



Operator's Manual For
Hagie Model **STS 10T Hi-Tractor**

Hagie Manufacturing Company

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493529 Covers Machine serial numbers: U16T1221001 through U16T1221100

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ABBREVIATIONS

ADJ	ADJUST	MT	MOUNT
ADPTR	ADAPTER	MTH	MONTH
ALT.....	ALTERNATOR	MTR	MOTOR
AMP	AMPERE	NO.....	NUMBER
APPROX	APPROXIMATELY	OD.....	OUTSIDE DIAMETER
ASSY.....	ASSEMBLY	POLY	POLYETHYLENE
AUX.....	AUXILIARY	PRESS.....	PRESSURE
BRKT.....	BRACKET	PRKNG	PARKING
BTRY	BATTERY	PSI	POUNDS PER SQUARE INCH
C.....	CELSIUS	QT	QUART
CAL	CALIBRATION	RAD	RADIATOR
CCA.....	COLD CRANKING AMPS	REC	RECOMMENDED
CHEM.....	CHEMICAL	REQ	REQUIRED
cm	CENTIMETER	RPM.....	REVOLUTIONS PER MINUTE
CYL	CYLINDER	SEC.....	SECOND
DIA	DIAGRAM	SERV	SERVICE
DISPL.....	DISPLACEMENT	SMV	SLOW MOVING VEHICLE
EA	EACH	SOLE	SOLENOID
ELECT.....	ELECTRIC	SOLU	SOLUTION
F.....	FAHRENHEIT	SPEC	SPECIFICATION
FIG	FIGURE	STRG	STEERING
FRT	FRONT	SQ.....	SQUARE
FT.....	FOOT OR FEET	TACH	TACHOMETER
GA	GAUGE	TEMP	TEMPERATURE
GAL.....	GALLON	TERM.....	TERMINAL
GPA.....	GALLONS PER ACRE	TRD.....	TREAD
GPM.....	GALLONS PER MINUTE	TT.....	TUBE-TYPE
HAL	HALOGEN	TU	TUBELESS
HR	HOUR	VAR.....	VARIABLE
HYD.....	HYDRAULIC	V.....	VOLT
HYDRO	HYDROSTATIC	VFC.....	VARIABLE FLOW CONTROL
ID.....	INSIDE DIAMETER	VLV	VALVE
INFO.....	INFORMATION	W/.....	WITH
L	LITER (DISPLACEMENT)	W/O.....	WITHOUT
l	LITER (LIQUID)	W.....	WEIGHT
LB.....	POUND	WD	WHEEL DRIVE
m	METER	WHL.....	WHEEL
MAINT	MAINTENANCE	WK	WEEK
MIN.....	MINUTE	WLD	WELDMENT
M/F	MAINFRAME		

INTRODUCTION



A WORD FROM HAGIE MANUFACTURING COMPANY

Congratulations on your selection of a Hagie Model STS 10T Sprayer. We recommend that you study this Operator's Manual and become acquainted with the adjustments and operating procedures before attempting to operate your new sprayer. As with any piece of equipment, certain operating procedures, service, and maintenance are required to keep it in top running condition.

We have attempted herein to cover all of the adjustments required to fit varying conditions. However, there may be times when special care must be considered.

Hagie Manufacturing Company reserves the right to make changes in the design and material of any subsequent sprayer without obligation to existing units.

We thank you for choosing a Hagie sprayer and assure you of our continued interest in its satisfactory operation for you. If we might be of assistance to you, please call us.

We are proud to have you as a customer.

TO THE OPERATOR:

The following pages and illustrations will help you operate and service your new sprayer. It is the responsibility of the user to read the Operator's Manual and comply with the safe correct operating procedures and lubricate and maintain the product according to the maintenance schedule.

The user is responsible for inspecting the machine and having parts repaired or replaced when continued use of the product causes damage or excessive wear to other parts.

Keep this manual in a convenient place for easy reference when problems arise. This manual is considered a permanent fixture with this machine. In the event of resale, this manual should accompany the sprayer. If you do not understand any part of the manual or require additional information or service, contact the Hagie Customer Support Department:

Hagie Manufacturing Company
721 Central Avenue West
Box 273
Clarion, Iowa 50525-0273
(515) 532-2861 OR 1-800-247-4885




The following symbols, found throughout this manual, alert you to situations that could be potentially dangerous conditions to the operator, service personnel, or the equipment.	
	This symbol indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	This symbol indicates a potentially hazardous situation, which if not avoided, could result in death or injury.
	This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

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SAFETY

Most accidents occur as the result of failure to follow simple and fundamental safety rules. For this reason, most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs.

Many conditions cannot be completely safeguarded against without interfering with efficient operation and/or reasonable accessibility. Therefore, you must study this Operator's Manual and learn how to use the sprayer controls for safe operation. Likewise, do not let anyone operate without instruction.



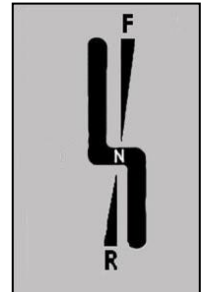
Do NOT make modifications such as weldments, add-ons, adaptations, or changes from the original design of sprayer. Such changes and/or modifications may become safety hazards to you and to others and **will void all warranties**.



Replace missing, faded, or damaged safety signs. See the operator's manual for correct sign and placement.

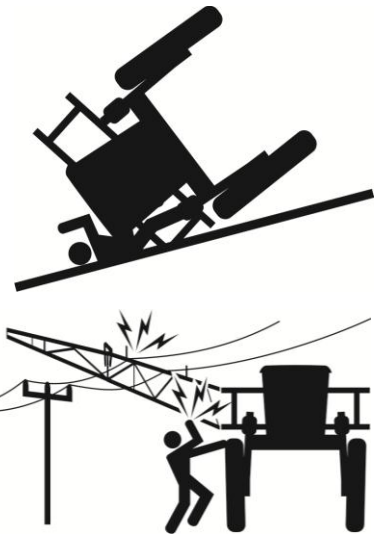
Do Not By-Pass Safety Start Switch

- Start the machine from the operator's seat only. The machine must be in neutral to start.



Use Caution While Driving

- Never drive too close to ditches, embankments, holes, mounds or other obstacles.
- Never drive on hills too steep for safe operation.
- Reduce the sprayer speed while turning.
- Do not permit passengers on machine when it is moving; they may fall off or obstruct the operator's view.
- Check overhead clearance before driving under any overhead obstructions. Contact with power lines can result in serious injury or death.
- Booms must be folded and in cradles when driving.



Keep Riders off Machine

- Do not permit passengers to ride on the machine or in the cab. The only time passengers should be permitted is for instructional or diagnostic purposes. The passenger should be seated on the buddy seat next to the operator and never allowed to ride outside of the cab.



Remove Paint before Welding or Heating

- Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.
- Do not use chlorinated solvents in areas where welding will take place.
- Do all work in an area that is well ventilated to carry toxic fumes and dust away
- Dispose of paint and solvents properly.



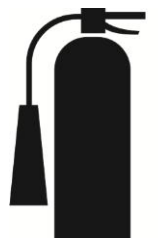
Avoid Heating near Pressurized Lines

- Avoid torching, welding, and soldering near pressurized hydraulic lines. Pressurized lines may accidentally burst when heat goes beyond the immediate flame area.



Handle Fuel Safely– Avoid Fires

- Always turn engine off and allow it to cool before re-fueling.
- NEVER smoke while re-fueling.
- Do not fill tank completely, fuel may expand and run over.
- Always clean up spilled fuel with soapy water.
- Keep a fire extinguisher close when re-fueling.



Operate Safely

- Before moving sprayer, make sure there are no obstacles or persons in the path of travel.
- Never operate a machine in the same field as walking personnel.
- Always drive at a reasonable field speed.
- Never operate sprayer on roadway with any solution in the tank. Additional weight caused from partially full or full solution tanks may cause erratic or increased stopping distance.
- Never operate the sprayer at transport speeds with a full tank. The wheel motors and planetary gear hubs are not rated to withstand high speeds under full loads and may over heat or blow out.
- Make sure SMV and SIS emblem is in place and visible from rear when traveling on public roadways.
- Pull over to the side of the road before stopping.
- Always come to a complete stop before reversing directions.
- Keep a fire extinguisher close at all times.
- Keep ALL shields in place.
- Keep clear of all moving parts and keep others away when operating.
- Do not wear loose fitting clothing that may be blown or drawn into moving parts.
- Do not activate parking brake while machine is in motion.
- Stop slowly to avoid “nose diving”.
- Reduce speed for icy, wet, graveled or soft roadway surfaces.
- Use flashers/hazard warning lights, day or night, unless prohibited by law.
- Keep away from overhead power lines. Serious injury or death to you or others may result should the machine contact electrical wires.
- Never fold/unfold boom extension when main boom is in cradle.
- Never operate sprayer with one boom out of cradle and the other boom in cradle.
- Do not adjust factory engine RPM settings.
- Operate engine at two pumps to assure proper charge pressure for brakes to work properly.
- Never use starting fluid to assist engine start up.
- If equipped with ground speed sensing radar or light sensing depth units, do NOT look directly into radar beam. It emits a very low intensity microwave signal which may cause possible eye damage.



Be Prepared

- Be prepared for an emergency. Keep a fire extinguisher handy, a first aid kit and clean water in the cab.
- Make sure to service the fire extinguisher regularly. Keep an accurate inventory of supplies in the first aid kit and dispose of anything that has expired.



Wear Protective Clothing

- Do not wear loose fitting clothes that could get caught in moving parts. Wear safety equipment that is appropriate for the job.
- Do not store chemical soaked clothes in the cab. Clean off as much mud and dirt from your shoes as you can before entering the cab.



Protect Against Noise

- Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the machine.
- Prolonged exposure to loud noise could cause loss of hearing. Wear suitable hearing protection.



Battery Acid Accident Prevention

Avoid serious injury by avoiding battery acid contact with your body. Battery electrolyte contains sulfuric acid that is strong enough to eat holes in clothing and cause blindness if splashed into eyes.

Make sure to:

- Fill batteries in a well-ventilated area.
- Wear Personal Protective Equipment when servicing a battery.
- Avoid breathing in the fumes when recharging with electrolyte.
- Avoid spilling or dripping electrolyte.
- When charging a battery, connect positive cable to positive terminal and negative cable to negative terminal. Failure to do so may result in an explosion and cause injury

If you spill on yourself:

- Immediately begin flushing affected area with cold water while removing any contaminated clothing and shoes. Continue to flush the area for a minimum of 15 minutes.
- Call a physician.
- While transporting or waiting for medical attention, apply compresses of iced water or immerse affected area in iced water. Do not allow tissue to freeze.
- Do not apply creams or ointments until you have been seen by a physician.



If acid is swallowed:

- Do not induce vomiting.
- Drink large amounts of water.
- Get medical attention immediately!
- Do not neutralize the acid.



If fumes are inhaled:

- Move the person into fresh air.
- Do not give artificial respiration to a person that is able to breathe on their own.
- Give CPR only if there is no breathing AND no pulse.
- Seek medical attention IMMEDIATELY!

Handle Agricultural Chemicals Safely

Agricultural chemicals used in applications can be harmful to your health and the environment if not used carefully.

- Always follow the manufacturer's label directions for use.
- Never allow chemicals to come in contact with your skin or eyes.
- NEVER pour chemicals into an empty tank, fill tank half full of water first.
- Dispose of empty chemical containers properly.
- Wash spilled chemicals or spray residue from the sprayer to prevent corrosion and deterioration.

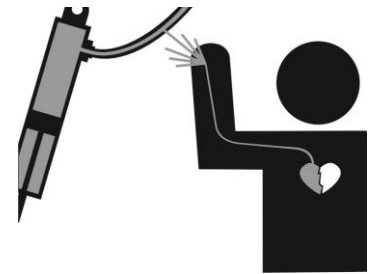


- Select safe areas to fill, flush, calibrate, and clean sprayer where chemicals will not run off to contaminate people, animals, vegetation, or water supply.
- Never place a spray nozzle to your lips in an attempt to unclog it.
- Do not spray when wind is in excess of chemical manufacturer's recommendation.
- Store chemicals in their original containers with the label intact.
- Store chemicals in a separate, locked building.
- Wear protective equipment as recommended by chemical manufacturer.



Safe Hydraulic Maintenance

- Always practice personal safety when performing service or maintenance on the hydraulic system.
- Use caution when working with hydraulic fluid under pressure. Escaping fluid can have sufficient force to penetrate your skin causing serious injury. This fluid may also be hot enough to burn.
- Always lower the load or relieve the pressure before repairing a hydraulic oil leak.



Beware of Exhaust Fumes

- Never run the machine in a closed building. Proper ventilation is required. Use an exhaust pipe extension to remove fumes if you must operate in a building. Also open doors and windows to bring in enough outside air into the area.



General Maintenance Safety

- Turn off engine before checking, adjusting, repairing, lubricating, or cleaning any part of the sprayer.
- When servicing the radiator, let the engine cool before removing pressurized cap.
- Disconnect battery ground cable and turn main battery switch off before servicing electrical system or welding on machine.
- Each Hagie machine outfitted with AWS has position sensing internal to the steering cylinders. Please disconnect each sensor before welding on the machine. Then re-connect when done welding.



Operating Optional Components

Tread Width

- Select a tread setting to fit between crop rows.

Sprayer Booms

- Cradle booms when leaving sprayer unattended.
- Make sure booms are folded when cradled.
- Select a safe area before folding/unfolding booms.
- Clear area of personnel.
- Check for overhead obstructions.
- Do not fold or unfold booms near power lines. Contact with power lines can result in serious injury or death.
- Do not fold/unfold boom extensions when main boom is in the cradle.
- Do not operate sprayer with one boom out of cradle and other boom in cradle.



DECALS

WARNING DECALS

Decals warning you of avoidable danger are located on various parts of the sprayer. They are there for your personal safety and protection. DO NOT remove them. They will fracture upon attempted removal and therefore must be replaced.

Following are locations of important safety decals. Replace them if they are torn or missing. All warning decals and other instructional Hagie decals or machine striping may be purchased through Hagie Customer Support Department. To replace decals, be sure the installation area is clean and dry; decide on exact position before you remove the backing paper.



Safety Decal Locations

650107

Rear of frame, around the booster terminals



650118

On engine compartment in front of air cleaner.



650164

Left hand, rear cab post



650165

Right hand, rear cab post



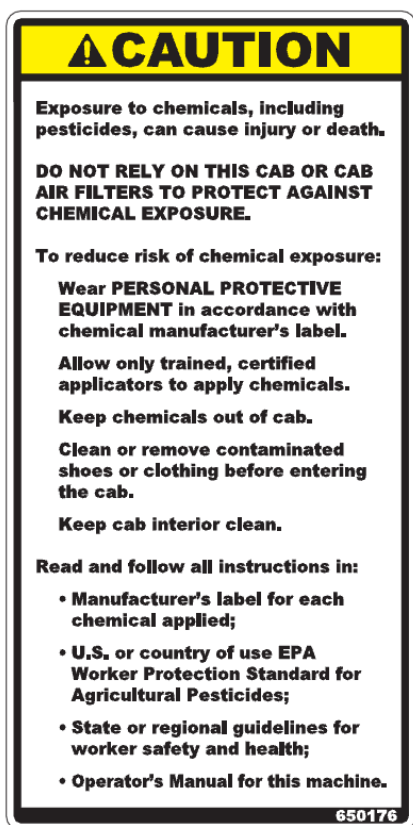
650174

In engine compartment, on top of the radiator



650176

On cab door, near handle



650178

Engine, on the radiator



650339

Front cross member: left hand side

Hydraulic Reservoir: left side of the sight gauge



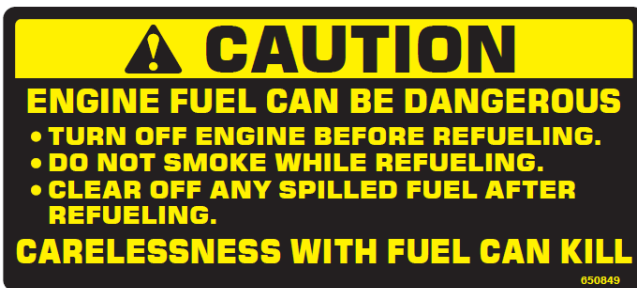
650848

On ladder pivot tube



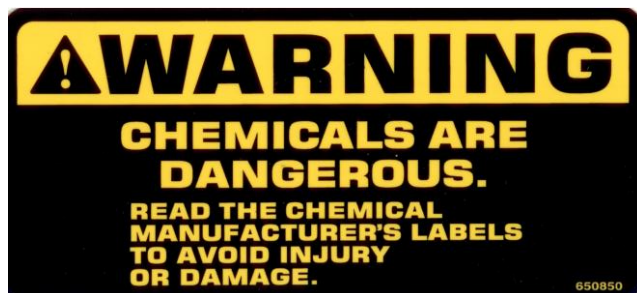
650849

Left side panel, near fuel cap



650850

Front fill-on solution tank near fill lid



650851

Left side panel, near rear compartments



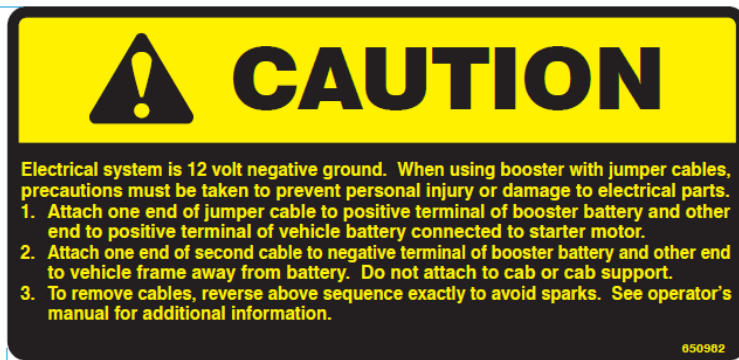
650981

In engine compartment, near radiator cap



650982

Rear of frame, around the booster terminals



IDENTIFICATION

Each Hagie sprayer is identified by means of a frame serial number. This serial number denotes the model, year in which it was built, and the number of the sprayer. For further identification, the engine has a serial number, the hydrostatic pumps have serial numbers, and the planetary hubs have identification plates that describe the type of mount and gear ratio.

To ensure prompt, efficient service when ordering parts or requesting service repairs from Hagie Manufacturing Company, record the serial numbers and identification numbers in the spaces provided below.

NOTICE

Reference to right hand and left hand used throughout this manual refers to the position when seated in the operator's seat facing forward.

Sprayer

The sprayer serial number is stamped on the left side of the frame underneath the platform.



Engine

The diesel engine serial number is located on the engine block valve cover.



Wheel Hubs

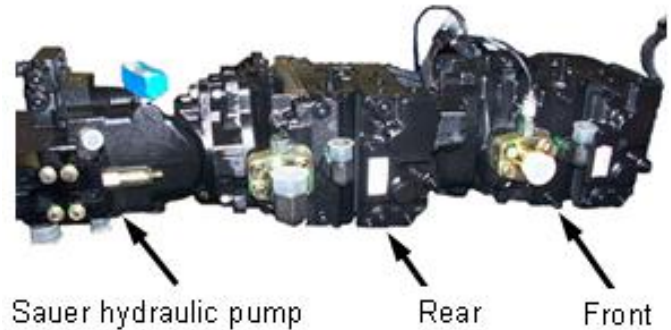
Each wheel hub has an identification plate attached to the front of it. The plate also contains information regarding gear ratio.



- _____ Right Front
- _____ Right Rear
- _____ Left Front
- _____ Left Rear

Hydrostatic Pumps

The engine has one hydrostatic pump in front of the engine block. Refer to the Hagie Parts Manual for Hagie part number.



- _____ Front
- _____ Rear

Wheel Motors

The wheel motors each have an identification plate permanently attached to it. The identification plate contains the serial number and other manufacturer information. Refer to Hagie Parts Manual for Hagie part number.



- _____ Right Front
- _____ Right Rear
- _____ Left Front
- _____ Left Rear

SPECIFICATIONS

<i>Item</i>	<i>Specification</i>
Engine	
Manufacturer	Cummins
Model	QSB6.7-220
Type	Electronic with air to air cooler and turbo charger
Number of Cylinders	6
Displacement	6.7 liters (360 c.i.)
Horse Power	215 hp (205 KW)/ power bulge to 225hp (optional 275hp)
Type of Fuel	Number 1 or Number 2 Diesel
Fuel System	Filtered, Direct-Injected
Air Cleaner	Dry-Type, Dual Element
Engine Air Filter Restriction Monitors	Filter Minder®
Slow Idle	850 RPM
Fast Idle (no load)	2500 RPM (no load)
Hydrostatic Drive	
Hydrostatic Pump	Sauer-Danfoss Tandem 90 series
Displacement	150 cc (75x2) with electronic displacement control
Drive Train	All-wheel four wheel drive
Speed Ranges	2
Hydrostatic Wheel Motors	Sauer-Danfoss (90 Series)
Final Drives	Planetary Gear Reduction Hubs
• Front	Torque Hub® (22:1)
• Rear	Torque Hub® (27:1) w/ brake
• Lubrication	Oil Bath
Brakes (Parking Only)	Multiple disc, spring applied, hydraulically released
Steering System	Hydraulic, dedicated circuit
• Control	Full Time Power
• Steering Cylinders	Self-centering, double action
Auxiliary Hydraulic System	
Type	Single Closed Center Pump
Pump Type	Load Sense
Spray System	
Booms	70 foot
• Type	6 ft. Drop nozzles
• Controls	Electro-hydraulic (fold, lift, level)
• Level Shock Absorber	Gas charged accumulator
Solution Fill Connection	
• Quick-fill Connection	2 in. (5.08 cm) inner diameter
Solution Tank	
• Standard	1000 gal. (3785 L) polyethylene

• Optional	1000 gal. (3785 L) stainless steel
Agitation	
• Polyethylene Tank	Eductor-type w/ electric variable speed control
• Stainless Steel Tank	Sparge-type w/ electric variable speed control
General Spray System	
• Pump	Diaphragm - semi-hydraulically driven with pulse width modulated control valve
• Solution Valves	Electric ball valves
• Pressure Gauge	100 PSI glycerin filled
• Console	Raven 4600 (GPS ready)
Rinse System	
Spray System Rinse (solution tanks, pump, and booms)	Standard
Electrical System	
<i>General Electrical System</i>	
• Battery	Dual 12V, negative ground
• Alternator	130 AMP, voltage regulated
• Starter	12V with solenoid
<i>Circuit Breakers/Fuses</i>	
1. Fuse Module 1	
• MD3 Module	3 AMP (1)
• Input power, control handle, console switch, console lights, field and work lights	5 AMP (4)
• Ignition, hazard lights, head lights switch, seat air ride, XS-A0 and A1 module power	10 AMP (4)
• Terminal strip power, HVAC control power, power point 1, wiper/washer, power point 2, XS-A2 module power, Norac (if equipped)	15 AMP (7)
• Raven console, XT2- A1 module power	20 AMP (2)
• HVAC fan-high	25 AMP (1)
2. Fuse Module 2	
• Ignition ON	5 AMP (1)
• Radio, dome light, MDM RTC, diagnostic plug, (spare)	10 AMP (4)
• Head lights-2 , terminal strip power, agitator/ rinse valves, air dryer, field lights	15 AMP (6)
• XP2-A0 module power, XT2-A0 module power, XP2-A1, A2 and A3 module power, boom valves	20 AMP (6)
3. Relay Module 1	
• Head lights-2, reverse, forward, field lights-1 and 2, console light	12V micro relays
4. Relay Module 2	
• Brake light, spare (3), ignition ON, HVAC high fan	12V micro relays

<i>Engine Electrical Box</i>	
1. Fuses	7.5 AMP (3), 10 AMP (2), 20 AMP (1), 125 AMP (2)
2. Relays	
• Start	12V/ 40 AMP (1)
• Intake heater 1 and 2	12 V micro (2)
3. Circuit Breaker	
• Main Breaker	100 AMP (1)
<i>Other Fuses and Relays</i>	
1. Flasher/Light Harness	12V flasher relay, 15 AMP fuse (4 each), 40 AMP relay (3 each)
2. Main rear harness	30 AMP fuse
3. Main Chassis	5V relay
4. Console Relay	15V/100 AMP
<i>Lights</i>	
1. Front of Cab	2 Trapezoidal head lights, 4 flood lights
2. Transom Mount	2 Trapezoidal head lights
3. Boom Cradle (forward facing)	2 Trapezoidal flood lights (1 each cradle)
4. Boom Cradle (rear facing)	2 Trapezoidal flood lights (1 each cradle), 2 Oval amber lights (1 each cradle)
5. Rear Engine Hood	2 Round red lights, 2 round amber lights
Cab and Instruments	
<i>Cab</i>	
General Cab	Tilt steering, windshield wiper/ washer, dual side mirrors, dome light, tinted glass, training seat
Temperature Control	Full range
A/C Charge Type	R-134a
Fresh Air Filtration	Paper and charcoal filter
Seat	Air ride
<i>Instruments</i>	
MP3	Hour meter, fuel, water temperature, battery voltage, engine oil pressure, ground speed, engine RPM, tread adjust assist
Stereo	AM/FM/WB with CD
Capacities	
Solution Tank	1000 gallons (3785 L)
Fuel Cell	150 gallons (512.9 L)
Cooling System (including block, lines, and radiator)	18 gallons (68 L)
Hydraulic Oil (including tank, filter, and cooler)	55 gallons (208 L)
Rinse System Tank	100 gallons (379 L)
Engine Oil (including crankcase, lines, filter, and cooler)	17 quarts (16 L)
Wheel Hubs (front and rear)	40 ounces (1.18 L)

Tires	
Standard	
<i>380/80R46</i>	Radial TU
• Air pressure	46 PSI (317.16 kPa)
• Tread Width	15.2 in. (38.61 cm)
• Load Capacity *	6600 lbs. (2993.71kg)
• Overall Diameter	71.8 in. (182.37 cm)
• Static Load Radius **	32.9 in. (83.57 cm)
• Rolling Circumference	217.0 in. (551.18 cm)

*Load capacity measured at 30 mph (48.28 km/h) unless otherwise specified

**Static load radius is suggested and will vary with load.

OPERATOR'S STATION

Front Console

- A. Hazard/warning light switch
- B. Highway lights, running light switch
- C. Steering wheel
- D. Turn signal indicator light
- E. Horn
- F. Turn signal switch
- G. Ignition switch
- H. Steering wheel tilt adjust
- I. Steering column release pedal



Hazard/Warning Lights

To activate the hazard/ warning lights (A, B, E) depress the FLASHER switch. Use the hazard/ warning lights anytime, day or night that you are traveling on a public roadway unless prohibited by law.

Highway/Running Lights

The highway/ running lights are mounted on the transom (D) and on the transom mount (C). Use these trapezoid headlamps when traveling on a public roadway at night. Turn them on using the highway/ running light switch located on the front console.

Activating the highway lights will also turn on the red running lights on the rear of the machine (F).

The ignition does not have to be on to operate these lights. Prolonged use of these lights without the engine running is not recommended.

Turn Signals

To activate the front turn signals (A) and the rear turn signals (B, E), move the turn signal lever forward, away from the operator, to signal a right turn and back, toward the operator, to signal a left turn.

Steering column mounted indicator lights will correspondingly flash when either turn signal is activated.

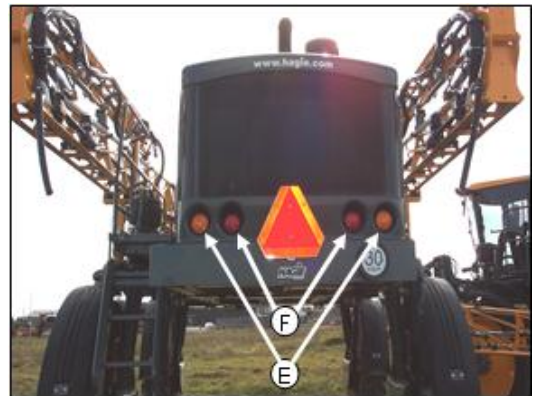
The turn signal switch is not self-centering and must be manually returned to the OFF position after completing your turn.

Ignition Switch

The ignition switch has three positions. The first position is the OFF position. The second position is referred to throughout this manual as the ON position and the last position is the START position.

Before engaging the starter, turn the key to the ON position and wait for the “wait to start” light on the message center to go off.

To engage the starter, turn the key to the START position and hold momentarily until the engine engages. If the engine does not engage after 15 seconds, turn the key to OFF. Constant cranking of the starter when an engine fails to engage will cause damage to the battery and the starting system. Refer to the section on the hydrostatic drive for more information.



Horn

The horn is a push button located on the front console below the turn signal indicator lights.



Tilt Adjust Handle

The steering wheel tilt adjust handle is for the movement of the upper portion of the steering column only. The steering wheel has infinite position possibilities.

To use the adjustment handle, turn it down (toward the operator) to loosen it. You do not need to remove the handle all the way, simply loosen it enough to freely move the steering wheel.

With the handle loosened, push or pull on the steering wheel until it is in a comfortable position. Hold the steering wheel in that position while tightening the adjustment handle. To tighten the handle, turn it upward (away from the operator).



Steering Column Release Pedal

The steering column release pedal is for easy exit/ entry of the cab. Push the pedal to release the locking gas spring. With the spring released, you can smoothly move the entire steering column forward or rearward.

To lock the column in place, simply remove your foot from the pedal while holding the column in place. Once the gas spring has been locked again, check the column by firmly trying to move the column in either direction.

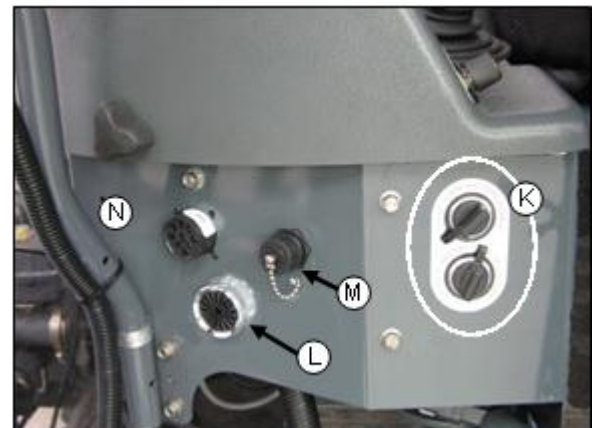
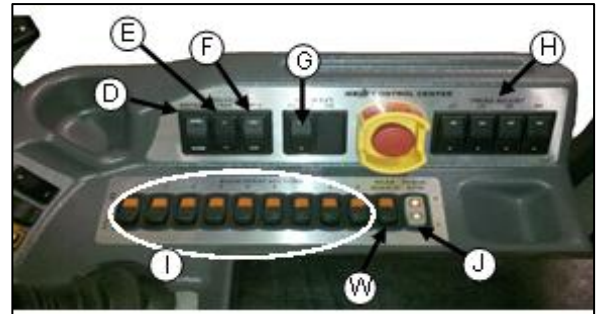


NOTICE

Be sure that the steering wheel and column are locked into place before trying to move the machine. Failure to do so will make it difficult to maintain control of the machine.

Side Console

- A. Speed control
- B. Throttle switch
- C. Brake/ ladder switch
- D. Agitation switch
- E. Solution tank switch
- F. Rinse tank switch
- G. Boom extension switch
- H. Tread adjust switches
- I. Boom spray section switches
- J. Fence row nozzle switch
- K. Power ports
- L. Warning buzzer
- M. Hagie diagnostic port
- N. Engine diagnostic port
- O. Hydrostatic lever
- Q. Hydraulic lift
- R. Left boom (level, horizontal extension)
- S. Right boom (level, horizontal extension)
- T. Master spray switch ON
- U. Speed range switches
- V. Solution pump Switch
- W. Rear Nozzle Switch



Hydrostatic Lever

The hydrostatic lever is used to control the direction of motion of the machine and the speed at which it travels. It is a part of the ACE hydrostatic system or the Automatically Controlled Engine hydrostatic drive. To learn more about the ACE system, refer to the section on the hydrostatic drive system.

The lever also houses controls for the spray system and foam marking system. For more information on these controls, refer to the section on the spray system.



Speed Control

Another feature of the hydrostatic drive system is the speed control. This feature will help the operator to regain consistent field speeds when re-entering a field from the end rows.

The speed control will maintain its setting until you reset it. It does not have to be re-set each time you turn off the machine.

For more information on how to use the speed control feature, refer to the section on the hydrostatic drive system.



Throttle Switch

The throttle switch (A) is used to control engine speed. The engine speed for field state is between 850 and 2500 RPM. The engine speed for road state is between 850 and 2100 PRM. The switch works with a timer to tell the engine how fast to turn. The longer the operator holds the switch in either direction, the more the engine will speed up or slows down (Note that this is not the only way the engine receives this information; refer to the section on ACE).

The buttons on the side of the hydrostatic lever (B) are to control the speed ranges within the RPM setting. For more information on the throttle controls, refer to the section on the hydrostatic drive system.



Parking Brake

The parking brake switch is located next to the throttle switch on the side console. The switch also controls the ladder. The brake switch must be on to lower the ladder and to operate the side fill or pressure washer (if equipped).

The parking brake is not intended for normal or emergency stopping and will not engage if the machine is traveling over 1 mile per hour. Activating the brake while the machine is still moving is hazardous to the operator and the sprayer. Bring the sprayer to a complete stop with the hydrostatic lever in the neutral position before applying the parking brake.



Solution Pump Switch

The solution pump switch is used to turn on/off the solution pump. This is the ONLY way to turn on/off the solution pump. By leaving the switch in the ON position, the pump will continue to run which could cause damage to the solution pump. Refer to the Spray System Section for more information on the solution pump.



Forward, Neutral, Reverse

The hydrostatic lever is used to determine the direction of motion of the machine. To move the machine forward, pull the lever slightly to the right and push forward. The farther you push, the faster the speed of the machine.

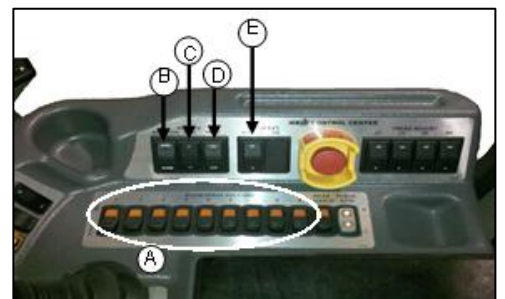
To stop the machine, or put the machine in neutral, slowly pull the lever back to the center position and move it slightly to the left. The neutral position must be met before changing direction of the machine. The machine must also be in neutral before several functions can be performed.

To move the machine in reverse, move the lever to the far right and slowly pull back. The farther back the lever is pulled, the faster the machine's speed.



Boom Solution Valve Switch

The solution valve switches (A) each control a valve located on the transom or the booms. The valves control the flow of solution through the boom. The boom is divided into 5 sections (3 on a 60 ft. boom), the far left tip being the beginning of the first section. More information is available in the spray systems section.



Agitation Switch

The agitation switch (B) controls the rate of flow through the sparge system. For more information on the agitation system, refer to the section on the spray system.

Tank Switch

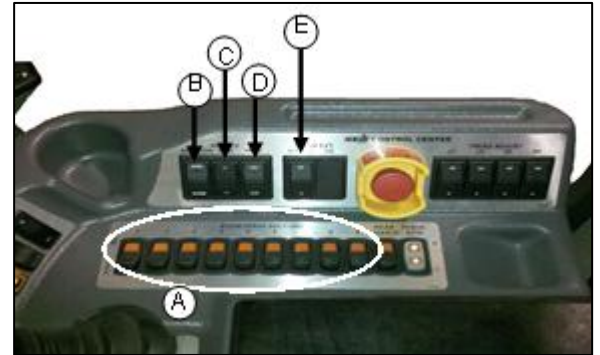
The tank switch (C) controls the solution tank valve. This switch must be in the ON position to spray. For more information on the tank switch, refer to the section on the spray system.

Rinse Switch

The rinse switch (D) is used when you wish to rinse the solution tank or the booms. For more information on how to use the rinse system, refer to the section on the rinse system.

Boom Extension Switch

The boom extension switches (E) are used when vertically extending or retracting the booms. Refer to the section on the spray booms for more information.



Warning: When operating or positioning the booms observe the following safety items to avoid serious injury or death.

- Select a safe area before folding/unfolding booms.
- Clear area of personnel.
- Check for overhead obstructions.
- Do not fold or unfold booms near power lines. Contact with power lines can result in serious injury or death.



Caution: When operating or positioning the booms observe the following safety items to avoid injury or equipment damage.

- Do not fold/unfold boom extensions when main boom is in the cradle.
- Do not operate sprayer with one boom out of cradle and other boom in cradle.
- Do not transport machine without booms folded and in cradle.

Tread Adjust Switch

The tread adjust switches (A) are used to hydraulically adjust the tread width. These switches will not do anything if the machine is not equipped with hydraulic tread adjust. For more information on hydraulic tread adjustment, refer to the sections regarding tread adjust.



Fence Row Switch

The fence row switch (B) is for the selection of right or left fence row spray nozzle. More information on fence row spraying can be found in the section on the spray system.

Emergency Stop (E-Stop)

The emergency stop is located on the side console. DO NOT use this button for non-emergency stopping or as a parking brake.

The emergency stop switch provides a quick and positive method for stopping the engine in an emergency situation. When the button is depressed, it locks in position and removes the ignition switch to shut down the engine. To reset the switch, turn the button in the direction of the arrows on the face of the button.

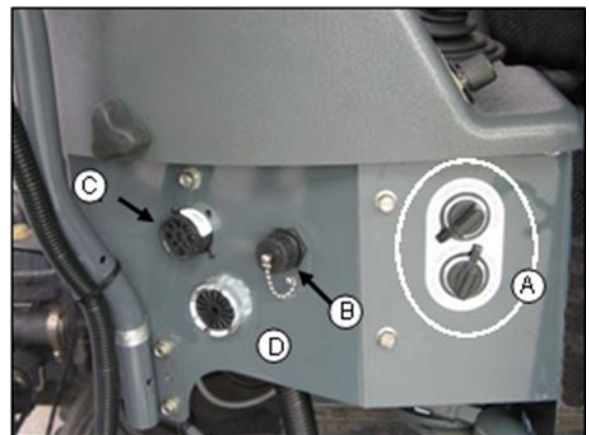


Power Ports

On the front side of the console, there are two power ports (A) for extra equipment to be plugged in. They are each protected by a 15 amp fuse. They are not intended for the permanent connection of extra systems to the sprayer. There is a terminal strip, inside the console, intended for the installation of extra radios and computer equipment. See your parts manual for electrical diagrams.

Hagie Diagnostic Port

The Hagie diagnostic port (B) is located on the front rear panel of the side console. This port is for the use of a laptop to diagnose machine program errors and machine reprogramming. This port is to be used by Hagie service technicians only. DO NOT use this port to connect personal digital assistants (PDA's) or other personal electronic equipment.



Engine Diagnostic Port

Much like the Hagie diagnostic port, the engine diagnostic port (C) is used to connect directly into the engine by Hagie service technicians or Cummins service technicians. DO NOT attempt to plug into this port with personal electronic equipment.

Warning Buzzer

The warning buzzer (D) located on the front rear panel of the side console alerts the operator when there is an immediate need of attention for one of the machine's systems.

Foam Marker Switch

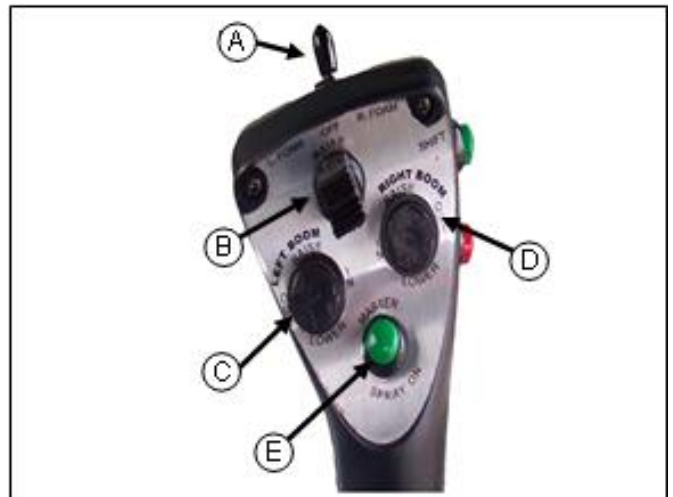
The foam marker switch (A) located on the top of the hydrostatic lever controls the foam option on both sides of the machine. See the section regarding the foam marking system for more information.

Main Solution Switch

The main spray control (E) in the lower middle of the hydrostatic lever makes it so that the operator can turn all spray valves off at the same time. See the spray systems section for more information.

Lift, Level, Horizontal Extension

The lift (B), level (C, D) and horizontal extension (C, D) are all hydraulic boom functions. A complete explanation of their operations can be found in the spray system section.



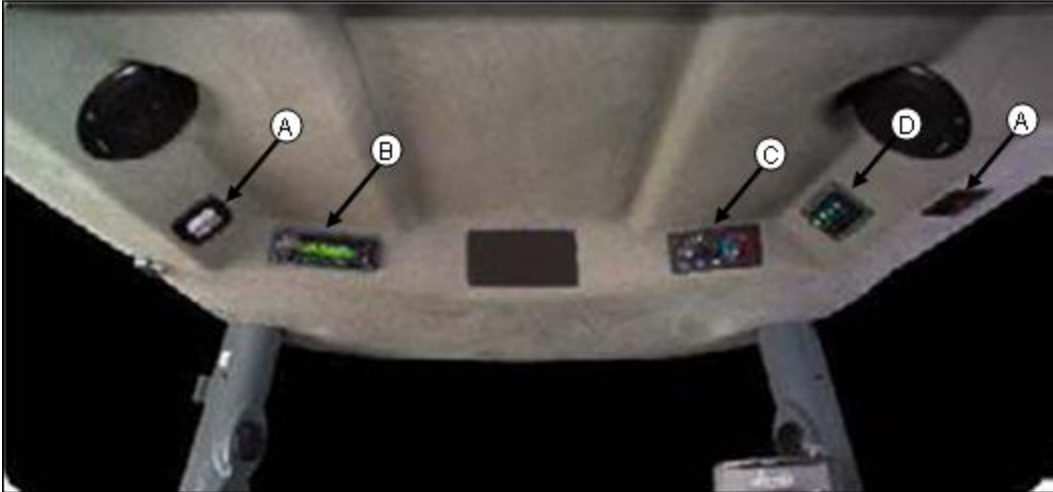
Warning: When operating or positioning the booms observe the following safety items.

- Select a safe area before folding/unfolding booms.
- Clear area of personnel.
- Check for overhead obstructions.
- Do not fold or unfold booms near power lines. Contact with power lines can result in serious injury or death.



Caution: When operating or positioning the booms observe the following safety items to avoid injury or equipment damage.

- Do not fold/unfold boom extensions when main boom is in the cradle.
- Do not operate sprayer with one boom out of cradle and other boom in cradle.
- Do not transport machine without booms folded and in cradle.



Overhead Monitors and Controls

- A. Courtesy light/ interior work light
- B. Stereo
- C. Climate controls
- D. Wiper and lights switch panel
- E. Raven console
- F. MD3
- G. Boom Solution Valve L.E.D. Indicator



Courtesy Light/Interior Work Light

The courtesy light comes on when the cab door is opened. The interior work light can be turned on manually by pushing on the right (front) or left (rear) edges of the lens.



Stereo

The cab has an AM/FM/tuner with a CD player and Weather Band broadcasting. Refer to the stereo manufacturer's manual for operating and programming information.



Warning Indicator Message

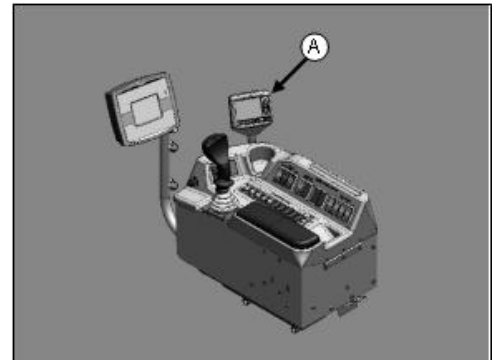
The warning indicator message (A) will come on if there are any malfunctions or faults in the systems monitored by the MD3. These warnings include, but are not limited to: engine oil pressure, oil level, hydraulic oil level, coolant temperature, battery voltage, and fuel level. An explanation of the fault will appear on the screen. If a fault appears, shut the engine off immediately and resolve the fault before continuing. Failure to shut the engine off may result in damage to the system with the detected fault.



MD3

The MD3 (A) is the machine's control center. The MD3 takes the place of the conventional gauges. The MD3 can give you information on tread width, engine RPM, engine oil pressure, hour meter, fuel level, coolant temperature, tire size, battery voltage, speed range, and machine program version. The information can be viewed by using the different function keys to move through it. The MD3 will also display any faults found in the monitored systems.

Refer to the section on the MD3 for more information. Call Hagie Manufacturing Customer Service if you are unable to navigate the MD3 successfully.



Spray System Indicator Light

The spray system indicator light (C) will illuminate when the main spray control on the hydrostatic lever has been activated. If the light is not on, the spray system is not on.



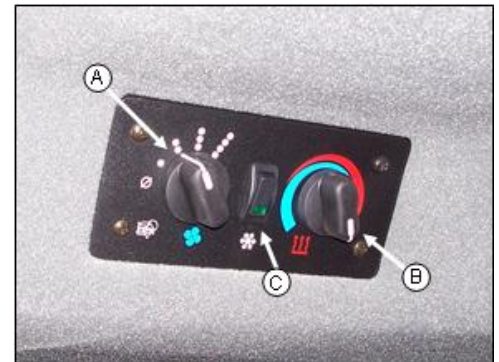
Climate Controls

The climate controls are continuous adjusting dial switches located on the front upper cab headliner.

Adjusting the Fan Blower Speed-fan blower speed is controlled by the left rotary dial (A). To increase the fan speed, rotate the dial clockwise. To reduce the fan speed, rotate the dial counterclockwise. To shut off, rotate the dial all the way counterclockwise.

Adjusting Temperature Setting-forced air temperature adjustments are controlled by the right rotary dial (B). Temperature control is a continuously variable adjustment. To increase the forced air temperature, rotate the dial clockwise. To decrease the forced air temperature, rotate the dial counterclockwise.

Operating the Air Conditioning- to activate the air conditioner, press the air conditioning switch (C). Adjust the fan speed and temperature accordingly. See the service section for more information.



Vents

There are six adjustable vents (D), three on each front cab corner post. They may be adjusted by rotating them for desired direction, or individually turned on or off with the directional fins.

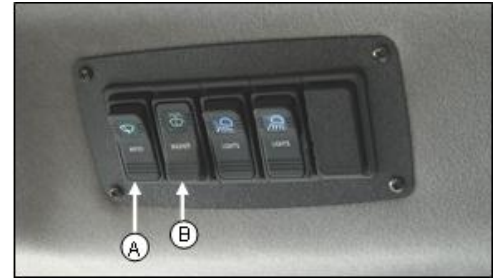


Windshield Wiper and Washer Fluid Switches

The windshield wiper switch (A) located on the right side of the cab headliner operates the windshield wiper (E). The wiper will continue to operate until the switch is returned to the OFF position. Replace the 39 inch wiper blade as necessary.

To activate the washer fluid pump, press the washer fluid switch (B) and hold until the desired amount of fluid is dispensed and then release the switch. You must turn the wiper OFF when the fluid has been completely wiped away. The washer fluid reservoir is located behind the cab (C).

The fluid spray nozzle (D) is adjustable. The fluid spray pattern should be checked at the beginning of each season and adjusted as necessary.



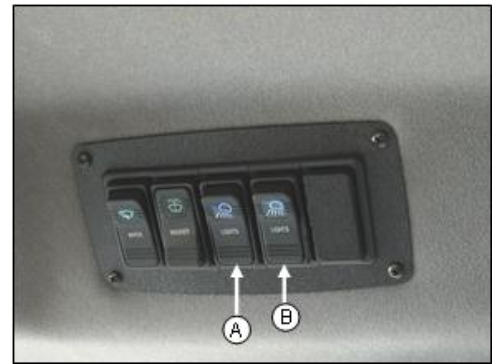
Field Lights and Work Lights

The field lights (C), located on the front of the cab with the headlights, are activated by pushing the switch located on the upper right cab headliner (A).

Use these lights when operating in the field after dark. Turn them off before entering a public roadway.

The work lights (D), located on each boom cradle, one facing forward and one facing rearward, are activated by pressing the other switch (B) located on the upper right cab headliner. These lights can also be used when operating in the field after dark. Turn them off before entering a public roadway.

The ignition key has to be on to operate these sets of lights, but extended use without the engine operating to charge the battery is not recommended.



Boom Solution Valve L.E.D. Indicators

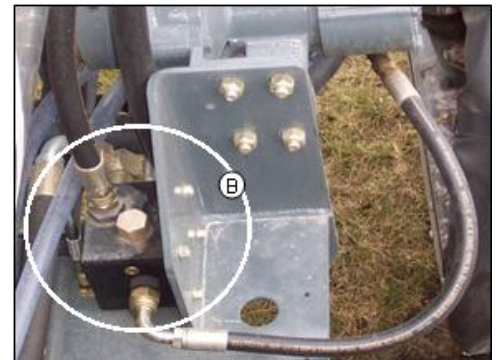
The boom solution valve status is displayed in the cab by a series of L.E.D. indicators. Each indicator will illuminate if that particular boom solution valve is turned OFF. See the Spray System Section for more information.



Raven Spray Control Console

The spray system is controlled by the Raven SCS 4600 (A) and the Pulse Width Modulated Control Valve (B). The system receives data and automatically makes adjustments based on the target rate of application set by the operator.

For detailed information regarding the programming and operating of the Raven console system, please refer to the manufacturer's installation and operation manual.



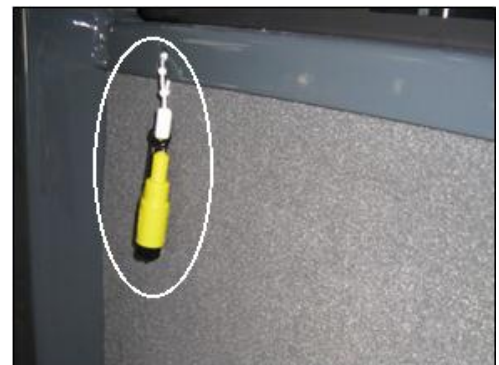
Other Features and Controls

- A. Emergency exit tool (Res-Q-Me tool)
- B. Cab glass
- C. Rear-viewing mirrors
- D. Fresh air filters
- E. Buddy seat
- F. Air ride seat
- G. Optional seat

A. Emergency Exit (Res-Q-Me Tool)

The Res-Q-Me tool is located on the right rear cab frame. The tool is used to shatter the glass of the cab in the event of an emergency and the cab door is unable to be opened.

The tool, when firmly pressed against any glass in the cab, will automatically trigger, shattering the glass. Do not look directly at the glass when you use the tool.



B. Cab Glass

The glass of the cab (A) is DOT approved tempered glass. The front windshield is rounded with a green UV reflective tint and the side and rear glass panels are flat with a UV reflective gray tint.

The design of the cab and the use of the glass allows a 210° view, tip to tip of the booms from the operator's seat.



C. Rear Viewing Mirrors

The cab is equipped with two external rear viewing mirrors (B).

D. Fresh Air Filters

Inside the cab are two filters, a charcoal filter and a paper filter. Refer to the Service section on the filters for maintenance information. Refer to the Hagie Parts Manual for replacement part information.



E. Buddy Seat

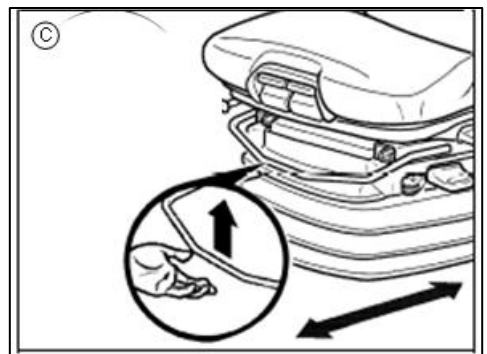
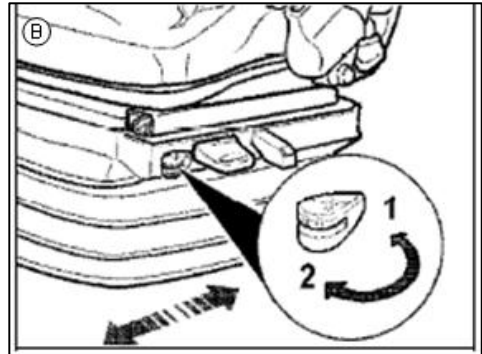
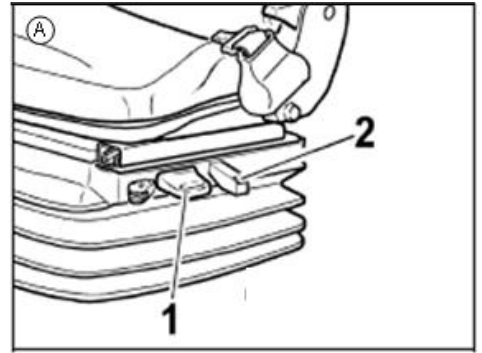
The buddy seat (1) was designed as an instructional tool. It is specifically designed for a “co-pilot” to be seated in a good position to be taught how to use the sprayer.

The buddy seat has a hinged seat that lifts to reveal a storage compartment. Do not use the compartment to store chemical soaked clothing or gloves.



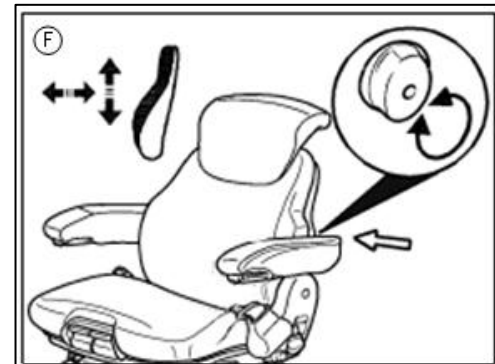
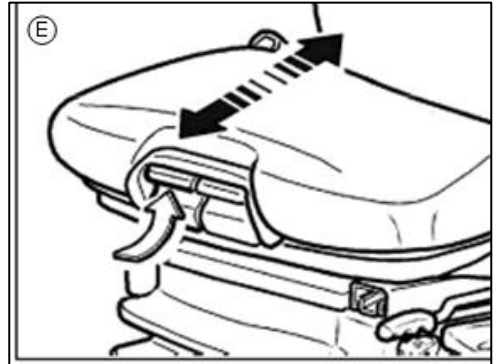
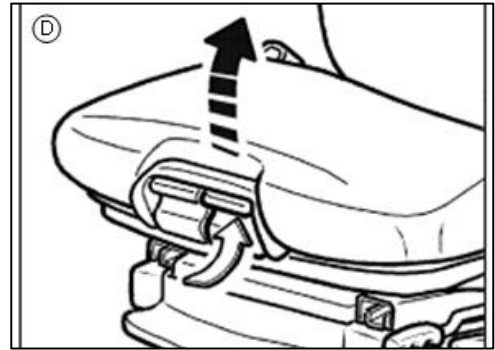
F. Air Ride Seat

- A. *Height and Weight Adjustment*– Push or pull the actuator lever (A-1) until the green marking is visible in the indicator (A-2).
- B. *Fore/Aft Isolator*– Adjust the lever to lock or unlock the seat’s lateral movement. Position 1 is locked and Position 2 is unlocked. After an adjustment from Position 2, the seat must be pushed back until there is an audible click. Once the seat is locked, it should not be possible to move it to another position.
- C. *Fore/Aft Adjustment*- Lift lever to allow adjustment.



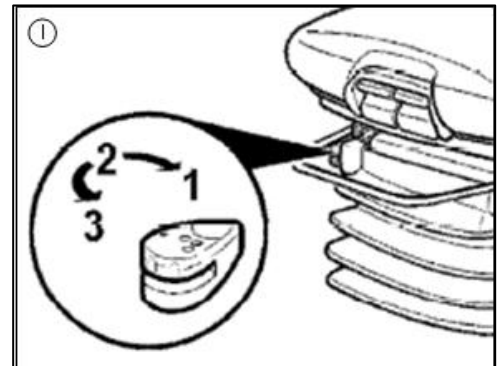
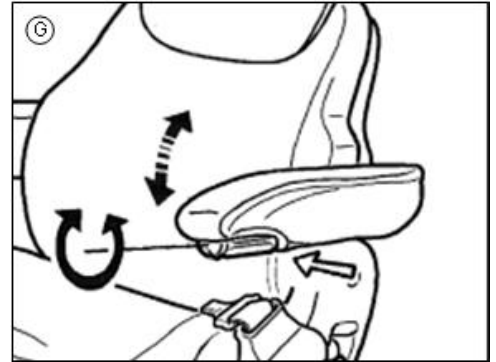
Air Ride Seat (continued)

- D. *Seat Pan Angle Adjustment*– Lift the left hand handle and exert pressure on or off the seat pan to adjust to the desired angle.
- E. *Seat Depth Adjustment*– Lift the right hand handle and move the seat cushion forwards or backwards to the desired position.
- F. *Lumbar Support Adjustment*– Turn the adjustment knob to adjust both the height and curvature of the backrest cushion.



Air Ride Seat (continued)

- G. *Armrest Tilt Adjustment*– Turn the adjustment knob to the outside to raise the front of the armrest and to the inside to lower the front of the armrest.
- H. *Backrest Adjustment*– Lift the lever to release the lever. Apply or release pressure to allow the backrest to move to the desired position.
- I. *Absorber Adjustment*– Turn the lever to the desired position of shock absorbance. Position 1 is soft, position 2 is medium, and position 3 is hard.
- J. *Operator Presence Switch (OPS)* - Internally located, the electrical interlock ensures that attachment functions stop when the operator is not seated.



MD3 OPERATING INSTRUCTIONS

The MD3 is the control center of the machine. It helps to control approximately 90% of the machine's electronically driven products which in turn help to influence how the machine drives, how the All Wheel Steer operates, how the attachments operate, how the tread adjust operates, how the spray sections and the lights work, and how all of the diagnostics given to the operator work.

There are nine buttons that line the bottom and right hand side of the screen. For the purpose of customer service, the buttons have been assigned names, please be sure to use these names when speaking with a technician to help them understand what may be happening with the machine.

Button names:

- A. *F1*– far left side of the screen
- B. *F2*– second button from the left
- C. *F3*– third button from the left
- D. *F4*– fourth button from the left
- E. *Cancel/Home*– the fifth button from the left. The button has a left pointing arrow symbol on it.
- F. *Menu*– the far right corner. The button has three lines across its face.
- G. *Up Arrow*– top button on the right side. Has an upward pointing arrow on its face.
- H. *OK*– the second button down on the right side.
- I. *Down Arrow*– the third button down on the right side. The button has a downward pointing arrow on its face.



MD3 Pages

The MD3 currently has three display pages, Home page (A) and Machine Hours page (B), and the Misc. Page (C). This is how these pages will be referred to throughout the rest of these instructions. The Home page should come up every time the machine is started.

The Up and Down Arrow buttons are the toggle buttons that will navigate through the pages. Push the Up Arrow button to go to the next page and the Down Arrow button to go to the previous page. Continuing to press the button will get you back to the page that you started from.



Toggling Between Menu Screens

To navigate from the Home Page to the Main Menu (A), press the Menu button (B) in the lower right hand corner of the display face.

Use the Cancel/Home button (C) to go back one page at a time while in the Adjust, Measure, Preferences, and Info menus.

Use the “F” buttons (D) to select the group or menu from the Main Menu page. Also use them while in the menu for prompted requests.

Use the Cancel/Home button to go back to the Home Page from the Main Menu.



Adjusting the Display Lighting

To adjust the lighting of the display:

1. Press the Menu button (B). The Main Menu will appear.
2. Press the F3 button (C) under “Preferences”
3. Press the F1 button under “Display”
4. Press the F2 button under “Backlight” to change the lighting or press the F3 button under “Screen Saver” to adjust the time that the screen is lit to its full intensity.
5. Toggle with the Up and Down arrow buttons (D) to desired level and then press the OK button (E) to accept the change.



Software Version

To view the software version in the MD3, press the Menu button (A) in the lower right hand corner of the display face. Enter the Info menu by pressing the F4 button (B) and the software version should be displayed at the top of the screen.



Changing the Tire Size Value

It may be necessary to change the tire size value. Remember that for an accurate spray job, the speed of the machine must be accurate. If the tires are replaced with a different sized tire, this value must be changed.

1. Press the Menu button.
2. Press the F1 (A) button (Adjust).
3. Select "Operator Adjustments".
4. Toggle down to "Tire Size Selector" (B) using the DOWN arrow (C)
5. Press the OK button (D).
6. Toggle to the desired tire size.
7. Press the OK button.



Changing the Unit of Measure

To change the unit of measure:

1. Press the Menu button (A) to get to the Main Menu.
2. Press the F1 button (B) under Adjust.
3. Use the Up and Down arrows (C) to toggle to display adjustments and select OK (D)
4. Toggle to UNITS ADJ parameter and select OK.
5. Toggle to a value of 1 for Standard Units or to a value of 2 for Metric Units and press OK.



Home Page

The Home Page has many features and functions. On this page is the analog tachometer, temperature gauge, fuel gauge, digital gear reading, digital speed reading, time, different warnings, and different operating system statuses. Continue reading this section for more information. Do not hesitate to call Hagie Manufacturing Company with any questions.



Clock

The clock is located in the upper left corner of the display screen (A).

The clock is set to standard time. If this time zone is not correct, the time can be changed.

To change the date or time:

1. Press the Menu button (B).
2. Press the F3 button (Preferences)
3. Press the F2 button (Date/Time)
4. Press the F1 button for adjusting the Date or F2 for adjusting the Time.
5. Use the Up Arrow or Down Arrow to adjust the Date or Time to the desired value and then press the OK button to accept the changes.



Warning Light Indicator

There is a red light that will illuminate to the right of the clock (A) when there is an error that needs attention. The light will be accompanied with a message (B) telling what the error is and what should be done to correct it. The message can be cleared by pressing the F2 button below OK, but the light will remain illuminated until the error has been corrected.



Refer to Operator's Manual

A blue manual icon (A) will appear to the right of the page title when an error has occurred (such as a service interval has been reached) that requires the operator to refer to the manual for more information. A warning will accompany the icon also stating that the operator needs to refer to the manual for more information.



Main Spray Indicator

A green indicator light (A) will illuminate directly above the tachometer indicating that the main solution control switch on the hydrostatic lever has been activated. Read more about this indicator in the Spray Systems section of this manual.



Tachometer

There is an analog and digital tachometer display in the left middle of the Home Page. The tachometer displays the engine's revolutions per minute (RPMs).



Temperature Gauge

The temperature gauge (A) is an analog gauge located next to the tachometer in the center of the display page.

The gauge indicates the temperature of the engine. If the engine temperature gets to an intolerant level, a warning light directly above the gauge will illuminate (B).

If the temperature rises still after the initial warning, a second warning (C) will appear shortly before the machine begins to go into a protective mode. If this warning appears, immediately reduce the engine speed to help prevent engine damage. Shut the machine down as soon as possible and troubleshoot the issue. Contact Hagie Customer Service if you are unable to resolve the issue.

When this warning appears, the machine may be severely limited in engine and hydraulic functions to prevent damage to those systems. The warning will disappear and the buzzer will go off by pressing F2 to clear, but it does not correct the problem. The red warning light at the top (D) will continue to flash until the fault is resolved.



Fuel Gauge

The fuel gauge is a bar gauge indicating the amount of fuel in the tank. Below the bar reading is a digital reading that indicates the number of gallons (liters) in the tank.

When the fuel level in the tank reaches a minimum level, a warning light will appear directly above the gauge. The light will not disappear until the fuel level is above the minimum level.



Gear Display

The gear (speed range) that the machine is traveling in is digitally displayed in the far right hand center section of the display screen.

The gears are the same in both road and field state with road state having an extra gear that is not achievable while in field state.



Speedometer

The speed in which the machine is traveling is digitally displayed directly below the gear reading on the right hand side of the Home Page.

The unit of measure can be changed from miles per hour (MPH) to kilometers per hour (K/h). The unit of measure is displayed to the right of the word "SPEED".



Drive State (F1)

The drive state of the machine is displayed at the bottom far left corner of the screen. The drive state is a safety measure that cannot be changed unless the machine is in neutral. The machine has three drive states, road, field and fault. The drive state helps the machine determine what kind of work it is meant to do, field work or transport work.

In road state, the machine is limited on what functions can be operated, for instance, the spray booms are not able to be operated. Road state is used for the transporting of the machine and therefore will allow the machine to reach maximum speed. The engine speed in road state can range from 850 to 2100 RPM.

Field state allows the functions of the attachments, such as the spray boom, to operate. All wheel steer (if equipped) is also only allowed while in field state. The machine is also limited on speed and is unable to reach maximum speed while in the field. The engine speed in field state can range from 850 to 2500 RPM.

The third drive state, "drive fault" (B), may show if there is a system error that affects the machine's ability to function. This is called a drive fault and the MD3 should show a message explaining why it happened and what if anything should be done. Severe warnings will be accompanied by a shut down or power down of systems to protect the machine (C). This drive state is automatic and cannot be voluntarily selected.

To toggle between the two drive states, make sure there are no drive faults present and that the machine is in neutral. Press the F1 button until the desired drive state appears below "Drive State" on the display screen.



F2 Function Button

The F2 function button is not directly associated with anything on the Home Page. The warnings that appear on the screen (drive faults, service warnings, system errors, etc.) will be able to be acknowledged through pushing the F2 button.



Machine Hours

The second page of the MD3 is titled “Machine Hours” and can be found by using the Down Arrow (A) key to toggle to the next page from the Home Page.

This page is a service tool for operators to use to set and track service intervals. There are several things that need to be serviced at specific intervals and you will see these intervals on this page (50 hrs, 100 hrs, 500 hrs, etc.). Please refer to the service section of this manual for details regarding on what parts of the machine need serviced and the procedure to perform the service at each interval.

Some of the service intervals can be adjusted to suit your schedule if you do not want to wait as long as possible to perform some of the services, such as oil and filter servicing. The default on the Machine Hours page is the recommended practices of the engine manufacturer, however, these practices are also discussed as being fairly loosely interpreted based on how the machine is used and they can be done on shorter intervals than what is recommended. The default will not be able to be extended past the recommendation.

When a service interval is reached, a “manual” icon (B) will appear at the top of the Home Page and a message telling you that a service interval has been reached (C). The message will disappear by pressing F2, but the icon will remain at the top of the page until the hours of the interval have been reset.



Adjusting Service Intervals

The Machine Hours page has three columns of information. The first column tells you what service action or interval the hours are referring to. The second column tells the hours since the last service. The third column tells how many hours before the next service.

The engine oil/filter, hydraulic filter, and hydraulic oil intervals can be adjusted to suit your needs. The remaining intervals cannot be adjusted.

To adjust the service intervals:

1. Press the Menu button (A) in the lower right hand corner of the display face.
2. Press the F1 button under adjusts.
3. Use the Down Arrow to toggle down to the Service Interval Group (B). Press OK to select.
4. Adjust the interval and press OK to accept the changes.



Resetting Service Hours

Once a service procedure has been completed, the hours must be reset. To reset the service hours:

1. Press the Menu button in the lower right hand corner of the display face.
2. Press the F1 button to adjust.
3. Use the Down Arrow to select the Service Reset group.
4. Reset the parameters, by toggling the parameters to 1 and then back to 0 using the UP and Down Arrow keys.



Miscellaneous Page

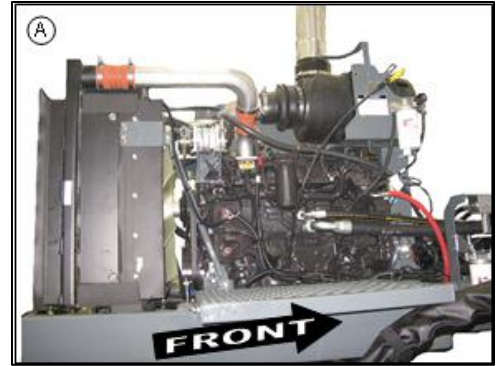
The third page is information only entitled Misc. Page. This page gives you current tire size, current tread adjust setting, and the tread setting on both the left and right side separately. You cannot adjust anything from this page.



HYDROSTATIC SYSTEM

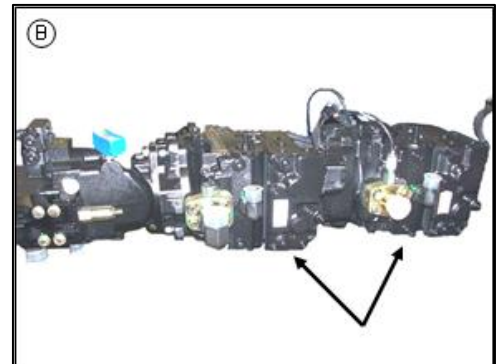
Hydrostatic Drive Components

- A. Cummins engine
- B. Tandem hydrostatic pumps
- C. Front and rear wheel motors
- D. Wheel hubs



Cummins Engine

The STS 10T comes standard with a 215hp Cummins diesel engine (A). The engine has a direct-mounted Sauer-Danfoss 90 Series tandem hydrostatic pump (B). More information on the operation of the engine is contained in this section.



Wheel Motors and Wheel Hubs

The all-time four wheel drive system consists of Sauer-Danfoss hydrostatic wheel motors (C) and the planetary gear reduction hubs (wheel hubs) (D).

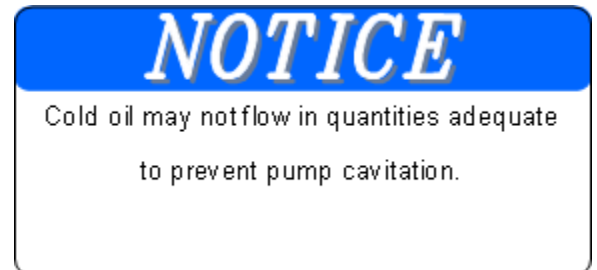




Caution: Start the engine from the operator's seat only. When running the engine in a building, be sure that there is adequate ventilation.

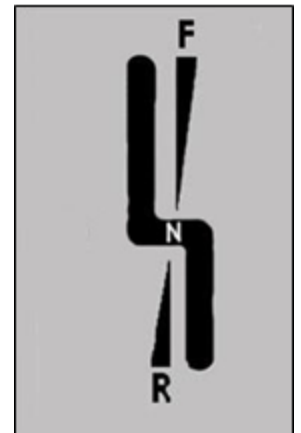
Pre-operational Checks

1. Check the engine oil level. Do not operate when oil is below the low mark on the dipstick.
2. Check the coolant level in the radiator and the coolant overflow reservoir.
3. Check the hydraulic oil reservoir level.
4. Check the cooling air intake screen.
5. Check the Filter Minder®
6. Drain fuel/ water separator.
7. Check the engine drive belt.
8. Drain any water out of the air tank daily.
9. Check for any oil or fuel leaks and correct them if needed.



Starting the Engine

1. Position the hydrostatic lever to the neutral position.
2. Put the parking brake switch to the ON position. (See the information contained in this section on the parking brake)
3. Turn the ignition ON, but do not engage the starter. Wait for the “wait to start” warning light and message to disappear. Make sure that there aren't any other warnings before continuing.
4. Engage the starter. If the engine fails to start after 15 seconds, turn the key to OFF, wait one minute and repeat the procedure. If the engine does not start in three attempts, check the fuel supply system. Absence of blue or white exhaust smoke during cranking indicates that no fuel is being delivered.
5. Observe the warning lights on the MD3 after start up. If any functions do not operate, shut off engine and determine the cause.
6. Always allow at least a five minute warm-up period before operating the engine at high RPM. This means that the engine must reach operating temperature and oil pressure must stabilize in the normal operating range before it is run faster than idle (1000 RPM or less).



Filter Minder® is a registered trademark of Engineered Products Company.

Battery Disconnect

The STS is set up with a battery disconnect safety device. The device is located on the left side of the rear frame cross tube. When the key is turned to the OFF position the electrical circuit is broken therefore rendering the machine unable to start. Do not use this device as a safety when working on the electrical system- disconnect the negative battery cable before servicing.

This device is also used as an anti-theft safeguard. Keep the key in a safe place, out of the machine when it is not in use.



Parking Brake

The parking brake will engage the charge pressure falls below 150 PSI or the engine is shut off. To engage the brakes manually, press the top of the Parking Brake/Ladder switch located on the side console.

To disengage the brakes, press the bottom of the switch.


Always turn the brake off before moving the sprayer. The brake switch must be engaged to lower the ladder and to run the side-fill or pressure washer. The ladder will automatically lower when the brake switch is pressed (see the section on the ladder for more information).

! Caution: Activating the brake while the machine is moving is potentially hazardous to the operator and the sprayer.

Speed Control

Speed control may be adjusted with the speed control dial. This will conveniently help regain consistent field speeds when re-entering a field from the end rows.

To set a speed limit, begin by starting with the engine at 1800 RPM and speed controls dial all the way counterclockwise. Push the hydrostatic lever all the way forward. Now turn the speed control clockwise while observing ground speed and stop turning the dial when the desired ground speed is reached. Now your maximum field speed is set and you simply reposition the lever all the way forward to regain that speed

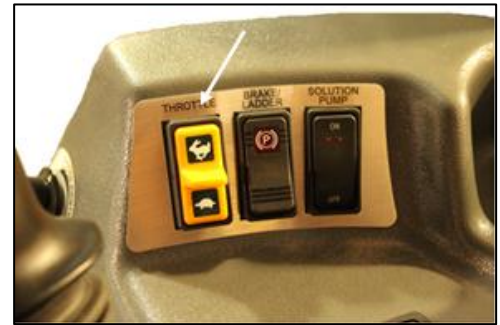
	<p>IMPORTANT</p> <p>Do not use disconnect to stop engine. Do not bypass disconnect. Do not terminate electrical devices to battery terminals. Disconnect negative before servicing electrical equipment. Completely isolate electronics before welding. Key must be inserted and rotated to "ON" position for operation.</p>
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<p>NOTICE</p> <p>The parking brake will not engage at speeds over 1 mile per hour.</p>



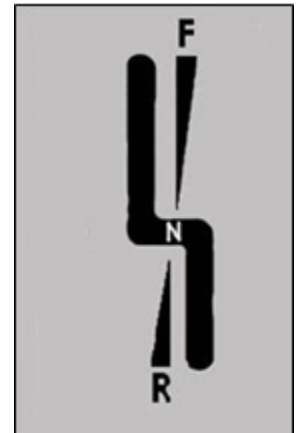
ACE: Automatically Controlled Engine.

1. Speed ranges are selected by a red (decrease speed range) and green (increase speed range) electronic switch mounted on the hydrostatic lever. The lower the setting, the higher the torque, but the lower the speed.
2. To move forward, slowly push the hydrostatic lever forward. The farther the lever is moved, the faster the sprayer will travel and the engine speed (RPMs) will increase. To stop, slowly pull the lever to the neutral position.
3. To reverse the machine, slowly pull the lever back. To stop, slowly push the lever to the neutral position.
4. Before turning off the engine, reduce the engine speed and allow the engine to idle for at least three minutes.



NOTICE

The operator can choose the minimum level above 850 RPMs of engine speed that they want to operate the machine with by using the throttle switch. See the throttle switch section for more information.

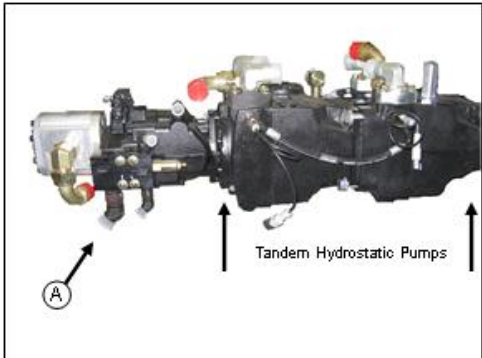


HYDRAULIC SYSTEM

Hydraulic System Components

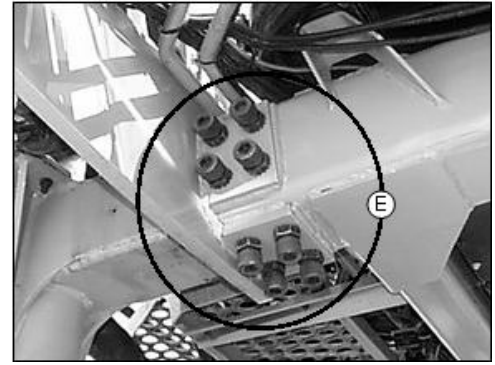
- A. Hydraulic pump
- B. Gear pump
- C. Solution pump
- D. Power steering

(continued on the next page)



Hydraulic System Components (continued)

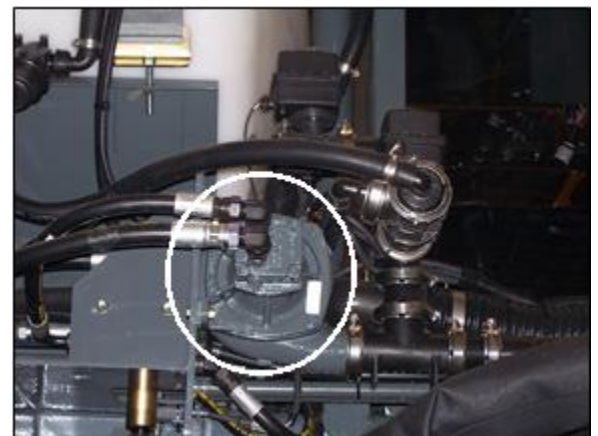
- E. Tread adjust
- F. Spray booms
- G. Ladder



Solution Pump

The solution pump is a diaphragm pump semi-hydraulically controlled with the pulse width modulated control valve. The valve is controlled by the Raven console per the calibration settings entered by the operator.

The solution pump is also used to distribute the water or cleaning solution from the rinse tank through the rinse systems.



Auxiliary Hydraulic System (Hydraulic pump and Gear pump)

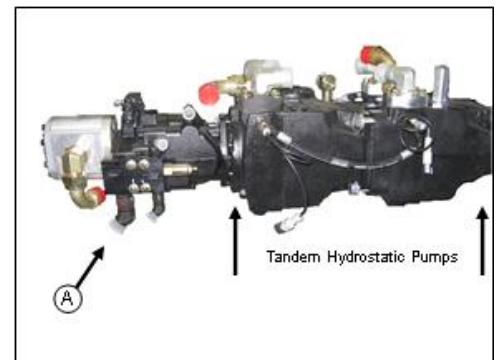
The auxiliary hydraulic system is a load sensing, pressure compensated system with efficiency in mind. That means it only pumps the amount of oil needed to do the job.

The pump is mounted to the “front” of the second hydrostatic pump (A). The system consists of a single variable displacement pump that supplies the required hydraulics to operate the full time power steering unit, boom control cylinders (lift, level, and fold), tread adjust, ladder, outer boom breakaway, and the solution pump.

The pump circulates the hydraulic oil throughout the necessary systems and back through a cooler before returning it to the reservoir. If the level in the reservoir drops too low to safely operate the machine you must shut down the engine immediately to prevent damage to the hydraulic system.

The return oil from the load sense pump is mixed with the oil from the gear pump (B) on the side of the engine. This pump supplies a constant flow of oil from the hydraulic tank to the cooler and then back to the tank through the filter. This is considered a kidney loop and is dedicated to the cooling and filtration of the hydraulic system.

The gear pump has a dedicated steering pump. The dedicated pump ensures the steering circuit is getting the flow that is needed. This allows the auto steer to have less potential problems.



Power Steering System

The power steering system is a dedicated circuit steering system with full time control, self-centering/double action steering cylinders.



Ladder

To raise or lower the ladder you will need to locate the BRAKE/LADDER switch at the front of the right hand console (A). When the brake is applied the ladder will lower automatically. The ladder will not rise until the machine is running and the switch has been returned to the OFF position.



! **Caution:** Upright ladder is not a service platform or step. DO NOT step on the ladder while in upright position. DO NOT lower the ladder while anyone is on the ground near the sprayer. DO NOT attempt to lower the ladder from the ground level.

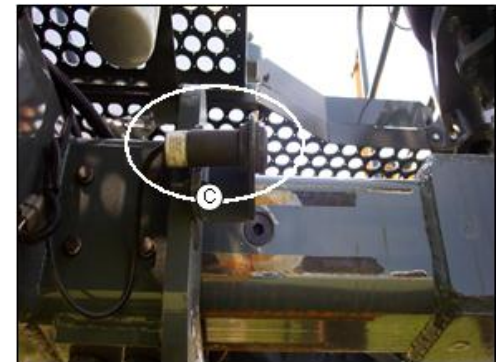
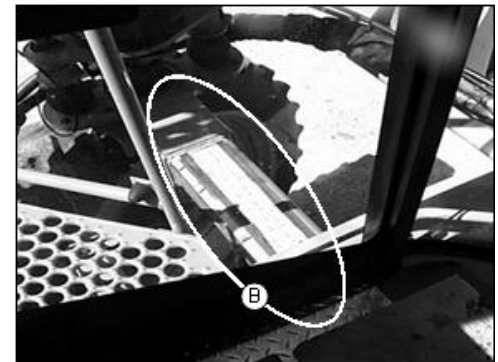


Hydraulic Tread Adjust

To adjust the tread widths hydraulically, follow the instructions below:

1. Survey the surroundings and allow yourself enough room to adjust the tread in either forward or reverse.
2. Locate the tread adjustment switches on the rear of the side console (A). They are marked LF (left front), LR (left rear), RF (right front), and RR (right rear). The legs may be moved in or out on each side independently*. While driving between one and two miles per hour, press and hold the desired switches to move the tread in the desired direction. Pressing the top of any switch will move that leg OUT and pressing the bottom of any switch will move that leg IN.
3. Observe the tread width on each leg. The front legs use indicator decals (B) while the rear legs use electronic sensors and display the readings on the message center (C). Release the switches when the tread indicator reaches the desired tread width.
4. After tread adjustment is complete, all four tread width indicators should have identical readings.


(continued on the next page)



Hydraulic Tread Adjust (continued)

5. To recalibrate (phasing the cylinders) toe-in:
 - a) While driving forward slowly, turn the steering wheel all the way one way until both steering cylinders bottom out; continue turning the wheel a little more to let fluid bypass the cylinder.
 - b) Then turn the wheel all the way the other way and repeat the process.
 - c) When the wheels are then straightened, the steering cylinders should be re-centered and correct toe-in should be obtained. To check the cylinders for center, measure the cylinder rod (B) (both cylinders should measure 7.64 in. at center). (see the service section regarding toe-in for more information)



 **Caution:** Never adjust the hydraulic tread width on a public roadway. Make sure the sprayer is on level ground where there are no ditches or valleys to interfere while you perform the adjustment.

Spray Booms

The spray booms are controlled by an electro-hydraulic system. This system consists of operator manipulated switches located in the sprayer's cab and hydraulic cylinders attached to the booms. It provides control of lift, level, and horizontal extension.



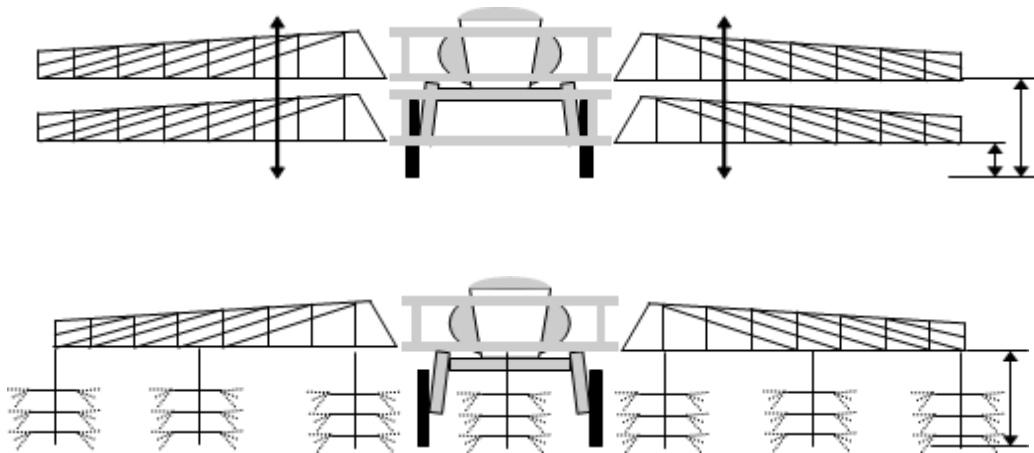
Warning: When operating or positioning the booms observe the following safety items.

- Select a safe area before folding/unfolding booms.
- Clear area of personnel.
- Check for overhead obstructions.
- Do not fold or unfold booms near power lines. Contact with power lines can result in serious injury or death.



Caution: When operating or positioning the booms observe the following safety items to avoid injury or equipment damage.

- Do not fold/unfold boom extensions when main boom is in the cradle.
- Do not operate sprayer with one boom out of cradle and other boom in cradle.
- Do not transport machine without booms folded and in cradle.



Lift

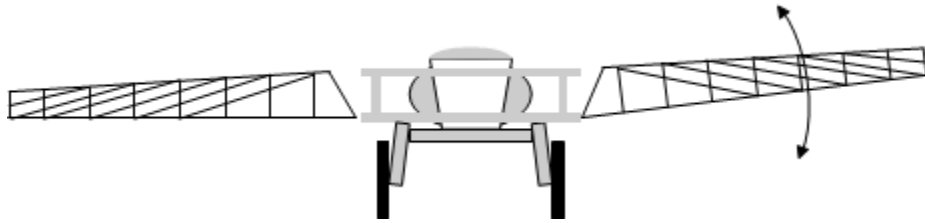
To raise and lower the transom/ boom assembly, depress the “square rocker” on the hydrostatic lever (A) and move it either UP or DOWN. While pressed, it will activate the transom lift cylinders (B).



NOTICE

See your spray tip manufacturer's guide for information regarding spray tip height.



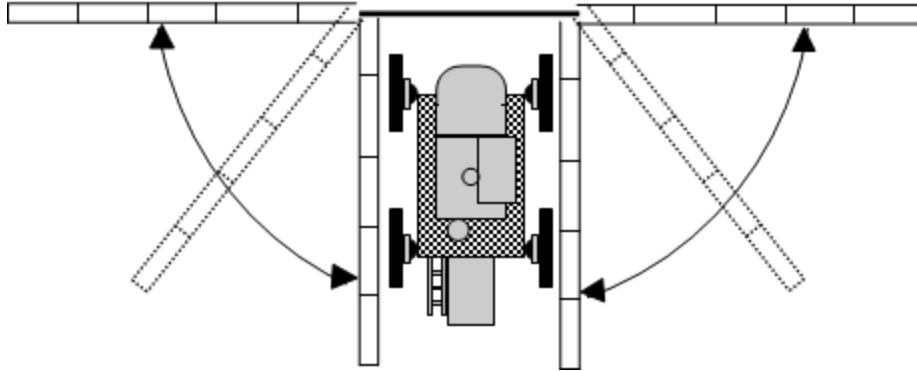


Level

To increase or decrease the angle of the individual boom levels, depress the right or left “round rocker” UP or DOWN on the hydrostatic lever (A). While depressed, these buttons activate the level cylinders connecting either boom to the transom (B).

This adjustment also aids in placing the booms correctly in the cradles for transporting and storage.





Horizontal Boom Extension

To fold either boom horizontally in toward the machine or out, depress the right or left “round rocker” IN or OUT switches on the hydrostatic lever (A). While depressed, these switches activate cylinders connecting either boom to the transom (B).

Fold or unfold the booms in an open area only. Make sure no one is standing in the boom fold’s travel path. Booms can be folded if the machine speed is less than 5 MPH.



SPRAY SYSTEM



Introduction

The spraying system is a constantly monitored and continuously adjusted computer controlled system. The cab mounted digital console receives information from various inputs to help determine GPM (gallons per minute) and GPA (gallons per acre).

This section explains the components of the spray system. Please read the entire section before operating the spray system. This section is not designed to replace the Raven manual and the numbers used may not reflect your specific situation. Read all manuals before operating the equipment.

NOTICE

Never attempt to operate the spray system without solution in the spray tank. Operating the spray system with no solution in the tank will cause severe damage and void the warranty.

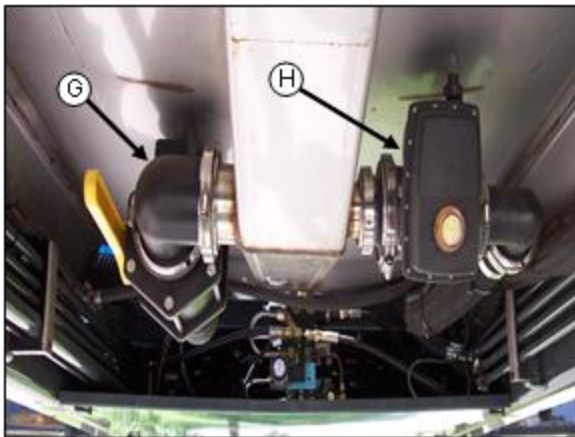
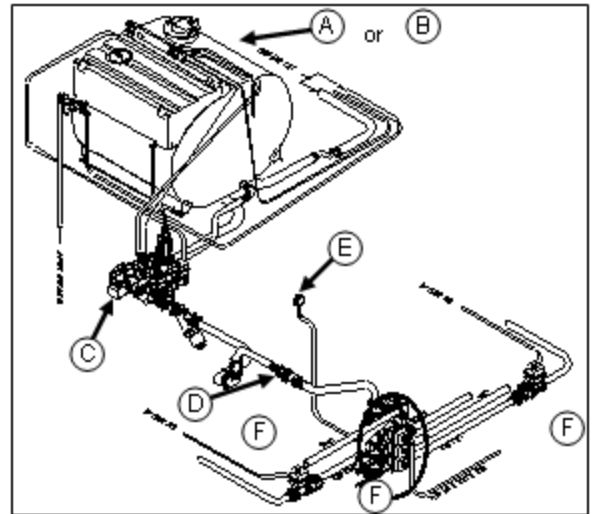
Getting Started:

1. Calibrate the spray system console.
2. Check the quantity of solution in the tank.
3. Start the engine.
4. Open the tank valves, if desired, activate the agitation system.
5. Press the F1 switch on the MD3 until the machine's drive state reads "field".
6. Turn on the main spray power.
7. Place the individual boom solution valve switches to the ON position.
8. Slowly move the hydrostatic lever forward to obtain the desired ground speed.
9. Frequently observe the pressure gauge. When it drops to zero, or spray pattern deteriorates, shut off the main spray power, solution pump, and agitation system until refilling solution.



Spray System Components

- A. 1000g Poly tank
- B. 1000g Stainless steel tank
- C. Solution pump
- D. Flow meter
- E. Pressure gauge
- F. Individual solution control valves
- G. Sump valve
- H. Solution tank valve
- I. Solution tank valve switch
- J. Agitation switch
- K. Individual spray control switches
- L. Main solution spray control switch



Solution Tank

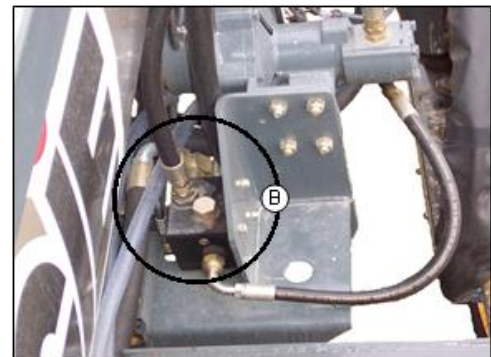
Customers have the option of the poly tank (A) or the stainless steel tank (B), both are 1000 gallon capacity.

The poly tank has an eductor type agitation system and the stainless steel tank has a sparge type agitation system. Functionally, there is no difference in the two tanks.



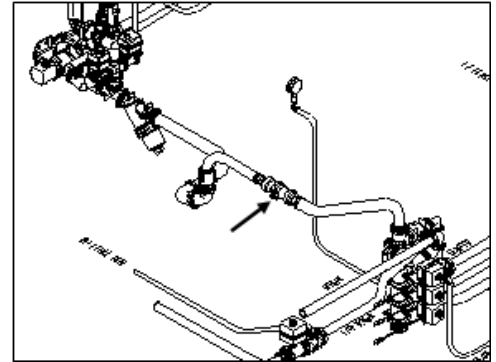
Solution Pump

The solution pump (A) is a diaphragm type semi-hydraulic pump that is controlled by the Pulse Width Modulated Valve (B) and the Raven console (C). The pump draws the solution out of the tank at the rate determined during the calibration of the Raven console. It dispenses it through the many valves and hoses that make up the spray system. The pump also dispenses fluids through the agitation system and the rinse systems.



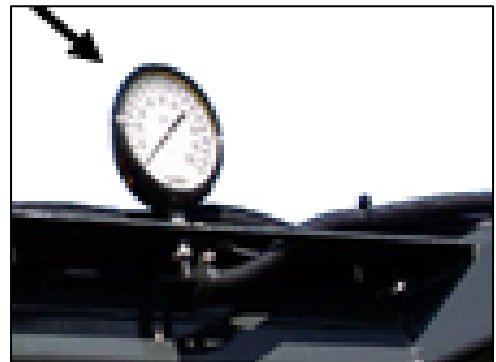
Flow Meter

The flow meter located in the main solution line monitors the solution flow and sends information back to the console and control valve. If the flow rate is not within the parameters programmed, the control valve will compensate by either opening or closing. If the rate continues to be outside the parameters, an alarm will sound signaling a low flow rate. (see the Raven console guide for more information on low flow limit)



Solution Pressure Gauge

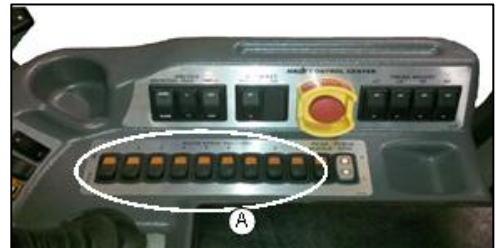
The pressure gauge gives you a constant visual display of the amount of the solution being applied (measured in PSI). The pressure, as determined by the pulse width modulated control valve, will vary according to ground speed. If applying solution manually, the solution pressure gauge visually informs the operator of needed manual adjustments. The gauge also shows when there is a drop in pressure indicating that the solution tank maybe empty or there is a problem with the system.



Individual Boom Solution Valve Switches

The spray booms are divided into sections that are independently supplied with solution and can therefore be shut off or turned on independently. The hydro-electric boom solution valves are controlled by a row of switches mounted on the right hand console (A).

Sixty foot boom configurations are divided into three sections and the valves are mounted on the transom. Eighty and ninety foot booms are divided into five sections with three of the valves mounted on the transom and one on each boom.



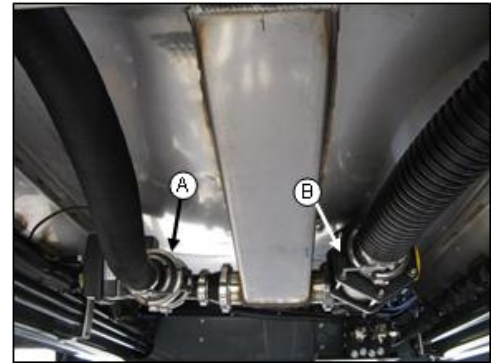
Boom Solution Valve L.E.D. Indicators

Boom solution valve status is displayed in the cab by a series of L.E.D. indicators (B). Each indicator will illuminate if that particular boom solution valve is turned OFF.



Solution Tank Valve

The solution tank valve (A) controls the amount of solution coming out of the tank. The valve is controlled from inside the cab with the TANK VALVE switch (B) located on the right hand console.



Tank Sump Valve

The tank sump valve (C) is a ball type valve that has to be turned on and off manually. This valve is to allow the fluid into the tank from the fill option.



Agitation

The speed of the sparge agitation system (stainless steel tank option) or the eductor agitation system (poly tank option) is controlled by a variable flow solution valve (A) mounted on the solution pump (B). The agitation switch (C) on the right hand console controls the rate of flow through the sparge system. While watching the indicator on the agitation valve, increase or decrease the flow rate with the control switch. To increase the flow, press the switch up. To decrease the flow press the switch down. When the desired rate of flow is achieved, release the switch.

To turn the agitation system off, decrease the flow rate all the way down.



Main Solution Switch

Main spray power can be controlled from a switch on the hydrostatic lever (A). This controls the panel of boom solution valve switches. The main switch must be on to supply the individual switches with voltage. This allows you to turn all of the boom solution valve ON or OFF at the same time such as turning them off when you arrive at the end rows and turning them back on when you re-enter the field. The individual switches allow you to turn the valves ON or OFF separately.

When the main spray power is ON a green indicator light located on the left side of the MD3 above the tachometer reading will illuminate and a white indicator light (B), mounted in the cab, will also illuminate.



NOTICE

DO NOT allow the pump to keep running when the boom switches are turned off. Failure to do so will generate in over-heating and cause severe pump damage and void the warranty.

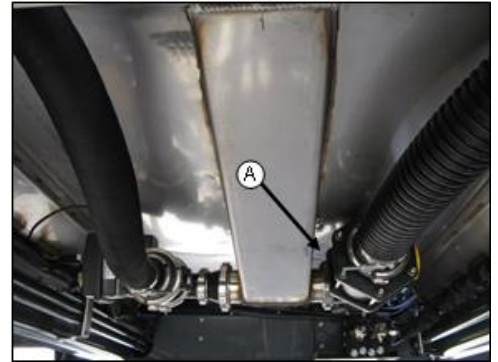


Solution Quick Fill

To fill the solution tank, make sure the sump valve under the tank (A) and the valve on the ladder is open. With the ladder down, you can attach the owner supplied connection to the solution fill connection. Fill to desired level. When finished, shut all of the valves and return the front fill to the locked position.



Caution: Wear the appropriate clothing and protective gear when working with agricultural chemicals. Do not store the clothing inside the cab.

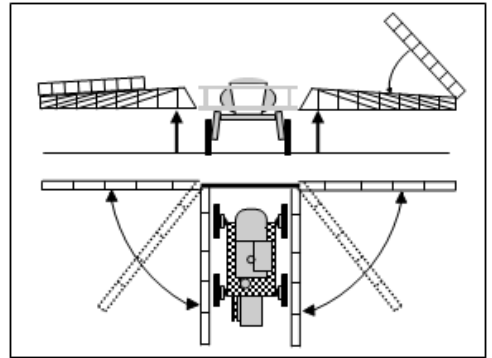


TRANSPORTING

Cradling the Booms

The booms should always be cradled before traveling, transporting, or parking for an extended period of time. **The booms must be folded when cradled.**

To cradle the booms, fold the boom extensions in, raise the transom, and fold the booms in toward the machine. When the boom reaches the last 8-10 degrees of travel, it will automatically slow down to avoid impact with the cradle. Raise each individual boom level until it clears the outer cradle stop. Fold the boom in toward the cradle back-stop. When it touches the back-stop, lower the boom level until the full weight of the boom rests in the cradle (A).



Warning: When transporting the sprayer observe the following safety items to avoid serious injury or death.

- Check for overhead clearance before driving under any overhead obstructions.
- Contact with power lines can result in serious injury or death.

Caution: When transporting the sprayer observe the following safety item to avoid injury or equipment damage.

- Do not transport machine without booms folded and in cradle.



Driving the Sprayer On A Public Road

When driving the sprayer on a public road or highway, drive carefully and follow these suggestions:


1. Always have the booms in the folded and cradled position when driving or transporting.
2. Use the flashing hazard/warning lights, day or night, unless prohibited by law, to warn other drivers.
3. Know and obey all state laws for driving farm equipment on a public road or highway.



Driving the Sprayer on A Public Road (continued)

4. Adjust the sprayer's speed to suit the conditions.
5. Slow down and use turn signals before turning.
6. Pull over to the side of the road before stopping.
7. Keep a proper lookout and maintain control of the sprayer.
8. Do not drive under trees, bridges, wires, or other obstructions unless there is proper clearance.
9. Use extra care before entering or leaving a public road or highway.
10. Make sure the SMV (Slow Moving Vehicle) emblem is properly displayed, unless prohibited by law, to warn other drivers.
11. Do not drive the sprayer at speeds exceeding 20mph with solution in the tank. Operating the machine fully loaded in excess of 20mph may result in tire blow out or wheel motor damage!



 **Caution:** Hagie Manufacturing Company does not recommend any form of transportation other than driving the sprayer. Loading the sprayer onto a trailer may result in sprayer rollover.

SERVICE INTERVALS

Initial checks after receiving machine

Immediately

- 1) Check lug nut torque, then every 50 hours (92)

First 50 hours

- 1) Change wheel hub oil, again at 100 hours, and then every 500 hours thereafter (80)
- 2) Change hydraulic return/section filter, then every 250 hours thereafter (84)

Daily

- 1) Check engine oil (80)
- 2) Check and drain fuel filter (water separator) (84)
- 3) Check radiator coolant level (80)
- 4) Check engine drive belt (91)
- 5) Check Filter Minder ® (84)
- 6) Check hydraulic oil reservoir level (80)
- 7) Check solution line strainer (84)
- 8) Drain wet tank and air tank (96)
- 9) Check batteries (89)
- 10) Check radiator grille screen (84)

As Required

- 1) Change coolant concentration (80)
- 2) Clean radiator grille screen (84)
- 3) Change engine drive belt (91)
- 4) Change A/C compressor belt (91)
- 5) Charge A/C compressor (80)
- 6) Change fuel filter (water separator) (84)
- 7) Change in-line fuel strainer and remoter fuel filter (84)
- 8) Clean solution line strainer (84)
- 9) Change batteries (89)
- 10) Change paper cab filter (84)
- 11) Change charcoal cab filter (84)
- 12) Check and replace spray nozzle diaphragms and spray tips (96)

Every 50 hours

- 1) Check tire pressure (96)
- 2) Check lug nut torque (92)
- 3) Visually inspect tread adjust bearing bolts (92)
- 4) Grease all lubrication zerks (88)
- 5) Knock particles from fresh air intake cab filter (84)
- 6) Check air dryer cartridge (96)

Every 100 hours

- 1) Check wheel hub oil level (80)
- 2) Clean batteries (89)
- 3) Torque check tread adjust bearing bolts (92)

Every 250 hours

- 1) Check A/C compressor belt (91)
- 2) Change hydrostatic charge pressure and suction filter (84)

Every 500 hours

- 1) Check coolant concentration (80)
- 2) Change fuel filter (water separator) (84)
- 3) Change hydraulic reservoir oil (80)
- 4) Change wheel hub oil (80)
- 5) Check spray nozzle diaphragms and spray tips (96)
- 6) Change engine oil and lube filter (84)
- 7) Change the in-line fuel strainer (84)
- 8) Change the remote fuel filter (84)

Every 1000 hours

- 1) Change radiator coolant (80)
- 2) Change air dryer cartridge (96)
- 3) Change spray nozzles and tips (96)

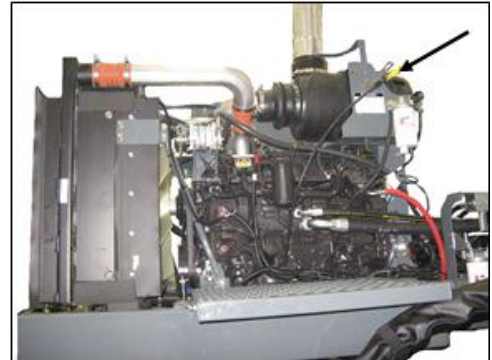
Inspection Point	Action (if necessary)
Check	
Engine oil level	Add oil
Radiator coolant level	Add antifreeze solution
Engine drive belt	Replace belt
Filter Minder®	Replace air filter element/reset gauge
Hydraulic reservoir oil level	Add hydraulic oil
Solution line strainer	Remove and clean
Batteries	Clean and/or tighten
Radiator grille screen	Clean
Look for loose or missing items such as shields	Tighten or replace
Look for any fluid leaks on machine or ground	Determine cause and correct
Drain	
Fuel/water separator	See page 84
Wet tank/air tank	See page 96

SERVICE: FLUIDS

Engine Oil

Oil level-The engine oil level dipstick is located on the left-hand side of the engine. Never operate the engine with the oil level below the “L” (low) mark or above the “H” (high) mark. Wait at least five minutes after shutting the engine off to check the oil level, this allows the oil to drain to the oil pan. Check the engine oil level daily.

Capacity-Low to high mark capacity is 2.0 quarts. The engine oil pan capacity is 17 quarts. Change the engine oil every 250 hours or yearly. Refill with 15W40 diesel engine oil.



NOTICE

The engine must be level when checking the oil level to make sure the measurement is correct.

Hydraulic Oil Reservoir

Oil level-Check the sight gauge level on the hydraulic oil reservoir daily. Add just enough fluid so the level is in the center of the sight gauge. Always check the hydraulic oil level when it is cool. Hydraulic will expand when heated.

Type-Premium hydraulic fluids containing high quality rust/oxidation/ and foam inhibitors are required. Hydraulic oil must conform to one of the following types: anti-wear hydraulic oil, type F automatic transmission fluid, or agricultural hydraulic transmission fluid. Replace the oil in the hydraulic reservoir at 500 hours or at the beginning of each spraying season, whichever comes first.



NOTICE

Cleanliness Standard: Always make sure area is clean before changing filter or hydraulic oil.

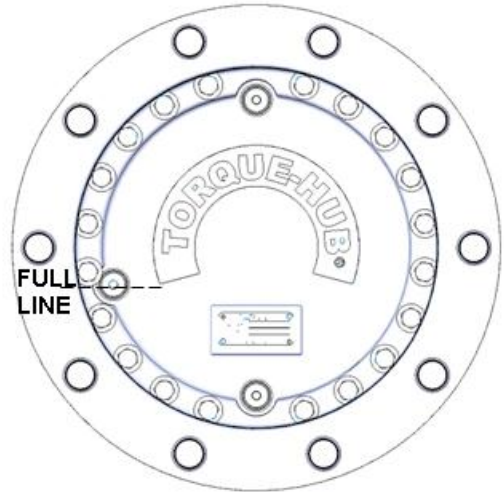
Wheel Hub Oil

Fairfield Option: *Oil Level*-Each wheel hub should maintain an oil level of half full at all times. If the hub has less than half full, it would limit lubrication and over half full could cause overheating and damage. To check oil level, position the wheel hub so one of the face plugs is positioned at 12 O'clock. The other plug will be either at 9 O'clock or 3 O'clock. Remove the lower of the two plugs. If no oil comes out, the oil level is too low. Check the wheel hub oil level daily. If 85-140 oil is needed, remove the top plug also and fill just until it starts to come out the lower hole. With the oil at a satisfactory level, re-install plugs.

Change-The wheel hub oil should be changed after the first 50 hours of operation, preferably in a loaded condition. Subsequently, it should be changed every 500 hours after that, or once a year whichever comes first.

To change the wheel hub oil, position one of the plugs at 6 O'clock and the other at either 3 O'clock or 9 O'clock. Remove the plugs to drain the oil. Once all of the oil is drained, re-install the bottom plug and remove 3 O'clock or 9 O'clock plug. Fill oil until a satisfactory level is met. Re-install the plug.

General Maintenance-If your sprayer is going to sit for an extended period of time, occasionally rotate the hubs by driving the sprayer forward and backward a few feet to adequately coat all internal hub parts. This will prevent rusting if moisture inadvertently entered the hub during an oil change. Failure to rotate the hub and disperse oil may cause rusting and internal damage.



NOTICE

Failure to rotate the hub and disperse oil may cause rusting and internal damage to the hub.

NOTICE

Synthetic oils must meet or exceed petroleum based lubricant specifications. The use of synthetic oils does not change the service intervals. Do not mix petroleum based and synthetic oils.

Cooling System

Coolant type-Your cooling system should always be sufficiently charged with an adequate mixture of antifreeze and water, regardless of the climate, in order to maintain a broad operating temperature range. Your cooling system has been factory charged with ethylene-glycol based antifreeze.

Checking Concentration-The radiator cap is located toward the rear of the engine compartment (A). Never remove the cap from a hot engine. Always allow the engine to cool before servicing the cooling system. Check coolant level daily.

A 50/50 antifreeze water mixture is a conservative mixture which allows good protection against both overheating and freezing. If a stronger antifreeze mixture is required, be sure not to exceed the engine manufacturer's guidelines for antifreeze mixing. The table (B) gives a few examples of ethylene-glycol antifreeze/water mixture protection values. Consult the engine manufacturer's handbook for further information.

Concentration should be checked every 500 hours or at the beginning of a spray season whichever comes first. A refractometer should be used to check concentration, "floating ball" type density testers are not accurate enough for use with heavy duty diesel cooling system.

Changing coolant-Your coolant should be changed periodically to eliminate the buildup of harmful chemicals. Drain and replace the coolant every other spraying season or 1,000 hours of service, whichever comes first. Refill only with soft water because hard water contains minerals which break down the anti-corrosion properties of antifreeze.

Fuel

Type-No. 2 diesel fuel is recommended for the best economy and performance under most operating conditions. In operating conditions fewer than 32°F, use a blend of No.1 and No. 2 diesel fuel. The addition of No.1 diesel fuel may cause loss of power and/or fuel economy.

Storing-See the section on storing the machine.

Refueling-Always turn off the engine and allow it to cool before refueling. Never smoke while fueling. Keep a fire extinguisher within reach while refueling. The fuel cell on a STS holds 150 gallons-do not fill it completely; fuel can expand and run over. Wipe up all spilled fuel and clean with detergent and water before starting the engine.



Ethylene Glycol		
40%	-23°C	-10°F
50%	-37°C	-34°F
60%	-54°C	-65°F



Windshield Washer Fluid

Reservoir-The windshield washer reservoir is located on the rear of the cab. Check it occasionally and refill it with non-freezing automotive windshield cleaner as required.



Air Conditioning

Type-The cab on the sprayer is equipped with a R-134a air conditioning system.

Recharging-Recharge it only with R-134a refrigerant. If your air conditioning system is mistakenly charged with R-12 refrigerant, serious problems, such as compressor seizure, may result. Therefore, confirm refrigerant before recharging the system.

If you do not have the proper equipment, it is recommended that you allow an independent service agent service your air conditioning system.

Fluid Capacities and Types	
Engine oil pan, including filter	17 quarts, SAE 15W-40
Engine oil dipstick, L-H mark	2 quarts
Hydraulic oil reservoir	32 gallons, anti-wear hydraulic oil
Hydraulic system (reservoir, lines, filter, cooler, etc.)	55 gallons
Wheel hub oil level	
• Fairfield wheel hub option (4)	Approx. 84 oz. each
Engine cooling system	18 gallons, ethylene glycol
Fuel Cell	150 gallons, No. 1 or 2 diesel

SERVICE: FILTERS

Engine Air Intake

Location-The engine air intake filter is accessed by opening the door on the front of the engine compartment (A).

Removal-The engine air intake filter element should only be removed if it is going to be replaced. After loosening the air cleaner and removing the end cap, carefully remove the filter so as not to knock any dust off the filter and into the air intake passage (B). The secondary filter does not need to be replaced if the primary is intact.

Replacement-Your sprayer is equipped with a Filter Minder® to notify you of filter element efficiency. Follow its guidelines for servicing (see next page). At appropriate service time, install the new element carefully to ensure proper sealing.

Cleaning-It is not recommended to clean the air intake filter element. However, a clean damp cloth should be used to wipe away dust and foreign material from the air cleaner housing.

NOTICE

Do not tap to remove dust. Engine damage may occur due to crushed filter caused by tapping. If the Filter Minder® indicates restriction, remove old filter, discard and install new filter only.

Filter Minder®

Location-The Filter Minder® is an air restriction monitoring system that progressively and constantly indicates how much air filter capacity remains. It is mounted on the foam marking tank mount bracket. Check its reading daily.

Service-Service the air cleaner when the Filter Minder® reads 20" (80% of dirt holding capacity). Service the air cleaner before the yellow indicator reaches the red line of the Filter Minder®. Be sure to reset the system after servicing.

Filter Minder® is a registered trademark of Engineered Products Company.



Radiator Screen

In order to maintain air flow through the engine cooling system's radiator, oil cooler, and air conditioning condenser, the cooling air intake grille must be inspected often and periodically cleaned.

When the engine hood has been opened for servicing, use compressed air to dislodge most large trash and dirt. Blow out the screen AWAY from the machine. Water from a pressurized hose may also be used, or if necessary the screen may be soaked with soapy water and scrubbed gently with a brush.

When cleaning the cooling fins of the radiator, oil cleaner, or A/C condenser with compressed air or water, be careful not to damage the cooling fins which may impair cooling capabilities.



NOTICE

Failure to keep cooling systems clean can cause overheating and damage to the hydrostatic system and/or engine.

Hydraulic Filter and Strainers

Return Filter-Remove and install a new 10 micron rated return filter at the end of the first 50 hours of use, subsequently replace the filter every 250 hours, or once a year, whichever comes first.

Suction Strainers-The suction strainers located inside of the tank should be examined for wear and blockage when the tank is empty for fluid service.

Fill Screen-Replace the fill screen immediately if there are any signs of a tear or break. The screen is the first defense against foreign materials entering the tank.



Engine Lube Filter

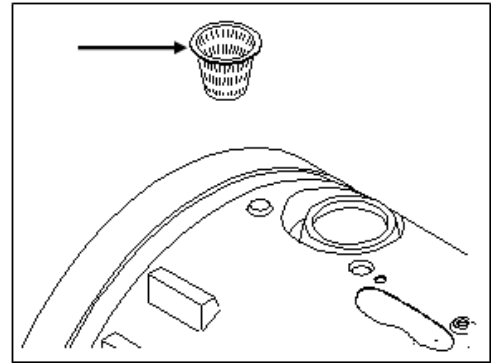
The engine lube filter (oil filter) should be changed every 500 hours or anytime that the oil is changed.

The filter is located under the service platform, behind the right rear wheel. It is accessible from the ground level.



Strainer Basket

There is a strainer basket in the top fill opening of the poly solution tank. Check the basket for any debris before using the opening to fill the tank. Do not remove the strainer except for cleaning.



Fuel Filters and Strainers

Remote Fuel Filter-(A) Located near the air intake filter, this filter should be replaced every 500 hours or once a year, whichever comes first.



Primary Fuel Filter (Water Separator)-(B) Located on the right side of the engine, this filter should be drained daily of water and other deposits. Replace the filter every 500 hours or as necessary.



In line Strainer-(C) Located on the right hand side of the engine, above the air filter. Note the direction of the fuel flow arrow when replacing.



Other Strainers

Poly Rinse Tank Strainer-If you have the pressure washer option on your sprayer you will have a 100 mesh strainer in the line from the rinse tank to the pressure washer (refer to Hagie Parts Manual for location). Check the strainer for blockage if you are unable to get pressure.

Rinse Strainer-The poly tanks have a 150 PSI (32 mesh) strainer in the line from the rinse valve to the solution tank rinse. If you are experiencing issues with pressure through your rinse cycle, you may check this strainer.

Solution Line “Y” Strainer-To help maintain consistent application rates, check the solution line strainer daily for blockage. Clean the strainer screen as required. Be sure to wear appropriate clothing while removing and cleaning the line strainer screen. Confirm the gasket is in place before re-installing the screen.

Check all strainers occasionally for blockage and replace them if they show signs of deterioration. Refer to the Hagie Parts Manual for replacement part numbers and specific locations.



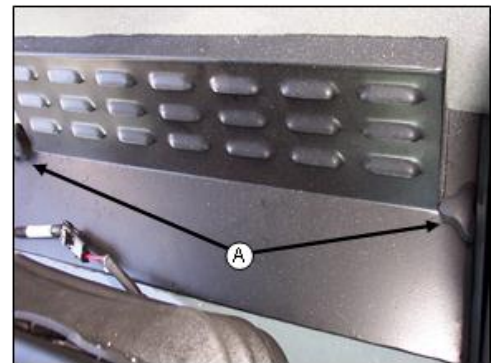
Fresh Air Cab Filters

Paper Filter-The paper filter should be cleaned every 50 hours, or more often if necessary. Remove the paper element and gently tap it against a flat surface. Direct low pressure compressed air through the filter to remove larger particles. Replace the paper filter if necessary.

Charcoal Filter-Remove and replace the charcoal filter at the first signs of chemical odor entering the cab.

To remove, clean, or replace the filters in the cab, undo the thumb screws on the cover (A) behind the operator's seat and carefully remove the filters. Wipe the cover clean with a damp cloth and allow drying before replacing.

Figure B shows the air tube that allows fresh air into the cab. Check it often for any material blocking the opening.



SERVICE: LUBRICATION

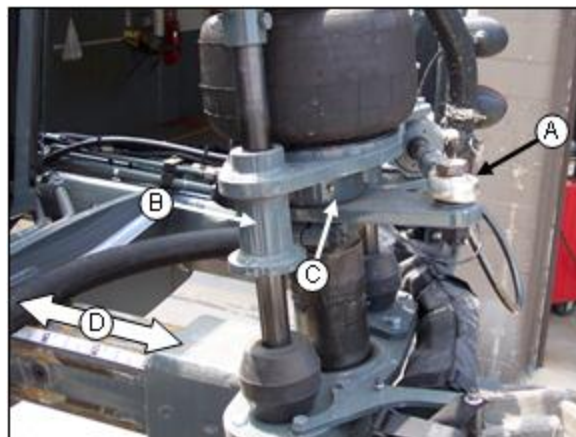
Legs and Steering

The front legs have a grease zerk in the tie rod ball (A) that needs greased every 25 hours or weekly.

Both the front and rear legs have two grease zerks, one in each of the tower bearings (B) that must be greased daily or as necessary. There is a grease zerk in the collar (C) under the air bag mounting plate that needs greased every 25 hours. Do not use air-type grease gun to lube these two locations as it may result in seal distortion.

The slide path of the tread adjust (D) should be greased every 25 hours depending on usage.

Each leg also has two grease zerks on the outside of the outer leg tube that should be greased every 25 hours. Tall crops may wipe away much of the grease, be sure to check each leg daily.



NOTICE

Failure to properly lube pivot and friction points may result in unnecessary wear and damage.

Transom Pivot Tubes

The transom pivot tube that attaches the booms to the transom has a grease zerk that should be greased every 50 hours or as needed depending on the amount of use. There is one on each side.



Ladder

The ladder pivot tube has a grease zerk that needs to be lubed every 50 hours or as needed.



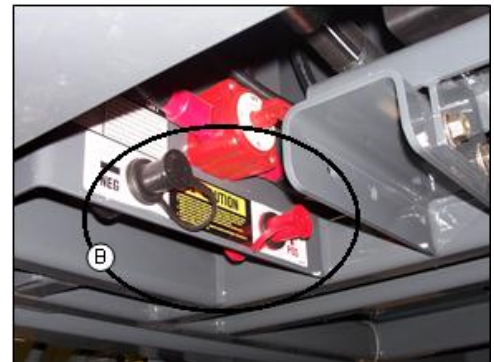
SERVICE: ELECTRICAL SYSTEM

Batteries

Service Access-The batteries are located at the rear of the machine behind the battery service access panel (A). When servicing the electrical system, always remove the batteries. Remove the ground cable first and connect it last.

Cleaning-Disconnect the battery cables from the batteries. Remove the corrosion with a wire brush or battery post brush. Wash the cable connections and battery posts with a weak solution of baking soda and ammonia. Apply dielectric grease or grease to prevent further corrosion. Reconnect the batteries making sure that they are tight. Clean every 100 hours.

Charging-To ease charging of the batteries, there is a set of auxiliary battery charging posts on the rear of the sprayer's mainframe (B). Connect your charging cables to them just as you would to the battery, positive cable to the positive terminal, and negative cable to the negative terminal. Keep these terminals clean and their caps in place when not in use.



! **Caution:** Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Do not inhale fumes or ingest liquid. Batteries contain gases which can explode. Keep sparks and flame away while servicing.

NOTICE

To ensure the best electrical contact, battery terminal connections should be as clean and as tight as possible.

Install replacement batteries with ratings equivalent to the specs. below


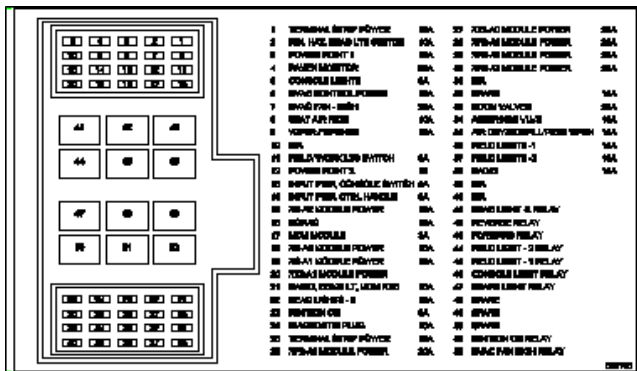



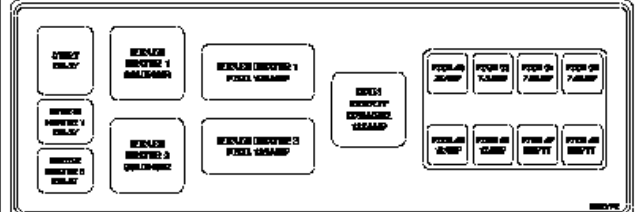
VOLTAGE - 12 V (only)

CCA (30 sec. @ 0°F) - 950

RESERVE CAPACITY - 185 min. at 25 amps

Circuit Breakers & Fuses

The STS has a circuit breaker and fuse systems in various locations. Under the right hand console (A) for the cab functions, under the cab (B) for the light functions, and the engine compartment (C) for the engine functions.

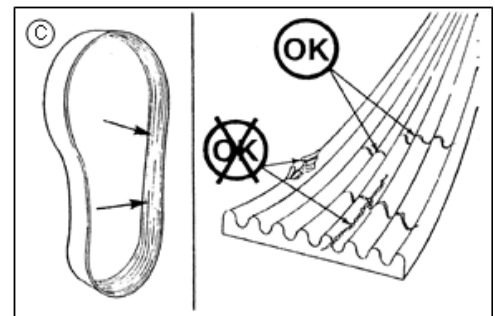
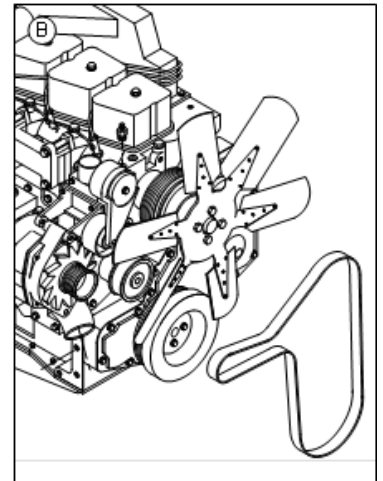
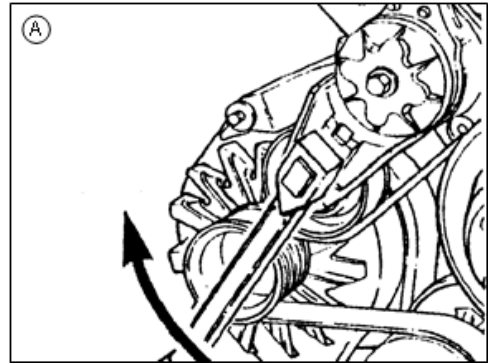
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SERVICE: BELTS

Engine Drive Belt

Removal-Insert a 1/2 inch square ratchet drive into the belt tensioner (A) and lift upward to remove the belt (B).

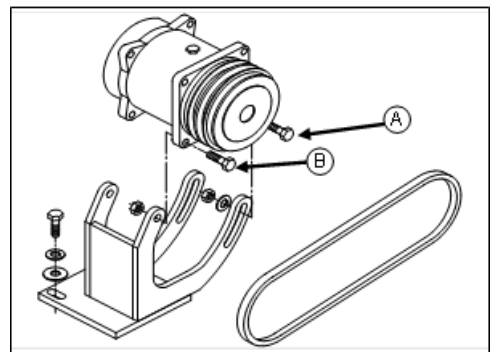
Inspection-Visually inspect the belt daily. Check the belt for intersecting cracks (C). Transverse (across the belt width) cracks are acceptable. Longitudinal (direction of the belt length) cracks that intersect with transverse cracks are not acceptable. Replace the belt if it is frayed or has pieces of material missing.



A/C Compressor Belt

To tighten air conditioner compressor belt loosen the pivot bolt (A) just enough to allow movement. Then loosen the adjustment bolt (B). Using a prying tool, adjust the tension of the belt to the desired tautness. While maintaining tension, re-tighten the bolts.

Visually inspect the belt daily. Replace the belt if it is frayed or missing material.




SERVICE: BOLT TORQUE

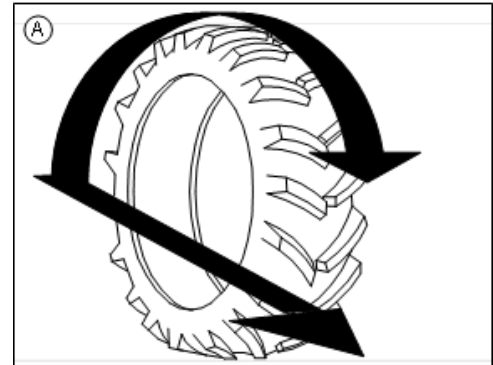
Wheel Bolts

If you do not have the proper equipment to mount a tire, let your local qualified tire sales/service dealer mount the tire for you. The tire should be mounted on the rim according to figure A for best traction and tread cleaning action. To install wheel and tire assembly on the wheel hub, lubricate the studs with an anti-seize grease. Align the wheel bolt holes with the wheel hub studs and mount the wheel on the hub.

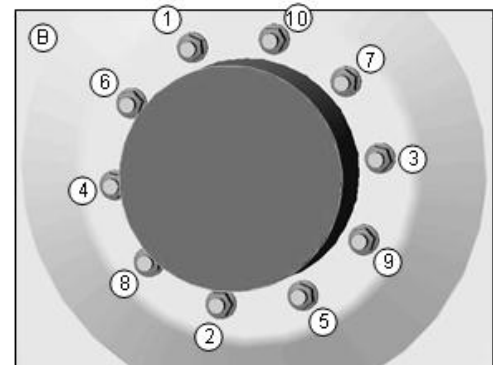
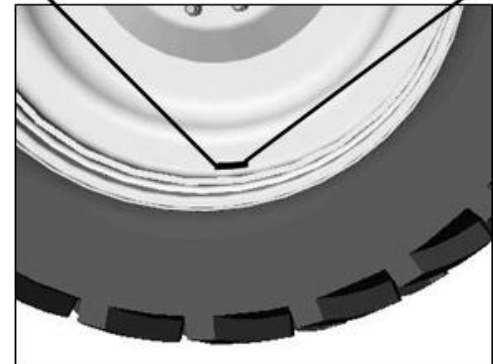
Start all of the lug nuts and tighten them until they are just snug. Following the torque sequence shown in figure B, first turn each lug nut to a torque value of 120 dry foot pounds. Use slow, even pressure on the torque wrench. Quick or jerky movements cause inaccurate values. Repeat the same sequences to 150 dry foot pounds and again finally to 400 to 500 dry foot pounds.

If the wheel turns during lug nut torquing, lower the machine to the ground just enough for the tire to touch and prevent rotation, or more preferably, place a suitable wedge between the tire and the ground. Lower the machine and resume operation. Recheck torque after 30 minute of operation.

 **Caution:** Check lug nut torque immediately after receiving the machine and every 50 hours thereafter.



**Keep wheel bolts tight.
See owner's manual for
torque specifications.**



Hydraulic Tread Adjust Units

With the engine turned off, visually inspect the tread bearing bolts on both the bottom and side tread adjust bearing plates every 50 hours. Torque check them every 100 hours.

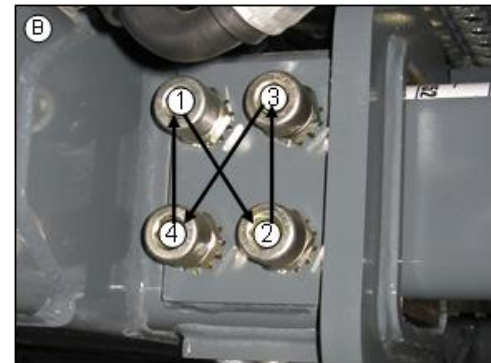
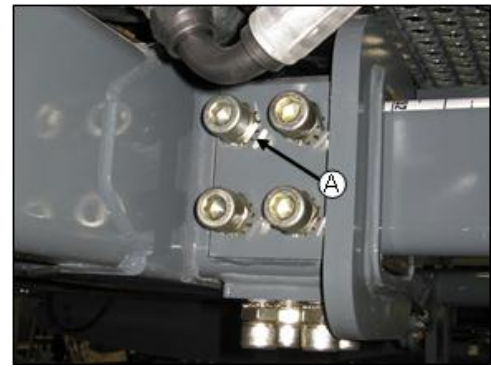
To torque check the tread adjust bearing bolts:

1. Loosen the jam nut (A) on each tread adjust bearing bolt.
2. Using an "X" pattern (B), verify that current torque on each tread adjust bearing bolt is equivalent to the last check from 100 hours previous.
3. Repeat pattern 3 to 4 times until last sequence shows no movement of the bolts to achieve desired torque.
4. Tighten jam nut.

Typically a torque value of 20 to 25 foot pounds is required to stabilize the axle and still allow tread width adjustment.

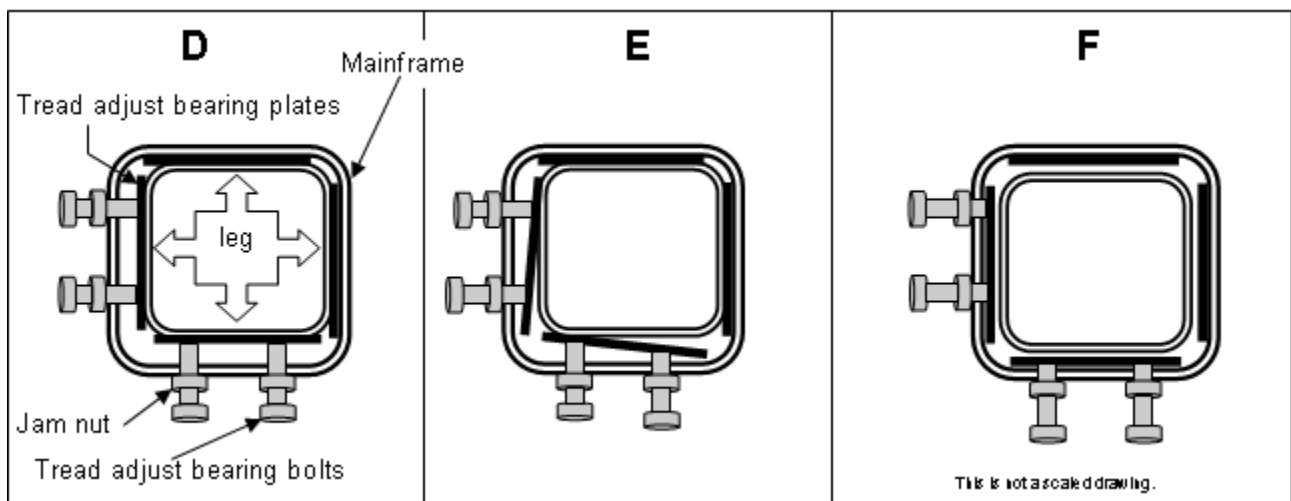
Never operate the unit with loose or missing tread adjust bolts.

Even pressure of the tread adjust bearing plates is required for proper operation! Figure D shows the correct position of the tread adjust bearing plates and bolts as well as the outer leg. Figure E shows the plates when there is not even torque on each of the tread adjust bearing bolts. Figure F shows a situation in which there is not enough torque on the tread adjust bearing bolts. Both figure E and F will cause the tread adjust to operate incorrectly or not at all.



NOTICE

If hydraulic tread adjust will never be used on your machine or you do not have hydraulic tread adjust, set all bolt torque settings to 50 foot pounds using the same procedure as stated at the left.



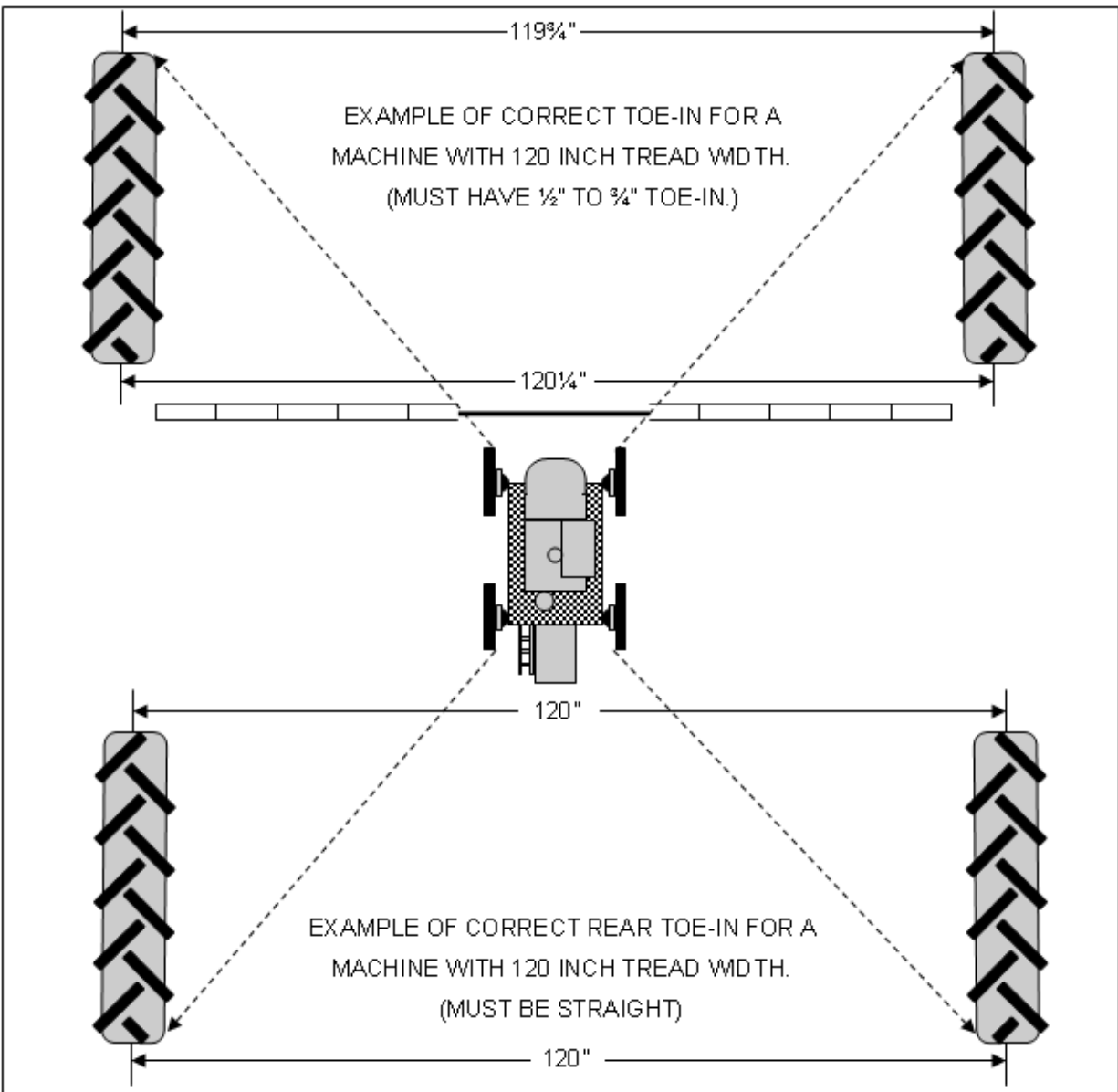
SERVICE: TOE-IN

Gauging Toe-In*

To correctly gauge toe-in, phase the cylinders first (63). Then use a tape measure placed at one-half the height on the front center seam of the front tire compared to the same measurement of the rear of the front tire (subtract the front measurement from the rear measurement— it must be a positive number). Correct toe-in should fall between one half and three quarters of an inch.

Toe-in is preset at the factory and should not have to be adjusted unless the steering cylinders are removed.

Difficulty steering one way versus the other or “darting” during operation may indicate incorrect toe-in and may require adjustment.

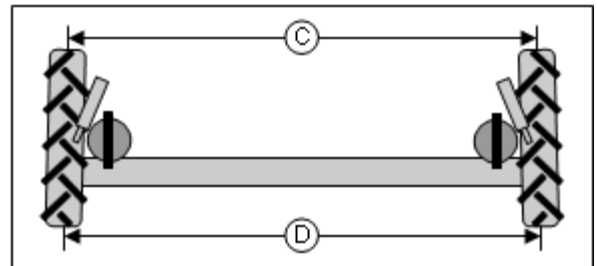
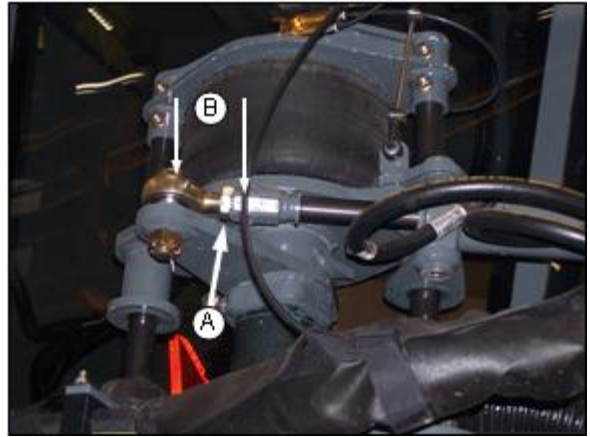


Toe-in Adjustment *

To adjust toe-in of the front tires follow these instructions for both front steering cylinders carefully:

1. Phase the cylinders, stopping at “center”.
2. Loosen jam nut (A).
3. Screw swivel assembly in or out on steering cylinder until the measurement from the center of the rod end to the collar (B) is the same on both of the front steering cylinders.
4. Tighten jam nut.
5. Phase cylinders again, re-check toe-in measurement. The cylinders must be phased anytime an adjustment is made to the cylinders.
6. Drive forward 30 to 50 feet and recheck toe-in.
7. Repeat steps 2-6 until a correct toe-in measurement is reached.

NOTE: Dimension “A” should be $\frac{1}{2}$ ” to $\frac{3}{4}$ ” less than dimension “B.”



SERVICE: MISCELLANEOUS

Air Bag Pressure

The airbags (A) automatically adjust pressure to compensate for load weight and field conditions. The system includes an air dryer (B) that dries the air coming from the air compressor before sending it to a collection tank. Check the dryer cartridge every 50 hours to make sure that it is purging with compressor unload. Change the cartridge as needed or every other season (1000 hours).

From the collection tank, the air is sent to the airbags located on the legs (A) as needed to maintain a level pressure. There are control valves on each leg that open and close to allow air in.

Visually check the air bags daily for leaks and cracking. If an air bag seems to be low check the bag for any punctures or leaks. Call Hagie Customer Service for repairs.



Air Tank

Drain the air tank daily by slowly releasing the drain cock. Check for moisture in the system. If there is excessive moisture in this tank, there may be a problem with the system. Call Hagie Customer Support for assistance.



Wet Tank

Drain the wet tank daily to prevent system condensation from contaminating the engine air compressor or dryer.



Tire Pressure

Check the pressure once a week or every 50 hours of operation (A). Never inflate a tire more than the recommended maximum air pressure. Use an air-line with a locking air chuck and stand behind the tire tread while filling (B).

Tire pressure will depend on type of tire and size of load in the solution tank.



Caution: When inflating tire use extension with in-line air gauge and clip on air chuck which will allow the operator to stand clear of tire side wall explosion trajectory.

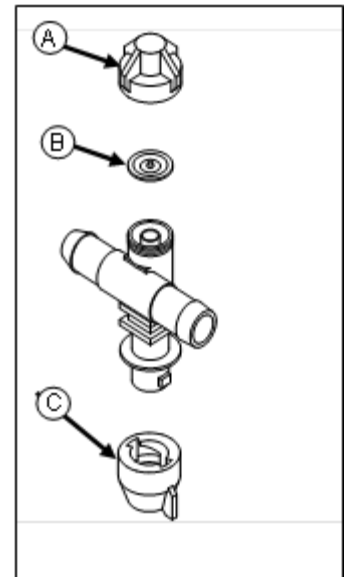


Spray Tips

At the beginning of each season, or as required, remove a random sample of spray tip caps (C) and inspect the nozzle tips. If they are plugged or worn, clean or replace them. **DO NOT** put your mouth to a spray tip to try to unplug it!

Nozzle Diaphragms

At the beginning of each season, remove each nozzle body cap (A) and inspect the diaphragm (B) for wear or fit. Replace if necessary. Refer to accompanying manual containing nozzle information.



Wiper Blade

Change the wiper blade as often as necessary. Do not allow the wiper blade to run on a dry windshield as this will shorten the life of the blade or cause scratching of the windshield.

Replace the blade with a 39 inch heavy duty blade of your choice.



STORAGE

Preparing For Storage

1. Perform daily level checks, lubrication, and bolt and linkage inspections as required in this manual
2. Every other season, drain the coolant from the engine and radiator. Probe the drain holes during draining to ensure they are not clogged by sludge, scale, or other deposits. Fill the cooling system to the top with a 50/50 water/antifreeze mixture. Run the engine to operating temperature and re-check the level.
3. Add a fuel stabilizer to the fuel and fill the tank.
4. Run the engine until it is at operating temperature, then drain the engine oil. Refill with fresh oil of recommended weight and install a new lubricating oil filter element.
5. With the engine at normal operating temperature, cycle all hydraulic functions including the steering.
6. Release tension on all belts.
7. Use plastic bags and water resistant adhesive tape to seal the air intake opening, all exhaust manifold openings, engine oil filter cap, hydraulic oil tank breather cap, and fuel tank caps.
8. Disconnect and remove batteries. Completely clean and charge the batteries. Coat the terminals with dielectric grease and store the batteries in a cool, above freezing place.
9. Thoroughly clean the sprayer. Touch up any painted surfaces that are scratched or chipped. *For touch up paint recommendations, contact the Hagie Manufacturing Customer Support Department.
10. Replace worn or missing decals. See Section 1 for proper location of warning decals and their corresponding part number. Warning decals and all other Hagie decals are available through the Hagie Customer Support Department.
11. Use a multi-purpose grease to coat exposed hydraulic cylinder rods.
12. To winterize the spray system, it is recommended that you use an environmentally safe type antifreeze and water mixture that will give you adequate protection to minus 30 degrees below zero. Drain any remaining solution in the spray system and run the antifreeze mixture through the spray system until it comes out all boom openings. Repeat the above process with both the foam marker and rinse systems.
13. Refer to the Raven manual for detailed information on storage procedures for the console and flow meters.
14. If the sprayer must be stored outside, cover it with a waterproof cover.

For replacement decals or touch up paint recommendations contact:
Hagie Manufacturing Company
721 Central Ave. West
Box 273
Clarion, IA 50525-0273

Removing From Storage

1. Inspect the condition, and test the air pressure of all the tires.
2. Carefully unseal all openings that were sealed in the storage process.
3. Clean and reinstall the batteries. Be sure to attach the battery cables to the proper terminals.
4. Tighten all belts. Inspect and replace any worn belts.
5. Check the engine oil, hydraulic oil, and engine coolant levels; add if necessary. A mixture of 50/50 water/antifreeze will cool adequately in summer as well as protect in winter.
6. Completely clean the sprayer.
7. Perform all needed services as instructed in this manual
8. For starting instructions, refer to the section on operating information.

NOTICE

Protective compounds such as grease can harden under exposure to weather conditions. Be sure to remove any dried grease and re-apply new if necessary.

TROUBLESHOOTING



PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Engine won't crank	<ul style="list-style-type: none"> • Dead battery • Poor battery connections • Starter or starter relay • Blown fuse in engine electric box • Battery switch in OFF position 	<ul style="list-style-type: none"> • Recharge or replace battery • Clean and tighten • Test; rebuild or replace • Check 20 amp fuse • Turn battery switch to ON position
Engine won't start	<ul style="list-style-type: none"> • Out of fuel • Clogged fuel filter • Cold weather • Low starter speed • Blown fuse in engine electric box 	<ul style="list-style-type: none"> • Fill fuel tank • Replace fuel filters • Refer to engine manual for cold weather starting • Check starter and battery • Check 20 amp fuse
Engine overheats	<ul style="list-style-type: none"> • Engine overloaded • Dirty radiator core or dirty grill screen • Faulty radiator cap • Loose or faulty fan belt • Faulty thermostat • Low coolant level 	<ul style="list-style-type: none"> • Reduce load • Remove all foreign material and clean all items • Replace cap • Tighten or replace fan belt • Replace thermostat • Refill to proper level with recommended coolant

Engine misfires: runs uneven, low power	<ul style="list-style-type: none"> • Water in fuel • Dirty air cleaner element • Poor grade of fuel • Fuel tank vent clogged • Clogged fuel filter 	<ul style="list-style-type: none"> • Drain, flush, replace filter, fill system • Replace element • Drain system, change to a better grade fuel • Open fuel tank vent in cap • Replace fuel filter
Engine knocks	<ul style="list-style-type: none"> • Low oil level in crankcase • Cold engine 	<ul style="list-style-type: none"> • Add oil to full mark • Allow proper warm-up period; refer to engine owner's handbook



PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Solution pump will not prime	<ul style="list-style-type: none"> • Low water level in pump • Air leak in suction line • Solution tank valve closed 	<ul style="list-style-type: none"> • Make sure the solution tank is not empty, solution pump is self-priming • Inspect and tighten all fittings on suction line • Open solution tank valve, allow air to leave the system
Erratic reading on pressure gauge	<ul style="list-style-type: none"> • Orifice in back of gauge clogged • Faulty gauge • Air leak in suction line • Solution strainers plugged • Glycerin leaking from gauge 	<ul style="list-style-type: none"> • Remove gauge; clean orifice; reinstall • Replace gauge • Inspect and tighten all fittings in suction line • Check solution strainers • Replace gauge

Malfunction of electric solution valve	<ul style="list-style-type: none"> • Faulty ground • Dirty contact terminals • Separation in wire • Faulty switch • Short in solenoid coil • Bad valve 	<ul style="list-style-type: none"> • Clean and tighten ground • Clean contact terminals • Check continuity and replace wire • Replace switch • Replace valve
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NOTICE

If your machine is equipped with a high-pressure system, call the Hagie Manufacturing Customer Service Department for possible causes and suggested remedies.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Solution pump not producing normal pressure	<ul style="list-style-type: none"> • Clogged line strainer screen • Air leak in suction flow to pump • Restricted solution flow to pump • Suction hose collapsed • Internal restriction of diaphragm such as buildup of chemical • Hydraulic failure 	<ul style="list-style-type: none"> • Remove screen; clean thoroughly; tighten strainer cap to avoid air leak • Inspect and tighten all fittings on suction line • Main solution tank shut-off valve not completely open • Obstruction at inlet end of hose causing high vacuum on hose • Disassemble; inspect; clean; reassemble • Call Hagie Customer Service

NOTICE

Refer to the Raven installation and operation manual for trouble shooting guide on Raven console and system



PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Machine won't move in either direction	<ul style="list-style-type: none"> • Speed Control is set too low • Engine speed too low • Oil level in reservoir too low • Clogged filter • Hydrostatic system failure 	<ul style="list-style-type: none"> • Adjust the setting of the speed control knob • Set engine at operating RPM before trying to move machine • Fill reservoir to proper level with approved oil; see section on service and maintenance • Replace filter • Call Hagie Customer Service
Machine will move in only one direction	<ul style="list-style-type: none"> • Speed Control is set too low • Hydrostatic system failure 	<ul style="list-style-type: none"> • Adjust the setting of the speed control knob • Call Hagie Customer Service
Hydrostatic system responding slowly	<ul style="list-style-type: none"> • Engine speed too low • Oil in reservoir low • Cold oil • Plugged filter • Partially restricted suction line • Hydrostatic system failure 	<ul style="list-style-type: none"> • Set engine at operating RPM before trying to move machine • Fill reservoir to proper level with approved oil; see section on service and maintenance • Allow adequate warm up period • Check and replace filter • Inspect for collapsed suction hose

		<ul style="list-style-type: none"> • Call Hagie Customer Service
Noisy hydrostatic system	<ul style="list-style-type: none"> • Cold oil • Low engine speed • Oil level in reservoir low • Hydrostatic system failure 	<ul style="list-style-type: none"> • Allow adequate warm up period • Increase engine speed • Fill reservoir to proper level with approved oil; see section on service and maintenance • Call Hagie Customer Service
Entire hydraulic system fails to function	<ul style="list-style-type: none"> • Oil level in reservoir too low • Auxiliary hydraulic system failure 	<ul style="list-style-type: none"> • Fill reservoir to proper level with approved oil; see section on service and maintenance • Call Hagie Customer Service
Noisy hydraulic pump	<ul style="list-style-type: none"> • Oil level in reservoir too low • Auxiliary hydraulic system failure 	<ul style="list-style-type: none"> • Fill reservoir to proper level with approved oil; see section on service and maintenance • Call Hagie Customer Service

 CAUTION	<p>Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Do not inhale fumes or ingest liquid. Batteries contain gases which can explode. Keep sparks and flame away while servicing.</p>
 	

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Entire electrical system is dead	<ul style="list-style-type: none"> • Dead battery • Poor battery connection • Low charging rate • No charging rate • Battery master switch is in OFF position 	<ul style="list-style-type: none"> • Replace battery • Clean and tighten battery connections • Tighten alternator belt • Replace alternator • Turn battery master switch to ON position
Light system does not function	<ul style="list-style-type: none"> • Poor ground • Burned out bulb • Separation or short in wire • Blown fuse • Faulty switch • Ignition switch is off 	<ul style="list-style-type: none"> • Clean and tighten ground • Replace bulb • Check continuity and replace wire • Replace fuse • Replace switch • Turn ignition switch to ON position

<h2 style="margin: 0;">NOTICE</h2>
<p>Disconnect battery when servicing any part of the electrical system to prevent system damage.</p>

TROUBLESHOOTING NOTES

WARRANTY

Hagie Manufacturing Company Product Warranty

Hagie Manufacturing Company warrants each new Hagie product to be free under normal use and service from defects in workmanship and materials for a period of lesser of: two (2) years or 1000 hours from the date of delivery on all Agricultural Products. Hagie Manufacturing Company makes this warranty from the original delivery date and is transferable to a purchaser from the original purchaser of this equipment, given there is remaining time left under the year and hour warranty standard stated above. This warranty shall be fulfilled by repairing or replacing free of charge any part that shows evidence of defect or improper workmanship, provided the part is returned to Hagie Manufacturing Company within thirty (30) days of the date that such defect or improper workmanship is discovered, or should have been discovered. Labor to repair said items will be covered by standard labor time rates. Freight charges of defective parts are not covered by this warranty and are the responsibility of the purchaser. No other express warranty is given and no affirmation of Hagie Manufacturing Company, by words or action, shall constitute a warranty.

Hagie Manufacturing Company limits its warranty to only those products manufactured by Hagie Manufacturing Company and does not warrant any part or component not manufactured by Hagie Manufacturing Company, such as parts or components being subject to their manufacturer's warranties, if any. Excluded from this warranty are parts subjected to accident, alteration, or negligent use or repair. This warranty does not cover normal maintenance such as engine tune ups, adjustments, inspections, nor any consumables such as tires, rubber products, solution system valves, wear parts, wiper blades, etc.

Hagie Manufacturing Company shall not be responsible for repairs or replacements which are necessitated, in whole or in part; by the use of parts not manufactured by or obtainable from Hagie Manufacturing Company nor for service performed by someone other than Hagie authorized personnel, unless authorized by Hagie Manufacturing Company. Customer acknowledges that it is not relying on Hagie Manufacturing Company's skill or judgment to select finish goods for any purpose and that there are no warranties which are not contained in this agreement.

In no event shall Hagie Manufacturing Company's tort, contract, or warranty liability exceed the purchase price of the product. The foregoing limitation will not apply to claims for personal injury caused solely by Hagie Manufacturing Company's negligence.

Hagie Manufacturing Company shall not be liable for damages, including special, incidental or consequential damages or injuries (damage and repairs of equipment itself, loss of profits, rental or substitute equipment, loss of good will, etc.) arising out of or in connection with performance of the equipment or its use by customer, and Hagie Manufacturing Company shall not be liable for any special, incidental or consequential damages arising out of or in connection with Hagie Manufacturing Company's failure to perform its obligation hereunder. HAGIE MANUFACTURING COMPANY'S ENTIRE LIABILITY AND THE CUSTOMER'S EXCLUSIVE REMEDY SHALL BE REPAIR OR REPLACEMENT OF PARTS COVERED UNDER THIS WARRANTY. THIS WARRANTY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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