



HAGIE

MODEL 2100

**OPERATOR'S
MANUAL**

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and 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 2100



OPERATOR'S MANUAL FOR HAGIE MODEL 2100 HI-TRACTOR

HAGIE MANUFACTURING COMPANY

BOX 273 CLARION, IOWA 50525

(515) 532-2861

COVERS MACHINE SERIAL NUMBERS: U140000001 thru U140000200

10-99 493207

ABBREVIATIONS

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

TO THE OWNER



A WORD FROM HAGIE MANUFACTURING COMPANY

Congratulations on your selection of a Hagie Model 2100 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.



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



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



This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

TABLE OF CONTENTS

I.	SAFETY/DECALS.....	4-13
II.	SPRAYER IDENTIFICATION	14-15
III.	SPECIFICATIONS.....	16-21
IV.	PREPARING TO OPERATE.....	22-27
V.	OPERATING INFORMATION	28-86
VI.	CALIBRATION.....	87-88
VII.	TRANSPORTING	89-93
VIII.	SERVICE AND MAINTENANCE.....	94-126
IX.	STORAGE	127-128
X.	TROUBLE SHOOTING.....	129-136
XI.	LIMITED WARRANTY	137
	INDEX.....	138-142

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

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.
- 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.
- Never manually adjust tread width on sprayer until wheels have been properly blocked. Loosen leg clamp bolts only enough for leg to slide on frame.
- If equipped with hydraulic tread adjust, never loosen leg mounting bolts to adjust bearing clearance. Add additional shims only to gain clearance.

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.
- Handle starting fluid with care. Keep it away from open flame. Store it with cap on in a cool place.
- 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.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

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 injury. Likewise, avoid battery acid contact and incurring injuries.

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 to 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 the 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 

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

I. SAFETY/DECALS

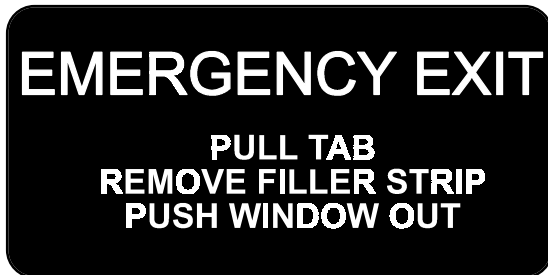
WARNING DECALS

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

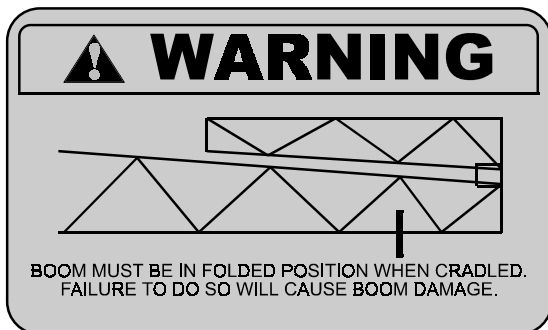
warning decals and other instructional Hagie decals or machine striping may be purchased through the Hagie Customer Support Department. To replace decals, be sure that the installation area is clean and dry; decide on exact position before you remove the backing paper.

DECAL LOCATION



650320

Inside rear cab window on left side.

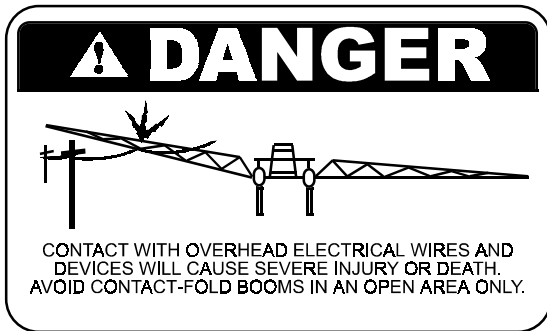


650336

Inside right-hand cab window to the rear.



I. SAFETY/DECALS



650337

Right-hand cab window.



650339

Steering column.



650340

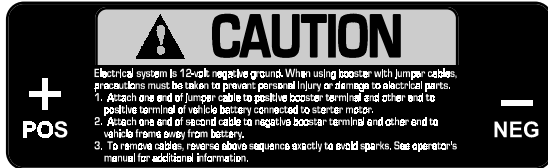
Right of brake switch on switch panel in cab.



DECALS CONTINUED ➔

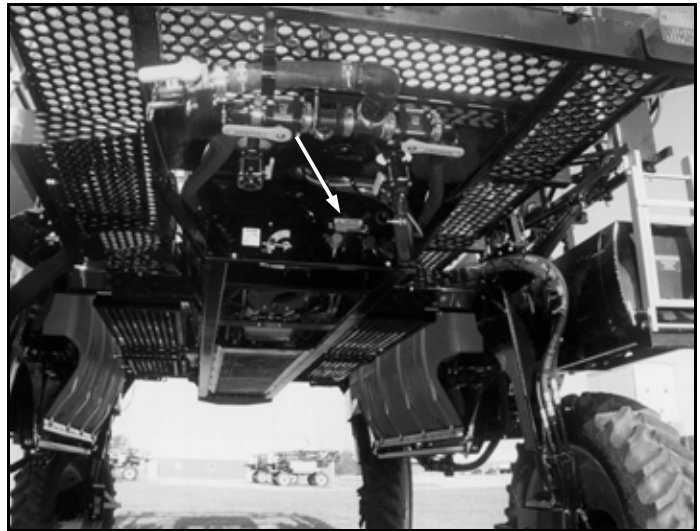
SAFETY/DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

I. SAFETY/DECALS



650350

Rear of mainframe above booster terminals.



650831

Steering column.



650847

Outside, left-hand, rear panel of cab



I. SAFETY/DECALS



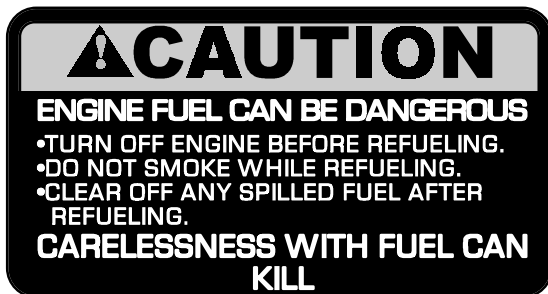
650848

Rear of left-hand fuel tank.



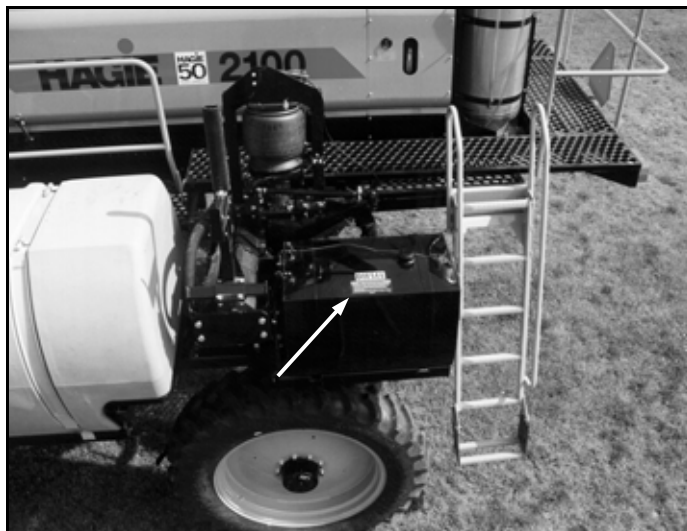
650848

Rear of right-hand fuel tank.



650849

Top of each fuel tank.



DECALS CONTINUED ➔

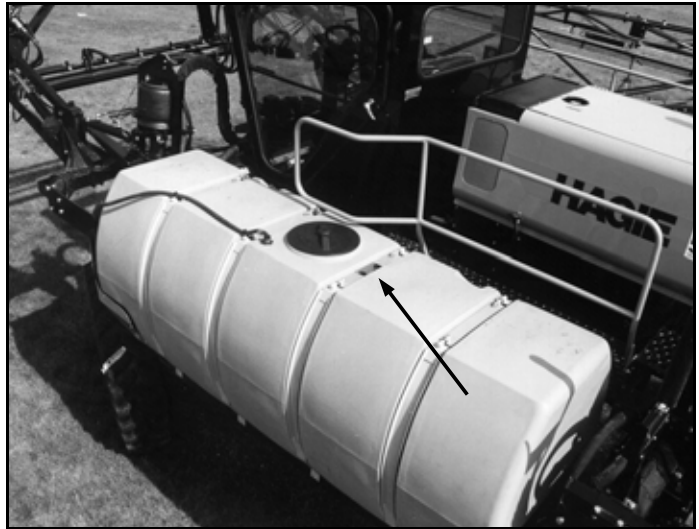
SAFETY/DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

I. SAFETY/DECALS



650850

Top of each solution tank.



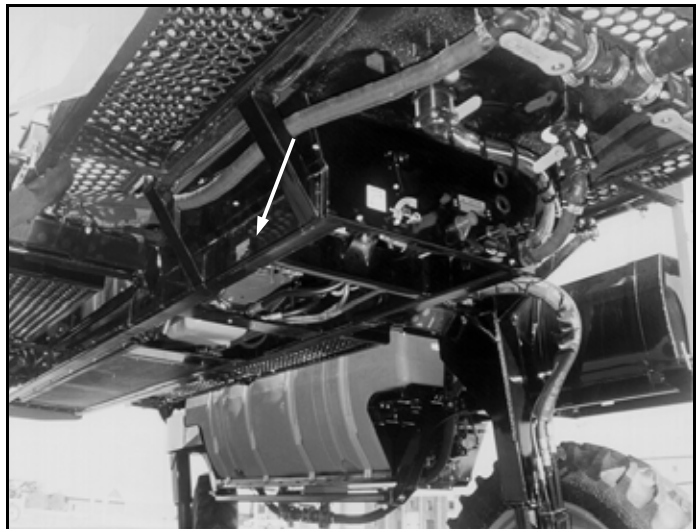
650851

Right rear mainframe.

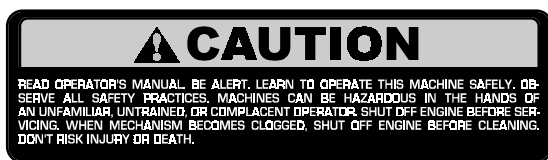


650851

Left rear mainframe

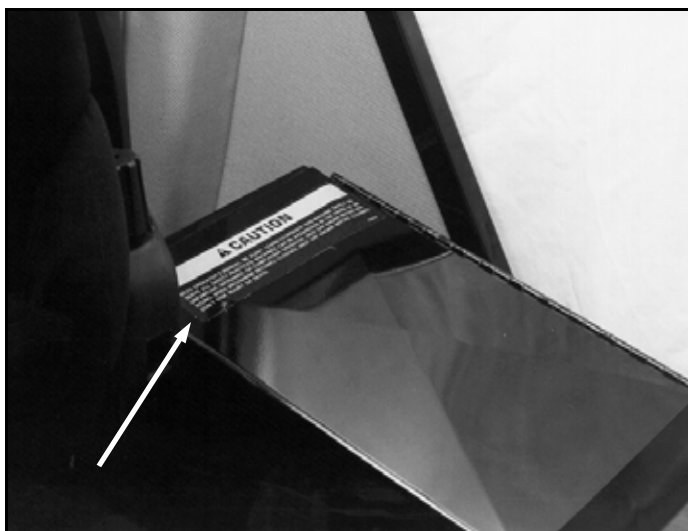


I. SAFETY/DECALS



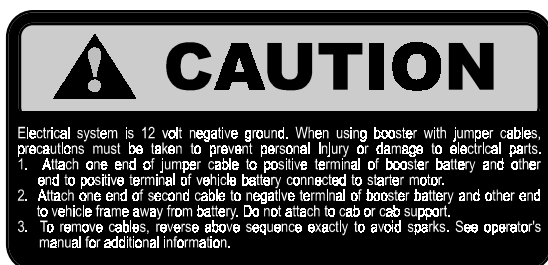
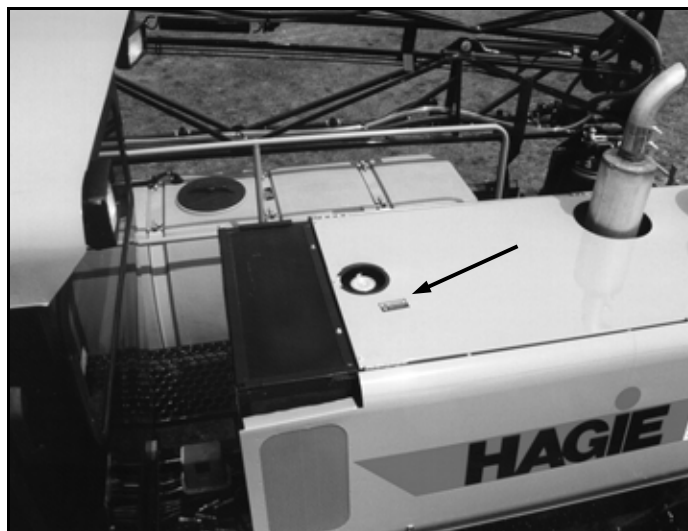
650852

Storage console lid in cab.



650981

Front of mullion to left of radiator cap.



650982

Inside right hood, above battery.



SAFETY/DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

II. IDENTIFICATION NUMBERS

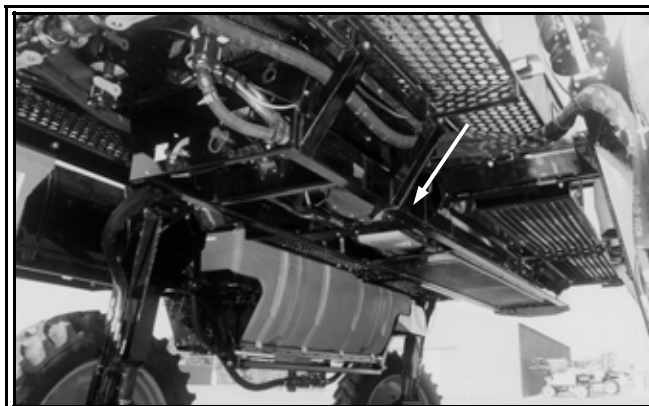
SPRAYER IDENTIFICATION

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.

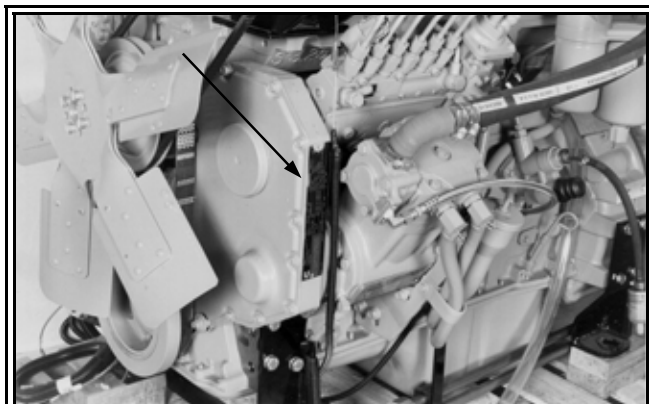
NOTE:

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

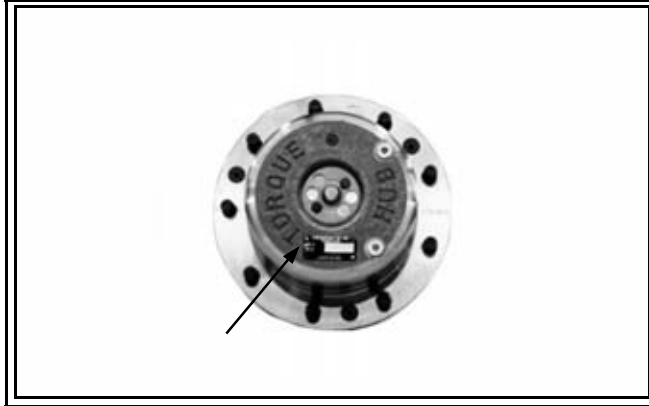
NOTE: Sprayer serial number stamped in the frame on right rear corner.



Engine

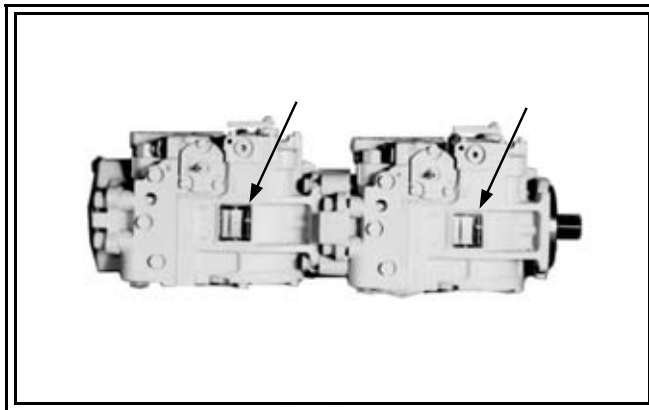
NOTE: Diesel engine serial number located on the side of the front left gear housing.

II. IDENTIFICATION NUMBERS



Planetary Hubs

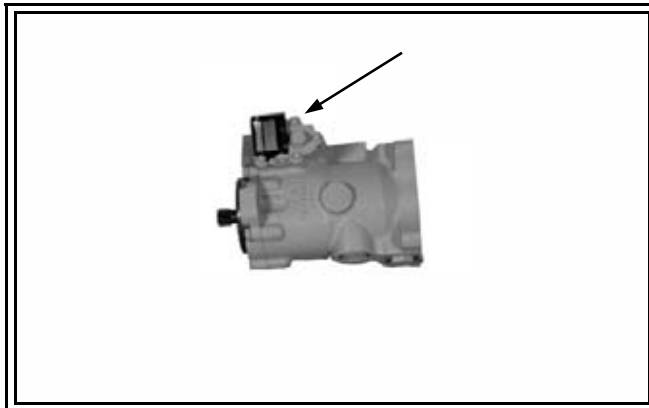
	Left	Rear
Front:	_____	_____
Rear:	_____	_____



Hydrostatic Pumps

Front: _____

Rear: _____

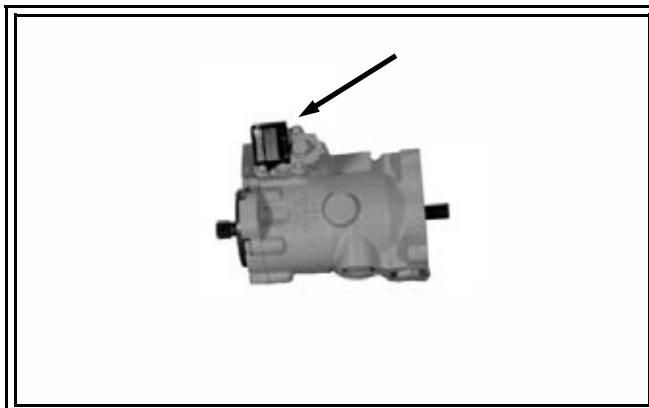


Front Wheel Motors

Left: _____

Right: _____

Refer to parts manual.



Rear Wheel Motors

Left - w/o
Sensor: _____

Right - w/
Sensor: _____

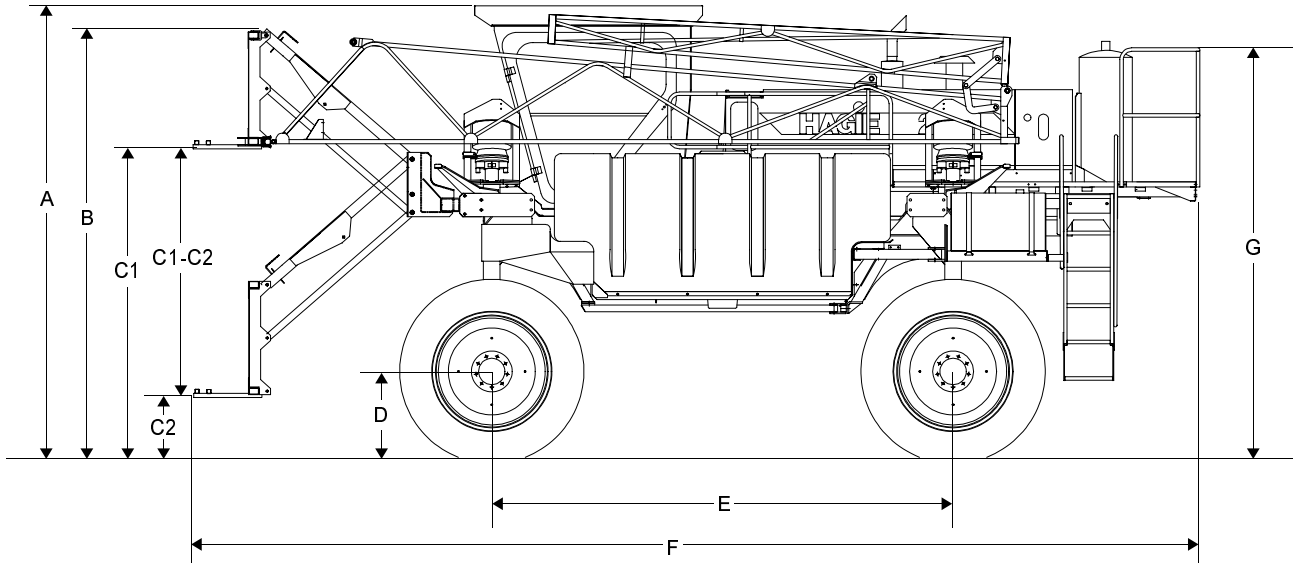
Refer to parts manual.

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

III. SPECIFICATIONS

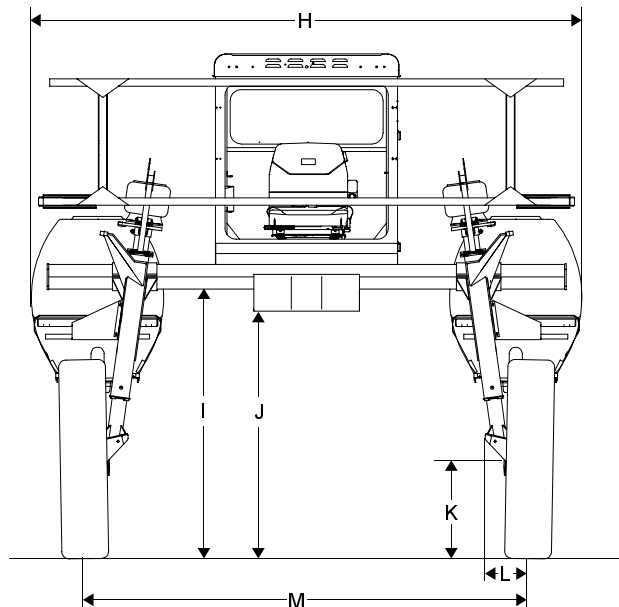
SPRAYER DIMENSIONS

- | | | | |
|-----------------------------------|----------------------|------------------------------|------|
| A. Overall tractor height | 136" | E. Wheel base..... | 139" |
| B. Raised transom height..... | 133" | F. Sprayer length..... | 296" |
| C. Transom lift range..... | 23"-101" (78" range) | G. Rear handrail height..... | 124" |
| D. Static loaded hub height | 25.8" | | |



- | | |
|---|--------------|
| H. Width (booms folded, 120" tread) | 143" |
| I. Frame clearance | 73" |
| J. Center clearance | 67" |
| K. Lower leg clearance | 25.5" |
| L. Tire center to inside of lower leg | 14.5" (rear) |
| M. Tread width* | Adjustable |
| Optional | Adjustable |
| | 120" - 144" |
| | 120" - 154" |

*NOTE: Measure tread width at 1/2 tire height.



GENERAL SPRAYER INFORMATION

- | | | | |
|--------------------------------|------------------------------------|--------------------|--------------------------|
| ◆ Frame type..... | Rigid, 4 wheel independent air bag | ◆ Ladders (2)..... | Rear |
| ◆ Approximate dry weight | 13,600 lb. | Primary..... | Side mounted, stationary |
| ◆ Shipping width..... | 143" | Secondary..... | Folding, service access |

III. SPECIFICATIONS

ENGINE

Manufacturer and model	Cummins
Model	6BTA5.9 Turbocharged
Type	In line, liquid cooled
Number of cylinders	6
Displacement	5.9 liter
Horsepower	174, intermittent
Type of fuel	Number 1 or number 2 diesel
Fuel system	Filtered, direct-injected
Air cleaner	Dry-type, single element
Slow idle	800 RPM
Fast idle	2,500 RPM

POWER TRAIN

Drive

Hydrostatic pump	Sauer/Sundstrand Tandem 90 series
Range	150cc (75 X 2) variable displacement
Drive train	All-time four wheel drive
Speed - Low	0-14 mph
- Medium	0-18 mph
- High	0-28 mph
Hydrostatic wheel motor - front	Sauer/Sundstrand M46
- rear	Sauer/Sundstrand M46
Final drives	
Type	Planetary gear reduction hubs
- front	Torque Hub® MW3 Drive ratio - 17.87:1
- rear	Torque Hub® MW3 Drive ratio - 25.59:1
Lubrication	Oil bath

Brakes

Type	Multiple disc Spring applied Hydraulically released
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Steering System

Type	Hydraulic, priority on demand
Control	Full-time power
Steering cylinders	Self-centering, double action
Turning radius (120" tread setting)	19' 5"

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

III. SPECIFICATIONS

AUXILIARY HYDRAULIC SYSTEM

TypeOpen
Pump typeTandem gear
Pressure setting2600 PSI

SPRAY SYSTEM

Booms

TypeDry, with variable row spacing
Standard60 ft. (3 spray sections)
Optional60/80 or 90 ft. (5 spray sections)
ControlsElectro-hydraulic: fold/lift/level
Hydraulic level shock absorberHagie boom level accumulator

Hoses

Rear fill connection (male with adapter for female)2" I.D.
Solution hose from tank1 ½" I.D.
Boom section feeder hose1" I.D.
Boom nozzle hose¾" I.D.

Solution Tanks

StandardTwo 500 gal. polyethylene
with sight gauge
AgitationMechanical - hydraulically driven with
variable speed control

General Spray System

PumpCentrifugal - hydraulically driven with
variable speed control
Solution valvesElectric ball valves
Pressure gauge100 PSI glycerin filled
MonitorRaven 460 (GPS-ready)
Fence row nozzleOptional

FOAM MARKING SYSTEM

MakeHagie Foam Marker
TypeLive air

RINSE SYSTEMS

Spray system rinse (solution tanks, pump, and booms)Standard
High pressure washing systemOptional

III. SPECIFICATIONS

ELECTRICAL SYSTEM

General Electrical System

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

Circuit Breakers

Starter relay	30 AMP
Highway and field lights (see below)	40 AMP
Work lights (see below).....	30 AMP
Foam marker and switch panel auxiliary power	30 AMP
A/C and storage console auxiliary power.....	30 AMP
Wire harness from engine.....	30 AMP
Wire harness from engine.....	(2) 30 AMP

Fuses

Rinse system power and gauges	10 AMP
Hydraulic tread adjust and seat.....	20 AMP
Spray solution valves	10 AMP
Flow control, agitation, and boom folding controls	10 AMP
Fuel and brake	15 AMP
AM/FM radio.....	10 AMP
CB radio power supply and dome light.....	10 AMP
Tank solution valves and rinse system control.....	10 AMP
Hazard/warning lights, turns signals, and wiper	10 AMP
Boom lift and level controls	15 AMP

Lights

Front of cab	4 halogen field lights
Rear of cab.....	2 halogen work lights
Booms	2 halogen work lights (1 each)
Tank shields.....	2 halogen highway lights (1 each)

Auxiliary Power Supplies

Switch panel.....	12V binding post-type
Storage console	12V cigarette lighter-type

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

III. SPECIFICATIONS

CAB AND INSTRUMENTS

Cab

General cab.....	Tilt steering Windshield wiper/washer Flashing/hazard warning lights Turn signals Side mirrors Dome light Tinted glass
Temperature control.....	Full-range
A/C charge type.....	R-134a
Fresh air filtration	Paper and charcoal filter
Seat.....	Air ride with adjustment for: Fore-aft Seat cushion Backrest Height Lumbar Ride firmness Armrest tilt
Storage.....	Right armrest/control station Floor mounted storage console

Instruments

Dial gauges	Hour meter Fuel Temperature Alternator Oil pressure
Digital gauge	Speedometer (MPH-Km/H) Tachometer (RPM)
Engine air filter restriction monitor.....	Filter Minder®
Stereo.....	AM/FM stereo cassette with dual speakers

III. SPECIFICATIONS

TIRES/RIMS

Rims (front and rear)

Standard..... 34" X 10"

Tires (front and rear)

Standard..... 320/85R34 (Radial TU)

Air pressure 30 PSI

Tire width 12.6"

Load capacity (at 20 MPH) 4860 lbs.

Overall diameter 55.4"

Static load radius (suggested—will vary with load)..... 25.8"

Rolling circumference 166.9"

Optional (narrow row crop)..... 290/95R34 (Radial TU)

Air pressure 30 PSI

Tire width 11.1"

Load capacity (at 20 MPH) 4700 lbs.

Overall diameter 55.4"

Static load radius (suggested—will vary with load)..... 25.4"

Rolling circumference 166.9"

CAPACITIES

Solution tanks (2) 500 gallons each

Fuel tanks (2) 40 gallons each

Cooling system..... 10 gallons

Hydraulic reservoir 25 gallons

Rinse system tank (optional)..... 55 gallons

Foam marker stainless steel tank (optional) 36 gallons

Engine crankcase (including filter) 17 quarts

Torque Hub® (4) 16 oz. each (approx.)

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

IV. PREPARING TO OPERATE

WHEEL TREAD AND ROW SPACING

With hydraulic tread adjust

See page 37 for information about hydraulic tread adjust operation.

Without hydraulic tread adjust

Knowing the row spacing of the field one intends to spray, follow the steps below to properly obtain the desired tread setting.



FIG 4.1

1. To adjust the tread width in or out, park the sprayer on level ground and shut off the engine.
2. Loosen the leg mounting bolts on both the front and rear legs on one side of the sprayer only.



CAUTION

Loosen leg mounting bolts only enough to allow for free movement of leg on mainframe. DO NOT remove bolts under any condition.

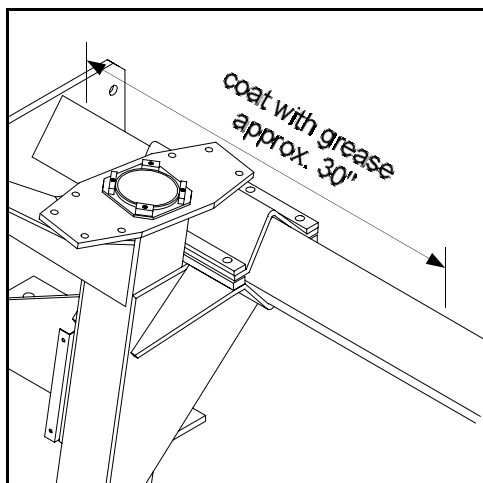


FIG 4.2

3. Loosen the rear lock nut on the leg brace (fig. 4.1). This will allow one leg to move further than the other without binding while adjusting the tread setting.
4. Lubricate the slide path the leg mount will travel along mainframe (fig. 4.2).

IV. PREPARING TO OPERATE



FIG 4.3



FIG 4.4



FIG 4.5

5. Place a suitable block under the air bag mounting plate before raising the sprayer (fig. 4.3). This will prevent the suspension from telescoping.
6. Raise the sprayer until the tires on the side being adjusted are just touching the ground.

CAUTION
Empty solution tanks before raising the sprayer.

7. To adjust the tread out, place a suitable prying tool under the center of the tire and pry out at the same time that you push out at the top of the leg (fig. 4.4). Carefully lower the sprayer to the ground which, in turn will allow the leg to slide outward. Repeat the procedure until the desired tread is obtained.
8. Adjust front and rear legs on one side according to the tread width gauge markers (fig. 4.5).
9. To adjust the tread in, raise the sprayer until the tires on the side being adjusted are just off the ground. Carefully lower the sprayer which, in turn will allow the top of the leg to slide in on the mainframe.
10. Retighten the leg mounting bolts following the torque specs and sequence on page 120.
11. Retighten the leg brace lock nut.
12. Repeat the above procedures to adjust and set the opposite side legs. When finished, all four tread width gauge markers should have identical readings.

PREPARATION CONTINUED ➔

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

IV. PREPARING TO OPERATE

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 122 for instructions on adjusting toe-in. See also page 38 for information on recalibrating self-centering cylinders.

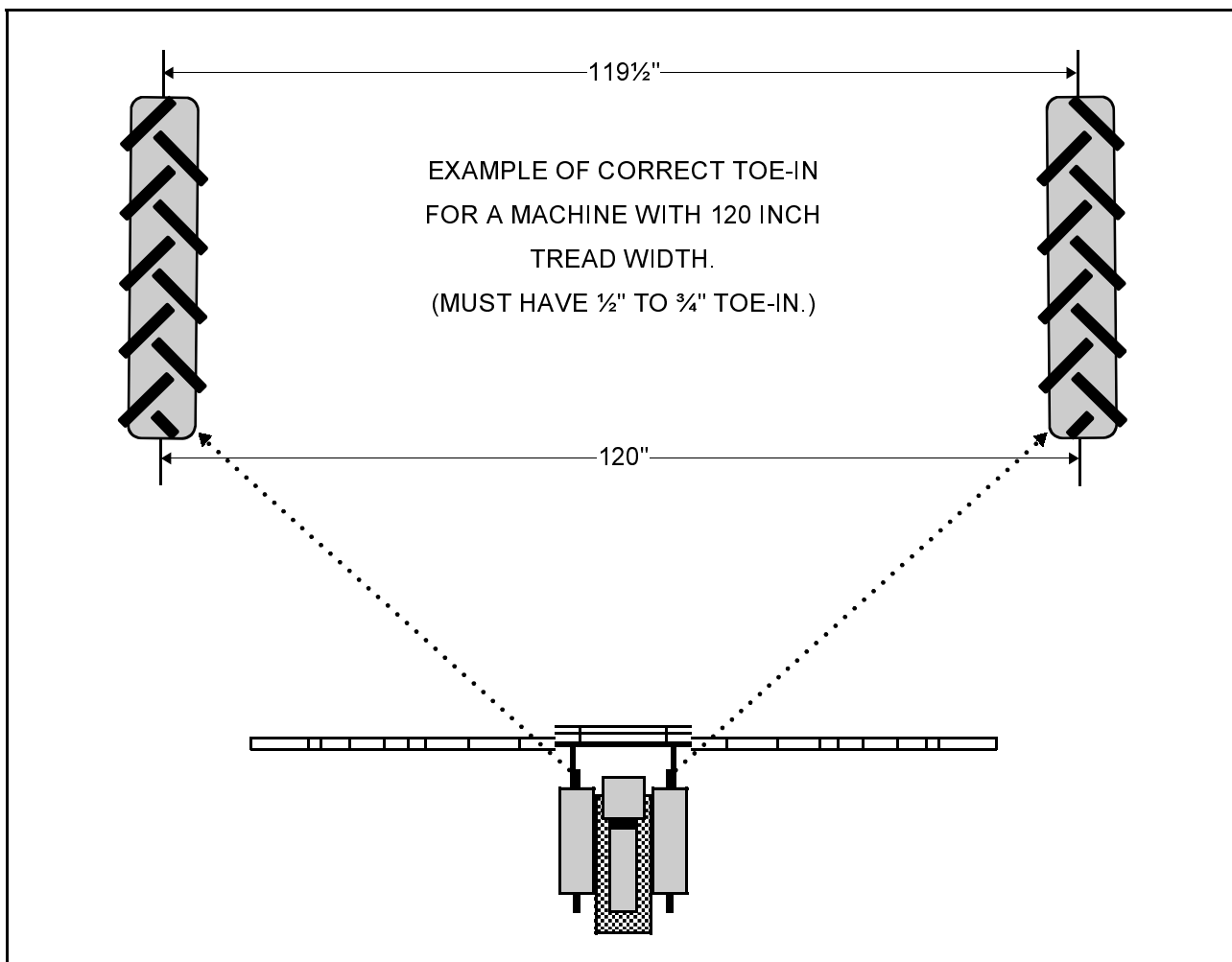


FIG 4.6

IV. PREPARING TO OPERATE

ATTACHING BOOMS AND SETTING NOZZLE SPACINGS

In shipment, some of the sprayer components may not have been assembled and will need to be installed before operating. In order to ensure the proper installation of the components, please read

and comply with the following instructions carefully.

Always make sure you have proper equipment and/or help installing the components.

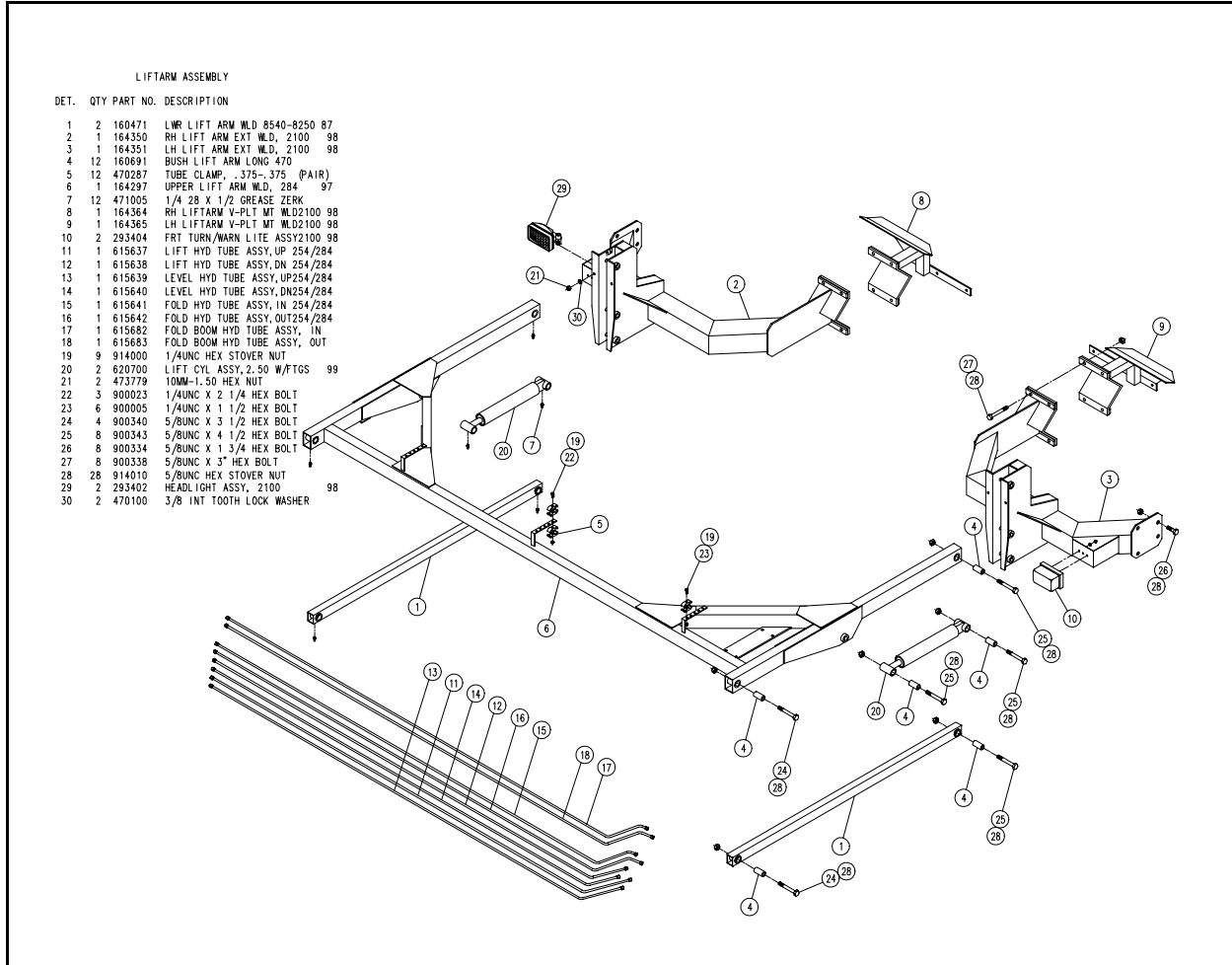


FIG 4.7

1. First, attach right hand (fig. 4.7, items 2 & 8) and left hand (fig. 4.7, items 3 & 9) lift arm mounts and tighten all bolts.
2. Install upper lift arm weldment (fig. 4.7, item 6) to lift arm mounts using proper bushings and bolts provided.
3. Install two lift cylinders (fig. 4.7, item 20), using correct bushings and bolts.
4. After installing the lift cylinders, install two lower lift arm weldments (fig. 4.7, item 1), using correct bushings and bolts.

ATTACHING BOOMS CONTINUED ➔

- SAFETY/ DECALS
- SPRAYER IDENTIFICATION
- SPECIFICATIONS
- PREPARING TO OPERATE
- OPERATING INFORMATION
- CALIBRATION
- TRANSPORTING
- SERVICE/ MAINTENANCE
- STORAGE
- TROUBLE SHOOTING
- LIMITED WARRANTY
- INDEX

IV. PREPARING TO OPERATE

➔ ATTACHING BOOMS CONTINUED

5. Install the transom weldment (fig. 4.8, item 17).

NOTE:

An overhead hoist or fork lift is very useful when installing the transom.

6. After the transom is securely fastened, install the outer booms.

NOTE:

Before attaching outer booms, park the sprayer in an open area.

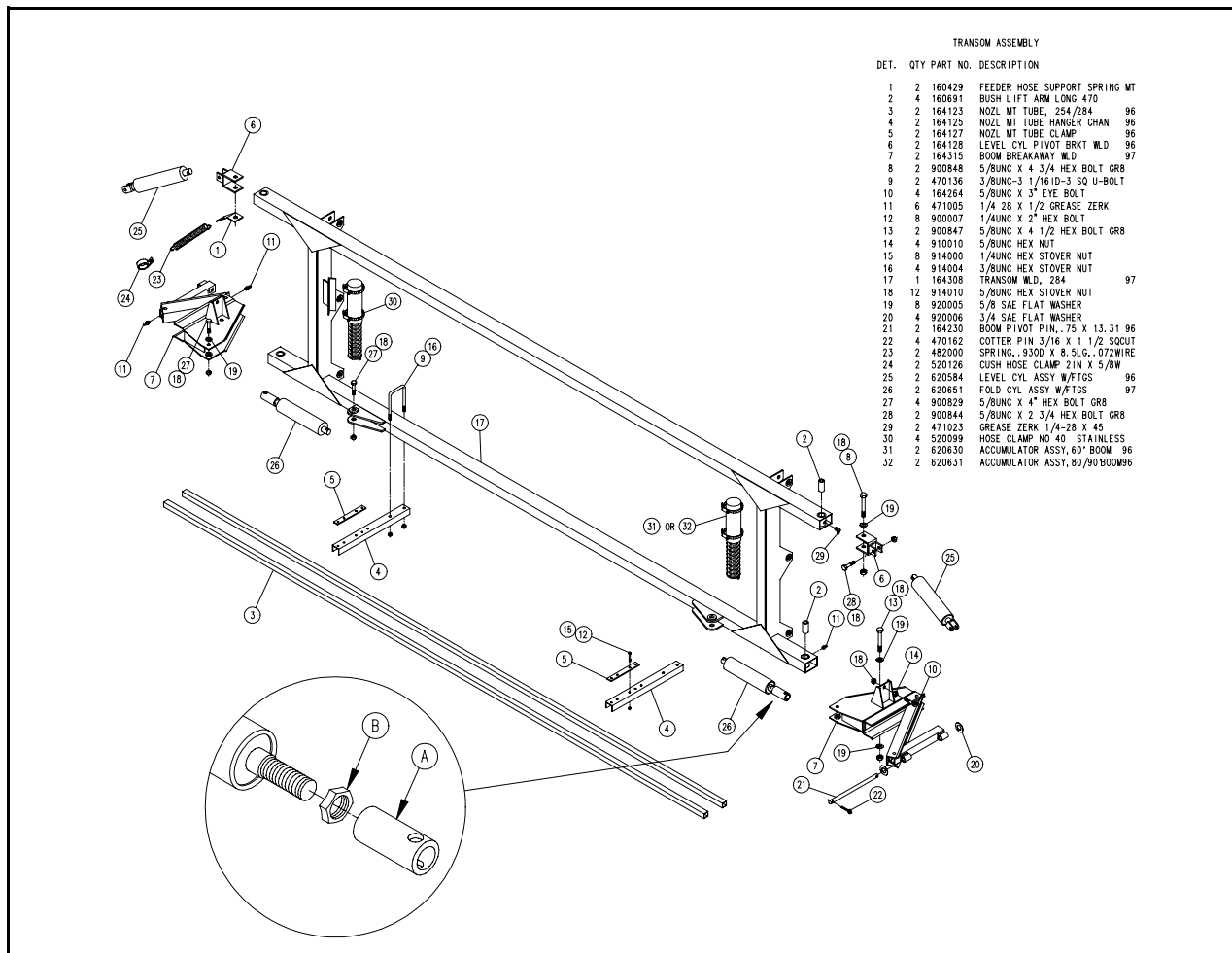


FIG 4.8

IV. PREPARING TO OPERATE

- The booms come in 60 ft., 80 ft., or 90 ft. lengths (fig. 4.9). Refer to the parts manual for detailed drawings for the correct hardware and hydraulic components when attaching to the transom.

NOTE:

Tighten the boom springs until daylight shows between the coils. Do not overtighten.

- After the outer booms have been installed, adjust the fold cylinder sleeve (page 26, fig 4.8, item A) until the booms are parallel with the transom. Then use this same adjustment to allow the boom to fold in far enough to locate in the boom cradle. Lock the cylinder sleeve in place with the jam nut (page 26, fig 4.8, item B).
- After steps 1 through 8 have been completed, mount the nozzle spacings to the outer booms and transom.

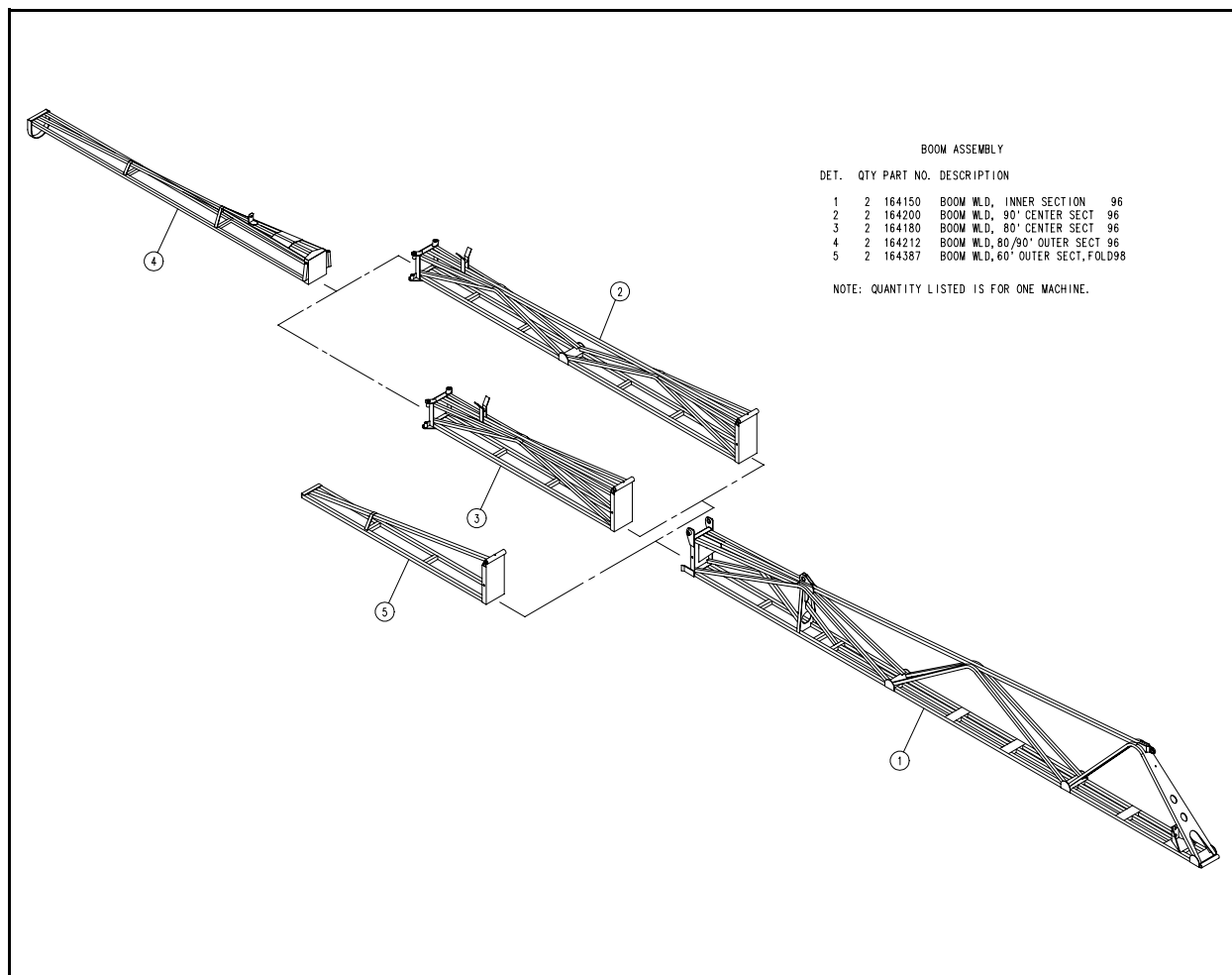


FIG. 4.9

- SAFETY/DECALS
- SPRAYER IDENTIFICATION
- SPECIFICATIONS
- PREPARING TO OPERATE
- OPERATING INFORMATION
- CALIBRATION
- TRANSPORTING
- SERVICE/MAINTENANCE
- STORAGE
- TROUBLE SHOOTING
- LIMITED WARRANTY
- INDEX

V. OPERATING INFORMATION

OPERATING THE ENGINE


Pre-operational Checks	Page Reference
1. Check the engine oil level. Do not operate the engine when oil is below the low mark on dipstick.	98
2. Check the coolant level in the radiator and the coolant overflow reservoir.	101
3. Check the hydraulic oil reservoir level.	98
4. Check cooling air intake screens.	103
5. Check engine drive belt.	117
6. Drain fuel/water separator.	107
7. Check the Filter Minder [®] .	104
8. Check for any oil or fuel leaks and correct if needed.	

Starting the Engine



1. Position hydrostatic control lever to "N" (neutral) position.
2. Put the parking brake switch to the "ON" position. (See page 34) When starting procedure is complete, return switch to "OFF" position.
3. Start the engine with the throttle at one-half speed.
4. Turn key to the "ON" position to check instruments.

V. OPERATING INFORMATION

CAUTION

Electrical system is 12 volt negative ground. When using booster with jumper cables, precautions must be taken to prevent personal injury or damage to electrical parts.

1. Attach one end of jumper cable to positive terminal of booster battery and other end to positive terminal of vehicle battery connected to starter motor.
2. Attach one end of second cable to negative terminal of booster battery and other end to vehicle frame away from battery. Do not attach to cab or cab support.
3. To remove cables, reverse above sequence exactly to avoid sparks. See operator's manual for additional information.

5. 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.
6. When engine starts, immediately reduce throttle lever setting to 1/3.
7. Inspect indicator lights and gauges for correct operation. If any lights or gauges do not operate, shut off engine and determine cause.
8. 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, thus causing pump failure.

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

COLD WEATHER STARTING

Using starting fluid without metering equipment:

CAUTION

Never use starting fluid near an open flame or pre-heater. This could cause an explosion. Do not breathe starting fluid fumes. Starting fluid fumes can be harmful to your health.

NOTE:

Do not use excessive amounts of starting fluid when starting an engine. The use of too much starting fluid will cause engine damage.

Spray starting fluid into the air cleaner intake while another person starts the engine (fig. 5.1). Do not move the sprayer until the other person is off the sprayer and a safe distance away.

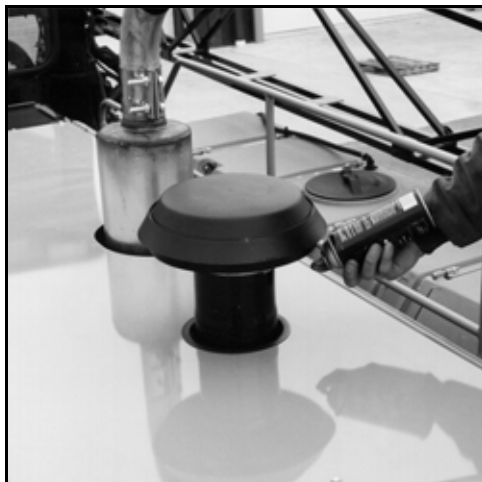


FIG 5.1

CAUTION

When using jumper cables to start engine, make sure to connect cables in parallel: positive (+) to positive and negative (-) to negative. When using an external electrical source to start engine, turn disconnect switch to the "OFF" position. Remove key before attaching jumper cables to prevent unintentional starter engagement.

V. OPERATING INFORMATION

HYDROSTATIC DRIVE

The power for the Hagie 2100 is derived from a Cummins diesel engine. The hydrostatic power system consists of a tandem set of Sauer/Sundstrand heavy duty variable displacement pumps and variable displacement wheel motors.

A manual control lever connected to the pumps' swashplates controls the amount and

direction of oil flow to the motors determining the speed and direction of the machine in any given speed range.

Speed ranges are selected by a three-position electronic switch mounted on the armrest console.

The lower the setting, the higher the torque, but the lower the speed.

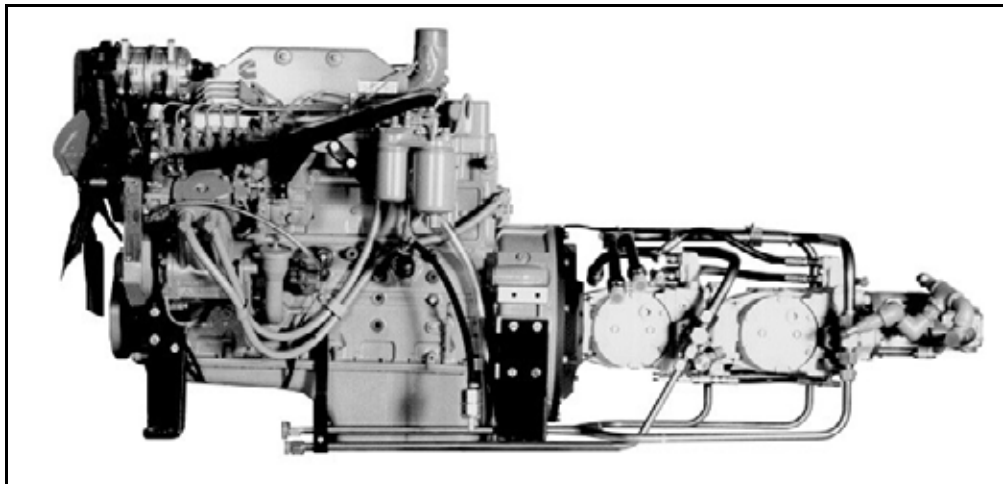


FIG 5.2

1. Open the throttle slowly to the maximum recommended engine speed setting.

NOTE:

Never operate the sprayer at anything less than full recommended throttle.

2. To move forward, slowly push the hydrostatic control lever (fig. 5.3) 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.
3. To reverse the machine, slowly pull the hydrostatic control lever back. To stop, slowly push the lever to the "N" (neutral) position.
4. Before turning off the engine, reduce engine speed and allow the engine to idle at least three minutes.

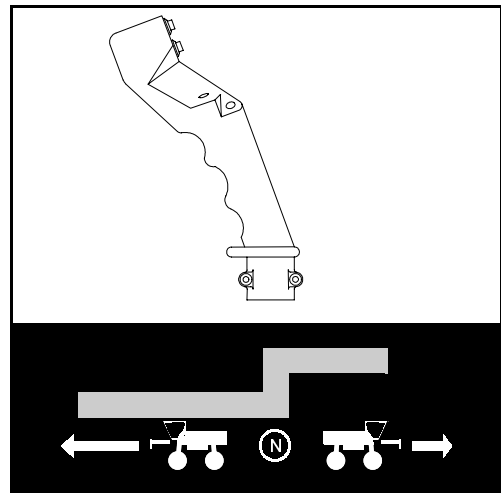
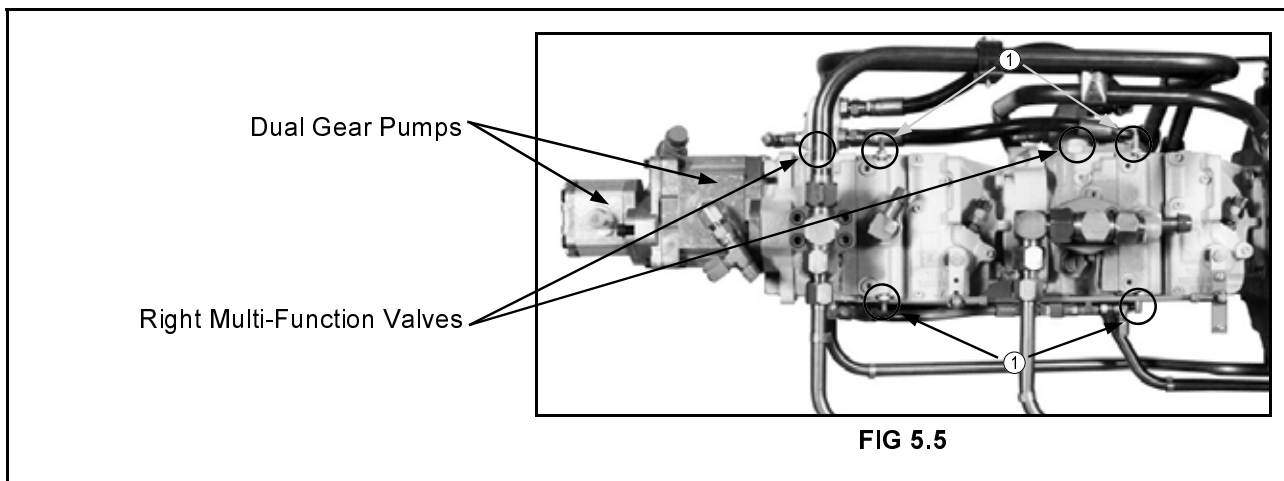
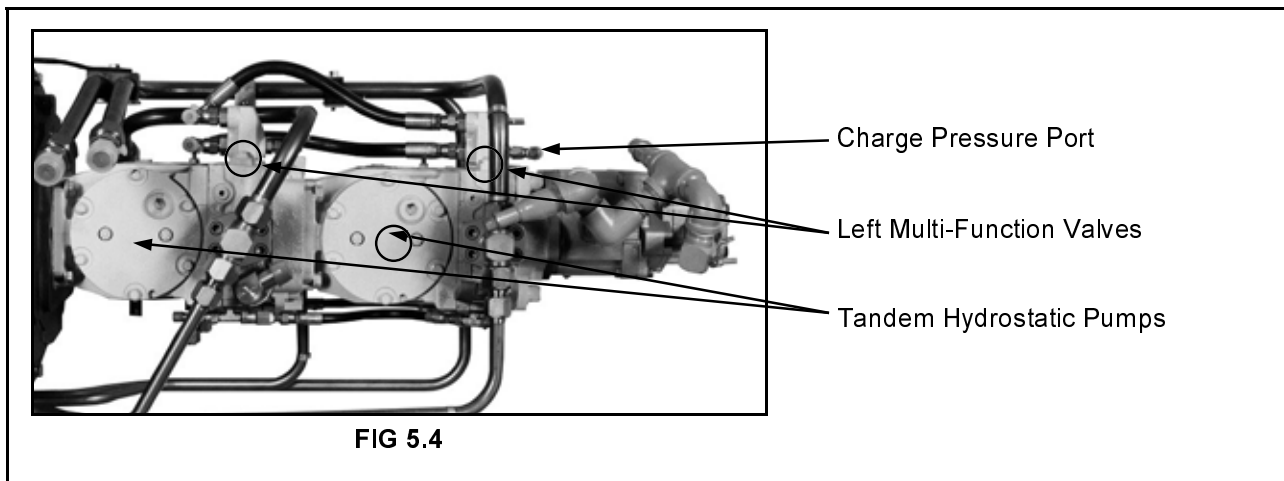


FIG 5.3

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

HYDROSTATIC SYSTEM



Displacement Limiter

The Sauer/Sundstrand Series 90 variable pumps are equipped with a mechanical displacement (stroke) limiter (fig. 5.5, item 1)

NOTE:

The limiter is factory set and requires no further adjustment. If adjustments are made without contacting the Hagie Customer Support Department, damage may result to the system and void the warranty.

V. OPERATING INFORMATION

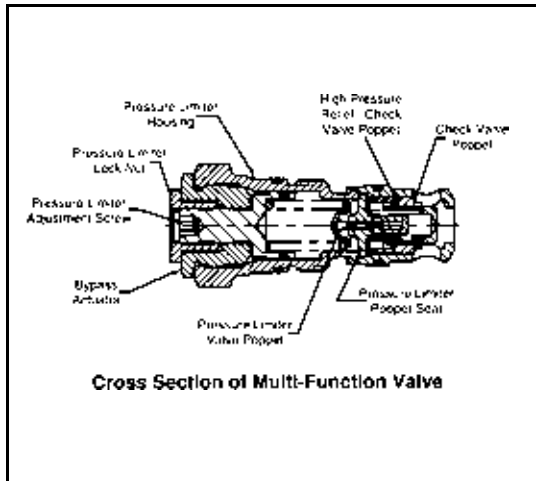


FIG 5.6

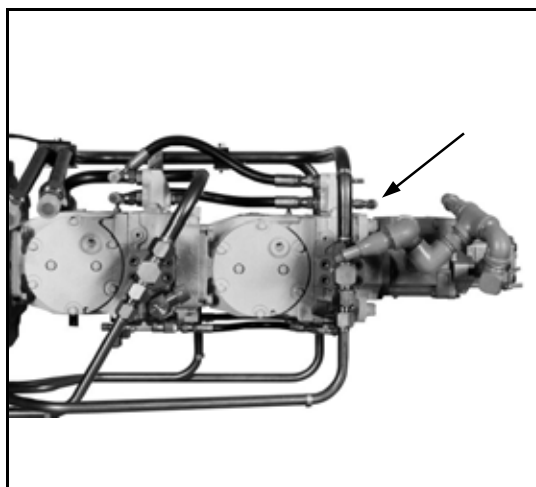


FIG 5.7

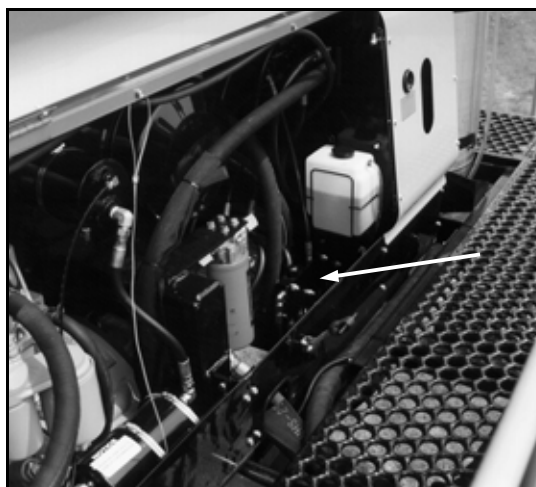


FIG 5.8

Multi-Function Valves

Each Series 90 pump is equipped with two multi-function valves (fig. 5.6). These valves incorporate the system check valve, the pressure limiter valve, the high pressure relief valve, and the bypass valve.

When the pre-set pressure is reached, the pressure limiter system acts to rapidly de-stroke the pump in order to limit the system pressure.

Charge Pressure

To monitor the closed loop system (tandem hydrostatic pumps), install a 500 PSI pressure gauge at the charge pressure port (fig. 5.7). Start the engine and open the throttle to full RPM. The charge pressure should be between 348 and 365 PSI. If it is below the required pressure, contact the Hagie Customer Support Department.

Loop Flushing Valves

Each hydrostatic pump is equipped with a loop flushing valve (fig. 5.8). They are used to remove fluid from the hydrostatic system for cooling and removal of contamination.

NOTE:

The loop flushing valves have been factory set. DO NOT adjust. Damage to the system may result if adjustment is made without contacting the Hagie Customer Support Department.

HYDROSTATIC SYSTEM CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ HYDROSTATIC SYSTEM CONTINUED

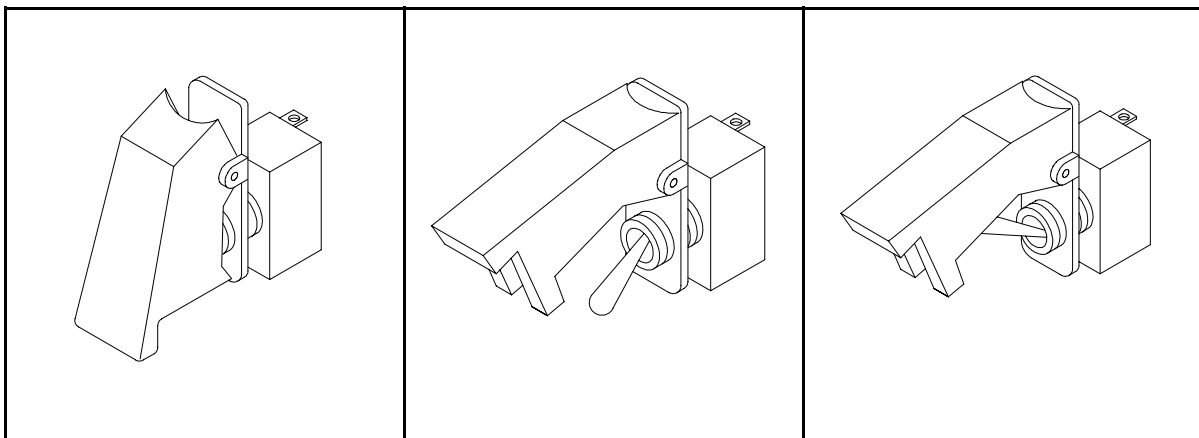
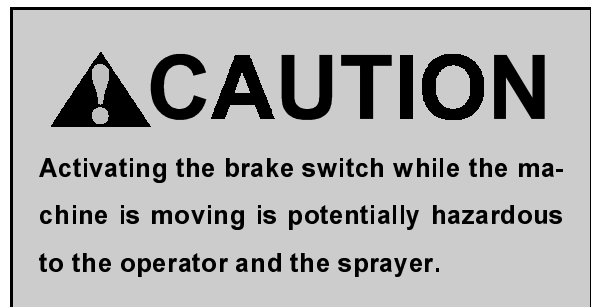


FIG 5.9

Parking Brake

The brakes are controlled by charge pressure. 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 (fig. 5.9).

Lift the RED switch cover as shown in figure 5.10B. To engage the brakes, flip the switch up to the "ON" position as shown in figure 5.10C. To release the brakes, close the RED cover and this in turn will flip the brake switch to the "OFF" position. Always return the brake switch to the "OFF" position before moving the sprayer.



A

B

C

FIG 5.10

V. 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 dual gear pumps that supply the required hydraulics to operate the full time power steering unit, boom control cylinders (lift, level, fold), the solution pump, mechanical agitation, and if equipped, hydraulic tread adjust.

After supplying each of these systems, the hydraulic oil is sent to the oil cooler in front of the

engine coolant radiator. Here it is cooled and then sent back to the hydraulic oil reservoir.

The front, larger gear pump (fig. 5.11, item 2) supplies only the hydraulic tread adjust cylinders and the solution pump. The rear, smaller gear pump (fig. 5.11, item 1) supplies power steering, boom controls, and mechanical agitation. Keeping these systems separate allows consistently even solution application if the operator activates any of the systems on the other pump.

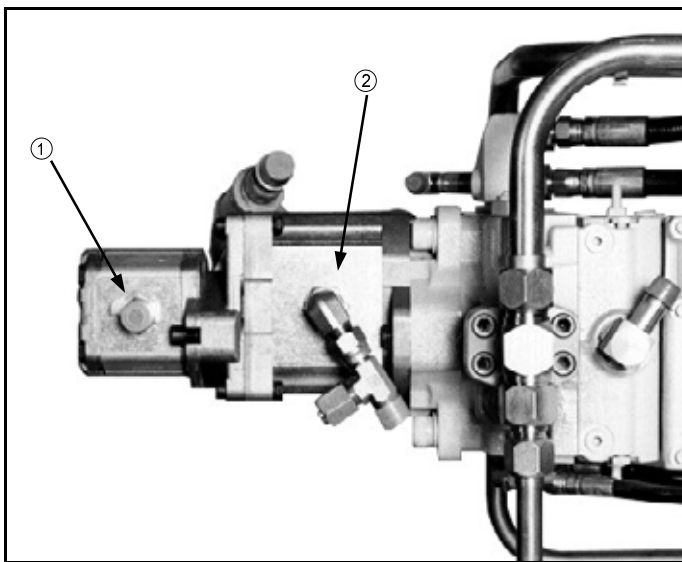


FIG 5.11

NOTE:

Immediately shut down engine if low level hydraulic oil light comes on in cab.

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 →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION



FIG 5.12

Hydraulic Tread Adjust

The Hagie 2100 is available with continuously variable hydraulic tread adjust. It is operated by a panel of switches located under the lid of the seat-mounted console (fig. 5.12). For information about operating the hydraulic tread adjust see page 37.

Booms

The sprayer has hydraulic cylinders (fig. 5.13) which aid in lifting the transom and booms for height adjustment (fig. 5.13, item 1), adjusting each boom separately for a level spraying pattern (fig. 5.13, item 2), folding the booms in toward the machine during transportation and storage (fig. 5.13, item 3), and folding the boom extensions in for transportation and storage (fig. 5.13, item 4). For more information on boom control adjustment see pages 41-44.



FIG 5.13

V. OPERATING INFORMATION

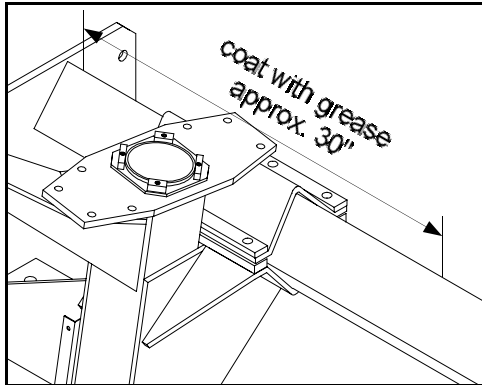


FIG 5.14

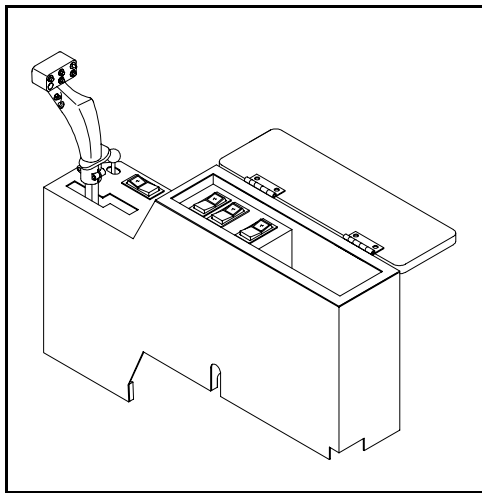


FIG 5.15

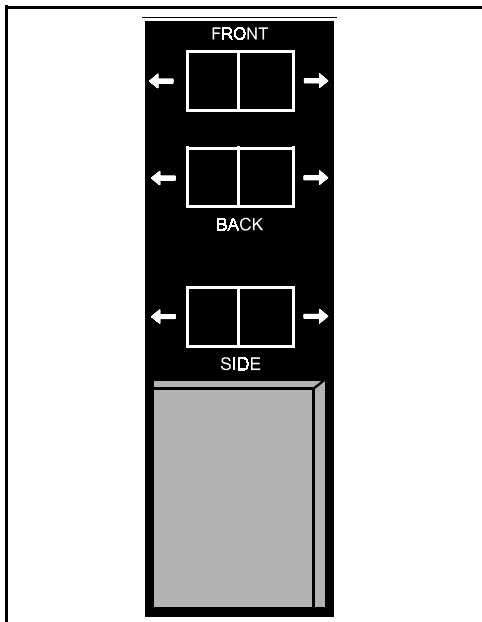


FIG 5.16

Operating the Hydraulic Tread Adjust

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.

NOTE:

The hydraulic tread adjust bearing clearance has been factory set. If further adjustment is required for more or less clearance, additional shims will need to be added or removed (see page 121).

Before you hydraulically adjust the tread:

1. Make sure the nylon material on the tread adjustment brackets on both the front and rear legs have an adequately lubricated surface to slide on during adjustment (fig. 5.14).
2. Survey the surroundings and allow yourself enough room to adjust tread either in forward or reverse.

Operating the Hydraulic Tread Adjust

NOTE:

Always adjust tread between 1 and 2 MPH; it may be adjusted in forward or reverse.

1. Locate switch panel under lid of seat-mounted console (fig. 5.15) and select the button marked "SIDE" (fig. 5.16). Depressing either side of the button will select the corresponding side of tread to be adjusted.
2. The legs may be moved in or out on each side independently. Press and hold the front and/or back switch simultaneously or separately.

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION



FIG 5.17

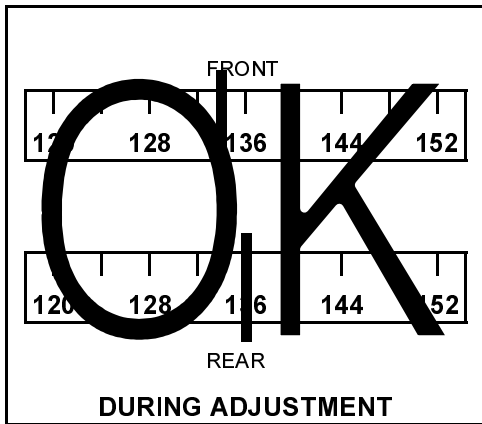


FIG 5.18

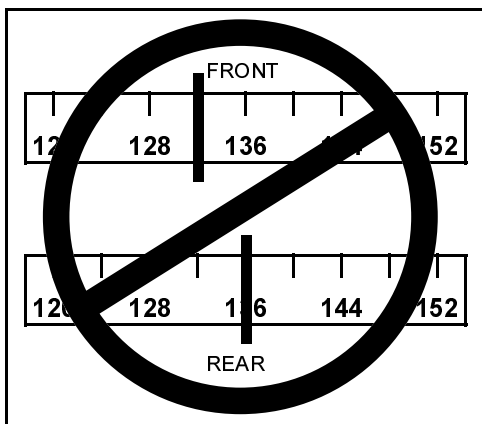


FIG 5.19

NOTE:

When operating the hydraulic tread adjust you will notice a squealing-type noise. This noise is the hydraulic fluid reaching the relief setting. Do not be alarmed of this noise during adjustment.

3. Observe the tread width indicator on each leg (fig. 5.17). Release the switch when the tread indicator reaches the desired tread parking. When finished, the front and rear indicators should have identical measurements.

NOTE:

If adjusting front and rear legs independently, do not allow the difference between the two to become greater than two inches according to the tread indicators (or one actual inch). (See figures 5.18 and 5.19.) If it does, damage may occur.

4. With one side complete, depress the "SIDE" switch to select the other side. Repeat the above procedure for the other side.
5. All four tread width indicators should have identical readings.
6. Return the "SIDE" selection switch to the center neutral position and close the lid.
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.

NOTE:

To correctly measure toe-in, see page 24.

V. OPERATING INFORMATION

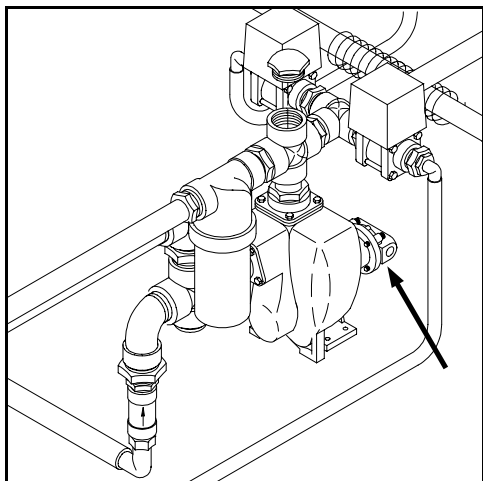


FIG 5.20

Solution Pump

The spray system's solution pump is powered by a hydraulic motor (fig. 5.20) in a system it shares only with the hydraulic tread adjust. Most likely, the hydraulic tread adjust will never be operated at the same time as the solution pump. Therefore the solution pump, theoretically is powered exclusively by its very own gear pump. This means operation of another system (other than hydraulic tread adjust) will not affect the solution pump's performance consistency. See page 55 for more information on the solution pump.



FIG 5.21

Mechanical Agitation

Solution in each of the polyethylene tanks maintain suspension in part to hydraulically driven agitator shaft assemblies (fig. 5.21). See pages 63-64 for more information on the agitation system.

Power Steering

The full-time power steering system consists of a hydraulic steering motor (mounted on the end of the steering shaft) which is connected to self-centering, double-action, steering cylinders on each steering leg (fig. 5.22). The system is powered by one of the hydraulic dual gear pumps driven by the sprayer's engine. Since these gear pumps are sensitive to engine RPM (the higher the RPM the higher the oil flow), it is best to always operate the sprayer at full recommended RPM to ensure maximum steering responsiveness.

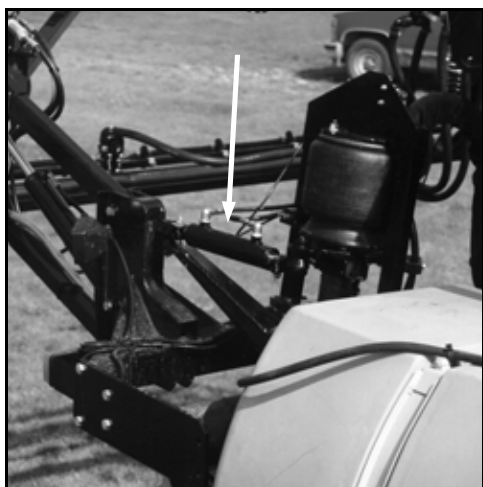


FIG 5.22

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

SPRAY BOOMS

Spray booms are available in three different lengths: 60 ft., 80 ft., and 90 ft. (fig. 5.24). Folding and locking the outer breakaway and turning off the two outer boom solution valves essentially makes an 80 ft. boom into a 60 ft. boom (fig. 5.23).

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 41), level (page 42), and horizontal and vertical fold (pages 43 and 44).

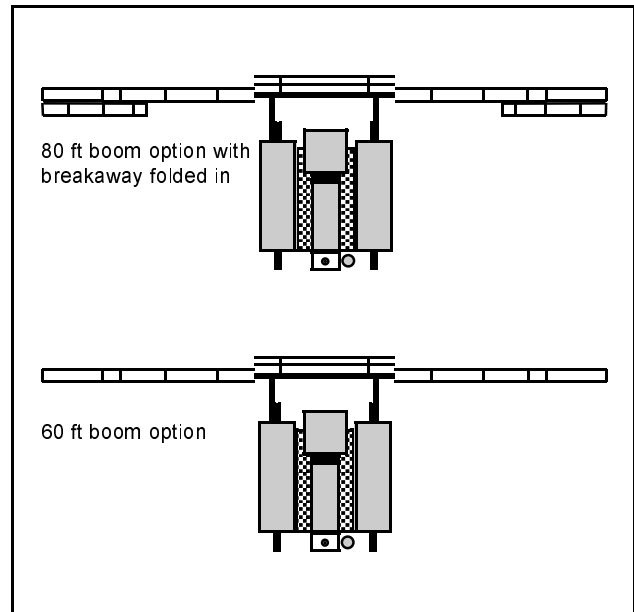


FIG 5.23

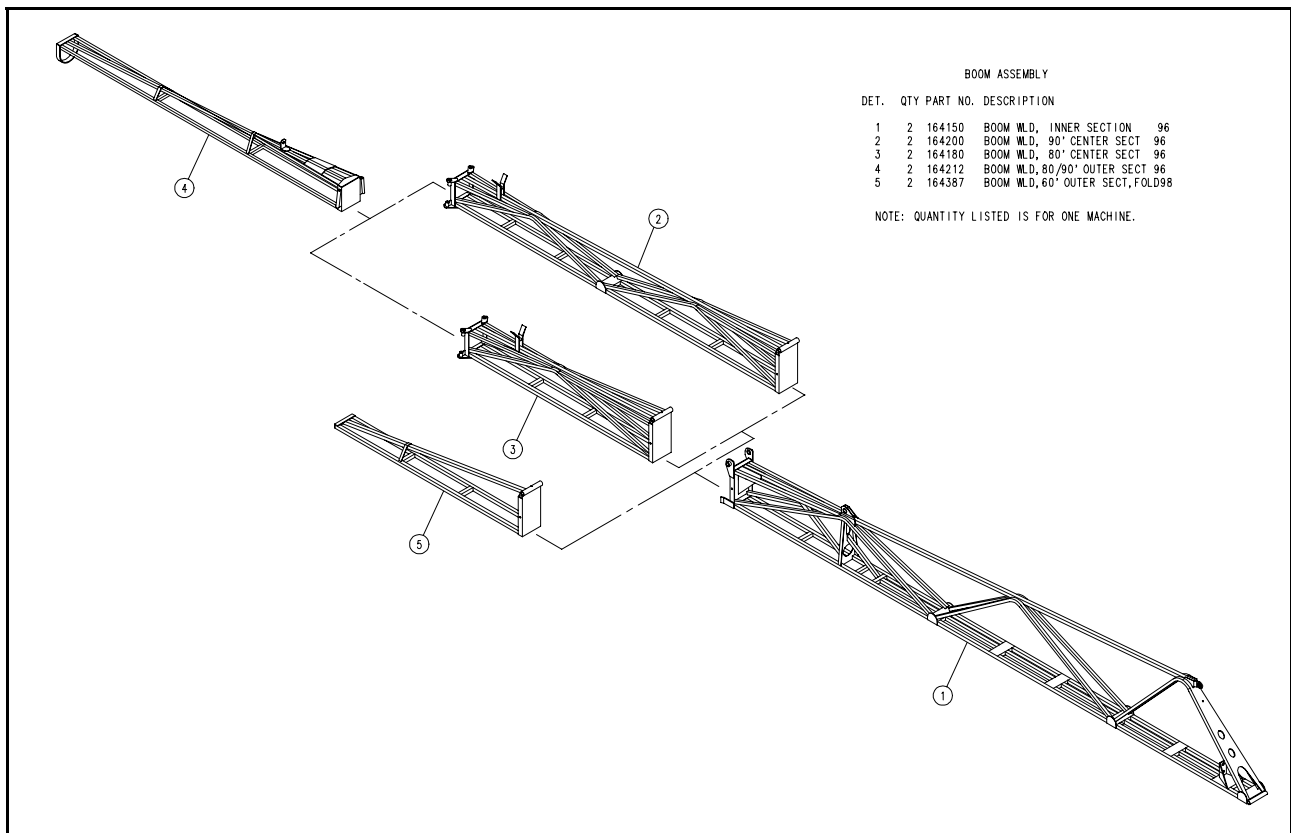


FIG 5.24

V. OPERATING INFORMATION

Lift



FIG 5.25

To raise and lower the transom/boom assembly, depress the “GRAY” (UP) or the “RED” (DOWN) buttons on the hydrostatic drive handle (fig. 5.26, item 1 & 2). While depressed, either button activates the transom lift cylinders (fig. 5.25).

See your spray tip manufacturer’s guide for information regarding spray tip height (fig. 5.27).

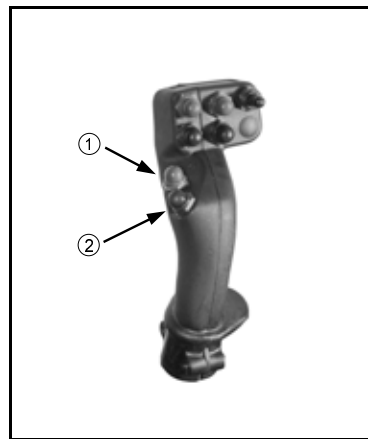


FIG 5.26

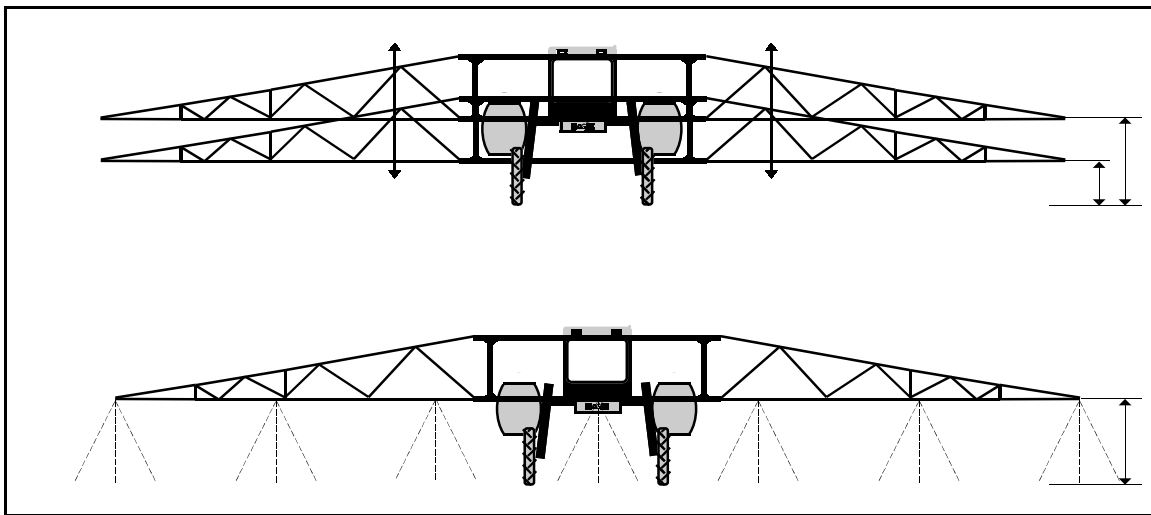


FIG 5.27

BOOM OPERATION CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ BOOM OPERATION CONTINUED

Level

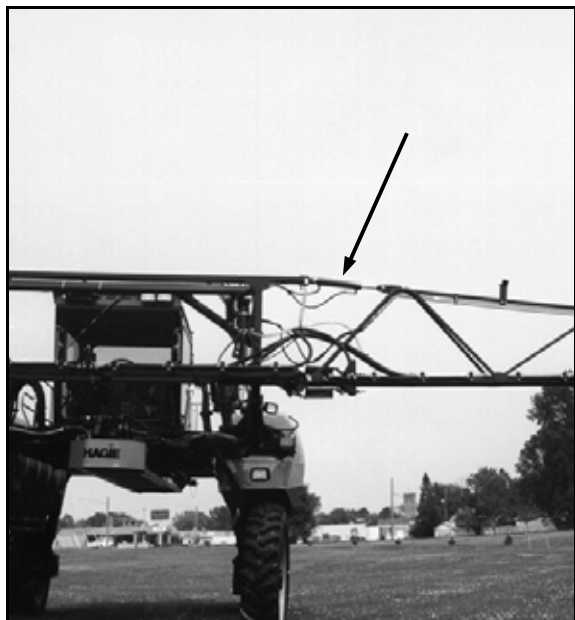


FIG 5.28

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. 5.29, items 1 thru 4). While depressed, these buttons activate the level cylinders connecting either boom to the transom (fig. 5.28).

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

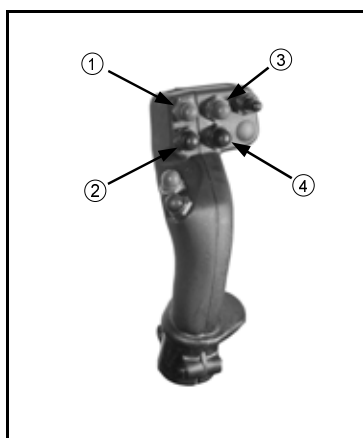


FIG 5.29

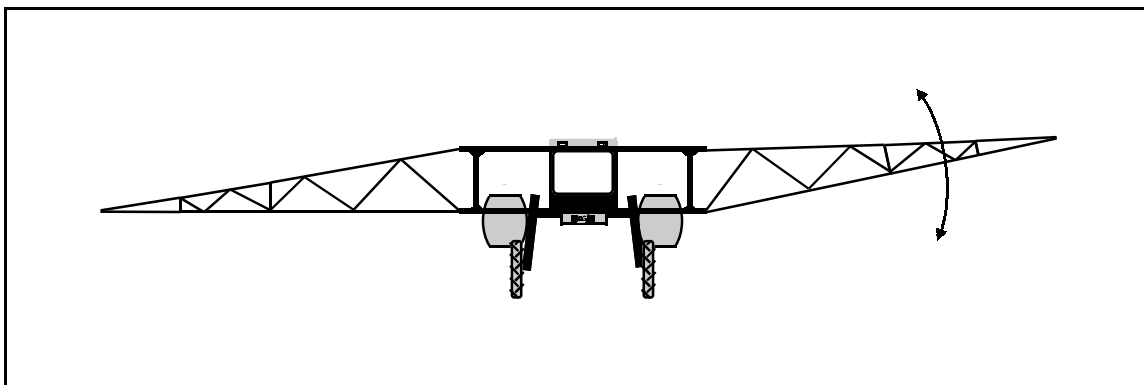


FIG 5.30

V. OPERATING INFORMATION

Fold



FIG 5.31

HORIZONTAL BOOM FOLD - To fold either boom horizontally in toward the machine or out away from the machine, depress the “IN” or “OUT” of either or both “BOOM FOLD” switches (fig. 5.32). While depressed, these switches activate cylinders connecting either boom breakaway mount to the transom (fig. 5.31).

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 5.32

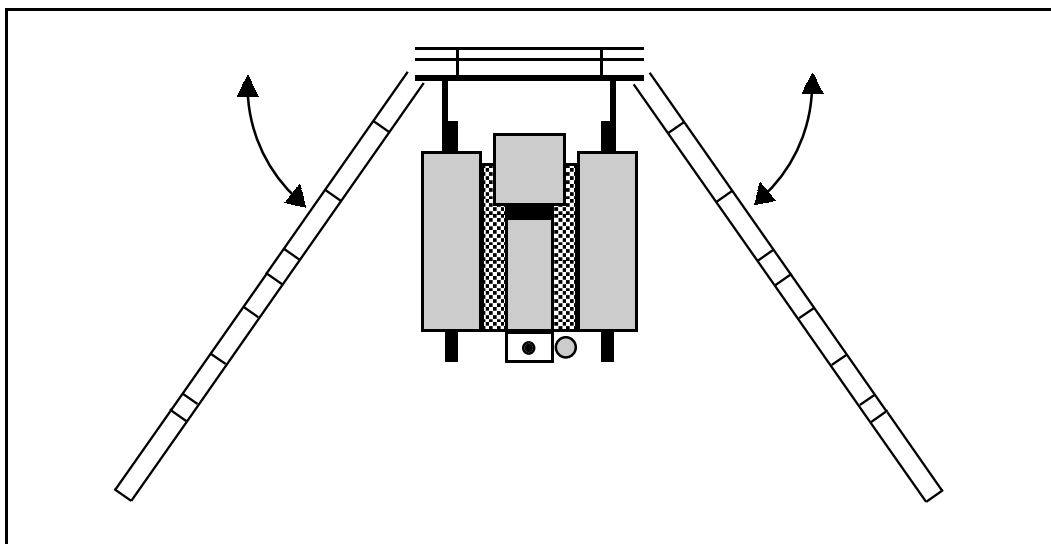


FIG 5.33

BOOM OPERATION CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ BOOM OPERATION CONTINUED

Fold



FIG 5.34

VERTICAL EXTENSION FOLD - To fold the boom extensions vertically in or out, depress the “IN” or “OUT” of the “EXTENSION” switch (fig. 5.35). This activates both extension cylinders connecting the inner boom section and the center boom section (fig. 5.34).

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

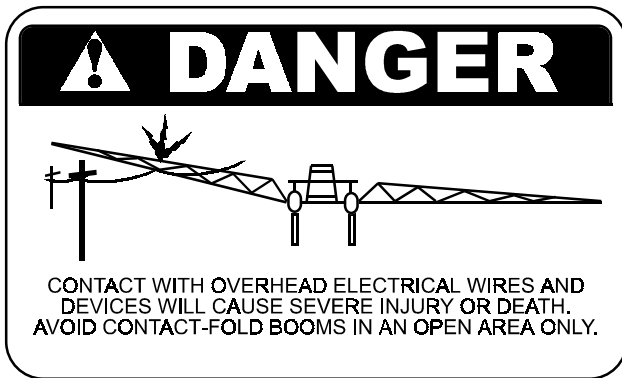


FIG 5.35

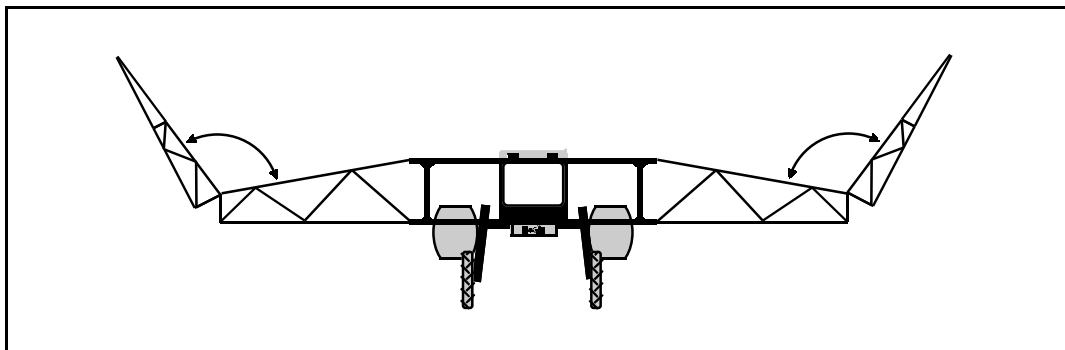


FIG 5.36

V. OPERATING INFORMATION

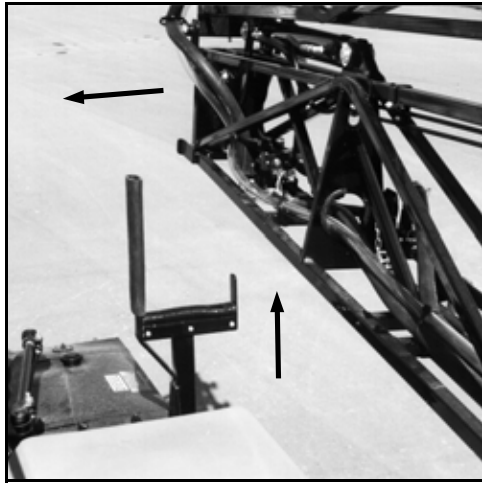


FIG 5.37

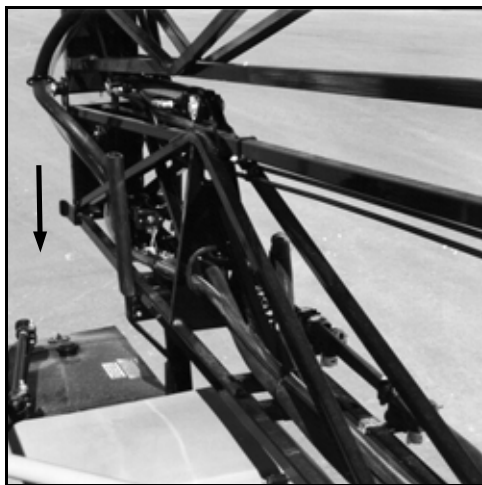


FIG 5.38

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. 5.37). 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. 5.38). If the boom does not fold in far enough, the fold cylinder sleeve may need to be adjusted (see page 27).

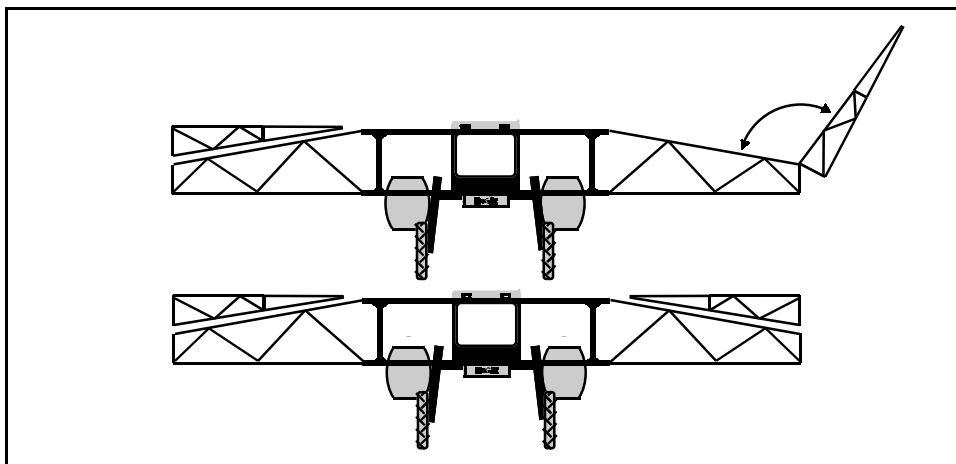
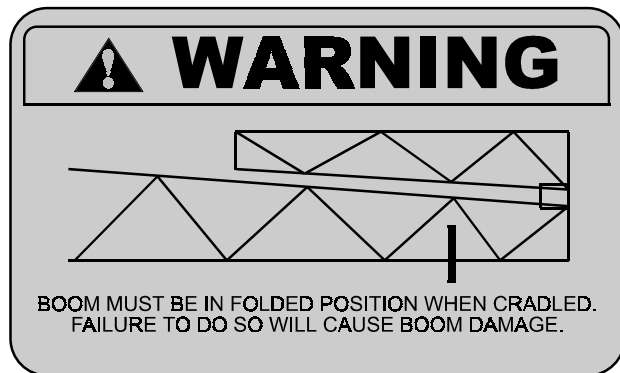


FIG 5.39

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ BOOM OPERATION CONTINUED

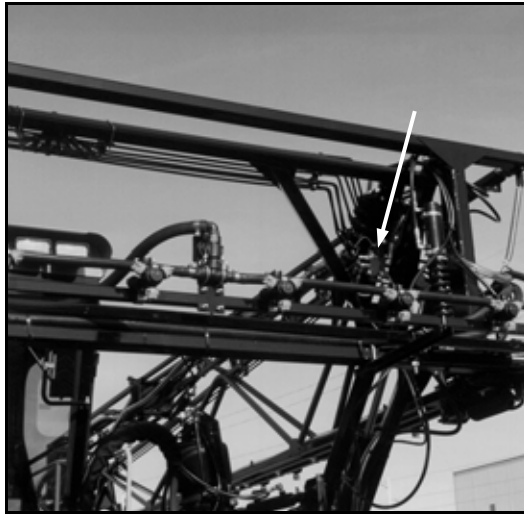


FIG 5.40

Boom Lock Valve

The boom lock valve (fig. 5.40) acts as a “flow-stop” between the two interconnected cylinders that raise and lower the transom/boom assembly. When the valve is closed, the cylinders become fixed, making the transom “rigid” (fig. 5.41A). This prevents undesirable boom rocking while traveling across uneven terrain (fig. 5.41B).

The valve opens when the transom is raised or lowered and stays open as long as the “RAISE” or “LOWER” button remains depressed. As soon as the button is released, the lock valve closes and the transom is once again “rigid.”

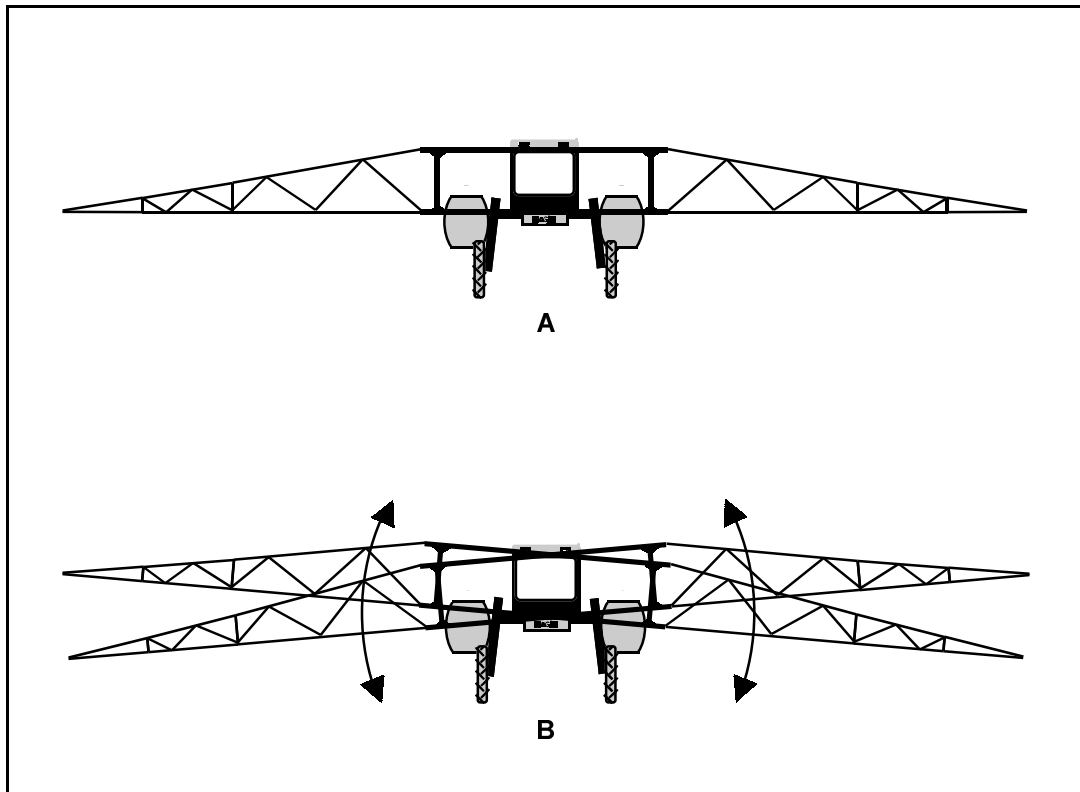


FIG 5.41

V. OPERATING INFORMATION

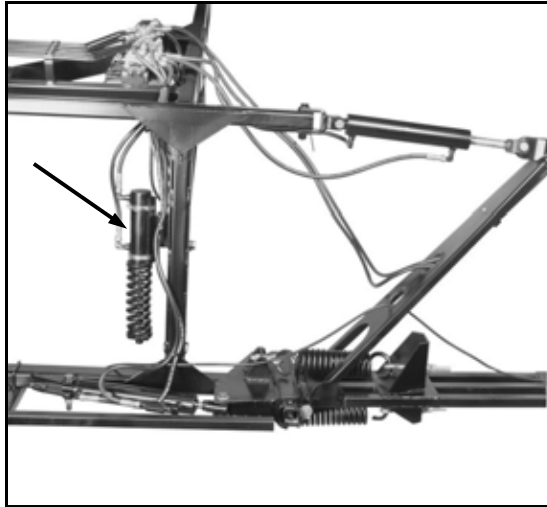


FIG 5.42

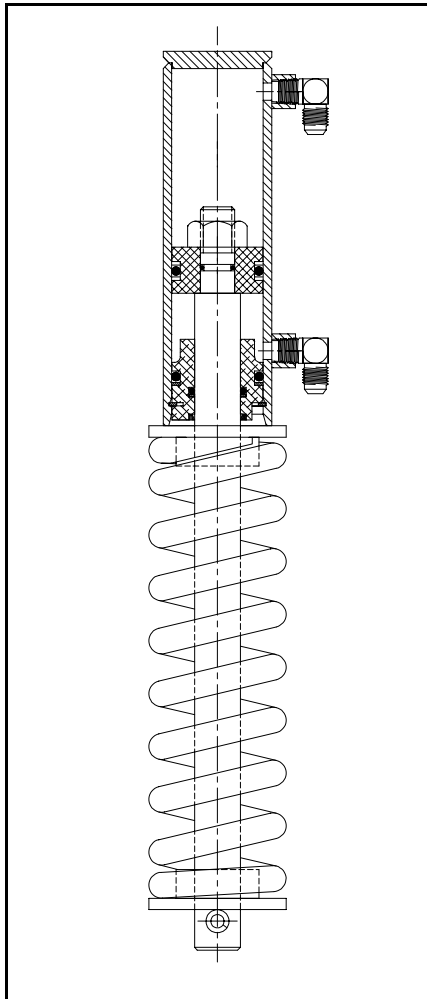


FIG 5.43

Accumulator

Each boom is equipped with an accumulator system. This system acts as a vertical “shock-absorber” for the booms (fig. 5.42). It consists of a spring-cushioned cylinder mounted on the transom (fig. 5.43). Each accumulator is hydraulically connected in parallel to each corresponding level cylinder of each boom.

If jarred up or down suddenly, the boom will push or pull the level cylinder’s shaft either in or out. The accumulator cylinder gives the oil on the side of the cylinder being compressed a place to transfer to, absorbing the shock. Without it, the cylinder is rigid and damage may occur.

The transferred oil compresses or extends the accumulator’s shaft. After the load of the “jar” has been absorbed, a spring returns the accumulator back to a “home” position and the boom returns to its previous level.

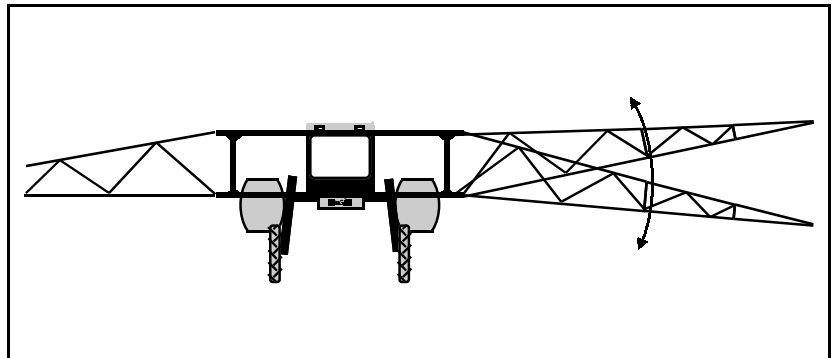


FIG 5.44

ACCUMULATOR CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ ACCUMULATOR CONTINUED

ACCUMULATOR HOISING DIAGRAM

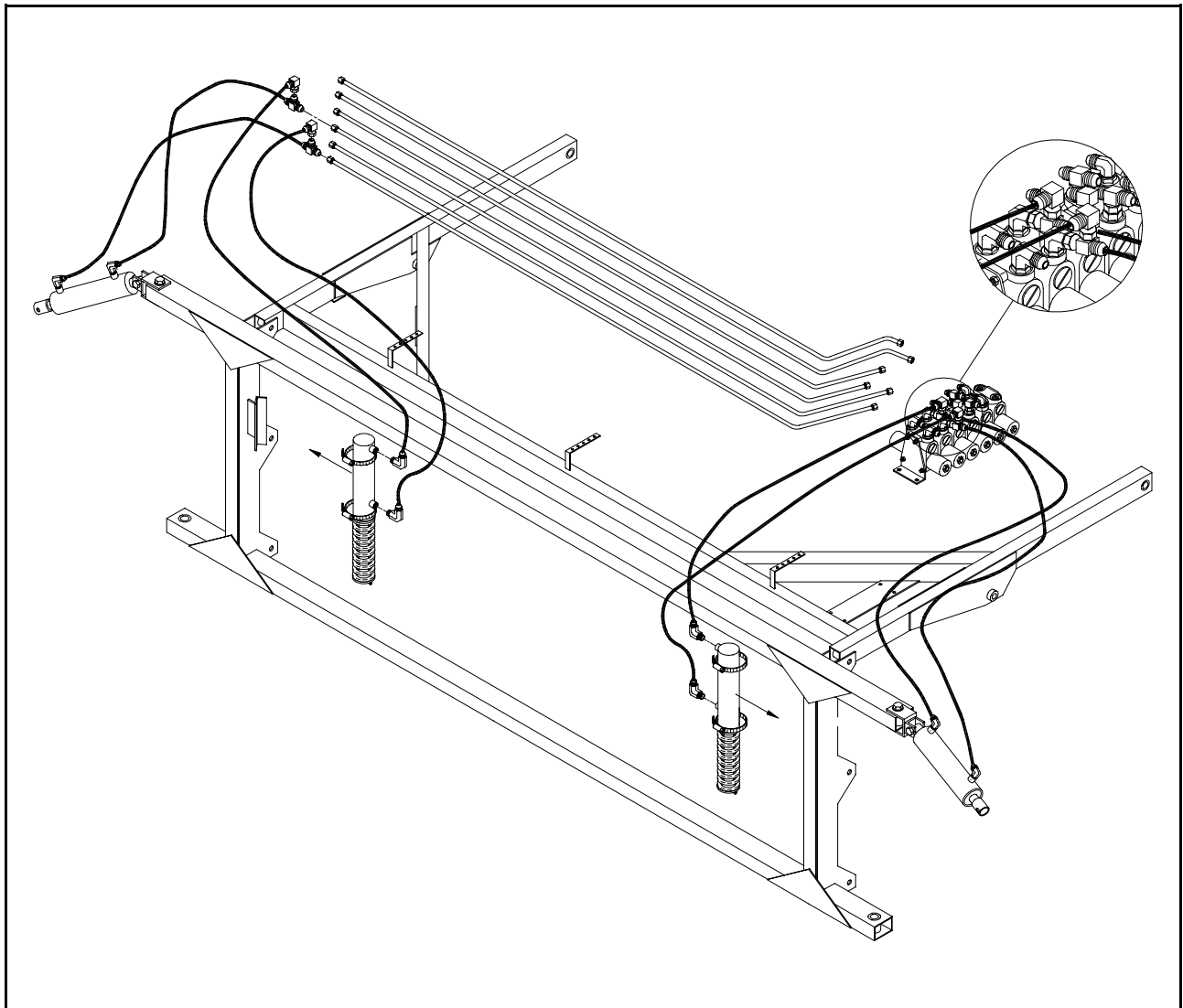


FIG 5.45

V. OPERATING INFORMATION

Inner Breakaway

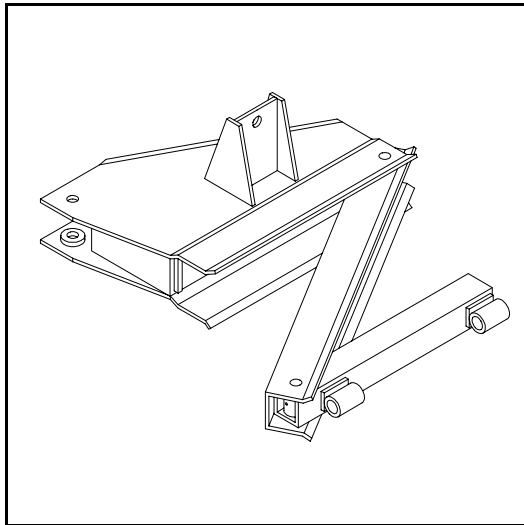


FIG 5.46

Each boom is equipped with an inner breakaway system. This system acts as a horizontal “shock-absorber” for the booms (fig. 5.48). It consists of a two-way hinge (fig. 5.46) and spring combination. Each breakaway connects each corresponding boom to the transom (fig. 5.47).

In event of a sudden stop, the forward momentum of the booms continues to the extent of the breakaway’s springs. As the springs extend they absorb the energy of the momentum transfer. The springs then retract, pulling the boom back to its previous position.

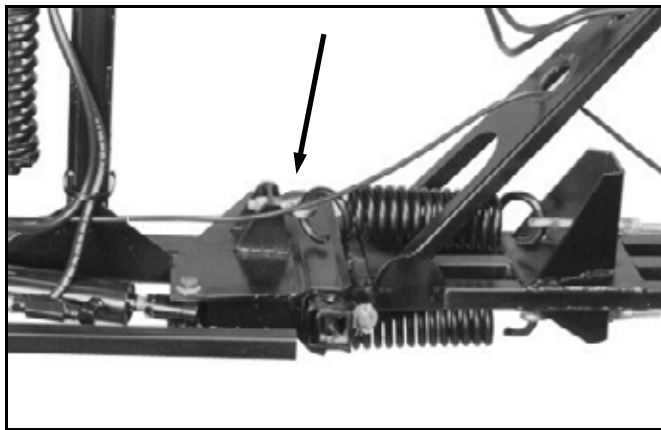


FIG 5.47

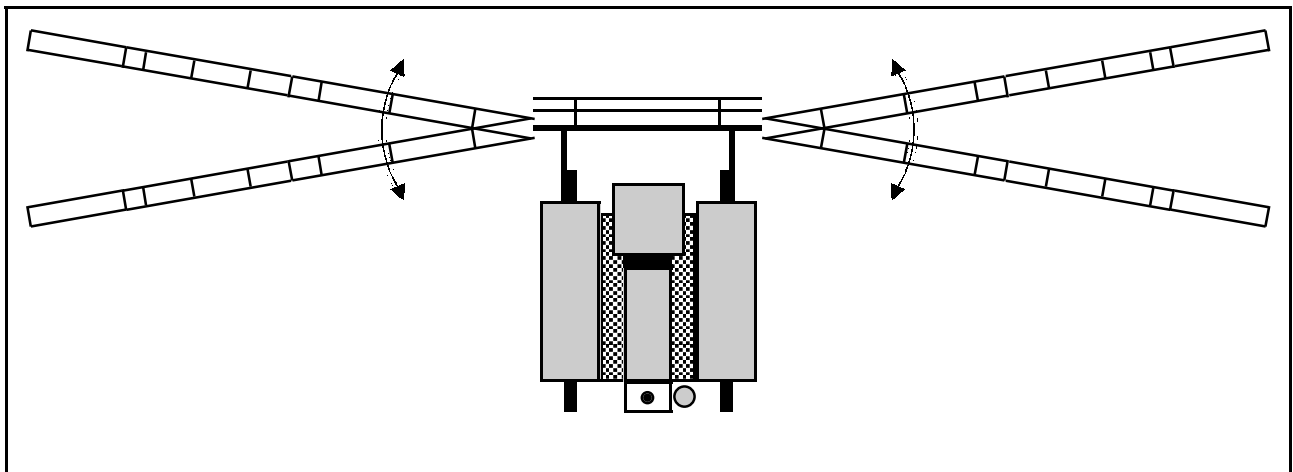


FIG 5.48

BREAKAWAYS CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

Outer Breakaway

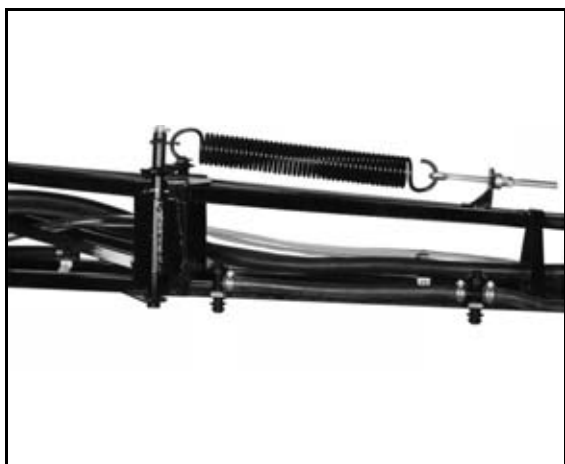


FIG 5.49

Eighty and ninety foot booms are equipped with a one-way, spring-loaded breakaway hinge on the outer boom section (fig. 5.49). If an object is struck with the outer section, it will hinge backward, minimizing damage to both the object and the boom (fig. 5.50). Once past the object the spring will pull the outer boom section back in-line.

The outer boom section can also be manually folded (fig. 5.51). The outer boom section should be locked down if in the folded position to prevent boom damage (fig. 5.52). Folding the outer breakaways of an eighty foot spray boom option gives it the same width as a sixty foot spray boom option (see page 40).

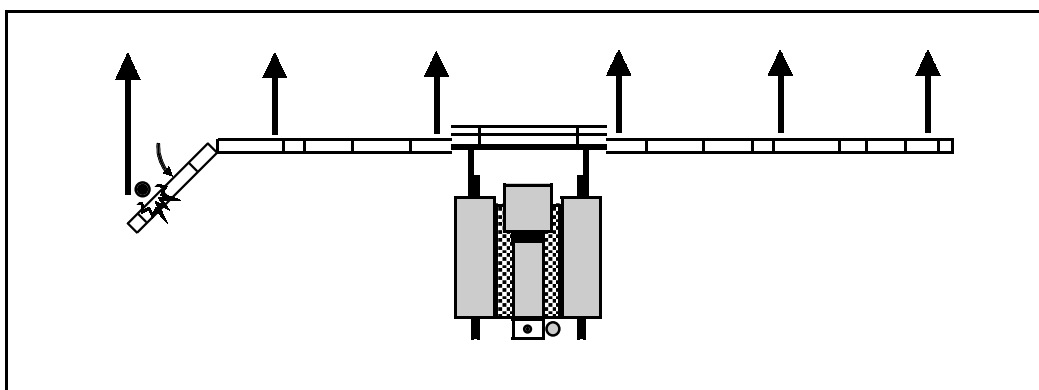


FIG 5.50



FIG 5.51



FIG 5.52

V. OPERATING INFORMATION

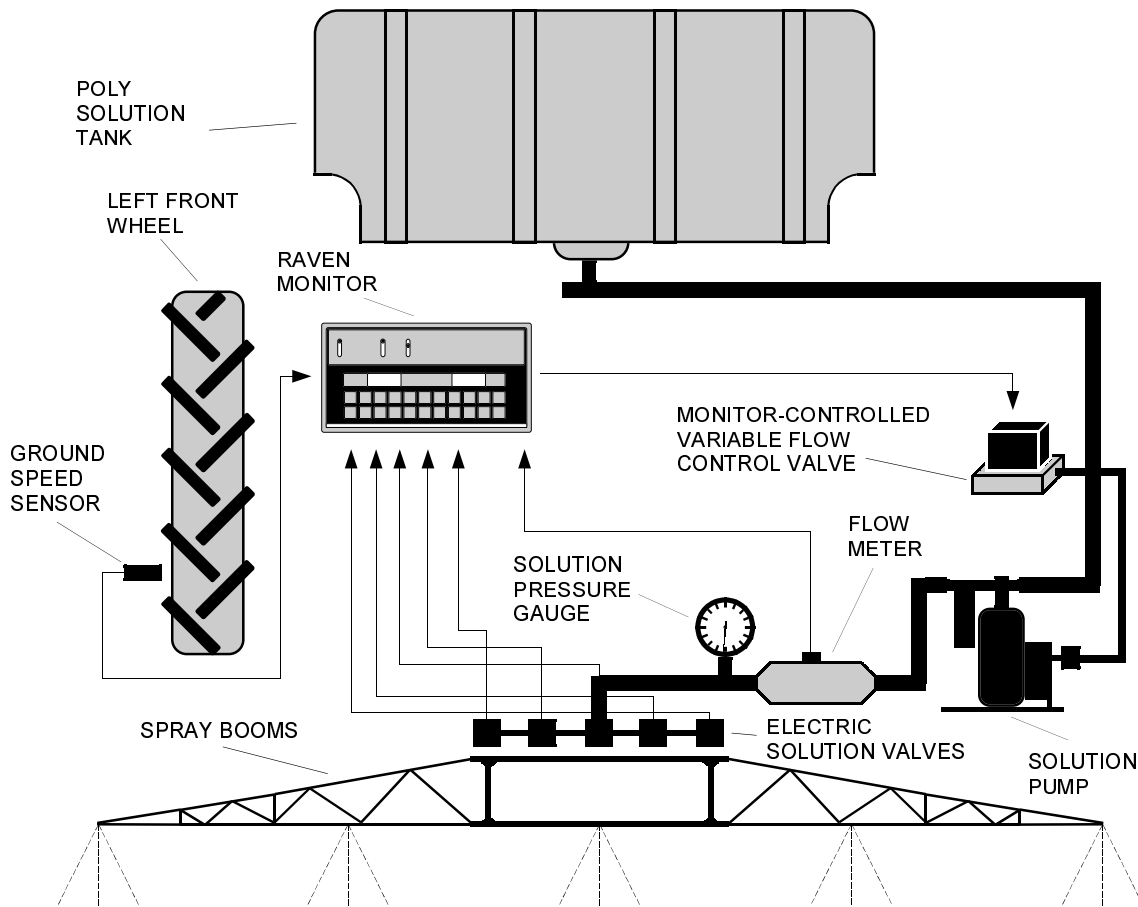
SPRAY SYSTEM

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).

The wheel-mounted ground speed sensor sends a signal to the monitor. The monitor in-turn adjusts the variable flow control valve accordingly, causing the solution pump output volume to vary.

The flow meter calculates the gallons per minute and relays this information so the monitor can perform necessary adjustments. The pressure gauge gives the operator a visual check on solution output. The spray boom electric solution valves assist in determining gallons per acre and let the monitor know if they are on or off so it can adjust accordingly.

All of these variables come in to play to determine desired solution application.



SPRAYING SYSTEM CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ SPRAYING SYSTEM CONTINUED

SPRAY SYSTEM OPERATION INSTRUCTIONS

OPERATION	PAGE REFERENCE
1. Calibrate spraying system monitor.	87-88
2. Check contents and quantity in spray tanks.	60
<div style="border: 1px solid black; padding: 5px;"><p style="text-align: center;">NOTE:</p><p>Never attempt to operate the spray system without solution in the spray tanks. Operating the spray system with no solution in the tanks will cause severe damage and void the warranty.</p></div>	
3. Completely open the tank valves.	61
4. Start engine and maintain a relatively low engine RPM setting (1,000 RPM). Increase engine RPM slowly until full recommended operating RPM is reached.	28-30
5. If desired, activate the agitation system.	63-64
6. Turn on the solution pump switch.	55
7. Turn on the main solution floor switch.	57
8. Place individual boom solution valve switches to the "ON" position.	56
9. Slowly move the hydrostatic control lever forward to obtain the desired ground speed.	31
10. Frequently observe the pressure gauge. When it drops to zero, or spray pattern deteriorates, shut off main solution switch, solution pump, and agitation system until refilling solution.	55, 57, 55, 63, 62

V. OPERATING INFORMATION



FIG 5.53

Spray System Monitor

The spraying system monitor (fig. 5.53) receives inputs from various sensors including a flow meter, ground speed sensor, and electric boom solution valves. These inputs determine solution flow. For more information regarding the monitor, refer to the handbook that accompanies this manual. For information on calibration see page 87.

Flow Meter

The solution flow meter (fig. 5.54) is mounted in-line after the solution pump. It monitors solution flow in gallons per minute. If the flow signal it sends to the monitor is too low, the monitor speeds up the solution pump. If it's too high, the monitor slows the solution pump down.

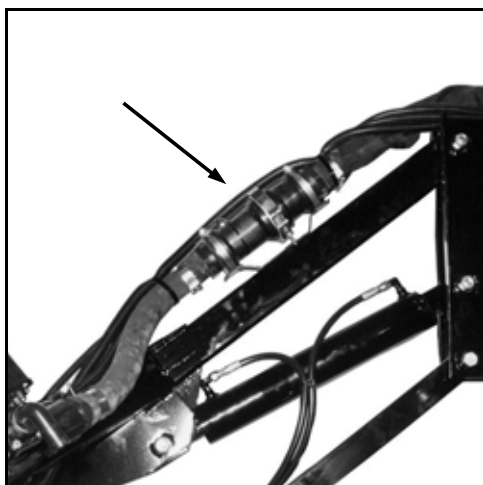


FIG 5.54

Ground Speed Sensor

A series of magnets mounted on the left front wheel and a sensor mounted on the left front leg aid in determining the sprayer's ground speed (fig 5.55). The higher the ground speed the more solution needs to be applied for the gallons per acre to remain the same. The monitor will adjust pump speed automatically to match ground speed within a preset window of operating speed (see monitor handbook).



FIG 5.55

SPRAYING SYSTEM CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ SPRAYING SYSTEM CONTINUED

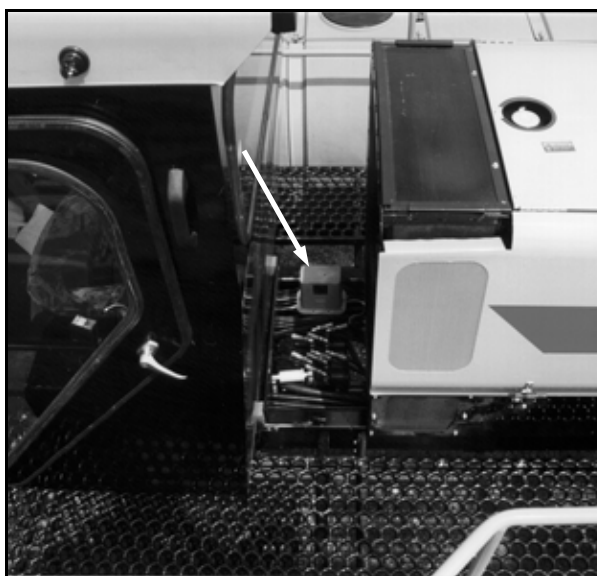


FIG 5.56

Monitor-Controlled VFC

The spray system's monitor electronically controls a variable flow control (fig. 5.56) which supplies hydraulic flow to the spray system's solution pump. The more open the valve is, the more oil that passes through, and the faster the solution pump turns. The monitor-controlled variable flow control is located directly in front of the cooling system's radiator.

Manual Variable Flow Control

The monitor-controlled variable flow control (fig. 5.57, item 3) is supplied by a factory-preset manual variable flow control (fig. 5.57, item 1). It limits the maximum RPM of the hydraulic motor on the solution pump. Do not adjust the preset or remove the maximum stop (fig. 5.57, item 2).

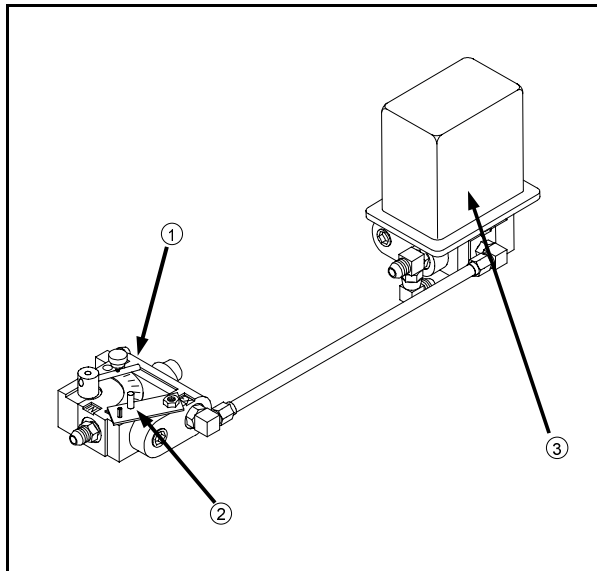


FIG 5.57

NOTE:

Removal of the manual flow control stop will over speed the motor and cause severe damage, voiding the warranty.

V. OPERATING INFORMATION

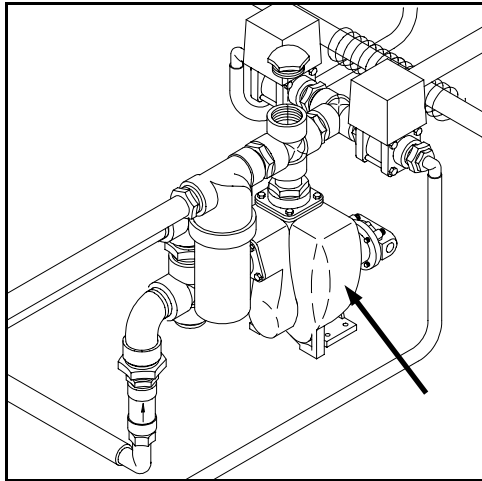


FIG 5.58

Solution Pump

The solution pump is a hydraulically driven centrifugal pump (fig. 5.58) with variable speed control. Engage the solution pump while at a relatively low engine RPM setting (1,000 RPM). Increase engine RPM slowly and maintain full recommended throttle RPM for field operation.

NOTE:

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

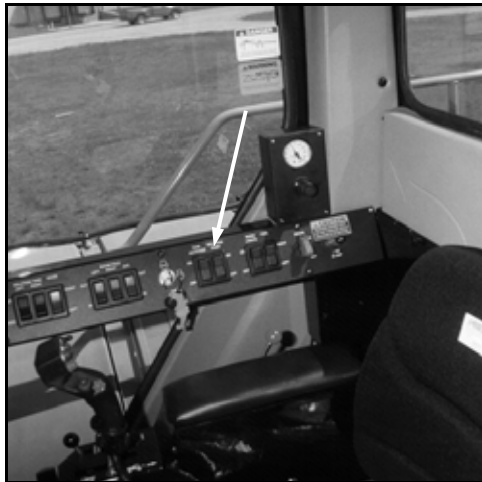


FIG 5.59

Solution Pump Switch

To turn the solution pump on, place the solution pump switch (fig. 5.59) to the "ON" position. This opens the monitor-controlled variable flow control valve that supplies hydraulic fluid to the solution pump's hydraulic drive. When finished applying solution or if solution tanks are empty, turn the solution pump switch to the "OFF" position.



FIG 5.60

Solution Pressure Gauge

The solution pressure gauge (fig. 5.60) 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.

SPRAYING SYSTEM CONTINUED ➔

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ SPRAYING SYSTEM CONTINUED



FIG 5.61

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 (fig. 5.61). Eighty and ninety foot booms are divided into five sections with three valves mounted on the transom and one mounted on each boom (fig. 5.62).

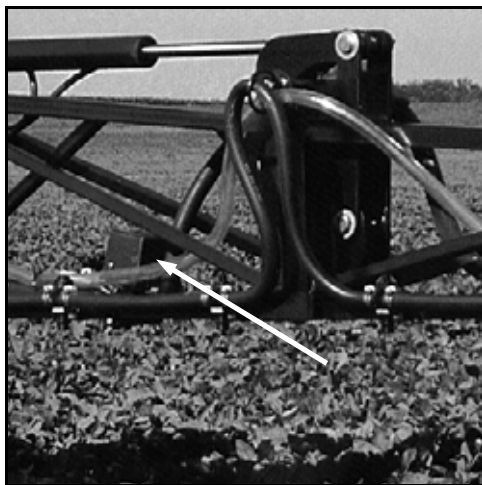


FIG 5.62

Boom Valve Switches

The electronic boom solution valves are controlled by a panel of switches mounted under the spraying system's monitor (fig. 5.63). 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. 5.64). Each indicator will light up if that particular boom solution valve is turned "OFF." The main solution switch "OPEN" status is indicated by an instrument panel-mounted "GREEN" or "GO" light (fig. 5.63, item 1; see also next page) and individual boom solution valve "CLOSED" status is indicated by a "RED" or "STOP" light.



FIG 5.63

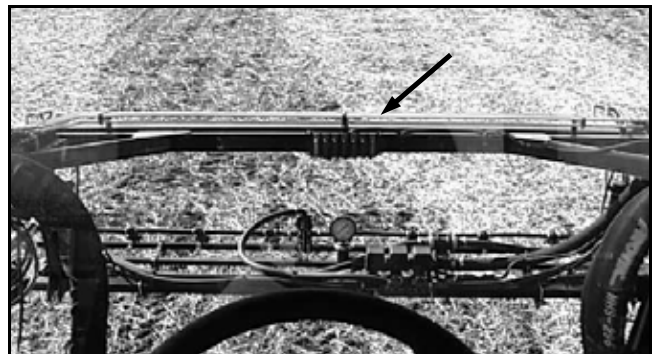


FIG 5.64

V. OPERATING INFORMATION



FIG 5.65

Main Solution Switch

The main solution switch is a floor-mounted “dimmer-style” switch (fig. 5.65). It controls the power supply to the panel of boom solution valve switches (fig. 5.66). The main floor switch 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 (fig. 5.67).

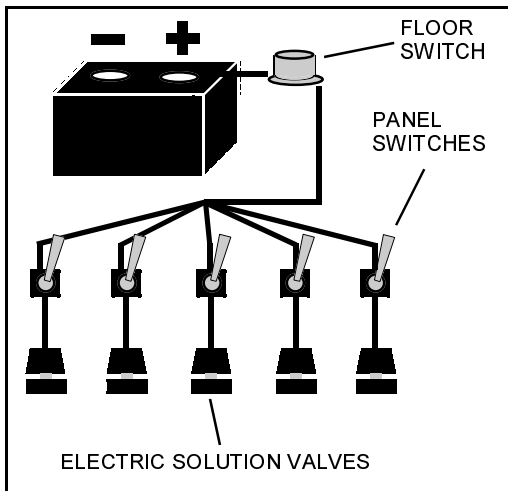


FIG 5.66

When the main solution switch is “ON” a “GREEN” indicator light mounted at the bottom of the instrument panel will light up. When the light is not lit, the main solution switch is “OFF.”

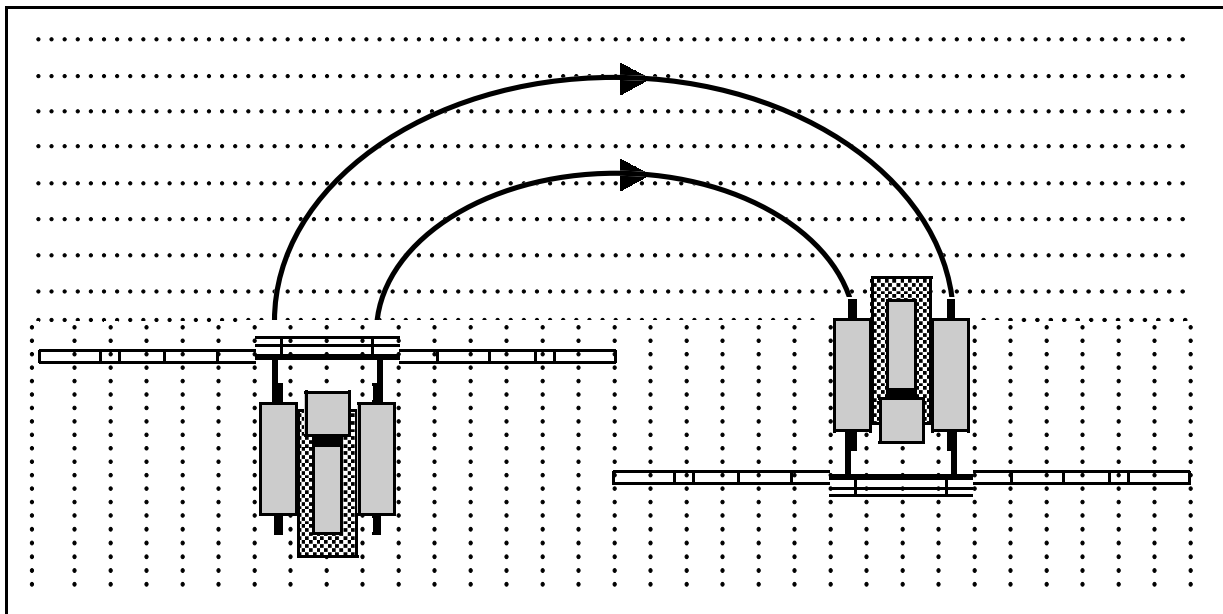


FIG 5.67

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ SPRAYING SYSTEM CONTINUED

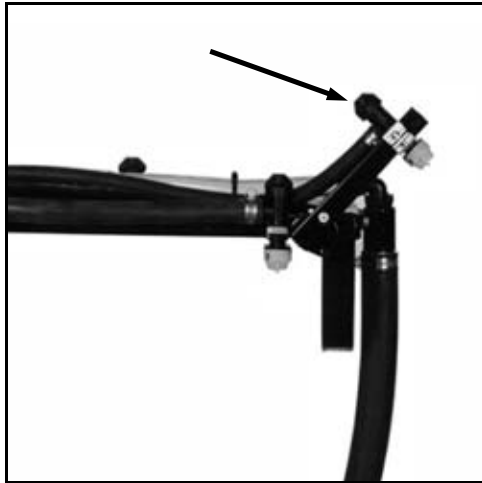


FIG 5.68

Fence Row Applicator

To operate the optional fence row nozzle (fig. 5.68) locate the fence row switch at the front of the switch control panel (fig. 5.69). If you wish to turn on either the right or left fence row nozzle, depress the corresponding “RIGHT” or “LEFT” 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 right fence row nozzle is on, the right amber L.E.D. light is lit (fig. 5.70, item 2). If the left fence row nozzle is on, the left amber L.E.D. light is lit (fig. 5.70, item 1). If neither amber L.E.D. light is lit, no solution is being applied through the fence row nozzles.



FIG 5.69

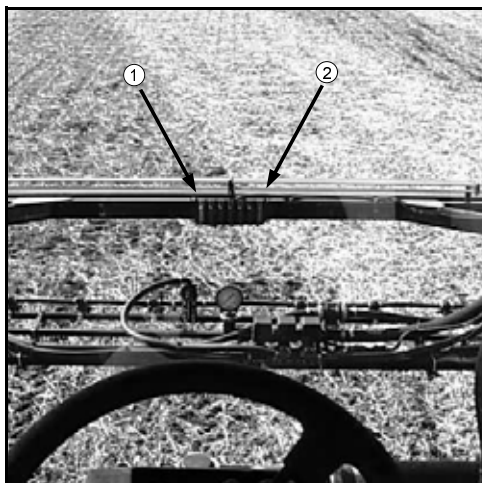


FIG 5.70

V. OPERATING INFORMATION

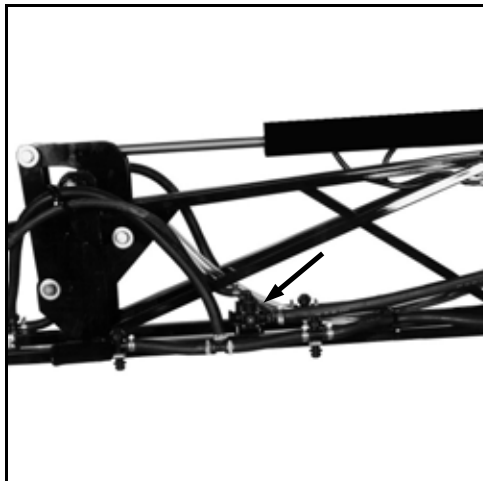


FIG 5.71

SIXTY FOOT BOOM – The fence row nozzle on a sixty foot boom is supplied by an electric valve mounted in-line with the left or right boom solution supply hose (fig. 5.71). In order to operate the fence row nozzle on a sixty foot boom, the corresponding boom section (left or right) must already be on.

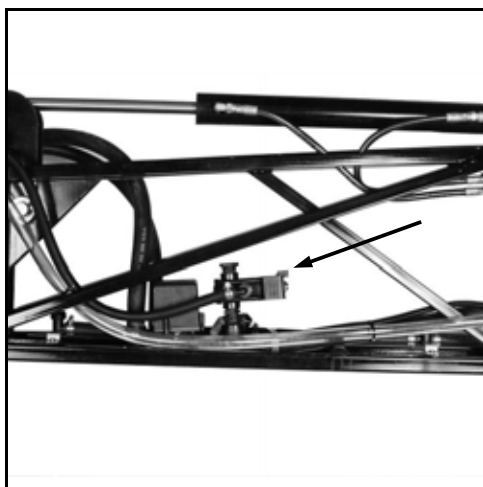


FIG 5.72

EIGHTY OR NINETY FOOT BOOM – The fence row nozzle on an eighty or ninety foot boom is supplied by an electric valve attached to the outer boom electric solution valve (fig. 5.72). The fence row nozzle on an eighty or ninety foot boom may be operated by itself.

ADJUSTING FENCE ROW NOZZLE ANGLE – To adjust the fence row nozzle angle, remove the locking bolt and nut (figure 5.73, item 1) and pivot to desired height. Re-install bolt and nut and resume operation.

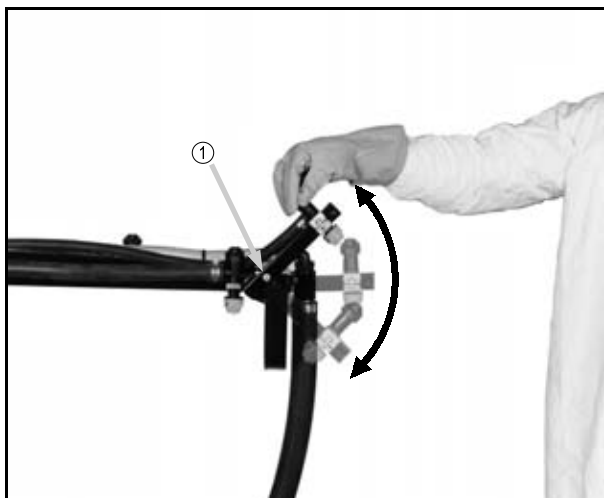


FIG 5.73

SPRAYING SYSTEM CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION



FIG 5.74

Dual Solution Tanks

The model 2100 comes standard with two 500-gallon polyethylene solution tanks equipped with mechanical agitation (see pages 63-64). The strainer on top of each tank (fig. 5.76) should always be in place to catch debris or objects from falling into the tank when the tank lid is removed. Both solution tanks come equipped with sight gauges showing solution level (fig. 5.75).

Rinse System

See pages 68-70.



FIG 5.75

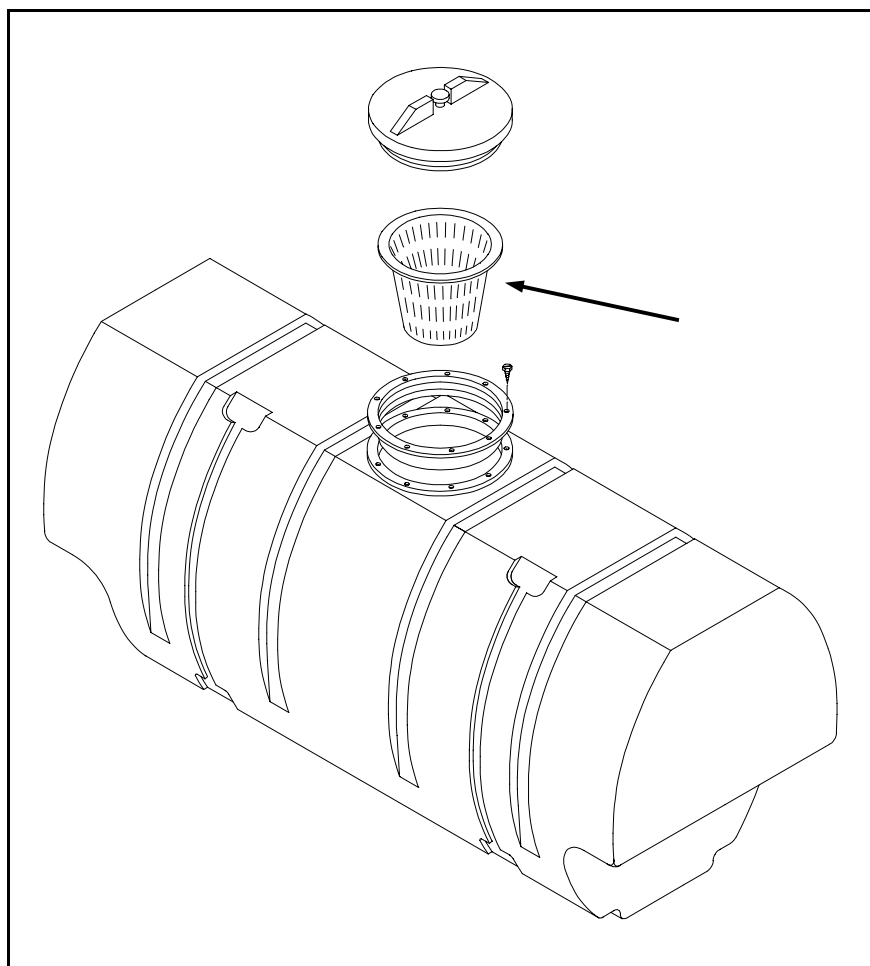


FIG 5.76

V. OPERATING INFORMATION

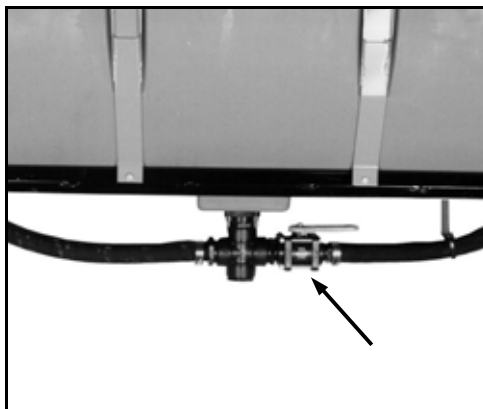


FIG 5.77

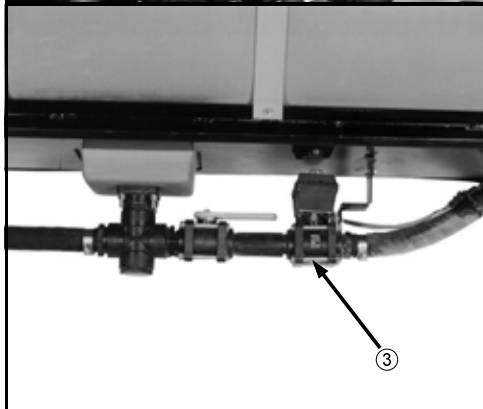
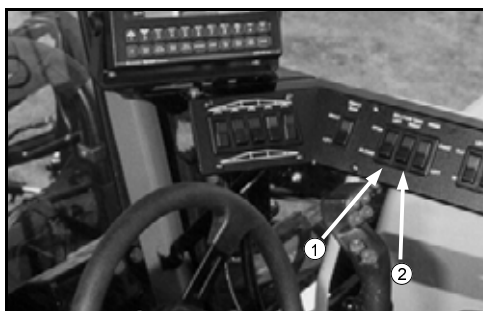


FIG 5.78

Tank Shutoff Valves

To shutoff either or both solution tank sumps, manually close either or both 1½” ball valve(s) located under each solution tank (fig 5.77). Your sprayer may be equipped with optional 1½” electric tank shutoff valves (fig. 5.78, item 3).

To operate the electric tank shutoff valves, locate the solution tank switches in the console. To open or close the left solution tank, depress the “OPEN” or “CLOSED” side of the left switch (fig 5.78, item 1). To open or close the right solution tank, depress the “OPEN” or “CLOSED” side of the right switch (fig. 5.78, item 2).

Utilize the tank shutoff valves when: 1 - you wish to draw solution from only one tank or the other; 2 - you are operating on unlevel ground such as a hillside or terrace and you don't want solution to siphon from one tank to the other (fig. 5.79); or 3 - you operate the rinse system (see page 70).

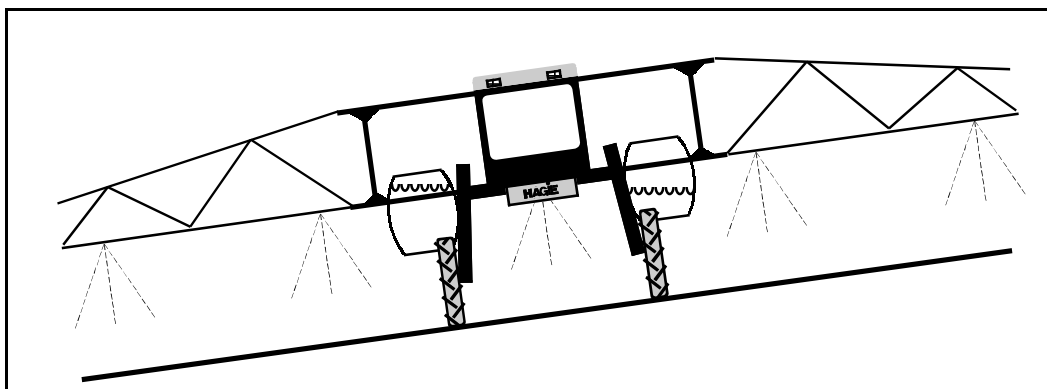


FIG 5.79

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ SPRAYING SYSTEM CONTINUED



FIG 5.80

Rear Fill

To fill the solution tanks, make sure the tank shutoff valve (fig. 5.81) under the tank you want to fill is open (you may fill both at the same time). The corresponding fill valve(s) in the rear must also be open (fig. 5.82).

Remove the rear fill connection from its cradle. Connect it to your solution supply and fill to the desired level (fig. 5.80). When done, shut the rear fill valve(s) and return the rear fill to its cradle.

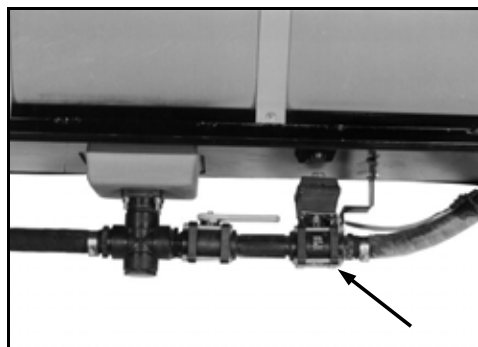


FIG 5.81

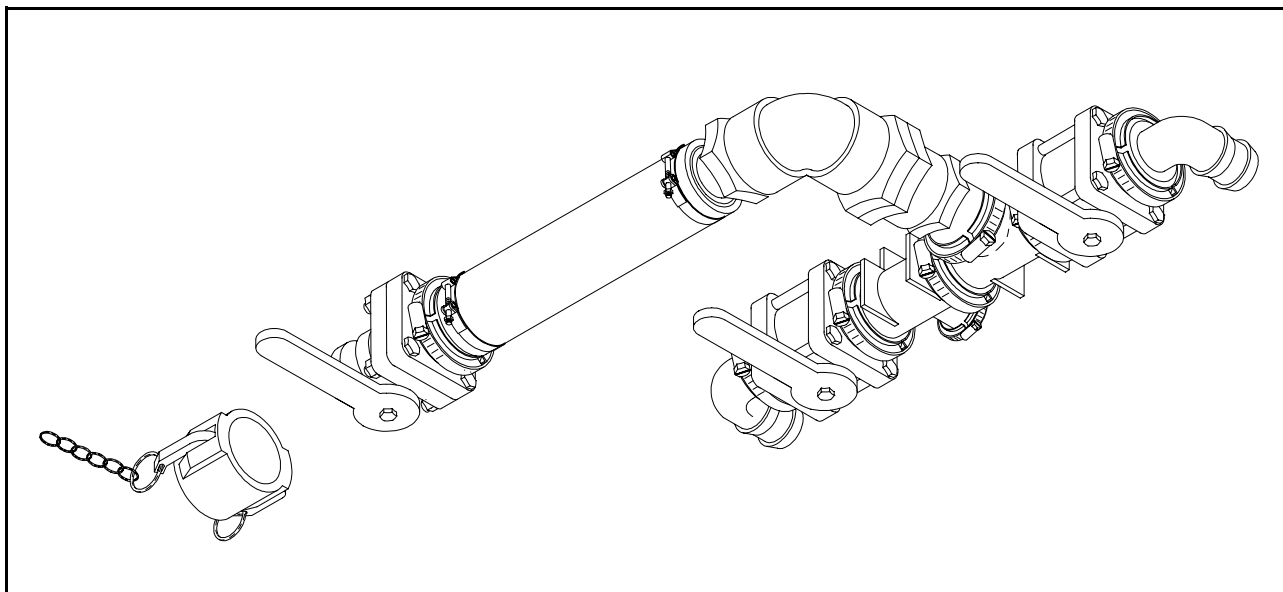


FIG 5.82

V. OPERATING INFORMATION

AGITATION SYSTEM



FIG 5.83

The Hagie 2100 comes standard with a hydraulically-driven mechanical agitation system to maintain suspension of solution in the sprayer's tanks.

To activate the system turn the "TANK AGITATION" switch (fig. 5.83) to the "ON" position. This will deliver hydraulic fluid to agitator motors on both solution tanks (fig. 5.84) turning the agitator shaft assemblies clockwise.

NOTE:

Operation of the agitation system with no solution in the spray tanks will void the warranty on the agitation system.



FIG 5.84

Agitator motor speed is governed by a manual variable flow control valve mounted on the rear of the sprayer (fig. 5.85). To adjust the speed loosen the set knob on the variable flow control handle; turn the lever to the desired speed and retighten the set knob (fig. 5.86).

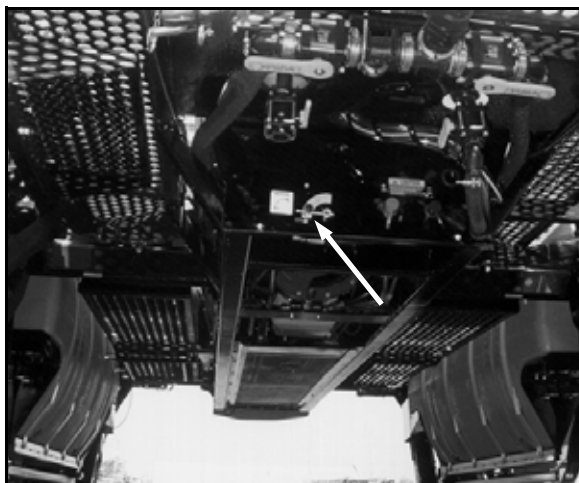


FIG 5.85



FIG 5.86

AGITATION SYSTEM CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ AGITATION SYSTEM CONTINUED

The gland packing (fig. 5.87, item 1) may require adjustment during start-up. If adjustment is required, shut off the agitation system and adjust the gland nut (fig. 5.87, item 2).

(reference to direction when seated in the operator's seat facing forward).

The agitator motors for the polyethylene tanks are held in place with a motor mount yoke (fig. 5.87, item 3). The yoke tap must extend through the motor mounting plate (fig. 5.87, item 4). This allows the motor to float with the agitator shaft.

⚠ CAUTION
DO NOT adjust the gland nut with the agitation system running.

When replacing the packing, be sure to wrap the packing clockwise on the agitator shaft

NOTE:
Damage will occur to the agitator system if the motor mounting yoke is not properly installed in the motor mounting plate.

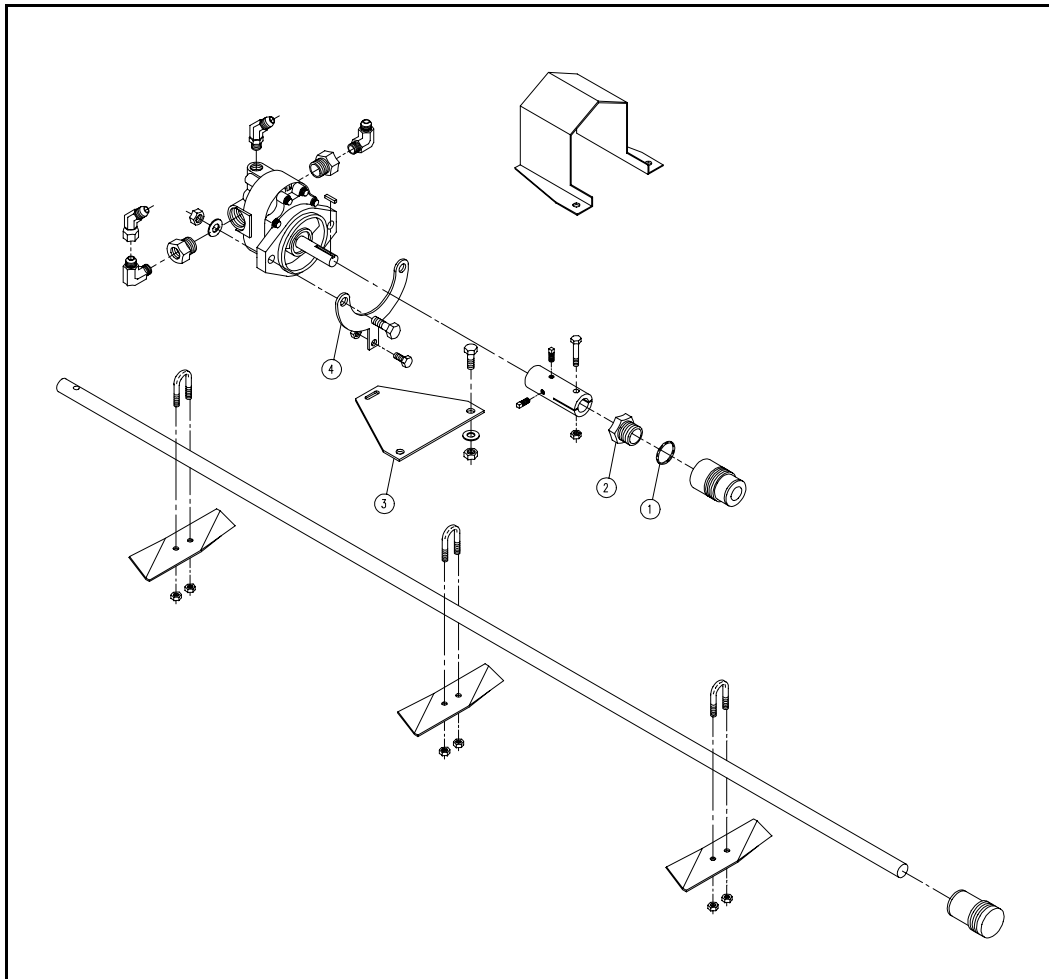
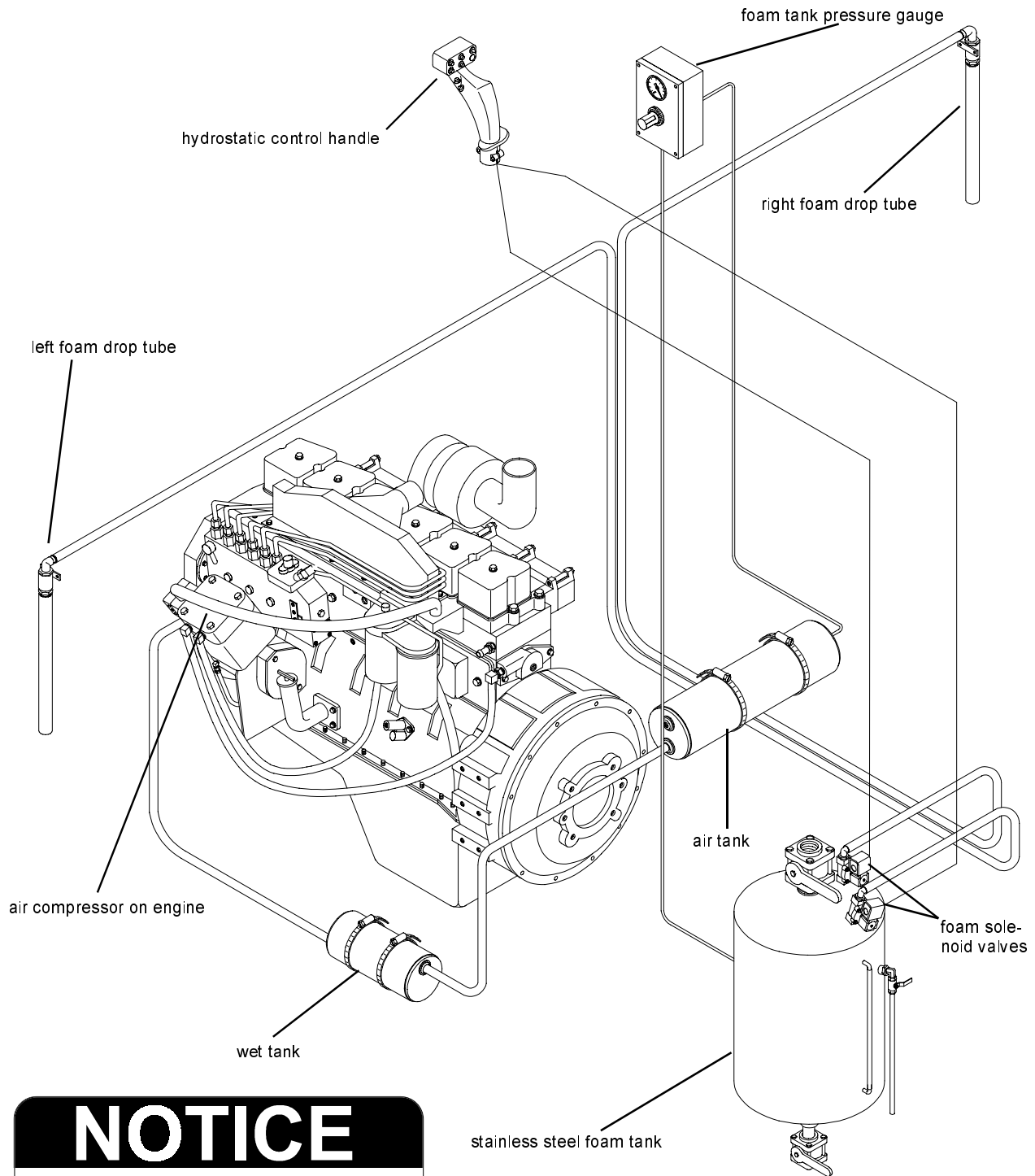


FIG 5.87

V. OPERATING INFORMATION

FOAM MARKER SYSTEM



NOTICE
DRAIN WET TANK DAILY TO REMOVE CONTAMINATION

FOAMER SYSTEM CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ FOAMER SYSTEM CONTINUED



FIG 5.88

Foamer Operation

To operate the foam marking system, locate the toggle switch on the hydrostat control handle (fig. 5.88). It controls a pair of valves on the pressurized stainless steel foam tank (fig. 5.89) which force foam to the foam drop tubes on the end of each outer boom (fig. 5.91).

Push the toggle switch to the left if foam is desired from the left boom tip. Push the toggle switch to the right if foam is desired from the right boom tip. Return the toggle switch to the middle position if no foam is desired.



FIG 5.89

System pressure is indicated by a pressure gauge on the regulator which is mounted above the parking brake (fig. 5.90). 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. For maintenance of the foam marker system see page 123.

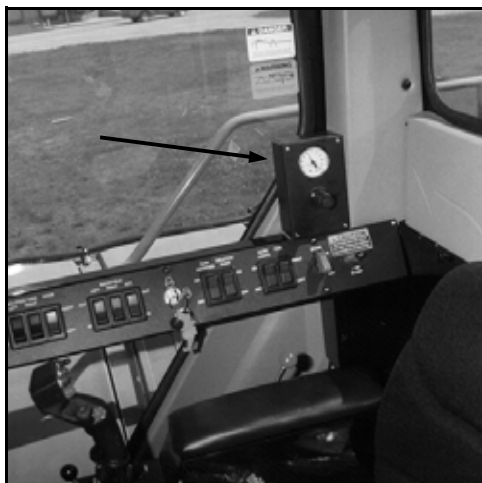


FIG 5.90



FIG 5.91

V. OPERATING INFORMATION

Filling Foam Marker System



FIG 5.92

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 1/4" ball valve on the side of the foam tank (fig 5.92, item 2). Close the ball valve after pressure is relieved. Open the top 2" ball valve (fig. 5.92, item 1). Add water to the tank (fig. 5.93), 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.



FIG 5.93

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

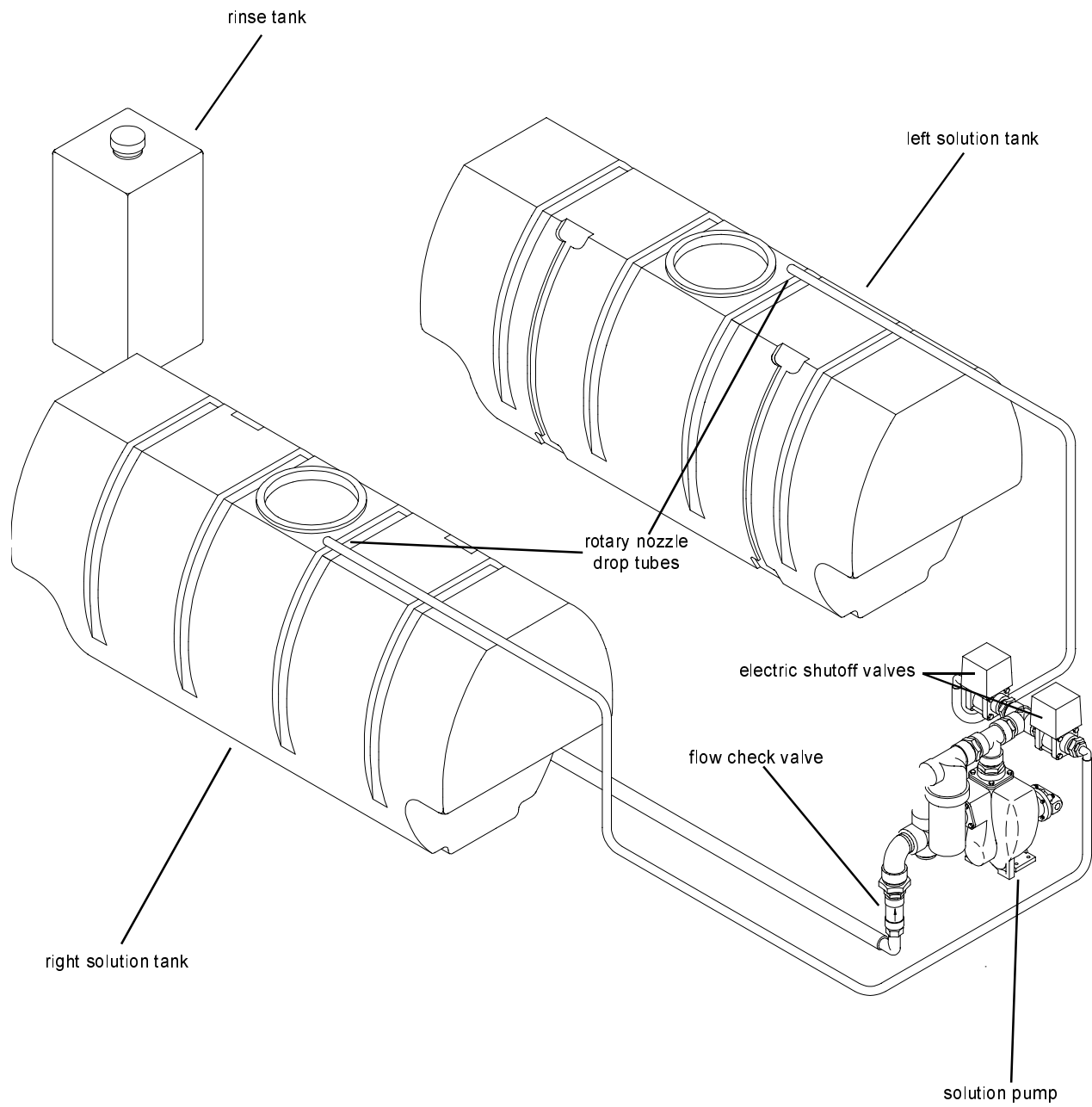
TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

RINSE SYSTEM



V. OPERATING INFORMATION

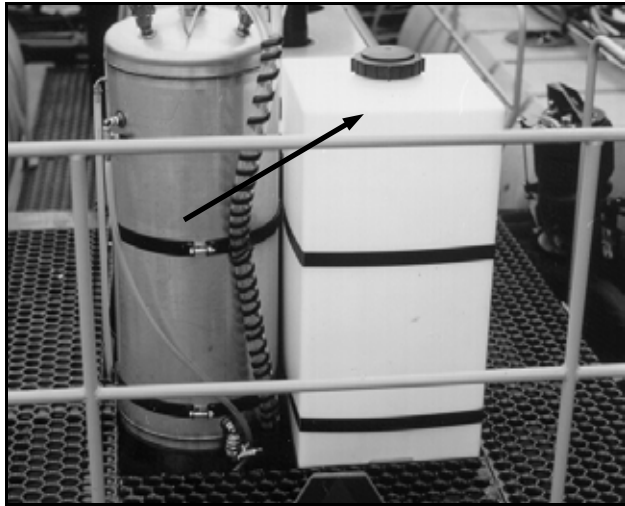


FIG 5.94

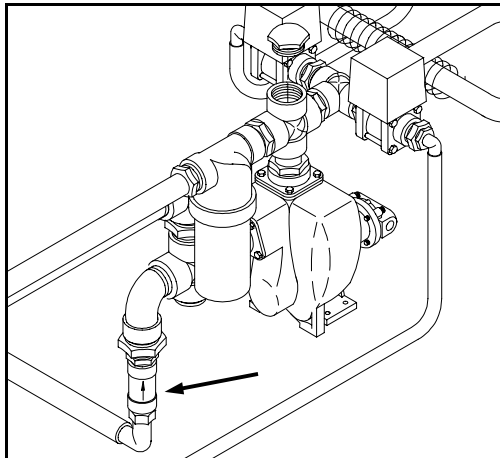


FIG 5.95

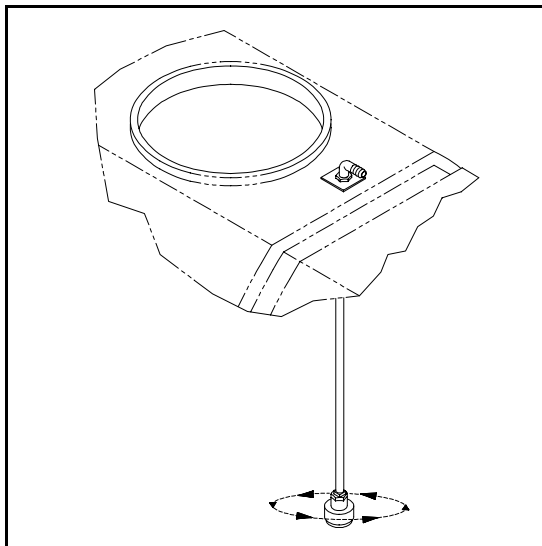


FIG 5.96

The Hagie 2100 comes standard with a rinse system for flushing the spray system (tanks, solution pump, and booms). The rinse tank, located on the rear of the machine (fig. 5.94), has a holding capacity of 45 gallons.

Rinse solution flows from the rinse tank to the solution pump. The rinse passes through a flow-check valve (fig. 5.95). The valve keeps the rinse line clean from spray solution when the rinse system is idle. The solution pump pumps the rinse through a rotary nozzle into either solution tank (fig. 5.96).

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.

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.

RINSE SYSTEM CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ RINSE SYSTEM CONTINUED

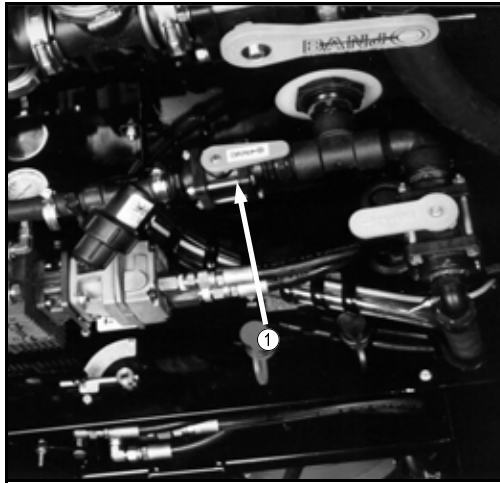


FIG 5.97

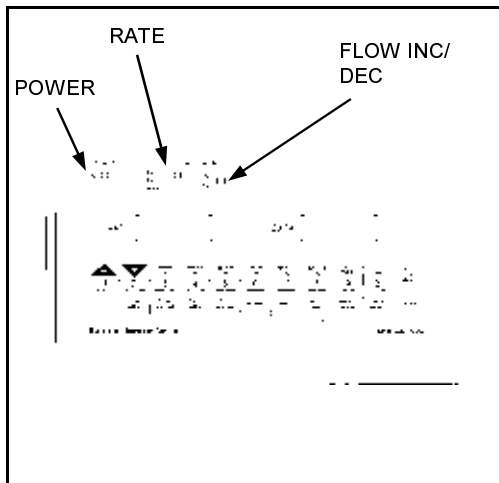


FIG 5.98



FIG 5.99

Rinse System Operation

To activate the rinse system after the solution tanks are empty:

1. If equipped with pressure washing system option, close rinse supply valve to washer pump (fig. 5.97, item 1).
2. Close the solution tank shutoff valves (see page 61).
3. Solution pump switch should be in the "ON" position (see page 55).
4. Turn on spray system monitor (fig. 5.98). Turn the rate switch to the "MANUAL" position. Using the flow increase/decrease lever, increase solution pressure to maximum PSI. (Do not exceed 150 PSI).
5. Locate the rinse switch on the console in the cab (fig. 5.99). To rinse the right tank, depress the switch to the "RIGHT" position. To rinse the left tank, depress the switch to the "LEFT" position.
6. When finished rinsing the solution tanks, return rinse switch back to the neutral "OFF" position.
7. To rinse the booms, open the solution tank shutoff valves (see page 61), turn on the "floor" solution switch (see page 57), and open the boom solution valves (see page 56).
8. Adjust the flow control lever on the monitor to maximum solution pressure according to the solution pressure gauge.
9. When finished rinsing the booms, turn the spraying system off (including solution pump switch, monitor, boom solution valves, and "floor" solution switch).
10. Be sure to close the rinse tank valve before refilling.

V. OPERATING INFORMATION

PRESSURE WASHING SYSTEM

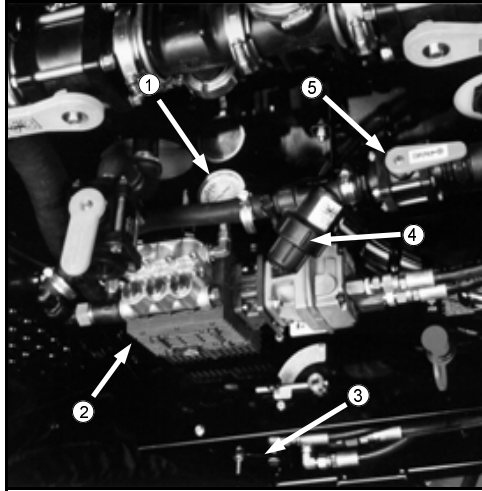


FIG 5.100



FIG 5.101



FIG 5.102

OPERATING – To operate the pressure washing system, leave the engine running between 1000 and 1200 RPM. Turn the parking brake on (see page 34). The rinse supply valve for the pressure washer (fig. 5.100, item 5) may remain open unless operating the solution tank rinse system, then you should close it as you open the rinse tank valve (see page 70). Activate the pressure washing pump (fig. 5.100, item 2) with valve handle in hydraulic sight gauge window (fig 5.101). The pressure washer “ON/OFF” handle has only approximately one half inch of travel.

DO NOT operate the pressure washing system while any other system is engaged, i.e. solution pump, hydraulic tread adjust, hydrostatic drive, etc. DO NOT allow the pump to run dry.

NOTE:

In event of emergency, pump may be turned off from underneath the machine by pushing upward on the hydraulic flow divider shaft (fig. 5.100, item 3).

The sprayer wand is located between the foam tank and the rinse tank (fig. 5.102). Spray pressure is indicated by the gauge mounted above the pressure pump (fig. 5.96, item 1).

MAINTENANCE – Remove and inspect in-line filter (fig. 5.100, item 4) occasionally and clean it as required.

NOTE:

For further information regarding operation and maintenance of the pressure washing system, refer to your HYPRO® pump's owner's manual.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

LIGHTS



FIG 5.103

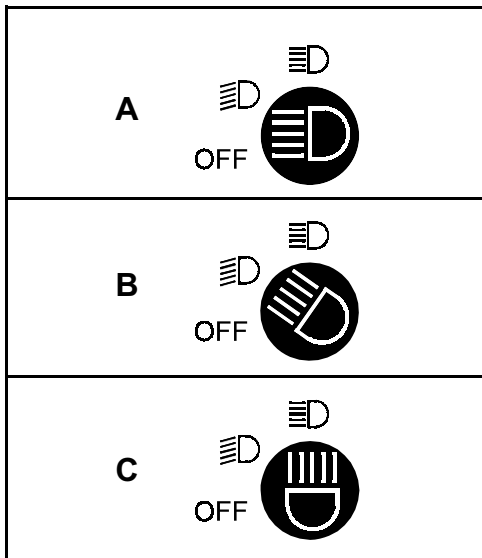


FIG 5.104



FIG 5.105

HIGHWAY LIGHTS - Mounted in the center of each front tank shield (two total) above the tires is a halogen driving lamp (fig. 5.105). Use these lights when traveling on a public road at night. Turn them on by rotating the light switch (fig. 5.103) clockwise to the first "ON" position (fig. 5.104B).

FIELD LIGHTS - The front of the cab houses four halogen field lamps (fig. 5.106). Use these lights when operating in a field after dark. Turn them on by rotating the light switch clockwise to the second "ON" position (fig. 5.104C). Turn them off when entering a public roadway.

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.



FIG 5.106

V. OPERATING INFORMATION



FIG 5.107

Work Lights

For additional lighting to the side and rear, locate the “WORK LIGHT” switch and turn it on (fig. 5.107). This will activate a pair of halogen lamps attached to the transom mount which direct light down each unfolded boom (fig. 5.108). It also activates a pair mounted above the back window of the cab lighting up the rear of the machine (fig. 5.109).

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.

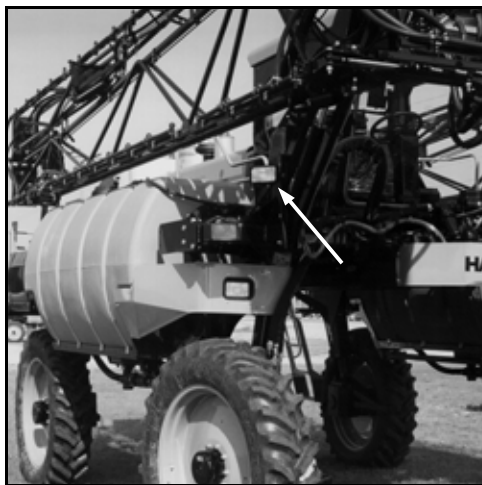


FIG 5.108

Interior Lighting

Interior lighting is provided by a ceiling mounted dome light (fig. 5.110). The ignition key must be in the “OPERATING” or “ACCESSORY” position for the interior light to operate.



FIG 5.109



FIG 5.110

LIGHTS CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ LIGHTS CONTINUED



FIG 5.111

Turn Signals

To activate the front (fig. 5.113) and rear turning signals (fig. 5.114, item 2), move the turn signal lever (fig. 5.111) 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 5.112

Hazard/Warning Lights

To activate the flashing hazard/warning lights (fig. 5.113 & 5.114, item 1), depress the “FLASHER” switch to the “ON” position (fig. 5.112). 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 72) will also turn on the “RED” running lights on the rear of the machine (fig. 5.114, item 2).



FIG 5.113

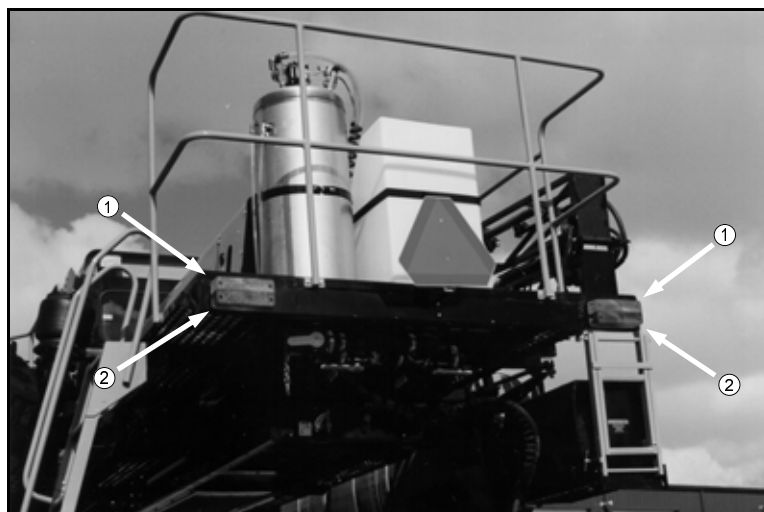


FIG 5.114

V. OPERATING INFORMATION

HAGIE 2100 CAB



FIG 5.115

Emergency Exit.....	76
Climate Controls	77
Radio.....	78
Windshield Wiper/Washer.....	78
Fuel Tank Selector.....	78
Instrumentation	79
Air Suspended Seat.....	82
Steering Column	84
Storage	85
Auxiliary Power Supplies.....	86

CAB OPERATION CONTINUED ➔

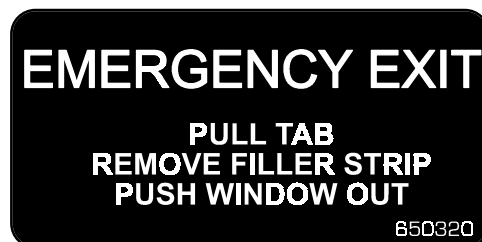
SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ CAB OPERATION CONTINUED



FIG 5.116



Emergency Exit

The right window in the cab is removable in the event that an emergency exit is required. To remove the rear window:

1. Grasp and pull the tag of the nylon ring next to the emergency exit decal (fig. 5.117) to remove the extrusion cord (fig. 5.118, item 1).
2. Push window outward until clear of window opening.
3. Climb out through window and away from hazardous situation.



FIG 5.117

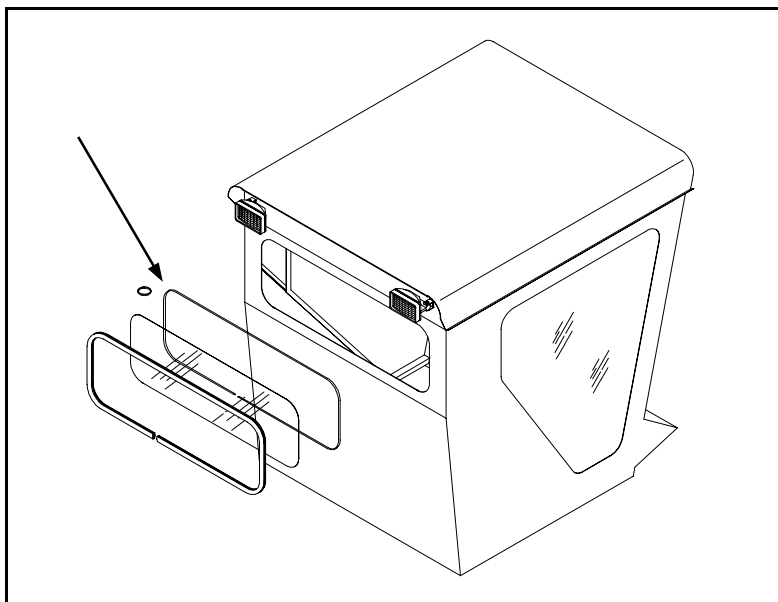


FIG 5.118

V. OPERATING INFORMATION

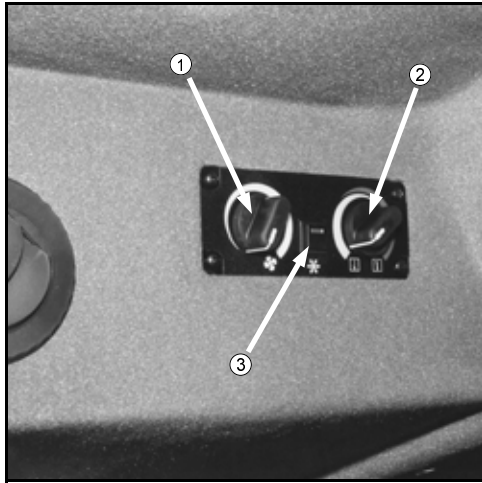
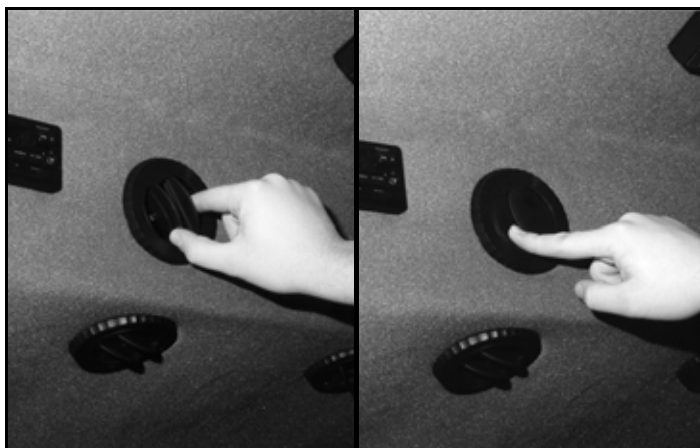


FIG 5.119



FIG 5.120



A

B

FIG 5.121

Climate Controls

ADJUSTING FAN BLOWER SPEED - Fan blower speed is controlled by the left rotary dial on the cab climate control panel (fig 5.119, item 1). The fan blower speed is a continuously variable adjustment. To increase fan speed, rotate fan blower dial clockwise. To reduce fan speed, rotate fan blower dial counterclockwise. To shut fan blower off, rotate fan blower dial all the way counterclockwise.

ADJUSTING TEMPERATURE SETTING - Forced air temperature adjustments are controlled by the right rotary dial on the cab climate control panel (fig. 5.119, item 2). Temperature control is a continuously variable adjustment. To increase forced air temperature, rotate temperature dial clockwise. To decrease forced air temperature, rotate temperature dial counterclockwise.

OPERATING AIR CONDITIONING - To activate the air conditioner, depress the air conditioning switch (fig. 5.119, item 3). Adjust fan speed and temperature accordingly.

ADJUSTING VENTS - Air vents may be adjusted by rotating them for desired direction (fig. 5.120) or individually turned on or off with the directional fins (fig. 5.121).

SERVICING A/C SYSTEM - See page 102 and page 106 for service information.

CAB OPERATION CONTINUED ➔

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ CAB OPERATION CONTINUED

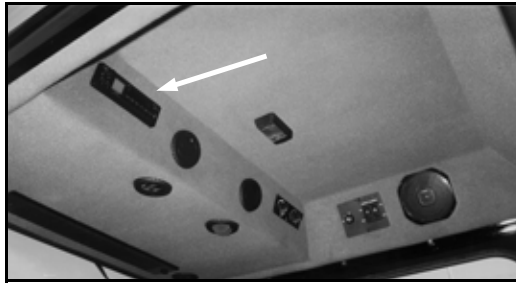


FIG 5.122

Radio

Your Hagie 2100 is equipped with an auto reverse AM/FM cassette tuner (fig. 5.122) and two speaker system. For stereo system operation and installation information refer to the radio owner's manual that accompanies this operator's manual.



FIG 5.123

Windshield Wiper/Washer

To turn the windshield wiper on, locate the windshield wiper/washer switch on the right-hand side of the head liner (fig. 5.123). 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 wiper/washer switch and hold the switch down (fig. 5.124) 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.

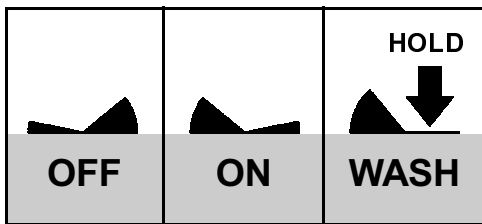


FIG 5.124

Fuel Tank Selector

To draw engine fuel from the right fuel tank, depress the fuel selector switch (fig. 5.125) to the "RIGHT" position. To switch to the left tank, depress the fuel selector switch to the "LEFT" position. You may operate from either tank until the "YELLOW" low level indicator light illuminates. Then you must either switch to the other tank or refuel.

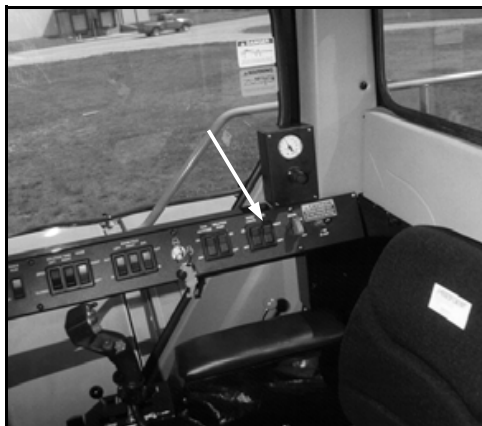


FIG 5.125

V. OPERATING INFORMATION



FIG 5.126

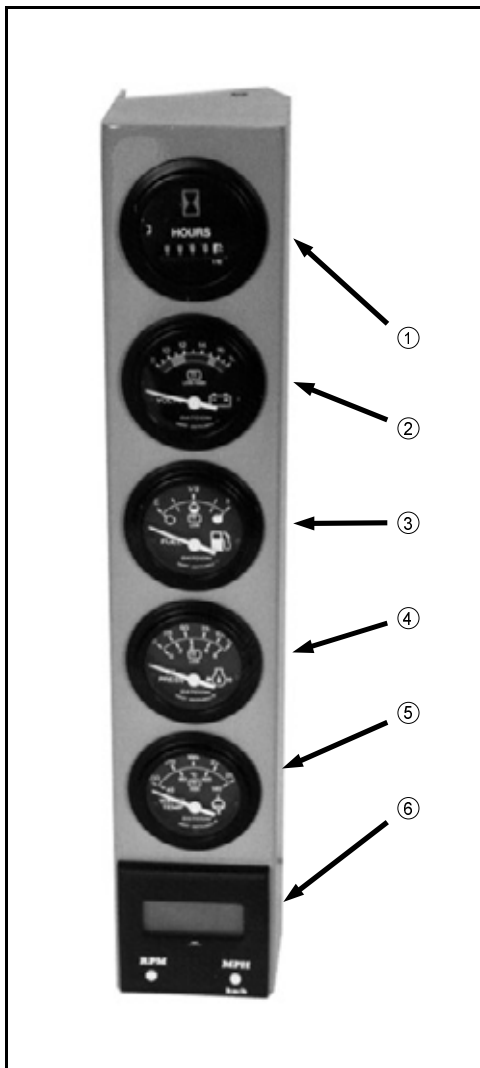


FIG 5.127

Gauge Panel

Hour Meter - (fig. 5.127, item 1) The hour meter progressively records elapsed time of sprayer operation. It is useful for determining service intervals.

Volt Meter - (fig. 5.127, item 2) The volt meter measures voltage from the alternator on the diesel engine. A "RED" indicator light will alert the operator if the system is operating either too low or too high.

Fuel Gauge - (fig. 5.127, item 3) The fuel gauge measures the amount of fuel in either fuel tank, depending on the tank selected with the fuel switch. A "YELLOW" indicator light alerts operator of low level operation.

Engine Oil Pressure - (fig. 5.127, item 4) The oil pressure gauge monitors pressure of the engine lubricating system. A "RED" indicator light alerts the operator of low level operation.

Water Temperature - (fig. 5.127, item 5) The water temperature gauge monitors the engine cooling system. A "RED" indicator light alerts the operator of unsafe operating temperatures.

Speedometer/Tachometer - (fig. 5.127, item 6) Unit will display either engine RPM or speed of travel depending on operator's selection. See next page for more information on the speedometer/tachometer.

NOTE:

Immediately reduce engine speed and shut off ignition if any of the above "RED" indicator lights illuminate. Determine cause and correct before continuing operation.

GAUGES CONTINUED ➔

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ GAUGES CONTINUED

Speedometer/Tachometer

The speed/tach unit is programmable with a digital read-out indicating MPH or RPM. The parameters have been factory set.

Turn the ignition key to the "ON" position. The display will show "0000", which indicates RPM. Press the MPH button; the readout will display "00.0" which indicates MPH.

To check the parameter settings, press the desired button and hold until four "8"s are shown, then release (fig. 5.128B). The parameter setting will be displayed for four seconds.

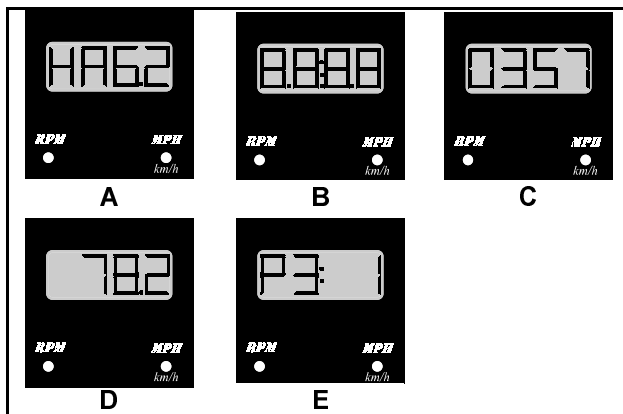


FIG 5.128

A = Torque-Hub reduction	$\frac{168 \times A \times B}{C} = X$
B = speedometer ring pick-up	
C = tire static load radius	
Y = MPH parameter setting	$\frac{600,000}{X} = Y$

FIG 5.129

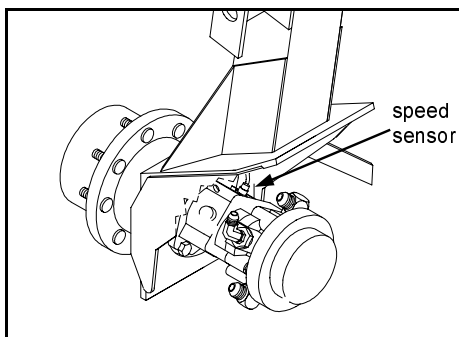


FIG 5.130

PARAMETER SETTING

RPM 357 (fig. 5.128C)
 MPH (320/85R34 tire) - 78.2
 (290/95R34 tire) - 77.0

To change or re-enter the parameters, press the desired button and hold in until the four "8"s are displayed. Release the button and the parameter setting will appear. If you want to increase the setting, press the RPM button. To decrease, press the MPH button.

PROGRAMMING MPH - To program the MPH, use the formula from figure 5.129. Example (320/85R34 tires): **168** divided by rear tire static load radius of **25.8** inches times Torque Hub reduction of **25.59** times number of speedometer ring pick-up sensors on wheel motor (fig 5.130) of **46** equals **7665**; **10,135** divided into **600,000** equals parameter setting of **78.2** (fig. 5.128D).

This parameter setting should be checked when you receive your sprayer.

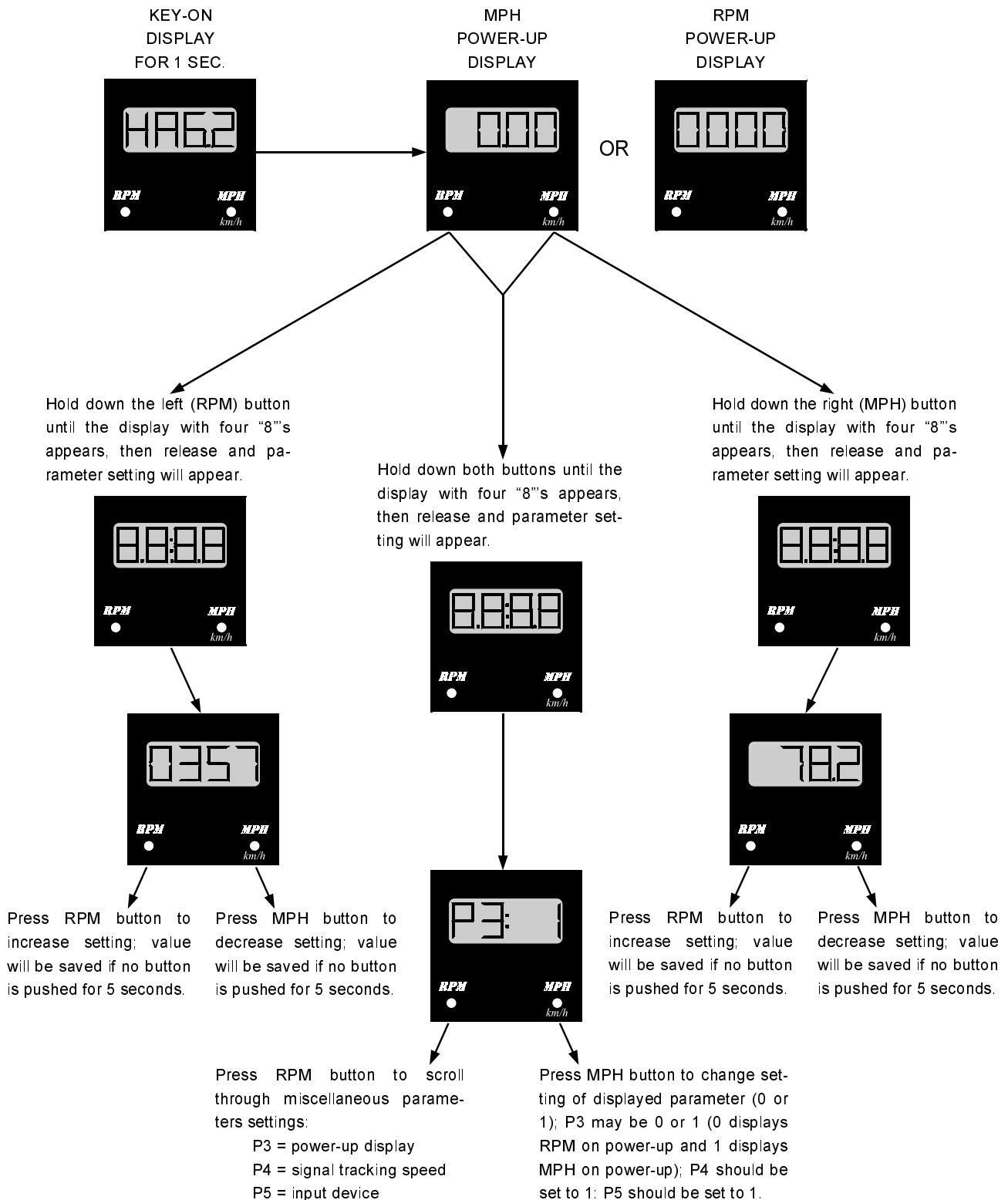
ADDITIONAL PARAMETERS - To access the miscellaneous parameters screen (fig. 5.128E), hold down both buttons at the same time until the screen with four "8"s appears.

Use the RPM button to scroll the parameter settings (P3 = power-up display, P4 = signal tracking speed, P5 = input device). Use the MPH button to change the setting of the displayed parameter (either 0 or 1).

See the next page for more information.

V. OPERATING INFORMATION

Speedometer/Tachometer Display Screen Quick Reference Chart



CAB OPERATION CONTINUED →

SAFETY/DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION

➔ CAB OPERATION CONTINUED

Air Suspended Seat

- 1 - **Seat Cushion Adjustment.** Rotate knob to desired cushion position.
- 2 - **Height Adjustment.** Pull knob out to lower seat. Push knob in to raise seat.
- 3 - **Lateral Isolator.** Lift lever to engage lateral isolator. Push lever down for lock-out.
- 4 - **Ride Firmness Adjustment.** Rotate knob counterclockwise for firm ride, clockwise for soft ride. For average ride, rotate knob to mid-point of travel.
- 5 - **Fore-Aft Adjustment.** Pull lever out and move seat forward or rearward to desired position.
- 6 - **Fore-Aft Isolator.** Lift lever to engage fore-aft isolator. Push lever down for lock-out.
- 7 - **Backrest Adjustment.** Lift lever to stop and lean rearward or forward to adjust backrest position.
- 8 - **Armrest Tilt Adjustment.** Turn counterclockwise to lower tilt, clockwise to raise tilt.
- 9 - **Lumbar adjustment.** Rotate knob clockwise to increase lumbar support, counterclockwise to decrease support.

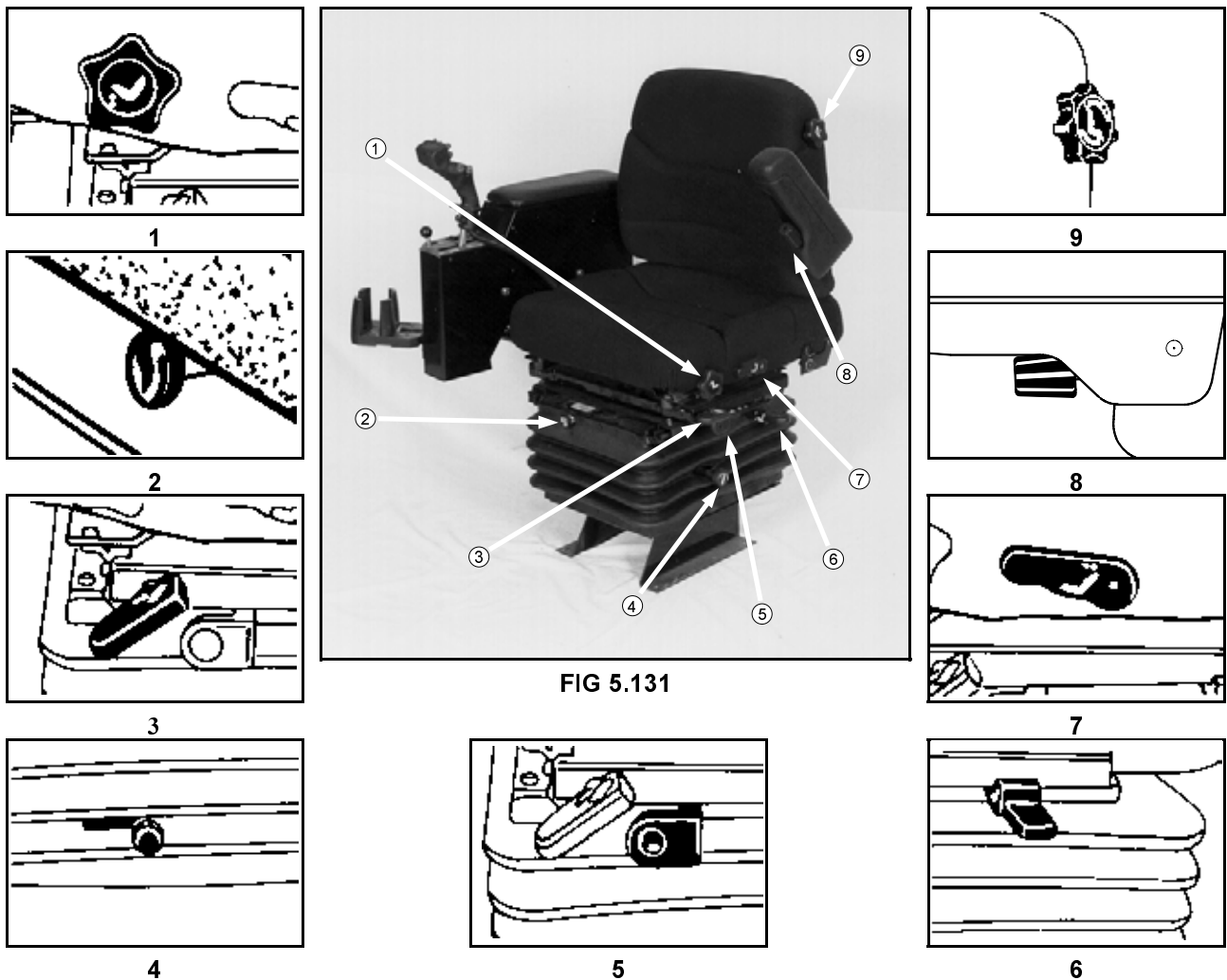


FIG 5.131

V. OPERATING INFORMATION

➔ SEAT OPERATION CONTINUED

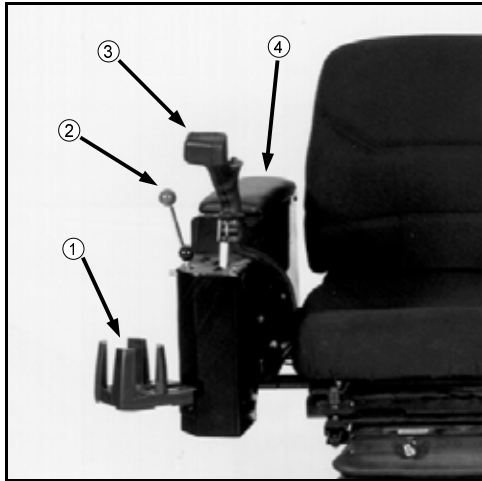


FIG 5.132

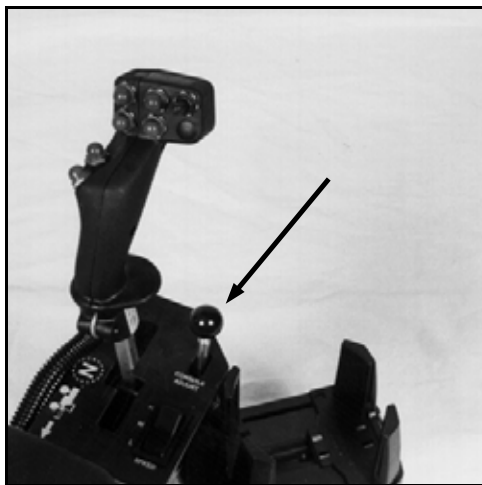


FIG 5.133



FIG 5.134

Seat-Mounted Console

The seat-mounted console/armrest houses the hydrostatic drive control lever (with boom lift and level controls and foam system operation switch) (fig. 5.132, item 3), engine throttle lever (fig. 5.132, item 2), operating panel for the hydraulic tread adjust (fig. 5.132, item 4), small storage tray (fig. 5.132, item 4), and adjustable drink holder (fig. 5.132, item 1).

To adjust the height of the console, pull the adjustment lever (fig. 5.133) back as you move the console either up or down. When the console is at the desired height, release the adjustment lever (fig. 5.134).

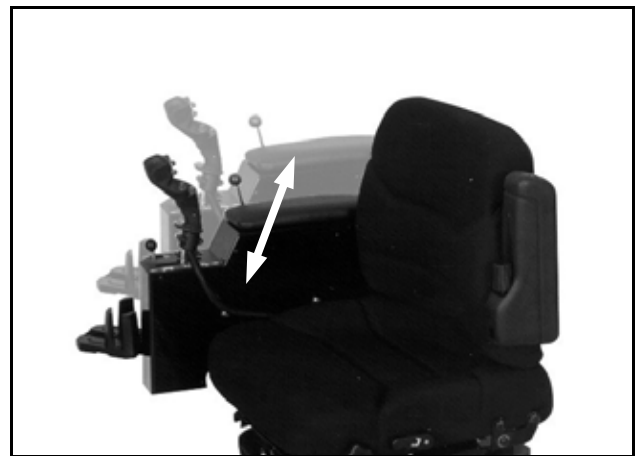


FIG 5.135

CAB OPERATION CONTINUED ➔

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

V. OPERATING INFORMATION



FIG 5.136

Steering Column

The Hagie 2100's steering column has two places for driver comfort adjustment. To adjust the upper tilt, locate the tilt lock lever on the right-hand side of the steering column (fig. 5.136); rotate the lever counterclockwise to release steering column tilt lock. Move steering column to desired position and rotate lever clockwise to lock column in place.

To ease cab exit and entry, the entire steering column tilts out of the driver's way. To operate the column base tilt, locate the foot pedal at the base of the steering column (fig. 5.138); push down on the foot pedal to release the column base lock. Pull or push the column to the desired position and release the foot pedal to re-lock the column base.



FIG 5.137

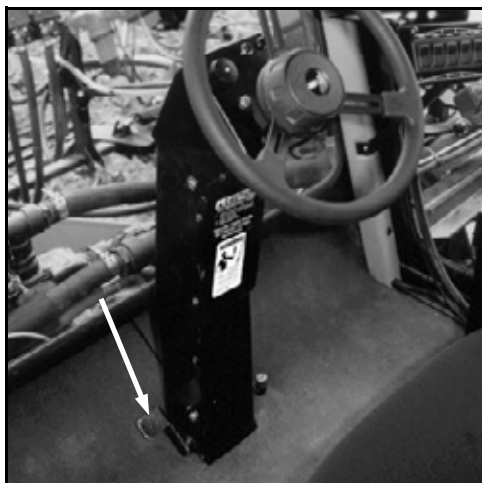


FIG 5.138



FIG 5.139

CAB OPERATION CONTINUED ➔

V. OPERATING INFORMATION



FIG 5.140

Storage

ARMREST - There is a small storage compartment under the padded lid of the seat-mounted console/armrest (fig. 5.140).

FLOOR CONSOLE - A larger storage console is located on the floor to the left of the operator's seat (fig. 5.141). Store larger items, such as your Hagie manuals, Hagie calibration tube, etc. in there.

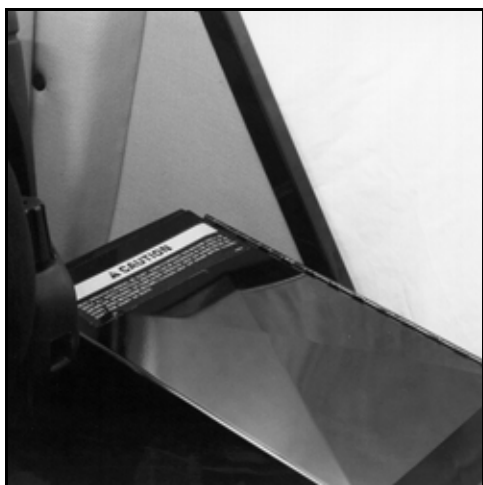


FIG 5.141



FIG 5.142

CAB OPERATION CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

V. OPERATING INFORMATION

➔ CAB OPERATION CONTINUED

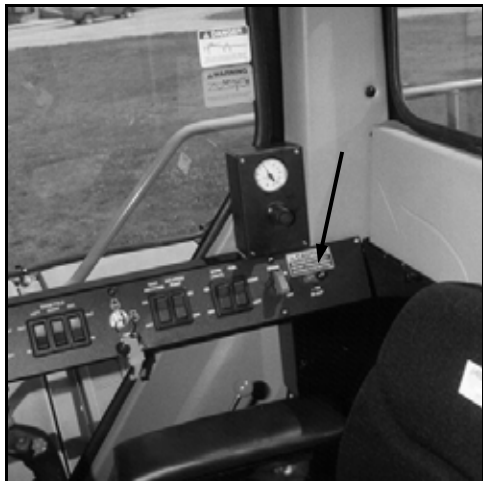


FIG 5.143

Auxiliary Power Supplies

The Hagie 2100 has two separate auxiliary power supplies in the cab for powering 12 volt accessories. They are both “hot” regardless of ignition key position. Turn the accessory off if the engine is not running for an extended period of time.

SWITCH PANEL “BINDING POST” TYPE - The binding post power supply is located to the right of the parking brake switch (fig. 5.143). Binding post power supply is protected by a 30 AMP circuit breaker (see page 114).

STORAGE CONSOLE “CIGARETTE LIGHTER” TYPE - The cigarette lighter power point is located to the left of the operator’s seat on the side of the floor-mounted storage console (fig. 5.144). Replace the insulated plug when not in use. Cigarette lighter power supply is protected by a 30 AMP circuit breaker (see page 114).

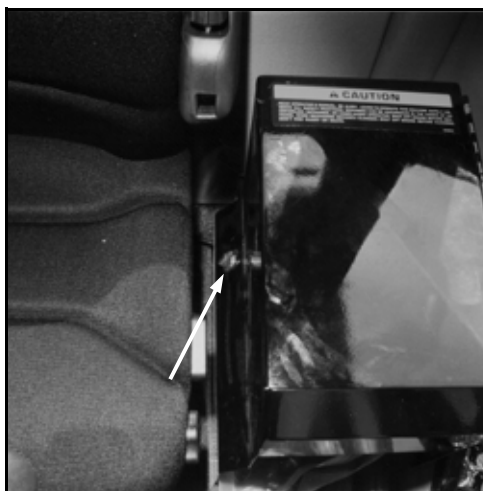


FIG 5.144

Roof Panel Access

See page 125 for information on accessing the area under the cab roof panel for service (fig. 5.145).

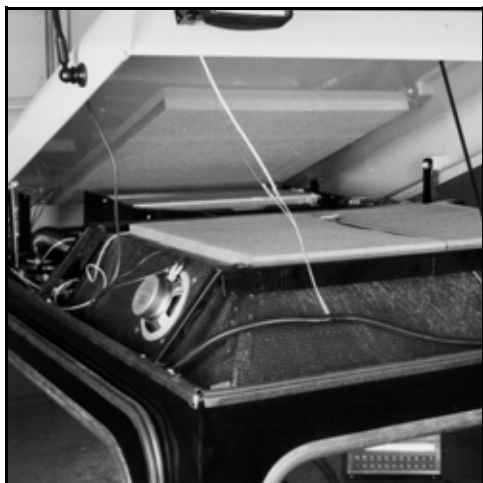


FIG 5.145

VI. 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. 6.1) to

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VI. 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

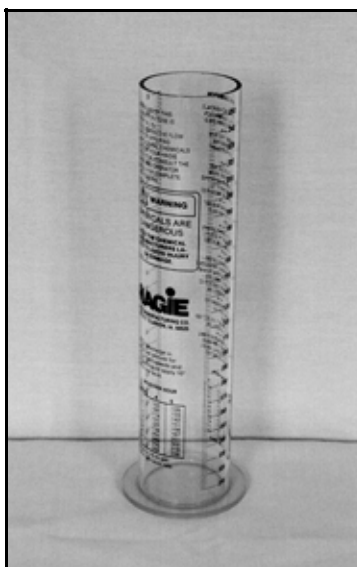


FIG. 6.1

acre.* 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. Always have the booms in the folded position and cradled when driving or transporting.

NOTE:

The booms are equipped with an accumulator system. When sitting in the cradle, do not allow the booms to bounce. If they do, damage will occur to the booms and void the warranty. When cradled, adjust the accumulator spring for maximum free travel (fig. 7.1). By adjusting the level cylinders, this will allow the weight of the boom to rest in the cradle.

2. Flashing hazard/warning lights have been placed on the sprayer to warn other drivers.
3. 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.
4. Know and obey all state laws for driving farm equipment on a public road or highway.
5. Adjust the sprayer's speed to suit the conditions.
6. Slow down and use turn signals before turning.
7. Pull over to side of road before stopping.
8. Keep a proper lookout, and maintain control of the sprayer.
9. Do not drive under trees, bridges, wires, or other obstructions unless there is clearance.
10. Use extra care before entering or leaving a public road or highway.

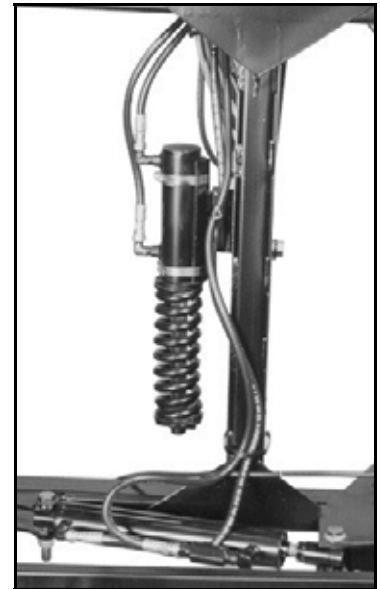


FIG 7.1

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VII. TRANSPORTING

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.

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.

VII. TRANSPORTING



FIG 7.2

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.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VII. TRANSPORTING

C. TOWING:

NOTE:

It is not recommended that the sprayer be towed, but if it should ever be necessary, follow these steps carefully:

1. Fold the booms in and lower to the boom cradle.
2. Disengage each Torque Hub[®] by removing the two outer cap bolts, turning the outer cap with the extended center in towards the hub and re-installing the two outer cap bolts. This process pushes on a spring-loaded splined shaft, disengaging the Torque Hub[®] (fig. 7.3).

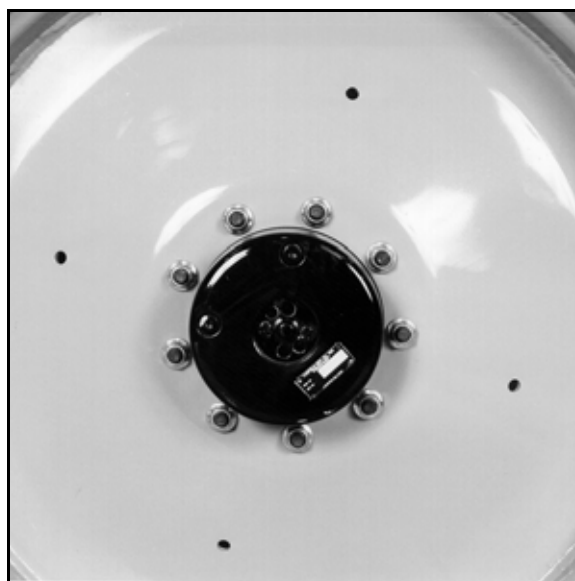


FIG 7.3

NOTE:

Wheel motors will be damaged if these steps are not taken.



CAUTION

When re-engaging Torque Hub[®], make sure spring-loaded splined shaft has returned to its extended position.

VII. TRANSPORTING

➔ TOWING CONTINUED

NOTE:

In order for the power steering system to function, the sprayer's engine must be running.

3. Turn on flashing hazard/warning lights.
4. When towing, it is necessary that two vehicles of sufficient size and weight for adequate pulling and braking are used. One of these vehicles is used for pulling the sprayer; the second vehicle is used for braking if the sprayer starts to overtake the towing vehicle, such as going downhill. The reason for this is the sprayer, once the Torque Hubs[®] have been disengaged, has no braking power of its own. Use extreme caution.

 **WARNING**

Secure items (tow straps, chains, etc.) between towing vehicle, braking vehicle, and sprayer to ensure that they will not dislodge.

5. If necessary, relocate the SMV emblem so that it is visible from the rear.
6. Always reduce towing speed well in advance of any anticipated turns.
7. Know and obey the state laws for towing farm equipment on public roads and highways.

NOTE:

Excessive speed may cause damage to the Torque Hubs[®] as well as the hydrostatic system. Do not exceed 25 MPH when towing sprayer.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

PAGE NO	Service Point	C L E A N	C H A N G E	C H E C K	G R E A S E	D R A I N
98	ENGINE OIL		A	DAILY		
100	RADIATOR COOLANT LEVEL			DAILY		
101	COOLANT OVERFLOW RESERVOIR LEVEL			DAILY		
100	COOLANT CONCENTRATION		AS REQ	500 HRS*		
103	RADIATOR GRILLE SCREEN	DAILY				
117	ENGINE DRIVE BELT		AS REQ	DAILY		
117	A/C COMPRESSOR BELT		AS REQ	250 HRS		
102	A/C COMPRESSOR		B			
106	A/C DRYER		AS REQ			
107	PRIMARY FUEL FILTER (WATER SEPARATOR)		500 HRS*			DAILY
107	SECONDARY FUEL FILTER		500 HRS*			
107	IN-LINE FUEL STRAINER		AS REQ			
104	AIR INTAKE FILTER	NOT REC	C			
104	FILTER MINDER®		D	DAILY		
98	HYDRAULIC RESERVOIR OIL LEVEL		500HRS**	DAILY		
105	HYDRAULIC SUCTION FILTER		E			
105	HYDROSTATIC CHARGE PRESSURE FILTER		E			
118	NEUTRAL SETTING OF HYDROSTATIC PUMPS		AS REQ	DAILY		
106	HIGH-PRESSURE IN-LINE FILTER (TREAD ADJUST VLVS)	AS REQ				
106	HIGH-PRESSURE IN-LINE FILTER (BOOM CTRL VALVES)	AS REQ				
106	SOLUTION LINE STRAINER	AS REQ		DAILY		
99	TORQUE HUB® OIL LEVEL		F	100 HRS		
109	TORQUE HUB® SEAL BOOT ZERK (4 PLACES - 1 EACH)				DAILY	
123	WET TANK					DAILY
108	LEG BEARING ZERKS (12 PLACES - 3 EACH)				DAILY	
111	BOOM/BREAKAWAY ZERKS (60 12-6EA OR 80/90 14-7EA)				AS REQ	
110	TRANSOM, LIFT ARM, AND LIFT CYL ZERKS (16 PLACES)				25 HRS	
109	TREAD ADJUST SLIDE-PATH ON MAINFRAME				AS REQ	
120	LEG MOUNT BOLT TORQUE			DAILY		
112-113	BATTERY	100 HRS	AS REQ	DAILY		
119	LUG NUT TORQUE			G		
124	TIRE PRESSURE			50 HRS		
107	FRESH AIR CAB FILTER	AS REQ*	AS REQ			
107	CHARCOAL CAB FILTER		AS REQ			
107	RECIRCULATION FILTER	AS REQ				
114-115	FUSES/CIRCUIT BREAKERS		AS REQ			
123	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

VIII. SERVICE AND MAINTENANCE

SERVICE INTERVALS

Initial checks after receiving machine

IMMEDIATELY  then 

- 1) Check lug nut torque, then every 50 hours (page 119)

FIRST 50 HOURS  then  or 

- 1) Change Torque Hub[®] oil, then every 500 hours (page 99)
- 2) Change hydrostatic charge pressure filter, then every 250 hours (page 105)
- 3) Change hydraulic suction filter, then every 250 hours (page 105)

Daily

- 1) Check engine oil (page 98)
- 2) Drain primary fuel filter (water separator) (page 107)
- 3) Check radiator coolant level (page 100)
- 4) Check radiator coolant overflow reservoir level (page 101)
- 5) Check engine drive belt (page 117)
- 6) Check Filter Minder[®] (page 114)
- 7) Check hydraulic oil reservoir level (page 98)
- 8) Check for neutral setting of hydrostatic pumps (page 118)
- 9) Check solution line strainer (page 106)
- 10) Grease Torque Hub[®] seal boot (page 109)
- 11) Drain wet tank (page 123)
- 12) Grease all leg bearings (page 108)
- 13) Check leg mount bolts (page 120)
- 14) Check battery (page 112)

Every Other Day

- 1) Grease transom, lift arm, and lift cylinder zerks (page 110)

SERVICE INTERVALS 

VIII. SERVICE AND MAINTENANCE

➔ SERVICE INTERVALS


As Required




- 1) Change coolant concentration (page 101)
- 2) Clean radiator grille screens (page 103)
- 3) Change engine drive belt (page 117)
- 4) Change A/C compressor belt (page 117)
- 5) Change A/C dryer (page 106)
- 6) Charge A/C compressor (page 102)
- 7) Change primary fuel filter (water separator) (page 107)
- 8) Change secondary fuel filter (page 107)
- 9) Change in-line fuel pre-filter (page 107)
- 10) Change hydraulic reservoir oil (page 98)
- 11) Adjust neutral setting of hydrostatic pumps (page 118)
- 12) Clean high-pressure in-line filter on boom control stack valve (page 106)
- 13) Clean high-pressure in-line filter on tread adjust stack valve (page 106)
- 14) Clean solution line strainer (page 106)
- 15) Grease all boom folding and breakaway zerks (page 111)
- 16) Grease tread adjust slide path on mainframe (page 109)
- 17) Change battery (page 113)
- 18) Clean fresh air intake cab filter (page 107)
- 19) Change fresh air intake cab filter (page 107)
- 20) Change charcoal cab filter (page 107)
- 21) Clean recirculating cab filter (page 107)
- 22) Replace fuses and circuit breakers (pages 114-115)
- 23) Check and replace spray nozzle diaphragms and spray tip (page 123)

VIII. SERVICE AND MAINTENANCE


➔ SERVICE INTERVALS

Every 25 HOURS 


- 1) Grease transom, lift arm, and lift cylinder zerks (page 110)

Every 50 HOURS 



- 1) Check tire pressure (page 124)
- 2) Check lug nut torque (page 119)

Every 100 HOURS 

- 1) Check Torque Hub[®] oil level (page 99)
- 2) Clean battery (page 113)

Every 250 HOURS 

- 1) Check A/C compressor belt (page 117)
- 2) Change hydrostatic charge pressure filter (page 105)
- 3) Change hydraulic suction filter (page 105)

Every 500 HOURS  or 

- 1) Check coolant concentration (page 100)
- 2) Change primary fuel filter (water separator) (page 107)
- 3) Change secondary fuel filter (page 107)
- 4) Change hydraulic reservoir oil (page 98)
- 5) Change Torque Hub[®] oil (page 99)
- 6) Check spray nozzle diaphragms and spray tips (page 123)

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VIII. SERVICE AND MAINTENANCE

FLUIDS

Engine oil

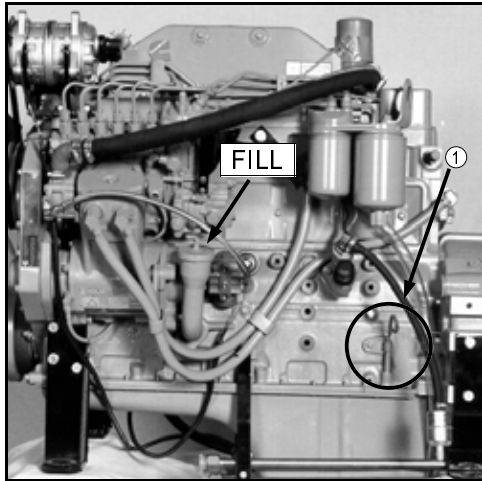


FIG 8.1

OIL LEVEL - The engine oil level dipstick is located on the left-hand side of the engine (fig. 8.1, item 1). 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 15 quarts. Refer to Engine Operation and Maintenance manual for maintenance schedule.

NOTE:

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



FIG 8.2

Hydraulic Oil Reservoir

OIL LEVEL - Check the hydraulic oil level in the reservoir using the dipstick (fig. 8.2) or the sight gauge on the left-hand side of the tank (fig 8.2, item 1) daily. Add just enough fluid so the level reaches the bottom tip of the dipstick or level is in the center of the sight gauge (fig. 8.3). Always check the hydraulic oil level when it is cool. Hydraulic oil will expand when heated in a system and measuring the reservoir by these levels allows for expansion.

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.

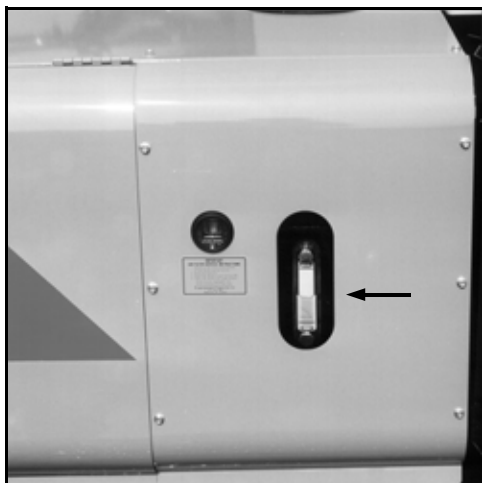


FIG 8.3

VIII. SERVICE AND MAINTENANCE

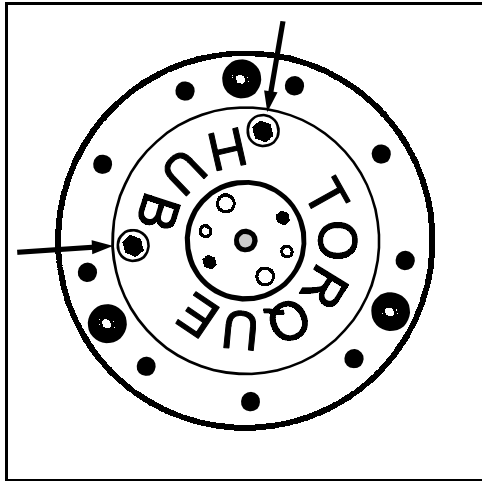


FIG 8.4



FIG 8.5



FIG 8.6

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. 8.4). 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. 8.5). 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. 8.6). 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 →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VIII. SERVICE AND MAINTENANCE

➔ FLUIDS CONTINUED

Cooling System

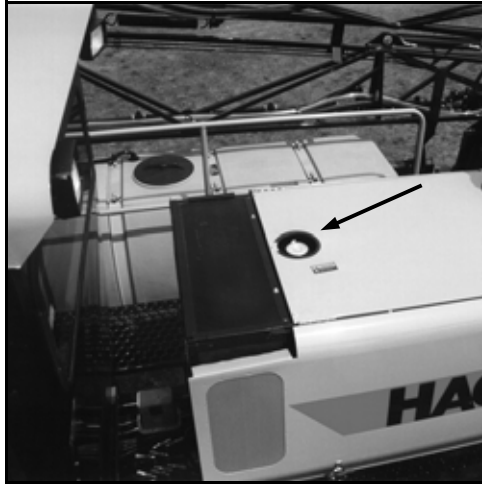


FIG 8.7

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.



FIG 8.8

CHECKING CONCENTRATION - The radiator cap is located immediately behind the rear of the cab (fig. 8.7). 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 8.9 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.

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

FIG 8.9

VIII. SERVICE AND MAINTENANCE

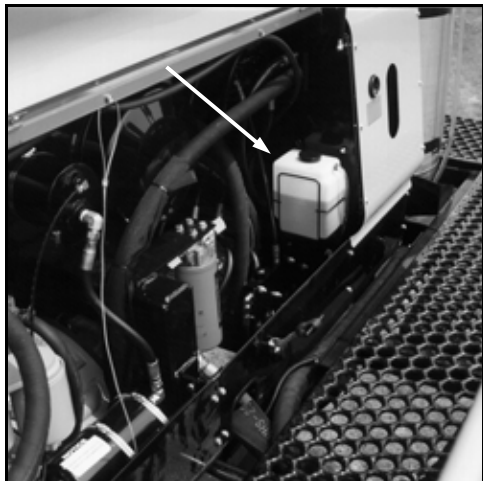


FIG 8.10

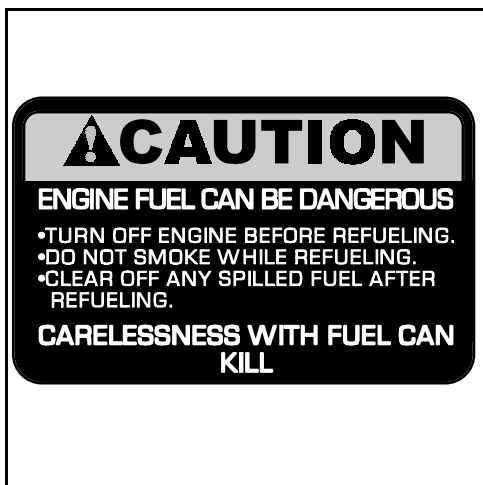


FIG 8.11

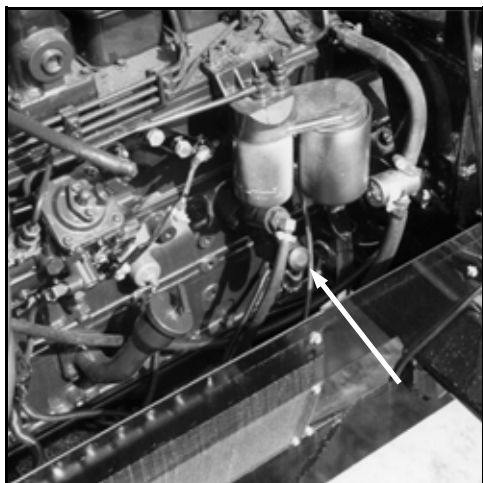


FIG 8.12

COOLANT RESERVOIR - The coolant reservoir is located under the left-hand hood toward the rear of the machine (fig. 8.10). 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 9 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.

Each tank holds 40 gallons - do not fill them completely: fuel can expand and run over. Wipe up all spilled fuel and clean with detergent and water before starting the engine.

PRIMING - If the fuel system should happen to run dry and lose its prime, there is a priming bulb located on the left side of the engine for use in filling the engine fuel filters (fig. 8.12).

FLUIDS CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

➔ FLUIDS CONTINUED

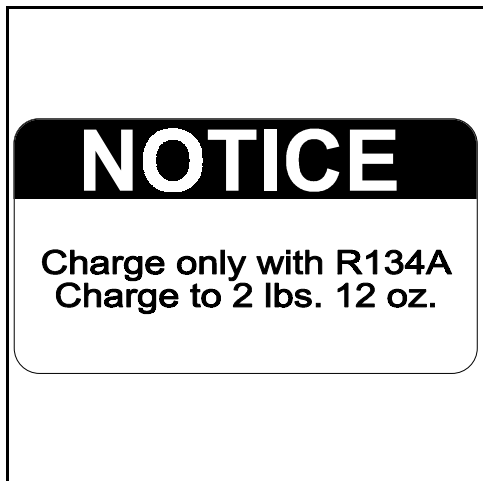


FIG 8.13

Air Conditioning

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

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

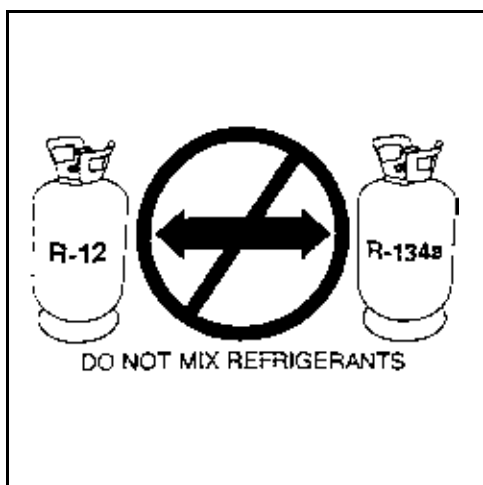


FIG 8.14

Windshield Washer Fluid

The windshield washer reservoir is located toward the front of the sprayer behind the center front shield (fig. 8.15). Check it occasionally and refill it with non-freezing automotive windshield cleaner as required.

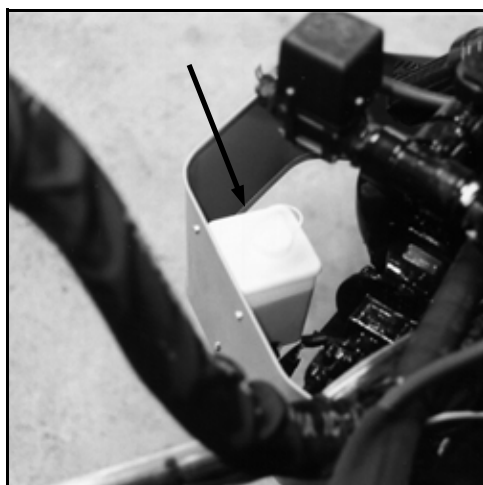


FIG 8.15

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	25 gallons anti-wear hydraulic oil
Torque Hub® oil level (4).....	approx. 16 oz. ea. EP-90
Engine cooling system.....	10 gallons ethylene glycol
Fuel tanks (2).....	40 gallons ea. No. 1 or 2 diesel

VIII. SERVICE AND MAINTENANCE

FILTERS

Grille Screens

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 screens must be inspected often and periodically removed for cleaning.



FIG 8.16

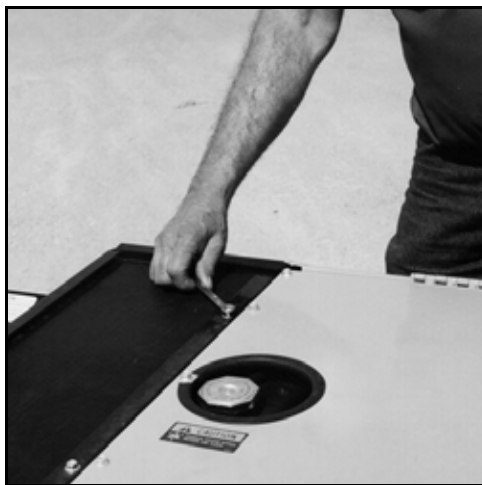


FIG 8.17



FIG 8.18

NOTE:

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

REMOVAL - The side grille screens are easily removed by sliding them up out of their housings (fig. 8.16). The top screen is held in place by two bolts (fig. 8.17) and may also be removed for cleaning.

CLEANING - Compressed air will dislodge most large trash or loose dirt after the screens have been removed (fig. 8.18). Blow out the screens away from the machine. Water from a pressurized hose may also be used, or if necessary the screens may be soaked in 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.

FILTERS CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

➔ FILTERS CONTINUED

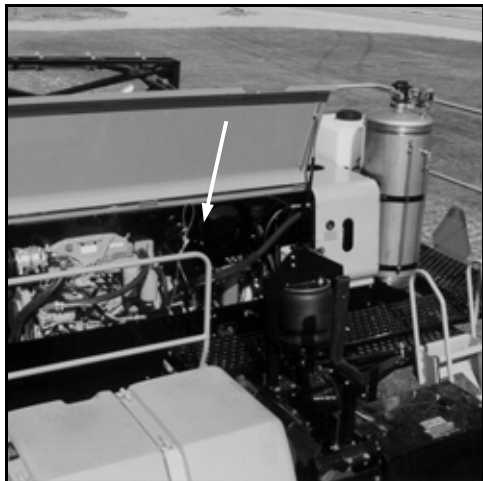


FIG 8.19

Engine Air Intake

LOCATION – The engine air intake filter is accessible by lifting the left engine compartment hood (fig. 8.19).

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. 8.20).

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.



FIG 8.20

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 behind the left-hand engine compartment hood (fig. 8.21). 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.



FIG 8.21

NOTE:

Service the air cleaner before the yellow indicator reaches the red line of the Filter Minder[®].

VIII. SERVICE AND MAINTENANCE

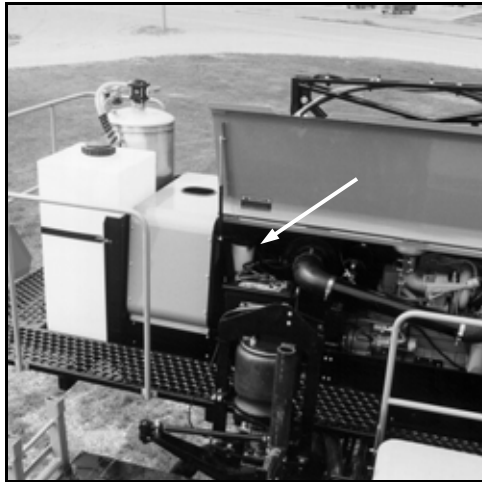


FIG 8.22

Suction Filter

Remove and install a new 10 Micron rated suction filter (fig. 8.22) at the end of the first 50 hours of use; subsequently, replace the filter every 250 hours, or once a year, whichever comes first.



FIG 8.23

Charge Pressure Filter

Remove and install a new 4 Micron rated charge pressure filter (fig. 8.23) at the end of the first 50 hours of use; subsequently, replace the filter every 250 hours, or once a year, whichever comes first.

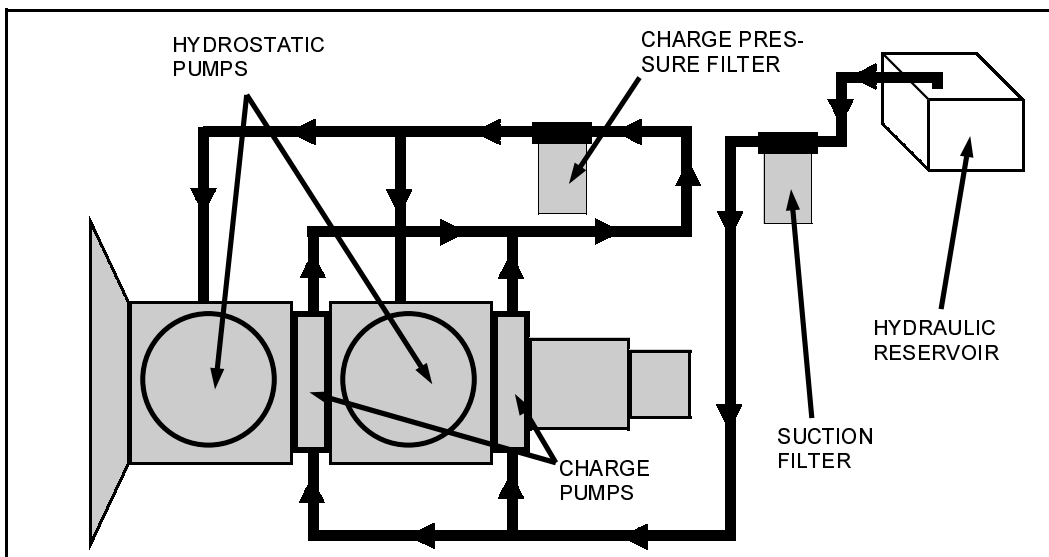


FIG 8.24

FILTERS CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VIII. SERVICE AND MAINTENANCE

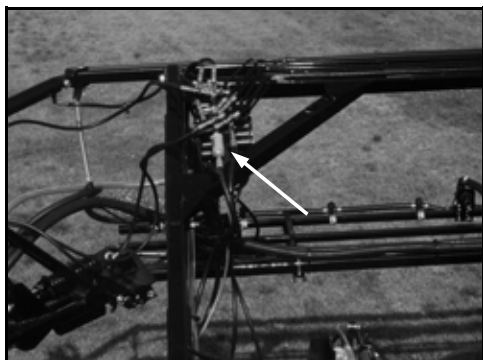


FIG 8.25

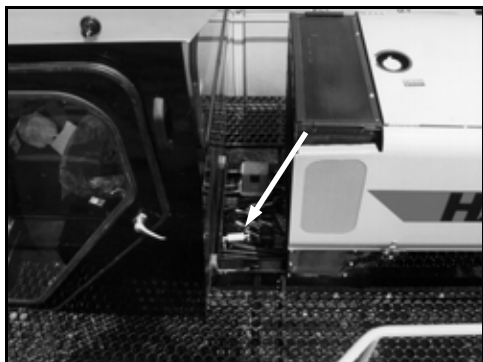


FIG 8.26

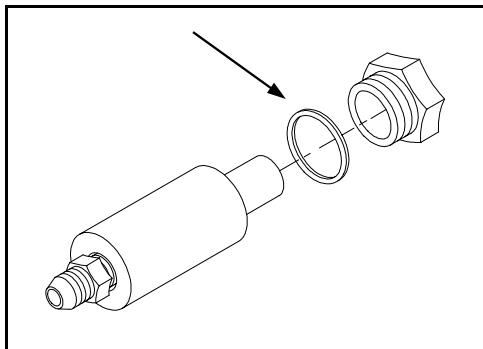


FIG 8.27



FIG 8.28

High Pressure In-line Filters

STACK VALVES - The valves on the boom control stack valve (fig. 8.25) and the valves on the tread adjust stack valve (fig. 8.26) are each protected by a 90 Micron in-line sintered bronze filter. When the filter elements are removed for cleaning, caution should be taken so the gasket is in the proper place when re-installing (fig. 8.27). 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 daily for blockage. To remove the strainer, close the tank shutoff valves. Clean the strainer screen as required. Be sure to wear the appropriate clothing while removing and cleaning the line strainer screen (fig. 8.28). Confirm the gasket is in place before re-installing the screen. Line strainers for the high pressure D230 pump are located under each solution tank. Remove and clean them in the same manner.

Air Conditioning System Dryer

The A/C system receiver/dryer (fig. 8.29) should be replaced if the A/C loop is ever opened such as replacing a compressor or condenser line, etc.

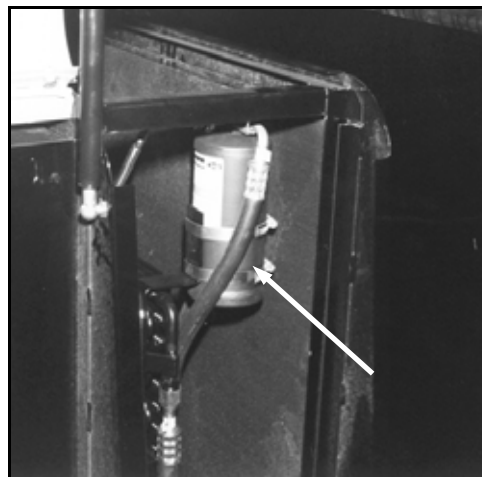


FIG 8.29

VIII. SERVICE AND MAINTENANCE

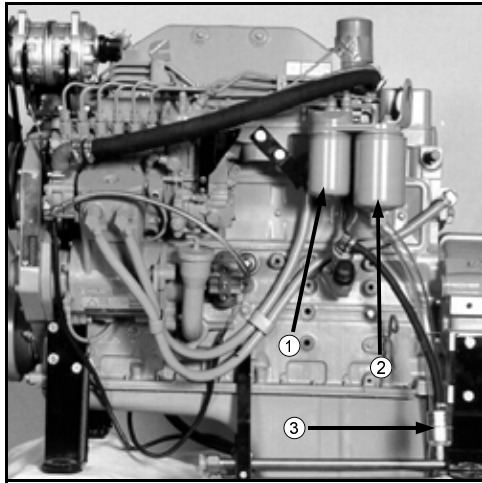


FIG 8.30

Fuel Filters

PRIMARY (WATER SEPARATOR) - (fig. 8.30, item 2) Drain water and sediment from the separator daily. Replace every 500 hours or once a year, whichever comes first.

SECONDARY - (fig. 8.30, item 1) Replace every 500 hours or once a year, whichever comes first.

IN-LINE STRAINER - (fig. 8.30, item 3) Note direction of fuel flow arrow when replacing.

Fresh Air Cab Filters

PAPER FILTER - (fig. 8.31, item 1) 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.

CHARCOAL FILTER - (fig. 8.31, item 2) Remove and replace at the first sign of chemical odor entering the cab.

RECIRCULATING FILTER - (fig. 8.31, item 3) The recirculating filter may be cleaned with soap and water. Replace if it becomes worn.

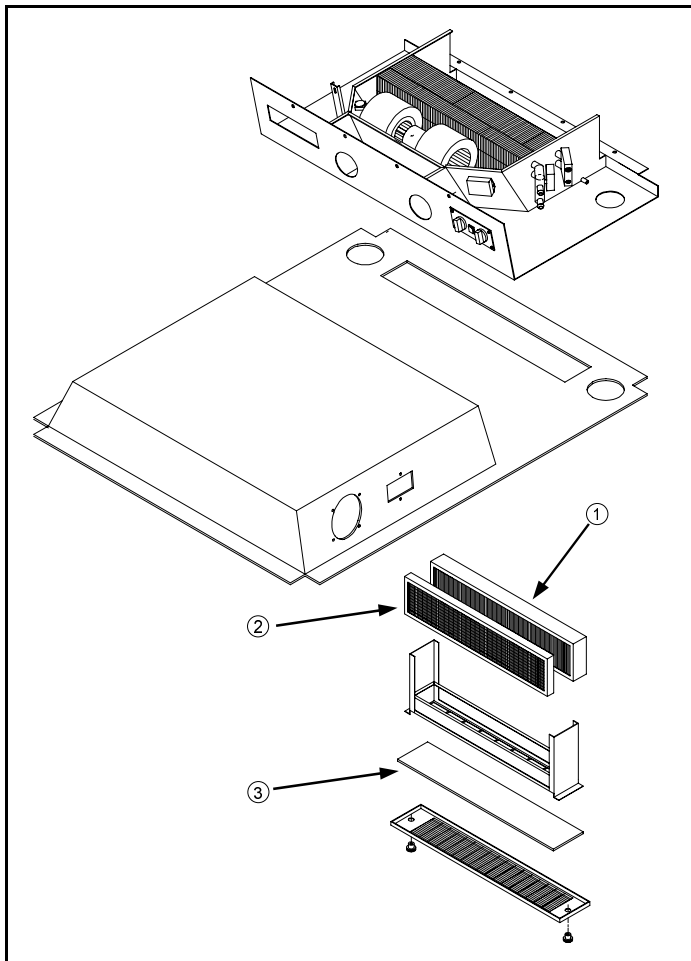


FIG 8.31



CAB FILTER LOCATION
FIG 8.32

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

LUBRICATION

Leg Bearings

Hagie 2100 leg assemblies are constructed with upper and lower nylon bearings for suspension telescoping between the inner and outer leg weldments. These bearings must be lubricated to avoid bearing failure and ensure optimal ride quality. There are grease zerks located on the sides of the leg assemblies, one for the upper bearing (fig. 8.33, item 1) and two for the lower bearing (fig. 8.33, item 2). Greasing all bearings on all four legs daily is very important.

In late season crop applications, the grease may possibly be wiped off by passing crop leaves, so the bearing should be greased at least twice a day. Suggested times are in the morning and at noon. If the crop is mature enough, or plant population is high enough, more frequent leg bearing grease application may be required. This will ensure proper lubrication allowing optimal performance.

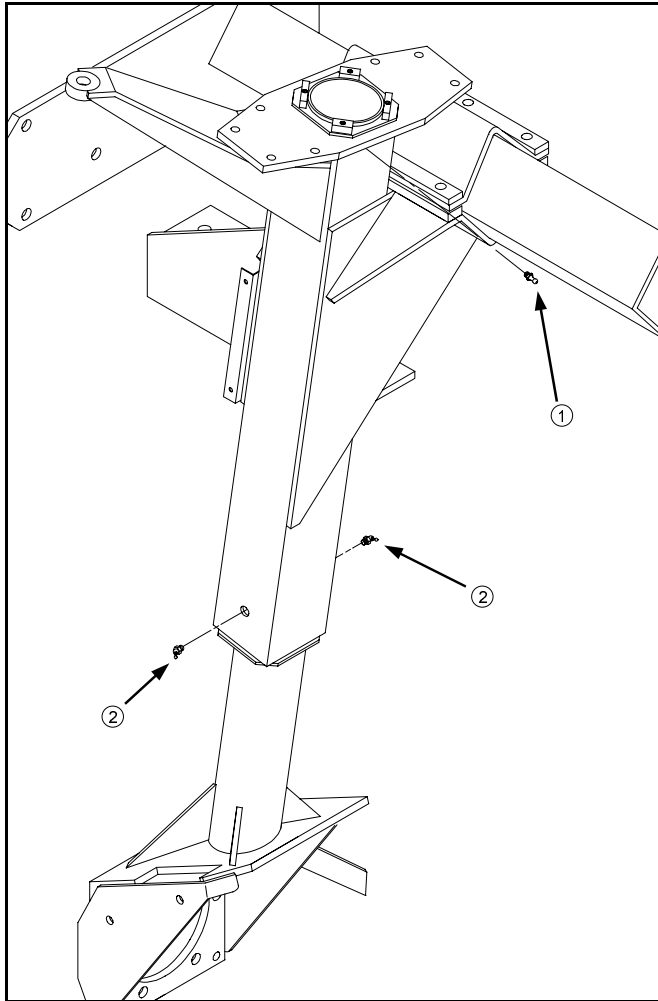


FIG 8.33

VIII. SERVICE AND MAINTENANCE

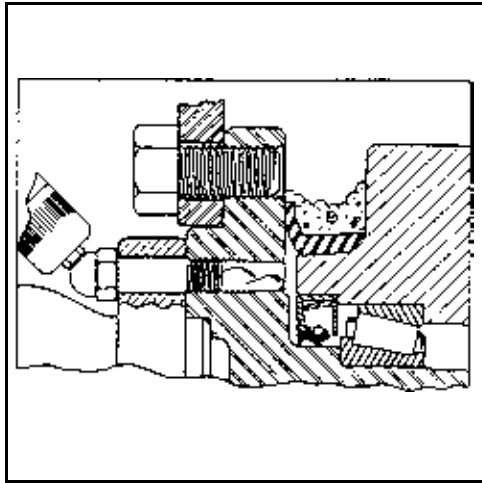


FIG 8.34

Torque Hub[®] Seal Boot

Each leg has a seal boot located between the wheel motor and Torque Hub[®]. It should be lubricated daily to optimize the hub's life duration.

An over-greased seal boot will leak some grease out around the seal and when heated may cause the appearance of a failed wheel motor leaking hydraulic fluid. Wipe off any excess grease after servicing. It is better to over-grease the seal boot than under-grease it.

The zerks are tapped into a "hollow" wheel motor mounting bolt (fig. 8.34). This bolt allows grease through and into the seal boot.

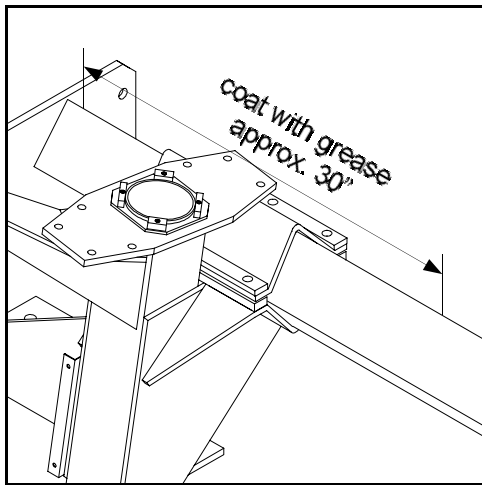


FIG 8.35

Hydraulic Tread Adjust Bearing Slide-Path

The slide-path (fig. 8.35) for the hydraulic tread adjust nylon bearings should be generously coated with an appropriate lubricant. Standard grease applied by hand over the entire length of the bearing's range of travel should suffice (fig. 8.36).

Inspect this area often and lubricate as required. Failure to do so may cause one of the legs to hang up while the other is still sliding during adjustment. This will cause damage to the machine. Bear in mind that late season or taller crops may wipe off some or all of the exposed grease on the under-side of the mainframe.



FIG 8.36

LUBRICATION CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VIII. SERVICE AND MAINTENANCE

➔ LUBRICATION CONTINUED

Transom/Lift Arm/Lift Cylinders

The transom, lift arm, and lift cylinders are fitted with grease zerks that should be lubricated ever other day or 25 hours, whichever comes first. They are located as follows:

Lift arm lift pivots: eight places (fig. 8.37, items 1)

Lift cylinder pivots: four places (fig. 8.37, items 2)

Boom fold pivots on transom: four places (fig. 8.37, items 3)

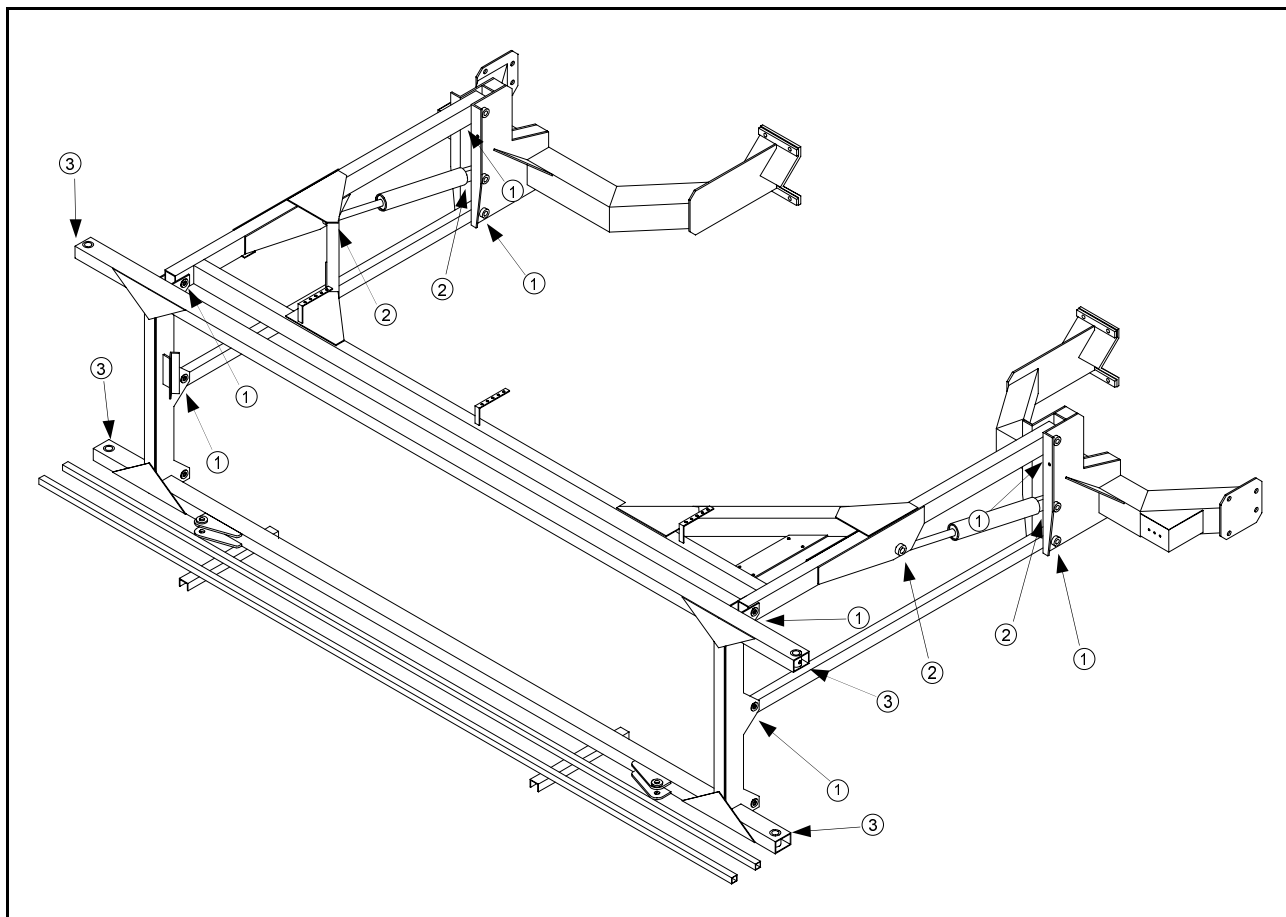


FIG 8.37

VIII. SERVICE AND MAINTENANCE

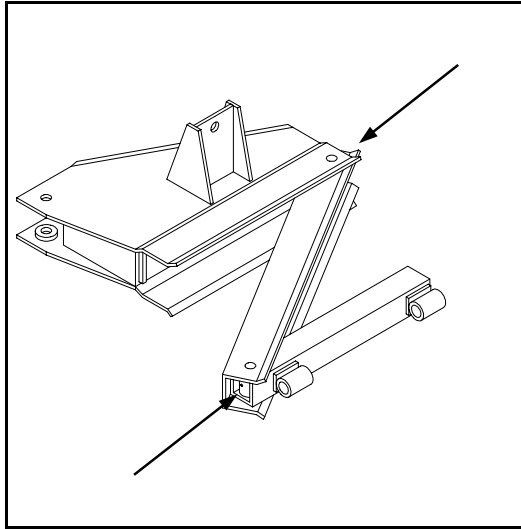


FIG 8.38

Boom Hinge and Breakaway Pivots

Each breakaway located between the transom and each inner boom section has two zerks (four total) that need to be greased as required (fig 8.38).

Sixty foot boom options have a grease zerk on the boom level pivot point connected to the breakaway (fig. 8.39, item 1), on the boom extension vertical folding pivot point (fig. 8.39, item 2), and on the boom folding link clevis pins (fig. 8.39, item 3). Eighty and ninety foot boom options also have these zerks in addition to zerks for the folding pivot of the outer boom breakaway (fig. 8.39, item 4). Check all and grease as required.

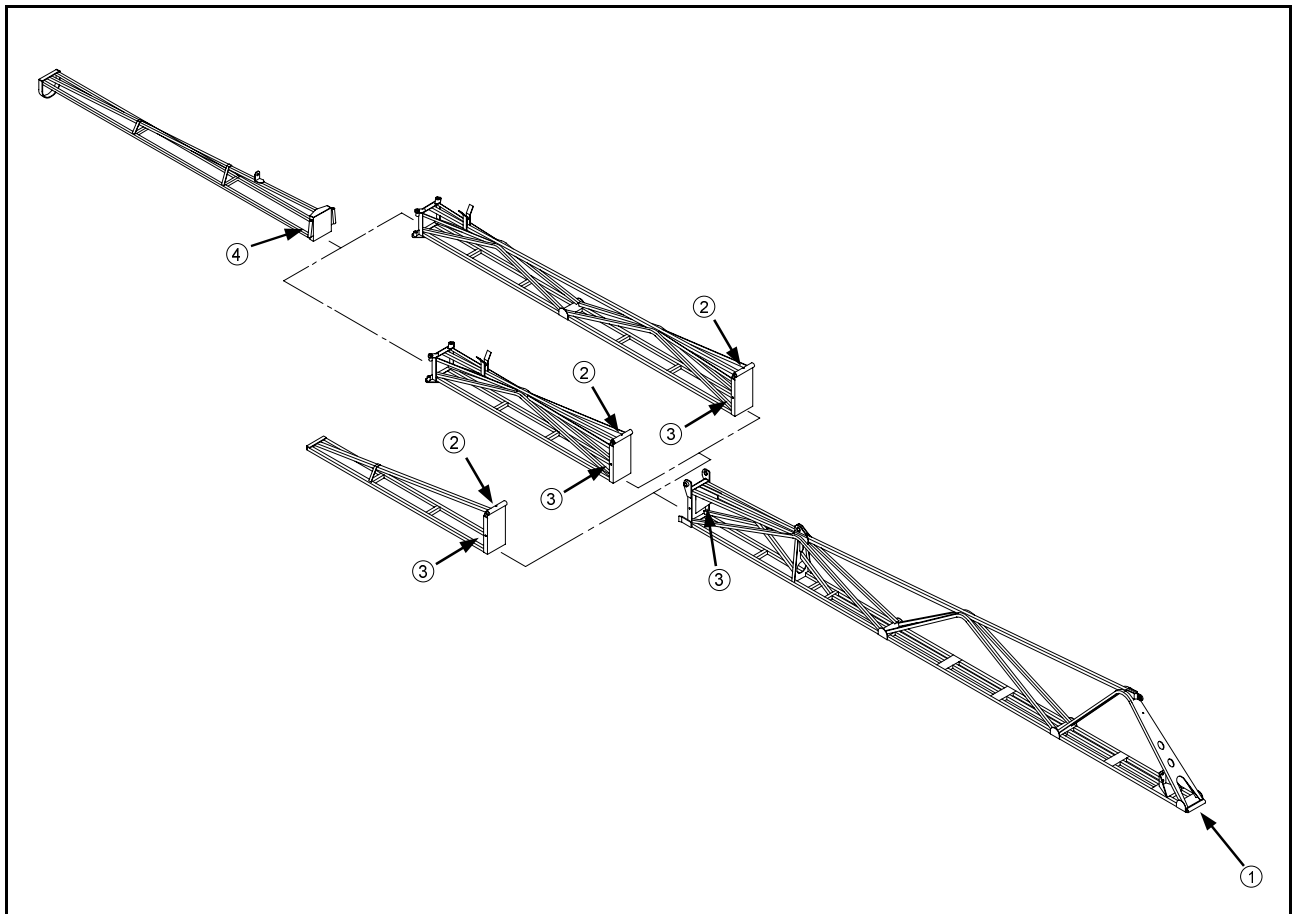


FIG 8.39

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VIII. SERVICE AND MAINTENANCE

ELECTRICAL

Battery

SAFETY

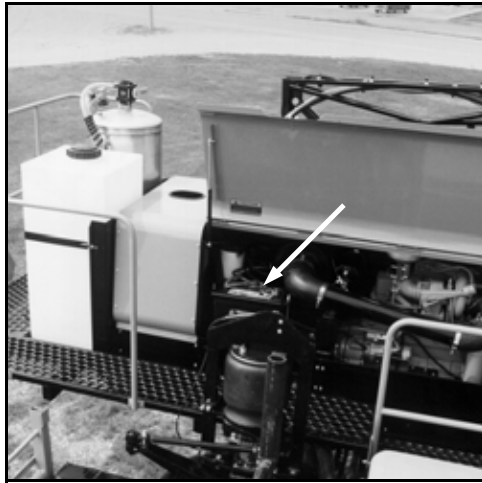


FIG 8.40

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 battery is located at the rear of the machine under the right engine hood (fig. 8.40). It is mounted on a pivoting plate which, when unbolted and swung out, allows the operator ease of battery maintenance and filter access.



FIG 8.41

NOTE:

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

To unlock battery for access, remove the 3/8" bolt and nut (fig. 8.41). The battery is now able to pivot freely (fig. 8.42). When finished servicing area, return battery access plate back to original position and bolt it down. Take care not to pinch or cut any electrical cables or wires when returning battery to original position.



FIG 8.42

NOTE:

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

VIII. SERVICE AND MAINTENANCE



FIG 8.43

CLEANING - Disconnect battery cables from battery. Remove all corrosion with a wire brush or battery post brush (fig. 8.43). 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 battery making sure they are tight. Clean every 100 hours.

CHARGING - To ease charging of the battery, there is a set of auxiliary battery charging posts on the rear of the sprayer's mainframe (fig. 8.44). Connect your charging cables to them just as you would to the battery, positive cable to positive terminal, and negative cable to negative terminal (fig. 8.45). Keep these terminals clean and their caps in place when not in use.

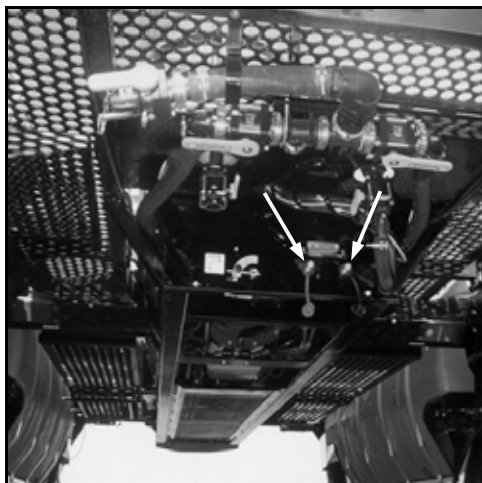


FIG 8.44

CAUTION

Electrical system is 12 volt negative ground. When using booster with jumper cables, precautions must be taken to prevent personal injury or damage to electrical parts.

1. Attach one end of jumper cable to positive terminal of booster battery and other end to positive terminal of vehicle battery connected to starter motor.
2. Attach one end of second cable to negative terminal of booster battery and other end to vehicle frame away from battery. Do not attach to cab or cab support.
3. To remove cables, reverse above sequence exactly to avoid sparks. See operator's manual for additional information.



FIG 8.45

STORAGE - See section 9 concerning proper battery storage.

REPLACEMENT - When replacing the battery, install a battery with ratings equivalent to or higher than the specs below.

VOLTAGE	12 V (only)
COLD CRANKING AMPS (30 sec. at 0° F)	950 CCA
RESERVE CAPACITY	185 min. at 25 amps

ELECTRICAL CONTINUED ➔

- SAFETY/
DECALS
- SPRAYER
IDENTIFICATION
- SPECIFICATIONS
- PREPARING
TO OPERATE
- OPERATING
INFORMATION
- CALIBRATION
- TRANSPORTING
- SERVICE/
MAINTENANCE
- STORAGE
- TROUBLE
SHOOTING
- LIMITED
WARRANTY
- INDEX

VIII. SERVICE AND MAINTENANCE

➔ ELECTRICAL CONTINUED

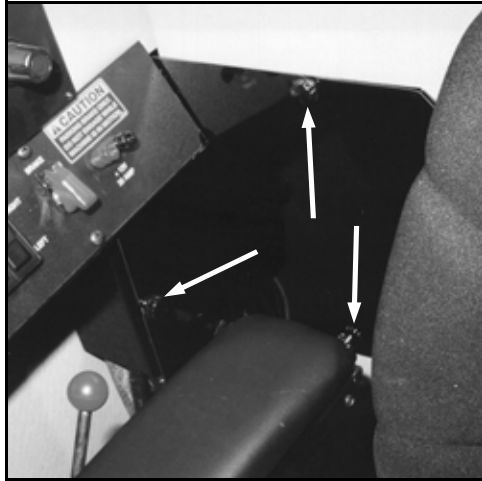


FIG 8.46

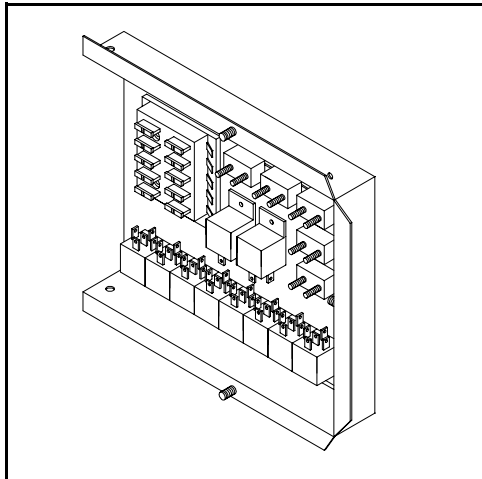


FIG 8.47

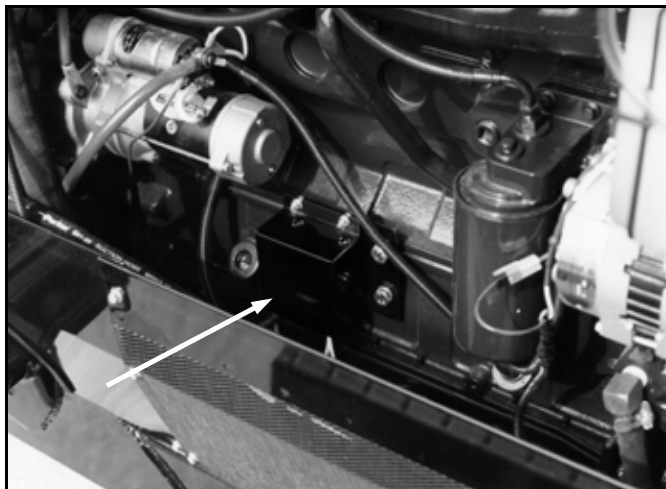


FIG 8.48

Fuses

Fuses protect individual lighter duty electrical circuits. The electrical panel is located on the rear wall of the cab to the right of the operator's seat. To gain access to the electrical panel, remove the three plastic panel screws (fig. 8.46).

If a fuse blows, remove it by pulling straight out. Do not pry it out with a screw driver. Replace each blown fuse with the same amperage fuse only. Correct fuse location and amperage is shown on page 115. If the fuse continues to blow, determine the cause and correct it.

Circuit Breakers

Mounted in Cab – Circuit breakers handle the functions of the heavier duty electrical circuits on the sprayer. They trip when overloaded and automatically reset themselves after they cool down. They will continue to trip and reset as long as the overload or short exists. If the circuit breaker does not reset, replace it with the same amperage breaker only. Correct circuit breaker location and amperage is shown on page 115. If a circuit breaker does not reset and continues to trip, determine the cause and correct it.

Mounted on Engine – The wire harnesses are protected by circuit breakers mounted on the engine (fig. 8.48). Correct fuse location and amperage is shown below. If the breakers do not reset and continue to trip, determine the cause and correct it.

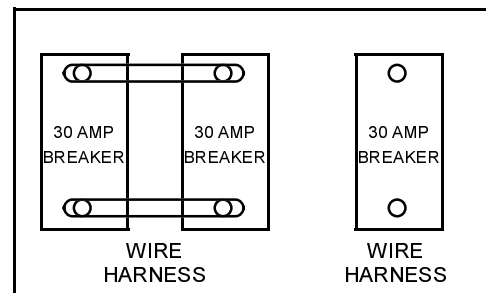


FIG 8.49

VIII. SERVICE AND MAINTENANCE

FUSES		CIRCUIT BREAKERS	
Rinse system power and Gauges 10 AMP	AM/FM Radio 10 AMP	Starter relay 30 AMP	
Seat power and Hydraulic tread adjust 20 AMP	CB radio and Dome light 10 AMP	Highway lights and Field lights 40 AMP	
Spray solution valves 10 AMP	Tank solution valves and Rinse system control 10 AMP	Work lights 30 AMP	
Flow ctrl, agitation, and Boom folding ctrlsa 10 AMP	Hazard/warning lights, Turn signal, and wiper 10 AMP	Foam marker and Switch panel aux power .. 30 AMP	
Fuel tank selector and Parking brake 15 AMP	Boom lift control and Boom level control 15 AMP	A/C and Storage console aux pwr 30 AMP	

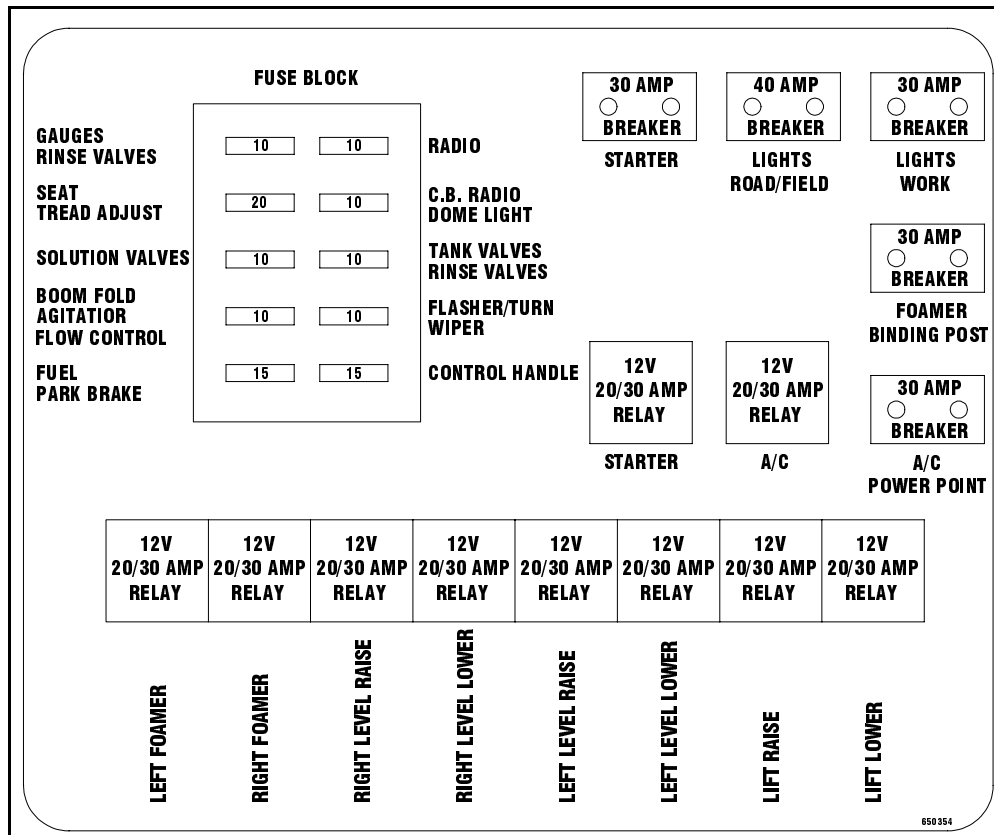


FIG 8.50

ELECTRICAL CONTINUED →

SAFETY/DECALS
 SPRAYER IDENTIFICATION
 SPECIFICATIONS
 PREPARING TO OPERATE
 OPERATING INFORMATION
 CALIBRATION
 TRANSPORTING
SERVICE/MAINTENANCE
 STORAGE
 TROUBLE SHOOTING
 LIMITED WARRANTY
 INDEX

VIII. SERVICE AND MAINTENANCE

➔ ELECTRICAL CONTINUED

Circuit Relays

Relays carry large electrical loads and are controlled by switches. They can be replaced, if necessary. It is recommended to contact the Hagie Customer Support Department or your local authorized Hagie Service Technician when servicing electrical relays. This will ensure maintaining proper wire location on the relay panel (fig. 8.51).

If it is necessary to remove a relay, tag all the wires going to that relay. Remove the two bolts that mount the relay panel to the electrical panel (fig. 8.52, item 1). Then unbolt the individual relay by removing the relay bolt (fig. 8.52, item 2) that holds it to the relay panel.

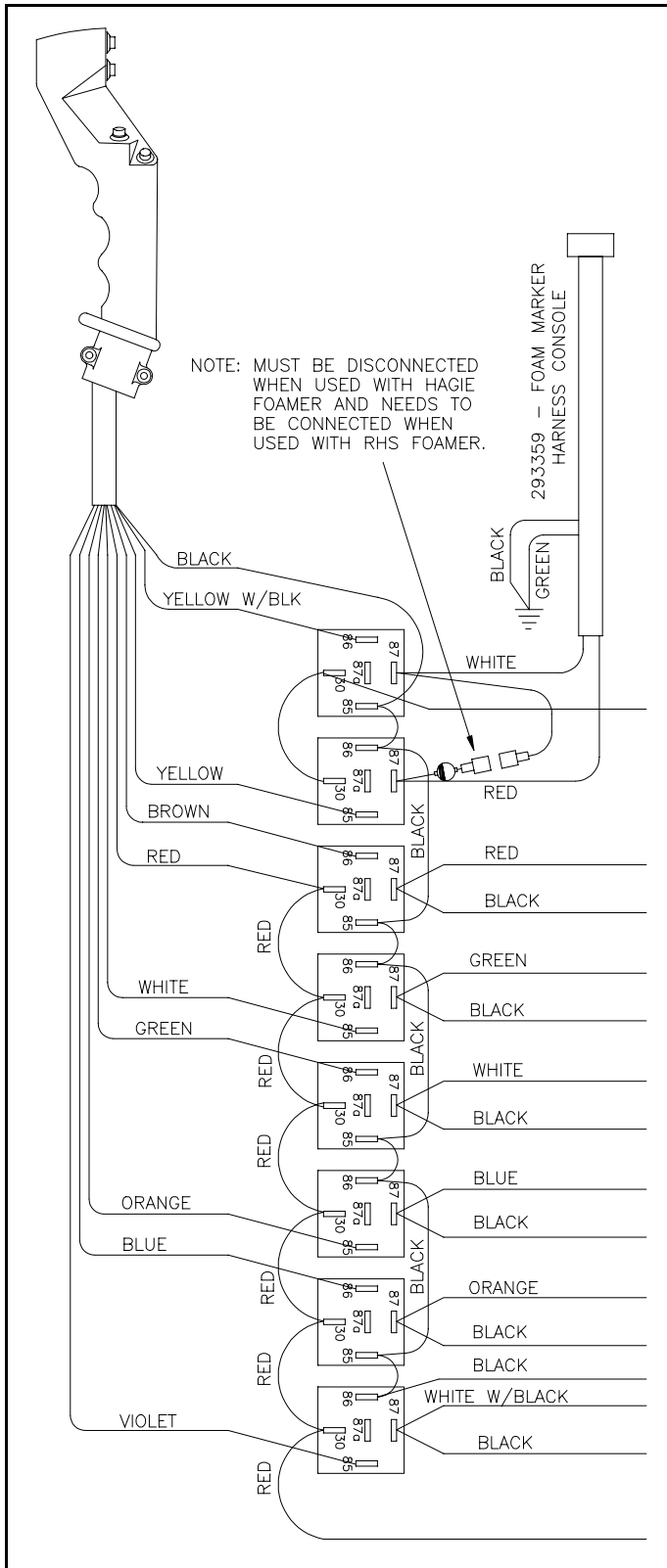


FIG 8.51

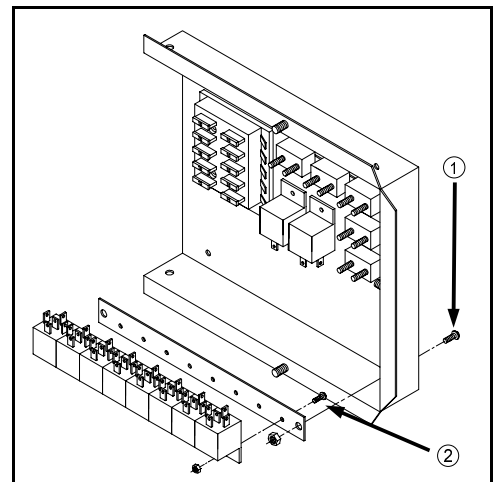


FIG 8.52

VIII. SERVICE AND MAINTENANCE

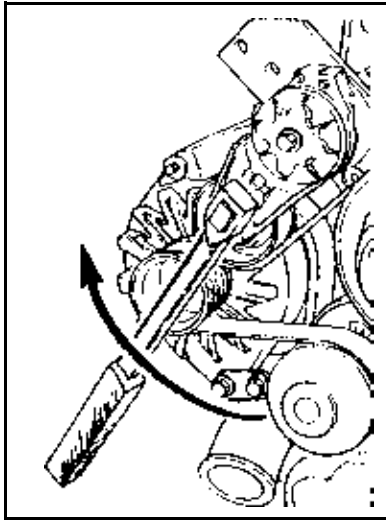


FIG 8.53

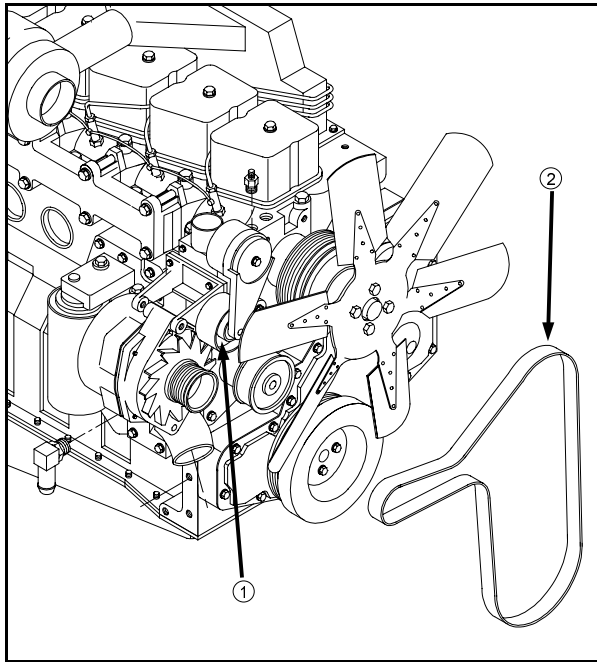


FIG 8.54

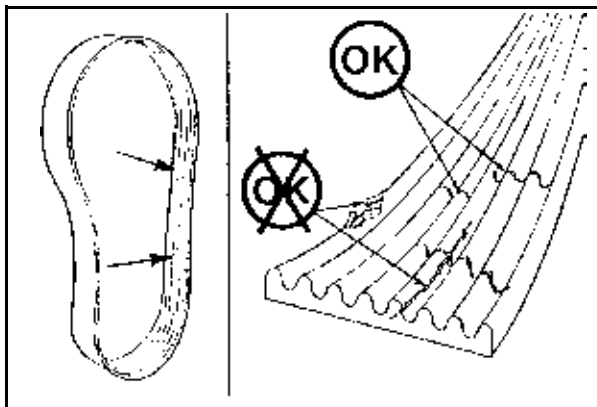


FIG 8.55

BELTS

Engine Drive Belt

REMOVAL - Insert a 3/8 inch square ratchet drive into the belt tensioner and lift upward to remove the belt (fig. 8.53).

INSPECTION - Visually inspect the belt daily (fig. 8.54). Check the belt for intersecting cracks (fig. 8.55). 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. 8.56, item 1) and the two slide bolts (fig. 8.56, 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.

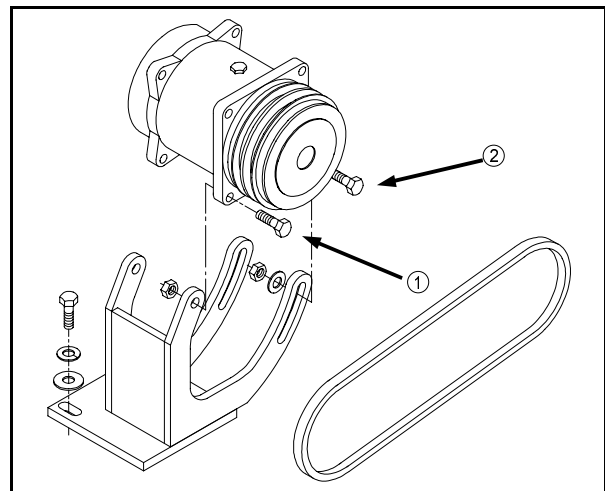


FIG 8.56

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

DRIVE TRAIN

Tandem Hydrostatic Pumps

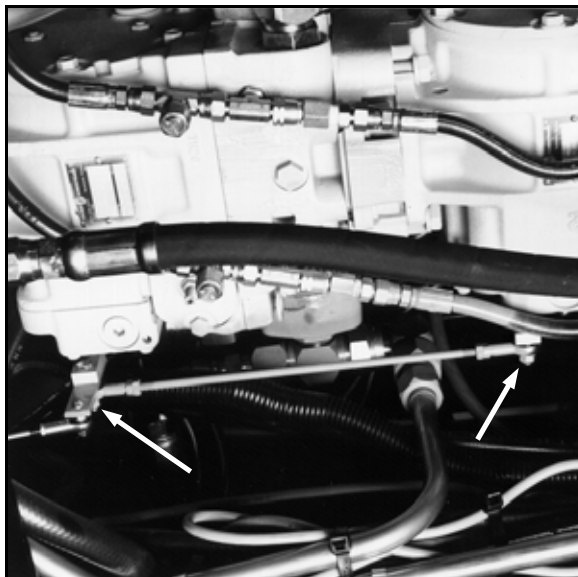


FIG 8.57

NEUTRAL SETTING - When the hydrostatic lever is in the neutral position, the machine should not be moving in either direction. If it does, the neutral setting of the lever (fig. 8.57) on the hydrostatic pump needs to be adjusted. See accompanying pump manual.

CHECK CHARGE PRESSURE - See page 33.

REPAIR/REPLACEMENT - See pump handbook accompanying this operator's manual. Hydrostatic pumps are available as a core exchange item from Hagie Manufacturing Customer Support Department.

Auxiliary Gear Pumps

REPAIR/REPLACEMENT - See pump handbook accompanying this operator's manual. Gear pumps are available from the Hagie Manufacturing Customer Support Department.

Wheel Motors

REPAIR/REPLACEMENT - See wheel motor handbook accompanying this operator's manual. Wheel motors are available as a core exchange item from Hagie Manufacturing Customer Support Department.

Torque Hubs[®]

GREASE - Grease according to page 109.

OIL - Maintain oil level according to page 99.

REPLACEMENT - Torque Hubs[®] are available as a core exchange item from Hagie Manufacturing Customer Support Department.

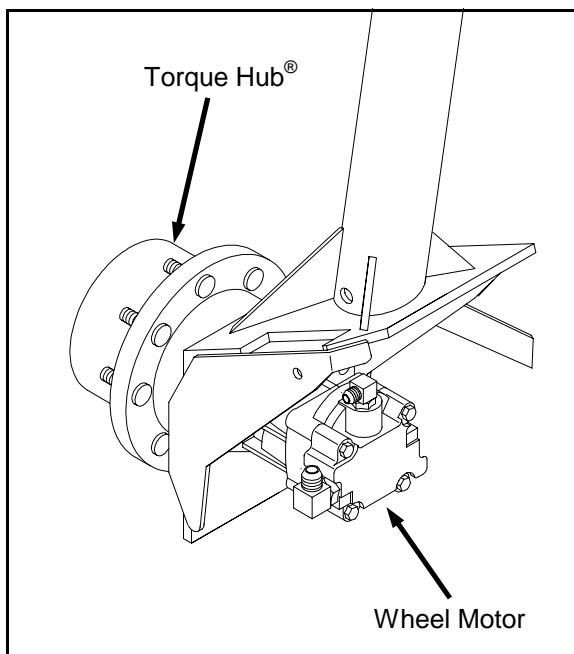


FIG 8.58

VIII. SERVICE AND MAINTENANCE

BOLT TORQUE

Wheel Bolts



FIG 8.59

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 8.60, 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.

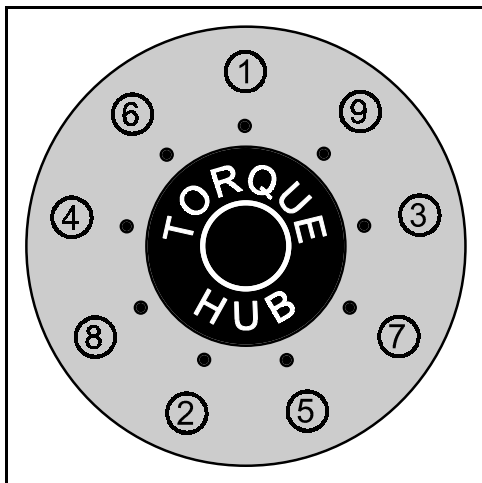


FIG 8.60

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.



FIG 8.61

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

BOLT TORQUE CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

VIII. SERVICE AND MAINTENANCE

➔ BOLT TORQUE CONTINUED

Leg Mounting Bolts

See page 121 for additional information regarding leg mounting bolts.

After changing hydraulic tread adjust bearings or adding or removing mounting shims, follow these procedures for torquing the leg mounting bolts:



CAUTION

Never remove more than three leg mounting bolts from any single leg mount.



FIG 8.62

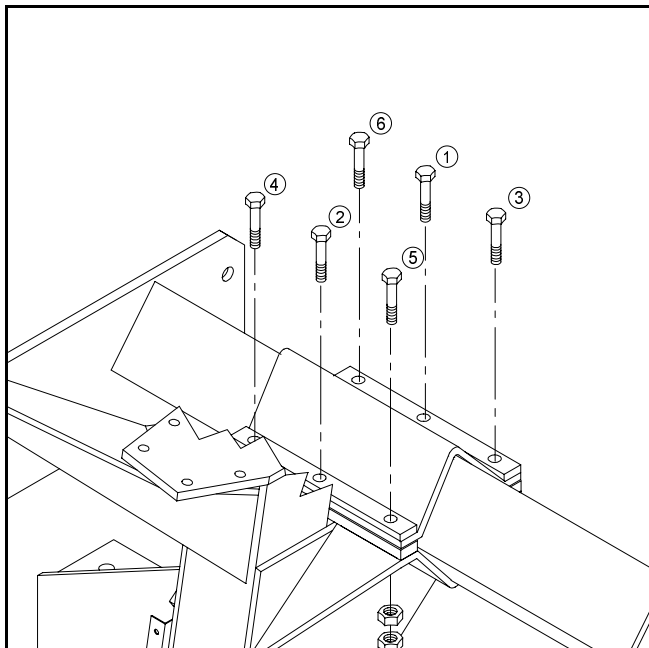


FIG 8.63

Start the nuts on the mounting bolts and tighten them until they are just snug. Following the torque sequence in figure 8.63, turn each lug nut to a torque value of 100 dry foot-pounds. Use slow, even pressure on the torque wrench. Quick or jerky movements cause inaccurate values.

Lower the sprayer to the ground and repeat the same sequence to 130 dry foot-pounds and again finally to 160 dry foot-pounds.

Resume operation and recheck torque values after 30 minutes of operation.

VIII. SERVICE AND MAINTENANCE

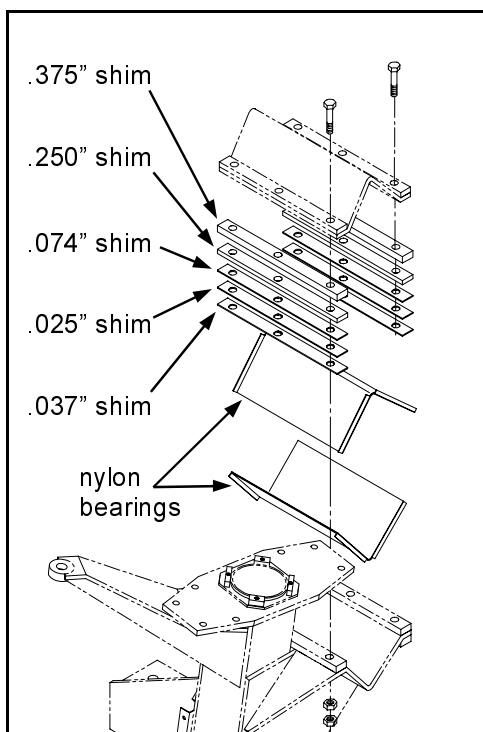


FIG 5.64

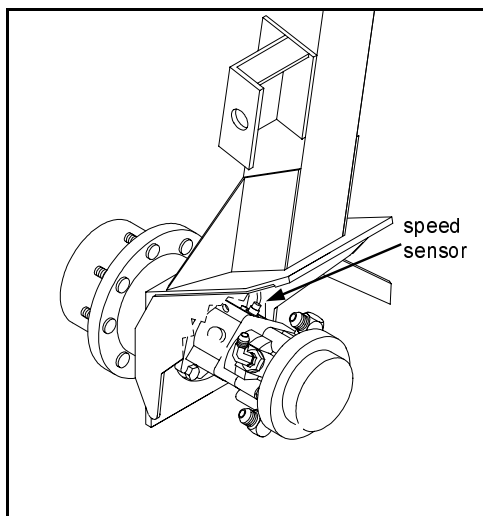


FIG 8.65

Tread Adjust Shim Adjustment

NOTE:

If the leg mount bolts have been tightened to the proper torque and the mount is loose, it may be that the bearing has worn and needs to be replaced. Check the bearing before you remove shims.

When adjusting for more or less bearing clearance, park the sprayer on level ground and shut off the engine. Block the wheel of the opposite side, both front and rear. Remove only three of the six leg mounting bolts at one time when removing or adding shims to the leg assembly. Refer to page 120 for leg mount bolt torque values and sequence.

WARNING

DO NOT loosen the leg mounting bolts to obtain more clearance for the leg to slide on the frame. Follow the above directions only for bearing clearance adjustment.

Speed Sensor Adjustment

(Left rear wheel motor - fig. 8.65) When installing or adjusting sensor, turn sensor in by hand until contact is made with speed ring. Back out one half turn (.030 gap). Rotate sensor until the wrench flats on housing are positioned at a 22 degree angle to motor shaft. Lock in place with lock nut. For further adjustment, see Sauer/Sundstrand service manual.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

TOE-IN ADJUSTMENT



FIG 8.66

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

1. Remove cotter pin (fig. 8.67, item 5), castle nut (fig. 8.67, item 3), and lock washer (fig. 8.67, item 4).
2. Loosen lock collar bolt and nut (fig. 8.67, item 2).
3. Lightly tap swivel assembly (fig. 8.67, item 1) out of steering arm.
4. Move left and right tires evenly until difference in dimension "A" and "B" (fig. 8.68) are within specified range.

NOTE:

Dimension "A" should be $\frac{1}{2}$ " to $\frac{3}{4}$ " less than dimension "B." For more information regarding toe-in, see page 24.

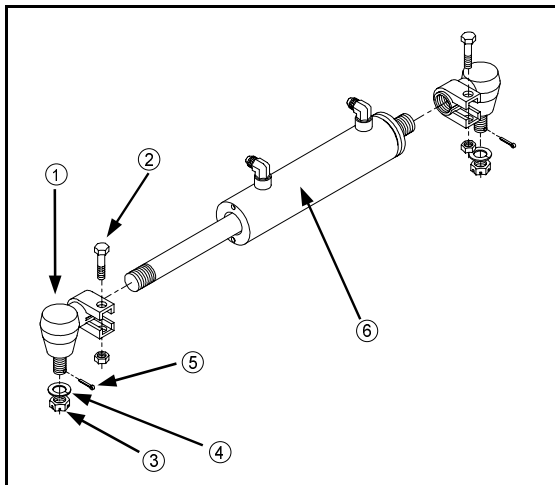


FIG 8.67

5. Screw swivel assembly in or out on steering cylinder (fig 8.67, item 6) until the treaded part lines up with steering arm.
6. Insert swivel assembly into steering arm.
7. Install lock washer and castle nut and tighten.
8. Install cotter pin.
9. Tighten lock collar bolt and nut.

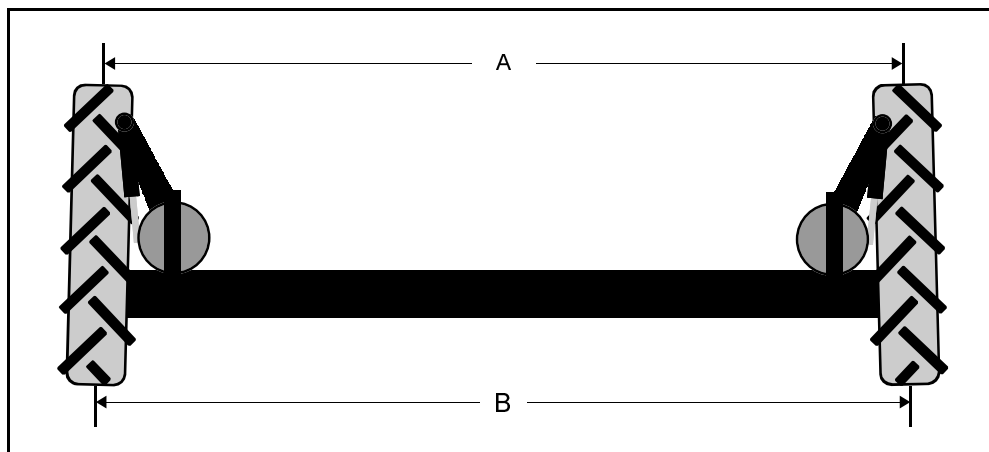


FIG 8.68

VIII. SERVICE AND MAINTENANCE

SPRAY SYSTEM

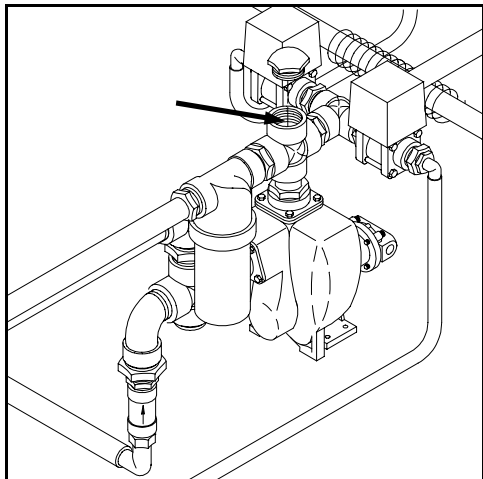


FIG 8.69

Solution Pump

PRIMING – In the event of loss of prime of the solution pump, remove the plug on the poly cross on top of the solution pump (fig. 8.69). Pour solution through the cross until the pump is full. Replace the plug and resume operation.

REBUILDING - Refer to accompanying handbook.

Line strainer

See page 106 for more information.

Spray Tips

At the beginning of each season, or as required, remove a random sample of nozzle caps (fig. 8.70, item 3) and inspect the nozzle tips. If they are plugged or worn, clean or replace them.

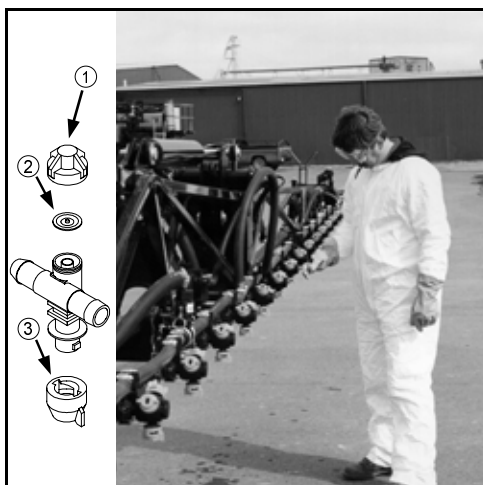


FIG 8.70

Nozzle Diaphragms

At the beginning of each spray season, remove each nozzle cap (fig. 8.70, item 1) and inspect the diaphragm for wear or fit (fig. 8.70, item 2). Replace if necessary. Refer to accompanying manual containing nozzle information.

Calibration

See pages 87-88, section six on spray system calibration.

Winter Storage

See page 128 on cold weather storage of spray system.

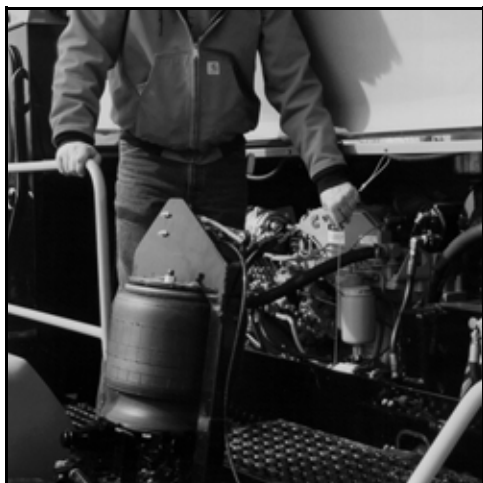


FIG 8.71

FOAM MARKER SYSTEM

Wet Tank

To prevent system condensation from contaminating the engine air compressor, remove moisture from the wet tank daily by pulling on its drain cord (fig. 8.71).

Winter Storage

See page 128 on storage of foamer system.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. SERVICE AND MAINTENANCE

TIRES



FIG 8.72

Air Pressure

Check tire pressure once a week or every 50 hours of operation (fig. 8.72). 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. 8.73).

NOTE:

Tire pressure will depend on load quantity and type in solution tanks. Refer to page 21 for tire specifications.



FIG 8.73

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 119 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 8.74 for best traction and tread cleaning action.

Toe-In

See pages 24 and 122 for information regarding toe-in measurement and adjustment.

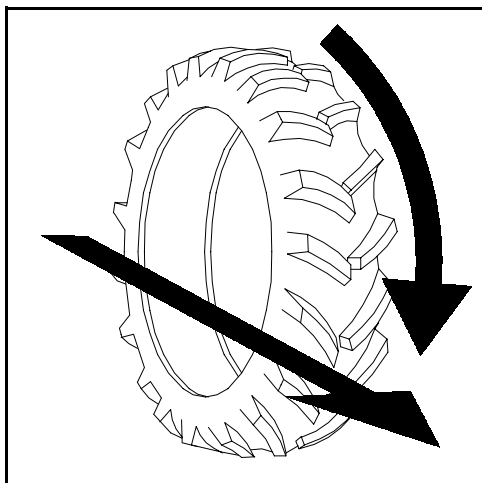


FIG 8.74

VIII. SERVICE AND MAINTENANCE

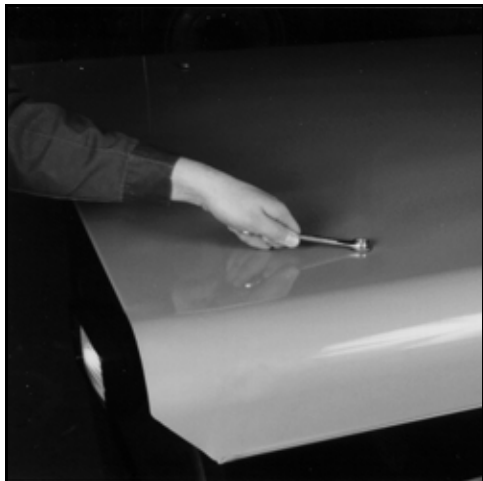


FIG 8.75

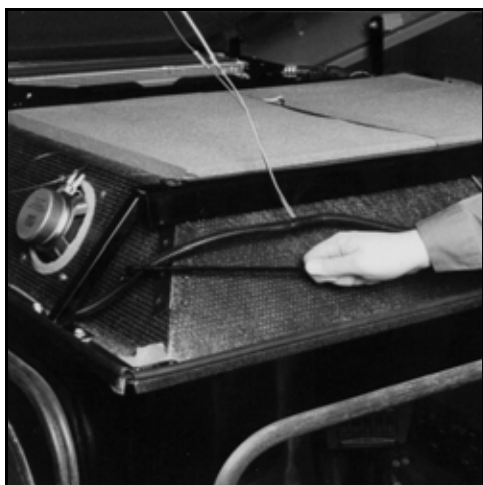


FIG 8.76



FIG 8.77

Roof Panel Access

To gain access under the roof panel, remove the four 3/8" bolts and rubber sealing washers (fig. 8.75). Lift the rear of the roof panel and locate the roof panel prop rod (fig. 8.76). Lift the prop rod and lower the roof panel to the prop rod. Insert the prop rod in the roof panel prop hole (fig. 8.77).

Service areas that can be accessed under the roof panel:

- A/C and heater blower
- A/C and heater hoses
- Radio memory fuse and in-line power fuse
- Speakers and speaker wiring
- Front roof-mounted field lights
- Rear roof-mounted work lights
- Headliner-mounted headlight/wiper/flasher control panel

When lowering the roof panel after servicing, take care not to pinch any wiring. When re-installing roof bolts, be sure sealing washers are in place to help maintain weather seal of cab roof.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

VIII. 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
Neutral setting of hydrostatic pumps	Adjust setting
Solution line strainer	Remove and clean
Visual inspection of leg mounting bolts	Tighten
Battery	Clean and/or tighten
Radiator grille screens	Remove and 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
Grease	
Upper and lower leg bearings	See page 108
Torque Hub® seal boots	See page 109
Drain	
Wet tank.....	See page 123
Fuel/water separator	See page 107

IX. 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 battery. 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 8-13 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

STORAGE CONTINUED →

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

IX. STORAGE

➔ STORAGE CONTINUED

11. Use a multi-purpose grease to coat exposed hydraulic cylinder rods to prevent rusting which could result in cylinder damage.
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 124 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 117.
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 eight on maintenance (pages 94-126), and perform all needed services as instructed.
8. For starting instructions, see pages 28-30 in section five on operating information.

NOTE:

See Warranty on page 137 concerning **improper storage**.

X. 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 Poor battery connections Neutral safety switch (located in the Sauer/Sundstrand pump) Starter or starter relay	Recharge or replace battery Clean and tighten Adjust and/or replace if needed Test; rebuild or replace
Engine won't start	Out of fuel Clogged fuel filters Cold weather Low starter speed	Fill fuel tank Replace fuel filters Refer to engine manual for cold weather starting information Check starter and battery

ENGINE CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

X. TROUBLE SHOOTING

➔ ENGINE CONTINUED


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

NOTE:

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

X. 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 tanks are not empty, add solution through the plugged tee on top of solution pump; solution pump is normally self-priming once filled
	Air leak in suction line	Inspect and tighten all fittings on suction line
	Solution valves turned off	Turn solution valves to open position, 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

SPRAY SYSTEM CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

X. TROUBLE SHOOTING

➔ SPRAYING SYSTEM CONTINUED


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 or valves 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	Blown fuse	Replace fuse
	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.

X. 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	<p>Engine speed too low</p> <p>Oil level in reservoir low</p> <p>Control linkage</p> <p>Clogged filter</p> <p>Hydrostatic pump not turning</p> <p>Faulty hydrostatic pump</p> <p>Air leak in suction line</p> <p>Low charge pressure</p>	<p>Set engine at operating RPM before trying to move machine</p> <p>Fill reservoir to proper level w/ approved oil; see section on Service and Maintenance</p> <p>Repair or replace</p> <p>Replace filter</p> <p>Check drive coupling</p> <p>Replace pump</p> <p>Inspect and tighten all fittings on suction line</p> <p>See section under charge pressure</p>
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 (Pages 32 & 33)

HYDROSTATIC SYSTEM CONTINUED →

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX


X. TROUBLE SHOOTING

➔ HYDROSTATIC SYSTEM CONTINUED

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

X. 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

- SAFETY/
DECALS
- SPRAYER
IDENTIFICATION
- SPECIFICATIONS
- PREPARING
TO OPERATE
- OPERATING
INFORMATION
- CALIBRATION
- TRANSPORTING
- SERVICE/
MAINTENANCE
- STORAGE
- TROUBLE
SHOOTING
- LIMITED
WARRANTY
- INDEX

X. 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 Poor battery connection Low charging rate No charging rate	Charge or replace Clean and tighten Tighten alternator belt Replace alternator
All gauges on instrument panel not working	Blown fuse Poor ground	Replace fuse Clean and tighten ground
Tachometer/MPH Indicator not working	Blown fuse Loose connections at sensor/alternator Faulty sensor	Replace fuse Tighten or replace connectors Replace sensor
Light system does not function	Blown fuse Poor ground Burned-out bulb Separation or short in wire Faulty switch	Replace fuse Clean and tighten ground Replace bulb Check continuity and replace wire Replace switch

XI. 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.

SAFETY/
DECALS

SPRAYER
IDENTIFICATION

SPECIFICATIONS

PREPARING
TO OPERATE

OPERATING
INFORMATION

CALIBRATION

TRANSPORTING

SERVICE/
MAINTENANCE

STORAGE

TROUBLE
SHOOTING

LIMITED
WARRANTY

INDEX

INDEX

	PAGE		PAGE
A		Boom	
Adjusting		Accumulator	47
Agitation Speed	63	Hosing Diagram	48
Boom Fold Cylinder Sleeve	27	Breakaways	
Cab Climate Controls	77	Inner	49
Fence Row Nozzle Angle	59	Outer	50
Foam Marker System Pressure	60	Cradling	45
Spray System Pressure	55	Lock Valve, Boom	46
Toe-In	122	Lubrication, Boom	111
Tread Adjust Shim Gap	121	Operation, Boom	
Tread Width		Fold	
Hydraulically	37	Horizontal	43
Manually	22	Vertical Extension	44
Air Conditioning System		Level	42
Belt	117	Lift	41
Cab Filters		Options, Boom	40
Fresh Air Intake	107	C	
Charcoal	107	Cab	75
Recirculation	107	Auxiliary Power Supplies	86
Charging System	102	Climate Controls	77
Climate Controls	77	Emergency Exit	76
Dryer	106	Filters	
Vents	77	Charcoal Filter	107
Agitation System		Fresh Air Intake Filter	107
Adjusting Hydraulic Flow Speed	63	Recirculation Filter	107
Operation	63	Seat Operation	82
Antifreeze	100	Storage, Cab	85
Attaching		Calibration	
Boom Options	27	Monitor	87
Lift Arm Assembly	25	Testing	88
Transom Assembly	26	Charcoal Filter, Cab	107
Auxiliary Hydraulic Gear Pumps	35	Charge Pressure Filter	105
Auxiliary Power Supplies		Cigarette Lighter-Type Power Supply	86
Binding Post	86	Circuit Breakers	114
Cigarette Lighter	86	Climate Controls, Cab	77
B		Cold Weather Starting	30
Battery		Cooling System	
Cleaning	113	Coolant	100
Charging Auxiliary Posts	113	Radiator Grille Screens	103
Service Access	112	E	
Belts		Electrical System	
Engine		Battery	
Removal	117	Cleaning	113
Inspection	117	Charging Auxiliary Posts	113
A/C Compressor	117	Service Access	112
Binding Post Power Supply	86	Circuit Breakers	114
Bolt Torque Values		Fuses	114
Leg Mounting Bolts	120	Relays	115
Wheel Lug Nuts	119		

INDEX

	PAGE		PAGE
Engine		G	
Cold Weather Starting	30	Gauges	
Fuel	101	Engine Oil Pressure	79
Filters	107	Filter Minder	104
Oil	98	Fuel Gauge	79
Operation	28	Hour Meter	79
Engine Oil Pressure Gauge	79	Speedometer	79
		Programming	80
F		Tachometer	79
Fence Row		Programming	80
L.E.D. Indicator	58	Volt Meter	79
Operation	58	Water Temperature	79
Nozzle Adjustment	59	Ground Speed Sensor, Spray System	53
Switch	58		
Valves	59	H	
Filter Minder®	104	High Pressure In-Line Filters	
Filters		Boom Control Stackvalve	106
Air Conditioning Dryer	106	Tread Adjust Stackvalve	106
Cab		Hour Meter	79
Charcoal Filter	107	Hydraulic Auxiliary Gear Pumps	35
Fresh Air Intake Filter	107	Hydraulic Tread Adjust	
Recirculation Filter	107	Bearings	109
Engine Air Intake Filter	104	Shim Adjustment	121
Fuel Filters	107	Operation	37
Hydraulic Charge Pressure Filter	105	Tread Width Indicators	38
Hydraulic High-Pressure In-Line Filters		Hydrostatic Drive System	
Boom Control Stackvalve	106	Charge Pressure	33
Tread Adjust Stackvalve	106	Displacement Limiters	32
Hydraulic Suction Filter	105	Loop Flushing Valve	33
Solution Line Strainer	106	Multi-Function Valves	33
Radiator Grille Screens	103	Operation	31
Fresh Air Intake Filter, Cab	107	Tandem Pumps	32
Flow Meter	53	Neutral Setting	118
Fluid Capacities	102	Service	118
Fluids			
Air Conditioning Charge	102	I	
Cooling System Coolant	100	Instrument Panel Gauges	79
Engine Oil	98		
Fuel	101	L	
Hydraulic Oil	98	L.E.D. Indicators	
Torque Hub® Oil	99	Boom Solution Valve	56
Windshield Washer	102	Fence Row Nozzle	58
Foam Marking System		Lift Arm Assembly	
Adjusting System Pressure	66	Lubricating	110
Draining Wet Tank	123	Mounting	25
Filling	67	Lights	
Foam Dropper	66	Field Lights	72
Operation	66	Switch	72
System Pressure Gauge	66	Hazard/Warning Lights	74
Wet Tank	123	Switch	74
Fuel Filters	107	Highway Lights	72
Fuel Gauge	79	Switch	72
Fuel Tank Selector Switch	78	Interior Lights	73
Fuses	14	Running Lights	74
		Turn Signal	74
		Lever	74
		Work Lights	73
		Switch	73

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

INDEX

	PAGE		PAGE
Lubrication			
Boom Hinge	111		
Breakaway	111		
Leg Bearings	108		
Torque Hub® Seal Boot	109		
Transom, Lift Arm, & Lift Cylinder Assembly	110		
Tread Adjust Bearing Slide Path	109		
Limited Warranty	137		
Lug Nuts	119		
		M	
Maintenance Schedule	94		
		O	
Operating Information	28-86		
Oil Pressure Gauge, Engine	79		
		P	
Parking Brake	34		
Parameters, Speedometer/Tachometer	80		
Preparing to Operate	22-27		
Pressure Washing System	71		
Pressure Gauges			
Foamer System Air Pressure	66		
Pressure Washing System Pressure	71		
Solution Spray System Pressure	55		
Programming			
Monitor	87		
Speedometer	80		
Tachometer	80		
Power Steering	39		
Pumps			
Auxiliary Gear Pumps	35		
Pressure Washing System Pump	71		
Solution Pump	39		
Tandem Hydrostatic Pumps	32		
		Q	
Quick Fill, Rear	62		
		R	
Radiator Grille Screens	103		
Radio	78		
Rear Fill	62		
Recirculation Filter, Cab	107		
Relays	116		
Rinse System			
Check Valve	69		
Operation	70		
Switch	70		
Tank	69		
Roof Panel Access	125		
		S	
Safety			
Chemical Handling Safety	7		
Driving Safety	4		
General Safety	7		
Operating Safety	5		
General Operating Safety	5		
Spray Boom Safety	5		
Tread Width Safety	5		
Repair/Maintenance Safety	6		
Fuel Safety	6		
General Repair Safety	6		
Hydraulic Safety	6		
Seat			
Comfort Controls	82		
Armrest Console	83		
Seal Boot, Torque Hub®	109		
Serial Number Location			
Engine	14		
Hydrostatic Pumps	15		
Sprayer	14		
Torque Hubs®			
Front	15		
Rear	15		
Wheel motors			
Front	15		
Rear	15		
Service/Maintenance	94-126		
Solution Line Strainer	106		
Solution Pump	39		
Solution Tank			
Lid Strainer	60		
Shutoffs			
Electric	61		
Operation	61		
Switches	61		
Valves	61		
Manual	61		
Valves	61		
Sight Gauge	60		
Specifications	16-21		
Speed Sensors			
Spray System Ground Speed	53		
Wheel Motor Sensor	80		
Speedometer	80		
Parameter Quick Reference Chart	81		

INDEX

	PAGE	PAGE
Spray Booms		
Accumulator.....	47	
Hosing Diagram.....	48	
Breakaways		
Inner.....	49	
Outer.....	50	
Cradling.....	45	
Lock Valve.....	46	
Operation		
Fold		
Horizontal.....	43	
Vertical Extension.....	44	
Level.....	41	
Lift.....	40	
Sprayer Dimensions	16	
Spray System		
Boom Solution Valves.....	56	
Flow Meter.....	53	
Ground Speed Sensor.....	53	
L.E.D. Indicators		
Boom Solution Valves.....	56	
Fence Row Nozzle.....	58	
Hydraulic Variable Flow Controls		
Monitor-controlled.....	54	
Manual.....	54	
Maintenance		
Nozzle Inspection		
Diaphragm.....	123	
Spray Tip.....	123	
Priming Solution Pump.....	123	
Monitor.....	53	
Operating Instruction.....	52	
Solution Pump		
Pressure.....	55	
Priming.....	123	
Switch.....	55	
Solution Switches		
Boom Solution Switches.....	56	
Main Solution Switch.....	57	
Solution Tanks.....	60	
Sight Gauge.....	60	
Shutoff Valves.....	61	
Steering		
Column Tilt.....	84	
Cylinder.....	39	
Power.....	39	
Storage		
Armrest Console.....	85	
Floor.....	85	
Suction Filter	105	
Switches		
Boom Operation Switches		
Fold		
Horizontal.....	43	
Vertical Extension.....	44	
Level.....	42	
Lift.....	41	
Electric Shutoff Switch, Solution Tank.....	61	
Fence Row Nozzle Switch.....	58	
Foam Marker Switch.....	66	
Fuel Selector Switch.....	78	
Hydraulic Tread Adjust Switches.....	37	
Light Switches		
Field Lights.....	72	
Hazard/Warning Lights.....	74	
Highway Lights.....	72	
Running Lights.....	74	
Turn Signal.....	74	
Work Lights.....	73	
Parking Brake Switch.....	34	
Rinse System Switch.....	70	
Solution Pump Switch.....	55	
Solution Switches		
Boom Switches.....	56	
Main Solution Switch.....	57	
Windshield Wiper/Washer Switch.....	78	
T		
Table of Contents	3	
Tachometer	80	
Parameter Quick Reference Chart.....	81	
Tandem Hydrostatic Pumps		
Core Exchange.....	118	
Filters.....	105	
Neutral Setting.....	118	
Tires		
Air Pressure.....	124	
Filling.....	124	
Mounting.....	124	
Specifications.....	21	
Toe-In		
Adjusting.....	122	
Checking.....	24	
Torque Hubs®		
Core Exchange.....	118	
Disengaging.....	92	
Oil Level.....	99	
Seal Boot Lubrication.....	109	
Torque Values		
Leg Mount Bolts.....	120	
Wheel Lug Nuts.....	119	

SAFETY/ DECALS
SPRAYER IDENTIFICATION
SPECIFICATIONS
PREPARING TO OPERATE
OPERATING INFORMATION
CALIBRATION
TRANSPORTING
SERVICE/ MAINTENANCE
STORAGE
TROUBLE SHOOTING
LIMITED WARRANTY
INDEX

INDEX

	PAGE		PAGE
Transom Assembly		Volt Meter	79
Lubricating	110		
Mounting	26	W	
Transporting Sprayer		Warning Decal Location	8-13
Driving	89	Warning Symbol Definitions	2
Trailing	90-91	Warranty	137
Loading	90	Water Temperature Gauge	79
Unloading	91	Wheel Lug Nuts	119
Towing	92-93	Wheel Motors	
Tread Width		Core Exchange	118
Adjusting		Speed Sensor	80
Hydraulically	37	Windshield Washer/Wiper	
Manually	22	Reservoir	102
Indicators	38	Switch	78
Trouble Shooting Guide	129-136	Winter Storage Directions	127-128
		V	
Valves			
Boom Solution Supply	56		
Solution Tank Shutoff	61		
Variable Flow Control			
Agitation	63		
Solution Pump	54		

NOTES
