ammonia Release Hazard:
Use only the Great Plains rear hitch for a trailing nurse tank cart. A custom hitch and/or mount, including any safety chain anchors, could fail entirely, resulting in a tank cart upset. Consequences could include a catastrophic release of NH_3. At the very least expect a breakaway event and cart damage.

Initial Setup

See manual 407-613Q for pre-delivery items (normally completed by dealer).

Other first-time/infrequent setup tasks include:

- Set lift assist valve (page 161).
- Install meter console in tractor (page 163).
- Install any Options not factory- or dealer-installed.

Post-Delivery/Seasonal Setup

On initial delivery, use with a new tractor, and seasonally, check and as necessary, complete these items before continuing to the routine setup items:

- Bleed hydraulic system (page 122).
- De-grease exposed cylinder rods if so protected at last storage.
- Verify that all time-dated components are within their service lives.

a. PPE: Personal Protective Equipment

NP3000A: Get Expert Advice

Anhydrous ammonia is 82% Nitrogen, the highest of any fertilizer. The compound NH_3 is normally a gas at ambient temperatures. It is retained in the soil only by chemical reactions and physical mechanisms, primarily reactions with soil moisture.

Consult with your agronomist about optimal application timing, rate and depth, based on proposed crop, soil temperature, soil moisture content and ambient temperature. Non-optimal applications can result in NH_3 loss to the atmosphere, soil drying, and undesired long term changes in soil pH.

Pre-Application Setup

Complete this checklist before routine setup:

- ❑ Read and understand "**Important Safety Information**" on page 1.
- ❑ Check that all working parts are moving freely, bolts are tight, and cotter pins are spread.
- ❑ Check that all grease fittings are in place and lubricated. See "**Lubrication and Scheduled Maintenance**" on page 127.
- ❑ Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See "**Safety Decals**" on page 9.
- ❑ Inflate tires to pressure recommended and tighten wheel bolts as specified. See "**Tire Inflation Chart**" on page 143.

⚠ CAUTION

Anhydrous Ammonia Exposure Hazard:
NP3000A models: Use a tractor with a fully enclosed cab. A tractor that is not fully enclosed exposes the operator to substantially more NH_3 vapor, particularly if field requirements result in downwind turns or downwind passes.

Repeated exposure to NH_3 vapor may exceed PEL (Permissible Exposure Limits) and also induces olfactory fatigue (adaptation). Over time, you become less sensitive to ammonia odor, and may fail to recognize dangerously high concentrations.

Hitching Tractor to Applicator

This manual presume the following (recommended) operations sequence:

1. Hitch tractor to applicator for transport: below
2. Transport applicator separately from a trailing nurse tank: page 53
3. Hitch a trailing nurse tank to applicator at field: page 70

To prevent soil compaction on rows, set tractor wheels between rows, for example: 60 inches center-to-center. For hillsides and steep slopes, set tractor wheels as wide as possible for maximum stability.

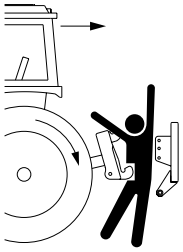
⚠ DANGER

Loss of Control / Public Safety Hazards:
*Do not transport on public roads with a conventional or anhydrous nurse tank hitched to the applicator. Transport with an anhydrous ammonia nurse tank hitched to an applicator is illegal in many places. See "**Transport**" on page 53.*

2-Point Hitching

DANGER

Crushing Hazard:
Do not stand or place any body part between applicator and moving tractor. You may be severely injured or killed by being crushed between the tractor and applicator. Stop tractor engine and set parking brake before attaching cables and hoses.



The NP3000 and NP3000A is engineered to be used with Category II or Category III tractors.

Refer to Figure 8
This implement is factory set for Category III tractors. Category II requires an optional hitch pin kit ① (see page 132).

In addition, the following bushings (not supplied by Great Plains) may be needed to fit your quick hitch or tractor's 3-point arms:

- Lower Links:
  $1\frac{1}{8}$ inch (28.6 mm) I.D. × $1\frac{7}{16}$ inch (36.5 mm) O.D.

1. Adjust tractor lower links to maximize lifting height.
2. Normally the lower arms engage pins in the lower holes ② of the applicator's three point lugs. You may use the upper holes if necessary.
3. Set tractor sway blocks to minimize side sway. Set tractor hitch lift control to Float.
4. Back tractor up to implement. Align lower links with the lower hitch clevis on implement. Adjust hitch bushings and spacers supplied with implement according to the category of your tractor. Lock pins in place.
5. Set hitch for Depth Control mode.

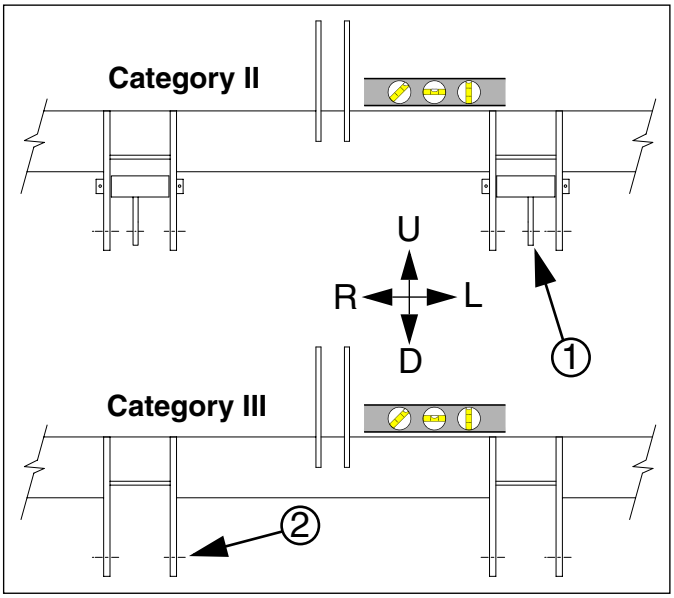


Figure 8
2-Point Hitch Pins

NP3000A: Emergency Shut-Off Rope

This part of hitching requires operating the emergency shut-off valve. If the applicator was correctly shut down and discharged after last use, there is no anhydrous ammonia liquid in the system, and only small amounts of vapor, at low pressure. If the applicator was improperly shut down, checking the emergency valve could be hazardous.

⚠ WARNING

Possible Chemical Hazard:
Wear your NH_3 PPE[a]. Be up-wind of any possible release points. Residual NH_3 (possibly in dangerous quantities) may be present in the applicator systems, from the inlet Acme cap (A11) to the On/Off solenoid valve (not shown). Unprotected exposure could result in permanent lung/eye injury or death.

Refer to Figure 9

At each cooler inlet emergency shut-off valve (A18):

Check System Discharged

1. Check that both halves of the breakaway coupler (A14) are fully mated. If they are not,
   STOP.
   Treat this as a breakaway event (see page 65).

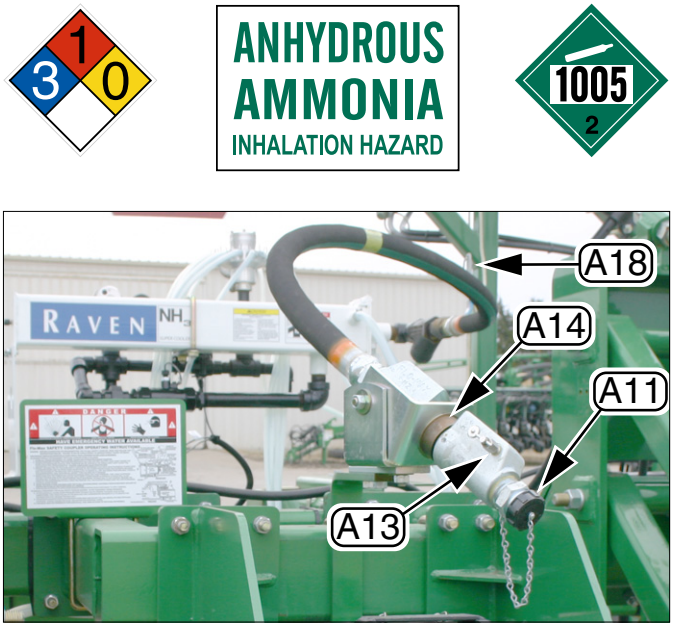


Figure 9 31529
Breakaway Check

Refer to Figure 10

About Bleed Valves:

The purpose of a bleed valve is to perform a controlled release, via an orifice ①, of any fluid or gas trapped in the *closed line* prior to operating other valves or uncapping at a nearby Acme fitting.

If the line is discharged, opening the valve may have no result, or may release a small amount of NH_3 vapor at low pressure. If there is a low pressure release, leave the valve open at the current position. Move away up-wind. Return when the release concludes.

If the line was not discharged, opening a bleed valve may release NH_3 vapor at high pressure, or may release NH_3 liquid, *most likely as a spray.*

If the there is liquid in the line segment, completion of a bleed can take a long time. As the fluid turns to vapor, it chills the remaining fluid, slowing evaporation.

If opening a bleed valve results in an unexpected large discharge, immediately close the valve and follow the instructions for discharging the system (page 108).

⚠ CAUTION

Suffocation, Blinding and Burning Hazards:
Be up-wind when operating a bleed valve.
Wear chemical gloves when operating a bleed valve.
Wear goggles when operating a bleed valve.
Do not place your body or head in front of the orifice.
Follow a check-list when operating a bleed valve.
Open a bleed valve slowly.
Leave it open until all fluid and vapor flow ceases.
This can take a long time.

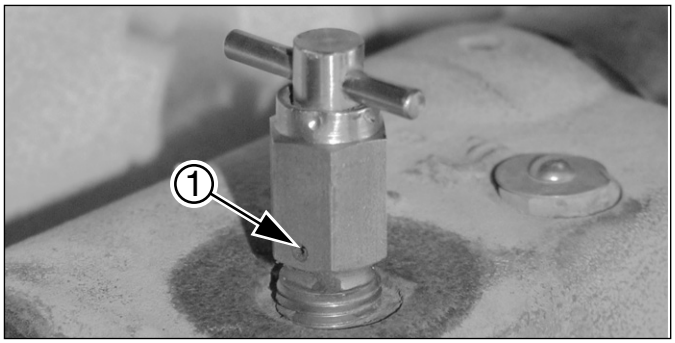


Figure 10 31569
Coupler Bleed Valve (A13) Detail

a. PPE: Personal Protective Equipment

Refer to Figure 11

2. Check the pressure gauge A28. If it is not 0,
   STOP.
   Discharge the system before resuming hitching.
   See page 108.
3. From up-wind, and with the bleed valve orifice pointing away from you, slowly open the cooler bleed valve A29 If any liquid appears, or vapor at high pressure, close valve and
   STOP.
   Discharge the system before resuming hitching.
   See page 108.

   Once there is no vapor flow at the bleed valve, close it and continue at the next step.

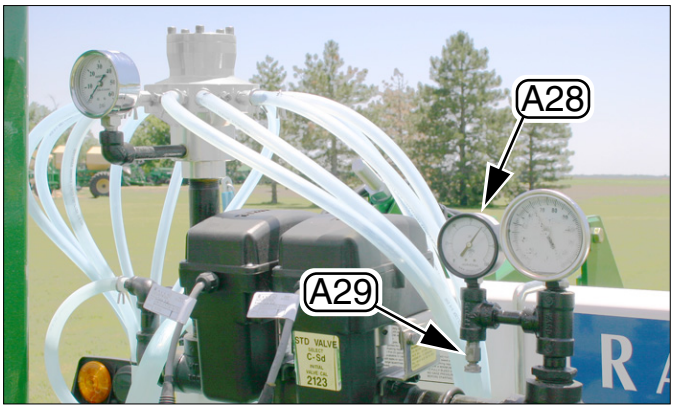


Figure 11 31587
Cooler Bleed Valve

Refer to Figure 12

4. Check the state of the emergency shut-off valve A18.

   If the valve A18 is closed, NH_3 may be trapped on the cooler side of the valve. Continue at step 5.

   If the valve A18 is open, step 3 above has already verified that the line is discharged on both sides of valve A18. Close bleed valve and continue at step 6
5. Standing up-wind, and with the bleed valve orifice pointing away from you, slowly open the breakaway coupler inlet bleed valve A13. If any liquid appears, or vapor at high pressure, close valve and
   STOP.
   Discharge the system before resuming hitching.
   See page 108.

   Once there is no vapor flow at the bleed valve, close it and continue at the next step.

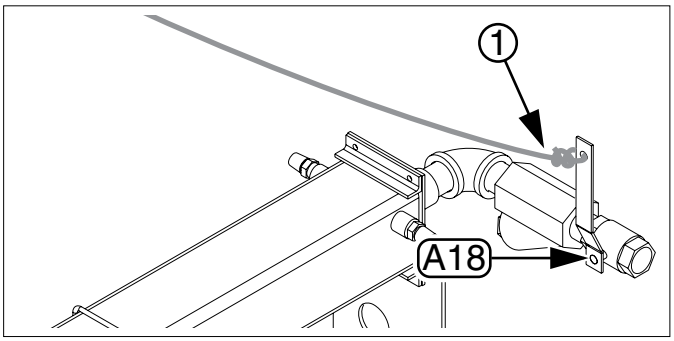


Figure 12 31076
Emergency Shut-Off Rope

Refer to Figure 12 (which depicts the shut-off valve closed)

6. If the emergency shut-off valve A18 was closed, open it.
7. Locate the emergency rope ①.
8. Inspect the attachment of the rope to the valve handle, and the rope itself. Replace the rope if cut, frayed or worn. If the handle connection is not secure, take corrective action.
9. Uncoil the rope. Remove any knots.
10. Route the rope forward and above the plumbing center-line (but otherwise near center-line), toward the tractor cab. Avoid having the rope rest on or rub against any applicator or tractor parts that could cause a snag or abrasion. Avoid running too far sideways, or operation may bend the handle.
11. Route the rope into the tractor cab.
12. **Test each rope**. Make sure each rope can quickly and smoothly close its valve.

⚠ CAUTION

Rope Function Hazard:
Avoid rope routes at or below plumbing centerline.
Routes below plumbing center-line cannot operate the valve.
Routes at plumbing center-line may fail to operate the valve.

Avoid rope routes that are too vertical.
A rope running at a high angle may fail to fully close the valve.

Note: On a 2-point applicator, the tractor cab may be high enough to provide the angle needed. On a pull-type applicator, it may be necessary to route the rope(s) over the transport rest.

Electrical Hookup

Refer to Figure 13

Your fertilizer applicator is equipped with systems that require separate electrical connections. For future reference, note any optional connectors on this checklist.

- ❑ ① Lighting connector (standard)
- ❑ ② Console flow harness connector (optional)
- ❑ ③ Console pressure connector (variable rate only)
- ❑ ④ Console speed connector (optional, and only if sensor/radar mounted on implement)
- ❑ _____

Make sure tractor is shut down with accessory power off before making connections.

These connections may be made in any order. The key requirement is that all connections be made prior to fertilizer applicator movement.

Figure 13
Connector Identification

36051
31083
32019
31950

Hydraulic Hose Hookup

WARNING

High Pressure Fluid Hazard:
Shut down tractor before making hydraulic connections. Only trained personnel should work with system hydraulics.

Escaping fluid under pressure can have sufficient pressure to penetrate the skin causing serious injury. If an accident occurs, seek immediate medical assistance from a physician familiar with this type of injury.

Use paper or cardboard, NOT BODY PARTS, to check for leaks. Wear protective gloves and safety glasses or goggles when working with hydraulic systems.

Refer to Figure 14
On implements with more than one hydraulic circuit, hydraulic hoses are color coded to help you hookup hoses to your tractor outlets. Hoses that go to the same remote valve are marked with the same color.

Color	Function
Red	Lift, Fold, Down-Pressure
Black	Hydraulic Pump Drive (Option)

To distinguish hoses on the same hydraulic circuit, refer to hose label.

- The hose under an extended-cylinder symbol feeds a cylinder base end, or the return side of a hydraulic motor.
- The hose under a retracted-cylinder symbol feeds a cylinder rod end, or the pressure side of a hydraulic motor.

Connect[a] either hose to either side of the remote. Use a regular remote and not a dedicated tractor 3-point remote[b]

Secure hoses and cables so that they have sufficient slack for hitch movements, but cannot get caught between moving parts of fertilizer applicator. Failure to safely route and secure hoses and cables could result in damage requiring component repair/replacement, and lost field time.

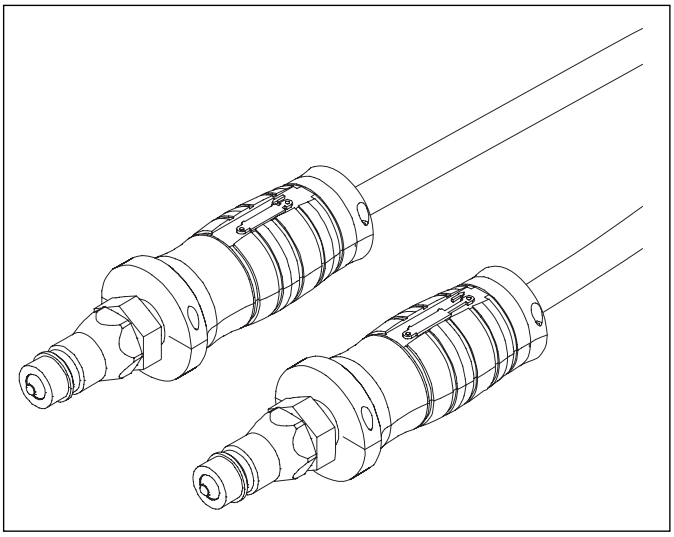


Figure 14
Hose Handles
31733

NOTICE

Machine Function Risk:
The NP3000/A weight transfer system requires a tractor with closed center hydraulics. Open center hydraulics are incompatible.

a. The 2-Point implement has a merged hydraulic circuit in which different cylinders are extending and retracting at the same time, and thus cannot meaningfully use the hose label. Determine by testing which lever direction lifts/folds and lowers/unfolds.
b. Some tractors provide a special remote pair at the 3-point hitch arms. On some tractor models, this circuit has specific flow and/or pressure-sensing behavior intended for certain implements (other than Nutri-Pro®). Nutri-Pro® lift and/or fold may not function on this type of circuit.

Hydraulic Pump Hookup

The hydraulic motor used is a 7 gpm (23 liter/min.) motor. If the tractor used does not have the capabilities to adjust the remotes down to this flow, then a Hydraulic Flow Divider Kit must be installed so that flow can be controlled to prevent operating the pump at excessive speeds. See a Great Plains dealer for more information.

If the tractor has only one circuit capable of continuous flow or only one capable of adjustable continuous flow, reserve that circuit for the pump, and use another for the main sprayer functions.

1. Connect the pump hydraulic hoses to suitable tractor remotes.

Refer to Figure 15

2. The pressure hose coming out of the tractor remotes must be connected to the motor inlet port:
   "I", Base end on hose label),
   and the return line connected to the motor outlet:
   "O", Rod end on hose label.
3. Before operating, place a stop in the neutral position for the tractor hydraulics so that the hydraulic lever can only be moved to the float and down positions. Refer to the tractor operator manual or tractor dealer on information for the neutral stop.
4. See page 72 for setting flow rate.

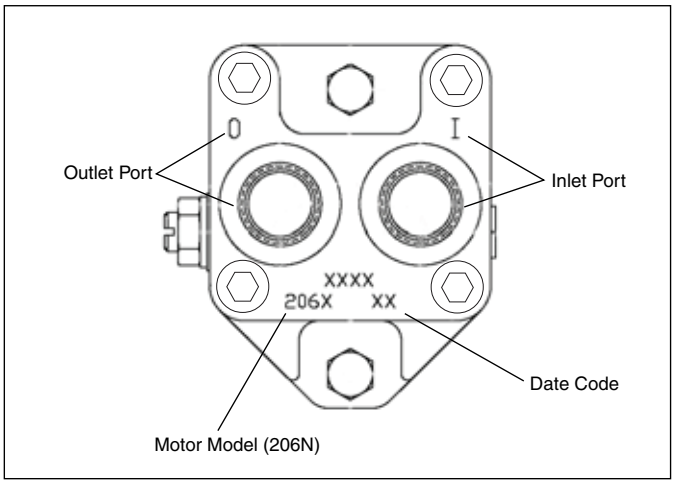


Figure 15 27141
Ace Pump Connections

NOTICE

Equipment Damage Risk:
DO NOT move the hydraulic lever into the Neutral position while the hydraulic pump is running. To do so may cause damage to the hydraulic pump.

Raise Parking Stands

Refer to Figure 16

⚠ CAUTION

Heavy Object Hazard:
Use the lifting handle ②. Push leg against frame while raiding or lowering. The leg weighs approximately 45 pounds (20 kg). The leg could cause injury if you lose control of it while raising or lowering.

1. Use tractor 2-point hitch and the lift-assist circuit to slightly raise the implement. See "**Raising/Lowering Applicator**" on page 48.
2. Remove cotters from pins ①.
3. Grasp the lifting handle. Use an assistant or shoulder to hold leg against frame and inside flanges.
4. Remove the pins ①.
5. Lift or lower the stand straight up or down.
6. Re-insert pins. Secure with cotters.

Figure 16 32030
Parking Stand (Raised)

Leveling Implement

During initial setup and periodically throughout the season, check that the implement runs level. When applying fertilizer, the top of the main frame should be parallel to the ground, and level left to right.

Set Application Depth

Before checking or correcting side-to-side or front-to-back level, set the application depth (which is controlled by tool bar height).

The Nutri-Pro® Liquid Fertilizer is designed for application at:
0 to 6in (0 to 15.3 cm)
For adjustment, see "**Vantage I Coulter Adjustments**" on page 82.

To check level, lower the implement into the ground in representative conditions.

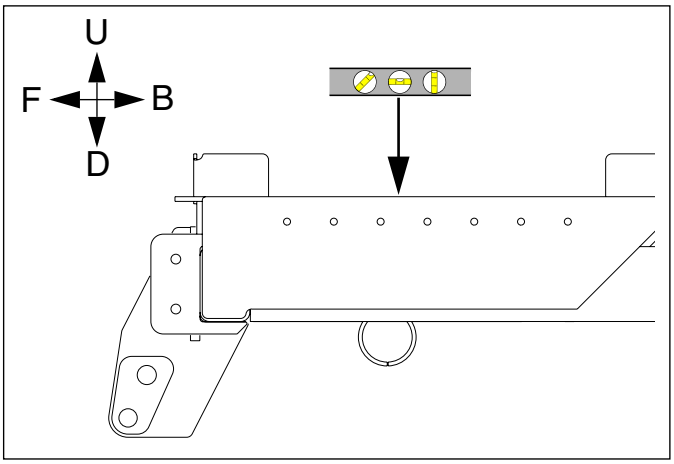


Figure 17 32002
2-Point Leveling

2-Point Front-to-Back Level (Spacers)

The rear lift-assist assembly must be set to match the gauge wheels and 2-point hitch in front. Lift-assist lowered height is controlled by (provided) spacers on the lift cylinder rods.

To set:

1. Lower implement until lift assist wheels are just off the ground.
2. Raise implement until wheels touch ground just firmly enough to resist spinning.

Refer to Figure 18

3. Insert a combination of spacers ⑤ to fill the space on the rod ⑥ between the cylinder end and clevis.
4. Raise and lower implement. Pull forward and check coulter depth and front-to-back level. Adjust spacers as required to achieve desired application depth.

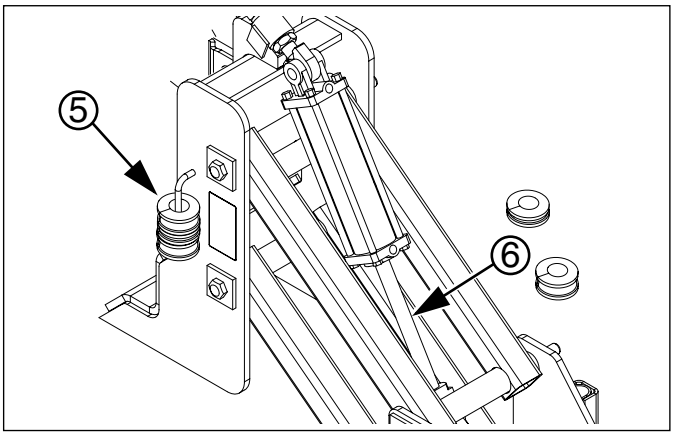


Figure 18 31636
Lift Assist Lowered Height

Meter / Variable Rate Setup (Option)

This topic presumes that the Nutri-Pro® applicator has one or more Raven SCS 450 consoles, speed radar, flow meter, pressure sensor, section control valves, and, for anhydrous models, single or dual Raven AccuFlow™ metering system. It also presumes that the console has been installed in the tractor cab per "**Console Installation**" on page 163.

NOTICE

If the Nutri-Pro® applicator has dealer- or user-provisioned controller or metering, carefully follow supplier documentation for installation, setup, use and maintenance. This Nutri-Pro® manual (407-613M) cannot describe your system. Great Plains cannot assume any liability for results with equipment not supplied by Great Plains.

Before first field use of the SCS 450, it must be programmed with data specifying the system configuration, consisting of various "CAL" numbers and user elected "RATE" numbers. See the Raven SCS 450 manual for display interpretation, and see the manual or the Calibration Card for the keystroke sequence for setting each of these values.

This data is retained as long as the SCS 450 remains connected to battery power. If power is removed for electrical work, long term tractor parking or welding, the data is lost and must be re-entered.

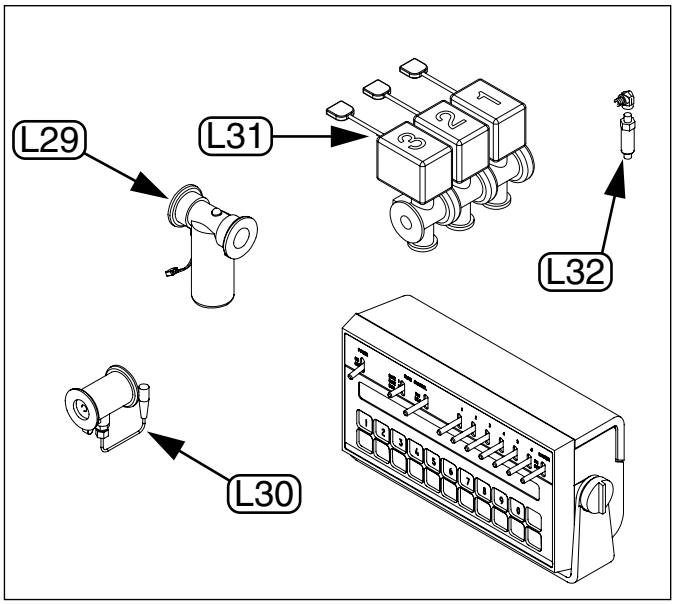


Figure 19 32020
Raven Flow Control and SCS 450

SCS 450: BOOM CAL

Anhydrous models without section control have one "boom section" (BOOM 1, whether single- or dual-cooler). The BOOM CAL number is simply the applicator swath on single-section applicators. See the table on page 46.

Hydraulic pump models and anhydrous models with section control have three boom sections. See the table on page 46.

SCS 450: SPEED CAL

A speed sensor connection to the Raven SCS 450 is required. Perform a calibration per the manuals for the sensor and the SCS 450.

A speed sensor input allows the SCS 450 to determine and control application rates at arbitrary field speeds.

Note: The Great Plains Raven AccuFlow™ and SCS 450 bundles do not include a speed sensor, nor the cable necessary to connect a Raven-compatible sensor or radar to the SCS 450 See page 139 for an available radar kit. See page 154 for harness cables available from Great Plains or Raven.

Note: Two-product applicators using two SCS 450 consoles usually require an additional Y-cable.

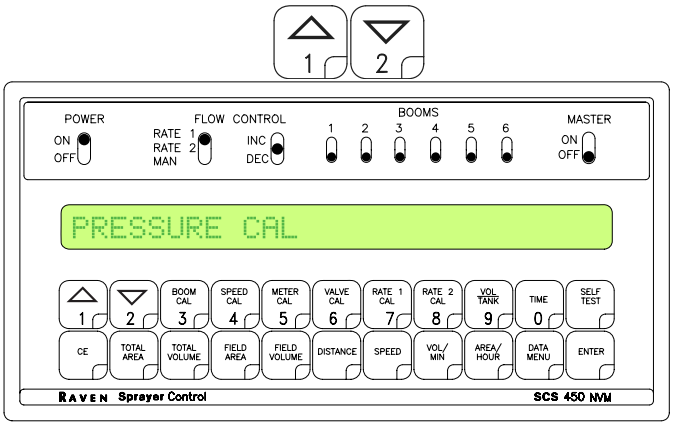
SCS 450: METER CAL
This is the pulse-vs.-rate calibration number for the flow meter (A25 or L30 in system diagrams in this manual).

Obtain this number from the tag affixed to the meter. Enter it into the SCS 450 and record it on the Calibration Card.

SCS 450: VALVE CAL
This is the response time calibration number for the control valve (A30 or L29 in system diagrams in this manual).

Obtain this number from the tag affixed to the valve. Enter it into the SCS 450 and record it on the Calibration Card.

SCS 450: PRESSURE CAL
Conventional Liquid Fertilizer only:
This DATA MENU sequence sets zero for the pressure transducer (L32 in system diagrams in this manual). Perform this operation only when lines are at zero pressure.

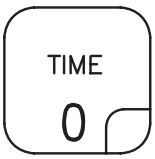


SCS 450: RATE 1 CAL
This is your primary desired application rate, typically in gallons per acre.

SCS 450: RATE 2 CAL
This is your secondary desired application rate, typically in gallons per acre. If you have no alternate rate preferred, set this to RATE 1 CAL, so that the control valve won't slew if you need to switch to MAN mode.

SCS 450: TANK VOL
Optional. If entered, the material consumed (as measured by the flow meter) is continuously subtracted from this number, and may be used to signal a low tank alarm. The number needs to be re-entered at each refill.

SCS 450: TIME
Optional. The SCS 450 (which is always in 24:00 hour time format) defaults to 00:00 (and resets to that after 10 days of inactivity). You may use this menu to set the actual time.



SCS 450 Setup Data

Model	Description	BOOM CAL			SPEED CAL	METER CAL	VALVE CAL
		1 (LH)	2 (CTR)	3 (RH)			
NP3000-1230 NP3000A-12C30 w/o Section Control	30-Foot, 12-Row, 30 inch	360.0 in. (914.4 cm)			598[a]	Cable Tag[b]	Body Label[c]
NP3000-1230 NP3000A-12C30 w/ Section Control	30-Foot, 12-Row, 30 inch	120 in. (304.8 cm)	120 in. (304.8 cm)	1820 in. (304.8 cm)	598[a]	Cable Tag[b]	Body Label[c]
NP3000-1230+SD[d] NP3000A-12C30+SD w/o Section Control	32.5-Foot, 13-Row, 30 inch	390.0 in. (990.6 cm)			598[a]	Cable Tag[b]	Body Label[c]
NP3000-1230+SD NP3000A-12C30+SD w/ Section Control	NH_3 42.5-Foot, 17-Row, 30 inch	150 in. (381.0 cm)	120 in. (304.8 cm)	120 in. (304.8 cm)	598[a]	Cable Tag[b]	Body Label[c]

a. Suggested initial value. Refine using calibration procedure in Raven SCS 450 manual.
b. This value is printed on a durable tag attached to the meter cable.
c. This value, for example “2123”, is printed on the label on the valve body.
d. Side Dress. These figures presume passes with no overlap. For overlapped application, use the non-SD values at top.

Wash Water

Refer to Figure 20

Empty the 10 gallon applicator First Aid Water tank. Refill it with fresh clean water. If the nurse tank cart is at hand, refill the nurse tank wash water as well.

The water needs to be changed daily. Water absorbs ammonia vapor from the air, and becomes an ammonium hydroxide solution over time.

When emptying wash tanks, use the time and water to train operators on tank operations, and first aid rinsing procedures.

Figure 20 31599
First Aid Water Station

Sealer Setup (NP3000A)

From the factory, sealers are preset for optimal shipping configuration. The factory default settings are not likely to be suitable for your field conditions.

Adjustments may also be required for different fields and from season to season.

See “**NH3 Sealer Adjustments**” on page 80.

Operating Instructions

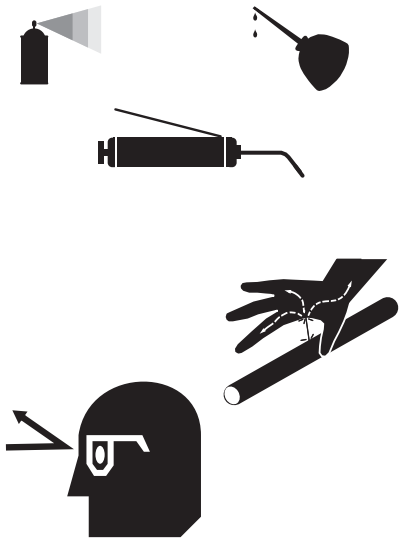
This section covers general operating procedures. Experience, machine familiarity and the following information will lead to efficient operation and good working habits. Always operate farm machinery with safety in mind.

Pre-Start Checklist

WARNING

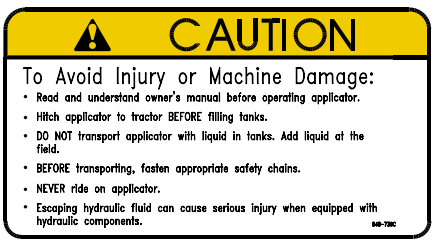
High Pressure Fluid Hazard:

Escaping fluid under pressure can have sufficient pressure to penetrate the skin. Check all hydraulic lines and fittings before applying pressure. Fluid escaping from a very small hole can be almost invisible. Use paper or cardboard, not body parts, and wear heavy gloves to check for suspected leaks. If injured, seek immediate medical attention from a physician familiar with this type of injury.



This checklist presumes that the nurse tank is not yet connected.

- ❑ Carefully read "**Important Safety Information**" on page 1.
- ❑ Empty the applicator's 10 gallon wash water tank, Refill it with fresh clean water.
- ❑ Review the Material Safety Data Sheet (MSDS) for the anhydrous ammonia.
- ❑ Check that all time-dated applicator components are still within their specified service lives.
- ❑ Check all plumbing components, hose, tubing and fittings are in satisfactory working condition.
- ❑ Lubricate fertilizer applicator as indicated under "**Lubrication and Scheduled Maintenance**" on page 127.
- ❑ Check all tires for proper inflation. See "**Tire Inflation Chart**" on page 143.
- ❑ Check all bolts, pins, and fasteners. Torque as shown in See "**Torque Values Chart**" on page 145.
- ❑ Check fertilizer applicator for worn or damaged parts. Repair or replace parts before going to the field.
- ❑ Check hydraulic hoses, fittings, and cylinders for leaks. Repair or replace before going to the field.



Raising/Lowering Applicator

Operate the tractor hitch in “position” or “depth” control mode, regardless of implement hitch type.

The implement may be raised and lowered while folded.

Raise/Lower

Refer to Figure 21 and Figure 22

The implement front height is controlled entirely by the lower two tractor 3-point arms ③ (not visible in figure).

The rear height of the implement is controlled by two lift-assist cylinders ④. Spacers are provided to limit the “lowered” position.

The lift-assist and wing fold cylinders share the same hydraulic circuit. When correctly adjusted, the wings partially fold just prior to lift. Self-engaging lock channels prevent complete folding during field operations. The lowered height of the wings is controlled by manually-set wing gauge wheels (page 84).

Raising (Field, Unfolded)

These instructions presume that the intention is to lift without folding, that the implement is unfolded, and that the wing fold locks auto-engaged at the last unfold, and have not been reset. If the intention is to lift and fold, see “**Folding**” on page 52.

1. Open the lift-assist shut-off valve ⑤.
2. To raise the implement, first raise the tractor hitch. This at least partially raises the coulters (and, if completely stopped, raises them with a slight forward motion to avoid plugging).
3. Extend the lift-assist cylinders (normally with an Extend operation of the tractor remote).

   The wings fold partially. When arrested by the stops, the rear lift-assist cylinders extend. This feature prevents wing droop in field turns.
4. When fully raised, set both hitch and lift/fold remotes to Neutral.

Raising (When Folded)

If the implement is already folded:

- Raise it with the 2-point and lift-assist circuits in any order. The fold circuits are supplied with oil, but since the wings are already folded, they do not move. The adjustment valve (page 161) then diverts all oil to the lift cylinders.
- Hold at raised with Neutral circuits.
- Install rear lift-assist lock channels (page 50).
- Deploy parking stands (page 42).

If the implement is unfolded, and the intention is to lift and fold, see “**Folding**” on page 52.

NOTICE

Equipment Damage Risk:
Do not fully fold or fully unfold while lowered. Perform complete fold and unfold only when fully raised. When lowered, the wing coulters near the wing pivot may be damaged by bending or ground dragging.

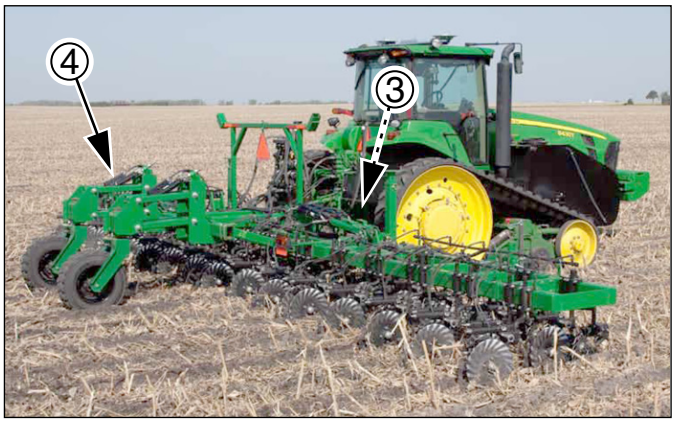


Figure 21 31524
Lift System

⚠ CAUTION

Gradual Crushing Hazard:
Do not rely on hydraulic pressure alone to keep the implement raised. Use parking stands (page 42) and transport/lift locks (page 50) when working around a raised implement. The tractor hitch may settle. The bypass orifices in the implement lift-assist re-phasing system cause it to slowly lower.

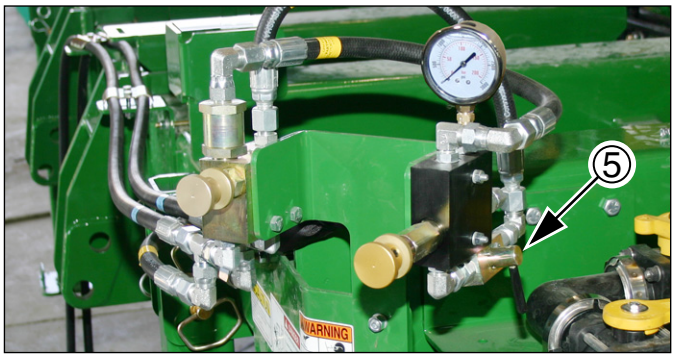


Figure 22 32041
Lift-Assist Valve (Closed)

Lowering (Field, Unfolded)

1. If lock channels are engaged on the rear lift-assist cylinders, raise the implement, disengage the channels (page 50), and insert the desired number of spacers (page 43).
2. Open the lift-assist shut-off valve (page 48).
3. To lower the implement, lower the tractor hitch and retract the lift-assist cylinders (normally with a Retract operation of the tractor remote).
4. The front of the implement lowers until the hitch movement is stopped by your control, or by any depth stop set on that control.
5. The rear of the implement lowers until the cylinders are stopped by the installed spacers, or until fully retracted if there are no spacers. If the coulters are not in the ground, the lift-assist wheels come off the ground until you pull forward into the field.
6. The wings (if unfolded) lower to the height set by the wing gauge wheels (page 84) or onto the coulters.
7. Set the lift/fold circuit to Float.

Lower (Service/Parking, Folded)

This topic presumes that the intention is to lower a folded implement without unfolding. If the intention is to both lower and unfold, see "**Unfolding**" on page 51.

1. Open the lift-assist shut-off valve (page 48).
2. Raise the implement. Set circuits to Neutral.
3. Remove spacers and install lift-assist lock channels. Deploy parking stands (page 42) as desired.
4. Lower front of implement with 3-point.
5. Slowly lower rear of implement with lift/fold circuit. Stop as soon as rear cylinders are fully retracted or on spacers/locks.
6. *If the wings began to unfold*, reverse the circuit just long enough to put the wings back on the transport rest.
7. Set circuits to Float.

First Pass Lowering:

- If lock channels are engaged on the rear lift-assist cylinders, raise the implement, disengage the channels (page 50), and insert the desired number of spacers (page 43).
- If the wings are drooped, retract the fold circuit (page 52) to bring the wings into contact with the wing locks, or to wings level. Set fold circuit to Neutral until lowered to ground.

CAUTION

Overhead Sharp Crushing Object Risk:
Clear the area near the implement. Lower with caution when folded. Once the lift-assist cylinders retract against locks or spacers, oil flows to the fold cylinder bases, and the wings begin to unfold. Anyone under the wings may not be expecting an unfold, and could be struck, injured or killed.

NOTICE

Equipment Damage Risk:
Fully fold before lowering onto parking stands. Parking stands support only the center section. If unfolded, wings will droop, and coulters will strike the ground.

Lift Cylinder Locks

Use transport locks to hold the fertilizer applicator at raised for transport, adjustments, maintenance and storage.

⚠ CAUTION

Falling Hazard:

Do not climb or stand on tires or wheels. Even at full extension on level ground, tires may not be in firm ground contact. They could spin without warning. A fall could result in injury.

Refer to Figure 23

Transport locks are present on all wheel assemblies with hydraulic cylinders. To install cylinder stops:

1. Open the lift-assist shut-off valve (page 48).
2. Fully raise implement (page 48). Set lift circuit to Neutral.
3. Remove and store lift-assist spacers (page 43).
4. Place channel on lift cylinder rod of each cylinder to be locked.
5. Re-install locking pin and secure with cotter pin.
6. Lower fertilizer applicator onto lock channels.
7. Set lift circuit to Float.

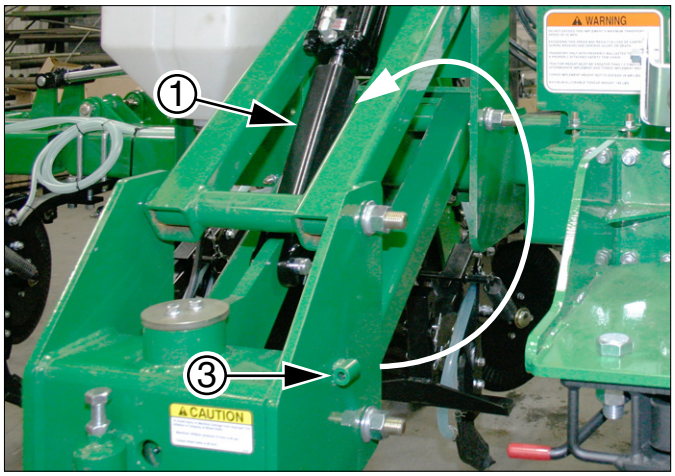


Figure 23 31619
Rear Lift Cylinder Lock Channel

Unfolding and Folding

- Nutri-Pro® implements have a merged lift/fold circuit. The lift-assist cylinders usually require reconfiguring just prior to unfold and fold. Wing locks require reset prior to fold. See "**Unfolding**", below.

Unfolding

The implement should only be unfolded in the field, or fully supported by parking stands and lift-assist cylinder transport locks.

Unfolding (At Field)

These instructions presume the implement has just completed transport, is raised, and transport locks are installed. It is being unfolded for field use.

1. Open the lift-assist shut-off valve (page 48).
2. Lower the lift-assist circuit. Leave the 2-point hitch at raised.

   Because the transport lock channels are in place, the lowering is arrested, and the wings unfold.

   After the wings pass vertical, lock channels swing into contact with the cylinder rods.
3. Stop the unfold when the wings are approximately level.
4. Raise the lift-assist circuit just enough to raise the lift cylinders off the lock channels. before the lift occurs, the wings fold up against the wing locks. Set circuit to Neutral.
5. Remove the transport locks (page 50).
6. Install the spacers (page 43).

The implement is now raised in field configuration.
To lower for nurse tank connections, continue…

7. Lower the 2-point hitch.
8. Lower the lift-assist circuit. The wings continue to unfold, and the lift cylinders lower onto the spacers. The implement lowers to or into the ground.
9. Set the hitch and lift/fold circuits as follows depending on the next operation required:

   Nurse Tank Hitching:
   Set the hitch and lift-assist circuits to Float.

   Field Application (Weight Transfer Adjusted):
   Set the hitch to depth control. Set the lift/fold circuit to lower/unfold (active weight transfer).

   Field Application (Weight Transfer NOT Adjusted):
   Set the hitch and lift/fold circuit to lower/unfold per "**Weight Transfer Adjustment**" on page 85.

Unfolding (Service)

To unfold, off field, for servicing, unfold with the center section fully raised. Unless the wing gauge wheels have been previously extended to maximum height, or extra stands or supports are used, the wing end coulters will reach the ground first. Take precautions if parking surface damage is a concern.

10. Set lift/fold circuit to Float.
11. Raise the 2-Point hitch.
12. If transport locks are not yet installed, open the lift-assist shut-off valve and perform a lift-assist raise operation. Wing fold is supplied with oil, but being folded, the wings do not move.
13. Set circuit to Neutral. Remove spacers (page 43). Install lift-assist transport locks (page 50).
14. Deploy parking stands. Set them to desired or maximum height.
15. Lower lift-assist circuit. Wings unfold first, then lift-assist lowers onto lock channels.
16. As the wings near level, set circuit to Neutral. Close the lift-assist shut-off valve.
17. Unless using blocks or stands, fully extend the gauge wheels to maximum height.
18. Resume unfolding until gauge wheels are on ground.
19. Lower the 2-point hitch.
20. Set hitch and lift/fold circuits to Float.

Folding

These instructions presume that the implement is unfolded and lowered.

1. Set lift/fold circuit to Float.
2. Raise the 2-Point hitch.
3. Raise the lift-assist circuit. The wings begin to fold, and are stopped by the wing locks. The lift-assist then raises.
4. Set the lift/fold circuit to Neutral to hold at lift.
5. Remove spacers (page 43).
   Install lift-assist transport locks (page 50).
6. Deploy parking stands if the implement is to be parked at the folding spot.
7. Lower the lift-assist circuit (which causes unfolding), just until the wings are level. Set the fold circuit to Neutral.

Refer to Figure 24 and Figure 25

8. Swing the wing locks up and out of their engaged ① positions, and into their reset ② positions.
9. To secure wing locks ① during transport, lower down into transport lock holder ③ and slide pin ④ through holder and wing lock handles. Secure with cotter pin.
10. Raise lift-assist circuit once more, which causes the wings to fully fold. When they have folded, the lift-assist raises cylinders to raise the implement rear.

For parking/storage/service, lower the implement onto parking stands. For transport, the lift-assist circuit may be left in Neutral fully raised, or lowered onto the lock channels and set to Float or Neutral.

For parking:

11. Lower the lift circuit just until the cylinders rest on the lock channels. If the wings begin to unfold, reverse the circuit briefly.
12. Lower the 2-point hitch.
13. Set the lift/fold and 2-point hitch circuits to Float.

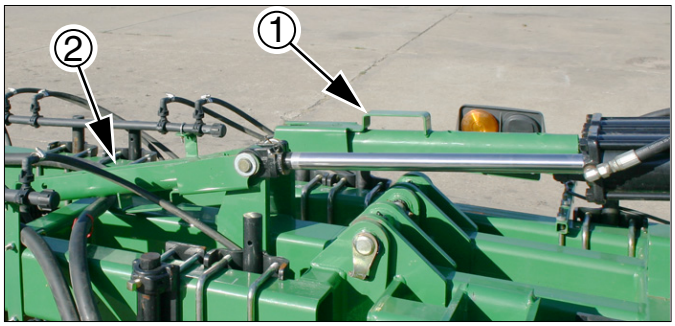


Figure 24: 2P: Resetting Wing Locks 31620

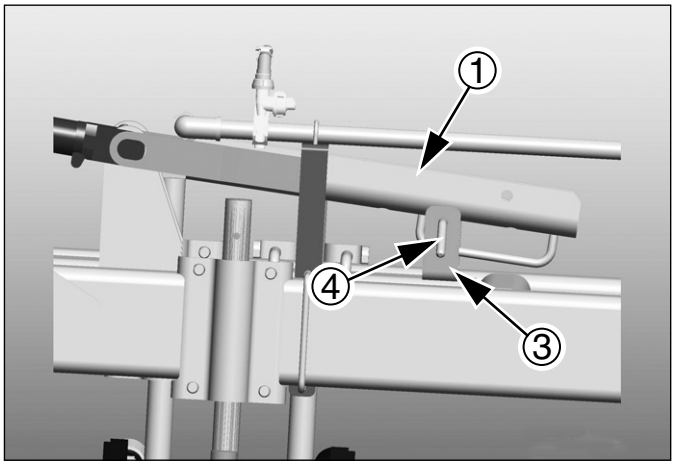
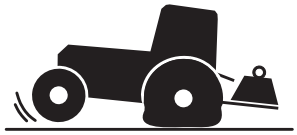


Figure 25: 2P: Securing Wing Locks 32179

Transport

DANGER

Braking and Loss of Control Hazard:
Do not exceed 20 mph (32 kph).



DANGER

Loss of Control Hazard:
Do not transport applicator with material in on-board tanks. Add liquid fertilizer at field. Full tanks add 3000 pounds (1400 kg) to the weight of the implement, almost all of it borne by the tractor 2-point hitch. This can substantially reduce tractor steering. The implement rear casters are free to swivel, and cannot provide protection against under-steer in turns.

DANGER

Loss of Control Hazard:
Never use the applicator to tow a nurse tank on public roads. Tow the tank to the field with a separate vehicle. The applicator cannot provide sufficient lateral control of a trailing cart at highway speeds. The total weight of the train can also easily exceed the steering and/or braking capability of the tractor. A tank upset could occur during normal highway maneuvers. The resulting accident or spill could cause serious injury or death.

DANGER

Loss of Control Hazard:
Never tow a 2-point implement that weighs more than 150% of the tractor (transport tractor must weigh at least 67% of implement). Ensure that the towing vehicle is adequate for the task. Using an inadequate tow vehicle is extremely unsafe, and can result in loss of control, serious injury and death.

Tractor weight matters. For field configuration (after transport), tractor must weigh at least 150% of the implement plus the loaded nurse tank. This weight is substantially higher than the required transport weight.

	NP3000-1230 Configuration Weights		
	Minimum	**Typical**	**Maximum**
Empty	7200 lbs 3300 kg	13900 lbs 6300 kg	16100 lbs 7300 kg
Full	- -	17000 lbs 7700 kg	19200 lbs 8700 kg

Minimum:	Single coulter, one boom, no tanks, no pump, no row cleaners, no rear hitch, no side dress
Typical:	Triple coulter, one boom, tanks, ground drive pump, no row cleaners, no rear hitch, no side dress
Maximum:	Triple coulter, two booms, tanks, dual ground drive pumps, row cleaners, rear hitch, side dress

	NP3000A-12C30 Configuration Weights		
	Minimum	**Typical**	**Maximum**
Empty	8900 lbs 4000 kg	11300 lbs 5100 kg	11500 lbs 5200 kg
Full	- -	- -	16900 lbs 7700 kg

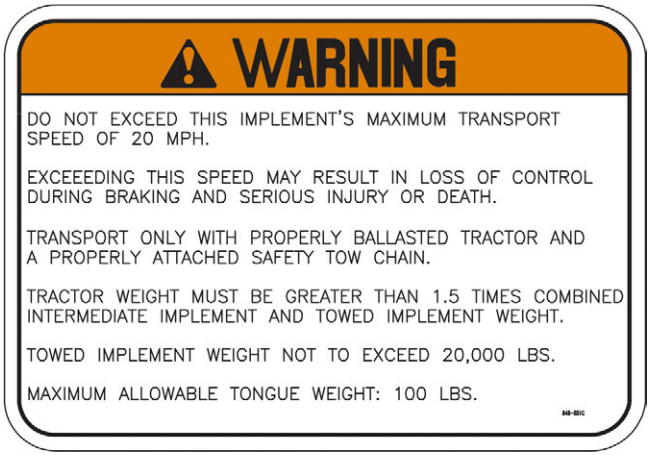
Minimum:	Single NH3 (only), spiders, no row cleaners, no rear hitch, no side dress
Typical:	Dual Sectional NH3 (only), spiders, row cleaners, weights, rear hitch, side dress
Maximum:	Dual materials, tanks, 1 boom, ground drive pump, row cleaners, weights, rear hitch, side dress

Transport Steps

Know your applicator weight. See page 53, 142 or 143 for a list of approximate weight of various configurations.

If tractor capabilities are marginal, check actual weight of applicator at a scale.

1. Check that fertilizer applicator is securely hitched to a sufficient tractor (page 37)
2. Verify correct operation of lights.
3. Raise fertilizer applicator (page 48).
4. Install lift cylinder locks (page 50).
5. Fold applicator if unfolded (page 51).
6. Plan the route. Avoid steep hills.
7. Always have lights on for highway operation.
8. Do not exceed 20 mph (32 km/h). Comply with all national, regional and local laws when traveling on public roads.
9. Remember that the fertilizer applicator may be wider than the tractor. Allow safe clearance.
10. Transport slowly over uneven or rough terrain.



Final Applicator Setup

Prior to hitching nurse tank, make and check final implement adjustments. This could include:

- Coulter (Option) depth and castering, page 79.
- Tine condition.
- Sealer adjustments (NP3000A), page 80.
- Application depth, page 82.
- Application Rate, page 88.
- Row cleaner adjustments, page 87.
- Make a dry run to check applicator functions, running depth and sealing.

For nurse cart hitching, the implement may be raised or lowered, folded or unfolded. However, raised and folded hastens departure if any nurse tank problems are discovered before cart hitching.

NH_3 Operations

Operations for convention liquid fertilizer begin on page 68.

NH_3 Nurse Tanks

Use nurse tanks with proper current safety certification, and current safety equipment and features.

Consult with your anhydrous ammonia supplier for safety information and correct safe handling, transport and use of anhydrous ammonia.

Consult with local and regional authorities on safe and legal use of anhydrous ammonia, including emergency and environmental contacts, and release reporting requirements.

Review any decals and manuals available for your nurse tank cart, and for any of its components. There may be separate manuals for the tank, running gear, indicators, valves and fittings.

This (Nutri-Pro® applicator) manual covers typical operations for a representative NH_3 nurse tank cart. Your cart is likely to vary. See the "**Using Anhydrous Ammonia Safely**" manual (407-551M) for further information about nurse tank carts.

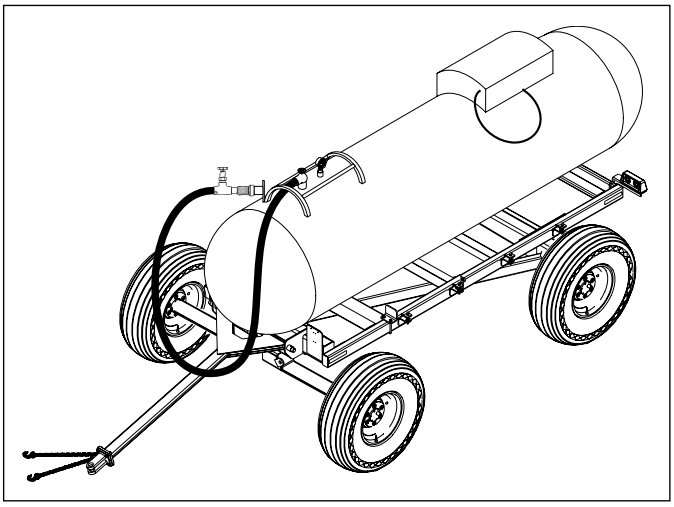


Figure 26 31672
Nurse Tank Cart

NH_3: Safing Applicator Before Cart Hitch

Close Line Valves

1. If any emergency shut-off valve (A18) is open, use the rope to close it. This also tests the rope and path.

Refer to Figure 35

2. Close solenoid valves:
   a. Set console MASTER switch OFF
   b. Set BOOM 1 BOOM 2[a] and BOOM 3[a] switches OFF.
   c. Turn POWER switch ON.
      If the valves were open, setting either MASTER or all BOOM switches off closes the On/Off Valve (A31).
   d. Wait 10 seconds.
      The Control Valve (A30) goes to minimum due to zero speed. It does not completely close.
   e. Set POWER switch OFF.

a. If the applicator has a single-section boom, only switch BOOM 1 needs to be operated.

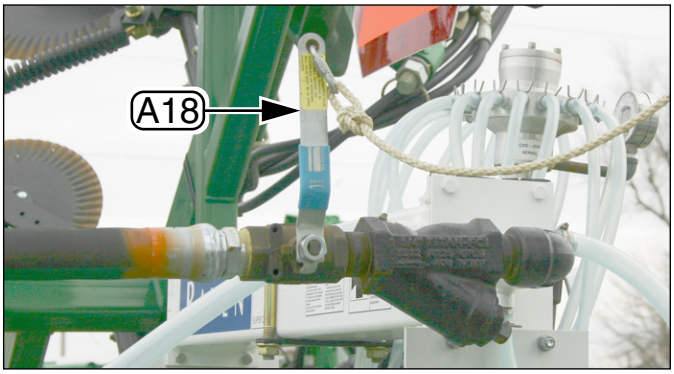


Figure 27 31528
Applicator NH_3 Shut-Off Valve

NH_3: Check Hydrostatic Relief Valves

3. Check that the plastic cap is in place at each valve. In the Great Plains configuration, this would be:
   - A23 at each cooler
   - A15 at the outlet side of the breakaway coupler

⚠ CAUTION

Ammonia Exposure and Loss Hazards:
Understand the reason for any lifted or missing hydrostatic relief valve caps. If a cap is out of place, that line section may have been closed with liquid NH_3 present, which later vented, dislodging the cap. It is also possible that the valve disc has deteriorated and is venting at normal operating pressures.

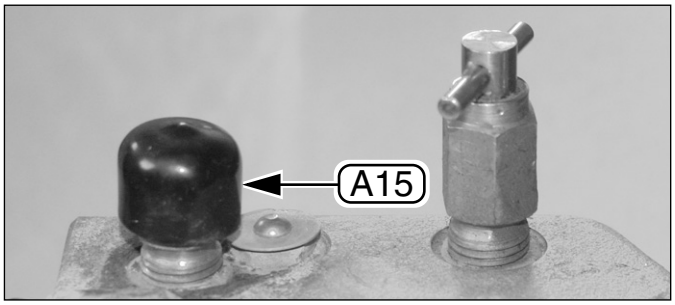


Figure 28 31564
Hydrostatic Relief Valve

NH_3: Close Bleed Valves

4. Put on goggles and gloves. Approach the applicator from up-wind.
5. Check that all bleed valves are closed:
   - A29 at the pressure/temperature gauges.
   - A16 at the outlet side of the breakaway coupler.
   - A13 at the inlet side of the breakaway coupler.

NH_3: Check Hose Discharged

6. Visually check the general condition of the breakaway connection A14. If the two halves appear mated, use the inlet side bleed valve A13 for the next step. Otherwise treat this as a breakaway event (page 65).
7. Orient the bleed valve orifice so that it points away from you and down-wind.
8. Wearing rubber chemical gloves, slowly open the bleed valve A13 by rotating the T-handle counter-clockwise.

   Check for signs that there may be residual NH_3 in between the Acme cap and the shut-off valve:
   • strong ammonia odor
   • hissing of escaping gas
   • valve getting cold
   • dripping or spraying fluid
9. If there are any signs of residual NH_3, leave the bleed valve open until the ammonia has vented, and the inlet fittings have re-warmed to ambient temperature. This could take tens of minutes if the applicator was recently and improperly shut down.
10. Close the bleed valve.

⚠ WARNING

Possible Chemical Hazard:
Wear your NH_3 PPE[a]. On a connection, residual NH_3 (possibly in dangerous quantities) may be present in the applicator systems, from the inlet Acme cap to the tines. NH_3 could also be present in dangerous quantities between the Acme cap and the cart shutoff valve. Unprotected exposure could result in permanent lung/eye injury or death.

a. PPE: Personal Protective Equipment

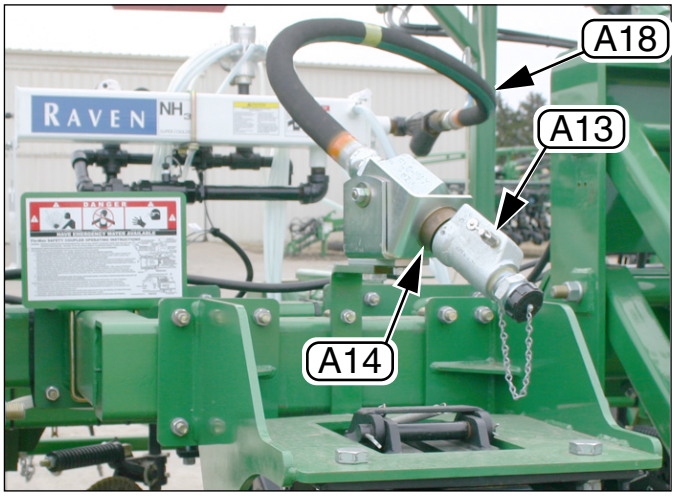


Figure 29 31529
Applicator NH_3 Supply Hose

NH_3: Hitching Nurse Tank

Consult with the nurse tank supplier, and all available nurse tank documents, before hitching for the first time.

⚠ CAUTION

NH_3: Possible Chemical Hazard:
Clear all non-essential personnel from the area at this time. Take normal NH_3 field precautions. Although ammonia release is not expected for mechanical hitching, the tank could be venting small amounts, or large amounts if mis-configured, or if a component fails. On a re-hitch, the applicator may also be venting residual material. Unprotected exposure could cause serious lung or eye irritation.

Hitch a nurse tank to the applicator only at the field, and not prior to transport.

If taking delivery of a tank at the field, complete an inspection (see "**Using Anhydrous Ammonia Safely**" manual (407-551M) before accepting the tank.

NH_3: Mechanical Cart Hitching

1. Spot the applicator. Three objectives are:

   All tank carts:

   - Spot to avoid reverse moves after cart hitching.
   - Face the tractor and applicator basically up wind, but with a cross-wind component such that:
   - the hose connection(s) and valve operations will be made down-wind of where you stand for those operations.

Refer to Figure 41

2. Bring the applicator rear hitch tongue and nurse tank cart tongue into close proximity (a few inches).
3. Push down on the red tongue release handle ①. This frees the applicator rear hitch tongue to extend 7 inches (17.8 cm) to the rear, and 9 inches (23 cm) to either side, to assist with cart tongue alignment.
4. Align the cart clevis hitch with the applicator pull bar. Insert and secure the 1 inch hitch pin.
5. Securely attach the cart's safety chains to the hitch chain anchors ②.
6. Optionally re-seat the applicator rear hitch tongue, at this time, by using the tractor to move the applicator backward several inches, until the latch on the hitch re-engages.

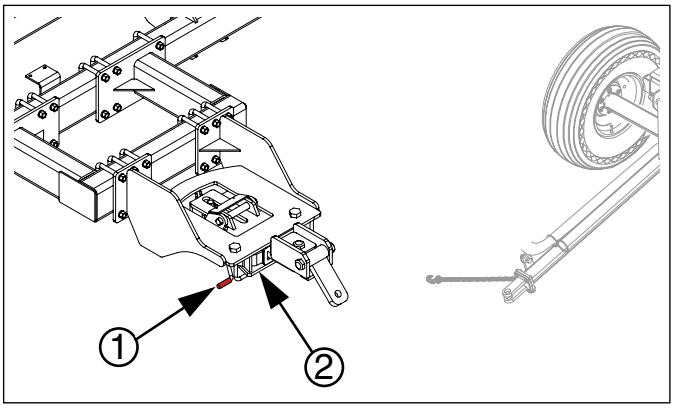
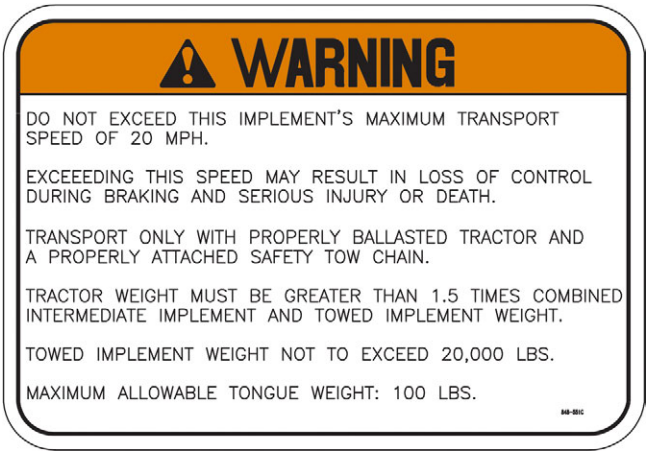


Figure 30 31961
Applicator-Cart Hitch (Retracted)



NH_3: Making Nurse Tank Connections

These instructions presume an applicator with Great Plains-supplied Squib-Taylor Flo-Max™ coupler and Raven AccuFlow™ application system.

1. Perform the steps at "**NH3: Safing Applicator Before Cart Hitch**", pages 55.

⚠ WARNING

Anhydrous Ammonia Exposure Hazard:
Do not skip step 1. Wear your PPE[a]. Never open a line without first performing a bleed to check it. If the applicator was improperly shut-down, the hose can contain more NH_3 than your PPE can handle. Lung damage, burning, blindness and death are possible.

Refer to Figure 31

2. Check that the two halves of the breakaway coupler (A14) are firmly mated at the swivel bracket. If not, see the Squibb-Taylor Flo-Max™ manual for re-connection instructions.
3. Check that the break-away coupler bracket ⑦ is free to swivel, relative to pointing directly rearward horizontal, by at least:
   80° to each side,
   45° up, and;
   20° down.
4. Remove, the Acme cap (A11) on the inlet side of the break-away coupler.

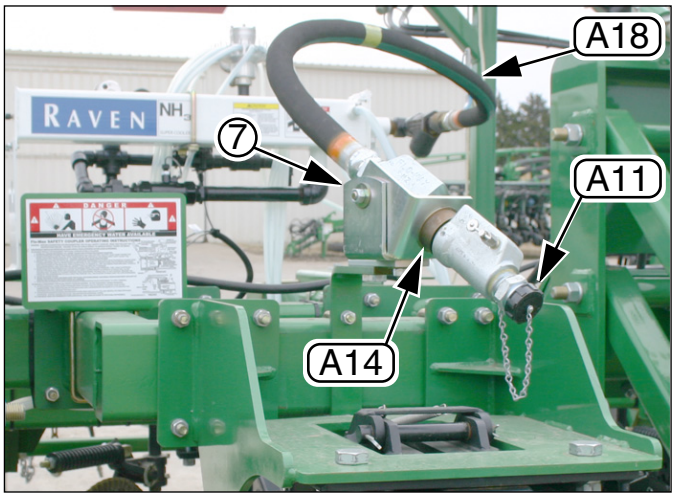


Figure 31 31529
Applicator NH_3 Inlet

Refer to Figure 32

5. Inspect the inlet Acme threads (A12). Clean away any debris or other contamination.

⚠ CAUTION

Blinding, Choking and Respiratory Hazard:
*Never look directly into an ammonia hose or fitting. Use a mirror. Always assume that ammonia is present in the system. There are many ways it can hide, and surprise you later. See "**Avoid Trapped Anhydrous**" on page 106.*

6. Using a hand mirror, inspect the gasket ② inside the fitting (A12). If there is no sign of ammonia, and no odor, you can remove the gasket by hand for closer inspection.

   This gasket makes the liquid-tight seal between the hose and break-away coupler. Inspect it for a smooth face, no cracks, chips or weathering, and no sign of permanent compression. Replace gasket as needed for a tight seal.

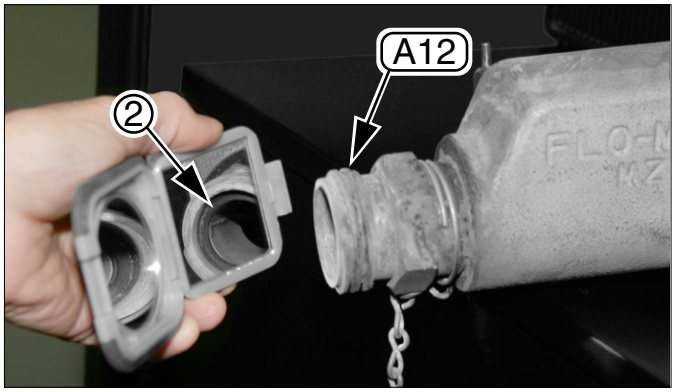


Figure 32 31565
Inspecting Fitting With Mirror

a. PPE: Personal Protective Equipment

NH_3: Connect Cart Hose

Refer to Figure 33

Continue wearing your NH_3 PPE[a].

7. Verify that the nurse tank hose withdrawal valve (A15) is closed. Hand tighten only. Do not use tools.
8. Verify that any hose valves ((A10), not shown here) are also closed. Hand tighten only. Do not use tools.
9. Check for signs that there may be residual NH_3 in between the Acme plug and the outlet shut-off valve:
   - strong ammonia odor
   - hissing of escaping gas
   - fitting getting cold
   - dripping or spraying fluid

   If there are any signs of residual NH_3, leave the plug in, but loose, until the ammonia has vented, and the Acme fitting has re-warmed to ambient temperature. This could take tens of minutes if the cart was improperly configured during or after filling.
10. Disconnect the outlet end of the hose (A7) from the Acme parking plug, or remove the Acme plug. Inspect the outlet Acme threads. Clean away any debris or other contamination.

Refer to Figure 33

11. Route the cart hose along the cart tongue, securing it to any clamps or caddies provided.

    Do not clamp or tie the hose within 3 feet (92 cm) of the breakaway coupler inlet (A12).

    Allow at least 13 inches (33 cm) slack in the hose within the first 3 ft. Do not allow excess slack that could allow the hose to snag or drag on the ground.
12. Bring the hose outlet (A7) and applicator inlet (A12) into contact. Hand tighten the swivel collar or shroud on the hose fitting. Do not use tools. You only need to adequately compress the gasket in the applicator inlet.

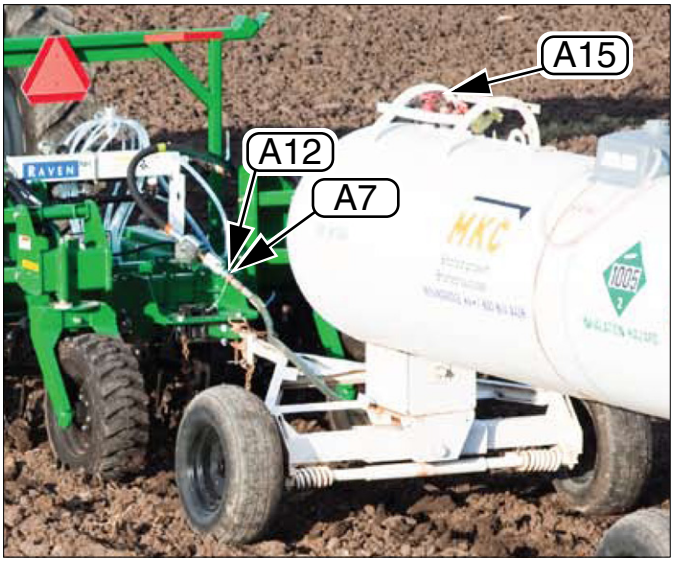


Figure 33 31566
Cart Hose Connected

NH_3: Dry Run

Before activating the NH_3 delivery, cautious practice is to make one dry run pass, including a turn in each direction. This assures that tine depth is set correctly, hydraulics are working correctly, the nurse tank cart is tracking without issue, proper slack exists for all hoses and harnesses, and the meter console is reporting correct field speed.

a. PPE: Personal Protective Equipment

NH_3: Pass Planning

If field requirements permit, you can minimize exposure to NH_3 vapor with the following recommendations:

Refer to Figure 34

- Check the wind direction.
- Plan passes to be cross-wind and turns up-wind.
- Plan first pass on down-wind side of field.
- Choose your first pass to allow you to be up-wind while operating valves at the nurse tank and applicator. Opening the emergency shut-off valve (A18) typically requires climbing on the applicator from the right. Starting with the wind from the right is optimal.

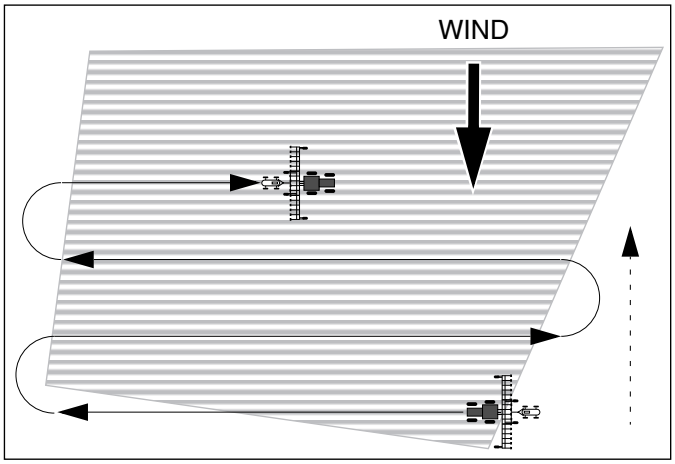


Figure 34
Ideal Pass Planning

⚠ CAUTION

Anhydrous Ammonia Exposure Hazard:
If field requirements result in any down-wind operations:

▲ *Use only a tractor with an enclosed cab.*

▲ *Have an escape route (up-wind turn) available for all down-wind operations.*

▲ *Conduct end-of-pass operations to minimize above-ground releases.*

▲ *Be mindful of the risks of olfactory fatigue. You can "get used to" the odor and fail to notice when concentrations get dangerously high.*

NH_3: Start of Pass Planning

Ideally, you want NH_3 to begin flowing out of the tines right at the start of a pass, with the tines already in the ground. This minimizes atmospheric releases.

Depending on wind direction, tractor capability, available headlands, and field conditions, there are several ways to start each pass.

A. **Capable Tractor:**
Lower applicator into ground at start of pass. Pull forward to set them to operating depth. Start meter flow. Do not start moving until flow divider pressure gauge nears typical operating value.

B. **Headlands Available, Any Tractor:**
Lower applicator to ground some distance ahead of the application area. Move forward slowly. As tines enter ground, start meter flow.

C. **No Headlands, Marginal Tractor:**
Lower applicator to ground at start of pass. Start forward movement, then meter flow. Move slowly until console rate display nears target rate.

Note: The procedures at left are not operating instructions or checklists. They are outlines for planning pass starts. See the step details starting on page 73 and the checklists on page 76.

NH_3: Monitor Operation

Refer to Figure 35

The optional SCS 450 console monitors NH_3 flow, monitors field speed, and operates the (rate) control valve to deliver anhydrous ammonia at your desired rate.

Once setup for the applicator and preferences, and configured for the rates/limits, the monitor is typically used in the “RATE 1” or “RATE 2” FLOW CONTROL modes.

POWER: must be ON

FLOW CONTROL: as desired

BOOMS: 1 or 1, 2 and 3 ON, all others don’t-care (suggest OFF)

MASTER: OFF except when in field and in ground

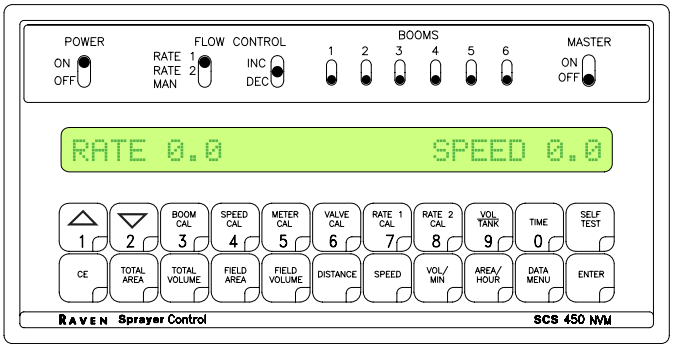


Figure 35 31588
Typical Line-Up Screen

CAUTION

POWER Switch: Ammonia Release Hazard:

The MASTER switch only controls the On/Off valve (A31) if the POWER switch is ON (and power is supplied to the console). If you turn the POWER switch off with the MASTER and BOOM 1(2 and/or 3) switch on, the On/Off valve(s) (A31) remain OPEN, the Control Valve (A30) retains its setting, and ammonia may continue to flow from the nurse tank to the tines.

See SCS 450 manual for monitor operation details.

NH_3: Field Application

NH_3: Starting Tank Flow

13. Spot the applicator at the start of the first pass.
14. If the tractor has adequate power, lower the tines into the ground and pull forward to fully seat them.

Refer to Figure 35

15. Check console MASTER switch OFF.
16. Put on your chemical gloves and goggles.

Refer to Figure 36

17. Check all applicator and nurse tank valves closed (all in-line valves and all bleed valves).
18. From up-wind, open the tank withdrawal valve (A15). Check for leaks and open valves. Expect NO ammonia odor at this time.
19. Open the applicator emergency shut-off valve (A18). Check for leaks and open valves. Expect NO ammonia odor at this time.

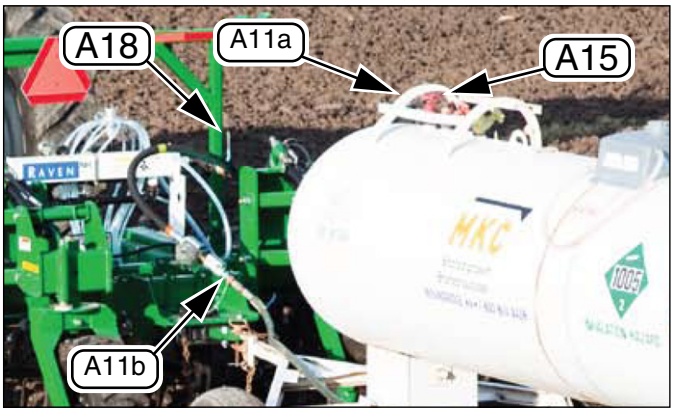


Figure 36 31566
Open Valves

20. Open hose inlet end valve (A11a), if any - tank depicted in Figure 36 has no hose valves). Check for leaks and open valves. Expect NO ammonia odor at this time.
21. Open hose outlet end valve (A11b), if any - tank depicted has no hose valves). Check for leaks. In an all-Great Plains configuration, if there has been no odor so far, there should be no odor now, as flow is blocked at the On/Off valve A31 (not visible).

Refer to Figure 37

22. At the meter gauges, pressure gauge A28 should read within 5 psi[a] of the nurse tank gauge. The flow divider gauge A42 should be zero. The temperature gauge A27 is likely to be below ambient.

NH_3: Starting Application

23. Enter the tractor cab.
24. Check the emergency shut-off rope. Make sure you know where it is. Make sure the rope cannot slip away. Leave enough slack in the line for uneven ground.

Refer to Figure 42

25. At the console, set the POWER switch ON.
26. Set the MASTER switch to ON.
27. Set the BOOMS 1 or BOOMS 1,2 & 3 switches on to ON.
28. Select the desired RATE preset.
29. Lower applicator to operating depth (if not already lowered) and begin first pass.

⚠ CAUTION

NH_3: Possible Chemical Hazard:
Anhydrous ammonia is now flowing into the ground. Some routinely escapes to the atmosphere. Check for leaks. Take action if strong odor is detected or a leak seen. Turn up wind. Turn off flow. Check gauges from tractor cab. Engage emergency shut-off valve if a leak is detected.

Minor odor during application is normal, particularly if the tractor cab is ever down wind of recent passes.

Strong or irritating odor indicates a problem. Conditions may not be suitable for application (soil too dry, cloddy and deeply cracked, for example), or there may be a system problem.

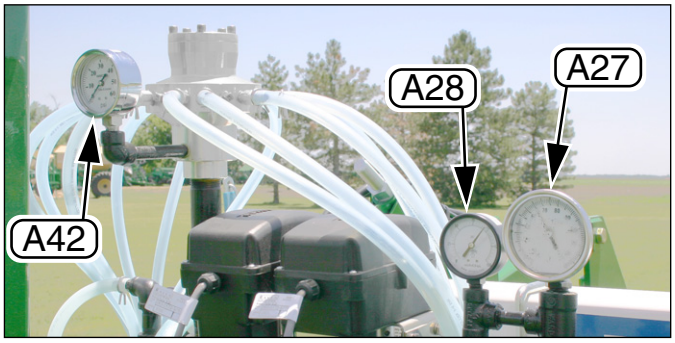


Figure 37
Line-Up Gauge Check
31587

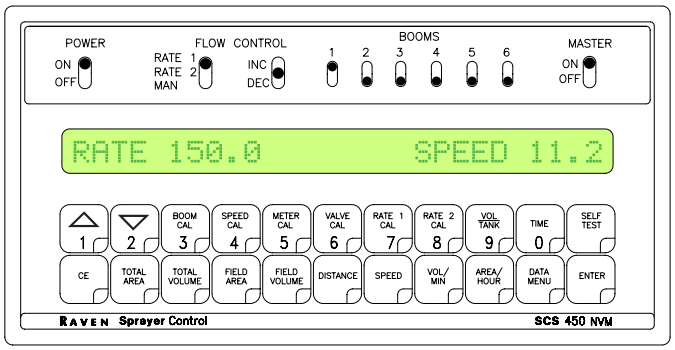


Figure 38
Typical Application Screen
31585

a. This 5 psi correlation is only true under no-flow conditions. When NH_3 application begins, the pressure reading at the cooler gauge drops, due to the reduced temperature of the cooled fluid, and pressure losses due to flow in plumbing.

NH_3: Suspending Application

These instructions are for brief stops in the field, for example, to make a phone call. See also "**NH3: Stopping Application**" on page 64.

a. What is the wind direction?

b. Turn MASTER switch OFF.
This turns On/Off Valve (A31) off.

With On/Off (A31) off, *there is still a substantial amount of liquid NH_3 downstream of all valves,* in the flow divider, row application tubing, and row applicators. When stopped, in ground, this slowly warms, vaporizes, and is expelled into the soil. See warning at right.

c. Continue field application until the Flow Divider pressure gauge (A42) reads zero. Wait at least another 5 minutes.

d. Turn up-wind.

e. Leave the applicator in the ground. There is still considerable NH_3 vapor in the lines that are open to the soil. There may also be a modest amount of liquid in cold tubing loops.

NH_3: Field Turns

a. Before the turn,
set the MASTER switch OFF.
Leave the applicator in the ground, and continue forward movement.

b. Lift the applicator (page 48) at the turn point.

DANGER

Major Spill / Equipment Damage Hazards:
Do not turn too tightly. The nurse tank could strike the applicator, be upset, and leak. On 2-Point and Pull-Type, the nurse tank tongue could strike the caster tires. On 3-Point, the nurse tank tires could strike sealers or tine shanks.

c. Turn up-wind for the next pass.

d. Line up per your start of pass plan.

e. Lower the applicator into the ground.

f. Set the MASTER switch ON.

g. Pull forward and complete the pass.

WARNING

Choking Hazard:
Never raise a recently operated applicator when you are down-wind of the applicator. Be facing up-wind or turn up-wind if it is necessary to raise a working applicator. Wear your goggles. A substantial amount of anhydrous ammonia is rapidly released if you do not allow time for it to bleed off underground. The concentration could be high enough to cause irritation, breathing difficulty or asphyxiation.

WARNING

Ammonia Vapor Release Occurs at Turns:
Avoid down-wind turns.
Do not raise for turns if unprotected individuals or sensitive livestock are immediately down-wind of the turn. Stop instead.

Turning off NH_3 flow prior to raising for turns does deplete some of the liquid ammonia in the delivery lines, but not all of it, and considerable vapor remains. At turns, there will be some release of NH_3 vapor, and possibly some NH_3 liquid. Be prepared for it. Minimize exposure to yourself and others.

Turn up-wind immediately if a hazardous concentration of fumes reaches the tractor cab.

NH_3: Stopping Application

Plan your stops. A safe stop requires depleting the anhydrous, from the nurse tank withdrawal valve to the tines.

a. What is the wind direction?

b. Suspend application per "**NH3: Suspending Application**" on page 63.

c. Put on your chemical gloves.
Be wearing your goggles.

d. Carefully approach the nurse tank from up-wind. Expect some ammonia odor, but if it is extremely strong, there may be an above-ground release in progress due to malfunction or part failure. If so, remain clear until the release subsides.

e. When safe to do so, shut off the nurse tank withdrawal valve (A15).

f. Re-enter the tractor cab.

g. Turn MASTER switch ON.

h. Resume field application until reported rate begins to fall. Increase rate to maximum (to fully open Control Valve (A30)).

i. Continue field application until both cooler and divider pressure gauges read zero.

j. Facing into the wind, raise the applicator and stop.

k. Set the MASTER switch to OFF.

l. Wait at least 1 minute for row line vapor to dissipate.

m. Turn so that the wind is directly from the right.

n. Open all bleed valves. Standing up-wind of each, and making sure orifices point away from you, slowly open bleed valves at:
- nurse tank hose inlet end (A11)
- nurse tank hose outlet end (A11)
- breakaway valve ((A13) or (A16), whichever is safer)
- cooler temperature gauge (A29).

o. Close all remaining operating valves:
- nurse tank hose inlet end (A10)
- nurse tank hose outlet end (A10)
- emergency shut-off valve (A18).

p. Wait at least one hour before moving applicator to any spot near unprotected people or livestock. It will continue to out-gas ammonia vapor for some time.

Ball Valves: Trapped NH_3 Hazard:
*Avoid routinely closing ball valves (other than the nurse tank withdrawal valve) with liquid NH_3 in the lines. Fluid is trapped in the line above the valve, may trigger relief valves, and can get trapped inside the valve ball unless it has a bleed port (not yet common on nurse tank hoses). See "**Avoid Line Traps**" on page 106 and "**Avoid Ball Traps**" on page 107.*

A typical ball valve can trap enough NH_3 to make a room the size of a two-car garage uninhabitable (concentrations above IDLH in moments). When the ball valve is later opened, while warm, the NH_3 is expelled at high pressure. If the line is pointed at your face, you could receive a fatal exposure.

NH_3: Breakaway Event

Initially treat a breakaway coupler separation event as you would any other field emergency. Perform the steps at "**Ammonia Emergency Action**" in the "**Using Anhydrous Ammonia Safely**" manual (407-551M). Only then consider performing the steps on this page.

Although the breakaway coupler is designed to separate, such *breakaways are not routine events*.

Upon a breakaway, what to do about the breakaway coupler itself is the last consideration. Priorities are:

1. Protect: Perform basic field emergency action, which may included summoning emergency responders if a major release is in progress, or the nurse tank is tipped over, or is otherwise at risk of a major release.
2. Assess: If the nurse tank appears intact, sound and stable, determine the cause of the breakaway. It is unlikely to be something simple that will allow a timely re-coupling and resumption of application.

If, and only if, the nurse tank is safe to approach, take the next steps to discharge both sides of the breakaway.

Discharge Applicator:

3. Perform the steps at "**NH3: Stopping Application**" on page 64. Remain up wind and clear of nurse tank while doing this.
4. With the orifice pointing away from you, and down-wind, slowly open the coupler bleed valve (A16) at the applicator half of the breakaway coupler(s). If you closed the emergency shutoff(s) after breakaway, each bleed will release liquid NH_3, under pressure, *most likely as a spray*.

Discharge Nurse Tank Hose(s):

5. Position the tractor and applicator near the nurse tank. Stop up-wind of the tank, but slightly cross-wind of the tank (so that you are not exposed to residual applicator fumes while working around the tank). Face the tractor into the wind.
6. From up-wind, approach the nurse tank.
7. Close the nurse tank withdrawal valve (A15).
8. From up-wind, approach the nurse tank hose outlet end (A7).
9. Locate a bleed valve (A13) on the nurse tank half of a coupler. Be careful not to touch or loosen the Acme coupler (A7). Bleed only one hose at a time.
10. Position the outlet such that the bleed valve orifice points both away from you AND points down-wind AND can be opened and left pointing that way unattended. If this is not possible, get expert help.

DANGER

Upon Event: Probable Chemical Hazard:
A 60cc NH_3 liquid release to air has already occurred. Assume a major release is also in progress or imminent. Act accordingly. Request assistance from trained experts rather than risk blindness, disfiguring/disabling injury or death.

A breakaway event is most likely due to a major equipment failure (such as nurse tank running gear fracture), or a gross operator error (such as towing/turning too fast, or departing level ground). These cases can result in an immediate serious spill, or result in a damaged tank at risk of leak at any time.

Even in the case of a basic operator error (such as movement with only the nurse tank hose connected) both applicator systems and nurse tank hose(s) at breakaway are fully charged with liquid NH_3, right up to the checks in the breakaway halves. The nurse tank side is under full tank pressurization. The applicator hose(s) may be under pressure.

This was an unplanned event. Wind direction may not be favorable for discharging and re-coupling. ***If the wind is light or calm, do not attempt to bleed the breakaway coupler halves.*** *Your field PPE[a] is not sufficient for the releases necessary.*

a. PPE: Personal Protective Equipment

11. Opening this bleed valve WILL release the substantial amount of liquid NH_3 presently trapped in the hose, *most likely as a spray*. Open the valve very slowly, just until some fluid appears. Leave the valve just slightly open.
12. Walk away, up-wind. Stay away until the release concludes. Carefully open bleed valve completely to confirm hose is discharged. For dual-cooler, repeat step 9 through step 12 for the other hose.
13. Close all breakaway bleed valves (A13x and A16), and any nurse tank hose valves A10. Disconnect the nurse tank half of the breakaway coupler at the Acme coupler A7.
14. Correct the cause of breakaway, only if trivial to do in the field.
15. Consult the breakaway manual for re-coupling instructions.

Before Re-connection: Elevated Exposure Hazard: *Exercise extreme care. Even if the nurse tank is undamaged, sound and upright, a breakaway event is not a normal re-hitch situation. A substantial NH_3 bleed is required that* ***WILL release a flow of liquid anhydrous ammonia under pressure. If the wind is calm or light, do not attempt to bleed the nurse tank hose(s).*** *Your field PPE[a] is not sufficient.*

a. PPE: Personal Protective Equipment

NH_3: Unhitching Nurse Tank

The procedure is different for exchanging tanks vs. concluding application.

NH_3: Exchanging Nurse Tanks

Consult with the nurse tank supplier, and all nurse tank documents, before unhitching or exchanging tanks.

a. Suspend NH_3 application per "**NH3: Suspending Application**" on page 63.

   The purpose of this step is to minimize atmospheric NH_3 vapor while working at the rear hitch, because you may not be able to conduct all unhitching and re-hitching steps from up-wind of all the tines.

b. Position the applicator cross-wind, with the wind from the right, tines in ground.

c. Use the rope to close the emergency shut-off valve.

d. Put on your goggles and rubber gloves.

e. Shut off the nurse tank withdrawal valve (A15). Leave the nurse tank hose valves ((A10), if any), open.

f. From up-wind, and with the orifice facing away from you, slowly open the breakaway coupler inlet bleed valve (A13).

g. Stand clear and wait for the hoses to discharge.

h. From the up-wind side, unscrew the nurse tank hose outlet coupler (A7). Secure the hose using whatever means the cart provides.

i. Close all opened bleed valves.

j. Release the nurse tank safety chains.

k. Remove the nurse tank hitch pin.

NH_3: Final Nurse Tank Unhitch

a. Conclude NH_3 application per "**NH3: Stopping Application**" on page 64.

   The purpose of this step is to minimize atmospheric NH_3 vapor while working at the rear hitch, because you may not be able to conduct all unhitching steps from up-wind of all the tines.

b. From the up-wind side, unscrew the nurse tank hose outlet coupler ((A7) on page 29).

c. Secure the outlet coupler with the nurse tank's Acme parking plug.

d. Close all opened bleed valves.

e. Release the nurse tank safety chains.

f. Remove the nurse tank hitch pin.

g. Remove nurse tank from behind applicator.

CAUTION

Control Variation Hazard:

If you are using multiple nurse tanks, study each one separately. Unless they are owned by you, and known to be identical, there is a high probability that there are differences between them, even if they are all from the same terminal.

Liquid Operations

Operations for anhydrous nitrogen fertilizer begin on page 55.

Liq: Filling On-Board Tanks

The tanks may be loaded from the quick-fill inlet, or from the lids (page 69).

If the fertilizer solution has any tendency to settle, sediment, gel, coagulate, precipitate or stratify, load material immediately prior to application. The tank system has no agitators for sustaining suspensions.

Apply fertilizer soon after material loading. Clean out unused materials promptly. Fertilizer allowed to remain in the tanks for an extended period can settle, resulting in excessive or insufficient concentrations during application. System plugging can also occur.

1. Hitch the applicator to a tractor. Filling an unhitched applicator is not recommended, as it can increase parking stand loads above the bearing capacity of the soil.
2. Inspect the tanks from the lids.
3. Drain excess condensation from the tank, so that this water does not dilute the material to be loaded. See "**Material Clean-Out (Liquid)**" on page 118.
4. Flush the tank if there is other residue present.

Liq: Tank Quick-Fill

Refer to Figure 39 and Figure 6 or Figure 5 on page 29 or 28

5. Position the applicator on level ground, or tanks may fill unevenly.
6. Connect the nurse-tank hose to the quick-fill coupler (L16) located at the left end of the left tank. Lock hose in place with cam-lock levers.
7. Open the discharge valve (L13, not shown) of each tank to be filled. If filling must be performed on unlevel ground, fill one tank at a time.
8. Set the selector valve (L15) to "FILL" (handle arrow pointing forward, toward elbow from inlet).
9. Open shut-off valve (L17) at quick-fill coupler.
10. Open any supply valve and fill tanks. Tanks are marked with fill levels.
11. Close valve at supply, then quick-fill coupler, and disconnect the nurse tank hose.
12. Set selector valve to OFF, or to PUMP if applying immediately.

DANGER

Agricultural Chemical Hazards:
Observe safety precautions specified by material suppliers. Some chemicals can cause serious burns, lung damage and death. Avoid contact with skin or eyes. Avoid prolonged breathing of chemical fumes. Wear respirator and other protective equipment as required by chemical manufacturer. Seek medical assistance immediately if accident occurs. Know what to do in case of an accident.

NOTICE

System Plugging Risk:
Use only pre-mixed liquid fertilizer. Fill tanks at field, immediately prior to application. Do not use dry mixes. Do not leave material in tanks for extended periods.

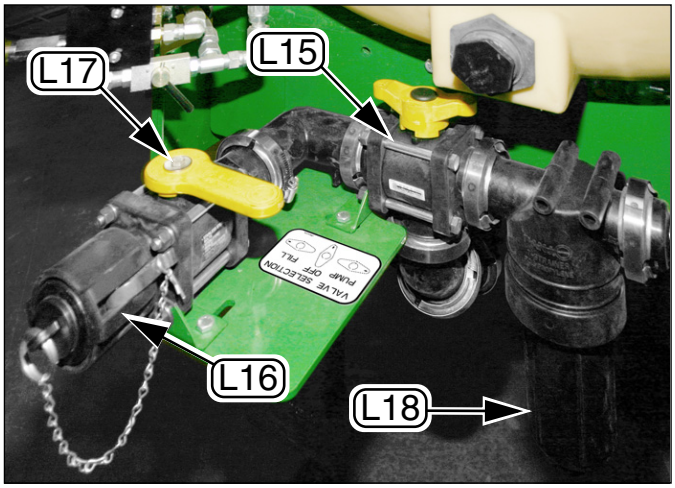


Figure 39 32082
Inlet and Selector Valve

Liq: Tank Lid Fill

Employ two persons for top fill; one to secure the hose at the tank, the other to control a supply line shut-off valve.

These steps presume completion of step 1 through step 5 on page 68.

Refer to Figure 40 and Figure 6 or Figure 5 on page 29 or 28

13. Close selector valve L15 (or set to PUMP; there is no risk of material leakage through the boom until the pump is operating).
14. Open both tank discharge valves L13 to the selector valve, if cross-filling from one tank to the next is desired.
15. Open the lid L12 of the tank to be filled.

    The tank lid completely unscrews for a 7 in (18 cm) opening.
16. Insert the supply hose.
17. Open the supply line valve. Monitor tank level. Fill to desired level. Close supply valve.
18. Remove hose. Close and secure the tank lid. The lid has twin threads. Make sure that both are evenly engaged when tightening the lid, and that the lid is fully seated.

⚠ CAUTION

Chemical Hazard - Tank Lid:

For top loading, wear gloves and any other protective equipment indicated for any materials that have ever been used in the tank (not just the materials recently loaded or presently being loaded). Normal operations splash material on the underside of the lid. It is likely to be coated with residues that could be highly concentrated, whether dry, damp or wet. Remove the lid slowly to avoid throwing off material toward yourself.

Figure 40 32083
Tank Lid Closed and Open

Liq: Hitching Conventional Nurse Tank

Hitch a nurse tank to the applicator only at the field, and not prior to transport.

Liq: Mechanical Cart Hitching

1. Spot the applicator to avoid reverse moves after cart hitching.

Refer to Figure 41

2. Bring the applicator rear hitch tongue and nurse tank cart tongue into close proximity (a few inches).
3. Push down on the red tongue release handle (L44). This frees the applicator rear hitch tongue (L46) to extend 7 inches (17.8 cm) to the rear, and 9 inches (23 cm) to either side, to assist with cart tongue alignment.
4. Align the cart clevis hitch (L47) with the applicator pull bar. Insert and secure the 1 inch (2.6 cm) hitch pin.
5. Securely attach the cart's safety chain(s) (L48) to the hitch chain anchor(s) (L45).
6. Optionally re-seat the applicator rear hitch tongue, at this time, by using the tractor to move the applicator backward several inches, until the latch on the hitch re-engages.

Liq: Making Nurse Tank Connections

1. Close shut off valves on all hoses of both tank (L50) and applicator (L17).
2. Route tank supply hose (L51) to applicator inlet (L16). Allow ample slack for tight field turns and uneven ground. Do not leave so much slack that the hose can reach the ground.
3. Remove plug from applicator inlet, and any cap on tank supply hose.
4. Inspect and clean connector fittings.
5. Mate connectors of tank and applicator supply hoses. Fold cam levers forward to lock. Leave valves closed.
6. If the tank has additional hoses, secure them at the tank.

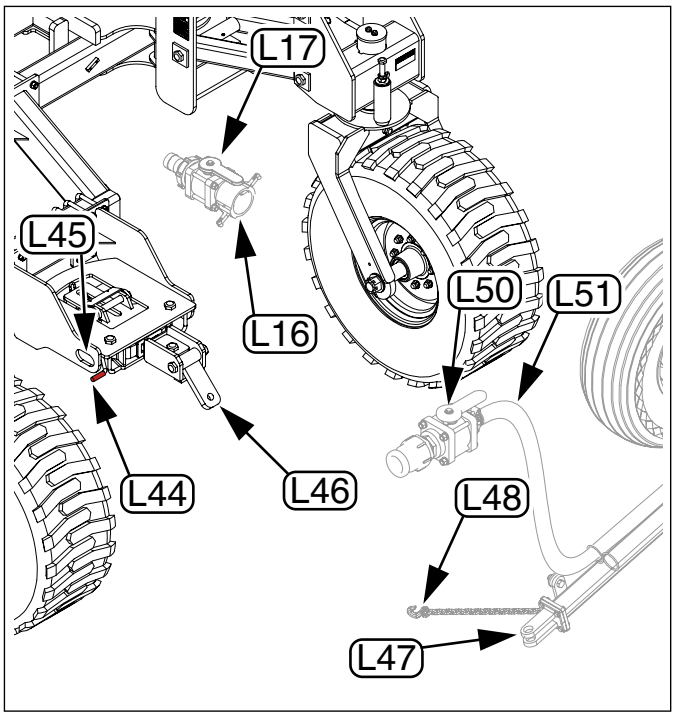
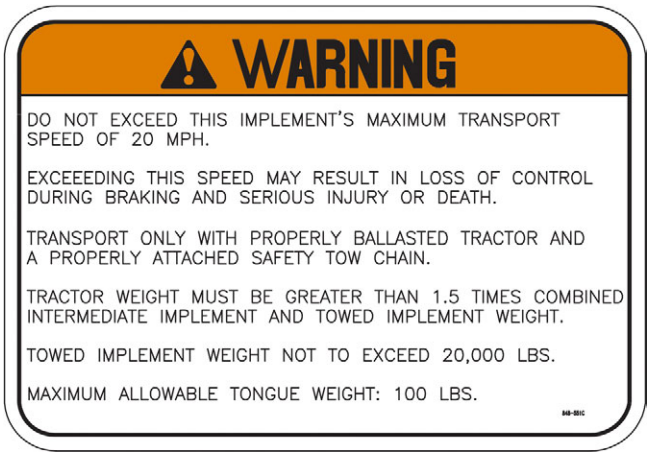


Figure 41
Applicator-Cart Hitch
32349

NOTICE

Equipment Damage Risk:
Use only pre-mixed liquid fertilizer.



Liq: Ground Drive Pump Start-Up

7. Check ground drive sprocket setup (page 94).
8. Set rate on pump adjuster dial.

Refer to Figure 6 on page 29 or Figure 5 on page 28

9. If relief valve (L25) has not been previously adjusted, perform initial setting per page 94.

Liq: Prime the Ground Drive System.

10. Wearing gloves, manually rotate the ground drive wheel until material appears at the tines.

Begin field operations.

The pump automatically operates when the applicator is lowered to ground contact and in motion. The pump automatically stops when the applicator is raised for turns.

Liq: Hydraulic Drive Start-Up

Prior to first use, determine the hydraulic remote circuit flow rate setting per the procedure on page 96.

11. Set console MASTER switch OFF.
12. Set console POWER switch ON.
13. Select FLOW CONTROL RATE1 or RATE2 as desired, and verify rate setting.
14. Set console BOOMS[a] switch 1 ON.
15. Set the flow rate for the hydraulic remote circuit as established by the procedure on page 96.
16. Activate the circuit by moving the lever to Retract. You may hear the pump operating, but with the MASTER switch off, no material flows to rows.
17. Set the MASTER switch ON. Check for material flow at the tines. Prime second hydraulic pump as required.
18. Begin field operations. Monitor the fertilizer pressure gauge (or PSI display on optional console).

Liq: Field Operations (Either Pump)

19. Monitor the fertilizer manifold pressure (gauge or PSI display on optional console).
20. Mind the fertilizer tank levels while planting, both to:
    a. confirm expected consumption rate, and;
    b. avoid running the pump dry.
21. If residual fertilizer is not recovered at end of planting, apply it to the last field planted.
22. Clean out fertilizer system per page 118.

CAUTION

Sharp Object Hazard:
Ground Drive: Exercise caution when near and handling the ground drive wheel. Wear gloves. The tines may be sharp.

NOTICE

Equipment Damage/Material Misapplication Risks:
Ground Drive: Do not run the pump dry. With all drive chains in place, the ground drive pump always runs when the applicator is lowered and in motion. Air rapidly damages the pump. Keep fluid in pump at all times. Disconnect a chain when not applying fertilizer.

Hydraulic Drive: Do not run the pump dry. The pump runs when the remote circuit is active, regardless of applicator status. Air can damage the pump. Keep fluid in the pump at all times. Set remote to Float when not applying fertilizer.

If fertilizer is exhausted prematurely, reload fertilizer immediately. If fertilizer is not available, load clean water, continue planting with pump operating (to flush system), and disconnect pump drive before water is exhausted (to keep pump wet).

Liq: Pauses and Turns

Ground Drive Pauses and Turns

When the applicator is stopped, or lifted, the pump stops. The boom is still pressurized, but this bleeds down to 8 psi very quickly (seconds), at which point the nozzle clamp check valves close off flow to the rows.

Hydraulic Drive Pauses and Turns

If the applicator has the optional hydraulic drive system, pauses cause the speed sensor to report zero speed, which causes the console to close the flow control valve. Set the pump hydraulic remote to Float if stopping for and extended period.

For turns and field moves, set the MASTER switch OFF to avoid material loss. If the factory configuration of the plumbing has been modified for section control, use the BOOM switches as desired for point row applications.

a. The standard configuration uses only Valve 1. If optional section control is installed, also engage BOOMS switches 2 and 3.

Liq: Fertilizer Operation

For an aftermarket pump system, consult the pump or system documentation. These pages describe the available Great Plains systems. See page 28 through page 34 for callout references.

Liq: Ground Drive Operation

The piston pump (L19) is ground driven. When the applicator is lowered and in motion, the pump operates, and fertilizer is applied based on the drive Range sprocket, and pump adjuster dial setting (L20).

Liq: Hydraulic Drive Operation

The centrifugal pump (L27) is driven by an integrated hydraulic motor. The output of the pump is under pressure whenever the hydraulic motor circuit is activated. Rate is regulated by a flow control valve (L29), and monitored by a flow meter (L30), both connected to a Raven SCS 450 console (or other compatible Raven console).

Liq: Boom Operation

The liquid fertilizer boom system is designed to operate (ideally) between 15 and 40 psi. Several system elements affect system pressure, and need initial setup, periodic maintenance, and adjustment.

Liq: Start-Up Preparation (Either Pump)

1. Check that ample fertilizer has been loaded into the tanks. The liquid level must be higher than the hydraulic pump for pump priming. Close and cap or plug any tank fill inlet valves (such as (L17) in the Great Plains plumbing system).
2. Check that tank valves (such as discharge, transfer, selector) are configured and ready for use. In the Great Plains tank plumbing system, this would be: (L13) tank discharge valves open to selector valve (L15) selector valve open to tanks and pump
3. On suitable ground, raise the applicator.

DANGER

Possible Agricultural Chemical Hazard:
Avoid contact with skin or eyes. Wear proper protective equipment as required by chemical manufacturer. Avoid prolonged breathing of chemical fumes. Wear respirator as required by chemical manufacturer. Some chemicals will cause serious burns, lung damage, and death. Seek medical assistance immediately if accident occurs. Know what to do in case of accident.

NOTICE

Pump No-Flow Risk:
The hydraulic[a] pump must be primed. The liquid level in the tank must be at a higher elevation than the pump inlet. The top of the pump must be fitted with either an air bleed line to the top of a tank, or a manual bleed valve. The bleed line must be open at least until the pump if filled with material.

When tanks and pump are ordered, the factory configuration includes an air bleed line from the hydraulic pump to one of the tank lids. User-configured systems must make provision for pump priming.

a. The ground drive pump is a positive displacement piston type, and normally self-primes at any liquid level.

Liq: Monitor Operation (Option)

Refer to Figure 42

With the optional hydraulic drive pump, the optional SCS 450 console monitors fertilizer flow, field speed, and manifold pressure. It operates the control valve to deliver fertilizer at your desired rate.

Once setup for the applicator and preferences, and configured for the rates/limits, the monitor is typically used in the “RATE 1” or “RATE 2” FLOW CONTROL modes.

Liq: Starting Application with Console

1. Enter the tractor cab.

Refer to Figure 42

2. At the console, set the POWER switch ON.
3. Set the MASTER switch to ON.
4. Set the BOOMS 1 or BOOMS 1,2&3 switch[a] on to ON
   all others don’t-care (suggest OFF).
5. Select the desired RATE preset.
6. Engage the remote for the hydraulic drive pump. Advance lever to preset for +35% of desired rate.
7. Lower applicator to operating depth (if not already lowered) and begin first pass.

See SCS 450 manual for monitor operation details.

Suspending Application

With the hydraulic drive pump option, material continues to flow if the implement is raised while in motion. To conserve material and prevent unintended application, set the MASTER switch to OFF when raising.

When stopping, operating the MASTER switch is not usually necessary, if the console has an active speed sensor data source.

If suspending application for more than a minute, also set the pump motor hydraulic circuit to Float.

No console actions are required to suspend application with ground drive (preset or variable rate).

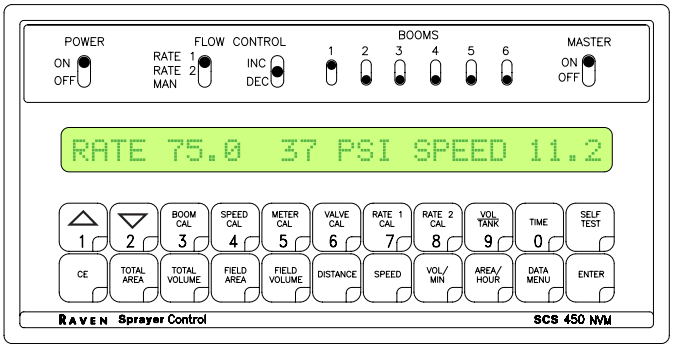


Figure 42 32105
Typical Application Display

Liq: Stopping Application

1. Ground Drive: If possible, plan final passes so that they occur prior to tank run-out. This keeps the pump wet. If you do exhaust the material, refill with water.
2. At completion of application, apply almost all of the remaining fertilizer on the last field. Refill the tank with clean water.
3. Set application rate to maximum to shorten the remaining steps:
   - Ground Drive: Exchange the ground drive driving sprocket to obtain High Range (page 94).
   - Ground Drive: Set the pump dial to 10 (page 95).
   - Hydraulic Drive: Set the console (Option) for maximum rate.

NOTICE

Piston Pump Damage Risk:
When configuring the ground drive pump for high rates, check the chart, slide chart or CDS-John Blue web calculator to determine the maximum field speed that stays at or below the pump’s maximum rated rpm.

4. Apply the water to the final field to flush system.
5. Close shut-off valves on both sides of all hose connections.

Liq: Unhitch Liquid Nurse Tank

6. Disconnect all tank-applicator couplers.
7. Disconnect the safety chains.
8. Remove the hitch pin. Move the trailer hitch off the applicator’s draw bar.

a. The standard configuration uses only Valve 1. If optional section control is installed, also engage BOOMS switches 2 and 3.

Field Set-Up Checklists

Use the following tables to develop a final checklist for your tractor/fertilizer applicator configuration. Additional or fewer steps may be necessary depending on tractor features, fertilizer applicator options and planting accessories.

Mechanical Checklist (Tractor Hitching)	Page
☐ Fertilizer Applicator hitched	36
☐ Stands stowed	42

Electrical Checklist	Page
☐ Verify electrical hookups solid	40
☐ Turn optional console POWER switch to ON. Check console and observe any diagnostic messages	[a]

a. Refer to console manual.

Hydraulic System Checklist	Page
☐ Check tractor hydraulic reservoir full	-
☐ Make hydraulic connections	41
☐ Inspect connections for leaks	-
☐ Perform a raise operation (leave transport locks in)	48
☐ Unfold Implement	51

Row Units Checklist	Page
☐ Check row cleaner setup (Option)	87
☐ Check tubing connections to tines	-
☐ NH_3: Check tine outlet behind shoes	
☐ NH_3: Check shoe condition	
☐ NH_3: Check tine shoes all at same height	
☐ NH_3: Check tine shank alignment	
☐ Liq: Check outlet behind arms	-
☐ Check coulter blade condition	-
☐ Check coulter depth	82
☐ Check NH_3 sealer adjustments	80
☐ Check spider condition	

Mechanical Checklist (post-Hitching)	Page
☐ Raise implement.	48
☐ Disengage transport locks	50
☐ Check front-to-rear level	43
☐ Check side-to-side level	84, 124
☐ Set application height	82

NH_3 System Checklist (Cart Unhitched)	Page
☐ Shut-off rope routed to tractor cab	39
☐ Emergency shut-off valve closed	55
☐ On/off solenoid valve closed	55
☐ Control valve closed	55
☐ Console POWER switch off	55
☐ All bleed valves closed (3 or more)	56
☐ Breakaway coupler mated (visual check)	56
☐ All hydrostatic relief valve caps seated	56

Plumbing System Checklist (Prior to Tank Connection)	Page
☐ Liq: Orifice plate size matches rate	91
☐ Fittings all secure	-
☐ Liq: Relief valve adjusted	94
☐ Liq: Pump rate set	94
☐ Liq: Strainer recently cleaned	119
☐ Liq: Inlet shut-off valve closed	30

Mechanical Checklist (Cart Hitching)	Page
☐ Nurse tank hitched	70
☐ Hitch pin locked	
☐ Safety chains secured	70

NH_3 Checklist (Cart Hitched)		Page
☐	Check breakaway firmly mated	58
☐	Check breakaway swivel function	58
☐	Remove inlet Acme cap.	58
☐	Inspect inlet with mirror.	58
☐	Check withdrawal valve and all nurse tank hose valves closed	59
☐	Check for signs of liquid NH_3 in hose	59
☐	Separate hose and Acme plug	59
☐	Route hose to breakaway	59
☐	Connect hose to breakaway	59

Plumbing Checklist		Page
☐	Tank(s) loaded	-
☐	Supply hose shut-off valve closed	30
☐	Liq: Discharge valve(s) open to pump	30
☐	Liq: Vent (if any) open	30
☐	Tank hose(s) routed to applicator connectors, mated and locked	33
☐	Hose slack adjusted.	33
☐	Unused hoses secured	-

Field Operation Checklists

Perform all steps in "**Pre-Start Checklist**" on page 47 and "**Field Set-Up Checklists**" on page 74. The applicator is presumed to be unfolded and raised.

Note: These are merged anhydrous (NH_3) and conventional liquid (Liq) lists. NH_3/Liq: refer to material-specific operations. Some steps may refer to Optional equipment.

	First Pass Operation Checklist	Page
1	Raise fertilizer applicator.	48
2	Unfold, if not already unfolded.	51
3	Line-up at pass start per plan.	-
4	Pull forward and stop.	-
5	Check console POWER switch ON, BOOMS[a] switch(es) ON and MASTER switch OFF	73
6	NH_3: Re-check all line valves and bleed valves closed.	61
7	NH_3: Open tank withdrawal valve. Check for zero releases.	61
8	NH_3: Open applicator emergency shut-off valve. Check for zero releases.	61
9	NH_3: Open nurse tank hose inlet valve (if any). Check for zero releases.	62
10	NH_3: Open nurse tank hose outlet valve (if any). Check for zero releases.	62
11	Liq: Open tank supply hose outlet valve.	33
12	Liq: Open applicator supply inlet shut-off valve.	30
13	NH_3: Check meter pressure gauge matches tank pressure gauge.	62
14	NH_3: Enter tractor cab. Check ropes present with nominal slack.	73
15	Console (Option): POWER on MASTER on RATE as desired	73
16	Lower applicator: a. hitch (lower, then Depth Control) b. wings (extend, then low rate continuous extend)	48
17	Begin first pass, setting switch MASTER to ON.	73
18	Liq: Hydraulic remote for hydraulic pump to preset	71
19	Monitor the console (Option) for expected reports of application rate/speed, and any alarms.	-
20	Periodically check the applicator gauges for expected pressures and temperatures.	-
21	Pay attention to odors. Watch for leaks.	-

a. BOOM 1, or BOOM 1,2,&3 (section control)

	Pass Turn[a] Operation Checklist	Page
1	Set console MASTER switch OFF some distance before end of pass, or stop at end of pass.	63
2	NH_3: To minimize vapor release, wait for flow divider pressure gauge to read zero during final pass distance or while waiting at end of pass.	48
3	While slowing at end of pass, or stopped	-
4[b]	Fold and lift (to partially fold wings)	51
5[b]	Raise 3-point hitch	-
6	Turn up-wind if possible. Turn slowly to avoid tank cart upset. Do not turn too tightly.	63
7	Make turn. Line up for next pass.	
8	Lower applicator (same as step 16) for First Pass, at left.	
9	Begin pass, setting switch MASTER to ON.	73
10	Begin next pass	

a. Monitor flow divider pressure during end-of-pass operations and turns. Adjust operations as needed if true zero pressure is desired.

b. These steps are for a full stop prior to a turn. If the lift is conducted while in motion, the exact order of hitch and lift-assist raising is not critical. The objective is to avoid any reverse motion of tines.

Short-Term Parking

1. Conclude application per "**NH3: Stopping Application**" on page 64 and/or "**Liq: Stopping Application**" on page 73.
2. Unhitch nurse tank per "**NH3: Final Nurse Tank Unhitch**" on page 67 or "**Liq: Unhitch Liquid Nurse Tank**" on page 73.
3. Choose an applicator parking location with level firm ground. Do not unhitch on a steep slope.
4. Recover emergency shutoff rope from tractor. Store on applicator.
5. Fully raise applicator (page 48).
6. Fold applicator (page 51).
7. Engage lift-assist transport locks (page 50), and deploy parking stands (page 42).
8. Lower applicator onto locks/stands.
9. Set FOLD / FIELD switch to PARK.
10. Set all hydraulic circuits to Float.
11. Shut off tractor.
12. Disconnect hydraulic lines. Secure them so that they do not touch the ground.
13. Disconnect electrical cables, capping where provisioned.
14. Disconnect any safety chain. Unhitch. Restart tractor and pull away from fertilizer applicator.

Long-Term Storage

NOTICE

Equipment Damage Risk:
Ground Drive: Keep the piston pump wet. Fertilizer suffices for short-term parking. Flush with water for longer term parking. Add RV antifreeze for winter storage. See page 118. Failure to properly care for your pump and other cart components can lead to serious equipment damage in a relatively short span of time.

1. Conclude application per "**NH3: Stopping Application**" on page 64 and/or "**Liq: Stopping Application**" on page 73.
2. Unhitch nurse tank per "**NH3: Final Nurse Tank Unhitch**" on page 67 or "**Liq: Unhitch Liquid Nurse Tank**" on page 73.
3. Choose an applicator parking location with level firm ground. Do not unhitch on a steep slope.
4. Fully raise applicator (page 48).
5. Flush and fill pump per page 118.

   If possible, remove pump from applicator and store indoors above freezing temperatures.
6. Clean applicator of mud, dirt, excess oil and grease.
7. Lubricate all points listed in Maintenance.
8. Apply grease to exposed cylinder rods to prevent rust.
9. Inspect applicator for worn or damaged parts. Make repairs and service during off season.
10. Use spray paint to cover scratches, chips, and worn areas on the applicator to protect the metal.
11. Fold applicator (page 51).
12. Cover applicator with a tarp if stored outside.

Adjustments

To get full performance from your NP3000 and NP3000A fertilizer applicator, you need an understanding of all component operations, and many provide adjustments for optimal field results. Some of these have been covered earlier in this manual.

Even if your planting conditions rarely change, some of these items need periodic adjustment due to normal wear.

Adjustment	Page	The Adjustment Affects
Hitch Class	37	Tractor compatibility
Frame height	84	Application height consistency
Frame Level, front to back	43	Application consistency
Wing Level	124	Application depth consistency
Weight Transfer	85	Application depth consistency
Lift-Assist Valve Setup	161	Lift-Fold Priority
Row Adjustments	79	
Anhydrous Coulter Application Depth	79	
Vantage I Coulter Adjustments	82	
Anhydrous Fertilizer Rate	61	Application rate
Conventional Liquid Fertilizer Rate	88	Application rate
Select and Install Orifice Plates	91	Consistent application rate across rows
Ground Drive Range	94	Minimum and maximum application rate.
Strainer Adjustment	93	Minimize cavitation and orifice clogging.
Ground Drive: Setting Relief Valve	94	Prevent system damage and material loss.
Ground Drive: Set Pump Drive Range	94	Set coarse application rate.
Ground Drive: Set Pump Rate Dial	94	Set fine application rate.
Hydraulic Drive: Pump Pressure	96	Correct pressure range for desired flow
Hydraulic Drive: Fertilizer Rate	Raven[a]	Application rate
Fertilizer Relief Valve (Option)	94	System protection; minimizing material waste
Terra-Tine™ Row Cleaners (Option)	87	Row preparation
Caster Stabilizers	130	Eliminate caster vibration in transport
Side Dress (Accessory)	164	Application between rows

a. See 016-0159-831 Raven SCS-450 Installation, Operation and Service manual, or aftermarket console manual.

Row Adjustments

Anhydrous Coulter Application Depth

Applies to model NP3000A only.

Refer to Figure 43

Tine release depth ① is set by tool bar height ② above the ground, coulter shank height ③ and tine height ④.

CAUTION

Chemical Hazard:

Adjust height dry. Make adjustments before charging the metering system with anhydrous ammonia, or after thoroughly discharging the system. With the tines out of the ground, there could otherwise be releases of ammonia at dangerous concentrations.

Tool bar height is controlled by the tractor hitch in the center section. Wing tool bar height is set to match the center using a crank-assisted manual adjustment (page 84).

Tine height ④ is adjusted at the mount ⑤. This requires adjustment as the coulter blades wear. Loosen the nuts on the U-bolts ⑥. Lower the shank and re-tighten.

Design coulter operating depth is 3 to 7 in (7.6 to 18 cm). Operation below 7 in (18 cm) is not recommended, as high rates of disc wear are likely.

Application depth is unaffected by the coulter spring ⑨ (page 121) and sealer spring ⓢ (page 80) settings.

Depth Reference Information

These are the factory settings.

Shank height below tool bar is:
③ $11\frac{11}{16}$ in (29.7 cm)

Overall height of the tool bar base to coulter edge is:
⑦ $32\frac{9}{32}$ in (79.5 cm)

At factory settings, NH_3 is released from the tube at:
④ $\frac{3}{8}$ in (9.7 mm) above the lower coulter edge.
For a precise release depth, subtract this amount from the total coulter depth ⑧.

Anhydrous Coulter Castering

Coulters may be operated locked in-line, or with limited free castering.

Refer to Figure 44

To lock the coulter, loosen the jam nut at ⓐ. Align the coulter front to back. Tighten the set screw at ⓐ, then the jam nut.

To unlock the coulter, loosen the jams nut at ⓐ. Loosen the set screw bolts at ⓐ, then tighten the jam nuts.

Note: Do not loosen the stop bolts ⓑ.

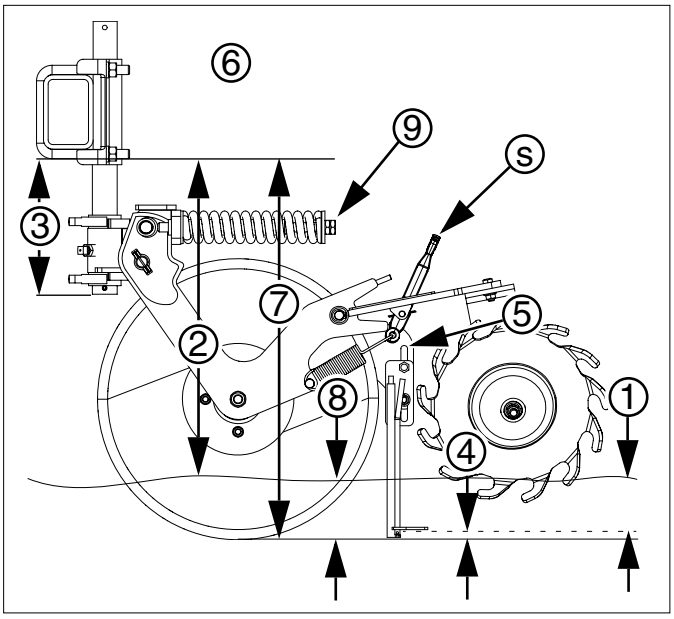


Figure 43 34929
NH_3 Application Depth

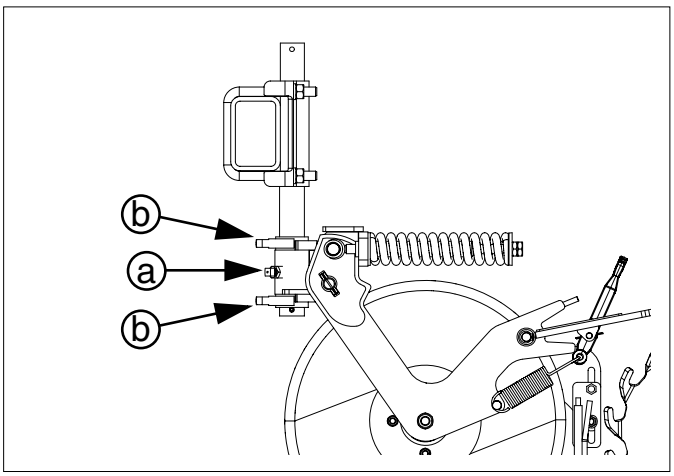


Figure 44 34929
Anhydrous Coulter Castering

Anhydrous Coulter Blade Wear

Blade wear is normal and the rate of wear varies with field conditions and operating depth. Consider replacing the blade when the initial diameter has been reduced by 1 to 2 inches.

Note: Although a nominal 22 inches in diameter, blades are lightly larger.

NH_3 Sealer Adjustments

The standard NP3000A spider sealers have three adjustments. You may need to alter these from factory settings, based on soil conditions, crop residue and application speed.

Refer to Figure 45

1. Down-pressure: T-handles ① set the arm spring tension. The adjustment plates ④ have 3 settings.
2. Spacing: The arm weldments have 8 bolt holes ② allowing 2 setback positions and 2 spacing positions.
3. Angle: The sealer mount plates ③ have 4 holes: 2 in-line ⑤, and 2 extra holes ⑥, slightly offset, providing an angle adjustment.

These adjustments are most easily made with the applicator raised. The down-pressure adjustment may be made with rows in the ground, with some extra effort.

⚠ CAUTION

Chemical Hazard:

Adjust sealers with rows dry. Make adjustments before charging the metering system with anhydrous ammonia, or after thoroughly discharging the system. With the tines out of the ground, there could otherwise be releases of ammonia at dangerous concentrations.

Sealer Down-Pressure Adjustment

The following trip down-pressures are available. These values are per sealer arm, and are with the coulters in the ground, and arms slightly raised per nominal factory assumptions (as depicted in Figure 43 on page 79).

Note: With the applicator raised, position ⓐ has minimal spring tension.

Handle Slot	Down-Pressure	
ⓐ Rear/Lowest	12 pounds	5.4 kg
ⓑ Mid/Medium	17 pounds	7.7 kg
ⓒ Forward/Max.	28 pounds	12.7 kg

Sealer Spacing or Setback Adjustment

For in-line (parallel) sealer wheel running, use the center holes ⑤ in the mount plates ③. In-line orientation is recommended for high-residue fields.

Sealer Angle Adjustment

10° of leading toe-out (20° total) is available by using the inner center hole of the mount plate and the leading offset hole ⑥. No setback adjustment is available when using toe-out. Toe-out is not recommended for high-residue fields.

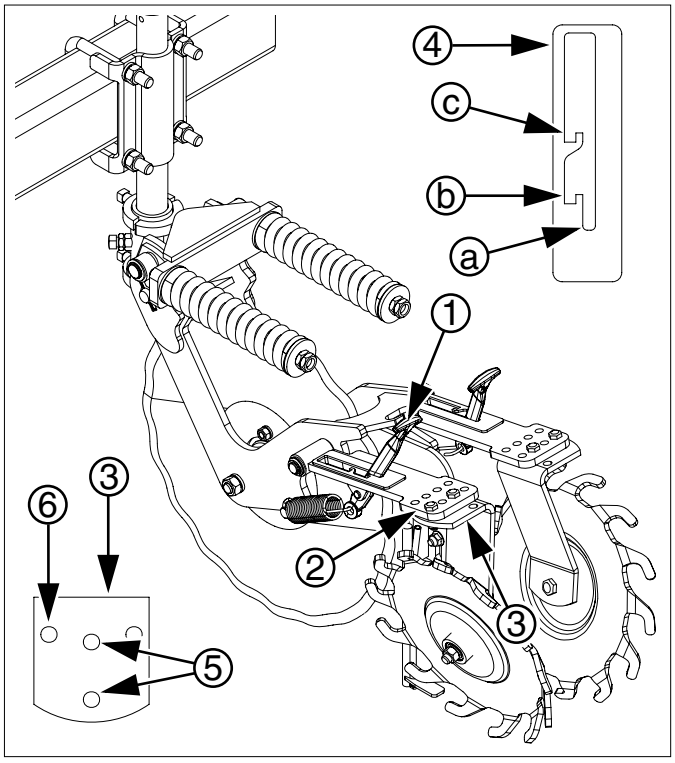


Figure 45
Sealer Adjustments
34931

Terra-Tine™ Adjustments (Option)

Note: All adjustments must be made with the applicator in the fully raised position.

Refer to Figure 56

NOTICE

Excess Wear Risk:
Check that the Terra-Tine™ Row Cleaner tines DO NOT touch the coulter blade or any other attachments. Such contacts cause excess wear to all parts involved. At least 1/2 in. (13 mm) clearance is recommended.

1. When the blade is out of the soil, adjust the lock collar height to set the height of tine fingers flush with the bottom of coulter blade.
2. Side-to-side alignment can be done by rotating the shank mount around the vertical shaft and retightening the square head set screw.
3. The factory setting for Terra-Tine™ height is a distance of 5.4 in. (13.7 cm) from frame bottom to top of Terra-Tine™ mount.

   Height may be adjusted at the mount set screw, or at the frame clamp. Changing arm angle ① also changes tine height.
4. The factory setting for arm angle is minimum ① (pivot mount hole closest to Terra-Tine™ mount).

Terra-Tine™ Down Force

Refer to Figure 57

A series of three holes in the spring adjuster ① and pivot mount plate ② provide five combinations for different levels of spring tension. The following table shows the down-force levels available.

Terra-Tine™ Spring Tension (per Tine Disc)		
Position	Newtons	Pounds
1	53	12
2	76	17
3	98	22
4	120	27
5	138	31

31875

Note: Changing force also changes height.

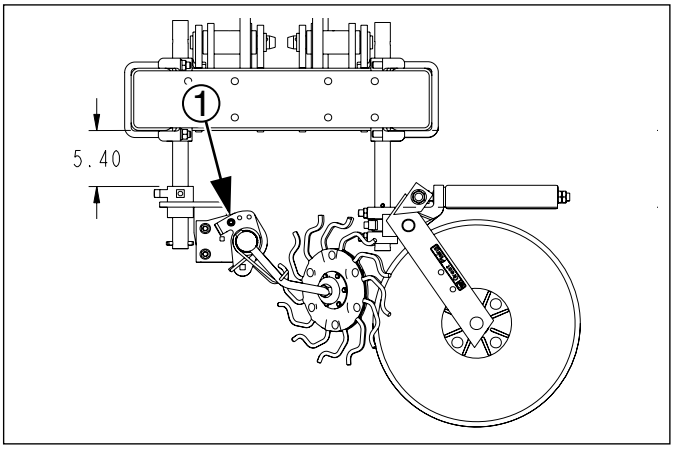


Figure 46
Terra-Tine™ Height

31658

Note: All adjustments must be made with the applicator in the fully raised position.

Note: The factory setting is an initial setting. Vary it as needed for your field condition and application needs.

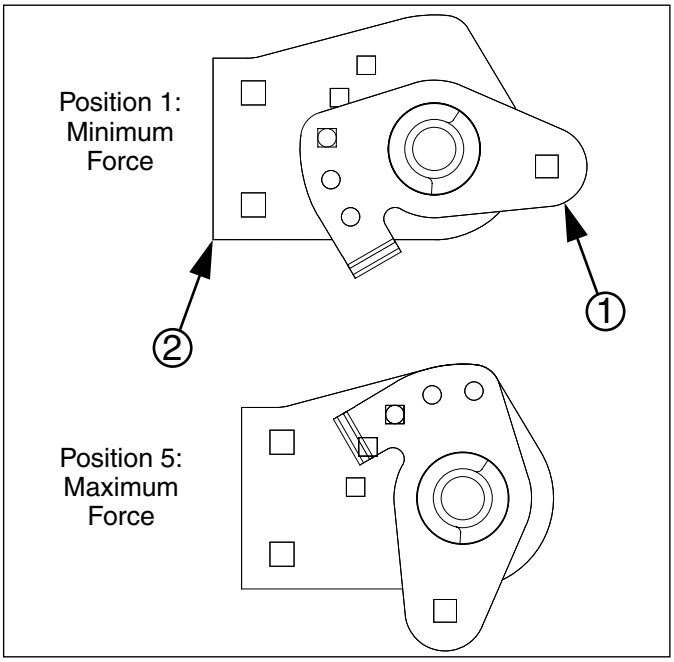


Figure 47
Terra-Tine™ Force

13156

Vantage I Coulter Adjustments

Applies to model NP3000 or NP3000A with optional liquid capability.

Fertilizer release height is normally at or just above the ground, and is controlled by three adjustments:

Refer to Figure 48

1. Tool bar height:
   This affects coulter depth. The procedure for setting tool bar height varies with hitch type:
   See page 84
2. Fertilizer arm height (page 83):
   This affects arm height relative to the coulter.
   This adjustment is primarily to compensate for blade wear.
3. Coulter height (page 83):
   This affects coulter height relative to the tool bar, and is normally not adjusted.

Factory settings:
25 in. (63.5 cm) above ground at 4 in. coulter depth
7.5 in. (19.1 cm) coulter shank distance
1 in. (2.5 cm) release height

Vantage I Coulter Force

Coulter springs are set to 400 pounds (181 kg).
In normal operation at target running depth, the spring is at full extension. It compresses briefly as obstructions are encountered.

- In heavy no-till conditions, you may observe the springs in compression most of the time. This means that the blades are not reaching the desired coulter depth. If applicator weight is available, you can increase the spring down-force to compensate.
- In light but rocky conditions, the factory spring setting may be higher than needed. You can extend blade life by reducing the force at which the blades ride up over obstructions.
- Applicator weight, in almost all applicator configurations, is generally sufficient to load the coulters to the full 400 pound factory setting.

  Setting all springs above 400 pounds might require the optional weight kit with some lighter triple-coulter configurations.

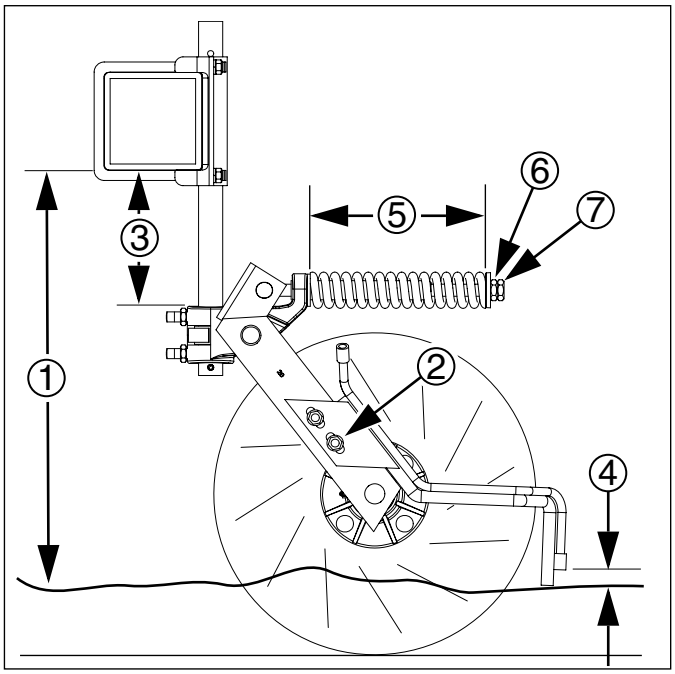


Figure 48
Vantage I 20in Coulter
31655

To adjust the coulter spring:

Refer to Figure 48

1. Raise the applicator and install transport locks. See "**Raising/Lowering Applicator**" on page 48.
2. Determine the new spring length ⑤ desired.

Spring Length	Force at Blade
10.25in (26.0 cm)	300 lbs. (136 kg)
10.0in (25.4 cm)	400 lbs. (181 kg)
9.75in (24.8 cm)	525 lbs. (238 kg)

31197

3. Measure the current length of the spring(s) to be changed. If already as short as $9\frac{3}{4}$ in. (24.8 cm), or as long as $10\frac{1}{4}$ in. (26 cm), do not further adjust them.
4. Loosen the jam nut ⑥.
5. Rotate the adjuster nut ⑦ until the spring is at the new length. Tighten the jam nut.

Note: If all springs are continuously in compression, the coulters can lift the wing frames off the ground (at the gauge wheels), resulting in uneven coulter depth and/or uneven seed depth. If the applicator is already operating at maximum down-pressure, reduce coulter depth.

Vantage I Coulter Height and Castering

Coulter height is the main control for application height. Coulters may need to be lowered for rows in tracks. Coulters applicator-wide need adjustment as blades wear.

If desired coulter depth cannot be achieved due to challenging soil conditions, consider installing the optional weight kit (page 141 and page 175).

Coulters may also be set for rigid row alignment, or limited castering.

Refer to Figure 49

1. The factory setting for coulter height ③ is a distance of 7.5 in (19.1 cm) from frame bottom to top of coulter mount casting.

   At a tool bar height ① of 25 in (63.5 cm) above ground, this is a blade depth ② of 4 in (10.2 cm).
2. For fields where frequent sharp turns are unavoidable, you can reduce coulter plowing by allowing the coulters to caster at the pivot casting. Loosen the jam nuts at ⑤. Loosen the set screws just enough to allow the casting to swivel. Re-tighten the jam nuts. Do not remove the center stop screw.
3. As blades wear, keep the release height ④ constant by raising the applicator weldment on the coulter arm. Loosen the bolts ⑥. Slide the weldment up. Tighten the bolts.

   If the application height is still too low after this adjustment, the coulter blades may be worn and in need of replacement.

Refer to the Vantage I manual (204-376M) for further coulter adjustments.

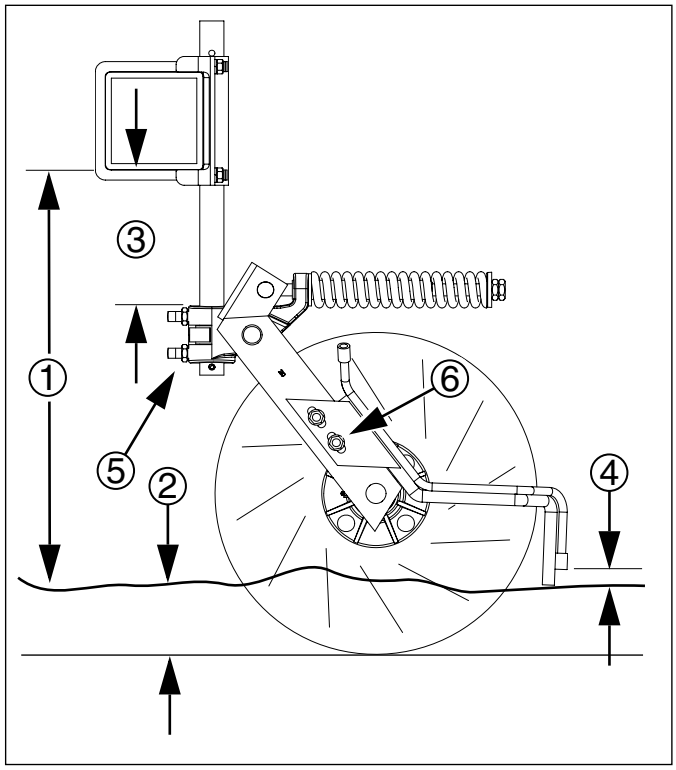


Figure 49 31655
Vantage I Coulter, Left

Vantage I Blade Wear

Blade wear is normal and the rate of wear varies with field conditions and operating depth. Consider replacing the blade when the initial diameter has been reduced by 1 to 2 inches.

Note: Although a nominal 20 inches in diameter, blades are lightly larger and vary slightly with blade style.

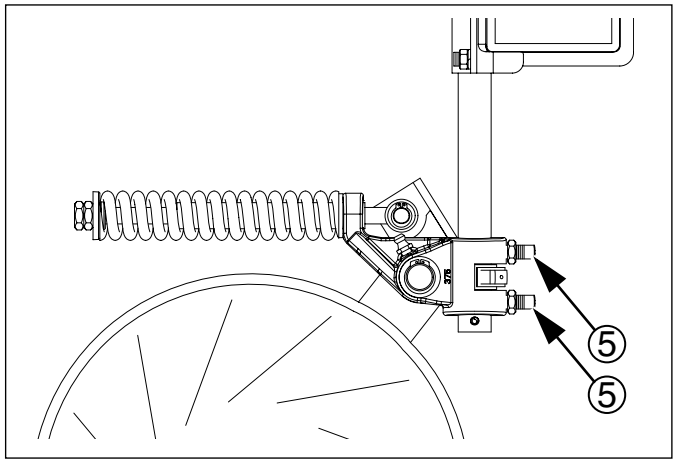


Figure 50 31597
Vantage I Coulter, Right

Tool Bar Height Adjustment

Center section tool bar height is set by the tractor hitch. Lift-assist spacers (page 43) must be selected and in place to assure front-to-back level.

Wing end tool bar height is set by independent gauge wheels on each wing end. Wings are maintained at level in the field with the weight-transfer system (page 85).

1. Move to smooth level ground with soil as similar as possible to field conditions. Set tractor brakes.
2. Determine the desired coulter depth.
3. Unfold the applicator (page 51).
4. Raise the applicator to bring the wing coulters off the ground, and the wings slightly above level.

Refer to Figure 51

5. At each gauge wheel, use the crank ① to remove tension at the pin ②. Remove the pin.
6. Use the crank to extend the wheels far enough to keep the wing coulters off the ground.
7. Unfold the wings until the gauge wheels are on the ground. Set fold/lift circuit to Float.
8. Use the 2-point hitch to lower the applicator until the center section coulters are just at ground level.
9. Check frame front-to-back level and adjust spacers (page 43) as necessary.
10. Adjust the gauge wheel heights to bring the wing coulters to the same height as the center section (just above the ground).
11. Measure the length ③ of exposed gauge wheel tube.
12. Crank the wheel up by the desired coulter depth (exposed tube length becomes length ③ minus the coulter depth). Capture this setting by re-inserting and securing the pin ②.
13. Crank the wheel up until the tube solidly contacts the pin. This transfers wheel loads to the pin, and not to the crank.
14. At the center section, measure the tool bar height above the ground. Operating height is this distance less the desired coulter depth.
15. Pull forward, lowering the 2-point hitch to operating height. Set a stop on the 2-point circuit to capture this height.
16. Adjust weight-transfer (page 85) to hold wings level at this coulter height for these field conditions.

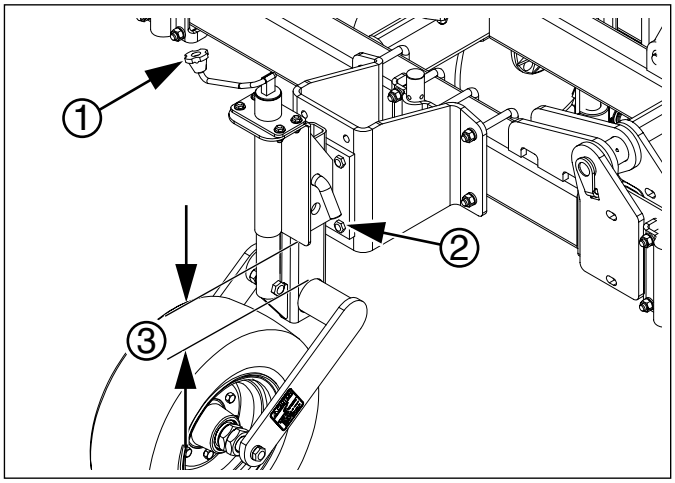


Figure 51 32354
Gauge Wheel Adjustment

NOTICE

Equipment Damage Risk:
Use the pin ②. Crank the tube up against the pin. Wheel loads transmitted to the crank can damage the crank.

Note: Turn crank clockwise to raise applicator (lower wheel), and counterclockwise to lower applicator (raise wheel).

Note: At maximum height, the coulters are off the ground. This configuration is useful for unfolded parking, storage and service.

Make a record of the setting needed for coulter depth prior to setting for maximum.

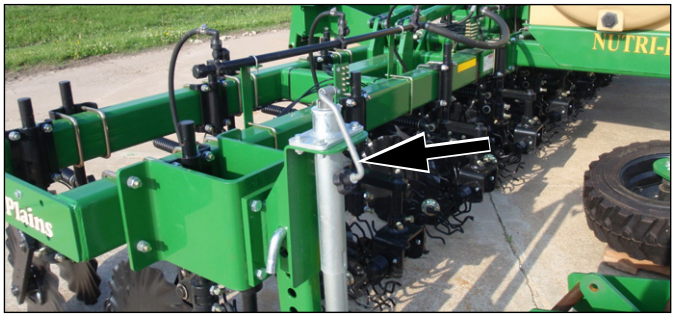


Figure 52 32170
Jack Handle Adjustment

Note: Prior to folding, fold the jack handle down alongside the jack body. This retains the jack handle and prevents it from hitting the fertilizer tanks when folded (if so equipped).

Weight Transfer Adjustment

Weight Transfer Safety Information

DANGER

Crushing and High Pressure Fluid Hazards:
This adjustment requires working near the unfolded and lowered implement with the hydraulic system active. Assign two people to this task, one in the tractor, ready to shut down on hand signal from adjuster or any unplanned event.

WARNING

High Pressure Fluid Hazard:
Escaping fluid under pressure can penetrate the skin causing serious injury. Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks. Wear protective gloves and safety glasses or goggles when working with hydraulic systems. If an accident occurs, seek immediate medical attention from a physician familiar with this type of injury.

WARNING

Crushing Hazard:
Keep body parts clear of wings, row cleaners and coulters while adjusting. Keep all bystanders well away. You will be seriously injured or killed if you are caught between lowering row implements and ground.

Refer to Figure 53 and Figure 54
Wing fold cylinders can extend, during field operation, to push the wings down using mainframe/center weight. Weight transfer is controlled by two adjustment valves (① and ②). See circuit diagram on page 157.

The fold circuit is set to continuous flow (in unfold mode) to maintain the active weight transfer.

The pressure reducing valve ① controls the flow to the cylinders.

The bypass valve ② returns excess oil to the tractor.

Adjust the weight transfer to achieve consistent coulter depth, while keeping the wings level with the center section. If insufficient weight is transferred, outside (wing) coulters may run higher than center section. If too much weight is transferred, center section may run high.

If adjusted when the tractor is cold, re-adjustment may be required when the oil warms. Monitor the pressure gauge during early field operations.

CAUTION

Falling Hazard - Tires Not a Step:
Do not use tires as steps or platforms. At some transfer settings, cylinders can lift wheels sufficiently for them to spin.

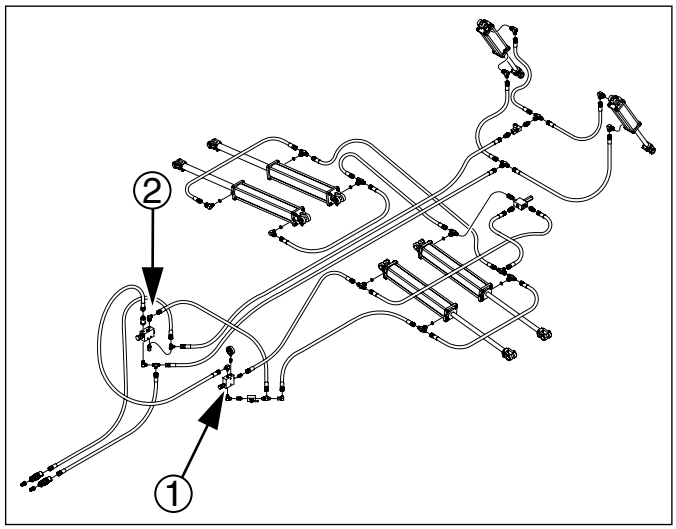


Figure 53 31944
3P Weight Transfer

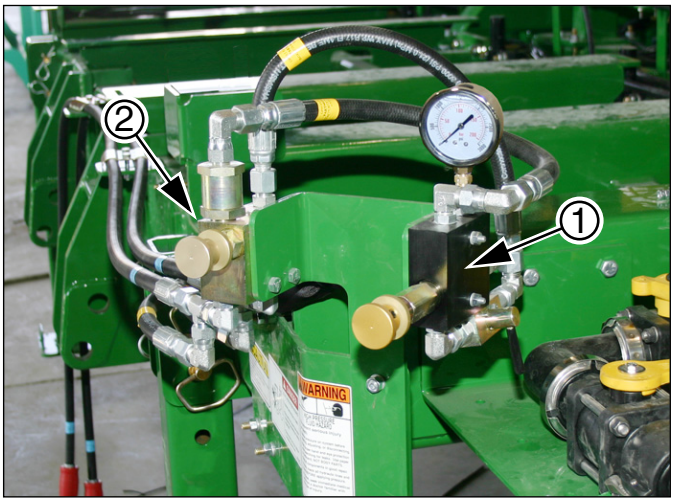


Figure 54 32041
Weight Transfer Valves

Refer to Figure 53, Figure 54, Figure 55

1. In field conditions, unfold (page 51), lower implement (page 48), and set or check coulter depth (page 83).
2. Pull forward to put coulters in ground.
3. Put tractor in Park and set parking brake.
4. Close the lift-assist valve ③.
5. Release the bypass valve lock disc ④. Turn the bypass valve knob ⑤ fully clockwise to shut-off all bypass oil flow. Tighten lock disc.
6. Set tractor to half throttle. Adjust tractor flow control valve so that wings fold/unfold at a reasonable speed. Keep tractor running for step 7 through step 10.

Note: On 2-point implements, fold and unfold are followed by lift and lower operations.

7. Set tractor remote circuit for unfold. Lock lever for continuous operation.
8. At the pressure reducing valve ①, release the lock disc ⑥.
9. Adjust the knob ⑦ for an initial value of 800 psi on the gauge ⑧. Tighten the lock disc.
10. At the bypass valve ②, release the lock disc ④. Adjust the bypass valve knob counter-clockwise until the pressure reading just begins to fall from the value set at step 9. Turn the knob clockwise ¼ turn. Tighten the lock disc.
11. Observe implement operation, and re-adjust down-pressure as necessary after oil warm-up. Repeat step 7 through step 10. The bypass valve needs to be closed prior to any adjustment to increase weight transfer.

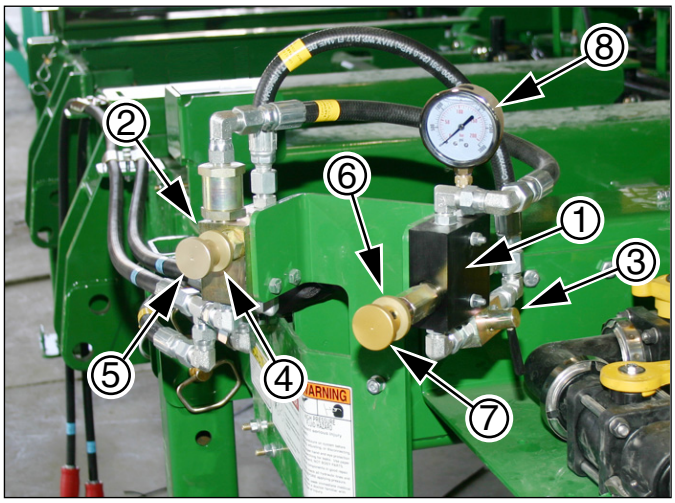


Figure 55 32041
Weight Transfer Adjustment

Terra-Tine™ Adjustments

Note: All adjustments must be made with the implement in the fully raised position.

Refer to Figure 56

NOTICE

Excess Wear Risk:
Check that the Terra-Tine™ Row Cleaner tines DO NOT touch the coulter blade or any other attachments. Such contacts cause excess wear to all parts involved. At least $^1/_2$in (13mm) clearance is recommended.

1. When the blade is out of the soil, adjust the lock collar height to set the height of tine fingers flush with the bottom of coulter blade.
2. Side-to-side alignment can be done by rotating the shank mount around the vertical shaft and retightening the square head set screw.
3. The factory setting for Terra-Tine™ height is a distance of 5.4 in (13.7 cm) from frame bottom to top of Terra-Tine™ mount.

   Height may be adjusted at the mount set screw, or at the frame clamp. Changing arm angle ① also changes tine height.
4. The factory setting for arm angle is minimum ① (pivot mount hole closest to Terra-Tine™ mount).

Terra-Tine™ Down Force

Refer to Figure 57

A series of three holes in the spring adjuster ① and pivot mount plate ② provide five combinations for different levels of spring tension. The following table shows the down-force levels available.

Terra-Tine™ Spring Tension (per Tine Disc)		
Position	Newtons	Pounds
1	53	12
2	76	17
3	98	22
4	120	27
5	138	31

31875

Note: Changing force also changes height.

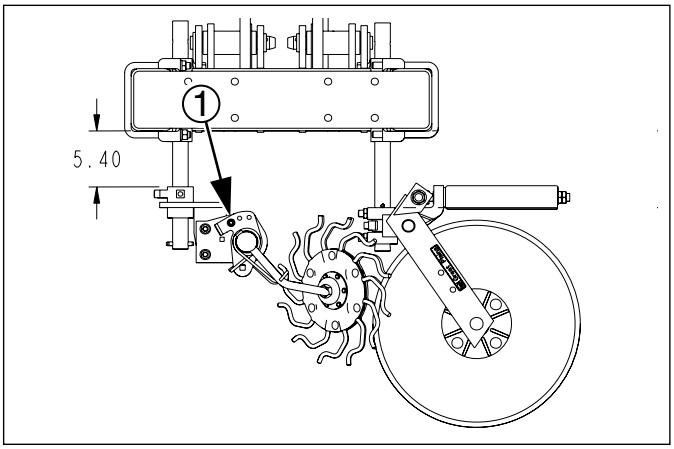


Figure 56 31658
Terra-Tine™ Height

Note: All adjustments must be made with the implement in the fully raised position.

Note: The factory setting is an initial setting. Vary it as needed for your field condition and application needs.

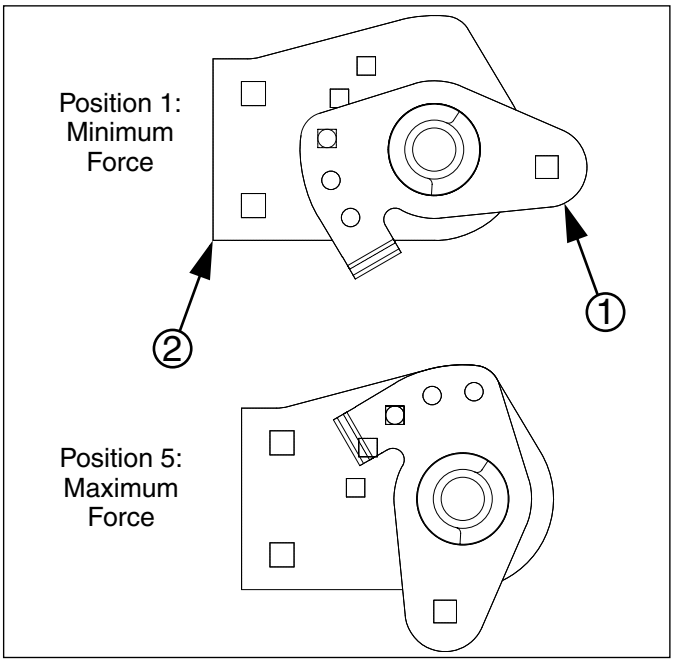


Figure 57 13156
Terra-Tine™ Force

Fertilizer Rates

Anhydrous Fertilizer Rate

Rate setting for anhydrous ammonia is controlled entirely by the console. For the Raven SCS 450 available from Great Plains, see page 44.

Conventional Liquid Fertilizer Rate

Rate setting is materially different for each pump type:

- Ground Drive: rate is positively set by the drive system and piston pump dial.
- Hydraulic Drive: rate is set on the console.
  The console operates a flow control valve. The valve adjusts the rate up to the peak value available at the current setting for hydraulic pump rpm.

Make adjustments to orifice plates to provide back-pressure, keeping the boom within a specific safe pressure range that assures consistent delivery.

Rate Setting Steps:

1. Determine the rate (below).
2. Install suitable orifice plates (page 91).
3. Check strainer screen size (page 93).
4. Ground Drive: Set the ground drive Range (page 94), and ground drive dial (page 95).

   Hydraulic Drive: Set the pump pressure (page 96); set the desired rate on the console (see 016-0159-831 Raven SCS-450 Installation, Operation and Service manual).
5. Check the manifold pressure and relief valve during operation (page 94).

Determining Application Rate

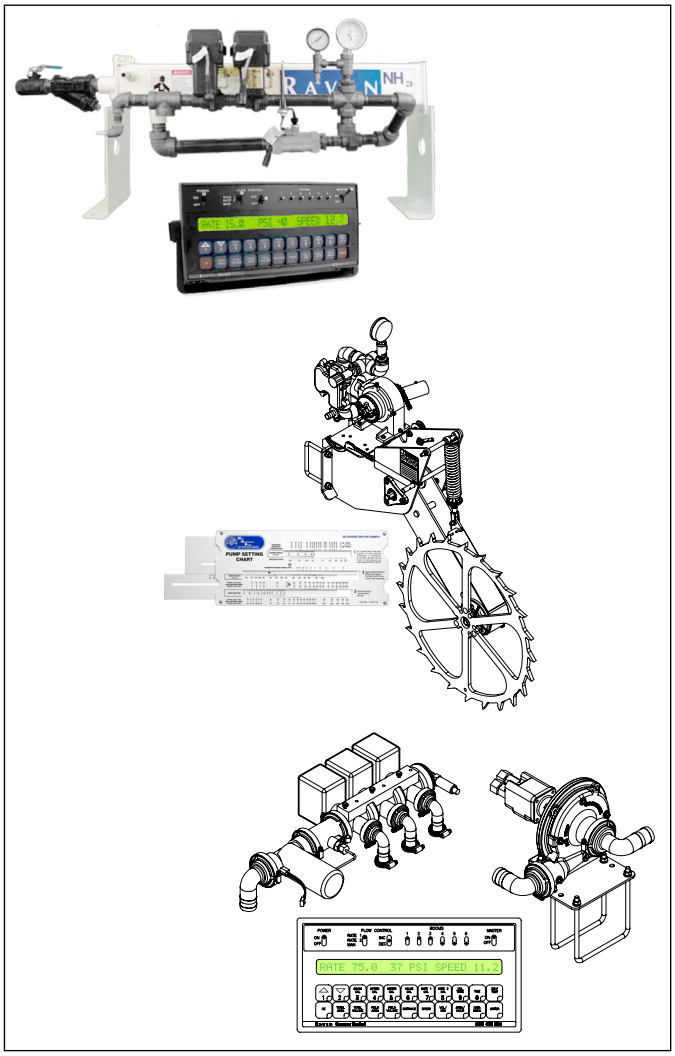
Great Plains recommends checking with your local agronomist as soil conditions vary. Soil conditions in your area may need less or more fertilizer than represented in the chart.

If your target rate is weight per area, you need to know the material density to convert it to liquid volume measure:

$$Volume\_per\_Area = Weight\_per\_Area \div Density$$

If you want to use the slide chart, and have only a metric rate value, convert it to U.S.customary units:

$$Gallons\_per\_Acre = 0.107 \times Liters\_per\_Hectare$$



Ground Drive:
The tables, and web calculator provided expect rates to be expressed as
[U.S.customary] gallons per [U.S.Survey] acre or liters per hectare.

The slide chart provided is gal/ac only.

Ground Drive Rate: NP3000-1230 Standard

NP3000-1230 Fertilizer Rate

Use the slide chart or internet calculator for more precise rate setting.

Gallons per Acre	Driving Sprocket 15 Dial Setting	Driving Sprocket 47 Dial Setting	Liters per Hectare
4	2.0		37
5	2.5		47
6	3.0		56
7	3.5		65
8	4.0		75
9	4.5		84
10	5.0		94
11	5.5		103
12	6.0		112
13	6.5	2.1	122
14	7.0	2.2	131
15	7.5	2.4	140
16	8.0	2.6	150
17	8.5	2.7	159
18	9.0	2.9	168
19	9.5	3.0	178
20	10.0	3.2	187
21		3.3	196
22		3.5	206
23		3.7	215
24		3.8	224
25		4.0	234
26		4.1	243
27		4.3	253
28		4.5	262
29		4.6	271
30		4.8	281
31		4.9	290
32		5.1	299
33		5.3	309
34		5.4	318
35		5.6	327
36		5.7	337
37		5.9	346
38		6.1	355
39		6.2	365

31657b

NP3000-1230 JohnBlue Reference Data

Use the data below with the CDS-John Blue 115797-01 slide chart or with the CDS-John Blue internet calculator.

Pump Type	(•) Piston Pump NGP-7050 Series	
Data Preference	(•) <user-specified>	
Application Rate	<user-specified>	
Drive System	(•) Ground Drive Loaded Radius: 17.55in (44.58cm)	
Swath Width	360 in (914.4 cm)	
	Drive (Required): 25 (Optional): 15 or 47 (Optional): __ (Optional): __	**Driven** (Required): 15 (Optional): 15 (Optional): __ (Optional): __
Sprocket Ratio (for slide chart)		Driving 15T: 1.67[a] Driving 47T: 5.22[b]
Ground Speed		5 mph[c] / 8 kph

a. For easier scale readings (but same net ratio), use:
Loaded Radius: 20
Sprocket Ratio: 1.9

b. For easier scale readings (but same net ratio), use:
Loaded Radius: 10
Sprocket Ratio: 3.0

c. Gallons per acre is independent of speed between 2 mph and 9 mph (3-14 kph). See advisory below.

NOTICE

Equipment Damage Risk:

Ground Drive: Plant at or below 9 mph (14.4 kph) with the 47T Driving sprocket installed. The pump is rated for 450 rpm maximum, which is exceeded at and above 9 mph (14.4 kph).

Ground Drive Rate: NP3000-1230 Side Dress (SD)

This data assumes passes are not overlapped. If overlapping passes (with reduced orifice plates or half-rate VeriFlow nozzles on end rows), use the standard 12-row data on page 89.

NP3000-1230SD Fertilizer Rate

Use the slide chart or internet calculator for more precise rate setting.

Gallons per Acre	Driving Sprocket Dial Setting 15	47	Liters per Hectare
4	2.2		37
5	2.7		47
6	3.2		56
7	3.8		65
8	4.3		75
9	4.9		84
10	5.4		94
11	6.0		103
12	6.5	2.1	112
13	7.0	2.2	122
14	7.6	2.4	131
15	8.1	2.6	140
16	8.7	2.8	150
17	9.2	2.9	159
18	9.7	3.1	168
19		3.3	178
20		3.5	187
21		3.6	196
22		3.8	206
23		4.0	215
24		4.1	224
25		4.3	234
26		4.5	243
27		4.7	253
28		4.8	262
29		5.0	271
30		5.2	281
31		5.4	290
32		5.5	299
33		5.7	309
34		5.9	318
35		6.0	327
36		6.2	337
37		6.4	346
38		6.6	355
39		6.7	365

31657c

NP3000-1230SD JohnBlue Reference Data

Use the data below with the CDS-John Blue 115797-01 slide chart or with the CDS-John Blue internet calculator.

Pump Type	(•) Piston Pump NGP-7050 Series	
Data Preference	(•) <user-specified>	
Application Rate	<user-specified>	
Drive System	(•) Ground Drive Loaded Radius: 17.55in (44.58cm)	
Swath Width	390 in (990.6 cm)	
	Drive (Required): 25 (Optional): 15 or 47 (Optional): __ (Optional): __	**Driven** (Required): 15 (Optional): 15 (Optional): __ (Optional): __
Sprocket Ratio (for slide chart)		Driving 15T: 1.67[a] Driving 47T: 5.22[b]
Ground Speed		5 mph[c] / 8 kph

a. For easier scale readings (but same net ratio), use:
Loaded Radius: 20
Sprocket Ratio: 1.9

b. For easier scale readings (but same net ratio), use:
Loaded Radius: 10
Sprocket Ratio: 3.0

c. Gallons per acre is independent of speed between 2 mph and 9 mph (3-14 kph). See advisory below.

NOTICE

Equipment Damage Risk:

Ground Drive: Plant at or below 9 mph (14.4 kph) with the 47T Driving sprocket installed. The pump is rated for 450 rpm maximum, which is exceeded at and above 9 mph (14.4 kph).

Select and Install Orifice Plates

If using VeriFlow nozzles, orifice plate instructions do not apply. However, the topic "**Tramlines and Doubled Rows**" on page 92 applies to all types of nozzles.

DANGER

Agricultural Chemical Hazard:
Wear protective gloves when changing orifice plates. Consult material manufacturer or supplier documents for proper handling and steps to take if skin contact occurs.

Refer to Figure 58
Orifice plates (L38) at each drop line nozzle provide back-pressure that balances flow in the manifolds, assuring that each row obtains the same flow rate. For a given rate, there may be more than one orifice size that provides the recommended back-pressure.

Plates are provided with the system in three sizes. Additional sizes are available. In general, the orifice needs to be small enough to create a minimum pressure in the manifold but large enough to prevent the manifold pressure from exceeding the maximum:
15 psi min., 15-40 psi optimal, 65 psi max.

Using an orifice size too large can result in unequal flow at rows. Using a size too small can cause excess back-pressure resulting in material dumping at the relief valve.

Determine Orifice Size

The chart below shows rate ranges for each Great Plains orifice size and row spacing. You may need to change to the next higher or lower orifice for a different fertilizer solution density and/or a different ground speed.

To reduce orifice plugging and pump wear, use the largest orifice practical for your fertilizer application rate.

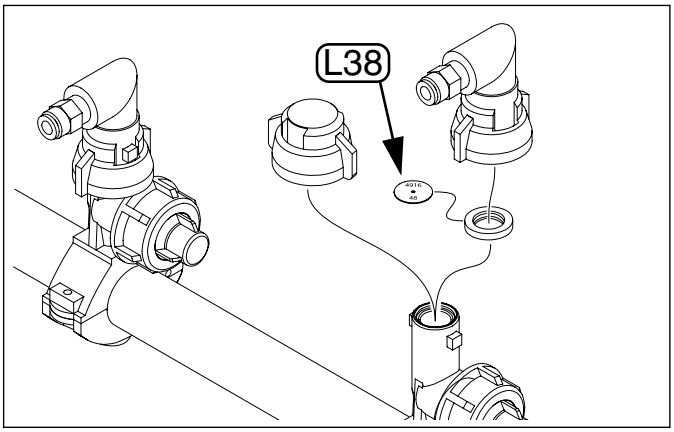


Figure 58 29984
Fertilizer Drop Line Nozzle

NOTICE

Material Loss or Misapplication Risks:
*Orifice size must be appropriate for rate selected. Drop line orifice plates **do not affect rate** on ground drive pumps, and are not used to control rate on hydraulic drive pumps. If the orifice size is too small, over-pressure in system may result in material loss at the ground drive relief valve. A size too small for a hydraulic drive system may require excess pressure to achieve the target rate. An orifice size too large may result in uneven application across all rows.*

If changing rate, changing material, changing field speed or shutting off rows, review orifice sizing.

Orifice Plate Size	20	28*	34*	48*	59	80	98
	Recommended Rate Range in Gallons per Acre. Range is 15 - 40 PSI						
Nozzle Spacing	(Values based on: 5.0 mph, 10.7 lbs/gallon Fertilizer solution density)						
10 inch (30in triple)	3.4 - 5.5	6.3 - 10	9.5 - 15	18 - 30	28 - 46	51 - 83	80 - 131
15 inch (30in twin)	2.2 - 3.6	4.2 - 6.9	6.3 - 10	12 - 20	19 - 30	34 - 56	54 - 88
30 inch single	1.1 - 1.8	2.1 - 3.4	3.2 - 5.2	6.1 - 10	9.3 - 15	17 - 28	27 - 44

* These sizes standard in most Great Plains fertilizer systems. 31014N

Install Orifice Plates

Refer to Figure 59

Insert the plate inside the gasket (L37) supplied with the nozzle (L39). Insert the gasketed plate with the legend side facing out the nozzle outlet (typically up).

In general, the orifice (L38) needs to be small enough to create enough pressure in the manifold to operate the check valves (L35) in the boom clamps, but not so much that the system dumps product at the boom relief valve.

The recommend operating pressure is: 15 to 40 psi

Using an orifice size too large can result in unequal flow at rows, intermittent flow, and flow stoppage at rows where pressure falls below the 8 psi required to open the clamp check valve. Using a size too small can cause excess back-pressure resulting in material dumping at the boom relief valve.

Use the same size at all active rows.

NOTICE

Excess Back-Pressure Risk:
If using a size of 0.048 inch or larger, remove the 828-046C nozzle from the outlet of the coulter tine.

Tramlines and Doubled Rows

If your operations result in row units running in the same row (or rows) in opposing passes, take steps to avoid double application (run those rows at half rate).

- For doubled rows using standard nozzles, use orifice plates having ½ (or slightly more than ½) the *Port Area* of the other rows. See the table at right, right-most column, for the Port Area of each plate call size.
- For doubled rows using VeriFlow nozzles, install 829-144C half-rate nozzles on those rows.

For either nozzle type, an adjustment to the rate calculation is required to compensate for the half-rate rows. Reduce the applicator swath by ½ row space for each row set to half rate.

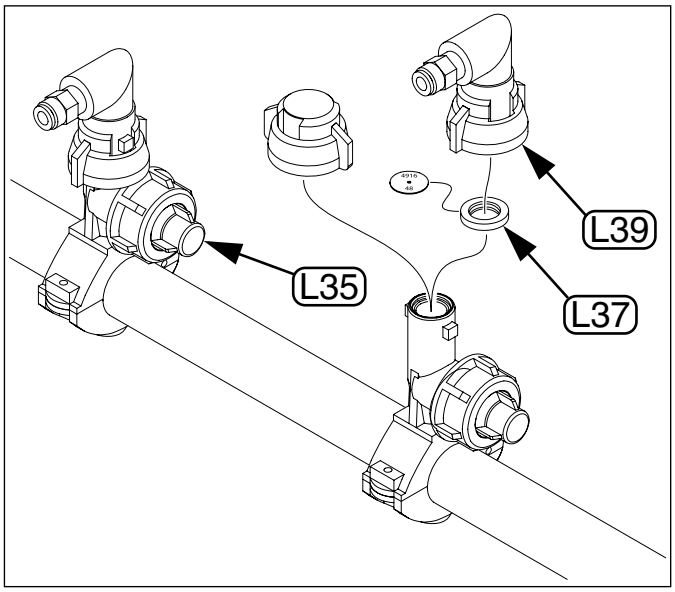


Figure 59 29984
Fertilizer Orifice Plate

Note: Replacement nozzles include gaskets. Gaskets (L37) may also be ordered separately as Great Plains part number CP18999-EPR.

DANGER

Agricultural Chemical Hazard:
Wear protective gloves when changing orifice plates and strainer screens. Consult material manufacturer or supplier documents for proper handling and steps to take if skin contact occurs.

Alternate Orifice Plates

Orifice Size	Part Number	Port Diameter	Port Area
20	832-052C	0.020 in	0.20 mm²
28*	832-056C	0.028 in	0.40 mm²
34*	832-053C	0.034 in	0.59 mm²
48*	832-054C	0.048 in	1.17 mm²
59	832-057C	0.059 in	1.76 mm²
80	832-055C	0.080 in	3.24 mm²
98	832-059C	0.098 in	4.87 mm²

* Sizes standard in many fertilizer bundles. Check your accessories before ordering. 29993

Row Shutoff

Refer to Figure 59

Unused drop lines may be shut off by replacing the nozzle (L39) with a Great Plains 832-051C cap (L36). Nutri-Pro® boom systems typically have more nozzles than coulters, and include caps for unused rows.

When installing a cap:

- It is not necessary to remove the gasketed orifice plate from inside the clamp. The cap includes its own gasket that seals at the end of the clamp port.
- Use a tie wrap or other line to secure the loose nozzle and drop line tubing to the boom.
- Adjust pump and/or orifice plates for new rate and row spacing.

NOTICE

Mis-Application or Material Loss Risk:

Do not apply materials after row shut-off or row turn-on without first reviewing setup. Merely changing the number of active rows does not change the application rate. If pump and/or orifice size changes are not also made, pressures could be too low or too high.

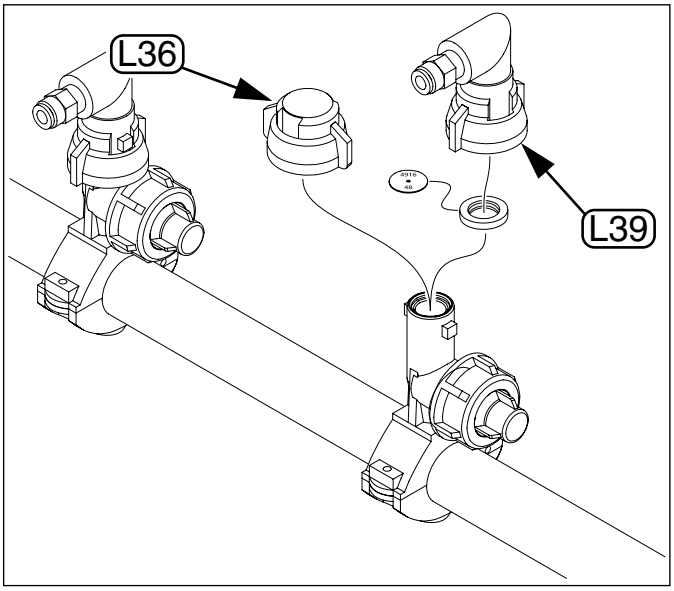


Figure 60 29984
Fertilizer Orifice Plate

Strainer Adjustment

Refer to Figure 61

A Banjo brand strainer (L18) is supplied with the ground drive fertilizer pump. It is plumbed before the CDS-John Blue pump. The standard 80 mesh screen ① should be suitable for most applications. A 50 mesh screen is available from Great Plains. Other screen sizes are available from Banjo Corporation.

If changing screen sizes, keep in mind the following.

- A smaller mesh (100) keeps very small manifold orifice plates from plugging so often. However, the screen requires cleaning more often.
- If using variable rate nozzles, Spray Target recommends use of a 50 mesh screen with the VeriFlow nozzles available from Great Plains (part number LST-1550).
- A larger mesh (50) or (30) passes more material but should only be considered when using large manifold orifice plates.
- Mesh sizes below 30 are not recommended for use with CDS-John Blue pumps.
- A plugged or partially plugged screen starves the pump resulting in a reduced application rate.
- Mesh sizes: (Smallest) 100, 80, 50, 30 (Largest)

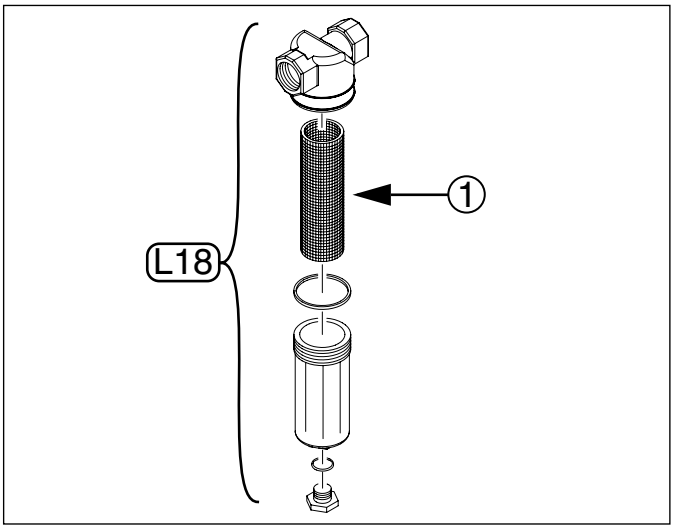


Figure 61 18418
Strainer

Ground Drive: Setting Relief Valve

A relief valve is plumbed after the ground drive pump outlet to protect the manifold and pump from excessive pressure. Any product that activates the relief valve (L25) discharges from the dump line (L26).

To set relief valve:

Refer to Figure 62

1. Unlock plastic jam nut ② from relief valve knob ③.
2. Unscrew knob counter-clockwise until it loses contact with internal spring.
3. Screw knob clockwise two turns. Start at this setting.
4. While operating in the field, observe manifold gauge (L24), and watch for relief valve discharge (L26).
5. If valve is dumping product and gauge reads under 65 psi, stop tractor and turn knob clockwise (looking down) ¼ turn. Continue operating at normal field speed. Repeat this step as needed until no product is discharged from relief valve.
6. If pressure gauge reads above 65 psi, change to a larger orifice. Go to step 2. Repeat steps.

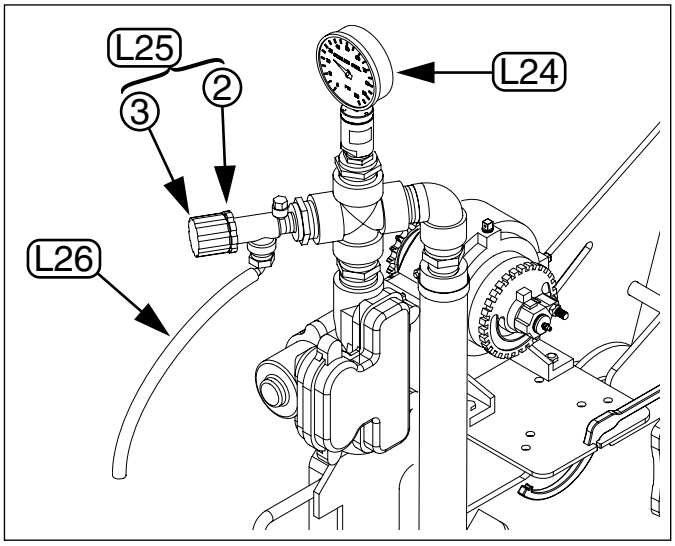


Figure 62 31729
Fertilizer Relief Valve

Ground Drive: Set Pump Drive Range

Refer to Figure 63

Two Driving sprockets are provided for the pump:
Low Range: 15T ①
High Range: 47T ②

The choice of Driving sprocket depends on the application rate desired. The pump adjuster dial (see ***Figure 64***) must be in the range 2-to-10 for consistent pump rate.

Use the rate chart on page 89 to determine which Range to use for the rate desired.

For applicators with optional variable rate capability, choose the sprocket which, at dial setting 10, provides a rate higher than the maximum you intend to use. If Low range suffices, use it for reduced pump wear.

To change Driving sprocket:

1. Loosen the bolt securing the rear idler ③. Slide the idler forward. Lift the chain off the lower Driving sprocket.
2. Remove pins at the storage ④ and Driving ⑤ shafts.
3. Exchange sprockets. Re-pin.
4. Re-engage idler for slack of ⅜ inches (9 mm) in the longest chain span ⑥.

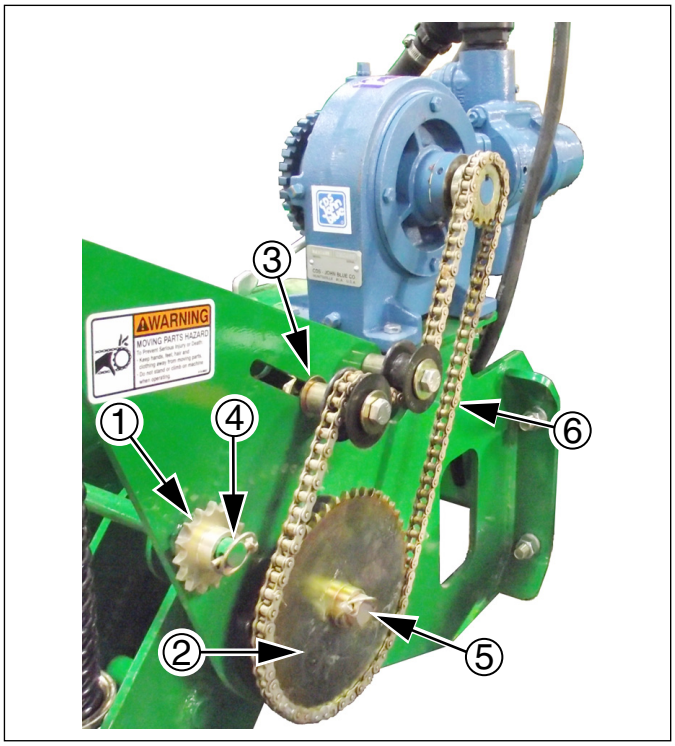


Figure 63 31656
Pump Range Sprockets

Ground Drive: Set Pump Rate Dial

Refer to Figure 64

Consult the 12-M-43 CDS-John Blue NGP Pump Parts and Instructional manual for complete details on pump operation and maintenance.

1. Loosen the nut ⑦ at the setting pointer.
2. Use the setting wrench ⑧ to rotate the dial until the desired pump setting is under the pointer ⑨.

Note: Settings below 2 are not recommended.
If presently using High range, switch to Low range and use the dial setting for your rate in Low range.

3. Tighten the nut.

NOTICE

Material Loss/Equipment Damage Risks:
Operate only with material loaded, or disconnect chain or remove sprocket if not intending to apply material. Ground drive wheel and chain system operate whenever the applicator is lowered and in motion. The pump must not be run dry.

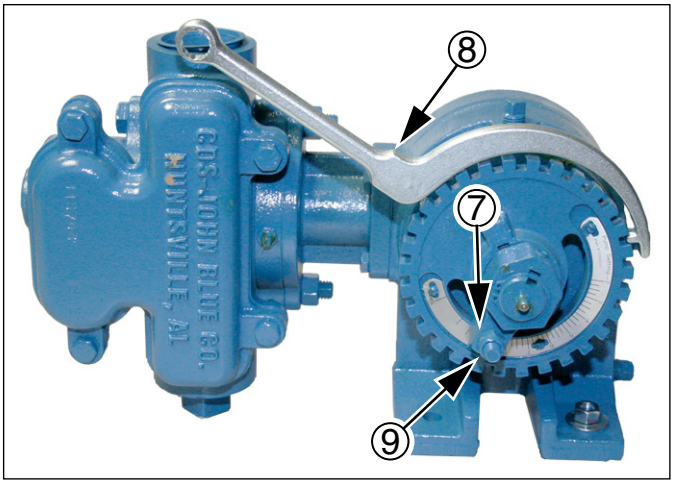


Figure 64 31320
Adjuster for NGP-7055-K Pump

Hydraulic Drive: Pump Pressure

These steps presume an applicator with optional on-board tanks and optional Raven SCS 450 console.

Flow-Based Adjustment

This adjustment verifies pump pressure, fertilizer flow and boom pressure.

1. Fill tank(s) with water.
2. Verify that the drop line orifice plates are the correct size for the intended application rate (see page 91).
3. Move applicator to a location where water and residual material in system is harmless to soil.
4. Set hydraulic remote circuit for pump to Float. Set flow rate to minimum.
5. Set tank discharge and selector valves to enable material flow from tank(s) to the pump.

Refer to Figure 65

6. Set the Console FLOW switch to MAN.
7. Set MASTER switch OFF.
8. Set the POWER switch to ON.
9. Verify that the BOOM CAL, SPEED CAL, METER CAL, VALVE CAL, and RATE CALs have been entered correctly into the console.
10. Press the SELF TEST button.
11. Enter the applicator's expected field speed.
12. Turn MASTER switch and BOOMS 1,2&3 ON.
13. Start tractor. Move remote lever for pump to Retract.
14. Increase the circuit flow rate until the console pressure reading is between 15 and 45 psi.
15. Operate the FLOW CONTROL switch to the INC position until the RATE is about 35% higher[a] than the intended field rate. Increase the hydraulic flow as needed to keep the psi in the 15-to-45 range.
16. Reduce the RATE (via the DEC switch) to the desired field rate. Verify that the pressure is still in the 15-to-45 range.
17. Make a record of the flow rate setting for the hydraulic circuit.
18. Set pump hydraulic circuit to FLOAT.
19. Set console switches:
    MASTER to OFF.
    FLOW switch to RATE 1.

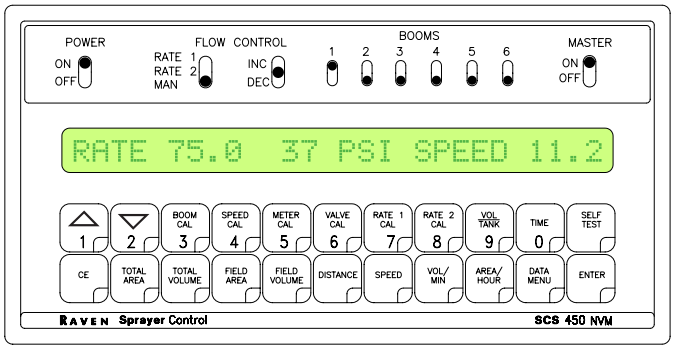


Figure 65 32106
Typical Adjustment Display

Dead-Head Adjustment

This adjustment verifies only pump pressure, but is quicker than the flow-based adjustment, and delivers no material to the tines.

1. Fill tank(s) with water or fertilizer.
2. Set hydraulic remote circuit for pump to Float. Set flow rate to minimum.
3. Set tank discharge and selector valves to enable material flow from tank(s) to the pump.
4. Set the Console FLOW switch to MAN.
5. Set MASTER switch OFF.
6. Set the POWER switch to ON.
7. Push the FLOW CONTROL to the INC position and hold it there for several seconds to open the valve.
8. Turn the MASTER switch ON and BOOMS 1,2&3 OFF.
9. Start tractor. Move remote circuit lever for pump to Retract.
10. Increase the circuit flow rate until the console pressure reading is 45 psi.
11. Make a record of the flow rate setting for the hydraulic circuit.
12. Set pump hydraulic circuit to FLOAT.
13. Set console switches:
    MASTER to OFF.
    FLOW switch to RATE 1.

a. Hydraulic oil heating causes the pump performance to gradually decline by 30% over several hours. Setting the remote to have a 35% excess capability assures that adequate flow will be available for the duration of application.

Troubleshooting

General Applicator Troubleshooting.....97
NH3 Metering System Troubleshooting 98
General Application Troubleshooting 100
Ground Drive Pump Troubleshooting.....102
Hydraulic Drive Pump Troubleshooting.....103

The topics in this section presume that the applicator has a Raven SCS 450 console, Raven AccuFlow™ metering system, and CDS-John Blue® Impellicone® flow divider.

If also equipped with conventional liquid capability, the topics in this section presume that the applicator is equipped with a CDS-John Blue® pump and ground drive, or a hydraulic pump and Raven SCS 450 console.

Troubleshooting sections are also found in the following component manuals:

016-0159-403
Raven AccuFlow™ Operator manual

016-0159-831
Raven SCS-450 Installation, Operation and Service manual

12-M-43
CDS-John Blue NGP Pump Parts and Instructional manual

General Applicator Troubleshooting

Problem	Cause	Solution
Fold or unfold jerky or imbalanced	Air in lines	Bleed fold/lift circuit (page 123).
Lift jerky or imbalanced	Air in lines	Bleed fold/lift circuit (page 122).
Lift-Assist casters oscillating	Caster stabilizer too lightly set	Increase spring tension on caster stabilizer piston (page 130).
Uneven application depth	Excessive field speed.	Reduce field speed.
	Coulters set too deep, lifting entire applicator	Reduce coulter depth.
	Rough application conditions	Rework the field.
	Worn tines inadequately preparing trench	Replace worn tines.
Wings too Shallow	Insufficient weight transferred to wings	Increase weight transfer (page 85).
Center too Shallow	Excess weight transferred to wings	Decrease weight transfer (page 85).
Sealers not compacting the soil as desired.	Sealer adjustment not optimal.	Adjust sealer (page 80).
	Not level front to rear.	Check applicator front-to-back level (page 43).
	Too wet or cloddy	Wait until drier weather or rework ground.
2-Point Lift-Assist slow	Adjustment valve not fully open.	Open valve (page 161).

NH_3 Metering System Troubleshooting

Problem	Cause	Solution
Pressure Spikes (no alarm)	Plugged tine or tines	Stop application per page 64. Lift applicator and inspect tines. Clear any plugging per "**Clearing Plugged Tines**" on page 110.
Flow divider pressure sag	Open line or lines	Stop application per page 64. Lift applicator and inspect tines for open line plugging. Clear any plugging per "**Clearing Plugged Tines**" on page 110
Temperature Rise (no alarm)	Plugged refrigerant vapor line	Stop application per page 64. Lift applicator and inspect tines. Clear any plugging per "**Clearing Plugged Tines**" on page 110.
Rate Alarm, Low	System not fully charged	Expect early rate alarms until the cooler is ensuring that all meter flow is liquid.
	One or more manual valves not fully open	Suspend operations (per page 63). Check all manual valves from nurse tank withdrawal valve to emergency shut-off valve.
	Solenoid or control valve malfunction or harness status	Suspend operation (page 63). Close emergency shut-off valve. Discharge line from emergency shut-off valve to tines. Wait for applicator to be safe to approach. Check harness connections and fuses. Use console SELF-TEST mode to command Raven valves open. Check valve ball indicators at valves.
	Field speed too high (higher than available pressure can supply NH_3)	Slow down, or wait for warmer conditions.
	Tank pressure low	Ambient or tank temperature may be too low to provide sufficient delivery pressure. Wait for tank to warm, or wait for warmer weather.

Problem	Cause	Solution
Rate Alarm, High	Incorrect VALVE CAL for Control Valve or METER CAL for flow meter.	Recheck console setup against values provided for components (page 44).
	Control Valve failed, or harness status	Suspend operation (page 63). Close emergency shut-off valve. Discharge line from emergency shut-off valve to tines. Wait for applicator to be safe to approach. Check harness connections and fuses. Use console SELF-TEST mode to command rate to zero open. Check valve ball indicators at valves. Command rate to maximum. Check ball indicator.
Excess NH_3 Remaining (but no alarms)	Incorrect console setup	Re-check METER CAL and BOOM CAL.
	Field size different.	After ruling out metering problems, re-check geography.
	Excessive gaps between fertilizer applicator passes.	Gap between opposing pass end trenches should be one row space (e.g. 30in)
	Flow meter malfunction	Consult dealer.
NH_3 Consumption Too High (but no alarms)	Incorrect console setup	Re-check METER CAL and BOOM CAL.
	Field size different.	After ruling out metering problems, re-check geography.
	Excessive overlap	Gap between opposing pass end trenches should be one row space (e.g. 30in). Also check tracks for unintended re-applications, particularly if relying on GPS mapping.
	Tank or system Leak	Suspend application. Carefully approach applicator and nurse tank from up-wind. Check for leaks in
	Flow meter malfunction	Consult dealer.
Rows Not Fertilized	Check for plugged row-unit tube	Stop application per page 64. Lift applicator and inspect tines. Clear any plugging per “**Clearing Plugged Tines**” on page 110.
	Failed or malfunctioning aftermarket section control.	Consult system supplier documentation.

Problem	Cause	Solution
No Fertilizer Flow	Strainer plugged	Close all valves. Inspect strainer (page 117). Clean screen and magnets as needed.
	Material run-out	Check tank level.
	Temperature too low	Wait for warmer conditions.
	On/Off solenoid valve failure or open circuit.	Suspend operation (page 63). Close emergency shut-off valve. Discharge line from emergency shut-off valve to tines. Wait for applicator to be safe to approach. Check harness connections and fuses. Use console SELF-TEST mode to command Raven valves open. Check valve ball indicators at valves.

General Application Troubleshooting

Problem	Cause	Solution
Excess Material Remaining	Field size different.	After ruling out metering problems, re-check geography.
	Excessive gaps between applicator passes.	Gap between opposing pass end trenches should be one row space (e.g. 30 inch)
Material Consumption Too High	Field size different.	After ruling out metering problems, re-check geography.
	Excessive overlap	Gap between opposing pass end trenches should be one row space (e.g. 30 inch). Also check tracks for unintended re-applications, particularly if relying on GPS mapping.
	Tank or system Leak	Suspend application. Check for leaks.
Rows Not Fertilized	Check for plugged row-unit tube	Stop application. Lift applicator and inspect tines.
No Fertilizer Flow	Strainer plugged	Close all valves. Inspect strainer (page 119). Clean screen as needed.
	Material run-out	Check tank level.
Tines plugging frequently	Tine tips too low for coulter depth	Raise tine weldment (page 79).
	Coulter blades too worn	Replace coulter blades.
	Field too wet	Wait for drier conditions.
	Applicator not level from front to rear	Check applicator front-to-back level (page 43).
	Tractor rocking backward during stops, or lift sequence pushing tines backward	Refine stopping and/or lifting technique to avoid reverse coulter motion in ground.

Problem	Cause	Solution
Excessive NH_3 loss to atmosphere (all rows)	Application depth too shallow	Check/adjust tractor hitch (page 43), lift-assist spacers (page 43) and gauge wheel height (page 84).
	Coulters set too deep; lifting tines	Reduce coulter depth to tine depth (page 79).
	Insufficient sealing	Adjust sealers (page 80). Test running dry. Try multiple settings on different rows at the same time if the adjustment needed is not obvious. Check applicator front-to-back level.
	Application rate too high for soil or weather conditions	Consult with agronomist on optimal rate and conditions.
	Field speed too high	Slow down.
NH_3 loss to atmosphere (some rows)	Wings not level	Check tire pressures. Check wings level (page 124).
	Fold cylinders locked in Neutral, and unable to follow terrain	Set fold/lift circuit to continuous Extend (unfold/lower) for field application.
NH_3 loss to atmosphere (one row)	Plugged tine	See "**Clearing Plugged Tines**" on page 110. If tines are plugging frequently, check: coulter setup, application depth, tine wear. Field conditions and weather may also be unsuitable at the moment.
	Disconnected delivery or vapor line	Treat this as tine plugging (page 110) until the cause is determined. If the cause is tall tough field trash, consider re-working the field if disconnects are frequent.
	Sealer mis-adjusted or failed (such as a broken spring)	Check sealer. Adjust (page 80) or repair.
	Rows in tractor tracks too shallow	Reset tractor wheel spacing to avoid rows.
Tines plugging frequently	Tines worn	Replace worn tines.
	Field too wet	Wait for drier conditions.
	Tractor rocking backward during stops, or lift sequence pushing tines backward	Refine stopping and/or lifting technique to avoid reverse tine motion.
Sealers plugging	Conditions too wet.	Wait for drier conditions.
	Too much pressure on row-units.	Reduce spring pressure.
	Sealers running at an angle	Adjust sealers to run straight.
	Coulters set too deep, bring up excess dirt and moisture.	Check coulter adjustment.
	Fertilizer Applicator not level from front to rear	Check applicator front-to-back level (page 43).
	Failed bearings	Replace bearings.

Problem	Cause	Solution
Low Manifold Pressure	Rate, speed or material viscosity too low for orifice plate size	Re-check pump rate determination, Range sprocket, pump dial and console setup (Option). If correct, replace orifice plates with a smaller size (page 91).
	Strainer clogged	Clean strainer, and possibly use coarser screen size (page 93).
	Ground Drive: Relief valve set too low	Adjust relief valve (page 94).
	Boom leak	Repair boom.
	Tank vent closed or plugged; pump cavitating	Check tank lid. check pump prime.
	Material run-out	Refill.
High Manifold Pressure	Orifice plate size too small	Replace orifice plates (page 91).
	Tine nozzle orifice smaller than orifice plate.	Remove nozzle.
	Orifice plates plugged	Clean plates. Check sizing.

Ground Drive Pump Troubleshooting

The CDS-John Blue NGP Pump Parts and Instructional manual (12-M-43) has additional troubleshooting information.

Problem	Cause	Solution
Low Rate	Ground drive on Low Range when rate requires High	Exchange Range sprockets (page 94).
	Dial setting incorrect	Re-check Range and Dial settings for rate.
	Ground drive slipping	Check condition of arm and chains. Check operating height of applicator (may be too high). If soil is too wet, try reconfiguring for a lower manifold pressure, or wait for dryer conditions.
	Pump damaged	See CDS-John Blue NGP Pump Parts and Instructional manual.

Problem	Cause	Solution
High Rate	Ground drive on High Range when rate requires Low	Exchange Range sprockets (page 94).
	Dial setting incorrect	Re-check Range and Dial settings for rate.
Low Manifold Pressure	Relief valve set too low	Adjust relief valve (page 94).
	Ground drive on Low Range when rate requires High	Exchange Range sprockets (page 94).
	Field speed too low	Increase speed or reduce orifice plate size.
	Ground drive wheel or chains slipping	Check condition of arm and chains. Check operating height of applicator (may be too high). If soil is too wet, try reconfiguring for a lower manifold pressure, or wait for dryer conditions.
Product Dumping at Relief Valve	Rate, speed or material viscosity too high for orifice plate size	Re-check pump rate determination, Range sprocket, pump dial and console setup (Option). If correct, replace orifice plates with a larger size (page 91).
	Orifice plates clogged	Use larger plates (page 91) or finer strainer screen (page 93).
	Relief valve set too low	Adjust relief valve (page 94).
	Tines plugged	Clean out tine tubes
	Material slushy due to low temperature, or actual ice in boom	Wait for warmer conditions.
High Manifold Pressure	Ground drive on High Range when rate requires Low	Exchange Range sprockets (page 94).
	Field speed too high	Reduce speed or increase orifice plate size.

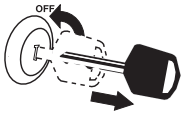
Hydraulic Drive Pump Troubleshooting

The Ace Pump Instruction manual (HYD-MAN) and the Raven SCS-450 Installation, Operation and Service manual (016-0159-831) have additional troubleshooting information.

Problem	Cause	Solution
Rate Alarm, Low	System not fully charged	Prime system. Check for blocked air bleed line on standard first pump. Open petcock on user-plumbed second pump.
	One or more manual valves not fully open	Suspend operations. Check all manual valves from nurse tank withdrawal valve (if any) to inlet shut-off valve.
	Control valve malfunction or harness status	Check harness connections and fuses. Use console SELF-TEST mode to command rate to zero. Check indicator at control valve. Command rate to maximum. Check valve open.
Rate Alarm, High	Incorrect VALVE CAL for Control Valve or METER CAL for flow meter.	Recheck console setup against values provided for components (page 44).
	Control Valve failed, or harness status	Check harness connections and fuses. Use console SELF-TEST mode to command rate to zero. Check indicator at control valve. Command rate to maximum. Check valve open.

Problem	Cause	Solution
Low Manifold Pressure	Pump not primed	Factory-installed pump: check bleed line for plugging. Second pump: open petcock valve or check bleed line.
	Mis-adjusted bypass valve in pump motor	Close valve or re-adjust for Open Center system (see pump manual)
	Impeller or volute worn	Repair pump.
Excess Material Remaining (but no alarms)	Incorrect console setup	Re-check METER CAL and BOOM CAL.
	Flow meter malfunction	Consult dealer.
Material Consumption Too High (but no alarms)	Incorrect console setup	Re-check METER CAL and BOOM CAL.
	Flow meter malfunction	Consult dealer.
No Fertilizer Flow	Pump not primed	Factory-installed pump: check bleed line for plugging. Second pump: open petcock valve or check bleed line.
	Strainer plugged	Close all valves. Inspect strainer (page 119). Clean screen as needed.
	Material run-out	Check tank level.

Maintenance and Lubrication



Proper servicing and maintenance is the key to long applicator life. With careful and systematic inspection, you can avoid costly maintenance, downtime and repair.

Always turn off and remove the tractor key before making any adjustments or performing any maintenance.

DANGER

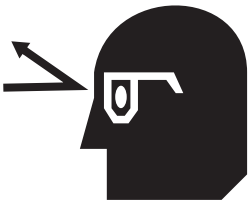
Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:
Do not perform maintenance with anhydrous ammonia in the system. Fully discharge the system of NH_3 liquid and vapor before working on the applicator. See page 108.

WARNING

Crushing Hazard:
Always have transport locks in place and/or use stands when working on applicator. You may be severely injured or killed by being crushed under a falling applicator.

WARNING

High Pressure Fluid Hazard:
Check all hydraulic lines and fittings before applying pressure. Fluid escaping from a very small hole can be almost invisible. Use paper or cardboard, not body parts, and wear heavy gloves to check for suspected leaks. Escaping fluid under pressure can have sufficient pressure to penetrate the skin. If an accident occurs, seek immediate medical assistance from a physician familiar with this type of injury.

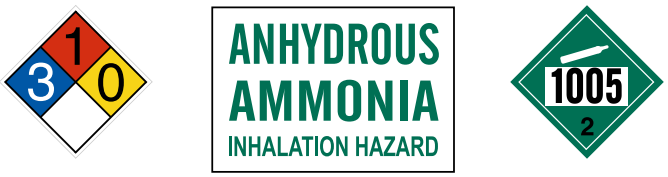


1. After using your applicator for several hours, check all bolts to be sure they are tight.
2. Ground Drive: Remove excess slack from chains. Clean and use chain lube on all roller chains as needed.
3. Maintain proper air pressure in tires.
4. Ground Drive: Keep pump full of liquid at all times.
5. Clean applicator on a regular basis. Regular and thorough cleaning will lengthen equipment life and reduce maintenance and repair.
6. Lubricate areas listed under “**Lubrication and Scheduled Maintenance**” on page 127.
7. Replace any worn, damaged, or illegible safety labels by obtaining new labels from your Great Plains dealer.

Avoid Trapped Anhydrous

Before servicing anhydrous equipment, or storing it near untrained individuals, be absolutely certain that there is no liquid NH_3 trapped in the system, and no NH_3vapor present (or only trace amounts).

Follow bleeding and discharge instructions carefully. Beware of places in the systems where NH_3 can be trapped.



Avoid Line Traps

Refer to Figure 67

Any two line valves in the system, if both closed with NH_3 present, can trap that ammonia indefinitely. Line valves include:

- tank withdrawal (A15),
- nurse tank hose valve(s) (A10),
- check valves at a disconnected breakaway (A14),
- emergency shut-off valve (A18),
- control valve at rate zero (A30),
- On/Off solenoid valve (A31), and
- aftermarket section valves.

In a properly designed system, segments not open to the atmosphere are protected by hydrostatic relief valves, but the operation of such valves only releases a small portion of the trapped ammonia.

Normal shut-down instructions, after closing the tank withdrawal valve, are intended to bleed most of the system NH_3 into the soil. However, there can still be substantial vapor in the system after that. If shut-down procedures were not followed, liquid may be present. If the state of the equipment is not known with certainty at time of servicing, you need to assume that a closed valve represents a risk of trapped NH_3.

The illustration at right depicts a nurse tank hose (A8) in use, and shut-off while still full of liquid NH_3. If this hose is removed to an enclosed space, then opened, it represents an extreme hazard. Vapor concentrations could rise to well above IDLH[a] levels in moments.

This example system line segment is equipped with relief orifice-equipped ball valves (A10), but that only bleeds the downstream side of a valve ball, the outlet valve in this example. See page 107 for information about ball traps.

The downstream side of this system line segment is equipped with a bleed valve (A11). The upstream side of the inlet valve is equipped with a hydrostatic relief valve (A12).

If this line segment warms, pressure can rise high enough to cause periodic releases at the relief valve. This protects the segment from rupture, but does not clear the line.

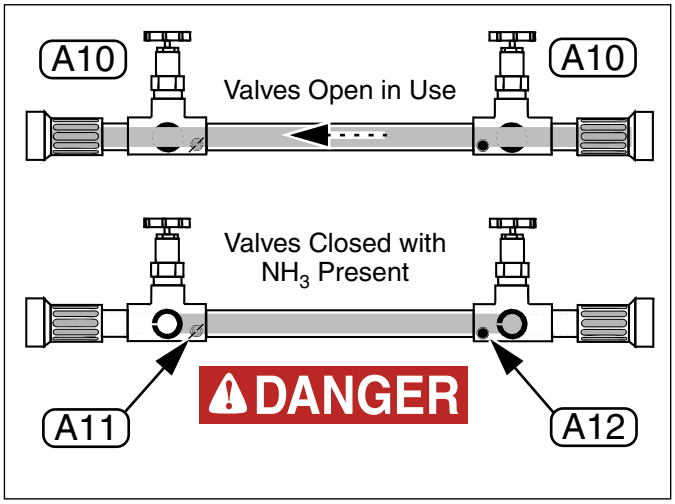


Figure 66
NH_3 Trapped in Line

31616

Clearing a Line Trap

To clear a line segment with possible trapped NH_3:

- ▲ *Move the equipment outdoors.*
- ▲ *If calm, wait for wind.*
- ▲ *Stand up-wind of the bleed valve.*
- ▲ *Point the bleed valve orifice down-wind and away from all personnel.*
- ▲ *If it's a hose bleed valve, make sure you can set the hose down with the valve still pointing in a safe direction.*
- ▲ *Open the bleed valve very slowly. Once any discharge is observed, (set any hose down) depart up-wind.*
- ▲ *Remain up-wind until the discharge completes.*

a. IDLH: Immediately Dangerous to Life and Health

Avoid Ball Traps

DANGER

IDLH Anhydrous Ammonia Exposure Hazard:
Beware of closed ball valves. A ball valve can trap liquid NH_3. If opened when disconnected, this liquid is likely at extreme pressures, is emitted forcefully and vaporizes rapidly.
A $1^3/_4$in ball valve can trap enough NH_3 to reach IDLH[a] vapor concentrations, within moments, in a space the size of a two car garage. Anyone present could be burned, blinded, or receive serious or permanent lung injury. If this happens in an enclosed space, the consequences could be fatal.

Refer to Figure 67
Always assume a closed ball valve contains liquid NH_3 under high pressure.

The flow gate of a traditional ball valve is a solid steel ball with a hole through it. When closed, the hole cavity is sealed by the side walls of the valve body.

If closed with the line full, the ball cavity is full of NH_3. If the valve is well constructed, that fluid remains there indefinitely, presenting future field and service hazards.

Note: If the valve has a bleed valve and/or relief valve, those safety valves *do not vent the ball cavity when a solid ball valve is closed*. One of them may vent just the downstream side of an orifice ball with the ball closed.

The emergency shut-off valve (A18) supplied on Great Plains applicators in October 2010 and later has a relief orifice on the downstream (strainer) side of the valve. See note on page 14 regarding valve Warning decal.

Nurse tank hoses are likely to have solid ball valves indefinitely. Treat all ball valves as potential traps.

- ▲ *Wear your PPE[b] when servicing lines and fittings that are in an uncertain status.*
- ▲ *Fully bleed all lines prior to servicing.*
- ▲ *Never carry a valve by the operating wheel or handle.*
- ▲ *Open ball valves when both sides of their lines are bled.*
- ▲ *Re-check the bleed on at least one side of the opened valve.*
- ▲ *If closing a ball valve for storage or parking, first wait for the valve to warm to ambient temperature to ensure that no liquid NH_3 remains.*
- ▲ *Never point a hose at your face.*
- ▲ *Treat all closed valves as possible traps.*

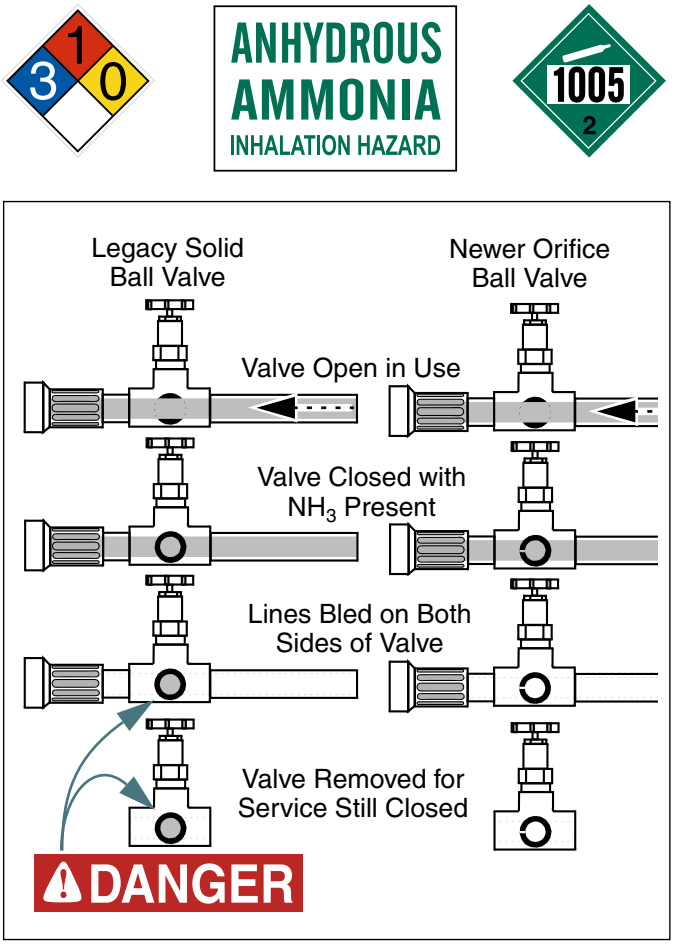


Figure 67
Legacy Valve Ball Trap
31614

- ▲ *Never open a closed valve in an enclosed area. In addition to the exposure hazard, a release of NH_3 could result in a concentration level that is flammable or explosive.*
- ▲ *Never point a closed valve at your face.*
- ▲ *If replacing a ball valve, don't just check that the new valve is specified for NH_3 service:*

  Replace orifice ball valves only with orifice ball valves.

  Replace solid ball valves with orifice ball valves.
- ▲ *Install an orifice ball valve correctly. The orifice side points down-stream (in the direction of flow).*

a. IDLH: Immediately Dangerous to Life and Health
b. PPE: Personal Protective Equipment

System Discharge

These steps are for clearing an applicator for service or for storage near untrained persons. These instructions presume that you have followed the steps at:
"**NH3: Stopping Application**" on page 64,
and the nurse tank is unhitched, per:
"**NH3: Final Nurse Tank Unhitch**" on page 67.

For a breakaway event, follow the instructions on page 65 up through breakaway re-connection. Then perform a normal shutdown (other than nurse tank steps), per page 64.

The challenges in system discharge are:

- NH_3 liquid can remain in the system after the recommended stopping procedures.
- NH_3 liquid self-cools as it evaporates, slowing evaporation. It can take a long time for all of it to turn to vapor, particularly in cooler weather.
- Once there is only vapor in the system, there is usually little gas movement to drive the rest of it out.
- The delivery tubing loops are usually the last to clear, and may not fully clear. See sidebar.

Even if no ammonium hydroxide forms, the NH_3 vapor in the system dilutes slowly with air. Harmless trace amounts, noticed as occasional odor, may remain indefinitely.

DANGER

Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:
Do not perform maintenance with anhydrous ammonia in the system. Fully discharge the system of NH_3 liquid and vapor before working on the applicator.

Normal Discharge

At the completion of stopping application and nurse tank unhitching, all line valves are closed and all bleed valves are open, and have been that way for at least an hour. Transport may also have occurred, which aids clearing.

1. Verify that all line valves are closed, and all bleed valves open. If this is not the case, there is risk of trapped ammonia. See "**Clearing a Line Trap**" on page 106.
2. Carefully walk down-wind of the applicator. Check for ammonia odor. If pungent, there is at least some pure NH_3 vapor in the system, and possibly some liquid. Give the applicator some time to vent.

   If there is no odor, or only mild odor, check the delivery loops for visible fluid. If only a few hours have elapsed since application ended, *this liquid is pure NH_3*. Stay away until it has vaporized.
3. From up-wind, check all the fittings and lines. If any are cold (more than a few degrees below ambient temperature), liquid evaporation is still in progress or has only recently completed. Give the applicator more time to vent.

Steps continue on next page...

The delivery tubes are open to the atmosphere at the tines. When they don't clear immediately, they are likely to absorb atmospheric moisture, forming ammonium hydroxide (NH_4OH) in the tubes. This liquid is *highly caustic*, and can persist for weeks or months, but remains liquid at ambient temperatures, is harmless to the tubing, and emits ammonia vapor slowly. If there is liquid in the tubes, and it is not cold, it is likely to be an NH_4OH solution, and not pure NH_3.

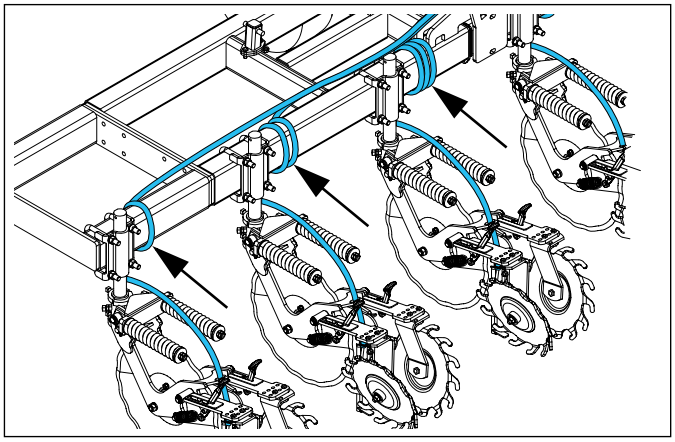


Figure 68
Delivery Loops
34983

System Blow-Out

4. To rapidly reduce the vapor in the system to trace amounts, use compressed air at the Acme inlet (A12).

   a. You will need to have the console connected to the meter harness and powered up. Have the console up-wind of the applicator.

   b. If liquid NH_3 is suspected to be present, lower the tines into the ground.

   c. Connect the air hose to the Acme inlet (A12). Use hose extensions as needed to perform this blow-out outdoors. You also need a connection at the Acme inlet that does not rely on a person standing there to maintain it.

   d. Open all line valves.
   Open the emergency shut-off valve (A18).
   On the console, turn the POWER switch on,
   MASTER switch on, and
   BOOM 1 switch on, and
   any section valves ON.
   Command a high rate.

   e. Set the air source regulator to no more than 150 psi.

   f. Flow air through the system until odor falls to acceptable levels.

If there is ammonium hydroxide (NH_4OH) fluid (or merely condensed water) in the delivery loops, this blow-out procedure may remove some, but not all, of that fluid.

Loop Clearing

5. Loop fluid: If it has been more than a day, with the temperature above freezing, since application completed, and there is still fluid in the loops, it is probably ammonium hydroxide (NH_4OH). If necessary to clear it from the lines, follow these steps:

   a. You will need a funnel with tip O.D. smaller than the delivery tube I.D. (⅜ inch, 9.5 mm), and a fresh water source.

   b. Face the applicator into the wind.

   c. Disconnect a delivery line (A45) at a flow divider outlet (A43).

   d. Connect the funnel to the line.

   e. Add water until it appears at the tines. Then add one more gallon (4 liters). This results in a an NH_4OH solution that is more dilute than household cleaning ammonia.

   f. Blow out the line if air is available.
   Do not exceed 150 psi.

   g. Reconnect the line at the flow divider.

   h. Repeat step 5a through step 5f for all tubes.

WARNING

Violent Reaction Hazard:

If the delivery loop fluid was freshly formed, or is cold, assume it is pure liquid NH_3, and do not perform a loop clearing for several hours, and then only after performing discharge step 1 through step 4f.

Adding water to pure NH_3 causes a violent solution reaction. It could cause large irregular discharges of liquid and vapor back up the delivery tube and at the tines. This liquid is likely to be highly caustic, and emitting dangerous concentrations of anhydrous ammonia vapor.

Clearing Plugged Tines

Tines can get plugged at release ports ①, due to sticky soil, reverse movement and other causes. Routinely check tines for evidence of plugging just prior to nurse tank hitching. More rarely, unusual field debris can cause a tubing disconnect at a tine. Treat it as a plugged line until you confirm otherwise.

⚠ WARNING

Elevated Ammonia Exposure Hazard:
Follow clearing instructions carefully. Wear your PPE[a]. Plugged delivery lines with tubing still attached can hold significantly greater than normal NH_3 liquid which is not likely to be mitigated by the normal Discharge procedures. Hastily disconnecting a charged line will release a dangerous amount of NH_3 liquid and vapor. Your PPE is not designed to protect you against such a release. Burning, respiratory injury, blinding or death could result.

Refer to Figure 69

Clearing Plugged Application Tubes

A plugged application tube ① often results in the delivery tubing (A45) lifting off the tine tubing at the clamp (an "open line plug"). The disconnect is usually easy to spot in the field as a condensation cloud from the row. The row is likely to be taking more than its equal share of NH_3 from the flow divider. You may see a drop in pressure at the flow divider gauge ((A42) on page 29).

If the plugged line remains closed ("closed line plug"), *the tubing may be completely full of liquid NH_3 by the time you detect the problem*. You may notice an increase in pressure at the flow divider gauge (A42), or pressure pulses, as trapped liquid warms, periodically vaporizes, and blows back into the flow divider ((A40) on page 29).

Clearing Open Line Application Plugs

1. Stop operation (page 64).
2. Discharge the system (page 108).
3. If the tine tubing is cold, wait for it to warm to ambient temperature (and vaporize any liquid NH_3 inside).
4. Use a thin flexible tool (a coat hanger wire may suffice) to clear the tine tube from above or below.
5. Reconnect the application tubing. Squeeze the spring clamp ②. Slide it up the delivery tubing. Push the delivery tubing onto the tine tube about ¾ inch (19 mm). Slide the spring clamp to centered in the overlap.

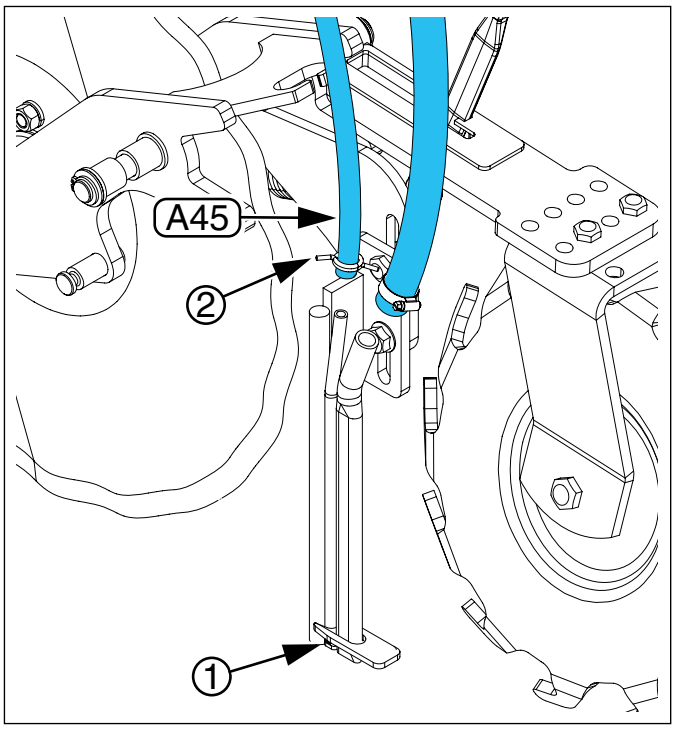


Figure 69 34990
Dual Tine Delivery/Vapor Tubes

Clearing Closed Line Application Plugs

1. Review the WARNING at the top of this page.
2. Stop operation (page 64).
3. Discharge the system (page 108). *The standard discharge is not likely to adequately discharge any plugged or closed lines*. Expect continuing vapor release at non-plugged rows. The plugged line discharges back through the flow divider, and out the other rows.
4. Wait until the plugged tine has warmed to ambient temperature, and the liquid level in the plugged loop is about the same as in the open loops.
5. Squeeze the spring clamp ②. Slide it up the tubing. Pull the delivery tubing off the tine tubing.
6. Use a thin flexible tool (a coat hanger may suffice) to clear the tine tube from above or below.
7. Reconnect the application tubing. Squeeze the spring clamp. Slide it up the delivery tubing. Push the delivery tubing onto the tine tube about ¾ inch (19 mm). Slide the spring clamp to centered in the overlap.

a. PPE: Personal Protective Equipment

Clearing Plugged Vapor Tubes

WARNING

Elevated Ammonia Exposure Hazard:
Follow clearing instructions carefully. Wear your PPE[a]. Plugged vapor tubes still attached can contain significantly greater than normal NH_3 vapor, which is not likely to be mitigated by normal Discharge procedures. Disconnecting a charged line releases a dangerous amount of NH_3 vapor. PPE is not designed to protect against such a release. Burning, respiratory injury, blinding or death could result.

Refer to Figure 70

A plugged vapor tube (A48) often usually *does not* result in the vapor tubing lifting off the tine tubing at the clamp (it is a "closed line plug").

If only one vapor line is plugged, the symptom may be an elevated temperature at the cooler gauge (A27) on page 29), and possibly a rate alarm if cooling is insufficient. If both vapor lines at a cooler are plugged (at moderate or warm ambient temperatures) the temperature gauge rises higher, and more quickly. Cooling ceases. Cooler pressure rises. Flow divider pressure falls. Rate alarm is likely. *Normal Discharge may not clear the line*.

If the plugged line disconnects ("open line plug"), you may see little change from normal operations. Odor is elevated, if you drive down-wind of application. The vapor line may not cause a cloud. The change in cooler pressure may be minor. You are most likely to detect an open line plugging of a vapor line during routine row inspection at re-hitch.

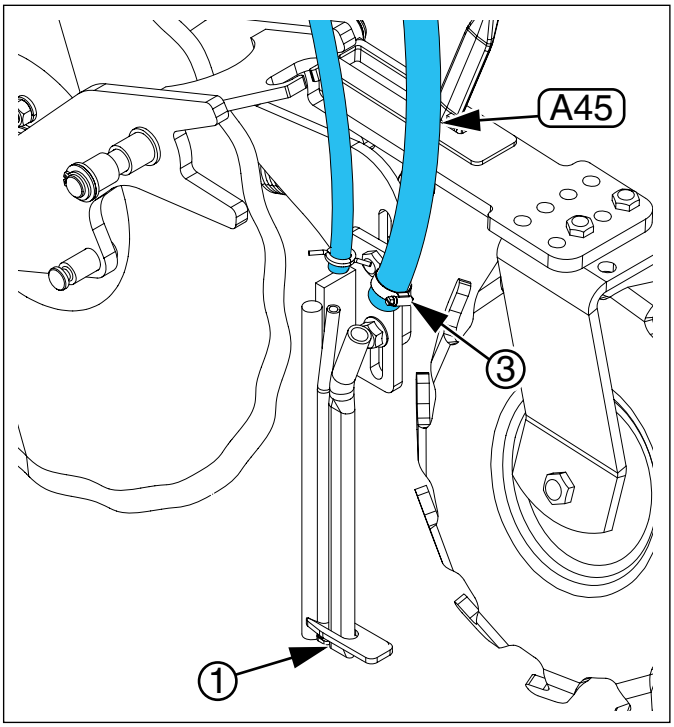


Figure 70
Dual Tine Vapor Tube
34990

Clearing Closed Line Vapor Plugs

1. Review the WARNING at the top of this page.
2. Stop operation (page 64).
3. Discharge the system (page 108). *The standard discharge is not likely to adequately discharge any plugged, closed, vapor lines*. Expect continuing vapor release at non-plugged rows. The plugged line discharges back through the cooler, then through the flow divider and out the other rows.
4. Wait until the plugged tine has warmed to ambient temperature, and there is no liquid in the vapor line.
5. Loosen the screw clamp ③. Slide it up the vapor tubing. Pull the vapor tubing off the tine tubing.
6. Use a thin flexible tool (a coat hanger wire may suffice) to clear the tine tube from above or below.
7. Reconnect the vapor tubing. Push the vapor tubing onto the tine tube about ¾ inch (19 mm). Slide the screw clamp to centered in the overlap and secure.

Clearing Open Line Vapor Plugs

1. Stop operation (page 64).
2. Discharge the system (page 108).
3. If the tine tubing is cold, wait for it to warm to ambient temperature (and vaporize any liquid NH_3 inside).
4. Use a thin flexible tool (a coat hanger may suffice) to clear the tine tube from above or below.
5. Reconnect the vapor tubing. Push the vapor tubing onto the tine tube about ¾ inch (19 mm). Slide the screw clamp to centered in the overlap and secure.

a. PPE: Personal Protective Equipment

Hydrostatic Relief Valve Maintenance

Relief valves require scheduled replacement and periodic inspection.

Relief Valve Inspection

Inspect relief valves seasonally, and during periodic maintenance. Check for cap present (step 2) prior to each application from a fresh tank of anhydrous.

1. Bleed the line at a relief valve before a detailed inspection. See "**System Discharge**" on page 108.

Refer to Figure 70 (depicting cooler relief valve (A23))

2. Check that the rain/dust cap is in place and fully seated.

   Do not operate with a missing cap. The cap keeps the spring mechanism, outlet (vent port) ① and weep holes ② free of contaminants that could prevent valve operation in an over-pressure situation.

   A missing or dislodged cap also indicates that the valve may have operated, or may be malfunctioning. Understand and correct the reason for a dislodged or missing cap prior to field operations.

   Replacement caps are:
   breakaway: Continental 400-DC
   cooler: Squibb-Taylor 1325-8.

⚠ CAUTION

Ammonia Exposure and Loss Hazards:
Understand and correct the reason for any lifted or missing hydrostatic relief valve caps. If a cap is out of place, that line section may have been closed with liquid NH_3 present, which later partially vented, dislodging the cap.

Liquid NH_3 may still be present. ***Carefully bleed the line section before taking any other action.***

It is also possible that the valve disc has deteriorated, or has debris under the seat and is venting or leaking at normal operating pressures.

Any hydrostatic relief valve that fully opens ("pops") must be removed and re-tested (or simply replaced).

3. Carefully remove the dust cap.
4. Check the replace-by date ③ stamped on the valve. If it has passed, replace the valve before next use.
5. Clean any clogged weep holes ②. If they cannot be cleaned, replace the valve.

⚠ CAUTION

Ammonia Exposure Hazards:

- ▲ *Wear safety equipment when inspecting or performing maintenance on relief valves. Even if the line is bled, NH_3 liquid or vapor may still be present.*
- ▲ *Always bleed the system before removing a relief valve cap or performing any more detailed inspection or valve maintenance.*
- ▲ *Never stand in front of or look directly into a relief valve. Use a mirror. If an overpressure event or valve malfunction is imminent or in progress, you can expect multiple valve activations. The initial activation can blow debris as well as liquid ammonia into your face.*
- ▲ *Follow inspection and replacement instructions carefully. Use the instructions on these two pages only if no separate instructions were supplied with the original and/or replacement valve.*

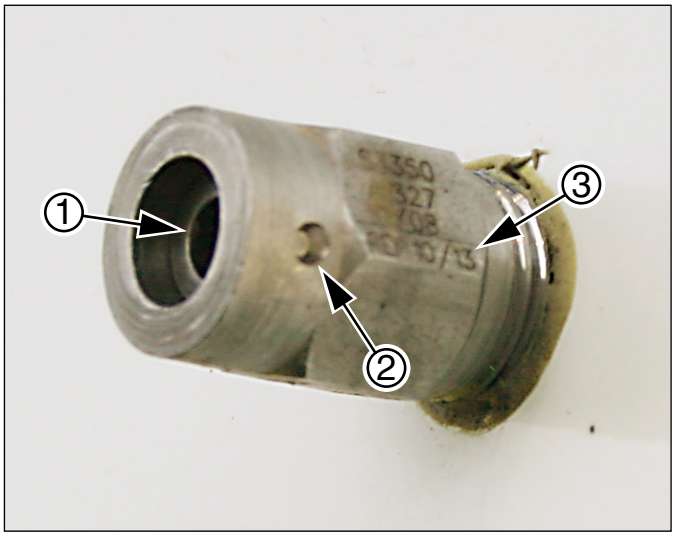


Figure 71 31635
Uncapped Relief Valve (A23)

Note: In severe conditions (such as exposure to salt, corrosive chemicals or pollutants), or if a valve has fully opened, you may need to replace a hydrostatic relief valve sooner than 5 years.

6. Inspect for dirt, sand, grease, paint, damage, corrosion, signs of tampering or insect activity. If visible, check the metal surface of the spring.

   If debris cannot be easily cleared, replace the valve.
   If there are signs of damage, replace the valve.
   If there is any question, replace the valve.
7. If a valve is venting at normal operating pressures, replace the valve.
8. Never force a valve closed. If a valve has remained open after operating, or is leaking, it is seriously contaminated or failed. Replace the valve.
9. Never attempt to protect a valve orifice with grease. Grease can harden over time, and/or collect contaminants. Either factor could prevent valve operation in an overpressure situation.

   Never plug a relief valve outlet. Relief valves are economical defense against serious ruptures and major releases. Help a valve do its job of protecting you.

Valve Replacement

The safest source for a replacement valve is Great Plains. Check the latest edition of the Parts manual (407-613P) or the Great Plains internet parts lookup. This assures a correct and compatible part that reflects any engineering enhancements.

Ammonia Exposure Hazard:
Fully discharge the system (page 108) before removing an old valve. Wear protective equipment. If the applicator was recently used, or ammonia was trapped, there could still be NH_3 liquid or vapor behind the valve.

Do not attempt to repair or adjust a relief valve. Hydrostatic relief valves are factory-set and tested, on specialized equipment, to discharge at a specific pressure.

On the component being protected by the valve, inspect the threaded hole after removing the valve. If there are signs of corrosion, replace the entire component.

Use pipe sealant when installing a replacement valve. Use only pipe sealant specified for use with anhydrous ammonia, such as RectorSeal No. 5. Do not use tape.

Record the replace-by date of the new valve in the "**Replacement Log**" section of this manual (beginning on page 114).

Ammonia Exposure and Rupture Hazards:
Always replace a relief valve with a valve:

- ▲ *that is an external "hydrostatic relief valve",*
- ▲ *that is specified for anhydrous ammonia service,*
- ▲ *that has the same NPT pipe thread size, and;*
- ▲ *that is rated for the same discharge pressure as the valve removed (or as otherwise specified by Great Plains or the manufacturer of the protected component).*

  Discharge pressure is specific to the valve location in the system.

  Using a valve rated too high could result in bursting of system components and a major liquid NH_3 release.

  Using a valve rated too low could result in unexpected liquid NH_3 release, and material loss during application.

Replacement Log

Certain components and fittings used with anhydrous ammonia service have limited service lives.

The service life of components originally installed by Great Plains is pre-printed in the tables. The life of replacement parts may vary.

Once past their expiration dates, they must be replaced before the applicator is used again to apply anhydrous, even if they appear to be in excellent condition.

Use this page, or a copy, to record the replacement schedule and history for your applicator.

Be sure to remove and save these pages, or transfer the data, if you update the manual itself.

Breakaway Coupler Hydrostatic Relief Valve (A15)

Part ID	Service Life	Date Life Started	Replace Before Date
Great Plains 891-203C	5 years: the replace-by date is stamped on the valve.		

Supply Hose (A17)

Part ID	Service Life	Date Life Started	Replace Before Date
Great Plains 891-196C	10 years: replace-by date is molded in hose data stripe		
Great Plains 891-197C	10 years: replace-by date is molded in hose data stripe		

Cooler Hydrostatic Relief Valve (A23)

Part ID	Service Life	Date Life Started	Replace Before Date
Raven or Great Plains 334-0002-005	5 years: the replace-by date is stamped on the valve.		

Refrigerant Line(A3)

This is the same tubing used for row delivery (A45).

Part ID	Service Life	Date Placed in Service	Replace Before Date
Great Plains 990-259R	10 Year rated life		

Row Delivery Tubing (A45)

It might be necessary to replace it before the 10 year life if the tine end is damaged by harsh field conditions.

When replacing delivery tubing:

- Use the same length of tubing as removed. This length is identical for all rows of a specific applicator model. This is required to ensure equal rate at each tine from the flow divider.
- Coil excess length. Secure it to the rear tool bar at the row. For wing rows, coil inboard of the row, so that the coil is below the tine when the applicator is folded.

Part ID	Service Life	Date Life Started	Replace Before Date
Great Plains 990-259R	10 Year rated life		

Row Vapor Tubing (A48)

This is a different (larger ID) tubing compared to the row delivery and refrigerant.

It might be necessary to replace it before the 10 year life if the tine end is damaged by harsh field conditions.

Part ID	Service Life	Date Life Started	Replace Before Date
Great Plains 990-261R	10 Year rated life		

Metering System Maintenance

Fully discharge system before performing any maintenance. See "**System Discharge**" on page 108.

If any system components are removed from plumbing, when replacing or re-installing them, use only a pipe sealant specified for use with anhydrous ammonia, such as RectorSeal #5.

Strainer (A19) Maintenance

Clean magnets every 4 to 5 tank loads. Check strainer screen at that time.

Ceramic magnets scavenge ferrous metal debris from the flow, preventing this material from contaminating the magnets in the flow meter (A25).

The 20 mesh screen filters out non-magnetic particles that could interfere with both accurate flow metering and flow control. If the screen cannot be cleaned, or is damaged, the replacement is Raven part number 339-9000-032.

Cooler (A21) Maintenance

Manual 016-0159-403, the Raven AccuFlow™ Operator manual, has specific recommendations for seasonal cooler storage, cleaning, and preserving the interior of the supercooler.

Cooler Hydrostatic Relief Valve (A23)

This is a limited life part (page 115). Check for expiration whenever servicing the cooler.

Flow Meter (A25) Maintenance

If flow meter readings are irregular, or consistently low relative to the amount of NH_3 known to have flowed from the tanks, remove the meter for cleaning and inspection. Refer to 016-0159-403, the Raven AccuFlow™ Operator manual, for details.

Control Valve (A30) Maintenance

<no recommendations found>

On/Off Valve (A30) Maintenance

<no recommendations found>

Flow Divider (A31) Maintenance

<no recommendations found>

DANGER

Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:

Do not perform maintenance with anhydrous ammonia in the system. Fully discharge the system of NH_3 liquid and vapor before working on the applicator.

CAUTION

Tank Failure Early Warning:

An excessive build-up on the magnets suggests that or more more nurse tanks, employed since the most recent magnet cleaning, is/are deteriorating internally. Notify the tank cart provider. If you own the tanks used, take steps to identify the failing tank.

NOTICE

Equipment Damage Risk:

Periodic cleaning is essential if NH_3 additives have been used, such as Dow Chemical N-Serve or Amoco ACA.

Material Clean-Out (Liquid)

With proper attention to maintenance, end of day clean-out, end of season clean-out and winterization, you can substantially increase the life and reliability of your conventional liquid fertilizer system. Protect the pump, clean the tanks, strainers, lines and nozzles, and you can avoid costly and time-consuming repairs at the next season.

Fertilizers are usually highly corrosive to metals other than stainless steel. Suspension fertilizers can clog system components in storage.

1. Flush entire system with clean water.
2. Remove end caps from booms and flush booms out with water. Drain and replace end caps.
3. Remove strainer and drain it out. Drain all lines and tanks completely to prevent freezing damage.
4. Flush pump per pump supplier manual. Fill pump with RV antifreeze and cap off.
5. Wash all spilled fertilizer off the applicator.

Tank Clean-Out

Refer to Figure 72 - which depicts the discharge valves open to the selector valve (not shown)

For bulk recovery of unused material, or for rinsing out tanks, dump line elbows (L14) are provided at the tank discharge valves (L13).

For connection of collection hoses, the elbows require a hose with 1½ inch inside diameter.

⚠ CAUTION

Possible Chemical Hazard:
Operate the valves from above. Wear chemical gloves. Inspect the valves from below only when flow is shut off. Wear eye protection when working under the tanks.

The valve operating handles have the word “FLOW” and a raised arrow ① that point in the open direction of flow. This provides tactile indication of handle orientation.

1. Connect any drain or collection hoses to the elbows (L14).
2. Check that the selector valve (L15) is closed.
3. Rotate one or both tank discharge valve (L13) operating handles to the elbows.
4. As desired, rinse out tanks from open lids.

Note: Parts of the tank plumbing system (to the selector valve) are below the elbows. These lines must be disconnected to completely drain them.

⚠ WARNING

Possible Chemical Hazard:
Wear proper protective equipment as required by chemical manufacturer. Avoid prolonged breathing of chemical fumes. Wear respirator as required by chemical manufacturer. Some chemicals will cause serious burns, lung damage, and death. Avoid contact with skin or eyes. Seek medical assistance immediately if accident occurs. Know what to do in case of an accident.

NOTICE

Equipment Damage Risk:
Do not leave fertilizer or fertilizer residue in pump. Do not allow air to enter pump. Even for short periods of storage, the entrance of air into the pump causes RAPID and SEVERE CORROSION.

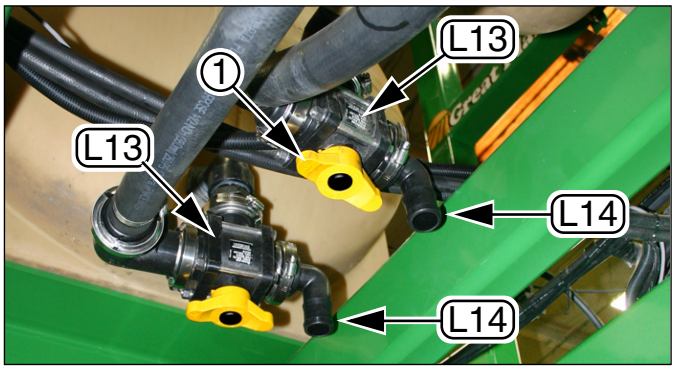


Figure 72 32017
Tank Discharge Valves

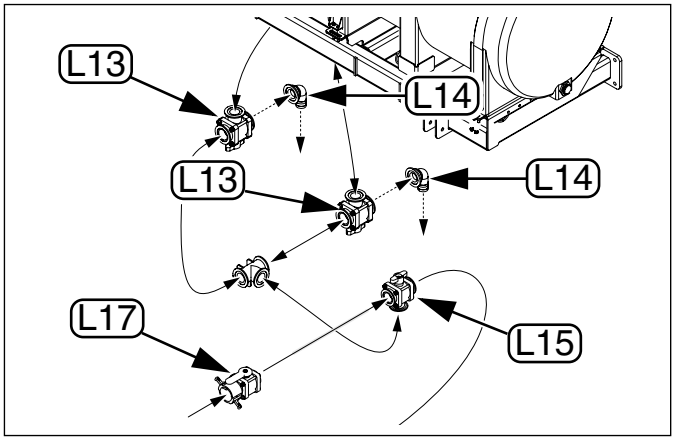


Figure 73 31955
Tank System Valves

Liquid Fertilizer Strainer Maintenance

Refer to Figure 74

The fertilizer system uses an in-line strainer to keep damaging particulates out of the pump. The strainer becomes clogged over time, reducing pump rate. Plan to clean the strainer several times per season. Don't wait for application rates to fall below target. Higher quality liquid fertilizers may require less frequent cleaning.

Disassemble and clean the strainer prior to storage to prevent caking.

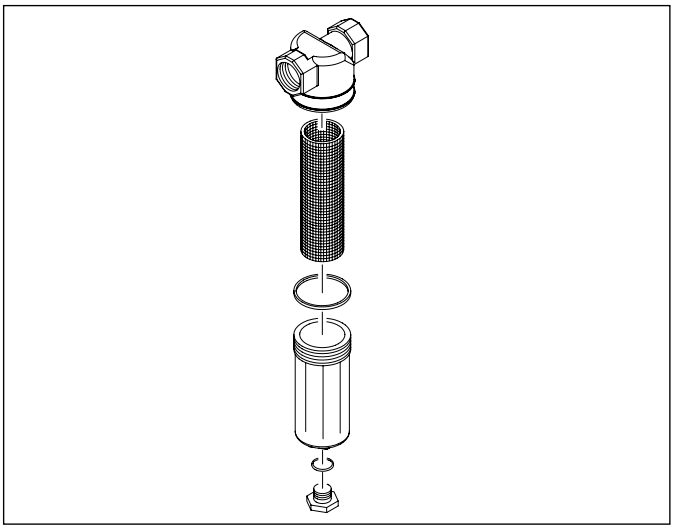


Figure 74
Strainer

18418

In Season Filter Cleaning

1. Shut off the ball valve at the filter, to minimize product spill.
2. Unscrew and remove the bottom canister of the filter.
3. Wash the filter cartridge with water, or replace with new cartridge if necessary.
4. Reinstall the cartridge, canister, and turn on the ball valve.

End of Season Filter Cleaning

1. Load 10 to 15 gallons (40 to 60 liters) of clean water in each supply tank.
2. Pump most of it through the system. If doing this by hand-turning the ground drive wheel, first install the largest drop-line orifice size, and set the pump adjuster to maximum, to increase flow.
3. With valves open, remove the canister. Clean strainer and canister.
4. Drain lines. Remove boom end-caps to drain wings.
5. Re-install strainer and canister.
6. Add 2 pints (1 liter) of RV antifreeze to the tank. Pump until tank is just empty (which leaves some fluid in strainer).
7. Open supply line at pump inlet. Introduce RV antifreeze, and operate pump until pump is filled.

Pump Maintenance and Repair

Ace Hydraulic Pump

The Ace pump is designed for long life and service. Through the years, it may be necessary to replace the mechanical seal or service components of the pump. A mechanical seal may weep slightly, but if it starts to drip, the pump will have to be disassembled. Before disassembly, be sure to wash it out with fresh water.

If the pump leaks, before removal from applicator, run the pump with adequate water in tank to diagnose the actual pump problem.

Refer to the Ace Pump Instruction manual (HYD-MAN) for disassembly instructions.

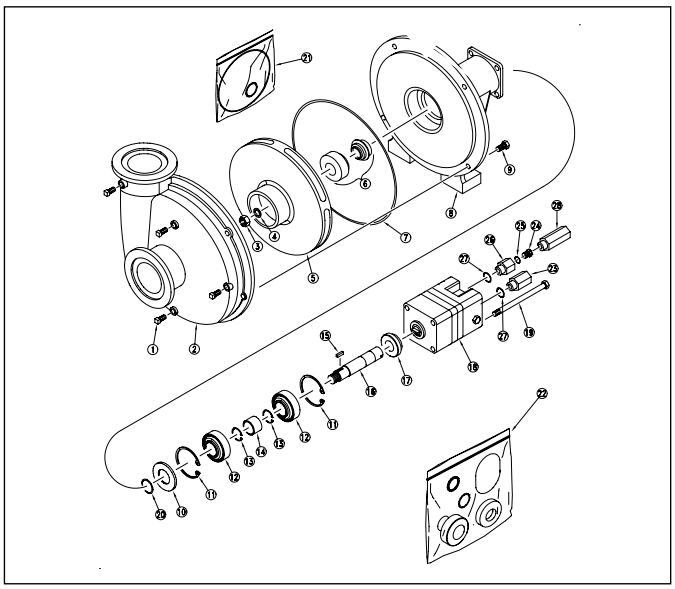


Figure 75 31965
Ace Pump Parts

Coulter Disc Replacement

22 Inch Coulters

Replace 22 in. (56 cm) coulter blades when adjusting application depth and/or applicator level becomes difficult. Signs that blade replacement is indicated are:

- Coulter blade diameter is close to, or below, 20 in. (51 cm).
- Height adjustment, when level, requires no lift-assist spacers (page 43).
- Tine height adjustment is at the upper limit (page 79).

See page 133 for replacement blades.

20 Inch Coulters

Replace 20 in. (51 cm) coulter blades when adjusting application depth and/or applicator level becomes difficult. Signs that blade replacement is indicated are:

- Coulter blade diameter is close to, or below, 18 in. (46 cm).
- Height adjustment, when level, requires no lift-assist spacers (page 43).
- Fertilizer arm adjustment is at the upper limit (page 82).

See page 134 for replacement and alternate coulter blades.

NH_3 Coulter Spring Setting

If the NH_3 coulter is ever disassembled for maintenance, reset the spring length to factory setting. Raise the applicator to ensure that the coulter is relaxed.

Refer to Figure 76

At the rear end of the spring ①, loosen the outer jam nut. Adjust the inner nut for a spring length ② of:

② $10\frac{3}{8}$ inches (26.4 cm)

This corresponds to a vertical trip force of 1557 pounds (705 kg).

NOTICE

Machine Damage Risk:

Do not attempt to compensate for extreme field conditions by adjusting the springs to higher forces (shorter springs). Higher trip force is not likely to improve penetration, and results in premature blade wear, higher risk of blade damage, and may simply lift the applicator.

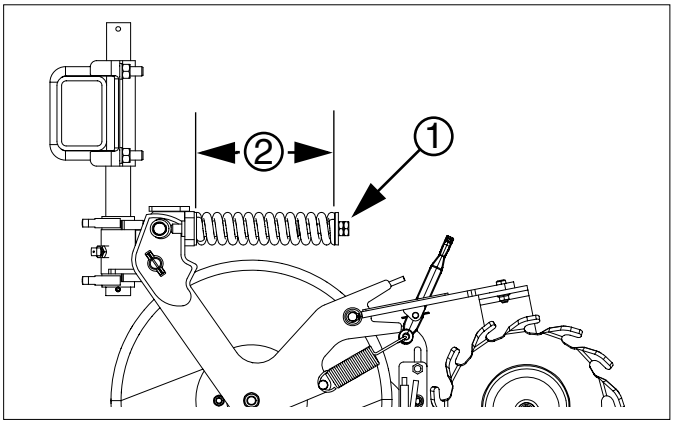


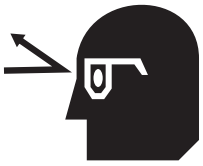
Figure 76 34929
Coulter Spring Length

Hydraulic Maintenance

As with any hydraulic system, contamination is the most common cause of performance problems and pre-mature wear. *Make a special effort to properly clean quick couplers prior to attaching the hoses to tractor, and never let them fall to the ground.*

⚠ WARNING

High Pressure Fluid Hazard:
Relieve pressure before disconnecting hydraulic lines.Wear protective gloves and safety glasses or goggles when working with hydraulic systems. Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks. Escaping fluid under pressure can penetrate the skin, causing serious injury. If an accident occurs, seek immediate medical assistance from a physician familiar with this type of injury.



Bleed only at JIC and NPT fittings.
Never try to bleed a QD (Quick Disconnect) fitting.
Avoid bleeding at ORB fittings. The O-ring is likely to be torn if any pressure remains in the circuit.

⚠ CAUTION

Crushing Hazard:
When reconnecting fittings at fold cylinder ports, verify that a 0.063in ($^{1}/_{16}$in, 1.6mm) orifice plate (Great Plains part number 196-430D) is installed at each port. A missing plate could result in a dangerously fast unfold, which might result in equipment damage, injury or death.

NOTICE

System Contamination Risk:
Always use liquid pipe sealant when adding or replacing NPT (National Pipe Thread, tapered thread) pipe-thread fittings. To avoid cracking hydraulic fittings from over tightening, and to keep tape fragments from clogging filters, do not use plastic sealant tape.

NOTICE

Over-Torque and Leak Risks:
JIC (Joint Industry Conference 37° Flare) fittings do not require high torque. Excess torque causes leaks. JIC and ORB (O-Ring Boss) fittings do not require sealant.

JIC Torque Chart

Size	Foot-Pounds	N-m
$^{7}/_{16}$-20	11-12	15-16
$^{1}/_{2}$-20	15-16	20-22
$^{5}/_{16}$-18	18-20	24-28
$^{3}/_{4}$-16	38-42	52-58
$^{7}/_{8}$-14	57-62	77-85
$^{11}/_{16}$-12	79-87	108-119

Bleeding Lift Hydraulics

Normally bleeding should not be required other than to raise fully and hold lever on for one minute or until all cylinders extend fully.

Bleeding Fold Hydraulics

Normally the fold hydraulics are bled at the factory before shipping, and bleeding should not be required.

1. Connect the fold circuit to a hydraulic source, such as a tractor remote.
2. Set the source circuit to Float to relieve any pressure in the lines.
3. Disconnect both base and rod ends of all fold cylinders.
4. Support the cylinders with ports facing up, and with cylinders oriented so that rods cannot strike implement parts when at full extension.
5. Orient cylinders with base ends higher than rod ends. Set circuit to Neutral.

One cylinder at a time:

6. Crack (slightly loosen) a JIC connection at a fold cylinder base end.
7. Extend the circuit slowly until fluid appears at the fitting.
8. Set the circuit to Neutral. Tighten the fitting.
9. Repeat step 6 through step 8 for the remaining cylinders.
10. Retract the fold cylinders. Set circuit to Neutral.
11. Orient cylinders with rod ends higher than base ends.

One cylinder at a time:

12. Crack (slightly loosen) a JIC connection at a fold cylinder rod end.
13. Extend the circuit slowly until fluid appears at the fitting.
14. Set the circuit to Neutral. Tighten the fitting.
15. Repeat step 12 through step 14 for the remaining cylinders.
16. Set circuit to Float.
17. Re-pin base and rod ends of cylinders to center section and wing lugs.
18. Test fold function carefully.

WARNING

Crushing and Equipment Damage Hazards:
Bleed after servicing fold cylinders or their hoses. Air in the system makes it hazardous to fold the implement. If it is necessary to service fold hydraulics while folded, the first unfold is especially dangerous. Wing motion can be uneven or jerky in fold. Unfolding wings could fall suddenly. Anyone nearby could be seriously injured or killed. Equipment damage is likely.

WARNING

High Pressure Fluid Hazard:
Wear safety goggles and gloves. The bleed procedure requires partially opening pressurized hydraulic lines. Escaping fluid under pressure can penetrate the skin, causing serious injury. If an accident occurs, seek immediate medical assistance from a physician familiar with this type of injury.

Wing Leveling

Before checking wing level, check that the center section is level left to right ("**Rear Eyebolt Adjustment**"). Rear eyebolts above the rear casters can affect left-right level if out of adjustment.

Wing level is controlled entirely by gauge wheel height. If wings are not running level, adjust gauge wheels.

Rear Eyebolt Adjustment

Side to side level at rear is controlled by eyebolts at the lift cylinder bases. On 2-point, rear height is set by spacers (page 43).

Check that both eyebolts are set to the same reveal ①.

Refer to Figure 77

The factory setting is a distance of:
① 4.5 in. (11.4 cm)
from the end of the eyebolt to the top face of the lug tube.

To adjust the eyebolt, loosen the hose guide nut ②, then the jam nut ③. Rotate the adjust nut ④ to set bolt reveal.

Check that the hose loop ⑤ is on top.
Tighten jam nut ③, then hose guide nut ②.

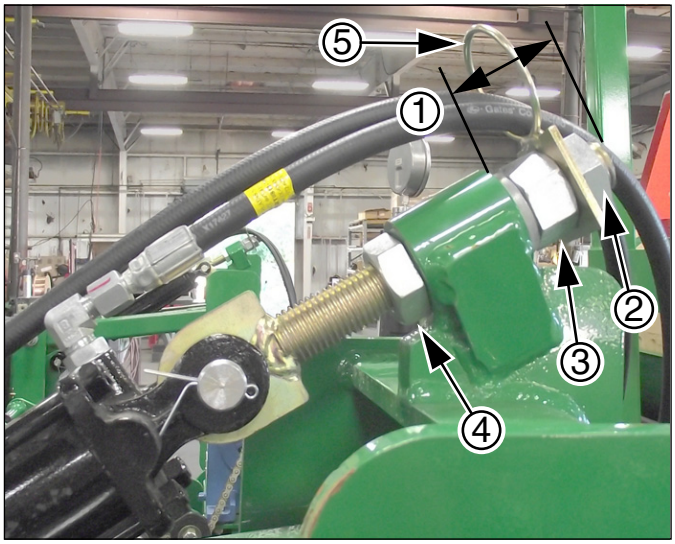


Figure 77 31622
Rear Lift Eyebolt

Caster Brake Adjustment

Refer to Figure 78

The rear lift-assist wheels each have independent adjusters for the caster pivot brake. The piston ① acts as a pivot brake, and helps prevent caster oscillation during transport. The adjustments will vary depending on different field-to-field conditions as well as road transport conditions.

If the caster is oscillating during transport turns or in field use, adjust the pressure plate bolt ⑤.

Pressure Plate Adjustment

Refer to Figure 78 and Figure 79

The factory setting for a new piston is:

1. Loosen the jam nut ③.
2. Turn the bolt ⑤ counterclockwise until the bolt is turning freely.
3. Drive screw in (down) until it contacts spring plate ④.
4. Drive screw in until the bolt reveal (from top of welded nut to bottom of bolt head) is:
   ② 2.0 inches (5.1 cm)
5. Tighten the jam nut.

Use more or less tension as needed to eliminate caster vibration during highway transport. Adjust as needed to compensate for piston wear.

Replace UHMW piston ① if its length is less than 1¼ in. (3.2 cm). Also replace piston if missing, damaged, tilted, or top of piston is visible.

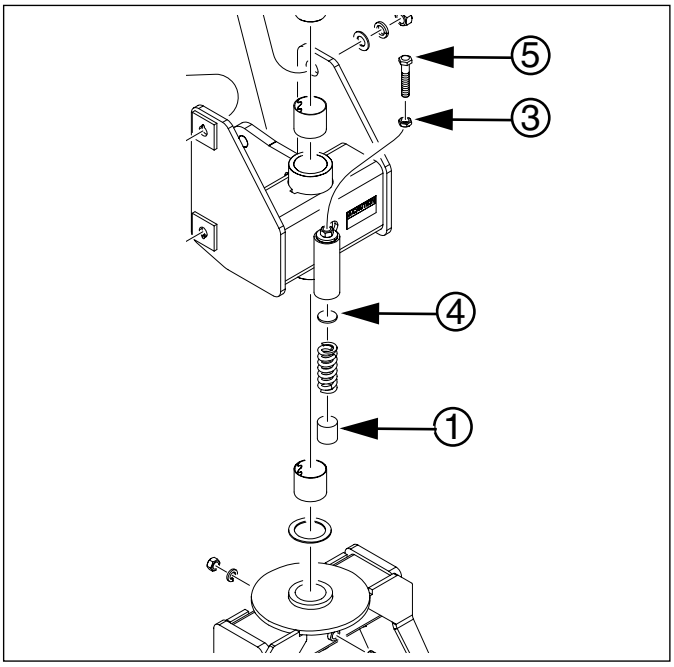


Figure 78 32319
Caster Brake Components

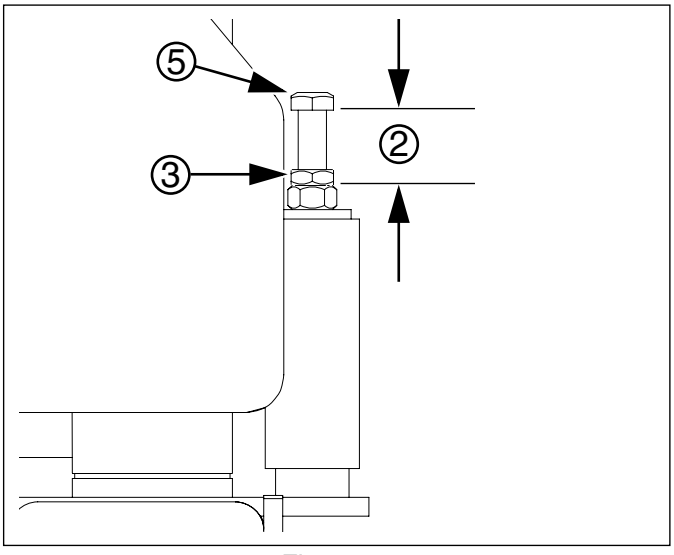


Figure 79 34955
Rear Caster Adjustment Bolt

Chain Maintenance

Inspect and lubricate chains regularly. The slack of new chains tends to increase during the first few hours of operation due to seating.

See also “**Chain Routing**” on page 159.

Chain Slack

Check slack at fixed idlers within the first 8 hours of operation and tighten idlers as necessary. Check slack at spring-operated idlers seasonally.

Refer to Figure 80, which, for clarity, greatly exaggerates slack, and omits the idlers.

1. Measure the span ① for allowable slack:
   Locate the longest span of each chain (usually the span which does not run through the idlers).
2. Determine the ideal slack:
   Long chains (over 36in/91cm): $\frac{1}{4}$in per foot
   Vertical short chains: $\frac{1}{4}$in per foot (2.1cm/m)
   Horizontal short chains: $\frac{1}{2}$in per foot (4.2cm/m).
3. Measure the current slack ②:
   Acting at a right angle to the chain span at the center of the span, deflect the chain in both directions. The slack is the distance of the movement.
4. Adjust the idlers for ideal slack.

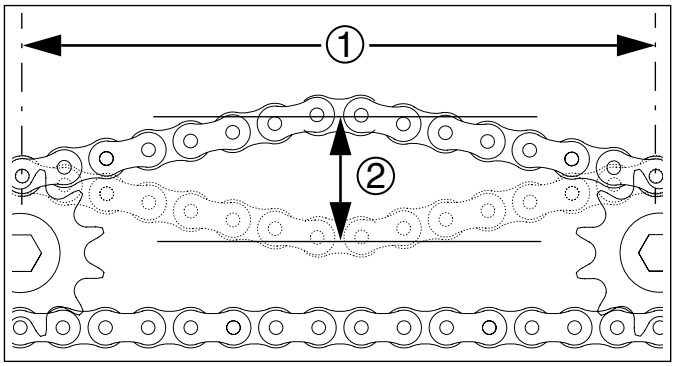


Figure 80 27264
Measuring Chain Slack

Chain Clips

Whenever mounting a chain, make sure the clip at the removable link is oriented to minimize snags.

Refer to Figure 81 (arrow shows chain direction)
Install clip with open end facing away from direction of chain travel (shown by gray or striped arrows in chain routing diagrams).

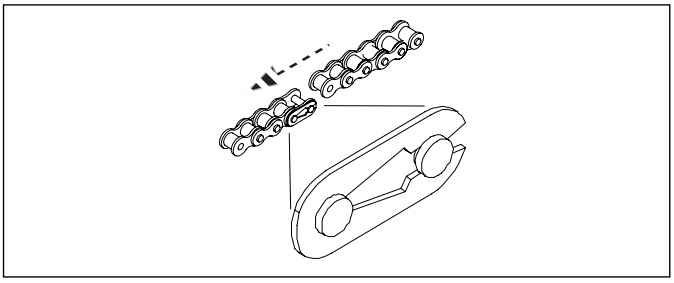


Figure 81 26482
Chain Clip Orientation

Lubrication and Scheduled Maintenance

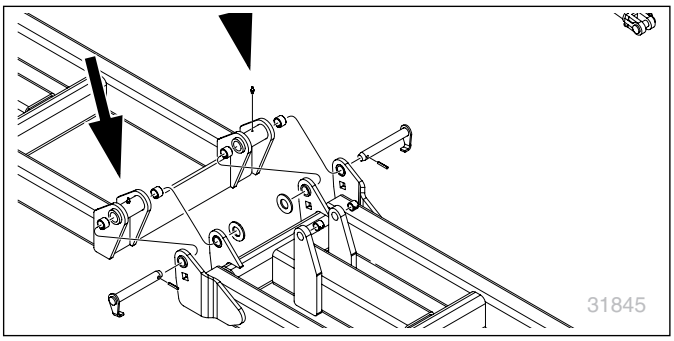
Multipurpose spray lube | Multipurpose grease lube | Multipurpose oil lube | Inspection required | 50 Intervals (service hours) at which lubrication is required

Wing Pivots

8

1 zerk each pin,
2 pins per wing;
4 zerks total

Type of Lubrication: Grease
Quantity: Until grease emerges

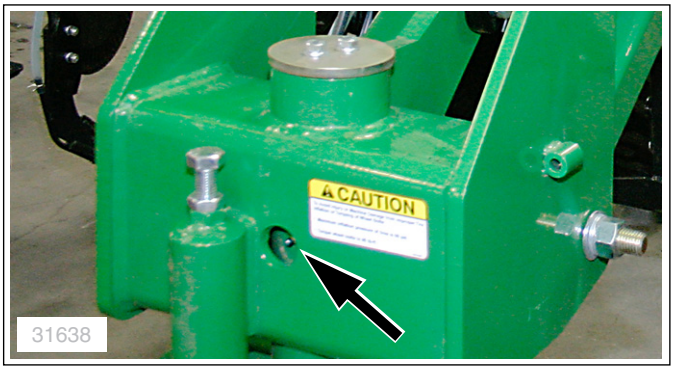


Caster Pivots

8

1 zerk each caster;
2 zerks total

Type of Lubrication: Grease
Quantity: Until grease emerges

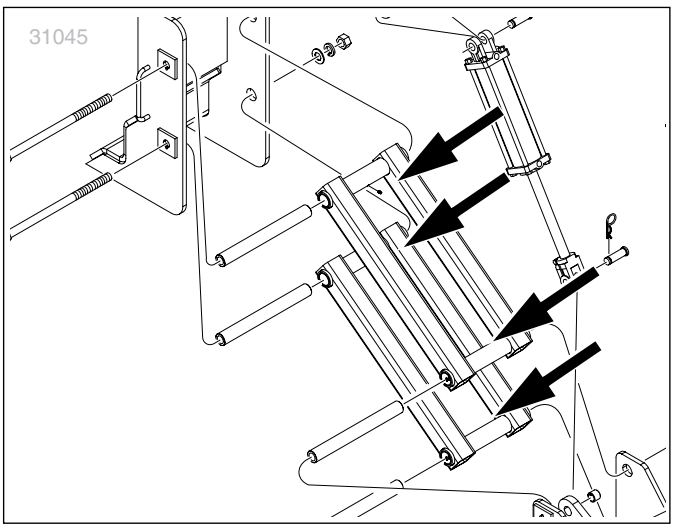


Lift- Assist Parallel Arms

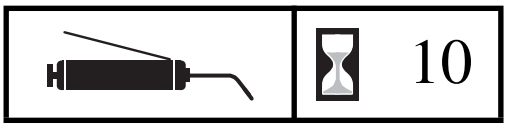
8

(2 zerks each arm,
2 arms per caster,
2 casters per implement;
8 zerks total

Type of Lubrication: Grease
Quantity: Until grease emerges

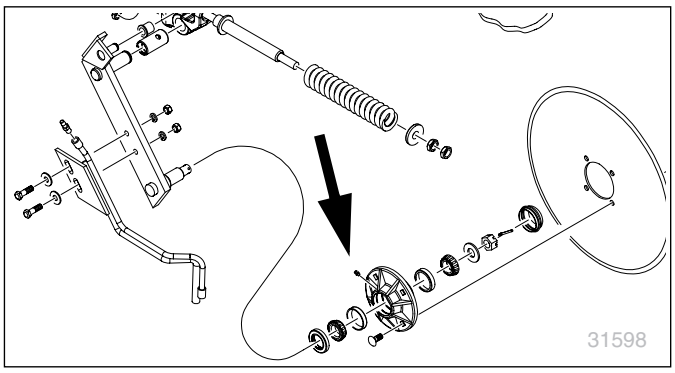


Vantage I Coulter Hubs (Option)

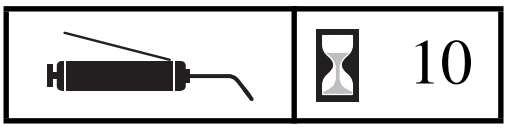


1 zerk per coulter,
12, 13 or 36 total

Type of Lubrication: Grease
Quantity: Until grease emerges



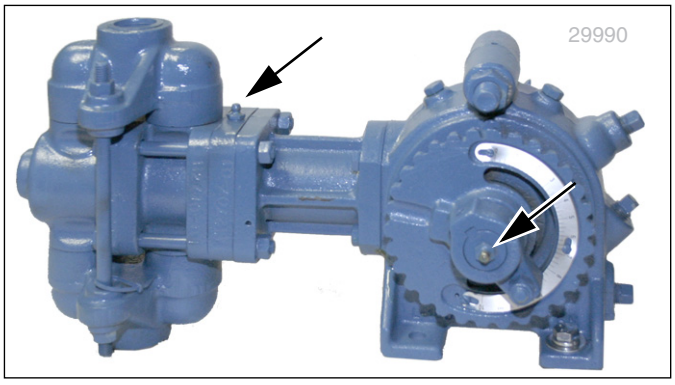
Fertilizer Pump Bearings



4 modules per fertilizer applicator,
one zerk per pivot;
4 total

Type of Lubrication: Grease
Quantity: Until grease emerges

Refer to JohnBlue manual for pump maintenance.

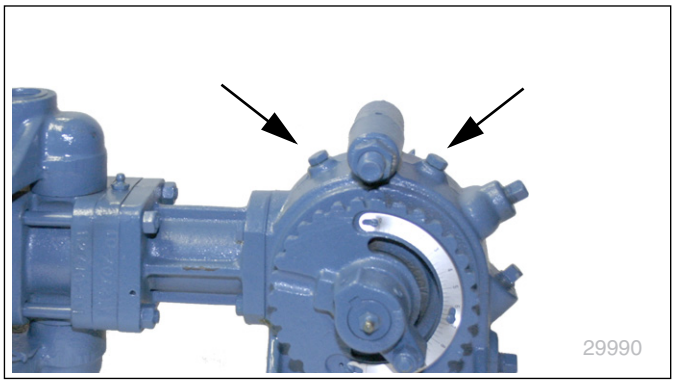


Fertilizer Pump Crankshaft

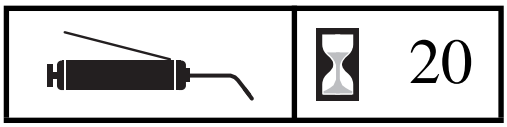
2 inspection/fill ports

Type of Lubrication: SAE 90 EP Gear Oil
Quantity: 8 fluid ounce capacity

Refer to JohnBlue manual for pump maintenance.

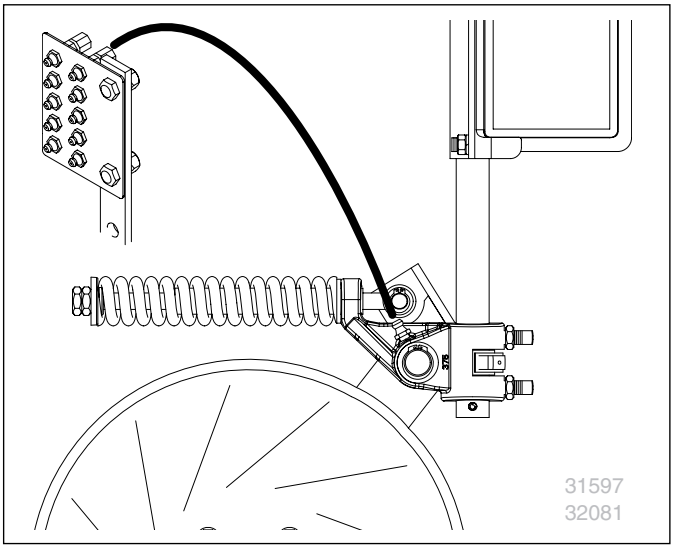


Vantage I Coulter Pivots

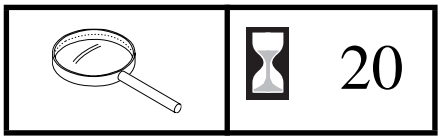


1 grease bank zerk per coulter pivot,
3 grease banks;
12 or 13 zerks total

Type of Lubrication: Grease
Quantity: Until grease emerges

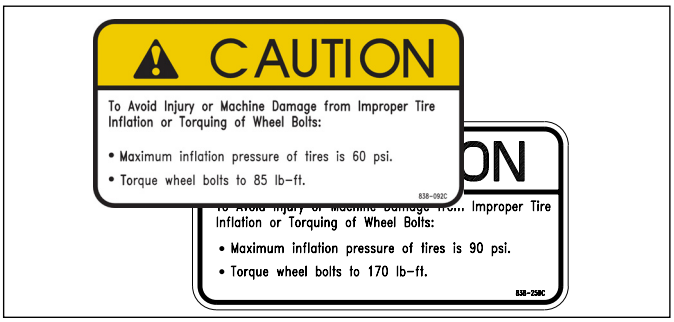


Tire Pressures

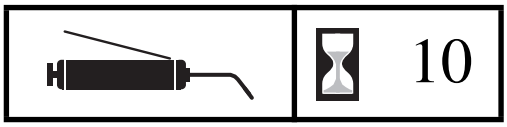


4 tires

Check tire pressures more frequently on a new implement, and with new tires. Check tire pressures before making any level adjustments, and whenever there are application problems.

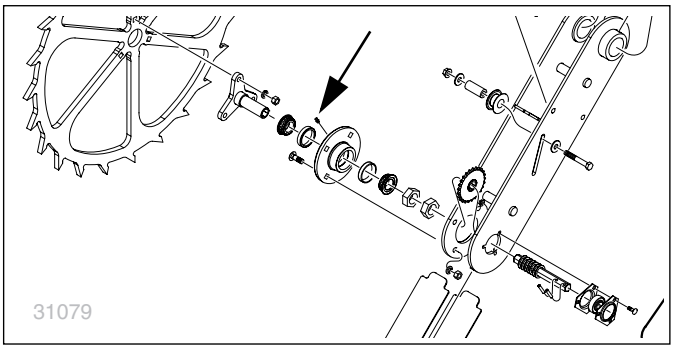


Ground Drive Wheel Hub (Option)



1 zerk at each bearing casting;
4 total

Type of Lubrication: Grease
Quantity: Until grease emerges

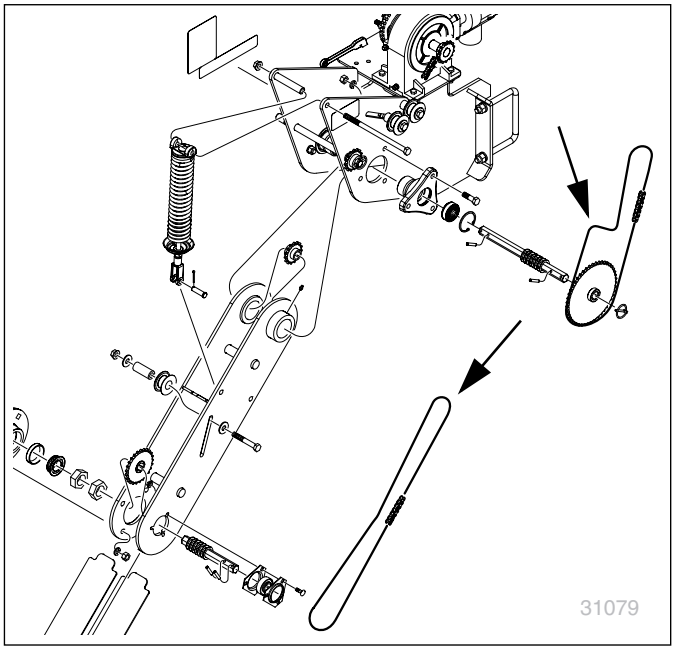


Fertilizer Drive: Chains (Option)

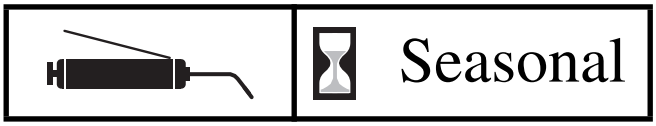
3 chains

Type of Lubrication: Chain Lube
Quantity = Coat thoroughly

Note: Lubricate chains any time there is a chance of moisture, and when being stored at the end of the planting season.

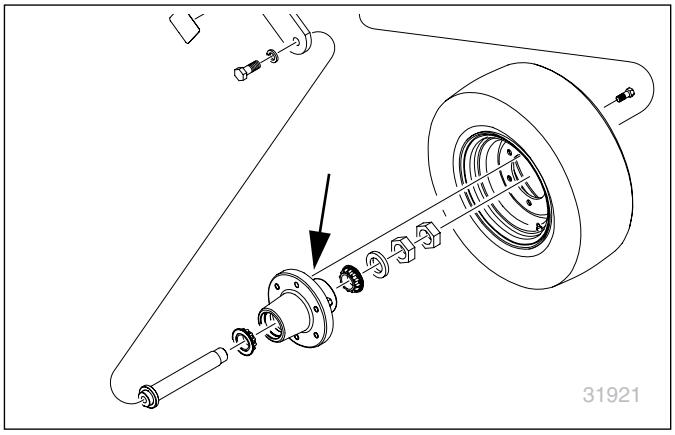


Gauge Wheel Hubs



1 zerk each hub,
2 hubs per implement;
2 zerks total

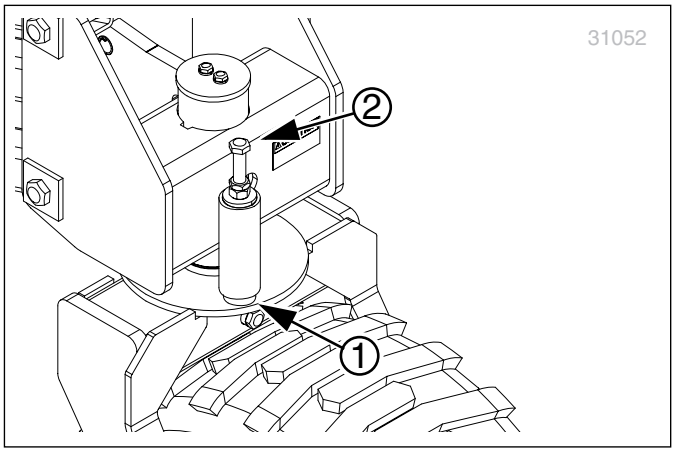
Type of Lubrication: Grease
Quantity: Until resistance is felt



Caster Stabilizers

One UHMW brake piston each caster;
2 total.

See page 125 for inspection and adjustment.



Options

The base Nutri-Pro® NP3000 and NP3000A is 2-point/ lift-assist tool bar with a choice of:

front frame (tanks or no tanks) 131
coulters (single or triple-row; without nozzles) 133

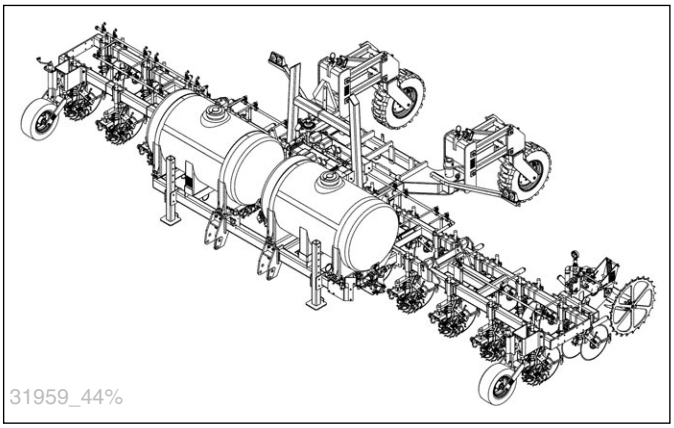
Discretionary options include:

manifold (three choices) 135
coulter applicators (three choices) 134
pump (two choices) 137
trailing hitch 139

These options are installed prior to delivery if ordered with the applicator.

Accessories available include:

Category II hitch pins.....132
controller console 138
side dress extension (three choices).....140
speed sensor.....139
a variety of speed sensor cables, for new or existing sensors. 138



2-Point Hitch and Tank Selection

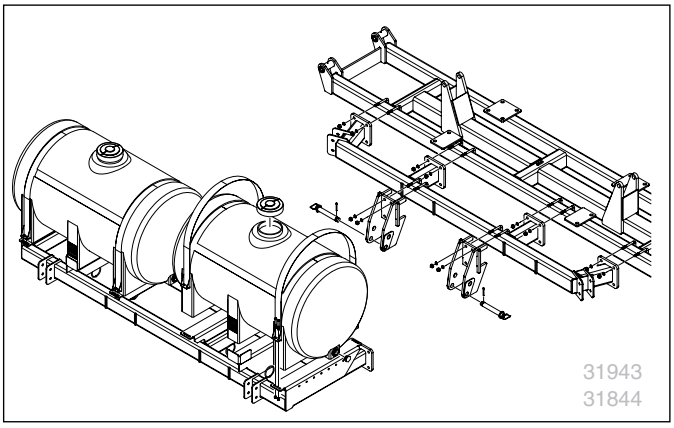
A forward sub-frame is required on the applicator, and is supplied with the choice of tanking.

Tank/Hitch	Original Option	Part Bundle
Dual 300 gallon tanks, large forward sub-frame	41	407-608A
No tanks, small forward sub-frame	40	407-607A

The tank option (41) includes tank plumbing, selector valve, and quick-fill inlet at the front tool bar.

The no-tank option (40) includes no plumbing. Use with a tractor-mounted or trailing nurse tank requires customer-provisioned plumbing.

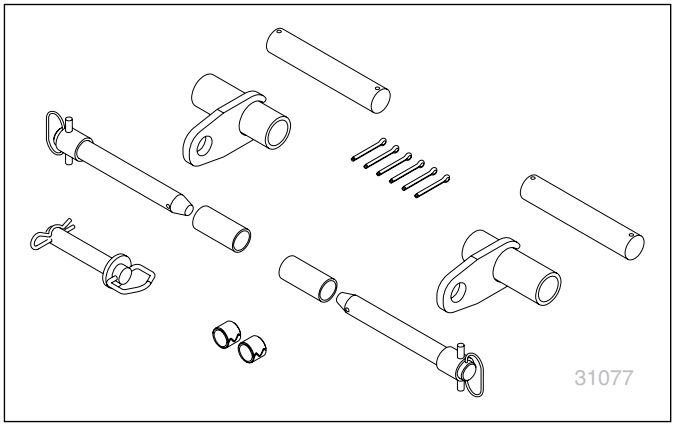
Field conversion is not presently documented. Conversion requires replacement of the forward sub-frame.



Category II Hitch Pin Kit

This kit adapts the applicator for use with tractors having Category II hitches.

Option Packages	Part Number
CAT 2 HITCH PIN KIT	596-060A



Row Cleaners

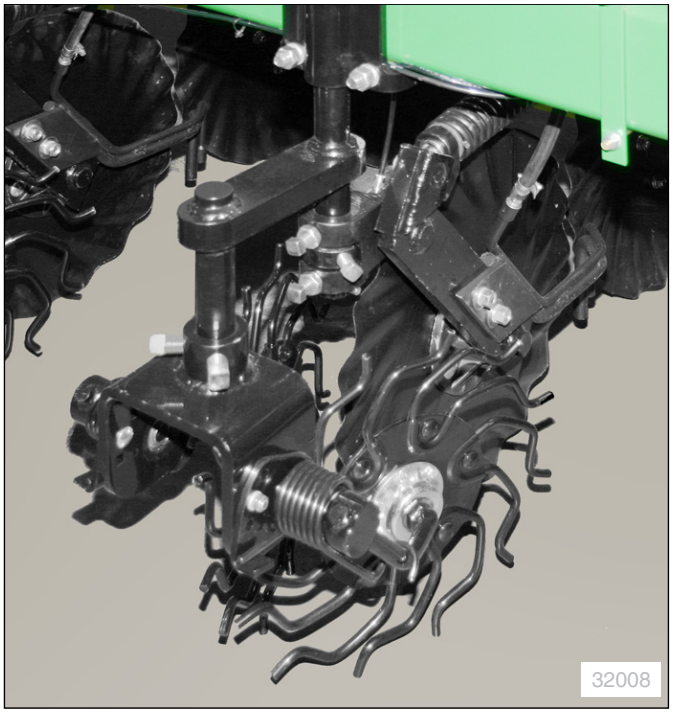
Terra-Tine™ Row Cleaners

These row cleaners are frame-mounted ahead of the forward single coulters. If row cleaners are used during side dress application, order one 207-254S for the13th row.

Packages	Original Option	Part Number
DOUBLE TERRA TINE (12R)	30[a]	207-241A
NP DBL TERRA TINE ASY	-	207-254S

a. Available only on NP3000-1230. For NP3000A-12C30, order 207-241A.

See “**Terra-Tine™ Adjustments**” on page 87.



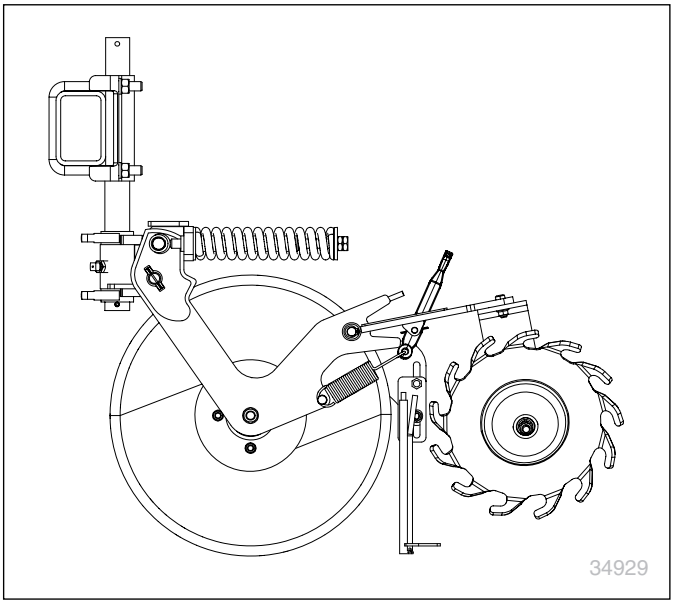
Coulters, Blades and Tines

Anhydrous Coulters

Figure at right shows a coulter with Turbo blade and spider sealers.

At time of publication, a single anhydrous coulter configuration was offered:

Package	Original Option	Part Bundle
22 inch turbo coulter, 12 row	(11)	417-122A
large spider sealers, 12 row	(16)	417-123A



NH_3 (22 Inch) Coulter Blades

Order replacement blades as:

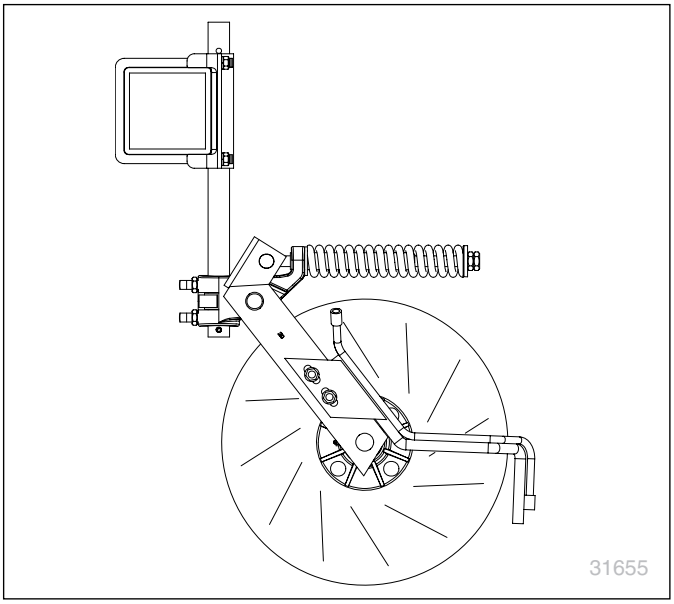
Description	Part Number
CLTR TURBO 22X.19X.5WV, 4-BOLT	820-521C

Vantage I Coulters

Figure at right shows a coulter with Turbo blade and optional applicator attachment.

A choice of Vantage I coulters is standard. Choose between single, dual-rear and three-coulter, and between fluted and turbo 20 inch blades.

Coulter Package	Original Option	Part Bundle
Triple: Fluted Coulters	(10)	204-255A
Triple: Turbo Coulters	(11)	204-256A
Single: Fluted Coulters	(12)	204-257A
Single: Turbo Coulters	(13)	204-258A
Double (rear): Fluted	(14)	204-268A
Double (rear): Turbo	(15)	204-269A



Three-coulter bundles now have novel Great Plains quick-detach coulter mounts on the rear coulters.

These kits provide strip-till capability, and do not include liquid fertilizer applicator tubing.

See “**Vantage I Coulter Adjustments**” on page 82.

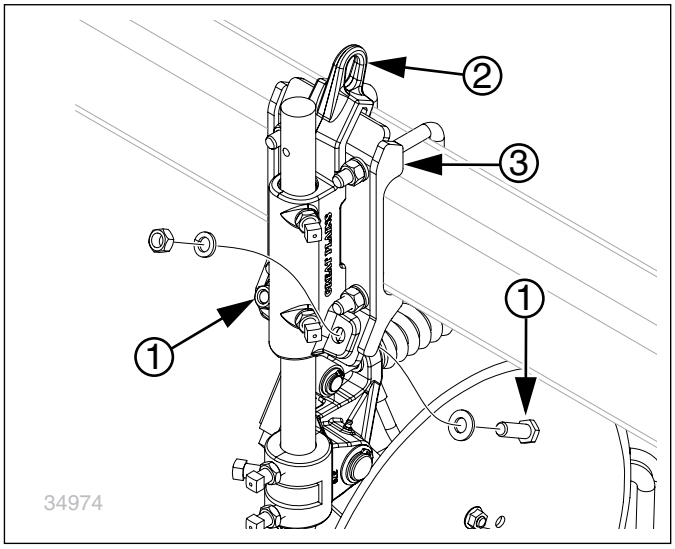
Quick-Attach Update Kit

For applicators manufactured prior to late 2012, the clamp style coulter mounts may be updated to quick-attach mounts.

The coulter is dismounted by removing two bolts ①, and lifting via a built-in hoist loop ②. The mount ③ remains in place. This dramatically speeds dismount/remount and eliminates the need to reset shank height as well as mark or re-align row stations.

Order one kit per row.

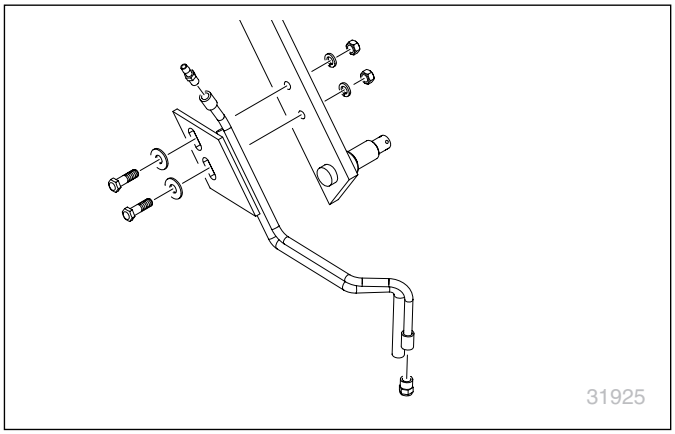
Description	Part Number
QUICK ATTACH MOUNT ASSY	417-207A



Vantage I Attachment Kits

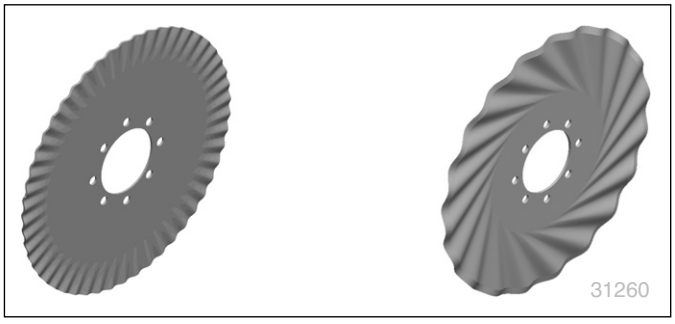
These kits include applicator tubing weldments, fittings and hardware. For side dress application, if no rear applicators are available for relocation, order one each 204-261K and 800-390C for the13th row.

Manifold Package	Original Option	Part Bundle
REAR CLTR FERT TINE OPTION (24 applicator arm kits)	(60)	204-259A
FRNT CLTR FERT TINE OPTION (12 applicator arm kits)	(61)	204-260A
FRONT & REAR TINE OPTION (36 applicator arm kits)	(62)	204-271A
RH FERT - TINE ASSY	-	204-261K
CLAMP WRM DRV #6 SS	-	800-390C



Coulter Blades

Single Blade	Part Number
20.3in fluted blade ($^{5}/_{16}$in wave)	820-074C
20.2in turbo blade ($^{3}/_{4}$in wave)	820-180C



Coulter Nozzles

Nozzle Description	Part Number
Solid Stream H1/4U-SS0002, size 2	828-036C
Solid Stream H1/4U-SS0003, size 3	828-037C
Solid Stream H1/4U-SS0004, size 4	828-038C
Solid Stream H1/4U-SS0005, size 5	828-039C
Solid Stream H1/4U-SS0006, size 6	828-040C
Solid Stream H1/4U-SS0008, size 8	828-041C
Solid Stream H1/4U-SS0010, size 10	828-042C

Nozzle Description	Part Number
Solid Stream H1/4U-SS0015, size 15	828-043C
Solid Stream H1/4U-SS0020, size 20	828-044C
Solid Stream H1/4U-SS0030, size 30	828-045C
Solid Stream H1/4U-SS0040, size 40	828-046C[a]
Solid Stream H1/4U-SS0050, size 50	828-054C
Solid Stream H1/4U-SS0060, size 60	828-055C
Solid Stream H1/4U-SS0070, size 70	828-056C

a. This is the standard nozzle size included with the coulter.

Manifolds and Accessories

Fertilizer wet booms (manifolds) are not standard. Select one or two booms and attachment kits depending on row applicators installed. Order pumps separately.

Manifolds

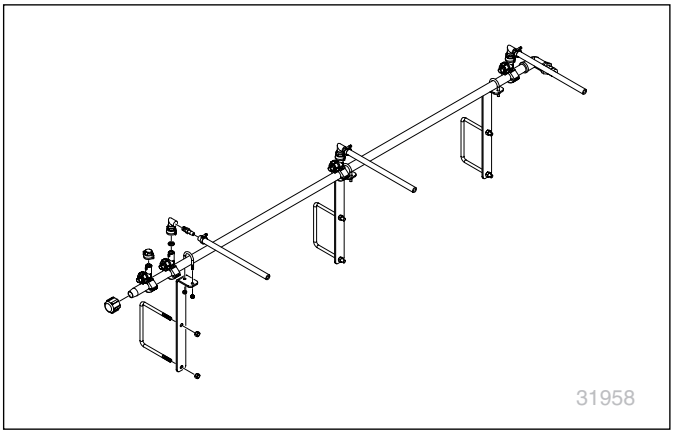
Manifolds are installed before delivery if ordered (as options) with the applicator. If a pump is also ordered, only the front manifold is plumbed to the pump. Manifolds include drop lines, but not row applicator tines.

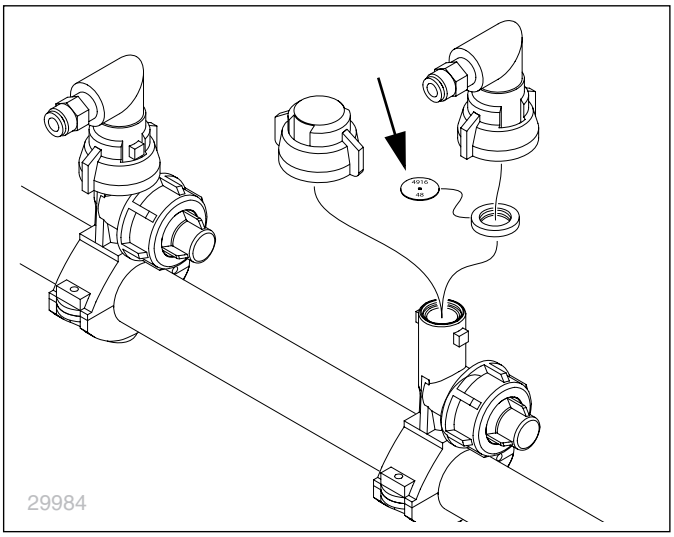
Manifold Package	Original Option	Part Bundle
1ST PRODUCT MANIFOLD (13-outlet forward boom)	(65)	407-627A
SECOND PRODUCT MANIFOLD (24-outlet rear boom)	(66)	407-628A
FRONT & REAR MANIFOLD (12-outlet front & 36-outlet rear)	(67)	407-680A

Fertilizer Orifice Plates

The manifold systems, and the side dress accessory include size 28, 34 and 48 plates. To order alternate plates, use the following part numbers. Order one per row unit.

See “**Select and Install Orifice Plates**” on page 91.





Variable Rate Nozzles

These SprayTarget VeriFlow regulators replace the standard nozzles and orifice plates. They provide consistent back-pressure over a wide range of rates. This eliminates changing orifice plates, and enables prescriptions (varying rates during application).

Description	Color Code	Part Number
NOZZLE HI-VERIFLOW1	GRN/YEL	829-143C
NOZZLE VERIFLOW1	BLU	829-144C

Order one 829-143C per full-rate row. Order one 829-144C per half rate (double-pass) row. See "**Tramlines and Doubled Rows**" on page 92.

SprayTarget recommends a 50 mesh strainer screen, available from Great Plains as part LST-1550.

Pumps

Pumps are not standard. One pump may be installed prior to delivery if ordered as an option. If a second pump is desired, order the bundle part number.

Pump Package	Original Option	Part Bundle
LIQUID FERT. GROUND DRIVE PUMP	(22)	407-604A
FERT VAR. HYD. DRIVE WITH TANK	(23)	407-633A
FERT VAR. HYD. DRIVE NO TANK	(24)	407-644A

Ground Drive Pump

Ground drive pump bundle ((22)) 407-604A includes a ground drive assembly, CDS-John Blue NGP-7055K piston pump, plumbing for on-board tanks (tanks ordered separately), relief valve, pressure gauge and passive manifold for a three section boom (boom ordered separately).

Hydraulic Drive Pumps

Hydraulic drive pump bundle ((23)) 407-633A and ((24)) 407-644A include hydraulic hoses from the hitch, Ace 150F-HYD-206 hydraulic motor, fittings and impeller pump, plumbing for on-board tanks (tanks ordered separately), three-section solenoid valves, pressure sensor, flow meter, electronic control valve and harnesses compatible with Raven SCS 440 or SCS 450 consoles (console not included).

Pump bundle ((24)) 407-644A has shorter hydraulic hoses, and is intended for use on applicators without on-board tanks.

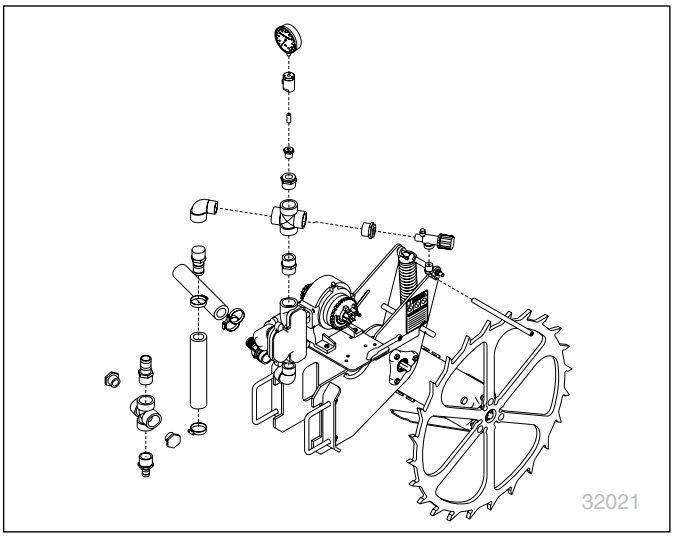
The Ace pump includes all fittings needed for use with open center and load-sensing (LS) or pressure-compensating (PC) closed center hydraulic systems. Fitting removal and/or needle valve adjustment is required prior to first use (see page 162).

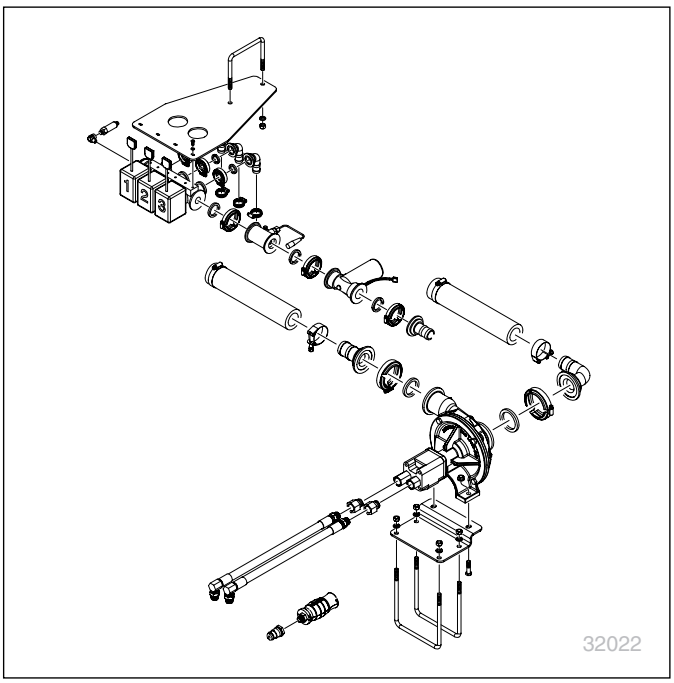
Hydraulic drive pump bundles ((23)) 407-633A and ((24)) 407-644A and require a new or existing Raven SCS 440 or SCS 450 controller, and a new or existing compatible speed sensor.

User-Provisioned Tanks

For tractor-mounted or trailing nurse tanks, some customer-provisioned plumbing is required.

For trailing nurse tank, also order a rear hitch (page 139).





Second Pump Note:

A second pump requires user-provisioned plumbing to the tractor tank, trailing nurse tank, or to one of the on-board tanks. A second hydraulic pump requires a second controller console.

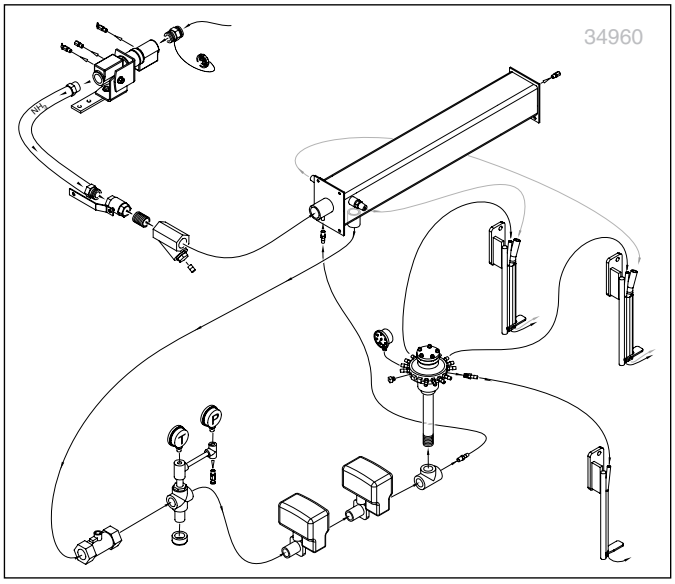
A second hydraulic pump requires a user-configured air bleed line for priming. The supplied fitting and tubing may be incompatible with the tanking used. Replace the topmost $\frac{1}{8}$ inch NPT plug with a $\frac{1}{8}$ inch NPT petcock valve.

Anhydrous Metering

Based on the Raven AccuFlow™ system, Great Plains factory-installed systems include all the components identified on pages 147 through page 150, plus all the piping, tubing, fittings and console harness[a] to hitch.

Meter Package	Original Option
Single-Cooler Single-Section	(20)
Dual-Cooler Single-Section	(21)
Single-Cooler Section Control	(22)
Dual-Cooler Section Control	(23)

Select the dual-cooler system for application rates above 30 gpm, or for application in colder conditions, where the nurse tank vapor pressure might not support a full 30 gpm rate with a single cooler.



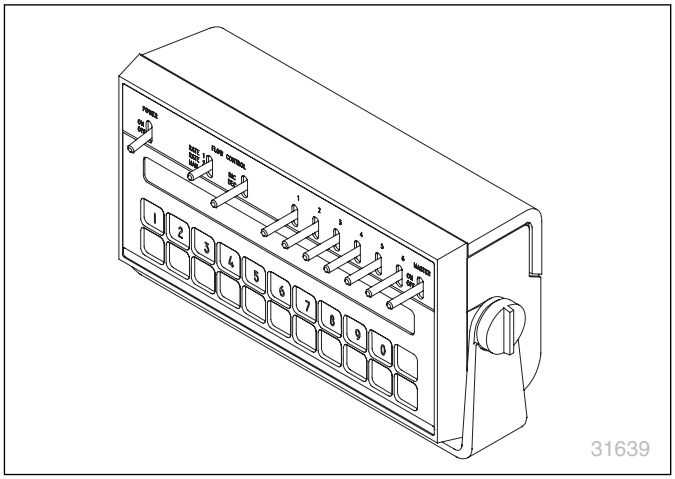
Console

The Raven SCS 450 is used only with a hydraulic pump. It controls and adjusts application rate based on flow meter input, ground speed, and operator rate settings. This console is sold separately from the cooler system (above) or hydraulic pump system (page 137), which includes the implement harnesses, flow meter and valves.

This kit includes only the console and cab mounting hardware.

Console Package	Part Number
RAVEN 450 CONSOLE	823-211C

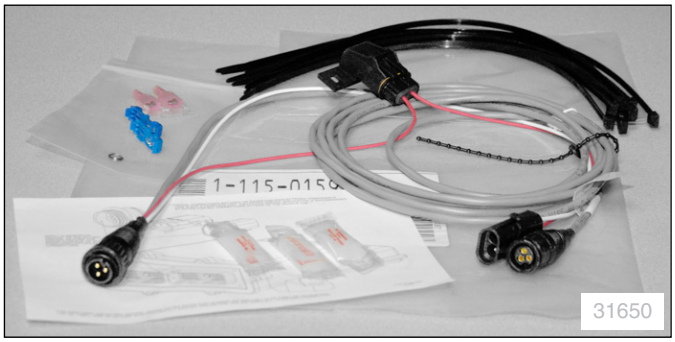
This console package does not include a speed sensor or speed sensor cable. The SCS 450 may be compatible with a speed sensor, radar or GPS speed output already installed on the tractor.



Speed Sensor Cable

If your existing or purchased speed sensor is compatible with the Raven 115-0159-539 cable (intended for use with a Raven radar), you may order it from Raven, or from Great Plains:

Cable Package	Part Number
Radar Power Cable	115-0159-539



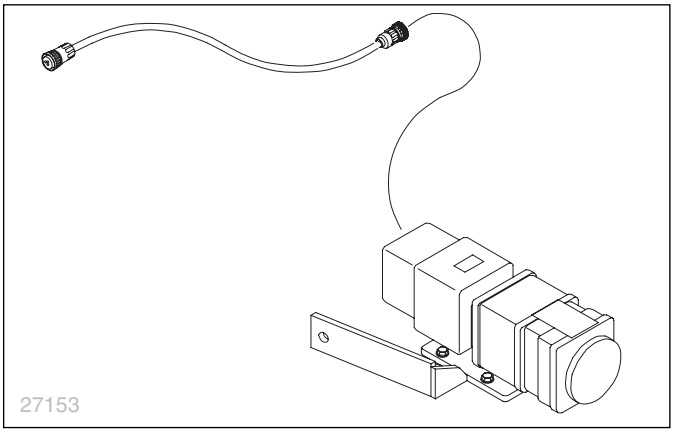
a. Console itself is sold separately.

Speed Sensor

The Raven SCS 450 accepts speed inputs from traditional magnet sensors, speed radars, and GPS receivers that provide compatible speed outputs. If the tractor does not already have a compatible speed data source, Great Plains offers DICKEY-john® radar.

Cable Package	Part Number
Radar Kit	509-289A

This kit includes the radar transceiver and a Raven 115-0159-526 power and data cable.



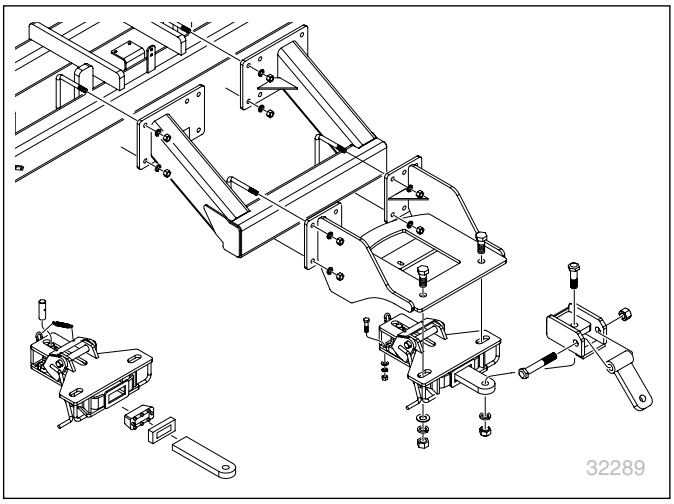
Rear Hitch

A rear hitch is required for a trailing nurse tank.

The drop hitch assembly offered by Great Plains includes hitch mount weldment, decal mount (not shown), breakaway coupler mount point, and a Schuck model 850 cushioned hitch with a 50,000 pound load rating and 2,000 pound tongue weight.

Drop Rear Hitch

Rear Hitch Package	Original Option	Accessory Kit
Drop Rear Hitch Assembly	(27)	407-722A



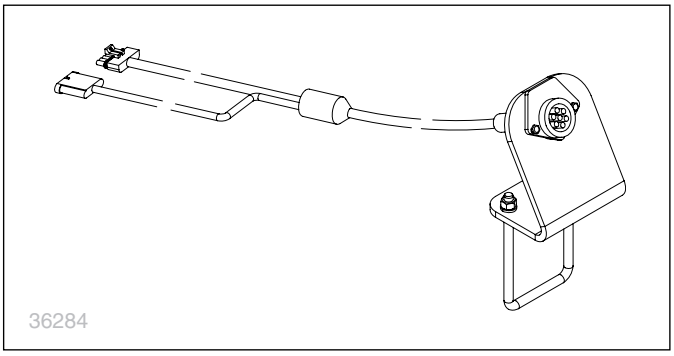
Nurse Tank Light Harness

For extra safety in the field, this harness provides an SAE J560b 7-pin receptacle at the applicator rear hitch (option), interconnected with the applicator lighting system.

Lighting Harness		Accessory Kit
Nurse Tank Light Kit	-	417-357A

⚠ WARNING

Loss of Control / Braking Hazards:
Do not use the lighting harness for highway transport of nurse tanks or trailers behind an applicator. At transport speeds on roads, an urgent or emergency deceleration will result in a "jackknife" upset of a trailer. Even normal braking above field speed risks loss of control. The entire train can exceed the braking capability of the tractor, particularly if a full tank is towed. An accident is likely to result in serious injury or death, and major equipment damage.



Note: Compatible with 2014+ Nutri-Pro® applicators, and earlier models having an LED lighting system. Requires an applicator rear hitch (not included - drop or high-clearance hitches are compatible).

Side Dress Extension

These accessory kits provide a left wing extension to support an additional (13th) forward single coulter and forward boom drop line. The kit is user-installed, and conversion between pre-emergence and side dress modes requires user re-configuration of the implement.

Accessory Package	Part Number
Conventional Liquid Side Dress	
SIDEDRESS OPTION 5/16 FLUTED	407-609A
SIDEDRESS OPTION TURBO	407-626A
DOUBLE TERRA TINE	207-254S
SIDEDRESS OPTION W/O COULTER	407-636A
Anhydrous Side Dress	
SIDEDRESS OPTION NH3 COULTER	417-124A

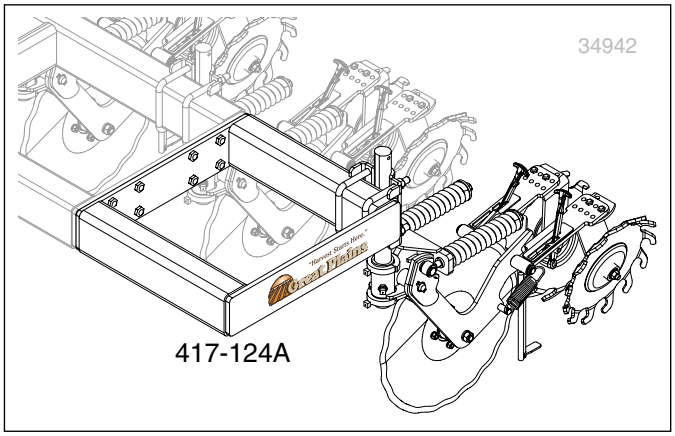
407-609A, 407-626A and 417-124A Notes:
These coulters do not include row cleaners. If row cleaners are desired order one 207-254S.

The conventional kits include a boom nozzle for the 13th boom outlet, and one set of orifice plates (sizes 28, 34 and 48). If a different size is required, order one or more plates. See page 135.

407-636A Note:
Order the without-coulter part number for use on triple-coulter implements that have both rear coulters and applicator attachments on the rear coulters. All of the rear coulters are removed during conversion to side dress; one coulter, its nozzle and drop line, and its grease bank tubing, is relocated to the wing extension.

417-124A Note:
This kit includes one anhydrous coulter, all hardware and tubing necessary to connect it to a spare port on the section flow divider.

See “**Appendix D - Accessory Installation**” on page 164 for installation and use instructions.



Weight Kit

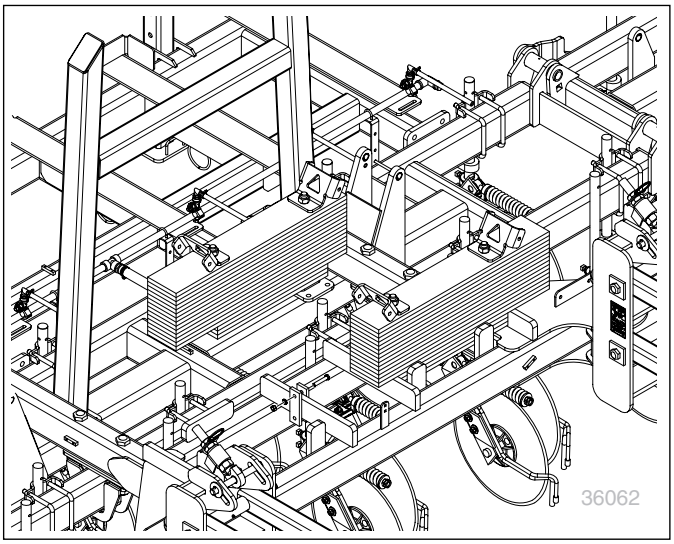
Standard applicator configurations provide sufficient weight for conventional till and most no-till conditions. For challenging no-till conditions, a weight set is available. It adds 1460 pounds (660 kg) at the rear sub-frame.

The weight stacks are available as an Option with the original fertilizer applicator order, or as a separate kit.

Description	Opt.	Part Number
NP3000 WEIGHT KIT	(70)	407-904A

Note: This kit is compatible only with applicators having serial numbers C1017A or higher. C1016A and earlier applicators have a mechanically incompatible rear sub-frame.

See “**Weight Kit Installation (s/n C1017A+)**” on page 175.



Appendix A - Reference Information

Specifications and Capacities

NP3000-1230

NP3000-1230	With On-Board Tanks		Tankless	
	Standard	Side Dress	Standard	Side Dress
Row Count	12	13	12	13
Row Spacing	30 in			
Working Width	29 ft. 7 in.	31 ft. 11 in.	29 ft. 7 in.	31 ft. 11 in.
Transport Width	17 ft. 2 in.			
Swath	30 ft. 0 in.	32 ft. 6 in.	30 ft. 0 in.	32 ft. 6 in.
Metering System	Option: Raven Control/Section Valves, Pressure Sensor & RFM60P Flow meter			
Controller Console	Option: Raven SCS 450 (Optional)			
Length, Transport	13 ft. 4 in.	13 ft. 4 in.	11 ft. 1 in.	11 ft. 1 in.
Length, Field	14 ft. 0 in.	14 ft. 0 in.	11 ft. 9 in.	11 ft. 9 in.
Working Height	9 ft. 7 in.			
Transport Height (Folded)	11 ft. 1 in.	12 ft. 7 in.	11 ft. 1 in.	12 ft. 7 in.
Transport Clearance	16 in. nominal, depends on tractor hitch			
Wing Down Flex	10°			
Min. Tractor HP Req.[1]	145 - 180 hp	145 - 180 hp	145 - 180 hp	145 - 180 hp
Hydraulic Circuits Req.	1 or 2 Circuits, 2250 psi, 4 to 17 gal./min.			
Weight, Maximum, Empty	13100 lbs	13400 lbs	10600 lbs	10900 lbs
Weight, Maximum, Full	18900 lbs	19200 lbs	N/A	N/A
Transport Tire Size	265/70B16.5 (10-16.5) (NHS 8-Ply Skid Loader 4140 lbs @ 5 mph)			
Wing Gauge Wheel Tire	20.5X8.0-10 (Load Rating E, 1520 Pounds)			
Operating Depth	0 to 6 in. Do not exceed 6.5 in. (release depth is 4.5 in. above coulter depth.)			
Rear Hitch (Optional)	Option: Schuck Model 850			
Nurse Tank Capability	2000 Gallons			

1. Power requirements vary significantly with conditions and practices.

NP3000A-12C30

NP3000A-12C30	With On-Board Tanks		Tankless	
	Standard	Side Dress	Standard	Side Dress
Row Count	12	13	12	13
Row Spacing	30 in			
Working Width	29 ft. 7 in.	31 ft. 11 in.	29 ft. 7 in.	31 ft. 11 in.
Transport Width	17 ft. 2 in.			
Swath	30 ft. 0 in.	32 ft. 6 in.	30 ft. 0 in.	32 ft. 6 in.
Metering System	Raven Accuflow™ with CDS-JohnBlue Impellicone (Optional)			
Controller Console	Option: Raven SCS 450 (Optional)			
Length, Transport	13 ft. 4 in.	13 ft. 4 in.	11 ft. 1 in.	11 ft. 1 in.
Length, Field	14 ft. 0 in.	14 ft. 0 in.	11 ft. 9 in.	11 ft. 9 in.
Working Height	9 ft. 7 in.			
Transport Height (Folded)	11 ft. 1 in.	12 ft. 7 in.	11 ft. 1 in.	12 ft. 7 in.
Transport Clearance	16in. nominal, depends on tractor hitch			
Wing Down Flex	10°			
Min. Tractor HP Req.[1]	145 - 180 hp	145 - 180 hp	145 - 180 hp	145 - 180 hp
Hydraulic Circuits Req.	1 Circuit, 2250 psi, 5 gal./min.			
Weight, Maximum, Empty	13500 lbs	13800 lbs	11300 lbs	11600 lbs
Weight, Maximum, Full	16600 lbs	16900 lbs	N/A	N/A
Transport Tire Size	265/70B16.5 (10-16.5) (NHS 8-Ply Skid Loader 4140 lbs @ 5 mph)			
Wing Gauge Wheel Tire	20.5X8.0-10 (Load Rating E, 1520 Pounds)			
Operating Depth	3 to 7 in. Do not exceed 7.0 in. (release depth is 3/4 in. above coulter depth.)			
Rear Hitch (Optional)	Option: Schuck Model 850			
Nurse Tank Capability	2000 Gallons			

1. Power requirements vary significantly with conditions and practices.

Tire Inflation Chart

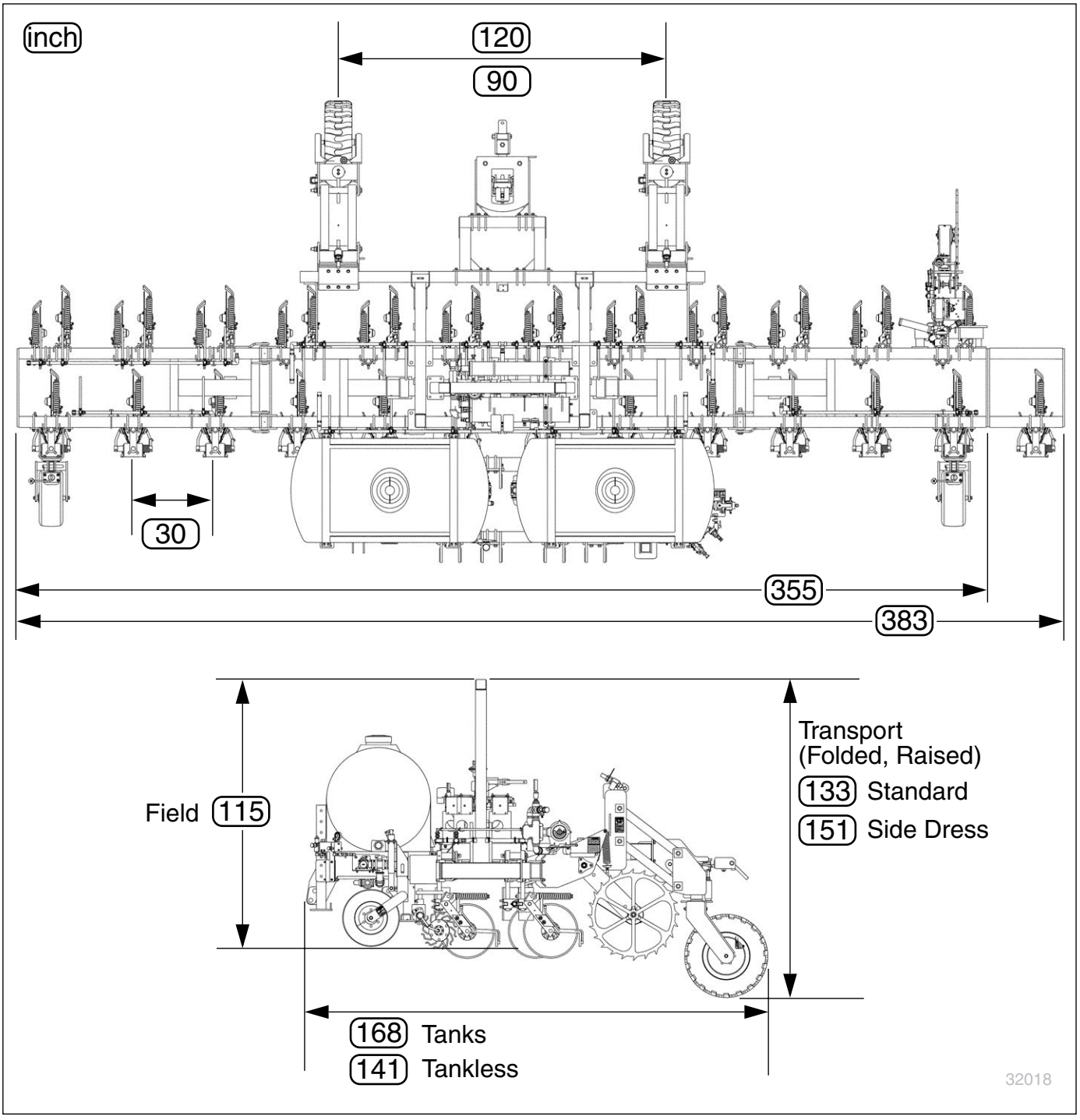
Wheel	Tire Size	Inflation
Lift-Assist	265/70B16.5	60 psi (415 kPa)
Wing Gauge	20.5X8.0-10	90 psi (620 kPa)

Tire Warranty Information

All tires are warranted by the original manufacturer of the tire. Tire warranty information is found in the brochures included with your Operator's and Parts Manuals or online at the manufacturer's web sites listed below. For assistance or information, contact your nearest Authorized Farm Tire Retailer.

Manufacturer	Web site
Firestone	www.firestoneag.com
Gleason	www.gleasonwheel.com
Titan	www.titan-intl.com

Dimensions


inch
120
90
30
355
383
Field 115
Transport
(Folded, Raised)
133 Standard
151 Side Dress
168 Tanks
141 Tankless
32018

Torque Values Chart

Bolt Size	Bolt Head Identification					
	 Grade 2		 Grade 5		 Grade 8	
in-tpi[a]	N-m[b]	ft-lb[d]	N-m	ft-lb	N-m	ft-lb
1/4-20	7.4	5.6	11	8	16	12
1/4-28	8.5	6	13	10	18	14
5/16-18	15	11	24	17	33	25
5/16-24	17	13	26	19	37	27
3/8-16	27	20	42	31	59	44
3/8-24	31	22	47	35	67	49
7/16-14	43	32	67	49	95	70
7/16-20	49	36	75	55	105	78
1/2-13	66	49	105	76	145	105
1/2-20	75	55	115	85	165	120
9/16-12	95	70	150	110	210	155
9/16-18	105	79	165	120	235	170
5/8-11	130	97	205	150	285	210
5/8-18	150	110	230	170	325	240
3/4-10	235	170	360	265	510	375
3/4-16	260	190	405	295	570	420
7/8-9	225	165	585	430	820	605
7/8-14	250	185	640	475	905	670
1-8	340	250	875	645	1230	910
1-12	370	275	955	705	1350	995
1 1/8-7	480	355	1080	795	1750	1290
1 1/8-12	540	395	1210	890	1960	1440
1 1/4-7	680	500	1520	1120	2460	1820
1 1/4-12	750	555	1680	1240	2730	2010
1 3/8-6	890	655	1990	1470	3230	2380
1 3/8-12	1010	745	2270	1670	3680	2710
1 1/2-6	1180	870	2640	1950	4290	3160
1 1/2-12	1330	980	2970	2190	4820	3560

Bolt Size	Bolt Head Identification					
	 Class 5.8		 Class 8.8		 Class 10.9	
mm x pitch[c]	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb
M 5 X 0.8	4	3	6	5	9	7
M 6 X 1	7	5	11	8	15	11
M 8 X 1.25	17	12	26	19	36	27
M 8 X 1	18	13	28	21	39	29
M10 X 1.5	33	24	52	39	72	53
M10 X 0.75	39	29	61	45	85	62
M12 X 1.75	58	42	91	67	125	93
M12 X 1.5	60	44	95	70	130	97
M12 X 1	90	66	105	77	145	105
M14 X 2	92	68	145	105	200	150
M14 X 1.5	99	73	155	115	215	160
M16 X 2	145	105	225	165	315	230
M16 X 1.5	155	115	240	180	335	245
M18 X 2.5	195	145	310	230	405	300
M18 X 1.5	220	165	350	260	485	355
M20 X 2.5	280	205	440	325	610	450
M20 X 1.5	310	230	650	480	900	665
M24 X 3	480	355	760	560	1050	780
M24 X 2	525	390	830	610	1150	845
M30 X 3.5	960	705	1510	1120	2100	1550
M30 X 2	1060	785	1680	1240	2320	1710
M36 X 3.5	1730	1270	2650	1950	3660	2700
M36 X 2	1880	1380	2960	2190	4100	3220

a. in-tpi = nominal thread diameter in inches-threads per inch

b. N· m = newton-meters

c. mm x pitch = nominal thread diameter in mm x thread pitch

d. ft-lb = foot pounds

Torque tolerance + 0%, -15% of torquing values. Unless otherwise specified use torque values listed above. 25199

Plumbing Diagrams

Convention Liquid Diagrams begin on page 151.

NH_3 Plumbing Diagrams

See page 22 for a narrative.

NH_3 System Elements

The dual-cooler systems (page 149 and 150) differ from the single-cooler systems (page 147 and 148) as follows:

- The inflow from the tank is split after the strainer (A19), feeding two coolers (A24).
- Cooler outlets are merged prior to flow meter (A25).
- Refrigerant tap (A32) is split.
- Two more tines (A49) are dual-tube for vapor dispersal.

The section-control systems (pages 148 and 150) differ from the single-section systems as follows:

- There is a check valve, bleed valve and 3-way flow divider prior to section flow dividers.
- Each section flow divider has a shut-off solenoid valve.

Legend:

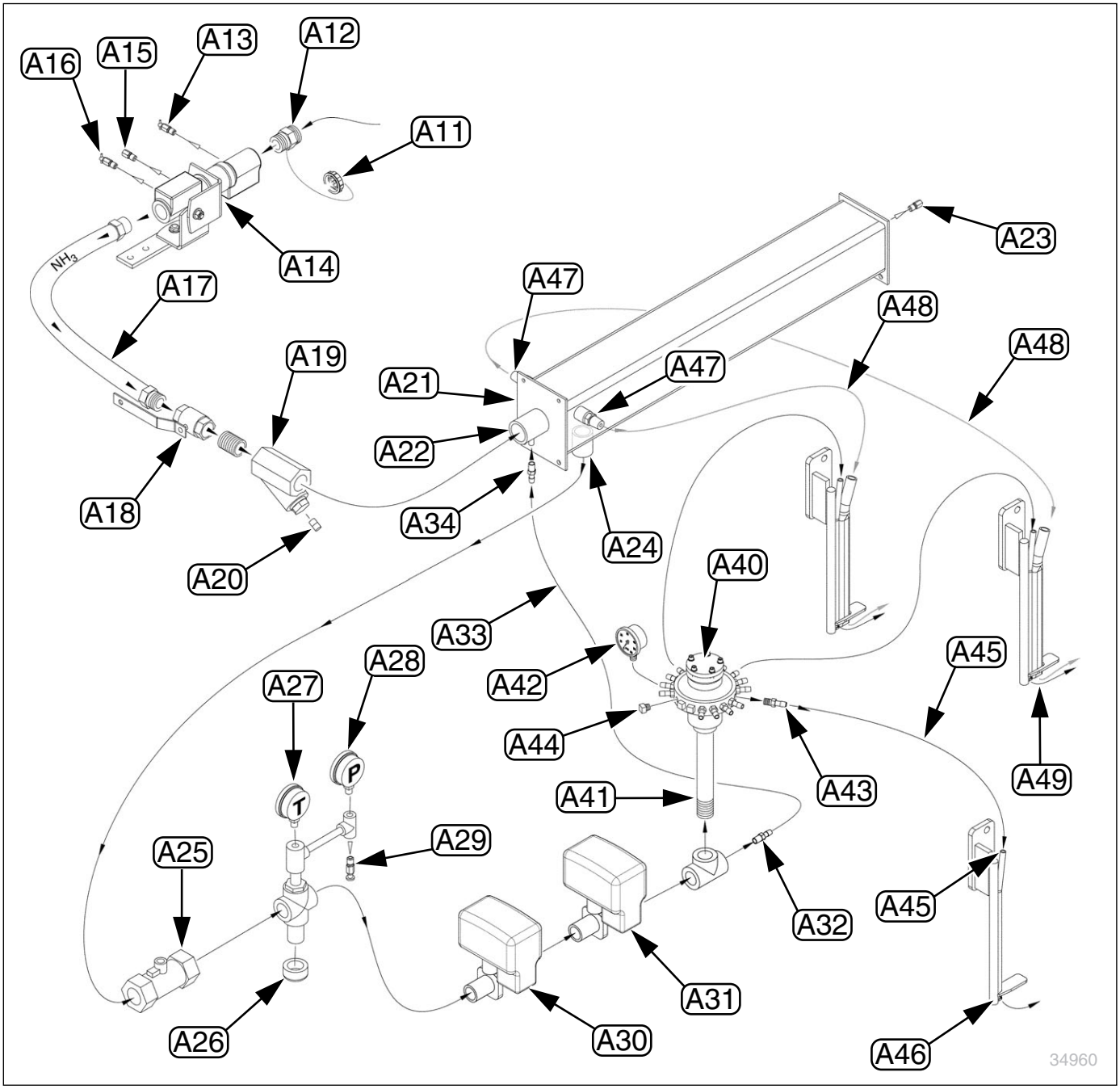
- Liquid NH_3
- NH_3 Vapor
- Direction of Flow
- Liquid Flow
- Vapor Flow
- Exception Flow

For more details on components A11 through A49, see "**NH3 System Narrative**" on page 22.

A11. Acme cap	A31. Master Shut-Off Valve
A12. Acme inlet	A32. Refrigerant Tap
A13. Coupler Inlet Bleed Valve	A33. Refrigerant Line
A14. Breakaway Coupler	A34. Cooler Refrigerant Inlet
A15. Breakaway Hydrostatic Relief Valve	A35. Section Control Check Valve
A16. Coupler Outlet Bleed Valve	A36. Section Control Bleed Valve
A17. Supply Hose	A37. Section Control Relief Valve
A18. Emergency Shut-off Valve	A38. Section Flow Divider
A19. Strainer	A39. Section Shut-Off Valves
A20. Strainer Magnets	A40. Row Flow Divider(s)
A21. AccuFlow™ Super Cooler (Heat Exchanger)	A41. Flow Divider Manifold Inlet
A22. Cooler Intake	A42. Flow Divider Pressure Gauge
A23. Cooler Hydrostatic Relief Valve	A43. Flow Divider Outlet
A24. Cooler Outlet	A44. Flow Divider Plug
A25. Flow Meter	A45. Delivery Tube
A26. Drain Cap	A46. Coulter Tine (Single)
A27. Temperature Gauge	A47. Cooler Vapor Outlets (2)
A28. Pressure Gauge	A48. Vapor Tube
A29. Cooler Bleed Valve	A49. Coulter Tine (Dual)
A30. Control Valve	

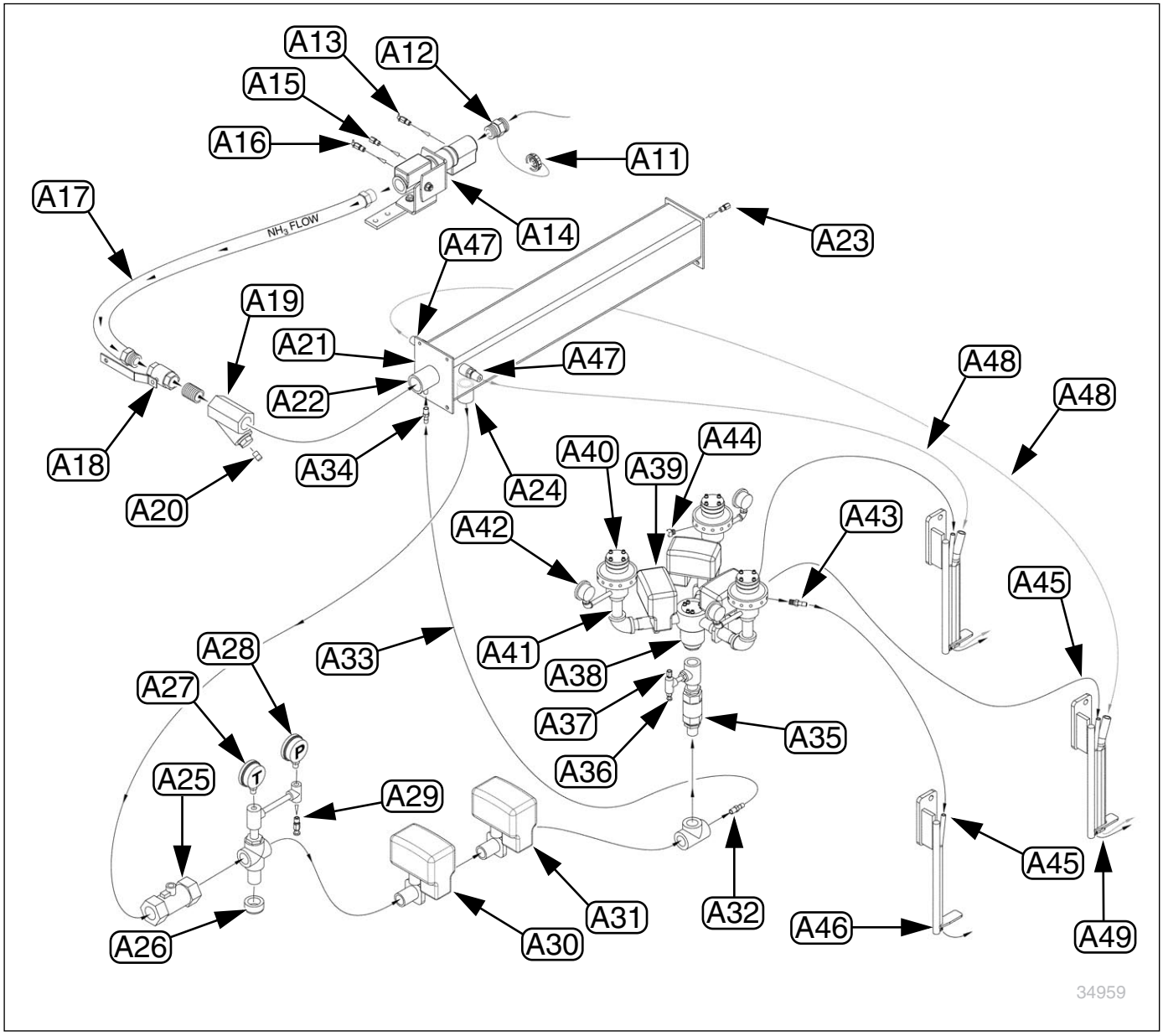
NH_3 Single Cooler Single Section Plumbing

See legends on page 146 and "**NH3 System Narrative**" on page 22.



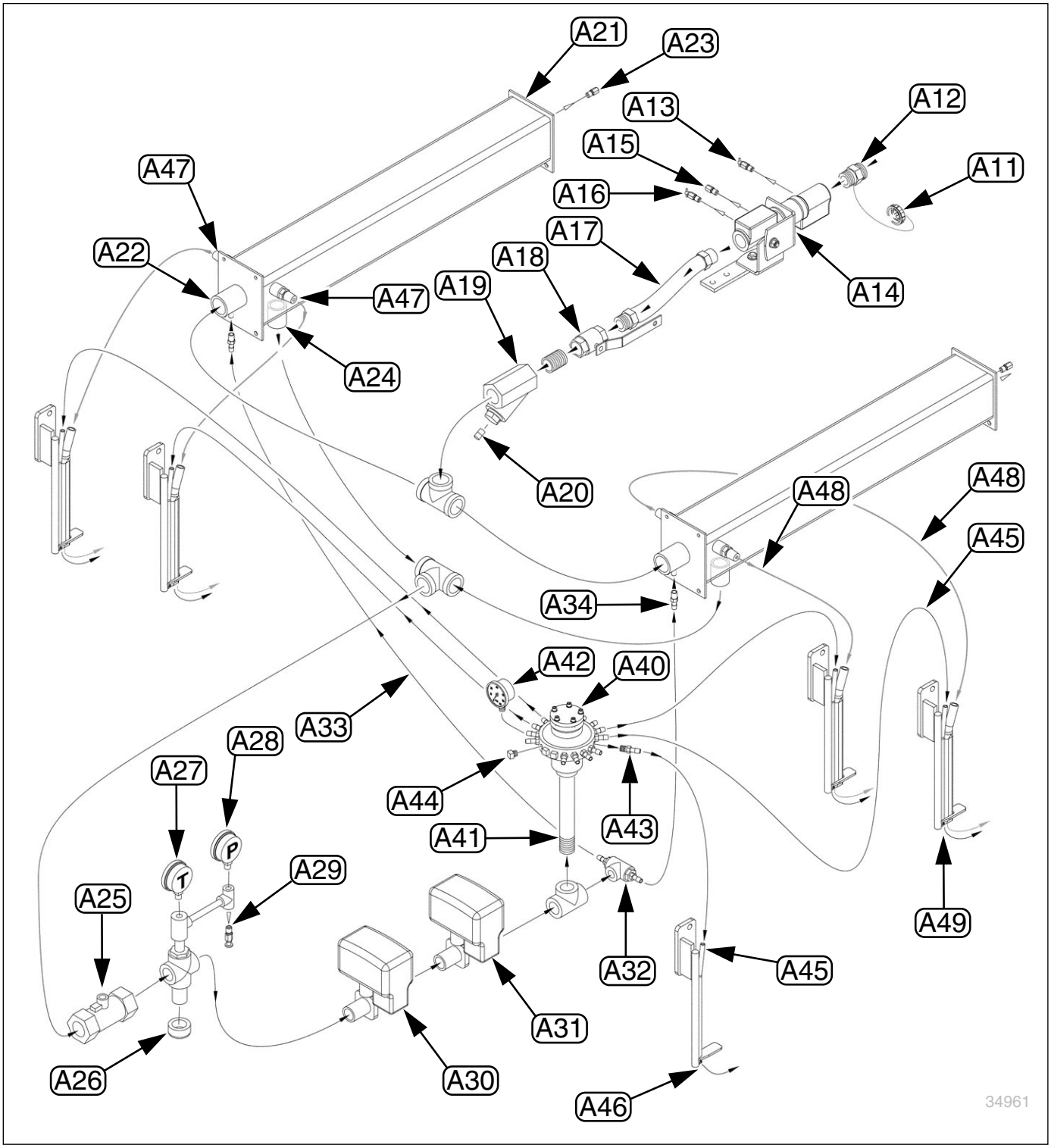
NH_3 Single Cooler Section Control Plumbing

See legends on page 146 and “**NH3 System Narrative**” on page 22.



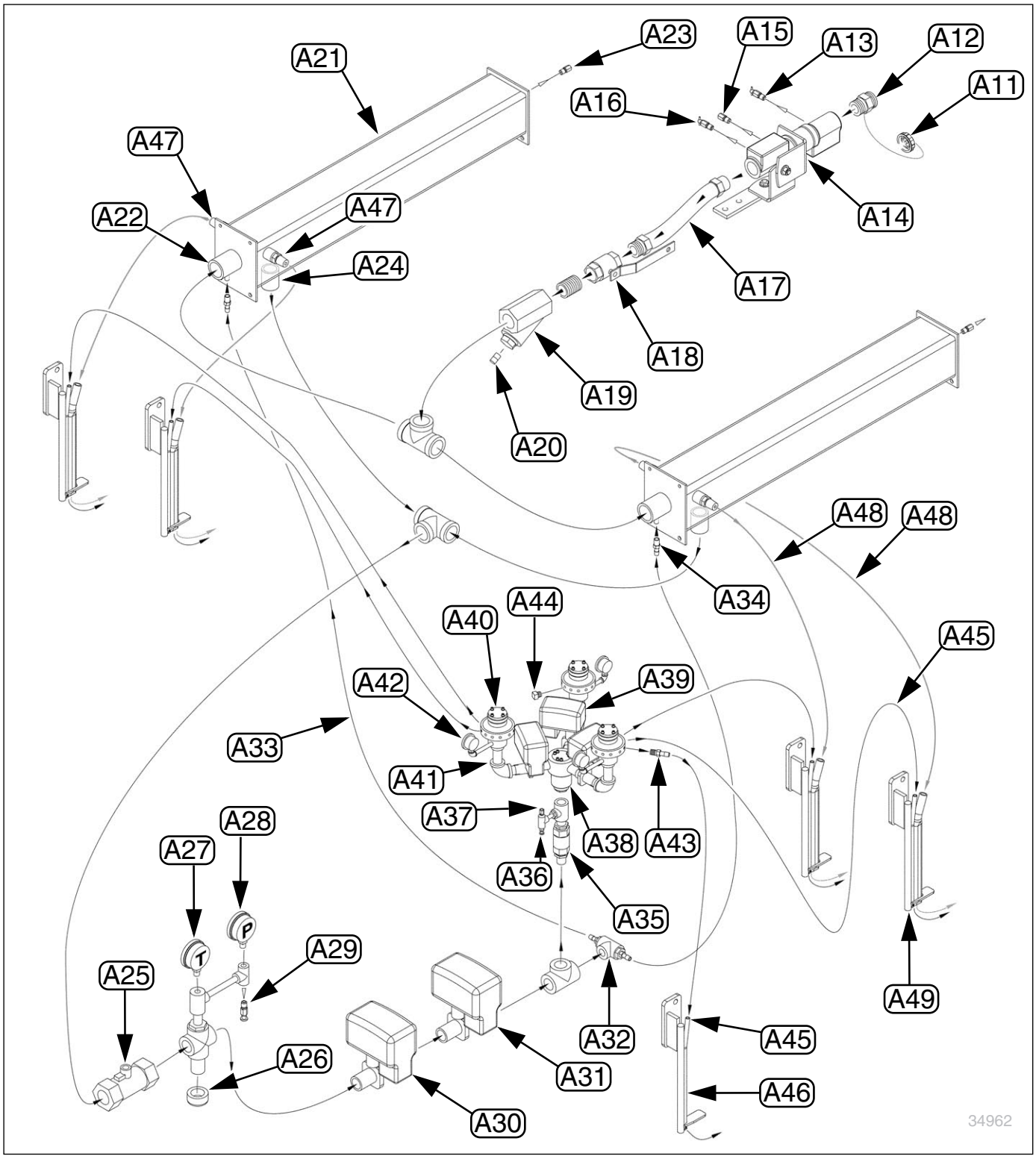
NH_3 Dual Cooler Single Section Plumbing

See legends on page 146 and "**NH3 System Narrative**" on page 22.



NH_3 Dual Cooler Section Control Plumbing

See legends on page 146 and "**NH3 System Narrative**" on page 22.



Conventional Liquid Plumbing Diagrams

- See page 30 for a component narrative.

Conventional System Elements

The hydraulic pump (variable rate) system (page 152) differs from the ground drive (preset rate) system (page 153) as follows:

- The ground drive system rate is set by simple drive system sprockets. The hydraulic pump rate requires a console which operates the flow control valve (L30).
- The ground drive system is single section. The hydraulic pump has three sections.

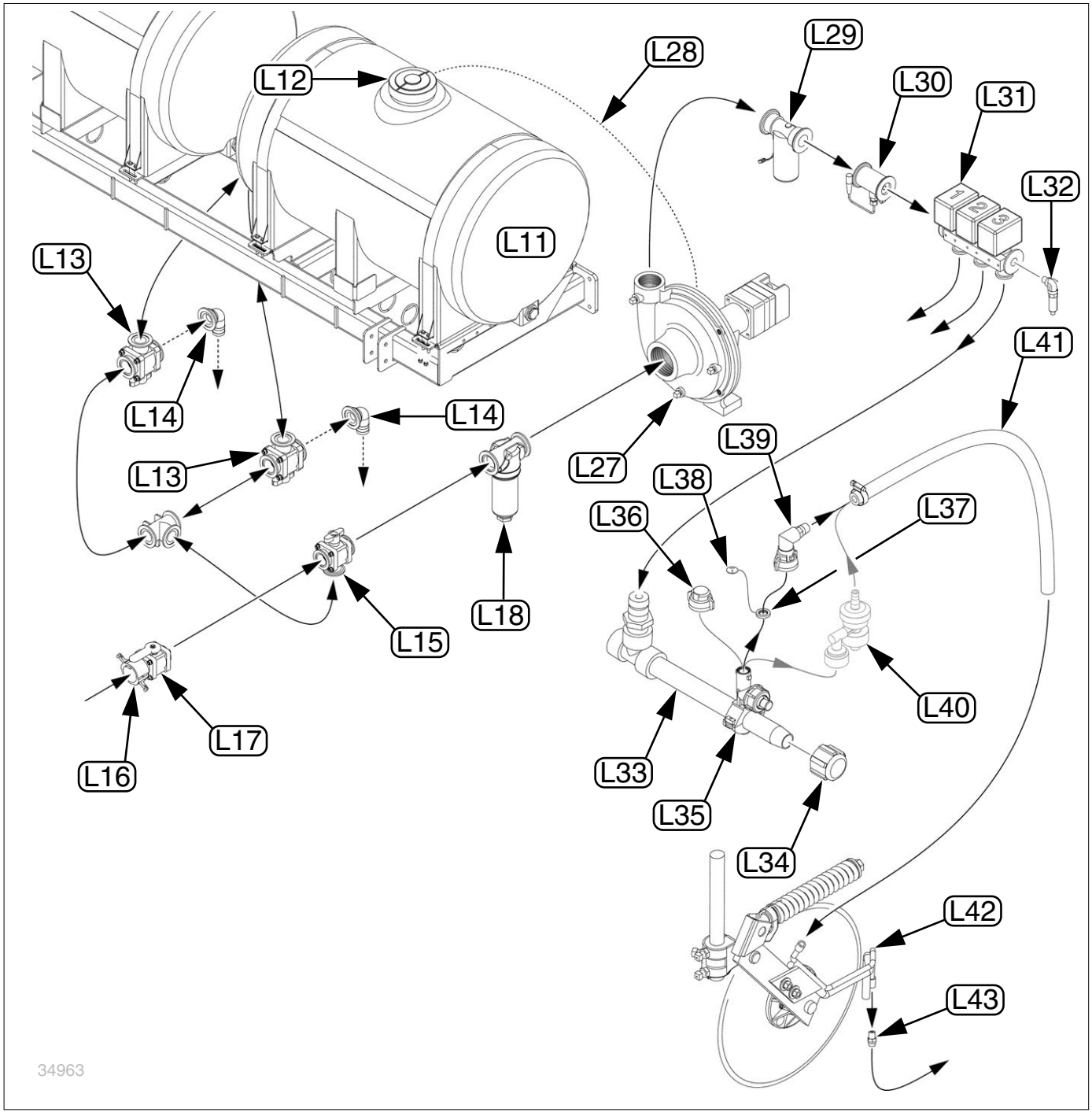
Legend:

→ Direction of Flow - - - ► Exception Flow

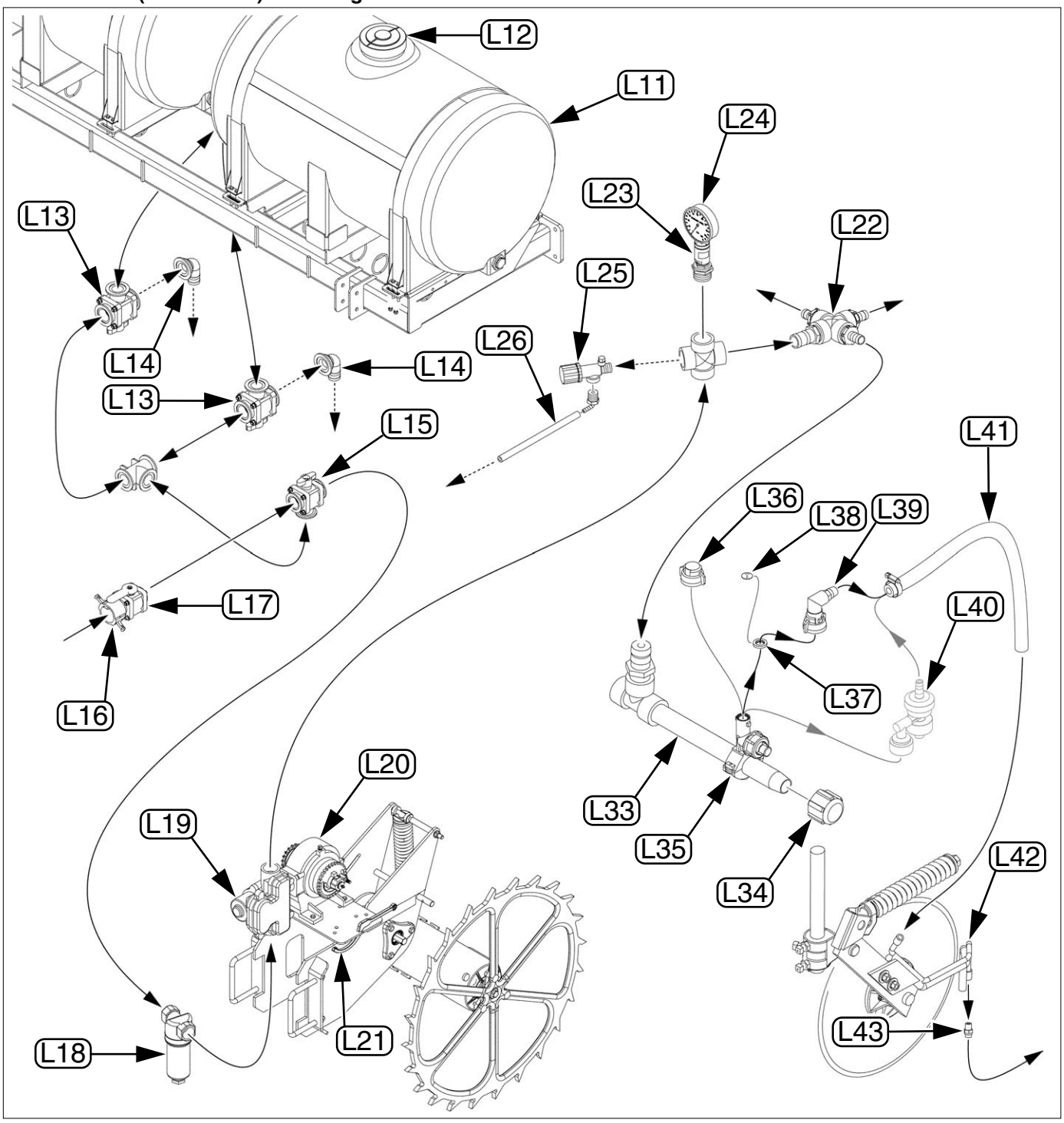
For more details on components L11 through L43, see "**Liquid System Narrative**" on page 30.

L11. Application Tank	L28. Air Bleed Line
L12. Vented Tank Lid	L29. Flow Control Valve
L13. Tank Discharge Valves	L30. Flow Meter
L14. Tank Drain Elbow	L31. Section Valves
L15. Selector Valve	L32. Pressure Sensor
L16. Supply Inlet	L33. Boom
L17. Inlet Shut-Off Valve	L34. End Cap
L18. Strainer	L35. Boom Clamp
L19. Ground Drive Pump	L36. Shutoff Cap
L20. Pump Adjustment Dial	L37. Gasket
L21. Pump Adjustment Tool	L38. Orifice Plate
L22. Passive Manifold	L39. Nozzle Body
L23. Gauge Protector	L41. Drop Tubing
L24. Pressure Gauge	L42. Coulter Arm and Tubing
L25. Relief Valve	L43. Tine Nozzle
L26. Dump Line	L44. Tongue Release Handle
L27. Hydraulic Drive Pump	L45. Chain Anchor

Hydraulic Pump (Variable Rate) Plumbing

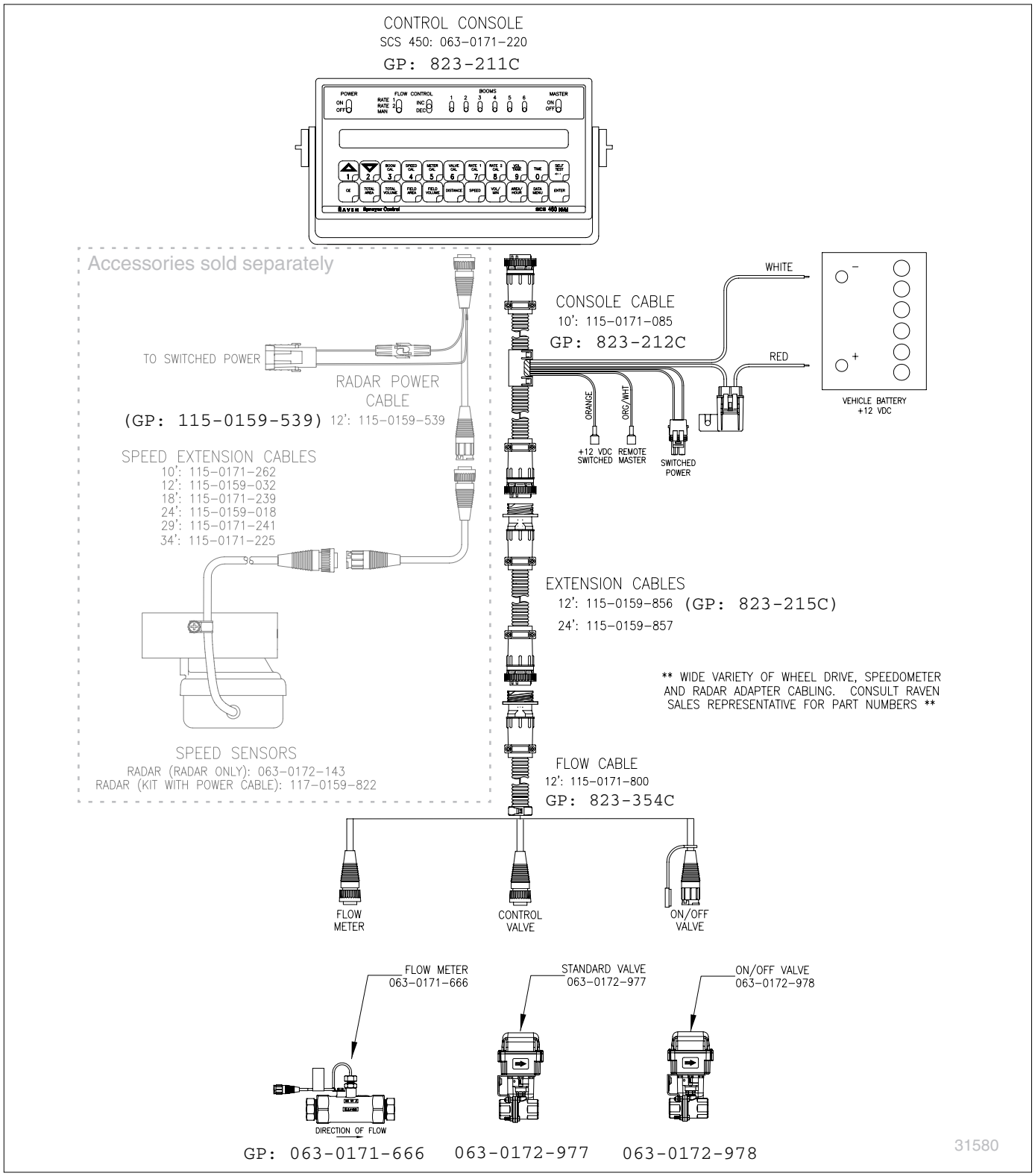


Ground Drive (Preset Rate) Plumbing

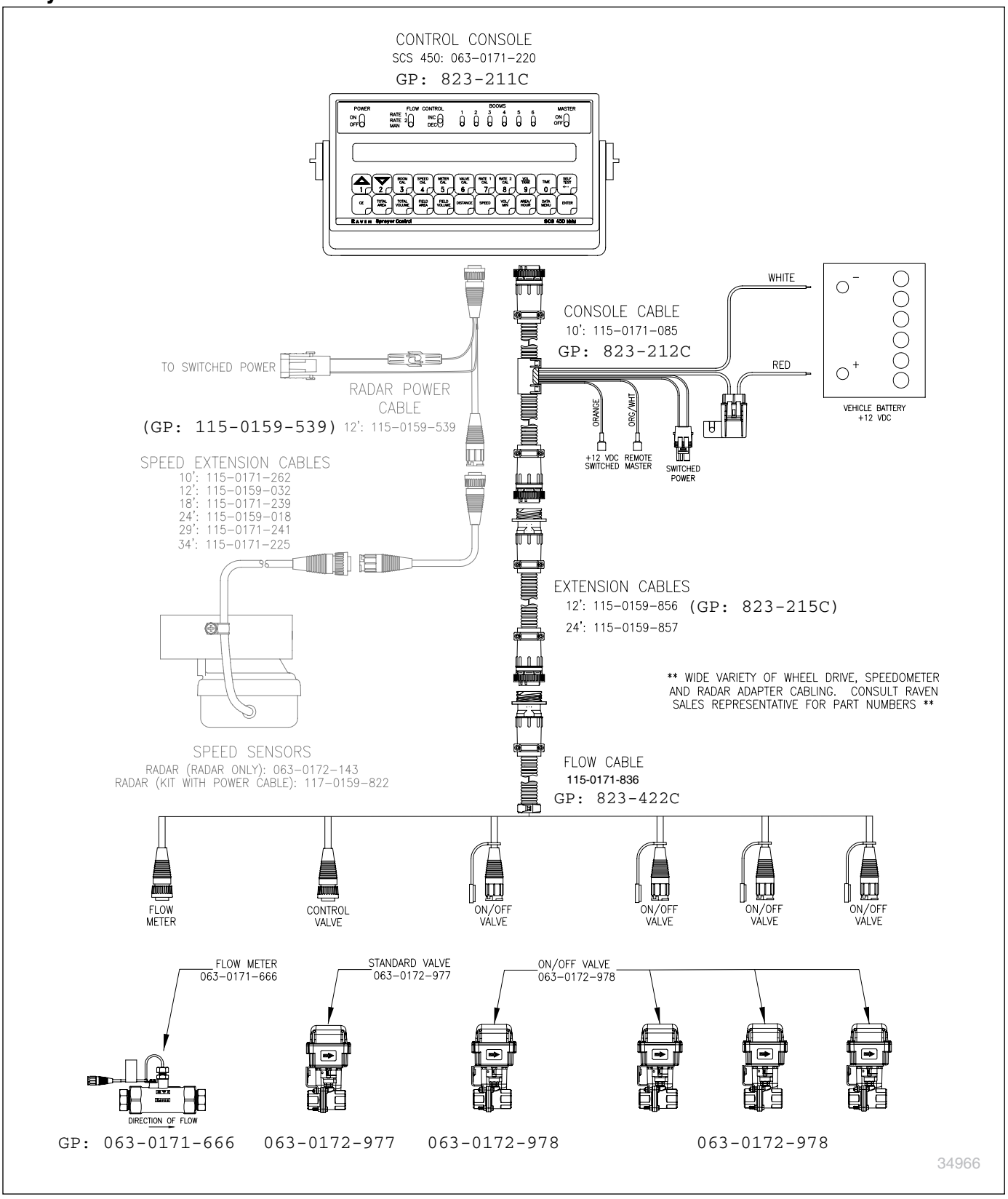


Controller System Diagrams

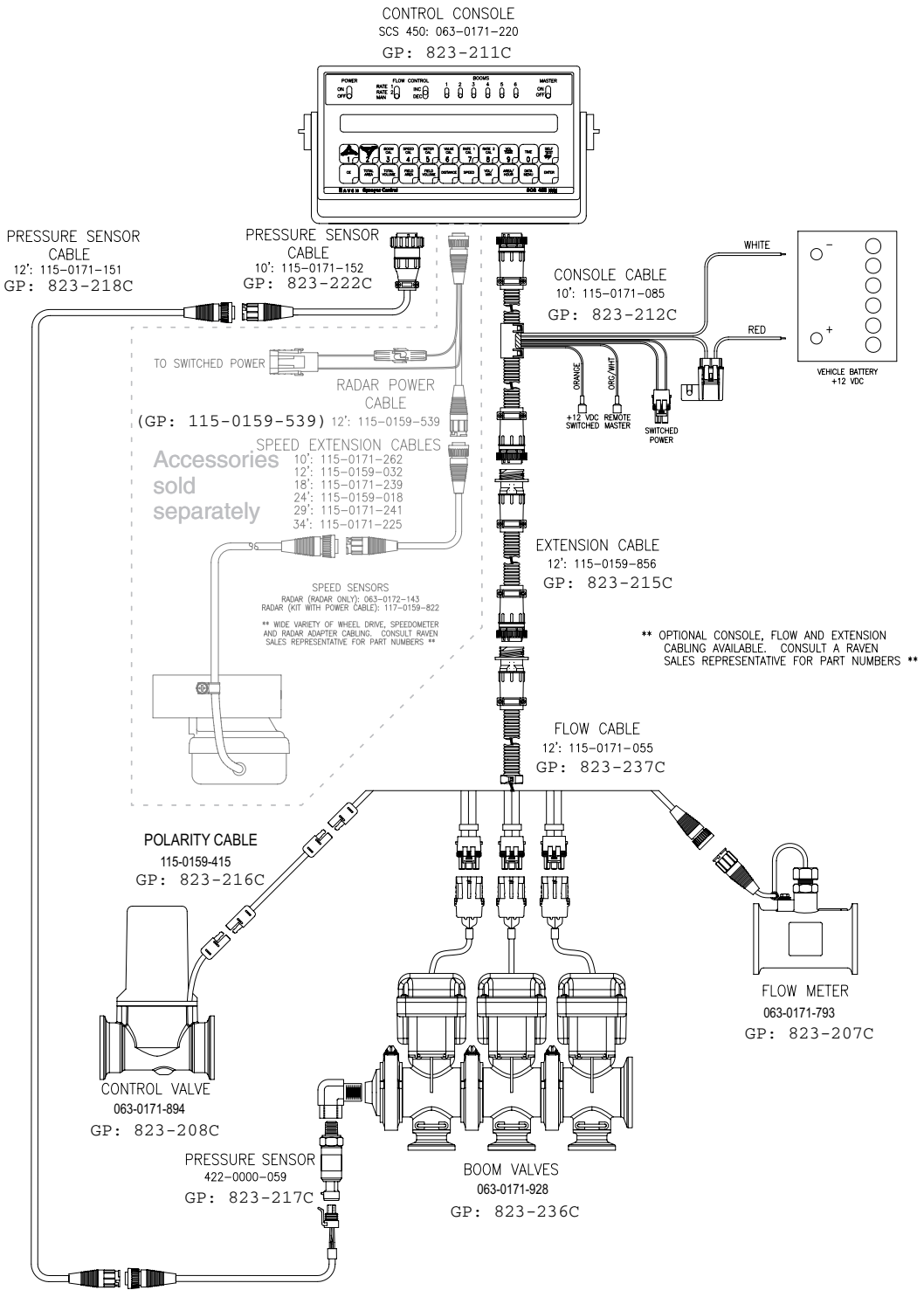
Anhydrous Single Section Controller



Anhydrous Section Control Controller

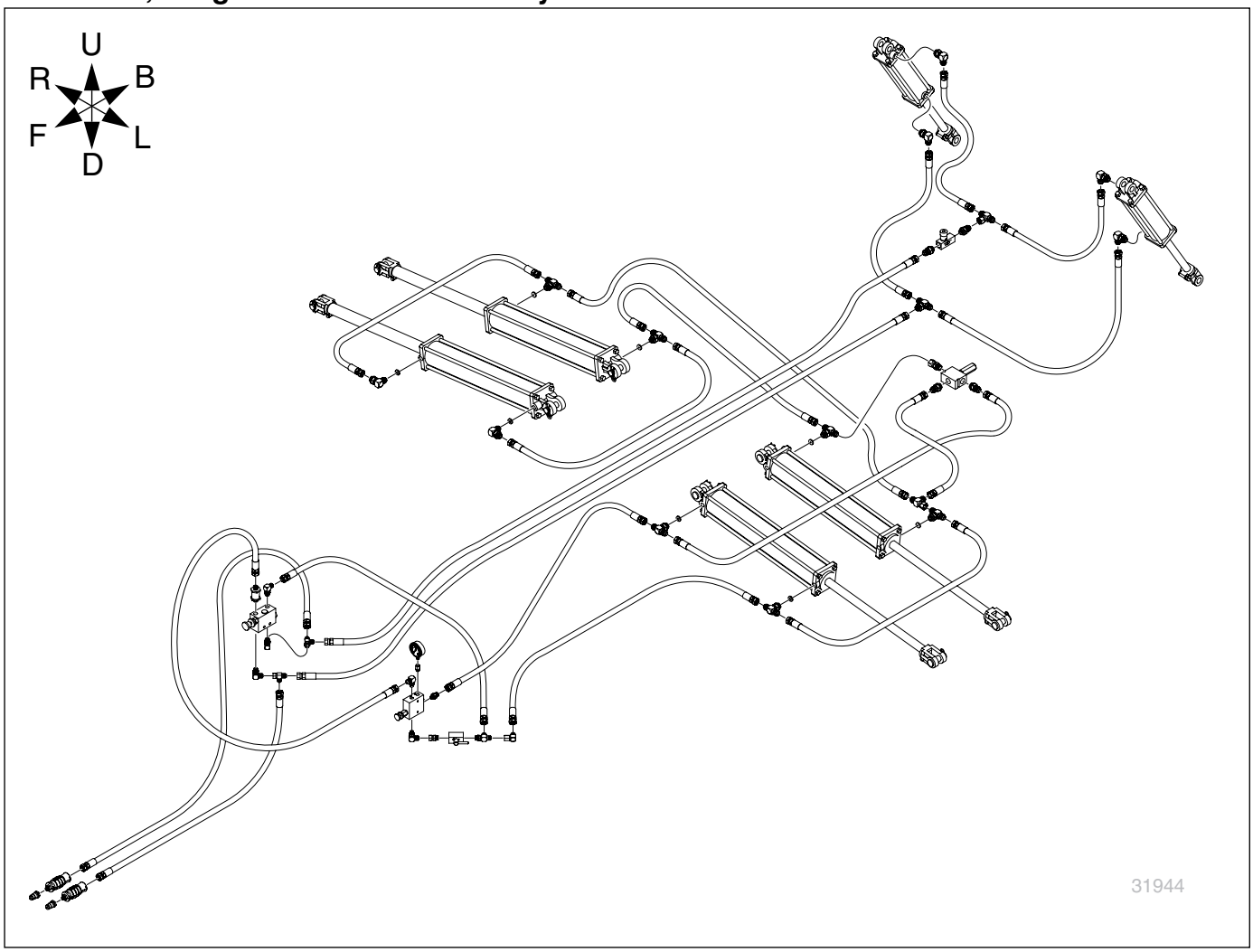


Hydraulic Pump Controller

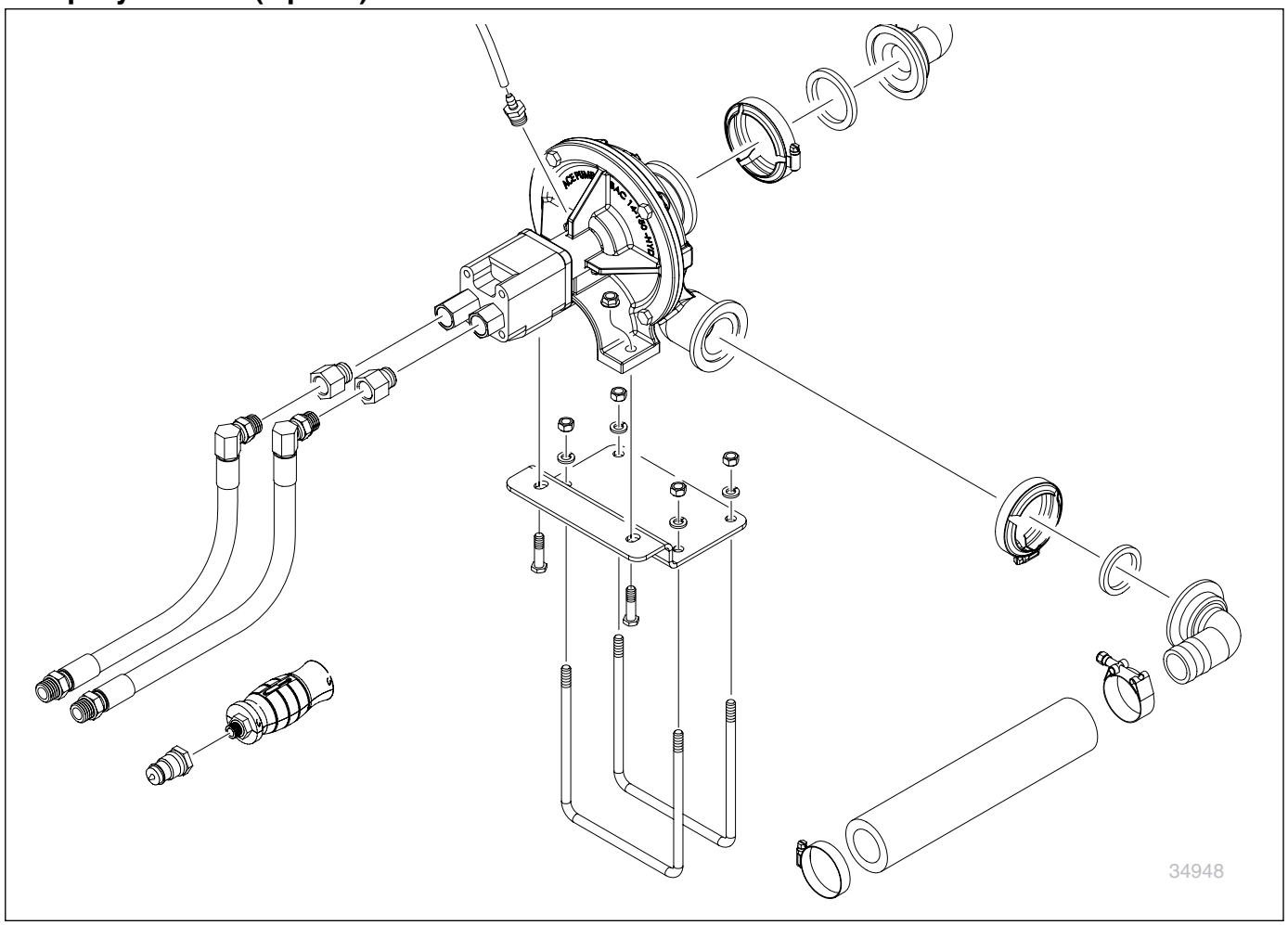


Hydraulic Diagrams

Lift-Assist, Weight-Transfer and Fold Hydraulics



Pump Hydraulics (Option)



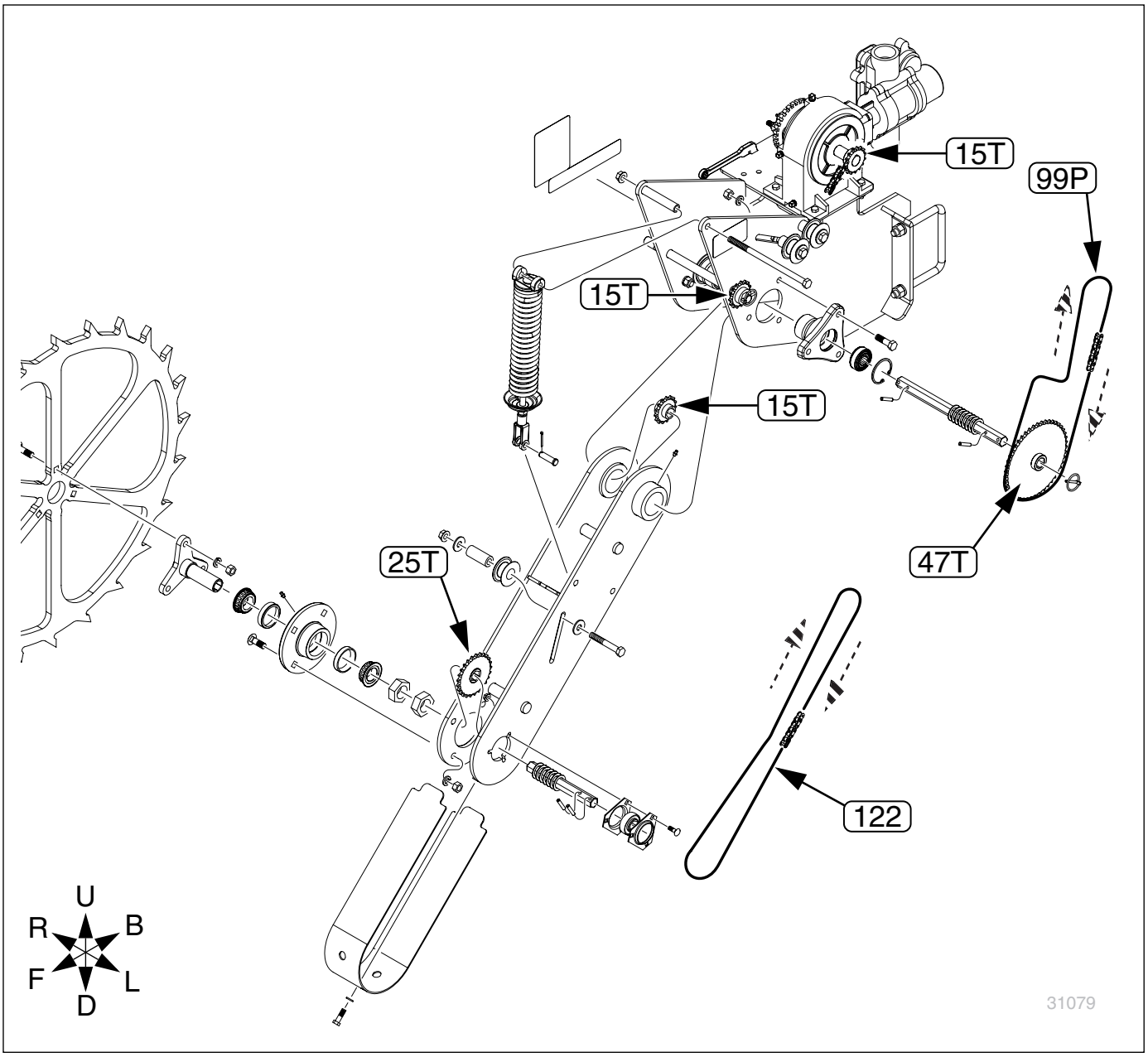
Chain Routing

See also “Chain Maintenance” on page 126.

Legend:

34T	Sprocket or idler Tooth count
56P	Chain Pitch count
	Direction of chain in motion

Ground Drive Chain



Appendix B - Initial Setup

This Appendix covers setup tasks performed only once, or at infrequent intervals. Routine setup tasks are covered in "**Initial Setup**" on page 35. Some of these items may already have been done by your Great Plains dealer:

a. Field lift partial fold adjustment (page 161)

b. Flow controller console installation (Option, page 163)

c. Parking stand clearance

d. Frame-mounted row options (see manual supplied with accessory)

e. Row drop line connections.

Post-Delivery Checklist

1. Read and understand "**Important Safety Information**" on page 1.
2. Check that all working parts are moving freely, bolts are tight, and cotter pins are spread.
3. Check that all grease fittings are in place and lubricated. See "**Lubrication and Scheduled Maintenance**" on page 127.
4. Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See "**Safety Decals**" on page 9.
5. Inflate tires to pressure recommended and tighten wheel bolts as specified. See "**Tire Inflation Chart**" on page 143.

Component Replacement Dates

(anhydrous models only)

Record replace-by dates on the "**Replacement Log**", pages 114 to 116.

If the implement has Great Plains-installed metering, several components of that system have limited service lives, and must be replaced before specific dates.

Where these dates are stamped on metal parts, normal oxidation, and the corrosive effects of extended field exposure to low levels of anhydrous ammonia vapor, can render these dates difficult to read soon after the implement is placed in service.

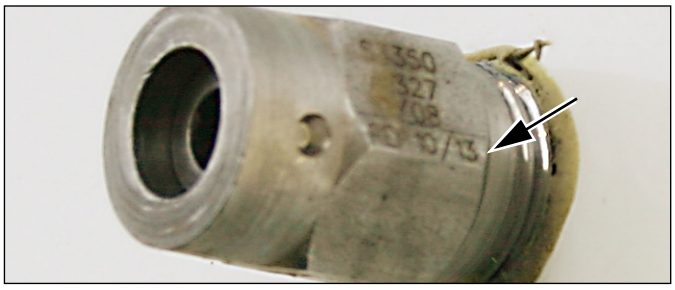


Figure 82 31635
REP (Replace-By) Date on Valve

Lift-Assist Valve Setup

This adjustment establishes fold priority in the combined lift-fold hydraulic system.

1. The implement is presumed to be unfolded.
   Hitch the implement to a tractor.
   Raise the implement (as for parking).
2. Open the lift-assist shut-off valve ① (located at the weight transfer valve assembly).
3. Locate the one-way restrictor valve ② at the tee that supplies the rear cylinder base ends.
4. Turn the knob fully counterclockwise, then clockwise one turn.
5. Start a lift/fold operation. Initially, the lift occurs before the fold. Stop. Lower.
6. Turn the valve clockwise one turn.
7. Start a lift/fold. Stop. Lower.

   If the lift occurred before the fold, repeat step 6.

   If the fold occurred before the lift, back the valve off (counterclockwise) a partial turn, and re-test lift/fold.
8. Find the point at which the wings fold to the wing locks prior to lift commencing.

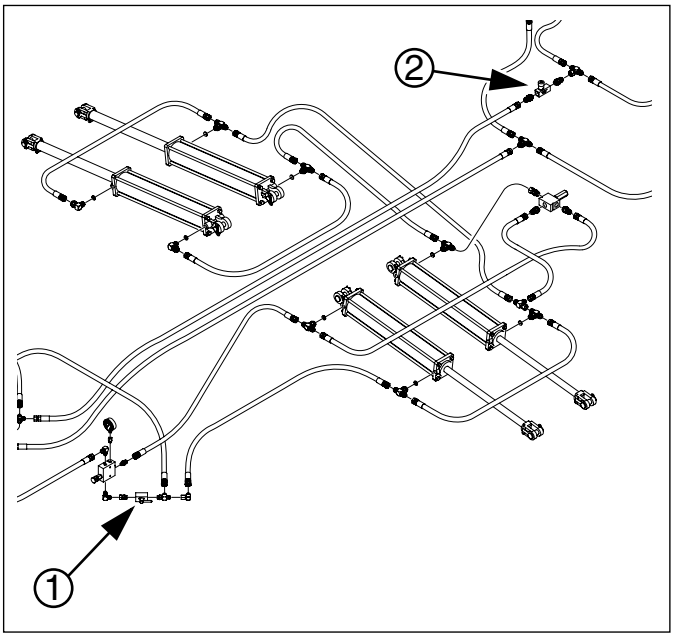


Figure 83
Lift-Assist Valves

31944

Appendix C - Option Setup

Hydraulic Pump Setup

Pump Fittings and Needle Valve

NOTICE

Equipment Performance Risk:
Prior to first use, the pump fittings must be configured for the type of hydraulic system provided by the tractor. If the system is Open Center, the needle valve must also be adjusted.

As delivered, the hydraulic pump includes all fitting necessary for use with any hydraulic system, but the as-shipped pump configuration is suitable for use with no system. Configure the pump before first use.

1. Have the Ace Pump Instruction manual (HYD-MAN) at hand for fitting use and adjustment details.

Refer to Figure 84 and table at right

2. Determine the tractor hydraulic system type. Consult the tractor operator manual.
3. Remove one or both fittings (① or ②), and as necessary, adjust the needle valve ③, based on the system type.

Follow the instructions in the Ace manual.

For needle valve adjustment, obtain “dead head” pressure by using the controller console to command the flow control valve to closed (rate zero).

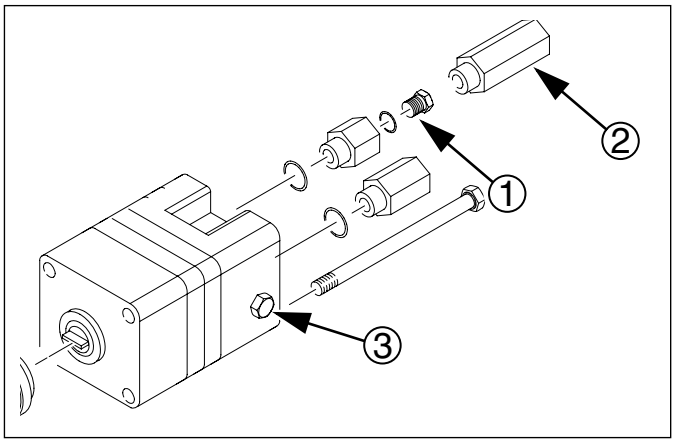


Figure 84 31965
Pump Configuration

Tractor Hydraulic System Type	Pump Configuration Required
Closed Center, Load Sensing (LS Closed)	Restrictor Orifice ① OUT Flow Limiter ② IN Needle Valve ③ closed
Closed Center, Pressure Compensating (PC Closed)	Restrictor Orifice ① IN Flow Limiter ② OUT Needle Valve ③ closed
Open Center	Restrictor Orifice ① OUT Flow Limiter ② OUT Needle Valve ③ adjusted

Console Installation

Refer to Figure 85

The fertilizer applicator's optional Raven SCS-450 flow controller system includes a console ① that needs to be mounted in the cab of the tractor to be used with the fertilizer applicator.

The monitor includes cables for power ②, speed sensor ③ and sensor harness ④. Installation instructions are found in the included 016-0159-831 Raven SCS-450 Installation, Operation and Service manual manual.

Power color code is:
+ positive: red
- negative: black

The included bracket ⑤ requires customer-supplied fasteners.

The SCS 450 requires some initial data about your sprayer and tractor prior to first use. See "**SCS 450 Setup Data**" on page 46.

This data is retained as long as the SCS 450 remains connected to battery power. If power is removed for electrical work, long term tractor parking or welding, the data is lost and must be re-entered.

Consult the Raven manual for display interpretation and keyboard procedures.

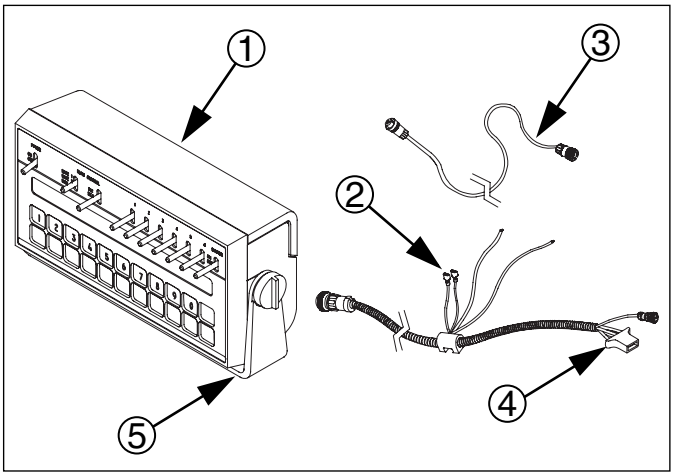


Figure 85 27271
SCS-450 Tractor Components

CAUTION

Transport and Field Safety Risk:
Mount the module so it is easy to monitor during application, but does not interfere with safe operation of the tractor in the field or on public roads.

Appendix D - Accessory Installation

Side Dress Installation

Side Dress accessory kits provide a left wing extension to support an additional (13th) forward single coulter and forward boom drop line. The kit is user-installed, and conversion between pre-emergence and side dress modes requires user re-configuration of the implement.

Conventional Liquid Side Dress

Installing / Changing to Side Dress

For reverting to pre-emergence, continue at page 174.

Resources required:

- Stands or blocks support the rear frame
- Hoist or lift for supporting casters during shift
- one fertilizer orifice plate, sized to ½ of the rate intended, or a 829-144C VeriFlow nozzle (if 829-143C nozzles are used on the main rows)
- three dozen cable ties
- one poly bag or sheet of polyethylene per rear row, plus a rubber band or cable tie per row.
- all-purpose grease and grease gun
- basic hand tools

Prepare Implement

1. Discharge NH_3 system (page 108), if the applicator is also equipped for anhydrous.
2. Move implement to a level clear surface with adequate illumination.
3. Raise implement.
4. Unfold wings.
5. Fully extend wing gauge wheels.
6. Install parking stands.
7. Place stands or blocks under the rear frame.
8. Retract the lift-assist cylinders to lift the caster tires off the ground.
9. Lower implement onto stands.
10. Unhitch tractor.

See page 140 for ordering information.

407-636A Liquid, no coulter, for NP3000-1230 164
407-609A Liquid, fluted, for NP3000-1230 164
407-626A Liquid, turbo, for NP3000-1230.....164
417-124A Anhydrous for NP3000A-12C30 170

Figure 86 32012
Side Dress Installed

Install Wing Extension

Refer to Figure 86 and Figure 87

If the wing extension is already installed, continue at "**Dismount Rear Coulters**" on page 167.

11. Select one new:
    (30) 407-331H BOLT ON WING FRAME
    and eight sets new:
    (48) 802-055C HHCS 5/8-11X2 GR5
    (55) 804-022C WASHER LOCK SPRING 5/8 PLT
    (51) 803-021C NUT HEX 5/8-11 PLT
12. With the Great Plains decal to the left, and the amber reflector front, attach the extension (30) to the end of the left wing.

Note: Once installed, the extension itself never needs to be removed, unless you need to reduce the higher overall height when folded.

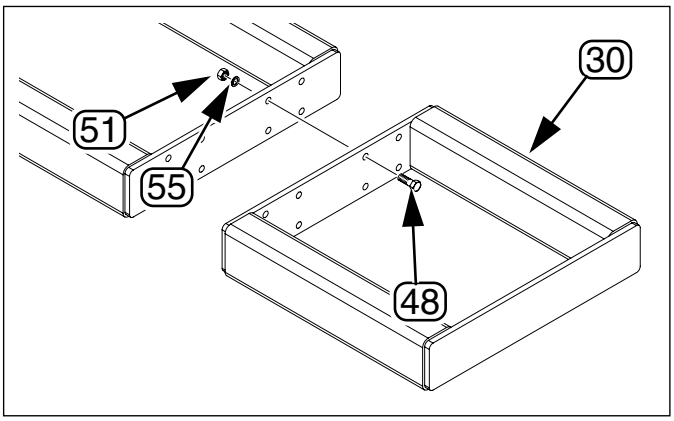


Figure 87 31845
Install Wing Extension

Install Quick-Attach Coulter Mount

This applies only to kit 407-636A and three-coulter configurations, or applicators updated to quick-attach. For other kits, or if the applicator rear coulters have traditional clamp mounts, continue at "**Dismount Rear Coulters**" on page 167.

If the applicator is a triple-coulter configuration manufactured in late 2012 or later, the rear coulters are on Great Plains quick-attach mounts (see page 134 for an illustration). The Side Dress kit includes a quick-attach mount for this situation.

Refer to Figure 88

13. Select one new:
    (51) 407-972H QUICK-ATTACH MNTNG WELDMENT
    two new:
    (58) 806-016C U-BOLT 5/8-11 X 6 1/32 X 5 3/4
    and four sets new:
    (55) 804-022C WASHER LOCK SPRING 5/8 PLT
    (51) 803-021C NUT HEX 5/8-11 PLT
14. Position the mount (51), ears forward, on the rear face of the front tool bar of the wing extension. Loosely secure it with U-bolts (58), lock washers (55) and nuts (51).
15. Slide the mount (51) along the tool bar until its center is one row space (5) from the left-most forward coulter.

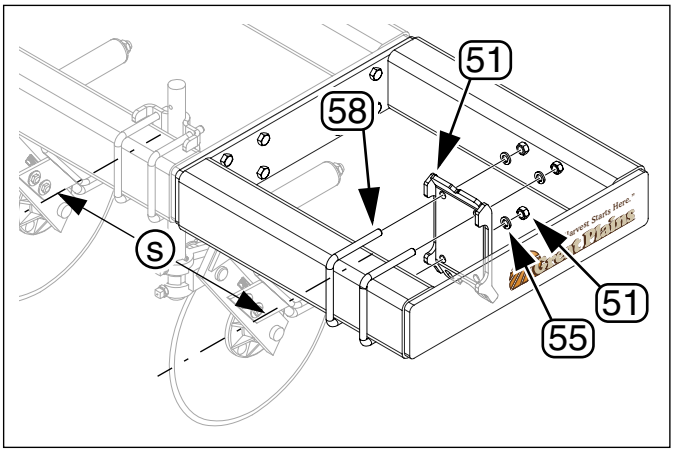


Figure 88 36064
Install Quick-Attach Mount

Note: Figure 88 depicts a rear-face installation. If your front coulters are mounted on the tool bar front face, install the side dress mount (51) on the front face.

Note: Once installed, the mount (51) does not need to be removed when reverting to pre-emergence.

Disconnect Rear Coulter Lines

Refer to Figure 89

16. At the rear tool bar, remove and save one:
    (24) 149-584D COULTER CLAMP 6H X 4W
    four sets:
    (55) 804-022C WASHER LOCK SPRING 5/8 PLT
    (51) 803-021C NUT HEX 5/8-11 PLT
    and two:
    (58) 806-016C U-BOLT 5/8-11 X 6 1/32 X 5 3/4
17. Remove and save one rear boom drop line:
    (L41) 990-080R HOSE 3/8 ID 150PSI EPDM
    two each:
    (44) 800-390C CLAMP WRM DRV #6 SS (.38-.87)

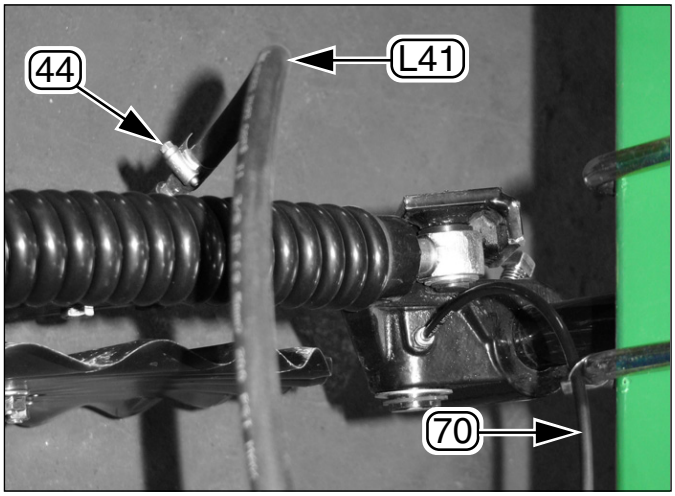


Figure 89 32028
Drop Line and Grease Connections

Refer to Figure 90

18. Remove and save one nozzle set which includes:
    (L38) 832-05#C ORIFICE SPR SYS CP4916-## SS
    (L39) 832-051C NOZZLE CAP QUICK X 90X1/4 FNPT
    (L37) CP18999-EPR ORIFICE SEAT STYLE GASKET
19. Remove and save the orifice plate (L39) inside the existing rear nozzle gasket (L37). The plate may or may not be the size you need for the front side dress row.
20. Replace the nozzle assembly with a cap (L36).

Note: If using VeriFlow variable rate nozzles (L40), remove and cap as well. Reserve this nozzle for side dress use only if running full-rate on the side dress row.

21. Remove and save all other rear drop lines and nozzles. Orifice plates and gaskets may be left in place. Cap all open boom clamps.

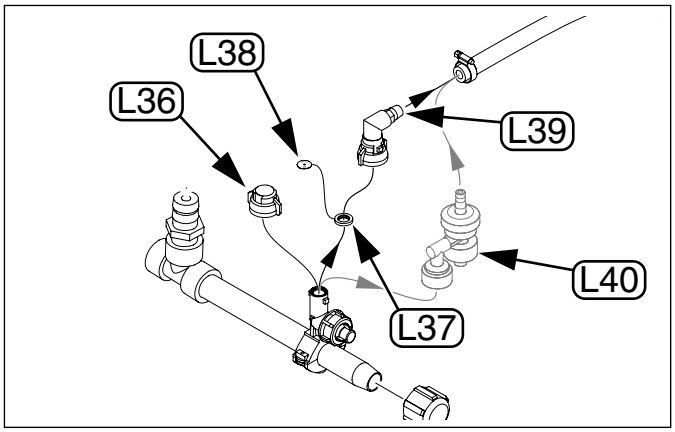


Figure 90 34963
Fertilizer Nozzle Parts

Refer to Figure 89 and Figure 91

22. Remove and save the one rear grease bank line:
    (70) 990-109R TUBE NYLON 1/4OD X 062WL
    and its fittings at the grease bank:
    (42) 800-130C GREASE ZERK STRAIGHT 1/8-27NPT
    (16) 800-158C FTG TUBE,CONNECTOR 1/8 FNPT
23. Disconnect all other rear grease lines at the lower clamps. Protect each line with a ploy bag or sheet secured to the line with rubber band or cable tie. Gather all lines and secure to rear tool bar with cable ties.

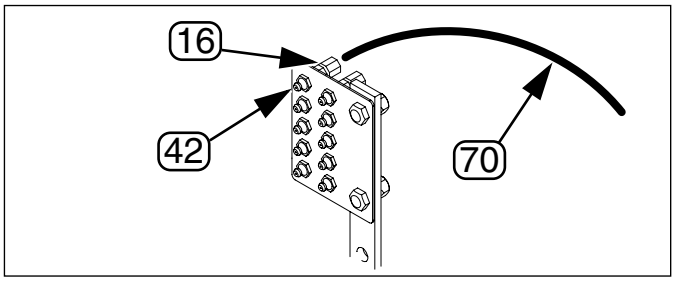


Figure 91 32081
Grease Bank Fittings

Transfer Quick-Attach Liquid Coulter

This applies only to kit 407-636A and three-coulter configurations, or applicators updated to quick-attach. For single-coulter configurations, continue at "**Dismount Rear Coulters**" below.

Refer to Figure 93

24. Attach the hoist line to the loop at the top of the quick-attach casting (14).
25. At the casting bottom, remove and save two sets:
    (51) 803-021C NUT HEX 5/8-11 PLT
    (55) 804-022C WASHER LOCK SPRING 5/8 PLT
    (17) 802-053C HHCS 5/8-11X1 3/4 GR5
    (19) 804-095C WASHER FLAT 5/8 HARD ASTMF436
26. Use the hoist to remove the coulter assembly. Set one assembly (with a straight shank) aside for use as the side dress coulter. Chose a rear coulter mounted on the same tool bar face as the mount installed at step 13.
27. Dismount all other rear coulters. Leave quick-attach mounts in place.
28. Move the selected coulter to the quick-attach coulter mount on the side dress wing extension.
29. Continue at "**Install Applicator Attachment**" on page 168

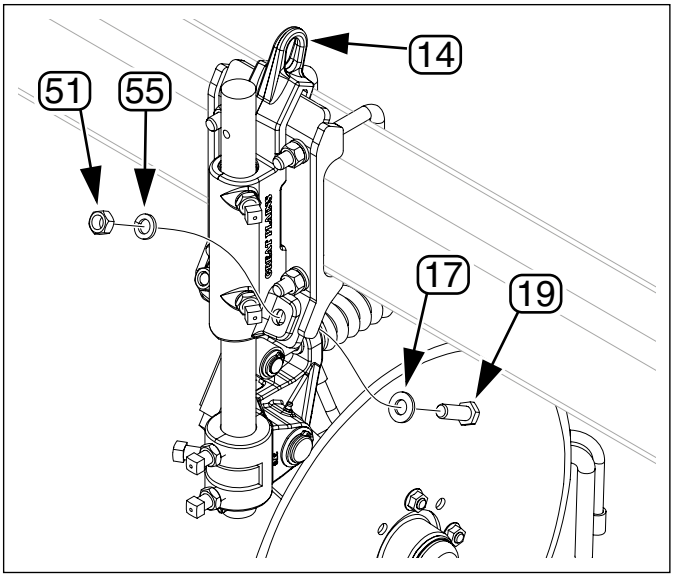


Figure 92 34974
Coulter on Quick-Attach Mount

Dismount Rear Coulters

This applies only to traditionally mounted rear coulters.

30. At each rear coulter shank, use a grease or paint pencil to make a mark on the top of the rear tool bar at shank (26) center-line.
31. If coulter height has been changed from factory default, record the height. See "**Vantage I Coulter Adjustments**" on page 82 for reference points.
32. At each rear coulter pivot, disconnect the tubing from the grease bank, and, if installed, the fertilizer drop line. Use a cable tie to secure each row's tubing to a U-bolt at the front coulter clamp.

Refer to Figure 93

33. Carefully loosen the four nuts (51) at each coulter clamp (24).
34. Slide the coulter shank (26) down out of the clamp.
35. Leave clamps in place (except as required for step 37 on page 168). Re-tighten nuts to no more than Grade 2 torque.

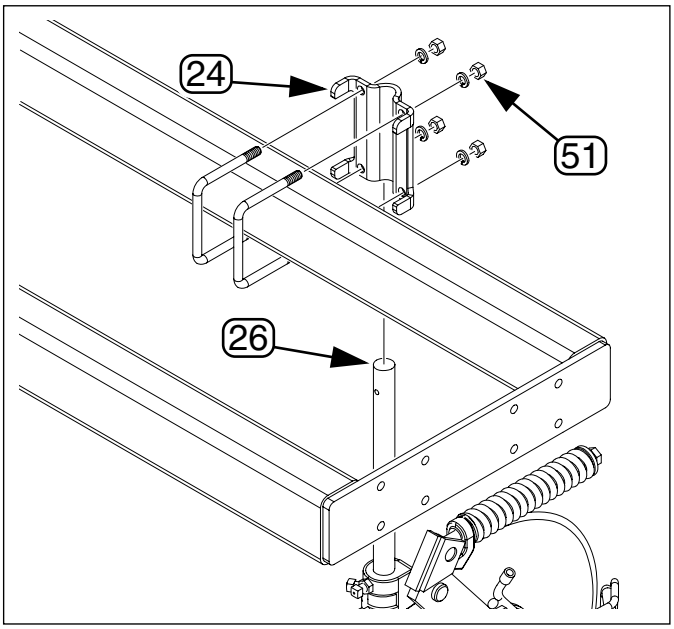


Figure 93 32023
Rear Coulter Mounts

Install Side Dress Coulter

This applies only to traditionally mounted rear coulters.

Refer to Figure 94

36. On the top of the front tool bar of the wing extension, use a grease or paint pencil to make a mark exactly 30in to the left of the existing left end coulter.
37. Select one new or saved:
    (24) 149-584D COULTER CLAMP 6H X 4W
    two:
    (58) 806-016C U-BOLT 5/8-11 X 6 1/32 X 5 3/4
    and four sets:
    (55) 804-022C WASHER LOCK SPRING 5/8 PLT
    (51) 803-021C NUT HEX 5/8-11 PLT
38. Loosely assemble a clamp (24) to the front of the front tool bar on the wing extension (30).
39. Select one new or saved:
    (29) 204-691K NP COULTER ASSY RH
40. Slide the coulter's shank (26) up into the clamp (24). Align coulter shank with mark.
41. Set the height to match the other front coulters. Secure nuts to Grade 5 specification.
    See "**Vantage I Coulter Adjustments**" on page 82 for factory settings.

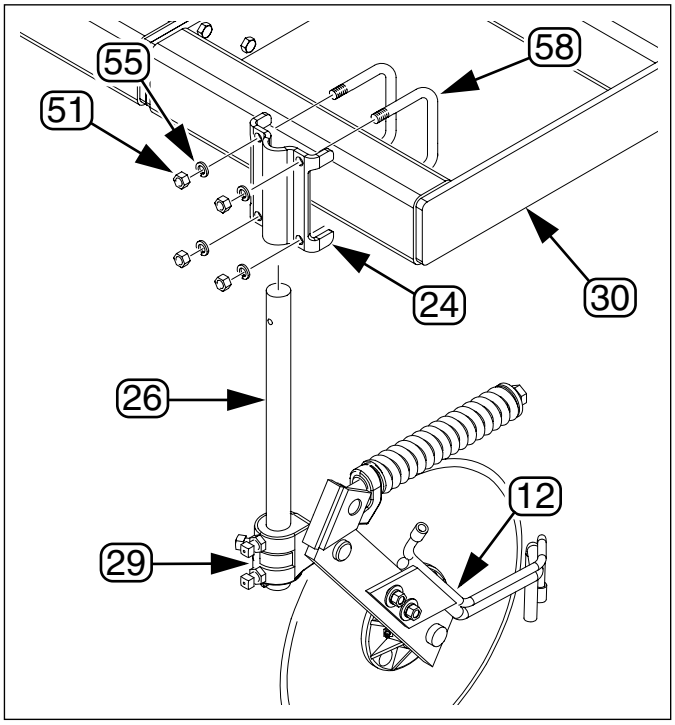


Figure 94 32024
Side Dress Coulter Mount

Install Applicator Attachment

If the applicator tubing weldment is already installed on the coulter, continue at "**Connect Coulter Tubing**" on page 169.

42. Select one new:
    (12) 204-688H VANTAGE I 20" LH FERT. ARM
    which may be marked as:
    204-691K NP COULTER ASSY RH
    and two sets new:
    (18) 802-082C HHCS 1/2-13X1 3/4 GR5
    (20) 804-113C WASHER FLAT 1/2 USS HARD PLT
    (54) 804-015C WASHER LOCK SPRING 1/2 PLT
    (50) 803-020C NUT HEX 1/2-13 PLT
43. Mount the arm (12) on the coulter swing arm (11). See "**Vantage I Coulter Adjustments**" on page 82 for height setting.

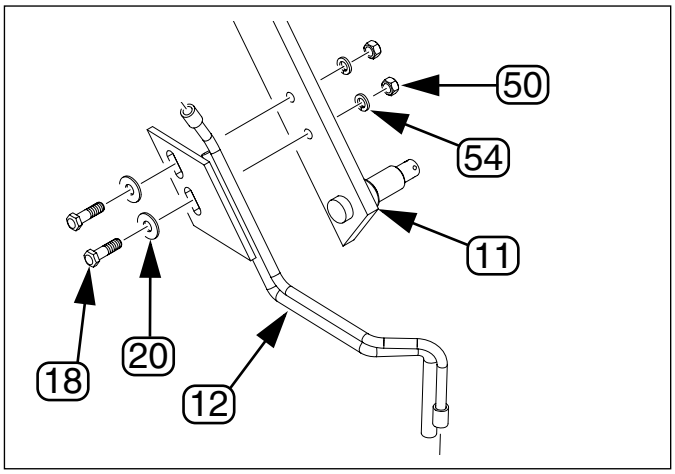


Figure 95 31925
Install Applicator Attachment

Connect Coulter Tubing

Refer to Figure 96

44. At the left end of the front boom, remove one cap and gasket from the boom clamp:
    L36 832-042C NOZZLE SHUT OFF CAP W/ GASKET
    L37 CP18999-EPR ORIFICE SEAT STYLE GASKET
    If a nozzle was removed at step 18 on page 166, relocate the shut-off cap L36 and gasket L37 to the open rear row boom clamp.
45. Select one new or saved:
    L37 CP18999-EPR ORIFICE SEAT STYLE GASKET
    Install an orifice plate L38 inside the gasket L37.
46. At the front left boom clamp, install one set of:

    New or saved nozzle set:
    31 407-373S NOZZLE ASSEMBLY - 3/8 HOSE
    which includes:
    21 830-071C AD 1/4MNPT X 3/8HB POLYPROP
    L39 832-051C NOZZLE CAP QUICK X 90X1/4 FNPT

    New half rate variable flow nozzle:
    L40 829-143C NOZZLE HI-VERIFLOW1 (GRN/YEL)
    or saved full rate nozzle:
    L40 829-144C NOZZLE VERIFLOW1 (BLU)

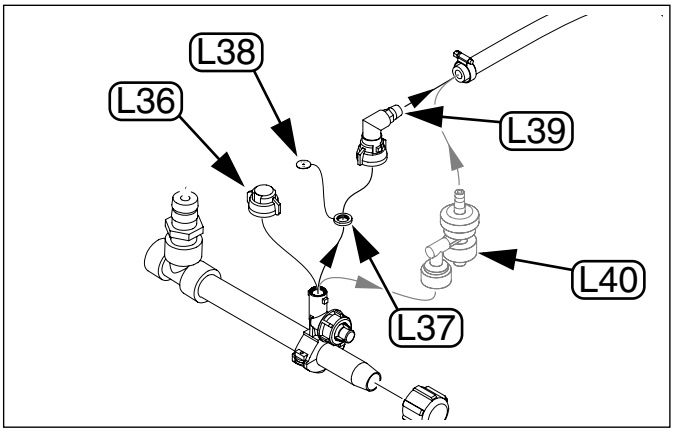


Figure 96 34963
Fertilizer Nozzle Parts

Refer to Figure 96 and Figure 97

47. Select one new or saved:
    L41 990-080R HOSE 3/8 ID 150PSI EPDM
    and two:
    44 800-390C CLAMP WRM DRV #6 SS (.38-.87)
    Connect this hose from the nozzle to the coulter applicator attachment 12.

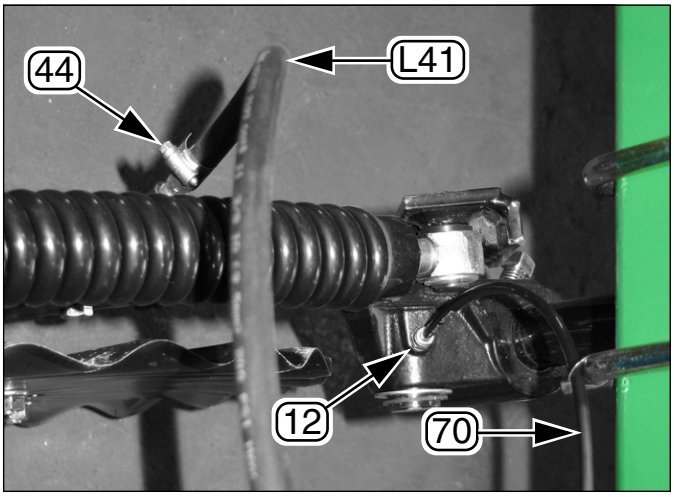


Figure 97 32028
Drop Line, Grease Connections

Refer to Figure 98

48. Select one set new or saved:
    42 800-130C GREASE ZERK STRAIGHT 1/8-27NPT
    16 800-158C FTG TUBE,CONNECTOR 1/8 FNPT
    Install these at an available hole in the front left wing grease bank.
49. Select the new or saved:
    70 990-109R TUBE NYLON 1/4OD X 062WL
    Connect this from the grease bank fitting 16 to the coulter pivot fitting (not shown). Secure with cable ties between grease bank and coulter.
50. Pump grease until it emerges at the coulter pivot.
51. Continue at "**Shift 2-Point Hitch**" on page 172.

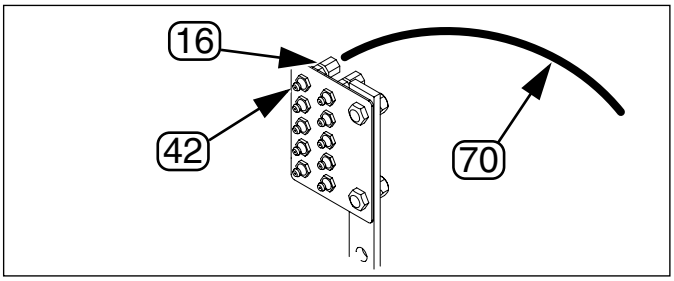


Figure 98 32081
Grease Bank Fittings

Anhydrous (NH_3) Side Dress

These instructions apply to kit 417-124A.

Side Dress accessory kits provide a left wing extension to support an additional (13th) rear single anhydrous coulter, tine and delivery tubing. The kit is user-installed, and conversion between pre-emergence and side dress modes requires user re-configuration of the applicator.

See page 140 for ordering information. 417-124A Side Dress is compatible only with model NP3000A-12C30.

Prepare Applicator

1. Discharge NH_3 system (page 108).
2. Move applicator to a level clear surface with adequate illumination. An outdoor location, or well-ventilated indoor location is recommended.
3. Raise applicator (page 48).
4. Install lift assist cylinder locks (page 50).
5. Unfold wings (page 51).
6. Fully extend wing gauge wheels (page 84).
7. Install parking stands (page 42).
8. Lower applicator onto parking stands.
9. Unhitch tractor.
10. Wear PPE[a]. A discharged system can still contain NH_3 or NH_4OH at irritating levels.

Install Anhydrous Coulter

Refer to Figure 99

11. Measure a distance of one anhydrous row space ⓐ from the center-line of the left wing outside row unit. Use a grease pencil or similar means to mark the position for the side dress row unit on the extension weldment.

Refer to Figure 100

12. Select one each new:
    37 417-121D FORMED SHANK CLAMP, 2 OD
    38 417-121L NH3 COULTER ROW UNIT ASSY
    two new:
    59 806-123C U-BOLT 3/4-10 X 6 1/32 X 6 3/4
    and four sets new:
    56 804-023C WASHER LOCK SPRING 3/4 PLT
    53 803-027C NUT HEX 3/4-10 PLT
13. Align the coulter shank 40 and clamp 37 at the position marked at step 11 above. Loosely secure with U-bolts 59, lock washers 56 and nuts 53.
14. Adjust the coulter height to match the rest of the applicator. Make sure that the flat on the shank is flush with the tool bar. Secure the clamp nuts.

DANGER

Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:

Do not perform this installation without first discharging the entire system. This installation requires opening a flow divider port to the atmosphere. This system segment could contain liquid anhydrous ammonia (NH_3) above atmospheric pressure. It would overwhelm your PPE[a] and could be fatal.

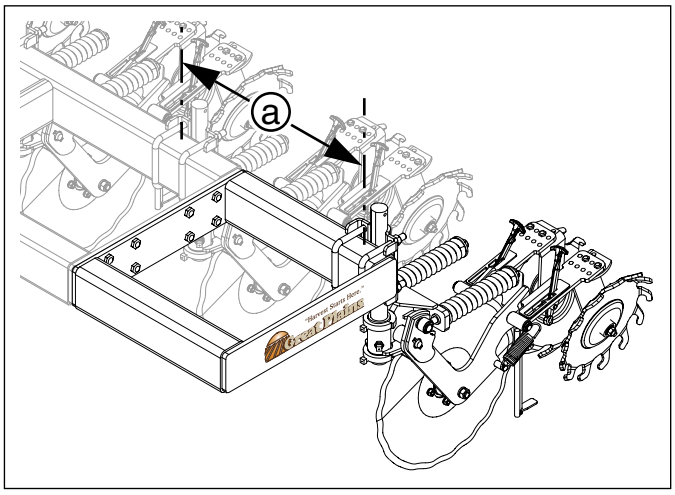


Figure 99 34942
417-124A NH_3 Side Dress

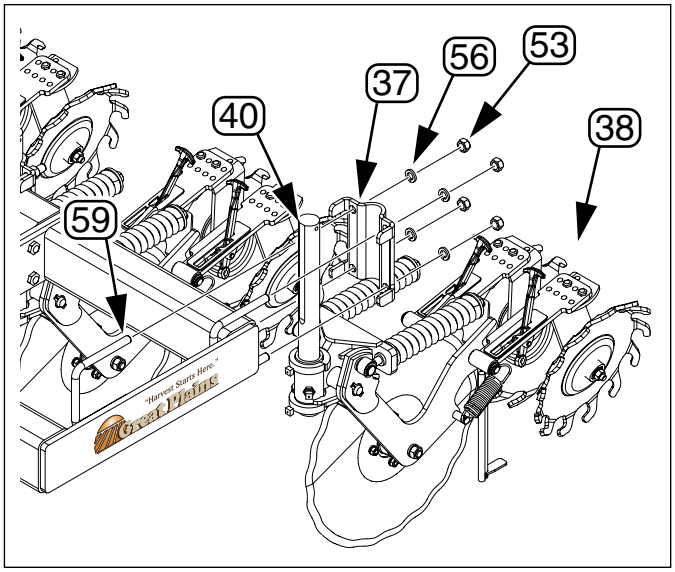


Figure 100 34979
Install Anhydrous Coulter

a. PPE: Personal Protective Equipment

Add NH_3 Divider Port

Refer to Figure 101

15. Wear PPE[a]. Verify that the system has been discharged (see "**System Discharge**" on page 108).
16. Locate the flow divider (A38) for the left wing. Verify that the pressure gauge (A42) is reading zero.
17. Select one new:
    (A43) 830-406C AD 1/4MNPT X 3/8 HB SS
18. Choose any plug (A44) on the divider. Position yourself up-wind of the plug. Begin to slowly unscrew the plug, watching for signs of pressure or residual ammonia bleed-off. If any ammonia is detected, wait for it to bleed off before continuing.
19. Replace the plug with the adaptor (A43). Use pipe sealant when installing a port fitting. Use only pipe sealant specified for use with anhydrous ammonia, such as RectorSeal No. 5. Do not use tape.

Cut New Tubing

Connect Side Dress Tubing

Refer to Figure 101 and Figure 102

20. Disconnect the delivery tubing (A45) at row 1, the existing left-most row. Release any coiled-up length from ties at the row. Make sure that there is enough slack for a tube of this length to reach the side dress row. If not, have your dealer contact the factory.
21. Release the remaining length of row 1 tubing all the way back to the section divider (A38). Do not disconnect it from the divider.

    Measure the length of this tubing from divider port (A43) to row end cut. Re-route and reconnect it to row 1. Do not re-tie until step 25.
22. Select one new:
    (A45) 990-259R EVA TUBING 3/8 ID
    Cut this tubing to the length measured at step 21.
23. Select two new:
    (45) 800-400C HOSE CLAMP NO.10 .593 ID SS
    Slide one over each end of the new tubing.
24. Connect the new tubing (A45) to the adaptor (A43) installed in step 19. Route the tubing along the rear tool bar, passing through the pin axis at the wing hinge. Coil up excess behind or around[b] the tool bar. Connect the wing end to the coulter tine. Secure both ends with clamps (45).
25. Secure all tubing with ties provided.
26. Note change in swath for rate setting.

DANGER

Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:
Do not perform this installation without PPE or without verifying system discharge. This installation requires opening a flow divider port to the atmosphere. This system segment could contain liquid anhydrous ammonia (NH_3). It would overwhelm your PPE[a] and could be fatal.

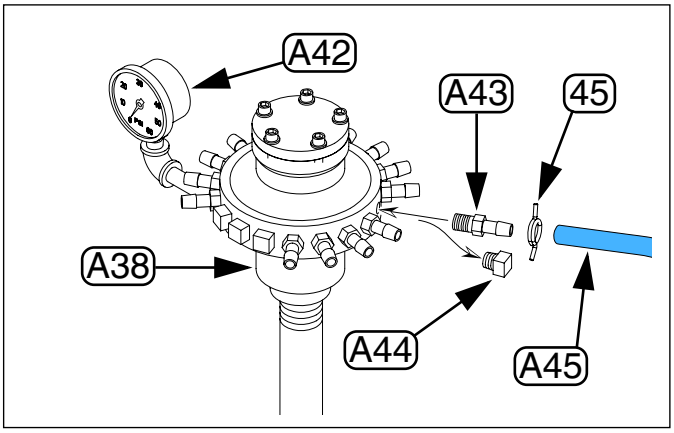


Figure 101 34982
Install Side Dress Divider Port

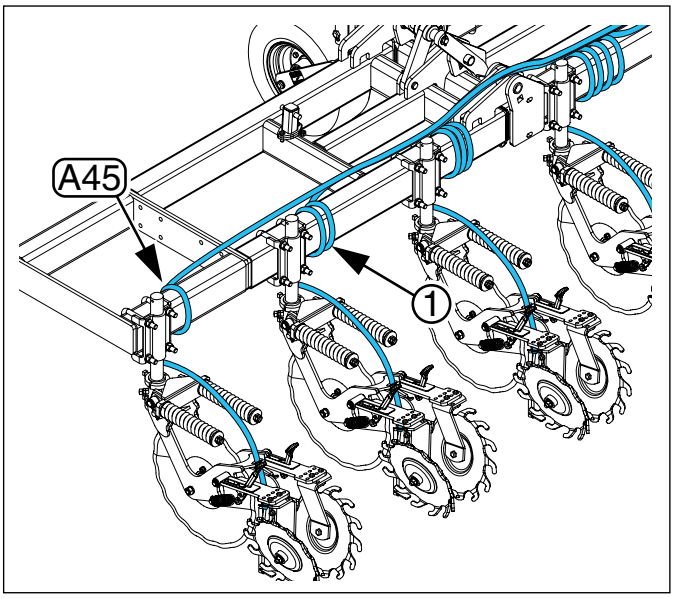


Figure 102 34983
Install Side Dress Tubing

a. PPE: Personal Protective Equipment
b. Avoid tight bends and kinks if wrapping around the tool bar. Make coils nearly circular.

Shift 2-Point Hitch

Refer to Figure 103

The front tool bar of the forward sub-frame has stop keys for the standard (pre-emergence) hitch position ② and for the side dress hitch position ③.

27. Loosen or remove the nuts (53) at all four hitch U-bolts.
28. Move each hitch (13) to align the left edge of the bolt plate with the left stop keys on the frame.
29. Tighten nuts to $^{3}/_{4}$-10 Grade 5 torque specification.

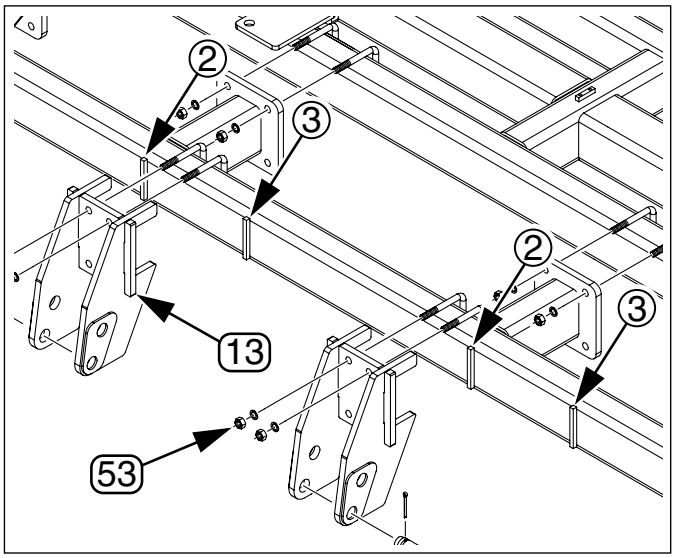


Figure 103
Hitch Shift
31844

Re-Space Caster Pivots

Caster Angle Adjustment (s/n C1017A+)

For s/n C1016A-, see page 173.

Refer to Figure 104 and Figure 105

Your operations may require that the lift-assist tires be in-row (on 90 inch centers) or out-of-row (on 120 inch). Post-emergence (side-dress), for example, requires out-of-row placement. The forward caster parallel arm weldments may be pivoted and pinned for either spacing.

90 Inch (In Row) Spacing

With the caster pins the through leading outside holes ① of the lift assist frame, and through the outside tubes of the forward caster pivot weldment, the caster arms are in straight trail, and provide a 90 inch (2.29 m) wheel spacing. The wheels are directly behind 30 inch rows.

120 Inch (Out of Row) Spacing

With the caster pins the through inside holes ② of the lift assist frame, and through the inside tubes of the forward caster pivot weldment, the caster arms are angled out, and provide a 120 inch (3.05 m) wheel spacing. The wheels are in between 30 inch rows.

⚠ WARNING

Loss of Control and Machine Damage Risks:
Never operate with one or both pins removed, or with pins installed but not in a caster weldment tube. Always install pin ③ from the top, in case the cotter is lost. If the caster arms are free to pivot at both ends, they can strike other implement components, and directional control is substantially reduced. This could contribute to a road accident, resulting in serious injury or death.

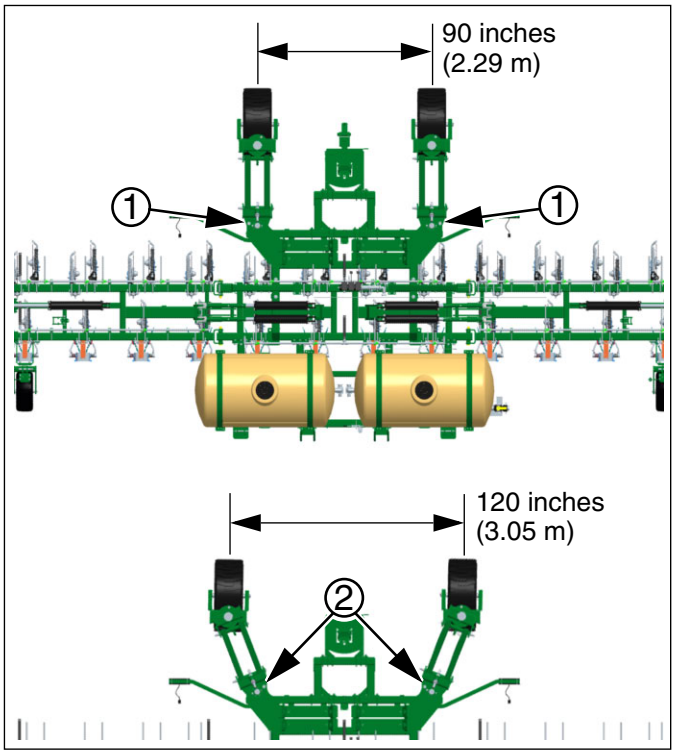


Figure 104
Caster Wheel Spacings
32356

Note: Other configurations of the pins are not recommended. In particular, it is not necessary to set a wheel stance asymmetry for side-dress.

Changing Spacing

This is a two person operation. If the applicator frame is not exactly level, the caster arms may be difficult to control with one hand.

1. Hitch the applicator to a suitable tractor (page 36).
2. Raise the applicator. Move to a level, and firm or hard surface.
3. While raised, remove any lift lock channel or spacers on the lift-assist cylinder.
4. Lower the applicator until the caster tires are just out of ground contact. Set the lift circuit to Neutral and shut off the tractor.
5. Remove the hairpin cotter ④ at a caster pin ③. Have one person control the caster position. Remove the pin.
6. Reposition the caster as desired for the new spacing. Insert the pin. Secure with cotter. Repeat for other caster.

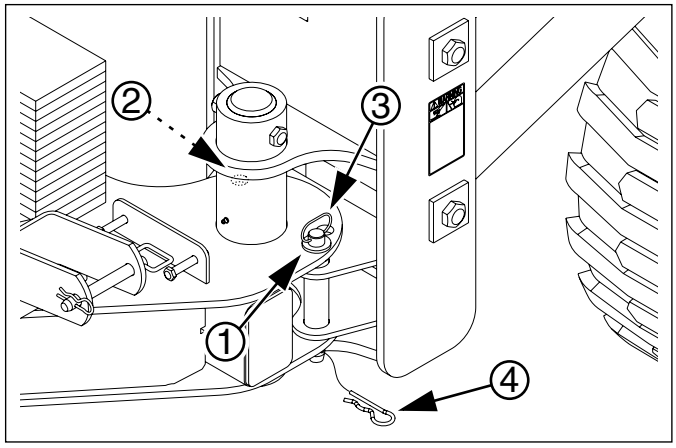


Figure 105 32357
Caster Wheel Spacing Pin

Re-Space Caster Pivots (s/n C1016A-)

Refer to Figure 106

Both casters are moved inward from the standard 120 inch spacing so that they run in-fertilizer-row in side dress.

7. Attach a hoist or lift to a caster to support its weight.
8. Loosen the four nuts ④ at the clamp bracket.
9. Slide the bracket and caster toward implement center by 15 inches. Re-tighten nuts to $\frac{3}{4}$-10 Grade 5 torque specification.
10. Repeat step 7 through step 9 for the other caster.

Reset and Disable Pumps

11. With side dress installed, both the row count and swath of the implement change. Configure the ground drive pump or controller console for 13 rows and the wider swath. “**Fertilizer Rates**” on page 88.
12. On triple-coulter applicators, take steps to prevent the rear boom pump from operating. Remove the contact wheel or a chain from a ground drive. Leave the hydraulics disconnected for a hydraulic pump.

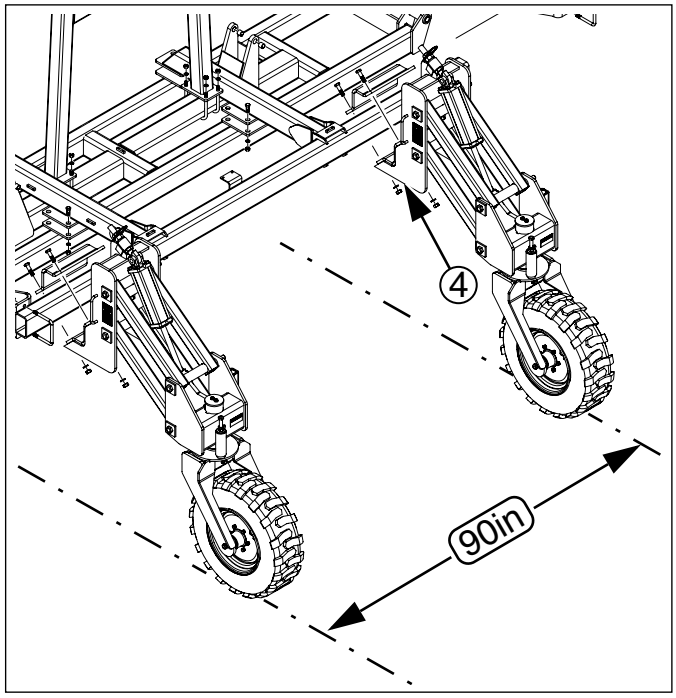


Figure 106 31885
Side Dress Caster Spacing

Reverting to Pre-Emergence

For converting to pre-emergence, continue at page 164.

Resources required:

- s/n C1016-: Stands or blocks support the rear frame
- s/n C1016-: Hoist or lift for supporting casters during shift
- all-purpose grease and grease gun
- basic hand tools
- One shut-off cap or plug.
  Conventional liquid fertilizer:
  (L36) 832-042C NOZZLE SHUT OFF CAP W/ GASKET
  Anhydrous:
  (A44) 830-407C PL 1/4 MNPT STAINLESS

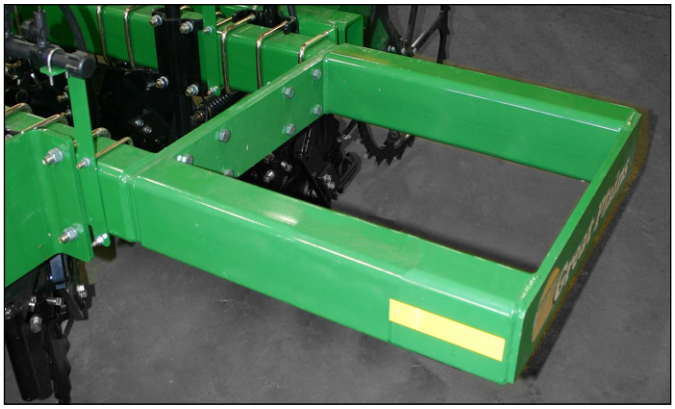


Figure 107 32029
Side Dress Removed

Prepare Implement

13. Move implement to a level clear surface with adequate illumination.
14. Raise implement.
15. Unfold wings.
16. Fully extend wing gauge wheels.
17. Install parking stands.
18. Place stands or blocks under the rear frame.
19. Retract the lift-assist cylinders to lift the caster tires off the ground.
20. Lower implement onto stands.
21. Unhitch tractor.
22. Restore caster spacing.
23. Re-center 2-point hitch.
24. Note change in swath for rate setting.

Revert Liquid to Pre-Emergence

1. Disconnect the drop line from the boom and the side dress coulter. Cap the boom clamp.
2. Disconnect the grease line at the grease bank. Remove the zerk from the plate to prevent dirt build up; re-attach zerk to line. Coil up the grease line at the coulter.
3. Dismount side dress coulter. If a quick-attach type, leave the mount plate installed. Frame extension may be left in place.
4. Re-install rear coulters (if removed). Reconnect drop and grease lines.

Revert NH_3 Side Dress to Pre-Emergence

DANGER

Suffocation, Blinding, Burning, Freezing, Disabling and Disfigurement Hazards:
Do not perform this installation reversion without PPE or without verifying system discharge. This process requires opening a flow divider port to the atmosphere. This system segment could contain liquid anhydrous ammonia (NH_3). It would overwhelm your PPE[a] and could be fatal.

1. Discharge system (see “**System Discharge**” on page 108).
2. Disconnect side dress delivery tubing at divider and coulter. Leave tubing in place on frame.
3. Replace adaptor at divider with plug.
4. Dismount coulter. Frame extension may be left in place.

a. PPE: Personal Protective Equipment

Weight Kit Installation (s/n C1017A+)

These instructions apply to an installation of an optional 407-904A weight kit.

Note: This kit is compatible only with applicators having serial numbers C1017A or higher. C1016A and earlier applicators have a mechanically incompatible rear sub-frame.

Tools Required:

- Lift or hoist with a capacity of at least 750 pounds (340 kg). Two lift lines, each with a capacity of at least 750 pounds (340 kg).
- Tractor for raising and unfolding the applicator.
- Basic hand tools.

1. Raise and unfold the applicator. Leave it hitched or install parking stands.

WARNING

Heavy Overhead Object Hazard:
Move only one weight stack at a time. Use an adequate hoist. Use two or more lines, each rated for the full weight of a single weight stack. Inspect lines for wear and damage. If the hoist fails or tips, or a line fails, a weight could fall or swing, causing serious injury or death.

Refer to Figure 108

2. Locate one:
   (25) 160-296S NTA WEIGHT BRACKET ASSY

   Observe that a weight stack is not symmetrical. The weight base has a long (outside) notch ① and a short (inside) notch ②.
3. As needed, orient the weight stack prior to line attachment, so that it is in the correct orientation when placed on the frame.
4. Connect hoist lines to the weight mounts ③.
5. With the longer notch ① toward the wings, and the shorter notch ② to machine center, place the weight in the openings of the rear sub-frame. Push it fully to the rear before releasing the lines.
6. Select two sets:
   (34) 407-991D BRACKET STOP
   (49) 802-226C HHCS 1/2-13X2 3/4 GR5
   (54) 804-015C WASHER LOCK SPRING 1/2 PLT
   (50) 803-020C NUT HEX 5/8-11 PLT
   Assemble the stop (34) pair on either side of the weight support bar ④. Snug against weight stack (25). Secure with bolts (49), lock washers (54) and nuts (50).
7. Repeat step 2 through step 6 for second weight stack.

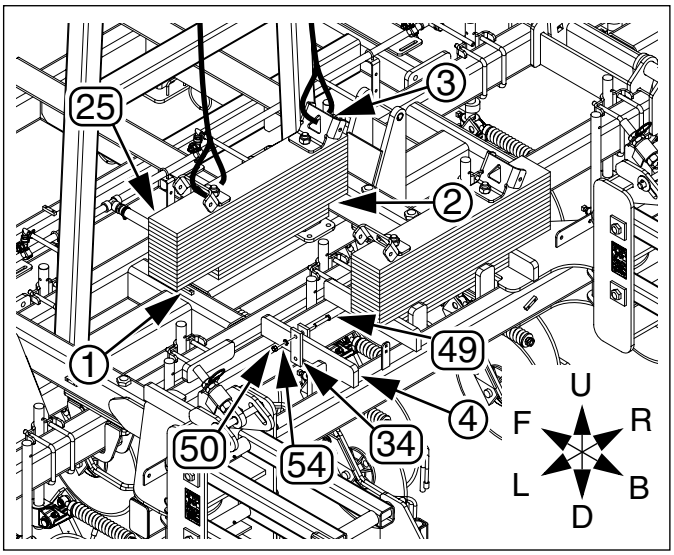


Figure 108 36062
Install/Remove Weight Kit

CAUTION

Heavy Overhead Object Hazard:
Do not stand to either side of an elevated weight stack. Keep body parts away from gaps between the stack and other machine parts. Remain behind and out from under the elevated weight stack. Move the stack slowly and carefully. Assume a line could fail, and that the weights could swing down and to the side.

NOTICE

Machine Damage Risk:
Do not install a single weight on either side. Do not leave weight pairs uncoupled on either side. Always install or remove all four weights. When installed, always use provided fasteners to couple front and rear weights at their mounts ③. Weights are held in place largely by gravity. A single weight, or uncoupled pair, could tip forward during a sudden stop, causing machine damage.

Warranty

Great Plains Manufacturing, Incorporated warrants to the original purchaser that this application equipment will be free from defects in material and workmanship for a period of one year from the date of original purchase when used as intended under normal service conditions for personal use; 90 days for commercial or rental purposes.

This Warranty is limited to the replacement of any defective part by Great Plains Manufacturing, Incorporated and the installation by the dealer of any such replacement part. Great Plains reserves the right to inspect any equipment or part which are claimed to have been defective in material or workmanship. This Warranty does not apply to any part or product which, in the judgement of Great Plains, shall have been misused or damaged by accident or lack of normal maintenance or care, or which has been repaired or altered in a way which adversely affects its performance or reliability, or which has been used for a purpose for which the product is not designed. This Warranty shall not apply if the product is towed at a speed in excess of 20 miles per hour.

Claims under this Warranty must be made to the dealer which originally sold the product and all warranty adjustments must be made through such dealer. Great Plains reserves the right to make changes in materials or design of the product at any time without notice.

This Warranty shall not be interpreted to render Great Plains liable for damages of any kind, direct, consequential, or contingent, to property.

Furthermore, Great Plains shall not be liable for damages resulting from any cause beyond its reasonable control. This Warranty does not extend to loss of crops, losses caused by harvest delays or any expense or loss for labor, supplies, rental machinery or for any other reason.

No other warranty of any kind whatsoever, express or implied, is made with respect to this sale; and all implied warranties of merchantability and fitness for a particular purpose which exceed the obligations set forth in this written warranty are hereby disclaimed and excluded from this sale.

This warranty does not cover damage caused by acts of God or accidents.

No part of this warranty extends to dealer- or customer-installed equipment not supplied by Great Plains. Great Plains shall have no liability whatsoever for damages or injuries resulting from equipment not supplied by Great Plains.

This Warranty is not valid unless registered with Great Plains Manufacturing, Incorporated within 10 days from the date of original purchase.

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