Read the operator’s 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!
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Important Safety Information

Be Aware of Signal Words
The word that designates a degree or level of hazard seriousness. The signal words are:

⚠️ 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.

Keep Riders Off Machinery
▲ Riders obstruct the operator’s view they could be struck by foreign objects or thrown from the machine.
▲ Never allow children to operate equipment.

For Your Protection
▲ Thoroughly read and understand the “Safety Decals” section, read all instructions noted on them.

Use Safety Lights and Devices
▲ Slow moving tractors, self-propelled equipment, and towed implements can create a hazard when driven on public roads. They are difficult to see, especially at night.
▲ Flashing warning lights and turn signals are recommended whenever driving on public roads. Use lights and devices provided with implement.

Shutdown and Storage
▲ Disengage power, put tractor in park, turn off engine, and remove the key.
▲ Detach and store sprayer in an area where children normally do not play. Secure sprayer by using blocks and supports.
Use A Safety Chain
▲ A safety chain will help control drawn machinery should it separate from the tractor drawbar.
▲ Use a chain with the strength rating equal to or greater than the gross weight of the towed machinery.
▲ Attach the chain to the tractor drawbar support or other specified anchor location. Allow only enough slack in the chain to permit turning.
▲ Do not use safety chain for towing.

Transport Machinery Safely
▲ Comply with state and local laws.
▲ Maximum transport speed for implement is 20 mph. DO NOT EXCEED. Never travel at a speed which does not allow adequate control of steering and stopping. Some rough terrains require a slower speed.
▲ Sudden braking can cause a towed load to swerve and upset. Reduce speed if towed load is not equipped with brakes.
▲ Do not transport sprayer when filled with chemicals.
▲ Do not tow an implement that weighs more than 1.5 times the weight of towing vehicle.

Practice Safe Maintenance
▲ Understand procedure before doing work. Use proper tools and equipment, refer to Operator’s Manual for additional information.
▲ Work in a clean dry area.
▲ Disengage power, put tractor in park, turn off engine, and remove key before performing maintenance.
▲ Make sure all moving parts have stopped and all pressure in the system is relieved.
▲ Allow sprayer to cool completely.
▲ Do not work on hoses, nozzles or plumbing components (with the exception of throttling valve and chemical inductor) while pump is running or hoses are pressurized.
▲ Disengage pump and release hose pressure by turning boom section switches on before working on individual components.
▲ Do not grease or oil sprayer while it is in operation.
▲ Disconnect battery ground cable (-) before servicing or adjusting electrical systems or before welding on sprayer.
▲ Inspect all parts. Make sure parts are in good condition & installed properly.
▲ Remove buildup of grease, oil or debris.
▲ Remove all tools and unused parts from sprayer before operation.

Prepare for Emergencies
▲ Be prepared if a fire starts. It is recommended that the operator of this sprayer carry a minimum five-pound ABC fire extinguisher.
▲ Keep a first aid kit.
▲ Keep emergency numbers for doctor, ambulance, hospital and fire department near phone.

▲ Be prepared if a fire starts. It is recommended that the operator of this sprayer carry a minimum five-pound ABC fire extinguisher.
▲ Keep a first aid kit.
▲ Keep emergency numbers for doctor, ambulance, hospital and fire department near phone.
Handle Chemicals Properly

▲ Read and follow Chemical Manufacturer's instructions.
▲ Protective clothing should be worn.
▲ 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. Concentrate should not be poured 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 clear water and have soap available in case of an emergency. Flush any area of the body that is contaminated by chemicals immediately and thoroughly.
▲ 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. The container should then be punctured to prevent future use. An alternative is to jet-rinse or pressure rinse the container.
▲ Wash hands and face before eating when working with chemicals. Shower as soon as spraying is completed for the day.
▲ Spray only with acceptable wind conditions. Make sure wind drift of chemicals will not affect any surrounding land, people or animals.
▲ Never wash the sprayer tank out within 100 feet of any freshwater source or in a car wash.
▲ Rinse out the tank and spray rinse water on the last field sprayed.

Safety at All Times

Thoroughly read and understand the instructions given in this manual before operation. Refer to the "Safety Decals" section, read all instructions noted on them.
▲ Operator should be familiar with all functions of the unit. This sprayer can be dangerous and can cause bodily harm if not properly used or guarded.
▲ Keep others away from sprayer when in operation.
▲ Operate sprayer from the driver's seat only.
▲ Use only water without pesticides added to calibrate the sprayer.
▲ Do not exceed the calibrated sprayer speed and pressure when operating.
▲ Do not leave tractor or sprayer unattended with engine running.
▲ Dismounting from a moving tractor could cause serious injury or death.
▲ Do not stand between the tractor and sprayer during hitching.
▲ Keep hands, feet, and clothing away from power-driven parts.
▲ Wear snug fitting clothing to avoid entanglement with moving parts.
▲ Turning tractor too tight may cause implement to ride up on wheels. This could result in injury or equipment damage.
▲ When using a PTO pump, be sure that (1) PTO shield is in place on the tractor, (2) PTO coupler bolts are torqued to the correct specification, and (3) torque bar is properly chained to tractor drawbar.
▲ When inductor tank is not being used, keep inductor tank valve closed to prevent chemical overflow.
▲ Run pump when using inductor tank. Failure to do so will cause chemical overflow.
▲ Avoid High Pressure Fluids Hazard

▲ Escaping fluid under pressure can penetrate the skin causing serious 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.
▲ If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
▲ Handle Chemicals Properly

Run pump when using inductor tank. Failure to do so will cause chemical overflow.
Wear Protective Equipment
▲ Protective clothing and equipment should be worn.
▲ 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 (read the label) must be destroyed according to state and local regulations.

▲ Wear clothing and equipment appropriate for the job. Avoid loose fitting clothing.
▲ Prolonged exposure to loud noise can cause hearing impairment or hearing loss. Wear suitable hearing protection such as earmuffs or earplugs.
▲ Operating equipment safely requires the full attention of the operator. Avoid wearing radio headphones while operating machinery.

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▲ Operating equipment safely requires the full attention of the operator. Avoid wearing radio headphones while operating machinery.

Tire Safety
▲ Tire changing can be dangerous and should be performed by trained personnel using the correct tools and equipment.
▲ When inflating tires, use a clip-on chuck and extension hose long enough to allow operator to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.
▲ When removing and installing wheels, use wheel handling equipment adequate for the weight involved.

Personal Safety Equipment
Great Plains advises all users of chemical pesticides or herbicides to use the following personal safety equipment. Always follow the chemical label instructions, operator safety and the effectivity of the product depends upon operator actions.

▲ 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
Safety Decals

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

1. Read and follow decal directions.
2. Keep all safety decals clean and legible.
3. Replace all damaged or missing decals. Order new decals from your Great Plains dealer. Refer to this section for proper decal placement.

4. When ordering new parts or components, also request corresponding safety decals.

5. To install new decals:
   a. Clean the area on which the decal is to be placed.
   b. Peel backing from decal. Press firmly on surface, being careful not to cause air bubbles under decal.
WARNING
CHEMICAL OVERFLOW HAZARD

To prevent serious injury or death from chemical overflow:
- Keep hood cover closed when not in use.
- Run pump when hood cover is in use.

818-303C
Chemical Overflow
**Important Safety Information**

**818-323C**

**Personal Safety Equipment**

**Danger**

**818-324C**

**General Caution**

**818-339C**

**High Pressure Fluid Warning**

**818-365C**

**Tire Inflation & Torquing Caution**
**CAUTION**

To avoid injury or machine damage from improper tire inflation or torquing of wheel bolts:
- Minimum inflation pressure for tires is 35 psi.
- Torque wheel bolts to 240 lb-ft.

**818-381C**

Tire Inflation & Torquing Caution

---

**WARNING**

To prevent serious injury or death:
- If an unattended engine, go off engine to prevent a dangerous situation as a result of engine overheating or fire escalation.
- Keep a fire extinguisher ready to use at all times when operating the sprayer.
- Use proven methods to control the operation of the sprayer.

**818-548C**

Inflation & Torquing Caution

---

**WARNING**

**WATER CONTAMINATION HAZARD**

To prevent sickness, serious injury, or death from water contamination:
- Fill sprayer with supply tank higher than sprayer tank, or
- Fill sprayer with pump from water supply.

**818-696C**

Water Contamination Warning
**Important Safety Information**

**383333**

Rotating Driveline

**383334**

Guard Missing
Introduction

This implement has been designed with care and built by skilled workers using quality materials. Proper setup, maintenance and safe operating practices will help you get years of satisfactory use from the machine.

Description of Unit
The TS1000 is a pull-type sprayer units.

Intended Usage
Use sprayer to apply chemicals to agricultural-production crops only. Do not modify sprayer for use with attachments other than those approved by Great Plains.

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

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

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.

IMPORTANT: A crucial point of information related to the preceding topic. For safe and correct operation, read and follow the directions provided before continuing.

NOTE: Useful information related to the preceding 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.

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 as shown in Figure A.

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

Your Great Plains dealer wants you to be satisfied with your new machine. If you do not understand any part of this manual or are not satisfied with the service received, please take the following actions.
1. Discuss the matter with your dealership service manager. Make sure they are aware of any problems so they can assist you.
2. If you are still unsatisfied, seek out the owner or general manager of the dealership.
3. For further assistance write to:

Product Support
Great Plains Mfg. Inc., Service Department
PO Box 5060
Salina, KS 67402-5060
Assembly and Setup

Before You Start
1. Find an open, flat area to assemble the sprayer.
2. Read all the instructions and understand them before assembling the sprayer.
3. Have the adequate tools necessary.

Read and understand the Operator’s Manual for the sprayer. A basic understanding of how the sprayer works will aid in the assembly, setup and operation of the sprayer. Find an open, flat area to assemble the sprayer and attach it to the tractor.

Tractor/Sprayer Hook-Up

The Great Plains Sprayer is equipped with a ball hitch on sprayers equipped with a PTO driveline pump.

A single tang hitch is used in place of the ball hitch on other pump options. If the sprayer has a single tang hitch, attach it to the tractor using a hitch pin with a retaining hair pin. Park the sprayer in a open, flat area. With the jack in the park position, figure 2. Skip instructions 1-4 and proceed with 5.

If the sprayer is equipped with the ball hitch, use the instructions 1-4 to assemble the hitch plate.

Refer to Figure 1
1. Remove the hammer-strap on the tractor. Assemble the ball hitch plate (1) to the drawbar by placing the 1" x 5" long bolt (2) through the drawbar hole using flat washers on both ends.
2. Secure the 3/4" x 5" long bolts (3) in the slots of the ball hitch plate (1) and in the slots of the backup plate (4) using the flange nuts provided. Orient the backup plate (4) with the slots in the opposite direction of the ball hitch plate.

Refer to Figure 2
3. Park the sprayer in an open, flat area with the jack in the park position.
4. Back the tractor up to the sprayer and hook up the sprayer ball hitch onto the stud (5) mounted on the ball hitch plate (1). Secure the ball hitch with the flat washer (6) and the lynch pin (7).
Refer to Figure 3
5. Now that the sprayer is attached to the tractor, prepare to level the frame of the sprayer by securely supporting the front of the frame with a hoist.

6. Adjust the frame by moving the adjustment bolts (1) to a position where the frame is sloping to the front about one degree. This will allow the fluid in the tank to drain into the sump when the sprayer is in use. Securely fasten the adjustment bolts (1) using the Torque Values Chart in the “Appendix” section on page 35.

Tractor/Hydraulic Pump Hook-Up
The hydraulic motor used on all liquid pumps is a 7 GPM 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 and to prevent operating the pump at excessive speeds. See an Great Plains dealer.

To hook up the pump conduct the following instructions:

Refer to Figure 4
1. The pressure hose coming out of the tractor remotes must be connected to the “I” port of the motor and the return line connected to the “O” port. 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 manual or tractor dealer for 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.
Ace Pump Flow Limiter (Option)
Refer to Page 33 Figure 27

The flow limiter is a hydraulic device designed to shut off the flow of hydraulic oil when a specified flow is exceeded. On tractors with LOAD SENS-ING (LS) Closed Center hydraulic systems, this device limits the flow of oil to the Ace motor and prevents failures due to misapplication.

The new 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.

To Install:

1. Install the flow limiter in the inlet port of the Ace motor.

2. Close the needle valve on the Ace motor by loosening the jam nut and screwing the needle valve in a clockwise direction all the way down.

3. Connect the hydraulic hoses so that the pump runs with the hydraulic lever in the “Lower/Retract” position. Connect return hose to Low Pressure Return Port, when available.

4. Shut off boom and agitation valves on the sprayer to deadhead the sprayer pump flow.

5. Adjust the flow control on the tractor to minimum flow setting (turtle).

6. Move the hydraulic lever to the “Lower/Retract” position. NOTE: Always shut the pump off in the “Float” position. This eliminates high pressure being trapped in the return line and protects hydraulic seals. Avoid returning the oil to the remote valve; use the Low Pressure Return port, when available.

7. Adjust the flow control on the tractor until the sprayer system deadhead pressure is 80 psi.

NOTE: If the flow limiter stops the flow of oil to the motor: 7a) Move the hydraulic lever to the “Neutral” position. This removes the oil pressure from the flow limiter and allows it to reset. 7b) Adjust the flow control to a lower flow position. 7c) Repeat steps 6 and 7.

8. Set sprayer pressure by opening the agitation valve.
Tractor / PTO Shaft Hook-Up

⚠️ DANGER!
Rotating driveline contact can cause death. KEEP AWAY! Do not operate without guards attached and driveline securely attached at both ends.

Refer to Figures 5 and 6
1. The tractor drawbar should be adjusted to ASAE standard or as shown.
   Adjust implement driveline to a position which is level with the tractor PTO.

NOTE: If, after adjusting the vertical position of the pump driveshaft, the driveshaft is still a lot higher than the PTO driveshaft on the tractor; adjust the hitch up one position and readjust the pump driveshaft. Refer to Tractor/Sprayer Hook-Up Instructions in this section starting on page 11 to adjust the hitch.

2. Position PTO shaft on tractor. Be sure shaft is coupled on tractor.
   Refer to Figure 7
3. Adjust the vertical position of the pump driveshaft on the sprayer so that it is level, to slightly higher than level with the PTO shaft on the tractor. This reduces driveline vibration when turning a corner. Adjust the vertical position by moving the four bolts supporting the driveshaft bracket.

Axle Adjustment
When using the 50 and 60 foot Cross-Fold Booms, leave the axle in the rear most position.

⚠️ CAUTION!
Axle position must be located correctly to avoid excessive tongue weight or negative tongue weight which could cause mechanical failure resulting in personal injury.

Refer to Figure 8
The wheel spacing of the axle can also be adjusted for differing row spacings.

⚠️ CAUTION!
Do not adjust the wheel spacing wider than 120". To do so may cause a falling axle hazard while the sprayer is in service.
Adjustments Before Going to the Field

1. Securely hitch the sprayer to the tractor and fasten the safety chain. Make sure the hitch is adjusted so that the front of sprayer is 1 1/2" lower than the rear so that the liquid in the tank will drain to the sump.

2. Fill sprayer 1/2 full with water for calibrating purposes.

3. Carefully unfold the boom on level ground. Inspect the boom for levelness. If boom is not level, reference Tractor/Sprayer Hook-Up in the “Assembly and Setup” section on page 11.

4. Hook-up the pump to the tractor. Engage the pump slowly and check for any leaks.

5. Set the deadhead pressure of the pump at 80 P.S.I. depending on how the pump is driven.

Hydraulic Driven Pumps

a. To determine the correct flow rate to the hydraulic motor, start out with the hydraulic control valve set at a minimum flow, and the hydraulic lever in the float position.

b. Open up the sprayer control valve to its maximum setting. (On Raven 440 monitors, 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.)

c. Start the tractor and engage the pump by placing the hydraulic lever in the down position. Once the system builds pressure on the magnetic nozzle pressure gauge, speed up the tractor throttle to normal operating speed. Shut off the boom section switches, close the throttling valves (if applicable) and close the agitation valve.

d. The pump is now at deadhead pressure and the hydraulic control valve must be adjusted up until the spray pressure reaches 80 P.S.I. maximum on the nozzle pressure gauge. Mark this setting on the hydraulic control valve for future reference.

e. Open up the agitation valve and reset the throttling valves (if applicable).

PTO Driven Pumps

a. Open up the sprayer valve to the maximum setting. (On Raven 440 monitors, 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.)

b. Start the tractor and engage the PTO pump slowly with the tractor engine idling. Once the system builds pressure on the magnetic nozzle pressure gauge, shut off the boom section switches, close the throttling valves (if applicable) and close the agitation valve.

c. The pump is now at deadhead pressure. Increase the engine RPM’s until the spray pressure reaches 80 P.S.I. maximum on the nozzle 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.

d. Open up the agitation valve and reset the throttling valves (if applicable).

6. Calibrate sprayer. Sprayer calibration (1) prepares your sprayer for operation and (2) diagnoses nozzle wear. This will give you optimum performance from your nozzles and ensure accuracy from your sprayer.

Equipment Needed:

- Calibration Container
- Calculator
- Stopwatch or wristwatch with second hand.

Step 1

Measure off a 200’ course in the area to be sprayed or in an area with similar surface conditions. Select the engine throttle setting and gear that will be used when spraying. The starting post should be far enough away to permit your tractor/sprayer to reach desired spraying speed. Hold that speed as you approach the “start” marker, and check the time required to travel through the course to the “end” marker. Repeat the above procedure, and average the times that were recorded. Use the following equation to determine the exact ground speed.

\[
\text{Speed (MPH)} = \frac{\text{Distance (ft.)} \times 60}{\text{Time (seconds)} \times 88}
\]

Example: MPH = 200 x 60
\[
\frac{27 \times 88}{2376}
\]

MPH = 5.05

Step 2

Determine the application rate at which your chemical should be sprayed. In determining which spray nozzles to use with your sprayer, you must know:

a. Nominal application pressure ____P.S.I.

b. Target application rate ____GPA

c. Target speed ____MPH

d. Nozzle spacing ____W (in)

Using this information, calculate the volume per minute, per nozzle as follows:
Using GPM .34 and pressure 30 P.S.I., you would select a nozzle from your nozzle chart that comes closest to providing the desired output.

**Step 3**

Turn on your sprayer and adjust the pressure. Operate the sprayer at desired pressure and catch the discharge in the calibration container for one minute. Divide 128 into the number of ounces caught to determine gallons per minute (GPM) per nozzle. 128 fluid ounces equals one gallon.

Example:

a. Nominal application pressure 30 P.S.I.
b. Target application rate 20 GPA
c. Target speed 5.0 MPH
d. Nozzle spacing 20 W (in)

\[
GPM = \frac{20 \text{ GPA} \times 5 \text{ MPH} \times 20 \text{ W (in)}}{128} = .34 \text{ GPM}
\]

**Step 4**

Determine your nozzle spacing in inches.

Example: 1 nozzle every 20 inches.

Solution:

\[
\text{GPA (gallons per acre)} = \frac{5,940 \times \text{GPM (per nozzle)}}{\text{MPH} \times W \text{ (nozzle spacing)}}
\]

Example:

\[
\text{GPA} = \frac{5,940 \times .34}{5.05 \times 20} = \frac{2020}{101} = 20
\]

All Raven 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 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 (Step 3) of the Raven manual to select either SP1-(wheel drive sensor) or SP2-(radar sensor).
Operating Instructions

General Notes For Field Operation

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

1. Securely hitch the sprayer to the tractor and fasten the safety chain. Make sure the hitch is adjusted so that the liquid in the tank will drain to the sump of the tank. Refer to Tractor/Sprayer Hook-Up in the “Assembly and Set-up” section on page 11.

2. Check the tire pressure in each tire. Refer to the Tire Inflation Chart in the “Appendix” section on page 35.

3. Lubricate the sprayer as needed. Refer to the Lubrication portion of the “Maintenance and Lubrication” section starting on page 31.

4. Hook-Up the pump to the tractor. Refer to Operating Pump in this section on page 19 and follow the instructions

5. When transporting the sprayer, DO NOT exceed 20 mph and DO NOT transport with chemical in the tank.

6. NEVER allow anyone to ride on the sprayer.

7. Make sure all tank shut off valves are turned on.

8. Calibrate sprayer with water only, not chemical and water. Calibrate with the sprayer tank half full of water. Refer to the calibration procedures in the Application Guide.

9. Adjust throttling valves on the boom valves, and the manual pressure adjustment valve (if applicable). Adjust the boom height required for the nozzles and spacing to be used. (Refer to nozzle tables in the Application Guide.)

10. Check and clean, if necessary, pump, nozzles and Whirlfilters®.

11. Safely and carefully add the chemical to the sprayer tank. ALWAYS wear personal safety equipment as shown in the Personal Safety Equipment portion of the “Important Safety Information” section on page 4. 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.

12. If possible, work crosswise to the wind, starting from the downwind side of the field. This will prevent heading directly into the chemical fumes.

13. Check the sprayer initially and periodically for loose bolts, pins and hose clamps. Check the hoses, pumps, valves and fittings for leaks.

14. Make sure that the handwash tank is full of clean water.

Operating Checklist
Each time the sprayer is used, check the following:

- Check 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 4.
- 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 Tank to flush away chemicals.

1. 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.
2. Close the tank valve and refill the handwash tank with fresh water when finished.
3. Periodically refill the handwash tank with fresh water. ALWAYS keep the handwash tank clean.

Agitation
Refer to Figure 9
To adjust the agitation, adjust the agitation valve. Refer to the agitation gauge to set a reference pressure for the agitation.

Operating Whirlfilter®
There are two Whirlfilters® on the Great Plains Sprayer. One filters the water entering the tank and the other filters the chemical solution being sprayed.

Refer to Figure 10
Clean-out the solution Whirlfilter®
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.

To clean out the tank-fill filter, proceed with the following:
1. Start with an empty sprayer tank.
2. Position a bucket under the plug in the sump of the filter 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.

Figure 9
Agitation Valve

Agitation handle

Figure 10
Quick-fill Ball Valve

Quick-fill Ball Valve

Clean-out Plug
Filling Tank Procedures

**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.

The Great Plains Sprayer fills the tank from the bottom of the tank and uses a standard 2 inch cam-lock coupler to connect to the freshwater hose.

1. To fill the tank, hook up the freshwater hose to the quick-fill camlock coupler with the quick-fill ball valve in the closed position. Refer back to figure 9 on page 18.
2. Turn the water on and open the quick-fill ball valve for the freshwater to enter the tank. When using a positive displacement pump to fill the tank, open the quick fill ball valve first and then pump water into the tank.

**CAUTION!**
Add the chemical only at the field, just prior to spraying. When adding chemical, follow the manufacturer’s instructions for mixing the spray solution in order to achieve the desired application rate.

3. Before adding the chemical to the tank, make sure the tank is at least one half full. The concentrate should not be poured into an empty tank.
4. 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.
5. Keep chemical containers low when pouring.
6. Make sure the wind is blowing the fumes and dust away from the operator while pouring chemical.
7. Do not smoke while handling chemicals.

Operating Pump

**DANGER!**
Rotating driveline contact can cause death. KEEP AWAY! Do not operate without guards attached and driveline 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 dead head pressure reaches 80 PSI, refer to Tractor/PTO Pump Hook-Up in the “Assembly and Set-up” section page 12, or 540 RPM. On a 1000 RPM pump, the RPM of the PTO would be the speed at which the dead head pressure reaches 80 PSI or 1000 RPM.

**WARNING!**
Never operate the PTO pump without the pump tongue bar firmly chained in place.

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 the Tractor/PTO Pump Hook-up in the “Assembly and Set-up” section on page 12, for more details. To run the pump, push the hydraulic lever in the “down” position. To stop the pump, push the hydraulic lever in the “float” position.

NOTE: 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.

Hydraulic Elevator
Raise and lower to the desired boom height using the tractor hydraulics. Use the height gauge on the elevator to use as an easy-to-read height reference from the tractor seat. Make sure the boom doesn’t settle hydraulically (lower in height) during the operation of the sprayer.

Transporting
1. Park the sprayer in an open area where power lines, buildings, etc. will not come in contact with the folded boom.
2. Secure the level-float pin in the lock position on the boom before folding.
3. Make sure the safety chain is securely fastened to the tractor draw bar and the retaining clip is fastened to the hitch pin.
4. Never allow riders when transporting the sprayer.
5. When transporting the sprayer, be sure to watch the height clearances for the folded boom to prevent damage and possible injury.

**DANGER!**
Contact with electrical power lines by booms can cause death by electrocution.

6. Do not exceed 20 mph transporting the sprayer.
7. Do not transport sprayer while filled with chemical mixture.

Parking
The following steps should be followed when unhitching the sprayer. See Storage in the “Maintenance and Lubrication” section on page 30, for more information on long term storage of the sprayer.
1. Drain the sprayer tank of any excess water or chemical. Dispose of or store chemical properly by instructions on the chemical label.
2. Park the sprayer on a level, solid area.

Refer to Figure 11 and 12

3. Remove the jack from the transport position and move to the parking position.

4. Unplug the hydraulic lines from the hydraulic pump.

3. If the ground is soft, place a board or plate under the jack to widen the ground contact area.
4. Extend the jack until the weight of the tongue is off the tractor drawbar and is supported by the jack.

Tank Rinse and Flush System
The Tank Rinse and Flush is a factory installed feature that will flush the tank and plumbing with clean water. The Tank Rinse and Flush will use the fresh water in the 100 gallon flush tank to rinse out the main sprayer tank in the field.

Refer to Figure 13

Before operation make sure the flush tank is filled with fresh, clean water. To operate the Tank Rinse and Flush option, refer to the following instructions:

1. Completely empty the chemical in the main sprayer tank by turning the agitation off the last pass and spraying it out in the field.
2. Make sure all boom valves and pump are turned off.
3. Turn the agitation valve #1 (in the control panel) to “FLUSH”, and rotate the flush tank valve #2 from “MAIN TANK” to “FLUSH TANK”. Turn operation valve #3 to “SPRAY”.

IMPORTANT: Refer to Tractor/Sprayer Hook-Up in the “Assembly and Set-up” section on page 11 when preparing to hitch the sprayer to the tractor.

IMPORTANT: If the sprayer is being hitched up and operated for the first time, it is important to follow the safety, set up, adjustment, and operating information in the front of this manual.
4. Operate the pump with the sprayer stationary, and rinse the tank until 1/3 of the flush tank volume (33 gallons) 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 14
6. Rotate the flush tank valve #2 from “FLUSH TANK” to “MAIN TANK”.

7. Operate the pump and spray out the full volume of liquid (deposited into the main sprayer tank from the Flush Tank) in the field just finished.

8. Repeat steps two through seven twice more until the flush tank is empty and the main sprayer tank has been rinsed completely three times.

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

Inductor (Optional Equipment)
The chemical inductor provides a safe and easy way to put the chemical into the tank which keeps an operator from having to climb up on the walkboard and dispense the chemical into the tank from the tank lid. Placing the chemical into the inductor tank allows it to transfer the chemical into the sprayer tank. Follow the following instructions to use the inductor tank.

Refer to Figure 15
1. Fill the main sprayer tank with the carrier needed and transport the sprayer to the field where the sprayer will be used.

2. Make sure the boom section valve switches are all off and operate the pump.

3. Turn the product valve #4 from “OFF” to “INDUCT”.

4. Add chemical to inductor tank.

5. Turn tank valve #2 to “MAIN TANK” and quick fill valve #3 to “SPRAY”. Turn agitation #1 to “AGITATION”. Be sure the valve to the tank is open.

6. Turn inductor valve #5 from “INDUCTOR OFF” to “INDUCTOR ON”.

7. Add additional chemical as needed into the inductor tank.

8. When finished, turn inductor valve #5 from “INDUCTOR ON” to “INDUCTOR OFF”, rotate product valve #4 from “INDUCT” to “OFF”, and turn off pump in that order.
Tank Fill Using Existing Pump Operations

The Tank Fill can be used to fill the main sprayer tank using the existing sprayer pump. To do so refer to the following instructions:

1. Make sure sprayer pump is off and insert supply tank hose into the walk-board quick-fill coupler. Leave quick-fill valve off.

Refer to Figure 16

2. Turn agitation valve #1 to “OFF”. Turn tank valve #2 to “MAIN TANK”. Turn operation valve #3 to “QUICK FILL W/ PUMP”.

3. Open supply tank valve making sure that positive head pressure is maintained at the quick-fill to prevent back-flow from the sprayer tank.

WARNING!

Make sure the supply tank is higher than the sprayer tank. Failure to do so can cause back-flow from the sprayer tank causing sickness, serious injury or death from water contamination.

4. Open quick-fill valve under the walk-board.

Refer to Figure 17

5. Turn product valve #4 from “OFF” to “TANK FILL”.

6. Make sure the boom section valve switches are all off, start the pump and fill the tank.

7. When finished, follow this order:
   a. Turn off pump.
   b. Rotate product valve #4 from “TANK” to “OFF”.
   c. Shut quick fill valve under walkboard.
   d. Shut off supply tank valve.
   e. Rotate operation valve #3 to “SPRAY”.

NOTE: Make sure there is positive head pressure from supply tank during this procedure.
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. Refer to Hydraulic Elevator Option in the “Operating Instructions” section on page 19. 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 (refer to 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.

Tank Straps
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.

Agitation Adjustment
The agitation valve is used to adjust the pressure to the agitation nozzles in the tank. Refer to the agitation gauge, and adjust the pressure to a desired rate. Different chemicals require different agitation pressures to keep the chemical in suspension.

CAUTION!
If using liquid fertilizer or any other chemical that will corrode brass, install a gauge protector under the brass agitation gauge or plug the gauge hole. Failure to do so will eventually cause the gauge to fail and chemical to be expelled from the gauge.

Agitation Adjustment with Tank Rinse
Refer to Figure 18
The agitation is adjusted the same way when the sprayer has the Tank Flush option. The only difference is the plumbing to adjust it. Rotate the agitation valve to achieve the desired pressure on the agitation gauge.

Figure 18
Agitation Valve
**WARNING!**
Crushing hazard. The boom could fall and cause serious injury or death. Before performing any maintenance, secure boom to parking stands if provided.

**Hydraulic Elevator**
*Refer to Figure 19*
Periodically check the slide pads (A) for wear. As the pads wear, tighten 1/2-inch bolts (B) on both sides of elevator frame (C) until pads just touch frame.

**Boom Height**
After calibrating sprayer for your nozzles, desired pressure and tractor speed, the main field adjustment is boom height. Set boom height to achieve correct overlap for your nozzle. If the crop canopy is taller in some fields than others, adjust boom height accordingly.

Refer to nozzle tables in the *Application Guide* to determine correct boom height.

---

**Figure 19**
Hydraulic Elevator
<table>
<thead>
<tr>
<th>Problem</th>
<th>Problem Area</th>
<th>Specific Checks</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure decreasing</td>
<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>Clean out Whirlfilter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plugged gauge</td>
<td>Remove 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</td>
<td>Remove obstruction from clogged area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of air at nozzles</td>
<td></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</td>
<td>Reduce swath width by nozzle reduction; install smaller nozzles and drive</td>
</tr>
<tr>
<td>increase</td>
<td></td>
<td>+ agitation requirement)</td>
<td>at a lower rate of speed</td>
</tr>
<tr>
<td></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</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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 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 agitator valve is open and that 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</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>valve is open</td>
</tr>
</tbody>
</table>
Maintenance and Lubrication

Maintenance
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 Personal Safety Equipment portion of the “Important Safety Information” section on page 4., are stored in an easily accessible place but protected from potential contamination from dust or chemicals.

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.

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 solution through the plumbing system.

The cast iron pump must be either full of antifreeze or completely empty of all liquid to avoid corrosion. If the contents 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.

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.
Scott and Ace Pumps

The centrifugal 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.

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.

Ace Hydraulic Pump Seal Replacement
Refer to Figure 20

Disassembly
1. Remove four 5/16” hex head cap screws (19) from rear of motor (18). Remove motor (18) and coupler.
2. Remove rear internal bearing snap ring (11).
3. Remove four 3/8” x 3/4” hex head cap screws (9) from mounting frame (8). Remove volute (2).
4. Remove 3/8” lock nut (3) from shaft (16). Insert a flat file into impeller vane to hold stationary. CAUTION: Excess torque may cause damage to plastic impellers.
5. Press shaft (16) out of impeller (5) using one 5/16” 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 a screwdriver or pressing out from motor end of pump housing.
8. Remove o-ring (20) from shaft groove.

NOTE: If you are only replacing the pump seal: 1) Press the shaft/bearing assembly into the frame. 2) Reinstall the rear internal bearing snap ring. 3) Skip to Assembly step 8.

Assembly
10. Remove forward internal bearing snap ring (11).

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 1-3/8” 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 the polished seal faces.
13. Insert key (15) in keyway (5) and install impeller (5) on shaft (16).
14. Place lock washer (4) and 3/8” lock nut (3) on shaft (16) and tighten nut (3).
15. Replace volute o-ring or gasket (7), volute (2), and four 3/8” x 3/4” 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 5/16” cap screws (19).

Figure 20
Ace Hydraulic Pump
Ace Belt Drive Pump Seal Replacement

Refer to Figure 21

If seal replacement is required:

1. Loosen 4 3/8" x 3/4" 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 nonrotating 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 nonhardening sealant to new seal case to assure good seal to mounting frame bore. Insert case into bore.

7. Make sure nonrotating 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 counterclockwise while holding shaft steady.

10. Replace gasket (6), volute and four 3/8" x 3/4" long hex screws.
Scott Pump Seal Replacement

Refer to Figure 22

The following are instructions for how to reassemble the pump after it has been disassembled and repaired. Refer to the parts manual for the components of the pump.

If seal replacement is required:

1. Disassemble pump and clean all components.
2. Assemble the ceramic ring seat of the mechanical seal (3) into the adapter (4) of the pump. Make sure the ceramic seat is positioned square into the volute housing.
3. Clean off any grease or dirt from the pump sleeve (1) and dry the sleeve so the rubber bellows on the mechanical seal will adhere to the sleeve properly when assembled.
4. Assemble the seal (2) with its spring, on the sleeve by pushing on the inside rubber portion of the seal using water as the lubrication. Make sure to align the notches in the mechanical seal with the notches in the sleeve. Assemble the mechanical seal/sleeve assembly on the pump shaft. The graphite seal face should touch the white ceramic seat face.
5. Assemble the impeller, being careful not to jar the mechanical seal that has been positioned on the pump shaft.
6. Assemble the rest of the pump.
Tank Agitation

Refer to Figure 23

There are two tank agitators in the sprayer tank that shoot jets of liquid out at a high velocity. This keeps the pesticides in suspension. Each agitator has four holes and is oriented as shown. To ensure that the tank gets proper agitation, make sure the agitators are always kept in the orientation shown.

Storage

1. Empty solution from the tank, clean the chemical inductor (if included), and store or dispose of the chemical as recommended by the manufacturer’s chemical label.
2. Flush the entire sprayer system with clean water.
3. Clean out Whirlfilters®. Refer to Operating Whirlfilter® in the “Operating Instructions” section on page 18.
4. Circulate 3 - 5 gallons of antifreeze through the system including the pump, hoses and nozzles. Drain the sprayer and properly dispose of antifreeze.
5. The cast iron pump must be either full of antifreeze or completely empty of all liquid to avoid corrosion. If the contents 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.

⚠️ WARNING!

Regular antifreeze is harmful or fatal to animals and humans. Use carefully according to the label’s instructions.

6. Remove nozzles, disconnect the control box, and place them indoors with the pump.
7. Change filters in the tractor cab after finished.
8. Wash off the exterior of the sprayer thoroughly using a safe solvent or soap and water.
9. Inspect all parts of the sprayer for wear and rust. Repair and paint parts as necessary.
10. Store the sprayer in a dry area away from direct sunlight.
Lubrication

**Legend**
- Multipurpose spray lube
- Multipurpose grease lube
- Multipurpose oil lube
- Intervals at which lubrication is required

---

**Two Wheel Bearings**
(Tandem Axle)
Repack and check the seals every 500 hours of use

Type of Lubrication: Wheel bearing grease
**Options**

**Chemical Inductor**

The chemical inductor provides a safe and easy way to put chemical into the tank, which keeps an operator from having to climb up on the walkboard and dispense the chemical into the tank from the tank lid. Placing the chemical into the inductor tank allows it to transfer the chemical into the sprayer tank.

*For additional information refer to:*
- “Important Safety Information” on page 1.
- “Operating Instructions” on page 17.
- “Troubleshooting” on page 25.
- “Maintenance and Lubrication” on page 26

**Foam Marker**

The High Volume Foam Marker is specifically for extreme residue conditions. It can be adjusted to produce a continuous stream of foam.
Pumps
The standard TSF1080, TSF1090, TSF1280 & TSF1290 does not include a pump. Optional hydraulic or PTO pumps are available.

Ace Hydraulic Pump
If ordered with a new TSF1080, TSF1090, TSF1280 & TSF1290 (Option 35), the pump is pre-installed prior to delivery.

<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 19.

Pump kit weight: 40 lbs (18 kg)

Ace Flow Limiter
On tractors with LOAD SENSING (LS) 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.

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

For use, see “Ace Pump Flow Limiter (Option)” on page 13.

Ace PTO Pumps
Pumps are available for 540 rpm PTO (#33) or 1000 rpm 1 3/8 in PTO (#34).

The pump kit includes required hitch components.

If ordered with a new TSF1080, TSF1090, TSF1280 & TSF1290 (see option #s above), the pump is pre-installed prior to delivery.

<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 SHFT</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)
## Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheel Spacing</strong></td>
<td>Single Axle 80&quot;-120&quot; (TS1000P) / 72&quot;-120&quot; (TS750P)</td>
</tr>
<tr>
<td><strong>Tires:</strong></td>
<td>Standard Optional: Single Axle 13.6 x 28 R1, 13.6 x 38 R1</td>
</tr>
<tr>
<td><strong>Transport Width</strong></td>
<td>12'8&quot; (60' Boom)</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>12'2&quot; (60' Boom)</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>225&quot; (60' Boom)</td>
</tr>
<tr>
<td><strong>Control Options</strong></td>
<td>Raven 440 Monitor</td>
</tr>
<tr>
<td><strong>Great Plains Pump Options</strong></td>
<td>Hydraulic Drive, Frame Mount 540/1000 RPM</td>
</tr>
<tr>
<td><strong>Boom Option</strong></td>
<td>CF60 or CF50</td>
</tr>
<tr>
<td><strong>Boom Elevator</strong></td>
<td>36&quot; Hydraulic Lift</td>
</tr>
<tr>
<td><strong>Boom Height Adjustments</strong></td>
<td>15&quot; to 55&quot;</td>
</tr>
<tr>
<td><strong>Foam Marker</strong></td>
<td>Optional</td>
</tr>
<tr>
<td><strong>Pull Through Hitch</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Axle Clearance</strong></td>
<td>25&quot; (13.6-28) / 29&quot; (12.4-38 or 13.6-38)</td>
</tr>
<tr>
<td><strong>Loaded Weight Approx.</strong></td>
<td>13,130 lbs on TS1000P</td>
</tr>
<tr>
<td><strong>Hitch Options</strong></td>
<td>Ball, Single strap</td>
</tr>
<tr>
<td><strong>Bottom Fill Kit</strong></td>
<td>Standard</td>
</tr>
<tr>
<td><strong>Electrical System</strong></td>
<td>12-volt, negative ground</td>
</tr>
<tr>
<td><strong>Hydraulic System</strong></td>
<td>For hydraulic pump, one hydraulic remote that can restrict flow to 6 gpm.*</td>
</tr>
<tr>
<td></td>
<td>For hydraulic elevator and hydraulic pump used in combination, two hydraulic remotes.</td>
</tr>
<tr>
<td><strong>Pumps</strong></td>
<td>Tractor mounted PTO pump - 540 RPM</td>
</tr>
<tr>
<td></td>
<td>Tractor mounted PTO pump - 1000 RPM 1 3/8&quot; spline</td>
</tr>
<tr>
<td></td>
<td>Tractor mounted PTO pump - 1000 RPM 1 3/4&quot; spline</td>
</tr>
<tr>
<td></td>
<td>Hydraulic pump</td>
</tr>
<tr>
<td></td>
<td>Tractor mounted high volume PTO pump - 540 RPM</td>
</tr>
<tr>
<td></td>
<td>Tractor mounted high volume PTO pump - 1000 RPM 1 3/8&quot; spline</td>
</tr>
</tbody>
</table>

* If tractor cannot restrict flow to 6 gpm, purchase a flow-control kit from your Great Plains dealer.
† At 24 inches behind lower lift-arm balls.

NOTE: All tires are warranted by the original manufacturer of the tire. Tire warranty information can be found in the brochures included with your Operator’s and Parts Manuals or online at the manufacturer’s websites. For service assistance or information, contact your nearest Authorized Farm Tire Retailer.

### Manufacturer
- Titan
- Goodyear
- Firestone

### Website
- www.titan-intl.com
- www.goodyearag.com
- www.firestoneag.com
## Torque Values Chart

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Bolt Head Identification</th>
<th>5.8</th>
<th>8.8</th>
<th>10.9</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Grade 2</td>
<td>Grade 5</td>
<td>Grade 8</td>
<td>Class 5.8</td>
</tr>
<tr>
<td>in-tpi^1</td>
<td>N·m^2</td>
<td>ft-lb</td>
<td>N·m</td>
<td>ft-lb</td>
</tr>
<tr>
<td>1/4-20</td>
<td>7.4</td>
<td>5.8</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>3/16-18</td>
<td>15</td>
<td>11</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>3/16-24</td>
<td>17</td>
<td>13</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>5/32-20</td>
<td>27</td>
<td>20</td>
<td>42</td>
<td>31</td>
</tr>
<tr>
<td>5/32-24</td>
<td>31</td>
<td>22</td>
<td>47</td>
<td>35</td>
</tr>
<tr>
<td>7/32-14</td>
<td>43</td>
<td>32</td>
<td>67</td>
<td>49</td>
</tr>
<tr>
<td>7/32-20</td>
<td>49</td>
<td>36</td>
<td>75</td>
<td>55</td>
</tr>
<tr>
<td>9/32-13</td>
<td>66</td>
<td>49</td>
<td>105</td>
<td>76</td>
</tr>
<tr>
<td>9/32-20</td>
<td>75</td>
<td>55</td>
<td>115</td>
<td>85</td>
</tr>
<tr>
<td>9/16-12</td>
<td>95</td>
<td>70</td>
<td>150</td>
<td>110</td>
</tr>
<tr>
<td>9/16-18</td>
<td>105</td>
<td>79</td>
<td>165</td>
<td>120</td>
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<tr>
<td>9/16-24</td>
<td>130</td>
<td>97</td>
<td>205</td>
<td>150</td>
</tr>
<tr>
<td>9/16-32</td>
<td>150</td>
<td>110</td>
<td>230</td>
<td>170</td>
</tr>
<tr>
<td>1/2-10</td>
<td>235</td>
<td>170</td>
<td>360</td>
<td>265</td>
</tr>
<tr>
<td>1/2-16</td>
<td>260</td>
<td>190</td>
<td>405</td>
<td>295</td>
</tr>
<tr>
<td>5/8-9</td>
<td>225</td>
<td>165</td>
<td>585</td>
<td>430</td>
</tr>
<tr>
<td>5/8-10</td>
<td>250</td>
<td>185</td>
<td>640</td>
<td>475</td>
</tr>
<tr>
<td>5/8-12</td>
<td>340</td>
<td>250</td>
<td>875</td>
<td>645</td>
</tr>
<tr>
<td>7/16-12</td>
<td>370</td>
<td>275</td>
<td>955</td>
<td>705</td>
</tr>
<tr>
<td>7/16-14</td>
<td>480</td>
<td>355</td>
<td>1080</td>
<td>795</td>
</tr>
<tr>
<td>7/16-20</td>
<td>540</td>
<td>395</td>
<td>1210</td>
<td>890</td>
</tr>
<tr>
<td>9/16-12</td>
<td>680</td>
<td>500</td>
<td>1520</td>
<td>1120</td>
</tr>
<tr>
<td>9/16-14</td>
<td>750</td>
<td>555</td>
<td>1680</td>
<td>1240</td>
</tr>
<tr>
<td>9/16-16</td>
<td>890</td>
<td>655</td>
<td>1990</td>
<td>1470</td>
</tr>
<tr>
<td>9/16-18</td>
<td>1010</td>
<td>745</td>
<td>2270</td>
<td>1670</td>
</tr>
<tr>
<td>9/16-20</td>
<td>1180</td>
<td>870</td>
<td>2640</td>
<td>1950</td>
</tr>
<tr>
<td>11/32-12</td>
<td>1330</td>
<td>980</td>
<td>2970</td>
<td>2190</td>
</tr>
</tbody>
</table>

1. in-tpi = nominal thread diameter in inches-thread per inch
2. N·m = newton-meters
3. ft-lb = foot pounds
4. mm x pitch = nominal thread diameter in millimeters x thread pitch

Tire Inflation Chart

<table>
<thead>
<tr>
<th>Tire Size</th>
<th>Inflation PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.50 x 20&quot; 4-Ply Drill Rib</td>
<td>28</td>
</tr>
<tr>
<td>9.0 x 22.5 10-Ply Highway Service 70</td>
<td>70</td>
</tr>
<tr>
<td>9.0 x 24&quot; 8-Ply Rib Implement</td>
<td>40</td>
</tr>
<tr>
<td>9.5L x 15&quot; 6-Ply Rib Implement</td>
<td>32</td>
</tr>
<tr>
<td>9.5L x 15&quot; 8-Ply Rib Implement</td>
<td>44</td>
</tr>
<tr>
<td>9.5L x 15&quot; 12-Ply Rib Implement</td>
<td>60</td>
</tr>
<tr>
<td>13.6 x 28 R1 10 Ply</td>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tire Size</th>
<th>Inflation PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>11L x 15&quot; 6-Ply Rib Implement</td>
<td>28</td>
</tr>
<tr>
<td>11L x 15&quot; 12-Ply Rib Implemenet</td>
<td>52</td>
</tr>
<tr>
<td>12.5L x 15&quot; 8-Ply Rib Implement</td>
<td>36</td>
</tr>
<tr>
<td>12.5L x 15&quot; 10-Ply Rib Implement</td>
<td>44</td>
</tr>
<tr>
<td>16.5L x 16.1&quot; 10-Ply Rib Implement</td>
<td>36</td>
</tr>
<tr>
<td>41 x 15&quot; x 18 - 22-Ply Rib Implement</td>
<td>44</td>
</tr>
<tr>
<td>13.6 x 38 R1 6 Ply</td>
<td>22</td>
</tr>
</tbody>
</table>
Warranty

Great Plains Manufacturing, Incorporated warrants to the original purchaser that this spraying equipment will be free from defects in material and workmanship for a period of one year from the date of original purchase when used as intended and under normal service and conditions for personal use; 90 days for commercial or rental purposes. This Warranty is limited to the replacement of any defective part by Great Plains Manufacturing, Incorporated and the installation by the dealer of any such replacement part. Great Plains reserves the right to inspect any equipment or part which are claimed to have been defective in material or workmanship.

This Warranty does not apply to any part or product which in Great Plains’ judgement shall have been misused or damaged by accident or lack of normal maintenance or care, or which has been repaired or altered in a way which adversely affects its performance or reliability, or which has been used for a purpose for which the product is not designed. This Warranty shall not apply if the product is towed at a speed in excess of 20 miles per hour.

Claims under this Warranty must be made to the dealer which originally sold the product and all warranty adjustments must be made through such dealer. Great Plains reserves the right to make changes in materials or design of the product at any time without notice.

This Warranty shall not be interpreted to render Great Plains liable for damages of any kind, direct, consequential, or contingent, to property. Furthermore, Great Plains shall not be liable for damages resulting from any cause beyond its reasonable control. This Warranty does not extend to loss of crops, losses caused by harvest delays or any expense or loss for labor, supplies, rental machinery or for any other reason.

No other warranty of any kind whatsoever, express or implied, is made with respect to this sale; and all implied warranties of merchantability and fitness for a particular purpose which exceed the obligations set forth in this written warranty are hereby disclaimed and excluded from this sale.

This Warranty is not valid unless registered with Great Plains Manufacturing, Incorporated within 10 days from the date of original purchase.