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 NP30A, NP40A, NP3000 or NP4000 models where the topic function is identical.
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Important Safety Information

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.

Be Familiar with Safety Decals

▲ Read and understand “Safety Decals” on page 8, thoroughly.
▲ Read all instructions noted on the decals.
▲ Keep decals clean. Replace damaged, faded and illegible decals.
Use Safety Chains (Pull-Type only)

▲ Use safety chains to help control drawn machinery should it separate from tractor draw-bar or trailing nurse tank hitch.
▲ Use chain with a strength rating equal to or greater than the gross weight of towed machinery.
▲ Attach implement chain to tractor draw-bar support or specified anchor location. Attach nurse tank chain(s) to anchors provided on implement. Allow only enough slack in chain for turns.
▲ Replace chain if any links or end fittings are broken, stretched or damaged.
▲ Do not use safety chain for towing.

Wear Protective Equipment (PPE)

▲ Waterproof, wide-brimmed hat
▲ Waterproof apron.
▲ Face shield, goggles or full face respirator.
▲ Goggles with side shields or a full face respirator is 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 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 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.
▲ Wear clothing and equipment appropriate for the job. Avoid loose-fitting clothing.
▲ 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.
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 at other remotes, and shutting down tractor before connecting, disconnecting or inspecting 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 assistance from a physician familiar with this type of injury.

Minimize Radiation Exposure

The 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 front caster tires, gauge wheel tires, or lift-assist tires as steps. A tire could spin underfoot, resulting in a fall onto the implement or ground, possibly causing serious injury.

▲ The front caster wheels 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 ft. (4 m). Overhead lines at farm structures are a particular hazard. An incorrectly folded implement is at risk from lines lower than 22 ft. (7 m).

▲ 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 30m (100 feet) 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 implement 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.

▲ Tow nurse tank separately. Do not tow a nurse tank in train with the implement on public roads.
▲ Do not tow a pull-type or 2-point implement or nurse tank that, when fully loaded, weighs more than 1.5 times the weight of towing vehicle.
▲ Do not transport a 3-point implement 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 121.
▲ Do not exceed 20 mph. 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.
Handle Chemicals Properly

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. Make sure wind drift of chemicals will not affect any surrounding land, people or animals.
- Never wash out a hopper within 100 feet 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 blocks and supports provided.
- Detach and store fertilizer applicator in an area where children normally do not play.
Tire Safety
Tire changing can be dangerous. Employ 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 for additional information.
▲ Work in a clean, dry area.
▲ Lower implement, put tractor in park, turn off engine, and remove key before performing maintenance.
▲ Make sure all moving parts have stopped and all system pressure is relieved.
▲ Allow implement to reach ambient temperature before commencing maintenance.
▲ Disconnect battery ground cable (⁻) before servicing or adjusting electrical systems or before welding on fertilizer applicator.
▲ 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 implement 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 fertilizer applicator functions.
▲ Operate machinery from the driver’s seat only.
▲ Do not leave fertilizer applicator unattended with tractor engine running.
▲ Do not stand between tractor and implement, or implement and nurse tank, during hitching.
▲ Keep hands, feet and clothing away from power-driven parts.
▲ Wear snug-fitting clothing to avoid entanglement with moving parts.
▲ Watch out for wires, trees, etc., when folding and raising fertilizer applicator. 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 each light bracket, and back face, outside ends of the top transport rest tube; 4 total
838-265C
Amber Reflectors
On front face of front tool bar near wing hinge;
Pull-Type (shown):
On outside face of lift-assist brackets;
2-Point:
On the outside faces of casters;
3-Point Models:
on the outside faces of lift assist brace weldments;
4 or 6 total

838-267C
Daytime Reflectors
On each light bracket,
back face, outside ends of the top transport rest tube;
4 total

818-323C
Danger: Possible Chemical Hazard
Option: on the mount of each ground drive;
0, 1 or 2 total
818-557C
Danger: Peligro: Ingles
(in Spanish, warning users to seek translation assistance if they do not speak English)
Pull-Type: On top of left tongue tube near hitch,
2-Point/3-Point: On front face of frame tube, left of hitch; 1 total

818-590C
Danger: Hitch Crush
On front of frame tube; 2 total

838-599C
Danger: Electrocution
On frame tube near wing hinges; 2 total
818-337C
Warning: Speed
On front face of front tool bar, right of center; 1 total

818-339C
Warning: High Pressure Fluid Hazard
Pull-Type: On top of left tongue tube near hitch, 1 total

818-437C
Warning: High Pressure Fluid Hazard
On front face of front tool bar, left of center, Pull-Type: On mount of each front caster wheel, Pull-Type and 2-point: On each lift-assist mount; 1, 3 or 7 total
**818-860C**
*Warning: Moving Parts*
Option: On mount of each ground drive, 0, 1 or 2 total

**848-551C**
*Warning: Towing*
On decal mount near rear hitch: 1 total
See “Transport” on page 56 and “Hitching Nurse Tank” on page 58 for further information.

**818-398C**
*Caution: Tires Not a Step*
2-and 3-Point: 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, left of center; 1 total

838-092C
Caution: Tire Pressure and Bolt Torque
NP30L (all), NP40L (15-Row and 31-Row)
Pull-type: on valve stem side of each front caster wheel rim,
Pull-type & 2-point: each lift-assist tire rim; 0, 2 or 6 total
838-380C
Caution: Transport Locks
Pull-type: on mount of each front caster wheel, Pull-type and 2-point: on mount of each lift-assist; 0, 2 or 6 total

838-595C
Caution: Tire Pressure and Torque
2-/3-Point: inside faces of manual gauge wheel arms; 2 total

848-846C
Caution: Tire Pressure and Bolt Torque
NP40L. 16-Row and 17-Row
Pull-type: on valve stem side of each front caster wheel rim, Pull-type & 2-point: each lift-assist tire rim; 0, 2 or 6 total
Introduction

Great Plains welcomes you to its growing family of new product owners. The 30- and 40-Foot Liquid Fertilizer Applicator (NP30L or NP40L) 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.

Models Covered

Conventional Liquid Fertilizer Models

NP30L-11R30  30-Foot, 11-Row, 30 inch
NP30L-12R30  30-Foot, 12-Row, 30 inch
NP30L-13R30  30-Foot, 13-Row, 30 inch
NP40L-15R30  40-Foot, 15-Row, 30 inch
NP40L-16R30  40-Foot, 16-Row, 30 inch
NP40L-17R30  40-Foot, 17-Row, 30 inch
NP40L-31R15  40-Foot, 31-Row, 15 inch

Description of Unit

The Nutri-Pro® NP30L or NP40L Fertilizer Applicator is a precision implement for sub-soil application of conventional liquid fertilizer, from a user-provisioned trailing nurse tank or tractor-mounted tank. The NP30L or NP40L offer a choice of pull-type, 3-point or lift-assist 2-point hitching.

The NP30L or NP40L (conventional liquid) models are designed for use with a ground-drive CDS-John Blue piston pump, optional hydraulic pump, or a user-provisioned pump. A Raven SCS 450 console is available for the 3-section variable-rate manifold.

Intended Usage

Use the NP30L or NP40L Fertilizer Applicator to apply compatible liquid fertilizers. Do not modify Great Plains-provisioned components, or install user-provisioned components, except as authorized or recommended by Great Plains.
Using This Manual
This manual will familiarize 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.

Definitions
The following terms are used throughout this manual.

NOTICE
A crucial point of information related to the preceding topic. Read and follow the directions to remain safe, avoid serious damage to equipment and ensure desired field results.

Note: Useful information related to the preceding topic.

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 art illustrations shows the directions of: Up, Back, Left, Down, Front, Right.

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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.

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

Refer to Figure 2
For 2013+ 5-section applicators, the serial number plate is located on the center section, on the front face of the left front fold cylinder mount.

Refer to Figure 3
For 2012- 5-section applicators, the serial number plate is located on the center section, on the rear face of the rear tool bar near the left end of the rear sub-frame.

Refer to Figure 4
For 3-section applicators, the serial number plate is located on the left face of the top 3-point hitch weldment.

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

Two-digit callouts in the range \( 11 \) to \( 56 \) refer to the same tank and Nutri-Pro® plumbing system components throughout this manual.

Callouts \( 11 \) and above refer to parts of Options (see Appendix C).
Record your NP30L or NP40L Fertilizer Applicator model and serial number here for quick reference:

Model Number: ____________________________
Serial Number: ____________________________

Great Plains Manufacturing, Inc. and your Great Plains dealer want you to be satisfied with your new NP30L, NP40L. If for any reason you do not understand any part of this manual or are otherwise dissatisfied, please take the following actions first:

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.

If your dealer is unable to resolve the problem or the issue is parts related, please contact:

**Great Plains Service Department**
1525 E. North St.
P.O. Box 5060
Salina, KS 67402-5060

Or go to www.greatplainsag.com and follow the contact information at the bottom of your screen for our service department.
Metering Overview

Hydraulic Drive System Components (Options)
See page 21 to page 24 for callout descriptions.

Figure 5
Options: Hydraulic Drive Plumbing

36031
Ground Drive (Preset Rate) System
See page 21 to page 24 for callout descriptions

Figure 6
Ground Drive Preset Rate Plumbing
Variable Rate Ground Drive System
See page 21 to page 24 for callout descriptions.

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

Figure 7
Variable Rate Ground Drive Plumbing
See page 115 for a summary of the differences between systems.

**Fertilizer Tank Components**

Consult the manual or other documentation for your tank. This Nutri-Pro® manual assumes a generic trailing nurse tank cart for the purposes of setup and operation. Your tank is likely to differ.

If the nurse tank has its own pump, the tank supply plumbing must be able to bypass the pump. Disable or disconnect any pump drive system on the nurse tank.

Refer to Figure 6 on page 19 and Figure 7 on page 20

**L11. Nurse Tank**

A fertilizer supply tank is not included with the Nutri-Pro® applicator. The fertilizer supply tank may be tractor-mounted, or, as illustrated on pages 18 through 20, may be a trailing nurse tank cart.

A trailing nurse tank cart requires the optional nurse tank hitch (page 118) on the implement. The cart must be full-trailerizing, and not semi-mounted.

**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. 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 38 1/2 inches (98 cm) with the current drop hitch and 48 inches (122 cm) with the older high-clearance hitch.

**L13. 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 implement has anchor points for two chains.

**L14. Tank Vent**

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.

**L15. Tank Supply Hose**

The tank supply hose must be large enough to support the application rates intended. A hose ID of 1 1/2 inch or larger suffices.

Note: Callouts L11 to L56, correspond to the items beginning below, and identify the same tank and implement components throughout this manual.

**L16. 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.

**L17. Tank Supply Hose Quick-Coupler**

The supply inlet for ground drive NP30L or NP40L applicators is a 2 inch male cam-lock quick coupler (MCL). The tank supply hose fitting must be, or be adapted to 2 inch FCL.

The supply inlet for hydraulic drive is a 1 1/2 inch unterminated hose. This requires an inlet coupling compatible with the nurse tank to be used. An applicator-side shut-off valve is recommended.

**L18. Tank Return Hose**

(variable rate ground drive implements only)

With the variable rate feature, the ground drive pump dial [L39] is typically set to maximum rate. Flow control valve [L40] diverts excess fertilizer back to the tank.

This hose must have an ID of 1 1/2 inch or larger. This line is not intended for agitation.

**L19. Tank Return Hose Shut-Off Valve**

(variable rate ground drive implements only)

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

**L20. Tank Return Hose Inlet**

(variable rate ground drive implements only)

The return outlet of the NP30L or NP40L applicator is a 2 inch cam-lock quick coupler receptacle (female, FCL). The tank return hose fitting must be, or be adapted to 2 inch MCL.

**L21. Tank Bypass Return Hose**

(variable rate ground drive implements only)

With the variable rate feature, a bypass solenoid valve [L44] opens whenever all of the section valves are closed. The entire output of the pump [L31] is returned to the tank at outlets [L26] and [L28].

This hose must have an ID of 1 inch or larger.
L22. Tank Bypass Return Shut-Off Valve
(variable rate ground drive implements only)
This Nutri-Pro® manual mentions only a single shut-off valve for the tank bypass return hose. Your tank may have additional shut off and/or flow management valves. Consult your tank manual.

L23. Tank Bypass Return Inlet
(variable rate ground drive implements only)
The return outlet of the NP30L or NP40L applicator is a 3/4 inch cam-lock quick coupler plug (male, MCL). The tank bypass return hose fitting must be, or be adapted to 3/4 inch FCL.

Implement System Components (Option)
This list presumes that the implement has system components factory-installed by Great Plains. The list includes all components for both pumping systems (preset and variable rate). If the implement has aftermarket components, part or all of this information may not apply to your operations.

L24. Supply Inlet
The supply inlet of ground drive NP30L or NP40L 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.

The supply inlet for hydraulic drive is a 1 1/2 inch unterminated hose. This requires an inlet coupling compatible with the nurse tank to be used. An applicator-side shut-off valve is recommended.

L25. Inlet Shut-off Valve
Where present, this valve is open for application and clean-out, and closed at all other times.

L26. Return Outlet
(variable rate ground drive implements only)
With the variable rate feature, the pump dial 32 is typically set to maximum rate. Flow control valve 40 diverts excess fertilizer back to the tank.

The return outlet of the NP30L or NP40L applicator is a 2 inch male cam-lock quick coupler (MCL). The tank return hose fitting must be, or be adapted to 2 inch FCL.

L27. Return Outlet Shut-Off Valve
(variable rate ground drive implements only)
This valve is open for application and clean-out, and closed at all other times.

L28. Bypass Return Outlet
(variable rate ground drive implements only)
The return outlet of the NP30L or NP40L applicator is a 3/4 inch cam-lock quick coupler plug (male, MCL). The tank bypass return hose fitting must be, or be adapted to 3/4 inch FCL.

L29. Bypass Return Shut-Off Valve
(variable rate ground drive implements only)
This valve is open for application and clean-out, and closed at all other times.

L30. Strainer
This fitting contains an 80 mesh screen for filtering large particles and coagulates in the fertilizer, preventing blockage at the orifice plates 59. See page 90 for alternative screen sizes and page 104 for maintenance.

L31. Ground Drive Pump
The CDS-John Blue NGP-7055-K has a capacity of 34 gallons/minute (129 liters/minute). See the CDS-John Blue NGP Pump Parts and Instructional manual (12-M-43) for maintenance.

L32. Pump Adjustment Dial
(ground drive implements only)
This 0-to-10 adjustment sets the percentage of rated gpm/lpm to use. Settings below 2 are not recommended.

Preset Rate:
Pump and application rate are set by a combination of ground drive sprockets (not shown) and dial setting. See page 92 for preset rate setting.

Variable Rate:
The pump is typically operated at dial setting 10, using whichever ground drive sprocket provides higher-than-needed gpm/lpm. Application rate is controlled by valve 40, which diverts excess flow back to the nurse tank.

L33. Pump Adjustment Tool
(ground drive implements only)
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.

L34. Gauge Protector
(ground drive implements only)
This fitting transmits manifold pressure to the pressure gauge 59, and protects the gauge from direct contact with corrosive fertilizer.
L35. Pressure Gauge
(ground drive implements only)
This 0-to-100 psi gauge reports the pressure in the manifold, which is typically 15-40 psi during application. The pressure should be above zero only when fertilizer is flowing. The back-pressure at the nozzle orifices falls quickly when the pump stops.
Check the pressure periodically during application. If it rises to over 65 psi, the relief valve may be activating. See also pressure sensor.

L36. Relief Valve
(ground drive implements only)
Adjust this valve to activate at 65 psi (page 91). 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.

L37. Dump Line
(ground drive implements only)
If the relief valve operates, material is jettisoned at this tube. If you observe dumping, check the pressure and review the orifice plate configuration.

L38. Hydraulic Drive Pump (Option)
Hydraulic Drive Option: The Ace FMC-150F-HYD-206 has a capacity of up to 150 gallons/minute (560 liters/minute). See the Ace Pump Instruction manual (HYD-MAN) for maintenance.

L39. Air Bleed Line
(hydraulic drive pump implements only)
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.

L40. Flow Control Valve
(variable rate only)
Under the control of the console (not shown) this valve is being constantly adjusted to divert back to the tank, any material not required at the current application rate (as reported by the flow meter).

L41. Flow Meter
(variable rate only)
This sensor reports the actual material rate entering the variable rate manifold. As it detects variations from your desired rate, it signals the console to adjust the control valve.

L42. Passive Manifold
(used only with preset rate implements)
This plumbing cross splits the flow into three sections. Equal flow is assured by the orifice plates.

L43. Section Valves
(variable rate only)
There are three On/Off solenoid valves (1, 2 & 3). These open and close under the control of BOOM switches on the Raven SCS 450 console, or as commanded by a controller with section capability.

L44. Bypass Valve
(variable rate only)
This 4th manifold On/Off valve is normally closed. If the controller commands all of the section valves to close, it also commands the bypass valve to open. The flow control valve cannot respond as quickly as On/Off valves, so the bypass valve controls pressure spikes by diverting some flow back to the tank.

L45. Pressure Sensor
(variable rate only)
The optional Raven SCS 450 console displays the manifold pressure during operation. This is measuring essentially the same pressure as the mechanical pressure gauge.

L46. Boom
There is one boom assembly per implement section. Booms may be different lengths at center and on wings. The assembly feed may be via a tee or into one end of the boom. Preset rate implements are operated as a single boom. Variable rate implements are operated as a three-section boom.

L47. End Cap
A boom has at least one end cap. A tee-supplied boom has two caps. These caps are removed for clean-out (see page 103).

L48. Boom Clamp
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 103) 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 implement models). Active rows have nozzle bodies. Inactive stations have shutoff caps.
L49. Shutoff Cap
Unused boom clamp stations are capped. Use a gasket (with or without plate) under a cap.

L50. Gasket
This flat O-ring seals the nozzle body (L52) or shutoff cap (L49) to the boom clamp (L48). The inside diameter of the gasket is grooved to accept an orifice plate (L51). Do not operate without a gasket.

L51. Orifice Plate
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 88 for plate selection and installation.

L52. Nozzle Body
This fitting adapts the boom clamp to tubing, and may be positioned for forward or rear tubing direction.

L53. VeriFlow Nozzle (Option)
This accessory replaces components L50, L51 and L52 with a spring-regulated valve nozzle that requires no adjustment (or orifice plate changes) over a wide range of flow rates.

L54. Drop Tubing
This tubing carries the material to the row.

L55. Applicator Tube
This metal tubing delivers the material to the trench opened by the coulters. The exit port is protected behind arm structure. The arm may be adjusted for release depth relative to coulter depth (page 66).

L56. 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. Alternate sizes are available (see page 119).
Preparation and Setup

This section helps you prepare your tractor and NP30L or NP40L 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.

Initial Setup

See manual 407-313Q for pre-delivery items (normally completed by dealer), and first-time/infrequent setup tasks, including:

- Adjust field lift partial fold on 2-Point (page 140).
- Install optional variable rate console in tractor (page 142).
- Install other 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 105).
- De-grease exposed cylinder rods if so protected at last storage.

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 109.
- Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See “Safety Decals” on page 8.
- Inflate tires to pressure recommended and tighten wheel bolts as specified. See “Tire Inflation Chart” on page 122.
Hitching Tractor to Applicator

This manual presumes the following (recommended) operations sequence:

1. Hitch tractor to applicator for transport
   2- and 3-Point Hitching: below
   Pull-Type Hitching: page 27
2. Transport applicator separately from nurse tank: page 56
3. Hitch nurse tank to applicator at field: page 58

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.

2- and 3-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 NP30L or NP40L 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 115).

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

- **Upper Link** (full 3-point only):
  1 inch (25.4 mm) I.D. x 1 1/4 inch (31.8 mm) O.D.
- **Lower Links**:
  1 1/8 inch (28.6 mm) I.D. x 1 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.
Full 3-Point Hitching

For 2-Point hitching (3-Point semi-mounted), continue at “Electrical Hookup” (next topic).

Determine which top holes to use:

- (3) Upper Category III
- Category III Quick Hitch
- (4) Middle Category III
- Category IIa
- (5) Lower Category IIa Quick Hitch

a. Requires an optional hitch pin kit (page 115)

Attach tractor top link to applicator upper hitch clevis.

For intended results, the frame must be level side-to-side and front-to-back. This must be done in the field, and cannot normally be established during hitching. See “Leveling Implement” on page 32.

Pull-Type 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.

Refer to Figure 10

1. Use jack (1) to raise and lower applicator tongue.
2. Back tractor draw bar into alignment with hitch.
3. Secure with a locking hitch pin (2).

⚠️ CAUTION

Loss of Control Hazard:
If a nurse tank will be used, do not operate without a locking hitch pin. A pin working loose could cause abrupt implement motions resulting in a tank upset and fertilizer release.

4. Secure safety chain to an anchor on the tractor.

Refer to Figure 10 and Figure 11

5. After hitching tractor to applicator, store jack on storage stob (3) on top of fertilizer applicator tongue.
Electrical Hookup

Refer to Figure 12

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 Hydraulic connector (2013+ 2-point 5-section only)
- ④ Console pressure connector (variable rate only)
- ⑤ 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 12
Connector Identification

36051
31083
34970
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.

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.

**Refer to Figure 13**

To distinguish hoses on the same hydraulic circuit, refer to the cylinder symbols on the hose handles\(^a\).

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

On a 2-point\(^b\) implement, connect either hose to either side of the remote. Use a regular remote and not a dedicated tractor 3-point remote\(^c\).

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.

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\(^a\) Older implements do not have handles. The cylinder symbols are instead on a hose label clamped near the QD connectors.\n\(^b\) 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.\n\(^c\) 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\(^R\)). Nutri-Pro\(^R\) lift and/or fold may not function on this type of circuit.

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**Machine Function Risk:**

The NP30/40L weight transfer system requires a tractor with closed center hydraulics. Open center hydraulics are incompatible.
Hydraulic Pump Hookup (Option)

The hydraulic pump used has a 7 gpm (23 liters/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 applicator functions.

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

Refer to Figure 14

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 61 for setting flow rate.

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**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 (newer applicators)

This applies to 2-point (lift assist) hitching, and 3-point hitching (but not pull-type hitching, as the tongue parking stand was already stored at an earlier step).

Refer to Figure 16 (which depicts the same style stand on an NP4000 applicator)

⚠️ CAUTION ⚠️

Heavy Object Hazard:
Use the lifting handle ②. Push leg against frame while raising 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 44.
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.

Raise Parking Stands (older applicators)

This applies to 2-point (lift assist) hitching, and 3-point hitching (but not pull-type hitching, as the tongue parking stand was already stored at an earlier step).

Refer to Figure 16

1. Use tractor 3-point hitch (and if so equipped, the lift-assist circuit) to slightly raise the implement. See “Raising/Lowering Applicator” on page 44.
2. Remove the pivot pin ① at each stand. To prevent the leg from reaching (and possibly passing) full vertical, insert the pin in the rear storage hole ②.

⚠️ CAUTION ⚠️

Crushing Hazard:
Do not stand in front of the leg while raising it. The stand leg is heavy. If you lose control of it, it can fall forward and may cause injury.

3. Swing the stand forward, up and then back.
4. Re-insert the pivot pin in either of the two upper holes, and the leg tube, to secure the leg at vertical.

Note: The rear hole ② holds the stand at full vertical.
5. If the leg cannot be swung up due to interference with a tractor component (such as a tire), see “Parking Stand Clearance” on page 143.
Leveling Implement

During initial setup and periodically throughout the season, check that the implement runs level. When planting, 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 6 inches (0 to 15.3 cm)

For adjustment, see “Application Height Adjustment” on page 66.

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

3-Point Leveling

Refer to Figure 17

Leveling is controlled entirely by the tractor hitch.

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  to fill the space on the rod  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.
Pull-Type Hitch Leveling

Refer to Figure 20 (bottom of page)

With new coulter blades at 4 inch depth and coulter applicator tips 1 inch above ground, the tool bar height is:

① 25 inches (63.5 cm)

and normally requires a pull-type hitch height ② of:

② 16.75 inches (42.5 cm)

measured from the bottom of the tongue to the ground.

Refer to Figure 19

NOTICE

Sudden Hitch Slump or Failure Risks:

Always have two bolts through two holes on both hitch and tongue. Never rely on a single bolt.

To obtain the correct height, and a level tongue, remove the two hitch bolts ③, and reposition the fertilizer applicator hitch ④ on the tongue.

The hitch can be inverted in the tongue for extreme height changes.

Figure 19
Hitch Height Adjustment

Figure 20
Pull-Type Leveling
Meter Setup (Option)

This topic presumes that the Nutri-Pro® applicator has a Raven SCS 450 console, speed radar, flow meter, pressure sensor, 3-section control valves (and bypass valve on ground drive). It also presumes that the console has been installed in the tractor cab per “Console Installation” on page 142.

**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 (407-313M) 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 (or the Calibration Card) for the keystroke sequence for setting each of these values.

**SCS 450: BOOM CAL**

The variable rate Nutri-Pro® has three “boom sections” (BOOM 1, BOOM 2 and BOOM 3). The BOOM CAL number is the swath of each section. Use the values from the following table.

These values presume one fertilizer drop line per row, in-row. The booms have extra drops per section. If using off-row drops, and/or extra drops, determine the BOOM CAL per the Raven SCS 450 manual.

<table>
<thead>
<tr>
<th>Implement Model</th>
<th>BOOM 1</th>
<th>BOOM 2</th>
<th>BOOM 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP30L-11R30</td>
<td>90 inches (228.6 cm)</td>
<td>150 inches (381.0 cm)</td>
<td>90 inches (228.6 cm)</td>
</tr>
<tr>
<td>NP30L-12R30</td>
<td>90 inches (228.6 cm)</td>
<td>180 inches (457.2 cm)</td>
<td>90 inches (228.6 cm)</td>
</tr>
<tr>
<td>NP30L-13R30</td>
<td>120 inches (304.8 cm)</td>
<td>150 inches (381.0 cm)</td>
<td>120 inches (304.8 cm)</td>
</tr>
<tr>
<td>NP40L-15R30</td>
<td>120 inches (304.8 cm)</td>
<td>210 inches (522.4 cm)</td>
<td>120 inches (304.8 cm)</td>
</tr>
<tr>
<td>NP40L-16R30</td>
<td>180 inches (457.2 cm)</td>
<td>120 inches (304.8 cm)</td>
<td>180 inches (457.2 cm)</td>
</tr>
<tr>
<td>NP40L-17R30</td>
<td>180 inches (457.2 cm)</td>
<td>150 inches (381.0 cm)</td>
<td>180 inches (457.2 cm)</td>
</tr>
<tr>
<td>NP40L-31R15</td>
<td>135 inches (342.9 cm)</td>
<td>165 inches (419.1 cm)</td>
<td>135 inches (342.9 cm)</td>
</tr>
</tbody>
</table>
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 Raven flow control bundles offered by Great Plains do not include a speed sensor, nor the cable necessary to connect a Raven-compatible sensor or radar to the SCS 450. See page 114 for an available radar kit. See page 123 for harness cables available from Great Plains or Raven.

SCS 450: METER CAL
This is the pulse-vs.-rate calibration number for the flow meter (L41 in system diagrams in this manual).
Obtain this number from the tag affixed to the meter. Enter it into the SCS 450 and record on the Calibration Card.

SCS 450: VALVE CAL
This is the response time calibration number for the control valve (L40 in system diagrams in this manual).
Obtain this number from the tag affixed to the valve. Enter it into the SCS 450 and record on the Calibration Card.

SCS 450: PRESSURE CAL
This DATA MENU sequence sets zero for the pressure transducer (L45 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 liquid fertilizer 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.
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

Perform the following steps before transporting the NP30L, NP40L fertilizer applicator to the field. This checklist presumes that the nurse tank is not yet connected.

- Carefully read “Important Safety Information” on page 1.
- Review the application instructions and Material Safety Data Sheet (MSDS) for the fertilizer(s).
- Lubricate fertilizer applicator as indicated under “Lubrication and Scheduled Maintenance” on page 109.
- Check all tires for proper inflation. See “Tire Inflation Chart” on page 122.
- Check all bolts, pins, and fasteners. Torque as shown in “Torque Values Chart” on page 122.
- 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.

**WARNING**

**High Pressure Fluid Hazard:**

Relieve pressure and shut down tractor before connecting, disconnecting or checking hydraulic lines. Use a piece of paper or cardboard, **NOT BODY PARTS**, to check for leaks. Wear protective gloves and safety glasses or goggles when working with hydraulic systems. 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.
Implement Locks

Channels, pins, latches and solenoid valves limit movement for various situations. Channels and pins require operator attention. Latches and valves are automatic if the systems are operating properly.

The lock set combinations vary by applicator width, hitch type and year. Consult the following table for locks provided on your applicator.

<table>
<thead>
<tr>
<th></th>
<th>Pull-Type</th>
<th>2-Point</th>
<th>3-Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP30L</td>
<td>Lift-Assist Locks</td>
<td>Lift-Assist Locks</td>
<td>Wing Lock Channels</td>
</tr>
<tr>
<td></td>
<td>Front Caster Wheel Lock Channels</td>
<td>Front Caster Wheel Lock Channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wing Transport Lock (All 5 Section)</td>
<td></td>
</tr>
<tr>
<td>NP40L 2012-5-section frame</td>
<td>Lift-Assist Locks</td>
<td>Lift-Assist Locks</td>
<td>Wing Lock Channels</td>
</tr>
<tr>
<td></td>
<td>Front Caster Wheel Lock Channels</td>
<td>Front Caster Wheel Lock Channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wing Transport Lock (All 5 Section)</td>
<td>Wing Lock Channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outer Wing Fold Latches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP40L 2013+5-section frame</td>
<td>Lift-Assist Locks</td>
<td>Lift-Assist Locks</td>
<td>Wing Lock Channels</td>
</tr>
<tr>
<td></td>
<td>Front Caster Wheel Lock Channels</td>
<td>Front Caster Wheel Lock Channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wing Transport Lock (All 5 Section)</td>
<td>Wing Lock Channels</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<td>Lift-Assist Locks</td>
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</tr>
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<td></td>
<td>Front Caster Wheel Lock Channels</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Wing Transport Lock (All 5 Section)</td>
<td>Wing Lock Channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outer Wing Fold Latches</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solenoid Valves</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lift-Assist Locks

 Applies only to 2-point and pull type. Use the lift-assist locks (and front caster wheel cylinder locks, if any) to hold the fertilizer applicator at raised for transport, adjustments, maintenance and storage.

2-Point Applicators

Refer to Figure 23

To install cylinder stops:

1. Fully raise applicator (page 44). Set lift circuit to Neutral.
2. Remove and store lift-assist spacers (page 32).
3. Remove lock channel 🔄 from storage location.
4. Place a lock channel on the lift cylinder rod of each cylinder to be locked.
5. Re-install locking pin and secure with cotter pin.
6. Install center section wheel lock channels.
7. Lower fertilizer applicator onto lock channels.
8. Set lift circuit to Float.

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 serious injury.
Pull-Type Applicators

Refer to Figure 23

To install cylinder stops:
1. Fully raise applicator (page 44). Set lift circuit to Neutral.
2. Remove lock channel ① from storage location.
3. Place a lock channel on the lift cylinder rod of each cylinder to be locked.
4. Re-install locking pin and secure with cotter pin.
5. Install center section wheel lock channels.
6. Lower fertilizer applicator onto lock channels.
7. Set lift circuit to Float.

Front Caster Wheel Lock Channels

In routine use, install only the center section locks. For maintenance, install all four. Installing the left wing lock requires disabling the hydraulic depth stop.

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 serious injury.

Refer to Figure 23 and Figure 24

To install cylinder stops:
1. Fully raise applicator (page 44). Set lift circuit to Neutral.
2. Install lift-assist locks.
3. At each section lift cylinder to be locked, remove cotter pin and lock pin. Remove lock channel ① from storage location.

Refer to Figure 25
4. If locking for maintenance, at the left wing lift cylinder, remove the rear pin of the depth stop clevis. Swing the clevis forward.

**NOTICE**

*Machine Damage Risk:*

*Do not install a lock channel on the depth stop cylinder unless the clevis has been rotated clear of the cylinder rod. Lowering the applicator onto a lock channel with the clevis in place will damage the clevis.*

5. Place a lock channel on the lift cylinder rod of each cylinder to be locked.

6. Re-install locking pin and secure with cotter pin.

7. Lower fertilizer applicator onto lock channels.

8. Set lift circuit to Float.

**Wing Lock Channels**

*Refer to Figure 26*

These lock channels are only present on 2012- NP40A, NP30A, NP3000 2-point with lift assist and 3-point models. They enable a partial “gull wing” fold during field lift. On 2013+ 5-section models, this function is controlled by solenoid valves.

See page 51 for operation.

**Wing Lock Pins**

These pins are present only on NP40A models with 5-section wings (inner and outer wings).

*Refer to Figure 29*

These pins are manually inserted after fold, both as a safety precaution, and to minimize wing-cradle impacts during transport.

When not engaged, the pins are stored in tubes at the base of the rest weldment.

See “Unfolding and Folding 2013+ 5-Section 2-Point” on page 54.
Outer Wing Fold Latches

These pins are present only on NP40A models with 5-section wings (inner and outer wings).

Refer to Figure 30

These latches are automatic, and should never require operator action. The latches couple the outer wing to the inner wing when folded, preventing movement of the outer wing during transport (the two outer wings might otherwise be able contact each other in unusual circumstances).

When unfolded, the latch ① pivots out and down (disengaged). During fold, the outer wing folds first, until the stop posts ② contact each other. As the inner wing then folds, and passes vertical, the latch ③ swings into engagement on the pins of the outer wing stop post.

At the start of unfold, the latches restrain the outer wings, causing the inner wings to unfold first. As the inner wings near the ground, the latches fall away, allowing the outer wings to unfold.

Solenoid Valves

These valves are present only on 2013+ 2-Point NP40A models. They normally require no operator attention.

See “2013+ NP40A 2-Point Fold/Lift Circuit” on page 43 for functions controlled by solenoid valves.

See “Unfold Stop Adjustment” on page 77 and See “Field Fold Stop Adjustment” on page 78.

Wing Transport Lock (All 5 Section)

Refer to Figure 29

These pins ⑥ are manually inserted after fold, both as a safety precaution, and to minimize wing-cradle impacts during transport.

When not engaged, the pins are stored in tubes ⑦ at the base of the rest weldment.
Outer Wing Fold Latches (All 5 Section)

Refer to Figure 30

These latches are automatic, and should never require operator action. The latches couple the outer wing to the inner wing when folded, preventing movement of the outer wing during transport (the two outer wings might otherwise be able contact each other in unusual circumstances).

When unfolded, the latch ① pivots out and down (disengaged). During fold, the outer wing folds first, until the stop posts ② contact each other. As the inner wing then folds, and passes vertical, the latch ③ swings into engagement on the pins of the outer wing stop post.

At the start of unfold, the latches restrain the outer wings, causing the inner wings to unfold first. As the inner wings near the ground, the latches fall away, allowing the outer wings to unfold.

Figure 30: 5 Section: Outer Wing Latch
2013+ NP40A 2-Point Fold/Lift Circuit

On 2-point NP40L 5-section applicators made in 2013 or later, the fold and lift cylinders share a single hydraulic circuit. Solenoid valves (controlled by a switch box), one or more passive valves, and mechanical locks control hydraulic sequencing.

This system design provides a partial fold, as a single self-limiting hydraulic operation, during field lift, providing extra wing clearance in field turns.

If the hydraulic harness is not connected at the hitch, or the switch box is off, or power is off, most valves default to an Open state.

FOLD / FIELD Switch

Refer to Figure 31 (depicting the switch in PARK)

This switch is mounted in the tractor cab (page 139), and connected to the applicator at the hitch. It controls several solenoid valves on the applicator. It has three toggle positions and two indicator lamps.

Note: The switch is powered by the tractor. An illuminated lamp indicates power sent to the harness. The harness must be connected at the hitch for the function to be effected.

Switch Positions

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARK</td>
<td>All solenoid valves are powered off and are spring-loaded to flow-open positions. Use this position only for parking, to save tractor battery power. With the switch in PARK, any hydraulic flow to the fold/lift circuit may have undesired results.</td>
</tr>
<tr>
<td>FOLD</td>
<td>Full fold and unfold sequence is controlled. Down-pressure is disabled.</td>
</tr>
<tr>
<td>UNFOLD</td>
<td>During unfold, the inner wings unfold before the outer wings. During fold, the outer wings fold before the inner wings. Fold range from fully folded to wings level (excepting down-pressure) is available.</td>
</tr>
<tr>
<td>FIELD</td>
<td>Outer wings locked. Inner wing fold restricted to “gull wing”. Down-pressure available. Use this position in the field. It engages the down-pressure circuit for weight transfer. It provides a partial fold for extra wing clearance in field turns.</td>
</tr>
</tbody>
</table>

Machine Damage Risks:
Lift/lower (except field lift) and fold/unfold operations are possible with the hydraulic harness off, but care must be exercised. It is possible to lower below level, which can result in row unit ground strikes and dragging.
Raising/Lowering Applicator

When raising in the field with a hydraulic drive pump, first turn off material flow. See page 61.

Lift/lower procedures depend on applicator model, year and hitch type:

- Pull-type applicators use six cylinders for lift/lower. The lift circuit is separate from the fold circuit. See “Raising/Lowering Pull-Type” on page 45.
- 3-point applicators rely solely on the tractor hitch. Separate partial activation of the fold circuit is necessary to avoid wing droop in lift. See “Raising/Lowering 3-Point” on page 46.
- 2-point applicators rely on the tractor hitch at applicator front, and a lift-assist cylinder circuit at rear. Lift and fold share a remote circuit.

3-section and 2012-5-section: Wing lock channels must be configured to arrest fold during lift. See “Raising/Lowering 2012- & 3-Section 2-Point” on page 47.

2013+ 5-section: Solenoid valves provide partial “gull wing” fold during lift. See “Raising/Lowering 2013+5-Section 2-Point” on page 49.

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

The lift circuits are re-phasing master-slave on pull-type and 3-section or 2012-2-point. See “Re-Phasing Pull-Type Lift System” on page 45.

The applicator may be raised and lowered while folded.

Weight-Transfer Shut-Off Valve

This applies to:
all 3-section,
all pull-type,
all-3-point, and
all 2012- NP40A (3 and 5-section).

The 2013+ 5-section 2-point weight transfer has no interaction with raise/lower.

Refer to Figure 32 (depicting the valve closed on an NP3000, which has the same weight transfer hydraulic system)

Model 2011 and later (and updated model 2010) applicators have a shut-off valve in the weight transfer system. This “weight-transfer shut-off valve”, when closed, bypasses the pressure reducing valve, and allows fold cylinders to operate at full speed. The weight-transfer shut-off valve must be open for the weight transfer system to operate in the field.

NOTICE

Equipment Damage Risk:
Do not back up when lowered. Always raise the applicator for any reverse/backing. Backing when lowered will plug tines, and can damage delivery tubing.

Note: Lowering while stationary may result in lift-assist or front caster wheels being lifted off the ground. The applicator may not be at operating depth until it is pulled forward in field conditions.

Figure 32
Weight-Transfer Shut-Off Valve
Raise/Lower Pull-Type

Five of the six lift cylinders are slaved to the left front caster wheel cylinder, which has a hydraulic down stop.

**NOTICE**

*Equipment Damage Risk:*
Do not fold while in ground. Fold only when fully raised. When lowered, the wing coulters and tines near the wing pivot may be damaged by ground dragging.

Raising Pull-Type

**NOTICE**

*Material Loss Risk:*
When raising in the field with a hydraulic drive pump, first turn off material flow. See page 61.

To raise the applicator, extend the cylinders (normally with an Extend operation of the tractor remote).

The applicator raises fully at end of stroke, regardless of depth setting. Holding the circuit at raised for a few seconds re-phases the cylinders.

If raising for highway transport, parking or storage, engage center section lift cylinder lock channels (page 38).

If raising for maintenance, swing out hydraulic depth stop and engage all lift cylinder lock channels (page 38).

Lowering Pull-Type

If lock channels are engaged on any lift cylinders, raise the applicator and disengage the channels (page 38). Re-engage the depth stop as needed.

To lower the applicator, retract the lift cylinders (normally with a Retract operation of the tractor remote).

The applicator lowers to the depth set at the hydraulic depth stop at the left front caster wheel. See “Hydraulic Depth Stop Adjustment” on page 70 for details on height adjustment.

**CAUTION**

*Gradual Crushing Hazard:*
Do not rely on hydraulic pressure alone to keep the fertilizer applicator raised. Use transport/lift locks (page 38) when working around a raised fertilizer applicator. The bypass orifices in the re-phasing system cause it to slowly lower.

Re-Phasing Pull-Type Lift System

In typical use during a single application operation, it is normal for the lift cylinders to get out of phase, resulting in uneven raising and lowering of the fertilizer applicator.

Every 8 to 10 passes, re-phase the cylinders with this procedure:

1. Raise the applicator completely, and hold the hydraulic lever or switch in Extend for several seconds after the applicator reaches full elevation.
2. When all cylinders are fully extended, momentarily reverse (Retract) the control to lower the applicator 1/2 inch (12 mm).
3. Set circuit to Neutral to hold for level check.

If re-phasing does not bring the applicator into level, other possibilities include:

- tire pressures too high or too low (page 122),
- worn tires,
- pull-type tongue height incorrect (page 33),
- 2-point tractor hitch height and level incorrect,
- 2-point gauge wheel height incorrect (page 68),
- 2-point lift-assist height spacers incorrect or not installed (page 34), and;
- front caster wheel / lift-assist eyebolts (page 107)
- significant amounts of air in the hydraulic system, indicating a need to perform a hydraulic bleed.
Raise/Lower 3-Point

The height/depth of the center section of a 3-point fertilizer applicator is controlled entirely by the tractor hitch.

The height of the wings is controlled by manually-set wing gauge wheels. Operator action during lift and lower is needed to control wing droop.

Raising 3-Point (Field Lift, Unfolded)

These instructions presume that the intention is to lift without folding, that the applicator 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 3-Point” on page 51.

**NOTICE**

**Material Loss Risk:**

_When raising in the field with a hydraulic drive pump, first turn off material flow. See page 61._

1. Fold the wings up. The wing locks arrest the fold just above wings-level. Set circuit to Neutral.
2. Lift the center section with the 3-point.

Raising 3-Point (Transport/Service Lift, Folded)

If the wings are already folded, and are being left that way, you may raise (and lower) the 3-point hitch without touching the fold circuit.

Lowering 3-Point (Field Lower, Unfolded)

See sidebar for first pass.

1. Lower the 3-point hitch to field setting.
2. Set hitch to Depth Control mode.
3. Set fold circuit to Float.

If you are already in forward motion, the knives or tines will pull the applicator to application depth. Otherwise, the applicator will rest on the knives or tines until pulled forward.

Lowering 3-Point (Parking/Service, Folded)

Deploy parking stands (page 31) if parking, storage or service is the intention.

If the wings are already folded, and are being left that way, you may lower (and raise) the 3-point hitch without touching the fold circuit.

**First Pass Lowering:**

- If the wings are drooped, retract the fold circuit (page 51) to bring the wings into contact with the wing locks, or to wings level. Set fold circuit to Neutral until lowered to ground.
Raise/Lower 2012- & 3-Section 2-Point

These instructions apply to 3-section applicators and 2012-5-section applicator. For 2013+5-section applicators, see page 49.

Refer to Figure 33

The front height of the applicator center section is controlled by the lower two tractor 3-point arms (not visible in figure).

The rear height of the applicator is controlled by two lift-assist cylinders. Spacers are provided to limit the “lowered” position (page 34).

Raising 2012- & 3-Section 2-Point (Field, Unfolded)

These instructions presume that the intention is to lift without folding, that the applicator 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 “Unfolding and Folding 3-Section & 2012-5-Section 2-Point” on page 52.

When raising in the field, the wings tend to droop. Use the fold circuit to counter this.

1. Retract the fold cylinder circuit until the wing locks stop motion, or the outside row knives or tines just start to lift out of the ground. Set the circuit to Neutral.

2. Raise the tractor hitch. This raises the knives or tines with a slight forward motion, preventing plugging of the ammonia tube outlets.

3. Extend the lift-assist cylinders (normally with an Extend operation of the tractor remote).

Note: Holding the lift-assist circuit at raised for a few seconds re-phases the cylinders.

4. When fully raised, set all remotes to Neutral.

Raising 2012- & 3-Section 2-Point (When Folded)

Refer to Figure 33 (depicting an NP3000, which has the same weight transfer hydraulic system)

If the applicator is already folded:

1. Close the weight-transfer shut-off valve (5).

2. Raise it with the 2-point and lift-assist circuits in any order.

3. Hold at raised with Neutral circuits.

4. Install rear lift-assist lock channels (page 38).

5. Deploy parking stands (page 31).

If the applicator is unfolded, and the intention is to lift and fold, see “Unfolding and Folding 3-Section & 2012-5-Section 2-Point” on page 52.
Lowering 2012- & 3-Section 2-Point (Field, Unfolded)

See sidebar for considerations on a first pass.

1. Close the weight-transfer shut-off valve (page 47).
2. To lower the applicator, lower the tractor hitch and retract the lift-assist cylinders (normally with a Retract operation of the tractor remote).
3. The front of the applicator lowers until the hitch movement is stopped by your control, or by any depth stop set on that control.
4. The rear of the applicator lowers until the cylinders are stopped by the installed spacers (page 34), or until fully retracted if there are no spacers. If the knives or tines are not in the ground, the lift-assist wheels come off the ground until you pull forward into the field.
5. The unfolded wings lower to the height set by the wing gauge wheels (page 68) or onto the knives or tines.
6. Set the 2-Point to Depth Control.
   Set lift and fold circuits to Float.

Lower 2012- & 3-Section 2-Point (Service/Parking, Folded)

This topic presumes that the intention is to lower a folded applicator without unfolding. If the intention is to both lower and unfold, see “Unfolding 3-Section & 2012- 5-Section 2-Point” on page 52.

1. Close the weight-transfer shut-off valve (page 47).
2. Raise the applicator. Set circuits to Neutral.
3. Remove spacers (page 34) and install lift-assist lock channels. Deploy parking stands (page 31) as desired.
4. Lower rear of applicator with lift/fold circuit. Stop as soon as rear cylinders are fully retracted or on spacers/locks.
5. Lower front of applicator with 2-point hitch.
6. Set circuits to Float.

First Pass Lowering:

- If lock channels are engaged on the rear lift-assist cylinders, raise the applicator, disengage the channels (page 39), and insert the desired number of spacers (page 32).
- If the wings are drooped, retract the fold circuit to bring the wings into contact with the wing locks, or to wings level. Set fold circuit to Neutral until lowered to ground.

NOTICE

Equipment and Pavement Damage Risk:

Fully fold before lowering onto parking stands. Parking stands support only the center section. If unfolded, wings may be drooped, or will droop. Knives or tines will strike the ground, immediately or eventually.
Raise/Lower 2013+ 5-Section 2-Point

These instructions apply to 2013 and later 5-section applicators. For 3-section applicator, and 2012- 5-section applicators, see page 47.

Raise For Transport (Folded) 2013+ 5-Section

These steps presume an applicator parked or stored folded, already raised, but on lift-assist locks and parking stands. No use of the applicator hydraulics is required.

1. Verify that lock channels are installed on the lift-assist cylinders (page 39).
2. Verify that wing lock pins are installed on the folded wings (page 41).
3. Raise the tractor 3-point hitch just enough to lift the parking stand bases off the ground. Set the hitch circuit to Neutral. Shut off the tractor.
4. Raise the parking stands (page 31).

Note: The FOLD / FIELD switch may be in any position for lift while folded.

Raise Pre-Folding (from Unfolded) 2013+ 5-Section

These steps presume an applicator parked or stored unfolded, already raised, but on lift-assist locks at rear, on extended gauge wheels at wing tips, and on parking stands at hitch.

1. Verify that lock channels are installed on the lift-assist cylinders (page 39), that wing lock pins are not in the locking holes (page 41) and that the hydraulic harness is connected at the hitch (page 28).
2. Raise the tractor 3-point hitch enough to lift gauge wheels, coulters, and the parking stand bases off the ground. Set the hitch circuit to Neutral.
3. Set the FOLD / FIELD switch to FIELD. This arrests fold at field lift.
4. Retract the fold/lift circuit until lift-assist and wing fold operations each their stops. Set fold/lift circuit to Neutral. Shut off the tractor engine, leaving the FOLD / FIELD switch powered-up.
5. Raise the parking stands (page 31).

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a. If the FOLD / FIELD switch is wired directly to the tractor battery, the tractor may be shut off completely. Otherwise leave the ACC active.

**CAUTION**

Gradual Crushing Hazard:
Do not rely on hydraulic pressure alone to keep the applicator raised. Use parking stands (page 31) and locks (page 38) when working around a raised applicator. The tractor hitch may settle.

**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 pivots may be damaged by bending or ground dragging.
Unfolding and Folding

All Nutri-Pro® applicators have identical fold cylinders (with weight transfer capability), but they differ in locks and operational steps:

- Pull-Type applicators have a dedicated fold system with no wing locks. See “Unfolding and Folding Pull-Type” on page 50.
- 3-Point applicators have wing locks requiring reset prior to fold. See “Unfolding and Folding 3-Point” on page 51.
- 2-Point applicators have a lift-assist that usually requires reconfiguring just prior to unfold and fold. Additional steps vary with configurations:

On 3-section, and 2012-5-section, wing locks require reset prior to fold. See “Unfolding and Folding 3-Section & 2012-5-Section 2-Point” on page 52.

2013+ 5-section applicator require a switch setting change. See “Unfolding and Folding 2013+ 5-Section 2-Point” on page 54

Unfolding and Folding Pull-Type

The pull-type implement has no particular restrictions on unfolding or folding on or off the field. As long as the lift circuit is fully raised, coulter/tine strike is not an issue.

Unfolding Pull-Type

These instructions presume the implement has just completed transport, and is being unfolded for field use.

1. Close the weight-transfer shut-off valve (page 47).
2. If the applicator is 5-section, remove the wing transport lock pins (page 41).
3. Extend the fold cylinders to unfold.
4. Set control to Float when wing front caster wheels contact the ground.
5. Extend the lift circuit (page 45) to raise the implement fully.
6. Remove and store the transport locks at center section and lift-assist cylinders (page 38). If wing lift cylinder lock channels were installed. Remove them and re-engage hydraulic depth stop (page 103).
7. If lined up at field, retract the lift circuit to lower the implement to height set by the hydraulic depth stop (page 70).
8. Set the lift circuit to Float.
9. Open the weight-transfer shut-off valve.
10. For field operations, if weight transfer is already adjusted, set the fold circuit to Extend.

See page 71 to set or adjust weight transfer.

Folding Pull-Type

These instructions presume the implement has just completed application, and is being folded for transport or parking.

1. If the applicator is 5-section, verify that the wing transport lock pins are out of the lock cradle (page 41).
2. Set the fold circuit to Float.
3. Close the weight-transfer shut-off valve.
4. Re-extend the lift circuit to assure that it is fully raised.
5. Install lock channels at the lift-assist and center section lift cylinders (page 38).
6. Retract the fold cylinders to fold the wings.
7. If the applicator is 5-section, install the wing transport lock pins (page 41).
8. Stop, circuit in Neutral, when both wings are on the transport rest.

Leave the fold circuit in Neutral for transport, or set to Float for unhitching.
Unfolding and Folding 3-Point

Unfolding 3-Point
The 3-Point implement should only be unfolded in the field, or fully supported by parking stands.

Unfolding 3-Point (At Field)
These instructions presume the implement has just completed transport, and is being unfolded for field use.
1. Line the applicator up into the wind.
2. Close the weight-transfer shut-off valve (page 44).
3. Raise the 3-Point hitch fully.
4. Unfold the wings. Slowly extend the fold cylinders.
   After the wings pass vertical, lock channels swing into contact with the cylinder rods.
   Stop the unfold when the wings are approximately level. Hold at level with circuit Neutral.
5. Lower the applicator to the ground with the 3-point hitch.
6. Open the weight-transfer shut-off valve.
7. Set the hitch to Depth Control mode.
   Set the fold circuit to Float.

Unfolding 3-Point (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 knives or tines will reach the ground first. Take precautions if parking surface damage is a concern.
1. Fully raise the 3-Point hitch.
2. Close the weight-transfer shut-off valve (page 44).
3. Point the applicator into the wind.
4. Deploy parking stands. Set them to maximum height.
5. Extend fold cylinders.
6. As the wings near level, set circuit to Neutral.
7. Unless using blocks or stands, fully extend the gauge wheels to maximum height.
8. Resume unfolding until gauge wheels are on ground. Set fold circuit to Float.
9. Lower the 3-point hitch.

Folding 3-Point
These instructions presume that the applicator is unfolded and lowered.
1. Close the weight-transfer shut-off valve (page 44).
2. Retract the fold cylinder circuit until the wing locks stop motion, or the outside row knives or tines just start to lift out of the ground. Set the fold circuit to Neutral.
3. Raise the 3-point hitch.
4. Wait for the delivery lines to discharge.
5. Deploy parking stands if the applicator is to be parked at the folding spot.

Refer to Figure 37 (depicting an NP40L, which has similar wing locks)
6. Swing the wing locks up and out of their engaged positions, and into their reset positions.
7. Retract the fold cylinders until the wings contact the transport rest. Set circuit to Float if unhitching, or Neutral for transport.

For parking/storage/service, lower the applicator onto parking stands.
Unfolding and Folding 3-Section & 2012-5-Section 2-Point

Unfolding 3-Section & 2012-5-Section 2-Point

The 2-Point applicator should only be unfolded in the field, or fully supported by parking stands and lift-assist cylinder transport locks.

Unfolding 3-Section & 2012-5-Section 2-Point (At Field)

These instructions presume the applicator has just completed transport, and is being unfolded for field use.

1. Point the applicator into the wind.
2. Close the weight-transfer shut-off valve (page 47).
3. Raise the 2-Point hitch and perform a lift-assist raise operation. Set circuit to Neutral.
4. Remove the transport locks (page 38).
5. Install the spacers (page 34).
6. Unfold the wings. Slowly extend the fold cylinders.

After the wings pass vertical, lock channels swing into contact with the cylinder rods.

Stop the unfold when the wings are approximately level. Hold at level with circuit Neutral.

7. Retract the lift-assist cylinders to lower the applicator at the rear, and lower the 2-point hitch in the front.
8. Set the hitch to Depth Control mode.
   Set both fold and lift-assist circuits to Float.
9. Open the weight-transfer shut-off valve.

Unfolding 3-Section & 2012-5-Section 2-Point (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 knives or tines will reach the ground first. Take precautions if parking surface damage is a concern.

1. Point the applicator into the wind.
2. Close the weight-transfer shut-off valve (page 47).
3. Raise the 2-Point hitch.
4. If transport locks are not yet installed, perform a lift-assist raise operation. Set circuit to Neutral. Remove spacers (page 34). Install lift-assist transport locks (page 38).
5. Deploy parking stands. Set them to maximum height.
6. Extend fold cylinders.
7. As the wings near level, set circuit to Neutral.
8. Unless using blocks or stands, fully extend the gauge wheels to maximum height.
9. Resume unfolding until gauge wheels are on ground. Set fold circuit to Float.
10. Lower the lift-assist onto the lock channels. Set lift circuit to Float.
11. Lower the 2-point hitch.
Folding 3-Section and 2012-5-Section 2-Point

These instructions presume that the applicator is unfolded and lowered.

1. Close the weight-transfer shut-off valve (page 44).
2. Retract the fold cylinder circuit until the wing locks stop motion, or the outside row knives or tines just start to lift out of the ground. Set the fold circuit to Neutral.
3. Raise the 2-point hitch.
4. Extend the lift-assist cylinders to raise the applicator rear.
5. Wait for the applicator lines to discharge.
6. Activate lift-assist again, in case the cylinders have settled during discharge.
7. Cautiously approach the rear of the applicator.
   Install lift locks at the rear casters.
8. Deploy parking stands if the applicator is to be parked at the folding spot.

Refer to Figure 38

9. Swing the wing locks up and out of their engaged ① positions, and into their reset ② positions.
10. Retract the fold cylinders until the wings contact the transport rest. Set circuit to Float if unhitching, or Neutral for transport.

For parking/storage/service, lower the applicator 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.
Unfolding and Folding 2013+ 5-Section 2-Point

Unfolding 2013+ 5-section 2-Point (At Field)
These instructions presume the applicator has just completed transport, is raised, and transport locks are installed. It is being unfolded for field use.

1. Remove the wing lock pins (page 41).

Refer to Figure 39 and Figure 40

2. Set the FOLD / FIELD switch to FOLD / UNFOLD.

3. Extend the fold/lift circuit to unfold the wings.

4. Retract the fold/lift circuit slightly to raise the lift-assist off the lock channels.

5. Set all circuits to Neutral. Shut off the tractor.

6. Remove the lift-assist lock channels (page 39). Install the spacers (page 34).

7. If wing gauge wheels were extended, crank them to field height (page 68).

8. Lower the hitch to field height.

Notes about normal unfold:
• Inner wings unfold first. The outer wings are constrained by the wing latches (page 42).
• Outer wings unfold last. The wing latches release just before the inner wings are level.
• Wings do not unfold to below wings-level.

NOTICE

Machine Damage Risk:
Set the switch to UNFOLD. If set to PARK or FIELD, the wings may unfold to below level and drag inward on the ground.
Folding 2013+ 5-Section 2-Point

These instructions presume that the applicator is unfolded and lowered.

1. Verify that the wing lock pins (page 41) are not in the wing rest cradles. Typically they are in storage tubes.

Refer to Figure 41

2. Set the Fold switch to FOLD / UNFOLD.

![Switch for Fold](image)

**CAUTION**

Electrocution and Overhead Collision Hazards:

Do not fold with switch in FIELD position. In FIELD, the outer wing sections cannot fold. The folded applicator would be over 21 feet (6.2 m) high. This dramatically increases the risk of electrocution from overhead lines, with or without direct contact. It is also too high for safe transport.

Refer to Figure 42

3. Raise the hitch.

4. Retract the fold/lift circuit to simultaneously raise and fold the applicator. Observe the fold sequence. Lift and fold do not start and end at the same time.

If an abnormal fold is detected, set the fold/lift circuit to Retract, then Neutral at wings level. Troubleshoot the problem.

![Abnormal Fold](image)

5. Set the fold/lift circuit to Neutral.


7. Insert wing lock pins (page 41).

8. Extend fold/lift to lower lift-assist cylinders onto lock channels. Set fold/lift circuit to Float. Shut off tractor.

For parking/storage/service, lower the applicator onto parking stands.
Transport

⚠️ 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 (2P, Pull-Type):**
Never tow a pull-type or 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.

⚠️ DANGER

**Loss of Control Hazard (2P, 3P):**
Never transport a 2-point or 3-point implement unless the tractor is properly ballasted to provide adequate weight on the steering wheels. A heavy 2-point or 3-point implement can dangerously reduce steering control. A normal turn could result in an accident and serious injury or death. Check your tractor manual for ballasting requirements.

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.

⚠️ CAUTION

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

Know your implement weight. See page 121 for a list of approximate weight of various configurations.

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

Pull-Type:
1. Check that implement is securely hitched to a sufficient tractor (page 27).
2. Always use a locking-style hitch pin sized to match holes in hitch and draw-bar (minimum 1-inch-diameter, heat-treated pin).
3. Attach safety chain to tractor with enough slack to permit turning (page 26).
4. Verify correct operation of lights.
5. Raise fertilizer applicator (page 45).
6. Install center and lift-assist cylinder locks (page 38).
7. Fold applicator if unfolded (page 50).
8. Check that tires are properly inflated (page 122).
10. Always have lights on for highway operation.
11. Do not exceed 32 kph (20 mph). Comply with all national, regional and local laws when traveling on public roads.
12. Remember that the implement may be wider than the tractor. Allow safe clearance.
13. Transport slowly over uneven or rough terrain.

2-Point and 3-Point:
1. Check that fertilizer applicator is securely hitched to a sufficient tractor (page 26)
2. Verify correct operation of lights.
3. Raise fertilizer applicator (page 47).
4. Install lift cylinder locks (2-point, page 38).
5. Fold applicator if unfolded (page 50).
6. Plan the route. Avoid steep hills.
7. Always have lights on for highway operation.
8. Do not exceed 32 kph (20 mph). 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 Implement Setup

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

- Application depth, page 66.
- Application Rate, page 80.
- Row cleaner adjustments, page 93.
- Make a dry run to check implement 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.

Fill Nurse Tank

Consult the nurse tank documentation for specific steps.

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.

If the fertilizer solution has any tendency to settle, sediment, gel, coagulate, precipitate or stratify, load material immediately prior to application.
Hitching Nurse Tank

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

Mechanical Cart Hitching

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

Refer to Figure 44 (older high-clearance hitch shown)

2. Bring the implement rear hitch tongue and nurse tank cart tongue into close proximity (a few inches).
3. Push down on the red tongue release handle. This frees the implement 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 implement pull bar. Insert and secure the 1 inch hitch pin.
5. Securely attach the cart’s safety chain(s) to the hitch chain anchor(s).
6. Optionally re-seat the implement rear hitch tongue, at this time, by using the tractor to move the implement backward several inches, until the latch on the hitch re-engages.

Making Tank Connections

Connections are different for preset rate implements and variable rate implements.

Tank Connections: Preset Rate

Refer to Figure 6 on page 19

1. Close shut off valves on all hoses of both tank and implement.
2. Route tank supply hose to implement inlet. 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 implement supply inlet, and any cap on tank supply hose.
4. Inspect and clean connector fittings.
5. Mate connectors of tank and implement supply hoses. Fold cam levers forward to lock. Leave valves closed.
6. If the tank has additional hoses, secure them at the tank.

Tank Connections: Variable Rate

Refer to Figure 7 on page 20

1. Close all shut off valves on all hoses of tank (, possibly more) and implement.
2. Route tank supply hose, return hose and bypass return hose to implement inlet. Allow ample slack for tight field turns and uneven ground. Do not leave so much slack that any hose can reach the ground.
3. Remove any plug from implement supply inlet, and any cap on tank supply hose.
4. Inspect and clean connector fittings.
5. Mate implement inlet and tank supply connectors. Fold cam levers forward to lock. Leave valves closed.
6. Repeat step 3 through step 5 for the pump return line ( and ), and then the bypass return line ( and ).
7. If the tank has additional hoses, secure them at the tank.

Notice

Equipment Damage Risk:

Use only pre-mixed liquid fertilizer.

Figure 44
Implement-Cart Hitch

Note: Older implements have a fixed-bar ball swivel hitch with slightly less side play.
Fertilizer Operation

The liquid fertilizer 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.

Setup and operation are different for:

- Ground Drive Preset Rate
- Ground Drive Variable Rate
- Hydraulic Drive Pump (Variable Rate)

Ground Drive Operations

The piston pump 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.

These steps presume that fertilizer has been loaded into the supplying tank, and the tank is configured and ready for use, with shut-off valves closed on hoses to implement.

1. Check ground drive sprocket setup (page 91).
2. Set rate on pump adjuster dial (10 for optional variable rate).
3. Set rate on console (optional variable rate only).
4. If relief valve has not been previously adjusted, perform initial setting per page 91.

Prime the Ground Drive System.

5. On suitable ground, raise the fertilizer applicator.
6. With the optional variable rate system, use the SELF TEST feature of the SCS 450 console to simulate a field speed.
7. Wearing gloves, manually rotate the ground drive wheel until material appears at the applicator tubes.

Ground Drive Field Operations

8. Begin field operations. Monitor the fertilizer pressure gauge (or PSI display on optional console).

9. Mind the fertilizer tank levels while planting, both to:
   a. confirm expected consumption rate, and;
   b. avoid running the pump dry.
10. If residual fertilizer is not recovered at end of planting, apply it to the last field planted.
11. Clean out fertilizer system per page 103.

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.

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

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

Ground Drive Pauses and Turns

When the implement 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.

If the implement has the optional variable rate system, it is not necessary to turn off the MASTER switch at stops and turns. However, do use the BOOM switches as desired for point row applications.
Hydraulic Drive Operations

The centrifugal pump 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, and monitored by a flow meter, both connected to a Raven SCS 450 console (or other compatible Raven console).

Hydraulic Drive Start-Up

Prior to first use, determine the hydraulic remote circuit flow rate setting per the procedure on page 94.

1. Set console MASTER switch OFF.
2. Set console POWER switch ON.
3. Select FLOW CONTROL RATE1 or RATE2 as desired, and verify rate setting.
4. Set console BOOMS switch 1 ON.
5. Set the flow rate for the hydraulic remote circuit as established by the procedure on page 94.
6. 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.
7. Set the MASTER switch ON. Check for material flow at the tines. Prime second hydraulic pump as required.
8. Begin field operations. Monitor the fertilizer pressure gauge (or PSI display on optional console).

Hydraulic Drive Field Operations

9. Monitor the fertilizer manifold pressure (gauge or PSI display on optional console).
10. Mind the fertilizer tank levels while planting, both to: a. confirm expected consumption rate, and; b. avoid running the pump dry.
11. If residual fertilizer is not recovered at end of planting, apply it to the last field planted.
12. Clean out fertilizer system per page 103.

Hydraulic Drive Pauses and Turns

With 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.

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.

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.

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

Sharp Object Hazard:
Exercise caution when near and handling the ground drive wheel. Wear gloves. The tines may be sharp.
Monitor Operation (Option)

Refer to Figure 45

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.

**NOTICE**

**Piston Pump Damage Risk:**

When configuring the 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.

Starting Application with Console

1. Enter the tractor cab.

Refer to Figure 45

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. For hydraulic drive, engage the remote for the hydraulic drive pump. Advance lever to preset for +35% of desired rate.

7. Lower implement 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 a ground drive pump system (preset or variable rate).

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

Ending 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 91).
   - Ground drive: set the pump dial to 10 (page 92).
   - Variable rate (either drive): set the console for maximum rate.

4. Apply water to the final field to flush the system.

5. Close shut-off valves on both sides of all hose connections.

6. Disconnect all cam-lock couplers from the tank to the implement.

7. For a trailing nurse tank cart:

8. Disconnect the safety chains.

9. Remove the hitch pin. Move the trailer hitch off the implement’s draw bar.

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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)**

- Fertilizer Applicator hitched
- Hitch pin locked (pull-type)
- Safety chain secured to tractor (pull-type)
- Parking jack or stands stowed

**Electrical Checklist**

- Verify electrical hookups solid
- Turn optional console POWER switch to ON. Check console and observe any diagnostic messages
  - Refer to console manual.

**Hydraulic System Checklist**

- Check tractor hydraulic reservoir full
- Make hydraulic connections
- Inspect connections for leaks
- Perform a raise operation (leave transport locks in)
- Unfold Implement

**Row Units Checklist**

- Check row cleaner setup (Option)
- Check tubing connections to applicators
- Check outlet behind arms
- Check coulter blade condition
- Check coulter depth

**Mechanical Checklist (post-Hitching)**

- Remove wing lock pins
- Raise implement
- Unfold wings
- Remove lift-assist locks
- Install spacers
- Check front-to-rear level
- Check side-to-side level
- Set application height

**Plumbing System Checklist (Prior to Tank Connection)**

- Orifice plate size matches rate
- Fittings all secure
- Relief valve adjusted
- Pump rate set
- Strainer recently cleaned
- Inlet shut-off valve closed
- Return line shut-off valves closed (Option)

**Mechanical Checklist (Cart Hitching)**

- Nurse tank hitched
- Hitch pin locked
- Safety chains secured

**Plumbing Checklist (Tank Connected)**

- Tank loaded
- Supply hose shut-off valve closed
- Return line shut-off valves closed (Option)
- Vent (if any) open
- Tank hose(s) routed to implement connectors, mated and locked
- Hose slack adjusted
- Unused hoses secured
Field Operation Checklists
Perform all steps in "Pre-Start Checklist" on page 37 and "Field Set-Up Checklists" on page 62.

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<td>6 Check console (option) POWER switch ON, BOOMS switch(es) ON and MASTER switch OFF</td>
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<td>-</td>
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<td>15 Periodically check the implement gauge for expected pressure.</td>
<td>-</td>
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<tr>
<td>a. BOOM 1, or BOOM 1,2,&amp;3 (section control)</td>
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<td>1 Set console MASTER switch OFF some distance before end of pass, or stop at end of pass.</td>
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<td>3a Fold and lift (to partially fold wings)</td>
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<td>4a Raise 3-point hitch</td>
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<td>5 Make turn. Line up for next pass.</td>
<td></td>
</tr>
<tr>
<td>6 Lower applicator (same as step 13) for First Pass, at left.</td>
<td></td>
</tr>
<tr>
<td>7 Begin pass, setting switch MASTER to ON.</td>
<td>61</td>
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<td>8 Begin next pass</td>
<td></td>
</tr>
<tr>
<td>a. 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.</td>
<td></td>
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<td>7 Disconnect all cam-lock couplers.</td>
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<tr>
<td>9 If using a nurse tank cart, remove hitch pin and unhitch cart.</td>
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Short-Term Parking

Equipment Damage Risk:
Keep the ground drive pump wet. Fertilizer suffices for short-term parking. Flush with water for longer term parking. Add RV antifreeze for winter storage. See page 103. 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 “Ending Application” on page 61.
2. Choose an implement parking location with level firm ground. Do not unhitch on a steep slope.
3. Fully raise implement (page 44).
4. Fold applicator (page 50).
5. Depending on hitch type:
   Engage center section and lift-assist transport locks (page 38), and/or
   swing down parking stands (page 31) and/or
   install jack stand on tongue (page 27).
6. Lower fertilizer applicator onto locks/stands. On pull-type, use parking jack to neutralize tongue weight at tractor hitch.
7. Set hydraulic circuits to Float.
8. Shut off tractor.
9. Disconnect hydraulic lines. Secure them so that they do not touch the ground.
10. Disconnect electrical cables, capping where provisioned.

Long-Term Storage

1. Conclude application per “Ending Application” on page 61.
2. Choose an implement parking location with level firm ground. Do not unhitch on a steep slope.
3. Fully raise implement (page 44).
4. Flush and fill pump per page 103.
   If possible, remove pump from implement and store indoors above freezing temperatures.
5. Clean fertilizer applicator of mud, dirt, excess oil and grease.
6. Lubricate all points listed in Maintenance.
7. Apply grease to exposed cylinder rods to prevent rust.
8. Inspect fertilizer applicator for worn or damaged parts. Make repairs and service during off season.
9. Use spray paint to cover scratches, chips, and worn areas on the fertilizer applicator to protect the metal.
10. Fold applicator.
11. Cover fertilizer applicator with a tarp if stored outside.
To get full performance from your NP30L or NP40L 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.

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Application Height Adjustment

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

Refer to Figure 46

1. Tool bar height:
   This affects coulter depth. The procedure for setting tool bar height varies with hitch type:
   See page 68

2. Fertilizer arm height (page 67):
   This affects arm height relative to the coulter. This adjustment is primarily to compensate for blade wear.

3. Coulter height (page 67):
   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 or only slightly compressed. It compresses briefly as obstructions and denser soil 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-coulters configurations.

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 already operating at maximum down-pressure, reduce coulter depth.

To adjust the coulter spring:

Refer to Figure 46

1. Raise the applicator and install transport locks. See “Raising/Lowering Applicator” on page 44.

2. Determine the new spring length desired.

<table>
<thead>
<tr>
<th>Spring Length</th>
<th>Force at Blade</th>
</tr>
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<tbody>
<tr>
<td>10.25 in (26.0 cm)</td>
<td>300 lbs. (136 kg)</td>
</tr>
<tr>
<td>10.0 in (25.4 cm)</td>
<td>400 lbs. (181 kg)</td>
</tr>
<tr>
<td>9.75 in (24.8 cm)</td>
<td>525 lbs. (238 kg)</td>
</tr>
</tbody>
</table>

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 ⚪.

5. Rotate the adjuster nut ⚫ until the spring is at the new length. Tighten the jam nut.
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.

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

Refer to Figure 47 and Figure 48

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

At a tool bar height 📈 of 25 inches (63.5 cm) above ground, this is a blade depth 📈 of 4 inches (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 📈. 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 📈 constant by raising the applicator weldment on the coulter arm. Loosen the bolts 📈. 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.

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.
Tool Bar Height Adjustment

2-Point Height

This applies to 2-point applicators only. See page 69 for 3-point and page 70 for pull-type.

Center section tool bar height is set by the tractor hitch. Lift-assist spacers (page 34) 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 71).

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 implement (page 54).
4. Raise the implement to bring the wing coulters off the ground, and the wings slightly above level.

Refer to Figure 49

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 lift/fold circuit to Float.
8. Use the 2-point hitch to lower the implement until the center section coulters are just at ground level.
9. Check frame front-to-back level and adjust spacers (page 34) 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 arm tube.
12. Crank the wheel up by the desired coulter depth (exposed arm tube length becomes length ③ plus the coulter depth). Capture this setting by re-inserting and securing the pin ②.
13. At the center section, measure the tool bar height above the ground. Operating height is this distance less the desired coulter depth.
14. Pull forward, lowering the 2-point hitch to operating height. Set a stop on the 2-point circuit to capture this height.
15. Adjust weight-transfer (page 71) to hold wings level at this coulter height for these field conditions.

Note: Turn crank clockwise to raise implement (lower wheel), and counterclockwise to lower implement (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.
3-Point Height

This applies to 3-point applicators only. See page 68 for 2-point and page 70 for pull-type.

Center section tool bar height is set by the tractor hitch. 3-point hitch must be adjusted to keep implement frame level front-to-rear.

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 71).

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 implement (page 51).
4. Raise the implement to bring the wing coulters off the ground, and the wings slightly above level.

Refer to Figure 50

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 lift/fold circuit to Float.
8. Use the 3-point hitch to lower the implement until the center section coulters are just at ground level. Check front-to-rear level.
9. Adjust the gauge wheel heights to bring the wing coulters to the same height as the center section (just above the ground).
10. Measure the length 3 of exposed gauge wheel arm tube.
11. Crank the wheel up by the desired coulter depth (exposed arm tube length becomes length 3 plus the coulter depth). Capture this setting by re-inserting and securing the pin 2.
12. At the center section, measure the tool bar height above the ground. Operating height is this distance less the desired coulter depth.
13. Pull forward, lowering the 3-point hitch to operating height. Set a stop on the 3-point circuit to capture this height.
14. Adjust weight-transfer (page 71) to hold wings level at this coulter height for these field conditions.

Figure 50
3-Point Gauge Wheel Adjustment

Note: Turn crank clockwise to raise implement (lower wheel), and counterclockwise to lower implement (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 field height prior to setting for maximum.
Hydraulic Depth Stop Adjustment

This applies to pull-type applicators only. See page 68 for 2-point and page 69 for 3-point.

The lift system includes an adjustable stop valve, on the left front caster wheel, to fix the height of the opener frame when the implement is lowered.

Note: The change in coulter depth is not linear and can be greater than the change in down-stop adjustment. Make adjustments in small amounts.

Refer to Figure 51

1. Move to smooth level ground with soil as similar as possible to field conditions.
2. Unfold the implement (page 50).
3. Lower the implement until the coulters just touch the ground. Hold that height by setting the lift circuit to Neutral.
4. Using the knob on the stop, adjust the stop position until the plunger just touches the top of the stop clevis bolt.
   Note: It is not necessary to adjust the stop clevis bolt.
5. Raise and then fully lower the implement.
6. Pull forward 10 feet (3m) and stop.
7. Measure the depth at which the coulters are running. If the coulters are at the desired depth, no further adjustment is necessary. Skip to step 12.
8. Raise the implement and set the lift circuit to neutral.
9. Adjust the stop up (to increase depth) or down (to reduce depth). Adjust in small increments.
10. Check the new setting starting at step 5.
11. Adjust weight-transfer (page 71) to hold wings level at this coulter height for these field conditions.
12. Raise and lower several times and confirm that the implement stops consistently at the new height.

**WARNING**

Crushing Hazard:
Make all down-stop adjustments with circuit in Neutral and implement raised (actuator plunger not in contact with down-stop). Loosening the down-stop with circuit active and implement lowered results in rapid lowering of the frame.

**NOTICE**

Make sure the implement is level and the lift system bled and re-phased before adjusting the tool bar height. If the center section does not consistently stop at the set height, or the wings do not run at the same height as the center, the lift system may have air or be out of phase (above), or the wings may not be level. See “Leveling Implement” on page 32.
Weight Transfer Adjustment

Weight Transfer Safety Information

⚠️ DANGER ⚠️

Crushing and High Pressure Fluid Hazards:
This adjustment requires working near the unfolded and lowered applicator 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 components and ground.

⚠️ CAUTION ⚠️

Falling Hazard - Tires Not a Step:
Do not use tires as steps or platforms. At some transfer settings, cylinders can raise lift-assist wheels sufficiently for them to spin. Gauge wheels can also be in light or no ground contact when the weight-transfer system is not active.
2-Point, Pull-Type, 3-Point & 2012-2-Point 5-Section

Description of system

Refer to Figure 52

Note: See circuit diagrams in the Appendix starting on Page 128.

Weight transfer is enabled by opening the weight-transfer shut-off valve 1, and controlled by two adjustment valves (2 and 3).

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

The weight-transfer shut-off valve 1 must be open for weight transfer. When closed, it bypasses the reducing valve for faster fold cylinder operation (and faster 2-point lift-assist).

The pressure reducing valve 2 controls the flow to the cylinders.

The bypass valve 3 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.
### Adjusting the Weight-Transfer

**Refer to Figure 53**

1. In field conditions, unfold (page 50), lower implement (page 44), and set or check coulter depth (page 66).
2. Pull forward to put coulters in ground.
3. Put tractor in Park and set parking brake.
4. Open the weight-transfer shut-off valve ①.
5. Release the bypass valve lock disc ②. Turn the bypass valve knob ③ 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 ④, release the lock disc ⑤.
9. Adjust the knob ⑥ for an initial value of 800 psi on the gauge ⑦. Tighten the lock disc.
10. At the bypass valve ⑧, release the lock disc ⑨. 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 1/4 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.
2013+ 2-Point 5-Section Weight Transfer

Description of system

Note: See circuit diagrams in the Appendix starting on Page 128.

Weight transfer is enabled by:

1. Set the FOLD / FIELD switch to FIELD.
2. Adjust the weight transfer valve.

The fold/lift circuit is set to continuous flow (in unfold mode) to maintain the active weight transfer. This system is designed for use with tractors having closed center hydraulics. It is incompatible with open center systems.

Note: Do not set or adjust the weight transfer system if the outer wings are not level with the inner wings at unfold. Do not use the weight transfer system to compensate for unfold stop adjustment issues. See “Unfold Stop Adjustment” on page 77.

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 gauges during early field operations.
Adjusting the Weight-Transfer

Note: See circuit diagrams in the Appendix starting on Page 128.

Refer to Figure 53

1. In field conditions, unfold (page 50) applicator.
2. Set FOLD / FIELD to FIELD.
3. Lower applicator (page 44), and set or check application depth (page 32).
4. Pull forward to put coulters in ground.
5. Put tractor in Park and set parking brake.
6. Set tractor to half throttle. Extend the fold/lift circuit (unfold). Lock lever for continuous operation.
7. Adjust tractor flow control valve so bypass gauge needle is within the 1500 - 2200 PSI range. Larger models will require the higher end of this range while smaller models will want to be within the lower end.

NOTE
On older models without an electronic down pressure valve, less PSI is required and pressure should fall within the 1000 - 1500 PSI range.

8. Release the lock disc ⑥.
9. Adjust the knob ⑦ for an initial value of 800 psi on the gauge ⑤. Tighten the lock disc.
10. Check that the bypass gauge ② is still in the green zone. Adjust the tractor remote flow to correct. Re-check the reading on the pressure-reducing gauge ⑤.
11. Observe applicator operation, and re-adjust down-pressure as necessary after oil warm-up. Repeat step 7 through step 10.
Wing Leveling

Before checking wing level, check that the center section is level left to right ("Rear Eyebolt Adjustment"). On 2-point and Pull-Type, rear eyebolts above the rear casters can affect left-right level if out of adjustment.

Wing Level: 2-Point and 3-Point

On 2-point and 3-point implements, wing level is controlled entirely by gauge wheel height. If wings are not running level, adjust gauge wheels.

Wing Level: Pull-Type

On pull-type implements, wing level is controlled by the lift cylinders and the top eyebolt.

If wings get out of level, perform re-phasing operations (page 45) until the lengths of the exposed rods are identical across the implement.

If the wings are still not level, check that the eyebolt reveal is still at the factory setting (or is at least identical at all eyebolts).

Refer to Figure 55

The factory setting is a distance of:

1. 3.5 inch (8.9 cm)

from the end of the eyebolt to the top face of the front caster wheel lug tube.

To adjust the eyebolt, loosen the hose guide nut  and jam nut . Rotate the adjust nut  to set bolt reveal. Tighten jam nut.

Rear Eyebolt Adjustment

On 2-point and pull-type implements, 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 34).

On pull-type, rear height is controlled by the cylinders, slaved to the hydraulic depth stop valve on the left wing.

Check that both eyebolts are set to the same reveal 5.

On pull-type, check front to back level (after re-phasing) at full lift on level ground. If front eyebolts have been changed from their factory settings, adjust the rear eyebolts to bring the frame back into front-back level.

Refer to Figure 56

The factory setting is a distance of:

5. 3.5 inch (8.9 cm)

from the end of the eyebolt to the top face of the lug tube.

To adjust the eyebolt, loosen the hose guide nut , then the jam nut . Rotate the adjust nut  to set bolt reveal.

Check that the hose loop  is on top.

Tighten jam nut , then hose guide nut .
Unfold Stop Adjustment

This applies to 2013+ 2-Point 5-Section applicators only.

Refer to Figure 57

During unfold (FOLD / FIELD switch in FOLD), the inner wing sections ① are intended to stop 0 to 5° above wings-level relative to the center section ②. The stopping point is controlled by a vertical proximity sensor ③ at each center/wing hinge. If a wing does not stop in this range, adjust the proximity sensor.

1. Verify that the misalignment is not caused by air in the hydraulic system. Do not use the proximity adjustment to compensate for hydraulic problems.

2. Move the applicator to a level surface. Raise and fold (page 49). Install lift-assist lock channels (page 38) and parking stands (page 31).

3. Set the FOLD / FIELD switch to FOLD. Extend the fold/lift circuit to unfold until the inner wings stop. Set the circuit to Neutral. Shut off the tractor.

4. Check the sensor-actuator (③-④) gap ⑤ at the affected wing pivot. With the actuator near the marked region on the sensor, the gap must be: 1/8 to 1/4 inch (3.2 to 6.3 mm)

   If the gap is incorrect, correct that, at the current sensor height. Fold and unfold to see if further adjustment is required.

5. To adjust the sensor, loosen the bolts securing the sensor ④ to the bracket. Do not adjust the actuator ⑤ position.

   To lower the angle at which the wing stops, raise the sensor.

   To raise the angle at which the wing stops, lower the sensor.

6. Secure the bolts. Fold and unfold to test.
Field Fold Stop Adjustment

This applies to 2013+ 2-Point 5-Section applicators only.

Refer to Figure 58

During field fold (FOLD / FIELD switch in FIELD), the inner wing sections 1 are intended to stop 5 to 10° above wings-level relative to the center section 2. The stopping point is controlled by an angled proximity sensor 43 at each center/wing hinge. If a wing does not stop in this range, adjust the proximity sensor.

1. Verify that the misalignment is not caused by air in the hydraulic system. Do not use the proximity adjustment to compensate for hydraulic problems.

2. Move the applicator to a level surface. Raise and fold (page 49). Install lift-assist lock channels (page 49) and parking stands (page 31).

3. Set the FOLD / FIELD switch to FOLD. Extend the fold/lift circuit to unfold until the inner wings stop.

4. Set the FOLD / FIELD switch to FIELD. Retract the fold/lift circuit until the wings stop at “gull wing” (field lift, page 49). Set the circuit to Neutral. Shut off the tractor.

5. Check the sensor-actuator (43-19) gap 3 at the affected wing pivot. With the actuator near the marked region on the sensor, the gap must be: 
   1/8 to 1/4 inch (3.2 to 6.3 mm)
   If the gap is incorrect, correct it, at the current sensor height. Fold and unfold to see if further adjustment is required.

6. To adjust the sensor, loosen the bolts securing the sensor 43 to the bracket. Do not adjust the actuator 19 position.

   To lower the angle at which the wing stops, raise the sensor.

   To raise the angle at which the wing stops, lower the sensor.

7. Secure the bolts. Fold and unfold to test.
Caster Brake Adjustment
This applies only to pull-type and 2-point models.

Refer to Figure 59
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 59 and Figure 60
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 1 1/4 inch (3.2 cm). Also replace piston if missing, damaged, tilted, or top of piston is visible.

Pull-Type Wing Caster Brake Adjustment for Field Use
On wing caster wheels only apply light pressure (1/8 inch or less) to allow for easier swiveling of casters during turning.
Setting Fertilizer Rate

For preset rate implements, rate is positively set by the drive system and pump.

For variable rate implements, maximum rate is set by the drive system and pump, and is reduced from that under console control.

Adjustments to orifice plates must also be made to provide back-pressure keeping the boom within a specific pressure range to assure consistent delivery.

Setting the application rate requires the following steps:

1. Determine the rate (below), in gallons per acre or liters per hectare.
2. Install suitable orifice plates (page 88).
3. Check strainer screen size (page 90).
4. Set the ground drive Range (page 91).
5. Set the ground drive dial (page 92).
6. Set the console rate (see 016-0159-831 Raven SCS-450 Installation, Operation and Service manual).
7. Check the manifold pressure and relief valve during operation (page 91).

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.

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.

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

\[
\text{Volume\_per\_Area} = \frac{\text{Weight\_per\_Area}}{\text{Density}}
\]

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

\[
\text{Gallons\_per\_Acre} = 0.107 \times \text{Liters\_per\_Hectare}
\]
Nutri-Pro® NP30L-11R30 Fertilizer Rate

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

<table>
<thead>
<tr>
<th>Gallons per Acre</th>
<th>Driving Sprocket Dial Setting</th>
<th>Liters per Hectare</th>
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</table>

NP30L-11R30 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: 17.55 in. (44.58 cm)
- **Swath Width**: 330 inches (838.2 cm)
- **Drive (Required)**:
  - 15
  - 47
- **Driven (Optional)**:
  - 25
  - 15 or 47
  - ___
  - ___
- **Sprocket Ratio** (for slide chart):
  - Driving 1ST: 1.67a
  - Driving 47T: 5.22b
- **Ground Speed**: 5 mphc / 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:

- 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).
NP30L or NP40L

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NP30L or NP40L

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Nutri-Pro® NP30L-12R30 Fertilizer Rate

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

<table>
<thead>
<tr>
<th>Gallons per Acre</th>
<th>Driving Sprocket 15</th>
<th>Sprocket Dial Setting</th>
<th>Liters per Hectare</th>
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</table>

NP30L-12R30 JohnBlue Reference Data

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

Equipment Damage Risk:

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).

<table>
<thead>
<tr>
<th>Pump Type</th>
<th>Piston Pump NGP-7050 Series</th>
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<tr>
<td>Data Preference</td>
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<tr>
<td>Application Rate</td>
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<tr>
<td>Drive System</td>
<td>Ground Drive</td>
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<tr>
<td>Swath Width</td>
<td>360 in (914.4 cm)</td>
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<td>Drive (Required):</td>
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<td>(Optional):</td>
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<td>Driven (Required):</td>
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<tr>
<td>(Optional):</td>
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<tr>
<td>Sprocket Ratio (for slide chart)</td>
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</tr>
<tr>
<td>Ground Speed</td>
<td>5 mphc / 8 kph</td>
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</tbody>
</table>

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:

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).
Nutri-Pro® NP30L-13R30 Fertilizer Rate
Use the slide chart or internet calculator for more precise rate setting.

<table>
<thead>
<tr>
<th>Gallons per Acre</th>
<th>Driving Sprocket Dial Setting</th>
<th>Liters per Hectare</th>
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NP30L-13R30 JohnBlue Reference Data
Use the data below with the CDS-John Blue 115797-01 slide chart or with the CDS-John Blue internet calculator.

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<td>Data Preference</td>
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<td>Application Rate</td>
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<td>Drive System</td>
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<td>Driven (Required):</td>
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<td>(Optional):</td>
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<tr>
<td>Sprocket Ratio</td>
<td>(for slide chart)</td>
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<td>Driving 1ST:</td>
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<td>Driving 47T:</td>
<td>5.22b</td>
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<tr>
<td>Ground Speed</td>
<td>5 mphc / 8 kph</td>
</tr>
</tbody>
</table>

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:
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).
Nutri-Pro® NP40L-15R30 Fertilizer Rate

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

NP40L-15R30 JohnBlue Reference Data

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

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<th>Gallons per Acre</th>
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<th>Dial Setting</th>
<th>Liters per Hectare</th>
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NOTICE

Equipment Damage Risk:
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).
Nutri-Pro® NP40L-16R30 Fertilizer Rate

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

NP40L-16R30 JohnBlue Reference Data

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

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<tr>
<th>Gallons per Acre</th>
<th>Driving Sprocket 15</th>
<th>Sprocket Ratio (for slide chart)</th>
<th>Liters per Hectare</th>
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NOTICE

Equipment Damage Risk:
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).
Nutri-Pro® NP40L-17R30 Fertilizer Rate
Use the slide chart or internet calculator for more precise rate setting.

<table>
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<tr>
<th>Gallons per Acre</th>
<th>Driving Sprocket (Dial Setting)</th>
<th>Liters per Hectare</th>
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NP40L-17R30 JohnBlue Reference Data
Use the data below with the CDS-John Blue 115797-01 slide chart or with the CDS-John Blue internet calculator.

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<th>(•) Piston Pump NGP-7050 Series</th>
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<td>Application Rate</td>
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<td>Drive System</td>
<td>(•) Ground Drive</td>
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<td>Driving 47T: 5.22b</td>
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<td>Ground Speed</td>
<td>5 mphc / 8 kph</td>
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</table>

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:
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).
Nutri-Pro® NP40L-31R15 Fertilizer Rate

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

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<th>Driving Sprocket Dial Setting</th>
<th>Liters per Hectare</th>
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<td>281</td>
</tr>
<tr>
<td>31</td>
<td>6.4</td>
<td>290</td>
</tr>
<tr>
<td>32</td>
<td>6.6</td>
<td>299</td>
</tr>
<tr>
<td>33</td>
<td>6.8</td>
<td>309</td>
</tr>
<tr>
<td>34</td>
<td>7.0</td>
<td>318</td>
</tr>
<tr>
<td>35</td>
<td>7.2</td>
<td>327</td>
</tr>
<tr>
<td>36</td>
<td>7.4</td>
<td>337</td>
</tr>
<tr>
<td>37</td>
<td>7.6</td>
<td>346</td>
</tr>
<tr>
<td>38</td>
<td>7.8</td>
<td>355</td>
</tr>
<tr>
<td>39</td>
<td>8.0</td>
<td>365</td>
</tr>
<tr>
<td>40</td>
<td>8.2</td>
<td>374</td>
</tr>
<tr>
<td>41</td>
<td>8.4</td>
<td>384</td>
</tr>
<tr>
<td>42</td>
<td>8.7</td>
<td>393</td>
</tr>
<tr>
<td>43</td>
<td>8.9</td>
<td>402</td>
</tr>
<tr>
<td>44</td>
<td>9.1</td>
<td>412</td>
</tr>
<tr>
<td>45</td>
<td>9.3</td>
<td>421</td>
</tr>
<tr>
<td>46</td>
<td>9.5</td>
<td>430</td>
</tr>
<tr>
<td>47</td>
<td>9.7</td>
<td>440</td>
</tr>
<tr>
<td>48</td>
<td>9.9</td>
<td>449</td>
</tr>
</tbody>
</table>

NP40L-31R15 JohnBlue Reference Data

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

<table>
<thead>
<tr>
<th>Pump Type</th>
<th>(*) Piston Pump NGP-7050 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Preference</td>
<td>(*) &lt;user-specified&gt;</td>
</tr>
<tr>
<td>Application Rate</td>
<td>&lt;user-specified&gt;</td>
</tr>
<tr>
<td>Drive System</td>
<td>(*) Ground Drive</td>
</tr>
<tr>
<td>Swath Width</td>
<td>465 inches (1181.1 cm)</td>
</tr>
<tr>
<td>Drive System</td>
<td></td>
</tr>
<tr>
<td>(Required):</td>
<td>25</td>
</tr>
<tr>
<td>(Optional):</td>
<td>15 or 47</td>
</tr>
<tr>
<td>(Optional):</td>
<td></td>
</tr>
<tr>
<td>(Optional):</td>
<td></td>
</tr>
<tr>
<td>Driven</td>
<td>(Required): 15</td>
</tr>
<tr>
<td>(Optional):</td>
<td>15</td>
</tr>
<tr>
<td>(Optional):</td>
<td></td>
</tr>
<tr>
<td>(Optional):</td>
<td></td>
</tr>
<tr>
<td>Sprocket Ratio</td>
<td>Driving 1ST: 1.67&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>(for slide chart)</td>
<td>Driving 47T: 5.22&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ground Speed</td>
<td>5 mph&lt;sup&gt;c&lt;/sup&gt; / 8 kph</td>
</tr>
</tbody>
</table>

NOTICE

Equipment Damage Risk:

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).

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.
Select and Install Orifice Plates

If using VeriFlow nozzles, orifice plate instructions do not apply. However, the topic “Tramlines and Doubled Rows” on page 89 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 61**

Orifice plates ① 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 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.

<table>
<thead>
<tr>
<th>Orifice Plate Size</th>
<th>20</th>
<th>28*</th>
<th>34*</th>
<th>48*</th>
<th>59</th>
<th>80</th>
<th>98</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nozzle Spacing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 inch single</td>
<td>2.2 - 3.6</td>
<td>4.2 - 6.9</td>
<td>6.3 - 10</td>
<td>12 - 20</td>
<td>19 - 30</td>
<td>34 - 56</td>
<td>54 - 88</td>
</tr>
<tr>
<td>30 inch single</td>
<td>1.1 - 1.8</td>
<td>2.1 - 3.4</td>
<td>3.2 - 5.2</td>
<td>6.1 - 10</td>
<td>9.3 - 15</td>
<td>17 - 28</td>
<td>27 - 44</td>
</tr>
</tbody>
</table>

* These sizes standard in most Great Plains fertilizer systems.

<table>
<thead>
<tr>
<th>Nozzle Spacing</th>
<th>38.1 cm single</th>
<th>76.2 cm single</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended Rate Range in Litres per Hectare. Range is 15 - 40 PSI</strong></td>
<td>(Values based on: 8.0 kph, 1.28 kg/litre Fertilizer solution density)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 - 34</td>
<td>39 - 64</td>
</tr>
<tr>
<td></td>
<td>10 - 17</td>
<td>20 - 32</td>
</tr>
</tbody>
</table>

* These sizes standard in most Great Plains fertilizer systems.
Install Orifice Plates

Orifice plates are used only with the standard (TeeJet®) nozzles.

**Refer to Figure 62**

Insert the plate inside the gasket L50 supplied with the nozzle L52. Insert the gasketed plate with the legend side facing out the nozzle outlet (typically up).

In general, the orifice L51 needs to be small enough to create enough pressure in the manifold to operate the check valves L6 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.

---

**NOTE**

**Excess Back-Pressure Risk:**

*If using a size of 0.048in 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 \( \frac{1}{2} \) (or slightly more than \( \frac{1}{2} \)) 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 \( \frac{1}{2} \) row space for each row set to half rate.

---

**Alternate Orifice Plates**

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

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

---

**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.
Row Shutoff

Refer to Figure 63

Unused drop lines may be shut off by replacing the nozzle \text{L52} with a Great Plains 832-051C cap \text{L49}. Nutri-Pro\textsuperscript{®} 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.

\textbf{NOTICE}

\textbf{Mis-Application or Material Loss Risk:}

\textit{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.}

Strainer Adjustment

Refer to Figure 64

A Banjo brand strainer \text{L30} is supplied with the ground drive fertilizer pump. It is plumbed before the CDS-John Blue pump. The standard 80 mesh screen \text{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)
Setting Relief Valve

A relief valve is plumbed after the pump outlet to protect the manifold and pump from excessive pressure. Any product that activates the relief valve discharges from the dump line ②.

To set relief valve:

Refer to Figure 65

1. Unlock plastic jam nut ③ from relief valve knob ④.
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 ⑥, and watch for relief valve discharge ②.
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.

Set Pump Drive Range

Refer to Figure 66

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 67) must be in the range 2-10 for consistent pump rate.

Use the rate charts on page 81 through page 84 to determine which Range to use for the rate desired.

For implements 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.
4. Re-engage idler for slack of 3/8 in (9mm) in the longest chain span ⑥.
Set Pump Rate Dial

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 at the setting pointer.
2. Use the setting wrench to rotate the dial until the desired pump setting is under the pointer.

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 implement is lowered and in motion. The pump must not be run dry.

Sensor Adjustment

The proximity sensor on the left-hand side of the front of the machine is for starting the gull winging process. This sensor should be set to activate by the upper lift arm. Once the arm passes the sensor, the gull winging process will begin. The rear proximity sensors are located near the wing hinges. They control the height or angle of the gull winging process.

All three sensors should be given between 1/8-1/4" clearance.

To adjust, loosen the hardware securing the sensor, then slide the sensor up or down in the bracket. The further the sensor is raised in the bracket the more delayed the gull winging process will be. Once the sensor is set to the desired position, secure the sensor with hardware. Test this configuration by lifting and gull winging the wings of the machine. If you want gull winging to delay or hasten the process more, make further adjustments until satisfied.
Row Implement Adjustments

Terra-Tine™ Adjustments (Option)

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

Refer to Figure 68

**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 inches (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 also changes tine height.

4. The factory setting for arm angle is minimum (pivot mount hole closest to Terra-Tine™ mount).

Terra-Tine™ Down Force

Refer to Figure 69

A series of three holes in the spring adjuster and pivot mount plate 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    |

Note: Changing force also changes height.
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 88).
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 70

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.
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 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.

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.
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

The topics in this section presume that the implement has a Great Plains-supplied CDS-John Blue NGP-7055-K pump and for variable rate topics, the Raven SCS 450 console.

General Implement Troubleshooting ........................................95
FOLD / FIELD Troubleshooting (2013+ 2-Point 5-Section Only) .................................................................96
Application Troubleshooting ................................................97
Variable Rate Troubleshooting .............................................99
Ground Drive Pump Troubleshooting ...............................100
Hydraulic Drive Pump Troubleshooting .........................101

Troubleshooting sections are also found in the following optional component manuals:
12-M-43: CDS-John Blue NGP Pump Parts and Instructional manual
016-0159-831: Raven SCS-450 Installation, Operation and Service manual

General Implement Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fold or unfold jerk or imbalanced</td>
<td>Air in lines</td>
<td>Bleed fold circuit (page 106).</td>
</tr>
<tr>
<td>Lift jerky or imbalanced</td>
<td>Air in lines</td>
<td>Re-phase lift circuit (page 45).</td>
</tr>
<tr>
<td>Depth stop uneven</td>
<td>Air in lines</td>
<td>Re-phase lift circuit (page 45).</td>
</tr>
<tr>
<td>Lift-Assist casters oscillating</td>
<td>Caster stabilizer too lightly set</td>
<td>Increase spring tension on caster stabilizer piston (page 112).</td>
</tr>
<tr>
<td>Uneven application depth</td>
<td>Excessive field speed.</td>
<td>Reduce field speed.</td>
</tr>
<tr>
<td></td>
<td>Coulters set too deep, lifting entire implement</td>
<td>Reduce coulter depth.</td>
</tr>
<tr>
<td></td>
<td>Rough application conditions.</td>
<td>Rework the field.</td>
</tr>
<tr>
<td>Wings too Shallow</td>
<td>Insufficient weight transferred to wings</td>
<td>Increase weight transfer (page 71).</td>
</tr>
<tr>
<td>Center too Shallow</td>
<td>Excess weight transferred to wings</td>
<td>Decrease weight transfer (page 71).</td>
</tr>
<tr>
<td>Lift Before Fold on 2-Point</td>
<td>Adjustment valve setting too restrictive for lift</td>
<td>Adjust valve (page 140).</td>
</tr>
<tr>
<td>Slow Lift-Assist on 2-Point</td>
<td>Adjustment valve setting too restrictive for lift</td>
<td>Adjust valve (page 140).</td>
</tr>
</tbody>
</table>
## FOLD / FIELD Troubleshooting (2013+ 2-Point 5-Section Only)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fold or Unfold Abnormal with Switch Box Indicator Illuminated</td>
<td>Circuit to solenoid valves broken, typically a disconnected harness at hitch</td>
<td>Check harness connections at hitch, then, check for 12 Vdc at solenoids.</td>
</tr>
<tr>
<td>Outer wings folding in field lift</td>
<td>No power to outer wing fold solenoid, or switch in FOLD or PARK</td>
<td>Check connections and continuity, or set switch to FIELD.</td>
</tr>
<tr>
<td></td>
<td>Air in hydraulic system</td>
<td>Cycle system several times, and as needed bleed hydraulics (page 106).</td>
</tr>
<tr>
<td>Outer wings not folding before inner wings</td>
<td>Possible harness problem</td>
<td>Check connections.</td>
</tr>
<tr>
<td>Unfold: Inner wings do not stop at wings-level</td>
<td>Switch not in FOLD</td>
<td>Check switch position and indicator lamps</td>
</tr>
<tr>
<td></td>
<td>No power to switch or harness</td>
<td>Check power to switch, harness connections at hitch.</td>
</tr>
<tr>
<td></td>
<td>Defective switch, damaged harness</td>
<td>Check 12 Vdc at solenoids.</td>
</tr>
<tr>
<td>One inner wing unfold does not stop at wings-level</td>
<td>Proximity switch damaged or disconnected</td>
<td>Check 12 Vdc at solenoids.</td>
</tr>
<tr>
<td></td>
<td>Inner proximity switch Mis-adjusted</td>
<td>If 12 Vdc present, check/adjust switch, see &quot;Unfold Stop Adjustment&quot; on page 77.</td>
</tr>
<tr>
<td>Field fold: wings do not stop at gull-wing</td>
<td>Switch not in FIELD</td>
<td>Check switch position and indicator lamps</td>
</tr>
<tr>
<td></td>
<td>No power to switch or harness</td>
<td>Check power to switch, harness connections at hitch.</td>
</tr>
<tr>
<td></td>
<td>Defective switch, damaged harness</td>
<td>Check 12 Vdc at solenoids.</td>
</tr>
<tr>
<td>Field fold: outer wing does not reach gull-wing</td>
<td>Air in system</td>
<td>Cycle system several times, and as needed bleed hydraulics (page 106).</td>
</tr>
<tr>
<td>Field fold: one wing does not stop at gull-wing</td>
<td>Proximity switch damaged or disconnected</td>
<td>Check 12 Vdc at solenoids.</td>
</tr>
<tr>
<td></td>
<td>Inner proximity switch Mis-adjusted</td>
<td>If 12 Vdc present, check/adjust switch, see &quot;Field Fold Stop Adjustment&quot; on page 78.</td>
</tr>
<tr>
<td>Outer wing does not unfold at all</td>
<td>Automatic wing latch stuck</td>
<td>Slightly re-fold to release latch. If latch does not release, lubricate pivot.</td>
</tr>
<tr>
<td>Wings won’t fold at all.</td>
<td>Switch in FIELD</td>
<td>Set switch to FOLD.</td>
</tr>
<tr>
<td></td>
<td>Loose connection on weight transfer solenoid</td>
<td>Check harness connections and 12 Vdc at solenoid.</td>
</tr>
</tbody>
</table>
# Application Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess Material Remaining</strong> (but no alarms)</td>
<td>Incorrect console setup</td>
<td>Re-check METER CAL and BOOM CAL.</td>
</tr>
<tr>
<td></td>
<td>Field size different.</td>
<td>After ruling out metering problems, re-check geography.</td>
</tr>
<tr>
<td></td>
<td>Excessive gaps between fertilizer applicator passes.</td>
<td>Gap between opposing pass end trenches should be one row space (e.g. 30 in)</td>
</tr>
<tr>
<td></td>
<td>Flow meter malfunction</td>
<td>Consult dealer.</td>
</tr>
<tr>
<td><strong>Low Rate</strong></td>
<td>Ground drive on Low Range when rate requires High</td>
<td>Exchange Range sprockets.</td>
</tr>
<tr>
<td></td>
<td>Dial setting incorrect</td>
<td>Re-check Range and Dial settings for rate.</td>
</tr>
<tr>
<td></td>
<td>Ground drive slipping</td>
<td>Check condition of arm and chains. Check operating height of implement (may be too high). If soil is too wet, try reconfiguring for a lower manifold pressure, or wait for dryer conditions.</td>
</tr>
<tr>
<td></td>
<td>Pump damaged</td>
<td>Consult dealer.</td>
</tr>
<tr>
<td><strong>Material Consumption Too High</strong> (but no alarms)</td>
<td>Incorrect console setup</td>
<td>Re-check METER CAL and BOOM CAL.</td>
</tr>
<tr>
<td></td>
<td>Field size different.</td>
<td>After ruling out metering problems, re-check geography.</td>
</tr>
<tr>
<td></td>
<td>Excessive overlap</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Tank or system Leak</td>
<td>Suspend application. Check for leaks in</td>
</tr>
<tr>
<td></td>
<td>Flow meter malfunction</td>
<td>Consult dealer.</td>
</tr>
<tr>
<td><strong>High Rate</strong></td>
<td>Ground drive on High Range when rate requires Low</td>
<td>Exchange Range sprockets.</td>
</tr>
<tr>
<td></td>
<td>Dial setting incorrect</td>
<td>Re-check Range and Dial settings for rate.</td>
</tr>
<tr>
<td><strong>Rows Not Fertilized</strong></td>
<td>Check for plugged row-unit tube</td>
<td>Stop application. Lift implement and inspect applicators.</td>
</tr>
<tr>
<td><strong>No Fertilizer Flow</strong></td>
<td>Strainer plugged</td>
<td>Close all valves. Inspect strainer (page 104). Clean screen as needed.</td>
</tr>
<tr>
<td></td>
<td>Material run-out</td>
<td>Check tank level.</td>
</tr>
</tbody>
</table>
## Application Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applicators plugging frequently</strong></td>
<td>Applicator tips too low for coulter depth</td>
<td>Raise applicator weldment (page 67).</td>
</tr>
<tr>
<td></td>
<td>Coulter blades too worn</td>
<td>Replace coulter blades.</td>
</tr>
<tr>
<td></td>
<td>Field too wet</td>
<td>Wait for drier conditions.</td>
</tr>
<tr>
<td></td>
<td>Fertilizer Applicator not level from front to rear</td>
<td>Check implement front-to-back level (page 32).</td>
</tr>
<tr>
<td></td>
<td>Tractor rocking backward during stops, or lift sequence pushing applicators backward</td>
<td>Refine stopping and/or lifting technique to avoid reverse coulter motion in ground.</td>
</tr>
<tr>
<td><strong>Low Manifold Pressure</strong></td>
<td>Rate, speed or material viscosity too low for orifice plate size</td>
<td>Re-check pump rate determination, Range sprocket, pump dial and console setup (Option). If correct, replace orifice plates with a smaller size (page 89).</td>
</tr>
<tr>
<td></td>
<td>Strainer clogged</td>
<td>Clean strainer, and possibly use coarser screen size (page 90).</td>
</tr>
<tr>
<td></td>
<td>Ground Drive: Relief valve set too low</td>
<td>Adjust relief valve (page 91).</td>
</tr>
<tr>
<td></td>
<td>Boom leak</td>
<td>Repair boom.</td>
</tr>
<tr>
<td></td>
<td>Tank vent closed or plugged; pump cavitating</td>
<td>Check tank lid. check pump prime.</td>
</tr>
<tr>
<td></td>
<td>Material run-out</td>
<td>Refill.</td>
</tr>
<tr>
<td><strong>High Manifold Pressure</strong></td>
<td>Orifice plate size too small</td>
<td>Replace orifice plates (page 89).</td>
</tr>
<tr>
<td></td>
<td>Applicator nozzle orifice smaller than orifice plate</td>
<td>Remove nozzle.</td>
</tr>
<tr>
<td></td>
<td>Orifice plates plugged</td>
<td>Clean plates. Check sizing.</td>
</tr>
<tr>
<td><strong>Product Dumping at Relief Valve</strong></td>
<td>Rate, speed or material viscosity too high for orifice plate size</td>
<td>Re-check pump rate determination, Range sprocket, pump dial and console setup (Option). If correct, replace orifice plates with a larger size (page 88).</td>
</tr>
<tr>
<td></td>
<td>Orifice plates clogged</td>
<td>Use larger plates (page 88) or finer strainer screen (page 90).</td>
</tr>
<tr>
<td></td>
<td>Relief valve set too low</td>
<td>Adjust relief valve (page 91).</td>
</tr>
<tr>
<td></td>
<td>Applicators plugged</td>
<td>Clean out applicator tubes</td>
</tr>
<tr>
<td></td>
<td>Variable Rate: return line closed</td>
<td>Open return line shut-off valves.</td>
</tr>
<tr>
<td></td>
<td>Material slushy due to low temperature, or actual ice in boom</td>
<td>Wait for warmer conditions.</td>
</tr>
</tbody>
</table>
### Variable Rate Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate Alarm, Low</strong></td>
<td>System not fully charged</td>
<td>Prime system (page 59).</td>
</tr>
<tr>
<td></td>
<td>One or more manual valves not fully open</td>
<td>Suspend operations. Check all manual valves from nurse tank withdrawal valve (if any) to inlet shut-off valve.</td>
</tr>
<tr>
<td></td>
<td>Control valve malfunction or harness status</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Excess Material Remaining (but no alarms)</strong></td>
<td>Incorrect console setup</td>
<td>Re-check METER CAL and BOOM CAL.</td>
</tr>
<tr>
<td></td>
<td>Flow meter malfunction</td>
<td>Consult dealer.</td>
</tr>
<tr>
<td><strong>Rate Alarm, High</strong></td>
<td>Incorrect VALVE CAL for Control Valve or METER CAL for flow meter.</td>
<td>Recheck console setup against values provided for components (page 34).</td>
</tr>
<tr>
<td></td>
<td>Control Valve failed, or harness status</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Material Consumption Too High (but no alarms)</strong></td>
<td>Incorrect console setup</td>
<td>Re-check METER CAL and BOOM CAL.</td>
</tr>
<tr>
<td></td>
<td>Flow meter malfunction</td>
<td>Consult dealer.</td>
</tr>
</tbody>
</table>
## Ground Drive Pump Troubleshooting

The CDS-John Blue NGP Pump Parts and Instructional manual (12-M-43) has additional troubleshooting information.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Rate</strong></td>
<td>Ground drive on Low Range when rate requires High</td>
<td>Exchange Range sprockets (page 91).</td>
</tr>
<tr>
<td></td>
<td>Dial setting incorrect</td>
<td>Re-check Range and Dial settings for rate.</td>
</tr>
<tr>
<td></td>
<td>Ground drive slipping</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Pump damaged</td>
<td>See CDS-John Blue NGP Pump Parts and Instructional manual.</td>
</tr>
<tr>
<td><strong>High Rate</strong></td>
<td>Ground drive on High Range when rate requires Low</td>
<td>Exchange Range sprockets (page 91).</td>
</tr>
<tr>
<td></td>
<td>Dial setting incorrect</td>
<td>Re-check Range and Dial settings for rate.</td>
</tr>
<tr>
<td><strong>Low Manifold Pressure</strong></td>
<td>Relief valve set too low</td>
<td>Adjust relief valve (page 91).</td>
</tr>
<tr>
<td></td>
<td>Ground drive on Low Range when rate requires High</td>
<td>Exchange Range sprockets (page 91).</td>
</tr>
<tr>
<td></td>
<td>Field speed too low</td>
<td>Increase speed or reduce orifice plate size.</td>
</tr>
<tr>
<td></td>
<td>Ground drive wheel or chains slipping</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Product Dumping at Relief Valve</strong></td>
<td>Rate, speed or material viscosity too high for orifice plate size</td>
<td>Re-check pump rate determination, Range sprocket, pump dial and console setup (Option). If correct, replace orifice plates with a larger size (page 88).</td>
</tr>
<tr>
<td></td>
<td>Orifice plates clogged</td>
<td>Use larger plates (page 88) or finer strainer screen (page 90).</td>
</tr>
<tr>
<td></td>
<td>Relief valve set too low</td>
<td>Adjust relief valve (page 91).</td>
</tr>
<tr>
<td></td>
<td>Tines plugged</td>
<td>Clean out tine tubes</td>
</tr>
<tr>
<td></td>
<td>Material slushy due to low temperature, or actual ice in boom</td>
<td>Wait for warmer conditions.</td>
</tr>
<tr>
<td><strong>High Manifold Pressure</strong></td>
<td>Ground drive on High Range when rate requires Low</td>
<td>Exchange Range sprockets (page 91).</td>
</tr>
<tr>
<td></td>
<td>Field speed too high</td>
<td>Reduce speed or increase orifice plate size.</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate Alarm, Low</strong></td>
<td>System not fully charged</td>
<td>Prime system. Check for blocked air bleed line on standard first pump. Open petcock on user-plumbed second pump.</td>
</tr>
<tr>
<td></td>
<td>One or more manual valves not fully open</td>
<td>Suspend operations. Check all manual valves from nurse tank withdrawal valve (if any) to inlet shut-off valve.</td>
</tr>
<tr>
<td></td>
<td>Control valve malfunction or harness status</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Rate Alarm, High</strong></td>
<td>Incorrect VALVE CAL for Control Valve or METER CAL for flow meter.</td>
<td>Recheck console setup against values provided for components (page 34).</td>
</tr>
<tr>
<td></td>
<td>Control Valve failed, or harness status</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Low Manifold Pressure</strong></td>
<td>Pump not primed</td>
<td>Factory-installed pump: check bleed line for plugging. Second pump: open petcock valve or check bleed line.</td>
</tr>
<tr>
<td></td>
<td>Mis-adjusted bypass valve in pump motor</td>
<td>Close valve or re-adjust for Open Center system (see pump manual)</td>
</tr>
<tr>
<td></td>
<td>Impeller or volute worn</td>
<td>Repair pump.</td>
</tr>
<tr>
<td><strong>Excess Material Remaining (but no alarms)</strong></td>
<td>Incorrect console setup</td>
<td>Re-check METER CAL and BOOM CAL.</td>
</tr>
<tr>
<td></td>
<td>Flow meter malfunction</td>
<td>Consult dealer.</td>
</tr>
<tr>
<td><strong>Material Consumption Too High (but no alarms)</strong></td>
<td>Incorrect console setup</td>
<td>Re-check METER CAL and BOOM CAL.</td>
</tr>
<tr>
<td></td>
<td>Flow meter malfunction</td>
<td>Consult dealer.</td>
</tr>
<tr>
<td><strong>No Fertilizer Flow</strong></td>
<td>Pump not primed</td>
<td>Factory-installed pump: check bleed line for plugging. Second pump: open petcock valve or check bleed line.</td>
</tr>
<tr>
<td></td>
<td>Strainer plugged</td>
<td>Close all valves. Inspect strainer (page 104). Clean screen as needed.</td>
</tr>
<tr>
<td></td>
<td>Material run-out</td>
<td>Check tank level.</td>
</tr>
</tbody>
</table>
Maintenance and Lubrication

Maintenance

Proper servicing and maintenance is the key to long implement 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.

1. After using your fertilizer applicator for several hours, check all bolts to be sure they are tight.
2. Remove excess slack from chains. Clean and use chain lube on all roller chains as needed.
3. Maintain proper air pressure in fertilizer applicator tires.
4. Keep pump full of liquid at all times.
5. Clean fertilizer applicator on a regular basis. Regular and thorough cleaning will lengthen equipment life and reduce maintenance and repair.
7. Replace any worn, damaged, or illegible safety labels by obtaining new labels from your Great Plains dealer.

⚠️ WARNING ⚠️

Crushing Hazard:
Always have transport locks in place and/or use stands when working on implement. You may be severely injured or killed by being crushed under a falling implement.

⚠️ 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.
Wing Front Caster Wheel Locks

When working on raised unfolded wings, use the wing front caster wheel locks (not normally needed for operations).

1. Raise the fertilizer applicator.
2. Remove the rear pin at the depth stop clevis. Rotate the depth stop clevis weldment forward.

**NOTICE**

*Machine Damage Risk:*
Do not install a lock channel on the depth stop cylinder unless the clevis has been rotated clear of the cylinder rod. Lowering the implement onto a lock channel with the clevis in place will damage the clevis.

3. Place channels on the lift cylinder rod of all lift cylinders.
4. Install channel locking pins and secure with cotters.
5. Lower fertilizer applicator onto lock channels.
6. Set lift circuit to Float.

**Material Clean-Out**

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 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.
5. Wash all spilled fertilizer off the fertilizer applicator.

**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.
Liquid Fertilizer Strainer Maintenance

Refer to Figure 72

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.

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 the 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.
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 0.063 inch (1/16 inch, 1.6 mm) 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.

**Bleeding Lift Hydraulics**

Normally the lift hydraulics are bled at the factory before shipping, and bleeding should not be required other than to raise fully and hold lever on for one minute or until all cylinders extend fully. See “Re-Phasing Pull-Type Lift System” on page 45.

---

**JIC Torque Chart**

<table>
<thead>
<tr>
<th>Size</th>
<th>Foot-Pounds</th>
<th>N-m</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/16-20</td>
<td>11-12</td>
<td>15-16</td>
</tr>
<tr>
<td>1/2-20</td>
<td>15-16</td>
<td>20-22</td>
</tr>
<tr>
<td>5/16-18</td>
<td>18-20</td>
<td>24-28</td>
</tr>
<tr>
<td>3/4-16</td>
<td>38-42</td>
<td>52-58</td>
</tr>
<tr>
<td>7/8-14</td>
<td>57-62</td>
<td>77-85</td>
</tr>
<tr>
<td>11/16-12</td>
<td>79-87</td>
<td>108-119</td>
</tr>
</tbody>
</table>
Bleeding Fold Hydraulics

Normally the fold hydraulics are bled at the factory before shipping, and bleeding should not be required.

1. Close the weight-transfer shut-off valve (page 47).
2. Connect the fold circuit to a hydraulic source, such as a tractor remote.
3. Set the source circuit to Float to relieve any pressure in the lines.
4. Disconnect both base and rod ends of all fold cylinders.
5. Support the cylinders with ports facing up, and with cylinders oriented so that rods cannot strike implement parts when at full extension.
6. Orient cylinders with base ends higher than rod ends. Set circuit to Neutral.

One cylinder at a time:
7. Crack (slightly loosen) a JIC connection at a fold cylinder base end.
8. Extend the circuit slowly until fluid appears at the fitting.
9. Set the circuit to Neutral. Tighten the fitting.
10. Repeat step 7 through step 9 for the remaining cylinders.
11. Retract the fold cylinders. Set circuit to Neutral.
12. Orient cylinders with rod ends higher than base ends.

One cylinder at a time:
13. Crack (slightly loosen) a JIC connection at a fold cylinder rod end.
14. Extend the circuit slowly until fluid appears at the fitting.
15. Set the circuit to Neutral. Tighten the fitting.
16. Repeat step 13 through step 15 for the remaining cylinders.
17. Set circuit to Float.
18. Re-pin base and rod ends of cylinders to center section and wing lugs.
19. Test fold function carefully.

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.

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.
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 138.

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 73, which, for clarity, greatly exaggerates slack, and omits the idlers.

1. Measure the span \( \mathbf{1} \) 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 36 inch / 91 cm):
     \( \frac{1}{4} \text{ inch per foot (2.1 cm/m)} \)
   - Vertical short chains:
     \( \frac{1}{4} \text{ inch per foot (2.1 cm/m)} \)
   - Horizontal short chains:
     \( \frac{1}{2} \text{ inch per foot (4.2 cm/m)} \).

3. Measure the current slack \( \mathbf{2} \):
   - 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.

Chain Clips

Whenever mounting a chain, make sure the clip at the removable link is oriented to minimize snags.

Refer to Figure 74 (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).
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 76
Ace Pump Parts
Lubrication and Scheduled Maintenance

Wing Pivots

1 zerk each pin,
2 pins per wing;
4 zerts total
Type of Lubrication: Grease
Quantity: Until grease emerges

Outer Wing Pivots

(Appplies to five-section applicators only)

1 zerk each pin,
2 pins per wing;
4 zerts total
Type of Lubrication: Grease
Quantity: Until grease emerges

Caster Pivots

1 zerk each caster;
4 zerts total (pull-type)
2 zerts total (2-point)
Type of Lubrication: Grease
Quantity: Until grease emerges
Caster Wheel Parallel Arms

(2-Point and Pull-Type implements only)
2 zerks each arm,
2 arms per caster,
4 casters per applicator - 16 zerks total (pull-type);
2 casters per applicator - 8 zerks total (2-point)
Type of Lubrication: Grease
Quantity: Until grease emerges

Rear Wheel Module Pivot

(pull-type implements only)
4 zerks each pivot tube,
2 pivot modules per;
8 zerks total
Type of Lubrication: Grease
Quantity: Until grease emerges

Vantage I Coulter Hubs (Option)

1 zerk per coulter,
11 to 15 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 zerk per coulter pivot, 11 to 15 total
Type of Lubrication: Grease
Quantity: Until grease emerges

Tire Pressures

2, 4 or 6 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.

Caster Stabilizers

One UHMW brake piston each caster; 4 total (pull-type) 2 total (2-point)
Replace UHMW piston \( \geq \) if its length is less than \( 1\frac{1}{4} \) inch (3.2 cm). Also replace piston if missing, damaged, tilted, or top of piston is visible.
See “Caster Brake Adjustment” on page 79.
2-Point and 2-Point Gauge Wheel Hubs

<table>
<thead>
<tr>
<th>Seasonal</th>
</tr>
</thead>
</table>

1 zerk each spindle;
4 total

Type of Lubrication: Grease
Quantity: Until resistance is felt

Pull-Type Caster Wheel Hubs

<table>
<thead>
<tr>
<th>Seasonal</th>
</tr>
</thead>
</table>

(pull-type implements only)
1 zerk each hub,
4 hubs per implement;
4 zerks total

Type of Lubrication: Grease
Quantity: Until resistance is felt
Options

Monitor Console

The Raven SCS 450 controls and adjusts application rate based on flow meter input, ground speed, and operator rate settings. This console is sold separately from the variable rate fertilizer systems (page 115), which include the implement harnesses, flow meter and valves.

This kit includes only the console and cab mounting hardware.

<table>
<thead>
<tr>
<th>Option Package</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAVEN 450 CONSOLE</td>
<td>823-211C</td>
</tr>
</tbody>
</table>

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

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.

<table>
<thead>
<tr>
<th>Option Package</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radar Kit</td>
<td>509-289A</td>
</tr>
</tbody>
</table>

This kit includes the radar transceiver and a Raven 115-0159-526 power and data cable.

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:

<table>
<thead>
<tr>
<th>Option Package</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radar Power Cable</td>
<td>115-0159-539</td>
</tr>
</tbody>
</table>
**Hitches**

(Pull-type implements only)

A cast or clevis hitch option is specified on initial implement order. The hitch may be exchanged later as required. The accessory kits below include hitch, bolts, washers and nuts. The safety chain is standard on the implement itself.

<table>
<thead>
<tr>
<th>Hitch Package</th>
<th>Original Option</th>
<th>Accessory Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Diameter Cast Hitch</td>
<td>2</td>
<td>170-004A</td>
</tr>
<tr>
<td>Small Diameter Clevis Hitch</td>
<td>3</td>
<td>170-039A</td>
</tr>
<tr>
<td>Category V Adaptor Kita</td>
<td>-</td>
<td>170-072A</td>
</tr>
<tr>
<td>Category V Hitch Kit</td>
<td>-</td>
<td>170-073A</td>
</tr>
</tbody>
</table>

a. This kit converts a standard hitch to Cat.V. For a complete hitch package, including mounting bolts and safety chain, order 170-073A.

**Category II Hitch Pin Kit**

This kit adapts 3-Point and 2-Point applicators for use with tractors having Category II hitches.

<table>
<thead>
<tr>
<th>Option Packages</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT 2 HITCH PIN KIT</td>
<td>596-060A</td>
</tr>
</tbody>
</table>

**Fertilizer Systems**

The Nutri-Pro® NP30L or NP40L may be ordered as a basic tool bar (no boom), or with a boom and pump, preset or variable rate.

- The ground drive system (page 116) is based on a CDS-John Blue pump. The basic ground drive system is single-section preset-rate. Rate is controlled by pump settings.
- The variable rate ground drive system (page 116) includes a manifold for 3-section control, and a flow control valve.
- The hydraulic drive system (page 117) is based on an Ace hydraulic pump, and has standard variable-rate and section-control capabilities.

As options on the original order, all elements are factory- or dealer-installed.

Ordering the part bundles for field installation or upgrade is not recommended. There are a large number of parts (some uncut coils of hose and tubing), not presently supported by field installation instructions.
Ground Drive Systems

With a boom, there is a choice between preset rate (shown at right) and variable rate systems.

Preset Rate System

The preset rate option is a single-section boom system that is manually rate-adjusted at the pump dial.

<table>
<thead>
<tr>
<th>Preset Rate Ground Drive System</th>
<th>Original Option</th>
<th>Part Bundle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicator Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP30L-11R30</td>
<td>22</td>
<td>407-387A</td>
</tr>
<tr>
<td>NP30L-12R30</td>
<td>22</td>
<td>407-387A</td>
</tr>
<tr>
<td>NP30L-13R30</td>
<td>22</td>
<td>407-387A</td>
</tr>
<tr>
<td>NP40L-15R30</td>
<td>22</td>
<td>407-389A</td>
</tr>
<tr>
<td>NP40L-16R30</td>
<td>22</td>
<td>407-800A</td>
</tr>
<tr>
<td>NP40L-17R30</td>
<td>22</td>
<td>407-800A</td>
</tr>
<tr>
<td>NP40L-31R15</td>
<td>22</td>
<td>407-691A</td>
</tr>
</tbody>
</table>

Ground Drive Variable Rate System

The variable rate option is a three-section boom with rate controlled from a console in the tractor cab. The passive manifold of the preset rate system is replaced by three section valves and a flow control system (shown at right).

Because you may already have a console compatible with the Raven components, a console is not included (see page 114). See page 123 for a list of the Raven components used.

<table>
<thead>
<tr>
<th>Variable Rate Ground Drive System</th>
<th>Original Option</th>
<th>Part Bundle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicator Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP30L-11R30</td>
<td>23</td>
<td>407-388A</td>
</tr>
<tr>
<td>NP30L-12R30</td>
<td>23</td>
<td>407-388A</td>
</tr>
<tr>
<td>NP30L-13R30</td>
<td>23</td>
<td>407-388A</td>
</tr>
<tr>
<td>NP40L-15R30</td>
<td>23</td>
<td>407-390A</td>
</tr>
<tr>
<td>NP40L-16R30</td>
<td>23</td>
<td>407-801A</td>
</tr>
<tr>
<td>NP40L-17R30</td>
<td>23</td>
<td>407-801A</td>
</tr>
<tr>
<td>NP40L-31R15</td>
<td>23</td>
<td>407-692A</td>
</tr>
</tbody>
</table>
Hydraulic Drive

The hydraulic drive options include a 3-section boom, section and flow control valves, an Ace hydraulic pump, and cables compatible with a Raven SCS 450 or SCS 440 console.

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 141).

Rate control is variable, and requires a controller console (not included, see page 114).

<table>
<thead>
<tr>
<th>Hydraulic Drive System</th>
<th>Original Options</th>
<th>Part Bundle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicator Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP30L-11R30 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-205A</td>
</tr>
<tr>
<td>NP30L-11R30 (3-Point)</td>
<td>05 + 24</td>
<td>417-220A</td>
</tr>
<tr>
<td>NP30L-11R30 (2-Point)</td>
<td>06 + 24</td>
<td>417-220A</td>
</tr>
<tr>
<td>NP30L-12R30 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-205A</td>
</tr>
<tr>
<td>NP30L-12R30 (3-Point)</td>
<td>05 + 24</td>
<td>417-220A</td>
</tr>
<tr>
<td>NP30L-12R30 (2-Point)</td>
<td>06 + 24</td>
<td>417-220A</td>
</tr>
<tr>
<td>NP30L-13R30 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-205A</td>
</tr>
<tr>
<td>NP30L-13R30 (3-Point)</td>
<td>05 + 24</td>
<td>417-220A</td>
</tr>
<tr>
<td>NP30L-13R30 (2-Point)</td>
<td>06 + 24</td>
<td>417-220A</td>
</tr>
<tr>
<td>NP40L-15R30 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-203A</td>
</tr>
<tr>
<td>NP40L-15R30 (3-Point)</td>
<td>05 + 24</td>
<td>417-204A</td>
</tr>
<tr>
<td>NP40L-15R30 (2-Point)</td>
<td>06 + 24</td>
<td>417-204A</td>
</tr>
<tr>
<td>NP40L-16R30 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-224A</td>
</tr>
<tr>
<td>NP40L-16R30 (2-Point)</td>
<td>06 + 24</td>
<td>417-223A</td>
</tr>
<tr>
<td>NP40L-17R30 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-224A</td>
</tr>
<tr>
<td>NP40L-17R30 (2-Point)</td>
<td>06 + 24</td>
<td>417-223A</td>
</tr>
<tr>
<td>NP40L-31R15 (Pull-Type)</td>
<td>01 + 25</td>
<td>417-222A</td>
</tr>
<tr>
<td>NP40L-31R15 (3-Point)</td>
<td>05 + 24</td>
<td>417-221A</td>
</tr>
<tr>
<td>NP40L-31R15 (2-Point)</td>
<td>06 + 24</td>
<td>417-221A</td>
</tr>
</tbody>
</table>
Fertilizer Orifice Plates

The manifold systems include size 28, 34 and 48 plates. To order alternate plates, use the following part numbers. Order one per row unit.

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

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

See “Select and Install Orifice Plates” on page 88.

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).

<table>
<thead>
<tr>
<th>Description</th>
<th>Color Code</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOZZLE HI-VERIFLOW1</td>
<td>GRN/YEL</td>
<td>829-143C</td>
</tr>
<tr>
<td>NOZZLE VERIFLOW1</td>
<td>BLU</td>
<td>829-144C</td>
</tr>
</tbody>
</table>

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 89.

SprayTarget recommends a 50 mesh strainer screen, available from Great Plains as part LST-1550.

Terra-Tine™ Row Cleaners

These row cleaners are available as frame-mounted.

<table>
<thead>
<tr>
<th>Packages</th>
<th>Original Option</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP30 11R TERRA TINE</td>
<td>30</td>
<td>207-240A</td>
</tr>
<tr>
<td>NP30 12R TERRA TINE</td>
<td>30</td>
<td>207-241A</td>
</tr>
<tr>
<td>NP30 13R TERRA TINE</td>
<td>30</td>
<td>207-242A</td>
</tr>
<tr>
<td>NP40 15R TERRA TINE</td>
<td>30</td>
<td>207-243A</td>
</tr>
<tr>
<td>NP40 16R TERRA TINE</td>
<td>30</td>
<td>207-257A</td>
</tr>
<tr>
<td>NP40 17R TERRA TINE</td>
<td>30</td>
<td>207-258A</td>
</tr>
</tbody>
</table>

See “Terra-Tine™ Adjustments (Option)” on page 93.
Vantage I Coulters

Vantage Coulters are standard. Choose between fluted and turbo 20 inch blades (turbo shown at right). Part bundle numbers shown for reference. To convert from one type of blade to another in the field, simply order blades.

<table>
<thead>
<tr>
<th>Coulter Package</th>
<th>Original Option</th>
<th>Part Bundle</th>
</tr>
</thead>
</table>

See “Application Height Adjustment” on page 66.

Coulter Blades

<table>
<thead>
<tr>
<th>Single Blade</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.3 inch fluted blade (5/16 inch wave)</td>
<td>820-074C</td>
</tr>
<tr>
<td>20.2 inch turbo blade (3/4 inch wave)</td>
<td>820-180C</td>
</tr>
</tbody>
</table>

Coulter Nozzles

<table>
<thead>
<tr>
<th>Nozzle Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Stream H1/4U-SS0002, size 2</td>
<td>828-036C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0003, size 3</td>
<td>828-037C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0004, size 4</td>
<td>828-038C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0005, size 5</td>
<td>828-039C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0006, size 6</td>
<td>828-040C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0008, size 8</td>
<td>828-041C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0010, size 10</td>
<td>828-042C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nozzle Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Stream H1/4U-SS0015, size 15</td>
<td>828-043C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0020, size 20</td>
<td>828-044C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0030, size 30</td>
<td>828-045C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0040, size 40</td>
<td>828-046C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0050, size 50</td>
<td>828-054C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0060, size 60</td>
<td>828-055C</td>
</tr>
<tr>
<td>Solid Stream H1/4U-SS0070, size 70</td>
<td>828-056C</td>
</tr>
</tbody>
</table>

a. This is the standard nozzle size included with the coulter.
Rear Hitch

A rear hitch is required for a trailing nurse tank. The 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

The nurse tank tongue must be able to elevate to a hitch height of 38\(\frac{1}{2}\) inches (97.7 cm) with the drop hitch.

<table>
<thead>
<tr>
<th>Rear Hitch Package</th>
<th>Original Option</th>
<th>Accessory Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop Rear Hitch Assembly</td>
<td>27</td>
<td>407-722A</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Lighting Harness</th>
<th>Accessory Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse Tank Light Kit</td>
<td>417-357A</td>
</tr>
</tbody>
</table>

**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).
## Appendix A - Reference Information

### Specifications and Capacities

<table>
<thead>
<tr>
<th>Model</th>
<th>NP30L-11R30</th>
<th>NP30L-12R30</th>
<th>NP30L-13R30</th>
<th>NP40L-15R30</th>
<th>NP40L-16R30</th>
<th>NP40L-17R30</th>
<th>NP40L-31R15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sections</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Row Count</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>Row Spacing</td>
<td>30 in.</td>
<td>30 in.</td>
<td>30 in.</td>
<td>30 in.</td>
<td>30 in.</td>
<td>30 in.</td>
<td>15 in.</td>
</tr>
<tr>
<td>Working Width</td>
<td>27 ft. 6 in.</td>
<td>30 ft. 0 in.</td>
<td>32 ft. 6 in.</td>
<td>37 ft. 6 in.</td>
<td>40 ft. 0 in.</td>
<td>42 ft. 6 in.</td>
<td>38 ft. 9 in.</td>
</tr>
<tr>
<td>Transport Width</td>
<td>17 ft. 0 in.</td>
<td>17 ft. 0 in.</td>
<td>17 ft. 0 in.</td>
<td>17 ft. 9 in.</td>
<td>-1 ft. 11 in.</td>
<td>-1 ft. 11 in.</td>
<td>-1 ft. 11 in.</td>
</tr>
<tr>
<td>Swath</td>
<td>27 ft. 6 in.</td>
<td>30 ft. 0 in.</td>
<td>32 ft. 6 in.</td>
<td>37 ft. 6 in.</td>
<td>40 ft. 0 in.</td>
<td>42 ft. 6 in.</td>
<td>38 ft. 9 in.</td>
</tr>
<tr>
<td>Metering System</td>
<td>Option: Raven Control/Section Valves, Pressure Sensor &amp; RFM60P Flow meter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controller Console</td>
<td>Option: Raven SCS 450 (Optional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (2 Point)</td>
<td>9 ft. 4 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (3 Point)</td>
<td>8 ft. 10 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (Pull Type)</td>
<td>17 ft. 4 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Working Height</td>
<td>6 ft. 10 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport Height (Folded)</td>
<td>12 ft. 6 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport Clearance, 2P, PT</td>
<td>16 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport Clearance, 3P</td>
<td>(depends on tractor 3-point hitch range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wing Down-Flex</td>
<td>8°</td>
<td>10°</td>
<td>8°</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Tractor HP Req.¹</td>
<td>130-165 hp</td>
<td>145-180 hp</td>
<td>155-195 hp</td>
<td>180-225 hp</td>
<td>180-225 hp</td>
<td>180-225 hp</td>
<td>200-250 hp</td>
</tr>
<tr>
<td>Hydraulic Circuits Req.</td>
<td>1 or 2 Circuits, 2250 psi, 4 gal/min</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, 2P (maximum)²</td>
<td>7700 lbs</td>
<td>7900 lbs</td>
<td>8100 lbs</td>
<td>7100 lbs</td>
<td>9000 lbs</td>
<td>92000 lbs</td>
<td>81000 lbs</td>
</tr>
<tr>
<td>Weight, 3P (maximum)²</td>
<td>7200 lbs</td>
<td>7400 lbs</td>
<td>7600 lbs</td>
<td>6600 lbs</td>
<td>7600 lbs</td>
<td>7600 lbs</td>
<td>7600 lbs</td>
</tr>
<tr>
<td>Weight, PT (maximum)²</td>
<td>11100 lbs</td>
<td>11300 lbs</td>
<td>11500 lbs</td>
<td>10500 lbs</td>
<td>11800 lbs</td>
<td>12000 lbs</td>
<td>11500 lbs</td>
</tr>
<tr>
<td>Transport Tire Size</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td></td>
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<tr>
<td>2-Point Gauge Wheel Tire</td>
<td>20.5X8.0-10 (Load Rating E, 1520 Pounds)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Depth</td>
<td>0 to 6 in. Do not exceed 6.5 in. (release depth is 4.5 in. above coulter depth.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Rear Hitch</td>
<td>Option: Schuck Model 850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse Tank Capability</td>
<td>3000 Gallons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Power requirements vary significantly with conditions and practices.
² With Great Plains-installed JohnBlue pump, Schuck hitch and Terra-Tines™. All weights are approximate.
A. 265/70B16.5 (10-16.5) (NHS 8-Ply Skid Loader 4140 lbs @ 5 mph)
B. 10-16.5 (NHS 10 Ply Skid Loader 4710 lbs @ 5 mph)
## Torque Values Chart

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Bolt Head Identification</th>
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<tr>
<td></td>
<td>Grade 2</td>
</tr>
<tr>
<td>in-tpi(^a)</td>
<td>N-m(^b)</td>
</tr>
<tr>
<td>1/4-20</td>
<td>7.4</td>
</tr>
<tr>
<td>5/32-20</td>
<td>8.5</td>
</tr>
<tr>
<td>5/16-18</td>
<td>15</td>
</tr>
<tr>
<td>5/16-24</td>
<td>17</td>
</tr>
<tr>
<td>3/8-16</td>
<td>27</td>
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<td>1/2-8</td>
<td>340</td>
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<td>1-12</td>
<td>370</td>
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<td>11/16-7</td>
<td>480</td>
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<td>11/16-12</td>
<td>540</td>
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<tr>
<td>11/16-6</td>
<td>1180</td>
</tr>
<tr>
<td>11/16-12</td>
<td>1330</td>
</tr>
</tbody>
</table>

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.

---

## Tire Inflation Chart

<table>
<thead>
<tr>
<th>Wheel</th>
<th>Tire Size</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull-Type (all) &amp; 2-Point Lift-Assist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NP30L &amp; NP40L 11 to 15 &amp; 31 Row</td>
<td>265/70B16.5</td>
<td>60 psi (415 kPa)</td>
</tr>
<tr>
<td>NP40L 16- and 17-Row</td>
<td>10-16.5 NHS</td>
<td>75 psi (517 kPa)</td>
</tr>
<tr>
<td>2-Point, 3-Point Gauge Wheel</td>
<td>20.5X8.0-10</td>
<td>90 psi (620 kPa)</td>
</tr>
</tbody>
</table>

---

## 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**  
- Firestone: [www.firestoneag.com](http://www.firestoneag.com)  
- Gleaner: [www.gleanerwheel.com](http://www.gleanerwheel.com)  
- Titan: [www.titan-intl.com](http://www.titan-intl.com)

---

2018-10-10
Controller System Diagrams
Ground Drive Variable Rate System (Option)
Hydraulic Drive Variable Rate System (Option)

---

**Accessories sold separately**

**Optional Console, Flow and Extension Cabling Available. Consult a Raven Sales Representative for Part Numbers.**
Plumbing Diagrams (Option)

Preset Rate System

See page 21 to page 24 for callout descriptions

Figure 77
Preset Rate Plumbing
Ground Drive Variable Rate System
See page 21 to page 24 for callout descriptions.

Figure 78
Variable Rate Plumbing
Hydraulic Drive System

See page 21 to page 24 for callout descriptions.

Figure 79
Hydraulic Drive Plumbing

| L30. Strainer                      | L48. Boom Clamp                  |
| L38. Hydraulic Drive Pump (Option) | L49. Shutoff Cap                 |
| L39. Air Bleed Line               | L50. Gasket                      |
| L40. Flow Control Valve           | L51. Orifice Plate               |
| L41. Flow Meter                   | L52. Nozzle Body                |
| L43. Section Valves               | L53. VeriFlow Nozzle (Option)   |
| L45. Pressure Sensor              | L54. Drop Tubing                |
| L46. Boom                         | L55. Applicator Tube            |
| L47. End Cap                      | L56. Tine Nozzle                |
Hydraulic Diagrams
Lift and Fold Hydraulics: 2-Point 3-Section

1. Shut-off valve
2. Pressure reducing valve
3. Bypass valve
Fold Hydraulics: 3-Point and Pull-Type 3-Section

1. Shut-off valve
2. Pressure reducing valve
3. Bypass valve
Hydraulic Schematic, 2013+ 2-Point 5-Section
Proximity and Solenoid Locations, 2013+ 2-Point 5-Section
Lift Assist, Weight Transfer and Fold Hydraulics: 2013+ 2-Point 5-Section

1 Weight-transfer valve
Lift Assist and Fold Hydraulics: 2012- 2-Point 5-Section

1. Shut-off valve
2. Pressure reducing valve
3. Bypass valve
Fold Hydraulics: Pull-Type 5-Section

1. Shut-off valve
2. Pressure reducing valve
3. Bypass valve
Lift Hydraulics: Pull Type: 2011+
Lift Hydraulics: Pull Type: 2010-
Pump Hydraulics (Option)
Chain Routing
See also “Chain Maintenance” on page 107.

Legend:

- Sprocket or idler Tooth count
- 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 “Preparation and Setup” on page 25. Some of these items may already have been done by your Great Plains dealer:

a. Field lift partial fold adjustment (below)
b. Flow controller console installation (Option, page 142)
c. 3-point parking stand clearance (page 143)
d. Frame-mounted row options
   (see manual supplied with accessory)
e. Row drop line connections.

FOLD / FIELD Switch Installation

Applies to 2013+ 5-Section 2-Point applicators only.

Refer to Figure 79

Chose a cab location for the FOLD / FIELD switch:

• Within easy reach for periodic field activation.
• Easy to observe periodically to verify state.
• Does not obstruct view of road or important tractor controls or indicators.

The switch bundle includes an optional fuse kit and both ring terminals and fuse box terminals for connection to the tractor’s 12Vdc supply.

The switch may be connected directly to battery power, or to a switched source. If connected direct, it is important to use the PARK position to save battery power when the applicator is connected but not in use.

Route the captive harness to the hitch. Secure it with the provided cable ties to prevent entanglement and damage.

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 109.
4. Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See “Safety Decals” on page 8.
5. Inflate tires to pressure recommended and tighten wheel bolts as specified. See “Tire Inflation Chart” on page 122.

Figure 80
Install FOLD / FIELD Switch
Lift-Assist Valve Setup

This applies to 2-Point applicators only.

1. The implement is presumed to be unfolded.
   Hitch the implement to a tractor.
   Raise the implement (as for parking).

2. Locate the one-way restrictor valve at the tee that supplies the rear cylinder base ends.

3. Turn the knob fully counterclockwise, then clockwise one turn.

4. Start a lift/fold operation. Initially, the lift occurs before the fold. Stop. Lower.

5. Turn the valve clockwise one turn.


   If the lift occurred before the fold, repeat step 5.

   If the fold occurred before the lift, back the valve off (counterclockwise) a partial turn, and re-test lift/fold.

7. Find the point at which the wings fold to the wing locks prior to lift commencing.

Figure 81
Lift-Assist Valve
Hydraulic Pump Setup (Option)
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 81 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).

<table>
<thead>
<tr>
<th>Tractor Hydraulic System Type</th>
<th>Pump Configuration Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed Center, Load Sensing (LS Closed)</td>
<td>Restrictor Orifice ① OUT Flow Limiter ② IN Needle Valve ③ closed</td>
</tr>
<tr>
<td>Closed Center, Pressure Compensating (PC Closed)</td>
<td>Restrictor Orifice ① IN Flow Limiter ② OUT Needle Valve ③ closed</td>
</tr>
<tr>
<td>Open Center</td>
<td>Restrictor Orifice ① OUT Flow Limiter ② OUT Needle Valve ③ adjusted</td>
</tr>
</tbody>
</table>
Console Installation

Refer to Figure 82

The applicator’s optional Raven SCS 450 flow controller system includes one or two consoles that need to be mounted in the cab of the tractor to be used with the applicator.

Each monitor includes cables for power, speed sensor and sensor harness. 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 requires customer-supplied fasteners.

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.

See “Meter Setup (Option)” on page 34.

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.

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.
Parking Stand Clearance

This applies only to older 2-Point and 3-point models with pivoting stands.

Pivoting parking stands must clear tractor tires for normal operations. See page 31 for stand operation.

Refer to Figure 83

If the parking stand leg 1 strikes any tractor component when swung up for stowage, relocate both parking stand mounts 2.

**NOTICE**

**Equipment Damage Risk:**

Do not rely on stand foot retraction as an alternative to moving the mounts. The stand feet do not retract far enough for adequate highway and field clearance. Striking an object with a foot could result in substantial machine or tractor damage.

1. Elevate the center section front tool bar to lift the stand feet 1 off the ground.
2. Support the tool bar with other stands.
3. To reduce the weight, remove the leg.
4. Loosen or remove the U-bolts 3.
5. Re-position the mounts. Use the widest stance at which both stands are equidistant from implement center-line, and clear tractor parts.
7. Test swing arc of leg.
9. Carefully check implement parking stability before unhitching tractor.

Note: This applies only to 2-point and 3-point implements. Pull-type implements have a single tongue side-mount parking stand.
Warranty

Great Plains (a division of Great Plains Manufacturing, Inc.) warrants to the original purchaser that this Great Plains unit will be free from defects in material and workmanship for a period of one year from the first use date when used as intended and under normal service and conditions for personal use; ninety days for custom/commercial or rental use. This Warranty is limited to the replacement of any defective part by Great Plains 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.

The following items and/or conditions are not covered under warranty: failures resulting from abuse or misuse of the equipment, failures occurring as a result of accidental damage or acts of God, failures resulting from alterations or modifications, failures caused by lack of normal maintenance as outlined in the operator’s manual, repairs made by non-authorized personnel, items replaced or repaired due to normal wear (such as wear items and ground engaging components), repeat repair due to improper diagnosis or repair by the dealer, temporary repairs, service calls and/or mileage to and from customer location, overtime premium, or unit hauling expenses. The warranty may be voided if the unit is towed at speeds in excess of 20 miles per hour (32 kilometers per hour), or is used in soils with rocks, stumps, or other obstructions.

Great Plains reserves the right to make changes in materials or design of the product at any time without notice. The warranty shall not be interpreted to render Great Plains liable for damages of any kind, direct or consequential or contingent to property. Furthermore, Great Plains shall not be liable for damages resulting from any cause beyond its control. This warranty does not extend to crop loss, losses caused by planting or harvest delays or any expense or loss of 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 is not valid unless the unit is registered with Great Plains within 10 days from the date of the original purchase.
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