

APACHETM

AS1000 & AS1200 Series

Owner's Manual



DO NOT OPERATE THIS EQUIPMENT UNTIL THIS MANUAL HAS BEEN READ AND UNDERSTOOD. ONLY PROPERLY TRAINED PERSONS SHOULD OPERATE THIS MACHINE.



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FORM # ~~000-000-000~~

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INTRODUCTION

Dear Valued Customer,

Congratulations on the purchase of your new Apache Sprayer and welcome to the Apache family of owners. We hope that your new sprayer exceeds your expectations and gives you years of satisfaction. We invite you to visit us at www.apachesprayer.com or in person at our plant in Mooresville, Indiana if you are in the area.

On behalf of all of our employees we thank you for your business.

Yours Faithfully,

Matthew F. Hays
Chief Executive Officer



INTRODUCTION



SPECIFICATIONS

	AS1000	AS1200
Tank Capacity	1000 gallons	1200 gallons
Engine	205 Cummins Tier II 625 ft-lb @ 1500 rpm	275 Cummins Tier II 730 ft-lb @ 1500 rpm
Transmission	Funk Powershift 6-speed, torque converted	Funk Powershift 6-speed, torque converted
Speeds	1st 0-6 mph 2nd 0-9 mph 3rd 0-11 mph 4th 0-15mph 5th 0-22 mph 6th 0-35 mph	
Brakes	Internal, wet disc self-adjusting	
Suspension	Front Axle: Center oscillation with independent hydraulic accumulation. Rear Axle: Patented hydraulic load suspension with compensating anti-sway control, self-adjusting for diminishing/increasing load.	
Crop Clearance	34", 42", 48"	48"
Axles	Narrow fixed: 88" to 90". 48" crop clearance only. Wide adjustable: 120" to 144" (Optional hydraulic adjust)	Wide adjustable: 120" to 144". (Optional hydraulic adjust)
Final Drive	Standard: Fairfield all gear drop box Optional: ITL/JCB planetary gear set	Fairfield all gear drop box
Cab	ET custom	ET custom
Weight	19,474 lbs. (approximate) Dry weight with poly tank.	20,170 lbs. (approximate) Dry weight with stainless steel tank.
Width	144" (12')	
Height	148"	
Length	23'	
Booms	60', 75', 80', 90', 100' 60/80, 60/90	
Boom Height	20" to 80" (48" crop clearance)	
Wheel Base	173" (14'5")	
Tires	Front: 380/80R38 Rear: 380/90R46	
Turning Radius	17'	
Fuel Capacity	100 gallons	
Product Pump	Ace 244 gpm, hydraulically driven centrifugal pump	

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Equipment Technologies Inc.	9-1
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SAFETY RULES

Safety Signals

Safety is a primary concern in the design and manufacturing of our products. Throughout this manual and on the machine potential hazards are identified by the “Safety Alert Symbol” followed by a “Signal Word” which indicates the degree of hazard. The three degrees of hazard are “Danger”, “Warning”, and “Caution”



“Danger” indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



“Warning” indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed.



“Caution” indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

Safety Rules

Training

Carefully read and understand this manual and all safety decals. If the manual or safety decals become damaged or misplaced, replacements may be obtained from your dealer or by calling (317) 834-4500.

Carefully read and understand all non-Apache Sprayer manufacturer instructions and manuals supplied with the Apache Sprayer. These include, but are not limited to the Engine Owner’s Manual, Sprayer Monitor System Manual, Radio Manual, Chemical Educator Manual, Product Pump Instructions, and other optional equipment.

Do not allow anyone to operate this equipment without proper instruction.

If you do not understand any part of this manual and need assistance, see your dealer.

Preparation

Check all hardware, tighten to torque chart specifications shown in the “Maintenance” section of this manual.

Check all hydraulic hoses and fittings for leaks and make sure they are in good working condition prior to starting the machine. Replace any worn or damaged fittings or hoses. Check hose, rout to prevent damage during machine operation.

Check tires for proper inflation pressure according to tire manufacturers recommendations.

Starting

Start engine only from operator’s seat, with transmission in neutral and the parking brake set.

Never start engine by shorting across starter terminals.

Seat Belt

Periodically inspect seat belt and seat belt mounting for damage. Inspect belt for cuts, frays, wear, discoloration, or abrasion. Replace any damaged parts (see your dealer).

Never operate equipment without seat belt properly installed.

SAFETY RULES

Operation

Reduce the chance of machine roll-over:

- Do not operate on steep slopes.
- Do not drive across a slope. Drive up and down slopes.
- Do not turn down a slope.
- Slow down when turning.
- Keep booms as close to the ground as possible.
- Drive slowly across rough ground.
- Do not operate on public roads or highways with product in the product tank.

Always come to a complete stop before reversing directions.

Do not fold or unfold booms near power lines.

Do not fold or unfold booms while moving.

Secure any loose items in cab. Items that are unsecured may cause injury in case of a vehicle roll-over.

Do not allow riders in the cab or on the Apache Sprayer.

Entanglement

Keep hands, feet, hair, and clothing away from all moving parts. Wear relatively tight and belted clothing while operating or repairing machine.

Protective Equipment

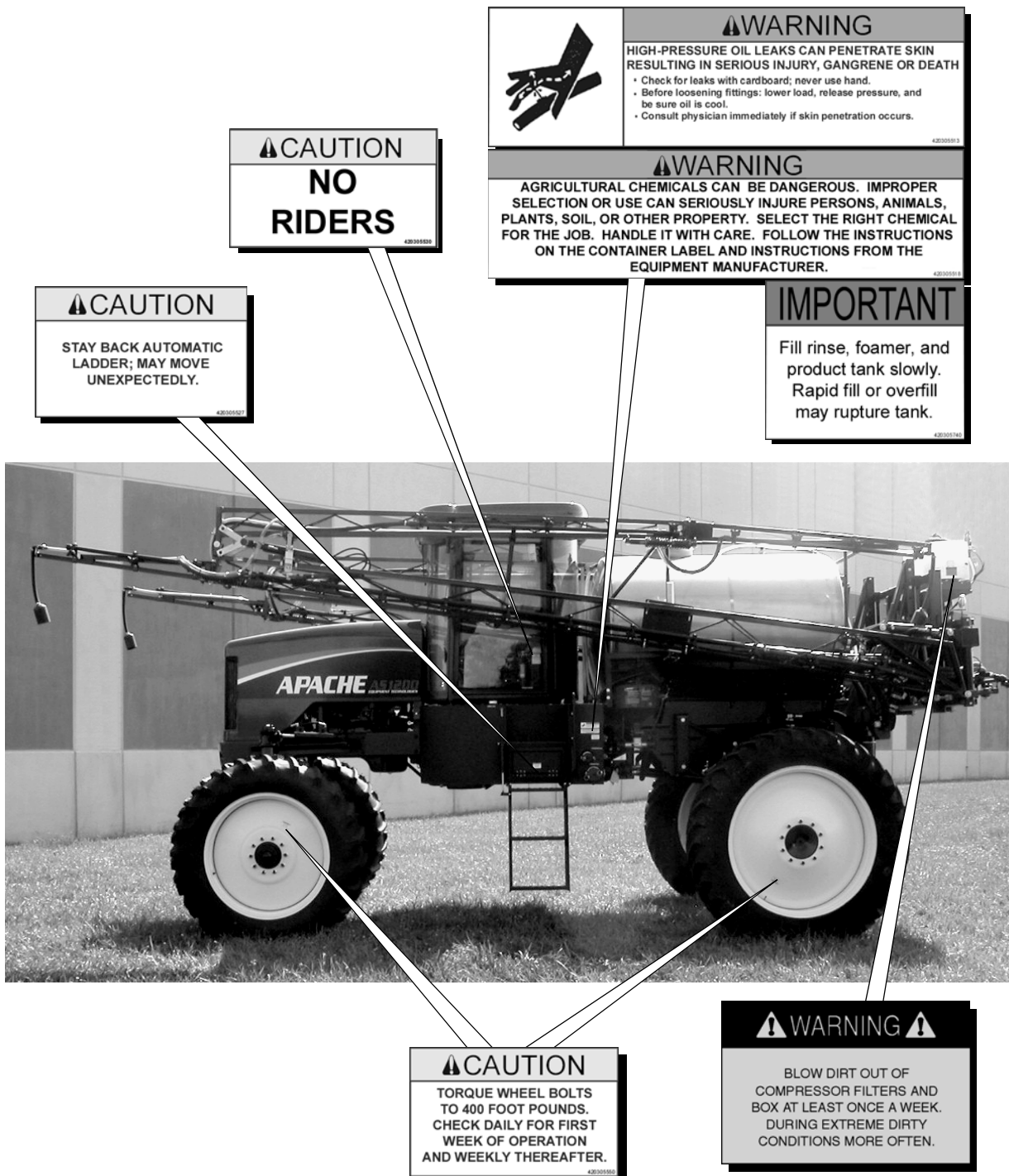
Always wear clothing appropriate to the job.

When handling chemicals wear long sleeves and pants, goggles, and gloves. If necessary wear a respirator when handling chemicals. Remove or clean contaminated clothing before entering the cab.

Always wear safety glasses when repairing machine.

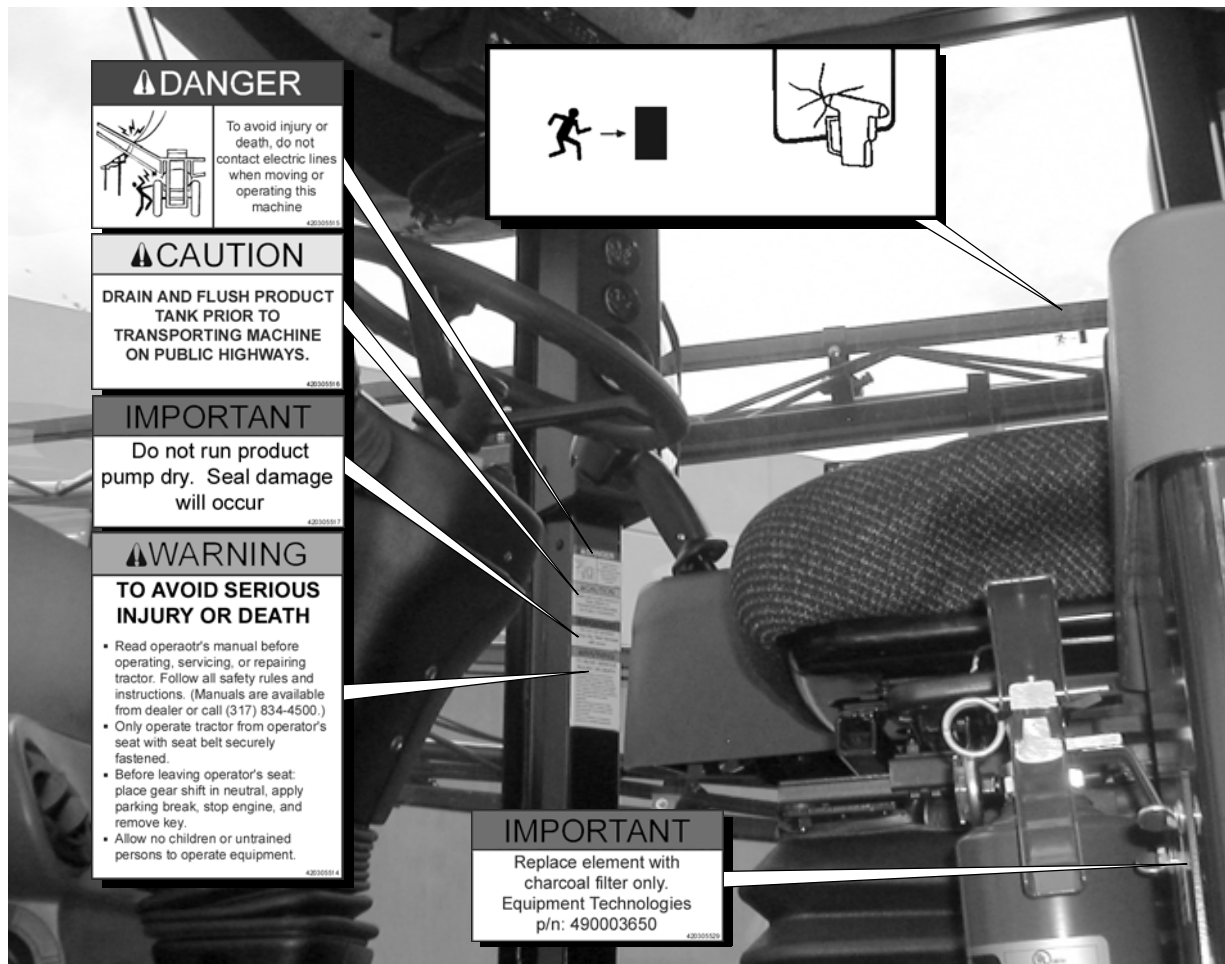
SAFETY DECALS

Left-Side Decals



SAFETY DECALS

Cab-Mounted Decals

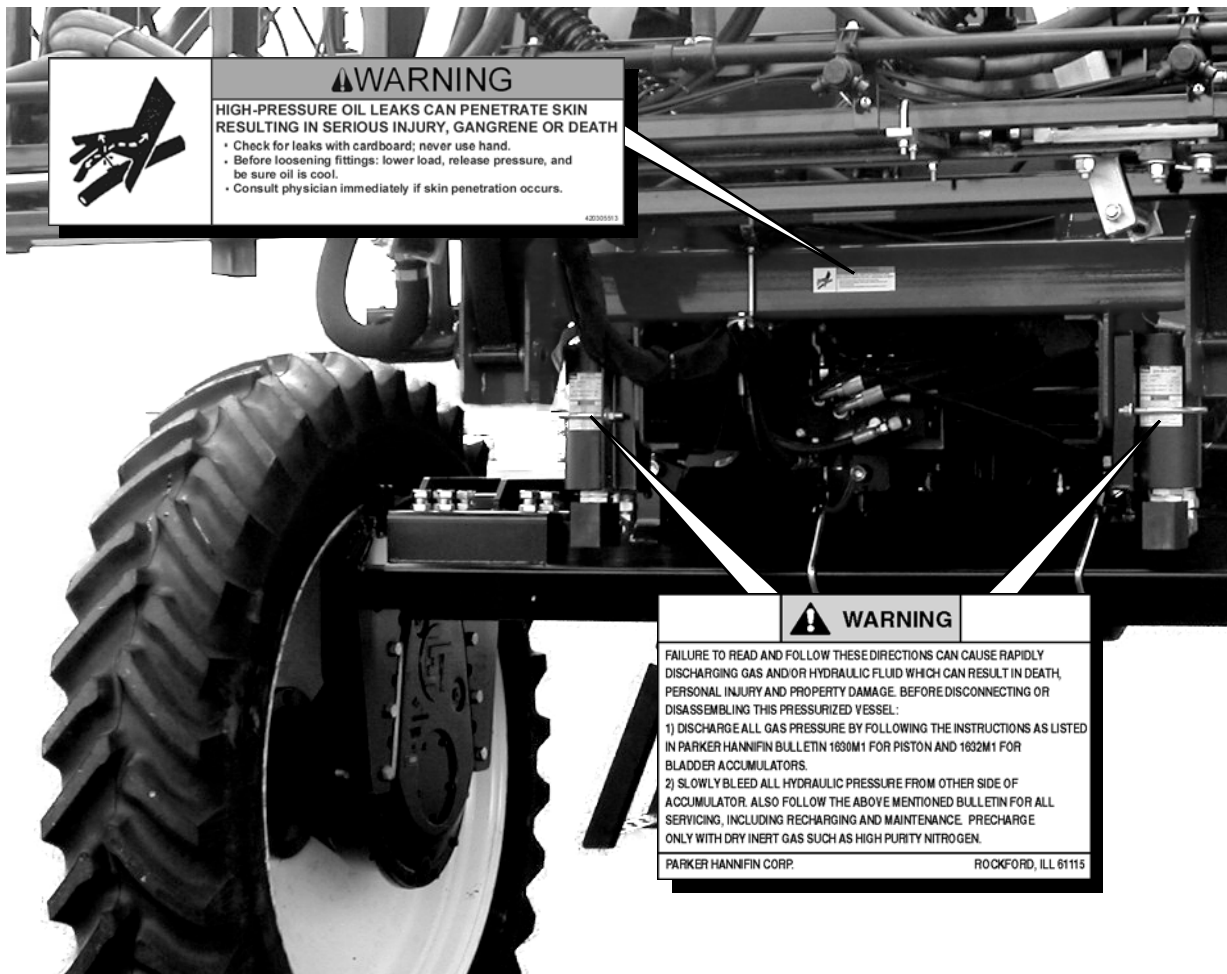


Engine-Mounted Decals



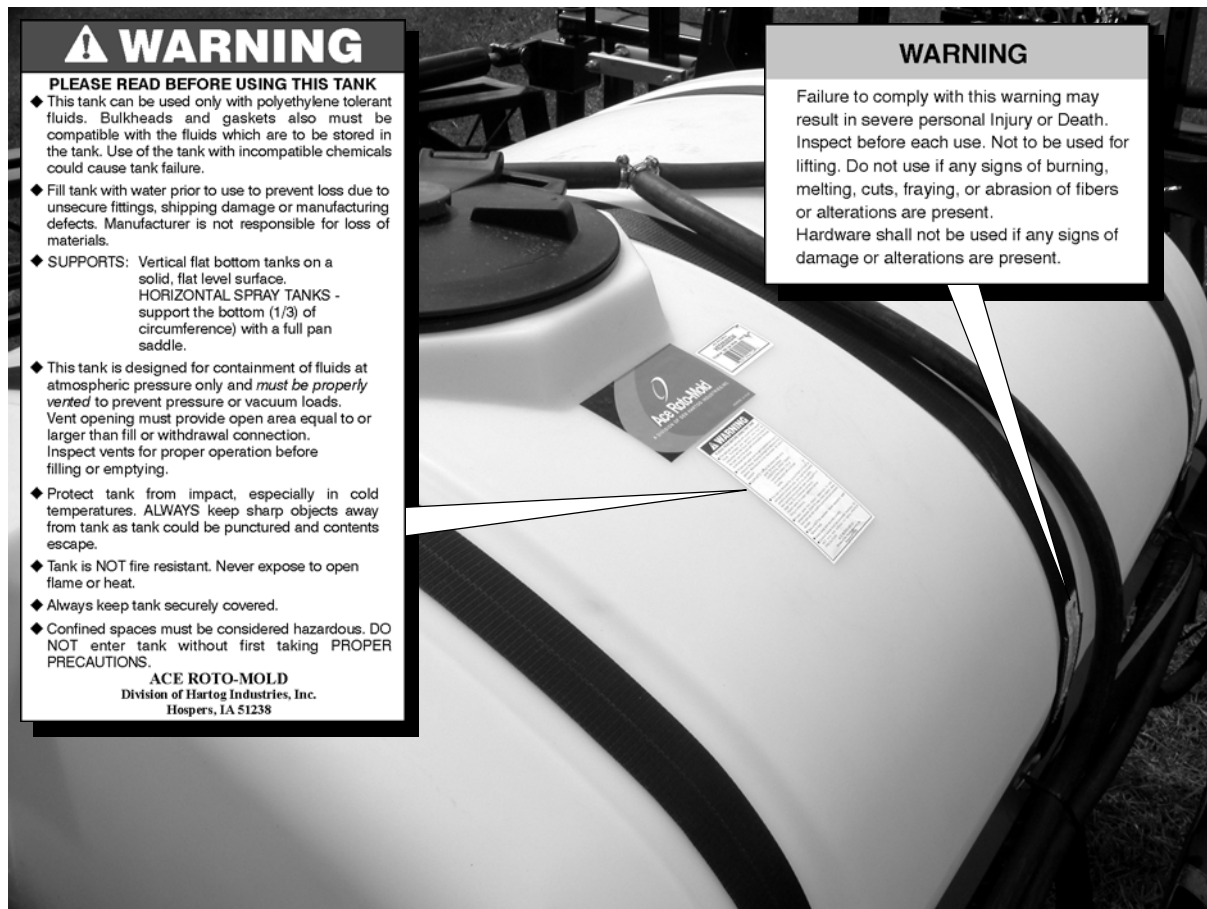
SAFETY DECALS

Chassis-Mounted Decals



SAFETY DECALS

Tank-Mounted Decals



VEHICLE OPERATION

General Guidelines

Carefully read and understand this manual and all safety decals. If the manual or safety decals become damaged or misplaced, replacements may be obtained from your dealer or by calling (317) 834-4500.

Do not allow anyone to operate this equipment without proper instruction.

If you do not understand any part of this manual and need assistance, see your dealer.

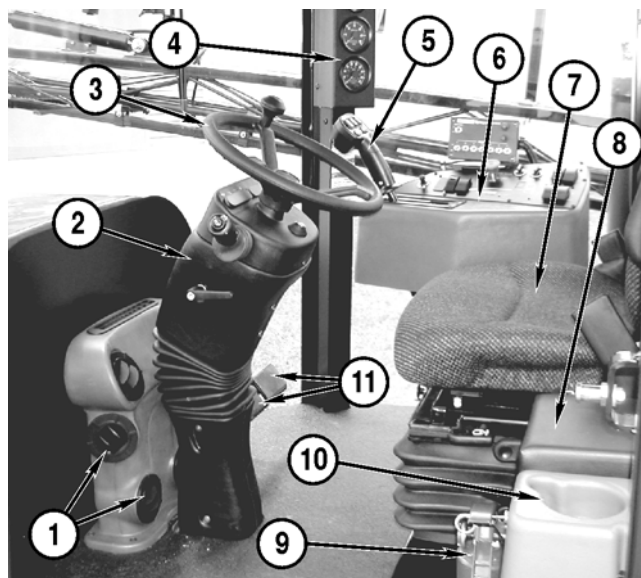
Pre-operation Check List

- Read and understand the owner's manual before operating the Apache Sprayer.
- Review and follow all safety rules and safety decal instruction. See "Safety Rules" and "Safety Decals" sections.
- Check that all safety decals are installed and in good condition. Replace if damaged.
- Check that all shields and guards are properly installed and in good working condition. Replace if damaged.
- Check that all hardware is properly installed and secured.
- Check area for bystanders and obstruction before operating.
- Check that all hydraulic hoses and fittings are in good condition and not leaking before starting tractor.
- Check that hoses are not twisted, sharply bent, kinked, frayed, or pulled tight and are not rubbing. Replace any damaged hoses immediately.
- Make sure seat belt is in good condition.
- Check tires for proper inflation pressure according to manufacturers suggestion (See "Service" section).
- Check oil level in engine prior to starting. Add oil as needed according to specifications on back cover of this manual. (See "Service" section).
- Check oil level in transmission. Add oil as needed according to specifications on back cover of this manual. (See "Service" section).
- Check oil level in differential, gearboxes, and/or planetaries prior to starting. Add oil as needed according to specifications on back cover of this manual. (See "Service" section).
- Check coolant level. Add coolant as needed according to specifications on back cover of this manual. (See "Service" section).
- Check hydraulic fluid level in tank (See "Service" section)

VEHICLE OPERATION

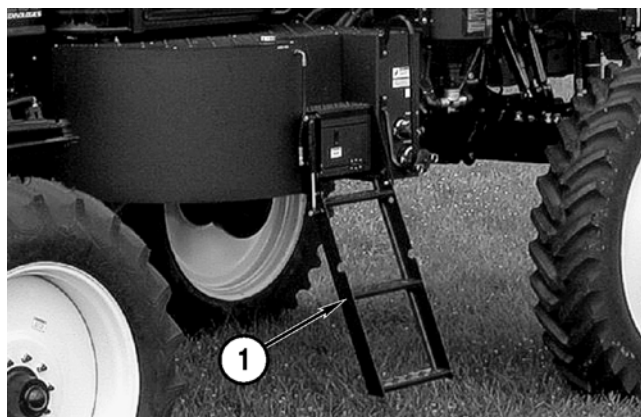
Cab Overview

1. Air vents
2. Steering Column
3. Steering Wheel
4. Gauges
5. T-Handle
6. Side Console
7. Air Seat
8. Padded Storage Unit
9. Fire Extinguisher
10. Cup Holder
11. Vehicle Brakes



Cab Access Ladder

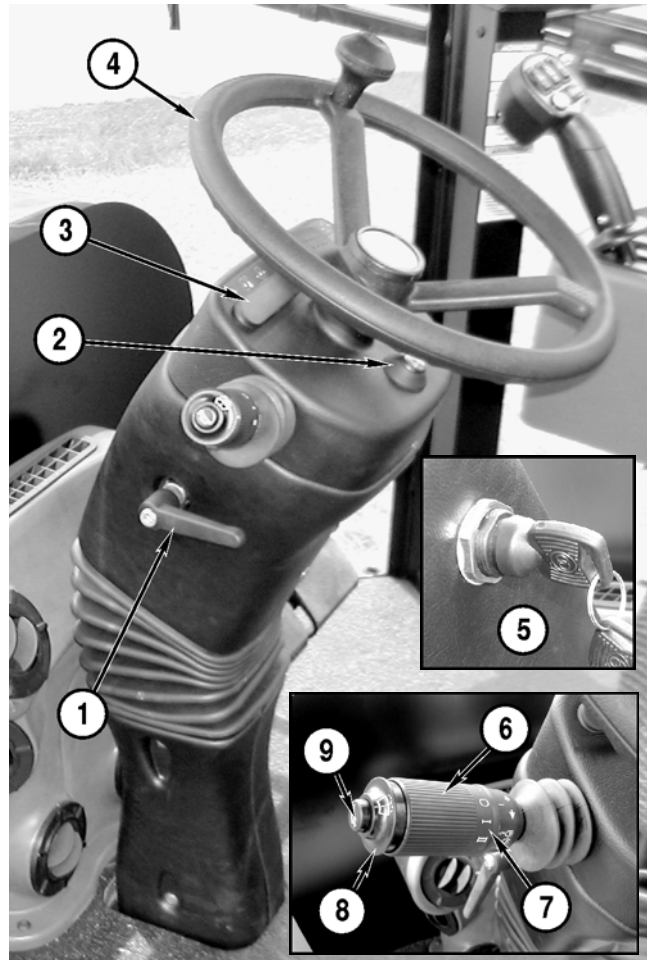
1. **Access Ladder**
The cab access ladder is automatically actuated by the parking brake switch. When the parking brake is applied, the ladder folds down. When the parking brake is released, the ladder folds up.



VEHICLE OPERATION

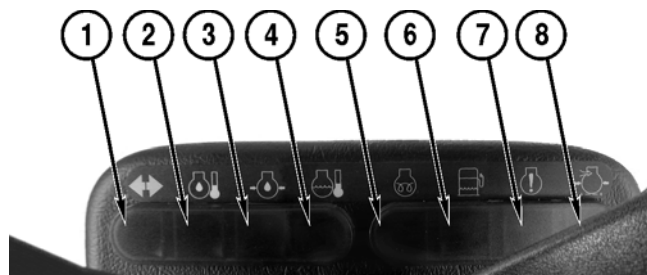
Steering Column

- 1. Adjustment Lever**
Turn the lever counter-clockwise to release the column. Set the tilt and telescope to the desired position. Turn the lever clockwise to lock the column.
- 2. Hazard Flasher Button**
- 3. Turn Signal Indicator and Warning Lamps**
Warning lamps are explained below.
- 4. Steering Wheel**
- 5. Key Switch**
Shown in "OFF" position. See Starting and Stopping the Engine for more details.
- 6. Turn Signal Lever**
Push lever up for right turn signal, push down for left turn signal.
- 7. Windshield Wiper Switch**
Turn lever to the "I" position for low speed wiper. Turn lever to the "II" position for high-speed wiper.
- 8. Windshield Washer**
Push ring to operate washer.
- 9. Horn Button**
Push to sound horn.



Steering Column Lamps:

- 1. Turn Signal Indicator**
Indicates a turn signal is flashing.
- 2. ~~Transmission Temperature~~**
~~Indicates the transmission temperature is not within normal operating range.~~
- 3. Engine Oil Pressure**
Indicates the engine oil pressure is not within normal operating range.
- 4. Engine Coolant Temperature**
Indicates the engine coolant temperature is not within normal operating range.
- 5. Wait-To-Start**
Indicates the operator should wait to start the engine when the key is first turned to the "ON" position. When the lamp is off, the engine is ready to start.

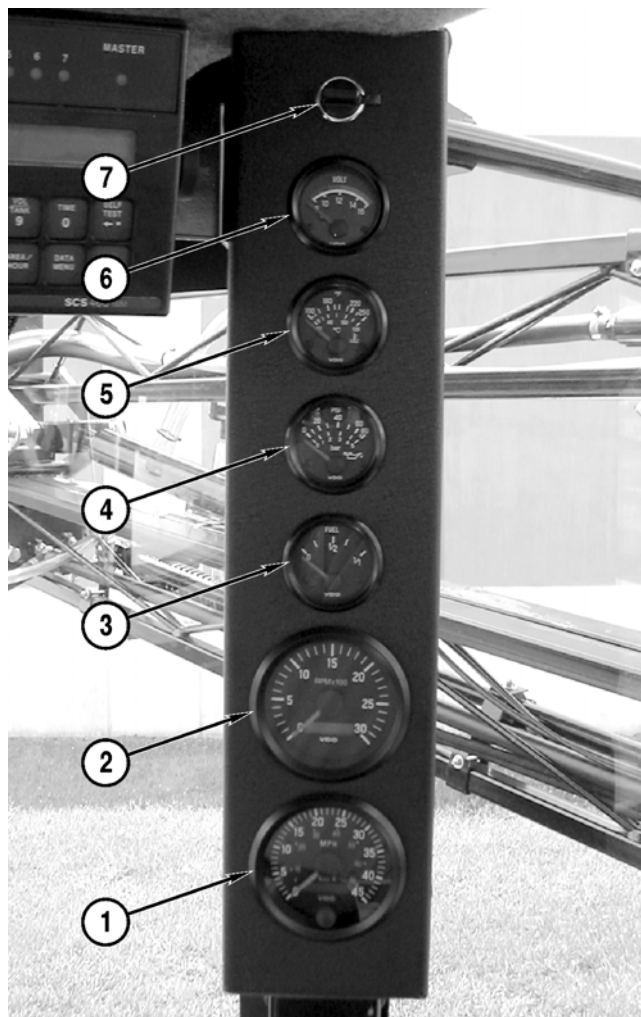


VEHICLE OPERATION

6. **Water-In-Fuel**
Indicates there is water in the fuel/water separator. See the Lubrication and Maintenance Section for details.
7. **Check Engine**
Indicates the engine requires service. See the engine manufacturer's instructions or contact your dealer.
8. **Air Filter**
Indicates the air filter requires service.

Gauges

1. **Speedometer**
Reads from sensor on the driveshaft. See calibration note below.
2. **Tachometer and Hour Meter**
Tachometer reads from alternator.
3. **Fuel Level**
4. **Engine Oil Pressure**
5. **Engine Coolant Temperature**
6. **Voltage Level**
7. **Auxiliary 12 Volt Power Outlet**

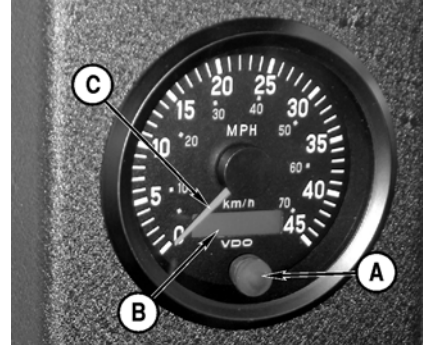


VEHICLE OPERATION

Speedometer Calibration

The speedometer is calibrated at the factory. A different size rear tire or varying tire pressure may require the speedometer to be recalibrated. Use the following steps to calibrate the speedometer:

1. Measure and mark a distance of exactly one mile on a straight road.
2. Press the black button (A), hold it in, and start the engine. Release the button when the display (B) reads, "AUTOCL".
3. After 3 seconds the display will read "BUTTON".
4. Push and release the black button (A). The display will read "START".
5. Drive the distance of one mile previously marked off.
NOTE: The speedometer will not register during calibration.
6. When one mile is driven push the button again. The speedometer is now calibrated.
7. When finished the needle (C) will rotate to 45 then back to zero.



T-Handle

1. T-Handle

Shown in neutral position. Place the handle into the left slot to move the vehicle forward. Place the handle into the right slot to move the vehicle in reverse. Push the handle forward to increase speed and pull back to decrease speed.

NOTE: Pulling the T-handle back does not apply the brakes.

2. Master Spray Switch

Press to turn all 5 spray sections "ON" or "OFF" at the same time.

3. Left Boom Tilt

Press to tilt the left boom up or down.

4. Boom Rack

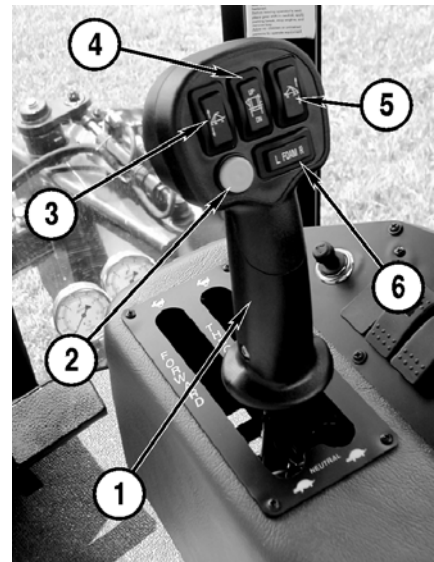
Press to move the boom rack up or down.

5. Right Boom Tilt

Press to tilt the right boom up or down.

6. Foam Marker Switch

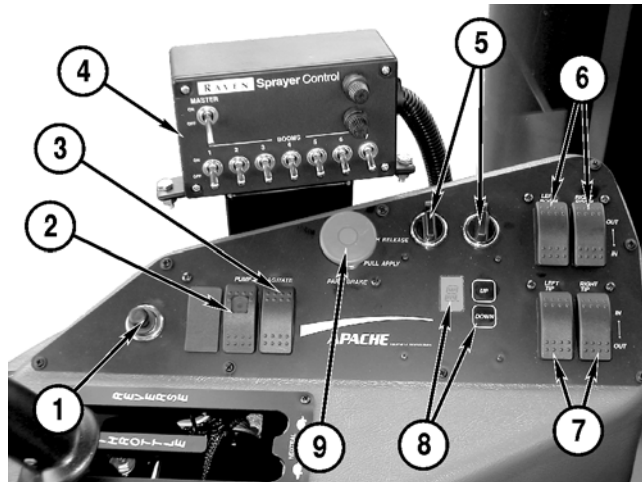
Press to drop foam on the left or right.



VEHICLE OPERATION

Side Console

1. **Cigarette lighter**
2. **Product Pump Switch**
See Wet System Operation for details.
3. **Agitate Switch**
See Wet System Operation for details.
4. **Raven Boom Section Switch Box**
See Wet System Operation for details.
5. **Auxiliary 12 Volt Power Outlets**
6. **Boom Fold Switch**
See Wet System Operation for details.
7. **Boom Tip Fold Switch**
See Wet System Operation for details.
8. **Transmission Shift Keys and LED Display**
The digital read-out shows the gear selected. Push the "UP" button to shift the transmission "UP". Push the "DOWN" button to shift the transmission "DOWN". The transmission can be shifted up or down on the go.
9. **Parking Brake Switch**
Pull the button to apply the brake and push the button to release the brake. The parking brake is spring applied and hydraulic release.
Applying the parking brake returns the transmission gear selector to neutral. The cab access ladder is also actuated by the brake switch. When the parking brake is applied the ladder automatically folds down. When the parking brake is released, the ladder automatically folds up.



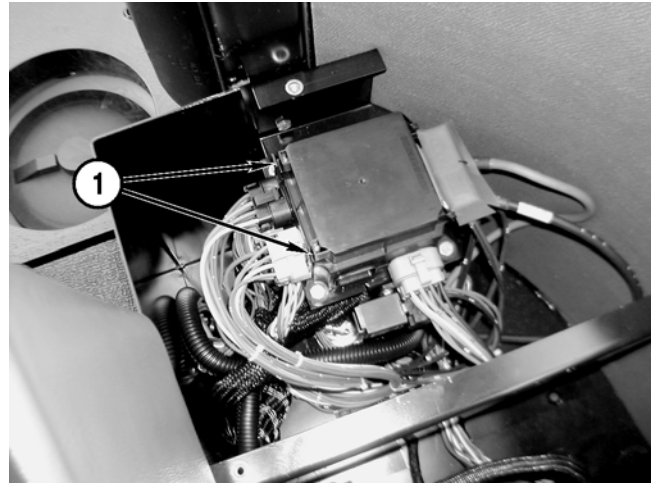
VEHICLE OPERATION

Fuse Block

The fuse block is located under a service cover inside the right, rear, of the cab. The cover is shown removed for clarity.

Remove the thumbscrews and cover to access the fuse block.

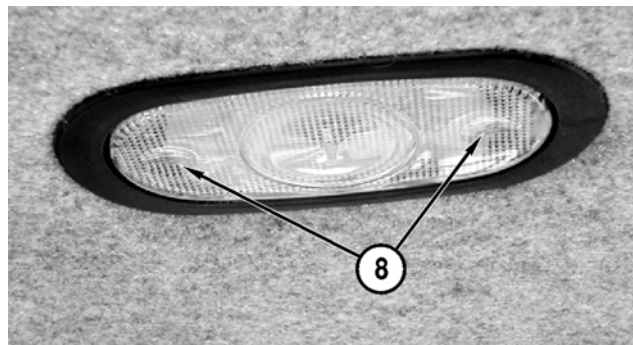
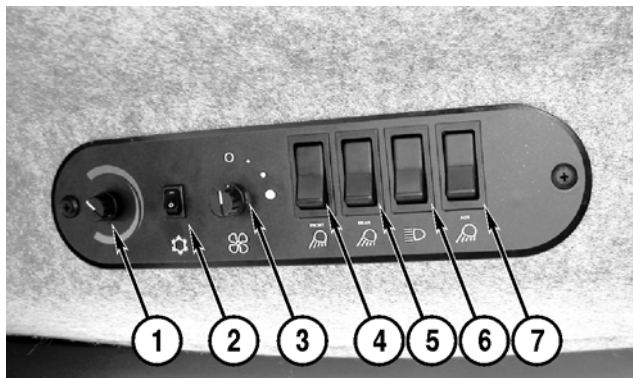
Press the two tabs (1) to access the fuses.



VEHICLE OPERATION

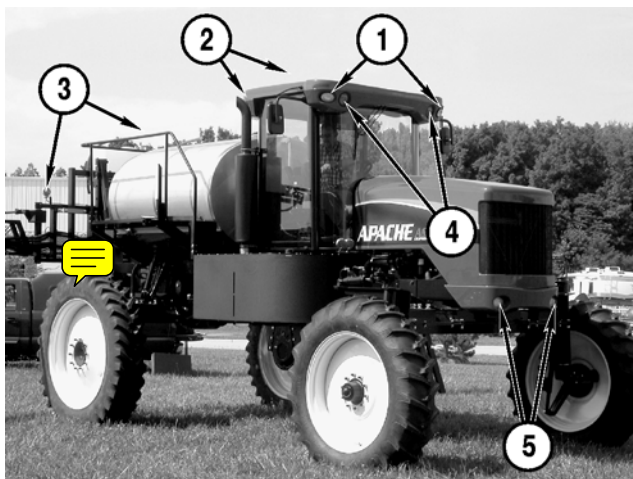
Climate Control and Light Switches

- 1. Cab Temperature Control**
Turn the switch toward blue (counter-clockwise) for cool. Turn the switch toward red (clockwise) for warm.
- 2. Air Conditioning Power Switch**
Press the switch up for "ON" and down for "OFF".
- 3. Blower Fan Control**
Turn the switch counter-clockwise for "OFF" and clockwise for "ON".
- 4. Cab Front Lights**
Press the switch up to turn "ON" and down to turn "OFF" the cab-mounted, front-facing, work lights.
- 5. Cab Rear Lights**
Press the switch up to turn "ON" and down to turn "OFF" the cab-mounted rear-facing, work lights.
- 6. Driving Lights**
Press the switch up to turn "ON" and down to turn "OFF" the bumper-mounted driving lights.
- 7. Future Field Lights**
Light switch for future use. The supplied power wire (#34, white) is bundled with the flasher wires on the boom rack.
- 8. Dome Light**
Press the dome light lens to turn the light on and off.
NOTE: The dome light can drain the battery if left on without the engine running.



Vehicle Lighting

- 1. Cab Front Work Lights**
- 2. Cab Rear Work Lights**
- 3. Rear Hazard and Turn Signal Lights**
- 4. Front Hazard and Turn Signal Lights**
- 5. Driving Lights**



VEHICLE OPERATION

AM/FM Radio with Weather Band

1. AM/FM Radio with Weather Band

See manufacturer instructions for operation.



Seat Adjustment

1. Height

Push the knob to raise the seat. Pull the knob to lower the seat.

2. Lateral Isolator

Lift to allow side-to-side movement of the seat. Press to lock-out movement.

3. Fore-Aft Position

Pull lever out to adjust seat forward or backward.

4. Lumbar

Turn knob counter-clockwise for more lumbar support. Turn knob clockwise for less lumbar support.

5. Backrest

Lift lever, position backrest, then release lever.

6. Fore-Aft Isolator

Lift to allow front-to-back movement of the seat. Press to lock-out movement.

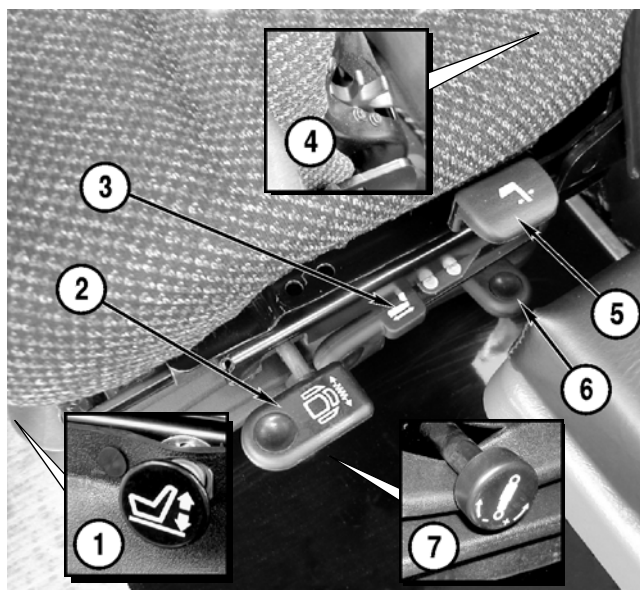
7. Ride Firmness

Turn knob counter-clockwise for firm ride. Turn knob clockwise for soft ride.

8. Armrest

Turn knob to adjust armrest angle.

9. Seat Belt



VEHICLE OPERATION

Starting and Stopping the Engine

Starting

WARNING

ALWAYS start the engine from the operator's seat with the T-handle (1) in the neutral position, the parking brake (2) applied, and seat belt fastened.

DO NOT attempt to start the engine by shorting across the starter terminals.



The key switch has 4 positions. Turn the key counter-clockwise as far as it will travel for the "OFF" position (1). The first position clockwise is the "ACC" position (2). The next position clockwise is the "ON" position (3). The last position clockwise is the "START" position (4).

Turn the keyswitch to the "ON" position and wait for the Wait-To-Start lamp on the steering column to go out.

Turn the key to the "START" position and crank the engine. When the engine starts, release the key.

IMPORTANT: DO NOT crank the engine for more than 30 seconds at a time. Damage to the starter can occur. Allow two minutes for the starter to cool before cranking again.

If the engine does not start after four attempts, see the Troubleshooting section in the Cummins engine service manual or contact your dealer.

IMPORTANT: If the engine stalls under load, immediately place the T-handle in neutral and restart the engine. Failure to do so can cause damage to the turbocharger.

After the engine is started, check all gauges for normal engine operation. If the gauges indicate a problem, stop the engine and determine the cause.

NOTE: A constant warning tone will sound when the T-handle is moved from the neutral position if the hydraulic fluid temperature is too high. If this warning tone is heard, stop the engine and determine the cause.



VEHICLE OPERATION

Warm-up

Check the engine oil pressure gauge as soon as the engine starts. If the oil pressure gauge does not reach the minimum pressure of 15 psi, stop the engine and determine the cause. Normal engine oil pressure is 50 psi when the engine oil is 240°F.



Check the engine coolant gauge. Normal operating temperature is 180°F. If the engine coolant rises above 234°F, reduce the load on the engine. If the coolant temperature does not drop, stop the engine and determine the cause.



Stopping

IMPORTANT: Before stopping an engine that has been operating under load, allow the engine to idle for 2 minutes to cool. Failure to do so can cause damage to the turbocharger.

Bring the vehicle to a complete stop. Place the T-handle (1) in the neutral position and apply the parking brake (2).

Turn the key to the "OFF" position and remove the key.



VEHICLE OPERATION

Vehicle Direction and Speed

IMPORTANT: DO NOT leave the operator's seat with the Apache Sprayer in gear. Place the T-handle in neutral and apply the parking brake before exiting the cab.

IMPORTANT: ALWAYS bring the vehicle to a complete stop before changing directions. Place the T-handle in the neutral position and apply the vehicle brake before changing directions.

IMPORTANT: DO NOT place the T-handle in neutral while the vehicle is in motion. The transmission is only lubricated while in gear. "Coasting" will cause damage to the transmission.

Shifting Gears

The Apache Sprayer is equipped with a torque converter. This allows the Apache Sprayer to take off in any gear. Once the vehicle is moving, you may up shift or down shift without returning the T-handle to the neutral position. The Apache Sprayer is equipped with a six forward gears. Be aware of speed ranges for each gear. Refer to the Gear Speed Range chart.

Gear Speed Ranges	
Gear	Speed (mph)
1st	0 to 6
2nd	0 to 9
3rd	0 to 11
4th	0 to 15
5th	0 to 22
6th	0 to 25

Upshifting: While the vehicle is in motion, simply push the transmission shift "UP" key one time for the next highest gear. Leave the T-handle in the forward position while performing this function. Push the "UP" key each time you want to up shift.

Downshifting: Pull the T-handle back slightly to reduce speed and engine rpm, apply the brakes slightly, then push the transmission shift "DOWN" key one time to down shift to the next gear. The transmission will downshift at this time. Repeat to continue to downshift.

NOTE: There is a one-second delay in the transmission shift selector.

Stopping

To stop the Apache Sprayer: Pull the T-handle back slightly, apply the vehicle brakes, and begin to downshift transmission with key pad. When completely stopped, place T-handle in neutral position and apply the parking brake.



VEHICLE OPERATION

Forward

To move the Apache Sprayer forward:

Apply the vehicle brakes and release the parking brake.

Push the transmission shift switch “UP” button once for first gear.

NOTE: The transmission will not shift if the parking brake is applied.

Move the T-handle left into the forward slot. As the T-handle is pushed forward, vehicle speed and engine rpm will increase. Push the T-handle forward until desired speed is reached.



Reverse

To move the Apache Sprayer in reverse:

Apply the vehicle brakes and release the parking brake.

NOTE: The transmission will not shift if the parking brake is applied.



~~NOTE: The Apache Sprayer has one reverse gear. Third gear is automatically selected when the T-handle is moved into the reverse slot.~~



~~Move the T-handle right into the reverse slot. The As the T-handle is pushed forward, vehicle speed and engine rpm will increase. Push the T-handle forward until desired speed is reached.~~

Towing

IMPORTANT: Towing a machine with driveshaft in place or with a damaged transmission may further damage the transmission.

IMPORTANT: DO NOT tow tractor if the rear differential has failed.

If the Apache Sprayer should become disabled and there is no engine, transmission, or differential failure, the vehicle may be towed for approximately 1 mile at speeds less than 3 mph. While towing the vehicle, the engine should be running at idle and the parking brake released.

If the Apache Sprayer should become disabled and the engine will not start, remove the drive shaft between the differential and the transmission. The vehicle may be towed up to 1 mile at speeds less than 3 mph.

Transmission Fluid Temperature Warning

~~The warning lamp on the steering column will come on~~ if the transmission fluid temperature is too high. If the warning lamp comes on, stop the vehicle immediately, shift the transmission to neutral and idle the engine at 900 to 1200 rpm. The transmission fluid temperature should drop and the lamp will go off. If the temperature does not drop, stop the engine and determine the cause.

NOTE: Overheating generally occurs when operating the transmission in too high a gear or when the transmission fluid level is too low or too high. Check transmission fluid level or shift to a lower gear.

Hydraulic Fluid Temperature Warning

~~A constant warning tone will sound~~ if the hydraulic fluid temperature is too high. If a warning tone sounds, stop the vehicle immediately, switch the product pump to the “OFF” position, shift the transmission to neutral, and idle engine at 1800 to 2000 rpm. The hydraulic fluid temperature should drop and the warning tone will stop. If the temperature does not drop, stop the engine and determine the cause.

NOTE: Overheating generally occurs when the hydraulic fluid level is too low.

VEHICLE OPERATION

Hood Release

IMPORTANT: Do not allow the engine compartment hood to swing open freely. Damage to the vehicle may result. Use the nylon strap under the hood to control the opening of the hood.

The engine compartment hood release is located on the front of the vehicle at the bottom of the grille.

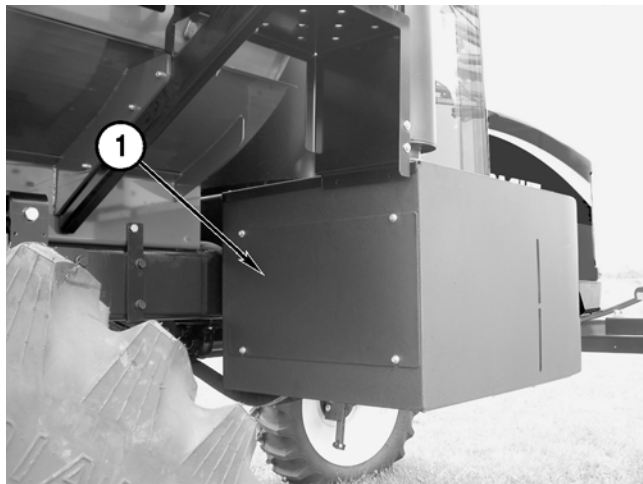
Pull the lever to release the hood. Use the nylon strap under the hood to control the opening of the hood.



Battery

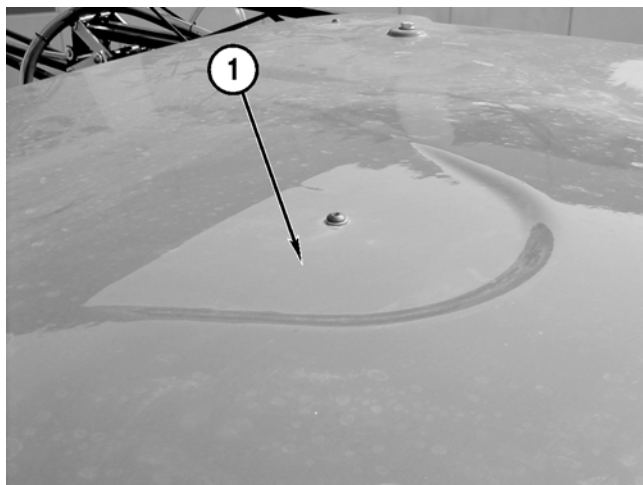
The battery is located in the battery box (1) on the right side of the vehicle.

Remove the four bolts and cover to access the battery.



Antenna Mounting Plate

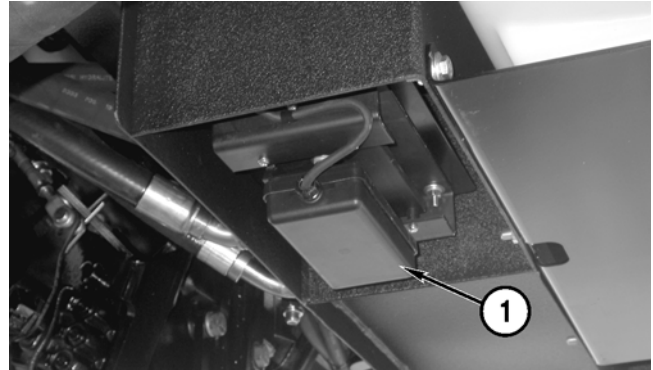
A steel plate is mounted under the recess in the roof of the cab (1) for magnetic base GPS and radio antennas.



VEHICLE OPERATION

Raven Radar Gun

The Raven radar gun is located on the right side of the vehicle, mounted under the battery box.



Axle Adjustment (Manual)

The front and rear axles on the Apache Sprayer are adjustable from 120" to 144" (center of left tire to center of right tire).

Front

Safely lift the front of the Apache Sprayer so the front tires are slightly off of the ground.

Remove the two inner bolts (1) from the locking bar.

Loosen the six jam nuts (2) and six bolts (3) on the axle brace. The right front axle is shown.

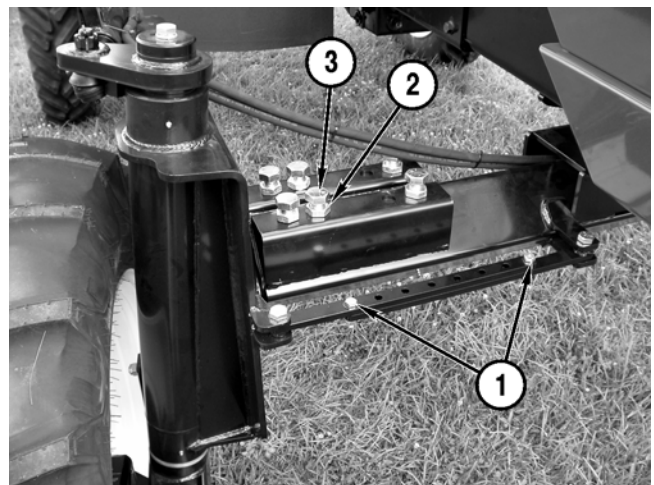
NOTE: Do not extend the axle beyond 144" from center of left tire to center of right tire.

Manually slide the wheel to the desired width, making sure the locking bar holes are aligned.

Tighten the six bolts (3) to 132 lb-ft [179 N•m] to secure the axle in place. Tighten the jam nuts (2).

Install the two locking bar bolts (1) and tighten.

Repeat the steps to adjust the other front axle.



VEHICLE OPERATION

Rear

Safely lift the rear of the Apache Sprayer so the rear tires are slightly off of the ground.

Remove the two inner bolts (1) from the locking bar.

Loosen the twelve jam nuts (2) and twelve bolts (3) on the two axle braces. The left rear axle is shown.

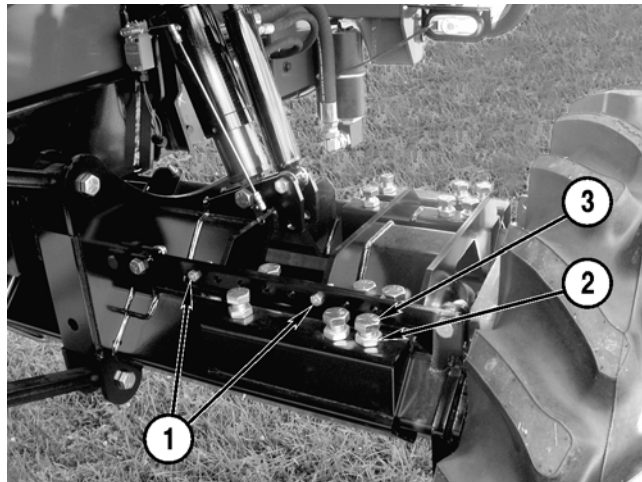
NOTE: Do not extend the axle beyond 144" from center of left tire to center of right tire.

Manually slide the wheel to the desired width, making sure the locking bar holes are aligned.

Tighten the twelve bolts (3) to 132 lb-ft [179 N•m] to secure the axle in place. Tighten the twelve jam nuts (2).

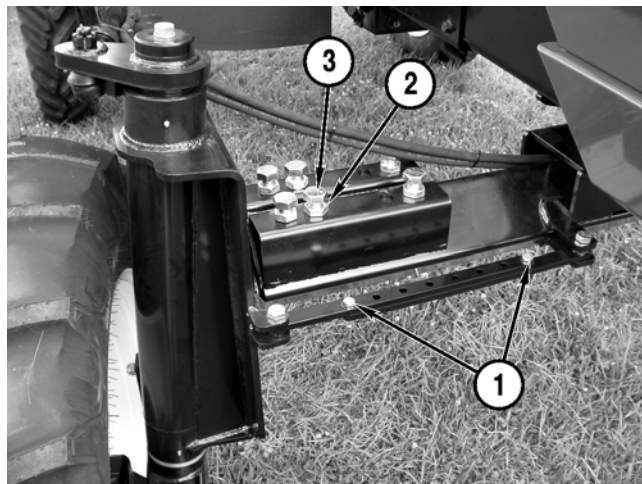
Install the two locking bar bolts (1) and tighten.

Repeat the steps to adjust the other rear axle.



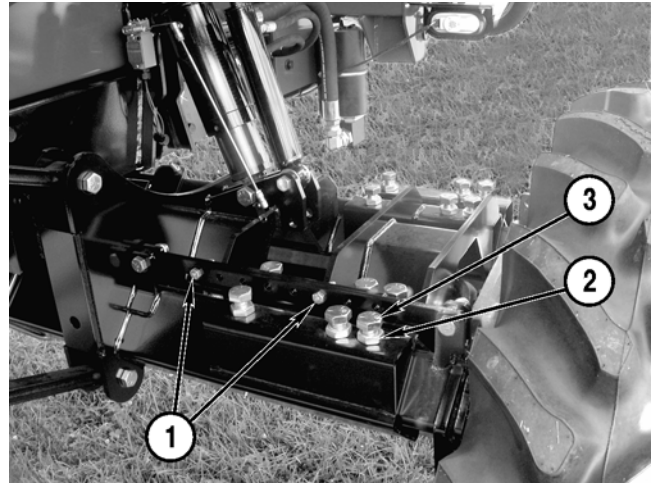
Axle Adjustment (On The Go)

Front



VEHICLE OPERATION

Rear

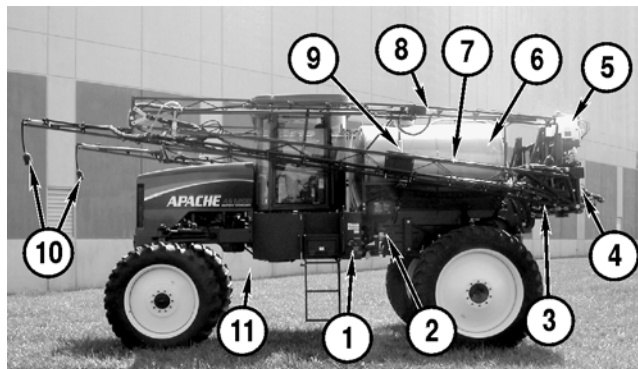


VEHICLE OPERATION

WET SYSTEM OPERATION

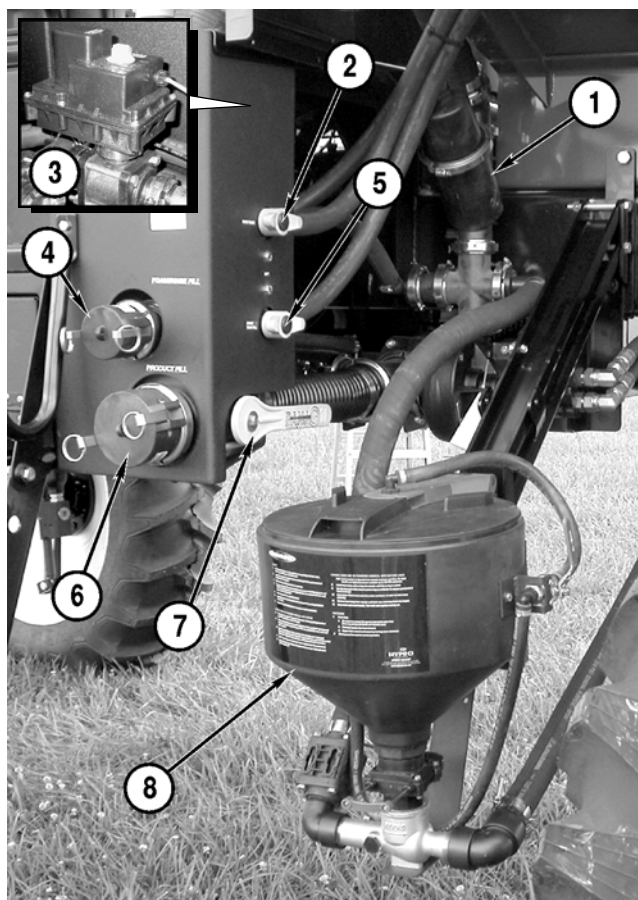
Wet System Overview

1. **Fill Station**
2. **Cleanload Chemical Eductor (optional)**
Shown in "UP" position.
3. **Flowmeter**
4. **Boom Rack**
5. **Foam Tank**
6. **Product Tank**
7. **Left Boom**
8. **Left Boom Tip**
9. **Boom cradle**
10. **Left and Right Foam Marker Nozzles**
11. **Rinse Tank (mounted on opposite side)**



Fill Station

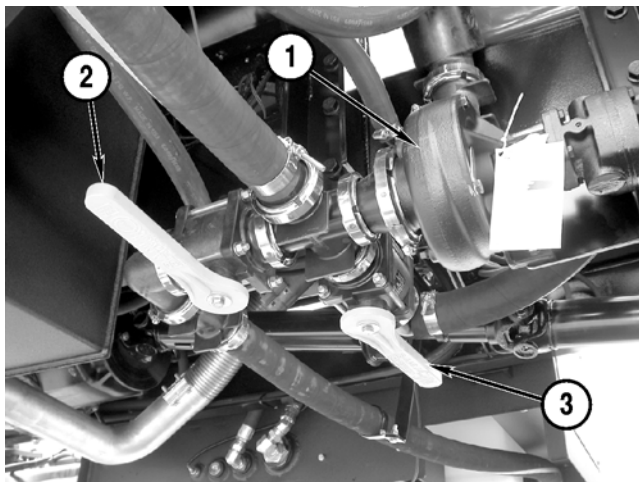
1. **Product Strainer**
100 mesh screen that filters product tank contents before entering the flowmeter and boom valves.
2. **Roto-Flush / Agitate Valve**
Shown in "AGITATE" position. Roto-Flush is optional on Apache Sprayers with poly tanks and standard on Apache Sprayers with stainless steel tanks.
3. **Agitation Valve**
This valve is electronically actuated and controlled by a switch on the side console in the cab.
4. **Foam / Rinse Tank Fill**
5. **Foam / Rinse Valve**
Shown in "RINSE TANK FILL" position.
6. **Product Tank Fill**
7. **Product Valve**
Shown in open position.
8. **Cleanload Chemical Eductor (optional)**
Shown in down position.



WET SYSTEM OPERATION

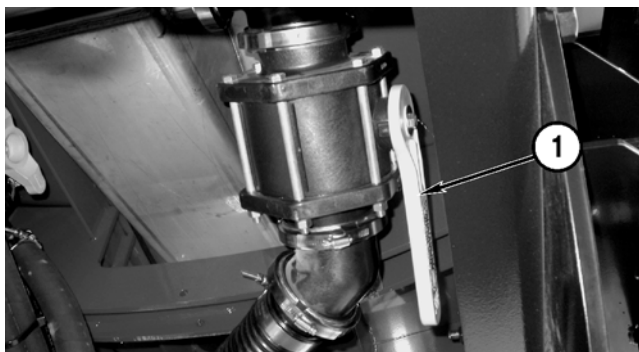
Product Pump and Valves

1. **Product Pump**
2. **Rinse Tank Shutoff Valve**
Shown in closed position.
3. **Product Tank Shutoff Valve**
Shown in open position.



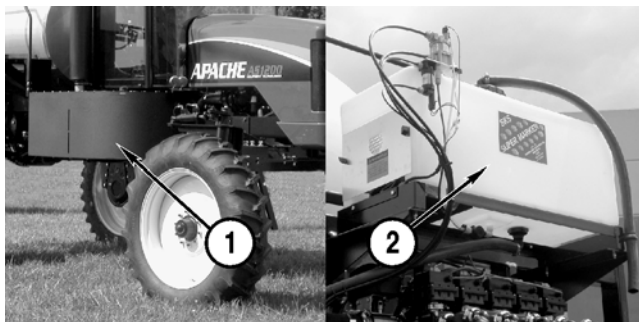
Sump Valve

1. **Product Tank Sump Valve**
Shown in the open position.



Rinse and Foam Tank


1. **Rinse Tank**
2. **Foam Tank**



WET SYSTEM OPERATION

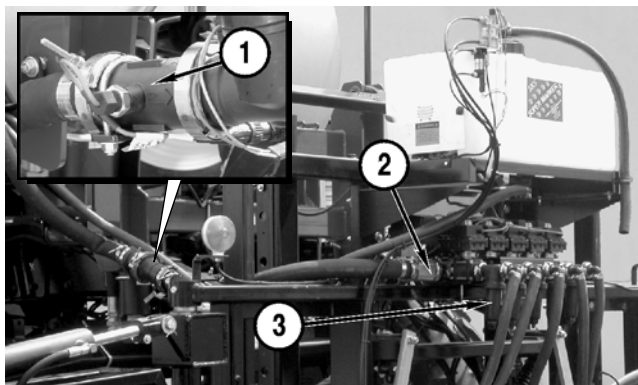
Flow Control

1. Raven Flowmeter

AS1000 & AS1200 v  high-flow plumbing. Location differs with application. Shown is AS1200.

2. Raven Servo Valve

3. Boom Section Strainers



Raven 460 Monitor

1. Raven 460 Monitor (optional)

On equipped Apache Sprayer models, the Raven 460 Monitor is located in the upper right front of the cab.

See the manufacturer's instructions, provided with the Apache Sprayer, for complete operating, calibration, and service information.

Monitor Calibration Information for the AS1000 and AS1200:

Valve cal - 2123

Speed cal - 615 (radar gun equipped)

Speed cal - 252 (drive shaft sensor)

Meter cal - See tag on the flow meter, located on the boom parallel arm at the rear of the vehicle. Record this number in a convenient location for future use.



NOTE: These are factory presets. All Raven controls must be calibrated before applying chemicals.

NOTE: The Raven radar gun, if equipped, is not factory calibrated. See the manufacturer's instructions, provided with the Apache Sprayer, for proper calibration.

WET SYSTEM OPERATION

Side Console

1. Cigarette lighter

2. Product Pump Switch

Turns the product pump “ON” and “OFF”. A light on the switch indicates when the pump is operating.

3. Agitate Switch

Push the top of the switch to increase agitation/reduce product pressure. Push the bottom of the switch to decrease agitation/increase product pressure.

4. Raven Boom Section Switch Box

Master switch located at upper left, two fuses on the upper right. Sections #1 through #5 go left to right on the boom. Sections #6 and #7 control optional fencerow nozzles. See “Spraying” on page 4-12.

5. Auxiliary Power Outlets

6. Boom Fold Switches

Folds the left and right boom “IN” and “OUT”. Push the bottom of the switch to fold “IN” and the top of the switch to fold “OUT”.

7. Boom Tip Fold Switches

Folds the left and right boom tip “IN” and “OUT”. Push the top of the switch to fold “IN” and the bottom of the switch to fold “OUT”.

8. Transmission Shifter

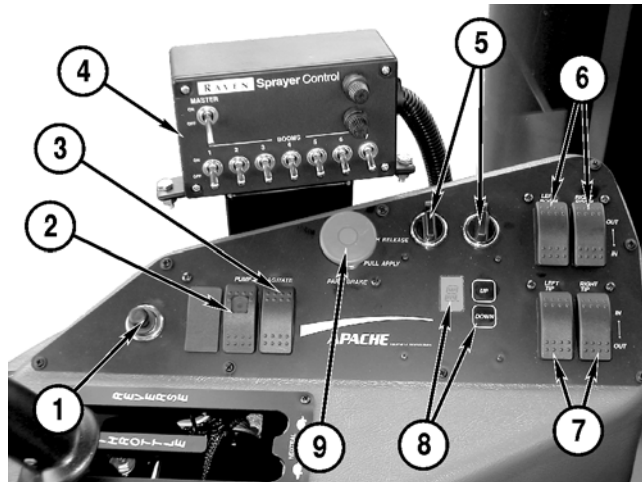
The digital read-out shows the gear selected. Push the “UP” key to shift the transmission up one gear. Push the “DOWN” button to shift the transmission down one gear. The transmission can be shifted up or down on the go.

9. Parking Brake Switch

The park brake is spring applied and hydraulic release.

When the parking brake is applied the ladder is “DOWN”. When the parking brake is released, the ladder is “UP”.

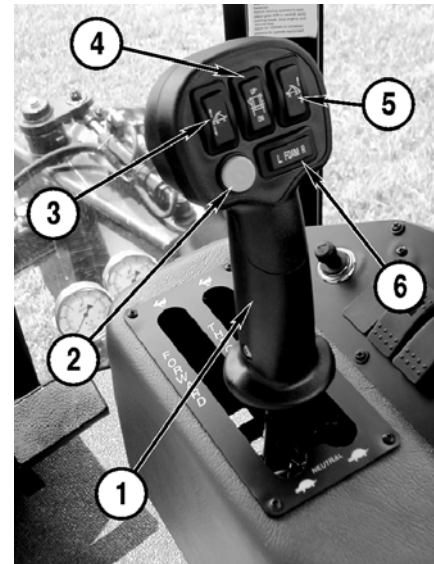
~~When the parking brake is applied, the transmission gear selector returns to neutral.~~



WET SYSTEM OPERATION

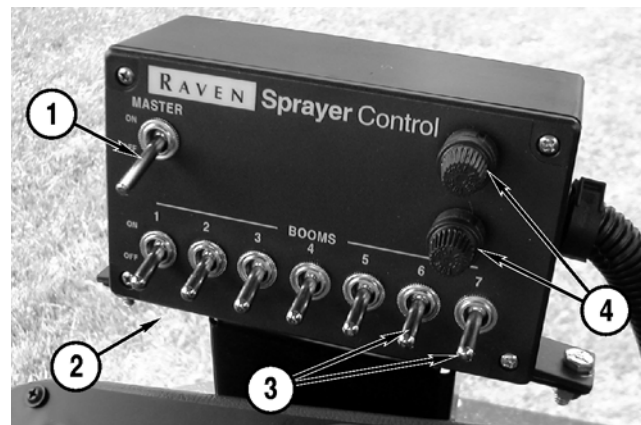
T-Handle

1. **T-Handle**
Shown in neutral position.
2. **Master Spray Switch**
Press to turn all 5 spray sections on or off at the same time. This function requires the Raven Controller, the Raven Switch Box Master, and the individual boom sections to be in the "ON" position.
3. **Left Boom Tilt**
Press to tilt the left boom up or down. Press the top of the switch to move up and press the bottom of the switch to move down.
4. **Boom Rack**
Press to move the boom rack up or down. Press the top of the switch to move up and press the bottom of the switch to move down.
5. **Right Boom Tilt**
Press to tilt the right boom up or down. Press the top of the switch to move up and press the bottom of the switch to move down.
6. **Foam Marker Switch**
Press to drop foam on the left or right. Return the switch to the center position to turn the foam off.



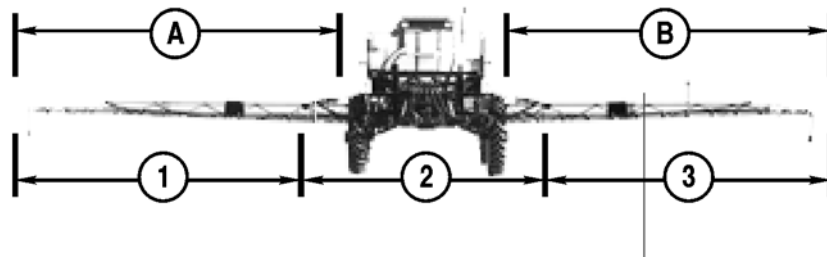
Raven Sprayer Control

1. **Master Switch**
2. **Boom Sections #1 through #5**
Controls sprayer function of each boom section, numbered left to right, on the vehicle. Refer to the following graphics for boom configuration.
3. **Boom Sections #6 and #7 (optional)**
Controls function of optional fencerow nozzles.
4. **Fuses**



WET SYSTEM OPERATION

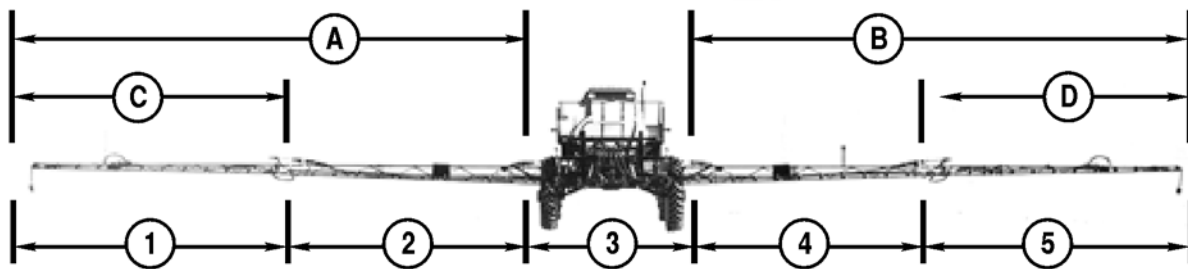
60' Boom



- 1. Sprayer Section 1
- 2. Sprayer Section 2
- 3. Sprayer Section 3

- A. Left Boom
- B. Right Boom

80' and 90' Boom



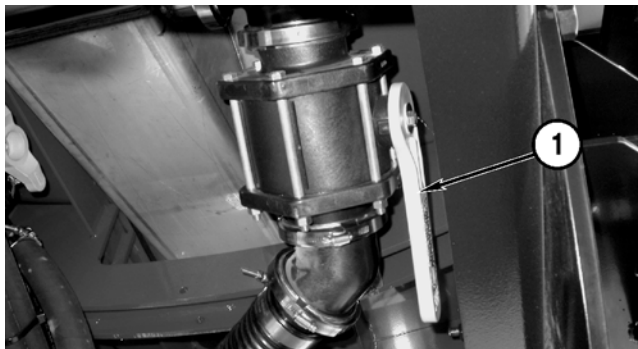
- 1. Sprayer Section 1
- 2. Sprayer Section 2
- 3. Sprayer Section 3
- 4. Sprayer Section 4
- 5. Sprayer Section 5

- A. Left Boom
- B. Right Boom
- C. Left Boom Tip
- D. Right Boom Tip

WET SYSTEM OPERATION

Filling Product Tank

Open the sump valve (1) on the underside of the product tank.



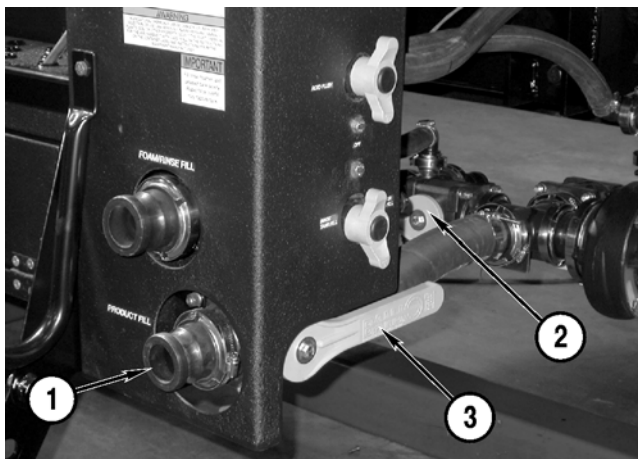
Remove the cap from the product fill inlet (1) and connect the hose from the nurse tank to the inlet.

Close the rinse tank valve (2).

Open the product fill valve (3), shown in the "OPEN" position, and fill tank to desired level.

When filling is complete, close the valve on the nurse tank, then close the product fill valve.

Disconnect the hose from the inlet and install the inlet cap.



Filling Rinse Tank

Remove the cap from the foam / rinse fill inlet (1) and connect the hose from the nurse tank to the inlet.

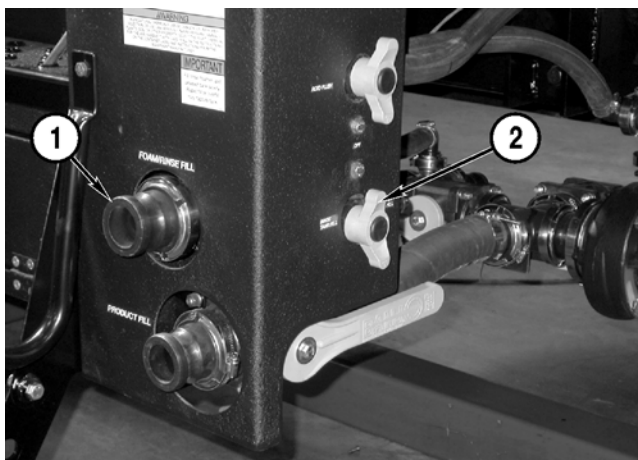
Set the foam / rinse knob (2), shown in the "CLOSED" position, to "RINSE TANK FILL".

IMPORTANT: Fill the tank slowly. Rapid filling or overfilling may rupture the tank.

Open the valve on the nurse tank and fill to desired level.

When filling is complete, close the valve on the nurse tank, then set the foam / rinse knob (2) to "CLOSED" position.

Disconnect the hose from the inlet and install the inlet cap.



WET SYSTEM OPERATION

Filling Foam Tank

Remove the cap from the foam / rinse fill inlet (1) and connect the hose from the nurse tank to the inlet.

Set the foam / rinse knob (2), shown in the “CLOSED” position, to “FOAMER TANK FILL”.

IMPORTANT: Fill the tank slowly. Rapid filling or overfilling may rupture the tank.

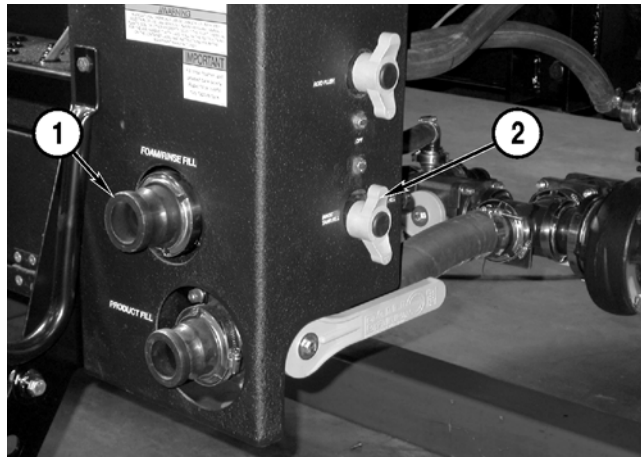
Open the valve on the nurse tank and fill to desired level.

When filling is complete, close the valve on the nurse tank, then set the foam / rinse knob (2) to “CLOSED”.

Disconnect the hose from the inlet and install the inlet cap.

Remove the lid on top of the foam tank, add the appropriate amount of foam concentrate, and install the lid.

Hard water and temperature can affect the consistency of the foam. If the foam is watery or there are air bubbles in the line, use more concentrate. If the foam is too stiff, use less concentrate. See “SKS Foam Marker Troubleshooting” on page 7-4.



WET SYSTEM OPERATION

Operating Booms

IMPORTANT: Do not fold or unfold the booms near power lines.

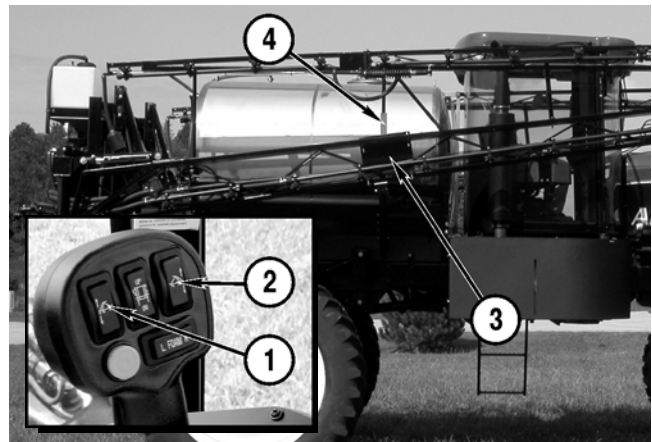
NOTE: Never fold or unfold the booms while the vehicle is moving.

NOTE: The operation of the 100' booms is different than the operation of the 60', 80', and 90' booms. Follow the instructions for your application.

Tilt to Remove Boom from Cradle

All Boom Sizes

On the T-handle, press the top of the left (1) and right (2) boom tilt raise/lower switches to tilt the boom/boom hangers (3) off of the boom cradles (4).



Unfold Booms

IMPORTANT: Do not fold or unfold the booms near power lines.

NOTE: Never fold or unfold the booms while the vehicle is moving.

NOTE: The boom hangers must be tilted off of the boom cradles before they can be unfolded.

60', 80', and 90' Booms

On the side console, press the top of the left and right boom fold switches (1) until the booms are fully extended. After the booms are fully extended, the boom tips can be unfolded.



100' Booms Only

On the side console, press the top of the left and right boom fold switches (1) until the booms are extended to approximately 45 degrees from the vehicle.

Unfold the boom tips before fully unfolding the booms. See "Unfold Boom Tips" on page 4-10.

Once the boom tips are extended, unfold the booms to fully extended.

WET SYSTEM OPERATION

Unfold Boom Tips

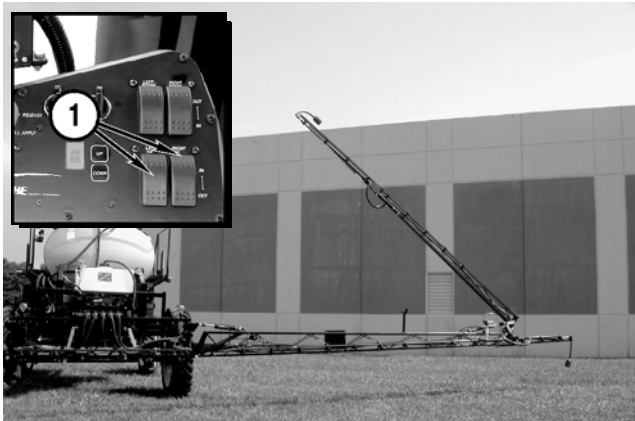
All Boom Sizes

NOTE: The booms must be unfolded before the boom tips can be extended. The cab can be damaged if the booms are not unfolded properly.

On the side console, press the bottom of the left and right boom tip fold switches (1) until the boom tips are fully extended.

100' Booms Only

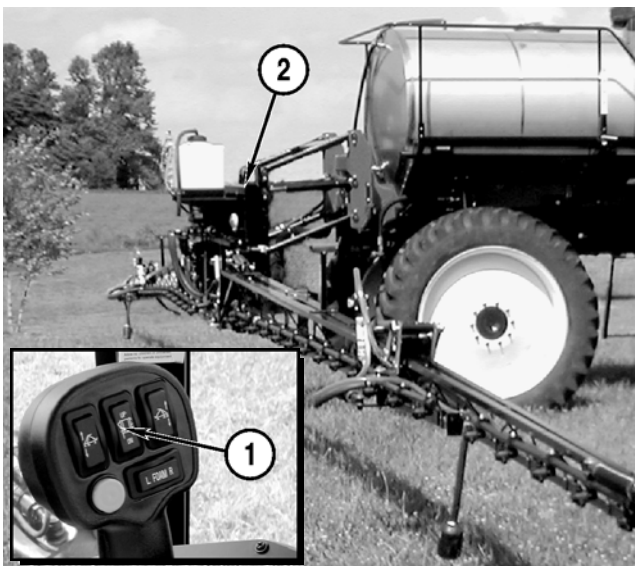
Once the boom tips are extended, unfold the booms to fully extended. See “Unfold Booms” on page 4-9.



Height Adjustment

All Boom Sizes

On the T-handle, press the bottom of the boom rack raise/lower switch (1) to lower the boom rack (2) to the desired height. Press the top of the switch to raise the boom rack.

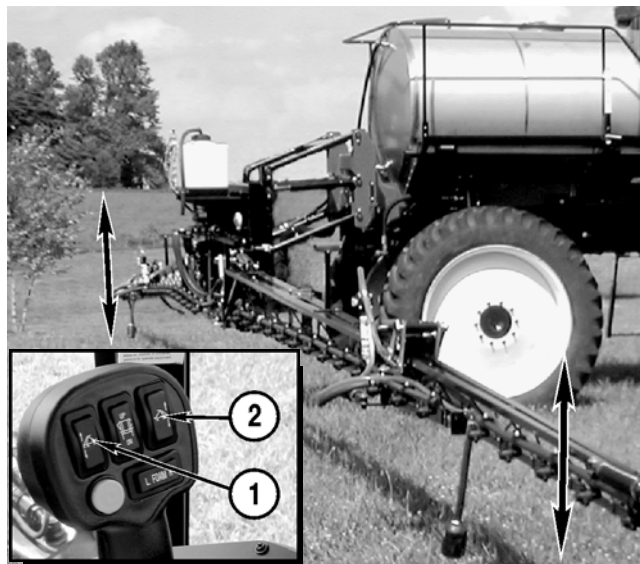


WET SYSTEM OPERATION

Tilt to Level Boom

All Boom Sizes

On the T-handle, use the left (1) and/or right (2) boom tilt raise/lower switches to adjust the booms to level. Press the top of the switches to tilt the boom up and the bottom of the switches to tilt the boom down.



Fold Boom Tips

All Boom Sizes

On the side console, press the bottom of the left and right boom tip fold switches (1) until the boom tips are fully folded. After the boom tips are fully folded, the booms can be folded.

100' Booms Only

Before the boom tips can be folded, the booms must be folded to approximately 45 degrees from the vehicle. See "Fold Booms" on page 4-11.

Once the booms are folded to 45 degrees from the vehicle, the boom tips can be folded as described above.



Fold Booms

IMPORTANT: Do not fold or unfold the booms near power lines.

NOTE: Never fold or unfold the booms while the vehicle is moving.

NOTE: The boom tips must be folded before the booms can be retracted. The cab can be damaged if the boom tips are not folded properly.

NOTE: Fold the booms slowly to reduce the possibility of the booms hitting the cab.

All Boom Sizes

On the side console, press the bottom of the left and right boom fold switches (1) until the booms are fully folded.



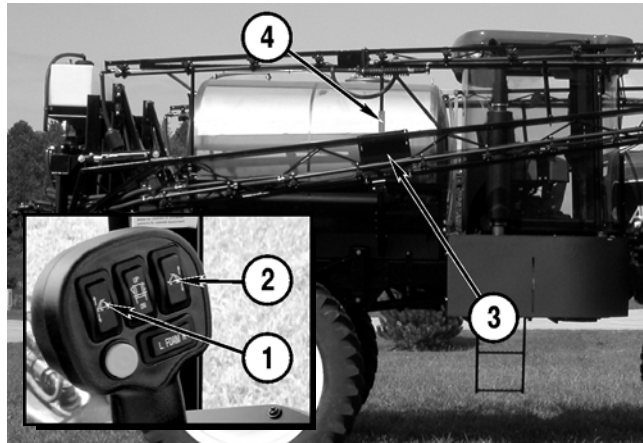
WET SYSTEM OPERATION

Tilt to Return Boom to Cradle

All Boom Sizes

On the T-handle, press the bottom of the left (1) and right (2) boom tilt raise/lower switches to tilt the booms (3) onto the boom cradle (4).

With the booms properly stored, the Apache Sprayer is ready for transport.



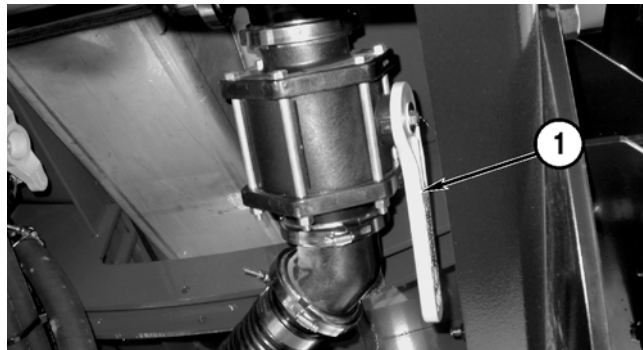
Spraying

Make sure the product, rinse, and foam marker tanks are filled. See the appropriate tank filling instructions in this section.

Level the booms and boom tips using the tilt and unfold switches. See Boom Operation for details.

Set the boom height using the boom rack switch. See “Operating Booms” on page 4-9.

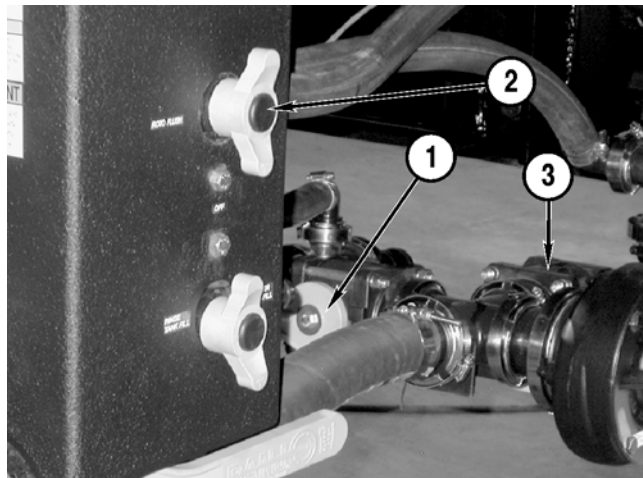
Open the sump valve (1) on the underside of the product tank.



Close the rinse tank valve (1).

Set the flush/agitation knob (2), shown in the “CLOSED” position, to “AGITATION”.

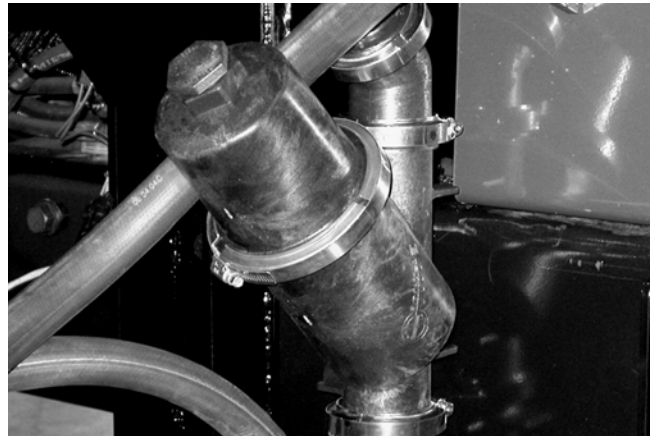
Open the product valve (3).



WET SYSTEM OPERATION

The product strainer features a 100 mesh screen which should be checked and cleaned after every 50 hours of operation or as needed.

NOTE: Depending on the chemicals being applied, it may be necessary to substitute the 100 mesh strainer with a more coarse strainer. See the chemical manufacturer's instructions for complete details.



Set the Raven 460 Monitor power switch to the "ON" position and check the settings. Select a saved flow rate or enter the desired rate. See the Raven Manual supplied with the Apache Sprayer for complete operating instructions.



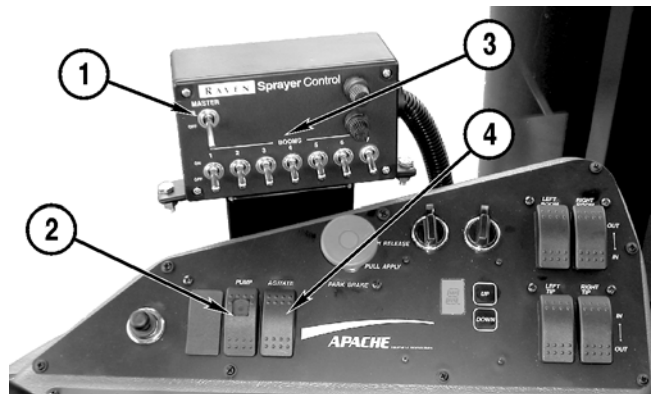
Set the Raven Sprayer Control master switch (1) to the "OFF" position.

Set the product pump switch (2) to the "ON" position.

Set the desired boom section switches (3) to the "ON" position.

IMPORTANT: DO NOT run the product pump dry. Damage to the pump seals will result. DO NOT intentionally dead-head the pump with high pressures. Damage to the pump seals will result.

Press the top of the agitation switch (4) to increase agitation/decrease product pressure. Press the bottom of the switch to decrease agitation/increase product pressure.



WET SYSTEM OPERATION

The agitation (1) and boom (2) pressure gauges are mounted outside at the lower right of the cab.

The agitation gauge reads pressure at the agitation valve.

The boom pressure gauge reads pressure from the five bank boom valves.

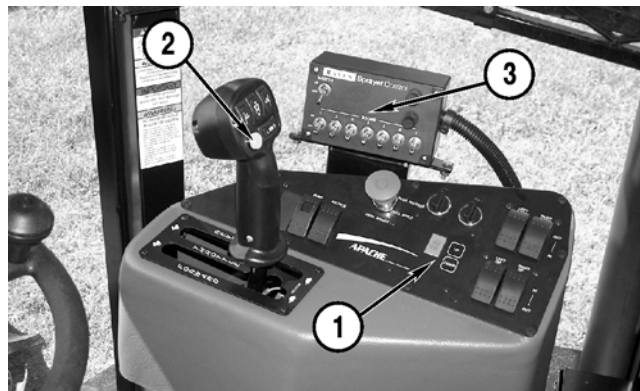
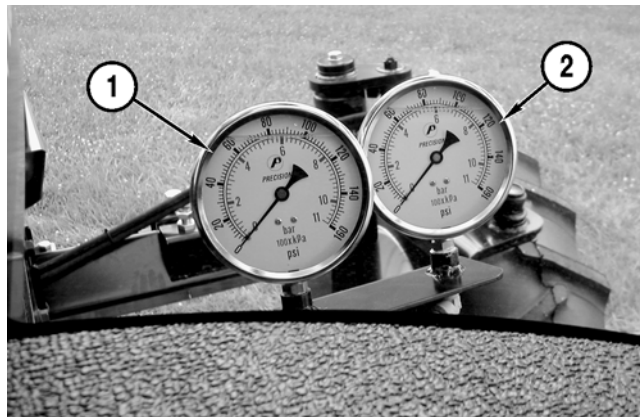
NOTE: When the agitation valve is fully open, the agitation pressure gauge and the boom pressure gauge should show approximately the same pressure.

IMPORTANT: Selecting the correct spray tip is critical to obtain proper application. See the spray tip manufacturer's instructions for proper selection.

Select an appropriate gear (1) for the desired vehicle speed during spraying. See the Specifications page for gear range and mph. Under typical operating conditions, third or fourth gear is recommended.

Use the master product on/off switch (2) on the T-handle to start and stop spraying.

Use the Raven Sprayer Control boom switches (3) to start and stop product flow to individual boom sections. The Raven Sprayer Control will automatically adjust the product flow for the remaining sections. See Operating Booms for a diagram of the boom sections.



WET SYSTEM OPERATION

Operating Foam Marker

Fill the foam tank per instructions on page 4-8. Push the left side of the foam marker switch (1) to drop foam on the left. Push the right side of the foam marker switch (1) to drop foam on the right. The center position of the switch is off.

If the Apache Sprayer has the optional split boom, open the foam valves on each of the booms to drop foam at 60'. The valves are located at the midpoint of each boom.

NOTE: After filling the foam tank, the foam marker may need to run for one to two minutes before the foam will begin.



Initial Setup

It may take a few attempts to get the foam to the correct consistency.

Fill the foam tank and test the consistency. If the foam is watery or there are air bubbles in the line, use more concentrate. If the foam is stiff, too much concentrate was used. Other factors, such as hard water and temperature, can require more concentrate to be used. See the Troubleshooting Section for more information.

Flushing Product Tank

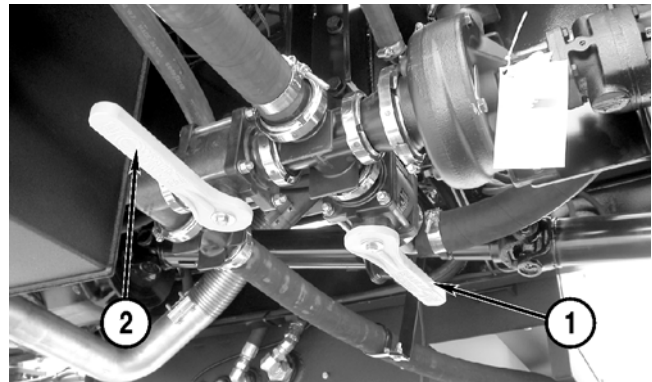
(with optional Roto-Flush)

NOTE: Read and follow chemical labels for flushing, disposal, and protective clothing requirement instructions.

IMPORTANT: DO NOT run the product pump dry. Damage to the pump seals will result. DO NOT intentionally dead-head the pump with high pressures. Damage to the pump seals will result.

Fill the rinse tank with clean, fresh, water. See "Filling Rinse Tank" on page 4-7.

Close the product valve (1) and open the rinse tank valve (2).



WET SYSTEM OPERATION

Turn the Agitate/Roto-Flush knob to “ROTO-FLUSH”.

Start the engine.

Use the Agitation switch on the side console to increase agitation to its highest level.

Set the product pump switch to the “ON” position.

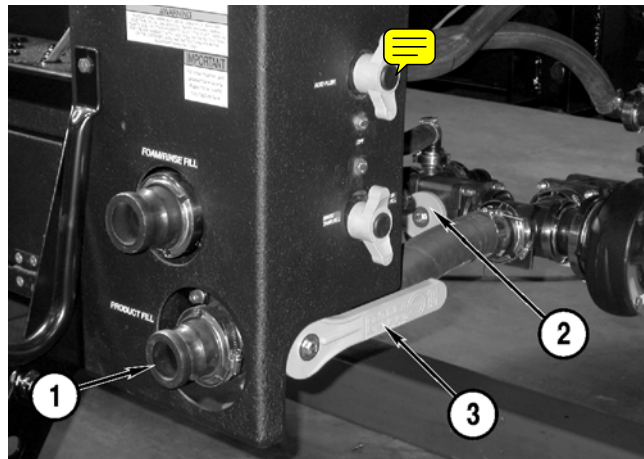
Use the T-handle to increase engine speed to 1800 rpm.

NOTE: The rinse tank will empty quickly. Monitor the process closely to reduce the possibility of running the product pump dry.

After the tank is rinsed, return the T-handle to “IDLE”, set the product pump switch to “OFF”, close the rinse tank valve, and turn the Agitate/Roto-Flush knob to “OFF”.

Open the product valve (1), set the product pump switch to the “ON” position, increase engine speed to 1800 rpm, unfold the booms, and turn boom sections on.

After the booms are flushed, return the engine speed to “IDLE”, turn boom sections off, turn product pump to “OFF”, close the rinse tank valve, set Agitate/Roto-Flush knob to “AGITATE”, return agitation switch to original setting, fold the booms, and turn off the engine.



WET SYSTEM OPERATION

Flushing Wet System

(without optional Roto-Flush)

⚠ CAUTION

CAUTION: Spray contaminated rinse water in a safe location in accordance to chemical label recommendations and local laws.

Follow chemical labels for proper rinsing procedure. Some chemicals may require multiple tank flushings

NOTE: Read and follow chemical labels for flushing, disposal, and protective clothing requirement instructions.

IMPORTANT: DO NOT run the product pump dry. Damage to the pump seals will result. DO NOT intentionally dead-head the pump with high pressures. Damage to the pump seals will result.

Fill the rinse tank with clean, fresh, water. See “Filling Rinse Tank” on page 4-7.

Close the product valve (1) and open the rinse tank valve (2).

Start the engine. Decrease the agitation to off using the switch on the side console.

Unfold the booms and boom tips and lower the boom rack as far as possible.



WET SYSTEM OPERATION

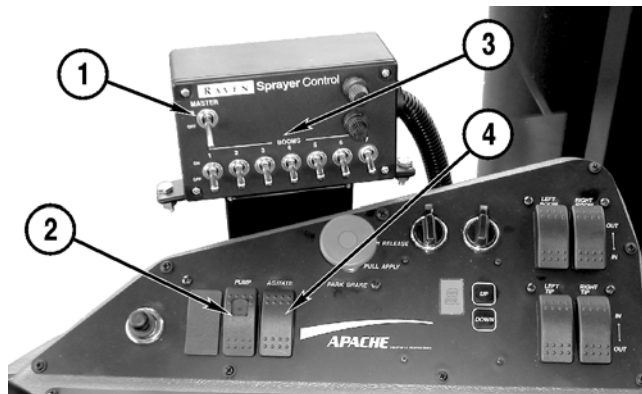
Set the Raven Sprayer Control master switch (1) to the ~~ON~~ position.

Set the product pump switch (2) to the "ON" position.

Set all the boom section switches (3) to the "ON" position.

IMPORTANT: DO NOT run the product pump dry. Damage to the pump seals will result. DO NOT intentionally dead-head the pump with high pressures. Damage to the pump seals will result.

After the booms are flushed, set the boom switches to "OFF", return the T-handle to the "IDLE" position, set the product switch to "OFF", fold the booms, and return all valves the spraying positions.



WET SYSTEM OPERATION

Cleanload Chemical Eductor

Startup

1. All Cleanload valves must be closed prior to starting: inlet ball valve, knife valve, and hopper rinse ball valve.
2. Open lid to check for foreign objects which may hinder performance or contaminate the system.
3. Close and lock lid by turning cover clockwise.
4. Divert pump flow to Cleanload inlet line. A pressure of 30 PSI minimum and 150 PSI maximum must be used. Highest pressures increase eduction rate and available wand suction.
5. Turn inlet ball valve on (yellow handle).
6. Open knife valve, located on the bottom of hopper, by pushing handle in (red handle).
7. Unlock and open lid slowly by turning cover counterclockwise.

Loading Liquid or Powdered Chemical into Hopper

8. Pour required amount of chemical into hopper. Avoid splashing liquids or powdered chemicals outside of hopper.
9. Rinse empty chemical containers if applicable. Place container opening over container rinse valve and press down. This will activate the rinse valve and rinse container.
10. Rinse Cleanload hopper. Close and lock lid by turning cover clockwise. Release the safety locking band on the hopper rinse ball valve and turn on for 20 seconds. Close ball valve and return locking band to locked position.
11. Open lid and inspect for chemical residue. Repeat step 10 as necessary.
12. Close knife valve by pulling red handle out towards you. Turn inlet (yellow handle) off.



WET SYSTEM OPERATION

Loading Liquid and/or Powdered Chemical with Suction Lance

NOTE: Lance suction is dependent on eductor pressure and flow. For best results, use highest pressure available (up to 150 PSI maximum).

8. Insert lance body with o-ring into eductor until the o-ring is sealed.
9. Use the free end of the lance to pierce bag or container to vacuum powdered or liquid chemical.
10. Rinse lance. Place lance end into a clean container of water to rinse lance assembly.
11. Remove lance body from eductor and drain any remaining fluid into hopper.
12. Close knife valve (red handle). Turn inlet valve (yellow handle) off.

Shutdown

1. Ensure that:
 - All valves are closed. Be sure to close knife valve first. (Close by pulling red handle out towards you.)
 - Chemical residue has been cleaned.
 - Hopper lid is closed and locked by turning cover clockwise.
2. Divert pump flow back to normal operation.
3. Raise eductor to up positions and insert latch pin.

NOTE: Do not store a contaminated lance in the Apache Sprayer cab.

LUBRICATION AND MAINTENANCE

General Information

IMPORTANT: Some components on the Apache Sprayer have additional maintenance requirements as outlined in the manufacturers manuals provided with the vehicle. These include, but are not limited to, the Engine Owner's Manual, Sprayer Monitor System Manual, Chemical Eductor Manual, Product Pump Instructions, and other optional equipment. Be sure to perform maintenance procedures for OEM equipment in addition to procedures for the Apache Sprayer.

LUBRICATION AND MAINTENANCE

Apache Sprayer Service Interval Chart

Perform and repeat the prescribed maintenance at each interval ○ = Conditional Service ● = Regular Service	Before Initial Use	After First 10 Hours	As Required	Daily	Every 40 Hours	After First 100 Hours	Every 100 Hours	Every 250 Hours	Every 500 Hours or Yearly	Every Year	Every 1000 Hours or Yearly
Grease Boom	○			●							
Torque Lug Nuts	○	○			●						
Grease Driveline	○						●				
Grease Steering Components	○						●				
Grease Axle Components	○						●				
Check Axle Extension Bolt Torque	○						●				
Adjust Poly Tank Straps (AS1000 only)	○								●		
Adjust Boom		○									
Inspect Front Accumulators			○								
Adjust Toe-In			○								
Clean/Replace Primary Engine Air Filter			○					●			
Replace Secondary Engine Air Filter			○							●	
Winterize Wet System			○							●	
Replace Cab Filters			○							●	
Flush Wet System (including product pump)			○	●							
Check Tire Pressure				●							
Check Oil Engine Level				●							
Check Coolant Level, Cooling Package, and Hoses				●							
Check Brake Fluid Level				●							
Check Transmission Fluid Level				●							
Check Hydraulic Fluid Level				●							
Check A/C Compressor Belt				●							
Check Differential Fluid Level					●						
Check Differential for Leaks					●						
Check Accumulator Fluid Level					●						
Replace Differential Fluid						○		●			
Replace Hydraulic Fluid Filter (Immediately if indicator is red.)						○		●			
Clean Hydraulic Fluid Strainer								●			
Replace Fuel Pre-Filter									●		
Replace Fuel/Water Separator Filter									●		
Replace Planetary Fluid (AS1000 only)									●		
Replace Engine Oil and Filter						○			●		
Replace Transmission Fluid and Filter						○			●		
Replace Hydraulic Fluid Strainer									●		
Inspect and Repack Wheel Hub and Flex Bearings									●		
Replace Drop Box Fluid										●	
Replace Hydraulic Fluid											●

LUBRICATION AND MAINTENANCE

Before Initial Use

The following services must be performed before initial use of the Apache Sprayer and repeated at the interval prescribed in the Apache Sprayer Service Interval Chart.

- Grease Boom. See “Grease Boom” on page 5-7.
- Tighten Lug Nuts. See “Tighten Lug Nuts” on page 5-13.
- Grease Driveline. See “Grease Driveline Components” on page 5-14.
- Grease Steering Components. See “Grease Steering Components” on page 5-15.
- Grease Axle Components. See “Grease Axle Components” on page 5-15.
- Check Axle Extension Bolt Torque. See “Check Axle Extension Bolt Torque” on page 5-16.
- Adjust Poly Tank Straps. See “Adjust Poly Tank Straps (if equipped)” on page 5-19.

After First 10 Hours

The following services must be performed after the first 10 hours of operation and repeated at the interval prescribed in the Apache Sprayer Service Interval Chart.

- Tighten Lug Nuts. See “Tighten Lug Nuts” on page 5-13.

Adjust Boom

NOTE: All boom adjustments should be performed with the boom fully unfolded and lowered.

Boom Lead

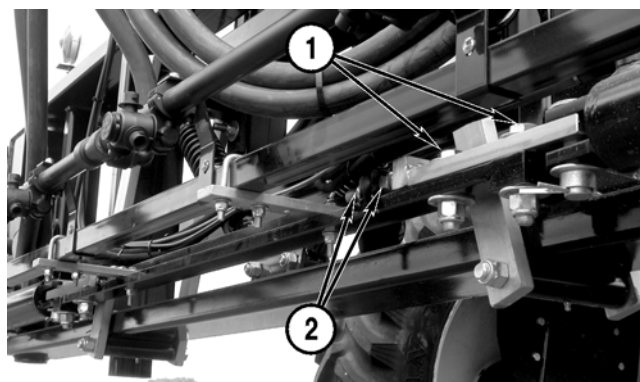
The outermost tip of the booms should lead the boom center section by three to four inches.



To adjust the boom lead, loosen the boom lead bolts (1) near the bottom of the boom center section. Turn the jam nuts (2) toward the end of the boom increase boom lead and turn the jam nuts (2) toward the boom center section to reduce boom lead.

Tighten the jam nuts and lead bolts after correct lead is set.

Repeat the steps for the remaining boom, as required.



LUBRICATION AND MAINTENANCE

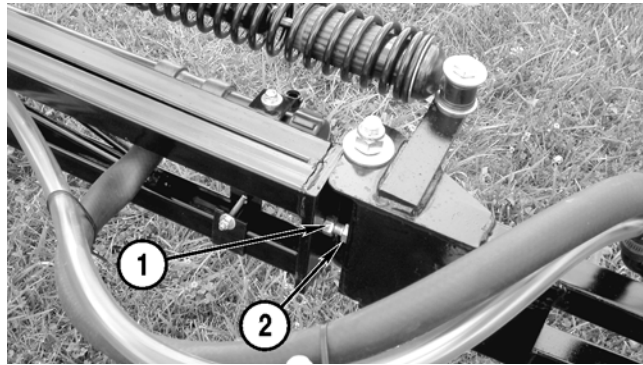
Boom Breakaway

Each left and right boom is equipped with one or two boom breakaways depending on boom configuration. A right, outer breakaway is shown.

The breakaways should be adjusted so the boom sections on both sides of the breakaways are straight and aligned as they extend from the center section.

To adjust the breakaway, loosen the jam nut (1) and turn the adjusting screw (2) to align the booms. Tighten the jam nut. The right boom tip breakaway is shown.

Repeat the steps for the remaining breakaways, as required.



Boom Stabilizer

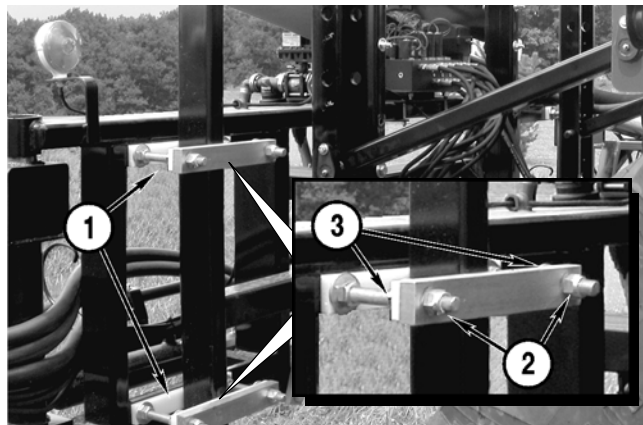
There are four boom stabilizers mounted the boom rack. The upper and lower right-side stabilizers (1) are shown.

The gap between the nylon wear pads and the steel frame should be $1/8''$ to $3/32''$ with the booms unfolded.

To adjust the gap, loosen both lock nuts (2) on the stabilizer and equally adjust the jam nuts (3) until the gap is correct.

Tighten the lock nuts (2).

Repeat the steps for the other stabilizers, as required.



NOTE: For best performance, the jam nuts must be adjusted so the stabilizer halves are parallel and provide the $1/8''$ to $3/32''$ gap.

Boom Tip

(80' and 90' Boom Only)

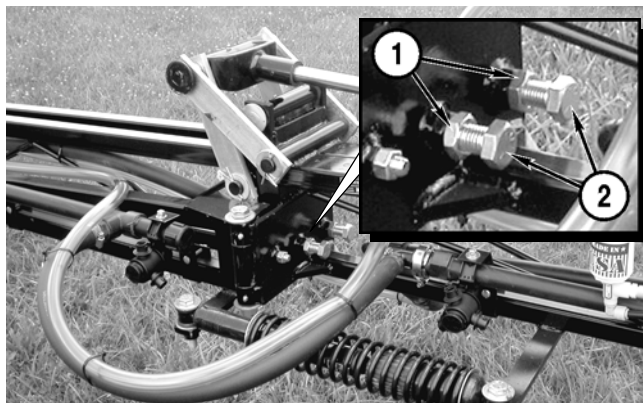
The boom tips should be level with the main boom.

To adjust the boom tip level, loosen the jam nuts (1) on the leveling bracket and turn the leveling bolts (2) clockwise to raise or counter-clockwise to lower the boom tip. The left boom tip is shown.

NOTE: When the boom tip is adjusted properly, there will be some side-to-side movement in the cylinder and in the linkage bars.

NOTE: The bolts must be adjusted equally for best performance.

Repeat the steps for the other boom tip, as required.



LUBRICATION AND MAINTENANCE

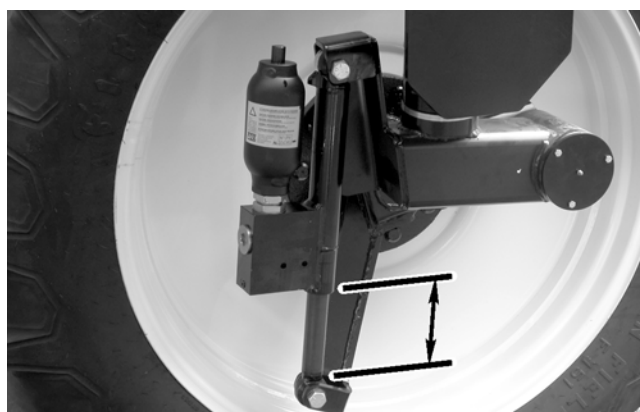
As Required

The following services will be required at various intervals depending on vehicle use and environmental conditions. Repeat these services as prescribed by the Apache Sprayer Service Interval Chart.

- Clean or Replace Primary Engine Air Filter. See “Clean or Replace Engine Primary Air Filter” on page 5-16.
- Replace Secondary Engine Air Filter. See “Replace Engine Secondary Air Filter” on page 5-24.
- Winterize Wet System. See “Winterize Wet System” on page 5-25.
- Replace Cab Air Filters. See “Replace Cab Recirculating Air Filter” on page 5-27.
- Flush Wet System. See “Flushing Wet System” on page 4-17.

Inspect Front Accumulator

Inspect the accumulators and cylinders for hydraulic leaks and correct operation. Typically, the cylinder should have 4” to 6” of the cylinder ram showing while the vehicle is on level ground.



Adjust Toe-In

Measure Tie Rods

Measure the rear tie rod ends on the left and right steering cylinder. The measurements must be equal and between 4-1/8” and 4-1/2”. Adjust the tie rods if necessary.

Make sure the tie rod ends are fully seated in the taper.

Safely lift the front of the Apache Sprayer so the front tires are slightly off of the ground and turn the steering wheel so the front wheels appear to be pointing straight.

Measure the distance that the steering cylinder ram is extended on the left and right wheel. The measurements must be equal and between 3-7/8” and 4-1/8”. Adjust the steering cylinder rams, if necessary, by turning the steering cylinders all the way to the left, then all the way to the right.



LUBRICATION AND MAINTENANCE

Measure Toe-in

NOTE: Raise the front wheels safely off of the ground while making toe-in adjustments.

Measure and note the distance (1) from the center of the left hub to the front of the right rim.

Measure and note the distance (2) from the center of the left hub to the rear of the right rim.

If distance (1) is $\frac{1}{8}$ " less than distance (2), the toe-in is correct for the right wheel. If the toe-in is not correct, it must be adjusted.

Repeat the steps, measuring from the right hub to the left rim, to measure toe-in for the left wheel.

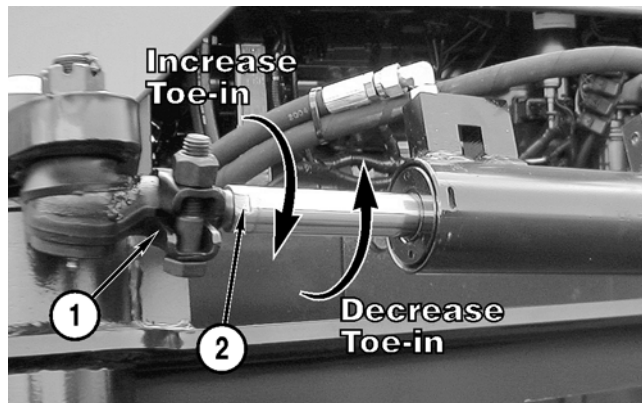
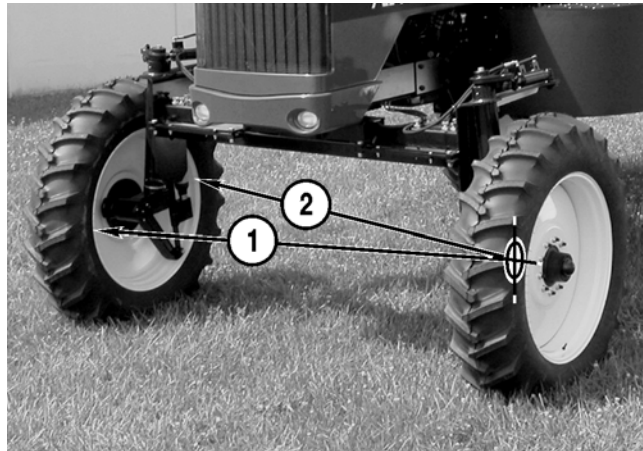
Adjust the toe-in on each wheel until it meets specification.

Adjust Toe-in

Toe-in adjustments should be made at the ram end of the steering cylinder.

Loosen the nut and bolt on the tie rod clamp (1).

Use a wrench on the end of the ram (2) to increase or decrease toe-in.

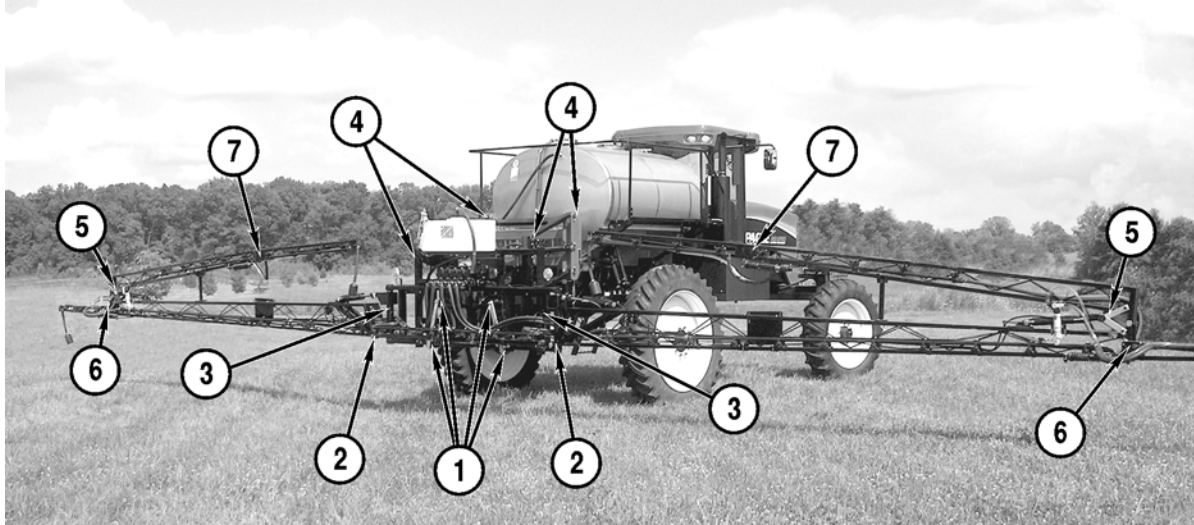


LUBRICATION AND MAINTENANCE

Daily

The following services must be performed daily, before operation of the Apache Sprayer.

Grease Boom

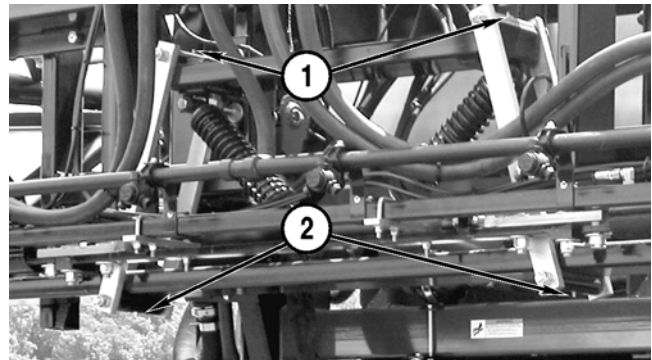


The boom is equipped with seven sets of grease fittings. Apply an ample amount of lithium grease through each of the grease fittings.

- | | |
|--------------------|--|
| 1. Boom Stabilizer | 5. Boom Tip |
| 2. Boom Tilt | 6. Boom Inner Breakaway |
| 3. Boom Fold | 7. Boom Outer Breakaway
(if equipped) |
| 4. Boom Rack | |

Boom Stabilizer

There are two upper (1) and two lower (2) boom stabilizer grease fittings.



LUBRICATION AND MAINTENANCE

Boom Tilt

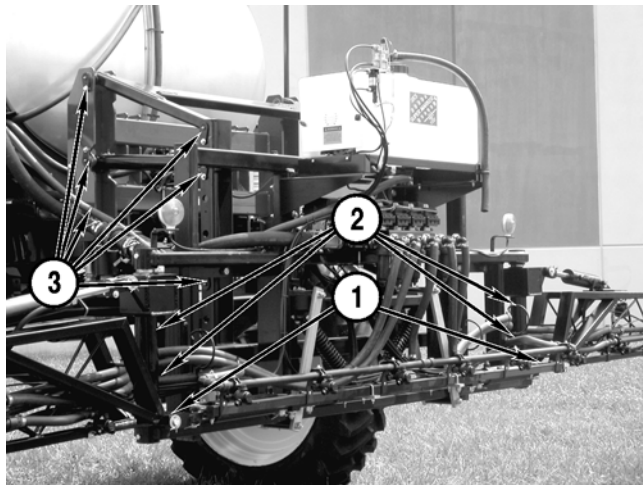
There are two boom tilt grease fittings (1).

Boom Fold

There are four boom fold grease fittings (2).

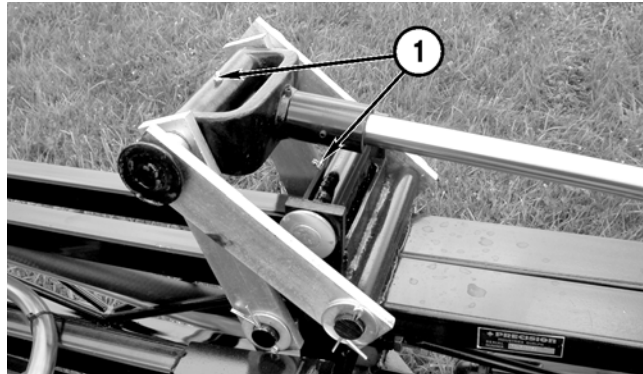
Boom Rack

There are two sets of six boom rack, flag-pin style, grease fittings (3) are shown. The six left side fittings (3) are shown. The six right side fittings are in the same orientation on the right side of the boom rack.



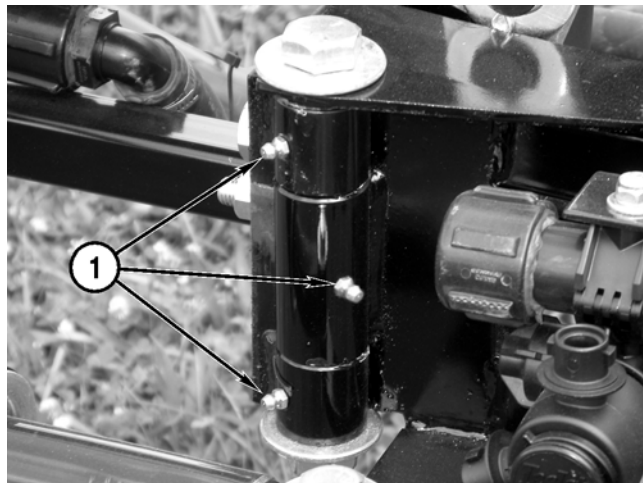
Boom Tip

There are four boom tip grease fittings (1), two on each boom tip. The left side is shown.



Boom Inner Breakaway

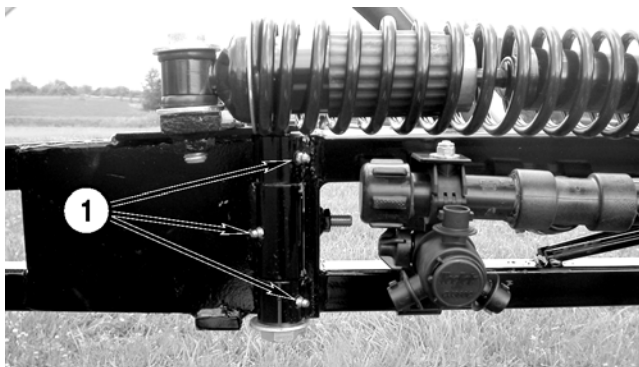
There are six boom inner breakaway grease fittings (1), three on each boom. The left side is shown.



LUBRICATION AND MAINTENANCE

Boom Outer Breakaway (if equipped)

There are six boom outer breakaway grease fittings (1), three on each boom tip. The left side is shown.



Flush Wet System

Drain and flush the product tank and wet system after use and when changing chemicals. See "Flushing Product Tank" on page 4-15. See "Flushing Wet System" on page 4-17.



Check Tire Pressure

Check the tires for proper inflation pressure and damage. Inflate according to the tire manufacturer's recommendations. Tire pressures are also listed on the back cover of this manual. Replace tires that have cuts or bubbles.

Check the rims for cracks and other damage. Replace damaged rims.



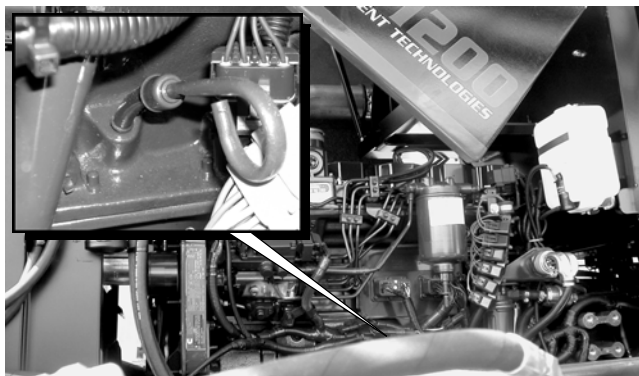
Check Engine Oil Level

NOTE: If the engine has been running, shut off and wait 10 minutes before checking oil level.

The dipstick is located in the engine compartment, on the left side of the engine.

Remove the dipstick and check the oil level.

The oil level should be within the hatched area on the dipstick.



LUBRICATION AND MAINTENANCE

If the oil level is below the “ADD” mark, add high quality 15W-40 motor oil at the oil fill location on top of the engine.

Add oil as needed to bring the level to the hatched area on the dipstick.

Replace the dipstick.

Additional lubricating oil system information is available in the engine manufacturer’s manual provided with the Apache Sprayer.



Check Cooling System

! CAUTION

DO NOT remove the radiator cap when the engine is hot. Stop the engine and wait until the engine has cooled.

Remove the radiator cap. The coolant level should be level with the bottom of the fill neck.

Add coolant as necessary. See the engine manufacturer’s manual for coolant requirement and additional cooling system information.

Inspect the cooling package components for damage and debris. Check tubes, hoses, and other components for damage and leaks. Replace damaged components as necessary. Clean debris from around or between cooling package components.



Check Brake Fluid Level

The brake fluid reservoir is located in the engine compartment, on the right side of the engine, toward the cab.

NOTE: Check the brake fluid level while the fluid is cold.

The reservoir is marked with “FILL” and “LOW” level indicators. Maintain the fluid level between these two marks.

If the brake fluid level drops to the “LOW” level, remove the reservoir cap and add Chevron 1000 THF to raise the fluid level to the “FILL” mark. Replace the cap.

NOTE: To reduce the possibility of air entering the brake lines, do not allow the fluid level to drop below the “LOW” level.



LUBRICATION AND MAINTENANCE

Check Transmission Fluid Level

NOTE: Check the transmission fluid level with the engine running, the transmission at normal operating temperature, and the transmission in neutral position.

The transmission fluid dipstick is located in the engine compartment, on the left side of the engine.

Turn the handle counter-clockwise to loosen. Remove the dipstick and check the transmission fluid level.



The fluid level should be between the two dots on the dipstick.

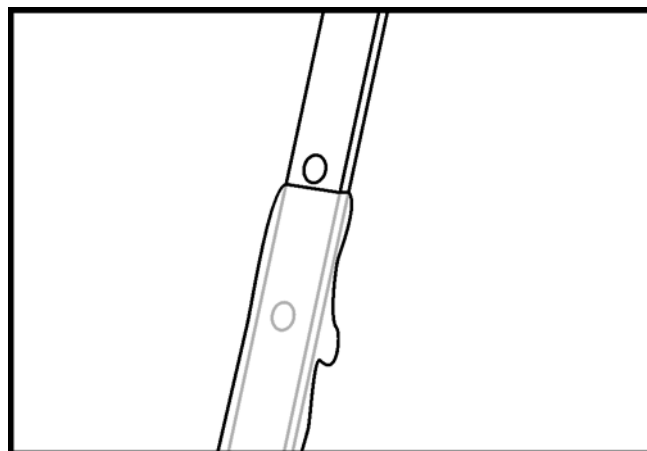
IMPORTANT: DO NOT overfill the transmission fluid. Overfilling can damage the transmission or cause the transmission to malfunction or overheat.

IMPORTANT: Use only Dexron III ATF transmission fluid.

If the fluid level is below the lower dot on the dipstick, use a funnel to add fluid through the dipstick tube.

Add Dexron III ATF to bring the level between the dots on the dipstick.

Replace the dipstick and turn the handle clockwise to tighten.



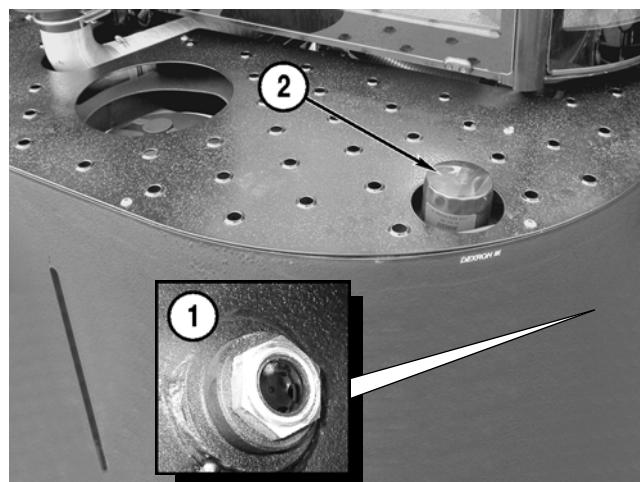
Check Hydraulic Fluid Level

IMPORTANT: The booms must be folded and in the transport position for an accurate hydraulic fluid level reading.

The hydraulic fluid reservoir is located on the right side of the vehicle and a sight glass (1) indicates the hydraulic fluid level.

IMPORTANT: Use only Dexron III ATF transmission fluid for the Apache Sprayer hydraulic system.

If no fluid is visible in the sight glass, remove the fill cap (2) and add Dexron III ATF until the sight glass is full.



LUBRICATION AND MAINTENANCE

Check A/C Compressor Belt

Inspect

Check the A/C compressor belt (1) for wear and damage. Replace as necessary.

Check the belt deflection at a point mid-way between two pulleys. The correct belt deflection is 3/4" to 1". If the deflection is greater than one inch, adjust the belt.

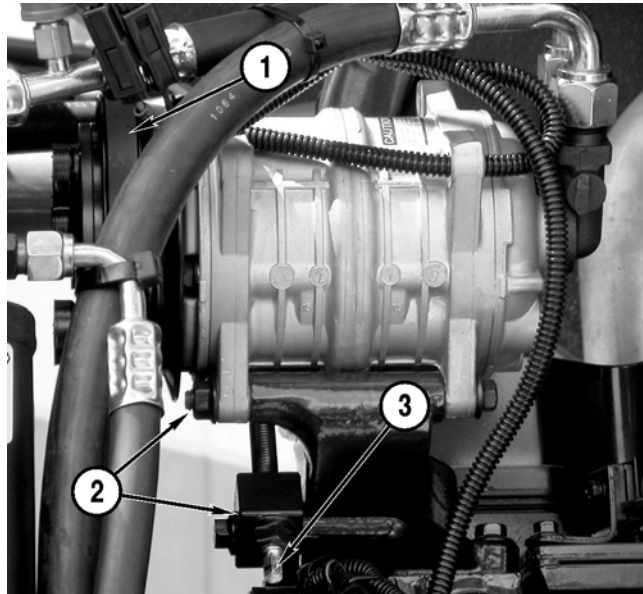
Replace

To remove the compressor belt, loosen the mounting and adjusting hardware (2). Turn the adjustment screw (3) counter-clockwise until the belt can be removed.

To install the new compressor belt, turn the adjustment screw (3) clockwise until the belt deflection is 3/4" to 1". Tighten the mounting and adjusting hardware (2).

Adjust

To adjust the A/C compressor belt, loosen the mounting and adjusting hardware (2). Turn the adjusting screw (3) clockwise to tighten the belt and counter-clockwise to loosen. The correct belt deflection is 3/4" to 1". When adjustment is complete, tighten the mounting and adjusting hardware (2).



LUBRICATION AND MAINTENANCE

Every 40 Hours

The following services must be performed after every 40 hours of operation of the Apache Sprayer.

Tighten Lug Nuts

Tighten the front and rear wheel lug nuts to 400 lb-ft [542 N•m].



Check Differential Fluid Level

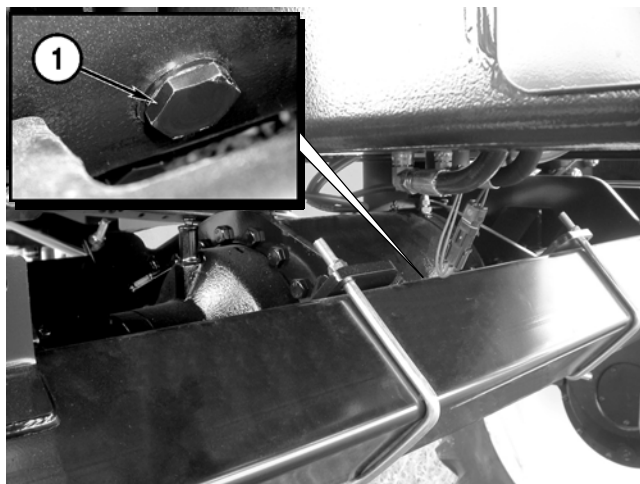
The differential is located under the vehicle, on the rear axle. The fill/level plug is directly above the drain plug on the rear of the differential.

Remove the differential fill/level plug (1) and check the fluid level. The fluid should be level with the bottom of the fill/level hole.

IMPORTANT: Use only Chevron 1000 THF for the differential fluid.

If required, add Chevron 1000 THF to fill the differential to the bottom of the fill/level hole.

Install the plug and tighten.




Check Rear Differential for Leaks

Inspect the differential for leaks at the U-joint, near the drop boxes, and between inner and outer housings.

Repair the leaks before operating the Apache Sprayer.

Check Accumulator Fluid Level

 Safely raise the front of the vehicle so the front tires are just off of the ground.

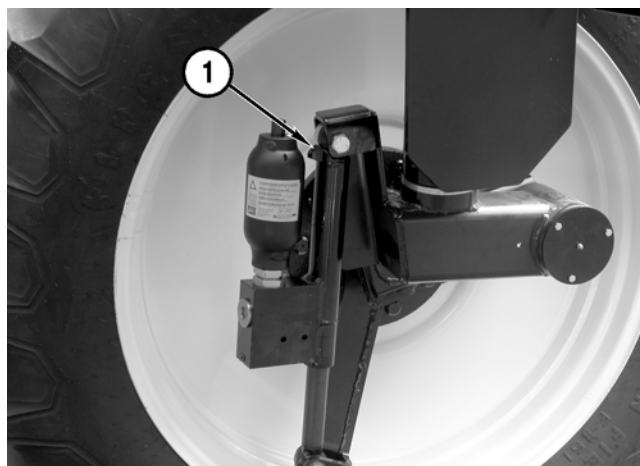
Remove the plug (1) from the front of each front accumulator and check the fluid level. The fluid should be level with the bottom of the fill hole.

NOTE: If the fluid is foamy, the accumulator has failed. Contact your dealer for repair.

IMPORTANT: Use only Chevron 1000 THF for the accumulator fluid.

If required, add Chevron 1000 THF to fill the accumulator to the bottom of the fill hole.

Install the plug and tighten.



LUBRICATION AND MAINTENANCE

After First 100 Hours

The following services must be performed after the first 100 hours of operation and repeated as prescribed by the Apache Sprayer Service Interval Chart.

- Replace Differential Fluid. See “Replace Differential Fluid” on page 5-17.
- Replace Hydraulic Fluid Filter. See “Replace Hydraulic Fluid Filter” on page 5-17.
- Replace Engine Oil and Filter. See “Replace Engine Oil and Filter” on page 5-21.
- Replace Transmission Fluid and Filter. See “Replace Transmission Fluid and Filter” on page 5-22.

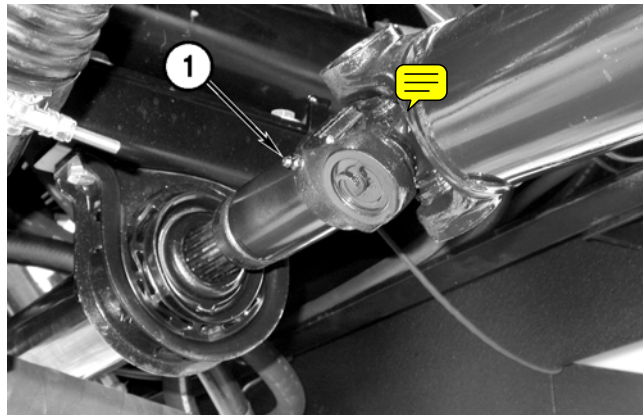
Every 100 Hours

The following services must be performed after every 100 hours of operation of the Apache Sprayer.

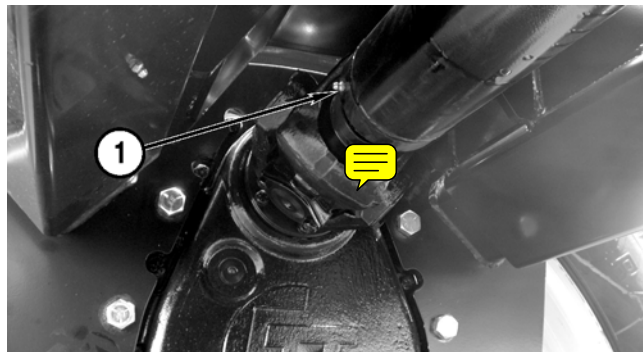
Grease Driveline Components

The Apache Sprayer has nine driveline grease fittings. Apply an ample amount of lithium grease through each of the fittings.

The slip joint grease fitting (1) is located under the vehicle, between the transmission and the rear axle.

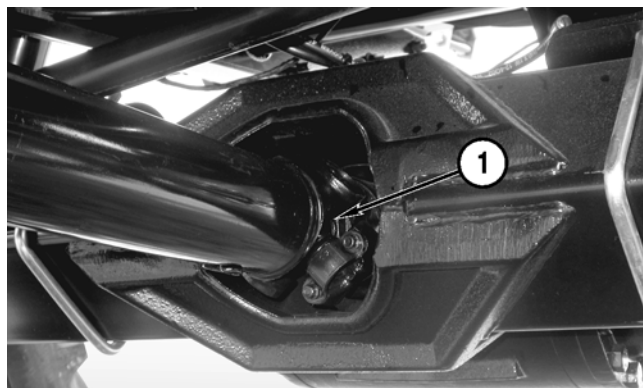


The two drive shaft grease fittings (1) are located under the vehicle, between the differential and the drop box U-joints. The left axle shaft grease fitting is shown.



Each of the seven U-joints in the driveline have a grease fitting to lubricate the U-joint pins. The differential input U-joint (1) is shown.

The U-joints are located at the transmission, slip joint, differential input (1), left and right differential output, and at the left and right drop boxes.



LUBRICATION AND MAINTENANCE

Grease Steering Components

IMPORTANT: Do not over-grease the ball-joints. Damage to the dust cover will result.

Each steering cylinder has two ball joint grease fittings (1), two king-pin grease fittings (2), one inter-flex bearing grease fitting (3), and one hub grease fitting (4). The right wheel is shown.

Apply lithium grease through the two ball-joint grease fittings (1) on the tie rod ends.

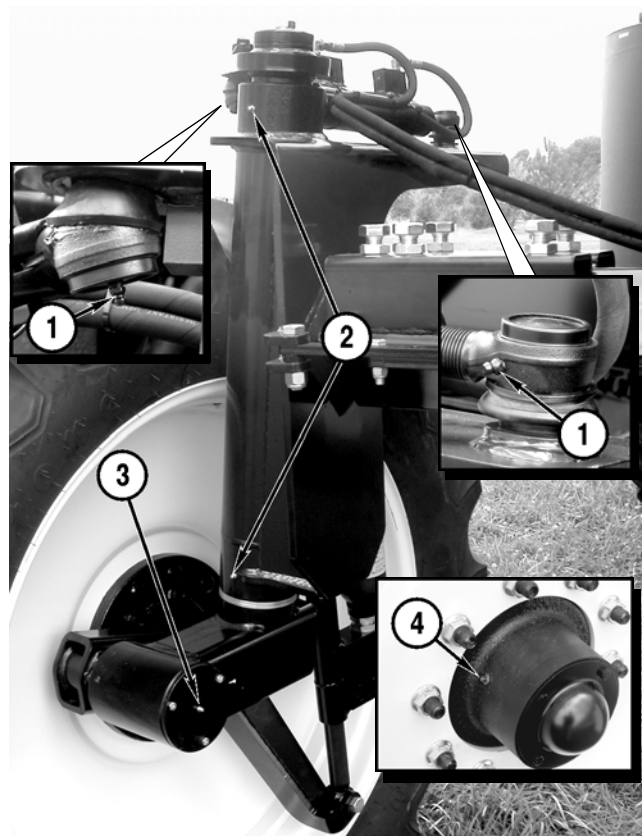
Apply lithium grease through the two king-pin grease fittings (2).

NOTE: The inter-flex (3) and hub (4) bearings are sealed chambers and once greased require very little grease to maintain.

Apply lithium grease through the inter-flex bearing grease fitting (3).

Apply lithium grease through the hub bearing grease fitting (4).

Repeat these steps for the other front wheel.



Grease Axle Components

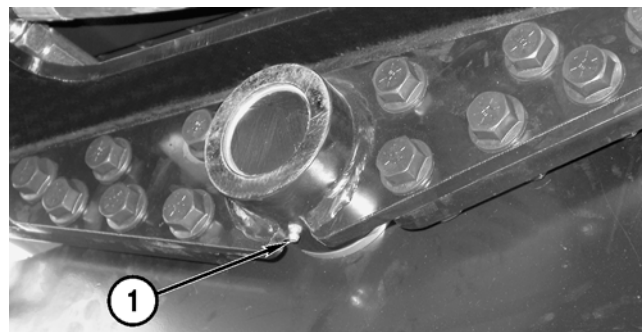
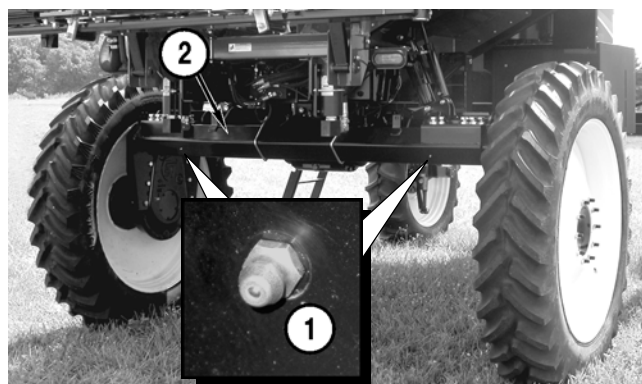
The rear axle is equipped with eight grease fittings, installed in two square-tube axle extension assemblies. Four fittings (1) point downward from the bottom faces of each square tube (2). Shown are the two rear-most fittings.

The front axle is equipped with four grease fittings installed on one square-tube axle extension assembly.

Apply an ample amount of lithium grease through each of the fittings.

An axle pivot is located under the vehicle on the front axle. The pivot is equipped with a grease fitting (1) on front and rear of the front axle.

Apply an ample amount of lithium grease through each of the fittings.



LUBRICATION AND MAINTENANCE

Check Axle Extension Bolt Torque

Check the bolt torque on the axle extension braces. There are six bolts on each front brace and twelve bolts on each rear brace. The left rear brace is shown.

Loosen all the jam nuts.

Tighten the bolts to 132 lb-ft [179 N•m].

Tighten the jam nuts.



Every 250 Hours

The following services must be performed after every 250 hours of operation of the Apache Sprayer.

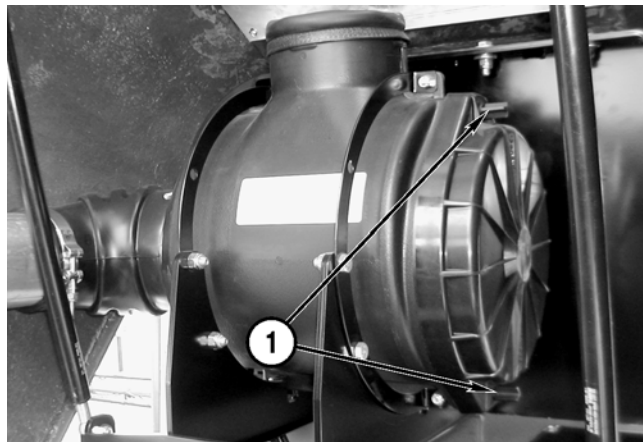
Clean or Replace Engine Primary Air Filter

IMPORTANT: When operating in severe conditions, the primary air filter should be cleaned after every 40 hours of use.

NOTE: If the air filter indicator lamp on the steering column comes on, stop immediately to remove and clean the primary air filter. Replace if necessary.

The primary air filter is mounted in the engine compartment, towards the cab.

Remove the two thumb screws (1) and cover from the air cleaner assembly.



Use a rocking motion to remove the primary air filter from the assembly.

Clean the filter using compressed air. Blow the filter from the inside-out.

If installing a new primary engine air filter, use Part Number 201300078. Install the filter, the air cleaner cover, and thumb screws.



LUBRICATION AND MAINTENANCE

Replace Differential Fluid

The differential is located under the vehicle, on the rear axle. The fill/level plug (1) is directly above the drain plug on the rear of the differential.

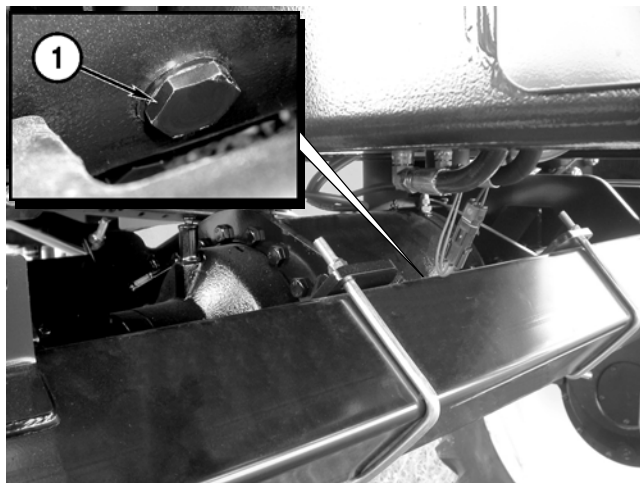
Remove the differential drain plug and drain the fluid into a suitable container. Dispose of the fluid properly.

Install the drain plug and tighten.

IMPORTANT: Use only Chevron 1000 THF for the differential/planetary fluid.

Remove the differential fill/level plug (1). Add fluid until it is level with the bottom of the fill/level hole. The differential capacity is approximately 26.4 quarts [25 liters].

Install the fill/level plug (1) and tighten.



Replace Hydraulic Fluid Filter

The hydraulic fluid filter is located under the vehicle, between the rear axle and fill station, on the left side.

IMPORTANT: An indicator bar is on top of the filter head. If the indicator is red, replace the filter immediately.

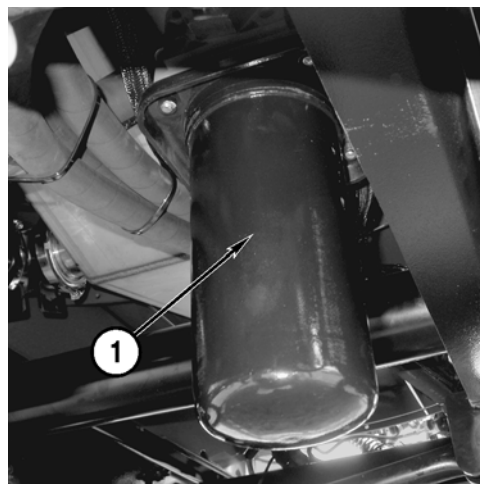
Remove the four mounting bolts from the filter head and lower the filter canister (1).

Remove the filter and canister o-ring from the canister. Remove the spring and metal plate from the filter. Discard the filter and fluid into an appropriate container. Rinse the canister with diesel fuel.

Install the spring and metal plate onto the new filter and install the filter into the canister. Install the o-ring on the canister and lubricate with clean hydraulic fluid.

Install the canister onto the filterhead and tighten the four bolts.

Use the sightglass to check the fluid level. See "Check Hydraulic Fluid Level" on page 5-11.

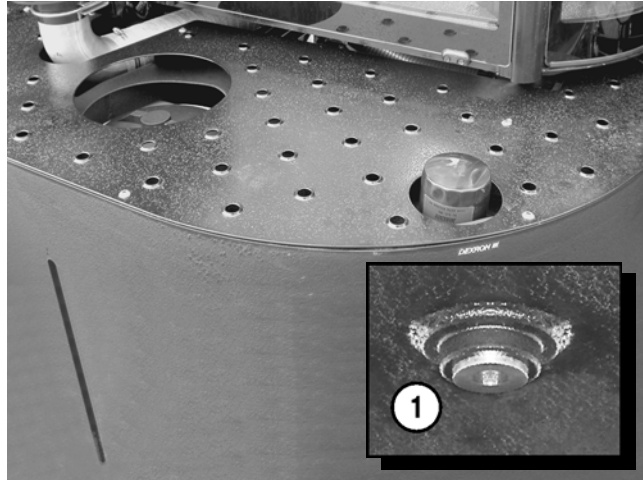


LUBRICATION AND MAINTENANCE

Clean Hydraulic Fluid Strainers

The hydraulic fluid strainers are located under the vehicle, on the side of the hydraulic fluid reservoir. The strainers are in line with the hydraulic fluid lines.

Remove the hydraulic fluid drain plug (1) from the bottom of the reservoir and drain the fluid into a suitable container with a capacity of approximately 30 gallons [113.5 liters]. Install the drain plug.



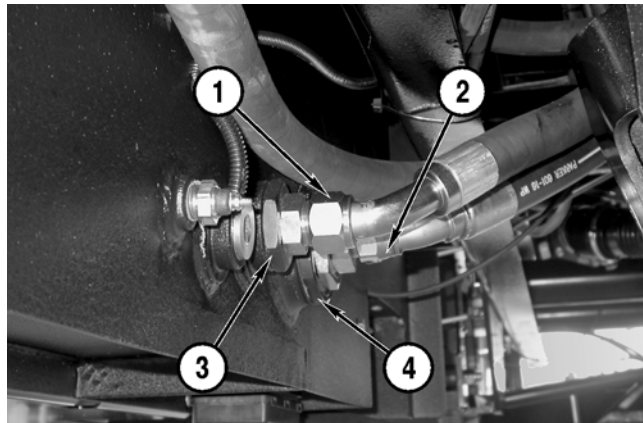
Remove the hydraulic fluid lines (1) and (2).

Remove the strainers (3) and (4).

Clean the strainers with diesel fuel and allow to air dry. Dispose of the fuel properly.

Install the small diameter hydraulic fluid strainer (3), Part Number 840000010. Install the large diameter hydraulic fluid strainer (4), Part Number 840000011.

Install the hydraulic lines (1) and (2).

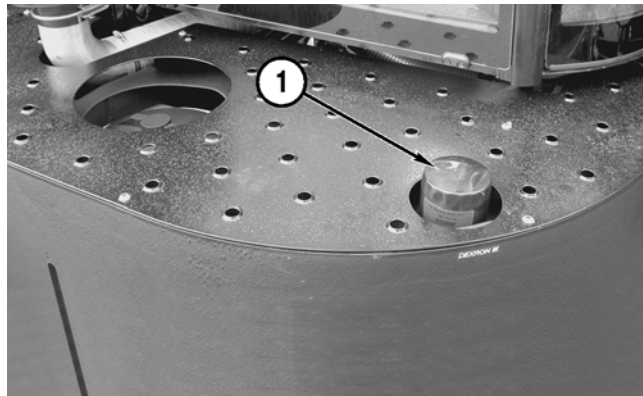


IMPORTANT: Use only Dexron III ATF transmission fluid for the Apache Sprayer hydraulic system.

NOTE: The hydraulic fluid fill location (1) has a screen in the fill neck. Fill the reservoir slowly to reduce the possibility of spilling.

Fill the hydraulic fluid reservoir with Dexron III ATF. The reservoir capacity is approximately 30 gallons [113.5 liters].

Use the sightglass to check the fluid level. See “Check Hydraulic Fluid Level” on page 5-11.



Every 500 Hours

NOTE: Some services at this interval were performed at the “After First 100 Hours” interval. If the service was performed as prescribed, measurement of 500 hours should begin at the 100 hour mark.

The following services must be performed after every 500 hours of operation of the Apache Sprayer.

LUBRICATION AND MAINTENANCE

Adjust Poly Tank Straps (if equipped)

Tighten the bolts on each tank strap without deforming the tank, bolts or tank skid. Tighten the bolts evenly from side to side.

Fill the product tank with water and drive the Apache Sprayer to allow the tank to settle. Stop the vehicle and check the straps. Adjust if necessary.

Check the strap adjustment after the first three loads.



Replace Fuel Pre-Filter

The fuel prefilter is located in the engine compartment on the left side of the engine.

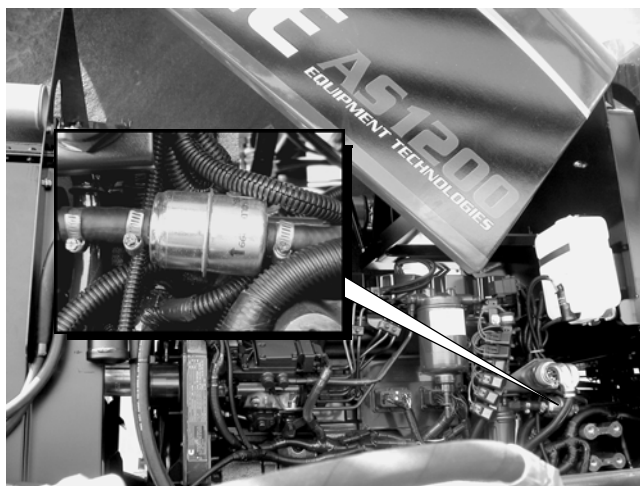
NOTE: Fuel will spill from the prefilter and fuel lines. Use a suitable container to collect the fuel and dispose of properly.

Loosen the hose clamps and remove the fuel prefilter.

Install a new prefilter, Part Number 201450202, with the flow arrows pointing toward the engine and tighten the hose clamps.

NOTE: It is not necessary to bleed the fuel system after replacing fuel filters.

Additional fuel system information is available in the engine manufacturer's manual provided with the Apache Sprayer.



LUBRICATION AND MAINTENANCE

Replace Fuel/Water Separator Filter

The fuel/water separator filter is located in the engine compartment on the left side of the engine.

Disconnect the water-in-fuel sensor near the bottom of the filter.

Turn the filter counter-clockwise to remove. Dispose of the filter properly.

IMPORTANT: Do not overtighten the filter. Damage to the seal can result.

Fill the new filter with clean diesel fuel. Tighten the filter, by hand, 3/4 to 1-1/4 turns after the seal contacts the filter housing.

Connect the water-in-fuel sensor.

NOTE: It is not necessary to bleed the fuel system after replacing fuel filters.

Additional fuel system information is available in the engine manufacturer's manual provided with the Apache Sprayer.



Replace Planetary Fluid

The planetaries are located on each rear wheel. The plug (1) on the planetary serves as the drain and fill location.

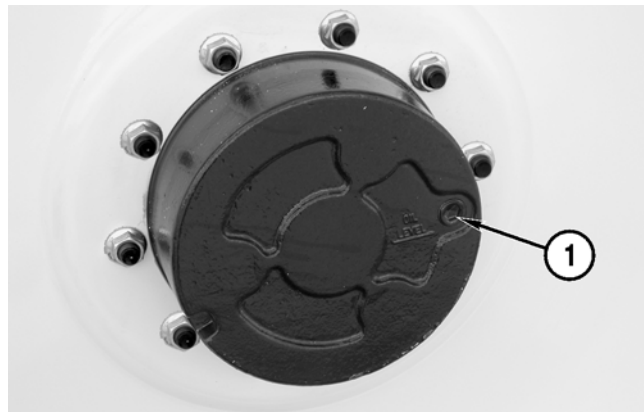
To drain the planetary fluid, position the wheel so the plug on the planetary is in the 6 o'clock position. Remove the plug in the planetary and drain the fluid into a suitable container. Dispose of the fluid properly.

To fill the planetary fluid, position the wheel so the plug on the planetary is in the 3 o'clock position.

IMPORTANT: Use only Chevron 1000 THF for the planetary fluid.

Fill each planetary with Chevron 1000 THF to the bottom of the fill hole. The planetary capacity is approximately 2.2 quarts [2.0 liters].

Install the plug (1) and tighten.



LUBRICATION AND MAINTENANCE

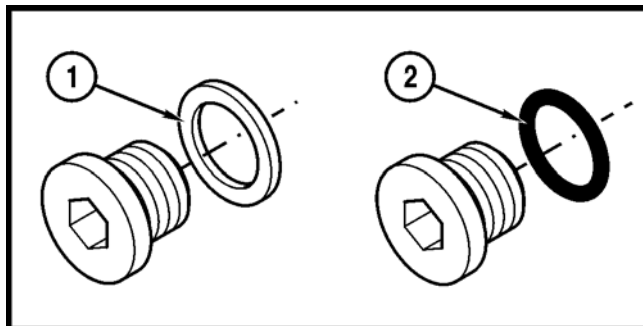
Replace Engine Oil and Filter

Operate the engine for approximately five minutes to warm the engine oil. Shut off the engine.

The engine oil drain plug is located on the right side of the oil pan. Remove the engine oil drain plug and drain the oil into a suitable container. Properly dispose of the used engine oil.

Install the drain plug and tighten to the torque value below:

1. Plug with Copper Washer:
52 lb-ft [71 N•m]
2. Plug with O-ring:
37 lb-ft [50 N•m]



The engine oil filter is located on the right side of the engine.

Turn the engine oil filter counter-clockwise to remove. Dispose of the filter properly.

IMPORTANT: Do not overtighten the filter. Damage to the seal can result.

Lubricate the seal on the engine oil filter, Part Number 201450241, and install. Tighten the filter, by hand, 3/4 to 1-1/4 turns after the seal contacts the filter housing.



NOTE: Crankcase oil capacity can vary. ALWAYS use the dipstick to determine if the engine oil is to the appropriate level.

IMPORTANT: Do not overfill the engine oil.

Fill the engine with high quality 15W-40 motor oil at the oil fill location on top of the engine. The engine oil capacity is approximately 16 quarts [15 liters].



LUBRICATION AND MAINTENANCE

Replace Transmission Fluid and Filter

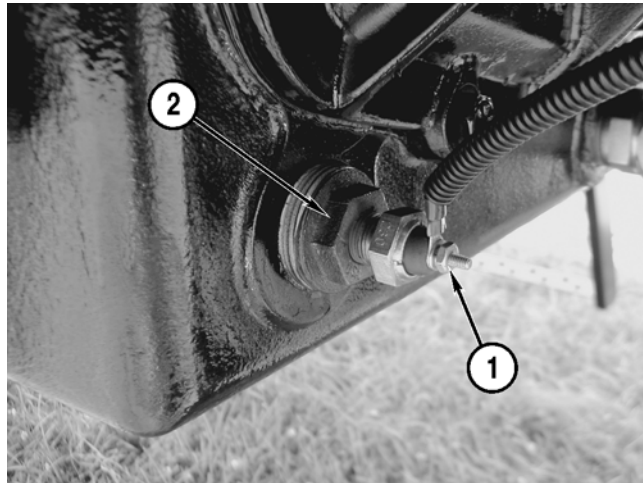
The transmission fluid drain plug is located under the vehicle on the front of the transmission fluid pan.

Disconnect the wiring harness from the transmission fluid temperature sensor (1).

Remove the drain plug (2) and drain the transmission fluid into a suitable container. Dispose of the fluid properly.

Install the drain plug.

Connect the wiring harness to the transmission fluid temperature sensor.

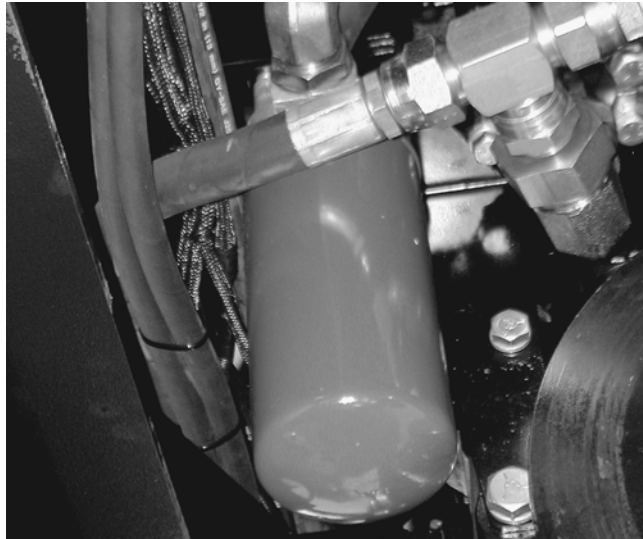


The transmission fluid filter is located under the vehicle on the left side of the transmission.

Turn the filter counter-clockwise to remove. Dispose of the filter properly.

IMPORTANT: Do not overtighten the filter. Damage to the seal can result.

Lubricate the seal on the transmission fluid filter, Part Number 300100110, and install. Tighten the filter, by hand, 3/4 to 1-1/4 turns after the seal contacts the filter housing.



The fluid capacity of the transmission is approximately 16 quarts [15 liters].

IMPORTANT: DO NOT overfill the transmission fluid. Overfilling can damage the transmission or cause the transmission to malfunction.

IMPORTANT: Use only Dexron III ATF transmission fluid.

Use a funnel to fill the transmission fluid at the transmission dipstick tube on the left side of the engine.

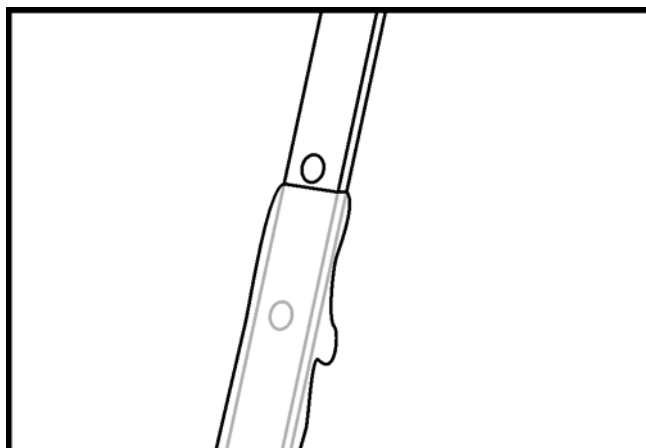


LUBRICATION AND MAINTENANCE

NOTE: Check the transmission fluid level with the engine running, the transmission at normal operating temperature, and the transmission in neutral position.

The fluid level should be between the two dots on the dipstick.

Replace the dipstick and turn the handle clockwise to tighten.



Add oil as needed to bring the level to the hatched area on the dipstick.

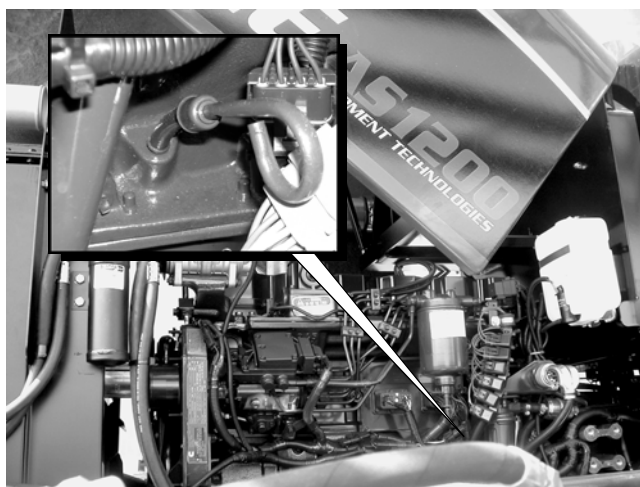


Replace the dipstick.

Operate the engine and check for leaks.

Shut off the engine and wait ten minutes. Check the engine oil level and add oil as needed to bring the level to the hatched area on the dipstick.

Additional lubricating oil system information is available in the engine manufacturer's manual provided with the Apache Sprayer.



Replace Hydraulic Fluid Strainers

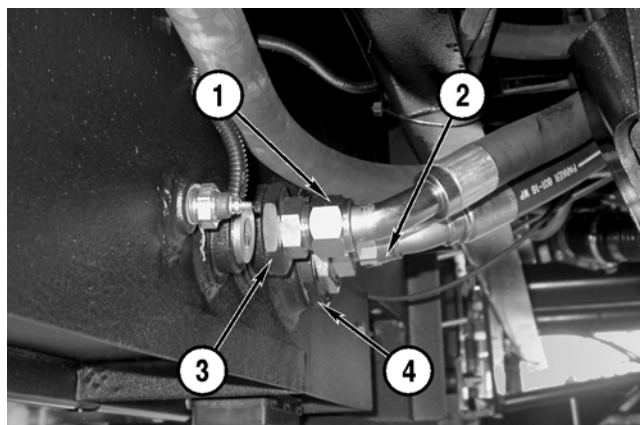
See "Clean Hydraulic Fluid Strainers" on page 5-18.

Remove the strainers (3) and (4) and dispose of properly.

Install the small diameter hydraulic fluid strainer (3), Part Number 840000010. Install the large diameter hydraulic fluid strainer (4), Part Number 840000011.

Fill the hydraulic fluid reservoir. See "Clean Hydraulic Fluid Strainers" on page 5-18.

Use the sightglass to check the fluid level. See "Check Hydraulic Fluid Level" on page 5-11.



LUBRICATION AND MAINTENANCE

Inspect and Repack Wheel and Inter-Flex Bearings

Contact your dealer.



Every Year

The following services must be performed every year.

Replace Engine Secondary Air Filter

IMPORTANT: Do not attempt to clean the secondary engine air filter. Always replace with a new filter.

The secondary engine air filter is mounted in the engine compartment, towards the cab.

Remove the two thumb screws and cover from the air cleaner assembly. Use a rocking motion to remove the primary air filter and set aside.

Use a rocking motion to remove the secondary air filter and discard the old filter. Do not leave the intake opening uncovered. If not replacing the filter immediately, cover the opening to prevent dirt and debris entering the intake system.

Install the new secondary engine air filter, Part Number 201300079.

Install the primary filter, air cleaner cover, and thumb screws.



LUBRICATION AND MAINTENANCE

Winterize Wet System

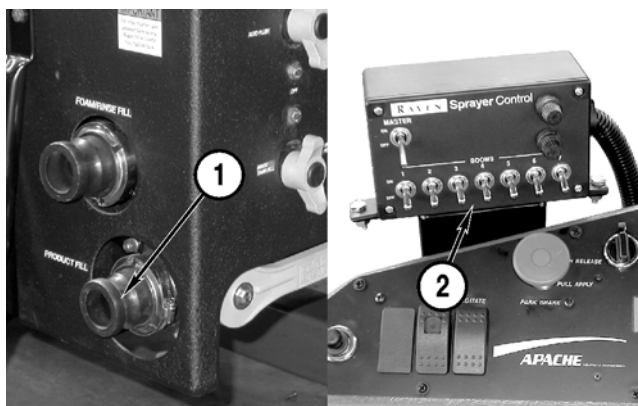
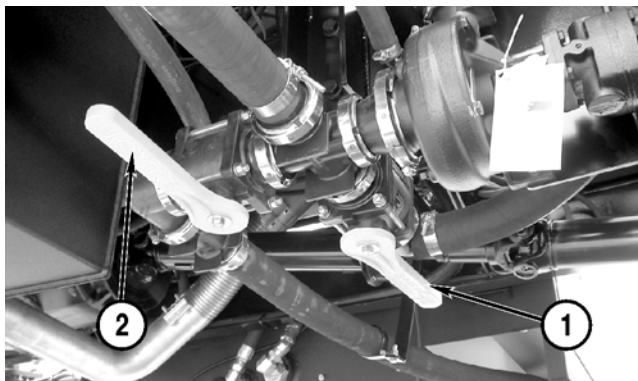
The product tank and wet system must be flushed before winterizing. See “Flushing Product Tank” on page 4-15. See “Flushing Wet System” on page 4-17.

Open the product tank fill valve, foam marker fill valve, rinse tank valve, and Roto-Flush valve to drain any remaining water in the tanks and Roto-Flush line.

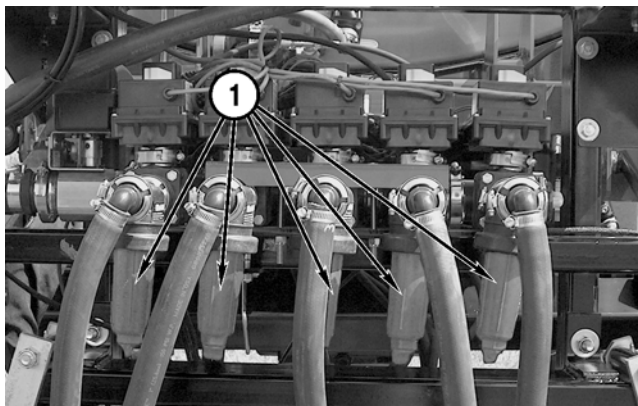
Close the rinse tank valve, foam marker valve, and sump valve. Set all boom section switches to the “ON” position and press the bottom half of the agitation switch to turn agitation off.

Connect a compressed air line to the main fill valve (1). Apply compressed air at 40 psi to blow out the wet system and booms. Cycle the boom section switches (2) off and on several times to purge water from around the valves.

Disconnect the air line and close the product fill valve.

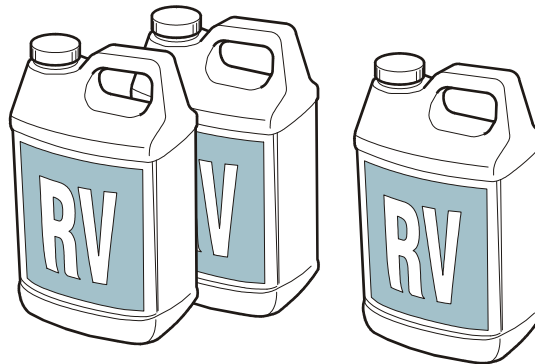


Remove all boom section strainers (1) and the product strainer. Replace the strainer bowls. Store the strainers in a warm, dry location.



LUBRICATION AND MAINTENANCE

Pour approximately 20 gallons [76 liters] of RV antifreeze into the product tank. Boom lengths over 60' will require more antifreeze. Pour 1 gallon [4 liters] of RV antifreeze into the rinse tank.



Repeatedly open and close the sump valve (1), rinse tank valve (2), and product valve (3), to allow the antifreeze to surround the ball valves.

Close the rinse tank valve (2) and open the sump valve (1).

Except for one nozzle at the end of each boom section, turn off all the nozzle bodies.

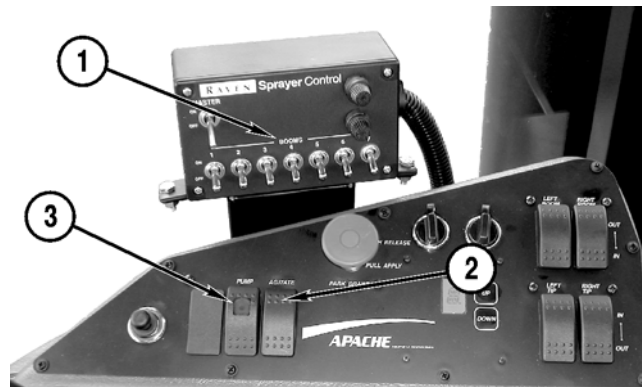
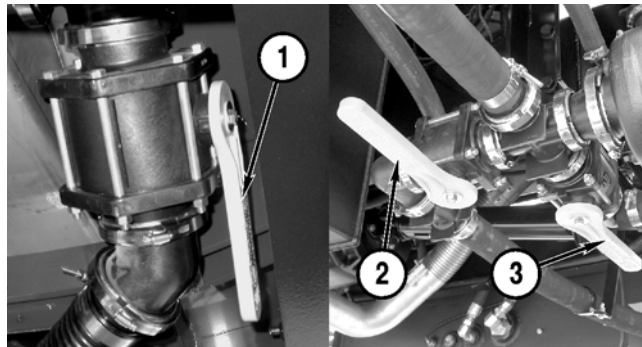
Open all manual valves halfway and then close to allow any trapped water to escape.

IMPORTANT: DO NOT run the product pump dry. Damage to the pump seals will result. DO NOT intentionally dead-head the pump with high pressures. Damage to the pump seals will result.

Start the engine. Unfold and lower the booms as far as possible. Set all boom section switches to the “OFF” position and press the top half of the agitation switch to increase agitation. Set the product pump switch to the “ON” position.

Press the bottom half of the agitation switch (2) to turn agitation off. One at a time, set the boom section switches (1) to the “ON” position until antifreeze flows from the open nozzle in each boom section, then turn the boom sections to “OFF”. Set the product pump switch (3) to the “OFF” position.

Excess antifreeze may be left in the sprayer.



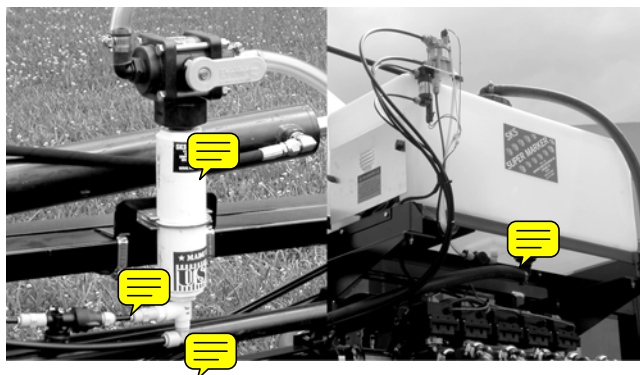
LUBRICATION AND MAINTENANCE

Disconnect the air and water hoses from the foam chamber on each boom.

Remove the strainer on each foam chamber and remove the strainer bowl from the bottom of the foam tank. Store the strainers in a warm, dry location.

Add approximately 2 quarts [1.9 liters] of windshield washer fluid to the foam tank.

Operate the foam marker until the washer fluid flows from the foam hoses on each boom.



Replace Cab Recirculating Air Filter

IMPORTANT: Do not attempt to clean the old cab air filters. Always replace with a new filter.

The recirculating air filter (1) is mounted in the cab, behind the driver's seat.

Grasp the edge of the filter and slide the old air filter up and out of the frame. Discard the old filter.

Insert a new filter, Part Number 490006660 into the frame with the air flow arrow pointing toward the driver's seat.



Replace Cab Charcoal Air Filter

The charcoal cab air filter is mounted in the cab, to the left of the driver's seat. The cover is shown removed for clarity.

Remove the two thumb screws and air filter cover. Slide the old air filter out of the frame and discard.

IMPORTANT: Do not allow old cab filters to stay in the cab. Once removed, dispose of the filters immediately.

IMPORTANT: Do not attempt to clean the old cab air filter. Always replace with a new filter.

Insert a new filter, Part Number 490003650, into the frame with the air flow arrow pointing toward the driver's seat.

Replace the cover and thumb screws.



LUBRICATION AND MAINTENANCE

Replace Drop Box Fluid

The drop box drain, level, and fill plugs are located on the drop box at each rear wheel. The left drop box is shown.

Remove the drain plug (1) and drain the fluid into a suitable container. Dispose of the fluid properly.

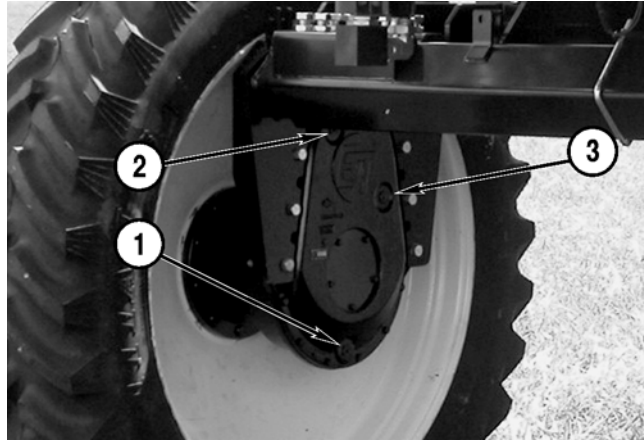
Install the drain plug.

IMPORTANT: Use only Chevron 1000 THF for the drop box fluid.

Remove the drop box fill plug (2) and level plug (3). Add fluid until it is level with the bottom of the level hole (3). The approximate capacity of each drop box is 10.5 quarts [10 liters].

Install and tighten the fill plug (2) and the level plug (3).

Repeat the steps for the other drop box.



Every 1000 Hours

The following services must be performed after every 1000 hours of operation of the Apache Sprayer.

Replace Hydraulic Fluid

The hydraulic fluid drain plug (1) is located under the vehicle, on the bottom of the hydraulic fluid reservoir. The hydraulic fluid fill location (2) is on top of the reservoir.

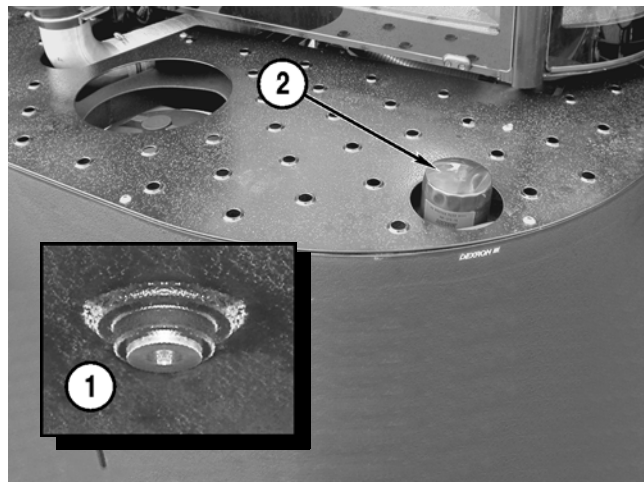
Remove the hydraulic fluid drain plug and drain the fluid into a suitable container with a capacity of approximately 30 gallons [113.5 liters]. Dispose of the fluid properly.

Install the drain plug.

IMPORTANT: Use only Dexron III ATF transmission fluid for the Apache Sprayer hydraulic system.

Fill the hydraulic fluid reservoir with Dexron III ATF. The reservoir capacity is approximately 30 gallons [113.5 liters].

Use the sightglass to check the fluid level. See "Check Hydraulic Fluid Level" on page 5-11.



TORQUE VALUE CHARTS

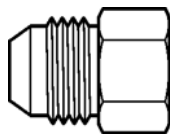
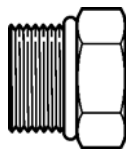
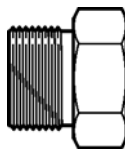
Fittings

Always tighten fittings to the values below unless a different torque value is specified.

Make sure fitting threads are clean and threads are engaged properly.

All torque values are adopted from SAE J514 and SAE J1453.

Size Chart

SAE Dash Size			
	SAE (JIC) 37 Flare Thread	O-ring Style Straight Thread	Face Seal
	Size	Size	Size
2	5/16-24	5/16-24	----
3	3/8-24	3/8-24	----
4	7/16-20	7/16-20	9/16-18
5	1/2-20	1/2-20	----
6	9/16-18	9/16-18	11/16-16
8	3/4-16	3/4-16	13/16-16
10	7/8-14	7/8-14	1-14
12	1 1/16-12	1 1/16-12	1 3/16-12
14	1 3/16-12	1 3/16-12	----
16	1 5/16-12	1 5/16-12	1 7/16-12
20	1 5/8-12	1 5/8-12	1 11/16-12
24	1 7/8-12	1 7/8-12	2-12
32	2 1/2-12	2 1/2-12	----

Torque Value Chart

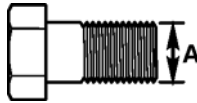
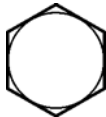


SAE Dash Size	TORQUE					
	SAE 37 Flare		O-ring Straight Thread		Face Seal	
	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m
2	4	5	4	5	----	----
3	8	11	9	12	----	----
4	12	16	16	22	18	25
5	15	20	22	30	---	---
6	18	25	35	48	27	37
8	37	50	60	82	40	54
10	48	65	105	143	63	86
12	74	100	140	190	92	125
14	88	120	184	250	----	----
16	100	135	221	300	122	165
20	133	180	258	350	147	200
24	166	225	317	430	166	225
32	236	320	----	----	----	----

TORQUE VALUE CHARTS







Bolts

Always tighten fittings to the values below unless a different torque value is specified. Fasteners must always be replaced with the same grade. Make sure fitting threads are clean and threads are engaged properly. All torque values are adopted from SAE J1701 and SAE J1701M.

SAE Series Torque Value Chart

 A = Bolt Diameter		 SAE Grade 2 (No Markings)		 SAE Grade 5 (3 Radial Dashes)		 SAE Grade 8 (6 Radial Dashes)	
A Diameter (Inches)	Wrench Size	GRADE					
		SAE 2		SAE 5		SAE 8	
		lb-ft	N•m	lb-ft	N•m	lb-ft	N•m
1/4"	7/16"	6	8	10	13	14	18
5/16"	1/2"	12	17	19	26	27	37
3/8"	9/16"	23	31	35	47	49	67
7/16"	5/8"	36	46	55	75	78	106
1/2"	3/4"	55	75	85	115	120	163
9/16"	13/16"	78	106	121	164	171	232
5/8"	15/16"	110	149	170	230	240	325
3/4"	1 1/8"	192	261	297	403	420	569
7/8"	1 5/16"	306	416	474	642	669	907
1"	1 1/2"	467	634	722	979	1020	1383

Metric Series Torque Value Chart

 Diameter & Thread Pitch (Millimeters)		 Metric Grade 8.8	 Metric Grade 10.9	 Metric Grade 8.8	 Metric Grade 10.9	 Diameter & Thread Pitch (Millimeters)				
	Wrench Size	Course Thread					Fine Thread			
		Metric 8.8		Metric 10.9			Metric 8.8		Metric 10.9	
		N•m	lb-ft	N•m	lb-ft		N•m	lb-ft	N•m	lb-ft
6 x 1.0	10	8	6	11	8	8	6	11	8	6 x 1.0
8 x 1.25	13	20	15	27	20	21	16	29	22	8 x 1.25
10 x 1.5	16	39	29	54	40	41	30	57	42	10 x 1.5
12 x 1.75	18	68	50	94	70	75	55	103	76	12 x 1.75
14 x 2.0	21	109	80	151	111	118	87	163	120	14 x 2.0
16 x 2.0	24	169	125	234	173	181	133	250	184	16 x 2.0
18 x 2.5	27	234	172	323	239	263	194	363	268	18 x 2.5
20 x 2.5	30	330	244	457	337	367	270	507	374	20 x 2.5
22 x 2.5	34	451	332	623	460	495	365	684	505	22 x 2.5
24 x 3.0	36	571	421	790	583	623	459	861	635	24 x 3.0
30 x 3.0	46	1175	867	1626	1199	1258	928	1740	1283	30 x 3.0

TROUBLESHOOTING

Apache Sprayer Troubleshooting Symptoms and Solutions

SYMPTOM	SOLUTION
Parking brake will not engage.	Check brake pads for wear. Inspect linkage for wear. Check linkage adjustment at the caliper.
Vehicle will not move forward or backward.	Parking brake is engaged. Check electrical connections on parking brake and transmission. Contact your dealer.
Constant alarm sounds when vehicle moves forward or backward.	Check hydraulic temperature sending unit.
Vehicle will not move forward.	Check driveshaft. Check transmission fluid level. Check electrical connections on transmission. Contact your dealer.
Vehicle will not move backward.	Check driveshaft. Check transmission fluid level. Check electrical connections on transmission. Contact your dealer.
Engine will not start.	T-Handle is not in neutral position. Check diesel fuel level. Check neutral safety relay. Check electrical connections in side console, under T-Handle
Vehicle steering does not work.	Check hydraulic fluid level. Check for hydraulic fluid leaks. Check steering column coupling on steering motor.
Transmission will not shift gears.	Check transmission fluid level. Contact your dealer.

TROUBLESHOOTING

SYMPTOM	SOLUTION
Vehicle brakes do not work.	Check brake fluid level. Tighten brake fluid reservoir cap. Check differential fluid level. Check push rods on master cylinder. Contact your dealer.
No power to console in cab.	Check electrical connections in right rear corner of cab, near fuse box.
Road and service lights do not work.	Confirm light switches in "ON" position. Check electrical connections to switches. Check for power at light housings. Contact your dealer.
Turn signals and/or flashers do not work.	Confirm lever/switch in "ON" position. Check electrical connections at light housings. Check for power at light housings.
Booms will not fold or unfold.	Confirm engine is running. Check hydraulic fluid level. Confirm booms are greased properly. Check for hydraulic fluid leaks. Check electrical connections in cab and at boom manifold.
Booms will not tilt up or down.	Confirm engine is running. Check hydraulic fluid level. Check for hydraulic fluid leaks. Check electrical connections in cab and at boom manifold.

TROUBLESHOOTING

SYMPTOM

SOLUTION

Apache will not spray.

Confirm engine is running.
Confirm product in product tank.
Confirm ball valves from tank to product pump are open.
Confirm product pump is turned on.
Check ground speed on Raven display.
Confirm boom valves are opening.

Booms will not turn off.

Check boom valves for operation.
Check electrical connections at boom valves.
Check electrical connections in cab.

Seat will not raise or lower.

Check wire connections at right side of seat.

Raven monitor does not turn on.

Check fuse in back of console.

Front suspension cylinder is flat.

Lift tire off ground and check accumulator fluid. If fluid is foaming, the accumulator has failed. If fluid is low, fill to top of plug. Check operation.
Contact your dealer.

Rear suspension will not rise.

Check hydraulic fluid level.
Check electrical connections at suspension block and switches.

Product pump will not turn on.

Confirm product pump switch in "ON" position.
Check electrical connections at hydraulic valve block.
Check electrical connections in cab.

A/C does not cool.

Confirm A/C switch in "ON" position.
Confirm fan in "ON" position.
Check belt to compressor.
Contact your dealer.

TROUBLESHOOTING

SKS Foam Marker Troubleshooting

If you're not making good foam:

1. Check the water strainer (between the tank and the water pump). Remove and clean the strainer and bowl.
2. Check and clean the disc and strainer located at the bottom of the foam chambers, where the water line comes into the foam chamber. Unscrew the fitting from the chamber to reveal the disc and the strainer. This will need to be performed on both booms.
NOTE: The disc and strainer must be installed for proper operation.
3. Check water pressure with a gauge, it should be approximately 40 psi [276 kPa].
4. Check air pressure with a gauge on the outlet side of the compressor should be 40 to 50 psi [276 kPa to 345 kPa]. If the air pressure is not within specification, see instructions below.

NOTE: More foam concentrate is needed when air bubbles go down the line.

Little or no air pressure:

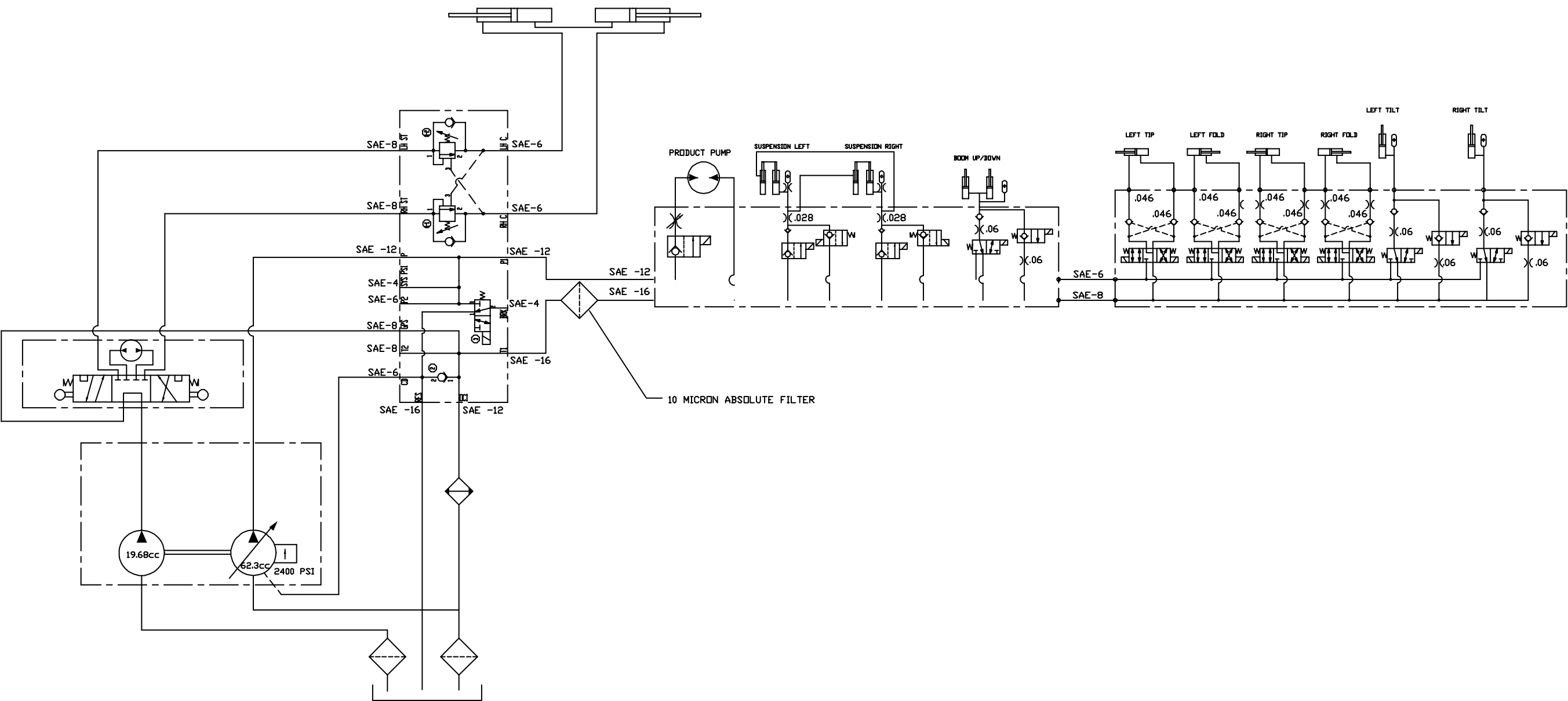
1. Check and clean the breather on the compressor. The compressor is located under the foam tank (remove aluminum cover to access). The breather is black, round, and threads into the top plate of the compressor.
2. Remove the breather assembly from the compressor by unscrewing it from the compressor. Then remove the end of the breather by popping off the end cap.
3. Clean the filter by blowing compressed air over the filter. Replace if filter is too dirty to be cleaned properly. ETI Part Number 540000005.
4. Assemble breather and check operation. If there is still little or no air pressure, go to step 5.
5. Check to make sure there is a full 12 volts going to the compressor. If the voltage is correct, then replace the compressor. If it is not correct, then contact your Apache sprayer dealer.

Troubleshooting Other Systems

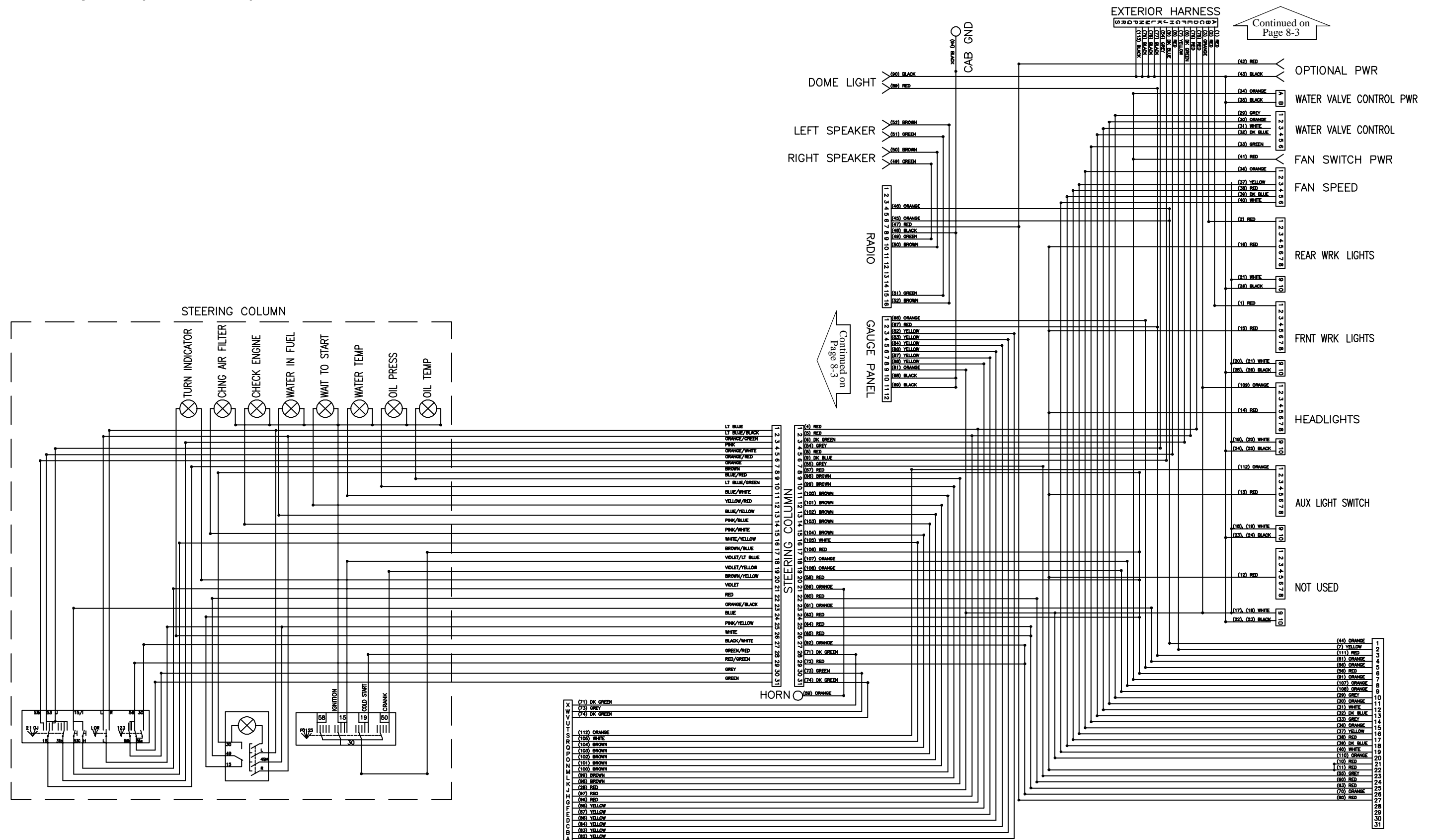
For troubleshooting information on the engine, Raven controller, and the Ace product pump, please see the manuals for each supplied with the Apache sprayer.

SYSTEM SCHEMATICS

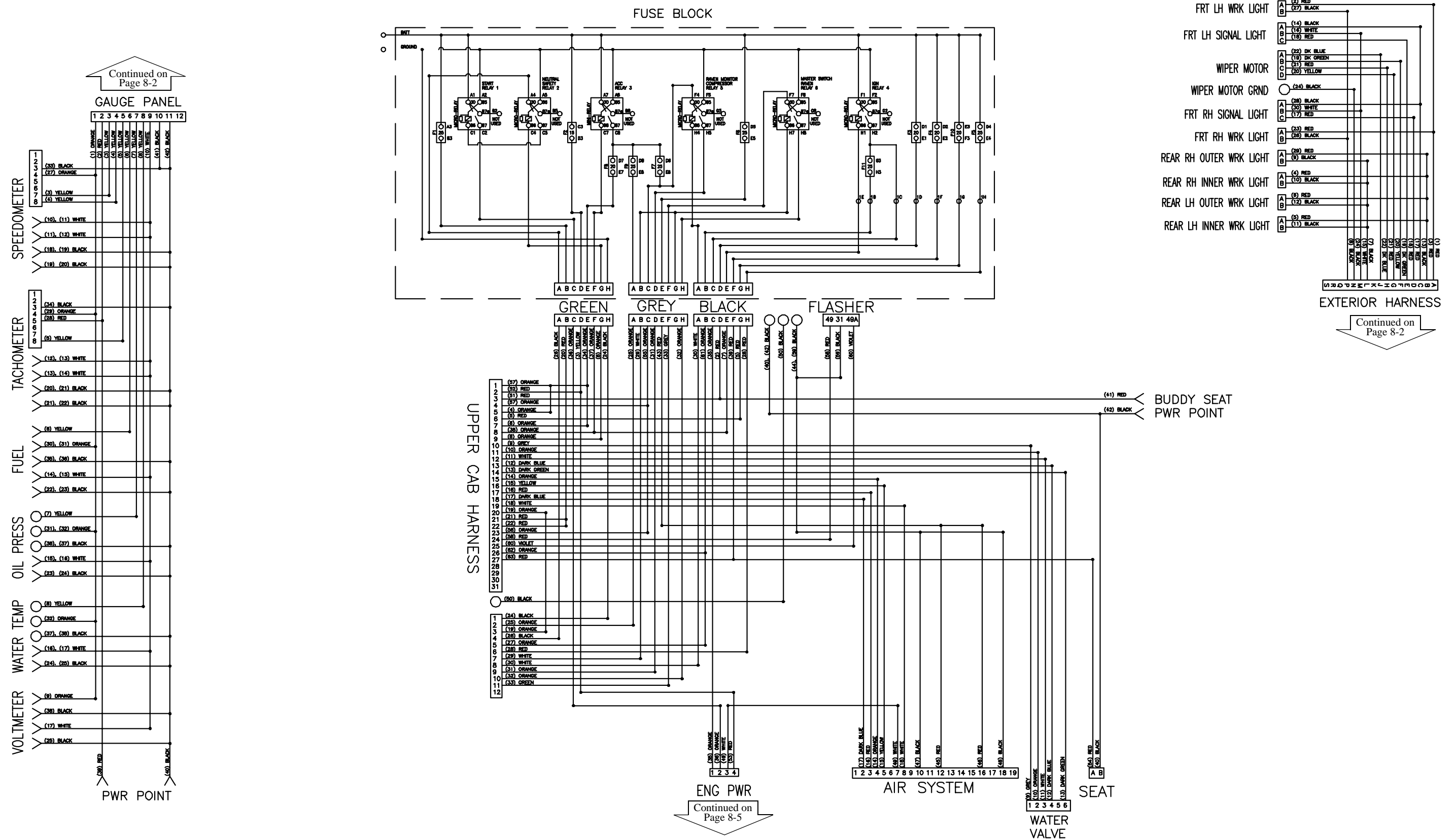
Hydraulic System



Electrical System (Sheet 1 of 5)

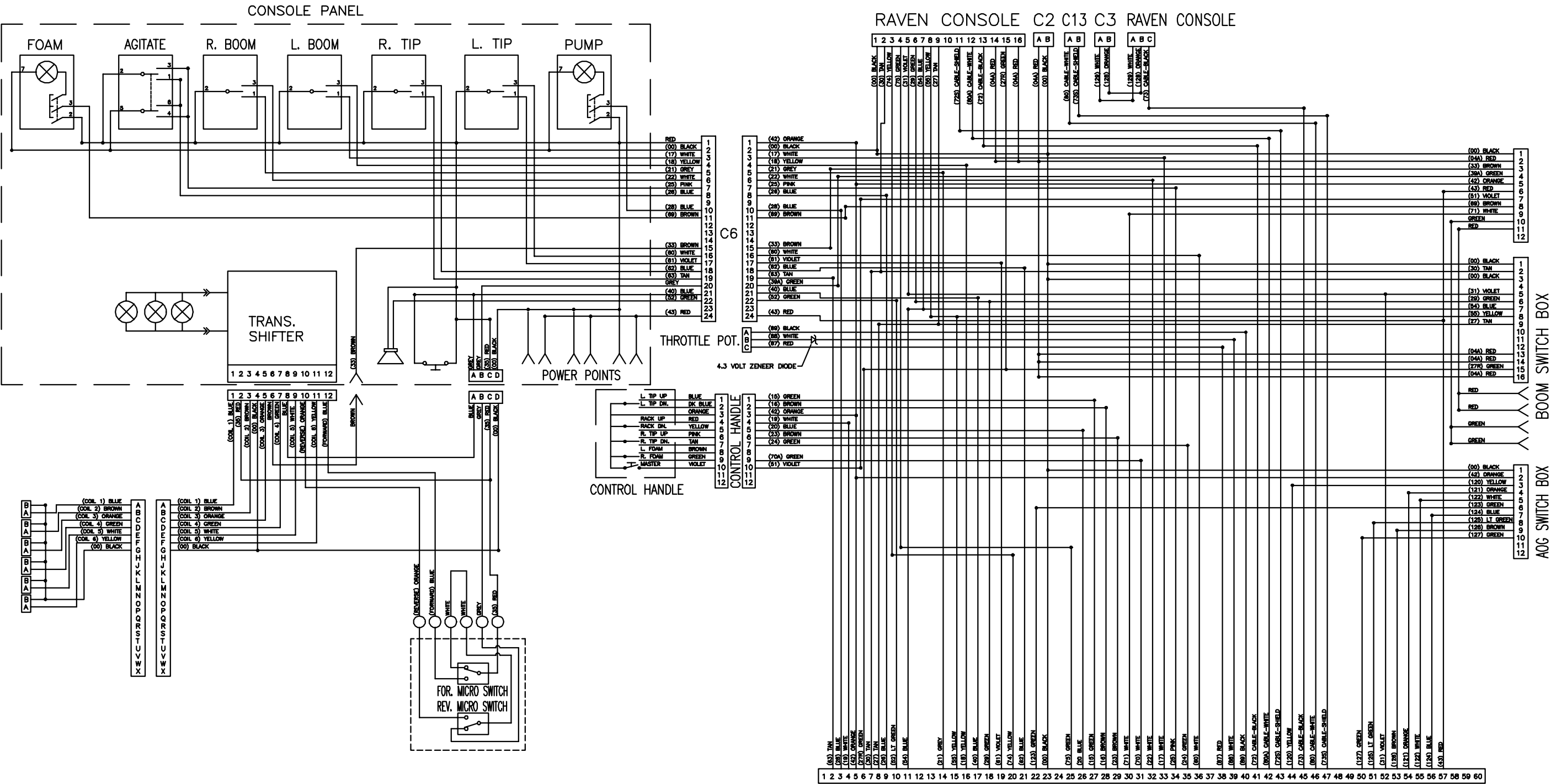


Electrical System (Sheet 2 of 5)



SYSTEM SCHEMATICS

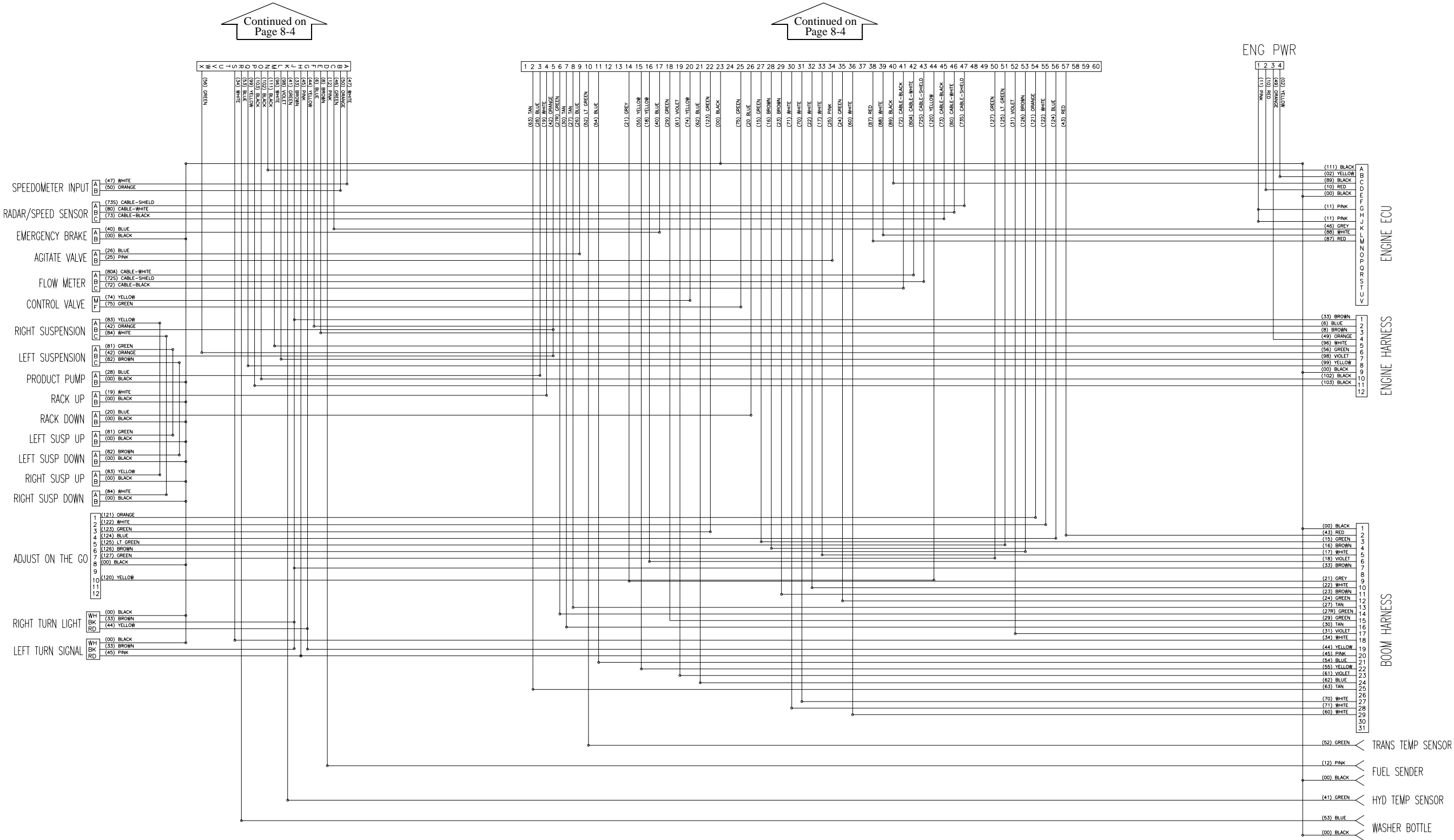
Electrical System (Sheet 3 of 5)



Continued on
Page 8-5

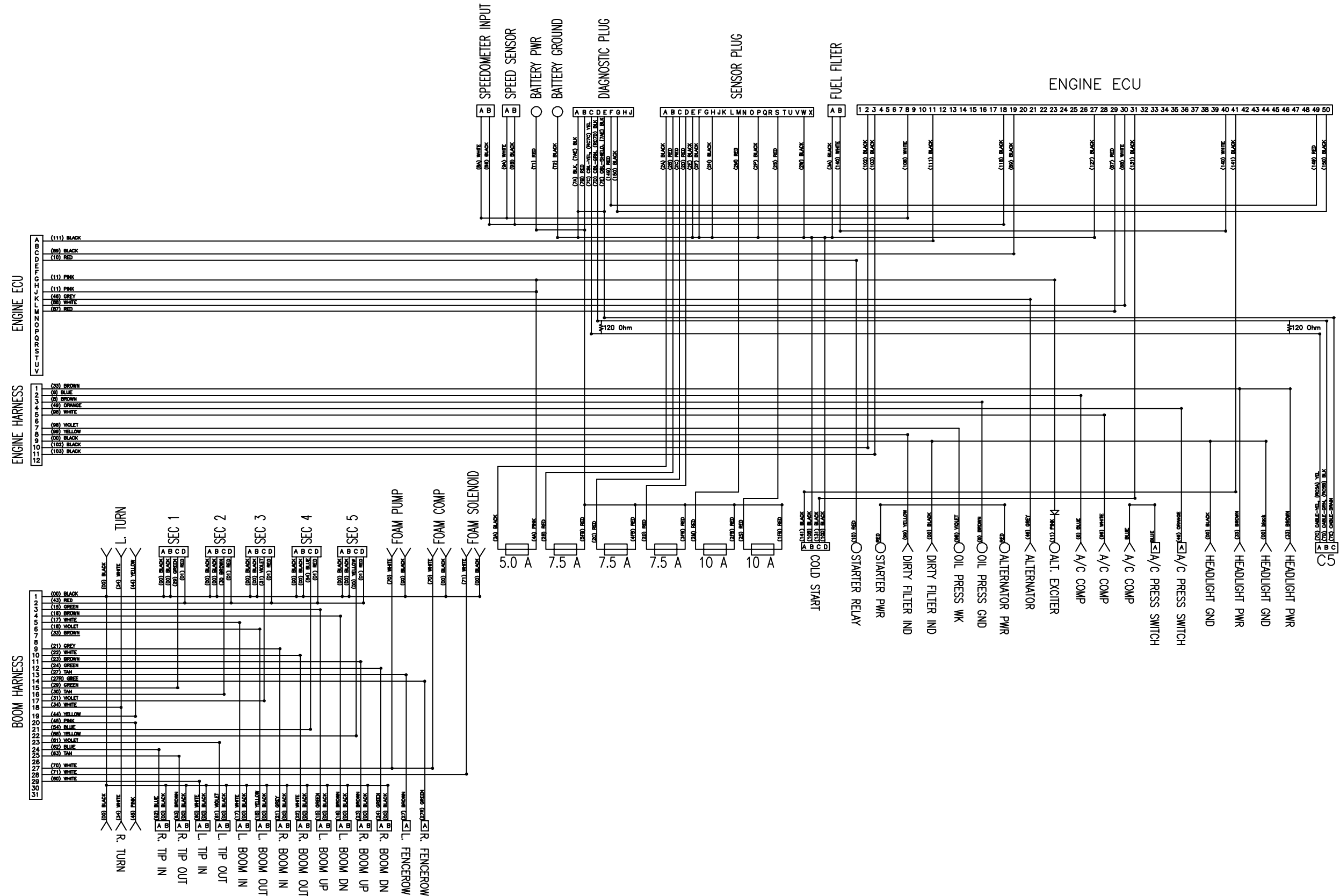
SYSTEM SCHEMATICS

Electrical System (Sheet 4 of 5)



SYSTEM SCHEMATICS

Electrical System (Sheet 5 of 5)



WARRANTY

Equipment Technologies Inc.

2003 AND NEWER APACHE LIMITED WARRANTY POLICY

Equipment Technologies Inc. (hereinafter called ETI) warrants each new Apache to be free from defects in materials and workmanship for a period of five (5) years or two thousand (2000) hours, whichever occurs first, from the date of delivery to the original purchaser, with the exclusions listed herein. Under no circumstances does this limited warranty cover any merchandise or component parts, which, in the sole opinion of ETI, have been subject to negligent, misuse, improper storage, alteration, accident, or if repairs have been made with parts other than those manufactured, supplied, and/or authorized by ETI. Under no circumstances are component parts warranted against normal wear and tear. There is no warranty on glass, parking brake pads, brake linings, filters, oils, product pump seals, product pump bearings, rubber product hoses, or pressure gauges.

First Year - Limited warranty covers the total machine for the first year from the date of delivery to the original purchaser or one thousand (1000) hours whichever occurs first, for both parts and labor. Under no circumstances does this limited warranty cover any merchandise or component parts, which, in the opinion of ETI, have been subject to negligent, misuse, improper storage, alteration, accident, or if repairs have been made with parts other than those manufactured, supplied, and/or authorized by ETI. For engine, tire, and battery warranty please see below.

Second Year - Limited warranty covers the driveline and chassis components for both parts and labor from the date of delivery to the original purchaser or one thousand (1000) hours which ever comes first. The following components are covered under the second year of warranty. Transmission and it's internal components, rear differential and it's internal components, front axle assembly (excludes seals, bearings, wear pads, suspension cylinder, accumulator, and steering cylinders), frame rails, engine bolster, rear axle assembly (excludes wear pads, drive shafts, and rear suspension components), planetaries and their internal components (excludes bearings, seals, and o rings), drop boxes and their internal components, and frame cross members and any bracket that bolts directly to the frame rails. This portion of coverage is subject to all listed conditions but further excludes oil, seals, gaskets and leakage.

Years Three through Five - Limited warranty covers the driveline and chassis components for parts only from the date of delivery to the original purchaser or two thousand (2000) hours which ever comes first. The following components are covered under year's three through five of warranty. Transmission and it's internal components, rear differential and it's internal components, front axle assembly (excludes seals, bearings, wear pads, suspension cylinder, accumulator, and steering cylinders), frame rails, engine bolster, rear axle assembly (excludes wear pads, drive shafts, and rear suspension components), planetaries and their internal components (excludes bearings, seals, and o rings), drop boxes and their internal components, and frame cross members and any bracket that bolts directly to the frame rails. This portion of coverage is subject to all listed conditions but further excludes oil, seals, gaskets and leakage.

Engine Warranty - The limited engine warranty is covered by the engine manufacturer for two (2) years or two thousand (2000) hours from the date of delivery to the original purchaser, whichever comes first. ETI does warranty the a/c compressor, a/c belt, and engine belt for the first year only. The engine manufacturer warrants all other bolt on and engine components. See engine warranty for complete details.

Tires - The tire manufacturer covers the tire warranty. Contact your local authorized dealer for complete warranty details.

Batteries - Batteries are warranted for thirty (30) months. Batteries are warranted through any authorized Interstate battery retailer. If you have no authorized Interstate battery retailer contact ETI for warranty replacement information.

ETI's obligation under this limited warranty is limited to repairing or replacing free of charge to the original purchaser, at a location designated by ETI, any part that in ETI's sole judgment, shows evidence of defect or improper workmanship, provided that the part is returned to ETI within thirty (30) days of the repair date. Parts must be returned through the authorized selling dealer, transportation charges pre-paid. All returned parts must be clean from all chemicals and/or oils.

WARRANTY

ETI'S obligation under this limited warranty is in lieu of all other warranties or representations, expressed or implied, and specifically excludes any obligations or liability for loss of crops, losses caused by harvest delays or any expense or loss of labor, supplies, rental equipment, and all incidental or consequential damages. The replacement of parts and/or repair is the exclusive remedy under this limited warranty. ETI reserves the right to repair or replace any defective part or parts. No person is authorized to give any other warranties or to assume any other liability on ETI's behalf. This limited warranty is void if ETI's limited warranty policy maintenance standards are violated.

ETI makes NO warranty of merchantability or fitness for a particular purpose. This machine must be registered with ETI within ten (10) working days from the date of delivery to the original purchaser.

All inquiries about this warranty policy should be addressed to:

Warranty Department
2201 Hancel Parkway
Mooresville, IN 46158

Telephone: 317-834-4500

2005 Apache 1200 Series

Component	Lubrication	Capacity Quarts [Liters]	Filter Part Number
Engine Oil	15w-40 Motor Oil	16 [15]	201450241
Engine Coolant	Chevron Supreme	23 [21.8]	----
Engine Primary Air Filter	----	----	201300078
Engine Secondary Air Filter	----	----	201300078
Transmission*	Dexron III ATF	16 [15]	300100110
Differential (Rear Axle)	Chevron 1000 THF	26.4 [25]	----
Planetary	Chevron 1000 THF	2.2 [2]	----
Rear Drop Box	Chevron 1000 THF	21 [20]	----
Brake Reservoir	Chevron 1000 THF	as required	----
Engine Fuel	Diesel	100 Gallons [341 Liters]	Engine Mounted: 201450203 In-Line: 201450202
Hydraulic System	Dexron III ATF	30 Gallons [113.5 Liters]	Filter: 840000013 Strainer: 840000010** Strainer: 840000011**
Front Suspension	Chevron 1000 THF	as required	----
A/C System	R134a	3 Lbs.	----
Cab Charcoal Filter	----	----	490003650
Cab Recirculating Filter	----	----	490006660

* - Check transmission fluid level with the engine running, transmission in neutral, and the transmission fluid hot. See "Check Transmission Fluid Level" on page 5-11.

** - The hydraulic fluid strainers are mounted in the hydraulic reservoir and may be cleaned and reused. See "Clean Hydraulic Fluid Strainers" on page 5-18.

NOTE: Any oil and fluid substitutions must meet or exceed recommended fluid specifications.

Tire Pressure (Cold)

14.9 x 38" 22 psi [242 kPa]

14.9 x 46", Titan 10 Star 78 psi [538 kPa]

Lug Nut Torque

Front 400 lb-ft [542 N•m]

Rear 400 lb-ft [542 N•m]

Wet System Capacities

Product Tank 1000 gallons [3785 liters]

Rinse Tank 50 gallons [189 liters]

SKS Foam Marker Tank 25 gallons [95 liters]

Hydraulic Pump Output

.....2650 psi [183 bar] @ maximum engine rpm

Raven Controller Numbers

Valve CAL # 2123

Speed CAL # w/ Radar Gun (approximate) 615

Speed CAL # w/ Drive Shaft Sensor (approximate) 252

2005 Apache 1000 Series

Component	Lubrication	Capacity Quarts [Liters]	Filter Part Number
Engine Oil	15w-40 Motor Oil	16 [15]	201450241
Engine Coolant	Chevron Supreme	23 [21.8]	----
Engine Primary Air Filter	----	----	201300078
Engine Secondary Air Filter	----	----	201300078
Transmission*	Dexron III ATF	16 [15]	300100110
Differential (Rear Axle)	Chevron 1000 THF	26.4 [25]	----
Planetary	Chevron 1000 THF	2.2 [2]	----
Rear Drop Box	Chevron 1000 THF	21 [20]	----
Brake Reservoir	Chevron 1000 THF	as required	----
Engine Fuel	Diesel	100 Gallons [341 Liters]	Engine Mounted: 201450203 In-Line: 201450202
Hydraulic System	Dexron III ATF	30 Gallons [113.5 Liters]	Filter: 840000013 Strainer: 840000010** Strainer: 840000011**
Front Suspension	Chevron 1000 THF	as required	----
A/C System	R134a	3 Lbs.	----
Cab Charcoal Filter	----	----	490003650
Cab Recirculating Filter	----	----	490006660
<p>* - Check transmission fluid level with the engine running, transmission in neutral, and the transmission fluid hot. See "Check Transmission Fluid Level" on page 5-11.</p> <p>** - The hydraulic fluid strainers are mounted in the hydraulic reservoir and may be cleaned and reused. See "Clean Hydraulic Fluid Strainers" on page 5-18.</p> <p>NOTE: Any oil and fluid substitutions must meet or exceed recommended fluid specifications.</p>			

Tire Pressure (Cold)

14.9 x 38" 20 psi [242 kPa]
 14.9 x 46" 60 psi [414 kPa]

Lug Nut Torque

Front 400 lb-ft [542 N•m]
 Rear 400 lb-ft [542 N•m]

Wet System Capacities

Product Tank 1000 gallons [3785 liters]
 Rinse Tank 50 gallons [189 liters]
 SKS Foam Marker Tank 25 gallons [95 liters]

Hydraulic Pump Output

..... 2650 psi [183 bar] @ maximum engine rpm

Raven Controller Numbers

Valve CAL # 2123
 Speed CAL # w/ Radar Gun (approximate) 615
 Speed CAL # w/ Drive Shaft Sensor (approximate) 252



Equipment Technologies, Inc.
 2201 Hancel Parkway
 Mooresville, IN 46158
 Tel: (317) 834-4500
 Fax: (317) 834-4501

Your Apache Dealer: