Operator Manual
TSF1060 and TSF1260
Front Fold Boom Sprayers

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.
Machine Identification

Record your machine details in the log below. If you replace this manual, be sure to transfer this information to the new manual.

If you or the dealer have added options not originally ordered with the machine, or removed options that were originally ordered, the weights and measurements are no longer accurate for your machine. Update the record by adding the machine weight and measurements with the option(s) weight and measurements.

<table>
<thead>
<tr>
<th>Model Number</th>
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<tbody>
<tr>
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<td>Delivery Date</td>
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<td>First Operation</td>
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<td>Accessories</td>
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</tbody>
</table>

Dealer Contact Information

Name: ____________________________
Street: __________________________
City/State: _______________________
Telephone: _______________________
Email: ___________________________
Dealer’s Customer No.: __________
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Printed in the United States of America
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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.

Be Familiar with Safety Decals

▲ Read and understand “Safety Decals” starting on page 8, thoroughly.

▲ Read all instructions noted on the decals.

Avoid High Pressure Fluids

▲ Escaping fluid under pressure can penetrate the skin, causing serious injury. If hydraulic fluid penetrates the skin under pressure, immediate medical attention is required. See a physician familiar with this type of injury

▲ Avoid the hazard by relieving pressure before disconnecting hydraulic lines.

▲ Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks.

▲ Wear protective gloves and safety glasses or goggles when working with hydraulic systems.
Wear Protective Equipment

Great Plains advises all users of chemical pesticides or herbicides to use the following personal safety equipment.

▲ 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 gloves are 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.
Handle Chemicals Properly

▲ Read and follow chemical manufacturer’s 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.
▲ Before adding chemical to the tank, make sure tank is at least half full. Do not pour concentrate into an empty tank.
▲ Never leave fill hose attached to the sprayer after filling tank. Chemicals in tank can siphon out of tank and contaminate freshwater source.
▲ Always keep handwash tank filled with clean water and have soap available in case of an emergency. Immediately and thoroughly flush any area of the body that is contaminated by chemicals.
▲ Do not touch sprayer components with mouth or lips.
▲ 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 spraying is completed for the day.
▲ Spray 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 the sprayer tank within 100 feet (30m) of any freshwater source or in a car wash.
▲ Rinse out the tank. Spray rinse water on last field sprayed.
Confined Space
Once used for hazardous fertilizers, or seeds with hazardous treatments, your tank may become a “permit-required confined space” under applicable statutes, regulations, insurance rules or business policy.

▲ When hazardous fumes are present, you can be quickly overcome even with the tank lid open.
▲ Do not enter a tank for material loading, material unloading, tank cleaning or valve maintenance.
▲ Clean tank by power washing from outside the tank top.
▲ Perform valve maintenance by removing meters from bottom of empty tank.
▲ If obstruction removal or repair requires tank entry, have the work performed by a team trained in confined space procedures.

Use A Safety Chain
▲ Use a safety chain to help control drawn machinery should it separate from tractor drawbar.
▲ Use a chain with a strength rating equal to or greater than the gross weight of towed machinery.
▲ Attach chain to tractor drawbar support or other specified anchor location. Allow only enough slack in chain to permit turning.
▲ Replace chain if any links or end fittings are broken, stretched or damaged.
▲ Do not use safety chain for towing.

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 tractor lights and lights provided with implement.
Check for Overhead Lines

⚠️ **DANGER**

Sprayer booms contacting overhead electrical lines can introduce lethal voltage levels on sprayer and tractor frames. A person touching almost any metal part can complete the circuit to ground, resulting in serious injury or death. At higher voltages, electrocution can occur without direct contact.

▲ Avoid overhead lines during sprayer operations.

Transport Machinery Safely

▲ Maximum transport speed for implement is 20 mph (32 kph). Some rough terrains require a slower speed. Sudden braking can cause a towed load to swerve and upset.

▲ Do not exceed 20 mph (32 kph). 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.

▲ Comply with state and local laws.

▲ Do not tow an implement that, when fully loaded, weighs more than 1.5 times the weight of towing vehicle.

▲ Carry reflectors or flags to mark Front Fold Boom Sprayer 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 78.

▲ Do not fold or unfold the Front Fold Boom Sprayer while the tractor is moving.

Shutdown and Storage

▲ Fold Front Fold Boom Sprayer, put tractor in park, turn off engine, and remove the key.

▲ Secure Front Fold Boom Sprayer using blocks and supports provided.

▲ Detach and store Front Fold Boom Sprayer in an area where children normally do not play.
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.

▲ Fold the Front Fold Boom Sprayer, 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 Front Fold Boom Sprayer to cool completely.

▲ Disconnect battery ground cable (-) before servicing or adjusting electrical systems or before welding on Front Fold Boom Sprayer.

▲ 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 Front Fold Boom Sprayer before operation.

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.

Tire Safety

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

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

▲ When removing and installing wheels, use wheel-handling equipment adequate for weight involved.
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 Front Fold Boom Sprayer functions.

▲ Operate machinery from the driver’s seat only.

▲ Do not leave Front Fold Boom Sprayer unattended with tractor engine running.

▲ Do not dismount a moving tractor. Dismounting a moving tractor could cause serious injury or death.

▲ Do not stand between the tractor and Front Fold Boom Sprayer 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 Front Fold Boom Sprayer. Make sure all persons are clear of working area.

▲ Do not turn tractor too tightly, causing Front Fold Boom Sprayer to ride up on wheels. This could cause personal injury or equipment damage.

▲ Use only water without pesticides added to calibrate the sprayer. Do not exceed the calibrated sprayer speed and pressure when operating.

▲ When using a PTO pump, be sure that PTO shield is in place on the tractor, PTO coupler bolts are torqued to the correct specification, and torque bar is properly chained to tractor drawbar.

▲ Spray with the boom in the unfolded position only.

▲ The boom has many pinch points during field operation and folding. Keep all bystanders away.

▲ Never use tank for potable water.
Safety Decals

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

▲ Read and follow decal directions.
▲ 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.

Slow Moving Vehicle Reflector
818-055C

Middle rear of center section; 1 total

Red Reflectors
(TSF1060 S/N A1237F-)
(TSF1260 S/N A1019G-)
838-266C

On the rear outside corners of boom frame; 2 total
Red Reflectors
(TSF1060 S/N A1238F+)
(TSF1260 S/N A1020G+)
838-266C

On center section of boom, rear face of lower tube on each side of SMV;
On rear face of each light bracket;
4 total

Amber Reflectors (Trailer)
838-265C

Main frame, outside faces, front and rear corners;
4 total

Amber Reflectors (Boom)
(TSF1060 S/N A1237F-)
(TSF1260 S/N A1019G-)
838-265C

Front corner faces of rear center tool bar,
Front outside corners of boom frame;
4 total
Amber Reflectors (Boom)
(TSF1060 S/N A1238F+)
(TSF1260 S/N A1020G+)
838-265C

On front face and outside face of each light bracket; 4 total

Daytime Reflectors
(TSF1060 S/N A1237F-)
(TSF1260 S/N A1019G-)
838-267C

Near outside corners of rear center tool bar; 2 total

Daytime Reflectors
(TSF1060 S/N A1238F+)
(TSF1260 S/N A1020G+)
838-267C

On rear face of each light bracket; 2 total
Danger: PTO Driveline
818-142C

Top of PTO shaft guard;
1 total

Danger: Driveline Shield Missing
818-187C

Top of PTO bearing mount guard;
1 total

Danger: Chemical Hazard
818-323C

Front face of mainframe left side;
On rear center boom frame;
2 total
Danger: Electrocution Hazard
818-367C

On rear of center section of boom; 1 total

Danger: Guard Missing
818-540C

Forward end of PTO driveline (visible only when in an unsafe condition); 1 total

Danger: PTO Driveline
818-552C

Rear end of PTO driveline (visible only when in an unsafe condition); 1 total
Danger: Crushing Hazard
818-864C

On rear face of elevator base (1);

On rear center boom frame (1);

On front face of center section of boom (2);
4 total
Warning: Negative Tongue Weight
818-019C

**WARNING**
NEGATIVE TONGUE WEIGHT HAZARD
Negative tongue weight can cause immediate elevation of tongue when unhitching implement.
To prevent serious injury or death:
- Always be certain implement is hitched securely to tractor drawbar before reaising.
- Lower implement BEFORE unhitching.

Left side of tongue; 1 total

Warning: Excessive Speed
818-188C

**WARNING**
EXCESSIVE SPEED HAZARD
Do Not exceed 20 mph maximum transport speed. Loss of vehicle control and/or machine can result.

To Prevent Serious Injury or Death:

Front left side of hitch; 1 total

Warning: Chemical Overflow Hazard
818-303C

**WARNING**
CHEMICAL OVERFLOW HAZARD
To Prevent Serious Injury or Death from chemical exposure:
- Keep chemical in safe storage when not in use.
- Use proper eye protection when in use.

On the optional inductor; 1 total
Warning: High Pressure Fluid Hazard
818-339C

Front left side of hitch,
at rear of center section of boom;
2 total

Warning: Overhead Boom
818-467C

On front of each inner wing section of boom;
2 total

Warning: Axle Adjustment
818-548C

Left center side of main frame;
1 total
Warning: Water Contamination
818-696C

![Warning: Water Contamination](image)

Center left tank frame;
1 total

Warning: Pinch Point
818-798C

![Warning: Pinch Point](image)

Rear facing on each center section pivot tubes (2);

At front and rear of hinge on each inner wing section of boom (4);

On front and rear faces of each boom breakaway section, and inside faces of end plates at boom breakaway sections (8)

14 total
Caution: General Checklist
818-324C

CAUTION
To Avoid Injury or Machine Damage:
- Read and understand owner’s manual before operating machine.
- Offer operator to remove BEFORE lifting operator seat.
- Do not transport operator with attachment in service lock. Ask operator of the risk.
- Never transport loader attachment fold pins and latches.
- Do not sit on seat.
- Keep hands, feet, and clothing away from moving chain and sprocket.
- Keep all safety shields and devices in place.
- Keep drive belt, fan, and shielding away from moving chain and sprocket.
- Never ride on machine.
- Always lower or properly support machine when changing hydraulic fluid.
- Always lower or properly support machine when changing tires.
- Always make sure the machine is equipped with a properly functioning automatic overload system.
- Always follow all safety instructions with all operators annually.

Front of tank, lower left; 1 total

Caution: Read Operator’s Manual
818-587C

CAUTION
- Read owner’s manual before operating machine.
- Stand clear when folding and unfolding markers.
- Stand clear when raising and lowering machine.
- Keep all safety shields and devices in place.
- Keep hands, feet, and clothing away from moving chain and sprocket.
- Never sit on seat.
- Always lower or properly support machine when changing hydraulic fluid.
- Always lower or properly support machine when changing tires.
- Always make sure the machine is equipped with a properly functioning automatic overload system.
- Always follow all safety instructions with all operators annually.

Front of tank, lower left; 1 total

Caution: Tire Pressure and Torque
818-381C

CAUTION
To Avoid Injury or Machine Damage from Improper Tire Inflation or Topping of Wheel Wells:
- Maximum inflation pressure for tires is 36 psi.
- Torque wheel bolts to 240 lb-ft.

14.9 R46 wheel rims; 0 or 2 total
Caution: Tire Pressure and Torque

818-365C (SN A1157F-)

**CAUTION**

- To avoid injury or damage, keep tires inflated to the correct pressure.
- Minimum inflation pressure for tires: 22 psi.
- Torque wheel bolts to 240 ft-lb.

13.6-38 wheel rims; 0 or 2 total

848-347C (SN A1158F+)

**CAUTION**

- To avoid injury or damage, keep tires inflated to the correct pressure.
- Minimum inflation pressure for tires: 32 psi.
- Torque wheel bolts to 280 ft-lb.

320/85R38 wheel rims; 0 or 2 total

**Safety: Handwash Tank Location**

818-304C

**HANDWASH TANK**

Top front of main tank; 1 total
Introduction

Great Plains welcomes you to its growing family of new product owners. Your Front Fold Boom Sprayer 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.

Document Family

<table>
<thead>
<tr>
<th>Document Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>500-642M</td>
<td>Owner’s Manual (this document)</td>
</tr>
<tr>
<td>500-642P</td>
<td>Parts Manual</td>
</tr>
<tr>
<td>509-200M</td>
<td>Application Guide</td>
</tr>
<tr>
<td>832-038C</td>
<td>Nozzle Calculator (U.S.customary units)</td>
</tr>
<tr>
<td>832-058C</td>
<td>Nozzle Calculator (metric)</td>
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Description of Unit

TSF1060 and TSF1260 are pull-type implements. They have a working width of 60 feet (18.3m). The level float boom is fully suspended starting with vertical spring suspension in a 42in (107cm) hydraulic elevator which provides a wide range of boom height adjustment along with gas shocks that provide side-to-side stability.

Intended Usage

Use these booms as part of a pressurized sprayer system to apply liquid pesticides, herbicides or fertilizers to production-agriculture crops only. Do not modify sprayer for use with attachments other than those approved by Great Plains.

Models Covered

<table>
<thead>
<tr>
<th>Model</th>
<th>Specification</th>
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<tbody>
<tr>
<td>TSF-1060-2530</td>
<td>1000 Gallon 60ft 25 Nozzles at 30in</td>
</tr>
<tr>
<td>TSF-1060-3620</td>
<td>1000 Gallon 60ft 36 Nozzles at 20in</td>
</tr>
<tr>
<td>TSF-1260-2530</td>
<td>1250 Gallon 60ft 25 Nozzles at 30in</td>
</tr>
<tr>
<td>TSF-1260-3620</td>
<td>1250 Gallon 60ft 36 Nozzles at 20in</td>
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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.

Definitions

The following terms are used throughout this manual.

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.

NOTICE

Paragraphs in this format present a crucial point of information related to the current topic.

Read and follow the directions to:
- remain safe,
- avoid serious damage to equipment and
- ensure desired field results.

NOTE:

Paragraphs in this format provide useful information related to the current topic.
Owner Assistance

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

Refer to Figure 2

Your machine’s parts were specially designed and should only be replaced with Great Plains parts. Always use the serial and model number when ordering parts from your Great Plains dealer. The serial-number plate is located on the left side of the cart frame below the front tank.

Record your sprayer model and serial number here for quick reference:
Model Number:__________________________
Serial Number: __________________________

Further Assistance

Great Plains Manufacturing, Inc. and your Great Plains dealer want you to be satisfied with your new product. 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.
Preparation and Setup

Before You Start

Read and understand the owners manual for your sprayer. A basic understanding of how the sprayer works will aid in the assembly, setup and operation of your sprayer.

Perform these checks before setting up your sprayer.

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” on page 70.
4. Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See “Safety Decals” on page 8.

Hitching Tractor to Sprayer

The standard TSF1060 and TSF1260 sprayers require a tractor with closed center hydraulics. If the tractor has open center hydraulics, the sprayer must be adapted to it with an open center conversion kit. See page 75.

Hitch Type

If the sprayer has a hydraulic pump, the hitch is a choice of single tang or clevis. Tang and clevis hitching instructions begin on page 22.

If the sprayer has a PTO pump, a ball hitch with hitch plate is standard. PTO hitching instructions begin on page 23.

**WARNING**

Negative Tongue Weight Hazard:
Do not unfold boom before hitching. When the tank is low or empty, unfolded booms can move the center of gravity aft of the wheels. This will cause the tongue to rise, with risk of personal injury and equipment damage.

**DANGER**

Crushing Hazard:
You may be severely injured or killed by being crushed between the tractor and sprayer. Do not stand or place any part of your body between sprayer and moving tractor. Stop tractor engine and set park brake before installing the hitch pin.

**DANGER**

Electrocution Hazard:
To prevent serious injury or death from electric shock, keep clear of overhead power lines when transporting, folding or unfolding boom. Boom is not grounded. Electrocution can occur without direct contact.
Hitching with Hydraulic Pump

Refer to Figure 3
A hydraulic pump sprayer has either a single tang or clevis hitch. To change the hitch type, see “Hitches (Hydraulic Pump Only)” on page 75 for ordering information. The clevis hitch may be inverted if necessary to obtain ideal hitch height.

Refer to Figure 4
1. Park the sprayer in an open, flat and level area with the jack in the park position.
2. Back the tractor up to the sprayer, and adjust the sprayer hitch height with the jack and/or adjust the tractor hitch height. Back the tractor until the hitches align.
3. Insert the hitch pin and secure.

Refer to Figure 4 and Figure 5
5. Remove the parking jack and pin it to the storage stob on the brace tube above the left wheel axle.
Hitching with PTO Pump

Refer to Figure 6

A PTO pump sprayer has a ball hitch. The hitch parts include a hitch plate and ball hitch pin to adapt a plain tractor drawbar (1) to ball hitch use.

If the tractor already has a ball hitch-compatible drawbar, skip to step 6.

1. Remove the hammer-strap on the tractor.
2. Assemble the ball hitch plate (2) to the drawbar by placing the 1-8 x 5-inch long bolt (3) through the drawbar hole using flat washers on both ends.
3. Place the backup plate (5) on top of the drawbar and orient the slots so they point in the opposite directions from the hitch plate (2) slots.
4. Insert the $\frac{3}{4}$-10 x 5-inch long bolt (4) through washers, the backup plate (5) slots and the hitch plate (2) slots. Secure with washers and flange nuts provided.
5. Insert the ball hitch pin stud (6) in the hitch plate (2) and secure with washer and $1\frac{1}{4}$-7 nylon insert nut.
6. Park the sprayer in an open, flat, level area with the jack in the park position.

Refer to Figure 7 and Figure 8

7. Back the tractor up to the sprayer. Hook up the sprayer ball hitch onto the stud pin (6) mounted on the ball hitch plate (2). Secure the ball hitch with the large flat washer (8) and the lynch pin (7).
8. Remove the jack and pin it to the storage stob on the brace tube above the left wheel axle.

Axle Spacing

The TSF sprayers have sliding axles allowing wheel center-lines to be in the range:

- North America: 80 to 120 inches (203 to 305cm)
- Export: 203 to 290cm (80 to 114in).

You can set them to match or complement tractor tire spacing.

This adjustment is most easily done when the sprayer is mechanically hitched with empty tanks. See “Axle Wheel Spacing Adjustment” on page 57 for detailed instructions.
Hydraulic Hookup

The standard sprayer has a single hydraulic connection at the hitch. Each cart hydraulic function is served by an electro-hydraulic control valve at boom center.

If an optional hydraulic pump is installed, there is a second hydraulic connection for the pump, which is located near the hitch.

Refer to Figure 9

Each hose set has a label for flow conventions. The label uses cylinder Base/Extend and Rod/Retract icons.

Be sure to connect these to the matching tractor remotes, so that when remote levers are activated as described in this manual:

a. booms move in the described directions, and
b. pump flow is forward and not reversed.

Sprayer Control Hydraulic Hookup

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

1. Connect the main sprayer hydraulic hoses to suitable tractor remotes. They are easily identified, as they pass behind the pump.

Hydraulic Pump Hookup

The hydraulic motor used on all liquid pumps is a 7 gpm (23 liter/min.) motor. If the tractor used on the sprayer 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.

Refer to Figure 10

2. The pressure hose coming out of the tractor remotes must be connected to the motor inlet port (“I” on current pumps; “A” on older pumps, Base end on hose label), and the return line connected to the motor outlet (“O” on current pumps, “B” on older pumps, 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’s operator’s manual or tractor dealer on information for the neutral stop.

NOTE:
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.

See page 29 for setting flow rate.
Tractor / PTO Shaft Hookup

DANGER

Entanglement Hazard:
Rotating driveline contact can cause death. KEEP AWAY! Shut down tractor when making connection. Do not operate without guards attached and driveline securely attached at both ends.

1. Verify that the tractor drawbar height, and tractor PTO-to-drawbar spacing, are within ASAE standards, or as shown on page 26.
2. Position the PTO pump on the tractor's PTO shaft with the coupler bolt removed on the splined end.
3. Push the coupler of the pump on to align with notch in the tractor PTO shaft and install bolt.
4. For a 540 rpm pump or a 1000 rpm 1 3/8-inch spline pump, torque the 1/2-inch Grade 8 coupler bolts to 105 ft-lbs.
5. Rotate the PTO shaft by hand to make sure the bolts clear the PTO shielding.
6. Attach the torque bar chain to the drawbar securely.
7. Hook the tarp strap in such a way that the slack in the chain is taken up slowly when the PTO is engaged so the torque bar does not bang.
8. Tie up any loose hoses with cable ties to prevent hose damage.

Refer to Figure 11

9. If ASAE dimensions can be maintained, re-adjust the tractor drawbar so that the implement end of the driveline centerline, at the bearing housing is level with or slightly higher than the output centerline at the tractor. This reduces driveline vibration when turning a corner.

Refer to Figure 12

10. If insufficient (or no) hitch adjustment is available, adjust the rear driveline height by loosening the four bolts (4) securing the pump mount.

NOTICE

If, after adjusting the vertical position of the pump drive-shaft, the drive-shaft is still much higher than the PTO drive-shaft on the tractor, adjust the hitch up one position and readjust the pump drive-shaft. See “Leveling Sprayer” on page 26.
Leveling Sprayer

Refer to Figure 13

Check and adjust this only when hitched on level ground.

For proper tank drainage and correct boom height control, the tank mainframe must be sloped forward in operation at an angle of one to two degrees (1).

ASAE standards call for the top of the tractor drawbar (2) to be 13 to 20 inches (33 to 51cm) above ground.

Using a level, and yardstick or meter stick, check along the tank frame. The forward end of the measuring stick would be lower than the back end by:

- yardstick: $\frac{3}{4}$ inch
- meter stick: 2 cm

Level may be adjusted either at the hitch, or at the tongue-to-frame joint (3), or both.

If a PTO pump is present, the hitch height adjustment range may be limited. If adjustments are made for PTO alignment, level needs to be re-checked, and may need adjustment at the tongue-mainframe joint (3).

**Hitch Height**

(2) Drawbar Height 13 to 20 inches 33 to 51cm
(4) PTO-to-Drawbar 6 to 12 inches 15.2 to 30.5cm
(5) 540 PTO Setback 14 inches 35.6cm
(6) 1000 PTO Setback 16 inches 40.6cm

With a hydraulic pump sprayer, make leveling adjustments at the tractor hitch (if possible). Keep the tractor drawbar height within the ASAE recommended range (13-20 inches, 33-51cm).

With a PTO pump, make leveling adjustments at the hitch, but only if:

- both drawbar height (2),
- PTO output to drawbar spacing (4) can be kept within recommendation - and
- the PTO input at the bearing mount (see Figure 11 on page 25) can be kept at or slightly above the height of the PTO output.
Frame Level Adjustment

**CAUTION**
Block the wheels, and use a hoist or multiple jacks for this adjustment. Do not remove the adjustment bolts until the front end of the tank mainframe is fully supported. Do not remove the rear pivot bolts.

Refer to Figure 16 (shown with the tongue removed for clarity - do not remove the tongue for adjustment)

The tongue can pivot about a pair of rear bolts (1), when the forward adjustment bolts (2) are removed. Two plates (3) with staggered hole patterns permit re-securing the tongue over a range of angles.

1. Securely support the front of the tank mainframe with a hoist or multiple jacks and stands.
2. Remove both adjustment bolts (2).
3. Adjust the hoist or jacks up or down until the mainframe is as close as possible to the desired one degree forward tilt angle.
4. Re-insert and securely fasten the adjustment bolts (2). Torque these $\frac{3}{4}$-10 Grade 5 bolts to the chart “Torque Values” on page 79.

Leveling Boom

**WARNING**

Pinch Point Hazard:
Your fingers, hands or arms could be seriously injured or severed if caught in the folding boom sections. Shut off tractor and remove key before adjusting shims.

 NOTE:
The boom sections must be level across the span for even spraying.

Refer to Figure 17 and Figure 18

To adjust the inner arm:
1. Unfold the boom. See page 49.
2. Place supports under boom.
3. Loosen bolts holding the plates at the top of the pivots, located between the center section and the inner boom arms.
4. Add or remove shims as necessary. Additional shims are available from Great Plains (part number 506-826D).
5. Retighten bolts.
Locking System Setup

Refer to Figure 19

The TSF1060 and TSF1260 have a locking system for automatic boom locking during folding and transport. For proper folding, the boom-lock cable must be tight enough that the lock arms just clear their stops when unfolded and rest secure against the stop when folded.

Refer to Figure 20

To adjust the tension on the boom-lock cable, loosen jam nut and turn clevis.
Re-tighten jam nut.
Hydraulic Pump Setup

The hydraulic motor used on all liquid pumps is a 7 gpm (23 liter/min.) motor. If the tractor used on the sprayer 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.

1. Connect the hydraulic pump to the tractor remotes. See “Hydraulic Pump Hookup” on page 24 for details. If no limiter is required, skip to step 7.

**NOTICE**

*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.*

Ace Pump Flow Limiter (Option)

The flow limiter (Great Plains part number 829-125C) is a hydraulic device designed to shut off the flow of hydraulic oil when a specified flow is exceeded. On tractors with load sensing closed center hydraulic systems, this device limits the flow of oil to the Ace motor and prevents failures due to misapplication.

Newer Case-IH, John Deere, New Holland, and CAT tractors, present a great potential to turn the motors beyond their rated speeds. Flows out of the hydraulic valves can exceed 20 gpm while the motors are rated at 4-11 gpm. The flow limiter protects the Ace motor by shutting off when hydraulic flows exceed the motor’s capacity.

The flow limiter should not be used on open center or pressure compensating closed center hydraulic systems. The flow limiter should not be used with a restrictor orifice.

**Flow Limiter Installation**

2. Install the flow limiter in the inlet port of the Ace motor.
3. Shut off boom and agitation valves on the sprayer to deadhead the sprayer pump flow.
4. Adjust the flow control on the tractor to the minimum flow setting (typically a “turtle” icon).
5. Move the hydraulic lever to the lower/retract position.
6. Adjust the flow control on the tractor until the sprayer system deadhead pressure is 80 psi.
   
   If the flow limiter stops the flow of oil to the motor:
   
   a. Move the hydraulic lever to the neutral position. This removes the oil pressure from the flow limiter and allows it to reset.
   b. Adjust the flow control to a lower flow position.
   c. Repeat step 5 and step 6.

Setting Pump Rate

7. To determine the correct setting of the flow rate, start out with the hydraulic flow control valve at minimum flow for the outlets that operate the pump.
8. With water in the sprayer tank and in the pump, place the hydraulic lever in the float position.
9. Open up the sprayer flow control valve to its maximum setting.
10. On the Raven SCS 440 monitor, with the power switch on, the rate switch must be placed in the manual position, and the increase/decrease switch must be pushed to increase for 10-12 seconds.
11. Start the tractor and engage the pump by placing the hydraulic lever in the down (forward) position.
12. Once the system builds pressure, close the agitation valve, shut off the boom section switches, and close the throttling valves (if applicable).
13. Open up the agitation valve and reset the throttling valve (if applicable). See “Manual Throttle Valve” on page 30.
PTO Pump Setup

1. Open up the sprayer control valve to the maximum setting.
   On the Raven SCS 440 monitor, with the power switch on, the rate switch must be placed in the manual position, and the increase/decrease switch must be pushed to increase for 10-12 seconds.

2. Start the tractor and engage the PTO pump slowly with the tractor engine idling. Once the system builds pressure on the nozzle pressure gauge, shut off the boom section switches, and close the agitation valve.

3. The pump is now at deadhead pressure. Increase the engine rpms until the spray pressure reaches 80 psi maximum on the nozzle pressure gauge or the PTO speed reaches the rated rpm (540/1000). Never exceed the rated tractor PTO rpm. This is the rpm needed to spray at to prevent excess pressure on the sprayer’s plumbing.

4. Open up the agitation valve.

Manual Throttle Valve

When the manual throttle valve is full open (valve (23) in Figure 28 on page 39), the pressure adjustment can be very sensitive. The butterfly valve (16) has to move more often causing additional wear.

To decrease the sensitivity, set the manual throttle adjustment valve as follows:

1. Open the throttle valve so that it is wide open and there is full flow to the sprayer booms. Open the butterfly valve until it is full open.

2. Close the throttle valve down until the pressure is about 20 psi greater than the pressure you intend to spray at. Spraying pressure is determined when calibrating sprayer. Refer to the Application Guide.

With this valve set, it decreases the flow through the electric ball valve and reduces the sensitivity of the pressure adjustment switch.
Electrical Connections

For a new sprayer (or moving to a different tractor), first complete tractor electrical installation, and installation of any sprayer options not factory- or dealer-installed.

<table>
<thead>
<tr>
<th>Lights</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raven Controller</td>
<td>Standard</td>
</tr>
<tr>
<td>Electro-Hydraulics</td>
<td>Standard (two connectors)</td>
</tr>
<tr>
<td>Foam Marker</td>
<td>Optional</td>
</tr>
<tr>
<td>Raven G1 Autoboom</td>
<td>Optional</td>
</tr>
<tr>
<td>Wheel Sensor</td>
<td>Optional</td>
</tr>
<tr>
<td>Radar Sensor</td>
<td>Optional - routine hook-up necessary only if sensor is mounted on sprayer</td>
</tr>
</tbody>
</table>

Lights

Refer to Figure 22

The lights and harness are standard, and pre-installed on the sprayer, but require the common SAE J560B 7-pin receptacle on the tractor. If your tractor doesn't have this connector, your dealer can assist you with the installation of one.

Raven SCS 440

The Raven SCS 440 (Sprayer Control System) is standard, and the sprayer-side components (other than speed sensor) are pre-installed.

The SCS 440 system consists of a computer-based control console, a speed sensor, a turbine type flow meter and a motorized control valve. The console mounts directly in the cab of the tractor for easy operator use. The radar speed sensor is mounted to the frame of the tractor or sprayer (wheel drive and speedometer drive speed sensors are also available.) The motorized control valve and flow meter mount to the framework supporting the boom valves. Appropriate cabling is furnished for field installation.

The controller module must be installed in the tractor cab prior to first use, and must be connected to one or more tractor systems, including:

- battery power (red:+, black:-)
- existing or new speed sensor, if tractor-mounted (and if new tractor mount, the sensor must be installed)

Your Great Plains dealer can assist with the installation. A Raven installation and service manual are provided.

Once installed and connected for the first time, setup and calibration steps are necessary prior to first field operations. See “Sprayer Calibration” on page 34.

It is important to read and understand the Raven manual before operating the system.
The operator sets the target volume per area to be sprayed and the SCS 440 automatically maintains the flow regardless of vehicle speed or gear selection. A manual override switch allows the operator to manually control flow for system check-out and spot spraying. Actual volume per area being applied is displayed at all times. The SCS 440 additionally functions as an area monitor, speed monitor and volume totalizer.

**Raven Setup**

Current TSF1060 and TSF1260 sprayers include a Raven SCS 440 controller as standard equipment. The controller needs to be installed in the tractor cab, and cables run to the sprayer, speed sensor and battery prior to first use. Consult the included Raven manual for installation instructions.

The SCS 440 requires some initial data about your sprayer and tractor prior to first use. This data is retained as long as the SCS 440 remains connected to battery power. If power is removed for electrical work, long term tractor parking or welding, the data is lost and must be re-entered.

Consult the Raven manual for display interpretation and keyboard procedures.

The following data is needed for Raven setup:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>BOOM CAL</th>
<th>SPEED CAL</th>
<th>METER CAL</th>
<th>VALVE CAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSF-1060-2530</td>
<td>1000 Gallon 60 foot 30in spacing</td>
<td>750in (1905 cm)</td>
<td></td>
<td>Cable Tag(^a)</td>
<td>Body Label(^b)</td>
</tr>
<tr>
<td>TSF-1060-3620</td>
<td>1000 Gallon 60 foot 20in spacing</td>
<td>720 in (1828 cm)</td>
<td></td>
<td>Cable Tag(^a)</td>
<td>Body Label(^b)</td>
</tr>
<tr>
<td>TSF-1260-2530</td>
<td>1250 Gallon 60 foot 30in spacing</td>
<td>750in (1905 cm)</td>
<td></td>
<td>Cable Tag(^a)</td>
<td>Body Label(^b)</td>
</tr>
<tr>
<td>TSF-1260-3620</td>
<td>1250 Gallon 60 foot 20in spacing</td>
<td>720 in (1828 cm)</td>
<td></td>
<td>Cable Tag(^a)</td>
<td>Body Label(^b)</td>
</tr>
</tbody>
</table>

\(^a\) This value is printed on a durable tag attached to the meter cable.

\(^b\) This value, typically “2123”, is printed on the label on the valve body.
Hydraulic Valve Control

Refer to Figure 24
Install the Fasse valve switch box in a convenient location in the tractor cab.

The Fasse controller requires a connection to the tractor battery. Use the 6-foot, two-wire red and black cable to connect the hydraulic controls. Connect the red wire from each cable to the positive terminal and the black wire from each cable to the negative terminal.

If no foam marker is installed, one 4-pin connector (1) is not used.

Foam Marker Control (Option)
This option includes a separate installation and operation manual.

If ordered with the sprayer, the foam marker is factory-installed and cabled to the Fasse harness.

Raven G1 AutoBoom (Option)
This option includes a separate installation and operation manual.

Refer to Figure 25
Dealer installation of the AutoBoom normally includes on the sprayer-side components. Install the controller module at a convenient location in the tractor cab.

Connect the unterminated ends of the power lead (1) to a switched source of 12Vdc power (black-, red+).

Route the control harness (2) to the hitch.
Spraying Setup

1. Securely hitch the sprayer to the tractor and fasten the safety chain. Make sure the hitch is adjusted for one to two degree forward tilt of the tank (front of sprayer tank frame is about 1 1/2 inch (3.8 cm) lower than the rear) so that liquid in the tank will drain to the sump.
2. Fill sprayer tank half full with clean water for calibrating purposes.
3. Hook-up the pump to the tractor. Engage the pump slowly and check for any leaks.
4. Set the deadhead pressure of the pump at 80 psi depending on how the pump is driven. See “Setting Pump Rate” on page 29 or “PTO Pump Setup” on page 30.
5. Calibrate sprayer.

Sprayer Calibration

Do not calibrate with actual agricultural chemicals. There is extreme hazard in sample collection, and excess material would be applied where the sprayer is parked. Instead, rely on the Rate Controller monitoring, and observed tank consumption rate over the acres/hectares applied.

Sprayer calibration prepares your sprayer for operation and diagnoses nozzle wear. This gives you optimum performance from your nozzles and ensures accurate application.

Equipment that may be needed:
- Calibration Container (see page 74 for replacement part numbers)
- Great Plains Nozzle Tip Calculator: 832-038C - U.S. customary units (English), or 832-058C - Metric (English/Russian legends)
- General calculator
- Stopwatch or wristwatch with second hand.

Speed Calibration

Current TSF1060 and TSF1260 sprayers include a Raven SCS 440 controller as standard equipment, and the SCS 440 requires a speed sensing input, a new or existing wheel sensor, or radar.

For a sprayer with the Raven SCS440 controller, perform the speed calibration procedure from the Raven SCS 440 manual, then resume at “Rate Calibration” on page 35 in this manual.

For a sprayer without a Raven controller, use the following steps.

1. Measure off a 200 foot (or 100 meter) course in the area to be sprayed or in an area with similar surface conditions.
2. Select the engine throttle setting and gear that will be used when spraying. Allow ample approach distance to starting point so that tractor is at desired speed at start marker. Allow ample overrun area so that braking is not needed until exiting the course.
3. Hold the speed as you approach the start marker, and check the time required to travel through the course to the end marker.
4. Repeat the above procedure, and average the times that were recorded. Use these equations to determine the trial ground speed.

\[
\text{mph} = \frac{\text{Course Feet} \times 60}{\text{Elapsed Seconds} \times 88}
\]

\[
\text{kph} = \frac{\text{Course Meters} \times 3.6}{\text{Elapsed Seconds}}
\]

Example:
27 seconds over a 200 ft course

\[
\frac{200 \times 60}{27 \times 88} = 5.05
\]

Speed: 5.05 mph
Rate Calibration
Current TSF1060 and TSF1260 sprayers include a Raven SCS 440 controller as standard equipment, and the SCS 440 system includes a flow rate sensor in the boom plumbing. This supports direct real-time readout of the current application rate.

For a newer sprayer, perform the rate calibration procedures from the Raven SCS 440 manual.

For an older sprayer without an SCS 440, perform the following steps.

1. Determine the nozzle rate of gallons or liters per minute (gpm or lpm) at which your chemical should be sprayed. In determining the rate, and which spray nozzles to use with your sprayer, you need to know:

2. Using this information, calculate the nozzle rate, per nozzle, per a formula below:

\[
gpm = \frac{gpa \times mph \times NozzleSpacing}{5940}
\]

\[
lpm = \frac{lpha \times kph \times NozzleSpacing}{60000}
\]

Example:
Nozzle Spacing: 20 inch
Speed: 5.05 mph
Pressure: 30 psi

\[
\frac{20 \times 5.05 \times 20}{5940} = 0.34
\]

Nozzle Rate = 0.34 gallons per minute

Using 0.34 gpm and 30 psi pressure, select a nozzle from your nozzle chart that comes closest to providing the desired output.

3. Turn on your sprayer and adjust the pressure.

4. While operating the sprayer at desired pressure, catch the discharge in the calibration container for one minute. For U.S. customary units, divide the number of ounces caught by 128 to determine gallons per minute (gpm) per nozzle. 128 fluid ounces equals one gallon.

\[
gpm = \frac{OuncesPerMinute}{128}
\]

Example:
Sample: 44 U.S. fluid ounces in 1 minute

\[
\frac{44}{128} = 0.34
\]

Nozzle Rate = 0.34 gallons per minute

5. Check the area rate. You need the nozzle spacing (inches or cm) from the sprayer, the intended field speed, and the nozzle gpm or lpm.

\[
gpa = \frac{gpm \times 5940}{mph \times NozzleSpacing}
\]

\[
lpha = \frac{lpm \times 60000}{kph \times NozzleSpacing}
\]

The above procedure assures you of accurate application in the event there is an error in the gauge, nozzle spacing, nozzle height, tractor speed or nozzle wear.

Since all tabulations are based on spraying clean water, conversion factors must be used when spraying solutions which are heavier or lighter than water, or which significantly change the viscosity of water. Consult material supplier documents for assistance.

If sprayer is equipped with a Raven SCS 440 Automatic Rate Controller, this simple calibration procedure will also work for verifying speed and proper nozzle output.

All Raven SCS 440 Control Systems require either wheel drive speed sensor magnets or a radar speed sensor. Calibration procedures for the speed sensor magnets can be found in the Raven SCS 440 manual. Calculation procedures for radar speed sensors are included with each radar unit dependent on make and model. Make sure to follow initial programming instructions from the Raven manual to select either SP1-(wheel drive sensor) or SP2-(radar sensor).
Operating Instructions

General Notes For Field Operation

**DANGER**

*Chemical Hazard:*
Read and follow chemical manufacturer’s instructions. Some chemicals and cause serious burns, lung damage and even death.

1. Lubricate the sprayer as needed. See “Lubrication” on page 70.
2. Check the tire pressure in each tire. See “Tire Inflation Chart” on page 78.
3. Securely hitch the sprayer to the tractor and fasten the safety chain. Make sure the hitch is adjusted so that the tank contents drain to the sump of the tank. See “Hitching Tractor to Sprayer” on page 21.
4. Hook-Up the pump to the tractor. See “Hitching Tractor to Sprayer” on page 21.
5. Fill the handwash tank with clean water. Have soap available to wash any exposed areas.
6. Check and clean, if necessary, pump, nozzles and Whirlfilters®.
7. Check the sprayer initially and periodically for loose bolts, pins and hose clamps. Check the hoses, pumps, valves and fittings for leaks.
8. When transporting the sprayer, DO NOT exceed 20 mph/32 kph and DO NOT transport with chemical in the tank.
9. NEVER allow anyone to ride on the sprayer.

**At the Field**

10. Make sure all tank shut off valves are turned on.
11. Calibrate sprayer with a half tank of water only, not chemical and water. Refer to the calibration procedures in the Application Guide.
12. Adjust the boom height required for the nozzles and spacing to be used. (Refer to nozzle tables in the Application Guide.)

**NOTICE**

Make sure to read the label on the chemical compound that is to be applied. It is the law.

13. Consider how the chemical will be stored and how you will dispose of the chemical, according to the chemical label.
14. When calibrating, filling the tank, or working around chemicals, wear protective clothing that covers the body. See “Wear Protective Equipment” on page 2. Never open a container with your bare hands.

15. When filling the sprayer, it is better to mix the chemical in the field where it is to be applied. Position the sprayer 100 feet (30m) from any well or other water source before mixing the chemical.
16. Safely and carefully add the chemical to the sprayer tank. By law rinsing of the used chemical container must be repeated three times. The container should then be punctured to prevent future use. An alternative is to jet-rinse or pressure rinse the container. When adding chemical, remain at least 100 feet from any water well or fresh water source. Follow chemical manufacturer’s recommendations for safe handling of chemicals.
17. Take note of adjoining crops, houses, gardens, people, etc.
18. Apply spray when the wind is 5 mph/8 kph or less. Minimize drift. Use nozzle tips with the largest practical openings. Operate the sprayer boom at the lowest practical height and lowest practical pressure.
19. If possible, work crosswise to the wind, starting from the downwind side of the field. This will prevent heading directly into the chemical fumes.
20. Drive at the same speed you used in your calibration. Refer to Application Guide. Keep your sprayer calibrated.
21. When turning at the end of a field, make sure you are correct on the rows so that the boom will not overlap on crop previously sprayed.
22. Check the condition of hoses and connections frequently. Release system pressure before working on the sprayer by shutting off the pump and flipping the individual boom section switches on the control box. Always wear rubber gloves when making repairs or adjustments.
23. When you are finished spraying, empty the tank and flush the sprayer with water, including the pump, the nozzles and the bypass line from the throttling valves. Properly store the chemical emptied from the tank or dispose of it per label recommendations.
Operating Checklist

Each time the sprayer is used, check the following:

- Check sprayer tire pressure, wear and overall condition.
- Check the tractor’s brakes to make sure they operate properly.
- Make sure all lights and turn signals are working properly.
- Lubricate sprayer as needed.
- Booms must be locked in place before transporting.
- Inspect tank. Make sure the hitch is adjusted so that the solution drains to the sump.
- Use safety equipment as listed on page 2.
- Fill with water and calibrate sprayer BEFORE adding chemical to the tank.
- Check the position of the ball valves in the plumbing to see if they are in the correct position.
- Check hoses, pumps and valves for any leaks.
- Check nozzle pattern for streaks and non-uniformity.
- Check the sprayer initially and periodically for loose bolts and pins.
- Follow “Important Safety Information” on page 1 of this Manual.
- Make sure the handwash tank is full of clean water.

Using Handwash Tank

In the event of an accidental spill of chemicals on skin or in eyes, use the handwash rank to flush away chemicals.

1. Make sure all persons working with or near the sprayer know where the tank is located and how to use it. In the event of a spraying accident, it may be necessary to find and operate the wash line with impaired vision.

2. Open the tank valve and use the hose to direct the clean water on all contaminated areas. Wash all contaminated areas of skin with soap and water. To flush chemicals from eyes, point the hose and water stream upward while lowering eyes into the stream of flowing water.

3. Close the tank valve and refill the handwash tank. See “Filling Handwash Tank” on page 41.

4. Periodically empty and refill the handwash tank with clean water.
Plumbing Overview

Refer to Figure 28

A basic knowledge of how the sprayer is plumbed helps you understand how to operate your Great Plains sprayer. Throughout this manual, the components on this diagram are described with the terminology labeling these components.

Five of the valves are labeled on the sprayer decals.

1. Agitator Selector Valve
2. Pump Inlet (Tank) Selector Valve
3. Fill/Spray Selector Valve
4. Product Valve (Tank Fill vs. Induct)
5. Inductor Valve (On/Off)

Other key components are:

10. Main Tank
11. Flush Tank
12. Main Tank Sump
13. Pump
14. Solution Whirlfilter®
15. Flow Meter
16. Bypass Control Butterfly Valve
17. 3-Way Boom Manifold Valves
18. Agitation Gauge
19. Inductor
20. Main Inlet Quick Connect
21. Main Inlet Filter
22. Flush Tank Inlet Quick Connect
23. Manual Throttle Valve
24. Agitator Inlet Shutoff Valves (Normally Open)
25. Main Inlet Shutoff (Normally Closed)
26. Flush Tank Inlet Shutoff (Normally Closed)
27. Main Tank Sump Shutoff (Normally Open)
28. Whirlfilter Cleanout Shutoff Valve (Normally Closed)
29. Inductor Outlet/Tank Inlet Shutoff Valve (N.Open)

Valves operate by moving their handles to point at the function on the decal, or toward the pipe desired on an otherwise unmarked selector valve. Shut-off valves are open when the handle is parallel to the piping, and closed when the handle is perpendicular.

Fluid is drawn from the main tank (10) via the sump (12) and passes through the pump (13). The illustration shows an Ace hydraulic pump, but your pump may be PTO or a non-standard installation.

From the pump, fluid passes through the solution Whirlfilter® (14), which filters out or grinds up all undissolved chemical and solid particles. The fluid then passes through both the flow meter (15) and the bypass control butterfly valve (16).

The bypass control butterfly valve (16) controls how much fluid goes to the boom. This is regulated by the Raven SCS 440 controller. The fluid passes through the flow meter (15) and proceeds to the 5-way boom manifold (17) valves. If a boom valve is on, the fluid passes to its respective boom section and is sprayed out the individual nozzles. See page 82 for a layout of the boom plumbing.

The agitation is set by adjusting the agitation pressure valve (1) while the pump is at operating speed. Refer to Application Guide to adjust the agitation.

The optional inductor (19) provides convenient pump-driven loading of concentrates into the main tank.

There are tank shut off valves (30 - 35) at each inlet and outlet. Use these to prevent spills and isolate any leaks.

To operate a correctly connected hydraulic pump, push the hydraulic lever in the down position. When you want to stop the pump, put the hydraulic lever in the float position.

**NOTICE**

Do not move the hydraulic lever to the neutral position while the hydraulic pump is running. To do so may cause damage to the hydraulic pump.
Figure 28
Sprayer Tank Plumbing
Figure 29
Boom Plumbing System
Filling Tanks
Always fill the handwash tank first.

Filling Handwash Tank

**NOTICE**

Use only potable or distilled water in the handwash tank. In the event of a chemical accident, it may be necessary to spray this water into your eyes.

Keep the handwash tank clean, and free of mold and fungus. After a period of storage, scrub the inside using a mild detergent. Rinse thoroughly.

Plug or cap the hose when parked or stored, to prevent pests from entering, nesting and plugging the hose. Test the valve and hose when filling.

To fill the handwash tank:

**Refer to Figure 30**

1. Open the filler cap (1) and inspect the condition of the tank interior. If any debris, sediments, deposits or growths are seen, scrub and rinse the tank before use.

2. Unplug/uncap the hose and open the valve (2).

3. Begin adding clean water at the filler.
   - If water flows freely out the hose, close the valve.
   - If water does not flow freely out the hose, stop adding water, and clear the obstruction.

4. Close the valve and complete filling the tank.
Filling the Flush Tank

The rinse/flush tank fills from the bottom of the tank and uses a standard 2 inch Cam-Lock coupler (22), located on the valve control panel, to connect to the freshwater hose.

The flush tank fill line is not connected to the sprayer pump. A supply pump or pressurized water source is required to fill the flush tank.

The tank lid is vented and does not need to be opened for any tank operations other than inspection and cleaning.

To fill the flush tank:

Refer to Figure 31 and Figure 28 on page 39.

1. Check that the handwash tank is full.
2. Check that all shutoff and cleanout valves are in their "normal" positions for field operations.
3. Close the ball valve (32) at the flush tank inlet.
4. Set pump inlet selector valve (2) to MAIN TANK.
5. Connect the supply hose to the quick-fill Cam-Lock coupler.

NOTE:
If using a positive-displacement pump, open the inlet valve (32) before starting the pump.

6. Turn on the water supply.
7. Open the quick-fill ball valve (32).
8. Stop filling by first stopping the pump, then closing the inlet valve (32).

Filling the Main Tank

Inspect Main Tank Quad Jets

The main tank has two 4-port nozzles at the bottom. A portion of the materials to be applied are recirculated through these jets to evenly mix the chemicals and keep insoluble components in suspension.

Before adding water to the main tank, inspect the quad ports to see that their nozzles point toward the tank corners.

If the nozzles are not correctly aligned, see “Quad-Jet Agitators” on page 68 for adjustment instructions. Follow the instructions carefully, as tank entry may be required, and can be extremely hazardous.
Adding Water to Main Tank

**CAUTION**

When filling the sprayer tank, use a check valve or anti-siphon device to prevent the solution in the tank from infiltrating into the fresh water source and contaminating it.

**NOTICE**

Never add chemicals to an empty tank. Add chemicals at the field. See page 45.

**NOTICE**

The tank straps that wrap around the sprayer tank may become loose after the first few hours of operation. This occurs when the tank settles in the saddle. Polyethylene tanks are especially susceptible to this. Retighten the tank straps to secure the tank.

Refer to Figure 33, Figure 34, page 38 and Figure 28 on page 39.

The main tank fills from the bottom of the tank and uses a standard 2 inch Cam-Lock coupler (20), located under the walkboard, to connect to the freshwater hose. The sprayer must be hitched to the tractor for this operation.

The tank lid is vented and does not need to be opened for any tank operations.

To fill the tank:

1. Check that the handwash tank is full.
2. Check that all shutoff and cleanout valves are in their normal positions for field operations. Set all boom switches to OFF.

**Main Fill Using Sprayer’s Pump**

The sprayer’s own hydraulic or PTO pump is a centrifugal type, and may be run with downstream valves closed. It may require priming if the water level at the source has no pressure and is below the sprayer.

3. Close the ball valve (31) at the main tank inlet.
4. Set panel valve (1) to OFF.
5. Set panel valve (2) to MAIN TANK.
6. Set inductor valve (4) to TANK FILL.
7. Connect the supply hose to the quick-fill Cam-Lock coupler (20).
8. Turn on the water.
9. Open the quick-fill ball valve (31).
10. Start the sprayer pump.
11. Stop filling by first stopping the pump, then closing the inlet valve (31).

**NOTE:**

Use of the sprayer’s own pump to fill the tank is possible only when the optional inductor is installed. Tank Fill relies on valves and plumbing supplied with the inductor.
Main Fill Using Supply Pump

**WARNING**

If relying on gravity, make sure the supply tank is higher than the sprayer tank.

If relying on an external pump, make sure there is sufficient pressure at the tank inlet (nominally, at least 10 psi).

Failure to do so can cause back-flow from the sprayer tank causing sickness, serious injury or death from water contamination.

Refer to Figure 35

**NOTICE**

If the supply pump at the water source is a positive displacement type, do not start it until after opening the ball valve (31) at the inlet.

1. Close the ball valve (31) at the main tank inlet.
2. Set panel valve (2) to MAIN TANK.
3. Set panel valve (3) to SPRAY.
4. Connect the supply hose to the quick-fill Cam-Lock coupler (20).
5. If using gravity or a pump that is not positive displacement, turn on the water source.
6. Open the quick-fill ball valve (31).
7. If using a positive displacement pump, turn it on.
8. When the tank is filled to the required level:
   - If using gravity or a pump that is not positive displacement, close the inlet ball valve (31), then shut off the water source.
   - If using a positive displacement pump, shut off the pump, and then close the inlet ball valve (31).
Adding Chemicals

Chemicals may be added at the tank top, or by using the optional inductor.

1. Check that the handwash tank is full of fresh potable or distilled water.

2. Before you add the chemical to the tank, make sure the tank is at least one half full of water. Never add chemicals to an empty tank. Do not add water after adding chemicals. Make sure the freshwater hose is disconnected and the inlet shutoff closed.

3. Check that all shutoff and cleanout valves are set to their normal field positions. Set all boom switches to OFF.

4. Park the sprayer so that you will be facing downwind when adding chemicals at the lid or at the inductor.

5. Keep the spray solution away from all skin. Wear protective clothing and goggles. If the solutions comes in contact with the body, wash off the contaminated area with soap and water.

6. Do not smoke while handling chemicals.

7. Store or dispose of unused chemicals as specified by the chemical manufacturer.

8. 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.

**CAUTION**

Do not add chemicals until you are at the field, just prior to spraying. When you add a chemical, follow the manufacturer’s instructions for mixing the spray solution in order to achieve the desired application rate.

**CAUTION**

Read the manufacturer’s label carefully before handling chemicals.

If using liquid fertilizer, or any other chemical corrosive to brass, install a Great Plains 507-034V gauge protector at the inlet of the agitation gauge (18). Failure to do so results in corrosion, eventually causes the gauge to fail, and chemical then leaks under pressure from the gauge.
Inducting Chemicals (Option)

**WARNING**

Chemical Overflow Hazard:
To prevent serious injury or death from chemical overflow, keep inductor tank valve closed when not in use. Run pump when inductor is in use.

**NOTICE**

Always turn pump on before opening inductor shutoff valve (at step 6). Always turn pump off after closing inductor shutoff valve (at step 11). If the pump is not running, the tank can drain back through the inductor. The inductor lid is vented, and cannot prevent overflow.

Refer to Figure 28 on page 39

1. Check that the inductor-outlet/tank-inlet valve (35) is open.

Refer to Figure 38 and Figure 37

2. At the inductor, set valves:
   - inductor valve (5) to OFF and
   - product valve (4) from OFF to INDUCT.

3. At the valve panel, set valves:
   - (1) to AGITATE,
   - (2) to MAIN TANK, and
   - (3) to SPRAY.

4. Be sure the valve to the tank is open. Start the pump.

   **NOTE:**
   The pump recirculates tank contents through a venturi beneath the inductor tank.

5. Open the inductor lid.

   **NOTE:**
   The inductor lid is vented, and the inductor may be operated with the lid on or off.

6. Open the inductor shutoff valve (5) and inspect to ensure that there is no back-flow of water from the tank into the inductor.

7. Add the chemical to the inductor tank.

8. When the required amount of chemical has been added, and the inductor tank is empty, close the inductor shutoff valve (5).

9. Secure the lid on the inductor tank.

10. Turn off the pump.

11. Set the product valve (4) to OFF.

---

Figure 37
Inductor Valves On

Figure 38
Panel for Induction
Agitation

Refer to Figure 39

The agitator system bleeds of some of the material flow and recirculates it through quad jet orifices at the bottom of the tank. It helps maintain constant concentration with materials that might otherwise tend to precipitate, sediment or stratify.

The agitation valve (1) adjusts the pressure to the agitation nozzles in the tank when set to positions in between OFF and AGITATION.

Refer to the agitation gauge (18), and adjust the pressure to a desired rate. Different chemicals require different agitation pressures to keep the chemical in suspension. (see chemical label).

Foam Marker Tank Fill

Consult the separate manual provided with the marker system for information on selecting, mixing, loading and applying marker foam.

Boom Operations

2007+ Sprayer Hydraulics

On newer sprayers, the hydraulics use a live system. The tractor hydraulic pump may be left on during sprayer operations. This requires 5-to-8 gpm flow.

The console toggle switches move up and down from center off, and are auto-return. They must be held up or down until an operation is complete.

2006- Sprayer Hydraulics

The tractor circuit is engaged only during the operation, and the tractor lever determines the direction of cylinder movement.

The console switches move only up, are detented, and remain in the selected position until moved. The switch may be operated before or after lever movement.

Refer to Figure 40

The live hydraulic controls come standard to operate with closed center tractor hydraulics. To be used with an open center system a conversion kit must be purchased (see “Open Center Hydraulic Kit” on page 75). To install the conversion kit, remove the plug from the end of the valve block (14) located on the top of the center boom section. Install the conversion valve and coil into this location. Plug the electrical cable into the open plug on the valve harness and the conversion is complete.
Elevator Raising/Lowering
The elevator lifts and lowers the center section of the boom, which raises and lowers the entire boom.

Refer to Figure 41
Lifting is performed by a hydraulic cylinder controlled by a solenoid valve, which in turn is controlled by an up-down/center-stop switch (1) on the boom control panel in the tractor cab.

The elevator is fully raised for folding.

Lowering is by gravity retraction of the cylinder. When the switch is toggled down, the hydraulic circuit is put in float. Lifting and lowering speeds may differ.

Boom Height
After calibrating the sprayer for the specific nozzle to be used at a desired pressure and tractor speed, the main field adjustment is the boom height.

Depending on which type of nozzle is being used, set the boom height so that the correct overlap for that specific nozzle is achieved. If the crop canopy is taller in some fields than others, adjust the boom height accordingly. Refer to the Nozzle Charts in the Application Guide to determine the height of the boom.

In center-off, the elevator stays at the current position. In normal field operations, the elevator is set to the desired height, and left there for the field. Typically this is about 20in (51cm) above the crop canopy.

As necessary, wings are raised and lowered at turns by the operator, and adjusted to accommodate uneven terrain. The optional AutoBoom system is useful on irregular terrain.
Boom Unfolding

**WARNING**

*Negative Tongue Weight Hazard:*  
*Do Not unfold the booms if the sprayer is unhooked from tractor with the sprayer tank empty or low.*

Use the following procedure to unfold the boom.

1. Raise left and right Tilt to uppermost position.
2. Unfold left and right inner booms 90°.
3. Lower left and right tilt to lowest position. Make sure lock plunger lowers out of the way.
4. Unfold left and right outer booms 180°.
5. Lower elevator to desired spraying height.

Normal boom use may shift the outer boom support locks along the inner section. When properly adjusted, the outer arm plate will snap into the gap between the lock plates, and the holes line up. Loosen the U-bolts and reposition brackets as necessary. Adjust cable tension so the plunger is out of the way when boom is unfolded.

Make sure outer boom cylinder pressure is released and lock plunger is free to move up and down before unfolding boom.

**Boom Folding**

Use the following procedure to fold the boom.

1. Raise elevator to top position.
2. Fold left and right outer booms 180°. Make sure outer booms snap into locks.
3. Raise left and right tilt to uppermost position. Make sure lock plunger moves up, locking boom in place.
4. Fold left and right inner booms 90°.
5. Lower left and right tilt so the booms rest on the transport supports.

**NOTE:**  
Outer booms will not lock if booms are tilted.

**Boom Tilt**

Tilt cylinders are single-acting (hydraulic retract, gravity/float extend).

On the standard TSF sprayers, the booms are level at full extension.

Tilt is used for storage and for lifting the booms at obstacles and turns.

**AutoBoom Operation (Option)**

On TSF sprayers with AutoBoom, the Tilt cylinders can extend below boom level. Boom tilt at full extension is regulated by gauge wheels with pressure transducers.

Consult the Raven manual for detail on AutoBoom installation, setup, adjustments and operations.
Operating Pump

⚠️ DANGER

Entanglement Hazard:
Rotating drive line contact can cause death. KEEP AWAY! Do not operate without guards attached and drive line securely attached at both ends.

To operate the PTO pumps, engage the PTO shaft slowly at the tractor’s idle throttle position. Slowly accelerate to the desired PTO rpm.

- On a 540 rpm pump, the rpm of the PTO would be the speed at which the deadhead pressure reaches 80 psi or 540 rpm.
- On a 1000 rpm pump, the rpm of the PTO would be the speed at which the deadhead pressure reaches 80 psi or 1000 rpm.

⚠️ WARNING

Never operate the PTO pump without the tractor PTO shield in place, and the pump torque bar firmly chained in place.

1. To operate the hydraulic pump, first make sure that the hydraulic hoses are routed correctly so that the pump turns in the correct direction. See “Hitching with Hydraulic Pump” on page 22.

2. To run the pump, push the hydraulic lever in the down position.

3. When stopping the pump, push the hydraulic lever in the float position.

⚠️ NOTICE

Do not move the hydraulic lever to the neutral position while the hydraulic pump is running. To do so may cause damage to the hydraulic pump.

Unloading Materials

⚠️ CAUTION

Do not attempt to drain the main tank by removing the main sump cap. Potentially hazardous materials will spray in random directions as the clamp is being removed.

Sprayed chemicals are normally diluted in water for application, and cannot be recaptured and stored for re-use.

Refer to Figure 44

If a small amount of material remains in the main tank at completion of spraying, one method of disposing of it is to apply it to the same fields. To avoid an overdose of material, reduce the rate or further dilute the tank contents with water (but do not use the flush tank water for this. Reserve it for final tank flush and clean-out).

If material must be drained from the tank, rather than applied via boom, drain at the Whirlfilter sump (1).
Tank and Boom Flush

The tank rinse and flush features use the fresh water in the 100 gallon flush tank to rinse out the main sprayer tank and boom in the field.

Before operation, make sure the flush tank is filled with fresh, clean water.

1. Completely empty the chemical in the main sprayer tank by turning the agitation off the last pass and spraying the main tank contents out in the field. To avoid overdosing, use a higher ground speed or lower application rate.

2. Make sure all boom valves and pump are turned off.

Refer to Figure 45

3. Set the panel valves to:
   - agitation valve (1) to FLUSH,
   - tank valve (2) FLUSH TANK, and
   - operation valve (3) SPRAY.

4. Operate the pump with the sprayer stationary, and rinse the tank until \( \frac{1}{3} \) of the flush tank volume (33 gallons or 126 liters) is consumed and then stop the pump.

5. With the sprayer pump off, turn the agitation valve (1) from FLUSH to OFF.

Refer to Figure 46

6. Rotate the tank valve (2) from FLUSH TANK to MAIN TANK.

7. Operate the pump and spray out, in the field just finished, the full 33 gallon (126 liter) volume of liquid (deposited into the main sprayer tank from the flush tank).

8. Repeat step 2 through step 7 twice more until the flush tank is empty and the main sprayer tank and boom has been rinsed completely three times.

9. Reset the agitation pressure before filling the main sprayer tank again.
Transporting

1. Position your sprayer in an open area where you will not hit power lines, buildings, etc. when the boom is folded.
2. If transporting empty, do at least fill the handwash tank. See "Filling Handwash Tank" on page 41.
3. Check that the tractor is capable of towing the sprayer. The sprayer must weigh no more than 150% of the tractor weight. The tractor must be rated for the load. See table at right for sprayer configurations.
4. Make sure the safety chain is securely fastened to the tractor draw bar and the retaining clip is fastened to the hitch pin.
5. **Never** allow riders when transporting the sprayer.
6. When transporting your sprayer, be sure to watch the height clearances of your folded boom to prevent damage to the boom and possible injury.

**DANGER**

Electrocution Hazard:
Contact with electrical power lines can cause death by electrocution.

7. **Do not** exceed 20 mph (32 kph) while transporting your sprayer.
8. **Do not** transport sprayer while filled with chemical mixture.

**NOTE:**
If a suitable water source exists at the field, transport the sprayer with main tank empty. The weight of the sprayer more than doubles when the main tank is full.

---

**WARNING**

**EXCESSIVE SPEED HAZARD**
To Prevent Serious Injury or Death:
- Do Not exceed 20 mph maximum transport speed. Loss of vehicle control and/or machine can result.

<table>
<thead>
<tr>
<th>Sprayer Configuration</th>
<th>Weight</th>
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<tr>
<td>TSF 1060, Empty</td>
<td>7520 lbs (3411 kg)</td>
</tr>
<tr>
<td>TSF 1060, Full</td>
<td>16450 lbs (7462 kg)</td>
</tr>
<tr>
<td>TSF 1260, Empty</td>
<td>8070 lbs (3660 kg)</td>
</tr>
<tr>
<td>TSF 1260, Full</td>
<td>19075 lbs (8652 kg)</td>
</tr>
</tbody>
</table>
Parking

**WARNING**

**Negative Tongue Weight Hazard:**
*Do Not unhitch an unfolded sprayer. If the tank is low or empty, the hitch will rise when disconnected from the tractor.*

The following list should be conducted when unhitching the sprayer. Important unhitching steps are different for hydraulic pump hitches and PTO hitches.

See “Storage” on page 55, for more information about long term storage of the sprayer.

**Refer to Figure 47 and Figure 48**

1. Fold the booms.

2. If field operations are complete, drain the sprayer tank of any excess water left from flushing. Dispose of or store chemical properly by instructions on the chemical label.

**Refer to Figure 49 or Figure 50 on page 54**

3. Inspect the hitch.
   - For a PTO hitch, if the large flat washer (8) is lifted up against the cross pin (7), there is negative tongue weight.
   - For a hydraulic pump hitch, if there is a gap between the [top] tang and the tractor tongue, there is negative tongue weight

*DO NOT UNHITCH* before resolving the negative tongue weight. Fold booms if not already done.

4. Park the sprayer on a flat, level area, preferably where it is sheltered from direct sunlight.

5. Remove the jack from the transport position and move it to the parking position.

6. If the ground is soft, place a board or plate under the jack to widen the ground contact area.

7. Extend the jack until the weight of the tongue is off the tractor drawbar and is supported by the jack.

8. Disconnect the electrical lines.

9. Set all tractor circuits to float.

10. Shut off tractor.

11. Unplug the hydraulic lines.
Unhitching with Hydraulic Pump

⚠️ **DANGER**

Negative tongue weight. Do Not unhitch an unfolded sprayer. If the tank is low or empty, the hitch will rise when disconnected from the tractor.

**Refer to Figure 49**

A hydraulic pump sprayer has either a single tang or clevis hitch.
1. Remove the hitch pin.
2. Disconnect the safety chain.
3. Check for any cables or hoses not yet disconnected.
4. Pull the tractor forward.

---

Unhitching with PTO Pump

**Refer to Figure 50**

1. Disconnect the PTO drive line.
2. Remove the \(\frac{3}{4}\)-10 x 5-inch long bolt (4) and the 1-8 x 5-inch long bolt (3).
3. Swing the ball hitch plate (2) away from the tractor tongue and loosely re-assemble the backup plate (5) on it using the bolts, washers and nuts just removed.
4. Check for any cables or hoses not yet disconnected.
5. Pull the tractor forward.
Storage

Read and follow chemical manufacturer’s instructions. Some chemicals can cause serious burns, lung damage and even death.

1. Empty solution from the tank, clean the chemical inductor (option), and store or dispose of the chemical as recommended by the manufacturer’s chemical label.

2. Flush the entire sprayer system with clean water.


4. Circulate 3 to 5 gallons (11 to 19 liters) of antifreeze (Great Plains strongly recommends the use of non-toxic recreational vehicle antifreeze) through the system including the pump, hoses and nozzles.

5. A cast iron pump must be either full of RV antifreeze or completely empty of all liquid to avoid corrosion. If the content of the pump is unclear it is advisable to drain the pump, remove it, and place it in a warm dry, environment during the winter.

Regular antifreeze is harmful or fatal to animals and humans. Use carefully according to the label’s instructions. We strongly recommend the use of recreational vehicle (RV) antifreeze which does not exhibit these harmful side effects.

6. Wash off the exterior of the sprayer thoroughly using a safe solvent or soap and water.

7. Unhitch sprayer per steps under “Transporting” on page 52.

8. Remove nozzles, disconnect the control box, and place them indoors with the pump.

9. Change filters in the tractor cab after finished.

10. Apply grease to exposed cylinder rods to prevent rust. Be sure to remove grease prior to next use, to avoid damaging seals.

11. Inspect all parts of the sprayer for wear and rust. Repair and paint parts as necessary.

12. Store the sprayer in a dry area away from direct sunlight.
The following table summarizes the available adjustments. Not all are in this section of the manual.

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<td>Nozzle Selection</td>
<td>*</td>
<td>See separate Application Guide and nozzle slide chart</td>
</tr>
<tr>
<td>Initial GPM and pressure</td>
<td>*</td>
<td>See separate Application Guide and nozzle slide chart</td>
</tr>
<tr>
<td>Foam setup and rate</td>
<td>*</td>
<td>See separate manual</td>
</tr>
<tr>
<td>Axle Wheel Spacing Adjustment</td>
<td>57</td>
<td>Tire tracks relative to rows and tractor tires</td>
</tr>
</tbody>
</table>

**General Field Adjustments**

**Boom Height**

After calibrating the sprayer for the specific nozzle that will be used at a desired pressure and tractor speed, the main field adjustment is the boom height. Depending on which type of nozzle is being used, set the boom height so that the correct overlap for that specific nozzle is achieved. If the crop canopy is taller in some fields than others adjust the boom height accordingly. Refer to the Nozzle Charts in the Application Guide located in this manual to determine the height of the boom needed.

**EXAMPLE:**
A 2.5 Metercone nozzle at 20 inch spacing is being used. From the Nozzle Chart in the Application Guide, a height of 19 to 21 inches above the top of the crop is required. If the crop is 6 inches off the ground, the boom height should be set to 25 to 27 inches off the ground.

**Nozzle Pressure**

Another area that will need some field adjustments is the nozzle pressure. As the tank level decreases the boom pressure may need to be adjusted to keep the pressure at the same magnitude for what the sprayer was calibrated for if the sprayer is not equipped with a monitor. Watch the pressure gauge and be aware of changes in the pressure.
Axle Wheel Spacing Adjustment

Refer to Figure 51

Axle extension can be adjusted for differing row spacings.

**CAUTION**

Do not change the fore/aft position of the axle mount. Moving it forward may result in negative tongue weight even when folded. Moving it aft increases positive tongue weight and risks tire contact with boom.

1. Hitch the sprayer on level ground.
2. Measure the current wheel spacing (span) between tread center-lines.

**NOTE:**

Also measure the distance from the outer end of each axle to the mount. Keep these equal, or the sprayer will pull skewed.

3. Compute the difference between the current and desired spans. Divide it by two. This is the amount to extend or retract each axle.
4. Use a hoist or jacks at the left rear corner of the mainframe to raise the sprayer until the tire on that side (only) is slightly elevated off the ground.

**CAUTION**

Leave the other tire firmly on the ground to provide resistance to lateral frame movement when adjusting an axle.

5. Loosen the bolts joining the upper and lower axle mounts, starting with the bolts nearest the wheel being adjusted. Loosen only enough bolts to allow movement of the axle to be adjusted.
6. Slide the axle in or out to the new setting.

**CAUTION**

Do not adjust the wheel spacing wider than 120in (305cm) on North American models, or 290cm (114in) on export models at tire tread center lines. To do so may cause a falling axle hazard while the sprayer is in service.

7. Secure the four bolts nearest the tire.
8. Lower the adjusted side.
9. Elevate the right corner, and repeat step 5 through step 8.
10. Tighten all the bolts to “Torque Values” on page 79.
Break-Away Spring

Refer to Figure 52

If an outer boom arm strikes an obstruction, a pair of spring-load rollers ride up and out of a detent, allowing the arm to pivot back and upward.

The arm usually re-seats itself automatically. If it does not:

1. Stop the tractor and set the parking brake.
2. Set hydraulic pump circuit to float or shut down PTO.
3. Wear gloves and swing the arm forward until the rollers are back in detent.

Periodically check that break-away springs are compressed to 5½ inch (14 cm)

Adjust spring by turning mounting nut under spring.

More serious obstructions may fail a shear bolt at the inner arm pivot. See page 63 for replacing this shear bolt.
### Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Problem Area</th>
<th>Specific Checks</th>
<th>Solutions</th>
</tr>
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<td>Between gauge and liquid supply</td>
<td>Pump wearing</td>
<td>Rebuild or replace pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plugged suction or pump to pressure head hose</td>
<td>Clean hose and reduce cause of clogging</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plugged Whirlfilter</td>
<td>See “Clean Out Solution Whirlfilter®” on page 62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plugged gauge</td>
<td>Remove the quick disconnect fitting and flush gauge protector</td>
</tr>
<tr>
<td>Pressure fluctuating</td>
<td>Between pump outlet and liquid</td>
<td>Check suction hose &amp; fittings for air leaks. Air in system is indicated by buffs of air at nozzles</td>
<td>Remove obstruction from clogged area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vortex in tank suction</td>
<td>Align agitators properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cracked pump housing</td>
<td>Replace pump housing</td>
</tr>
<tr>
<td>Pressure increasing</td>
<td>Between gauge and nozzle</td>
<td>Nozzle screens clogged</td>
<td>Clean screens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nozzle orifices plugged</td>
<td>Remove material with soft brush or air</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boom hoses becoming clogged</td>
<td>Remove obstruction from clogged area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boom hoses pinched</td>
<td>Use cable ties to position hose so it will not kink</td>
</tr>
<tr>
<td>Pressure cannot</td>
<td>Pump or electric ball valve</td>
<td>From nozzle charts check liquid demand against pump capacity (nozzle requirement + agitation requirement)</td>
<td>Reduce swath width by nozzle reduction; install smaller nozzles and drive at a lower rate of speed</td>
</tr>
<tr>
<td>increase</td>
<td></td>
<td>Electric ball valve or gauge not functional</td>
<td>Replace or repair</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressure adjust switch faulty</td>
<td>Test switch &amp; replace if faulty</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fuse is out in control box</td>
<td>Replace fuse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual pressure adjustment valve not all the way open</td>
<td>Open the manual pressure valve all the way and allow the electric ball valve to govern the pressure</td>
</tr>
<tr>
<td>No pressure</td>
<td>Plumbing</td>
<td>Tank shut-off valves off</td>
<td>Make sure all tank shut-off valves are open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose fittings</td>
<td>Tighten fittings so pump can prime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collapsed suction hose to pump</td>
<td>Replace hose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obstruction in suction hose or tank</td>
<td>Remove obstruction</td>
</tr>
<tr>
<td>No pressure</td>
<td>Pump</td>
<td>Hydraulic pump running in the wrong direction</td>
<td>Switch hydraulic hoses in the tractor outlet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PTO pump coupler loose</td>
<td>Tighten PTO coupler</td>
</tr>
<tr>
<td>Pressure cannot</td>
<td>Pump or electric ball valve</td>
<td>Tank agitation restricted</td>
<td>Check that the agitator valve is open and that the liquid is being agitated</td>
</tr>
<tr>
<td>decrease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid will not</td>
<td>Chemical Inductor</td>
<td>Make sure the valve below the inductor tank is open</td>
<td></td>
</tr>
<tr>
<td>induct</td>
<td></td>
<td>Make sure the pump is in operation and has prime</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make sure the venturi bypass valve is open</td>
<td></td>
</tr>
<tr>
<td>Inductor overflow</td>
<td>Chemical Inductor</td>
<td>Close valve below inductor tank until pump is running, has pressure and venturi valve is open</td>
<td></td>
</tr>
</tbody>
</table>
### Firing Diagram for Fasse 700-0807-4208  Great Plains 833-423C

<table>
<thead>
<tr>
<th>Switch No.</th>
<th>Boot Color</th>
<th>Switch Position</th>
<th>Hot Wires</th>
<th>Pin Out Location</th>
<th>Pressure Ports</th>
<th>Tank Ports</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Long</td>
<td>White</td>
<td>Left Foam (stat)</td>
<td>Red &amp; Wht 4 Cond</td>
<td>D-4WP, A-4WP</td>
<td>---</td>
<td>---</td>
<td>Left Foam Marker</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Center (off)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Off</td>
</tr>
<tr>
<td>Right Foam (stat)</td>
<td>Red &amp; Grn 4 Cond</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Right Foam Marker</td>
</tr>
</tbody>
</table>

| 2 Long     | Red        | Up (mom)       | Red/Blk & Grn 5-12P | 10-12P | C5          | Left Tilt Up |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Red/Blk & Grn & Blk/Wht 5-12P | 10-12P, 9-12P | C5          | Left Tilt Down |

| 3 Long     | White      | Up (mom)       | Org/Blk & Grn 6-12P | 10-12P | C4          | Center Up   |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Org/Blk & Grn & Blk/Wht 6-12P | 10-12P, 9-12P | C4          | Center Down |

| 4 Long     | Blue       | Up (mom)       | Wht/Blk & Grn 7-12P | 10-12P | C3          | Right Tilt Up |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Wht/Blk & Grn & Blk/Wht 7-12P | 10-12P, 9-12P | C3          | Right Tilt Down |

| 5 Short    | Green      | Up (mom)       | Grn/Wht & Blu/Wht & Grn A-3P, B-3P, 10-12P | ---         | C7          | Left Outer Fold |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Grn/Wht & Blu/Wht & Grn & Blk/Wht A-3P, B-3P, 10-12P | ---         | C7          | Left Outer Unfold |

| 6 Short    | Yellow     | Up (mom)       | Grn/Blk & Red/Wht & Grn 12-12P, C-3P, 10-12P | ---         | C6          | Left Inner Fold |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Grn/Blk & Red/Wht & Grn & Blk/Wht 12-12P, C-3P, 10-12P | ---         | C6          | Left Inner Unfold |

| 7 Short    | Grey       | Up (mom)       | Wht & Blu & Grn 3-12P, 8-12P, 10-12P | ---         | C2          | Right Inner Fold |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Wht & Blu & Grn & Blk/Wht 3-12P, 8-12P, 10-12P | ---         | C2          | Right Inner Unfold |

| 8 Short    | Red        | Up (mom)       | Red & Org & Grn 1-12P, 2-12P, 10-12P | ---         | C1          | Right Outer Fold |
|           |            | Center (off)   | ---        | ---             | ---          | ---        | Off      |
|           |            | Down (mom)     | Red & Org & Grn & Blk/Wht 1-12P, 2-12P, 10-12P | 12-12P, 10-12P | C1          | Right Outer Unfold |

---

|      |          | Blk (zip)      | ---        | ---             | ---          | ---        | Ground |
|      |          | Blk            | ---        | ---             | ---          | ---        | Ground |
|      |          | Blu/Blk        | ---        | ---             | ---          | ---        | Ground |
|      |          | Blk            | ---        | ---             | ---          | ---        | Ground |

---

29641
Maintenance and Lubrication

Proper servicing and adjustment is the key to long life for any implement. With careful and systematic inspection, costly maintenance, repairs and down time can be avoided.

**WARNING**

*Before working on, servicing or making adjustments on sprayer, always disengage power, shut off tractor engine, make sure all moving parts have stopped, and all pressure in the system is relieved.*

▲ Always wear rubber gloves when making repairs or adjustments.

▲ Make sure all safety equipment mentioned in the safety section of this manual, are stored in an easily accessible place but protected from potential contamination from dust or chemicals.

**Sprayer/Boom Maintenance**

1. After several hours of operation, check sprayer for loose bolts, pins and hose clamps.
2. Check hoses, pumps, valves and fittings for leaks. Always wear rubber gloves when making repairs and adjustments.
3. Clean nozzles with an air hose with less than 30 psi. Periodically replace nozzles.
4. Keep elevator slide pads properly adjusted. Lubricating slide pads with grease may cause dirt accumulation that jams elevator. If necessary, use silicone spray on slide pads.
5. For lubrication points and intervals refer to “Lubrication” starting on page 70.
6. Check for proper air pressure in the sprayer tires. See “Tire Inflation Chart” on page 78.
7. Wash sprayer and boom daily using a safe solvent, or soap and water.
8. If equipped with a foam marker, clean the air filter on the air pump no less than once a week, even more often in extreme conditions.

**Equipment Cleanup**

**DANGER**

*Read and follow chemical manufacturer’s instructions. Some chemicals and cause serious burns, lung damage and even death.*

Nozzles should be cleaned with a low pressure (less than 30 psi) air hose, and periodically replaced. Haul a supply tank of water so cleaning of the spray tank and applicator can be done in the field. NEVER wash tank out in the yard or at a car wash.

Dispose of leftover chemical in the same manner described on the manufacturer’s label of the chemical last used in the sprayer. Rinse out the tank and spray the rinse water on the last field that was sprayed.

Flush the sprayer with fresh water and spray the water in the field that was last sprayed. While the sprayer is being flushed at the field, turn the boom section switches on to flush the nozzles, then turn them off to flush out the bypass lines. Repeat this procedure several times.

**General Information**

If equipment is to be used in freezing or near freezing conditions, protect pump and plumbing system by thoroughly draining liquid and pumping antifreeze (Great Plains strongly recommends the use of recreational vehicle antifreeze) solution through the plumbing system.

The cast iron pump must be either full of RV antifreeze or completely empty of all liquid to avoid corrosion. If the content of the pump is unknown, it is advisable to drain the pump, remove it, and place it in a warm dry, environment during the winter.

**NOTICE**

*Regular antifreeze is harmful or fatal to animals and humans. Use carefully according to the label’s instructions. We strongly recommend the use of recreational vehicle (RV) antifreeze which does not exhibit these harmful side effects.*

Check the condition of the sprayer hoses and clamps. Fix all leaks by tightening hose clamps or fittings. If the pump is leaking, refer to the pump maintenance section. If the hoses are dragging when the sprayer is operated use cable ties to fix their position. Make sure the hoses do not bind or kink when the boom is folded or raised. If so, route the hoses to prevent kinking and binding. If hoses are damaged, replace as necessary. Periodically check for loose bolts and tighten.

Inspect all parts of the sprayer for wear and rust. Repair and paint parts as necessary.
Filter Maintenance

There are two filters on the sprayer. One is a canister type that filters the water entering the tank and the other is a Whirlfilter® that filters the chemical solution being sprayed.

These need to be cleaned seasonally, or sooner if flow restriction is observed.

Clean Out Solution Whirlfilter®

Refer to Figure 53

1. Fill the sprayer tank with water and turn the pump on.
2. With the pump running, slowly open the clean-out valve and allow the grit to flow out into a bucket. Clean out the solution Whirlfilter® only when the sprayer tank is filled with water and no chemical has been added.
3. Close the clean-out valve and turn off the pump.
4. Dispose of the grit and water in the same manner described on the manufacturer's label of the latest chemical used in the sprayer.

Clean Out Tank Fill Filter

CAUTION

Wear chemical gloves and protective clothing. Although used for adding clean water, the chemical mix in the main tank can back-wash into this assembly.

Refer to Figure 54

1. Start with an empty sprayer tank.
2. Position a bucket under the plug (1) in the sump cap (2) of the filter. Remove the plug and allow the grit to fall out.
3. Screw the plug back in using pipe thread sealant to seal the plug.
4. Dispose of the grit and water in the same manner described on the manufacturer's label of the latest chemical used in the sprayer.

If draining the filter does not improve flow:

5. Unscrew the entire sump cap (2). Remove it slowly and save the gasket (3).
6. Remove the filter element (4). Clean or replace it.
7. Re-assemble the filter. No thread sealant is required on the main cap threads.
Tank Straps

Refer to Figure 56

The tank straps that wrap around the sprayer tank may become loose after the first few hours of operation. This occurs when the tank settles in the saddle. Polyethylene tanks are especially susceptible to this. Retighten the tank straps to secure the tank.

Shear Bolt

Refer to Figure 56

Your Great Plains sprayer is equipped with four shear bolts (1), two each side, to help prevent damage to the booms. These are located at the inner boom pivot posts at the ends of the center section. When the boom encounters an obstruction, both bolts on that side fail, allowing the boom to swing back.

If a pair of shear bolts breaks, replace them with a pair of 5/8-11 x 3-inch Grade 5 bolts (Great Plains part 802-160C). If this size and grade bolt is not immediately available, you may temporarily substitute metric M14x2 Class 8.8 bolts.

Using a lower grade/class bolt causes nuisance shears. Using a higher grade/class bolt may result in serious equipment damage.

Inspect these bolts at the start of the spraying season to insure the bolts have not been weakened through use or rusting.

Stock a spare nut for each spare shear bolt, as the nut end of the sheared bolt commonly falls away and is difficult to locate.
Pump Maintenance and Repair

The Great Plains pump is designed for long life and service. Through the years there may be a need to replace the mechanical seal or service some component of the pump. A mechanical seal may weep slightly, but if it starts to drip the pump will have to be disassembled. Before disassembling the pump be sure to wash it out with fresh water. Refer to the parts manual for the components of the pump.

Refer to Figure 57

If the pump is leaking, before removing it from the sprayer, run the pump with adequate water in the tank to diagnose the actual pump problem. If fluid leaks out between the front suction housing (5) and the rear volute housing (8), the housing gasket may be dried out. Give the gasket (6) adequate time to absorb moisture and swell up. If necessary, re-tighten the volute housing (8) by alternating on opposite sides until all nuts (9) are torqued to 16 to 18 ft-lbs. It is a good practice to apply grease to both sides of the gasket (6) to prevent shrinkage.

If seal replacement is required:

1. Disassemble pump and clean all components.
2. Assemble the ceramic ring seat of the mechanical seal (7) into the volute housing (8) of the pump. Make sure the ceramic seat is positioned square into the volute housing.
3. Clean off any grease or dirt from pump shaft (10) and dry the shaft so the rubber bellows on the mechanical seal will adhere to the shaft properly when assembled.
4. Bolt up the pump input bearing housing (not shown) to the volute housing (8) using bolts (2), (3) and (4) with spacers (not furnished) for alignment and assembly of the shaft seal.
5. Assemble the seal (7) without its spring, on the pump shaft by pushing on the inside rubber portion of the seal using water as the lubrication. The graphite seal face should touch the white ceramic seat face. The rubber bellows adhering to the pump shaft should not protrude more than \( \frac{1}{16} \) inch (1.6 mm) beyond the stainless steel ring located on the impeller side of the seal.
6. Assemble the seal's spring and the impeller, being careful not to move the mechanical seal that has been positioned on the pump shaft. Torque the impeller bolt (1) 16 to 18 ft-lbs (22 to 24 N-m).
7. Remove the three bolts and spacers. Using gun grease, lubricate the gasket (6). Assemble the gasket (6) and suction housing (5) using bolts, flat washers and locknuts. Torque nuts 16 to 18 ft-lbs.
Ace Pumps

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 sprayer, run the pump with adequate water in tank to diagnose the actual pump problem.

Ace Hydraulic Pump Seal Replacement

Pump Disassembly

Refer to Figure 58

1. Remove four $\frac{5}{16}$-inch hex head cap screws (19) from rear of motor. Remove motor (18) and coupler.
2. Remove rear internal bearing snap ring (11).
3. Remove four $\frac{3}{8}$ x $\frac{3}{4}$-inch hex head cap screws (9) from mounting frame (8). Remove volute (2).
4. Remove $\frac{3}{8}$-inch lock nut (3) from shaft (16). Insert a flat file into impeller vane to hold stationary.

**NOTICE**

Excess torque may damage plastic impellers.

5. Press shaft (16) out of impeller (5) using one $\frac{5}{16}$-inch hex head cap screw from step 1. Remove impeller (5), key (15), and rotating seal member (6).
6. Press shaft/bearing assembly out of frame.
7. Remove stationary seal member (17) by prying out with screwdriver or pressing out from motor end of pump housing.
8. Remove O-ring (20) from shaft groove.
   If replacing only the pump seal:
   a. Press the shaft/bearing assembly into frame.
   b. Reinstall rear internal bearing snap ring.
   c. Skip to Assembly step 8.
10. Remove forward internal bearing snap ring (11).
**Pump Assembly**

**Refer to Figure 59**

1. Install forward internal bearing snap ring (11) in mounting frame (8).
2. Press in forward bearing (12) from rear side of mounting frame (8) to snap ring (11).
3. Install two external shaft retainer rings (13) with spacer (14) between on shaft (16).
4. Press shaft assembly through forward bearing (12) until forward shaft snap ring (13) rests against inner face of forward bearing (12).
5. Press rear bearing (12) over shaft (16).
6. Insert rear internal bearing snap ring (11).
7. Slide rubber slinger (10) over shaft (16) and push back to front bearing (12).
8. Clean old sealant from mounting frame seal bore.
9. Install O-ring (20) in shaft groove.
10. Apply non-hardening Type 2 Permatex or similar under stationary seal flange.
11. Place stationary portion of seal (17) over shaft (16) and press into seal bore cavity. Use a 1\(\frac{3}{8}\)-inch ID pipe or PTO adapter to press seal flange evenly on all sides.
12. Install rotating portion of seal (6) over shaft (16) and O-ring (20) by hand. The two polished seal faces should face each other. Avoid contacting polished seal faces.
13. Insert key (15) in keyway and install impeller (5) on shaft (16).
14. Place lock washer (4) and 3\(\frac{8}{6}\)-inch lock nut (3) on shaft (16) and tighten nut (3).
15. Replace volute O-ring or gasket (7), volute (2), and four 3\(\frac{8}{6}\) x 3\(\frac{4}{4}\)-inch cap screws (9).
16. Position coupler in pump shaft slot and fill cavity surrounding coupler with grease.
17. Install motor (18) by aligning motor tang and coupler slot. Rotate motor (18) until nameplate faces up.
18. Install four 5\(\frac{8}{16}\)-inch cap screws (19).
Ace Belt Drive Pump Seal Replacement

Refer to Figure 15

1. Loosen four $\frac{3}{8} \times \frac{3}{4}$-inch long hex screws (1) which attach the pump volute (2) to the mounting frame. Remove volute from mounting frame.

2. Remove impeller (3) from pump shaft. Use file or similar tool to unscrew in clockwise direction (left hand thread).

3. Ceramic rotating portion of the seal (4) may now be removed.

4. Using two screwdrivers inserted in mounting frame weep holes, pry non-rotating portion of the seal (5) toward the threaded part of the shaft and finish removing by hand.

5. If seal case is difficult to extract from the mounting frame seal bore, two screwdrivers may be used to further dislodge the seal.

6. Apply a small portion of non-hardening sealant to new seal case to assure good seal mounting frame bore. Insert case into bore.

7. Make sure non-rotating seal portion is properly seated by tapping lightly with suitable tool.

8. Place o-ring over pump shaft and slide downward. Oil face of new ceramic portion with light lubricating oil and place over o-ring and press downward to contact with the stationary portion.

9. Install impeller on shaft (left hand thread). Tighten by inserting a file or similar tool into impeller vane and turn counter-clockwise while holding shaft steady.

10. Replace gasket (6), volute, and four $\frac{3}{8} \times \frac{3}{4}$-inch long hex screws.

---

Figure 60
Ace Belt Drive Pump Seal
Elevator Slide

Refer to Figure 61

The polyethylene slides on the elevator can be adjusted to take out any side-to-side play. Periodically check the slide pads (A) for wear. As the pads wear, tighten 1/2-inch bolts (B) on both sides of elevator frame (B) until pads just touch frame.

Tighten the slides so that there is a minimal amount of play in the elevator.

NOTICE

When tightening the slides be sure to keep the elevator slide centered in the elevator mount. If the elevator is adjusted to one side there can be an interference.

Cycle the elevator a few times to ensure there is no binding and that the slides are sufficiently tightened.

Quad-Jet Agitators

DANGER

Confined space, chemical fume and low oxygen hazards. Review and implement the recommendations of “Tank Entry” on page 69 before performing any work inside the tank.

Refer to Figure 62

The quad-jet agitators are two 4-port nozzle heads in the sprayer tank. A portion of the tank outflow may be recirculated to the quad jets to maintain a constant concentration of materials that might otherwise tend to stratify, clump, precipitate, or sediment.

The agitator head is oriented at 45 degrees, with reference to the tank ends, so that the water jets are aimed at the corners of the tank. At completion of tank flushing, check that the ports are pointing to the corners.

If the ports have shifted, re-adjust them. If they require frequent adjustment, remove the assemblies and check for loose fittings.
Tank Entry

Normal use of the sprayer and routine maintenance do not require entry.

⚠️ DANGER

**Confined Space Hazard:**
You can be overcome by hazardous fumes very quickly even in an empty tank with the lid open. Oxygen levels may be insufficient. Do not enter a tank for loading or unloading material or for routine cleaning. Never enter a tank without at least one trained and equipped attendant present.

Never enter a tank for any reason unless you fully comply with applicable laws, regulations, rules, agreements, and the instructions in this section. Where applicable laws, regulations, rules, agreements contradict an instruction below, do not follow that instruction.

Depending on use, the sprayer tank may be or become a “permit-required confined space” under U.S. OSHA regulations (29 CFR 1910.146) and similar regulations, statutes, insurance agreements and local business policy. A written policy and permitting process may be required for any tank entry.

Tank entry may be necessary in some unusual circumstances, such as:

- agitator nozzle alignment;
- clean-out nozzle repair/replacement; or,
- removal of obstructions not susceptible to fishing or pumping out from the open lid.

Should such a situation arise, observe the following precautions:

1. **Evaluate the hazards**
   Review the material safety data sheets (MSDS) for any chemicals used in the tank since it was last thoroughly cleaned, and the most recent materials even if the tank was subsequently cleaned. Retain the MSDS information for any medical treatment that might be required.

2. **Designate or engage a team**
   Tank entry is never a single-person activity. At least one attendant/observer is necessary. Give priority to individuals already trained in confined space operations. Designate a leader (who will not be the entrant) with authority to terminate the activity.

3. **Protect the team**
   Obtain the necessary safety equipment specified for confined space exposure to those materials, paying particular attention to respiratory support and protection. This may include contaminant detection equipment and positive ventilation to refresh air in the tank.

4. **Equip the team**
   At least one attendant must be equipped with communications capability, to summon outside aid in the event that the tank worker is overcome. Equip the entrant with a safety harness and safety line.

5. **Train the team**
   Review the hazards. Review the procedures. Understand the use of the protective equipment. Know the steps to take in emergencies. Practice them. Train the observer to summon aid, and not attempt tank entry if the entrant is overcome.

6. **Secure the cart**
   Block the cart wheels to prevent movement.

7. **Empty the tank**
   Follow the steps at “Unloading Materials” on page 50. If a blockage makes this impossible, use an external pump line to remove as much material as possible without performing a tank entry. Pump until at least some material is exiting the clean-out port. Leave the clean-out port open.

8. **Clean the tank**
   Perform normal tank flushing, per “Tank and Boom Flush” on page 51. From the outside at the walkboard, power-wash the inside of the tank. Use a mild detergent sprayer. Rinse thoroughly.

9. **Air the tank**
   Leave the tank lid and clean-out door open, and do not commence work until the rinse water has completely evaporated.

10. **Plan the work. Work the plan.**
    Postpone the work if any team members, equipment or other resources are missing, or weather/lighting conditions are not favorable. Terminate and evacuate if any unexpected situations arise.
Lubrication

Elevator Slide

Pads and exposed vertical tube bearing surfaces
Type of Lubrication: Dry graphite or NLGI grade 2 grease
Quantity: coat surface lightly

Swing Arm Weldment

2 grease fittings each side; 4 total
Type of Lubrication: Grease
Quantity: Until resistance is felt

Ace Pump (if applicable)

1 grease fitting - located on belt idler arm casting
Type of Lubrication: Grease
Quantity: 3 pumps
PTO Pump (if applicable)

1 grease fitting - located on rear gear case cover, and marked by decal
Type of Lubrication: Grease
Quantity: 5 pumps

Inner Pivot Tube

2 grease fittings each side (top and bottom); 4 total
Type of Lubrication: Grease
Quantity: Until resistance is felt

Base Pivot, Inner Fold Section

1 grease fitting each side; 2 total
Type of Lubrication: Grease
Quantity: Until resistance is felt
Base Pivot, Outer Fold Section

2 grease fittings each side; 4 total
Type of Lubrication: Grease
Quantity: Until resistance is felt

Base Pivot, Outer Fold Section

1 grease fittings each outer break-away boom; 4 total
Type of Lubrication: Grease
Quantity: Until resistance is felt

Transport Wheel Bearings

Seasonally

2 bearings each axle; 4 total
Type of Lubrication: Grease
Quantity: repack
Options

Raven G1 AutoBoom

The Raven G1 AutoBoom system consists of:
- adjustable gauge wheel assemblies with pressure transducers for lift sensing,
- on-sprayer hydraulic control valve assembly, plumbed into existing sprayer lines, and;
- a cab control module with harness connections to valve block, sensors and power.

The standard kit is for tractors with closed center hydraulics. The sprayer-side components of the Autoboom are dealer-installed.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAVEN G1 AUTOBOOM ASY 2007+</td>
<td>833-421C</td>
</tr>
<tr>
<td>G1 OPEN CENTER CONV.</td>
<td>833-422C</td>
</tr>
<tr>
<td>RAVEN G1 AUTOBOOM ASY 2006-</td>
<td>510-038A</td>
</tr>
</tbody>
</table>

The Autoboom includes separate installation and operation manuals.

Axles and Wheels

All sprayers are available with North American or Export axles. Sprayers shipped by intermodal container must have export axles. Export models have shorter axle tubes. Available wheel-to-wheel span is:
- North America: 80 to 120 inches (203 to 305cm)
- Export: 203 to 290cm (80 to 114in).

1000 gallon sprayers (TSF-1080/1090) have a further choice of:
- 13.6-38 wheels and two-step ladder, or
- 14.9 R46 wheels and three-step ladder.

1250 gallon sprayers (TSF-1260) use only 14.9 R46 wheels.

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.6-38 Wheel, North America (SN A1157F-)</td>
<td>70</td>
<td>504-037A</td>
</tr>
<tr>
<td>13.6-38 Wheel, Export (SN A1157F-)</td>
<td>72</td>
<td>504-046A</td>
</tr>
<tr>
<td>14.9 R46 Wheel, North America</td>
<td>71</td>
<td>504-036A</td>
</tr>
<tr>
<td>14.9 R46 Wheel, Export</td>
<td>73</td>
<td>504-047A</td>
</tr>
<tr>
<td>320/85R38 WHEEL &amp; AXLE ASSY (SN A1158F+)</td>
<td>70</td>
<td>504-051A</td>
</tr>
<tr>
<td>320/85R38 WHEEL &amp; AXLE ASSY EXP (SN A1158F+)</td>
<td>71</td>
<td>504-052A</td>
</tr>
</tbody>
</table>

For setup, see “Axle Wheel Spacing Adjustment” on page 57.
Calibration Accessories

Your sprayer includes a nozzle calculator and sample container. Export sprayers include a metric nozzle calculator.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALIBRATION CONTAINER</td>
<td>817-199C</td>
</tr>
<tr>
<td>NOZZLE TIP CALCULATOR</td>
<td>832-038C</td>
</tr>
<tr>
<td>NOZZLE TIP CALCULATOR-METRIC</td>
<td>832-058C</td>
</tr>
</tbody>
</table>

Chemical Inductor

The inductor eliminates the need to climb the walkboard and add materials directly to the tank water. It provides a convenient and safe dedicated ground-level 3-gallon (11.3 liter) tank.

If ordered with a new TSF1060 and TSF1260 (option #61), the inductor is pre-installed prior to delivery.

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL INDUCTOR ASY</td>
<td>61</td>
<td>502-144K</td>
</tr>
</tbody>
</table>

For operations, see “Chemical Inductor” on page 74. The inductor adds 38 lbs (17 kg) to the empty weight of the sprayer. When fully loaded with material, the inductor adds 83 lbs (38 kg) to the sprayer.

High Volume Foam Marker

This kit includes a 25 gallon tank with integral pump, mounting hardware, plumbing, nozzles and cab control. Dispensers are provided for both left and right booms.

If ordered with a new TSF1060 and TSF1260 (option #52 or 53), the foam marker tank is pre-installed prior to delivery. The foam marker includes a separate installation and operation manual.

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOAM MARKER KIT 60FT</td>
<td>52</td>
<td>502-147A</td>
</tr>
</tbody>
</table>

The foam marker adds 114 lbs (52 kg) to the empty weight of the sprayer. When fully loaded, it adds 314 lbs (91 kg) to the sprayer.
Gauge Protector
This fitting protects the control panel pressure gauge from corrosive chemicals added to the main tank.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAUGE PROTECTOR ASSY</td>
<td>507-034V</td>
</tr>
</tbody>
</table>

See page 45 for installation location.

Hitches (Hydraulic Pump Only)
Sprayers with hydraulic (not PTO) pumps have a choice of tang or clevis hitch.

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clevis Hitch</td>
<td>62</td>
<td>500-007H</td>
</tr>
<tr>
<td>Tang Hitch</td>
<td>63</td>
<td>500-008H</td>
</tr>
</tbody>
</table>

For setup, see “Hitching with Hydraulic Pump” on page 22.

Open Center Hydraulic Kit
2007+ sprayers require a tractor with closed center hydraulics. Use this kit to convert the sprayer for use with an open center tractor.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FASSE LIVE HYD OPEN CTR KIT</td>
<td>833-427C</td>
</tr>
</tbody>
</table>

For installation location, see page 80.
Pumps

The standard TSF1060 and TSF1260 does not include a pump. Optional hydraulic or PTO pumps are available.

**Ace Hydraulic Pump**

If ordered with a new TSF1060 and TSF1260 (Option 35), the pump is pre-installed prior to delivery.

**Ace Flow Limiter**

On tractors with load sensing closed center hydraulic systems, this device limits the flow of oil to the Ace motor and prevents failures due to misapplication. Your Great Plains dealer can assist with installation of the flow limiter.

**Ace PTO Pumps**

Pumps are available for 540 rpm PTO (Option 33) or 1000 rpm 1 3/8-inch PTO (Option 34).

The pump kit includes required hitch components.

If ordered with a new TSF1060 and TSF1260 (see options above), the pump is pre-installed prior to delivery.

---

**Table of Contents**

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP - TS HIGH VOL HYD</td>
<td>35</td>
<td>507-105A</td>
</tr>
</tbody>
</table>

For operation, see “Operating Pump” on page 50.

Pump kit weight: 40 lbs (18 kg)

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW LIMITER VALVE - ACE PUMP</td>
<td>36</td>
<td>829-125C (2006-)</td>
</tr>
<tr>
<td>FLOW LIMITER VALVE - ACE LS206N</td>
<td>36</td>
<td>829-131C (2007+)</td>
</tr>
</tbody>
</table>

For use, see “Ace Pump Flow Limiter (Option)” on page 29.

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP TS ACE150 540 DRIVE SHAFT</td>
<td>33</td>
<td>507-083A</td>
</tr>
<tr>
<td>PUMP TS ACE 1000 1-3/8 DR SHAFT</td>
<td>34</td>
<td>507-084A</td>
</tr>
</tbody>
</table>

Pump kit weights:

- 507-083A 152 lbs (69 kg)
- 507-084A 167 lbs (76 kg)
Speed Sensors

The standard TSF1060 and TSF1260 does not include a speed sensor, which is required by the Auto-Control system to regulate material rate based on current speed. Optional sensors kits detect speed via wheel rotation or radar ground speed.

If the tractor already has a speed sensor, a “Y” cable is available to share its signal with the Raven SCS 440 controller. Otherwise, order one of the following:

Your Great Plains dealer can assist you with installation

Radar Speed Sensor

This easy-to-install precision sensor may be mounted on either the tractor or the sprayer. It is compatible with a wide variety of agricultural cab controls, and may be used for implements other than the TSF1060 and TSF1260 when not spraying.

Raven Wheel Speed Sensor

This economical speed sensor is sprayer-mounted. Consult your dealer for installation.

Y-Cable

If your tractor already has a speed sensor, it may be compatible with the Raven SCS 440 controller. Consult your dealer for advice. If the sensor is compatible, these cables share the signal between your existing tractor systems and the Raven SCS 440.

<table>
<thead>
<tr>
<th>Part Numbers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>115-0159-432</td>
<td>TRW radar, Case IH</td>
</tr>
<tr>
<td>115-0159-519</td>
<td>DICKEY-john or Magnavox radar, John Deere 1990 or later</td>
</tr>
<tr>
<td>115-0159-518</td>
<td>DICKEY-john radar, Cat Challenger (Model 65 &amp; 75)</td>
</tr>
<tr>
<td>115-0159-517</td>
<td>DICKEY-john radar, Case IH</td>
</tr>
<tr>
<td>115-0159-529</td>
<td>DICKEY-john radar, Ford/White</td>
</tr>
<tr>
<td>115-0159-627</td>
<td>DICKEY-john radar, Cat Challenger (Model 65C, 75C-Mod, D-Mod Row Crop 35,45,55)</td>
</tr>
<tr>
<td>115-0159-700</td>
<td>DICKEY-john or Magnavox radar, John Deere 7000/8000/9000 Series (2WD or MFWD)</td>
</tr>
<tr>
<td>117-0159-462</td>
<td>Magnavox radar, other than John Deere</td>
</tr>
<tr>
<td>117-0159-463</td>
<td>TRW radar, other than Case IH</td>
</tr>
</tbody>
</table>
Appendix

Specifications and Capacities

<table>
<thead>
<tr>
<th></th>
<th>TSF-1060-2530</th>
<th>TSF-1060-3620</th>
<th>TSF-1260-2530</th>
<th>TSF-1260-3620</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boom Width</strong></td>
<td>60 feet</td>
<td>60 feet</td>
<td>60 feet</td>
<td>60 feet</td>
</tr>
<tr>
<td></td>
<td>18.3 m</td>
<td>18.3 m</td>
<td>18.3 m</td>
<td>18.3 m</td>
</tr>
<tr>
<td><strong>Nozzle Spacing</strong></td>
<td>30 inches (76 cm)</td>
<td>20 inches (51 cm)</td>
<td>30 inches (76 cm)</td>
<td>20 inches (51 cm)</td>
</tr>
<tr>
<td><strong>Nozzle Count</strong></td>
<td>25</td>
<td>36</td>
<td>25</td>
<td>36</td>
</tr>
<tr>
<td><strong>Main Tank Capacity</strong></td>
<td>1000 gallons (3785 liters)</td>
<td></td>
<td>1250 gallons (4732 liters)</td>
<td></td>
</tr>
<tr>
<td><strong>Flush Tank Capacity</strong></td>
<td>100 gallons (379 liters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Handwash Tank Capacity</strong></td>
<td></td>
<td>5 gallons (18.9 liters)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marker Foam Tank Capacity</strong></td>
<td></td>
<td></td>
<td>25 gallons (95 liters)</td>
<td></td>
</tr>
<tr>
<td><strong>Tractor Requirement</strong></td>
<td>75 hp (55 kW)</td>
<td>100 hp (75 kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Closed Center Hydraulic Circuits</strong></td>
<td>One hydraulic remote (with PTO pump)</td>
<td>Two hydraulic remotes (with hydraulic pump)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Empty Weight</strong></td>
<td>7520 lbs (3411 kg)</td>
<td>8070 lbs (3660 kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Full Weight</strong></td>
<td>16450 lbs (7462 kg)</td>
<td>19075 lbs (8652 kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Working Width</strong></td>
<td>63 feet (19.2 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transport Width</strong></td>
<td>12 feet (3.7 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transport Height</strong></td>
<td>13 feet (4.0 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>22 feet 5 in (6.8 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clearance</strong></td>
<td>28 inches (71 cm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wheel Spacing</strong></td>
<td>North American models: 80 to 120 inches (203 to 305 cm)</td>
<td>Export models: 203 to 290 cm (80 to 114 inches)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tire Size</strong></td>
<td>320/85R38 Radial</td>
<td>14.9 R46 10 Ply</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pumps</strong></td>
<td>Ace Hydraulic, Ace Tractor mounted high volume PTO pump - 540 RPM, Ace Tractor mounted high volume PTO pump - 1000 RPM 1 3/8-inch spline, or customer-provisioned 90 gpm at 30 psi (341 liters/min at 207 kPa)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. An optional kit (833-427C) is available for open center tractors. See page 75.
b. If tractor cannot restrict flow to 6 gpm, purchase a flow-control kit from your Great Plains dealer.
c. Lowest part of hitched sprayer is the tractor side of the hitch.
d. May be upgraded by Option to 14.9 R46.
e. Standard sprayer does not include a pump.

Tire Inflation Chart

<table>
<thead>
<tr>
<th>Wheel</th>
<th>Tire Size</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>13.6-38 6 Ply Tubeless</td>
<td>22 psi 152 kPa</td>
</tr>
<tr>
<td>Transport</td>
<td>14.9 R46 4&quot; 10 Ply Radial</td>
<td>36 psi 221 kPa</td>
</tr>
<tr>
<td>Transport</td>
<td>320/85R38 Radial</td>
<td>52 psi 359 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 websites listed below. For assistance or information, contact your nearest Authorized Farm Tire Retailer.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firestone</td>
<td><a href="http://www.firestoneag.com">www.firestoneag.com</a></td>
</tr>
<tr>
<td>Gleason</td>
<td><a href="http://www.gleasonwheel.com">www.gleasonwheel.com</a></td>
</tr>
<tr>
<td>Titan</td>
<td><a href="http://www.titan-intl.com">www.titan-intl.com</a></td>
</tr>
</tbody>
</table>
## Torque Values

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Bolt Head Identification</th>
<th>Bolt Head Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>in-tpi</strong></td>
<td><strong>Grade 2</strong></td>
<td><strong>Grade 5</strong></td>
</tr>
<tr>
<td><strong>N-m</strong></td>
<td><strong>ft-lb</strong></td>
<td><strong>N-m</strong></td>
</tr>
<tr>
<td>M5 X 0.8</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>M6 X 1</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>M8 X 1.25</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>M8 X 1</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>M10 X 1.5</td>
<td>33</td>
<td>24</td>
</tr>
<tr>
<td>M10 X 0.75</td>
<td>39</td>
<td>29</td>
</tr>
<tr>
<td>M12 X 1.75</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>M12 X 1.5</td>
<td>60</td>
<td>44</td>
</tr>
<tr>
<td>M12 X 1</td>
<td>90</td>
<td>66</td>
</tr>
<tr>
<td>M14 X 2</td>
<td>92</td>
<td>68</td>
</tr>
<tr>
<td>M14 X 1.5</td>
<td>99</td>
<td>73</td>
</tr>
<tr>
<td>M16 X 2</td>
<td>145</td>
<td>105</td>
</tr>
<tr>
<td>M16 X 1.5</td>
<td>155</td>
<td>115</td>
</tr>
<tr>
<td>M18 X 1.5</td>
<td>195</td>
<td>145</td>
</tr>
<tr>
<td>M18 X 1.5</td>
<td>220</td>
<td>165</td>
</tr>
<tr>
<td>M20 X 2.5</td>
<td>280</td>
<td>205</td>
</tr>
<tr>
<td>M20 X 1.5</td>
<td>310</td>
<td>230</td>
</tr>
<tr>
<td>M24 X 3</td>
<td>480</td>
<td>355</td>
</tr>
<tr>
<td>M24 X 2</td>
<td>525</td>
<td>390</td>
</tr>
<tr>
<td>M30 X 3.5</td>
<td>960</td>
<td>705</td>
</tr>
<tr>
<td>M30 X 2</td>
<td>1060</td>
<td>785</td>
</tr>
<tr>
<td>M36 X 3.5</td>
<td>1730</td>
<td>1270</td>
</tr>
<tr>
<td>M36 X 2</td>
<td>1880</td>
<td>1380</td>
</tr>
</tbody>
</table>

- **in-tpi** = nominal thread diameter in inches-threads per inch
- **N-m** = newton-meters
- **mm x pitch** = nominal thread diameter in mm x thread pitch
- **ft-lb** = foot pounds

Torque tolerance + 0%, -15% of torquing values. Unless otherwise specified use torque values listed above.
Hydraulic and Plumbing Diagrams

Boom Hydraulics

<table>
<thead>
<tr>
<th>Valve Port</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, T</td>
<td>Tractor Remote Circuit</td>
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Null4: 27269

Null4: 833-427C
## Standard Closed Center Pin Assignments

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Manifold-Boom Assignments
Raven G1 AutoBoom Hydraulics
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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<td>73</td>
</tr>
<tr>
<td>Whirfilter</td>
<td>38, 50, 62</td>
</tr>
<tr>
<td>Whirfilter Cleanout Shutoff Valve</td>
<td>38</td>
</tr>
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Y cable: 77

Numerics:

29 CFR 1910.146: 69