2000
STS 12
Operator's Manual

493211

CALIFORNIA

Proposition 65

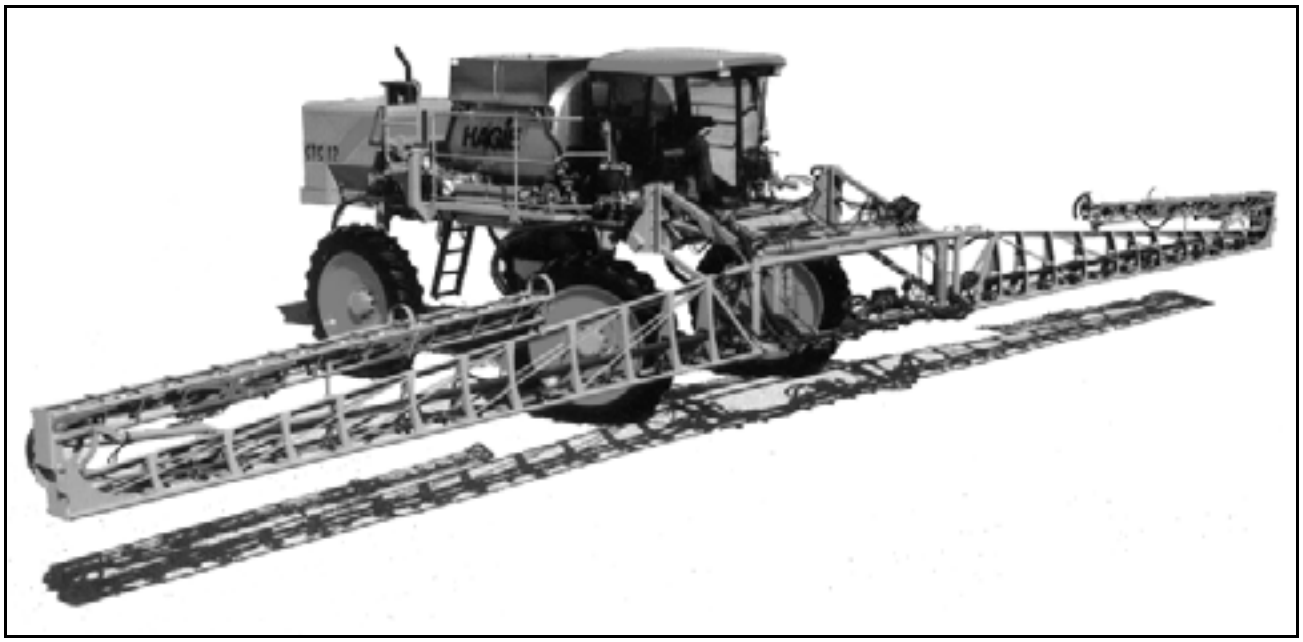
WARNING: Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer and birth defects or other reproductive harm.

WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

ANY PICTURES CONTAINED WITHIN THIS OPERATOR'S MANUAL THAT DEPICT SITUATIONS WITH SHIELDS, GUARDS, RAILS, OR LIDS REMOVED ARE FOR DEMONSTRATION PURPOSES ONLY. HAGIE MANUFACTURING COMPANY STRONGLY URGES THE OPERATOR TO KEEP ALL SHIELDS AND SAFETY DEVICES IN PLACE AT ALL TIMES.

HAGIE

MODEL STS 12



OPERATOR'S MANUAL
FOR
HAGIE MODEL STS 12 HI-TRACTOR

HAGIE MANUFACTURING COMPANY

BOX 273 CLARION, IOWA 50525 (515) 532-2861

COVERS MACHINE SERIAL NUMBERS:SNU1600000001 thru SNU1600000100

9-00 493211

ABBREVIATIONS

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

TO THE OWNER

Read this manual before operating.

A WORD FROM HAGIE MANUFACTURING COMPANY

Congratulations on your selection of a Hagie Model STS 12 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.

⚠ CAUTION

READ OPERATOR'S MANUAL. BE ALERT. LEARN TO OPERATE THIS MACHINE SAFELY. OBSERVE ALL SAFETY PRACTICES. MACHINES CAN BE HAZARDOUS IN THE HANDS OF AN UNFAMILIAR, UNTRAINED, OR COMPLACENT OPERATOR. SHUT OFF ENGINE BEFORE SERVICING. WHEN MECHANISM BECOMES CLOGGED, SHUT OFF ENGINE BEFORE CLEANING. DON'T RISK INJURY OR DEATH.

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
Box 273, Clarion, IA 50525
(515) 532-2861

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ DANGER — *This symbol indicates an immanently hazardous situation which, if not avoided, will result in death or serious injury.*

⚠ CAUTION — *This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or injury.*

⚠ WARNING — *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.*

TABLE OF CONTENTS

I. SAFETY/DECALS

SAFETY PRECAUTIONS

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.

⚠ DRIVING

- Before moving sprayer, make sure no persons or obstructions are in path of travel.
- Do not permit passengers on sprayer when it is moving; they may fall off or obstruct operator's view.
- Never drive near ditches, embankments, holes, mounds, or other obstacles.
- Never drive on hills too steep for safe operation.
- Always drive at a reasonable field speed.
- Reduce sprayer's speed before turning.
- Come to a complete stop before reversing direction.
- Pull over to side of road before stopping.
- Additional weight caused from partially full or full solution tanks may cause erratic or increased stopping distance.
- Never operate sprayer on roadway with any solution in solution tank.
- Do not activate parking brake while machine is in motion or damage may occur to sprayer.
- Use flashing/hazard warning lights when traveling on public roads, day or night, unless prohibited by local law.
- Make sure SMV emblem is in place and visible from rear when traveling on public roads.

I. SAFETY/DECALS

⚠OPERATING

TREAD WIDTH

- Select widest 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 unfolding booms. Avoid power lines and overhead structures.

GENERAL OPERATION SAFETY

- Do not adjust factory engine RPM settings.
- Operate engine at recommended RPMs to assure proper charge pressure for hydrostatic drive system which controls braking performance.
- Start engine from operator's seat only. Do not by-pass safety-start switch.
- Never use starting fluid to assist engine start up.
- Never run sprayer engine in a closed building. Proper exhaust ventilation is required.
- If equipped with ground speed sensing radar, do not look directly into radar beam. It emits a very low intensity microwave signal which may cause possible eye damage.

I. SAFETY/DECALS

⚠ REPAIR/MAINTENANCE

HYDRAULICS

- Use caution when working with hydraulic fluid under pressure. Escaping hydraulic fluid can have sufficient force to penetrate your skin, causing serious injury. This fluid may also be hot enough to burn.
- Always lower load or relieve hydraulic pressure before repairing a hydraulic oil leak.
- Avoid torching, welding, and soldering near pressurized hydraulic lines.

FUELING

- Always turn engine off and allow it to cool before refueling.
- Do not smoke while refueling.
- Do not fill fuel tank completely. Fuel may expand and run over.

GENERAL REPAIR/MAINTENANCE

- Turn off engine before checking, adjusting, repairing, lubricating, or cleaning any part of sprayer.
- When servicing radiator, let engine cool before removing pressurized cap.
- Disconnect battery ground cable before servicing electrical system or welding on machine.
- When charging battery, connect positive cable to positive terminal and negative cable to negative terminal. Failure to do so may result in an explosion and cause

I. SAFETY/DECALS

⚠CHEMICAL HANDLING

- Never allow chemicals to come in contact with skin or eyes. Wear protective clothing or respirators as recommended by chemical manufacturer. Store this clothing outside cab so as not contaminate filtered cab environment. Also, clean your boots to remove soil or other contaminated particles prior to entering cab.
- Never pour chemicals into an empty tank, fill tank half full of water first.
- Follow chemical manufacturer's instructions for mixing chemicals.
- Dispose of empty chemical containers properly.
- Wash spilled chemicals or spray residue from sprayer to prevent corrosion and deterioration.
- Select a safe area to fill, flush, calibrate, and clean sprayer where chemicals will not drift or run off to contaminate people, animals, vegetation, or water supply.
- Never place nozzle tips or other parts to one's lips in an attempt to unclog spray tip.
- Do not spray when wind is in excess of chemical manufacturer's recommended speed.
- Store pesticides in their original containers with label intact. Keep them in a separate, locked building.

⚠GENERAL SAFETY

- 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.

WARNING DECALS ➡

I. SAFETY/DECALS

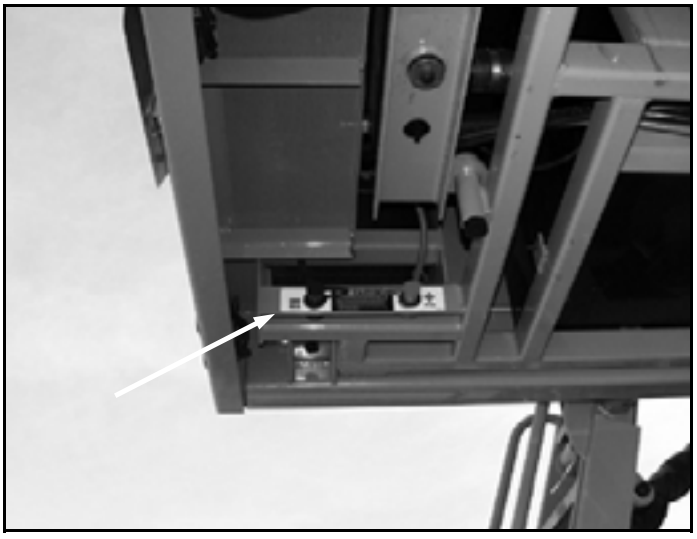
WARNING DECALS

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 the Hagie Customer Support Department. To replace decals, be sure that the installation area is clean and dry; decide on exact position before you remove the backing paper.

DECAL LOCATION

650107

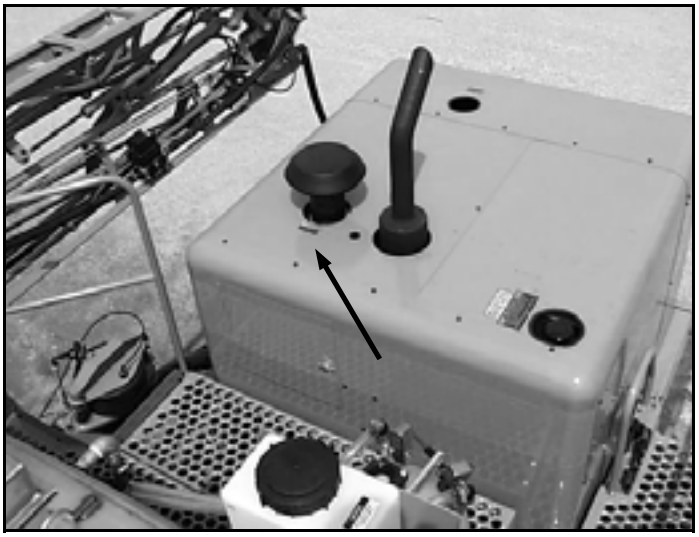


Rear of mainframe above booster terminals.

650113

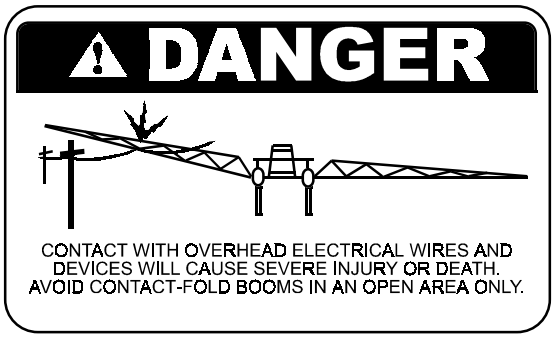
Next to right door handle in cab.

I. SAFETY/DECALS



650118

On engine compartment, in front of air intake.



650337

Inside right-hand cab window, above controls.

650339

On hydraulic reservoir, to left of sight gauge.

DECALS CONTINUED

I. SAFETY/DECALS

650339

On transom, near boom control manifold.

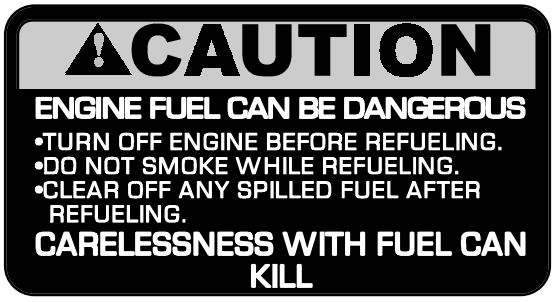
650340

Inside right-hand cab window, above controls.

650848

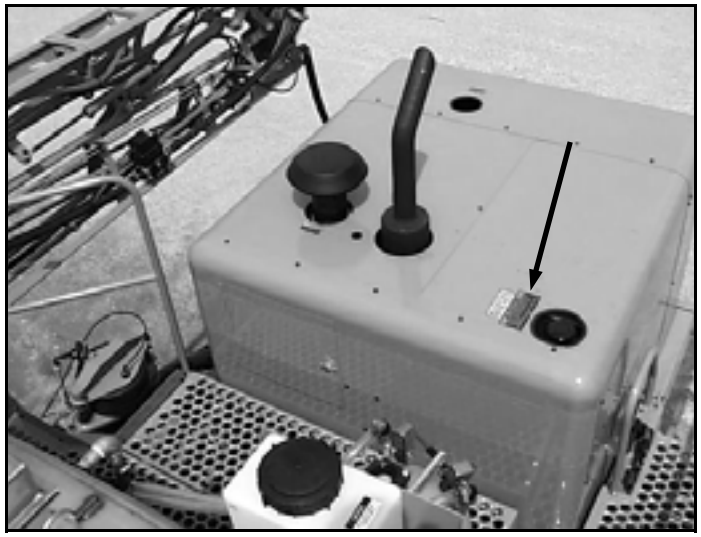
On ladder pivot tube.

I. SAFETY/DECALS



650849

On engine compartment, near fuel cell cap.



650850

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650851

Left rear mainframe.

DECALS CONTINUED

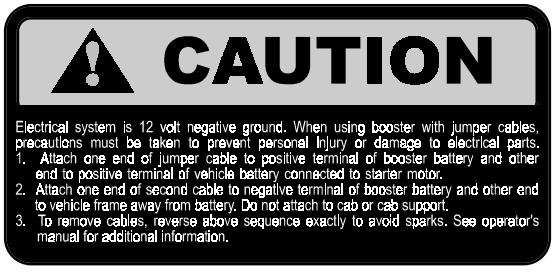
I. SAFETY/DECALS

650852

Above left door handle, inside cab.

650981

On engine compartment, near radiator cap.



650982

Above top battery.

II. IDENTIFICATION NUMBERS

SPRAYER 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, the wheel motors have identification tags, 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 and identification numbers in the space provided below.

NOTE:

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

Sprayer

_____

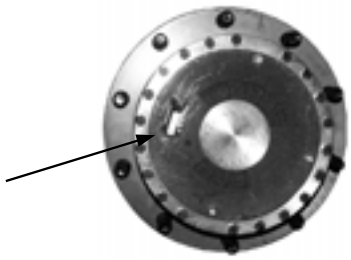
NOTE: Sprayer serial number stamped in the frame on right rear corner.

Engine

_____

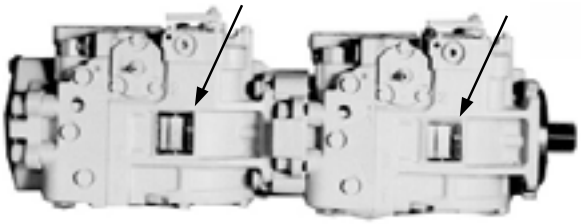
NOTE: Diesel engine serial number located on gear housing under alternator.

II. IDENTIFICATION NUMBERS



Planetary Hubs

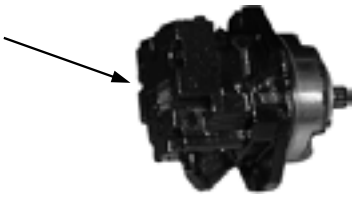
	Left	Right
Front:	_____	_____
Rear:	_____	_____



Hydrostatic Pumps

Front: _____

Rear: _____

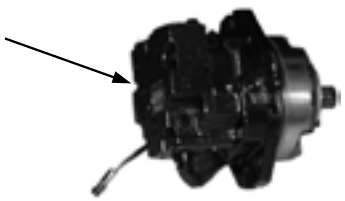


Front Wheel Motors

Left: _____

Right: _____

Refer to parts manual.



Rear Wheel Motors

Left - w/ Sensor: _____

Right - w/o Sensor: _____

Refer to parts manual.

III. SPECIFICATIONS

ENGINE

Manufacturer and model	Cummins
Model	QSB5.9-275
Type	Electronic with air to air cooler and turbocharger
Number of cylinders	6
Displacement	5.9 liter (360 c.i.)
Power	275 hp (205 kW), intermittent
Type of fuel	Number 1 or number 2 diesel
Fuel system	Filtered, direct-injected
Air cleaner	Dry-type, single element
Engine air filter restriction monitor	Filter Minder®
Slow idle	800 RPM
Fast idle	2750 RPM (no load)

POWER TRAIN

Drive

Hydrostatic pump		Sauer/Sundstrand Tandem 90 series
Range		150cc (75 X 2) pressure compensated with electronic displacement control
Drive train		All-time four wheel drive
Speed	- Low	0-14 mph (0-22.5 km/h)
	- Medium	0-18 mph (0-29.0 km/h)
	- High	0-30 mph (0-48.5 km/h)
Hydrostatic wheel motors- front and rear		Sauer/Sundstrand (90 series)
Final drives		
	Type	Planetary gear reduction hubs
	- front and rear	Torque Hub® CW12
	Lubrication	Oil bath

Brakes

Type	Multiple disc Spring applied Hydraulically released

Steering System

Type	Hydraulic, dedicated circuit
Control	Full-time power
Steering cylinders	Self-centering, double action
Turning radius (120" tread setting)	18 ft. (5.5 m)

III. SPECIFICATIONS

AUXILIARY HYDRAULIC SYSTEM

Type	Open
Pump type	Tandem gear

SPRAY SYSTEM

Booms

Type	Dry, with variable row spacing
Standard	60 ft. (3 spray sections)
Optional	60/80 ft. (5 spray sections) 60/80/90 ft. (5 spray sections)
Controls	Electro-hydraulic: fold/lift/level
Level shock absorber	Gas-charged accumulator
Full boom hydraulic breakaway	Self-actuated, non-auto-reset hydraulic
Outer boom tip hydraulic breakaway	Self-actuated, auto-reset hydraulic

Solution Fill Connection

Quick-fill connection (male with adapter for female)	3 in. (7.6 cm) I.D.

Solution Tank

Standard	1200 gal. (4542 ℓ) polyethylene with sight gauge
Optional	Stainless steel
Agitation	Sparge type with electronic variable speed control

General Spray System

Pump	Centrifugal - hydraulically driven with variable speed control
Solution valves	Electric ball valves
Pressure gauge	100 PSI glycerin filled
Monitor	Raven 460 (GPS-ready)
Fence row nozzle	Two position, remote activated

FOAM MARKING SYSTEM

Make	Hagie Foam Marker
Type	Live air

RINSE SYSTEMS

Spray system rinse (solution tank, pump, and booms)	Standard
High pressure washing system	Optional

III. SPECIFICATIONS

ELECTRICAL SYSTEM

General Electrical System

Battery	Dual 12V, negative ground
Alternator	105 AMP, voltage regulated
Starter	12V with solenoid

Circuit Breakers/Fuses (See Model STS 12 Parts Manual.)

Lights

Front of cab	2 halogen field lights
Transom mount	4 halogen work lights (2 each)
Boom cradle (forward)	2 halogen work lights (1 each)
Boom cradle (rearward)	2 halogen work lights (1 each)

CAB AND INSTRUMENTS

Cab

General cab	Tilt steering Windshield wiper/washer Power 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

Instruments

Message Center	Hour meter Fuel Water temperature Alternator Oil pressure Ground speed Engine RPM Tread adjustment assist Shift range Turbo PSI
Stereo	AM/FM stereo cassette with dual speakers

III. SPECIFICATIONS

TIRES

Tires (front and rear)

Standard	380/90R46 (Radial TU)
Air pressure	35 PSI (240 kpa)
Tire width	15.0 in. (381 mm)
Load capacity at 25 MPH (40.2 Km/H)	7150 lbs. (3250 kg)
Overall diameter	72.7 in. (1847 mm)
Static load radius (suggested—will vary with load)	33.5 in. (851 mm)
Rolling circumference	219.0 in. (5563 mm)
Optional (narrow row crop)	320/90R50 (Radial TU)
Air pressure	35 PSI (240 kpa)
Tire width	12.6 in. (320 mm)
Load capacity at 25 MPH (40.2 Km/H)	6800 lbs. (3075 kg)
Overall diameter	72.6 in. (1844 mm)
Static load radius (suggested—will vary with load)	33.8 in. (859 mm)
Rolling circumference	219.0 in. (5563 mm)
Optional (wide)	580/70R38 (Radial TU)
Air pressure	23 PSI (160 kpa)
Tire width	23.1 in. (587 mm)
Load capacity at 25 MPH (40.2 Km/H)	8550 lbs. (3875 kg)
Overall diameter	72.2 in. (1834 mm)
Static load radius (suggested—will vary with load)	32.4 in. (823 mm)
Rolling circumference	216.4 in. (5497 mm)

CAPACITIES

Solution tank	1200 gallons (4542 ℓ)
Fuel cell	140 gallons (530 ℓ)
Cooling system (including block, lines & radiator)	18 gallons (68 ℓ)
Hydraulic oil (including reservoir, lines, filter & cooler)	55 gallons (208 ℓ)
Rinse system stainless steel tank	100 gallons (379 ℓ)
Foam marker stainless steel tank	36 gallons (136 ℓ)
Engine crankcase (including filter)	17 quarts (16 ℓ)
Torque Hub®	
Front (2)	84 oz. (2.5 ℓ) each (approx.)
Rear (2)	62 oz. (1.8 ℓ) each (approx.)

IV. OPERATING INFORMATION

OPERATING THE ENGINE

Pre-operational Checks

Starting the Engine

ENGINE OPERATION CONTINUED

IV. OPERATING INFORMATION

ENGINE OPERATION CONTINUED

FIG 4.01

FIG 4.02

CAUTION

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

1. Position hydrostatic control lever to "N" (neutral) position.
2. Put the parking brake switch (fig. 4.01) to the "ON" position. (See page 22) When starting procedure is complete, return switch to "OFF" position.
3. Turn the ignition key switch to the start position to engage the starter. If the engine fails to start after 15 seconds, turn key to "OFF", wait one minute and repeat the procedure. If the engine does not start after three attempts, check fuel supply system. Absence of blue or white exhaust smoke during cranking indicates no fuel is being delivered.
4. Observe warning lights on ignition switch panel (fig. 4.02) after start up.
5. If any functions do not operate, shut off engine and determine cause.
6. Always allow at least a five minute warm-up period before operating the engine at high RPM. This means the engine must reach operating temperature and oil pressure must stabilize in the normal operating range before it is run faster than an idle (1000 RPM or less).

NOTE:

Cold oil may not flow in quantities adequate to prevent pump cavitation.

IV. OPERATING INFORMATION

HYDROSTATIC SYSTEM

FIG 4.03

FIG 4.04

Hydrostatic Drive

1. Speed ranges are selected by a three-position electronic switch mounted on the console (fig. 4.03, item 2). The lower the setting, the higher the torque, but the lower the speed.
2. Increase engine RPM with the throttle switch (fig. 4.03, item 1) to the maximum recommended engine speed setting.

> **NOTE:**
> Never operate the sprayer at anything less than full recommended throttle.

3. To move forward, slowly push the hydrostatic control lever (fig. 4.04) forward. The farther the control lever is moved, the faster the sprayer will travel. To stop, slowly pull the lever to the “N” (neutral) position.
4. To reverse the machine, slowly pull the hydrostatic control lever back. To stop, slowly push the lever to the “N” (neutral) position.
5. Before turning off the engine, reduce engine speed and allow the engine to idle at least three minutes.

Cruise Control

The maximum speed of the hydrostatic control lever may be adjusted with the cruise control dial (fig. 4.04). This will conveniently help regain consistent field speeds when reentering a field from the end rows.

To set a cruise limit, start with the engine at maximum recommended throttle and cruise control dial all the way down (counterclockwise). Push the hydrostatic control lever all the way forward. Now turn the cruise control dial up while observing the ground speed and stop turning the dial when the desired field speed is reached. Now your maximum field speed is set and you simply reposition the handle all the way forward to regain that speed.

IV. OPERATING INFORMATION

FIG 4.05

FIG 4.06

FIG 4.07

Parking Brake

When the engine is shut off or if the charge pressure is below 150 PSI the brakes will become activated. To set the brakes while the engine is running, activate the switch located on the right-hand switch panel.

To engage the brakes, press the safety lock (fig. 4.05) on the switch up. While holding the safety lock up, depress the top of the switch (fig. 4.06). To release the brakes, depress the bottom of the brake switch (fig. 4.07). Always return the brake switch to the “OFF” position before moving the sprayer.

⚠CAUTION

Activating the brake switch while the machine is moving is potentially hazardous to the operator and the sprayer.

IV. OPERATING INFORMATION

HYDRAULIC SYSTEM

The auxiliary hydraulic system is an open type directly mounted behind the heavy duty variable displacement pump. This system consists of two, dual gear pump systems that supply the required hydraulics to operate the full time power steering unit, boom control cylinders (lift, level, fold), the solution pump, ladder and hydraulic tread adjust.

After supplying each of these systems, the hydraulic oil is sent to the oil cooler at the rear of the engine compartment. Here it is cooled and then sent back to the hydraulic oil reservoir.

FIG 4.08

NOTE:

Immediately shut down engine if low level hydraulic oil light comes on in cab (fig. 4.08).

⚠ CAUTION

DO NOT GO NEAR LEAKS. High pressure oil easily punctures skin causing injury, gangrene, or death. If injured, seek emergency medical help. Immediate surgery is required to remove oil. Do not use finger or skin to check for leaks. Lower load or relieve hydraulic pressure before loosening fittings.

HYDRAULIC SYSTEM CONTINUED ➡

IV. OPERATING INFORMATION

Operating the Hydraulic Ladder Lift

FIG 4.09

FIG 4.10

FIG 4.11

⚠ CAUTION

Never operate ladder while anyone else is on the service platform, ladder or on the ground near the machine.

To raise or lower the ladder, locate the ladder switch on the right-hand console (fig. 4.11, item 2). Depress the top of the switch to raise the ladder and depress the bottom of the switch to lower the ladder. If in the raised position, ladder will automatically lower when machine is turned off.

Raise the ladder before placing machine in motion. When ladder is in the down position while machine is on, the “LADDER DOWN” warning is lit on the warning panel (fig. 4.11, item 1).

IV. OPERATING INFORMATION

Operating the Hydraulic Tread Adjust

FIG 4.12

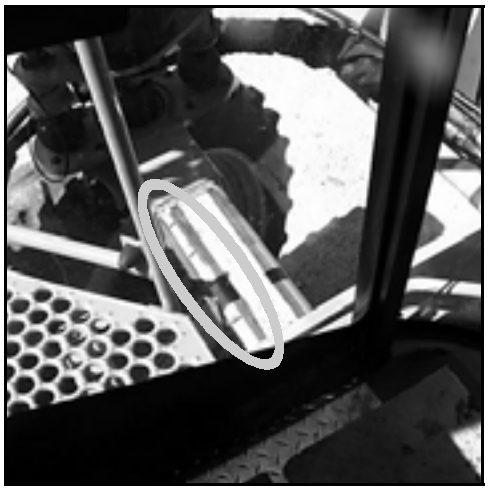


FIG 4.13

FIG 4.14

⚠ CAUTION

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

1. Survey the surroundings and allow yourself enough room to adjust tread either in forward or reverse.
2. Locate the tread adjustment switches on right-hand console (fig. 4.12) and select the button marked “SIDE”. Depressing either side of the button will select the corresponding side of tread to be adjusted.
3. The legs may be moved in or out on each side independently. While driving between one and two mph, press and hold the front and back switch simultaneously or separately.
4. Observe the tread width on each leg. Front legs use indicator decals (fig. 4.13) and rear legs use electronic sensors and the message center in the cab (fig. 4.14). See page 51 for information about message center. Release the switch when the tread indicator reaches the desired tread marking.
5. With one side complete, depress the “SIDE” switch to select the other side. Repeat the above procedure for the other side.
6. After adjustment is complete, all four tread width indicators should have identical readings. Return the “SIDE” selection switch to the center neutral position.
7. To recalibrate toe-in: while driving forward slowly, turn the steering wheel all the way one way until the steering cylinder bottoms out; continue turning the wheel a little more to let fluid bypass the cylinder. Then turn the steering wheel all the other way and repeat the process. When wheels are then straightened, steering cylinders should be recentered and correct toe-in should be obtained (see page 75).

IV. OPERATING INFORMATION

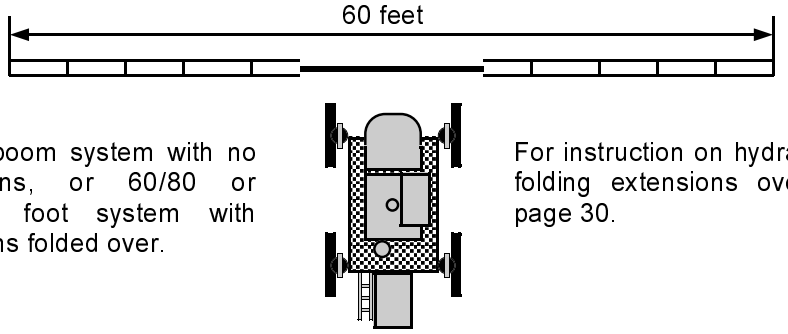
SPRAY BOOMS

Spray booms are available in three different configurations: 60 ft., 60/80 ft., and 60/80/90 ft. Hydraulically folding the extensions of a 60/80 or 60/80/90 foot system and adjusting spray valves essentially turns it into a 60 foot boom (see pages 30 & 35). Manually folding the outer extensions of a 60/80/90 foot system, adjusting spray valves and recalibrating spray monitor essentially turns it into an 80 foot boom (see pages 32 & 52).

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 (page 27), level (page 28), horizontal fold (page 29) and (on 60/80 or 60/80/90 foot systems) vertical fold (page 30).

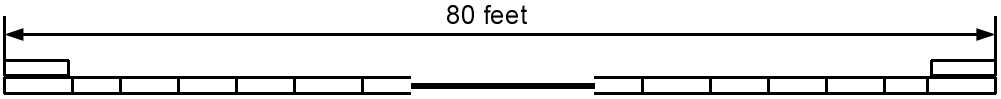
All STS 12 spray booms are equipped with a main hydraulic breakaway circuit. The boom must be reset manually by the operator with the left or right horizontal fold controls.

Eighty and ninety foot spray booms are also equipped with a one-way hydraulic breakaway circuit on the outer boom section. The outer breakaway is self-resetting and will return to normal operating position after it has cleared the hazard.



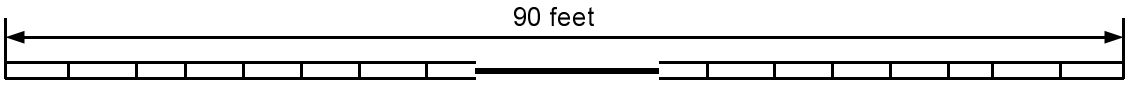
60 foot boom system with no extensions, or 60/80 or 60/80/90 foot system with extensions folded over.

For instruction on hydraulically folding extensions over, see page 30.



60/80/90 foot boom system with outer extensions manually folded forward. 60/80 foot system would not have outer extensions.

For information on manually folding outer extensions forward, see page 32.



60/80/90 foot boom system with all extensions folded out.

IV. OPERATING INFORMATION

Lift

FIG 4.15

To raise and lower the transom/boom assembly, depress the “GRAY” (UP) or the “RED” (DOWN) buttons on the hydrostatic drive handle (fig. 4.16 item 1 & 2). While depressed, either button activates the transom lift cylinders (fig. 4.15).

FIG 4.16

NOTE:

See your spray tip manufacturer’s guide for information regarding spray tip height (fig. 4.17).

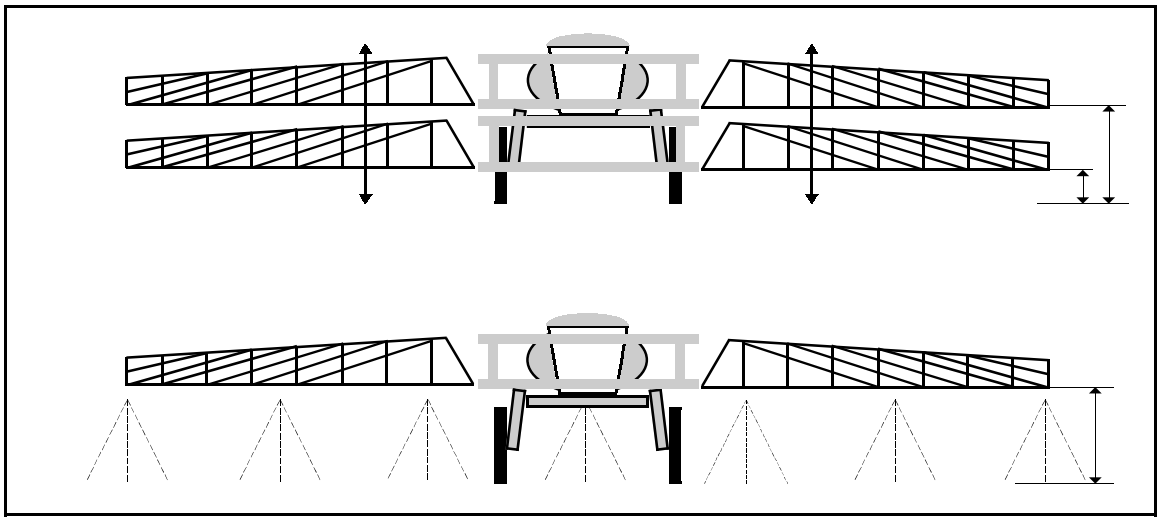


FIG 4.17

BOOM OPERATION CONTINUED

IV. OPERATING INFORMATION

➡ BOOM OPERATION CONTINUED

FIG 4.18

Level

To increase or decrease the angle of each individual boom level, depress the left or right “GRAY” (UP) or the left or right “RED” (DOWN) buttons on the hydrostatic drive handle (fig. 4.19, items 1 thru 4). While depressed, these buttons activate the level cylinders connecting either boom to the transom (fig. 4.18).

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

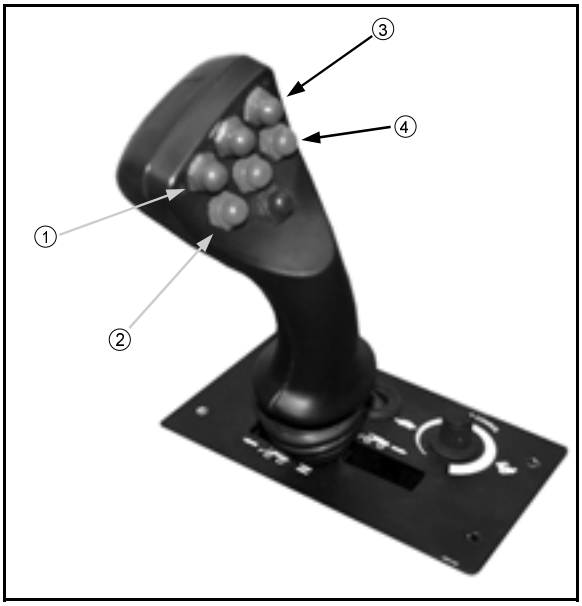


FIG 4.19

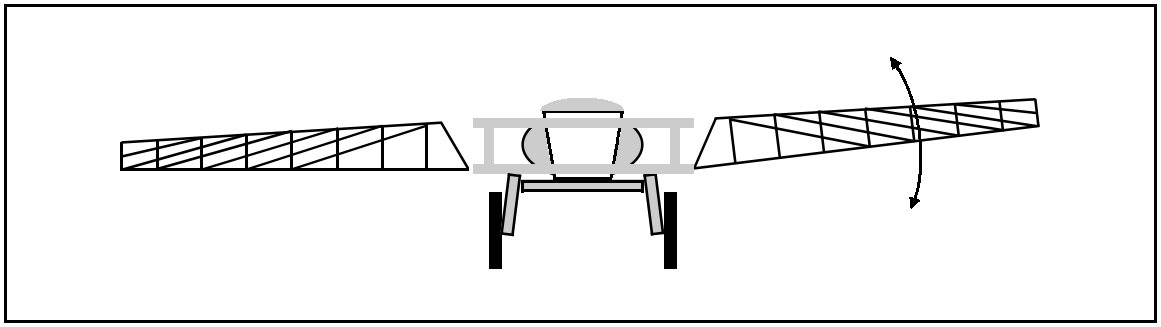


FIG 4.20

FIG 4.21

Fold

HORIZONTAL BOOM FOLD - To fold either boom horizontally in toward the machine or out away from the machine, depress the top or bottom of either or both "BOOM FOLD" switches (fig. 4.22). While depressed, these switches activate cylinders connecting either boom to the transom (fig. 4.21).

Fold or unfold the booms in an open area only. Make sure no one is standing in the path of the boom fold's travel path.

FIG 4.22

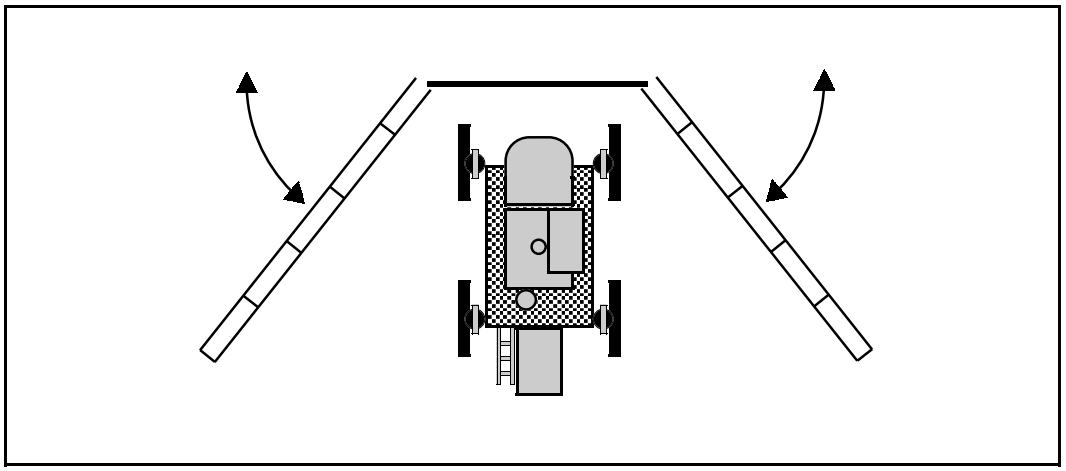


FIG 4.23

BOOM OPERATION CONTINUED

IV. OPERATING INFORMATION

Fold

FIG 4.24

VERTICAL EXTENSION FOLD - To fold the boom extensions vertically in or out, depress the top or "bottom of the "EXTENSION" switch (fig. 4.25). This activates both extension cylinders connecting the inner boom section and the center boom section (fig. 4.24).

Fold or unfold the booms in an open area only. Make sure there are no overhead obstructions or wires to interfere with extension folding.

NOTE:

Booms extensions can only be folded when hydro-static control lever is in the neutral position. If sprayer is put in gear during folding, booms will stop.

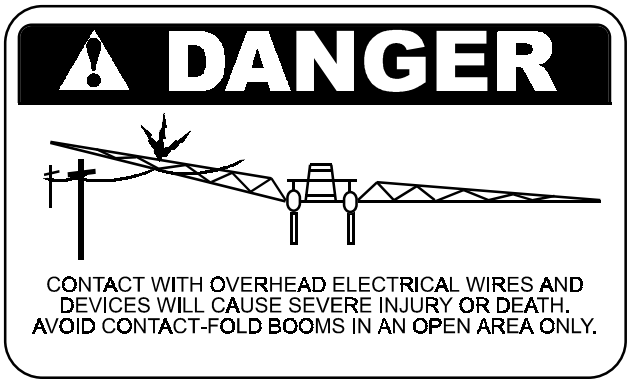


FIG 4.25

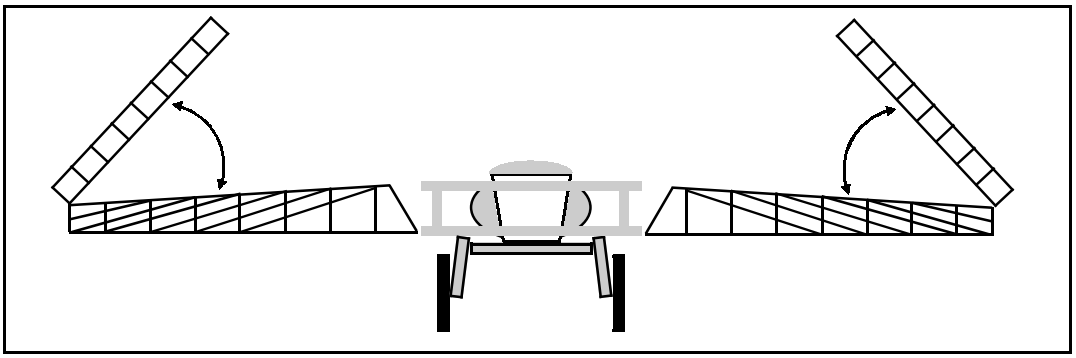


FIG 4.26

IV. OPERATING INFORMATION

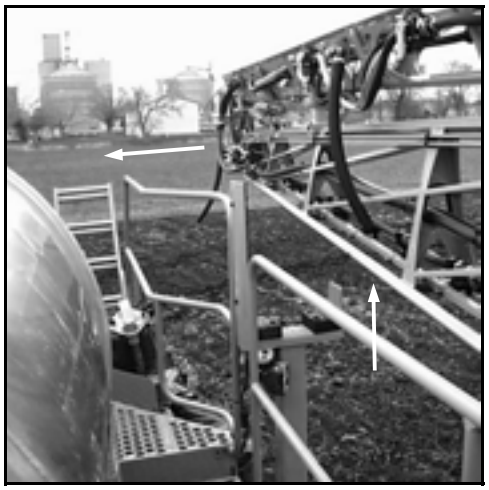


FIG 4.27

FIG 4.28

Cradling Booms

The booms should always be cradled when 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. The closer the booms get to the cradle, the more careful you need to be while making adjustments to avoid damage. Raise each individual boom level until it clears the outer cradle stop (fig. 4.27). 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 (fig. 4.28).

NOTE:

Booms must be in folded position when cradled. Failure to do so may cause boom damage.

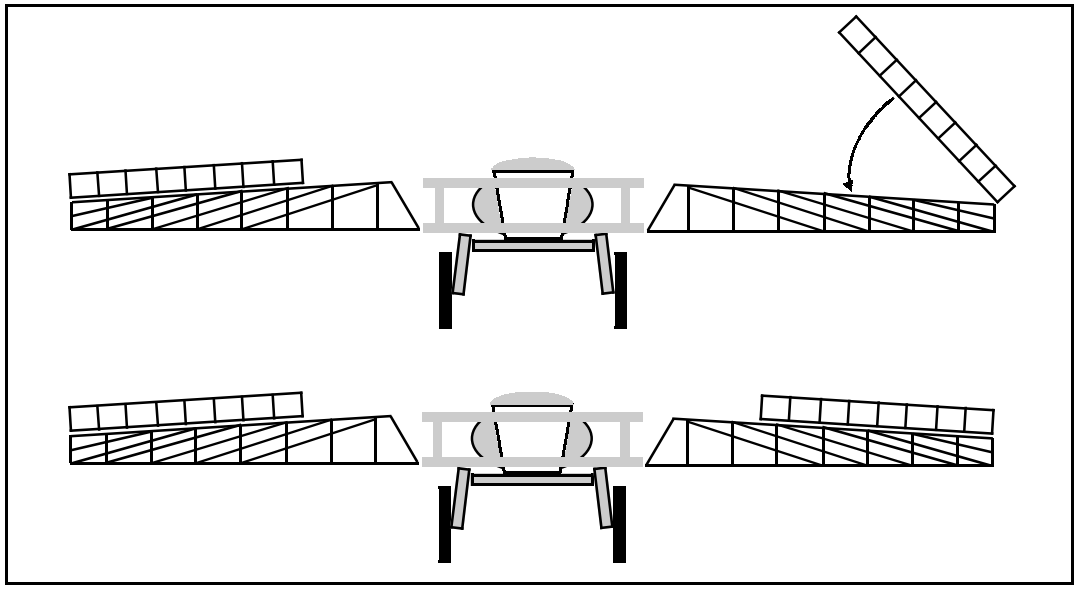


FIG 4.29

FIG 4.30

FIG 4.31

FIG 4.32

Folding 90’ Boom to 80’ Boom

To convert a 90 foot boom to an 80 foot boom, manually close the solution supply valve on the outer section (fig. 4.30). Remove the pin on the back side of the boom so it will hinge forward (fig. 4.31) and secure it with rear pin (fig. 4.32) Repeat these steps on the other side and recalibrate monitor accordingly (see page 52) before spraying resumes. See page 41 for information regarding foam marker width adjustment.

IV. OPERATING INFORMATION

SPRAY SYSTEM

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

SPRAY SYSTEM OPERATION INSTRUCTIONS

	OPERATION	PAGE REFERENCE
1.	Calibrate spraying system monitor.	52
2.	Check contents and quantity in spray tank.	

NOTE:

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.

3.	Start engine and maintain a relatively low engine RPM setting (1,000 RPM). Increase engine RPM slowly until full recommended operating RPM is reached.	19
4.	If desired, activate the agitation system.	40
5.	Turn on the solution pump switch.	34
6.	Turn on main spray power.	36
7.	Place individual boom solution valve switches to the “ON” position.	35
8.	Slowly move the hydrostatic control lever forward to obtain the desired ground speed.	21
9.	Frequently observe the pressure gauge. When it drops to zero, or spray pattern deteriorates, shut off main spray power, solution pump, and agitation system until refilling solution.	34, 36, 34, 40, 38

SPRAYING SYSTEM CONTINUED ➡

IV. OPERATING INFORMATION

SPRAYING SYSTEM CONTINUED

FIG 4.33

Solution Pump

To turn the solution pump (4.33) on, place the solution pump switch (fig. 4.34) to the “ON” position while at a relatively low engine RPM setting (1,000 RPM). Increase engine RPM slowly and maintain full recommended throttle RPM for field operation. When finished applying solution or if solution tank is empty, turn the solution pump switch to the “OFF” position.

NOTE:

DO NOT allow the pump to continue running when the boom switches are turned off (see page 35). Failure to do so will generate over-heating and cause severe pump damage and void the warranty.

FIG 4.34

Solution Pressure Gauge

The solution pressure gauge (fig. 4.35) gives the operator a constant visual display of the amount of solution being applied (measured in PSI). The pressure (as determined by the monitor-controlled variable flow control) will vary according to ground speed. If applying solution manually, the solution pressure gauge visually informs the operator of needed manual adjustments.

FIG 4.35

IV. OPERATING INFORMATION

FIG 4.36

Electric Solution Valves

The spray booms are divided into sections that are independently supplied with solution and can therefore independently be shut off or turned on. The number and location of solution valves varies with boom length. Sixty foot booms 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 valves mounted on the transom and one mounted on each boom.

FIG 4.37

Boom Valve Switches

The electronic boom solution valves are controlled by a panel of switches mounted under the spraying system's monitor (fig. 4.36). When the switches are in the "UP" position they are on and when they are in the "DOWN" position they are off.

Boom Section L.E.D. Indicators

Boom solution valve status is displayed on the transom by a series of L.E.D. indicators (fig. 4.37). Each indicator will light up if that particular boom solution valve is turned "OFF."

IV. OPERATING INFORMATION

SPRAYING SYSTEM CONTINUED

FIG 4.38

Main Solution Switch

Main spray power can be controlled from two different locations: a floor-mounted “dimmer-style” switch (fig. 4.38) or a switch mounted on the hydrostatic control lever (fig. 4.39). Either one controls the power supply to the panel of boom solution valve switches (fig. 4.40). One of the switches must be on to supply the panel switches with voltage. This way you can turn all of the boom solution valves “ON” or “OFF” all at once in a hands-free execution such as turning the main solution switch “OFF” as you arrive at the end rows of a field and turn it back “ON” as you enter the field again. Whichever switch supplied the power to the boom solution valve switches must be the one you turn off to disconnect the power; i.e. if you use the switch on the hydrostatic control handle to turn the power on, you will not be able to turn the power off with the floor switch, you must use the switch on the handle.

When the main spray power is “ON” a “GREEN” indicator light mounted at the bottom of the message center will light up (fig. 4.41). When the light is not lit, the main solution switch is “OFF.”

FIG 4.39

FIG 4.40

FIG 4.41

FIG 4.42

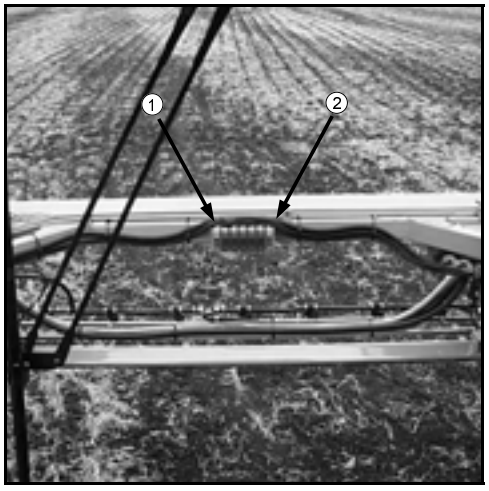


FIG 4.43

Fence Row Applicator

To operate the fence row nozzle, locate the fence row switch on the switch control panel (fig. 4.42). If you wish to turn on the right fence row nozzle, depress the top side of the fence row switch. If you wish to turn on the left fence row nozzle, depress the bottom side of the fence row switch. To turn either fence row nozzle off, return the fence row switch back to the center ("OFF") position.

As you engage either fence row nozzle you may notice a drop in solution pressure.

A set of amber L.E.D. lights mounted on the transom on either side of the boom solution valve L.E.D. lights will inform the operator of fence row status. If the left fence row nozzle is on, the left amber L.E.D. light is lit (fig. 4.43, item 1). If the right fence row nozzle is on, the right amber L.E.D. light is lit (fig. 4.43, item 2). If neither amber L.E.D. light is lit, no solution is being applied through the fence row nozzles.

FENCE ROW OPTION CONTINUED

SPRAYING SYSTEM CONTINUED

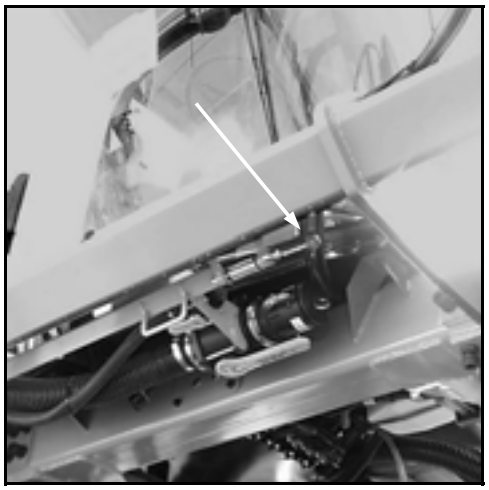


FIG 4.44

Solution Quick-Fill

To fill the solution tank, make sure the sump valve under the tank is open. To access the front fill, pull the front fill latch lever down and the assembly will lower (fig. 4.44). Connect it to your solution supply (fig. 4.45, item 2) and fill to the desired level. You may also fill the rinse tank from ground level (fig. 4.45, item 1) with owner supplied connection. When finished, shut the valves and return the front fill to the locked position. See the next page for information regarding the use of the side fill inductor (fig. 4.46) for filling the solution tank.

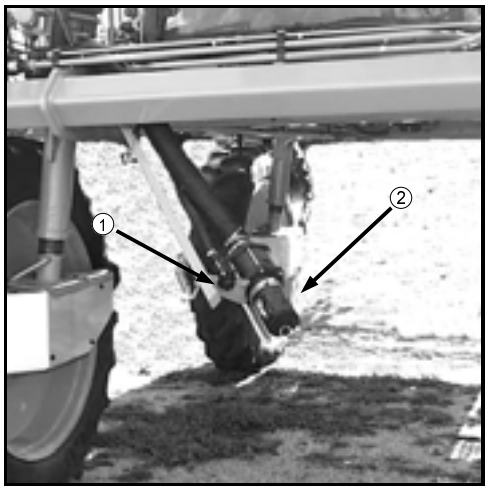


FIG 4.45

FIG 4.46

IV. OPERATING INFORMATION

Inductor Operation

With the engine running and the parking brake set, lower the inductor assembly with the inductor control box (fig. 4.47, item 2). If filling with the suck-on attachment, leave the engine running. If filling with the push-on attachment, turn the engine off.

NOTE:

The following fill and rinse scenarios refer to figure 4.48 below)

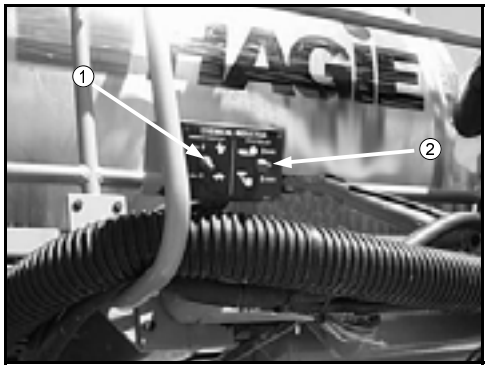


FIG 4.47

Load water only: B-capped, C-off, E-connected, F-open, G-off (flow arrow left), H-off.

Suck water only*: B-connected, C-open, E-capped, F-off, G-off (flow arrow left), H-off.

Load water/induct chem: B-capped, C-off, E-connected, F-open, G-off (flow arrow left), H-open.

Suck water/induct chem*: B-connected, C-open, E-capped, F-off, G-off (flow arrow left), H-open.

Fill rinse tank: I-handle perpendicular to sprayer.

Rinse inductor tank with rinse tank: G-flow arrow up, H-open, I-handle parallel to machine.

Rinse inductor tank with nurse tank (suck or load): G-flow arrow down, H-open, I-handle parallel to machine

*To activate "suck-on" pump, flip the inductor control switch up (fig. 4.47, item 1). This will start the pump and increase engine speed. Flip switch down after filling is complete. Return inductor assembly to upright position before moving sprayer.

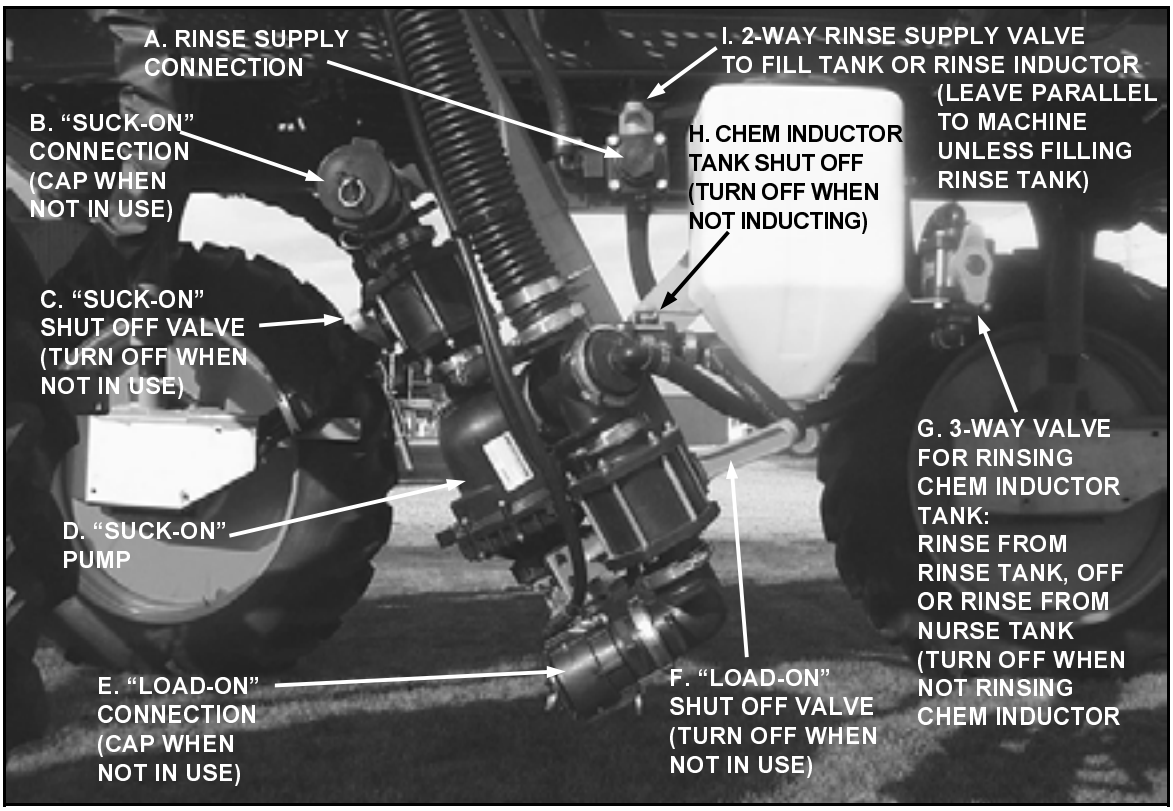


FIG 4.48

IV. OPERATING INFORMATION

AGITATION SYSTEM

FIG 4.49

The speed of the sparge agitation system is controlled by a variable flow solution valve mounted on the solution pump (fig. 4.49). The agitation switch (fig. 4.50) on the right-hand console controls the rate of flow through the sparge system. While watching the indicator on the sparge valve (fig. 4.51, item 1), increase or decrease the flow rate with the agitation control switch. Press up to increase flow rate and down to decrease it. When desired rate of flow is achieved, release the agitation switch.

FIG 4.50

FIG 4.51

FOAMER SYSTEM CONTINUED

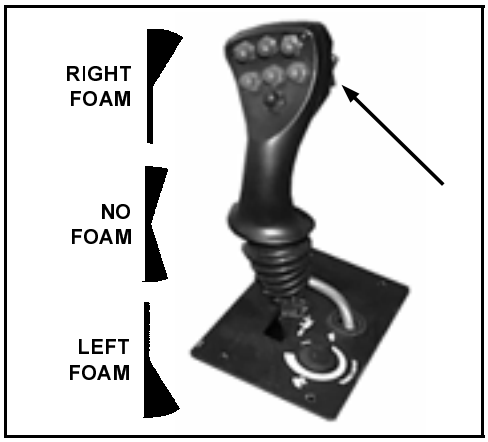


FIG 4.52

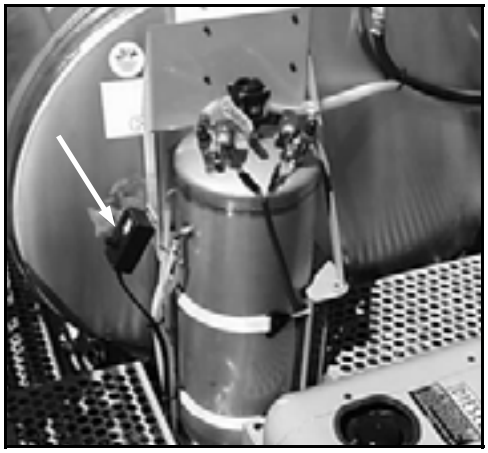


FIG 4.53

Foamer Operation

To operate the foam marking system, locate the rocker switch on the side of the hydrostat control handle (fig. 4.52). Depress the top of the switch foam is desired from the left foam drop. Depress the bottom of the switch if foam is desired from the right foam drop. Return the switch to the middle position if no foam is desired.

System pressure is indicated by a pressure gauge on the regulator which is mounted next to the foam tank (fig. 4.53). To adjust the air pressure in the foam tank, turn the knob on the regulator clockwise for more pressure, and counterclockwise for less pressure. To correctly decrease the pressure in the foam tank, you must first open either the left or right foam valve for a moment to relieve system pressure. Then adjust regulator accordingly.

See figure below for foam drop valve configurations.

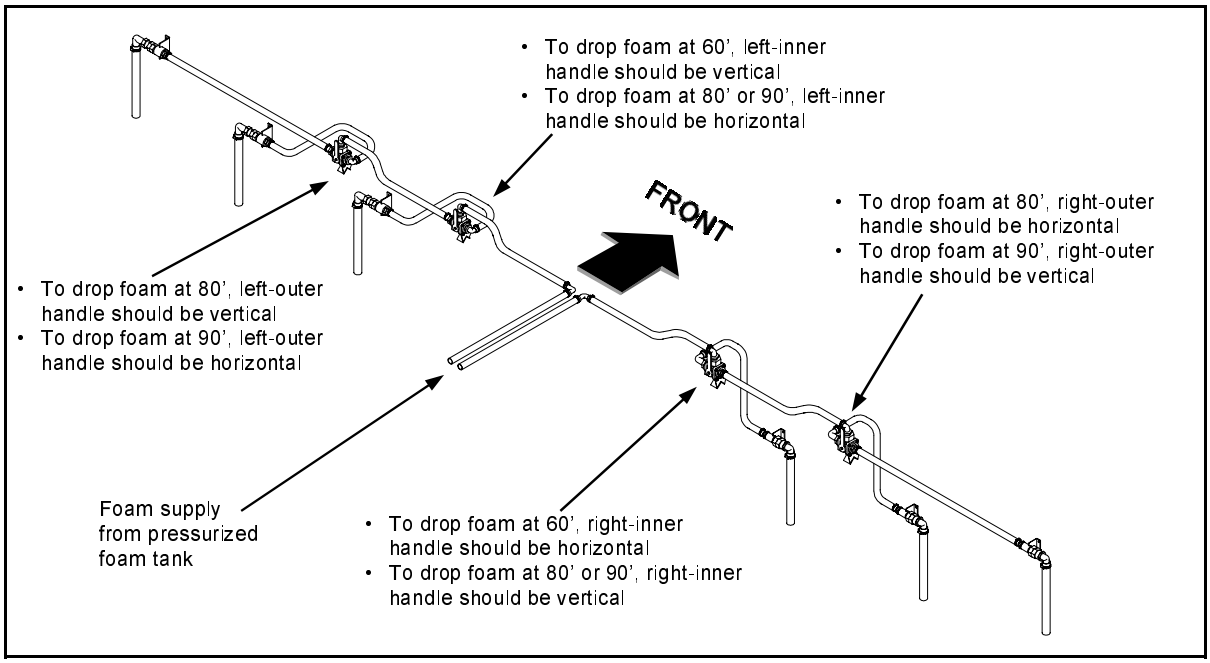


FIG 4.54

IV. OPERATING INFORMATION

FOAMER SYSTEM CONTINUED

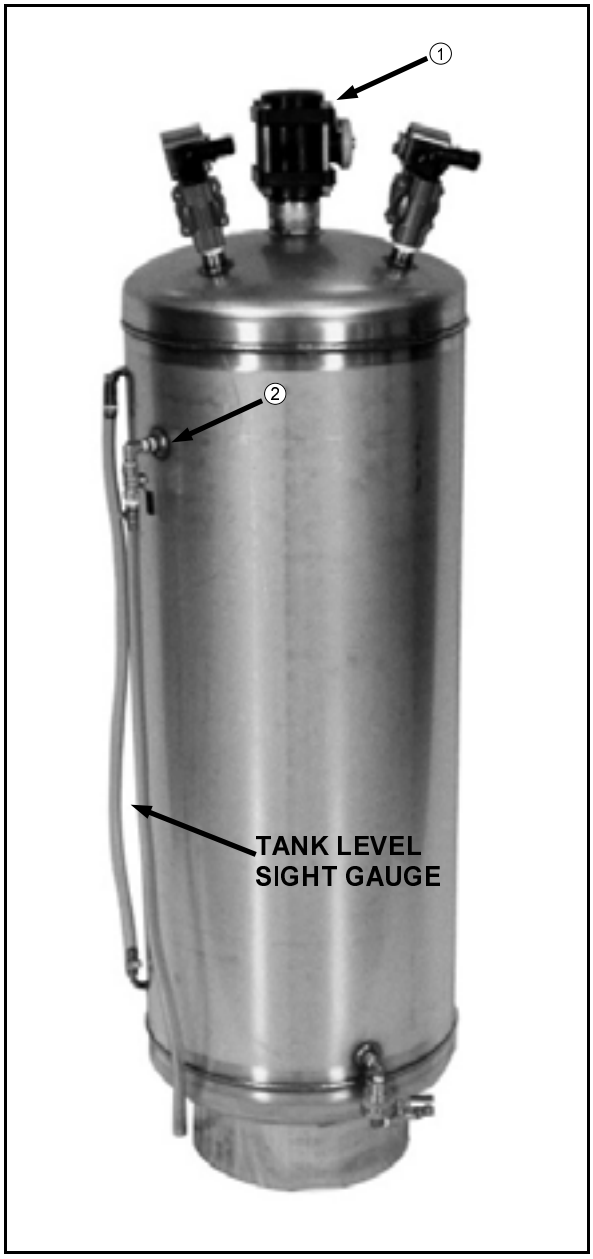


FIG 4.55

Filling Foam Marker System

CAUTION

Before performing any service or refilling of the foam marker, shut the engine off and relieve system pressure from the tank.

WARNING

DO NOT stand directly over or in front of valves when opening.

Relieve pressure from the foam tank by opening the ¼" ball valve on the side of the foam tank (fig 4.55, item 2). Close the ball valve after pressure is relieved. Open the top 2" ball valve (fig. 4.55, item 1). Add water to the tank, leaving enough room for the foam concentrate. Next add the foam concentrate according to the label on the container. After filling is complete, close the 2" ball valve on top of the tank. Start the sprayer's engine and adjust the air pressure accordingly (see previous page).

IV. OPERATING INFORMATION

FIG 4.56

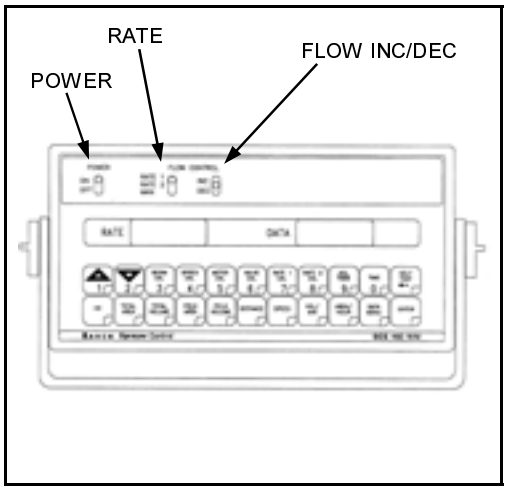


FIG 4.57

Rinse System Operation

To activate the rinse system after the solution tank is empty:

1. Solution pump switch should be in the “ON” position.
2. Turn on spray system monitor (fig. 4.57). Turn the rate switch to the “MANUAL” position. Using the flow increase/ decrease lever, increase solution pressure to maximum PSI.
3. Depress the rinse switch on the right-hand console (fig. 4.56).
4. When finished rinsing the solution tank, return rinse switch back to the “OFF” position.
5. To rinse the boom supply and nozzles, turn the main spray system power on and open the boom solution valves.
6. Adjust the flow control lever on the monitor to maximum solution pressure according to the solution pressure gauge.
7. When finished rinsing the booms, turn the spraying system off (including solution pump switch, monitor, boom solution valves and main spray power switch).

NOTE:

Select a safe area to rinse spray system and clean sprayer where the chemicals will not drift off to contaminate people, animals, vegetation, or water supply.

NOTE:

Refer to chemical manufacturer’s guide for types of cleaning solution combinations (plain water, cleaning agents, etc.). See the next page for operation of the rinse system.

IV. OPERATING INFORMATION

HAND WASH SYSTEM

FIG 4.58

NOTICE

FILL WITH FRESH WATER ONLY

Fill hand wash system tank (fig. 4.58) with fresh water only. The hand wash valve is located under the left side of the sprayer (fig. 4.59). Remember to close the valve before refilling.

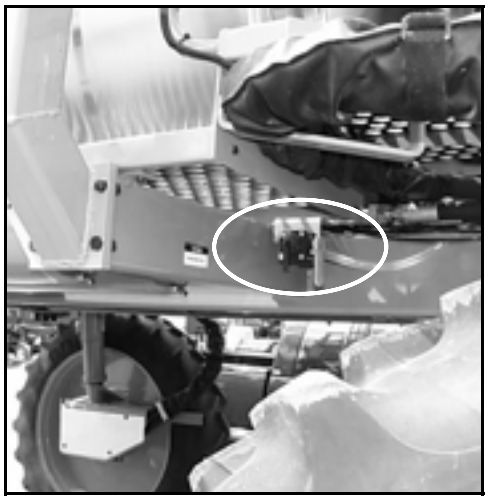


FIG 4.59

NOTICE

HAND WASH ONLY

LIGHTS

FIG 4.60

FIG 4.61

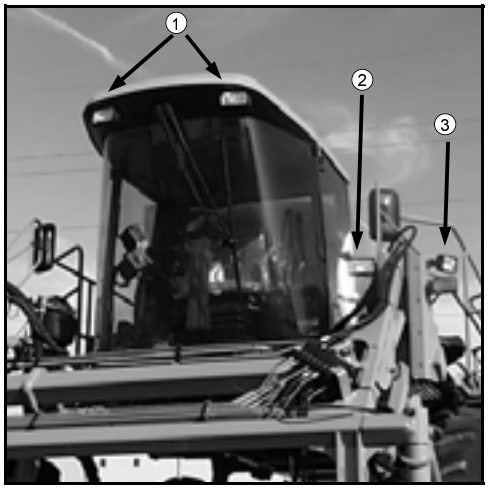


FIG 4.62

HIGHWAY LIGHTS - Mounted on the inside of each transom lift arm mount (two total) is a halogen driving lamp (fig. 4.62, item 2). Use these lights when traveling on a public road at night. Turn them on by twisting the light lever (fig. 4.60) to the first "ON" position (fig. 4.63B).

FIELD LIGHTS - Mounted on the outside of each transom lift arm mount (two total) is a halogen field lamp (fig. 4.62, item 3). The front of the cab also houses two halogen field lamps (fig. 4.62, item 1). Use these lights when operating in a field after dark. Turn them on by twisting the light switch to the second "ON" position (fig. 4.63A). Turn them off when entering a public roadway.

The highway or field lights are operational when the light switch is in either the up or down position (fig. 4.61). The ignition key does not have to be on in order to operate the highway or field lights, but extended use without the engine operating to charge the battery is not recommended.

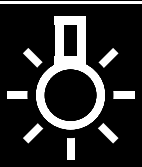
A		Field lights
B		Highway lights
C		No lights

FIG 4.63

LIGHTS CONTINUED

FIG 4.64

Work Lights

Additional work lights are located on each boom cradle (fig. 4.64, items 1 & 2), one on each side facing forward and one on each side facing backward. Use these lights when operating in a field after dark. Turn them on by pushing the light switch down away from you (fig. 4.65). To turn them off, lift the light switch up toward you. Turn them off when entering a public roadway.

The ignition key does not have to be on in order to operate the work lights, but extended use without the engine operating to charge the battery is not recommended.

FIG 4.65

IV. OPERATING INFORMATION

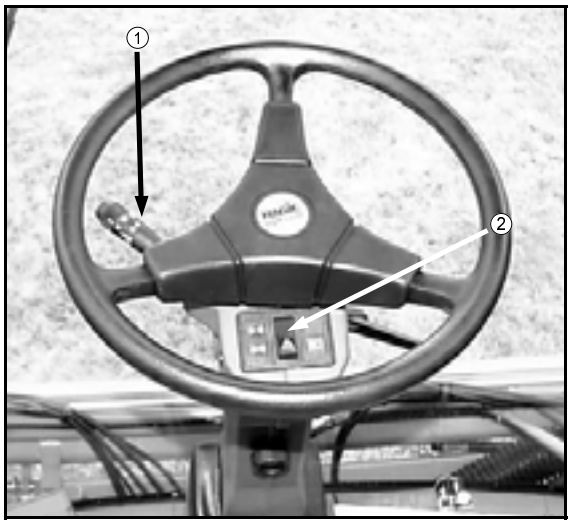


FIG 4.66

Turn Signals

To activate the front (fig. 4.67) and rear turning signals (fig. 4.68, item 2), move the turn signal lever (fig. 4.66, item 1) up to turn right and down to turn left. Steering column-mounted turn signal indicators will correspondingly flash when either side of the turn signals is activated. The turn signal lever is not a self-centering switch; you must return it to the "OFF" position by hand after completing your turn.

FIG 4.67

Hazard/Warning Lights

To activate the flashing hazard/warning lights (fig. 4.67 & 4.68, item 1), depress the "FLASHER" switch (fig. 4.66, item 2). Activate the hazard/warning lights anytime traveling on a public road, day or night, unless prohibited by law.

Running Lights

Activating the highway or field lights (see page 45) will also turn on the "RED" running lights on the rear of the machine (fig. 4.68, item 2).

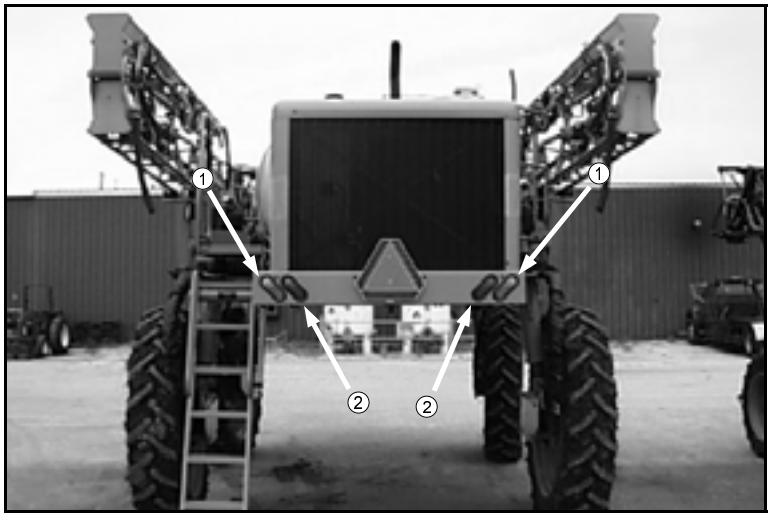


FIG 4.68

IV. OPERATING INFORMATION

HAGIE STS 12 CAB

FIG 4.69

FIG 4.70

Emergency Exit

The right cab door may be opened in the event that an emergency exit is required. To open the door:

1. Grasp the right door emergency exit handle (fig. 4.70) and lift upward (fig. 4.71).
2. Push door outward until latch post on frame is centered in the notch on door handle (fig. 4.71, item 1).
3. Push handle downward to free it from latch post (fig. 4.72) and resume pushing door open.
4. Climb out through door and away from hazardous situation.

FIG 4.71

FIG 4.72

CAB OPERATION CONTINUED

IV. OPERATING INFORMATION

CAB OPERATION CONTINUED

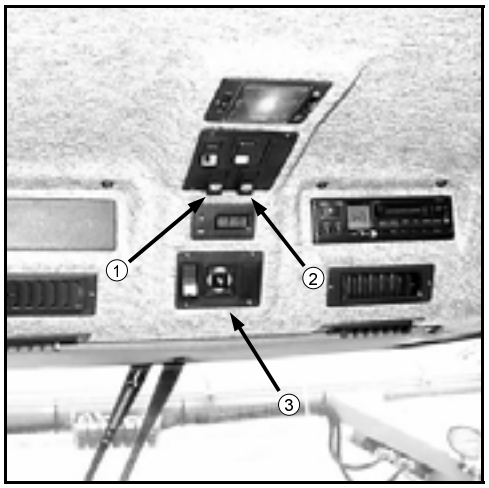


FIG 4.73

FIG 4.74

Windshield Wiper/Washer

To turn the windshield wiper on, locate the windshield wiper switch on the front of the head liner (fig. 4.73, item 1). Depress the switch to the “ON” position. The wiper will continue to operate until the switch is returned to the “OFF” position.

To activate the windshield washer pump, depress the windshield washer switch (fig. 4.73, item 2) and hold the switch down until the desired amount of washing solution has been applied and then release the switch. Turn the wiper switch to the “OFF” position when the washing solution has been completely wiped away.

Power Mirrors

Locate the power mirror control on the headliner (fig. 4.73, item 3). Rotate the control to select either the left or right side mirror, then push the control up, down, left or right for desired mirror position.

IV. OPERATING INFORMATION

FIG 4.75

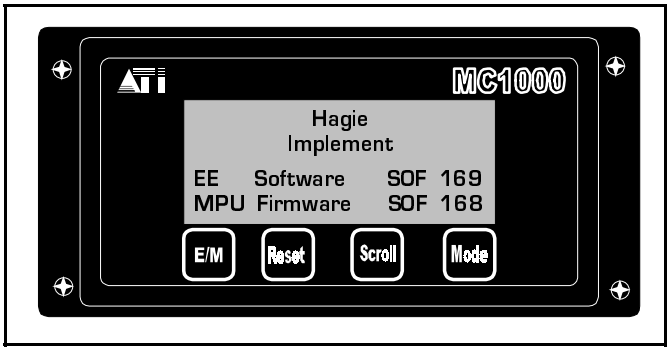


FIG 4.76

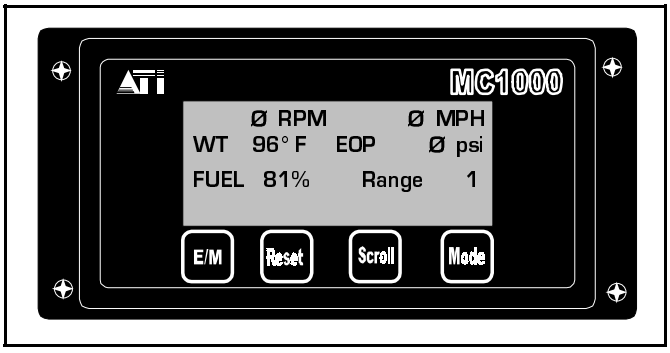


FIG 4.77

Message Center

The message center in the cab of a Hagie STS 12 offers valuable information such as engine RPM, sprayer ground speed, water temperature **(WT)**, engine oil pressure **(EOP)**, fuel percentage remaining and hydrostatic transmission range selection.

Button functions:

E/M – Allows you to set the display to English or metric units.

Reset – Restarts the message center from a fresh power up, as though the sprayer had just been started.

Scroll – Pressing the scroll button lets you browse through ten different readings on the display.

1. Tread setting of left rear and right rear tires.
2. Intake air temperature of engine.
3. Barometer (non-functioning).
4. Engine oil temperature.
5. Fuel rate (gallons per hour).
6. Engine hours.
7. Vehicle identification number.
8. Odometer.
9. Battery voltage.
10. Turbo boost (psi).

Mode – Mode button is currently non-functioning.

V. CALIBRATION

CALIBRATING YOUR SPRAYING SYSTEM

It is important to apply chemicals as recommended by the manufacturers of the product. In order to do so, the spraying system must be properly calibrated. Determine the speed at which the sprayer will be driven while applying chemicals.

To select the best speed, consider the lay of the land, the condition of the soil, the type of crops, the height of the crops, etc. Select the nozzle spacing (distance between each nozzle on the spray boom) best suited for the intended spraying job.

For help in determining the nozzle spacing and height of boom, refer to the spray product catalog that accompanies this manual. There are several types and sizes of nozzles. Select (as recommended by the catalog) and install the type and size of nozzles best suited for the intended spraying job. The type and size of nozzles selected will depend upon the speed the sprayer will travel, the nozzle spacing, and the number of gallons one intends to apply per acre.

IMPORTANT:

DO NOT ADD CHEMICALS UNTIL CALIBRATION IS COMPLETED.

VERIFYING CALIBRATION

Check with manufacturer on recommended spray pressure. To test your system, fill the solution tanks with clean water. Do not add chemicals until calibrated and verified.

With brakes applied, start the engine of the sprayer; throttle the engine to operating speed and remain parked. Turn on all boom section solution switches. Make sure there are no leaks and that all nozzles are spraying a desirable pattern. Continue spraying in the stationary position for at least 10 minutes for proper warm-up of the sprayer and its system. Use the Hagie Calibration Tube (fig. 5.01) to

V. CALIBRATION

catch one nozzle's spray for one minute. If the flow rate is more than the tube will hold, catch the spray in a larger container and then measure the contents with the calibration tube.

The numbered marks on the side of the calibration tube show the flow rate. The measured flow rate should be the same as the flow rate shown on the chart near the bottom of the calibration tube (also shown below). The chart shows rate of discharge in gallons per minute for various field speeds and row spacings to apply 10 gallons per acre.*

FIG. 5.01

If the measured flow rate is not the same as that on the calibration tube's chart, consult the trouble shooting guide in the service manual for the spray system's monitor.

All nozzles should be spraying at about the same flow rate. If one drives the sprayer at the proper speed and maintains the right pressure setting while spraying, the desired gallons per acre will be applied.

RATE OF DISCHARGE

Tip Spacing	GALLONS PER MINUTE**				
	4 mph	5 mph	6 mph	7 mph	8 mph
15"	.101	.126	.151	.176	.202
16"	.107	.133	.160	.187	.214
17"	.114	.142	.171	.199	.228
18"	.121	.151	.181	.211	.242
19"	.127	.158	.190	.222	.254
20"	.134	.167	.201	.234	.268
30"	.201	.251	.303	.351	.403
36"	.242	.302	.363	.423	.484
38"	.255	.318	.382	.446	.510
40"	.269	.336	.403	.470	.538

* Divide by 10 to get 1 gallon per acre rate

** At a rate of 10 gallons per acre

VII. TRANSPORTING

A. DRIVING

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

1. Empty solution tank before entering roadway.
2. Always have the booms in the folded position and cradled when driving or transporting.
3. Flashing hazard/warning lights have been placed on the sprayer to warn other drivers.
4. A SMV (Slow Moving Vehicle) emblem has been mounted on the sprayer to warn other drivers that one is moving slowly. Keep it properly displayed, unless prohibited by law.
5. Know and obey all state laws for driving farm equipment on a public road or highway.
6. Adjust the sprayer's speed to suit the conditions.
7. Slow down and use turn signals before turning.
8. Pull over to side of road before stopping.
9. Keep a proper lookout, and maintain control of the sprayer.
10. Do not drive under trees, bridges, wires, or other obstructions unless there is clearance.
11. Use extra care before entering or leaving a public road or highway.

⚠WARNING

Never drive a sprayer on a roadway with solution in the tank.

B. TRAILERING:

NOTE:

Extra care should be taken when loading the sprayer onto any trailer. Consider whether it is best to back the sprayer on or drive the sprayer forward.

1. Loading:

⚠WARNING

Never load or unload a sprayer with solution in the tanks.

NOTE:

Be sure to read and understand the trailer's owner and operator manual. Hitch the trailer to the pulling vehicle as shown in the trailer's owner and operator manual.

VII. TRANSPORTING

When moving the sprayer onto a trailer, follow these steps completely:

a. Pull the trailer to flat ground. Apply the pulling vehicle's parking brake and turn off the engine. Use tire chocks to keep the trailer from moving.

b. Fold in the sprayer's booms and lower to the boom cradle.

c. Lower the trailer ramps and set the ramp spacing for the sprayer's tread setting.

d. Get someone to help guide you onto the trailer. Keep everyone a safe distance from the sprayer.

⚠WARNING

Stopping the sprayer on the trailer loading ramps may result in sprayer tip-over.

e. Allow enough room between the sprayer and the pulling vehicle for turning.

f. Secure the sprayer to the trailer. See the trailer's owner and operator manual for instructions.

g. Cover or remove the SMV (Slow Moving Vehicle) emblem when traveling over 25 miles per hour.

NOTE:

The loaded height and width of the trailer must conform to the law of the state in which it is being used.

2. Unloading:

When moving the sprayer off of a trailer, follow these steps completely:

a. Pull the trailer to flat ground. Apply the pulling vehicle's parking brake and turn off the engine. Use tire chocks to keep the trailer from moving.

b. Lower the trailer ramps and set ramp spacing for the sprayer's tread setting.

c. Release securing restraints carefully.

d. Get someone to help guide off the trailer. Keep everyone a safe distance from the sprayer.

e. Uncover or replace the SMV (Slow Moving Vehicle) emblem.

NOTE:

The Model STS 12 should never be towed under any circumstances. Machine damage will occur and void the power train warranty.

VII. SERVICE AND MAINTENANCE

PAGE NO	Service Point	CLEAN	CHANGE	CHECK	GREASE	DRAIN
60	ENGINE OIL		A	DAILY		
62	RADIATOR COOLANT LEVEL			DAILY		
63	COOLANT OVERFLOW RESERVOIR LEVEL			DAILY		
62	COOLANT CONCENTRATION		AS REQ	500 HRS*		
66	RADIATOR GRILLE SCREEN	DAILY				
72	ENGINE DRIVE BELT		AS REQ	DAILY		
72	A/C COMPRESSOR BELT		AS REQ	250 HRS		
64	A/C COMPRESSOR		B			
68	FUEL FILTER (WATER SEPARATOR)		500 HRS*			DAILY
65	AIR INTAKE FILTER	NOT REC	C			
65	FILTER MINDER®		D	DAILY		
60	HYDRAULIC RESERVOIR OIL LEVEL		500HRS**	DAILY		
66	HYDRAULIC SUCTION FILTERS (2 TOTAL)		E			
66	HYDROSTATIC CHARGE PRESSURE FILTER		E			
67	HIGH-PRESSURE IN-LINE FILTER (TREAD ADJUST VLVS)	AS REQ				
67	SOLUTION LINE STRAINER	AS REQ		DAILY		
61	TORQUE HUB® OIL LEVEL		F	100 HRS		
69	FRONT LEG STRG ZERKS (4 PLACES – 2 EACH)				50 HRS	
69	REAR LEG BRG ZERKS (2 PLACES – 1 EACH)				500 HRS*	
74	TREAD ADJUSTMENT BEARING TORQUE		AS REQ	50 HRS		
70	BATTERIES	100 HRS	AS REQ	DAILY		
73	LUG NUT TORQUE			G		
78	TIRE PRESSURE			50 HRS		
68	FRESH AIR CAB FILTER	50 HRS	AS REQ			
68	CHARCOAL CAB FILTER		AS REQ			
68	RECIRCULATION FILTER		AS REQ			
77	SPRAY NOZZLE DIAPHRAGMS & SPRAY TIPS			500HRS**		

*OR YEARLY, WHICHEVER COMES FIRST; OR AS REQUIRED
**OR AT THE BEGINNING OF THE SEASON, WHICHEVER COMES FIRST; OR AS REQUIRED
NOTE A: SEE ENGINE MANUFACTURER'S HAND BOOK
NOTE B: CHARGE AS REQ; USE PROPER EQUIPMENT
NOTE C: FOLLOW FILTER MINDER READINGS
NOTE D: RESET EACH TIME YOU SERVICE AIR FILTER
NOTE E: 1ST 50 HRS, THEN 250 HRS THEREAFTER
NOTE F: 1ST 50 HRS, THEN 500 HRS THEREAFTER
NOTE G: IMMEDIATELY, THEN 50 HRS THEREAFTER

VII. SERVICE AND MAINTENANCE

SERVICE INTERVALS

Initial checks after receiving machine

IMMEDIATELY HOURS 0 then HOURS 50

1) Check lug nut torque, then every 50 hours (page 73)

FIRST 50 HOURS HOURS 50 then HOURS 250 or HOURS 500

1) Change Torque Hub® oil, then every 500 hours (page 61)
2) Change hydrostatic charge pressure filter, then every 250 hours (page 66)
3) Change hydraulic suction filters, then every 250 hours (page 66)

Daily HOURS 10

1) Check engine oil (page 60)
2) Drain fuel filter (water separator) (page 68)
3) Check radiator coolant level (page 62)
4) Check radiator coolant overflow reservoir level (page 63)
5) Check engine drive belt (page 72)
6) Check Filter Minder® (page 65)
7) Check hydraulic oil reservoir level (page 60)
8) Check solution line strainer (page 67)
9) Check batteries (page 70)

SERVICE INTERVALS ➡

VII. SERVICE AND MAINTENANCE

SERVICE INTERVALS

As Required 

1) Change coolant concentration (page 62)
2) Clean radiator grille screen (page 66)
3) Change engine drive belt (page 72)
4) Change A/C compressor belt (page 72)
5) Charge A/C compressor (page 64)
6) Change fuel filter (water separator) (page 68)
7) Change hydraulic reservoir oil (page 60)
8) Clean high-pressure in-line filter on tread adjust stack valve (page 67)
9) Clean solution line strainer (page 67)
10) Change batteries (page 70)
11) Knock particles from fresh air intake cab filter (page 68)
12) Change fresh air intake cab filter (page 68)
13) Change charcoal cab filter (page 68)
14) Knock particles from recirculating cab filter (page 68)
15) Change recirculating cab filter (page 68)
16) Check and replace spray nozzle diaphragms and spray tip (page 77)
17) Change tread adjust bearing bolt torque (page 74)

VII. SERVICE AND MAINTENANCE

Every 50 HOURS 

1) Check tire pressure (page 78)
2) Check lug nut torque (page 73)
3) Visually inspect tread adjust bearing bolts (page 74)
4) Grease front steering zerks (page 69)
5) Knock particles from fresh air intake cab filter (page 68)

Every 100 HOURS 

1) Check Torque Hub® oil level (page 61)
2) Clean batteries (page 70)
3) Check tread adjust bearing bolt torque (page 74)

Every 250 HOURS 

1) Check A/C compressor belt (page 72)
2) Change hydrostatic charge pressure filters (page 66)
3) Change hydraulic suction filters (page 66)

Every 500 HOURS  or 

1) Check coolant concentration (page 62)
2) Change fuel filter (water separator) (page 68)
3) Change hydraulic reservoir oil (page 60)
4) Change Torque Hub® oil (page 61)
5) Check spray nozzle diaphragms and spray tips (page 77)
6) Grease rear leg bearing zerks (page 69)

VII. SERVICE AND MAINTENANCE

FLUIDS

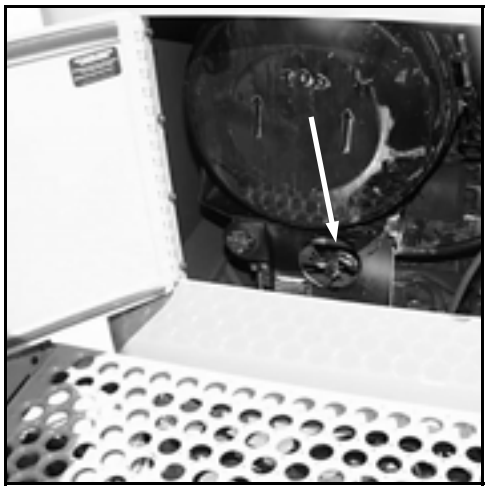


FIG 7.01

Engine oil

OIL LEVEL - The engine oil level dipstick is located on the left-hand side of the engine (fig. 7.01). 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 off the engine to check the oil level; this allows time for the oil to drain to the oil pan. Check the engine oil level daily.

CAPACITY - Low to high mark capacity is 2.0 quarts. Engine oil pan capacity is 17 quarts. Refer to Engine Operation and Maintenance manual for maintenance schedule.

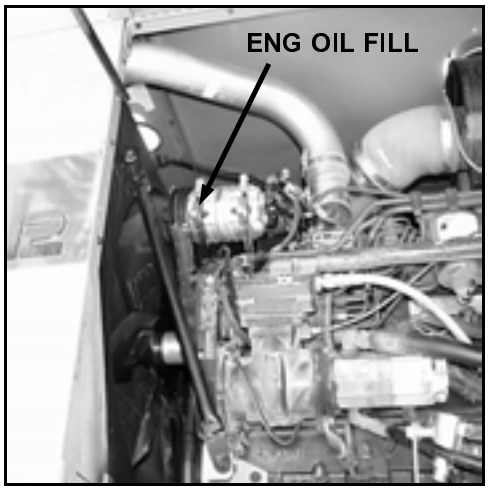


FIG 7.02

NOTE:
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 (fig 7.03) 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 oil 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.

FIG 7.03

VII. SERVICE AND MAINTENANCE

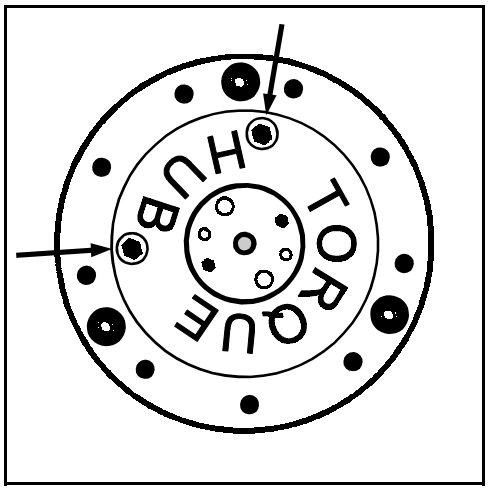


FIG 7.04

FIG 7.05

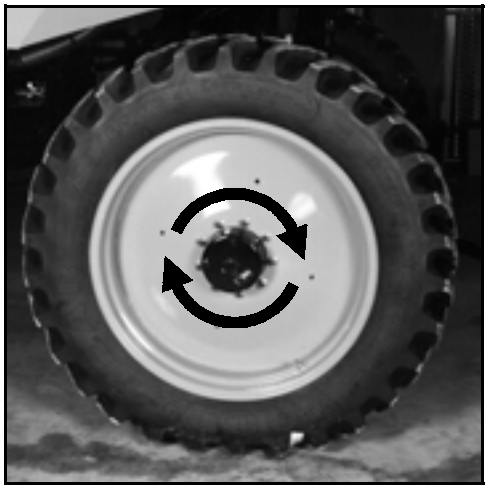


FIG 7.06

Torque Hub® Oil

OIL LEVEL - Each Torque Hub® should maintain an oil level of half full at all times. Less than that would limit lubrication, and over half full could cause overheating and damage. To check oil level, position Torque Hub® so one of the face plugs is positioned at 12 O'clock (fig. 7.04). The other plug will be either at 9 O'clock or 3 O'clock. Remove the lower plug: if no oil comes out, oil level is too low. Check Torque Hub® oil level every 100 hours.

If EP-90 oil is needed, remove the top plug also and fill just until it starts to come out the lower hole (fig. 7.05). With the oil at a satisfactory level, re-install plugs.

CHANGE - The Torque 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 Torque 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 bottom plug to drain the oil. Once all of the oil is drained, re-install the bottom plug and remove the top plug. Refill Torque Hub® with EP-90 oil as described above.

GENERAL MAINTENANCE - If your sprayer is going to sit for an extended period of time, occasionally rotate the hubs by driving the sprayer forward or backward a few feet to adequately coat all internal hub parts (fig. 7.06). This will prevent rusting if moisture inadvertently entered the hub during an oil change. Failure to rotate hub and disperse oil may cause rusting and internal damage.

FLUIDS CONTINUED ➡

VII. SERVICE AND MAINTENANCE

FLUIDS CONTINUED

FIG 7.07

FIG 7.08

Ethylene Glycol		
40%	-23ºC	-10ºF
50%	-23ºC	-34ºF
60%	-23ºC	-65ºF

FIG 7.09

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 an ethylene glycol-based antifreeze.

NOTE:

Ethylene glycol-based antifreeze and propylene glycol-based antifreeze should never be mixed.

CHECKING CONCENTRATION - The radiator cap is located toward the rear of the engine compartment (fig. 7.07). Never remove a cap from a hot engine. Always allow the engine to cool before servicing cooling system.

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 in figure 7.09 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 each winter, whichever comes first. It should be checked using a refractometer; "floating ball"-type density testers or hydrometers are not accurate enough for use with heavy duty diesel cooling systems.

VII. SERVICE AND MAINTENANCE

FIG 7.10

FIG 7.11

COOLANT RESERVOIR - The coolant reservoir is located next to the engine air filter behind the access door (fig. 7.10). Check its level everyday while the engine is cold. Maintain the coolant reservoir level within the normal cold range marks.

CHANGING COOLANT - Your coolant should periodically be changed to eliminate the buildup of harmful chemicals. Drain and replace the coolant every other spraying season or every 1,000 hours of operation, whichever comes first. Refill only with ethylene glycol coolant. Antifreeze should be mixed 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 under 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 section 8 on sprayer storage.

REFILLING - 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 an STS 12 holds 140 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.

FLUIDS CONTINUED

VII. SERVICE AND MAINTENANCE

FLUIDS CONTINUED

FIG 7.12

Air Conditioning

TYPE - The cab on your sprayer is equipped with a R-134a air conditioning system.

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

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

FIG 7.13

Windshield Washer Fluid

The windshield washer reservoir is located under the cab (fig. 7.12). Check it occasionally and refill it from the cap inside the cab (fig. 7.13) with non-freezing automotive windshield cleaner as required.

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
Torque Hub® oil level	
Front (2)	approx. 84 oz. ea. EP-90
Rear (2)	approx. 62 oz. ea. EP-90
Engine cooling system	18 gallons ethylene glycol
Fuel cell	140 gallons No. 1 or 2 diesel

VII. SERVICE AND MAINTENANCE

FIG 7.14

FIG 7.15

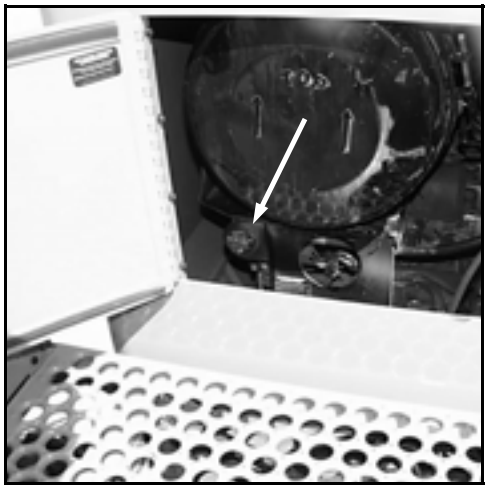


FIG 7.16

FILTERS

Engine Air Intake

LOCATION – The engine air intake filter is accessed by opening the door on the front of the engine compartment (fig. 7.14).

REMOVAL - The engine air intake filter element should only be removed if it is going to be replaced. After loosening the air cleaner clamp and removing the end cap, carefully remove the filter so as to not knock any dust off the filter and into the air intake passage (fig. 7.15).

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

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

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 near the air cleaner (fig. 7.16). Check its reading daily.

SERVICE - Service the air cleaner when the Filter Minder® reads 20” (80% of average dirt holding capacity). Reset the Filter Minder® to zero each time you replace the air filter element.

NOTE:
Service the air cleaner before the yellow indicator reaches the red line of the Filter Minder®.

VII. SERVICE AND MAINTENANCE

FIG 7.17

Radiator Screen

In order to maintain maximum air flow through the engine cooling system's radiator, oil cooler, and air conditioning condenser, the cooling air intake grille (fig. 7.17) must be inspected often and periodically cleaned.

NOTE:

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

Compressed air will dislodge most large trash or loose dirt after the screen has been swung out for service. 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 with a brush.

NOTE:

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

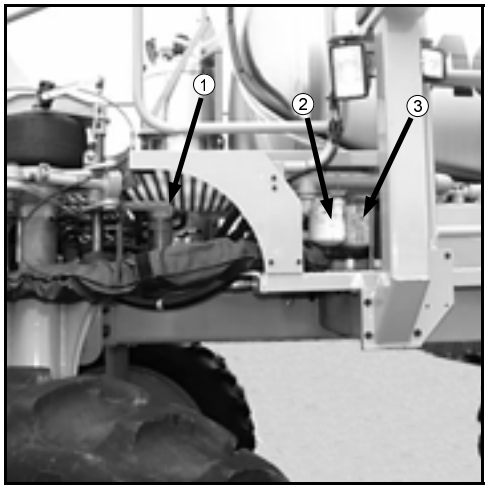


FIG 7.18

Hydraulic Suction Filters

Remove and install a new 10 Micron rated suction filters (fig. 7.18) at the end of the first 50 hours of use; subsequently, replace the filter every 250 hours, or once a year, whichever comes first.

Hydrostatic Charge Pressure Filter

Remove and install a new 4 Micron rated charge pressure filter (fig. 7.18) at the end of the first 50 hours of use; subsequently, replace the filter every 250 hours, or once a year, whichever comes first.

VII. SERVICE AND MAINTENANCE

FIG 7.19

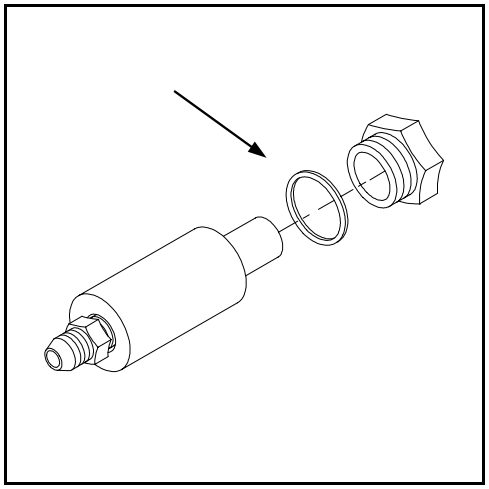


FIG 7.20

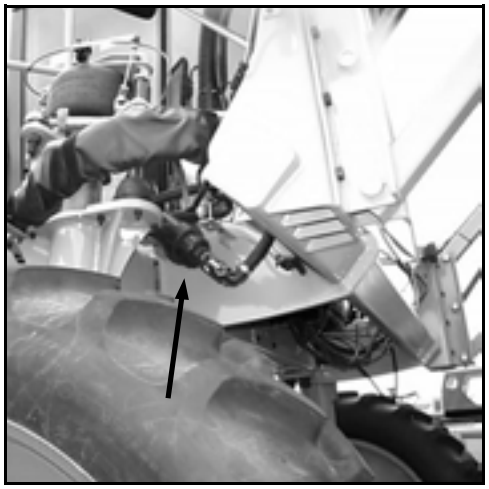


FIG 7.21

High Pressure In-line Filter

The valves on the tread adjust circuit are protected by a 90 Micron in-line sintered bronze filter (fig. 7.19). When the filter element is removed for cleaning, caution should be taken so the gasket is in the proper place when re-installing (fig. 7.20). Also, re-install filter paying attention to direction of flow so the end marked “OUT” is oriented correctly.

Solution Line Strainer

To help maintain consistent application rates, check the solution line strainer (fig. 7.21) daily for blockage. Clean the strainer screen as required. Be sure to wear the appropriate clothing while removing and cleaning the line strainer screen. Confirm the gasket is in place before re-installing the screen.

➡ FILTERS CONTINUED

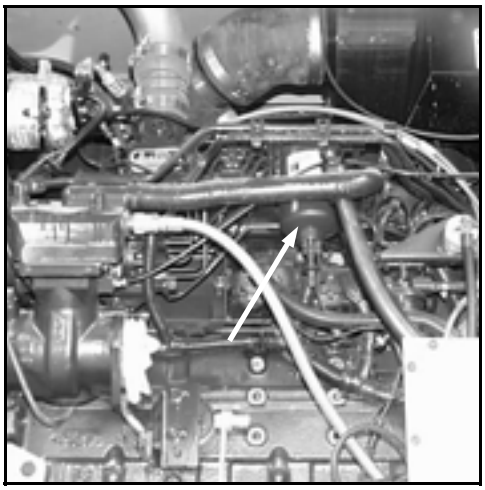


FIG 7.22

Fuel Filter

Drain water and sediment from the separator (fig. 7.22) daily. Replace every 500 hours or once a year, whichever comes first.

Fresh Air Cab Filters

PAPER FILTER - (fig. 7.23) 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 - (fig. 7.23) Remove and replace at the first sign of chemical odor entering the cab.

RECIRCULATING FILTER - (fig. 7.24) The paper filter should be cleaned once a year, 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.

FIG 7.23

FIG 7.24

VII. SERVICE AND MAINTENANCE

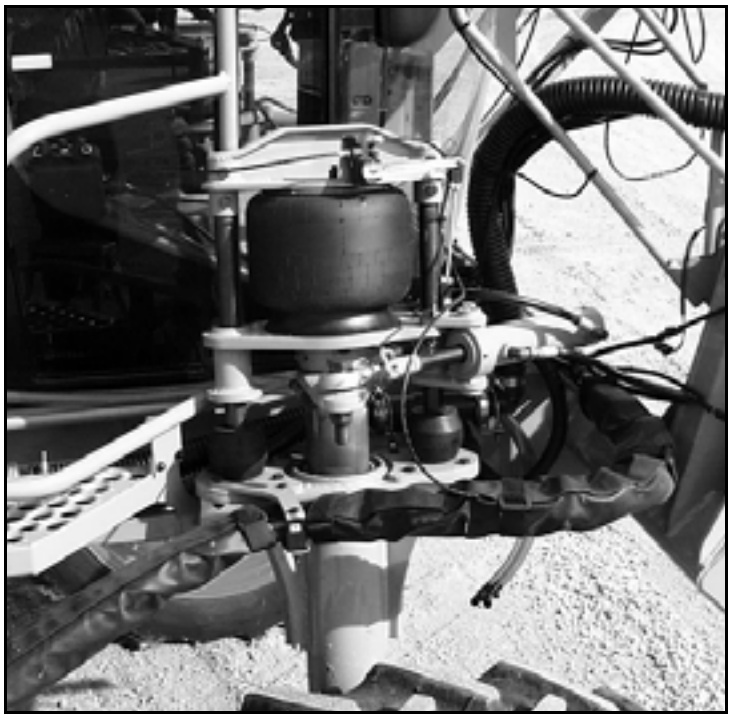


FIG 7.28

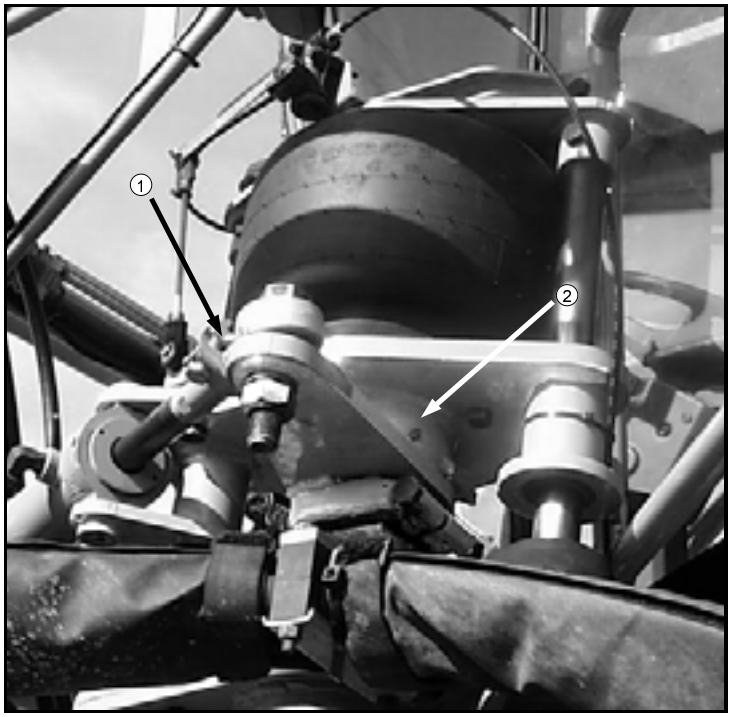


FIG 7.29

LUBRICATION

Steering Bearings

Grease zerks are located on the “tie rod” ball pivot (fig. 7.29, item 1) and steering plate (fig. 7.29, item 2) of each front leg (four places total). Grease all four zerks once a week or every 50 hours, whichever comes first. To maintain bearing integrity, grease the bearing plate on each rear leg every 500 hours or once a year, whichever comes first.

VII. SERVICE AND MAINTENANCE

ELECTRICAL

Batteries

FIG 7.30

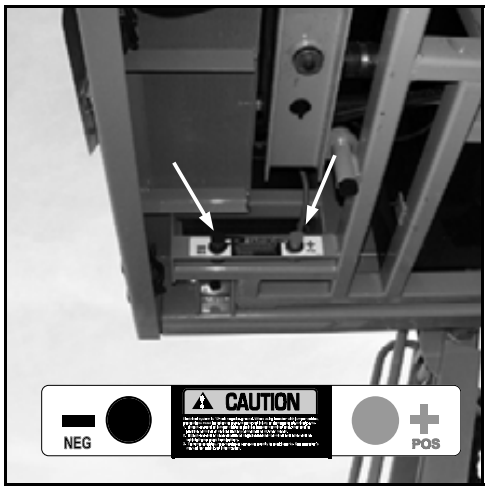


FIG 7.31

Install replacement batteries with ratings equivalent to or higher than the specs below.

VOLTAGE..... 12 V (only)

CCA (30 sec. at 0° F)..... 950

RESERVE CAPACITY .....185 min. at 25 amps

SAFETY

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.

SERVICE ACCESS - The batteries are located at the rear of the machine behind battery service access panel (fig. 7.30).

NOTE:

When servicing the electrical system always disconnect the batteries. Remove the ground cable first and connect it last.

NOTE:

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

CLEANING - Disconnect battery cables from batteries. Remove all corrosion with a wire brush or battery post brush. Wash the cable connections and battery posts with a weak solution of baking soda or ammonia. Apply petroleum jelly or grease to prevent future corrosion. Reconnect the cables to the batteries making sure 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 (fig. 7.31). Connect your charging cables to them just as you would to the battery, positive cable to positive terminal, and negative cable to negative terminal. Keep these terminals clean and their caps in place when not in use.

Circuit Breakers

FIG 7.32

FIG 7.33

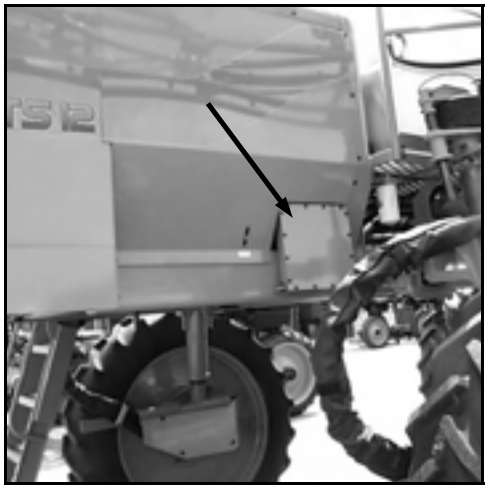


FIG 7.34

The Hagie STS 12 has three separate circuit breaker locations: transom (fig. 7.32) for boom functions and spray system, under-cab (fig. 7.33) for cab functions and controls located in the cab such as ladder, lights, tread adjust, etc. and engine compartment (fig. 7.34) for engine functions.

Refer to the Hagie STS 12 Parts Manual for specific information regarding correct breaker location and size.

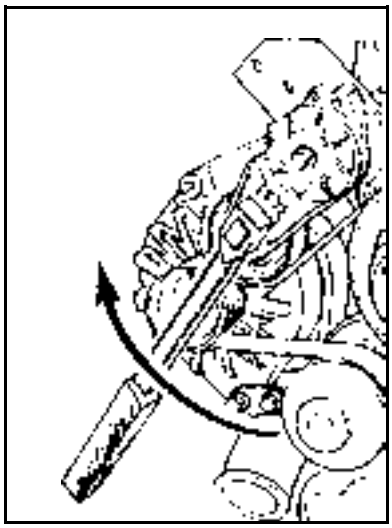


FIG 7.35

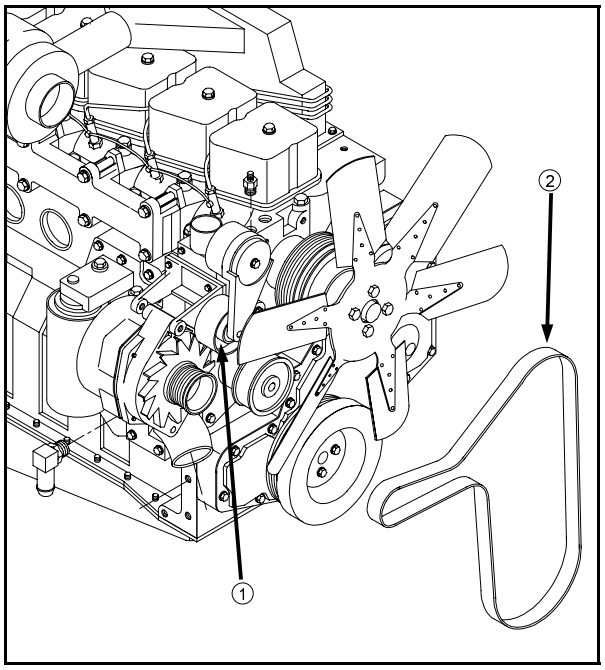


FIG 7.36

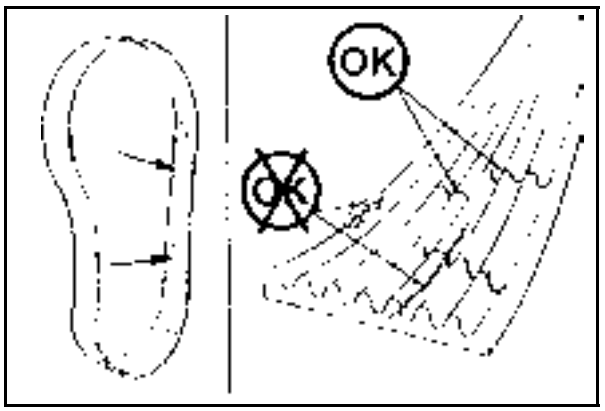


FIG 7.37

BELTS

Engine Drive Belt

REMOVAL - Insert a 3/8 inch square ratchet drive (fig. 7.35) into the belt tensioner (fig. 7.36, item 1) and lift upward to remove the belt (fig. 7.36, item 2).

INSPECTION - Visually inspect the belt daily. Check the belt for intersecting cracks (fig. 7.37). Transverse (across the belt width) cracks are acceptable. Longitudinal (direction of 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 two pivot bolts (fig. 7.38, item 1) and the two slide bolts (fig. 7.38, item 2). Using a suitable prying tool, adjust tension on belt to desired tautness. While maintaining tension, re-tighten all four bolts. Inspect belt ever 250 hours.

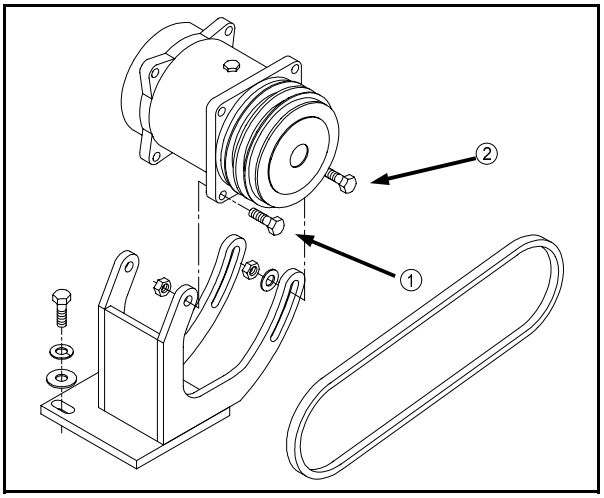


FIG 7.38

FIG 7.39

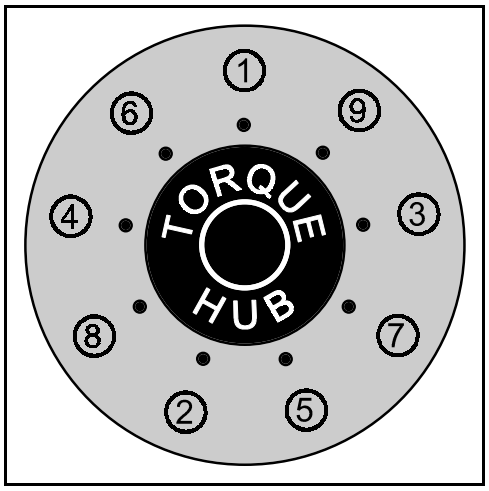


FIG 7.40

FIG 7.41

BOLT TORQUE

Wheel Bolts

To install wheel and tire assembly on the Torque Hub®, lubricate studs with anti-seize grease. Align the wheel bolt holes with the Torque Hub® studs and mount the wheel on the hub.

NOTE:

To achieve even torquing consistency, the tire should be completely off the ground.

Start all of the lug nuts on and tighten them until they are just snug. Following the torque sequence in figure 7.40, 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 sequence to 150 dry foot-pounds and again finally to 180 dry foot-pounds.

⚠CAUTION

Check lug nut torque immediately after receiving machine and every 50 hours thereafter.

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 minutes of operation.

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

BOLT TORQUE CONTINUED ➡

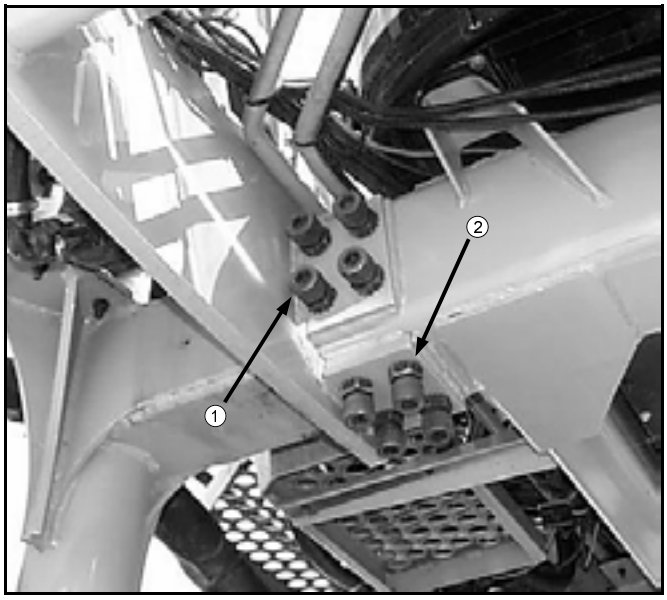


FIG 7.42

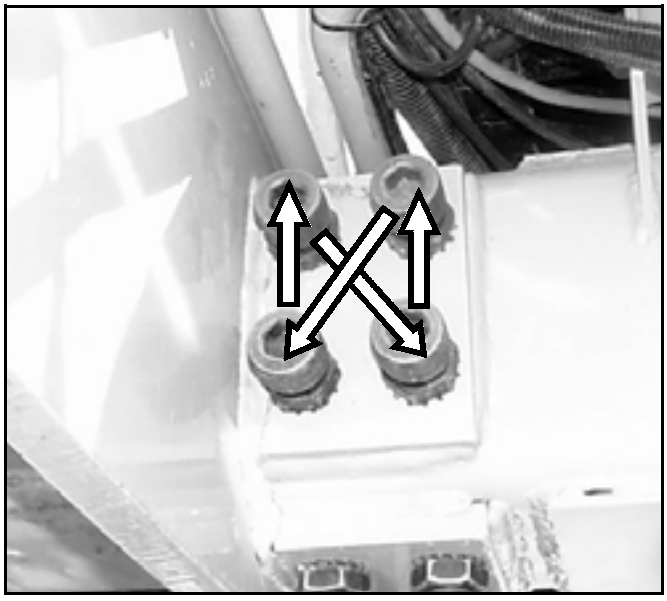


FIG 7.43

NOTE:

If hydraulic tread adjustment will never be operated on your machine, set all bearing bolt torque settings to 50 foot-pounds and continue inspection as above without adjustment test.

Tread Bearing Torque

With the engine turned off, visually inspect the tread bearing bolts on both the bottom and side (fig. 7.42) every 50 hours. Torque check them every 100 hours.

To torque check the bearing bolts:

1. Loosen the jam nut (fig. 7.42, item 1) on each bearing bolt.
2. Using a criss-cross or "X" pattern (fig. 7.43), verify current torque on each bolt (fig. 7.42, item 2) is equivalent to last check from 100 hours previous (repeat torque pattern a second time).
3. Then increase the torque two foot-pounds on each bolt using the "X" pattern and retighten each jam nut.
4. Start the sprayer and test the hydraulic tread adjustment (see page 25). If the tread still adjusts smoothly see next step. If the tread does not move skip to step 6.
5. Repeat steps 1 and 3 until the tread does not move.
6. Reduce torque setting to last value that allowed the tread to operate freely, retighten jam nuts and resume operation.

NOTE:

Never operate the unit with the tread bearing bolt torque set below 25 foot-pounds. If the bolt torque has to be loosened to 25 foot-pounds in order for the hydraulic tread adjust to work freely, call Hagie Customer Support.

VII. SERVICE AND MAINTENANCE

TOE-IN

To correctly gauge toe-in, use a tape measure placed at one-half tire 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 somewhere between one half and three quarters of an inch.

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

Difficulty steering one way versus the other may also indicate incorrect toe-in and may require adjustment. For further assistance regarding toe-in measurement and adjustment, contact the Hagie Customer Support Department.

NOTE:

See page 76 for instructions on adjusting toe-in. See also page 25 for information on recalibrating self-centering cylinders.

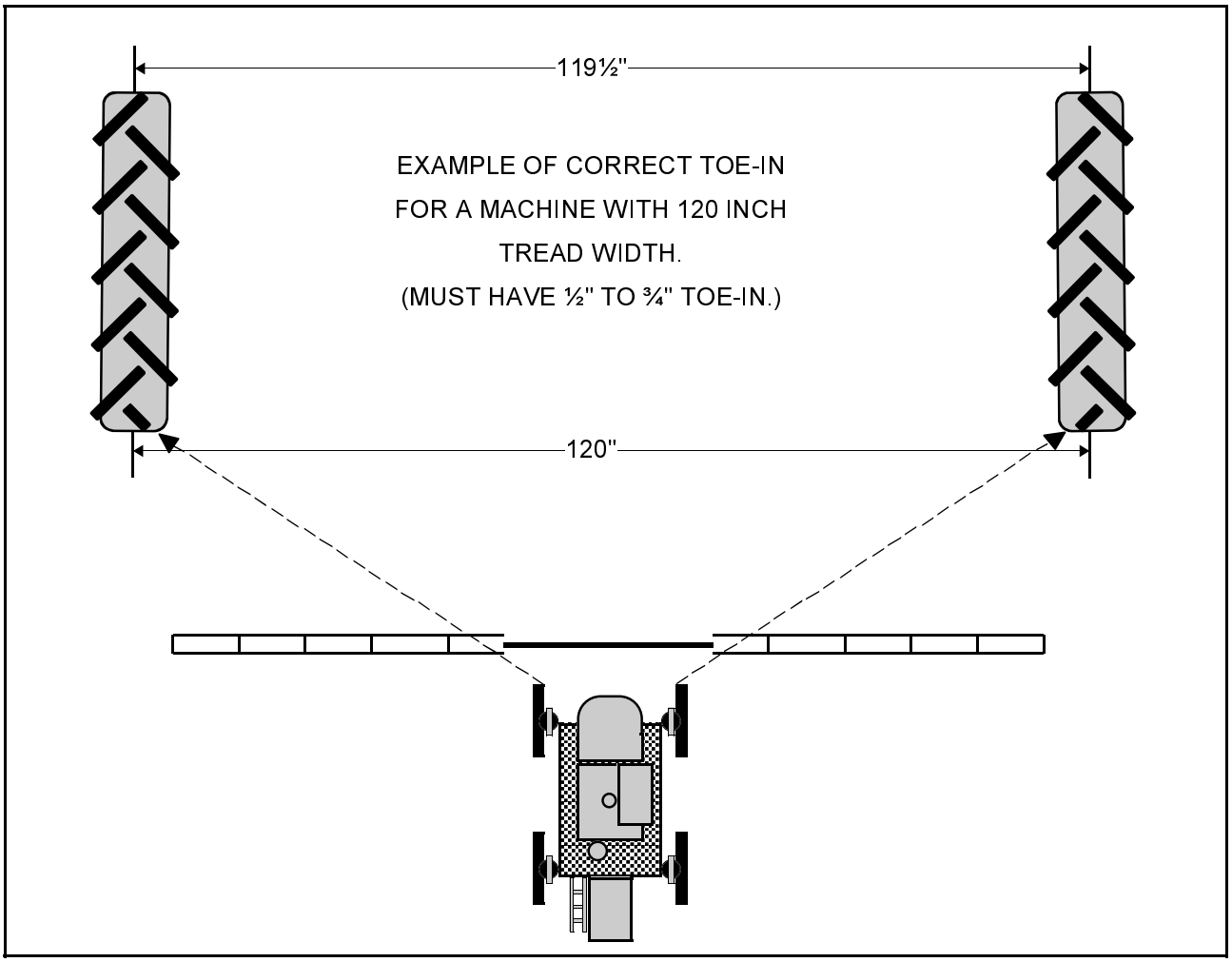


FIG 7.44

VII. SERVICE AND MAINTENANCE

TOE-IN ADJUSTMENT

FIG 7.45

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

1. Remove nut and lightly tap bolt (fig. 7.46, item 1) out of steering plate and swivel joint (fig. 7.46, item 2).
2. Loosen lock collar bolt and nut (fig. 7.46, item 3).
3. Move left and right tires evenly until difference in dimension “A” and “B” (fig. 7.47) are within specified range.

NOTE:

Dimension “A” should be ½" to ¾" less than dimension “B.” For more information regarding toe-in, see page 75.

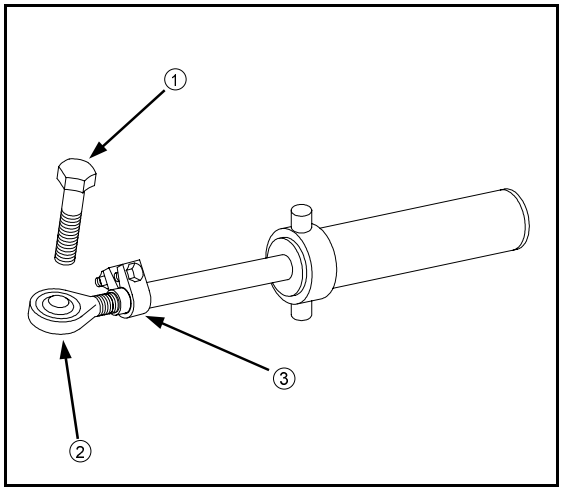


FIG 7.46

4. Screw swivel assembly in or out on steering cylinder until the swivel joint lines up with steering plate.
5. Insert bolt through swivel joint and steering plate.
6. Install nut and tighten.
7. Tighten lock collar bolt and nut.

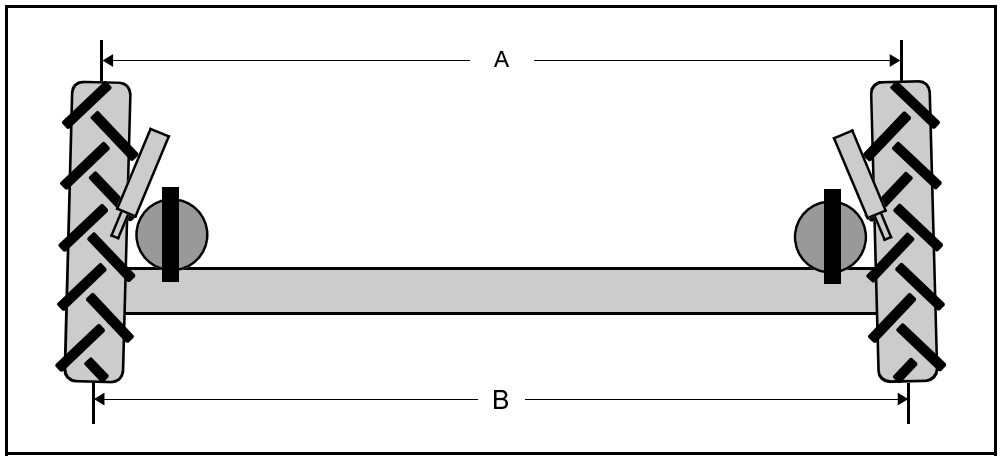


FIG 7.47

VII. SERVICE AND MAINTENANCE

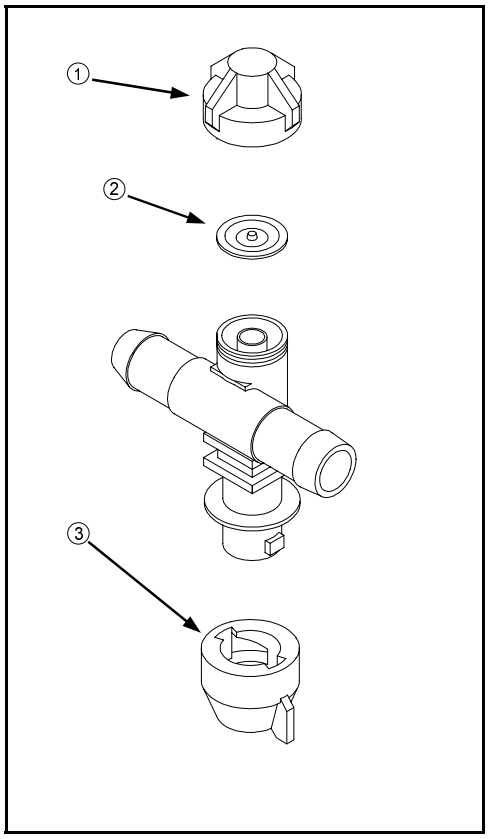


FIG 7.48

SPRAY SYSTEM

Spray Tips

At the beginning of each season, or as required, remove a random sample of spray tip caps (fig. 7.48, item 3) and inspect the nozzle tips. If they are plugged or worn, clean or replace them.

Nozzle Diaphragms

At the beginning of each spray season, remove each nozzle body cap (fig. 7.48, item 1) and inspect the diaphragm for wear or fit (fig. 7.48, item 2). Replace if necessary. Refer to accompanying manual containing nozzle information.

Calibration

See pages 52-53 on spray system calibration.

Winter Storage

See page 81 on cold weather storage of spray system.

FOAM MARKER SYSTEM

Winter Storage

See page 81 on storage of foamer system.

VII. SERVICE AND MAINTENANCE

TIRES

FIG 7.49

Air Pressure

Check tire pressure once a week or every 50 hours of operation (fig. 7.49). Never inflate a tire more than the recommended maximum air pressure. Use an air line with a locking air chuck and stand behind tire tread while filling (fig. 7.50).

NOTE:

Tire pressure will depend on load quantity and type in solution tanks. Refer to page 18 for tire specifications.

FIG 7.50

⚠ WARNING

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

Wheel Bolts

See page 73 for recommended wheel bolt torque specifications and torquing pattern.

Mounting

If you do not have proper mounting equipment, let your local qualified tire sales/service dealer mount the tire for you. Tire should be mounted on rim according to figure 7.51 for best traction and tread cleaning action.

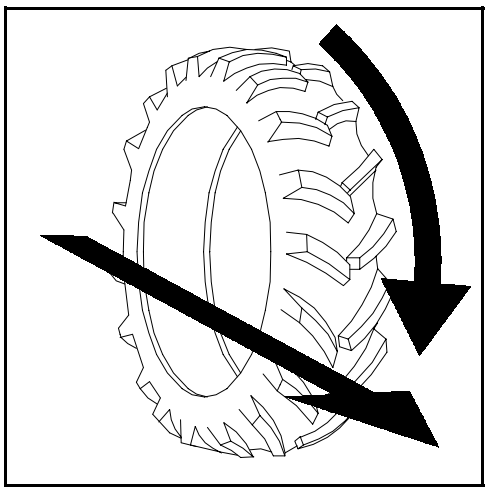


FIG 7.51

Toe-In

See pages 75-76 for information regarding toe-in measurement and adjustment.

VII. SERVICE AND MAINTENANCE

DAILY INSPECTION

Inspection Point	Action (if necessary)
Check	
Engine oil level	Add oil
Radiator coolant level	Add antifreeze solution
Coolant overflow reservoir level	Add antifreeze solution
Engine drive belt	Replace belt
Filter Minder®	Replace air filter element
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 pooled on machine or ground	Determine cause and correct
Drain	
Fuel/water separator	See page 68

VIII. STORAGE

A. Preparing the sprayer for storage.

1. Perform daily level checks, lubrication, and bolt and linkage inspections as required in this manual in section eight on maintenance.
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 engine to operating temperature and re-check level.

NOTE:

If antifreeze is added, make sure the engine is then run to operating temperature to assure proper mixing of solution.

3. Add a fuel stabilizer to the fuel and fill fuel 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. For more detailed information, consult the manufacturer's handbook that accompanies this manual.
7. Use plastic bags and water-resistant adhesive tape to seal the air intake opening, all exhaust manifold openings, engine oil filler cap, hydraulic oil tank breather cap, and fuel tank caps.
8. Disconnect and remove battery or batteries. Completely clean and charge the batteries. Coat the terminals with petroleum jelly and store battery in cool, dry 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 pages 8-12 for proper location of warning decals and their corresponding part number. Warning decals and all other Hagie decals are available through the Hagie Manufacturing Customer Support Department.

NOTE:

For replacement decals contact:
Hagie Manufacturing Company
Box 273, Clarion, IA 50525
Ph. 1-800-247-4885

VIII. STORAGE

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 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. If the sprayer must be stored outside, cover it with a waterproof cover.

B. Removing the sprayer from storage.

1. Inspect the condition, and test the air pressure, of all tires. Please see page 78 for information regarding proper tire maintenance.
2. Carefully unseal all openings that were sealed in the storage process.
3. Clean and reinstall the battery. Be sure to attach the battery cables to the proper terminals.
4. Tighten all belts. Inspect and replace any worn belts. For information on belts, see page xx.
5. Check engine oil, hydraulic oil, and engine coolant levels; add, if necessary. A mixture of 50/50 antifreeze and water will cool adequately in summer as well as protect in winter.

NOTE:

Protective compounds such as grease can harden under exposure to weather conditions.

6. Completely clean the sprayer.
7. Review section 7 on maintenance (pages 56-79), and perform all needed services as instructed.
8. For starting instructions, see pages 19-20 in section 4 on operating information.

NOTE:

See Warranty on page 91 concerning **improper storage**.

IX. TROUBLE SHOOTING

A. ENGINE

CAUTION

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

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Engine won't crank	Dead battery	Recharge or replace battery
	Poor battery connections	Clean and tighten
	Starter or starter relay	Test; rebuild or replace
Engine won't start	Out of fuel	Fill fuel tank
	Clogged fuel filters	Replace fuel filters
	Cold weather	Refer to engine manual for cold weather starting information
	Low starter speed	Check starter and battery

IX. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Engine overheats	Engine overloaded	Reduce load
	Dirty radiator core or dirty grill screen	Remove all foreign material and clean all items
	Faulty radiator cap	Replace cap
	Loose or faulty fan belt	Tighten or replace fan belt
	Faulty thermostat	Replace thermostat
	Low coolant level	Refill to proper level with recommended coolant
Engine misfires: runs uneven, low power	Water in fuel	Drain, flush, replace filter, fill system
	Dirty air cleaner element	Replace element
	Poor grade of fuel	Drain system; change to good grade
	Fuel tank vent clogged	Open fuel tank vent in cap
	Clogged fuel filter	Replace fuel filter
Engine knocks	Low oil level in crankcase	Add oil to full mark
	Cold engine	Allow proper warm-up period; refer to engine owner's handbook

NOTE:

For additional engine information, consult engine manufacturer's manual.

IX. TROUBLE SHOOTING

B. SPRAY SYSTEM

⚠ WARNING

CHEMICALS ARE DANGEROUS

Read The Chemical manufacturer's labels to avoid injury or damage.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Solution pump will not prime	Low water level in pump	Making sure the solution tank is not empty, solution pump is self-priming
	Air leak in suction line	Inspect and tighten all fittings on suction line
	Solution tank valve closed	Open solution tank valve, allowing air to leave the system
Erratic reading on pressure gauge	Orifice in back of gauge clogged	Remove gauge; clean orifice; re-install
	Faulty gauge	Replace gauge
	Air leak in suction line	Inspect and tighten all fittings in suction line
	Glycerin leaking from gauge	Replace gauge

IX. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Solution pump not producing normal pressure	Clogged line strainer screen	Remove screen; clean thoroughly; tighten strainer cap to avoid air leak
	Air leak in suction flow to pump	Inspect and tighten all fittings on suction line
	Restricted solution flow to pump	Main solution tank shut-off valve not completely open
	Suction hose collapsed	Obstruction at inlet end of hose, causing high vacuum on hose
	Faulty hydraulic pump	Replace hydraulic pump
	Faulty hydraulic motor on solution pump	Replace motor
	Internal restriction of diaphragm such as build up of chemical	Disassemble; inspect; clean; reassemble
Malfunction of electric solution valve	Faulty ground	Clean and tighten ground
	Dirty contact terminals	Clean contact terminals
	Separation in wire	Check continuity and replace wire
	Faulty switch	Replace switch
	Short in solenoid coil	Replace valve
	Bad valve	Replace valve

NOTE:

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

IX. TROUBLE SHOOTING

C. HYDROSTATIC SYSTEM

CAUTION

DO NOT GO NEAR LEAKS. High pressure oil easily punctures skin causing injury, gangrene, or death. If injured, seek emergency medical help. Immediate surgery is required to remove oil. Do not use finger or skin to check for leaks. Lower load or relieve hydraulic pressure before loosening fittings.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Machine won't move in either direction	Engine speed too low	Set engine at operating RPM before trying to move machine
	Oil level in reservoir low	Fill reservoir to proper level w/ approved oil; see section on Service and Maintenance
	Clogged filter	Replace filter
	Hydrostatic pump not turning	Check drive coupling
	Faulty hydrostatic pump	Replace pump
	Air leak in suction line	Inspect and tighten all fittings on suction line
	Low charge pressure	See section under charge pressure
Machine will move in only one direction	Faulty high pressure relief valve	Switch relief valves from side to side; If problem reverses, replace multi-function valve (Call Hagie Customer Support and refer to parts manual)

IX. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Hydrostatic system responding slowly	Engine speed too low	Set engine at operating RPM before trying to move machine
	Oil level in reservoir low	Fill reservoir to proper level with approved oil; see section on Service and Maintenance
	Cold oil	Allow for adequate warm-up period
	Plugged filter	Check and replace filter
	Partially restricted suction line	Inspect for collapsed suction hose
	Internal damage	Replace hydrostatic pump or motor
Noisy hydrostatic system	Cold oil	Allow for adequate warm-up period
	Low engine speed	Increase engine speed
	Oil level in reservoir low	Fill reservoir to proper level with approved oil; see section on Service and Maintenance
	Air in system	Inspect and tighten all fittings on suction line
	Internal damage to pump	Replace pump
External oil leaks	Loose or faulty fittings	Tighten or replace
	Damaged O-ring	Inspect; if damaged replace
	Faulty hose	Replace hose

IX. TROUBLE SHOOTING

D. HYDRAULIC SYSTEM

CAUTION

DO NOT GO NEAR LEAKS. High pressure oil easily punctures skin causing injury, gangrene, or death. If injured, seek emergency medical help. Immediate surgery is required to remove oil. Do not use finger or skin to check for leaks. Lower load or relieve hydraulic pressure before loosening fittings.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Entire hydraulic system fails to function	Oil level in reservoir low	Fill reservoir to proper level with approved oil; see section on Service and Maintenance
	Oil not reaching pump	Prime the pump by removing suction hose from reservoir; hold removed end higher than pump; hand feed two (2) quarts approved oil through suction hose by bumping engine w/ starter (careful not to start engine); re-install hose; tighten all fittings
	Faulty hydraulic pump	Replace hydraulic pump
Noisy hydraulic pump	Collapsed suction hose caused by cold oil	Allow for adequate warm-up period
	Oil level in reservoir low	Fill reservoir to proper level with approved oil; see section on Service and Maintenance
	Air leak in suction line	Inspect and tighten all fittings on suction hose

IX. TROUBLE SHOOTING

E. ELECTRICAL

⚠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.

NOTE:

Disconnect battery when servicing any part of electrical system to prevent system damage.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
Entire electrical system is dead	Dead battery	Charge or replace
	Poor battery connection	Clean and tighten
	Low charging rate	Tighten alternator belt
	No charging rate	Replace alternator
Light system does not function	Poor ground	Clean and tighten ground
	Burned-out bulb	Replace bulb
	Separation or short in wire	Check continuity and replace wire
	Faulty switch	Replace switch

IX. TROUBLE SHOOTING

NOTES

X. LIMITED WARRANTY

1. **The Warranty**
   a. This warranty gives you specific legal rights. You may also have other rights which may vary from state to state.
   b. Hagie makes this warranty only to the original purchaser of its new equipment.
   c. The warranty period ends 12 months from the date of delivery of equipment to the original purchaser. When requesting warranty service, the original purchaser must present evidence of the date of delivery of the equipment.
   d. Parts or rebuilt assemblies furnished under the terms of this warranty are not warranted beyond the original warranty period.
   e. Exceptions to this warranty must be covered by separate warranty agreements.
2. **Items not covered by Hagie Warranty**
   a. Used equipment.
   b. Tires, tubes, engines, and batteries (under separate manufacturer's warranty).
   c. Depreciation or damage caused by normal wear, accident, improper maintenance, improper storage, or improper use.
   d. Service calls and transporting the equipment to and from the place where the warranty work is performed.
3. **Unapproved service or modification**

NOTE:

All obligations of Hagie Manufacturing Company under this warranty shall be terminated if:

a. . . . service is performed by someone other than Hagie authorized personnel.

or

b. . . . the equipment is modified or altered without Hagie approval.

4. **No commercial loss coverage**
   a. Hagie shall not be liable for incidental or consequential damages or injuries (damage and repairs of equipment itself, loss of profits, rental or substitute equipment, loss of good will, etc.).
   b. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.
5. **Merger clause**
   a. The entire warranty agreement is included in this writing.
   b. Any oral agreements that are made by the selling persons about the equipment are not warranties, and are not to be relied upon by the purchaser.
6. **No representations or implied warranty**
   a. The parties agree that the implied warranties of merchantability and fitness for a particular purpose and all other warranties expressed or implied, are excluded from this transaction and shall not apply to the equipment sold.

INDEX

PAGE

INDEX