

Farm King

OPERATOR AND PARTS MANUAL

1600 High-Clearance Sprayer



1600 High-Clearance Sprayer

TO THE OWNER

Thank you for purchasing a Farm King 1600 High-Clearance Sprayer.

Farm King Sprayers have been designed to provide many years of profitable and dependable service. To assure maximum performance of your sprayer, it is mandatory that you thoroughly study the operator's manual and follow its recommendations. Proper operation and maintenance are essential for safety, to maintain performance, and to maximize the life of the sprayer.

It is the owner's responsibility to:

- Operate and maintain this sprayer in a safe manner and in accordance with all applicable local, state, and federal codes and/or laws; and in compliance with labeling instructions furnished by the supplier of the chemical being used.
- Make sure each and every operator has read the operator's manual and thoroughly understands safe and correct operating procedures.
- Make sure unauthorized people do not operate or are not in the vicinity of the sprayer while it is in operation.
- Maintain the sprayer in accordance with the maintenance schedule in this manual. Furthermore, as additional technology becomes available, the owner is responsible for improving the safety and reliability of the system.
- Fulfill all warranty obligations so as not to void the warranties. Verify the unit is warranty registered prior to making any warranty claims. The warranty section at the back of this manual outlines the warranty policy of Farm King.

Abuse or modifications to the sprayer that change the performance other than original factory specifications void the warranty.

Farm King reserves the right to make product improvements to the equipment at any time. It shall not be obligated to make such changes to machines already in service.

*The owner, manager and/or operator is responsible for safe, accurate operation and maintenance of the Farm King 1600 High-Clearance Sprayer.

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Safety Instruction

Section A

Safety First

Accidents can be prevented by recognizing the causes or hazards before an accident occurs . . . and doing something about them.

Regardless of the care used in the design and construction of this equipment, there are some areas that cannot be completely safeguarded without interfering with the accessibility and efficiency of operation.



THIS MESSAGE ALERT SYMBOL IDENTIFIES IMPORTANT MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY AND CAREFULLY READ THE MESSAGE THAT FOLLOWS.

In this manual and on labels used on the machine the words "DANGER", "WARNING", and "CAUTION", are used to indicate the following:

- DANGER:** Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.
- WARNING:** Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
- CAUTION:** Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.



THIS MESSAGE ALERT SYMBOL IDENTIFIES INFORMATION THAT MUST BE HEEDED FOR PROPER OPERATION OF EQUIPMENT AND TO PREVENT DAMAGE OR DETERIORATION OF THE EQUIPMENT.

In this manual the words "IMPORTANT" and "NOTE" are used to indicate the following:

- IMPORTANT:** Highlights information that must be heeded.
- NOTE:** A reminder of other related information that needs to be considered.

Safety Instructions for Operation

1. DO NOT ALLOW ANYONE TO OPERATE THIS FARM KING SPRAYER UNTIL HE OR SHE HAS READ THIS MANUAL AND IS COMPLETELY FAMILIAR WITH ALL SAFETY AND OPERATION PROCEDURES.



WARNING

Observe the IMPORTANT SAFETY INSTRUCTIONS listed below at all times! THE BEST KIND OF SAFETY IS A CAREFUL OPERATOR.



CAUTION

Always wear protective clothing, goggles, respirator and gloves when handling chemicals.



DANGER

Always wear protective clothing, goggles, respirator and gloves when handling chemicals.



WARNING

Observe all Federal and State EPA regulations and all Local, State and Federal codes and / or laws regarding licensing, handling, storage, transportation, application and waste disposal of chemicals.

2. If any safety device on the sprayer itself is not functioning properly, DO NOT use the sprayer. Remove it from service until it has been properly repaired by a qualified service technician.
3. Do not allow the following people to operate or repair this equipment.
 - Children
 - Irresponsible persons
 - People under the influence of alcohol, medications or other drugs that can cause drowsiness or impaired judgement.
 - Persons unfamiliar with equipment or people who are careless or unfamiliar with safe operating procedures.

4. People who are allergic to any of the chemicals used must never be allowed in or near the sprayer.
5. Always park the sprayer on a level surface, and lock the tractor brakes, or block the tires, before making adjustments or repairs.
6. Before operating this equipment, thoroughly inspect the unit to ensure it is in good working order.
7. Do not operate this unit if any defect or malfunction exists. Pay particular attention to safety features such as safety chains.
8. Verify that the sprayer is securely hitched to the tractor and safety chains are in place.
9. Always position the spray boom in cradles prior to disconnecting the trailer hitch from the tractor.

**WARNING**

Never disconnect the sprayer from the tractor hitch while the spray boom wings are in the spray position. This action will cause this sprayer to tip backwards with a high probability of injury to the operator and damage to the unit.

10. Stopping distance increases as the square of the speed. For example: It will take twice as much distance to stop a unit traveling 15 mph as one going 10 mph; and four times the distance at 20 mph (more than eight times the distance at 25 mph)! Road surface will influence stopping distance. Dry pavement is usually considerably better than gravel road. Materials (such as ice, snow, water, oil or mud) on the surface can greatly increase stopping distance.

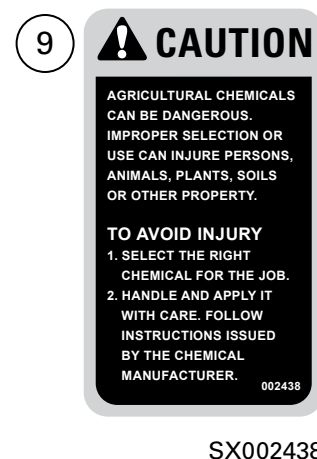
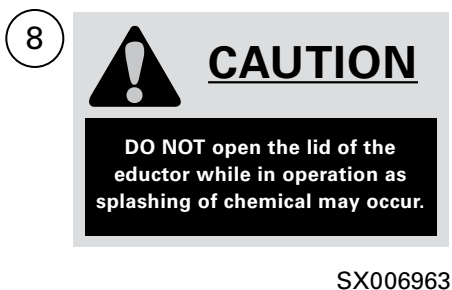
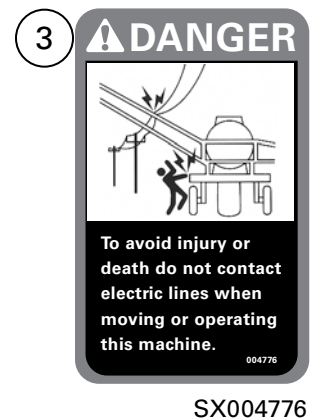
Road slope has a significant impact on stopping distance and can greatly magnify the other factors mentioned above. Under some downhill conditions stopping can be very difficult or impossible.

11. Do not replace components or parts with those other than genuine Farm King Factory Service Parts. To do so may reduce the effectiveness of safety features or decrease the accuracy of the unit.
12. Read the Operation Instructions section of this manual for further necessary information relating to the safe operation of the applicator.

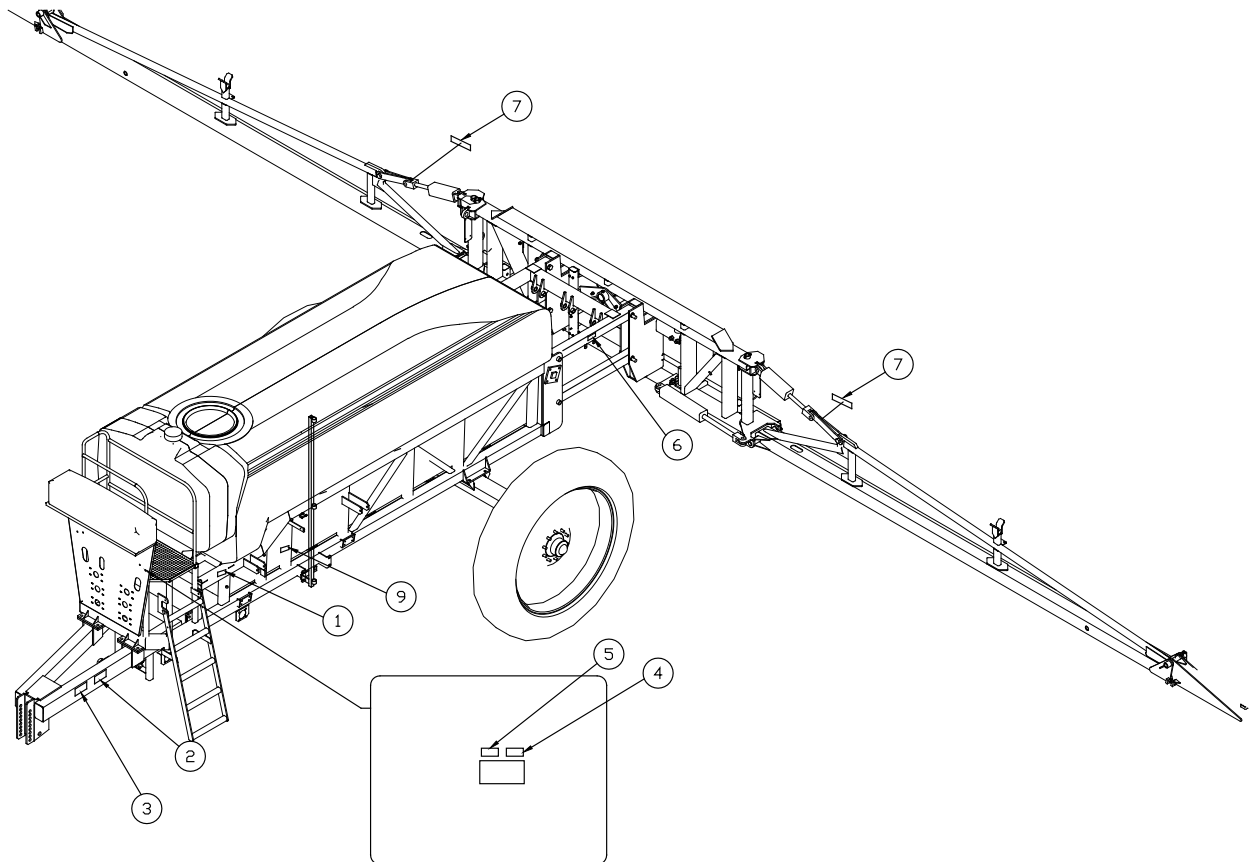
**WARNING**

Certain chemicals can be very corrosive and may oxidize steel over a period of time. This weakens steel parts and can cause failure to perform as intended, resulting in possible safety hazards. Periodically check all safety shields and structural members for corrosion. Replace or repair anything that could cause a potential safety hazard.

Safety Decals on a Farm King
Model 1600 High-Clearance Sprayer



Safety Decal Placement



NOTES:

Operation Instructions

Section B

Inspect Unit



IMPORTANT

Check machine thoroughly for screws, bolts, fittings, etc., which may have come loose during transport or operation.

System Overview

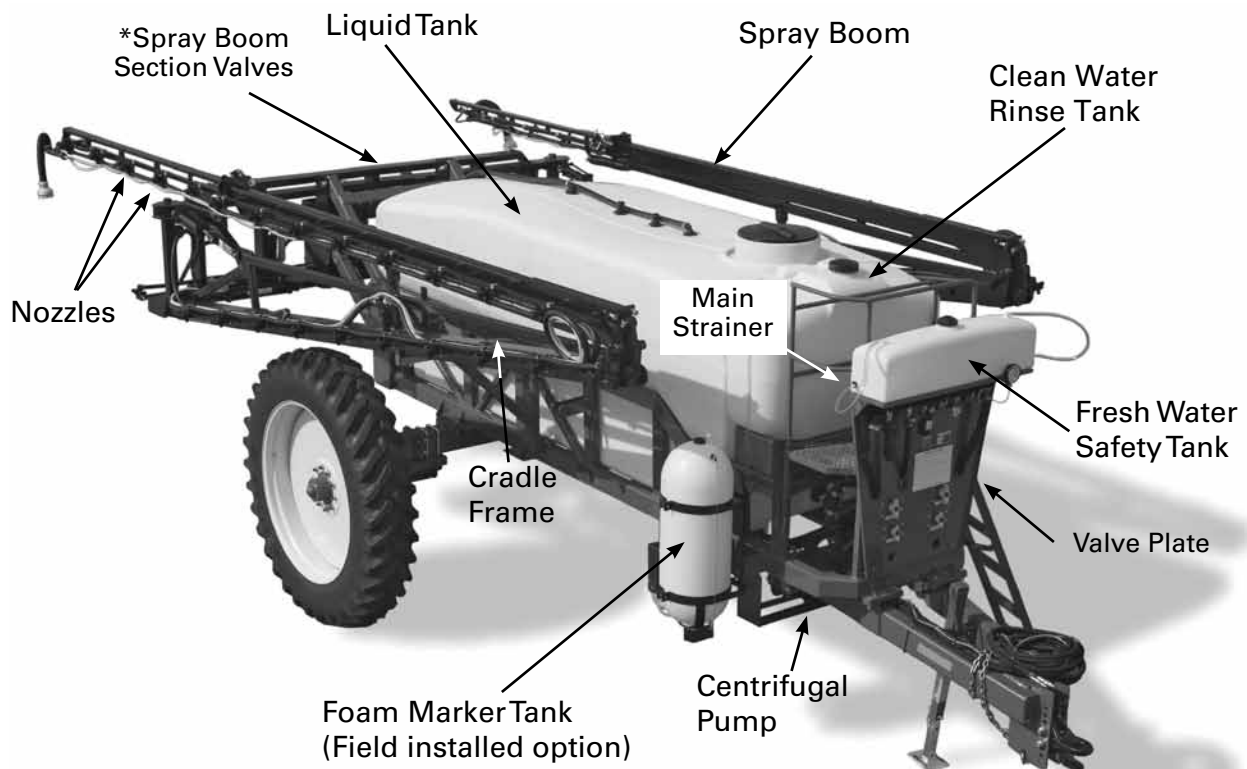


CAUTION

Prior to loading with chemical, the operator needs to test the sprayer with water only to ensure the system is intact prior to putting chemical into the system. Test to verify application at the desired rate and all components work correctly.

The Farm King Model 1600 High-Clearance Sprayer consists of the following subsystems:

- Hitch
- Liquid Tanks and Cradle Frame
- Spray Boom and Nozzles
- Liquid Pumping and Plumbing
- Solution Spray Control System
- Hydraulics
 - Centrifugal Pump
 - Spray Boom Folding
- Light and Marking System
- Foam Marker (optional)



*Note: Spray boom section valves are on the center section of the boom.

Hitch

Verify hitch is correctly attached to the tractor.
See Section C for connection procedures.



Pintle/Clevis Style Hitch



IMPORTANT

1. Towing tractor must weigh 12,000 pounds to ensure adequate stopping ability. Refer to your tractor manufacturer rating capabilities.
2. Do not tow sprayer over 20 MPH.

Liquid Tank & Cradle Frame

A polyethylene tank is supported by a structural steel cradle skid and frame weld. The tank is lowered into the cradle frame, requiring no additional strapping to hold in place.



WARNING

Never allow the clean water safety tank to become contaminated with chemical. Use the clean water tank for skin and eye rinse in case of accidental chemical contact.

Spray Boom(s) and Nozzles (not included)

Spray boom sizes are 60' to 90' vertical fold. Hydraulic cylinders, powered via the tractor hydraulics fold the Spray boom. The required size of the nozzles is dependent on the application rate and the tractor rate of travel (i.e. speed). The spacing of the nozzles is dependent on the type and size of nozzle utilized. See your Farm King Dealer for correct selection of nozzles and required spacing.



Eductor System (Field Installed Option)

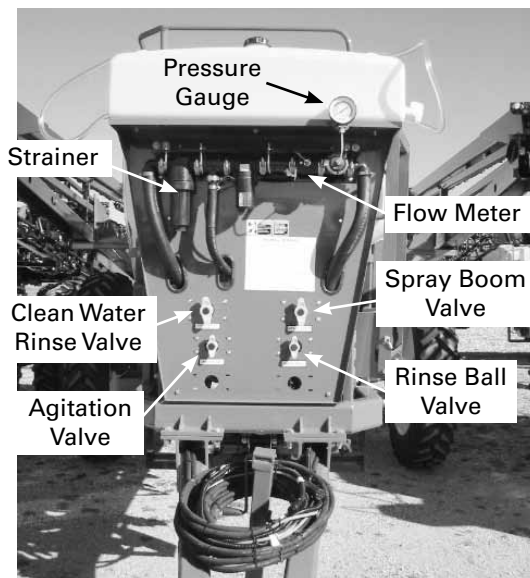
Liquid Pump & Plumbing

The liquid system begins with a suction line supplying a centrifugal pump. This pump is powered via tractor hydraulics and provides flow to the sprayer. The pump and plumbing have been configured to provide for the following functions:

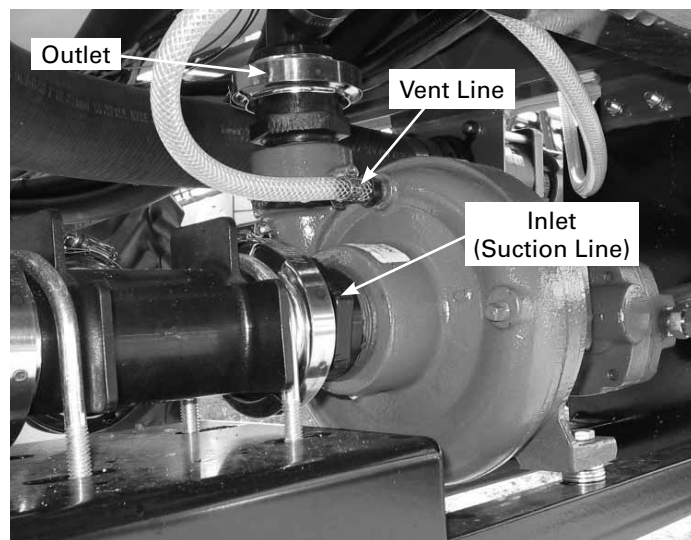
- Fill Solution Tank
- Fill Solution Tank, Utilizing Eductor (if equipped)
- Fill Solution Tank, With Tank Agitation
- Fill Clean Water Rinse Tank
- Rinse Agitation System
- Rinse Solution Tank
- Rinse Spray Boom Plumbing
- Spray
- Unload

Actual valve configuration will vary, depending on options purchased.

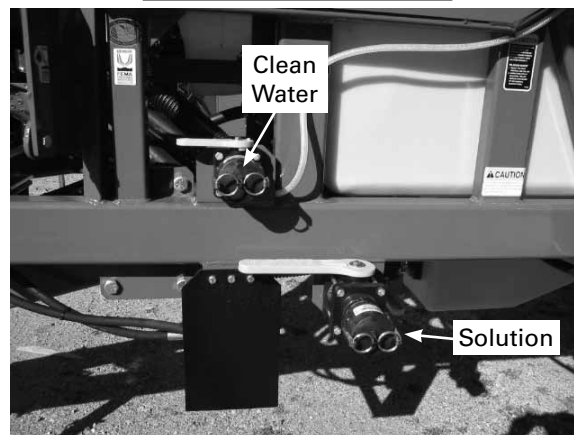
Front Panel



Hydraulically Driven Centrifugal Pump
Under Tank View



Quick Fill Connections



Centrifugal Pump

Pump operation is very important. The following must be followed when operating a centrifugal pump. Proper pump operation will make your system operate with minimal maintenance and down time. Failure to follow the manufacturer's pump operation instructions will void the pump warranty.

The pump **must never be run** in a non-flooded condition. Operating the pump in a non-flooded condition will cause extensive seal damage and possible pump damage. To verify the pump is flooded, visually check pump vent line for fluid. Fluid will appear in vent line when pump is flooded.

A "flooded" condition is when the centrifugal pump is completely full of fluid and no pockets of air are present in the pump. In order to get maximum pump efficiency the mounting and plumbing must meet the guidelines stated below.

1. The pump inlet must be mounted below the product tank(s) sump to allow gravity to naturally fill the pump with liquid. See Figures 1 - 3.
2. The suction line must have a continual rise from the pump inlet to the tank sump.
3. The pump must have the vent line plumbed to it.

Figure 1

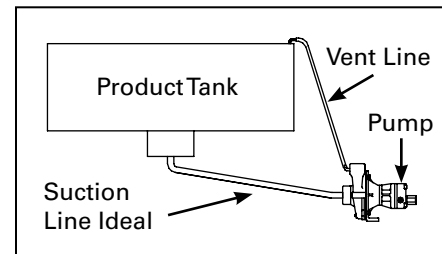


Figure 2

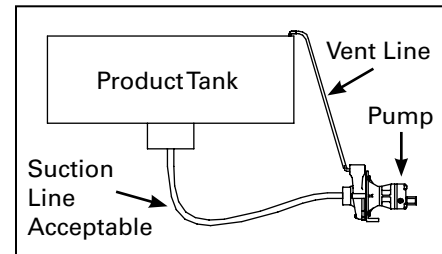
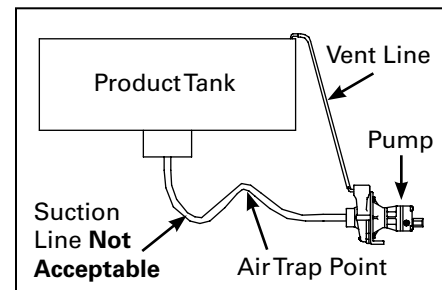


Figure 3



IMPORTANT

The vent line is designed to prevent air lock by bleeding off trapped air. This allows the pump to prime and keeps some fresh solution circulating by the seal.



IMPORTANT

For proper venting, the vent line must continually rise from the pump to the top of the tank. A small amount of solution will move through this line back to the solution tank indicating a primed pump.

Hydraulically Driven Centrifugal Pump:

It is very important that the proper oil flow is supplied to the hydraulic motor which powers the pump. Excessive flow will over-speed the motor and cause motor damage. To regulate the correct oil flow to the pump motor see the pump manufacturer's manual.





IMPORTANT

There are two basic rules to follow when operating a hydraulically driven centrifugal pump:

1. **Never run the pump** in a "non-flooded" condition.
 2. Always have the **correct oil flow** to the pump motor.
- Always read and follow the pump manufacturer's operational instructions.



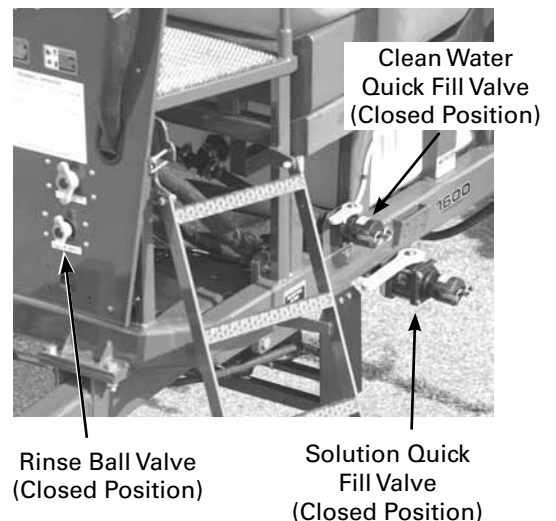
IMPORTANT

Turn off a hydraulically driven centrifugal pump using the "float" position of the tractor's hydraulic valve. This allows the motor to stop slowly helping to protect the motor and motor seals.

Fill Solution Tank

Load the solution tank without using the trailer sprayer pump via the following steps.

1. Close all valves.
2. Remove solution quick fill cap and connect load hose.
3. Open solution quick fill valve and solution tank main valve.
4. Open valve on loading reservoir (i.e. nurse tank).
5. Start the remote transfer pump.
6. Run remote transfer pump until the desired amount of solution is transferred into the trailer sprayer.
7. Close valves on loading reservoir.
8. Close solution quick fill valve on trailer sprayer.
9. Remove load line and replace cap on trailer quick fill.



CAUTION

Small amounts of liquid will remain in the load hose. Splashing of this liquid can cause a safety hazard to you and to those in the vicinity of the trailer sprayer.



CAUTION

Overfilling may cause the tank lid to open causing splashing of solution from the tank lid, which may be hazardous to you and the environment.

Fill Solution Tank, Utilizing Optional Eductor

Load the solution tank using the optional eductor via the following steps:

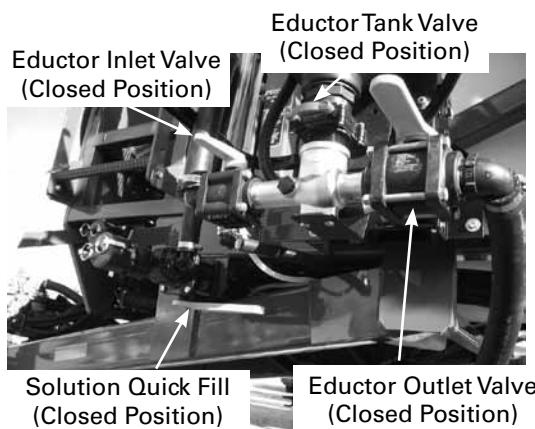
1. Close all valves.
2. Remove solution quick fill cap and connect load hose.
3. Open solution quick fill valve and solution tank main valve.
4. Open valve on loading reservoir (i.e. nurse tank)
5. Fill eductor with desired amount of chemical to be pulled into the solution tank. CLOSE Eductor Lid.
6. Start the remote transfer pump.
7. Once there is a steady flow rate from the nurse tank to the solution tank, open the eductor valve and close the solution quick fill valve. Once there is a steady flow rate again, open the eductor tank valve for 15-30 seconds.
8. Close the eductor tank valve and verify the chemical has been completely removed from the eductor tank. Repeat steps 7 and 8 if chemical remains in the eductor tank.
9. Run remote transfer pump until the desired amount of solution is transferred into the sprayer.
10. Close valves on the loading reservoir.
11. Close solution quick fill valve and the eductor valve on the sprayer.
12. Remove load line and replace cap on sprayer quick fill.

Left Side View Eductor (Optional)



Solution Quick Fill Connection

Solution Quick Fill and Eductor Plumbing (Optional) Left Under Frame View



CAUTION

AGRICULTURAL CHEMICALS CAN BE DANGEROUS. IMPROPER SELECTION OR USE CAN INJURE PERSONS, ANIMALS, PLANTS, SOILS OR OTHER PROPERTY.

TO AVOID INJURY

1. SELECT THE RIGHT CHEMICAL FOR THE JOB.
2. HANDLE AND APPLY IT WITH CARE. FOLLOW INSTRUCTIONS ISSUED BY THE CHEMICAL MANUFACTURER.

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CAUTION

DO NOT open the lid of the eductor while in operation as splashing of chemical may occur.

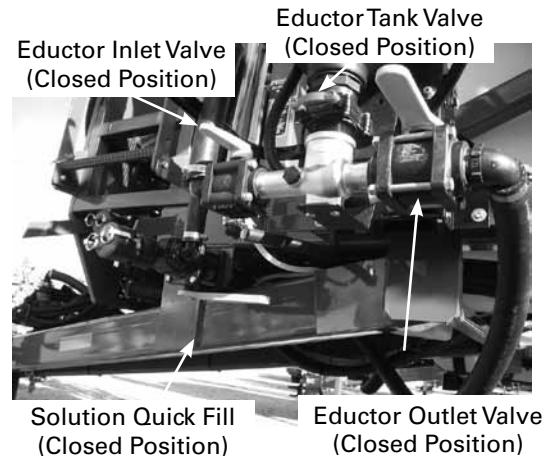


IMPORTANT

Only you, the operator, can determine the length of time required to completely rinse all chemical residue from the sprayer tanks and plumbing systems.

Rinse Eductor While Filling: Rinse the Eductor via the following:

1. Close and lock Cleanload lid by turning clockwise.
2. Release the safety locking band on the hopper rinse ball valve and turn on for 20 seconds.
3. Close the rinse ball valve and return locking band to locked position.
4. Open lid and inspect for chemical residue. Repeat step 2 as necessary.
5. Close eductor tank valve.
6. Close eductor inlet valve and eductor outlet valve.
7. Open solution quick fill valve to resume normal fill operation.

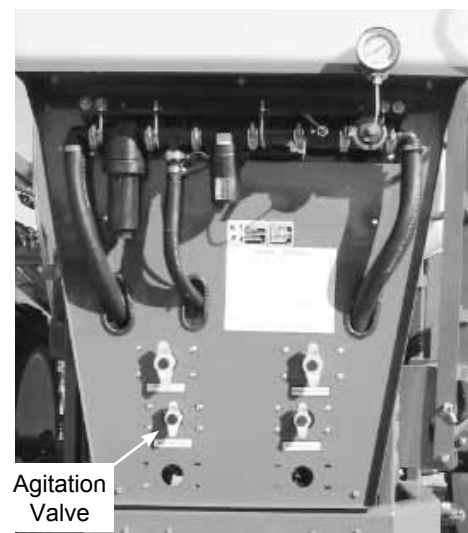


IMPORTANT

Turn off a hydraulically driven centrifugal pump using the "float" position of the tractor's hydraulic valve. This allows the motor to stop slowly helping to protect the motor and motor seals.

Fill Solution Tank, With Tank Agitation: Load the solution tank using tank agitation via the following steps:

1. Close all valves.
2. Remove solution quick fill cap and connect load hose.
3. Open solution quick fill valve and the solution tank main valve.
4. Open valve on loading reservoir (i.e. nurse tank).
5. Start the remote transfer pump.
6. Open the agitation valve.
7. Engage the liquid pump of the trailer sprayer.
8. Disengage the liquid pump of the trailer sprayer when adequate agitation is achieved.
9. Run remote transfer pump until the desired amount of solution is transferred into the trailer sprayer.
10. Close the agitation valve.
11. Close valves on loading reservoir.
12. Close the solution quick fill and the solution tank main valves.
13. Remove load line and replace cap on sprayer quick fill.





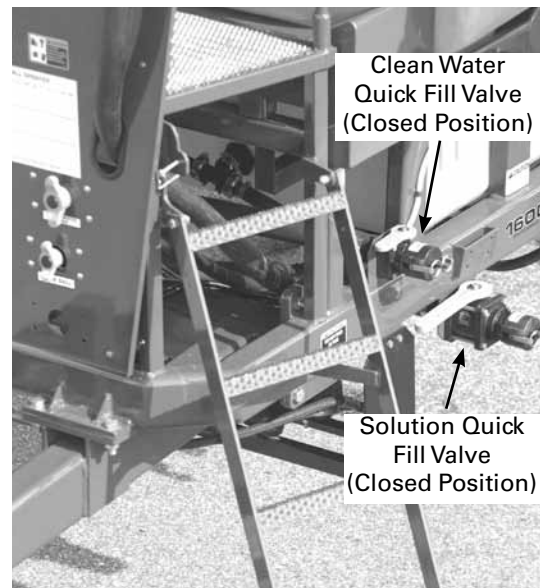
IMPORTANT

Turn off a hydraulically driven centrifugal pump using the "float" position of the tractor's hydraulic valve. This allows the motor to stop slowly helping to protect the motor and motor seals.

Fill Clean Water Rinse Tank

Filling the clean water rinse tank is achieved via the following steps:

1. Close all valves.
2. Remove clean water quick fill cap and connect load hose.
3. Open valve on clean water quick fill of trailer sprayer.
4. Open valve on loading reservoir (i.e. nurse tank).
5. Start the remote transfer pump.
6. Run remote transfer pump until the desired amount of clean water is transferred into the trailer sprayer.
7. Close valves on loading reservoir.
8. Close clean water quick fill valve on trailer sprayer. Remove load line and replace cap on trailer quick fill.



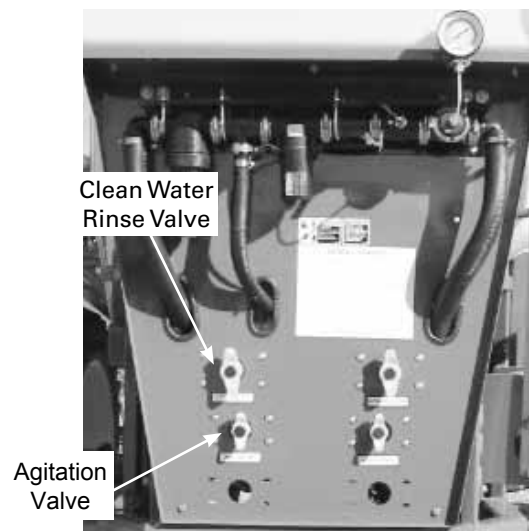
IMPORTANT

Only you, the operator, can determine the length of time required to completely rinse all chemical residue from the sprayer tanks and plumbing systems.

Rinse Agitation System

Rinsing the agitation plumbing is achieved via the following steps:

1. Close all valves.
2. Open the clean water rinse valve.
3. Engage the liquid pump of the trailer sprayer.
4. Open the agitation valve.
5. Run for 15-30 seconds to thoroughly rinse the insides of the agitation plumbing.
6. Disengage the liquid pump of the trailer sprayer.
7. Close the clean water rinse valve.
8. Close the agitation valve.



Valve Panel
(All valves in closed position)



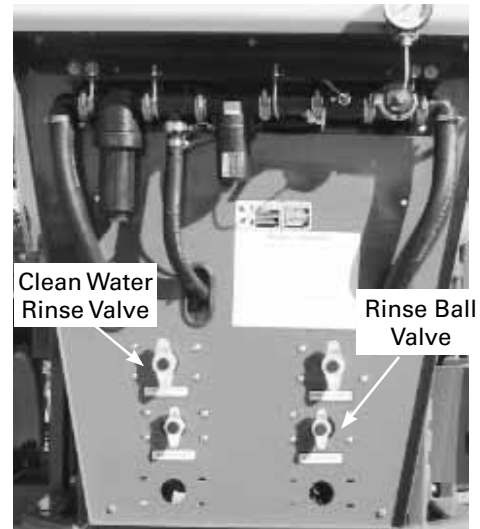
IMPORTANT

Only you, the operator, can determine the length of time required to completely rinse all chemical residue from the sprayer tanks and plumbing systems.

Rinse Solution Tank

Using the clean water rinse tank system, rinsing the solution tank with clean water is accomplished via the following steps:

1. Close all valves.
2. Open the clean water rinse valve.
3. Open the rinse ball valve.
4. Engage the liquid pump of the sprayer.
5. Run for 15-30 seconds to thoroughly rinse the inside of the solution tank. Repeat if needed.
6. Disengage the liquid pump of the trailer sprayer.
Close the clean water rinse valve.
7. Close the rinse ball valve.



Valve Panel
(All valves in closed position)



IMPORTANT

Turn off a hydraulically driven centrifugal pump using the "float" position of the tractor's hydraulic valve. This allows the motor to stop slowly helping to protect the motor and motor seals.



IMPORTANT

The number of times the tank must be rinsed is dependent on the chemical present in the solution tank. Only you, the operator, can determine the number of rinsing required to thoroughly clean all chemical residue from the sprayer tanks and plumbing systems.

Rinse Spray Boom Plumbing

Using the clean water rinse tank system, rinse the spray boom plumbing with clean water via the following steps: Close all valves.



IMPORTANT

Only you, the operator, can determine the length of time required to completely rinse all chemical residue from the sprayer tanks and plumbing systems.

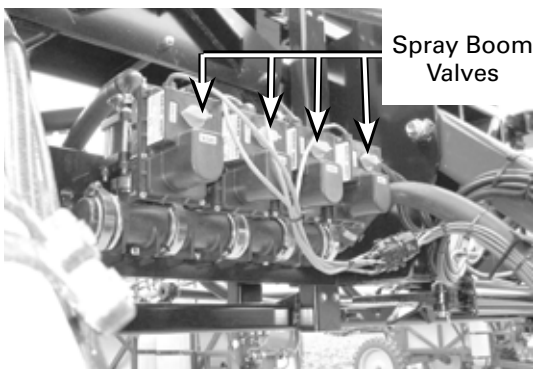
1. Close all valves.
2. Open the clean water rinse valve.
3. Open the spray boom valve.
4. Open all spray boom section valves with the spray controller.
5. Engage the liquid pump of the trailer sprayer.
6. Run for 15-30 seconds to thoroughly rinse. Repeat if needed.



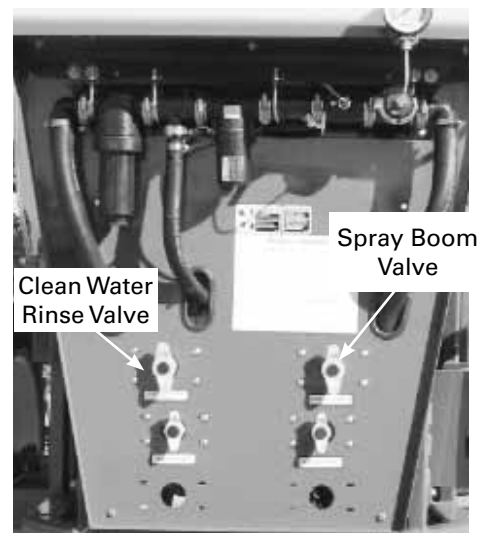
IMPORTANT

Turn off a hydraulically driven centrifugal pump using the "float" position of the tractor's hydraulic valve. This allows the motor to stop slowly helping to protect the motor and motor seals.

7. Disengage the liquid pump of the trailer sprayer.
8. Close the clean water rinse valve.
9. Close all spray boom section valves.
10. Close the spray boom valve.



Spray Boom Center Section

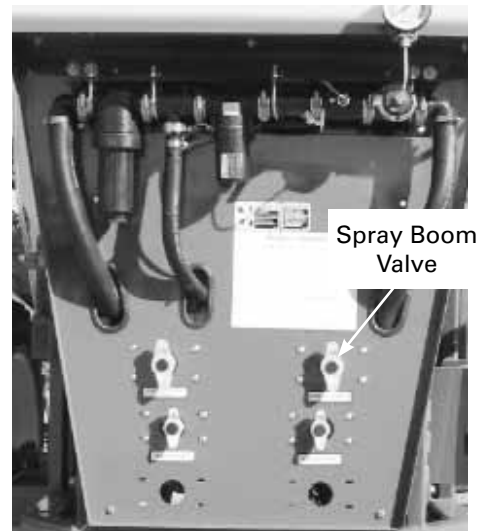


Valve Panel
(All valves in closed position)

Spraying

Spraying is accomplished via the following steps:

1. Close all valves.
2. Open the solution tank main valve.
3. Setup control system. (Setup and operation of the control system is covered in the manual provided by the controller manufacturer.)
4. Open the spray boom valve.
5. Engage the liquid pump of the trailer sprayer.
6. Open desired spray boom section valves.
7. Perform spraying according to the control system provided.
8. To stop spraying, close all spray boom section valves.
9. Disengage the liquid pump of the trailer sprayer
10. Close the spray boom valve.
11. Close the solution tank valve.



Valve Panel
(All valves in closed position)



IMPORTANT

Turn off a hydraulically driven centrifugal pump using the "float" position of the tractor's hydraulic valve. This allows the motor to stop slowly helping to protect the motor and motor seals.

Spraying with Agitation

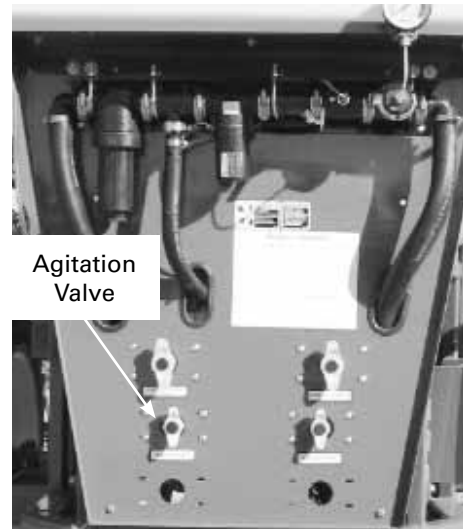
Certain chemicals require continuous agitation. If agitation is required during spraying, open the agitation valve provided. If severe foaming of your chemical occurs, check the chemical label or your supplier to determine if agitation is required or reduce the opening of the agitation valve to limit the flow rate back to the solution tank. Reduce agitation if adequate spray pressure cannot be maintained.

Unload

Two processes can be utilized for unloading of liquid remaining in the solution tank.

Option A: Spray remaining liquid out the spray boom plumbing.

Option B: Open the solution quick fill and the solution tank valves and let remaining liquid drain via gravity from the solution tank.



Valve Panel
(All valves in closed position)

**IMPORTANT**

Always dispose of chemical or diluted chemical according to your local, state, and federal regulations.

Strainers

Check and clean the main and in-line strainers daily, more frequently if your solution is not free of debris.

Hydraulics

Hydraulic power for the trailer sprayer is supplied from the tractor hydraulic system. The hydraulically driven centrifugal pump and the spray boom fold operations are powered by the tractor hydraulics. A pressure and return line for the liquid pump, and a pressure and return line for the boom fold cylinders are located near the hitch of the sprayer. A minimum requirement of 25 absolute micron filtration should be incorporated into the tractor hydraulics to assure adequate filtration of the oil supplied to the trailer sprayer components.



In-line Strainer
Rear View of Primary Section

**IMPORTANT**

Make certain to correctly connect the pressure and return lines between the sprayer and the tractor. See pump manufacturer's manual for open center and closed center hydraulic system instructions.



IMPORTANT

Remove the cylinder lock prior to operation. Operating the boom with the cylinder lock in place may cause damage to the Henschen suspension.

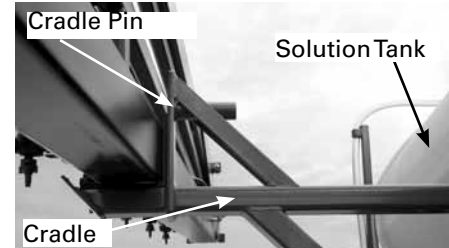
Top Fold Spray Boom Folding Out - Operation

Folding the front fold spray boom into the spray position requires the following steps:

Engage the tractor hydraulic control valve connected to the directional stack valve block. The hydraulic circuit for the directional stack valve block is "live" at all times.

1. Remove the cradle pins.
2. Remove both parallel cylinder locks. These locks store underneath the upper parallel arm.
3. Raise the entire boom up to the maximum height using the boom up/down switch.
4. Raise the left hand and right hand wings completely using the left and right hand wing up/down switches.
5. Unfold the left and right hand wings using the primary wing fold switch. Note: Both booms will fold at the same time.
6. Unfold outer tips with the secondary wing fold switch. Note: Both booms will unfold at the same time.
7. Lower the spray boom to the desired height using the boom up/down switch.
8. Adjust the left and right wings for terrain angles via the wing up/down switches.

Operate the boom with the wing tips slightly higher than the center section. Use the left and right wing up/down switches to raise the wing tips.



Vertical Fold Boom Cradle, left side view

LockUp Storage Tabs



Parallel Cylinder LockUp, left side view



Boom Control Box



DANGER

TO AVOID INJURY OR DEATH
KEEP EVERYONE CLEAR OF
MACHINE WHEN FOLDING
OR UNFOLDING WINGS

CAUTION

USE CYLINDER LOCKUP WHEN
SERVICING OR STORING UNIT



CAUTION

Disengage the hydraulic control valve connected to the directional stack hydraulic block when not spraying or when boom movement is not needed. Failure to disengage the hydraulics may allow the boom to move without activating the boom control switches (and/or hydraulic oil to overheat).



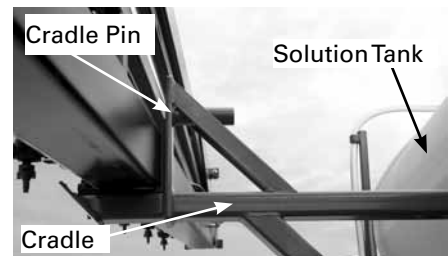
IMPORTANT

Verify that the 180° fold boom cylinders are retracted and the left and right wing are folded out so that they are resting on the adjustable stop bolts. Operation of the sprayer without the boom sections resting on the stop bolts may cause a failure of some boom sections.

Top Fold Spray Boom Folding In - Operation

Folding the boom into the cradle position requires the following steps:

1. Raise the entire boom up to the maximum height using the boom up/down switch.
2. Fold the left and right hand outer tips with the secondary wing fold switch. Note: Both booms will fold at the same time.
3. Raise the left hand and right hand spray boom completely using the left and right hand wing up/down switches.
4. Fold the left and right hand wings using the primary fold switch until the wings are positioned over the cradles. Note: Both booms will fold at the same time.
5. Lower the left and right hand wings into the cradles using the left and right wing up/down switches.
6. Replace the cradle pin to lock the wing into the cradle for transport.
7. Re-install the parallel cylinder locks.



Vertical Fold Boom Cradle, left side view

Lock-Up Storage Tabs

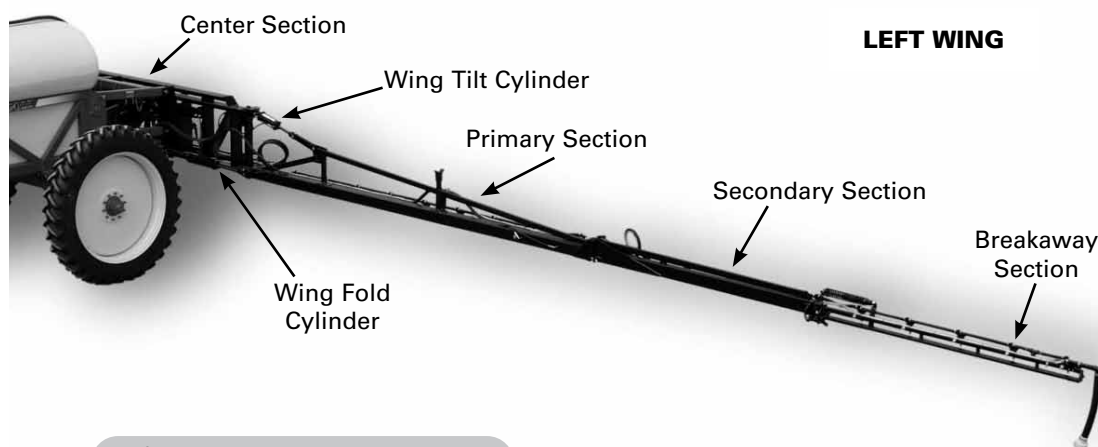


Parallel Cylinder, left side view



CAUTION

Disengage the hydraulic control valve connected to the directional stack hydraulic block when not spraying or when boom movement is not needed. Failure to disengage the hydraulics may allow the boom to move without activating the boom control switches (and/or hydraulic oil to overheat).



CAUTION

USE CYLINDER LOCKUP WHEN
SERVICING OR STORING UNIT



DANGER

TO AVOID INJURY OR DEATH
KEEP EVERYONE CLEAR OF
MACHINE WHEN FOLDING
OR UNFOLDING WINGS

Solution Spray Control System

See the controller manufacturer's manual for operation instructions.



Light and Marking System

The light system on the sprayer works with the tractor's light system. Amber lights flash in unison with the tractor's amber flashing lights. If a turn is not being signaled, both amber lights flash. When the operator signals a right turn with the tractor's turn signal switch, the left amber light stops flashing and remains on and the right amber flashes at the same flashing rate as the tractor's right amber turn light. If a left turn is signaled, the opposite takes place.

Red taillights also follow the tractor lights in their function. If road lights are on and the taillights of the tractor are lit, the red taillights will be lit on the implement. In a turn, the red, high intensity portion of the taillight will come on. As with the amber, in a right turn the left red, high intensity portion of the taillight will remain on and the right taillight flashes at the same rate as the tractor's red turn signal light. If a left turn signal is turned on, the opposite takes place. In a turn situation, this lighting system produces the effect of a vehicle braking and turning in the direction of the flashing light. The turn signal module, "The Black Box", produces the turn signal/stop effect with the red lights. See Section F for the location of this module.

The light and marking system also incorporates reflective decals front and rear of proper size and location for night travel and fluorescent decals of proper size and location for daylight travel.



Lights and Rear Facing Reflective and Florescent Decals

Foam Marker (Field Installed Option)

Refer to Foam Marker manual (SXL-24121) for operational instructions.

Connection & Startup

Section C

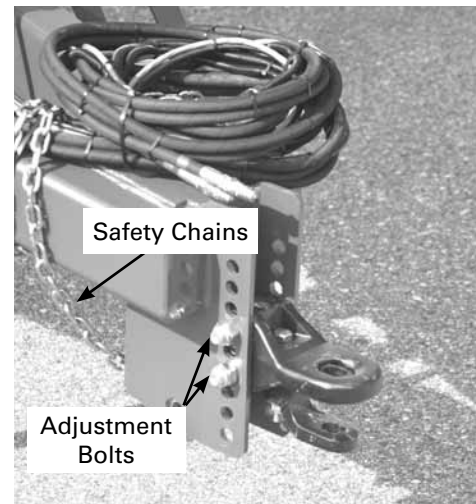
Connection

Hitch

Farm King provides a pintle/clevis hitch.

Adjust pintle/clevis hitch so sprayer is level when connected to tractor drawbar.

Connect the sprayer to the tractor according to the tractor manufacturer's instructions. Once the hitch is connected to the tractor make certain that the safety chains on pintle/clevis hitch are securely fastened to the tractor. Using the hand crank, raise the hitch jack high enough to allow for pivoting of the assembly. Pull the pin and rotate until horizontal and the pin is re-engaged and locked.



Pintle/Clevis Style Hitch



WARNING

For pintle/clevis style hitches, towing of the sprayer by any type of vehicle requires safety chains.



CAUTION

Prior to loading with chemical, the operator needs to test the sprayer with water only to ensure the system is intact prior to putting chemical into the system. Test to verify application at the desired rate and all components work correctly.

Visual Inspection

All steps of the inspection should be performed with the tractor engine turned off and the brakes correctly set or the tires blocked. A visual inspection of the entire sprayer should be made. The visual inspection should include, but not be limited to, the review of the following (see the maintenance section of this manual for further instructions):

- Corrosion of all metal (parts and structure)
- Weld joints are sound (no cracking or tears)
- Plumbing connections are solid
- Plumbing hoses have no visual damage
- Poly tanks have no cuts or punctures
- Poly tanks are free of debris (may damage pump)
- Poly tanks lids are secure
- Spray boom structure is solid



IMPORTANT

Any damage identified by the operator should be repaired prior to connecting the sprayer to the tractor.

Axles

Adjustable Width Axles

The Farm King Model 1600 High-Clearance Sprayer has adjustable axles to accommodate different row spacing. The axle width adjustment procedure follows:



Axle Tube Weldment

1. Secure sprayer on level ground, attached to a tractor with the wheels chocked and the tractor in park. Ensure that NO fore or aft rolling of sprayer can occur when elevating a tire.
2. Using a jack, hoist or forklift, raise one tire off the ground.
3. Secure elevated side with jack stands, braces, or equivalent, ensuring that the sprayer cannot fall while the tire and spindle are moved. Damage to the sprayer and serious injury or death to personnel can occur if the sprayer falls.



DANGER

Never attempt to adjust the tire width unless the sprayer is secure, and on level ground. The liquid tank should be completely void of fluid. Always secure sprayer with jack stands, braces or equivalent when working under an elevated unit.

4. The spindle assembly/hub and wheel is very heavy and should be moved with the aid of a floor jack or equivalent lifting system. Loosen and remove the two bolts that hold the spindle/hub assembly to the axle sub-frame. Slide the assembly in or out to the desired row spacing. Replace the bolts and nuts with new bolts and locknuts.



IMPORTANT

Always replace the adjustment bolts with new bolts and locknuts.

5. Tighten all axle adjustment bolts to the torque specified in Section E. Replace any bolts or nuts that have signs of physical damage, especially noting damage due to corrosion.
6. Remove jack stands and braces and lower the unit to the ground.
7. Repeat for the other side making certain the same center line distance is maintained.

Vertical Fold Spray Boom Tire Weight Capacities - 20 MPH Transport Speed


NOTE

Use this chart as a guide to determine the maximum amount of various solutions your sprayer tires are rated for. 8 MPH is the service or field speed for this sprayer. 20 MPH is used here to demonstrate a speed used to transport the sprayer, NOT as a service or field speed. Only the operator can determine the maximum safe operating speed of the sprayer.

Maximum Solution Tank Capacity in Gallons at 20 MPH with 380 - 90R46 Tires	
Solution Weight Per Gallon	1600 Gallon Tank
8.3 lb/gal (Water)	1600
10.0 lb/gal	1600
12.0 lb/gal	1600
14.0 lb/gal	1378
16.0 lb/gal	1206
Static Load Boom Height** Minimum 28", Maximum 68" Spindle and Hub Assembly: 10-Bolt	

Vertical Fold Spray Boom Tire Weight Capacities - 8 MPH Operating Speed


NOTE

Use this chart as a guide to determine the maximum amount of various solutions your sprayer tires are rated for.

Maximum Solution Tank Capacity in Gallons at 8 MPH with 380 - 90R46 Tires	
Solution Weight Per Gallon	1600 Gallon Tank
8.3 lb/gal (Water)	1600
10.0 lb/gal	1600
12.0 lb/gal	1600
14.0 lb/gal	1600
16.0 lb/gal	1500
Static Load Boom Height** Minimum 28", Maximum 68" Spindle and Hub Assembly: 10-Bolt	

** = Standard booms measured to bottom of boom frame.

Hydraulics

Tractor Hydraulic System Pressure

The hydraulic system on the Farm King Model 1600 High-Clearance Sprayer requires from the tractor's hydraulic system a pressure of at least 2200 PSI. A system pressure less than this may not provide the force necessary for boom functions or pump output. If you have difficulty running the pump and/or boom functions at the same time, check your tractor's hydraulic pressure. Recommended pressure is 2500 PSI.

Hydraulically Driven Centrifugal Pump

Refer to the manufacturer's recommendations to set the hydraulic oil flow from the tractor to the hydraulic motor driving the centrifugal pump. Make sure the hydraulic flow from your tractor does not exceed these specifications causing the pump to "over speed". Over speeding will decrease the motor seal life.

Connect the hydraulically driven pump to a tractor hydraulic circuit with a "float" position. Use the float position to turn off the hydraulic pump to protect the hydraulic seals.

For tractors with an open hydraulic system, connect the hydraulically driven pump to the priority circuit in the hydraulic system. The priority circuit prioritizes the oil to that circuit first and then to the others. The priority circuit allows the pump to maintain a more consistent output in the case you need to operate a boom function while operating the pump. If you do not have a priority hydraulic circuit, the pump output will decrease when you operate both the pump and a boom function.



Vertical Fold Spray Boom Directional Stack Valve Block Hydraulic Boom Function Controller (closed center section)

The Farm King vertical fold boom directional stack hydraulic controller utilizes "live" hydraulics. This eliminates the need to move the tractor's hydraulic controls in the direction desired to operate a boom function. Once the setup is complete, the operator will engage the tractor hydraulic controls connected to the directional stack in one direction and leave the circuit engaged. Movement of the toggle switch for a boom function will signal a valve in the directional stack to direct the hydraulic oil in the correct direction and operate the boom function selected.



Hydraulic Control Directional Stack
Closed Center Hydraulic System Set
Up - Rear View

Verify with your tractor manufacturer if you have an open or closed center hydraulic system in your tractor. The directional stack comes configured for the majority of closed center hydraulic systems. In this configuration, the manifold does not allow the hydraulic oil a path back to the return side of the manifold when no boom functions are needed. This configuration counts on the tractor's hydraulic system to turn off the flow of hydraulic oil to the manifold when no boom functions are needed.



IMPORTANT

Not configuring the directional stack hydraulic controller correctly may cause tractor hydraulic system heating and may damage the tractor.

If your tractor is a closed center system, generally no further setup is needed. Certain closed center systems may not work well with this configuration. Verify with the tractor manufacturer the requirements of your closed center hydraulic system. It may be necessary to insert the "dump" valve to allow hydraulic oil a path from the tractor through the manifold to return back to the tractor when no boom functions are needed.

Vertical Fold Spray Boom Directional Stack Valve Block Hydraulic Boom Function Controller (open center section)

If your system is an open center system, or certain closed center systems, configure the directional stack to account for this by following these instructions:



IMPORTANT

Not configuring the directional stack hydraulic manifold correctly may cause tractor hydraulic system heating and may damage the tractor.

1. Remove the solenoid from the "dump" cartridge valve located on the left end of the valve manifold. Refer to Section F, "Parts & Schematics" for further information.
2. Remove the cartridge from the manifold. This location is a storage location only. There are no hydraulic functions associated with this port.
3. Replace the "dump" valve port plug located on the right end of the valve manifold with the "dump" valve cartridge.
4. Install the solenoid on the cartridge valve and connect the solenoid to the harness. See the harness wiring schematic in Section F for information on which connection lead operates the "dump" valve.
5. Place the plug in the port in the left side of the manifold where you took out the "dump" cartridge.
6. Torque all fittings to the specifications given on the directional stack schematic in Section F.



Hydraulic Control Directional Stack Closed Center Hydraulic System Set Up - Rear View

Boom Control Switches



Raven Solution Spray Controller

Directional Stack Valve Block Control Box Mounting:

1. Mount the directional stack control box to the top of the solution spray controller with the brackets provided.
2. Connect the hydraulic hoses located near the sprayer hitch to the tractor.
3. Route the controller power cables to a 12 VDC power source in your tractor capable of at least 15 AMPs.
 - Black is negative (-)
 - Red is positive (+)



IMPORTANT

DO NOT remove the fuse or fuse holder from this power source. These are for the protection of these components and removal will void the warranty.

4. Route the harness out of the cab down to the hitch area. Connect the harness from the control box to the harness on the sprayer.



Boom Control Box

Spray Control System

Install the spray control console in the cab and route the wire harness to the back of the tractor per installation instructions provided by the control manufacturer.

Install the speed sensor and connect it to the solution controller according to the speed sensor and spray controller manufacturer's instructions.

Correct connection of the speed sensor, flow meter, control valve to the console should be made according to control manufacturer's instructions.

Calibration of the speed sensor is necessary to ensure accurate readings. Calibrate the speed sensor according to the manufacturer's instructions or the instructions provided with the spray controller. Even with a speed sensor, calibration of the spray output is necessary to assure correct application. Follow the control manufacturer's guidelines for this calibration.



IMPORTANT

DO NOT remove the fuse or fuse holder from this power source. These are for the protection of these components and removal will void the warranty.



IMPORTANT

Full testing of the sprayer including the controller, plumbing and electrical connections should be completed using water prior to loading with chemical.

Light System

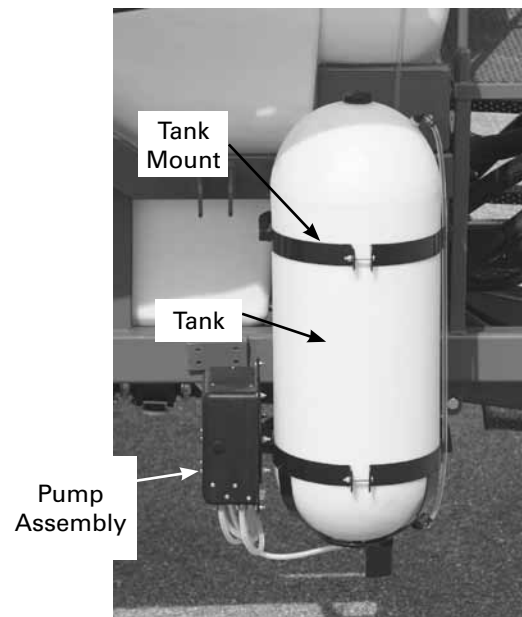
The light system provides the signal from the tractor to the sprayer. Connect the seven-pin male connector to the tractor's seven-pin female connector at the rear of the tractor. The connector for the sprayer is located near the hitch. If the tractor is not equipped with such a connector, see your tractor dealer.



Seven Pin Connector
Located Near The Hitch

Foam Marker (field installed option)

If not already done, attach the foam marker tank and compressor assembly to the frame of the sprayer. Refer to the Foam Marker Operations Manual (SXL-24121) for specific installation and setup instructions.

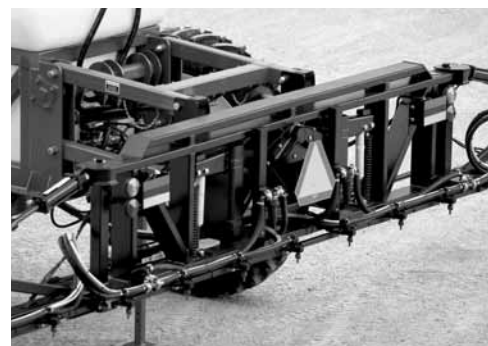


Foam Marker Mounting
Position, Right Front View

Vertical Fold Boom Adjustment

Boom and Parallel Arm Lubrication

The boom will follow the movement of the frame more if the boom is not allowed to move independently. Refer to Section E of this manual for lubrication points on the boom and parallel arms. Lubricate these points to allow free movement of the boom.



NOTES:

Storage

Section D

When storing the sprayer for longer periods of time, the following procedures must be followed to lessen the chance of rust and corrosion on the unit. It may be easier to perform functions 1 - 5 while the unit is connected to the tractor. This will allow for pumping and spray flushing power.

**DANGER**

Block and support the trailer sprayer when working on unit that has been removed from the tractor.

1. Make certain the inside of the tank is completely drained of chemical residue.
2. Thoroughly flush the inside of the poly tank with clean water.
3. Flush clean water through all areas of the plumbing, valves and nozzle system.
4. If the sprayer will be exposed to possible freezing temperatures, the final flush of the system should be made with RV anti-freeze.
5. Open all drain points and let as much liquid drain as possible.
6. Remove and clean the strainer(s).
7. Remove and clean nozzles. Store inside with other nozzles.
8. Check for loose hardware and fittings and tighten accordingly.
9. Replace all caps, tank lids and plug nozzle outlets prior to storage.
10. Poly tanks can become damaged when subjected to direct sunlight. For longer life of this system it is best to store it in a cool dry location or drape with a sun protective tarp.
11. Store sprayer with booms folded resting in the cradles. Coat all exposed cylinder shafts with a rust inhibitor to prevent corrosion. Verify with the manufacturer of the rust inhibitor and your tractor's hydraulic oil that the two are compatible before use.

**DANGER**

All chemical contaminated rinse material must be collected and disposed of according to product label instructions and in accordance with all local, provincial/ state and federal laws.

Sprayer Winterization

Proper winterization is an important step in extending the life of your sprayer investment and preparing it for operation next season. The following steps are a guideline to assist in the winterization of your sprayer.



DANGER

All chemical contaminated rinse material must be collected and disposed of according to product label instructions and in accordance with all local, provincial/ state and federal laws.



CAUTION

During the winterization process, maintain a minimum amount of solution in the plumbing system. Running the pump dry may cause severe damage to the pump seals.

1. Essential to optimum winterization is to thoroughly clean and rinse the interior of the tank and flush out the plumbing. This process can be completed with the aid of a tank-cleaning compound available from most farm and spray equipment centers. Fill with an adequate amount of cleaning solution to allow for circulation through the rinse balls while maintaining the solution level above the bulkhead fitting in the sump of the tank. This cleaning will remove any residual chemical left in the system.
2. The success of the winterization process is dependent upon the amount of water removed from the system. Excessive water left in the system will dilute the antifreeze solution and reduce its effectiveness.
 - a. Open all valves to the rinse ball, agitation and the booms.
 - b. Drain out any remaining solution from the main tank.
 - c. Drain out any remaining water from the clean water rinse tank.
 - d. Remove in-line strainer bowls and dump out water; reinstall the strainers.
 - e. Remove the plug from the bottom of the pump, drain and reinstall the plug.
 - f. Raise the booms and at the bottom end of the plumbing of each boom section, remove a diaphragm check valve to drain the boom. Replace the diaphragm check valve.
3. Begin the process of protecting the plumbing with the addition of RV antifreeze.
 - a. Close all of the valves in the system, including the solution tank valve located between the tank and the pump.
 - b. Add a minimum of 10 gallons of RV antifreeze to the rinse tank.
 - c. Open the rinse tank valve to let the antifreeze solution flow from the rinse tank to the pump. Make sure that the pump is charged with solution. The line out of the top of the pump should fill with antifreeze.
 - d. Start the solution pump. A minimum of 20 - 30 pounds of pressure is required to adequately circulate the antifreeze through the system.

Sprayer Winterization (cont.)

4. With the pump running, begin to winterize each of the segments in the plumbing system.
 - a. One at a time, slightly open the manual valves that feed the agitation and rinse system to allow the solution to circulate through those segments of the plumbing. Allow the solution to flow through the lines until the lines are full of the antifreeze solution. Close the valve and repeat through the other segments of the plumbing.
 - b. The next step is done with the controller set in the manual mode. If the system does not work in the manual mode, enter a test speed into the console and operate as normal for field operation. With a Raven system this is done by:
 - i. Touch the "self test" button.
 - ii. Touch the "enter" button.
 - iii. Touch the numbers "5" and "0".
 - iv. Touch the "enter" button. The console has now been told that the sprayer is traveling at 5 mph.
 - v. Upon the completion of the winterization, the test speed can be cancelled by repeating steps one and two, then enter "0" in step three instead of "5" and "0".
 - c. One at a time, turn on each of the boom sections to allow the antifreeze solution to be pumped through the controls and the boom valves. Run enough solution that the antifreeze begins to spray out the boom sections.
 - d. Turn off the solution pump. Cycle the spray boom valves open and closed to allow the antifreeze solution that is trapped in the hoses to drain back. Remove the strainers, clean and reinstall.
5. If the sprayer is equipped with an eductor or foam marker, these must be winterized as well.
6. Verify that the antifreeze solution has been circulated through the whole system.
7. Disconnect the electrical connections. Apply a coating of dielectric grease to the terminals to help prevent corrosion.
8. Inspect the complete machine for necessary repairs, grease all fittings and lubricate moving parts.

Maintenance, Service & Troubleshooting

Section E



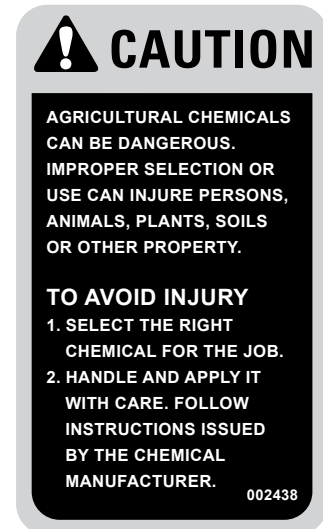
IMPORTANT



Proper maintenance of the sprayer and the tractor is critical for peak performance, reliability and accuracy of this system. The following is a guideline of the type of maintenance and servicing that should be performed on this unit. Your environment and uses may require additional maintenance and service beyond this list to assure a reliable and safe unit. The operator of this unit has ultimate responsibility to identify areas of concern and rectify them before they become a hazard or safety issue. There is no substitute for a trained, alert operator.

Liquid Tank, Frame, and Plumbing

1. Check tank visually for obvious cuts, cracks, punctures or leaks that could contribute to tank failure.
2. Check fittings for broken parts, cracks or wear marks and potential leaks.
3. Check gaskets of the bulk head fitting located on the sump for wear or weathering.
4. Inspect valves and pump for solid connections and correct mounting.
5. Inspect the tank lids for cracks and verify they tighten securely in place.
6. Remove any debris from inside the tanks as they may become lodged in the strainer or pass into the pump.
7. Clean strainer daily, more frequently if your liquid supply is not "free of debris".
8. Inspect all welds and structural components for tears, bends, cracks or damage. This unit operates in a corrosive environment. Make certain corrosion is quickly removed and painted. If corrosion is deep, replace component or add adequate plating with welding operation.



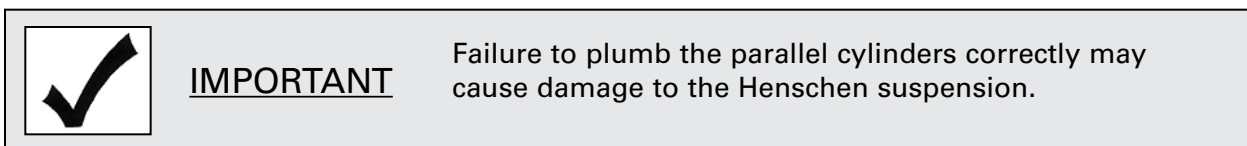
DANGER

If any of the above inspections, or others identified, are discovered **REPAIR IMMEDIATELY**.

Do not put this unit into operation with any questionably maintained parts. Poor performance or a hazard may occur.

Hydraulics

1. Inspect cylinder shafts for corrosion or damage. Repair or replace shaft to avoid hydraulic leaks or cylinder failure.
2. Inspect hydraulic hoses. Replace any hose that shows signs of wear or damage.
3. Removing hydraulic hoses for any reason requires that you plumb them back to their original position. Failure to do this may result in incorrect operation and may damage the sprayer. See Section F for the hydraulic plumbing schematic.



Electrical & Control System

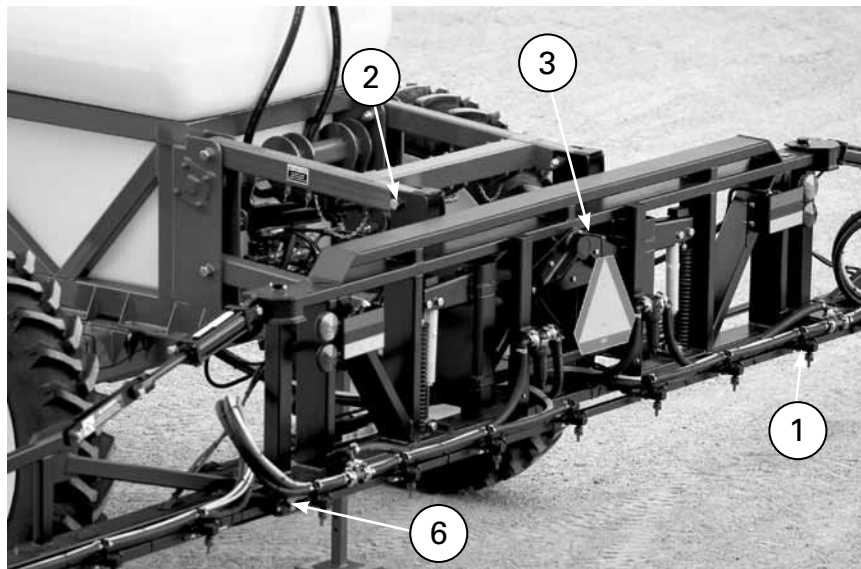
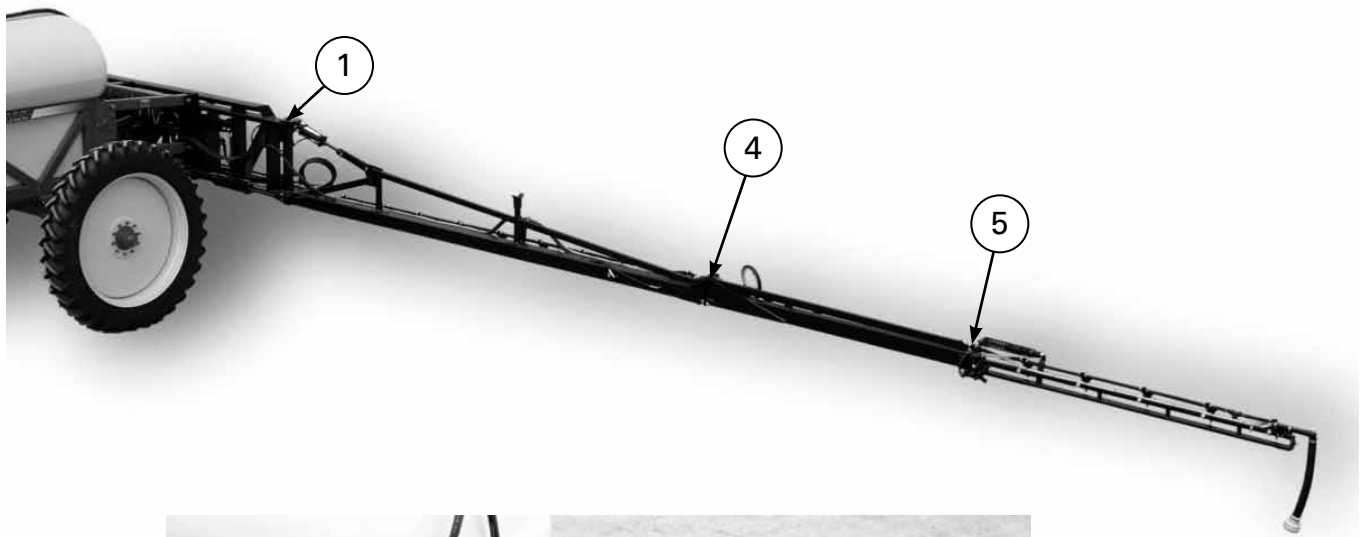
Use of dielectric grease is strongly urged for all electrical wire connections. All connections should be greased at the beginning of the season. Poor electrical connections due to corrosion is the leading cause of failure of sprayer equipment in this environment.

Packard style connections on certain options are designed to be weather resistant. This feature greatly reduces the corrosion associated with electric connectors. Use of dielectric grease is optional on these connections.

Top Fold Spray Boom Lubrication

Apply grease to all grease zerks daily when in use (more often if sprayer is utilized in severe conditions). Grease zerks are located at:

- Wing attach point, 4 total (Item 1)
- Parallel linkage pins, 8 total (Item 2)
- Boom pivot, 2 total (Item 3)
- Secondary boom section fold hinge, 2 total (Item 4)
- Breakaway section, pivot hinge, 2 total (Item 5)
- Primary section to boom pivots, 2 total (Item 6)





NOTE

Failure to check and maintain the proper lug nut torque could result in elongation of rim and/or broken lug-bolts. We recommend checking lug nut torque at regular maintenance intervals to ensure proper wheel tightness on your Farm King Sprayer.

Wheel Lug Nut Torque

When receiving your sprayer or replacing a tire, follow these steps for ensuring proper lug-nut torque:



NOTE

DO NOT lubricate threads.

1. Tighten lug nuts to correct torque specifications using a crisscross pattern.

<u>Size</u>	<u>Torque ft./lb</u>
3/4"-16 UNF	250 - 265
5/8"-18 Bolt	140 - 170

2. After tightening, pull the Farm King 1600 High-Clearance Sprayer approximately one (1) mile.
3. Retighten lug nuts to correct torque specs.
4. Use the sprayer, stopping after three (3) hours and again after ten (10) hours to retighten lug nuts to correct torque specifications.
5. At regular maintenance intervals recheck lug nut tightness.

Again, we recommend checking lug nut torque at regular maintenance intervals to ensure proper wheel tightness on your Farm King Sprayer.



NOTE

DO NOT use undersized tires. Use the right size tires for the job and properly match tires to wheels.

Bolt Torque Data

The chart provided contains information concerning standard hardware used on this machine. It is recommended that all fasteners be tightened to the torque values specified. The grade of the bolt is identified by the markings on the head of the bolt ; grade 2 - no markings, grade 5 - 3 radial lines, grade 8 - 6 radial lines.

GENERAL BOLT TORQUE DATA IN FT./LB.				
BOLT SIZE	SAE - GRADE 5		SAE - GRADE 8	
	DRY	LUB	DRY	LUB
1/4"-20	8	6	12	9
1/4"-28	9	7	13	10
5/16"-18	17	13	25	18
5/16"-24	19	14	25	20
3/8"-16	30	23	45	35
3/8"-24	35	25	50	40
7/16"-14	50	35	70	50
7/16"-20	55	40	80	60
1/2"-13	78	55	110	80
1/2"-20	90	65	120	90
9/16"-12	110	80	150	110
9/16"-18	120	90	170	130
5/8"-11	150	110	220	170
5/8"-18	170	130	240	180
3/4"-10	260	200	380	280
3/4"-16	300	220	420	320
7/8"-9	430	320	600	460
7/8"-14	470	350	660	500
1"-8	640	480	900	680
1"-14	700	530	1000	740



WARNING

Do not use values in place of those specified in other sections of this manual or contained in information published by the manufacturer of the components in question.



WARNING

Mechanical fasteners must be torqued to recommended specifications during repair to prevent personal injury or equipment damage.

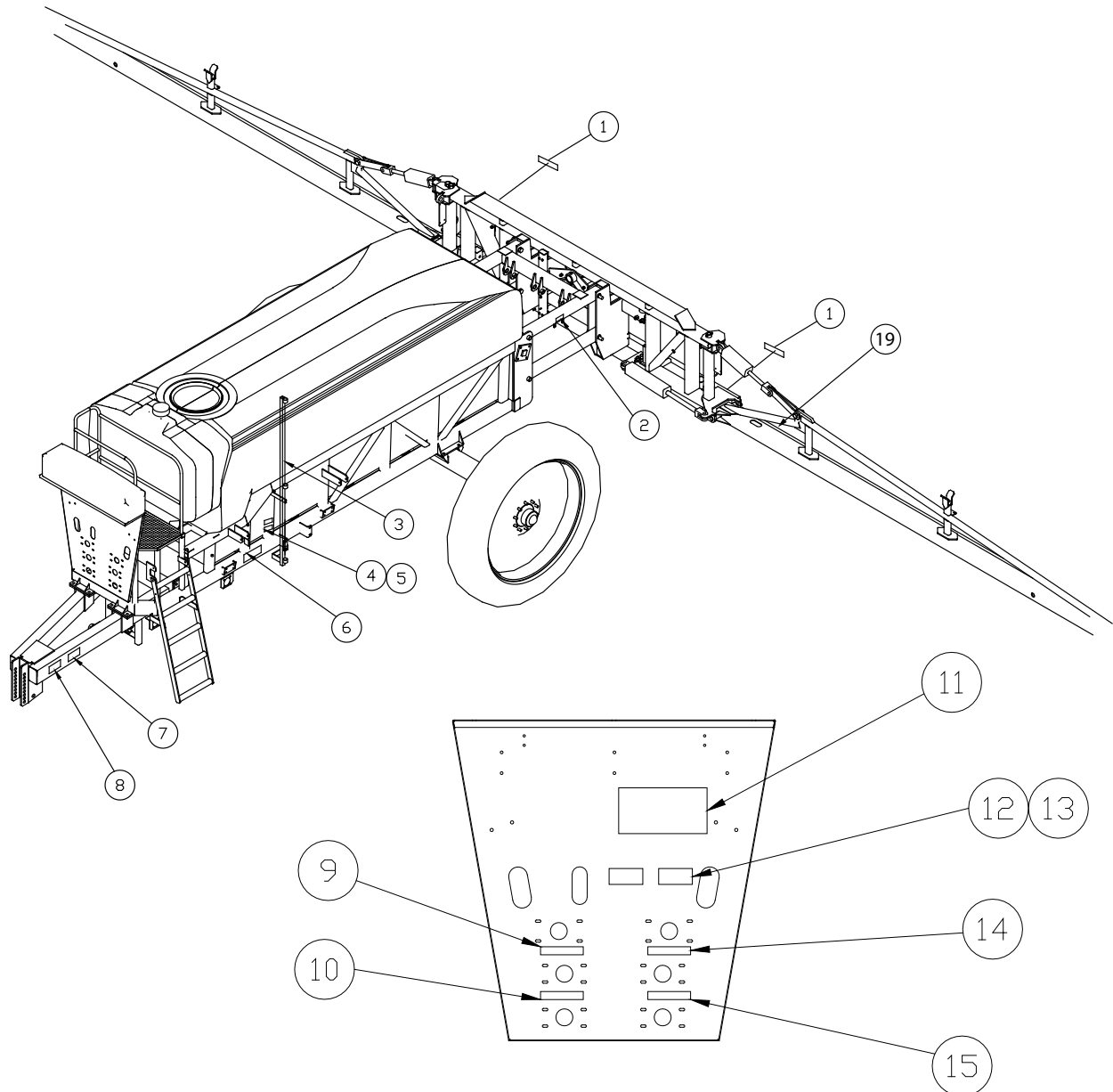
SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Loss of hydraulic fluid due to leakage	Fittings and tubes leaking	Tighten loose fittings and replace worn hoses of cracked tubing
	Leakage between flange and housing	Repair or replace
Low discharge of the hydraulically driven liquid pump	Pump not primed	Check vent line and clean if necessary to top of tank
	Air leaks in suction line	Check and reseal inlet fittings
	Blocked/clogged line strainer	Clean out and replace
	Impeller plugged or loose	Inspect and clear obstruction or tighten
	Bypass adjustment set improperly	Adjust bypass screw on side of hydraulic motor to manufacturer's specifications
Poor spray pattern, nozzles dribble	Nozzles too large	See nozzle supplier
	Strainer clogged	Clean strainer
Spray atomizing and blowing around	Nozzle too small	See nozzle supplier
	Tractor speed too fast	Reduce speed
Spray streaming (No uniform pattern)	Nozzle partially clogged	Remove and clean nozzles and strainer
Will not spray	Controller not setup	See control manual
	Valves not in correct position	See Section B
	Poor hydraulics or no hydraulic power	Troubleshoot hydraulic system
	Liquid supply blocked	Clean strainer
	Suction line collapsed	Inspect and replace

NOTES:

Parts & Schematics

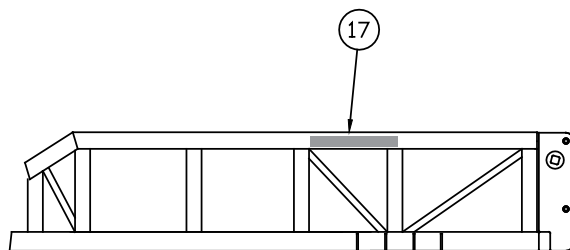
Section F

Description: Decal Placement

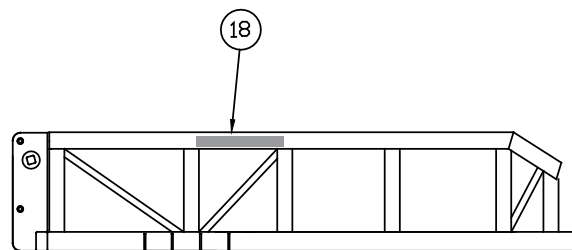


Description: Decal Placement

Item#	Part #	Description	Quantity
1	SX002439	Decal; Danger Avoid Injury/Death	2
2	SX004302	Decal; Caution Cylinder Lockup	1
3	SX006215	Decal; 1600 Gal. Sight Gauge	1
4	SX002438	Decal; Caution Ag Chemicals	1
5	SX006963	Decal; Caution Eductor	1
6	SX006358	Decal; 1600 Gal. Approx.	1
7	SX004774	Decal; Warning, Keep Hands Away	1
8	SX004776	Decal; Danger Electrical Lines	1
9	SX004764	Decal; 1" x 4" Clean Water	1
10	SX004766	Decal; 1" x 4" Agitation	1
11	SX006907	Decal; Sprayer Valve Chart	1
12	SX004772	Decal; Caution, Read Manual	1
13	SX004775	Decal; caution, Chemical Handling	1
14	SX004765	Decal; 1" x 4" Spray Boom	1
15	SX004767	Decal; 1" x 4" Rinse Ball	1
17	SX019779	Decal; Farm King 1600 <i>Left</i>	1
18	SX019780	Decal; Farm King 1600 <i>Right</i>	1
19	SX006339*	Decal; No. "0"	
	SX006345*	Decal; No. "6" & "9"	
	SX006335*	Decal; No. "8"	
	SX006359*	Decal; "FT"	

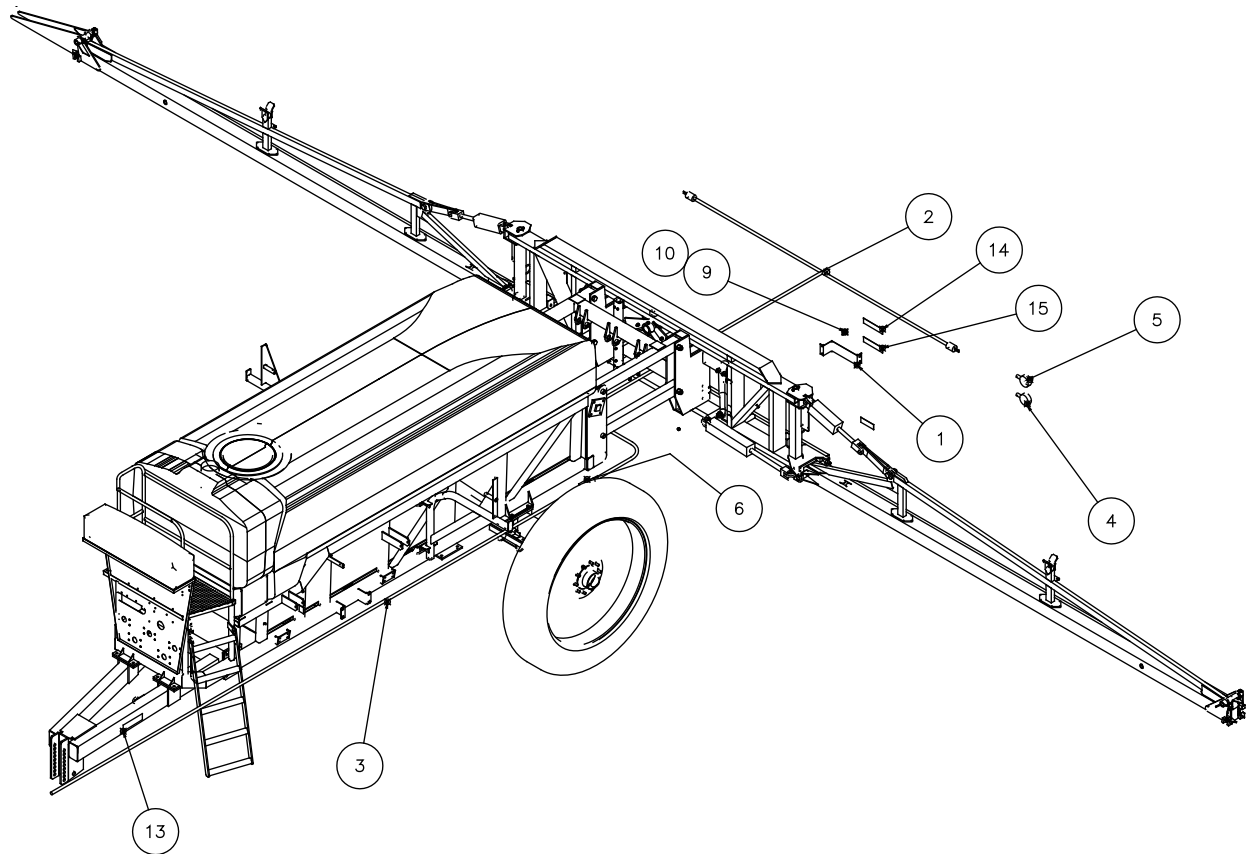


LEFT SIDE



RIGHT SIDE

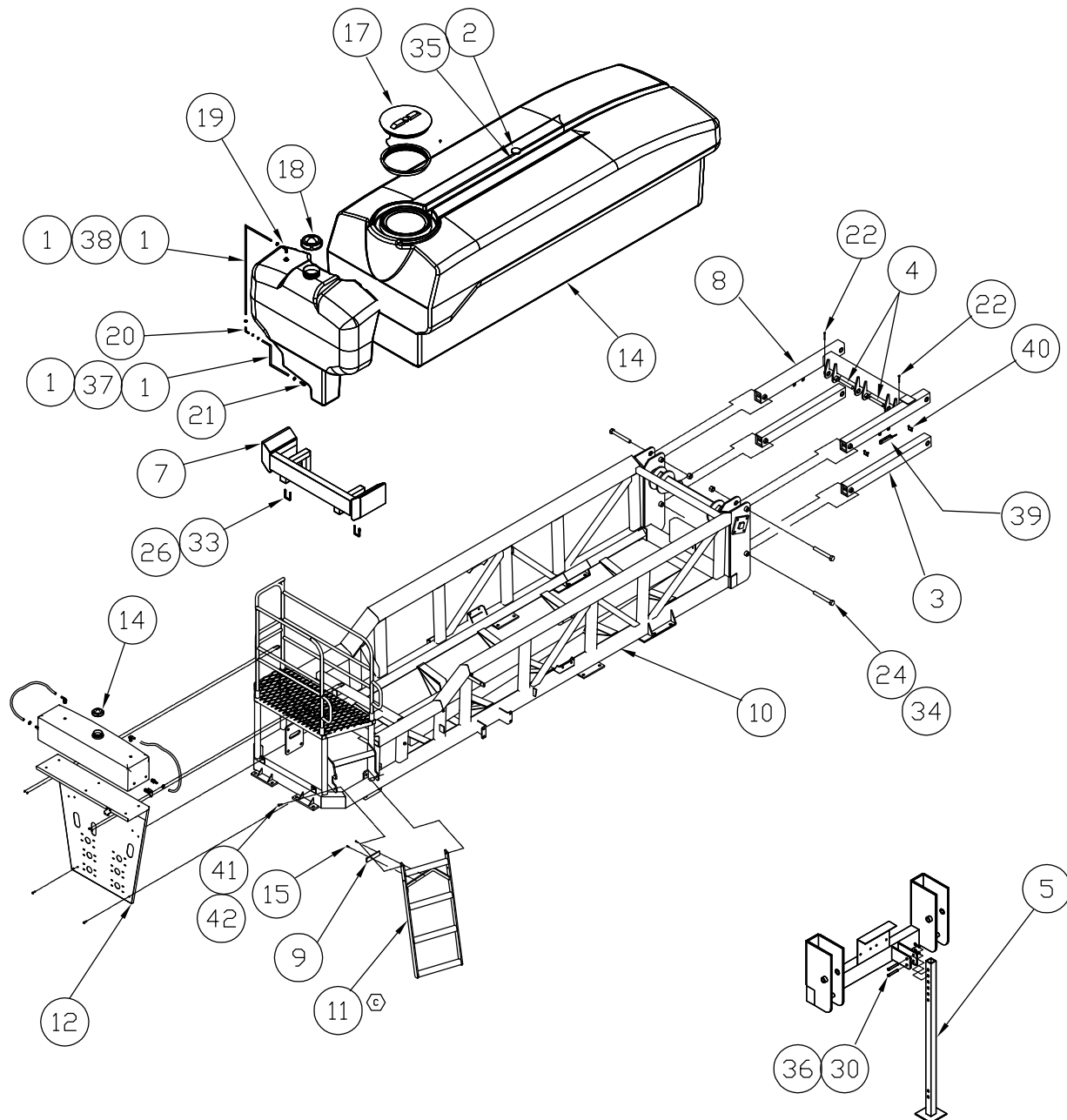
Description: Trailer Sprayer Light Kit Assembly



Description: Trailer Sprayer Light Kit Assembly

Item #	Part #	Description	Quantity
1	SX001186	Bracket; Light Mounting	2
2	SX007183	Harness, Light (Trailer Units)	1
3	SX007179	Harness, 20' Tractor/Implement	1
4	SX004560	Light; Red Lamp	2
5	SX004561	Light; Amber Lamp	2
6	SX006978	Turn Signal Module II	1
9	SXBH-050-125-2	Bolt; 1/2" x 1-1/4" Hex. Gr. 2	4
10	SXLN-050-NI	Locknut; 1/2" Nylon Insert	4
13	SX17-5910	Reflector, 2" x 9" Amber Night	4
14	SX17-5915	Reflector, 2" x 9" Red Night	2
15	SX17-5920	Reflector, 2" x 9" Orange, Day	2

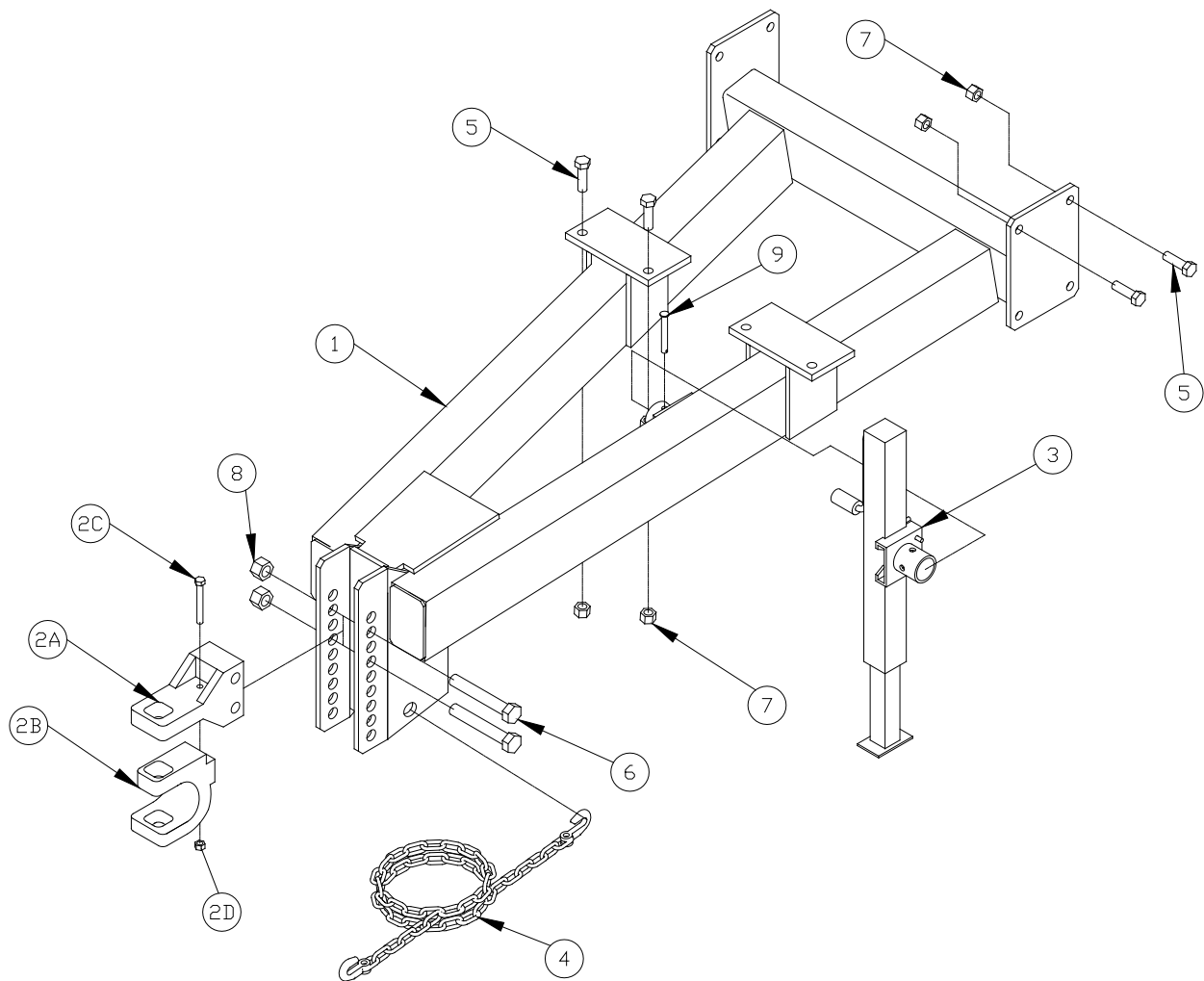
Description: Frame Assembly



Description: Frame Assembly

Item #	Part #	Description	Quantity
1	SX# 4JM	Clamp; 1/4" x 5/16" Stainless	4
2	SX001131	Anti-Vortex Fitting	1
3	SX004435G	Parallel-Tube, Weld	2
4	SX004540	Pin Weld; 6" Long	2
5	SX004752G	Jack stand, Weld	1
6	SX004753	Pin; Cotterless, 1/2" x 3.5"	1
7	SX006039G	Riser; Fresh Water Weld	1
8	SX007467G	Parallel; Upper, Weld	1
9	SX012120	Black Plastic	1
10	SX013376G	Weldment; 580, 1600 Gal. Frame	1
11	SX013381G	Ladder; 580	1
12	SX013548G	Weldment; Valve Panel	1
14	SX014675	15 Gallon Safety Tank; Assembly Kit	1
15	SX171-C	Screw; TEK 410HHS Cad Plated	8
17	SX3522160-1	Cover; 16" Closed Lid & Rim	1
18	SX354010	Cover, 6" 2/Vent Removed	1
19	SX3EL1438	Elbow; 1/4" MPT x 3/8" ELHB	1
20	SX3EL38HB	Hose Fitting; 3/8" ELHB x 3/8" HB	1
21	SXA1438	Hose Fitting, 1/4" MPT x 3/8" HB	1
22	SXBH-025-250-5	Bolt; 1/4" x 2-1/2" Hex. Gr. 5	2
23	SXBH-031-075-2	Bolt; 5/16" x 3/4" Hex	2
24	SXBH-100-850-5	Bolt; 1" x 8-1/2" Grade 5	4
25	SXBU031-100-175	U-Bolt; 5/16" x 1" x 1-3/4" Sq.	2
26	SXBU038-200-300	U-Bolt; 3/8" x 2" x 3" Gr. 2 Sq.	2
30	SXHPC-210	Pin Clip; 2-3/16" x 7/8"	2
31	SXLN-025-NI	Locknut, 1/4" Nylon Insert	2
32	SXLN-031-NI	Locknut, 5/16" Nylon Insert	2
33	SXLN-038-NI	Locknut, 3/8" Nylon Insert	5
34	SXLN-100-NI	Locknut, 1" Nylon Insert	4
35	SXNW60401	Bulkhead Fitting 3/4"	1
36	SXPCL-050-350	Pin, 1/2" x 3-1/2" Clevis Pin-Zinc	2
37	SXSIGHT-12	Hose; 1/2" x 1/8" Sight	
38	SXSIGHT-38	Hose; 3/8" x 1/16" Clear Sight	
39	SX013062	Cylinder Stop Assembly	1
40	SXPLI-031-250	Lynch Pin; 5/16" x 2-1/2"	2
41	SXBH-050-150-2	Bolt; 1/2" x 1-1/2" Gr. 2	2
42	SXLN-050-NI	Locknut; 1/2" Nylon Insert	2

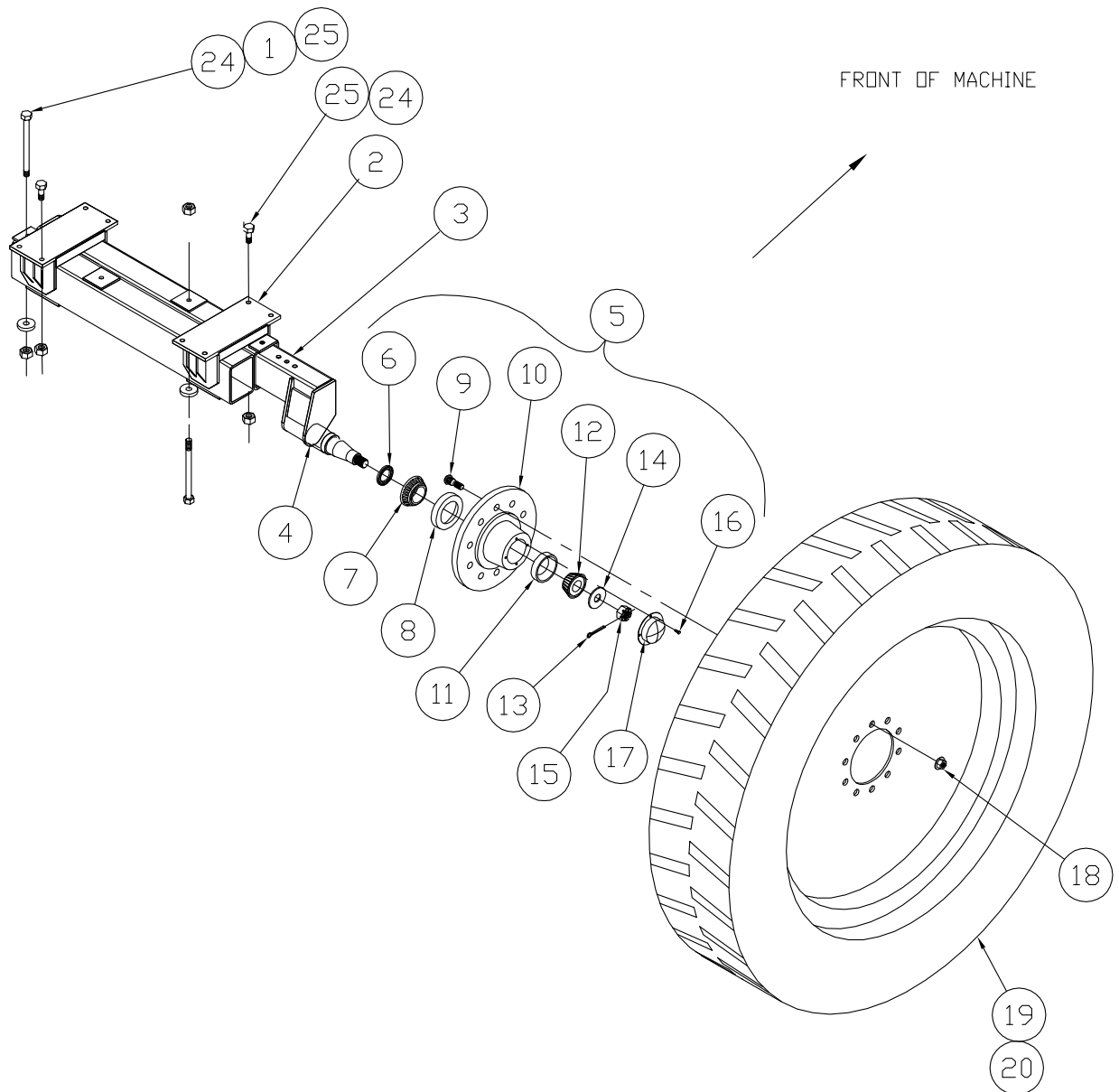
Description: Drawbar Assembly



Description: Drawbar Assembly

Item #	Part #	Description	Quantity
1	SX013363	Weldment; Hitch	1
2A	SXPPI-331VH	Hitch; Pintle	1
2B	SXPPI-208VR	Pintle; Clevis	1
2C	SXVB85	Bolt; Clevis	1
2D	SXVB91	Nut; Clevis	1
3	SX004752	Jack stand Weld	1
4	SX006933	Chains, Safety	1
5	SXBH-075-250-2	Bolt; 3/4" x 2-1/2" Gr. 5	12
6	SXBH-100-650-5	Bolt; 1" x 6-1/2" Gr. 5	2
7	SXLN-075-NI	Locknut, 3/4" Nylon Insert	12
8	SXLN-100-NI	Locknut, 1" Nylon Insert	2
9	SX004576	Pin; Cotterless 1/2" x 3-1/2"	1

Description: 10-Bolt Adjustable Axle Assembly



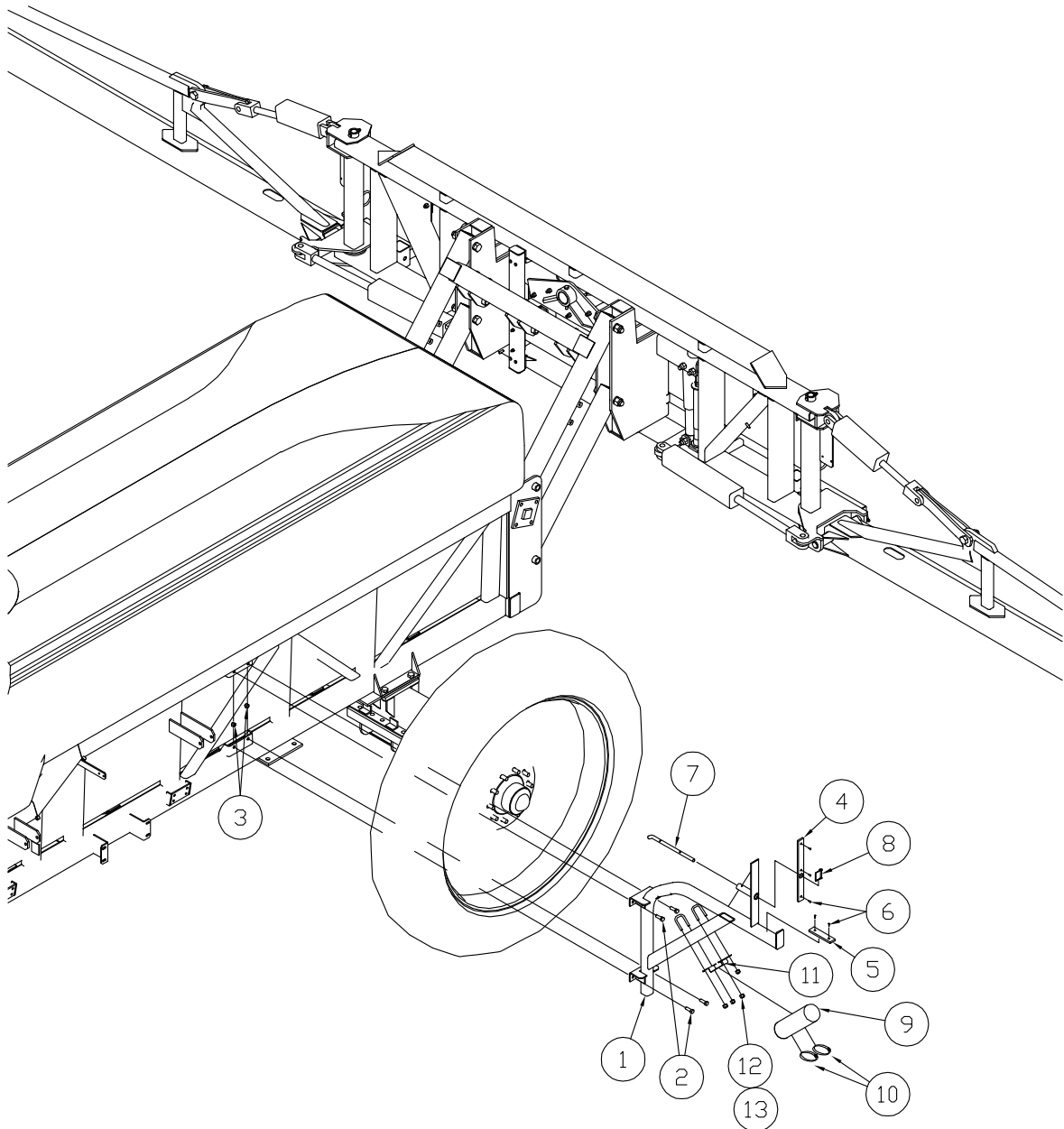
Description: 10-Bolt Adjustable Axle Assembly

Item #	Part #	Description	Quantity
1	SX011821	Plate; Axle Washer Reinforced	2
2*	SX012484	Weldment; Adjustable Axle Tube Mount	1
3*	SX011868	Bolt; 3/4" x 2-1/2" Gr. 5	16
4	SX2813180L16	Spindle 680 10-Bolt	1
5*	SX2891300	Complete Hub Assembly	1
6	SX906497	Grease Seal	1
7	SX910333	Inner Cone	1
8	SX910331	Inner Cup	1
9	SX913564	Stud Bolt 3/4" -16 (Single)	10
10		Machined Casting	1
11	SX910332	Outer Cone	1
12	SX910334	Outer Cup	1
13	SX905944	Cotter Pin, Spindle	1
14	SX913632	Flat Washer, Spindle	1
15	SX912969	Nut, Spindle, 1-1/4" - 12	1
16	SX905205	Bolt, Dust Cap	4
17	SX909983	Dust Cap	1
18	SX913571	Wheel Nut 3/4" - 16 Flanged	10
19	SX017690	380-90R46-YR	1
20	SX017692C	380-90R46-CR	1
21**	SX017689	380-90R46-YL	1
22**	SX017691C	380-90R46-CL	1
23	SXBH-075-250-5	Bolt; 3/4" x 2-1/2" Gr. 5	4
24	SXBH-075-900-8	Bolt; 3/4" x 9" Gr. 8	2
25	SXLN-075-CL	Locknut; 3/4" Center Lock Nut	4
26	SXLN-075-NI	Locknut; 3/4" Nylon Insert	4

*Specify color

** Not shown

Description: Cradle Assembly



Description: Cradle Assembly

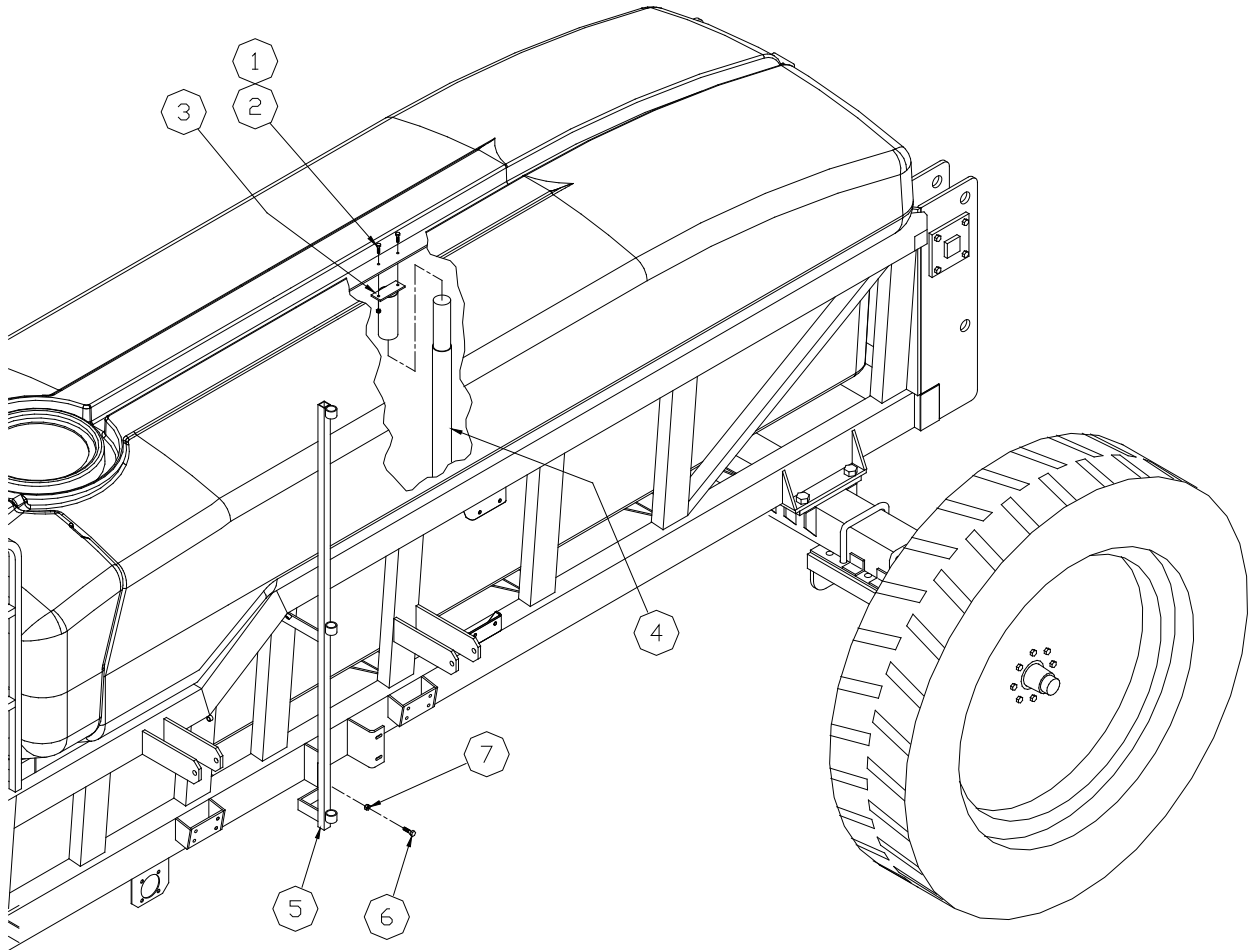
Item #	Part #	Description	Quantity
1	SX013463**	Weld, Cradle Arm	1
2	SXBH-050-150-2	Bolt, 1/2" x 1-1/2" Gr. 5	4
3	SXLN-050-NI	Locknut, 1/2" Nylon Insert	4
4	SX012119	Black Plastic For 570	1
5	SX012120	Black Plastic For 570	1
6	SX171-C	#8 x 3/4" Self Tapping Screw	5
7	SX013402	Rod; Wing Cradle Slide	1
8	SXPLI-031-250	Pin; Linch Pin; 5/16" x 2-1/2"	1
9*+	SX013049	Tube; Manual Storage	1
10*+	SX#64J	Clamp; 4" x 1/2" Stainless	2
11*+	SX014159	Manual Bracket, Bent with Holes	1
12*+	SXBU031-150-350	U-Bolt; 5/16" x 1-1/2" x 3-1/2" Gr. 2	2
13*+	SXLN-031-NI	Locknut; 5/16" Nylon Insert	4

*Not shown

**Specify color

*+Used on one side only. Quantities listed are per side

Description: Tank Spreader and Sight Gauge



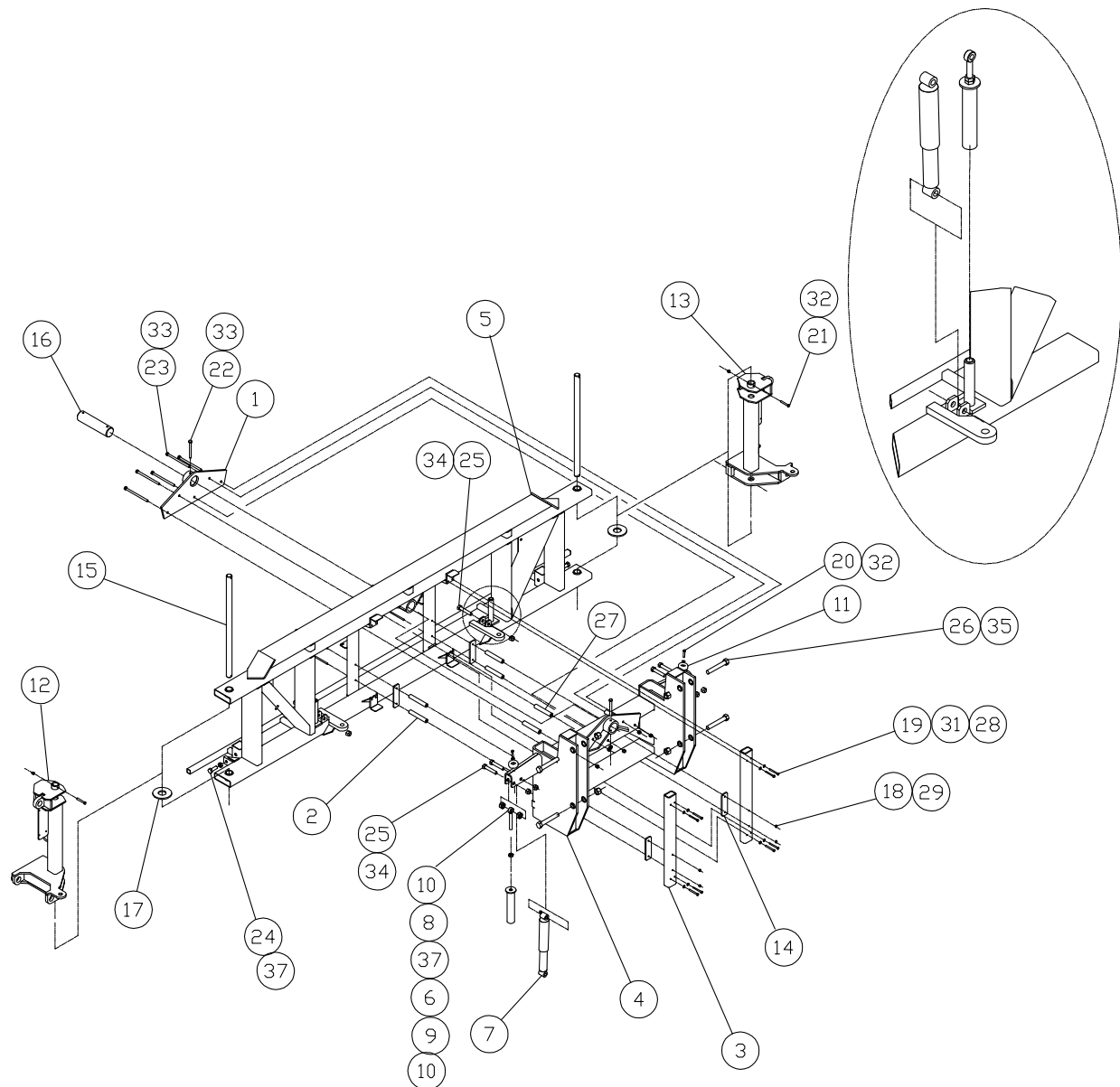
Description: Tank Spreader and Sight Gauge

Item #	Part #	Description	Quantity
1	SXBH-025-100-S	Bolt; 1/4" x 1" Hex. Stainless	2
2	SXLN-025-NI-S	Lock Nut; 1/4" Nylon Insert Stainless	2
3	SX007666	Sleeve, Tank Spreader Weld	1
4	SX007668	Shaft, 1600 Tank Spreader	1
5	SX006216	Sight Gauge; Weld	1
6	SXBH-038-125-2	Bolt; 3/8" x 1-1/4" Gr. 2	1
7	SXLN-038-NI	Locknut; 3/8 Nylon Insert	1

*Not shown

**Specify color

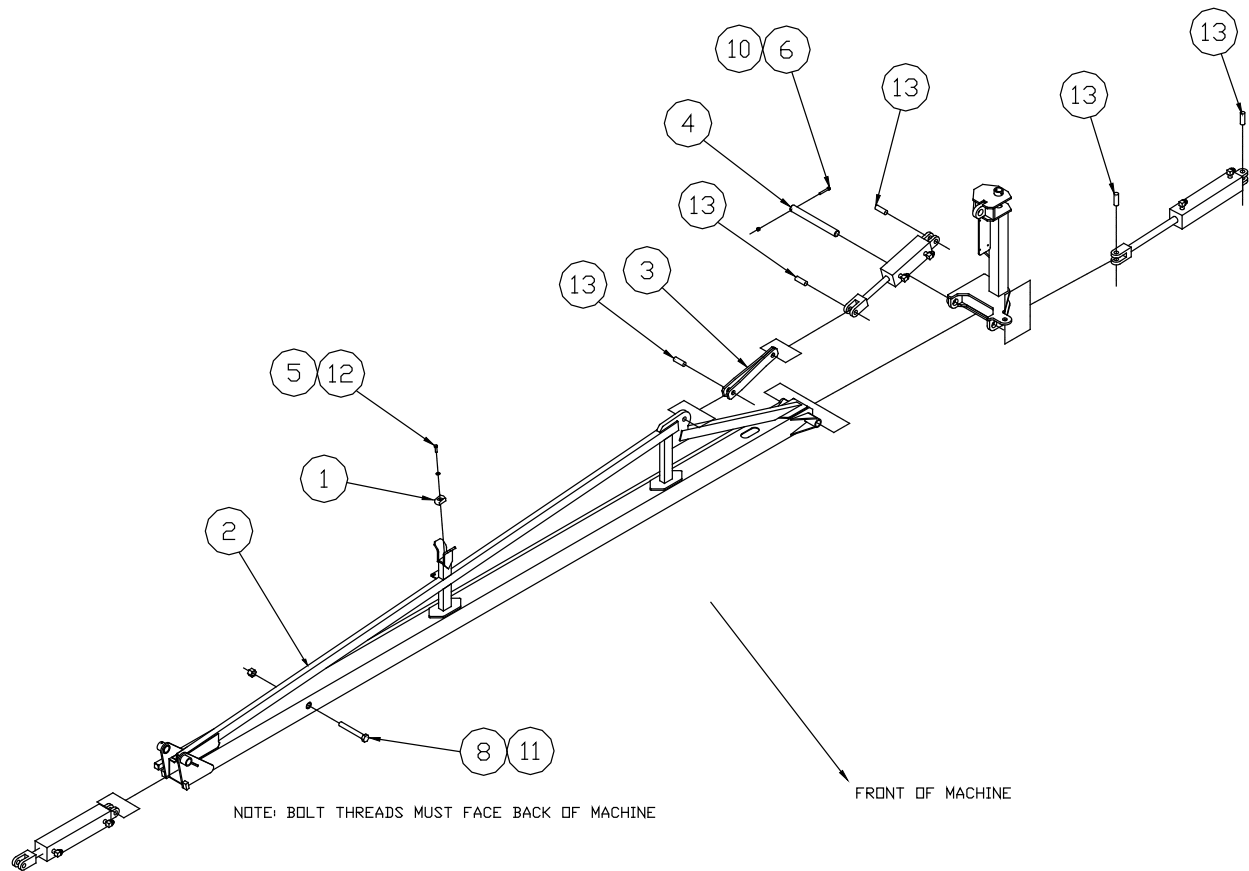
Description: Fold-Over the Top Boom; Center Section Assembly



Description: Fold-Over the Top Boom; Center Section Assembly

Item#	Part #	Description	Quantity
1	SX011910B	Weld; Pivot Pin Plate, Painted	1
2	SX011917	Tube; Bushing, Boom	4
3	SX011939	Weld; Free Half Center	2
4	SX011953	Weldment; Boom Center #1	1
5	SX011954	Weld; Boom Center #2	1
6**	SX011960	Spring; Compression, 2.75" x 17"x 3/8" W	2
7	SX66502	Shock Absorber	2
8	SX013136	Rod End	2
9	SX011974	Weldment; Spring Retain Long	2
10	SX013137	Spacer	4
11	SX012118	Bumper Pad Rework	2
12	SX012015	Weld; Boom Pivot, RH	1
13	SX012016	Weld; Boom Pivot, LH	1
14	SX012045	Wear Pad; 570 Booms	4
15	SX012097	Pin; Main Boom Pivot	2
16	SX012096	Pin; Main boom Pivot	1
17	SX012099	Wear Pad; 570 Booms	2
18	SXBH-031-1150-5	Bolt; 5/16" x 11-1/2" Grade 5	4
19	SXBH-031-300-5	Bolt; 5/16" x 3" Grade 5	8
20	SXBH-038-150-5	Bolt; 3/8" x 1-1/2" Grade 5	2
21	SXBH-038-300-5	Bolt; 3/8" x 3" Grade 5	2
22	SXBH-050-450-5	Bolt; 1/2" x 4-1/2" Grade 5	2
23	SXBH-050-800-5	Bolt; 1/2" x 8" Grade 5	5
24	SXBT-075-300-5	Bolt; Tap 3/4" x 3" Grade 5	2
25	SXBH-075-350-5	Bolt; 3/4" x 3-1/2" Grade 5	6
26	SXBH100-650-5	Bolt; 1" x 6-1/2" Grade 5	4
27	SX011907	Tube; Center Pivot Bolt	5
28	SXFW-031	Flatwasher; 5/16"	8
29	SXLN-031-C	Locknut; 5/16" Centerlock Steel	4
31	SXLN-031-NI	Locknut; 5/16", Nylon Insert	8
32	SXLN-038-NI	Locknut; 3/8" Nylon Insert	4
33	SXLN-050-NI	Locknut; 1/2" Nylon Insert	7
34	SXLN-075-CL	Locknut; 3/4" Center Locknut	6
35	SXLN-100-CL	Locknut; 1" Center Locknut	4
37	SXNUT-075-J	Nut; 3/4" Jam Nut	6

Description: Fold Boom, Primary Section Assembly

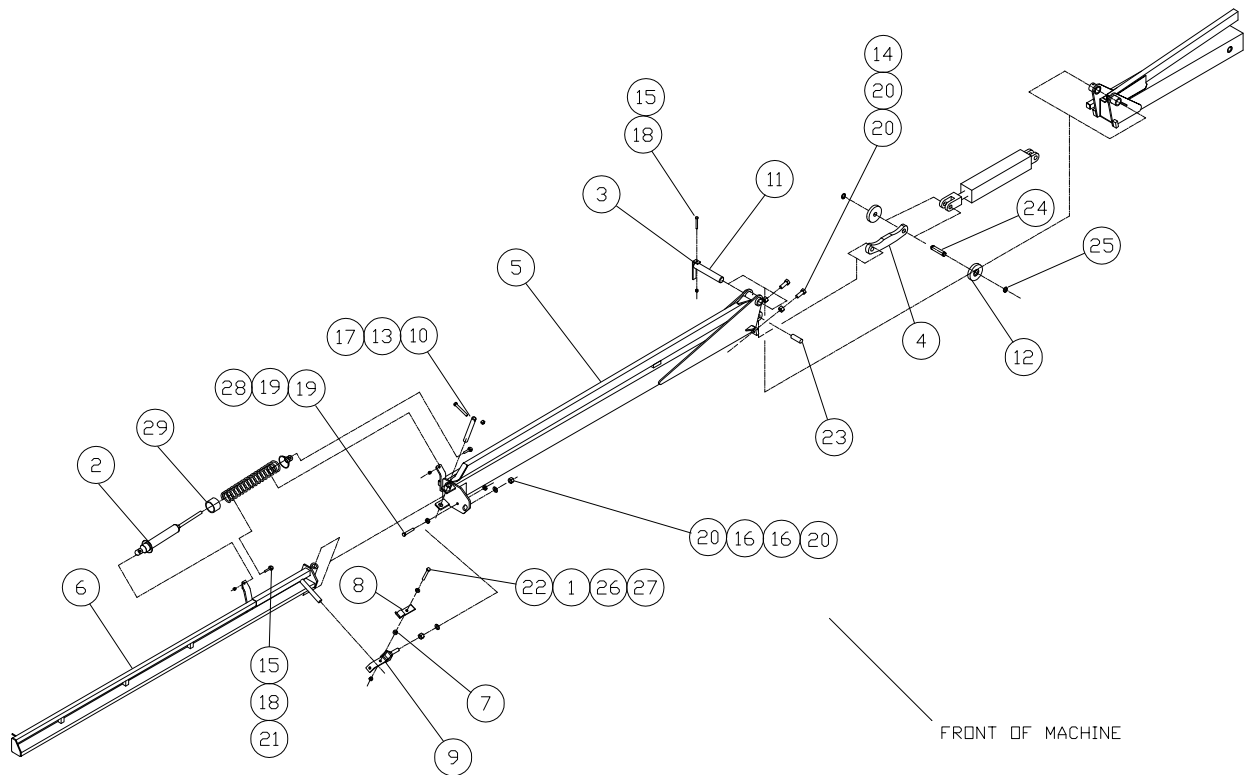


Description: Fold Boom, Primary Section Assembly

Item #	Part #	Description	Quantity
1	SX011982	Bumper Pad Rework	1
2	SX012043	Weld; Boom Primary RH	1
	SX012044	Weld; Boom Primary LH	1
3	SX012058	Plate; Cylinder Wing Lift	2
4	SX012095	Pin; Primary Mount	1
5	SXBH-038-150-5	Bolt; 3/8" x 1-1/2" Hex, Grade 5	1
6	SXBH-038-275-5	Bolt; 3/8" x 2-3/4" Grade 5	1
8	SXBH-100-600-8	Bolt; 1" x 6" Grade 8	1
10	SXLN-038-NI	Locknut; 3/8" Nylon Insert	1
11	SXLN-100-CL	Locknut; 1" Center Locknut	1
12	SXLW-038	Locknut; 1" Center Locknut	1
13	SXPCL-100-300	1" x 3" Clevis Pin	5

Note: Quantities are per side.

Description: Fold Boom, Secondary Breakaway Assembly



Description: Fold Boom, Secondary Breakaway Assembly

Item #	Part #	Description	Quantity
1*	SX011961	Spring; Breakaway Release 1" OD x 3" x 3/1	1
2	SX011962	Shock Absorber	1
3	SX012059	Plate; Hose Rub Guard	1
4	SX012690	Plate; Boom Fold Over	1
5	See Chart	Weld; Boom Secondary, RH	1
	See Chart	Weld; Boom Secondary, LH	1
6	See Chart	Weld Boom Secondary Breakaway, RH	1
	See Chart	Weld Boom Secondary Breakaway, LH	1
7	SX013095	Bushing; Breakaway Lock	1
8	SX012086	Plate; Breakaway Lock Top	1
9	SX013098	Weld; Breakaway Lock Bottom	1
10	SX007985	Pin; Weld Breakaway	1
11	SX012094	Pin; Secondary Mount	1
12	SX012098B	Roller; Boom Fold Over Top	2
13	SXBH-031-200-5	Bolt; 5/16" x 2" Gr. 5	1
14	SXBT-075-300-5	Bolt; 3/4" x 3" Grade 5	2
15	SXBH-038-300-5	Bolt; 3/8" x 3" Gr. 5 Hex	3
16	SXFW-075	Flat washer; 3/4" - 9.5" Per #	2
17	SXLN-031-NI	Locknut; 5/16" Nylon Insert	1
18	SXLN-038-NI	Locknut; 3/8" Nylon Insert	3
19	SXNUT-050-J	Nut; 1/2" Jam Nut	2
20	SXNUT-075-J	Nut; 3/4" Jam Nut	4
21	SXFW-038	Flat washer; 3/8"	2
22	SXBH-050-450-5	Bolt; 1/2" x 4-1/2" Gr. 5	1
23	SXPCL-100-300	Pin; 1" x 3" Clevis	1
24	SX012130	Pin; Primary to Secondary (w/ Link)	1
25	SX68019	Retaining; Snap Ring (Ext. 1" Shft.)	2
26	SXLN-050-NI	Locknut; 1/2" Nylon Insert	1
27	SXFW-050	Flat washer; 1/2"	1
28	SXBH-050-350-5	Bolt; 1/2" x 3-1/2" Gr. 5	1
29	SX013133	R. Tube; Spacer	1

Note: Quantities are per side.

*Not shown

NOTES:

Description: Boom Sections

Shown if looking at from back of sprayer

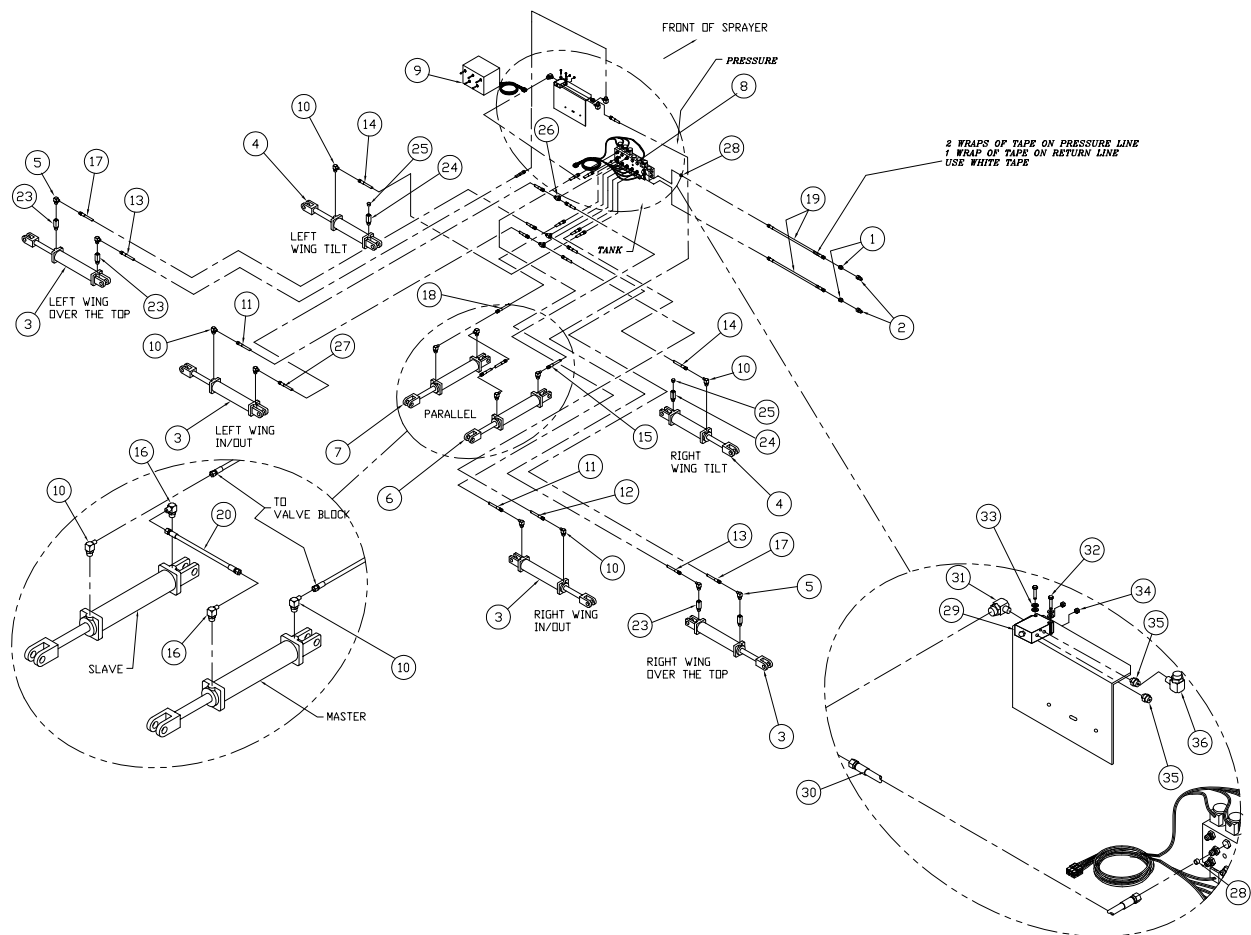
Tank Size	Boom Assembly #				
1600	SX011965 60' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX012110 Secondary R.S. 1' 9" SX012111 Secondary L.S. 1' 9"	SX012115 BKWY. R.S. 5' 6" SX012116 BKWY. L.S. 5' 6"
1600	SX011970 66' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX012110 Secondary R.S. 1' 9" SX012111 Secondary L.S. 1' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"
1600	SX011980 80' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX012070 Secondary R.S. 8' 9" SX012071 Secondary L.S. 8' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"
1600	SX011990 44'-88' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX011997 Secondary R.S. 13' 9" SX011998 Secondary L.S. 13' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"
1600	SX012000 45'-90' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX011997 Secondary R.S. 13' 9" SX011998 Secondary L.S. 13' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"

2006 Model Year & Prior

1600	SX011965 60' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX015759 Secondary R.S. 1' 9" SX015760 Secondary L.S. 1' 9"	SX012115 BKWY. R.S. 5' 6" SX012116 BKWY. L.S. 5' 6"
1600	SX011970 66' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX015759 Secondary R.S. 1' 9" SX015760 Secondary L.S. 1' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"
1600	SX011980 80' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX015761 Secondary R.S. 8' 9" SX015762 Secondary L.S. 8' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"
1600	SX011990 44'-88' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX015763 Secondary R.S. 13' 9" SX015764 Secondary L.S. 13' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"
1600	SX012000 45'-90' Vertical Fold	Center Section 11' 11" SX011953/SX011954	SX012043 Primary R.S. 16' 6" SX012044 Primary L.S. 16' 6"	SX015763 Secondary R.S. 13' 9" SX015764 Secondary L.S. 13' 9"	SX012083 BKWY. R.S. 8' 6" SX012084 BKWY. L.S. 8' 6"

2007 Model Year to Current

Description: Sprayer Hydraulic Routing

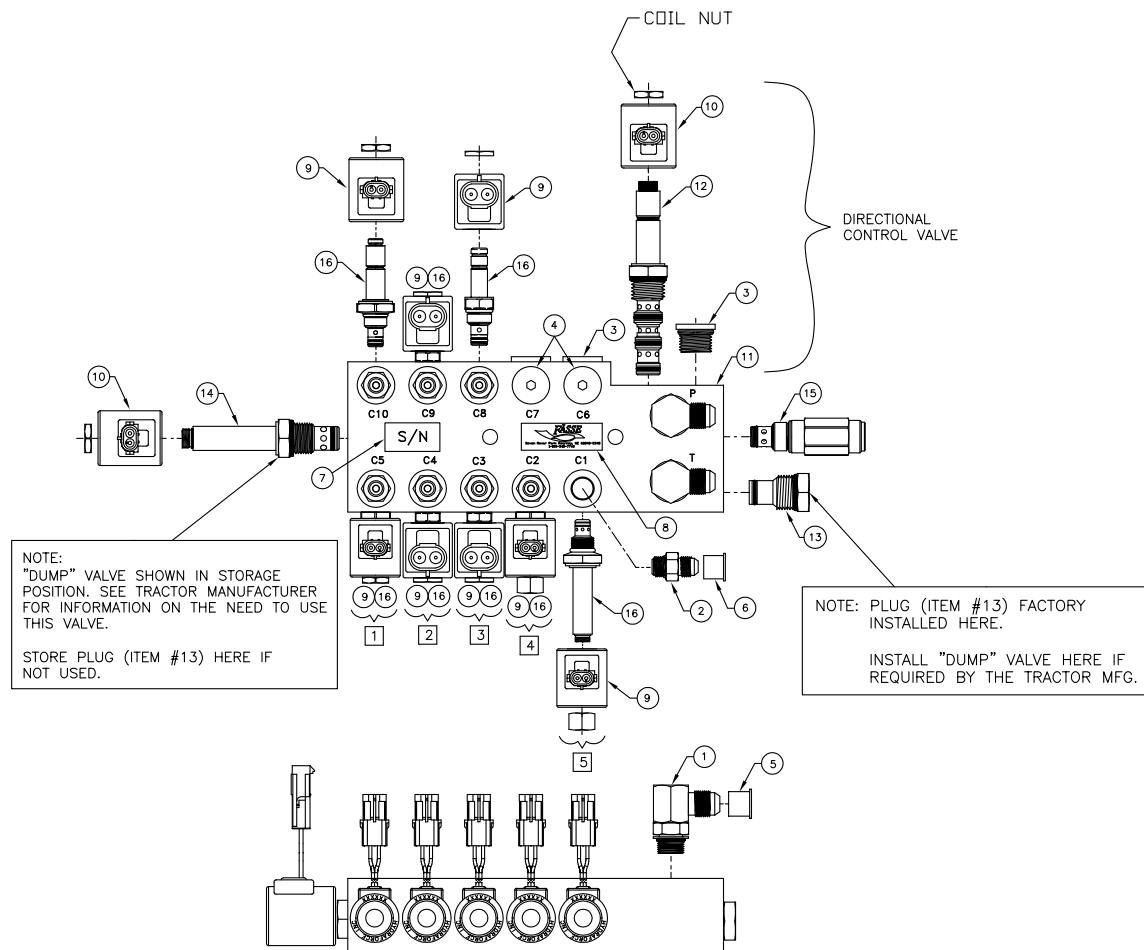


Description: Sprayer Hydraulic Routing

Item #	Part #	Description	Quantity
1	SX6400-6-8	Hyd. Adapter, 3/8" JIC & 3/4" ORB Male	2
2	SX8010-15P	Hyd. Quick Coupler, Univ. Poppet	2
3	SX011958	Cylinder; Hyd. 3" x 16"	4
4	SX011957	Cylinder; Hyd. 3" x 8"	2
5	SX6500-6	Hyd Ell; 90D-6JICSX-HMJIC	4
6	SX645214	3" x 12" Rephasing	1
7	SX645213	2-3/4" x 12" Rephasing	1
8	SX700-0805-4107	Hydraulic Valve	1
	SX319-028	Cable	1
9	SX312-001	Switch Box; Live Directional	1
10	SX6801-6-8R.06	Hydraulic Restrictor Elbow	6
11	SX004051	77" Hyd. Hose	1
12	SX9030-99	99" Hyd. Hose	1
13	SX004657	300" Hyd. Hose	2
14	SX004053	140" Hyd. Hose	2
15	SX004060	34" Hyd. Hose	1
16	SX6801-8-8R.06	Hydraulic Restrictor Elbow	2
17	SX004057	320" Hyd. Hose	2
18	SX004050	34" Hyd. Hose	1
19	SX007609	360" Hyd. Hose	2
20	SX007475	34" Hyd. Hose, 1/2" Female JIC Swivel	1
21*	SX210-127	Plug; -6 Outlet Plug	2
22*	SX210-038	Plug; -8 Cartridge Port	2
23	SX6400-6-8R.06	Hyd ADPT Rest; -8MORB/ -6MJIC,06	4
24	SX6405-8-8	Hyd. Fitting: -8MORB/ -8FPT	2
25	SX640370	Plug; Vent, 1/2" NPT	2
26	SX6602-6	Hyd Tee; Run w/Female Switch	3
27	SX9030-84	84" Hyd. Hose	1
28	SX013384	Orifice, Drop-In, -.04 .050" Hole	1
29	SX013644	Flow Divider	1
30	SX013645	Hyd Hose; 3/8" x 16' JICX-FEM	1
31	SX6801-6	Hyd Fitting; 9/16" ORB x 3/8" JIC	1
32	SXBH-025-200-2	1/4" x 2.00" Bolt	2
33	SXFW-025	1/4" Washer	4
34	SXLN-025-NI	1/4" Locknut	2
35	SX6400-6	Adapter, Striptill	2
36	SX6500-6	Hyd Ell; 9 OD-6 JIC x -.6 JIC	1

*Not shown

Description: Fold-Over The Top Boom, Hydraulic Valve Breakdown



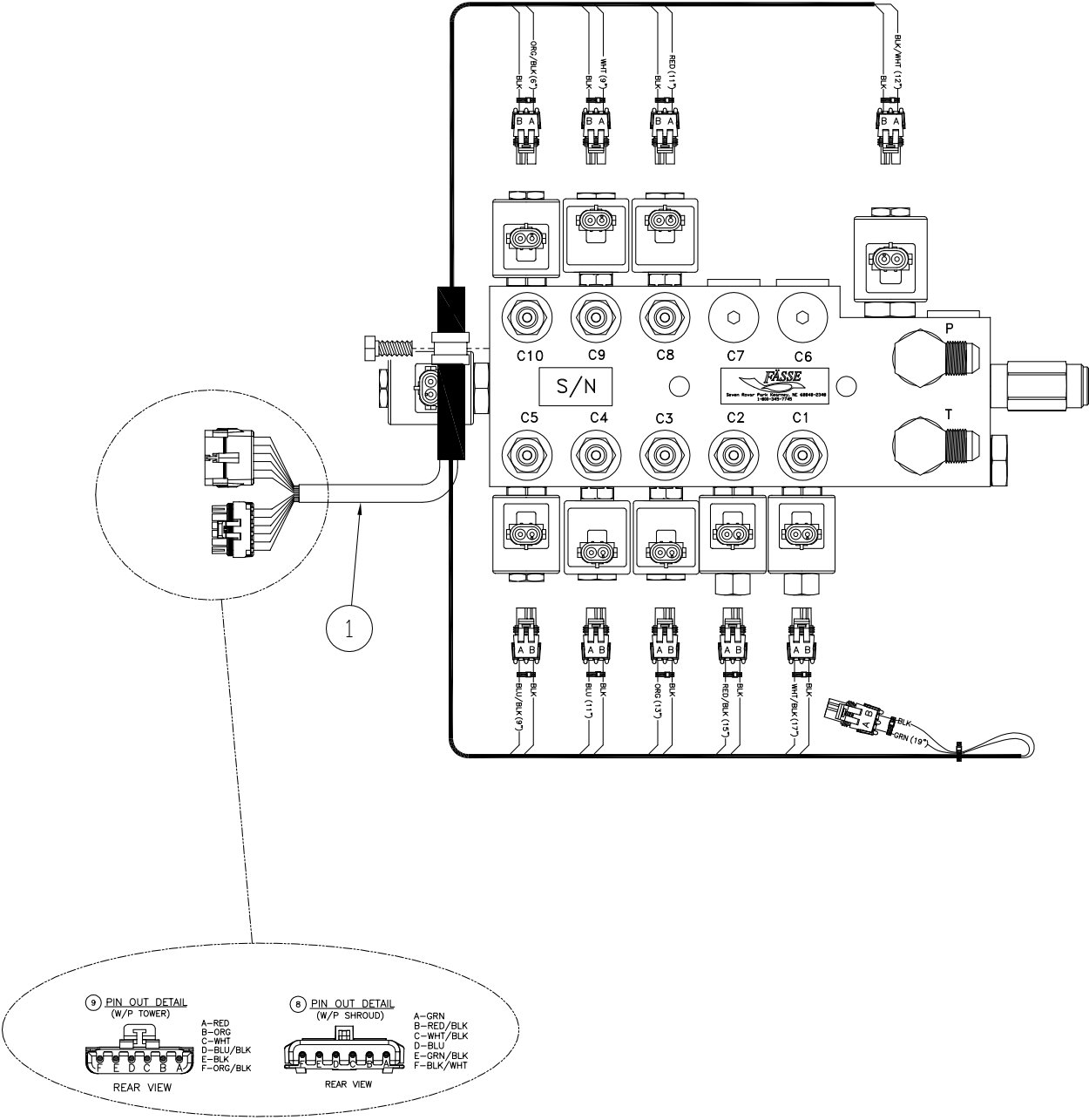
FUNCTIONS

- 1 PARALLEL
- 2 RIGHT & LEFT WING OVER THE TOP
- 3 RIGHT & LEFT WING IN/OUT
- 4 RIGHT WING TILT
- 5 LEFT WING TILT

Description: Fold-Over The Top Boom, Hydraulic Valve Breakdown

Item #	Part #	Description	Quantity
1	SX210-016	FTG 6801-6-8/E-MJ-MO	2
2	SX210-023	FTG 6400-6-6/S-MJ-MO	8
3	SX210-038	FTG 6408-HHP-8/HOLL Hex Plug MO	3
4	SX210-127	FTG 6408-HHP-6/HOLL Hex Plug MO	2
5	SX211-223	FTG CAP-8/MJ Red	2
6	SX211-234	FTG CAP-6/MJ Red	8
7	SX232-050	Decal S/N (Silver)	2
8	SX232-059	Decal Gold/Black 1.5" x .5"	1
9	SX253-022	Coil H/F 6309412 W/PS 12V 1.22A	4
10	SX253-028	Coil H/F 6369412 W/PS 12V 1.67A	6
11	SX270-093	Mani S14153-4 5Cir AL RV	1
12	SX273-008	Cart SV10-40-0-N-00	1
13	SX273-012	Cart CP10-20	1
14	SX273-017	Cart SV10-21-0-N-00	1
15	SX273-078	Cart H/F RV10-22H-0-N-35/30 RFL Diff Area Pop 3000 PSI	2
16	SX273-500	Cart H/F SV08-28-0-N-00 2P ROP NC BI-DIPI	1

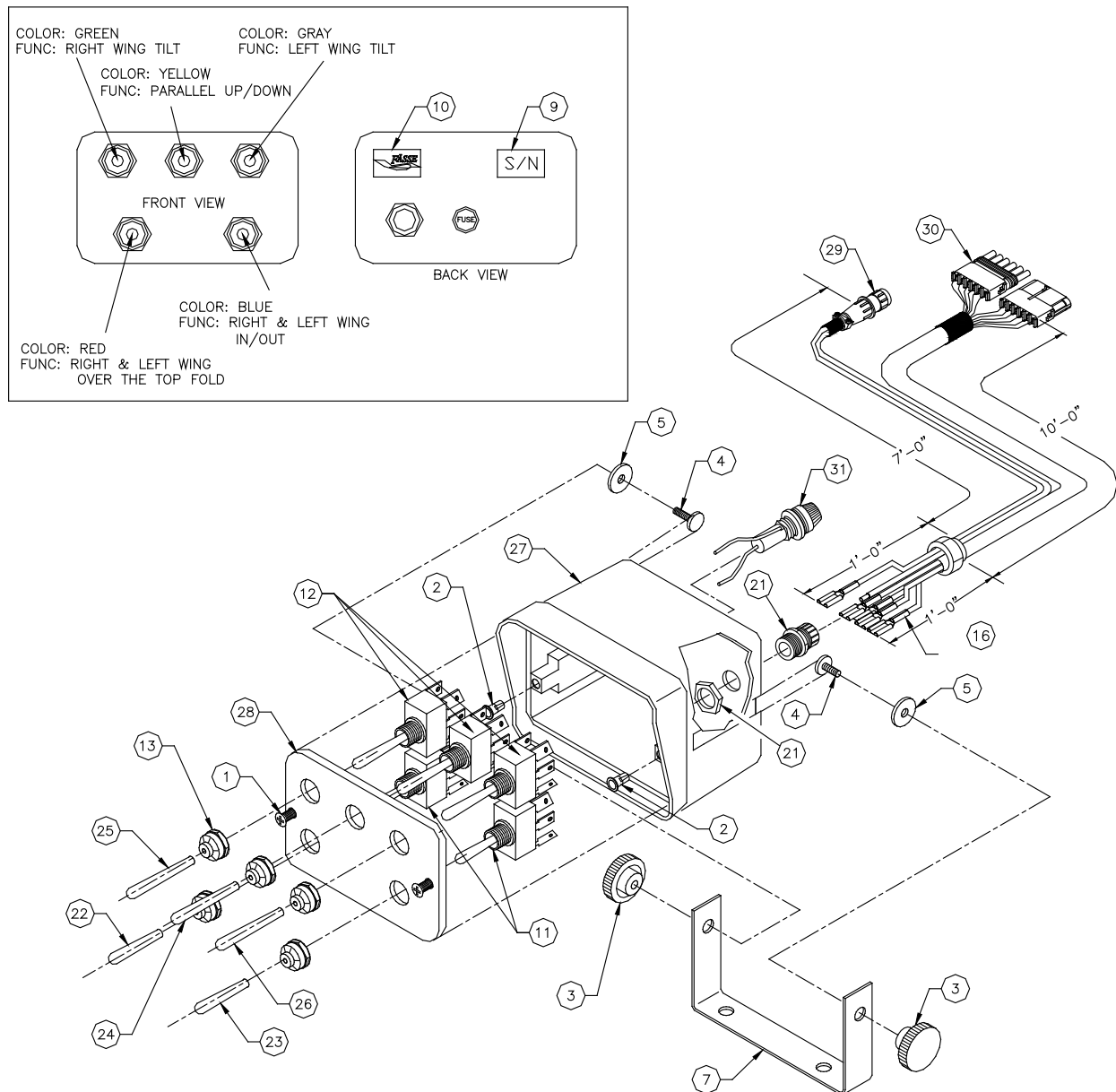
Description: Top Fold Boom, 5 Bank Hydraulic Valve Bank Wiring Diagram



Item #	Part #	Description	Quantity
1	SX319-028	Fasse Control Block Wiring Harness	1

NOTES:

Description: Fold-Over The Top Boom, 5 Bank Hydraulic Switch Box Breakdown



Description: Fold-Over The Top Boom, 5 Bank Hydraulic Switch Box Breakdown

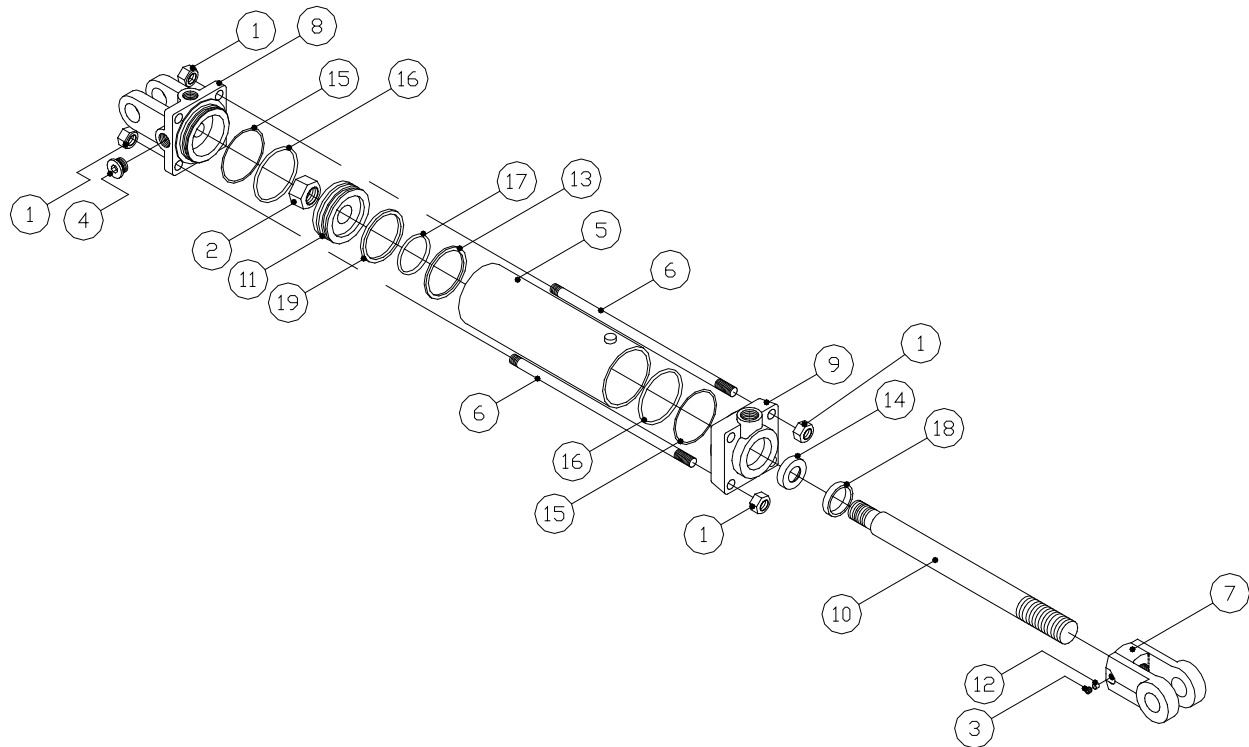
Item #	Part #	Description	Quantity
1	SX212-184	Screw 6/32" x 3/8" Oval Hd Blk	2
2	SX212-202	Insert 6/32" x 3/8" Brass	2
3	SX212-215	Knob 1/4"-20 Female	2
4	SX212-231	Screw Welded 1/4"-20 x .500"	2
5	SX213-335	Washer Nylon .257" x .875" x .060"	2
7	SX219-300	Bracket Housing Monitor	1
9	SX232-050	Decal S/N (Silver)	2
10	SX232-059	Decal Gold/Black 1.5" x 5"	1
11	SX250-007	SW Tog DPDT 3P MOM Short	2
12	SX250-013	SW Tog DPDT 3P MOM Long	3
13	SX250-023	SW TOG Boot Open Gray	5
16	SX255-006	TRM PO E NON INS 20/18GA	7
21	SX255-710	STR RLF Heyco .45"-.705" ID Hole Dia. 1.115"	1
22	SX259-005	SW TOG Grip Vinyl Red .187	1
23	SX259-015	SW TOG Grip Vinyl Blue .187	1
24	SX259-022	SW TOG Grip Vinyl Yel .187	1
25	SX259-023	SW TOG Grip Vinyl Grn .187	1
26	SX259-027	SW TOG Grip Vinyl Gry .187	1
27	SX304-358	Encl DRL MNTR-1" x 5/8" G1 x FUSEHOLDER	1
28	SX312-002	Encl Drill FP MNTR SW5 C00332	1
29	SX314-217	Harness R/B Wire Series 3 P/8"	1
30	SX319-031	HRN 12CON 18GA w/PS & W/PT 6P(6) 11"	1
31	SX319-769	Fuse Holder PM Assembly 10A /.5"	1

This exploded view diagram illustrates the assembly of a hydraulic cylinder. The components are numbered 1 through 21. The main body (1) is shown with internal components like the piston rod (4) and piston (5). The piston rod is equipped with a seal (6) and a wiper (7). The cylinder is shown with various mounting brackets (8, 9, 10) and fasteners (11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21). The diagram shows the assembly of the cylinder head, the main body, and the cylinder foot, along with the mounting brackets and fasteners.

Description: Spray Boom Cylinder Assembly

Item #	P/N SX011957 Wing Tilt 3 x 8	P/N SX011958 Wing Over the Top & In/Out 180° Fold 3 x 16	Description	Quantity
1	SX492675	SX492675	Clevis Cap	1
2	SX492670	SX592728	Rod Cap	1
3	SX494719	SX494719	Piston	1
4	SX492021	SX493597	Cylinder Rod	1
5	SX491738	SX491746	Cylinder Tube	1
6	SX492278	SX492286	Tie Rod	4
7	SX134953	SX134953	Cylinder Pin	2
8	SX135995	SX135995	Pin	4
9	SX498006	SX498006	Thread Lock-Nylon	1
10	SX492652	SX492652	Rod Clevis	1
11	SX148390	SX148390	SC Sckt Set 3/8" UNC	1
12	SX128250	SX128250	Nut, Hex (Tie Rod)	8
13	SX130560	SX130560	Nut, Hex (Cyl. Rod)	1
14	SX186562	SX186562	Plug 3/4"-16, SOC HD	1
15-21	SX639558	SX639559	Seal Repair Kit	1
15*			Seal	2
16*			O-Ring	2
17*			Seal Hallite	1
18*			O-Ring	1
19*			Seal NOK	1
20*			Seal PTFE Piston Ring	1
21*			Wear Ring	1

*Not sold separately, only available as a seal repair kit

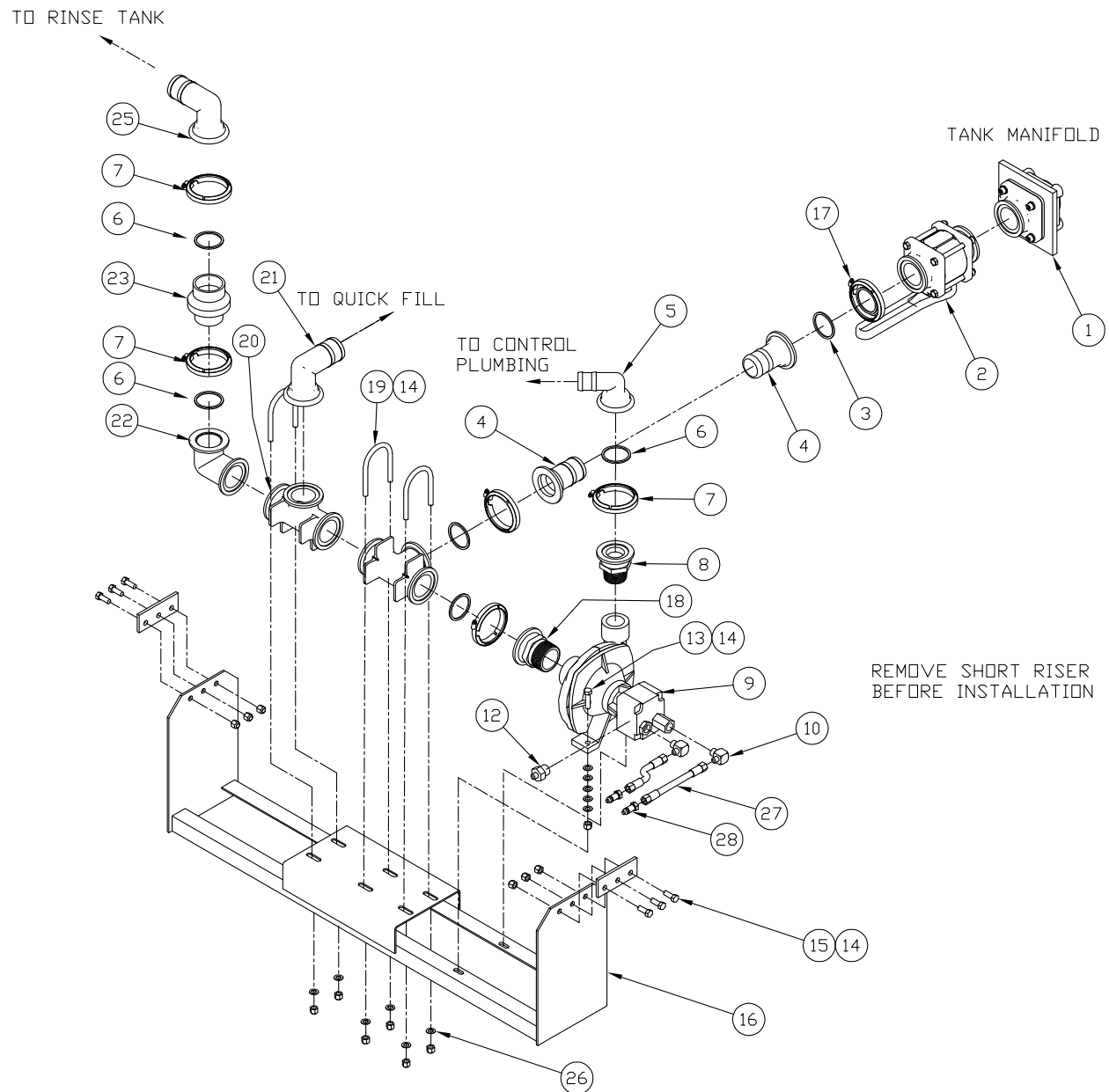
Description: Boom Rephasing Cylinder Assembly


Description: Boom Rephasing Cylinder Assembly

Item #	P/N SX645213 Slave Parallel 2-3/4 x 12	P/N SX645214 Master Parallel 3 x 12	Description	Quantity
1	SXNUT-050	SXNUT-050	Nut, Hex (Tie Rod)	8
2	SX130556	SX130560	Nut, Hex (Cyl. Rod)	1
3	SX148390	SX148390	SC Sckt Set 3/8" UNC	1
4	SX186562	SX186562	Plug 3/4"-16, SOC HD	1
5	SX464416	SX464418	Cylinder Tube, Weld	1
6	SX492282	SX492282	Tie Rod	4
7	SX492650	SX492652	Rod Clevis	1
8	SX492660	SX492675	Clevis Cap	1
9	SX492661	SX492670	Rod Cap	1
10	SX493272	SX493580	Cylinder Rod	1
11	SX494727	SX494719	Piston	1
12	SX498066	SX498006	Thrd Lock-Nylon	1
	SX639557	SX639558	Seal Repair Kit	1
13*			Seal PTFE Piston Ring	1
14*			Seal Hallite	1
15*			Seal	2
16*			O-Ring	2
17*			O-Ring	1
18*			Seal NOK	1
19*			Wear Ring	1

*Not sold separately, only available as a seal repair kit

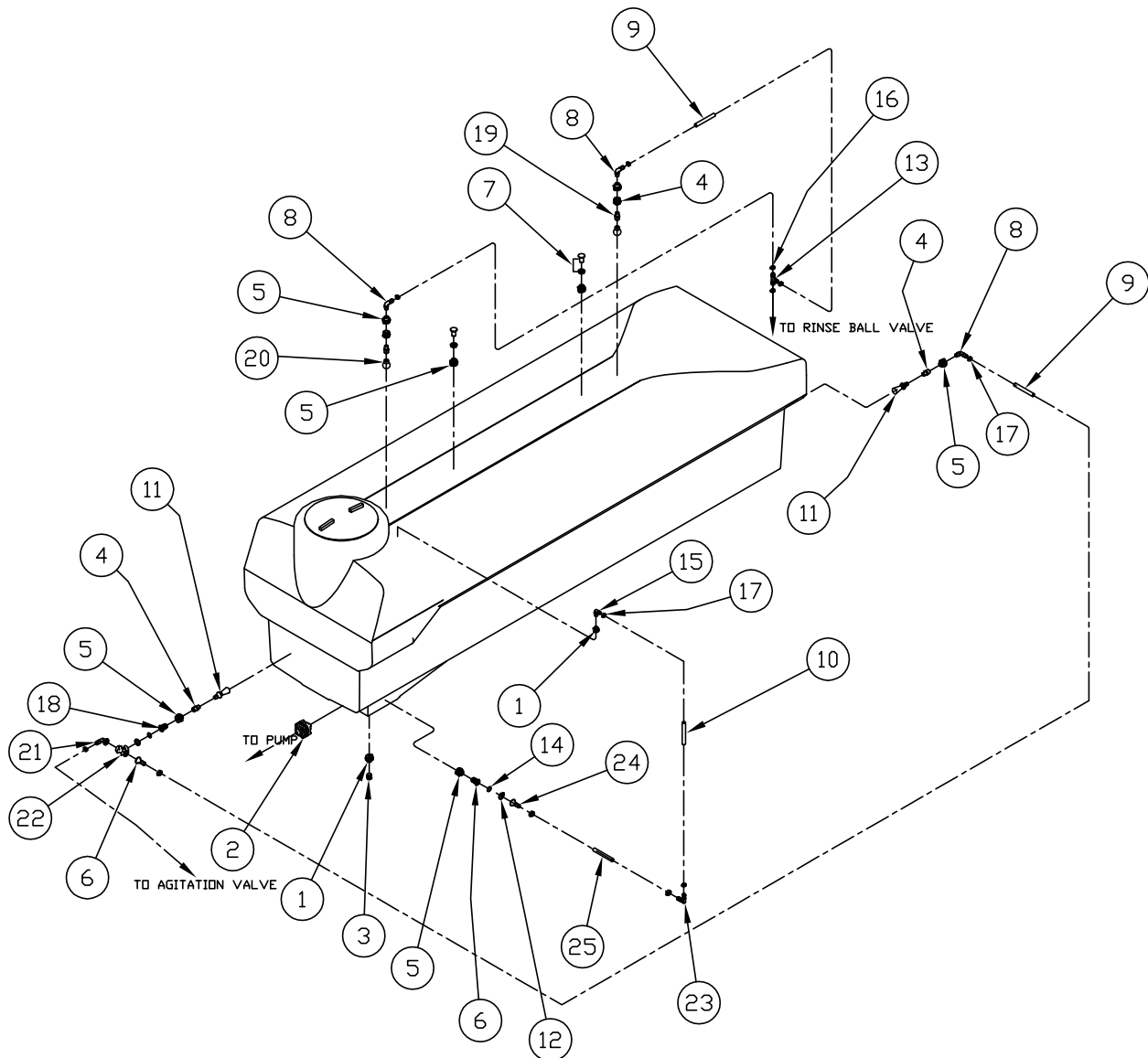
Description: Pump Plumbing



Description: Pump Plumbing

Item #	Part #	Description	Quantity
1	SXMBF220BD	Bulkhead, 2" Flange Bolted FP	1
2	SXMV220CF	Valve, 2" Full Port	1
3	SX200G	Gasket; 2" For Flange	6
4	SXM220BRB	Hose Barb, 2" Flange, FP	2
5	SXM200150BRB90	Hose Barb, 2" FLG x 1-1/2" Barb, Elbow	1
6	SX150G	Gasket, 1-1/2" For Flange	1
7	SXFC200BJ	Clamp, 2" Flange	1
8	SXM200150MPT	2" Flange x 1-1/2" Male NPT	1
9	SXFMCS200HYD	Pump, ACE, 2" In, 1-1/2" Out, SC	1
10	SX2501-8-8	Hyd Fitting, -8 MJIC x -8 MNPT, Elbow	1
12	SX2404-8-8	Hyd Fitting, -8 MJIC x -8 MNPT	1
13	SXBH-038-175-5	Bolt, Hex, 3/8" x 1-3/4" Gr. 5	2
14	SXLN-038-NI	Locknut, 3/8" Nylon Insert	14
15	SXBH-038-100-5	Bolt, Hex, 3/8" x 1 Gr. 5	6
16	SX013450	Weldment; Pump Mount	1
17	SXFC220BJ	Clamp, Flange, 2" FP	6
18	SXM220MPT	Manifold, 2" FP	1
19	SXBUR038-250	Bolt, U, 3/8" x 2 -1/2" x 4"	3
20	SXM220TEE	Tee, Flange, 2" FP	2
21	SXM220BRB90	Hose Barb, 2" FP FLG x 2" HB, Elbow	1
22	SXM220CPG90	Coupling, 2" FP FLG, Elbow	1
23	SXMCV200	Check Valve; 2"	1
25	SXM200BRB90	Elbow; Flange 2" x 2" HB 90°	1
26	SXFW-038	Flat washer; 3/8" -67 Per #	16
27	SX004656	Hyd Hose; 1/2" x 180"	2
28	SX8010-15P	Hyd Quick Coupler; Univ. Poppet	2

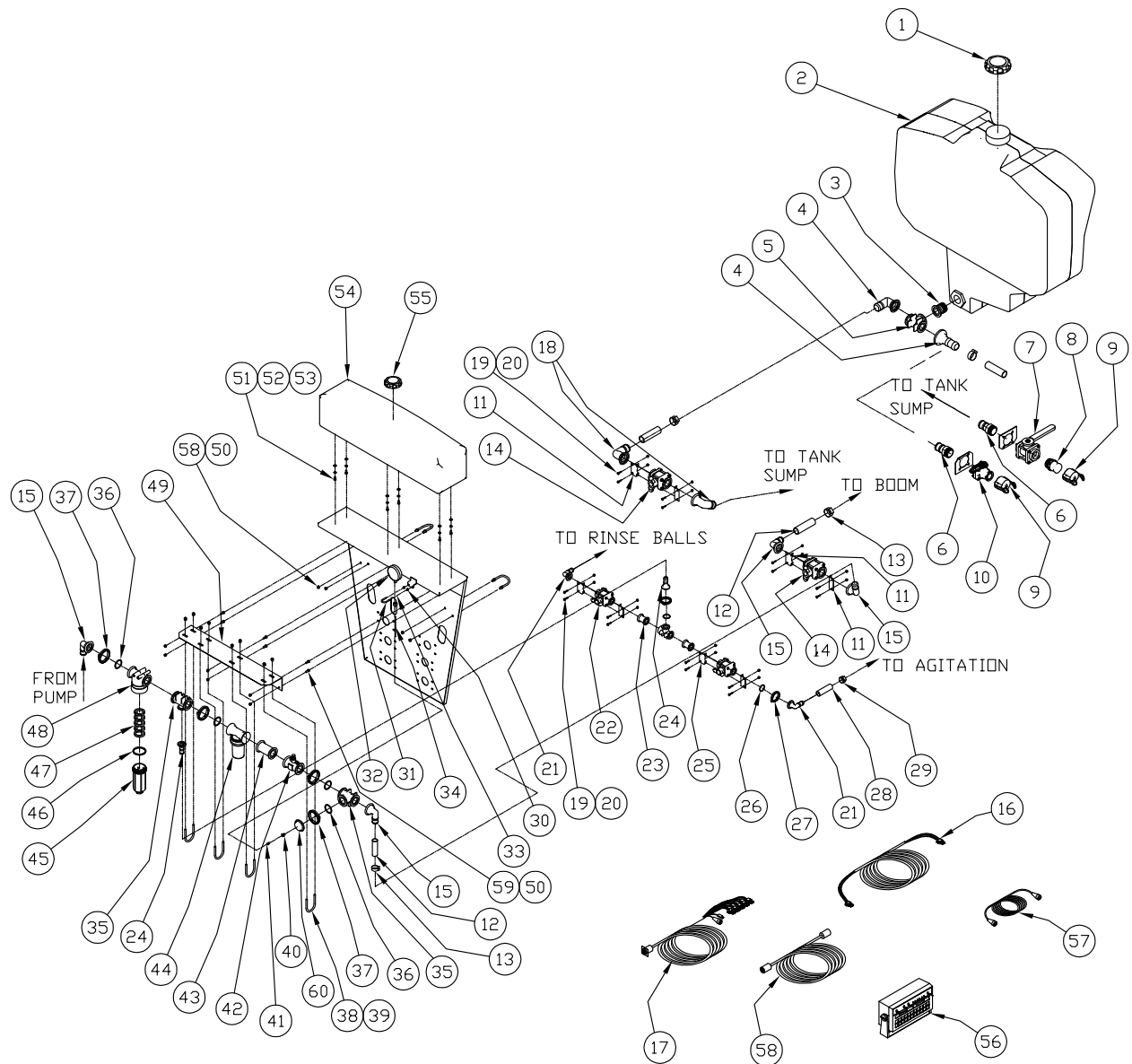
Description: Tank Plumbing



Description: Tank Plumbing

Item#	Part #	Description	Quantity
1	SXNW60401	Manifold, 3/4"	2
2	SXMBF220	Bulkhead, 2" FP FLG Bolted	1
3	SXPLUG075	Plug; 3/4" MPT Poly	1
4	SXRB100-075	Reducer Bushing; 1" x 3/4" Poly	4
5	SXNW60427	Bulkhead, 1"	7
6	SXM100075MPT	Hose Barb, 1" FLG, 1" HB	2
7	SX504-203	Vent, Tank	2
8	SXHB100-90	Hose Barb, 1" MPT x 1" HB, 90	3
9	SX011612	Hose; 1" 150# Black Rubber	35
10	SXSIGHT-34	Hose; Sight Gauge, 3/4"	6
11	SX3371-0028	Jet Agitator, High Cap	2
12	SXFC100BJ	Clamp, 1" FLG	4
13	SXHBT100	Tee, HB, 1"	1
14	SX100G	Gasket, 1" FLG	4
15	SXHB-075-90	HB, 3/4" HB x 3/4" MNPT, EL	1
16	SX#16J	Clamp, 1" Hose	8
17	SX#12J	Clamp, 3/4" Hose	4
18	SXM100MPT	Manifold, 1" FLG, 1" MNPT	1
19	SXMM3410	Reducing Nipple 1" to 3/4"	2
20	SX2000-6	Rinse Nozzle	2
21	SXM100BRB90	Hose Barb, 1" FLG x 1" HB, Elbow	1
22	SXM100TEE	Tee, 1" FLG	1
23	SXEL34HB	Hose Fitting, 3/4" ELHB x 3/4" HB	1
24	SXM100075BRB	Mani; 1" Flange x 3/4" Hose Barb	1
25	SX001212	Hose, 3/4" 150# EPDM, L85	1

Description: Raven® Control Plumbing



Description: Raven® Control Plumbing

Item #	Part #	Description	Quantity
1	SX354010	Lid, Vented, 6"	1
2	SX6000-01Y	Tank, 100 Gal. Rinse	1
3	SXM200MPT	Nipple; 1" x Short, MPT, Poly	1
4	SXM200BRB	Manifold, 2" MPT, 2" FLG	1
5	SXM200TEE	Tee, 2" FLG	2
6	SXHB-200	Hose Barb; 2MPT x HB Poly	2
7	SXV-204FP	Valve; 2" - 4 Bolted Ball Valve	1
8	SX200F	Valve; 2" - 4 Bolted Ball Valve	1
9	SX200CAP	Cap; 2" Female Cam Lever	2
10	SXVSF200	Valve; Stub, 2" M ADPT x 2" FPT	1
11	SX004555B	Mount; Valve 3-1/2" Black	4
12	SX012412	Hose; 1-1/2" 150# EPDM	
13	SX#24J	Clamp; 1-1/2" x 1/2" Stainless	5
14	SXMVT200CF	Valve; 2" FLG, T Handle	2
15	SXM200150BRB90	Hose Barb, 2" FLG x 1-1/2" HB, Elbow	6
16	SX013439	Cable; Valve Extension	*
17	SX006367	Cable Assembly; 12' Valve	1
18	SXM200BRB90	Elbow; Flange 2" x 2" HB 90°	2
19	SXBC-025-075-2	Bolt; 1/4" x 3/4" Carriage	16
20	SXNTF-025	Nut, 1/4"-20 Serrated Flange	16
21	SXM100BRB90	Hose Barb, 1" FLG x 1" HB, Elbow	2
22	SXMVT100CF	Valve, 1" FLG, T Handle	2
23	SXM100CPG	Coupler, 1" FLG x 1" FLG	2
24	SXM100BRB	Hose Barb, 1" FLG x 1" HB	2
25	SX004557	Mount, Valve, 2"	4
26	SX100G	Gasket; 1" Coupling EPDM	8
27	SXFC100BJ	Clamp; 1"	8
28	SX011612	Hose, 1" Black 150#	
29	SX#16J	Clamp; 1" x 1/2" Stainless	4
30	SXLN-025-NI	Locknut, 1/4" Nylon Insert	2
31	SXBU025-075-125	Bolt, U, Round, 1/4" x 3/4" x 1-1/4"	1
32	SXASG1604-RED	Gauge, 4" 0-160 PSI	1
33	SX4030-0016	Hose Barb; 1/4" FB3	1

Description: Raven® Control Plumbing (cont.)

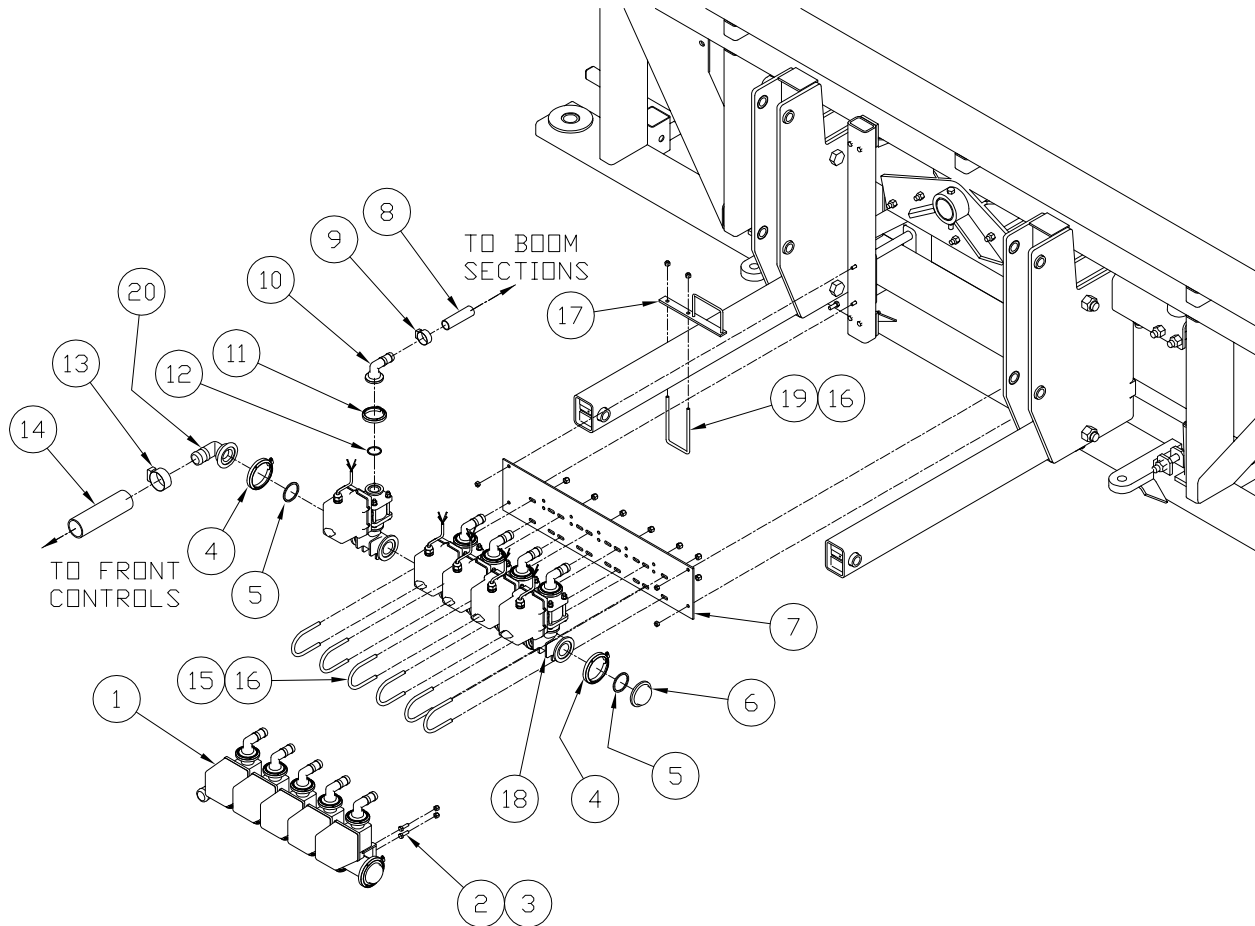
Item #	Part #	Description	Quantity
34	SX4030-0018	Tubing; 3/16"x .124" ID Yellow	4
35	SXM200100TEE	Tee; 2" x 1" Tee	1
36	SX150G	Gasket, 2" FLG	9
37	SXFC200BJ	Clamp; 2" FLG	9
38	SXBU038-250-450	Bolt, U, 3/8" x 2-1/2" x 4" Gr. 5	6
39	SXLN-038-NI	Locknut, 3/8" Nylon Insert	12
40	SXRB1418-SS	Reducer, 1/4"-1/8", SS	1
41	SX4030-0017	Hose Barb, 1/8" B3	1
42	SX063-0171-793	Flowmeter, Raven, 60-P	1
43	SXM200CPG	Coupler, 2" FLG	1
44	SX063-0171-894	Valve, 2" Regulating	1
45**	SXLST150-B	Strainer, Bowl, 2"	1
46**	SXLST150-G	Strainer, Gasket, 2"	1
47**	SXLST1550	Strainer, Screen, 50-Mesh	1
48**	SXLST150-H	Strainer, Head, 2"	1
49	SX013461	Plate; Control Plumb Mnt	1
50	SXLN-031-NI	Locknut, 5/16" Nylon Insert	8
51	SXBH-031-062-5	Bolt, Hex, 5/16" x 5/8" Gr. 5	6
52	SXLW-031	Washer, Lock, 5/16"	6
53	SXFW-031	Washer, Flat, 5/16"	6
54	SX6000-02Y	Tank, 9 Gallon Rinse	1
55	SX200972	Cover, 3-1/2"	1
56	SX063-0171-220	Console; SCS450	1
57	SX115-0159-017	Cable; 12' Flowmeter	1
58	SX115-0159-492	Cable; Raven 450 Control Cable	2
59	SXBH-031-075-2	Bolt; 5/16" x 3/4" Hex	6
60	SXM200PLG018	Plug; Flange 2" W/3/16 Port	1

* Depends on quantity of boom valves

** Complete assembly part number is SXMLST150-50

NOTES:

Description: Valve Mounting

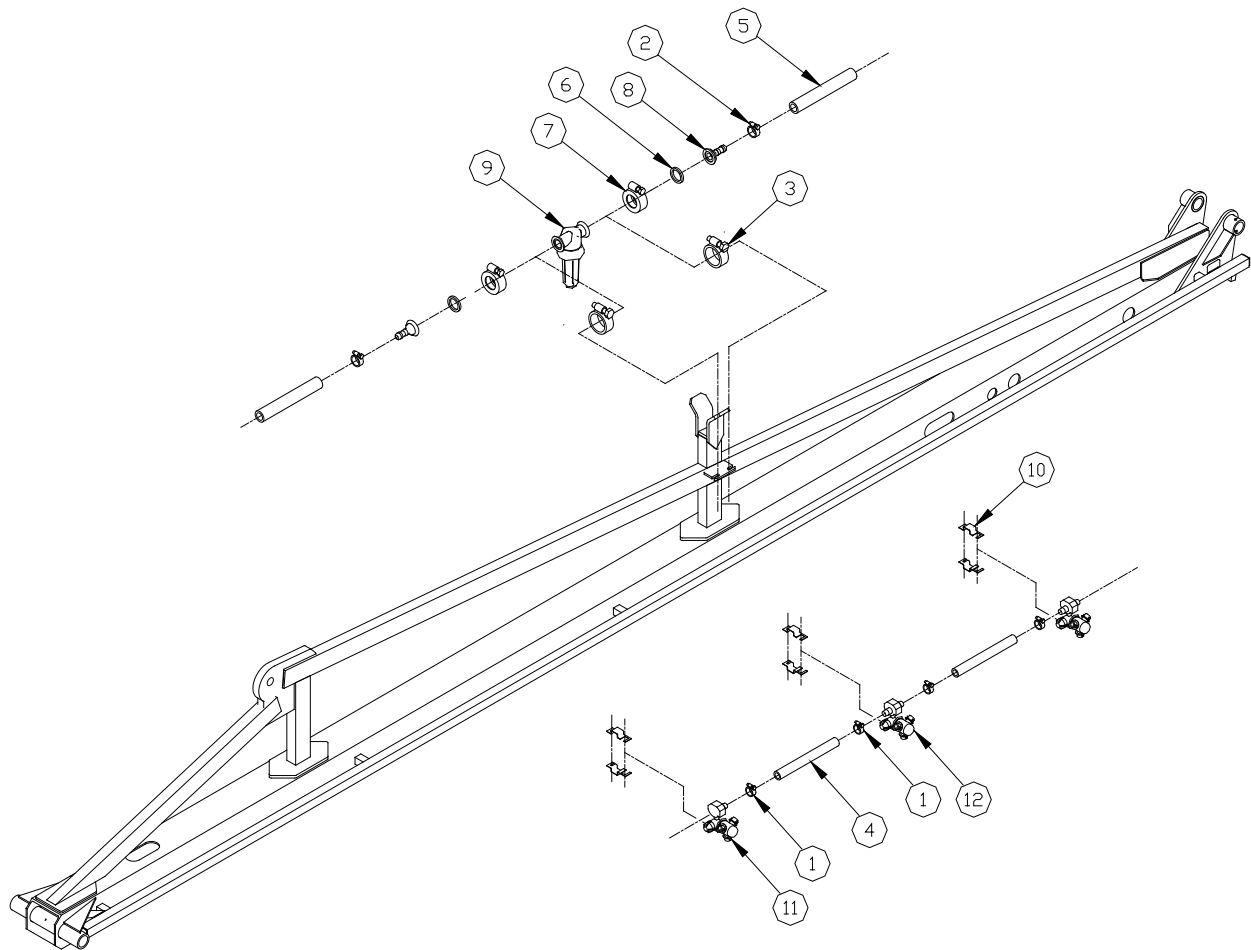


Description: Valve Mounting

Item#	Part #	Description	Quantity
1	SX2123683	1" Banjo Electric Ball Valve	*
2	SXBH-031-125-5	Bolt, Hex, 5/16" x 1-1/4" Gr. 5	*
3	SXLN-031-NI	Locknut, 5/16" Nylon Insert	*
4	SXFC200BJ	Clamp; 2" Flanged	*
5	SX150G	Gasket; 2" Flanged Valve	*
6	SXM200PLG	Plug, 2" Flange	1
7	SX013138	Flat; Liquid Valve Mounting	1
8	SX011612	Hose; 1" 150# Black Rubber	*
9	SX16J	Clamp; 1" Hose	*
10	SXM100BRB90	Hose Barb, Flange, Elbow, 1"	*
11	SXFC100BJ	Clamp, 1" Flanged	*
12	SX100G	Gasket; 1" Flanged Valve	*
13	SXTBC225	Clamp; T-Bolt	1
14	SX012412	Hose; 1-1/2" 150# Black Rubber	
15	SXBUR038-250	U-Bolt, 3/8" x 2-1/2" x 4" Round Zinc	*
16	SXLN-038-NI	Locknut, 3/8" Nylon Insert	*
17	SX013141	Weldment; Hose Support	1
18	SX013470	Valve, Boom, Banjo w/connection	*
19	SXBU050-300-450	Bolt, U, 1/2" x 3" x 4-1/2" Gr. 2	1
20	SXM200150BRB90	Hose Barb, 2" FLG, 1-1/2" HB, Elbow	1

* Quantity depends on valve section quantity and valve option

Description: Fold Over the Top Boom Plumbing Kit



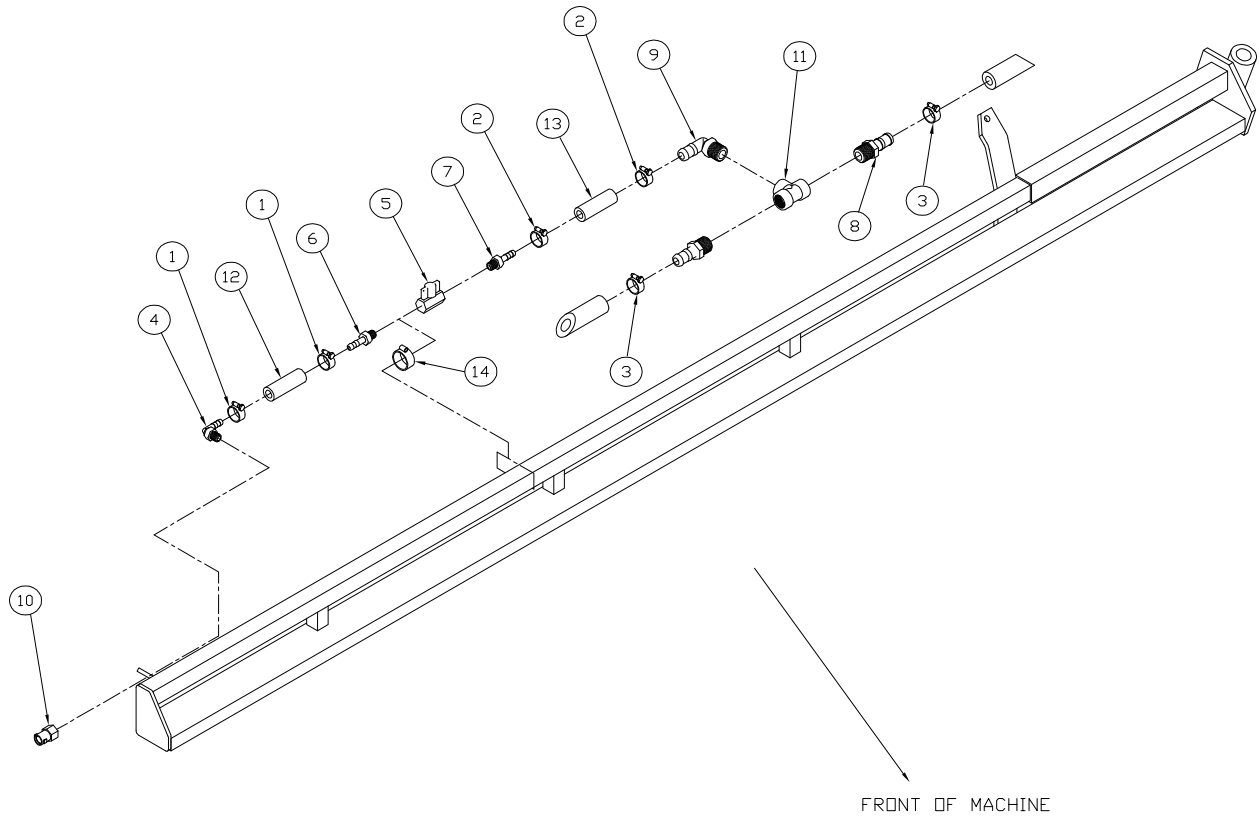
Description: Fold Over the Top Boom Plumbing Kit

Item #	Part #	Description	Quantity
1	SX#12J	Clamp, 3/4" Stainless	*
2	SX#16J	Clamp, 1" Stainless	*
3	SX#32J	Clamp, 2" Stainless	*
4	SX001212	Hose; 3/4" 150# EPDM	*
5	SX011612	Hose; 1" 150# Black Rubber	*
6	SXM100G	Gasket; 1" Manifold Valve	*
7	SXFC100BJ	Clamp, 1"	*
8	SXM100BRB	Hose Barb; 1" Flange Straight	*
9	SXMLST100-50	Strainer; T-Line Flanged	*
10	SXQJ111SQ	Clamp; 1-1/4" QUick Clamp, SQ	*
11	SXQJ363-750-1	Turret; 3-Outlet, 3/4" Elbow	*
12	SXQJ363-750-2	Turret; 3-Outlet w/3/4" Tee	*

Note: Quantities are per side.

* Quantities vary depending on boom length and nozzle spacing.

Description: Manual Fence Row Plumbing

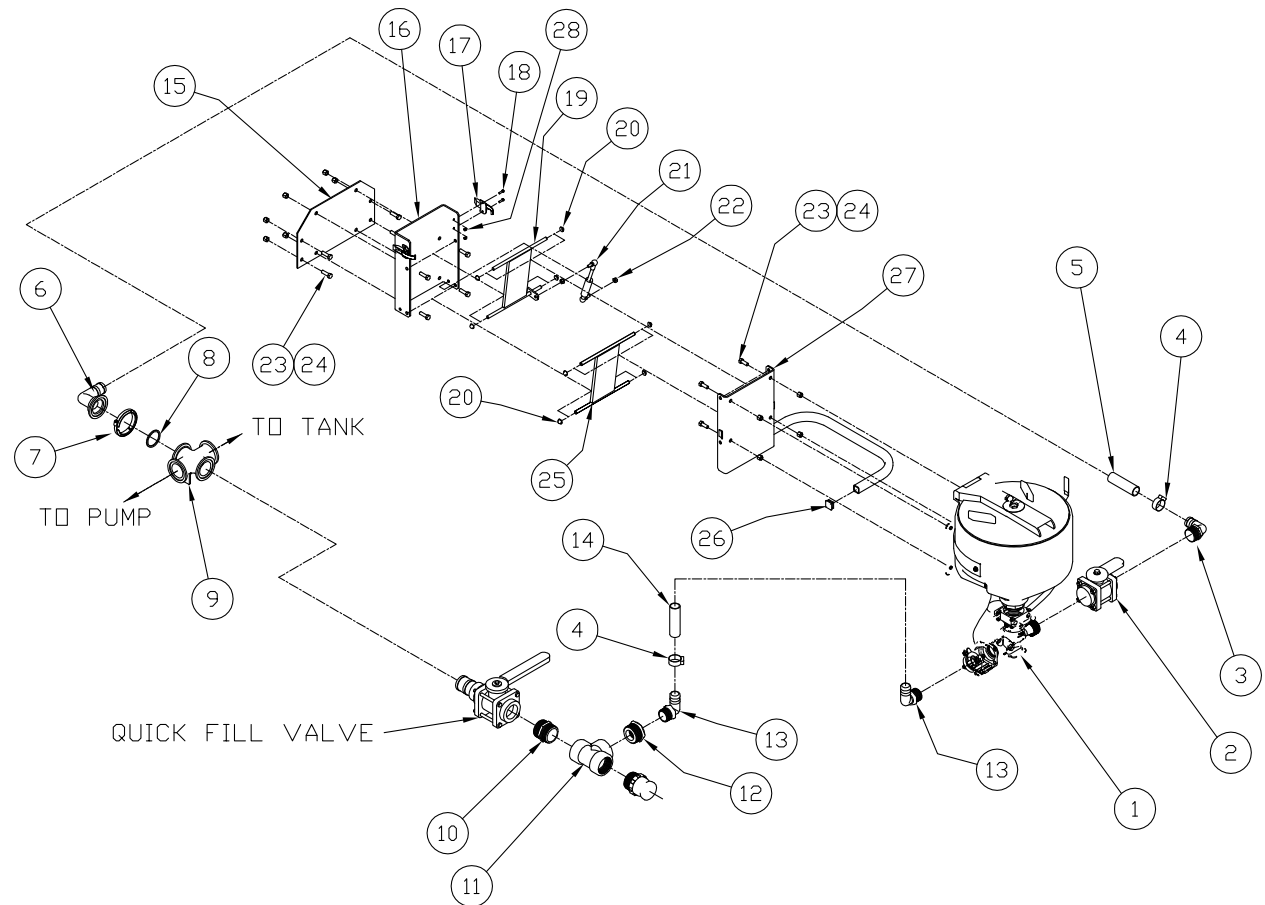


Description: Manual Fence Row Plumbing

Item #	Part #	Description	Quantity
1	SX#4JM	Clamp; 1/4" x 5/16" Stainless	2
2	SX#6JM	Clamp; 3/8" x 5/16" Stainless	2
3	SX#12JM	Clamp; 3/4" Stainless	2
4	SX3EL1438	Elbow; 1/4" FPT x 3/8" EL HB	1
5	SX90FFB38	Valve; 3/8" Female NPT, Brass	1
6	SXHB-038	Hose Barb; 3/8" MPT x 3/8" HB	1
7	SXHB-038-050	Hose Barb; 3/8" MPT x 1/2" HB	1
8	SXHB-075	Hose Barb; 3/4" MPT x 1/2" HB Poly	2
9	SXHB-075-050-90	Hose Barb Ell; 3/4" MPT x 1/2" HBEL	1
10	SXQJ1/4T-NYB	QJ-1/4T QuickJet Body	1
11	SXTEE 075	Tee: Poly, 3/4" Female	1
12	SX000612	Hose; 3/8" 150# EPDM	
13	SX000812	Hose; 1/2" 150# EPDM	
14	SX#24J	Clamp; 1-1/2" x 1/2" Stainless	1

Note: Quantities listed are per side

Description: Eductor Assembly



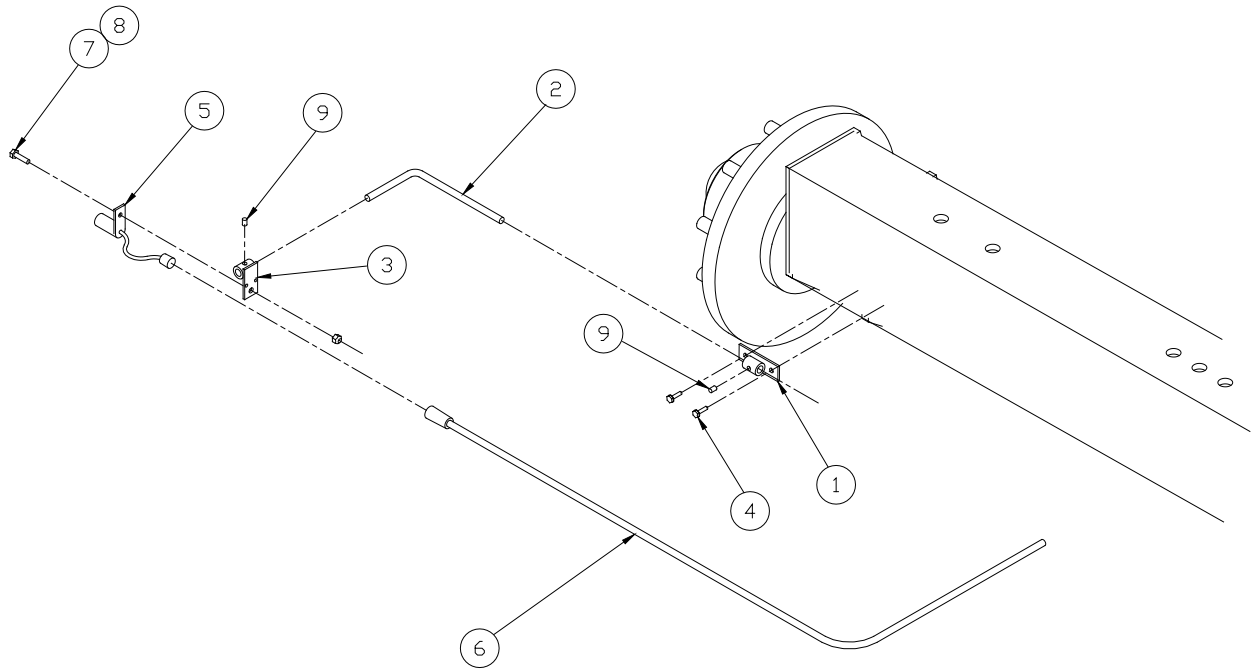
Description: Eductor Assembly (optional)

Item #	Part #	Description	Quantity
1	SX013487	Eductor, Hypro Clean Load	1
2	SXV-150	Valve, 1-1/2" Bolt, FNPT	1
3	SXHB-150-90	Hose Barb, 1-1/2" MNPT, 1-1/2" HB, EL	1
4	SX#28J	Clamp; 1-1/2" Hose	4
5	SX012412	Hose, 1-1/2" 150# EPDM	6
6	SXM220150BRB90	Hose Barb, 2" FP Flg, 1-1/2" HB, EL	1
	SXM200150BRB90	Hose Barb, 2" Flg, 1-1/2" HB, EL	2
7	SXFC220	Clamp, 2" FP Flg	1
	SXFC200BJ	Clamp, 2" Flg	1
8	SX200G	Gasket, 2" FP Flg	1
	SX150G	Gasket, 2" Flg	1
9	SXM220CR	Cross, 2" FP Flg	1
10	SXNIP200-SH	Nipple, 2" Short	1
11	SXTEE 200	Tee, 2" FPT	1
12	SXRB200-125	Reducer Bushing; Poly 2" x 1-1/4"	1
13	SXHB-125-90	Hose Barb, 1-1/4" MPT, 1-1/4" HB, EL	2
14	SX012012	Hose; 1-1/4" 150# EPDM	3
15	SX013142	Plate; Hypro Eductor Mount	1
16	SX013488	Plate; Frame Side Parallel	1
17	SXSBSE068	Latch, Overcenter	2
18	SXBM-10/24-075	Bolt; Mach. 10-24 x 3/4" Hex	4
19	SX013489	Weldment; Parallel w/Lug	1
20	SX013492	Nut, Push, Closed End, 3/8" Shaft	8
21	SX013493	Spring, Gas, 2.36" Stroke, 80 Lb. Force	1
22	SXNTF-031	Nut, 5/16" Flange	2
23	SXBH-038-100-2	Bolt, Hex, 3/8" x 1" Gr. 2	12
24	SXLN-038-NI	Locknut, 3/8" Nylon Insert	12
25	SX013494	Weldment; Parallel	1
26	SX9000-0031	Caplug, 1" x 11 Ga.	1
27	SX013495	Weldment; Outer Parallel	1
28	SXNUT-10/24	Nut; 10/24	4

Shipping Instructions:

1. Assemble parallel linkage assembly before shipping.
2. Ship eductor in Hypro box. Place all other items in separate box.

Description: Raven Proximity Speed Sensor

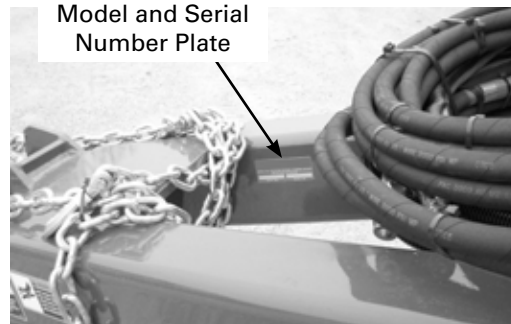


Item #r	Part #	Description	Quantity
1	SX010439	Weldment; Axle Mount	1
2	SX010442	Rod; Adjustment	1
3	SX010443	Weldment; Sensor Mount	1
4	SX171-C	Screw; TEK 410HSS Cad Plated	2
5	SX063-0159-982	Sensor; Gear Tooth Speed	1
6	SX115-0159-018	Cable; Speed Sensor 24' Ext. Cable	1
7	SXBH-025-075-2	Bolt; 1/4" x 3/4" Gr. 2	1
8	SXLN-025-NI	Locknut; 1/4" Nylon Insert	1
9	SXSTS-025-038	Set Screw; 1/4" x 3/8" Allen Hd	2

Warranty

Section G

Serial and Model Number Location



Hitch/Drawbar Tubes (Front of Sprayer)

The following page contains a space for you to record the information about your sprayer found on this plate. Please record this information here for future reference.

SERIAL NUMBER INFORMATION

Farm King Model Number: _____

Farm King Serial Number: _____

Component Serial Numbers:

Manufacturer	Part Number	Serial No.	Notes:



IMPORTANT

The binder containing this manual is sub-component of the sprayer and should go with the sprayer in the event of a future sale. This information contained within this binder is specific to this specific sprayer and cannot easily be replaced.

Warranty Policy

Farm King Pull-Type Sprayer Limited Warranty

This document limits your warranty rights.

Base Limited Warranty

Farm King provides this warranty only to original retail purchasers of its sprayers. Farm King warrants to such purchasers that all Farm King-manufactured parts and components used and serviced as provided for in the Operator's Manual shall be free from defects in materials and workmanship for a period following delivery to the original retail purchaser of one (1) year. This limited warranty applies only to those parts and components manufactured by Farm King. Parts and components manufactured by others are subject to their manufacturer's warranties, if any.

Farm King will fulfill this limited warranty by, at its option, repairing or replacing any covered part that is defective or is the result of improper workmanship, provided that the part is returned to Farm King within thirty (30) days of the date that such defect or improper workmanship is, or should have been, discovered. Parts must be returned through the selling representative and the buyer must prepay transportation charges.

Farm King will not be responsible for repairs or replacements that are necessitated, in whole or part, by the use of parts not manufactured by or obtained from Farm King. Under no circumstances are component parts warranted against normal wear and tear. There is no warranty on product pump seals, product pump bearings, rubber product hoses, pressure gauges, or other components that require replacement as part of normal maintenance.

Repair Parts Limited Warranty

Farm King warrants genuine Farm King replacement parts purchased after the expiration of the Farm King Limited Warranty, and used and serviced as provided for in the Operator's Manual, to be free from defects in materials or workmanship for a period of thirty (30) days from the invoice date for the parts. Farm King will fulfill this limited warranty by, at its option, repairing or replacing any covered part that is defective or is the result of improper workmanship, provided that the part is returned to Farm King within thirty (30) days of the date that such defect or improper workmanship is, or should have been, discovered. Such parts must be shipped to the Farm King factory at the purchaser's expense.

What is Not Covered

Under no circumstances does this limited warranty cover any components or parts that have been subject to the following: negligence; alteration or modification not approved by Farm King; misuse; improper storage; lack of reasonable and proper maintenance, service, or repair; normal wear; damage from failure to follow operating instructions; accident; and/or repairs that have been made with parts other than those manufactured, supplied, and or authorized by Farm King.

Continued on next page

Authorized Dealer and Labor Costs

Repairs eligible for labor under this limited warranty must be made by Farm King or an authorized Farm King dealer. Farm King retains the exclusive discretion to determine whether it will pay labor costs for warranty repairs or replacements, and the amount of such costs that it will pay and the time in which the repairs will be made. If Farm King determines that it will pay labor costs for warranty work, it will do so by issuing a credit to the dealer's or distributor's account. Farm King will not approve or pay invoices sent for repairs that Farm King has not previously approved. Warranty service does not extend the original term of this limited warranty.

Warranty Requirements

To be covered by warranty, each new sprayer must be registered with Farm King within thirty (30) days of delivery to original retail purchaser. If the customer decides to purchase replacement components before the warranty disposition of such components is determined, Farm King will bill the customer for such components and then credit the replacement invoice for those components later determined to be covered by this limited warranty. Any such replacement components that are determined not to be covered by this limited warranty will be subject to the terms of the invoice and shall be paid for by the purchaser.

Exclusive Effect of Warranty and Limitation of Liability

TO THE EXTENT PERMITTED BY LAW, FARM KING DISCLAIMS ANY WARRANTIES, REPRESENTATIONS, OR PROMISES, EXPRESS OR IMPLIED, AS TO THE QUALITY, PERFORMANCE, OR FREEDOM FROM DEFECT OF THE COMPONENTS AND PARTS COVERED BY THIS WARRANTY AND NOT SPECIFICALLY PROVIDED FOR HEREIN.

TO THE EXTENT PERMITTED BY LAW, FARM KING DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ON ITS PRODUCTS COVERED HEREIN, AND DISCLAIMS ANY RELIANCE BY THE PURCHASER ON FARM KING'S SKILL OR JUDGMENT TO SELECT OR FURNISH GOODS FOR ANY PARTICULAR PURPOSE. THE PURCHASER'S ONLY AND EXCLUSIVE REMEDIES IN CONNECTION WITH THE BREACH OR PERFORMANCE OF ANY WARRANTY ON FARM KING'S SPRAYERS ARE THOSE SET FORTH HEREIN. IN NO EVENT SHALL FARM KING BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BY WAY OF EXAMPLE ONLY AND NOT LIMITATION, LOSS OF CROPS, LOSS OF PROFITS OR REVENUE, OTHER COMMERCIAL LOSSES, INCONVENIENCE, OR COST OF REPLACEMENT OF RENTAL EQUIPMENT). IN NO EVENT SHALL FARM KING'S CONTRACT OR WARRANTY LIABILITY EXCEED THE PURCHASE PRICE OF THE PRODUCT. (Note that some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusion may not apply to you.) This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.

Farm King neither assumes nor authorizes any person or entity, including its selling representatives, to assume any other obligations or liability in connections with the sale of covered equipment, or to make any other warranties, representations, or promises, express or implied, as to the quality, performance, or freedom from defect of the components and parts covered herein. No one is authorized to alter, modify, or enlarge this limited warranty, or its exclusions, limitations and reservations.

Continued on next page.

Corrections of defects and improper workmanship in the manner, and for the applicable time periods, provided for herein shall constitute fulfillment of all responsibilities of Farm King to the purchaser, and Farm King shall not be liable in negligence, contract, or on any other basis with respect to the subject equipment.

This limited warranty is subject to any existing conditions of supply which may directly affect Farm King's ability to obtain materials or manufacturer replacement parts.

Buhler Industries Inc. reserves the right to make improvements in design or changes in specifications to its products at anytime, without incurring any obligation to owners of units previously sold.

www.farm-king.com

Farm King

1330 43rd Street NW
Fargo, ND USA 58102
Ph.: 701.282.7014 | Fax: 701.282.5865
E-mail: info@buhler.com
www.farm-king.com

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