APACHE™

AS1010 & AS1210

2007 Owner's Manual

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

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

FORM # 580000039

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


APACHE

SPECIFICATIONS

	AS1010		AS1210
Tank Capacity	850 gallons (1000 gallons optional)		1200 gallons
Engine	215 Cummins Tier III 655 ft-lb@1500 rpm		275 Cummins Tier III 655 ft-lb@1500 rpm
Transmission	Standard: ITL Powershift 6-speed torque converted Optional: Funk Powershift 6-speed torque converted		Funk Powershift 6-speed, torque converted
Speeds	ITL 6-Speed 1st 0-5 mph 2nd 0-8 mph 3rd 0-11 mph 4th 0-18 mph 5th 0-29 mph 6th 0-36 mph	Funk Transmission 1st 0-5 mph 2nd 0-8 mph 3rd 0-11 mph 4th 0-18 mph 5th 0-29 mph 6th 0-36 mph	1st 0-5 mph 2nd 0-8 mph 3rd 0-11 mph 4th 0-18 mph 5th 0-29 mph 6th 0-36 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	36”, 42”, 48”		48”
Axles	Narrow fixed: 88” to 90”, 100” to 101”, 102” - 104”, 105” to 114”. 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	17,329 lbs. (approximate) Dry weight with poly tank.		20,170 lbs. (approximate) Dry weight with stainless steel tank.
Width	144” (12’)		
Height	144” (42” crop clearance)		
Length	27’		
Booms	60’, 75’, 80’, 90’, 100’ 60/80, 60/90		
Boom Height	14” to 74” (42” crop clearance); 20” to 80” (48” crop clearance)		
Wheel Base	173” (14’5”)		
Tires	Standard Front: 12.4 x 28 Standard Rear: 380/90R46 Optional Front: 380/80R38 Optional Rear: 320/90R46		Standard Front: 380/80R38 Standard Rear: 380/90R46
Turning Radius	17’		
Fuel Capacity	100 gallons		

	AS1010	AS1210
Product Pump	Hypro 9306S HM1C, hydraulically driven centrifugal pump	

General Information

The graphics and text in this manual generally describe the AS1010 and AS1210 Apache Sprayers. Apache Sprayers differ by model and by optionally installed equipment. Your Apache Sprayer may not exactly match the graphics and/or text descriptions in this manual. Please contact your dealer or Equipment Technologies with any questions regarding this manual or the instructions within.

CONTENTS

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 Eductor 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 “Lubrication and Maintenance” section of this manual. See “Lubrication and Maintenance” on page 5-1.

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 routing 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.

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.

Left-Side Decals

⚠WARNING

HIGH-PRESSURE OIL LEAKS CAN PENETRATE SKIN RESULTING IN SERIOUS INJURY, GANGRENE OR DEATH

- Check for leaks with cardboard; never use hand.
- Before loosening fittings: lower load, release pressure, and be sure oil is cool.
- Consult physician immediately if skin penetration occurs.

420305513

⚠WARNING

AGRICULTURAL CHEMICALS CAN BE DANGEROUS. IMPROPER SELECTION OR USE CAN SERIOUSLY INJURE PERSONS, ANIMALS, PLANTS, SOIL, OR OTHER PROPERTY. SELECT THE RIGHT CHEMICAL FOR THE JOB. HANDLE IT WITH CARE. FOLLOW THE INSTRUCTIONS ON THE CONTAINER LABEL AND INSTRUCTIONS FROM THE EQUIPMENT MANUFACTURER.

420305518

⚠CAUTION

NO RIDERS

420305530

⚠CAUTION

STAY BACK AUTOMATIC LADDER; MAY MOVE UNEXPECTEDLY.

420305527

IMPORTANT

Fill rinse, foamer, and product tank slowly. Rapid fill or overfill may rupture tank.

420305740

⚠ WARNING ⚠

BLOW DIRT OUT OF COMPRESSOR FILTERS AND BOX AT LEAST ONCE A WEEK. DURING EXTREME DIRTY CONDITIONS MORE OFTEN.

NOTE

For 36 and 42”cc machines: Torque wheel bolts to 225 foot

⚠CAUTION

TORQUE WHEEL BOLTS TO **225** FOOT POUNDS. CHECK DAILY FOR FIRST WEEK OF OPERATION AND WEEKLY THEREAFTER.

420305560

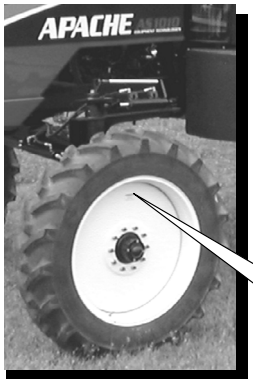
NOTE

For 48”cc machines: Torque wheel bolts to 315 foot pounds.

⚠CAUTION

TORQUE WHEEL BOLTS TO **315** FOOT POUNDS. CHECK DAILY FOR FIRST WEEK OF OPERATION AND WEEKLY THEREAFTER.

420305560



NOTE

For 12.4X28” tires: Torque wheel bolts to 180 foot pounds.

⚠CAUTION

TORQUE WHEEL BOLTS TO **130** FOOT POUNDS. CHECK DAILY FOR FIRST WEEK OF OPERATION AND WEEKLY THEREAFTER.

420305560

NOTE

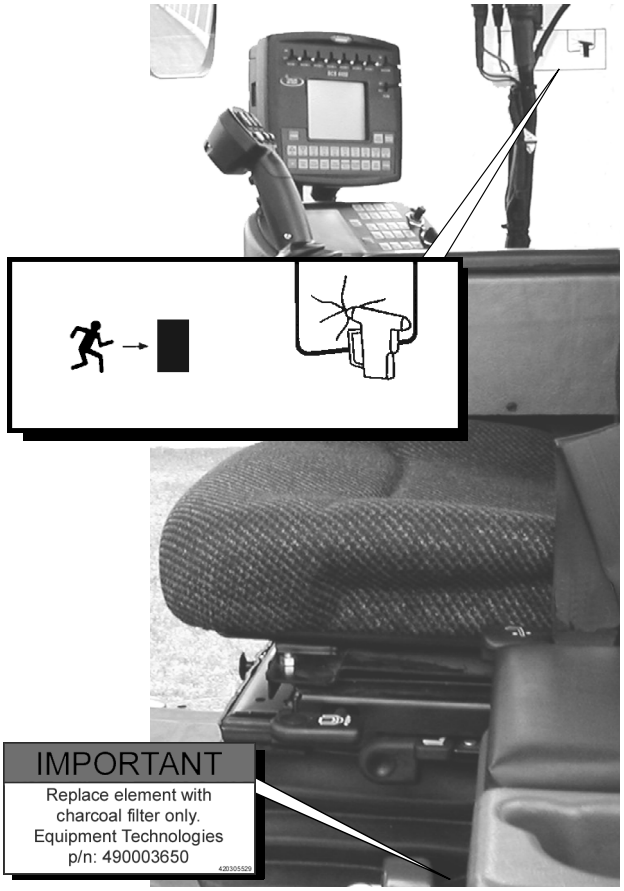
For 14.9X38” tires: Torque wheel bolts to 225 foot pounds.

⚠CAUTION

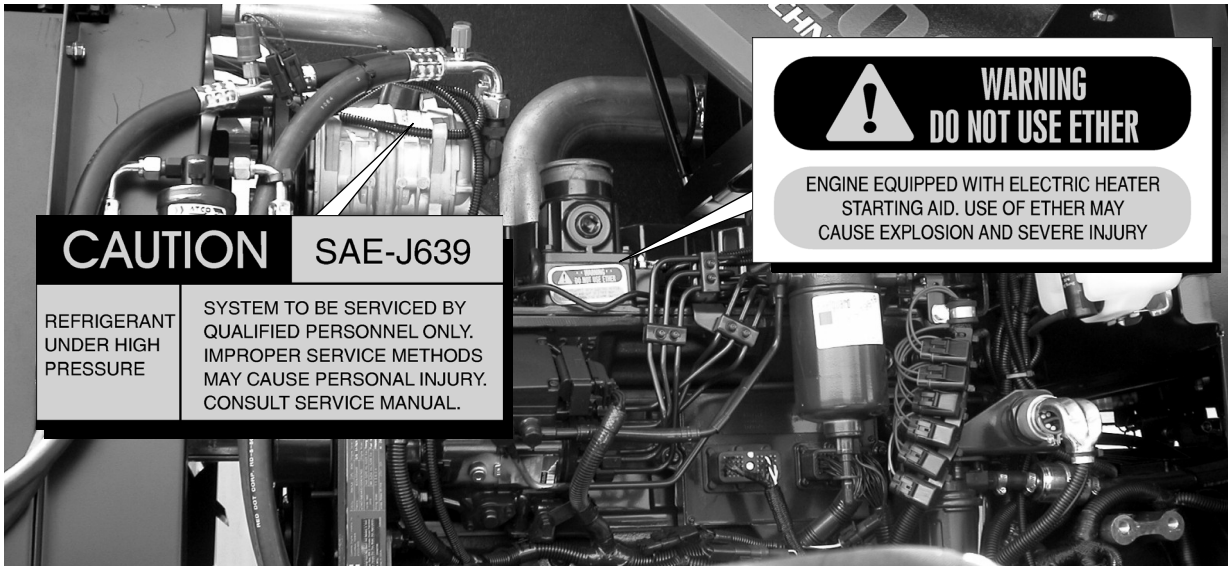
TORQUE WHEEL BOLTS TO **225** FOOT POUNDS. CHECK DAILY FOR FIRST WEEK OF OPERATION AND WEEKLY THEREAFTER.

420305560

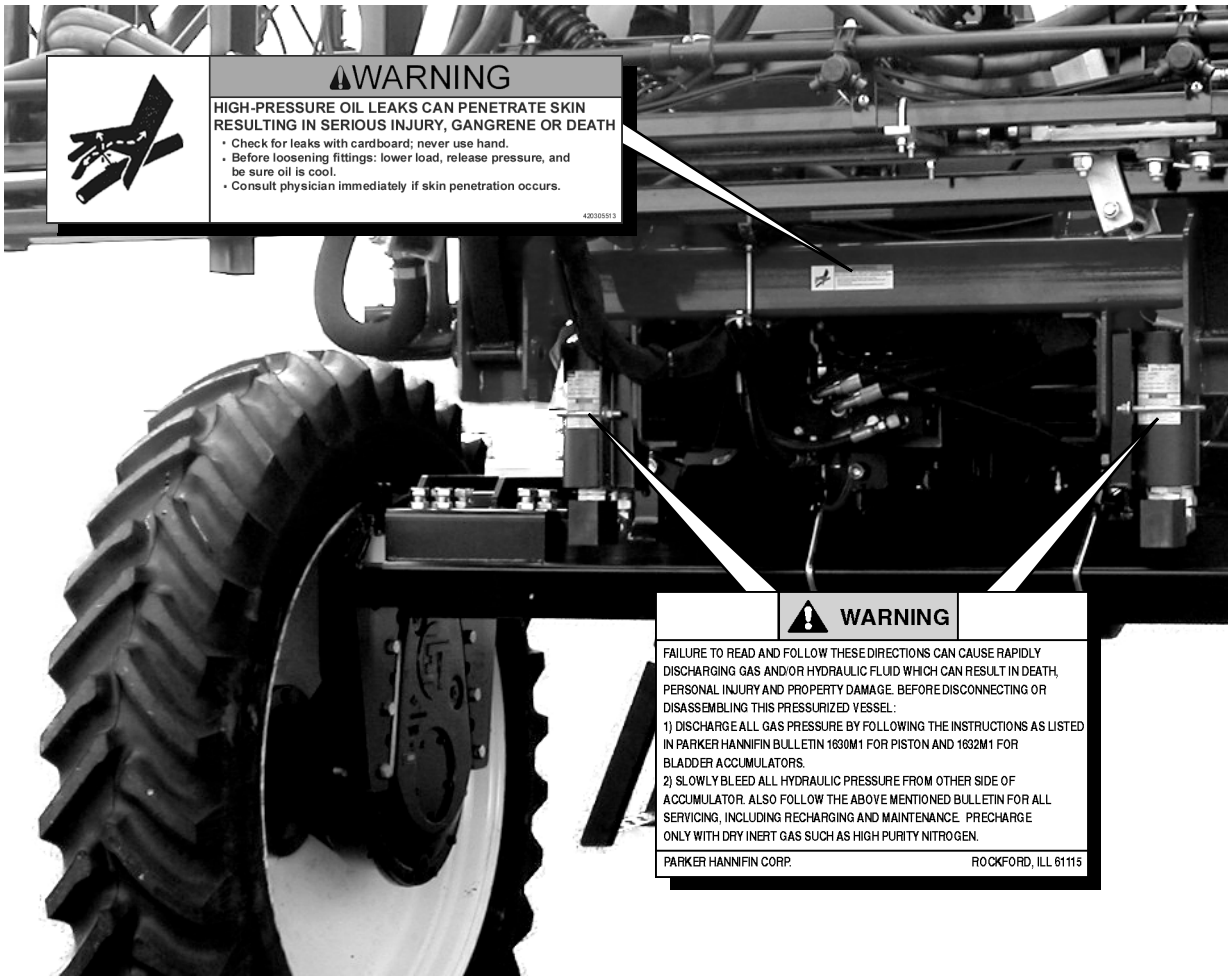
Cab-Mounted Decals



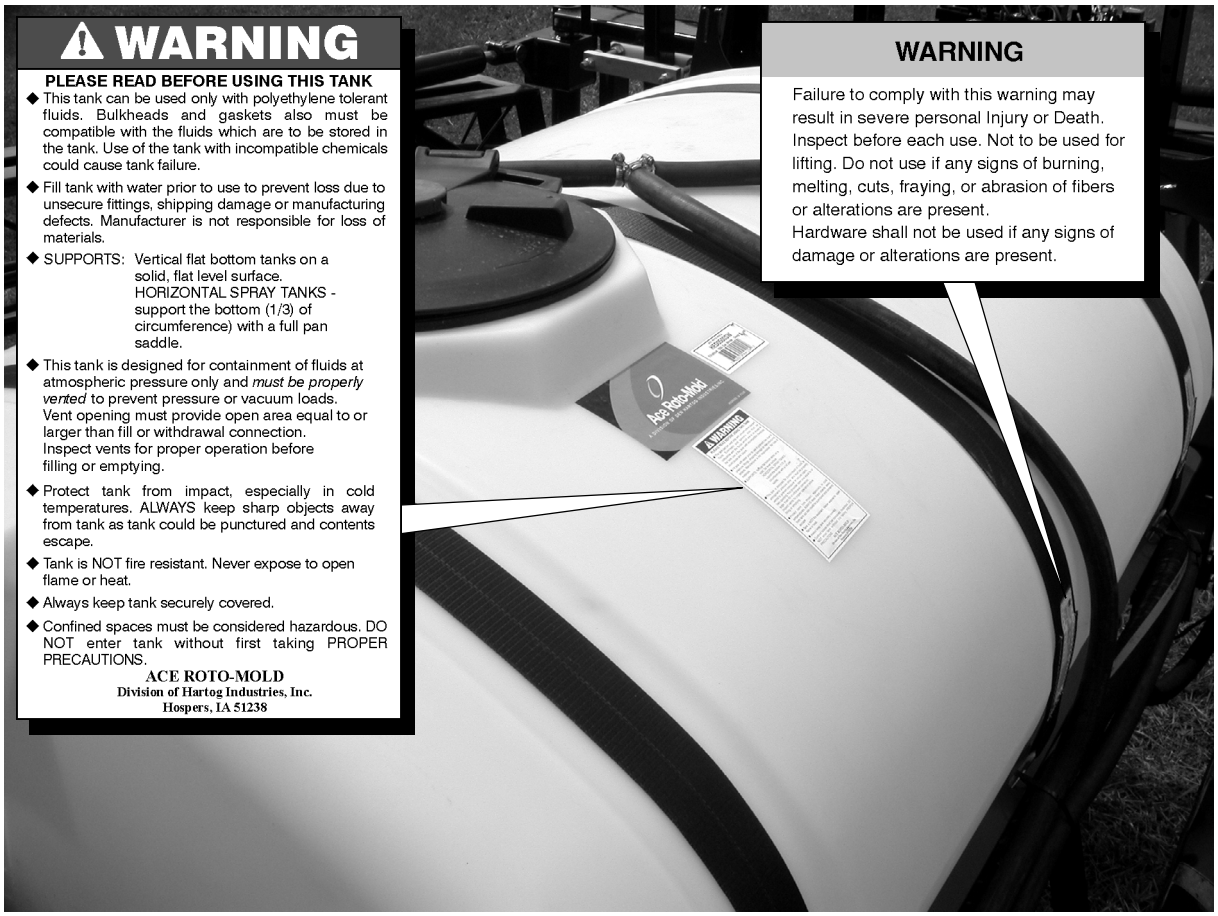
Engine-Mounted Decals



Chassis-Mounted Decals



Tank-Mounted Decals



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.

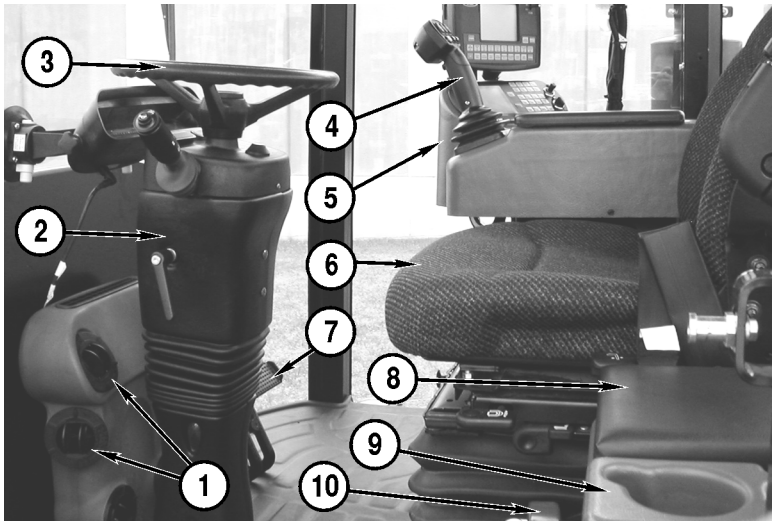
If you do not understand any part of this manual and need assistance, see your dealer.

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" on page 1-1. See "Safety Decals" on page 2-1.
- 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 specifications on the back cover of this manual. See "Check Tire Pressure" on page 5-8.
- Check oil level in engine prior to starting. Add oil as needed according to specifications on the back cover of this manual. See "Check Engine Oil Level" on page 5-8.
- Check fluid level in transmission. Add fluid as needed according to specifications on the back cover of this manual. See "Check Transmission Fluid Level" on page 5-10.
- Check fluid level in differential, gearboxes, and/or planetaries prior to starting. Add fluid as needed according to specifications on back cover of this manual. See "Check Differential Fluid Level" on page 5-13.
- Check coolant level. Add coolant as needed according to specifications on back cover of this manual. See the engine manufacturer's manual for details.
- Check hydraulic fluid level in reservoir. See "Check Hydraulic Fluid Level" on page 5-11.
- Check tank straps on poly product tank to make sure they are tight.

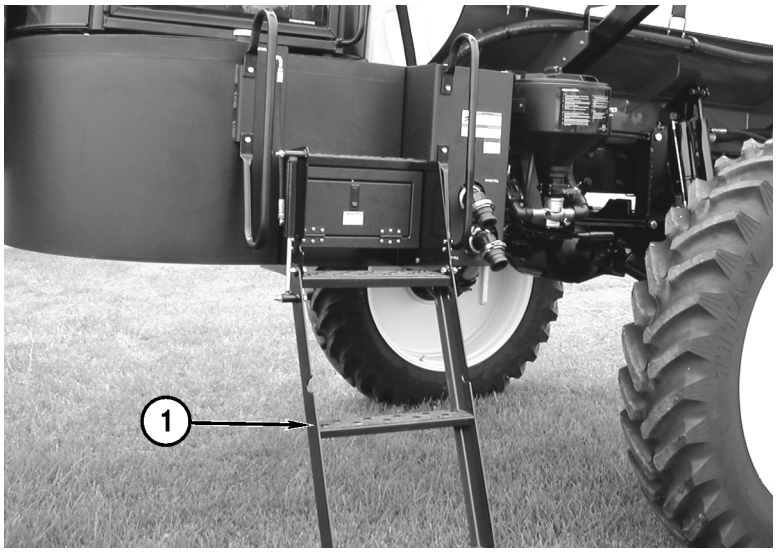
Cab Overview

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



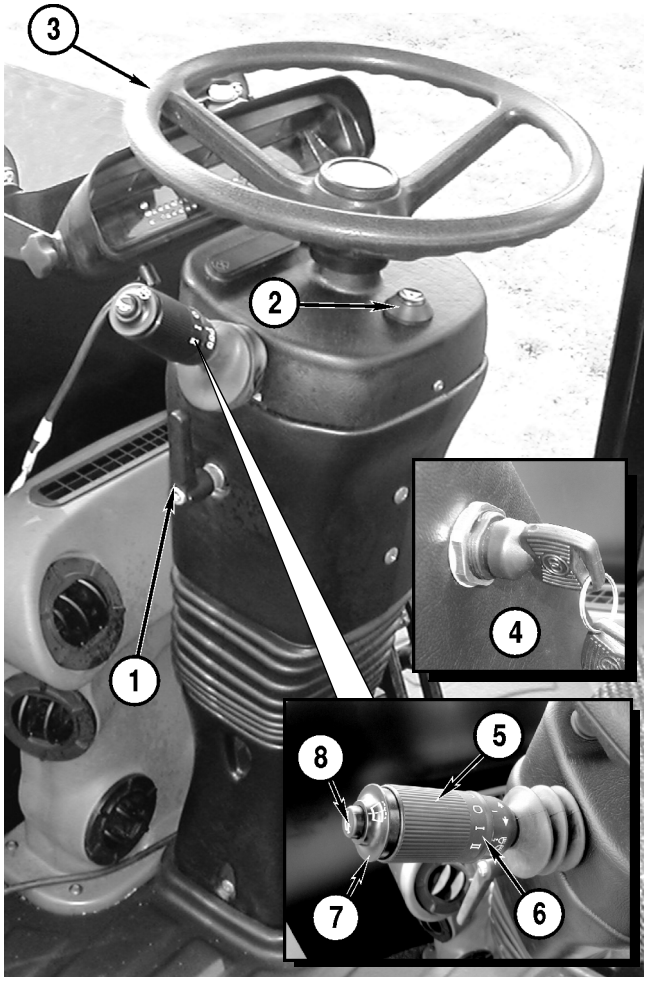
Cab Access Ladder

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.



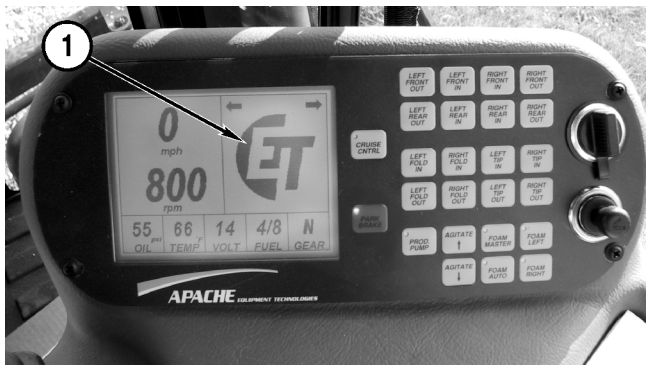
Steering Column

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. **Steering Wheel**
4. **Key Switch**
   Shown in “OFF” position. See Starting and Stopping the Engine for more details.
5. **Turn Signal Lever**
   Push lever up for right turn signal, push down for left turn signal.
6. **Windshield Wiper Switch**
   Turn lever to the “I” position for low speed wiper. Turn lever to the “II” position for high-speed wiper.
7. **Windshield Washer**
   Push ring to operate washer.
8. **Horn Button**
   Push to sound horn.



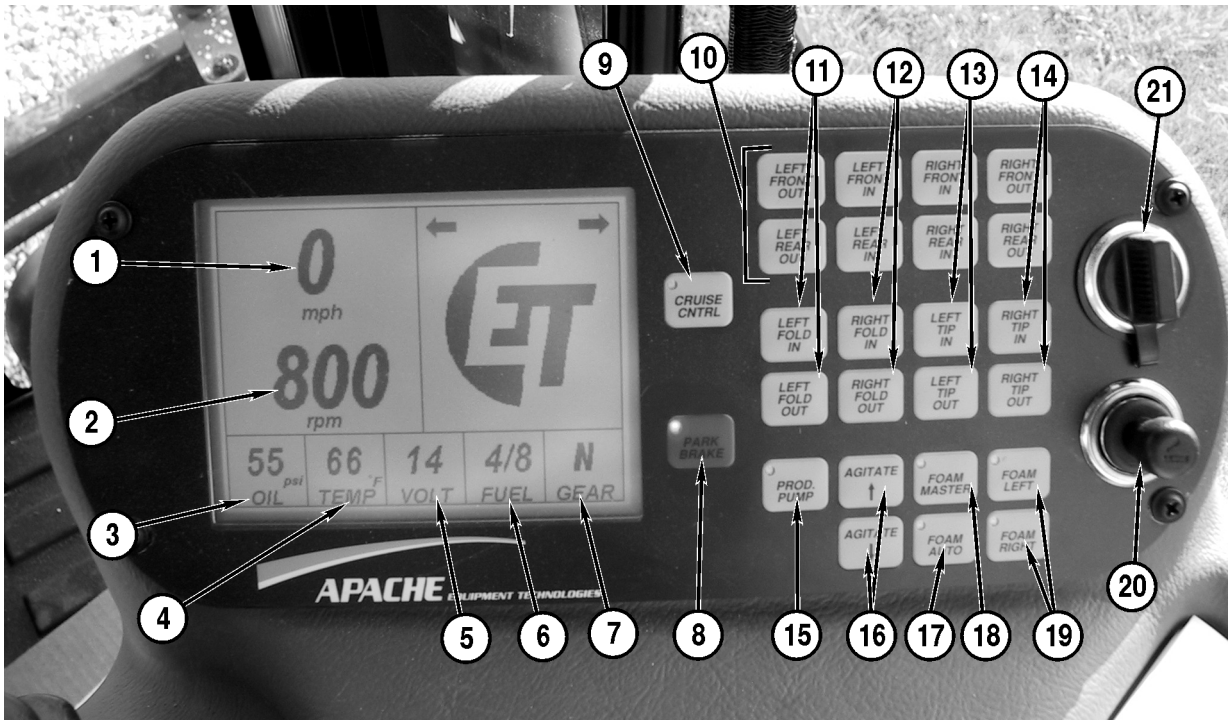
Fault Code Indicator:

1. **Fault Code Indicator on Console**
   When a fault code is logged, the ET logo will disappear on the right side of the console display and one or more of the following fault codes will appear:
   - Stop Engine
   - Check Engine
   - Water In Fuel
   - Wait To Start
   - Water Temperature
   - Failed Fuse F11
   - Low Oil Pressure
   - Change Air Filter
   - High Hyd Temp
   - High Trans Temp
   - Low Coolant
   - ECU Failure
   - SPN 00000 FMI 00



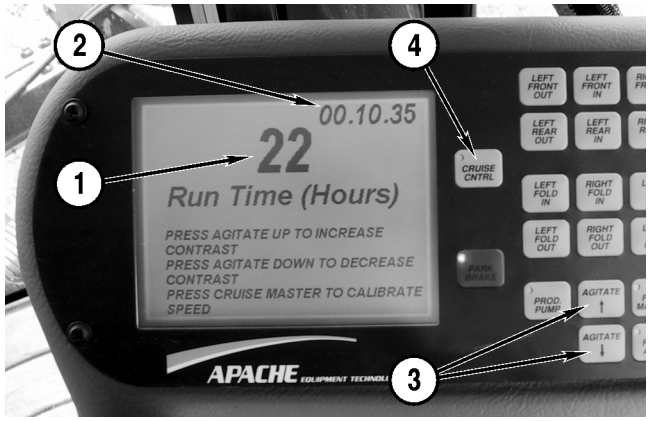
Refer to Fault Codes in the Maintenance Section; See “Cummins Engine Fault Codes” on page 6-1.

Apache Sprayer Console



1. MPH Readout
2. Engine RPM
3. Engine Oil Pressure
4. Engine Water Temperature
5. Voltage Level
6. Fuel Level
7. Direction & Gear Indicator
8. Park Brake Switch
9. Cruise Control Master Switch
10. Axle Hydraulic Adjust Switches In & Out (Optional)
11. Left Boom Fold In & Fold Out
12. Right Boom Fold In & Fold Out
13. Left Boom Tip In & Fold Out
14. Right Boom Tip In & Fold Out
15. Product Pump On/Off Switch
16. Agitation Pressure Increase & Decrease
17. Foam Master On/Off Switch
18. Foam Auto On/Off
19. Turn Foam Drop On for Right Side & Left Side
20. Cigarette Lighter
21. Auxiliary Power Outlet

The console displays the machine hours and software revision when the key is in the ON position and for five seconds at startup.



1. **Number of hours on machine**
2. **Software revision number**
3. **Console Display Contrast Adjust**
   To adjust the contrast of the console display, press the agitate increase button and hold to increase the contrast of display, press the agitate decrease button to decrease the contrast of display. Both must be down before start up of Apache Sprayer while the display is in this mode.
4. **Speed Calibration**
   To calibrate the speed of the vehicle: Press the cruise master button (while the board is in this state), press the cruise master a second time, and drive a measured mile (5,280 feet), drive through the mark at end of measure mile, pushing the cruise master when the front wheels are crossing the mile mark. This will automatically reset the speed reading on the vehicle.

Raven 4400 Controller and T-Handle

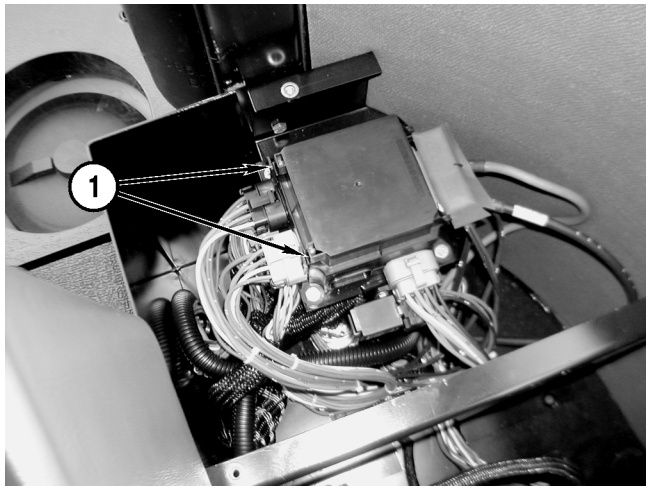
1. **Raven 4400 Controller**
2. **Boom Rack**
   Press to move the boom rack up or down.
3. **Left Boom Tilt**
   Press to tilt the left boom up or down.
4. **Right Boom Tilt**
   Press to tilt the right boom up or down.
5. **Master Spray Switch**
   Press to turn all five spray sections on or off.
6. **Resume Button for Cruise**
   Press to resume cruise control.
7. **Set Button for Cruise**
   Press to set cruise control.
8. **Forward Trigger Button**
9. **Reverse Trigger Button**
10. **T-Handle**

Fuse Block

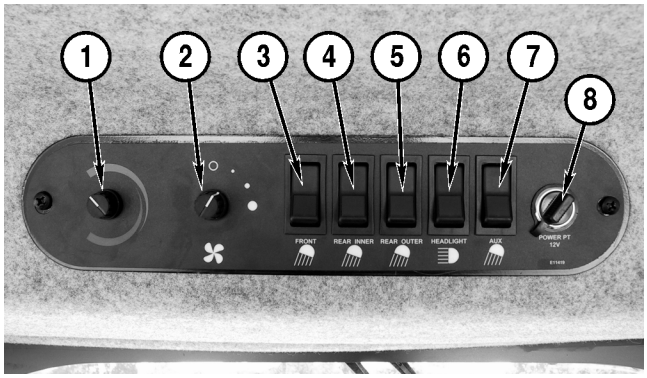
The fuse block is located under a service cover inside the right, rear, of the cab. The cover is shown removed for clarity.

Remove the thumbscrews and cover to access the fuse block.

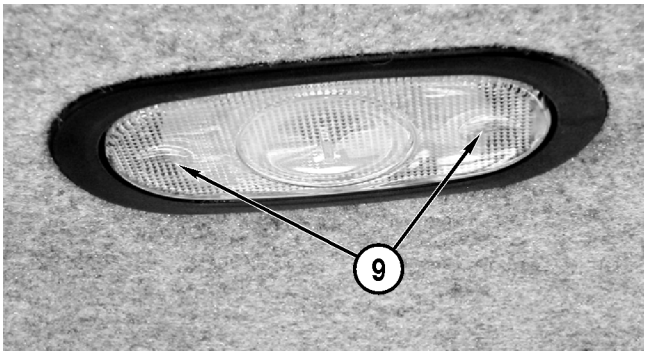
Press the two tabs (1) to access the fuses.



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. **Blower Fan Control**
   Turn the switch counter-clockwise for “OFF” and clockwise for “ON”.
3. **Cab Front Lights**
   Press the switch down to turn “ON” and up to turn “OFF” the cab-mounted, front-facing, work lights.

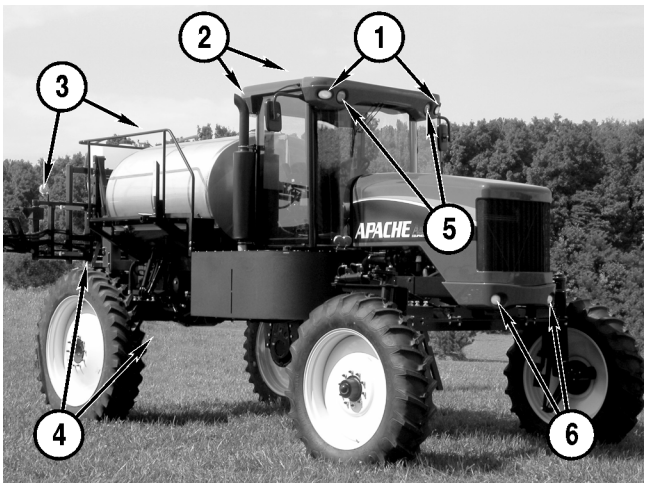


4. **Cab Inner Rear Lights**
   Press the switch down to turn “ON” and up to turn “OFF” the cab-mounted inner rear-facing, work lights.
5. **Cab Outer Rear Lights**
   Press the switch down to turn “ON” and up to turn “OFF” the cab-mounted outer rear lights.
6. **Driving Lights**
   Press the switch down to turn “ON” and up to turn “OFF” the bumper-mounted driving lights.
7. **Future Field Lights**
   Light switch for future use. The wires are in a two-pin weatherpack connector located at the boom valves on the boom rack.
8. **Auxiliary Power Outlet**

9. **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. **Brake Lights and Turn Signal Lights**
   When the brakes are applied, these lights will glow steady.
5. **Front Hazard and Turn Signal Lights**
6. **Driving Lights**



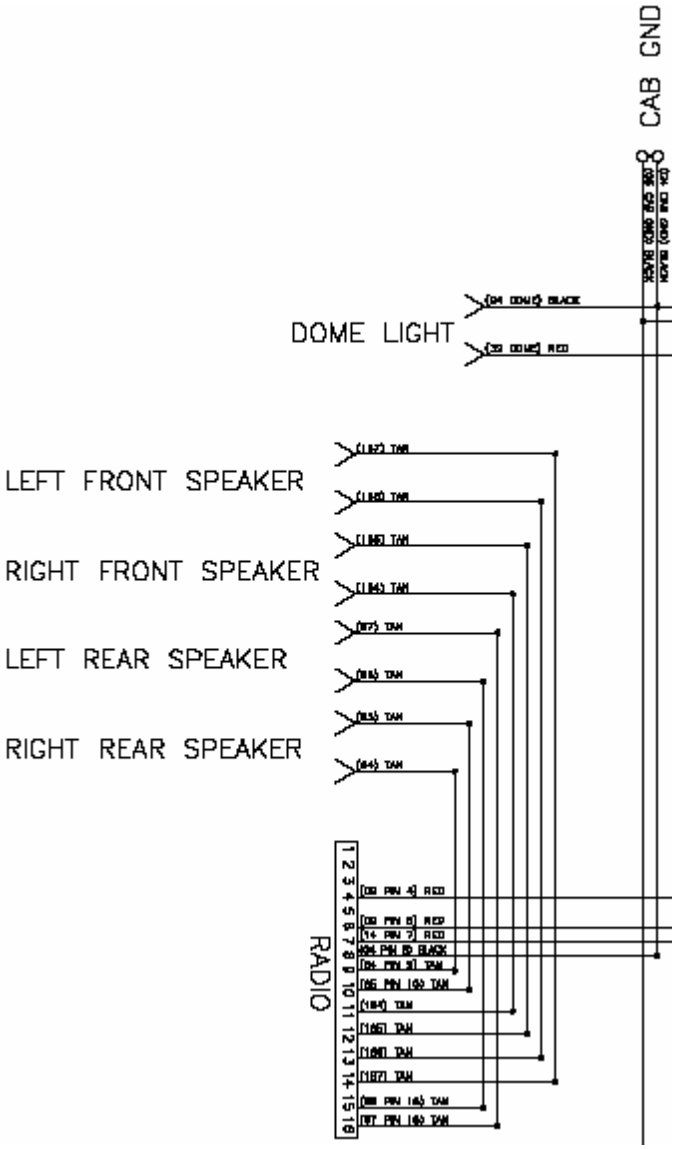
Turn Signal and Hazard Light Function:
When the hazard lights are turned on, light sets #5, #3 and #4 will all flash.

Turn Signal Function:
When the left turn signal is turned on, the left side of light sets #5, #3 and #4 will all flash. When the right turn signal is turned on, the right side of light sets #5, #3 and #4 will all flash. If the hazard lights are already flashing when the turn signal is activated, the lights opposite the turn indicator will glow steady while the lights on the side of the turn will flash.

AM/FM Radio with Weather Band and CD Player

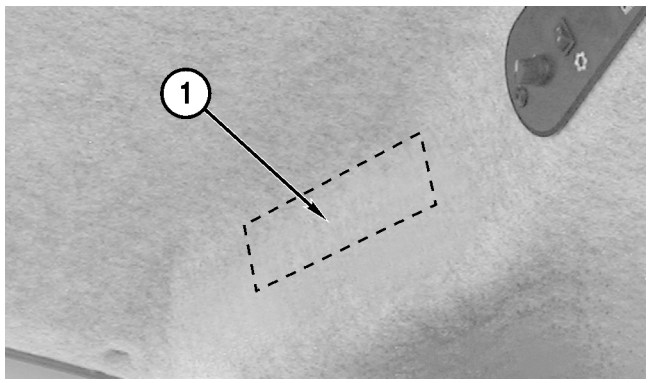
1. **AM/FM Radio with Weather Band and CD Player**
   See manufacturer instructions for operation.

The cab top wiring is below.



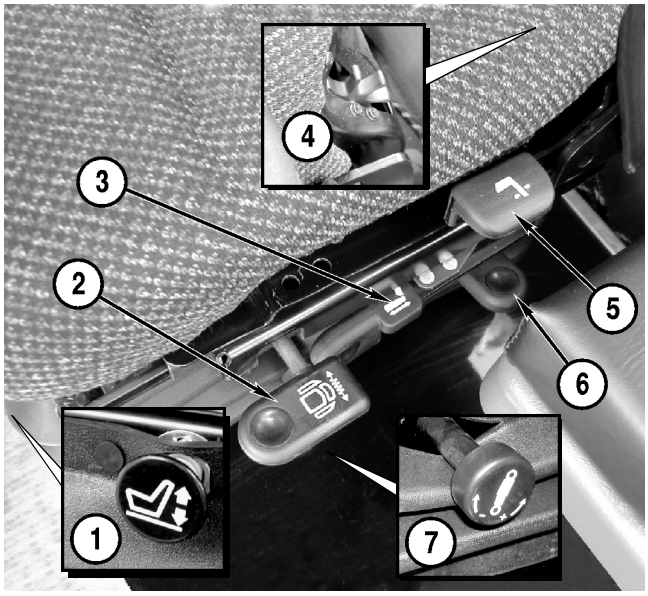
CB Radio Knockout

1. **CB Radio Knockout**
   The cab features an available knockout and power supply behind the headliner. The knockout location is in the upper left of the cab, mirrored from the AM/FM Radio location.



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**



Starting and Stopping the Engine

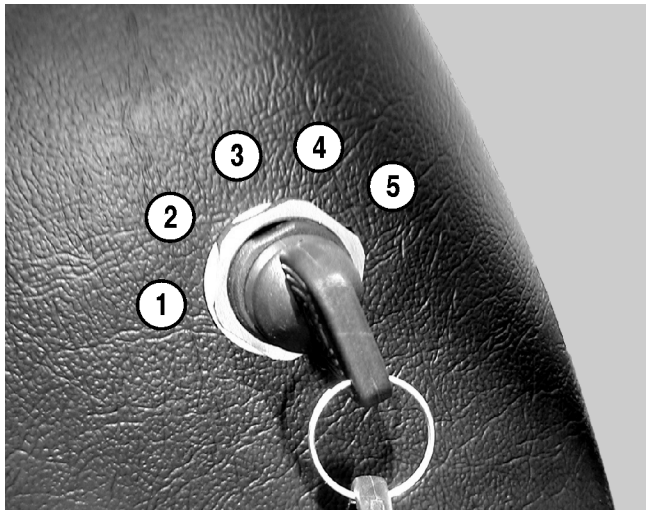
Starting

WARNING

ALWAYS start the engine from the operator's seat, the parking brake (1) applied, and seat belt fastened.

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

The key switch has 5 positions. Turn the key counter-clockwise as far as it will travel for the "ACC" position (1). The "ACC" position is not wired in the AS1010 and AS1210 Apache Sprayers. The first position clockwise is the "OFF" position (2). The next position clockwise is the "ON" position (3). The last position clockwise is the "START" position (5).



Turn the keyswitch to the "ON" position (3) and wait for the Wait-To-Start lamp on the steering column to go out.

Turn the key to the "START" position (5) 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 engine manufacturer's service manual or contact your dealer.

IMPORTANT: If the engine stalls under load, immediately place the vehicle 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.

Warm-up

Check the engine oil pressure gauge (1) as soon as the engine starts. If the oil pressure gauge does not reach the minimum pressure of 15 psi [1.03 bar], stop the engine and determine the cause. Normal engine oil pressure is 50 psi [3.45 bar] when the engine oil is 240°F [116°C].

NOTE: Engine oil pressure can vary depending on conditions. See the engine manufacturer's service manual, supplied with the Apache Sprayer.

Check the engine coolant gauge (2). Normal operating temperature is 180°F [82°C]. If the engine coolant rises above 234°F [112°C], 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. Shift the transmission to neutral (1), lower engine rpm and apply the parking brake (2).

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

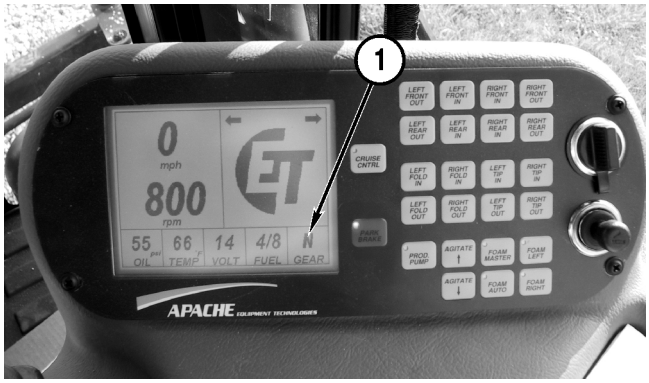
Vehicle Direction and Speed

IMPORTANT: DO NOT leave the operator's seat with the Apache Sprayer in gear. Place the transmission 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 transmission in the neutral position and apply the vehicle brake before changing directions.

IMPORTANT: DO NOT shift transmission into neutral while the vehicle is in motion. The transmission is only lubricated while in gear. "Coasting" will cause damage to the transmission.

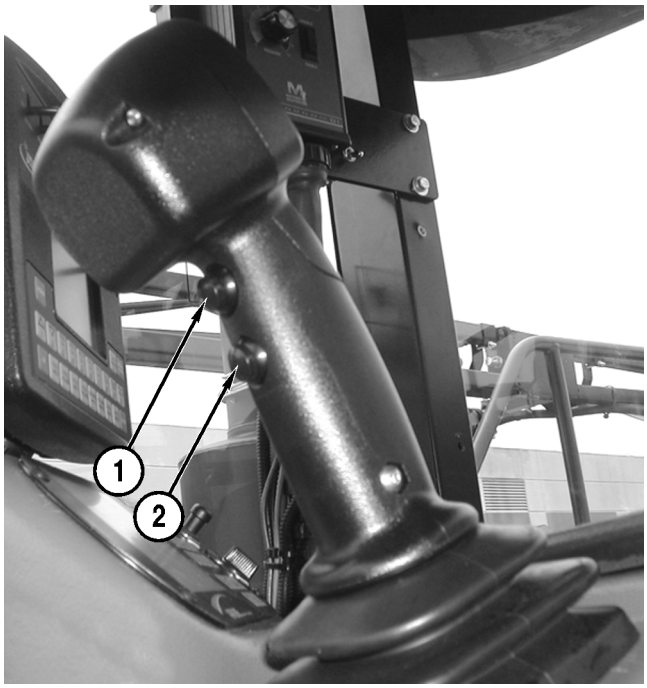
Neutral



At start up, the Apache Sprayer transmission is reset to neutral and an indicator lamp on the console will indicate "N" (1). Squeeze and hold either one of the trigger buttons to put into gear. Use the top button for forward and the bottom button for reverse. Once the transmission is in gear, the gear indicator will show the current gear. Return to neutral by squeezing either of the trigger buttons; the transmission will immediately shift to neutral.

NOTE: The T-handle will not shift the transmission into neutral. To obtain neutral from a forward gear, squeeze either trigger button on the T-handle. To obtain neutral from a reverse gear, release the bottom trigger button on the T-handle.

Forward



To move the Apache Sprayer forward:
Apply the vehicle brakes and release the parking brake.

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

To move forward, release the park brake, apply the vehicle brakes, and squeeze and hold the top trigger button (1) on the T-handle until the transmission shifts into first gear forward. The vehicle will begin rolling forward at this time. Once the vehicle is in first gear forward, release the button. Push the T-handle forward to increase the engine rpm and ground speed. Pull the T-handle back to decrease the engine rpm.

NOTE: The T-handle will not shift the transmission into neutral. To obtain neutral from a forward gear, squeeze either trigger button (1 or 2) on the T-handle.

NOTE: If the vehicle is moving forward and either trigger button on the T-handle is squeezed, the machine will shift to neutral. Once the vehicle is below 1400 rpm and 4 mph, squeezing and holding the top trigger button on the T-handle shifts the vehicle into the gear the transmission was in before neutral.

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 transmission to the neutral position. The Apache Sprayer is equipped with six forward gears. Be aware of speed ranges for each gear. Refer to the Gear Speed Range chart.

Upshifting and downshifting are achieved with a sideways rock and release movement or “bump” of the T-handle. The T-handle should return to the center (side-to-side) position between shifts and some time must be allowed for the transmission to respond.

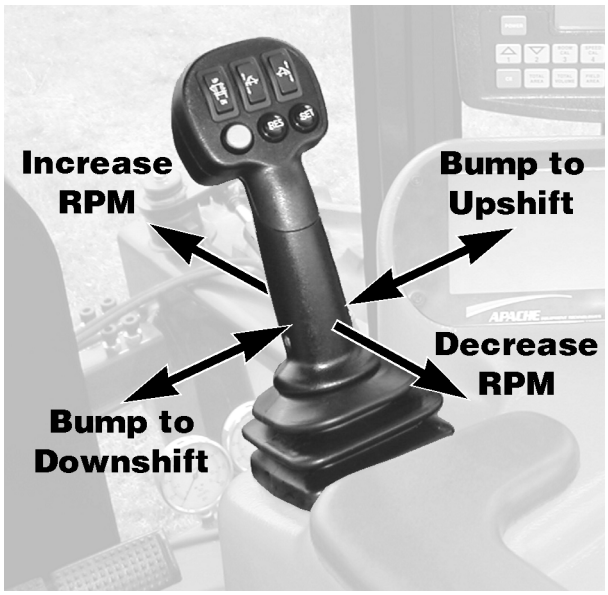
Upshifting: While the vehicle is in either the forward or reverse direction, bump the T-handle to the right one time to shift up to the next highest gear. Repeat this motion to upshift the transmission one gear at a time.

Downshifting: Pull back on the T-handle slightly to decrease engine rpm, lightly apply the vehicle brakes, then bump the T-handle to the left one time to downshift to the next lowest gear. Repeat this motion to downshift the transmission one gear at a time.

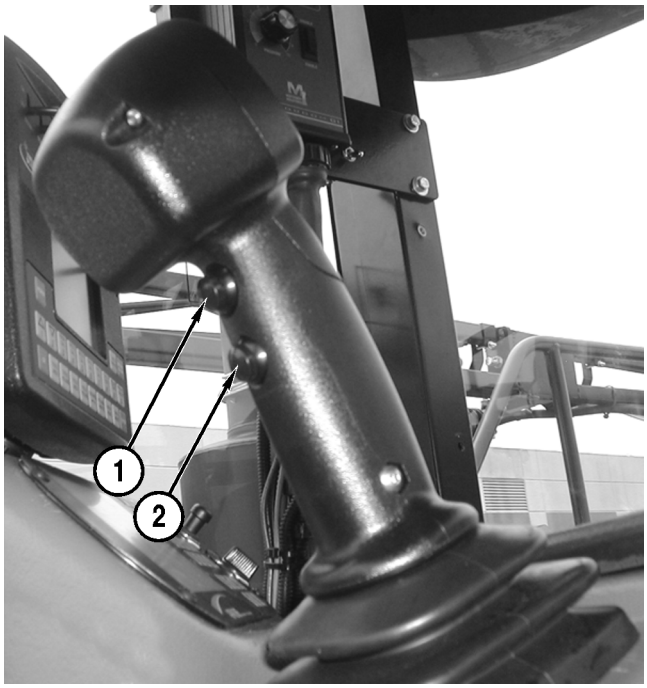
NOTE: The ITL transmission is equipped with shift protect; the transmission will not downshift, even if the display readout changes on the console, until the engine rpm’s drop down to the appropriate speed range.

IMPORTANT: DO NOT shift the transmission into neutral while the vehicle is in motion. The transmission is only lubricated while in gear. “Coasting” will cause damage to the transmission.

Gear Speed Ranges		
Gear	**Speed (mph) ITL Transmission**	**Speed (mph) Funk Transmission**
1st	0 to 5	0 to 6
2nd	0 to 8	0 to 9
3rd	0 to 11	0 to 11
4th	0 to 18	0 to 15
5th	0 to 29	0 to 22
6th	0 to 36	0 to 35



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.

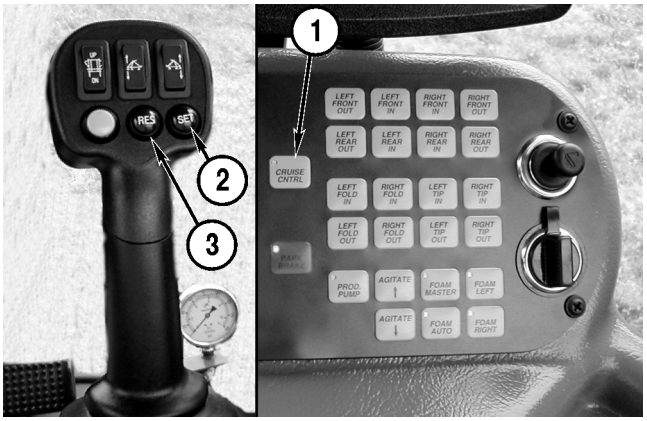
To shift into reverse from neutral, squeeze and hold the bottom trigger button (2) on the T-handle. Push the T-handle forward to increase the engine rpm and ground speed. Pull the T-handle back to decrease the engine rpm.

The reverse button (2) must be held in at all times to move in reverse.

NOTE: The T-handle will not shift the transmission into neutral. To obtain neutral from a reverse gear, release the bottom trigger button (2) on the T-handle.

NOTE: If the vehicle is moving in reverse and the reverse button (2) is released, the transmission will shift to neutral. Once the vehicle is below 1400 rpm and 4 mph, squeezing and holding the bottom trigger button (2) shifts the transmission into the gear the transmission was in before neutral.

Cruise Control



To use the cruise control function, turn the master cruise button (1) located on the console ON. Once the desired speed is reached, push and release the SET button (2) on the T-handle.

If the engine rpm's are decreased or increased, cruise control will disengage. to resume cruise speed, press the resume (RES) button (3) on the joystick to return to the previously set cruise control speed.

If the transmission is up- or down-shifted, the cruise control will disengage.

The cruise control will operate between 4 and 20 mph. If the SET button (2) is pressed while the speed is out of range, the command will be ignored.

When the cruise is set, the RES button (3) increases vehicle speed by one mph for each time it is pressed; pressing the SET button (2) when cruise control is set, decreases speed by one mph for each time it is pressed.

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 [1.6 km] at speeds less than 3 mph [4.8 km/h]. 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 [1.6 km] at speeds less than 3 mph [4.8 km/h].

Hood Release

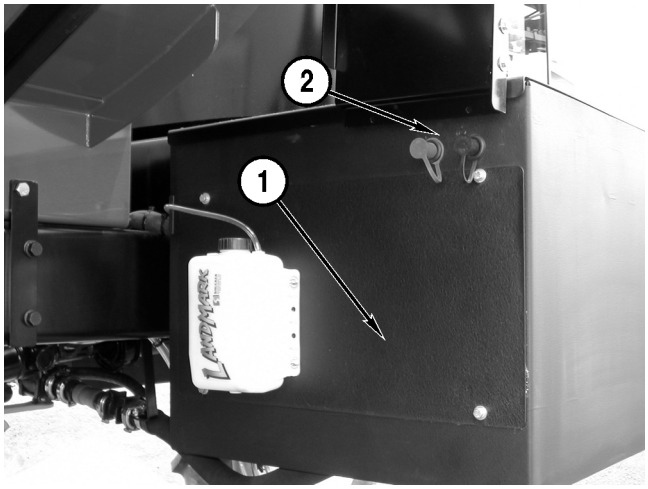
IMPORTANT: Do not allow the engine compartment hood to swing open freely. Damage to the vehicle may result. Use the nylon strap under the hood to control the opening of the hood.

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 batteries are located in the battery box (1) on the right side of the vehicle.

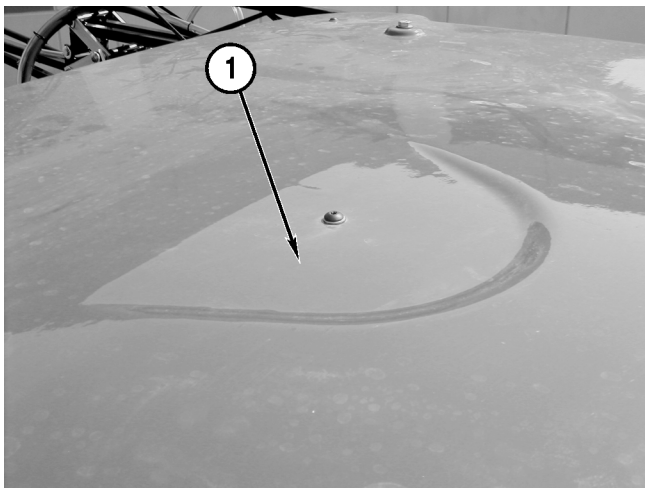


Remove the four bolts and cover to access the batteries.

1. **Battery box**
2. **External positive and negative battery posts.**

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.

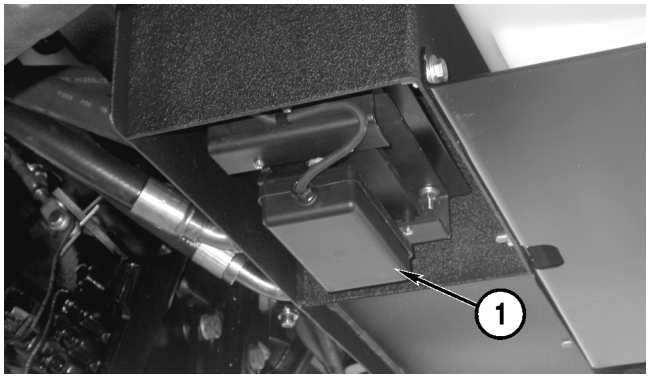


Raven Drive Shaft Speed Sensor (Optional)

The optional Raven drive shaft speed sensor is located just behind the carrier bearing on the drive shaft.

Raven Radar Gun (Optional)

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

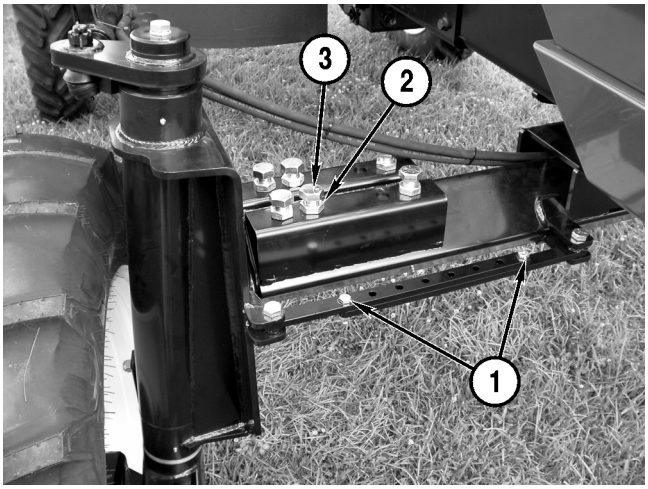


Axle Adjustment (Manual)

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.

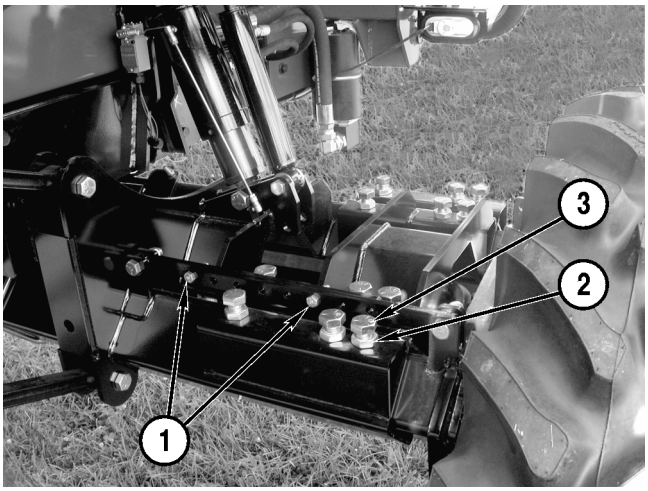
Tighten the six bolts (3) to 80 lb-ft [108 N•m] to secure the axle in place. Tighten the jam nuts (2).

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

Repeat the steps to adjust the other front axle.

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 80 lb-ft [108 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.

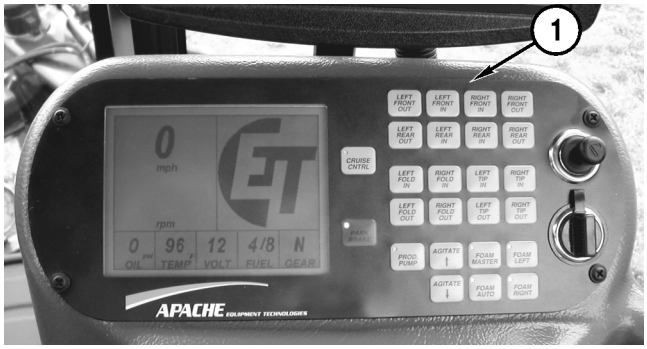
Axle Adjustment (Optional) (Adjust On The Go)

The front and rear axles on the Apache Sprayer are adjustable from 120” to 144” (center of left tire to center of right tire). The Adjust On The Go system will not allow the axle to be adjusted beyond 144”.

To adjust the axles:
While the engine is idling, operate the vehicle in the forward direction at approximately 3 mph.

Press the desired switch(es) (1) on the console to move the wheels in or out.

The axles can be adjusted individually, in combination, or all together.

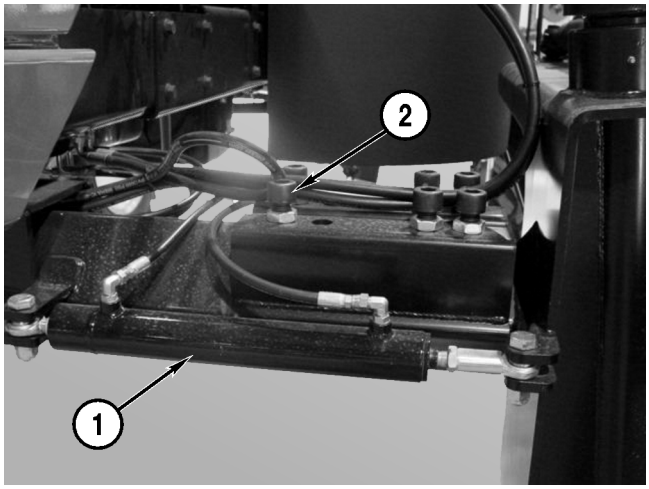


Front

When activated, the Adjust On The Go cylinder (1) adjusts the axle inward or outward as desired. The front wheels/axles are actuated by one cylinder per wheel. The left front Adjust On The Go axle is shown.

The socket-head bolts (2) should be torqued to 15 lb-ft [20 N•m] at all times. Check and adjust the torque weekly. See “Adjust On The Go” on page 5-15.

Grease the axles daily when using the Adjust On The Go feature. See “Grease Axle Components” on page 5-13.

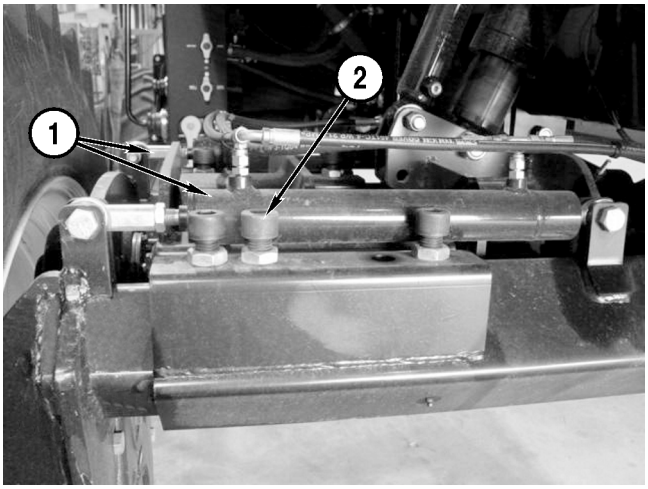


Rear

When activated the Adjust On The Go cylinders (1) adjust the axle inward or outward as desired. The rear wheels/axles are actuated by two cylinders per wheel. The left rear Adjust On The Go axle is shown.

The socket-head bolts (2) should be torqued to 15 lb-ft [20 N•m] at all times. Check and adjust the torque weekly. See “Adjust On The Go” on page 5-15.

Grease the axles daily when using the Adjust On The Go feature. See “Grease Axle Components” on page 5-13.

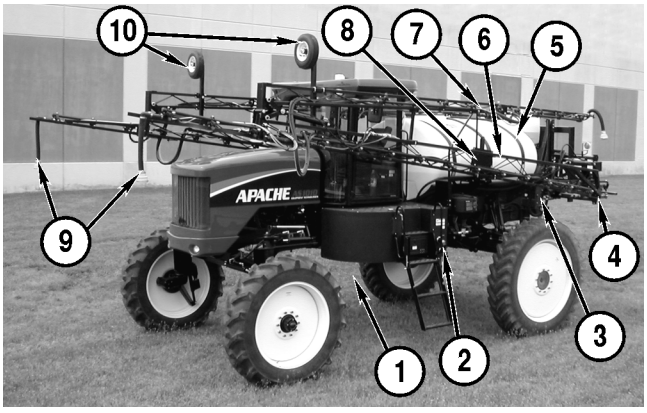


Optional Equipment

NOTE: If your Apache Sprayer is equipped with the optional Raven Smartrax autosteer, Raven Envisio smart bar, Raven RGL600T light bar or Raven Autoboom Height Control (G1 and G2), refer to the Raven manual supplied with the Apache Sprayer.

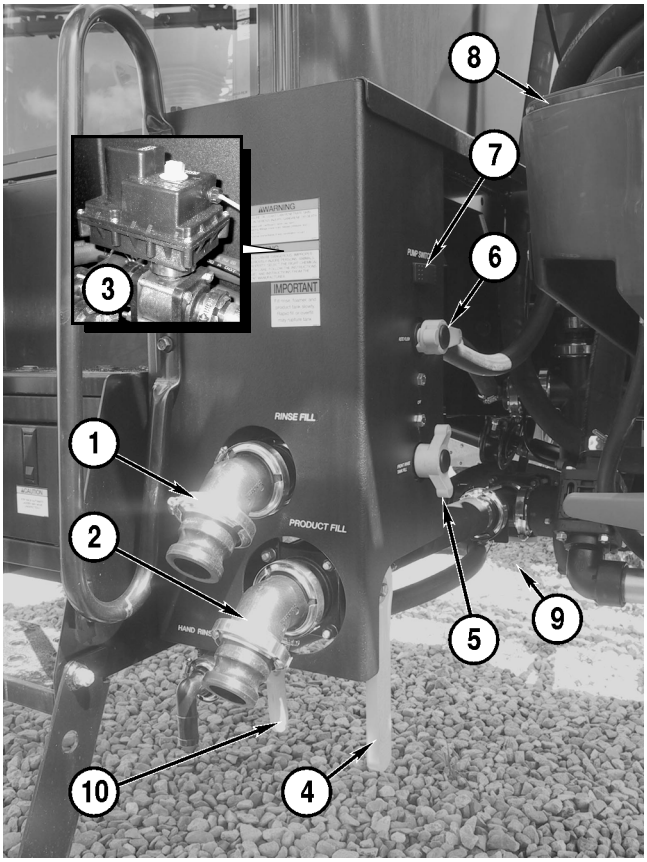
NOTE: The Raven Smartrax autosteer, Raven Envisio smart bar and Raven RGL600T light bar are the only factory-installed options for guidance. The Raven Autoboom Height Control (G1 and G2) are the only factory-installed options for height control. If your Apache Sprayer is equipped with a different guidance system or height control system, please contact your dealer for assistance.

Wet System Overview



1. **Rinse Tank (mounted on opposite side)**
2. **Fill Station**
3. **Flowmeter**
4. **Boom Rack**
5. **Product Tank**
6. **Left Boom**
7. **Left Boom Tip**
8. **Boom cradle**
9. **Left and Right Foam Marker Nozzles**
10. **Auto Boom Wheels (if equipped)**

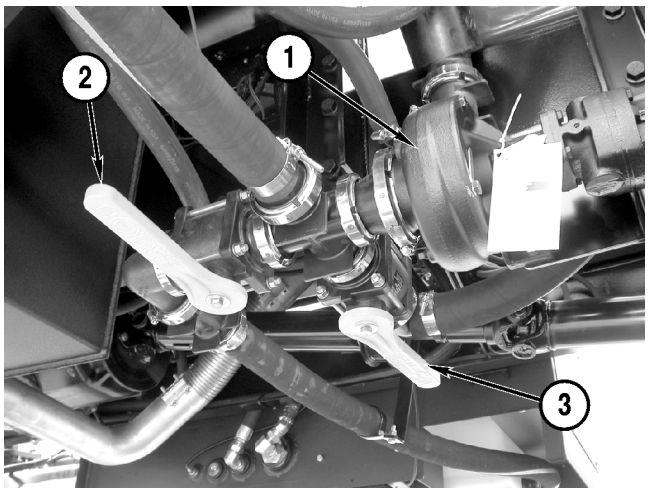
Fill Station



1. **Rinse Tank Quick Fill**
2. **Product Tank Quick Fill**
3. **Agitation Valve**
   This valve is electronically actuated and controlled by a switch on the side console in the cab.
4. **Product Valve (shown in CLOSED position)**
5. **Rinse Tank Fill (shown in OFF position)**
6. **Roto-Flush/Agitate Valve (shown in Agitate position)**
   Roto-Flush is optional on Apache sprayers.
7. **Remote Product Pump Switch**
   This switch turns the product pump ON to start agitation of product.
8. **Optional Cleanload Chemical Eductor**
9. **Check Valve for Rinse Tank**
10. **Hand Rinse Valve**
    This valve allows water from the rinse tank on the right side to be used for hand rinsing.

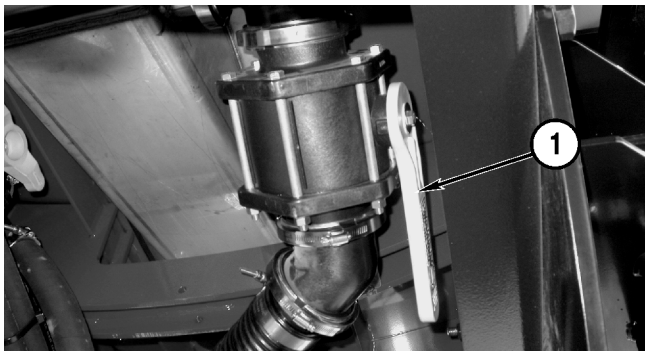
Product Pump and Valves

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



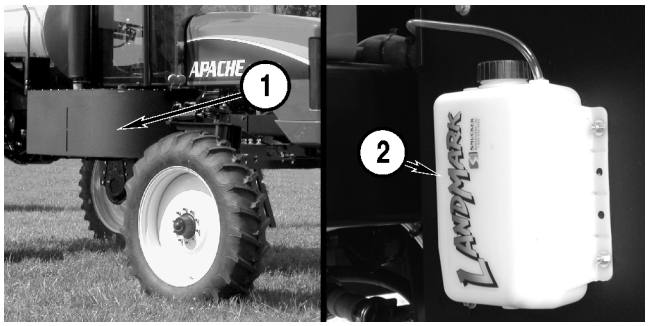
Sump Valve

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



Rinse and Foam Tank

1. **Rinse Tank**
2. **Foam Concentrate Bottle**



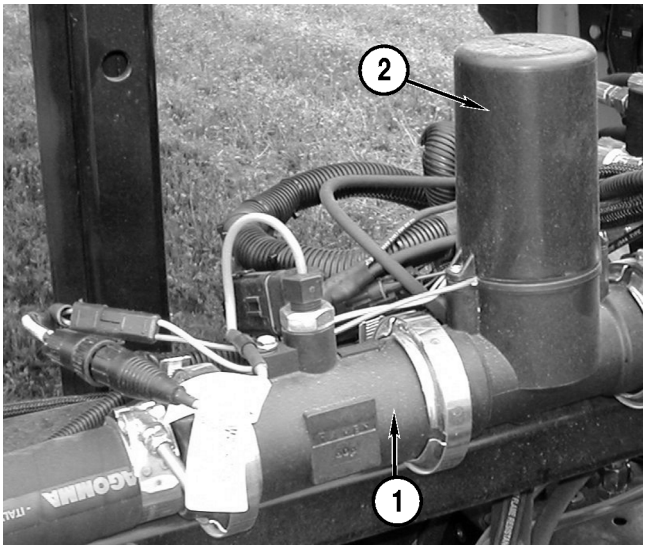
Second Rinse Tank (Optional)

The second rinse tank is plumbed into the cross just above the product pump. This tank can be used to flush the product tank (with optional Roto-Flush) and/or the booms.

Flow Control

Standard Flow

1. **Raven Flowmeter**
2. **Raven Servo Valve**



Electronic Boom Valves

The strainers (1) on the five electronic boom valves have 50 mesh screens which must be cleaned periodically.

Raven 4400 Monitor

1. Raven 4400 Monitor (optional)

On equipped Apache Sprayer models, the Raven 4400 Monitor is located on the right side console of the cab.

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

Monitor Calibration Information

Valve cal - 2123
Speed cal - 615 (radar gun equipped)
Speed cal - 252 (drive shaft sensor)
Meter cal - See tag on the flowmeter, located on the rear boom rack. Record this number in a convenient location for future use.

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

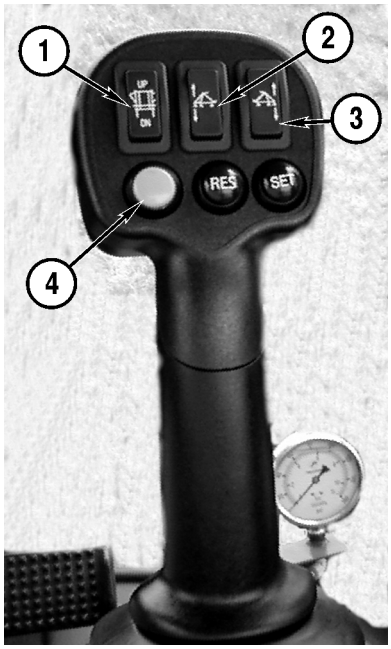
NOTE: The Raven radar gun, if equipped, is not factory-calibrated. See the manufacturer's instructions, provided with the Apache Sprayer, for proper calibration.

NOTE: The Raven 4400 Monitor is the only console installed by Equipment Technologies. If your Apache Sprayer has a different console, please contact your Apache dealer for information.

Side Console

1. **Raven 4400 Controller**
   The Master Switch must be in the OFF position to enable the yellow Master Boom switch on the T-handle.
2. **Cruise Control Master Switch**
3. **Left Boom Fold In and Out**
4. **Right Boom Fold In and Out**
5. **Left Boom Tip In and Out**
6. **Right Boom Tip In and Out**
7. **Axle Width Adjustment Switches (Optional Adjust on the Go)**
8. **Cigarette Lighter**
9. **Auxiliary Power Point**
10. **Foam Switch for Left and Right Side**
11. **Foam Master Switch**
12. **Foam Auto**
    When switched on, foam can be switched from left to right using the yellow Master Switch on the T-handle.
13. **Agitate Increase and Decrease**
14. **Product Pump Switch**
15. **Parking Brake Switch**

T-Handle



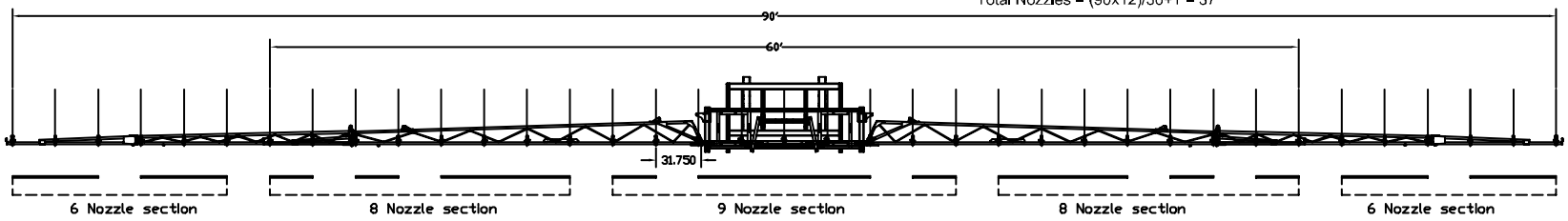
1. **Boom Center Rack Up/Down**
   Press to raise or lower the boom mast. Press the top of the switch to raise and press the bottom of the switch to lower.
2. **Left Boom Tilt**
   Press to tilt the left boom up or down. Press the top of the switch to raise and press the bottom of the switch to lower.
3. **Right Boom Tilt**
   Press to tilt the right boom up or down. Press the top of the switch to raise and press the bottom of the switch to lower.
4. **Master Spray Switch**
   Press to turn all 5 spray sections on or off at the same time. This function requires that all five boom sections be turned ON and the Master Switch turned OFF on the Raven 4400 Controller.

60'/90' Nozzle Layout

NOTE:
-15" and 30" spacing, nozzle is in center of boom
-10" and 20" spacing, nozzle is offset to center of boom

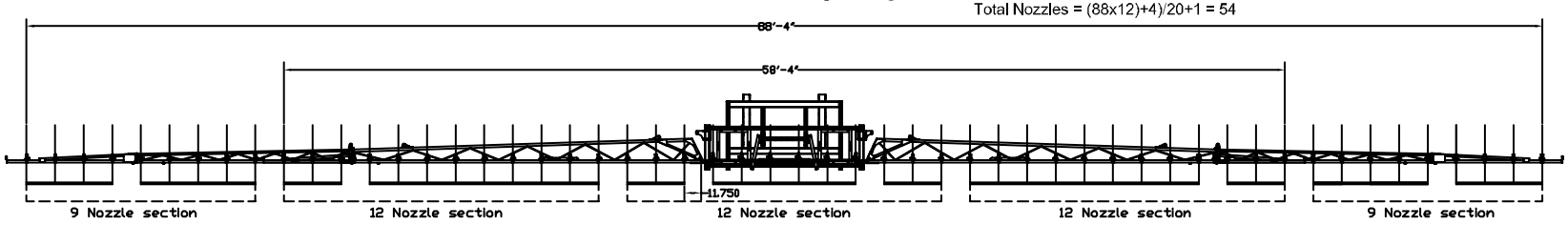
30-Inch Nozzle Spacing

Total Nozzles = (90x12)/30+1 = 37



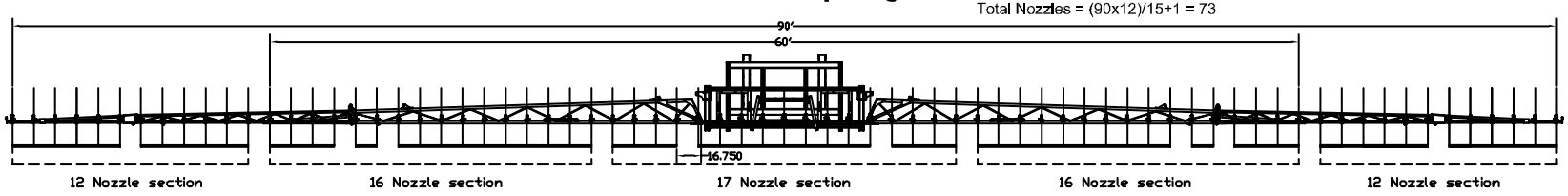
20-Inch Nozzle Spacing

Total Nozzles = (88x12)+4)/20+1 = 54



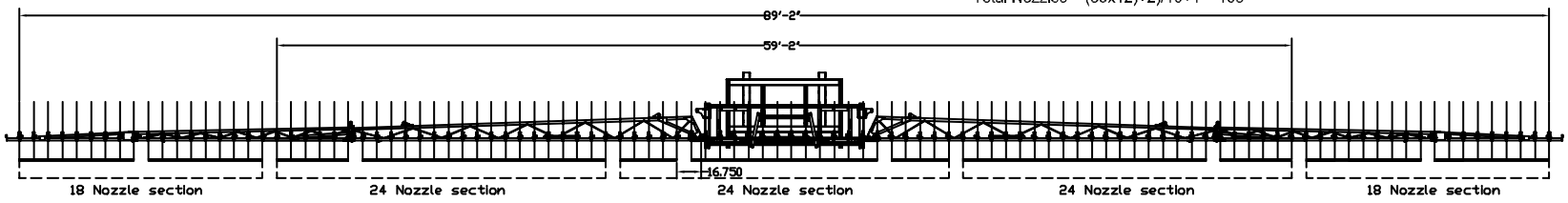
15-Inch Nozzle Spacing

Total Nozzles = (90x12)/15+1 = 73

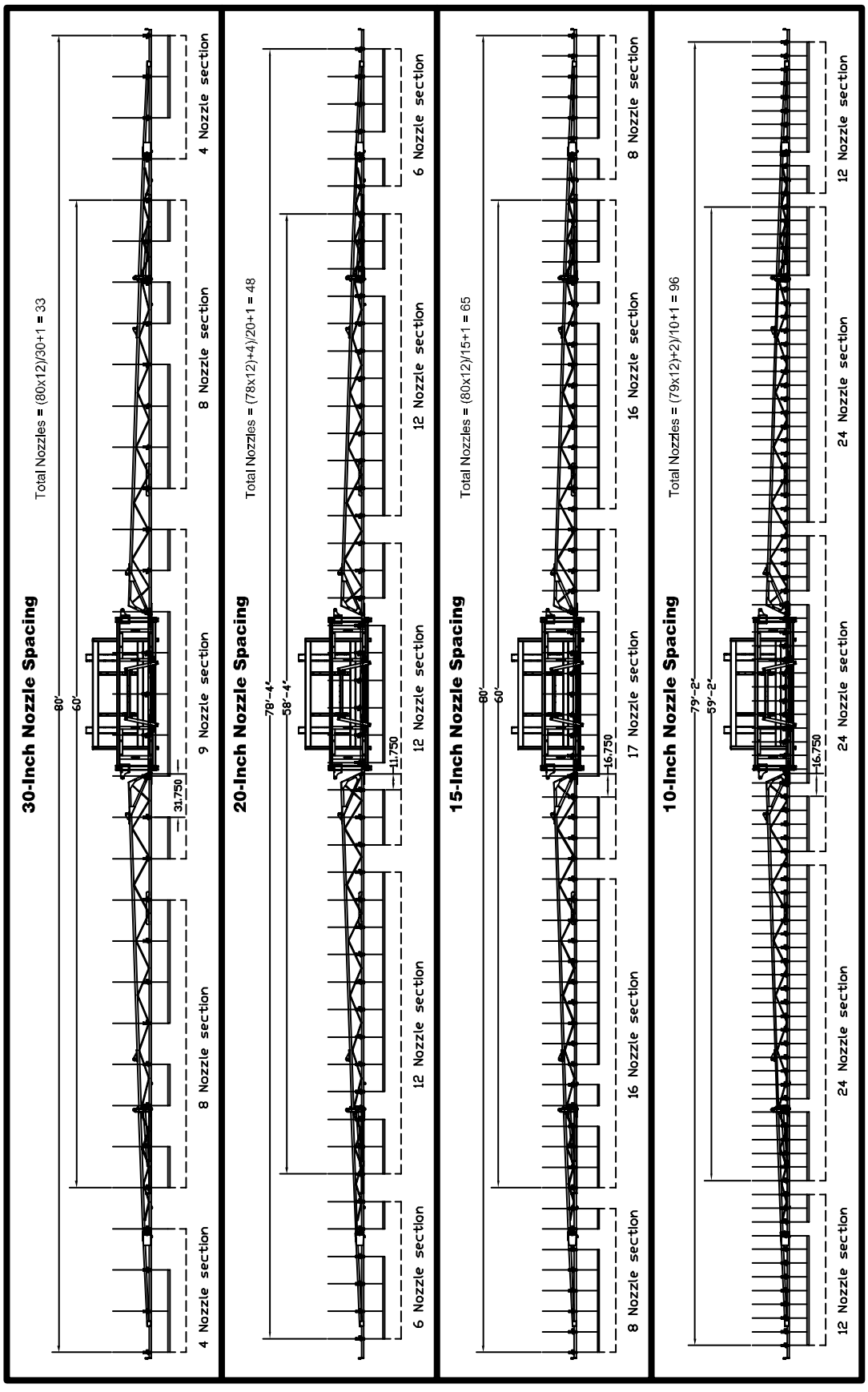


10-Inch Nozzle Spacing

Total Nozzles = (89x12)+2)/10+1 = 108

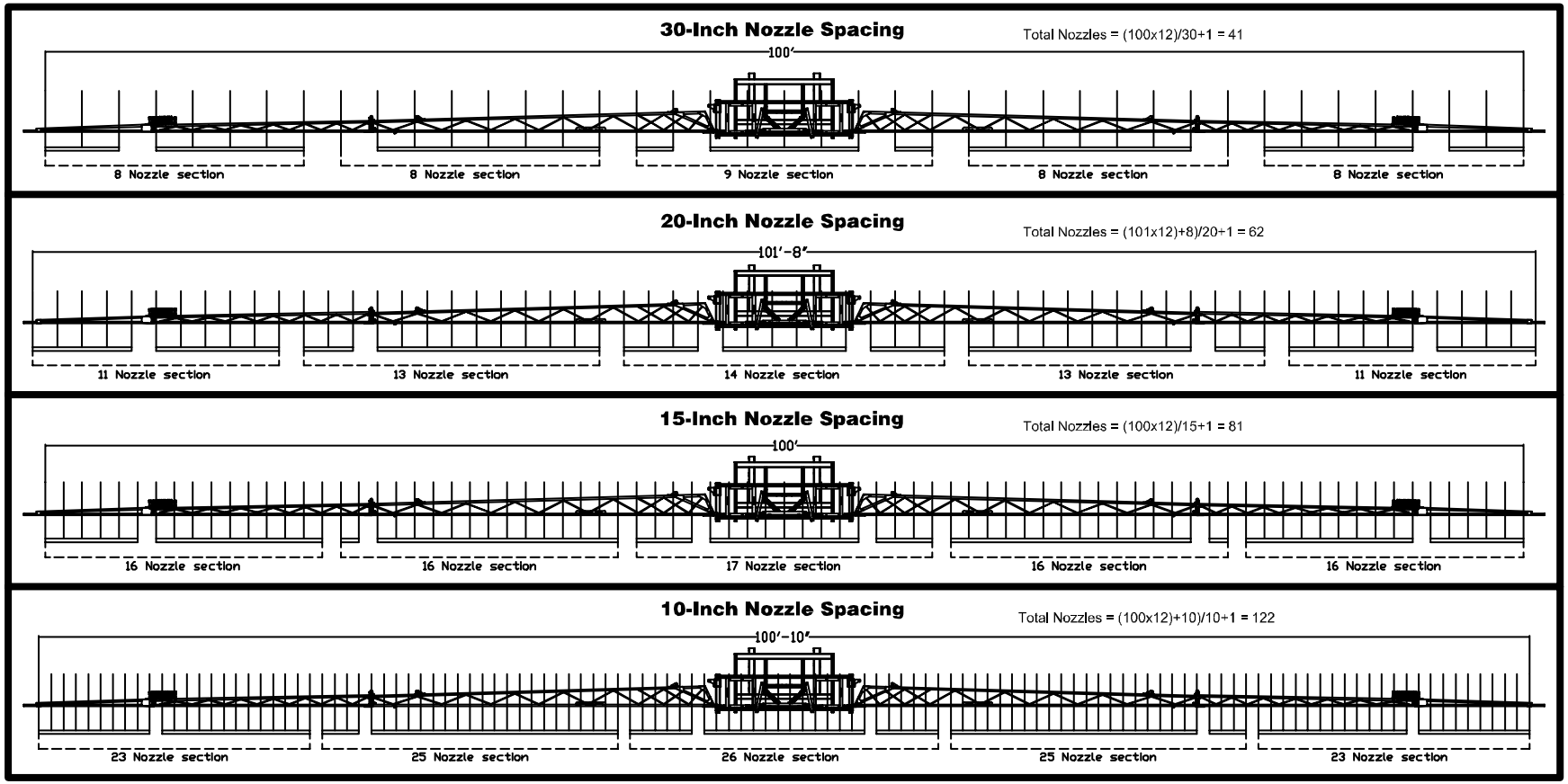


60'/80' Nozzle Layout



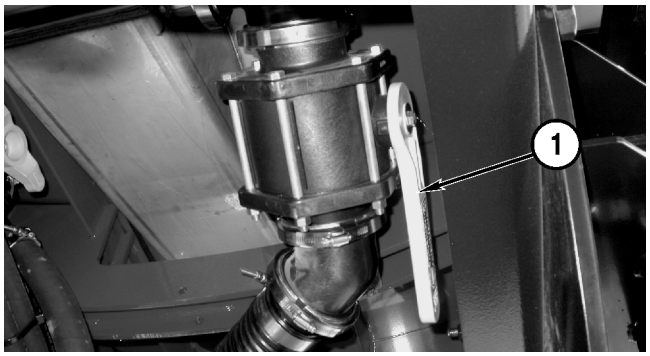
100' Straight Nozzle Layout

NOTE:
-15" and 30" spacing, nozzle is in center of boom
-10" and 20" spacing, nozzle is offset to center of boom



Filling Product Tank

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



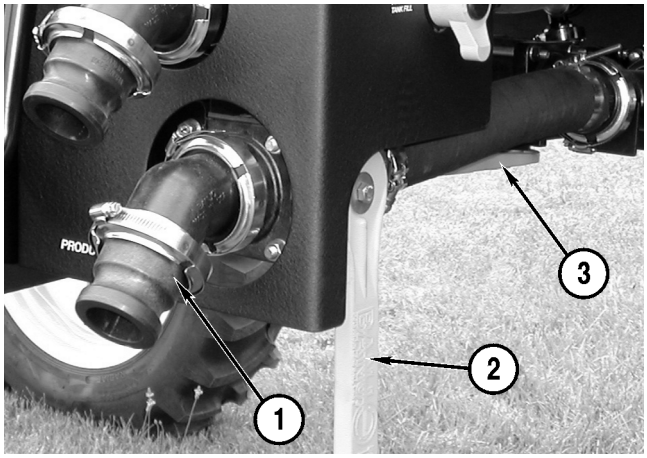
Remove the cap from the product quick fill inlet (1) and connect the hose from the nurse tank to the inlet.

Close the rinse tank valve (2).

Open the product fill valve (3), shown in the “CLOSED” 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 quick fill inlet cap.



Filling Rinse Tank

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

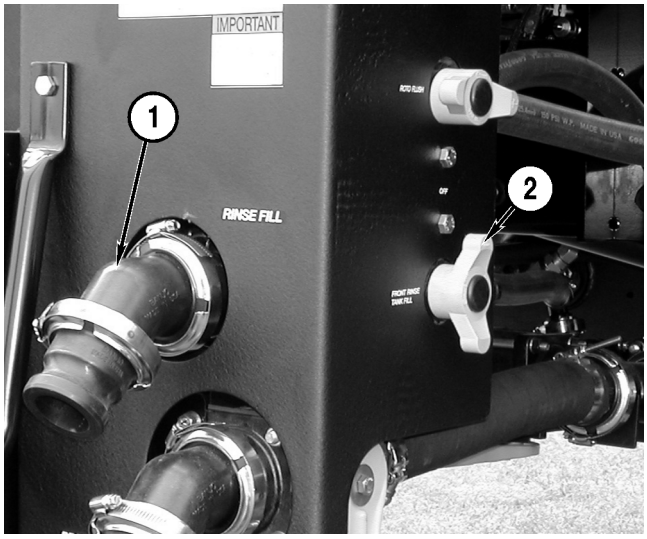
Set the rinse knob (2), shown in the “CLOSED” position, to “RINSE TANK FILL”.

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.

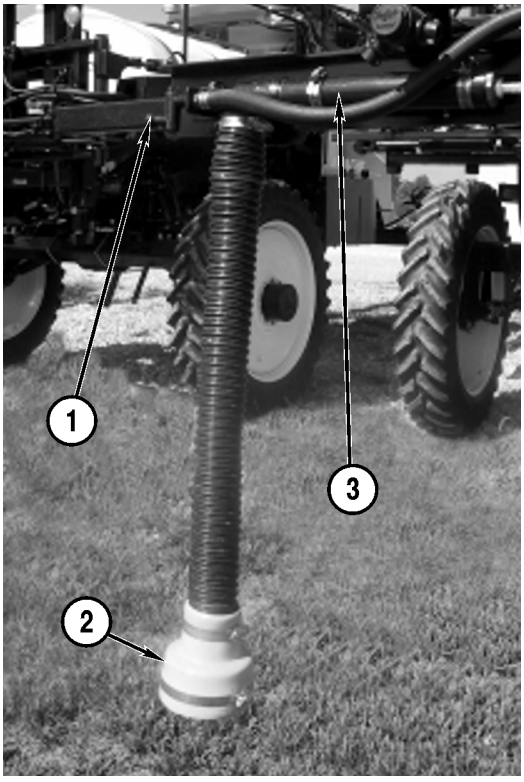
When filling is complete, close the valve on the nurse tank, then set the rinse knob (2) to “CLOSED”.

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



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

1. **Optional Fence Row Nozzle**
   If your vehicle has optional fence row nozzles, they are located near the end of each boom. The electric control valve for nozzles is located on the rear boom tank.
2. **Optional Foam Marker Boot and Drop**
   If your vehicle is equipped with the LandMark injection foam marker, then the boot is located near the end of each boom.
3. **Foam Marker Mixing Chamber**
   The foam marker mixing chamber is located near the end of each boom.



Operating Booms

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

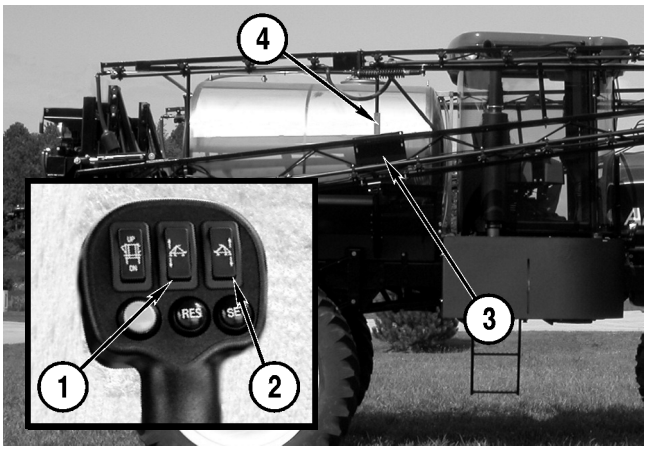
NOTE: Never fold or unfold the booms while the vehicle is moving.

NOTE: Never unfold booms with optional auto boom height control turned on.

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 and 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.

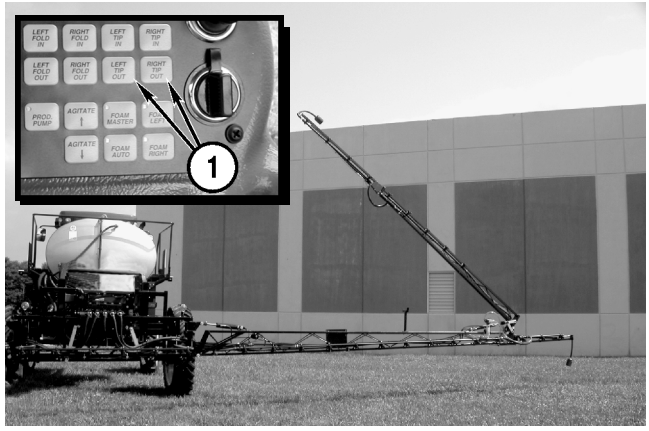
On the side console, press the top of the left and right boom fold switches (1) until the booms are fully extended. After the booms are fully extended, the boom tips can be unfolded.

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.

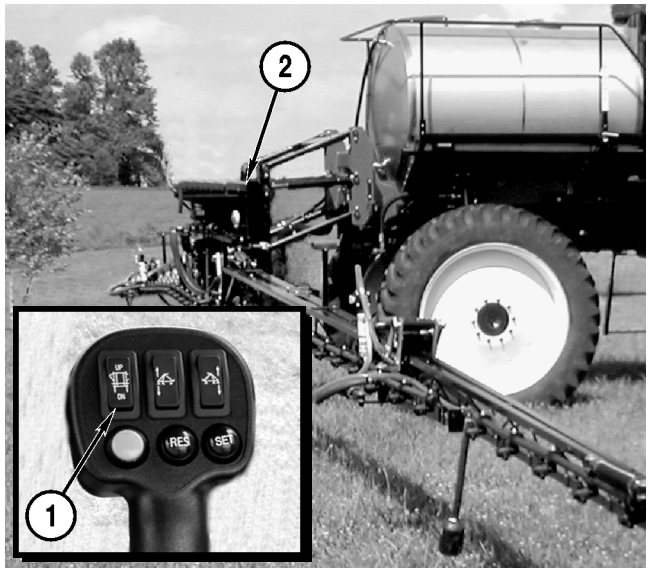
On the side console, press the bottom of the left and right boom tip fold switches (1) until the boom tips are fully extended.



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.

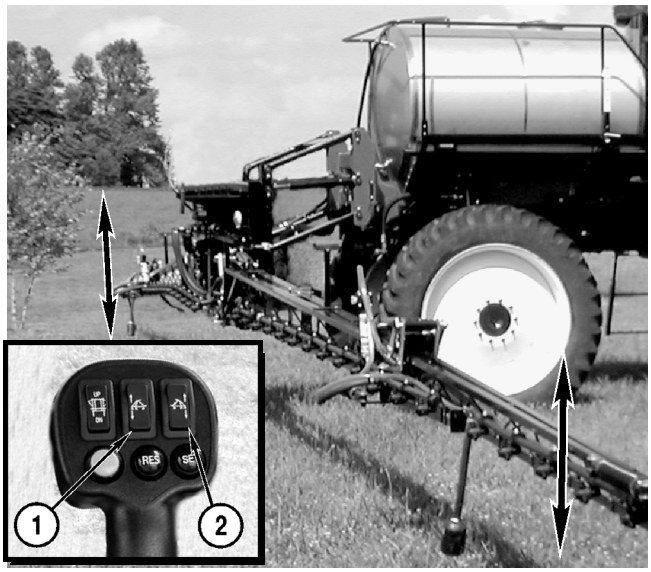


Tilt to Level Boom

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.

NOTE: The booms can be lowered past the center position.



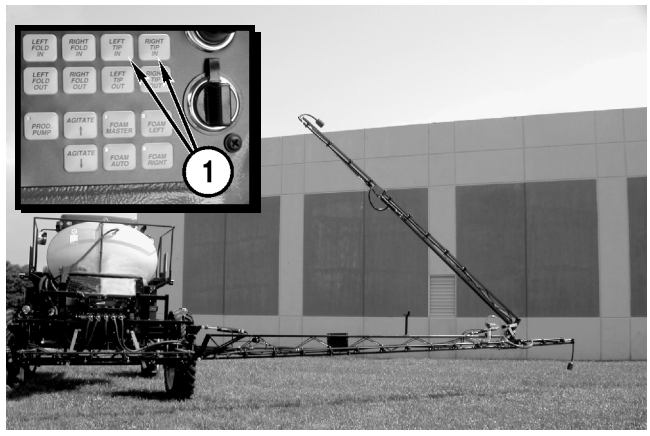
Fold Boom Tips

MPORTANT: Do not fold or unfold the boom tips near power lines.

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

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.



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: Never fold or unfold booms with the optional auto boom height control turned on.

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.

NOTE: Tilt the booms up before folding.

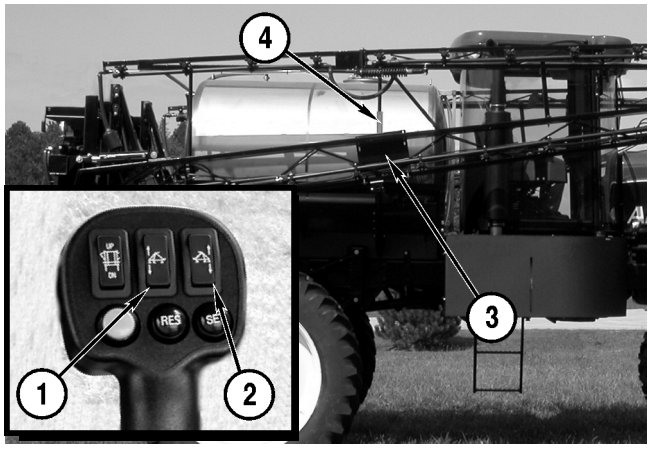
All Boom Sizes

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

Tilt to Return Boom to Cradle

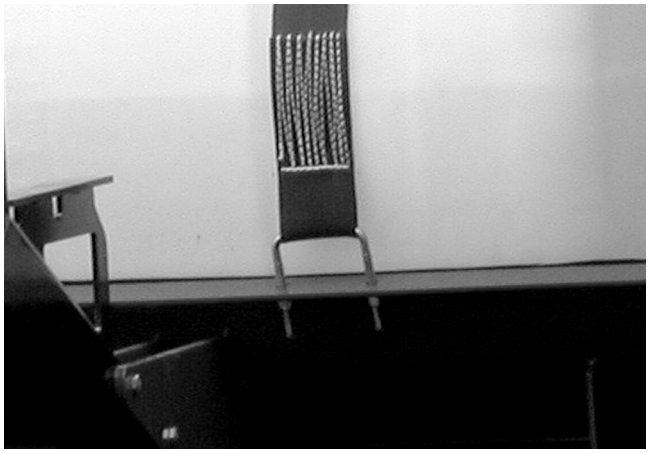
All Boom Sizes

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.

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.

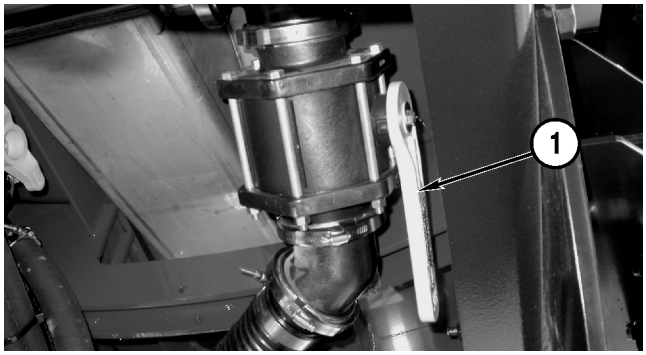
Spraying

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 4-12

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

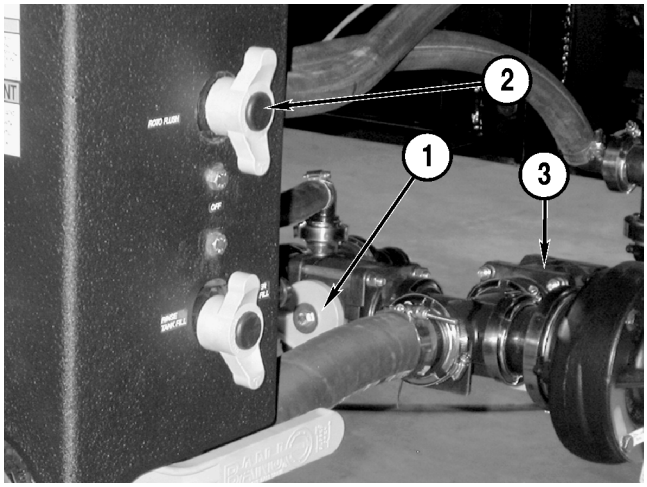


IMPORTANT: Always read and follow all chemical labels and follow all federal and state laws when applying chemicals.

Close the rinse tank valve (1).

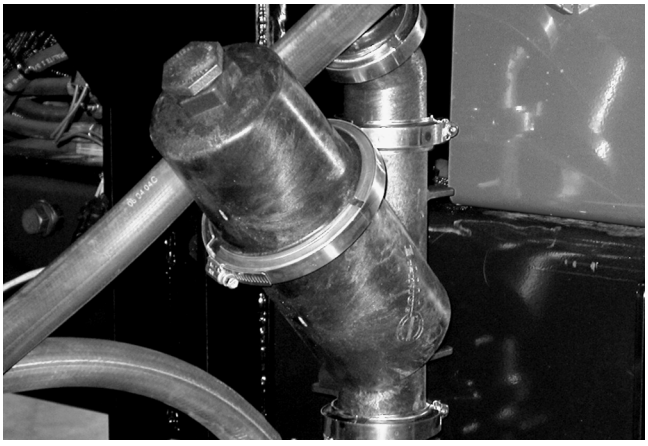
Set the flush/agitation knob (2), shown in the “CLOSED” position, to “AGITATION”.

Open the product valve (3).



The product strainer features a 50 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 50 mesh strainer with a more coarse strainer. See the chemical manufacturer’s instructions for complete details.



Set the Raven 4400 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.

NOTE: The Raven 4400 Controller is the only factory-installed controller. If your Apache Sprayer has a different controller, contact your dealer for information.

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

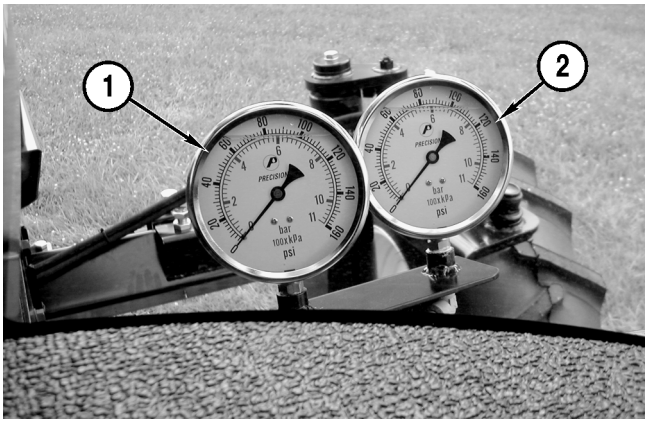
Set the product pump switch (2) to the “ON” position.

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.

NOTE: The Raven 4400 Controller is set with factory defaults only. The unit must be calibrated for speed and boom sections checked for accuracy.

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 for the desired vehicle speed during spraying. See "Shifting Gears" on page 3-14. Under typical operating conditions, second or third gear is recommended.

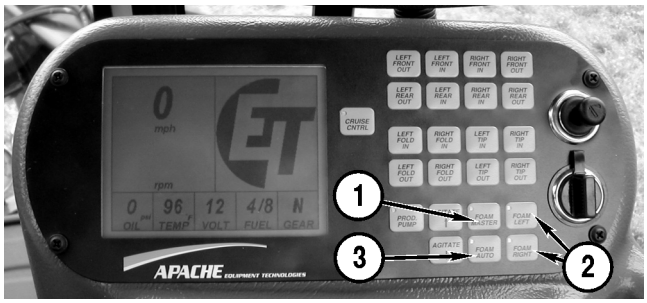
Use the master product on/off switch (1) on the T-handle to start and stop spraying.

Use the Raven Sprayer Control boom switches (2) to start and stop product flow to individual boom sections. The Raven Sprayer Control will automatically adjust the product flow for the remaining sections.

Operating Foam Marker

To turn on the foam marker, push the Foam Master button (1) on the console. Push the Foam Left button (2) to drop foam on the left. Push the Foam Right button (2) to drop foam on the right.

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.



Auto Foam

To use the Auto Foam feature, turn on the Foam Master switch (1), then turn on the Auto Foam button (3). Foam will drop from whichever side was used last. When you turn the boom section switches on or off with the yellow master spray switch on the T-handle, the foam will switch from left to right.

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

LandMark Injection Foam Marker

Your new foam marker is designed to produce the longest lasting foam, and provide you with the convenience of not having to mix your foam concentrate and fill the foam marker tank as often.

IMPORTANT: The LandMark injection marker draws fresh water in one line and soap concentrate in the other before it reaches the liquid pump. It is very important that when you first begin, or if you change brands of foam concentrate, that you properly set the "soap injection valve" and the "output valve". This will produce the best results in foam quality and ensure the proper amount of soap concentrate is used.

Injection Marker Operation Instructions
Reference the diagram on the following page.

Turn on the injection marker and allow the liquid pump to prime. If the liquid pump does not prime, open the priming valve until liquid begins to flow, then close the priming valve.

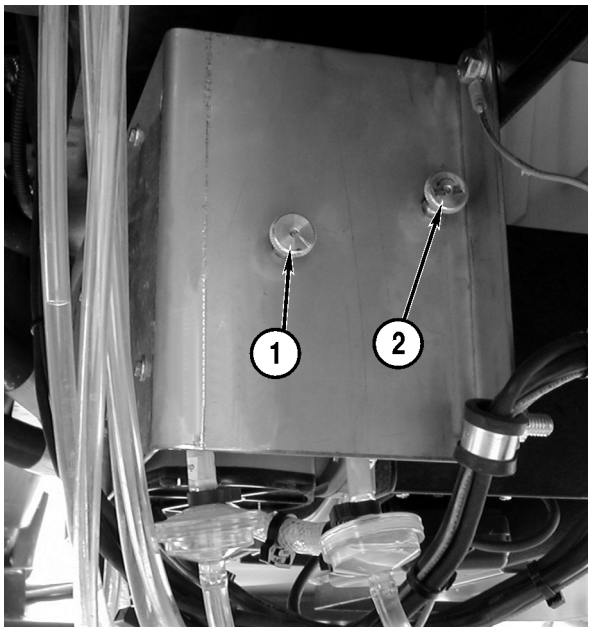
To adjust the foam quality, open the "soap injection valve" (1) by turning the knob counterclockwise. Adjust the foam quality until foam is rich and thick.

To adjust the total foam output, open the "output valve" (2) by turning the knob counterclockwise. Adjust as needed.

NOTE: Opening the valve too far will flood the chambers and produce soupy foam. Closing the valve too far will not produce enough foam.

When the foam marker is set properly, quality foam will be produced at 60 drops per minute (see chart on the following page). This foam should stick to your hand when turned upside down.

NOTE: The foam marker pulls water from the rinse tank on the right side of the vehicle to create foam.



Output (gpm)	Drops per Minute (based on a 3” boot)	Foam Spacing @ 5 mph	Foam Spacing @ 10 mph	Foam Spacing @ 15 mph
5	62	7.1 ft	14.2 ft	21.3 ft

Maintenance
Clean and replace the air pump and in-line solution filters regularly to extend the lift of the pump. The air pump has one sponge and one felt filter.

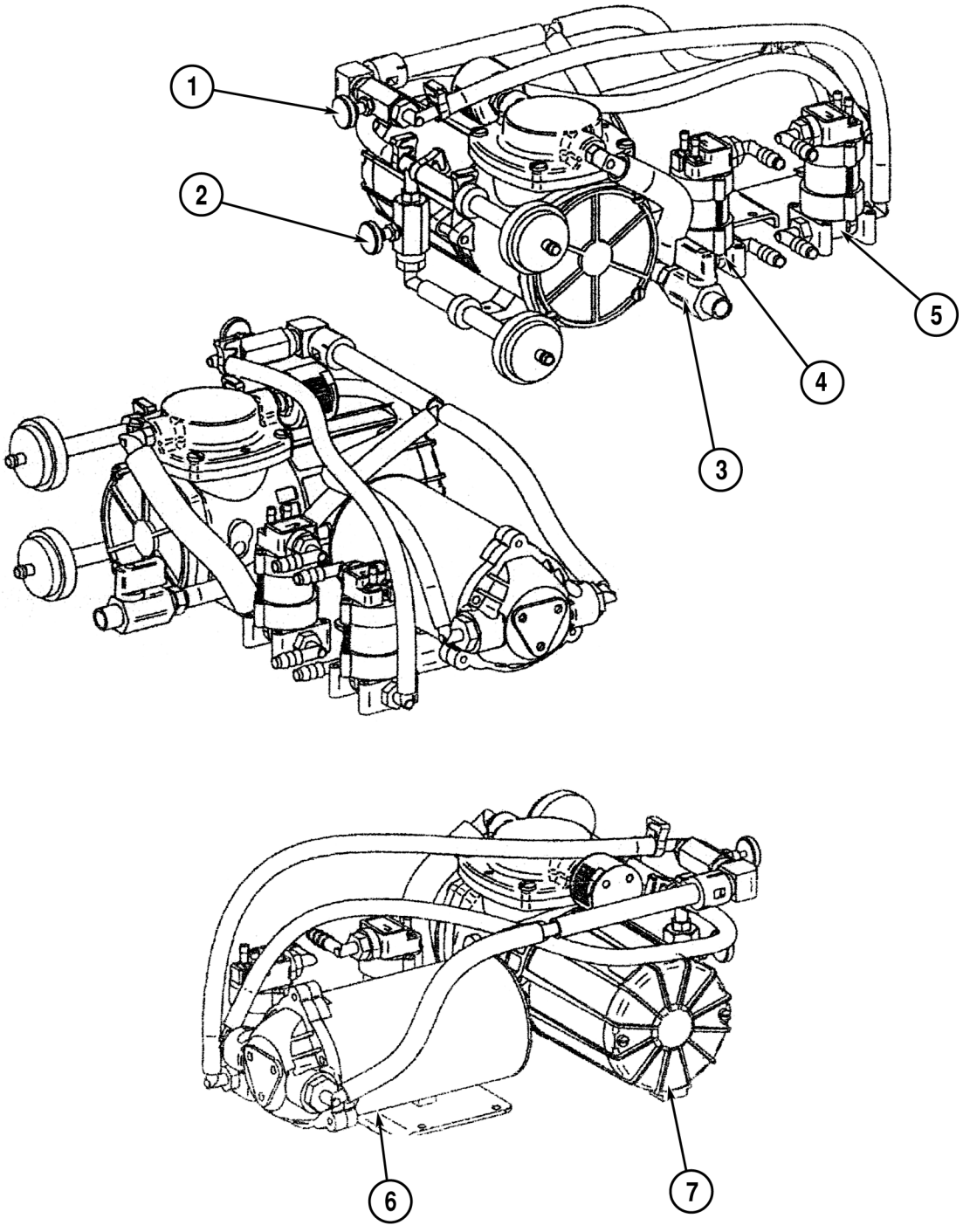
Freezing
When operating in temperatures at or below freezing, ethylene-glycol-based antifreeze may be added to the water and soap tanks.

If the system will be exposed to freezing temperatures overnight:

1. Pull the suction tube out of the tank and expose it to the air.
2. Close the soap valve and run the system for 10 to 15 seconds to clear the foam solution from the pump and solenoids.

For long-term storage:

1. Drain the tank of the foam solution and run fresh water through the entire system.
2. While the unit is running, blow air through the suction tube until the system is dry.
3. Flip the power switch to dry the other side.



1. **Output Valve**
   Labeled “More Foam Less Foam”
2. **Soap Injection Valve**
3. **Priming Valve**
4. **Air Solenoid**
5. **Soap Solenoid**
6. **Liquid Pump**
7. **Thomas Air Compressor**

Flushing Product Tank

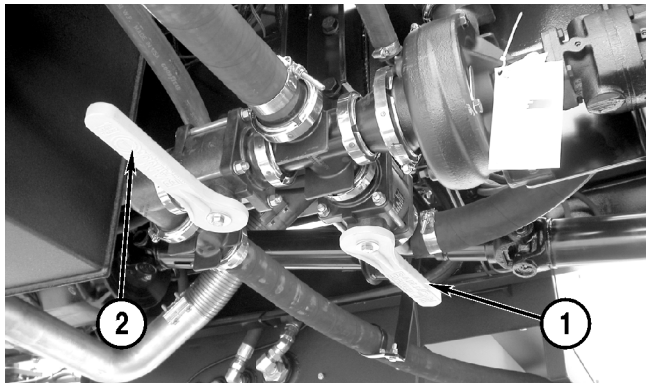
(with optional Roto-Flush)

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 4-10

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



Turn the Agitate/Roto-Flush knob to “ROTO-FLUSH” (1).

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.

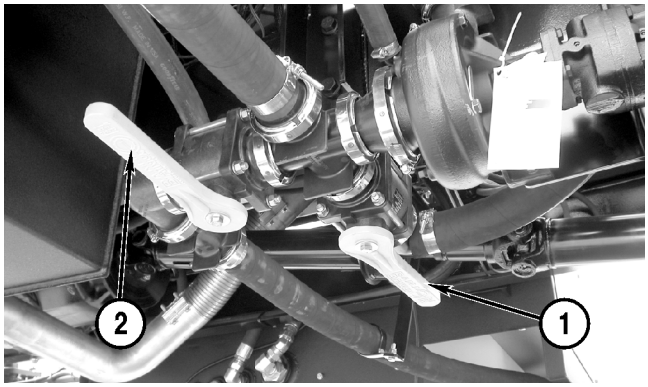
Use the T-handle to increase engine speed to 1800 rpm.

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 (2), and turn the Agitate/Roto-Flush knob (1) to “OFF”.

Flushing Booms

Open the product valve (1), set the product pump switch to the “ON” position, increase engine speed to 1800 rpm, unfold the booms, turn the agitate/roto-flush knob to “ROTO-FLUSH”, and set the boom section switches to the “ON” position.



NOTE: If the Apache Sprayer is equipped with an optional chemical eductor, flush the eductor at the same time as the booms.

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, return the engine speed to “IDLE”, set the boom section switches to “OFF”, set the product pump switch to “OFF”, close the rinse tank valve (2), set Agitate/Roto-Flush knob to “AGITATE”, return agitate switch to original setting, fold the booms, and turn off the engine.

⚠ 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.

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.

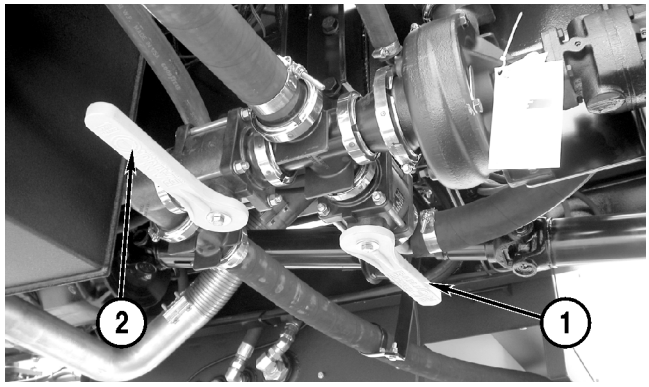
Follow chemical labels for proper rinsing procedure. Some chemicals may require multiple tank flushings

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 4-10

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.

NOTE: If the Apache Sprayer is equipped with an optional chemical eductor, flush the eductor at the same time as the booms.

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

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

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

Press the master spray button on the T-handle to begin spraying.

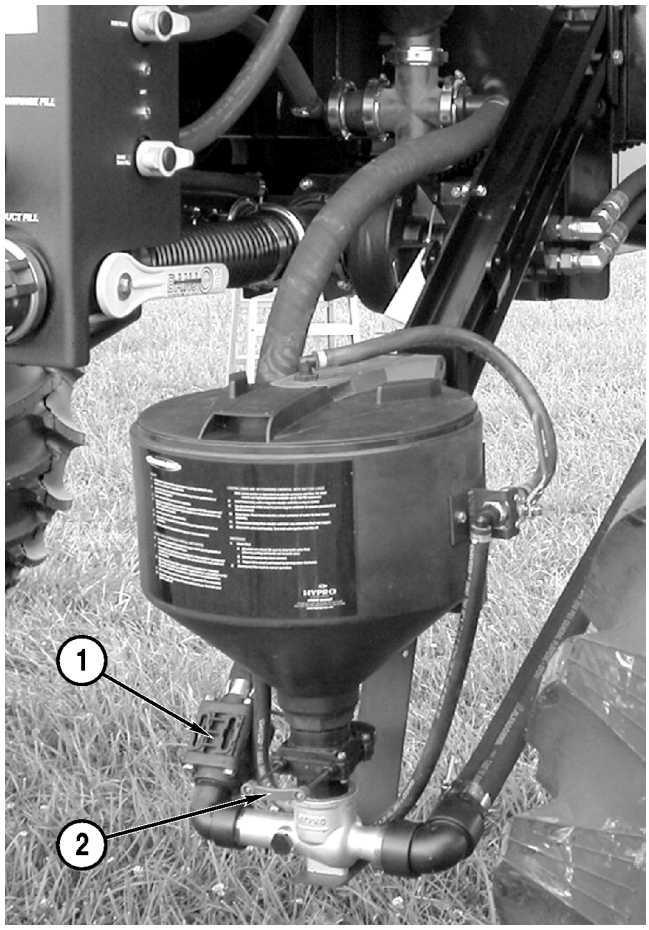
IMPORTANT: DO NOT run the product pump dry. Damage to the pump seals will result. DO NOT intentionally dead-head the pump with high pressures. Damage to the pump seals will result.

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 to spraying positions.

Cleanload Chemical Eductor

Startup

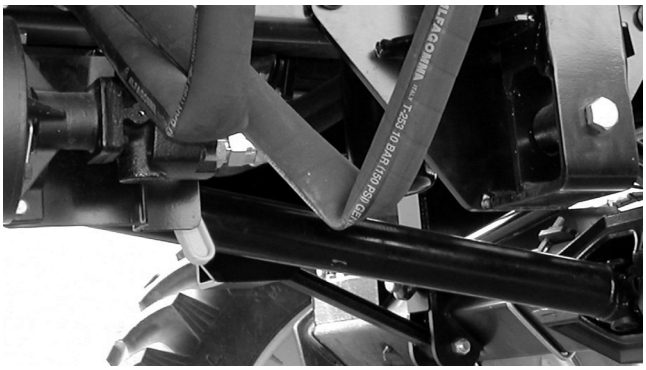
1. All Cleanload valves must be closed prior to starting: inlet ball valve (1), knife valve (2), and hopper rinse ball valve.
2. Open lid to check for foreign objects which may hinder performance or contaminate the system.
3. Close and lock lid by turning cover clockwise.
4. Divert pump flow to the Cleanload 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 the yellow handle of the inlet ball valve (1) to the open position.
6. Open the knife valve (2), located on the bottom of hopper, by pushing the red handle in toward the eductor.
7. Unlock and open the lid slowly by turning the cover counterclockwise.



Loading Liquid or Powdered Chemical into Hopper

8. Pour required amount of chemical into the hopper. Avoid splashing liquids or powdered chemicals outside of the hopper.
9. Rinse empty chemical containers if applicable. Place container opening over the container rinse valve and press down. This will activate the rinse valve and rinse the container.
10. Rinse the Cleanload hopper. Close and lock the lid by turning the cover clockwise. Release the safety locking band on the hopper rinse ball valve (1) and open the valve for 20 seconds. Close the ball valve (1) and return the locking band to the locked position.
11. Open the lid and inspect for chemical residue. Repeat step 10 as necessary.
12. Close the knife valve (2) by pulling the red handle out towards you. Turn inlet (yellow handle) off.

NOTE: The eductor hoses are flexible and may be kinked while in the “up” position. This is normal and will not cause any damage to the hoses or equipment.



Loading Liquid and/or Powdered Chemical with Suction Lance

NOTE: The suction lance must be purchased separately. It is not included with the chemical eductor.

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.

Apache Sprayer Service Interval Chart

Perform and repeat the prescribed maintenance at each interval ❍ = Conditional Service ● = Regular Service NOTE: Do not overlook the "After First 100 Hours" interval.	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 Steering Components	❍				●						
Grease Axle Components	❍		❍		●						
Grease Driveline	❍						●				
Check Axle Extension Bolt Torque	❍		❍				●				
Adjust Poly Tank Straps (AS1010 only)	❍	❍				❍			●		
Adjust Boom	❍	❍	❍								
Inspect Front Accumulators			❍								●
Clean/Replace Primary Engine Air Filter			❍					●			
Adjust Toe-In			❍							●	
Replace Engine Safety Air Filter			❍							●	
Winterize Wet System			❍							●	
Replace Cab Filters			❍							●	
Flush Wet System (including product pump)			❍	●							
Check Tire Pressure (See back cover for values)				●							
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					●						
Replace Differential Fluid						❍		●			
Replace Hydraulic Fluid Filter (Immediately if indicator is red.)						❍		●			
Clean Hydraulic Fluid								●			
Check Accumulator Fluid Level									●		
Replace Fuel Primary Filter									●		
Replace Fuel Separator Filter									●		
Replace Planetary Fluid (AS1010 only)									●		
Replace Steering Pressure Filter (Immediately if indicator is red.)									●		
Replace Engine Oil and Filter						❍			●		
Replace Transmission Fluid and Filter						❍			●		
Recalibrate Raven Radar Gun									●		
Inspect and Repack Wheel Hub and Flex Bearings									●		
Replace Drop Box Fluid (AS1210 or 48"CC AS1010)									●		
Clean Transmission Fluid Strainer						❍					●
Replace Hydraulic Fluid											●

Before Initial Use

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

- Grease Boom. See “Grease Boom” on page 5-6.
- Torque Lug Nuts. See “Torque Lug Nuts” on page 5-12.
- Grease Steering Components. See “Grease Steering Components” on page 5-12.
- Grease Axle Components. See “Grease Axle Components” on page 5-13.
- Grease Driveline. See “Grease Driveline Components” on page 5-14.
- Check Axle Extension Bolt Torque. See “Check Axle Extension Bolt Torque” on page 5-15.
- 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.

- Torque Lug Nuts. See “Torque Lug Nuts” on page 5-12.

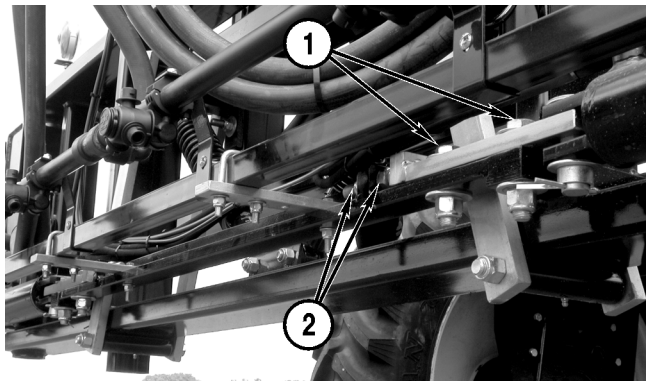
Adjust Boom

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.

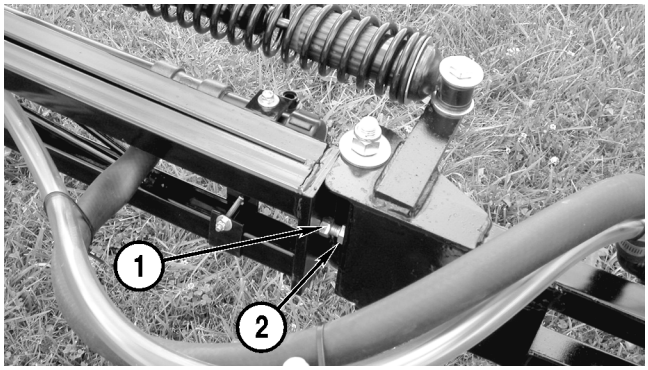


Tighten the jam nuts and lead bolts after correct lead is set.

Repeat the steps for the remaining boom, as required.

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.



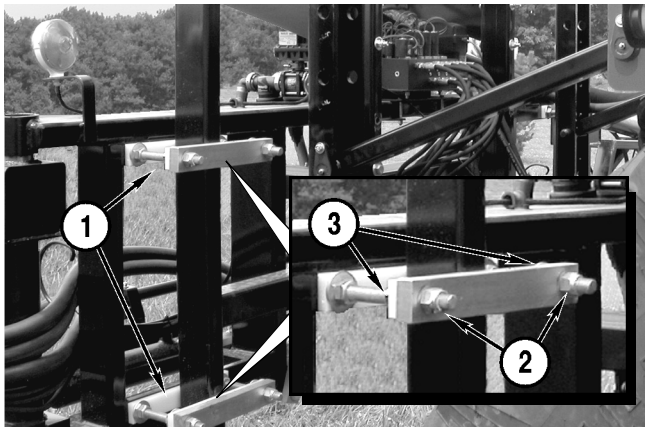
The breakaways should be adjusted so the boom sections on both sides of the breakaways are straight and aligned as they extend from the center section.

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 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.

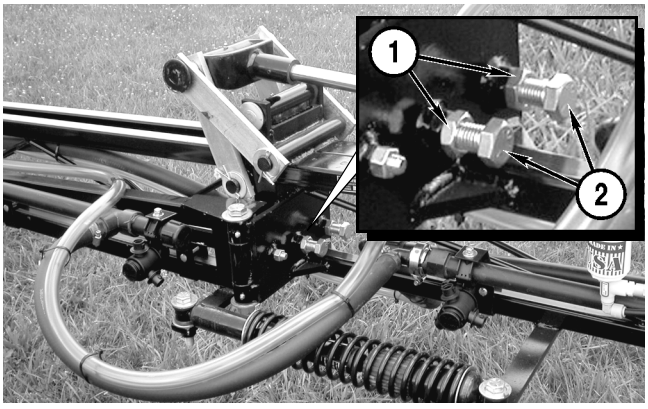
Tighten the lock nuts (2).

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’, 90’, and 100’ Booms)

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.

As Required

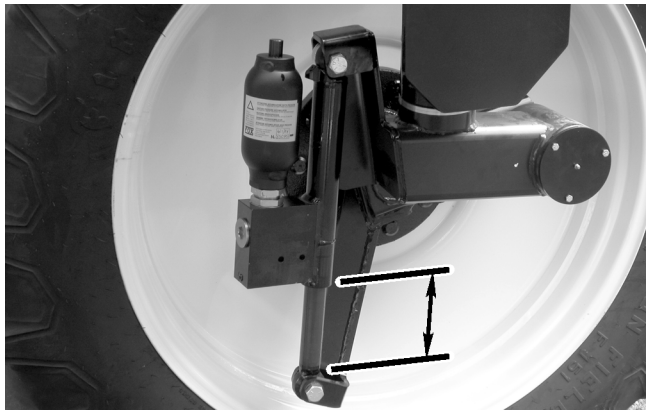
The following services will be required at various intervals depending on vehicle use and environmental conditions. Repeat these services as prescribed by the Apache Sprayer Service Interval Chart.

- Grease Axle Components. See “Grease Axle Components” on page 5-13.
- Check Axle Extension Bolt Torque. See “Check Axle Extension Bolt Torque” on page 5-15.
- Clean or Replace Primary Engine Air Filter. See “Clean or Replace Engine Primary Air Filter” on page 5-16.
- Adjust Toe-In. See “Adjust Toe-In” on page 5-26.
- Replace Secondary Engine Air Filter. See “Replace Engine Safety Air Filter” on page 5-27.
- Winterize Wet System. See “Winterize Wet System” on page 5-27.
- Replace Cab Air Filters. See “Replace Cab Recirculating Air Filter” on page 5-30.
- Flush Wet System. See “Flushing Wet System” on page 4-25.

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.

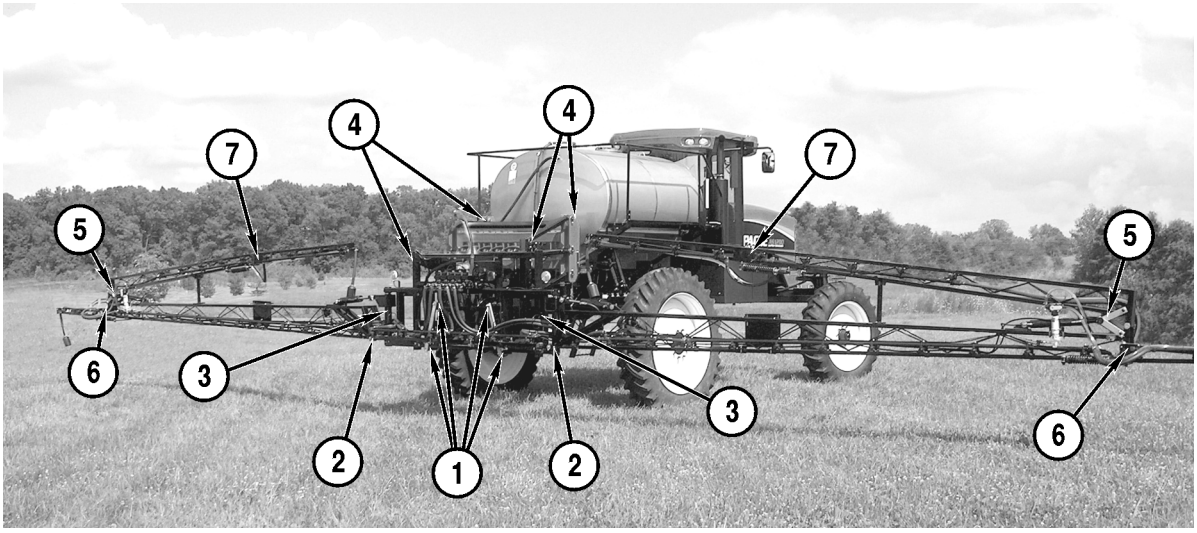
NOTE: Additional cylinder ram may be exposed when the Apache Sprayer is new. Several hours of operation will break-in the seals.



Daily

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

Grease Boom

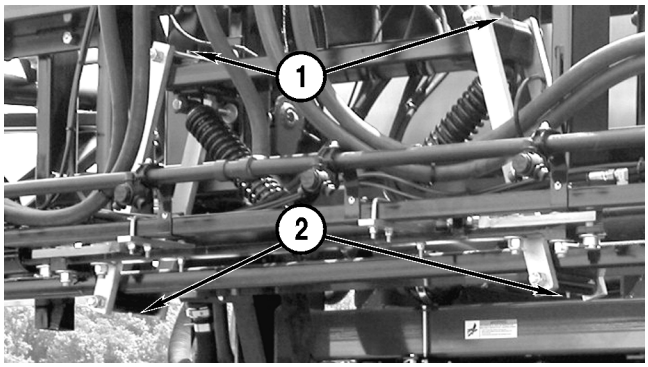


The boom is equipped with seven sets of grease fittings. Apply an ample amount of lithium grease through each of the grease fittings.

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

Boom Stabilizer

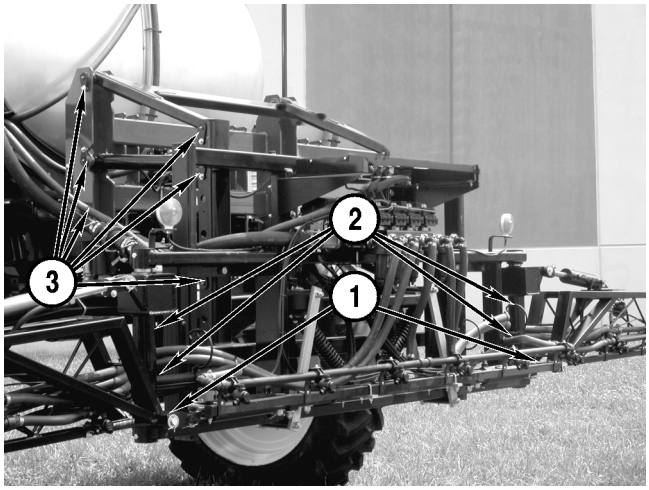
There are two upper (1) and two lower (2) boom stabilizer grease fittings.



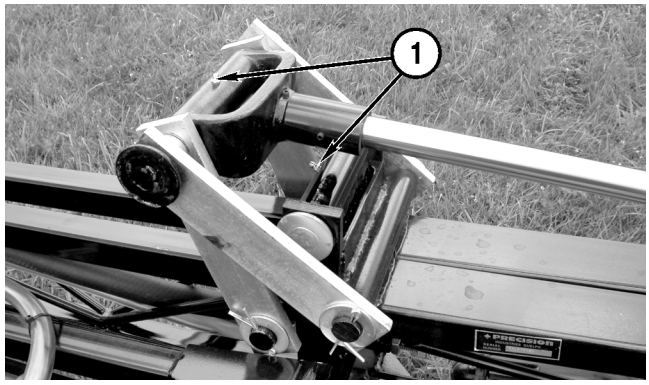
Boom Tilt
There are two boom tilt grease fittings (1).

Boom Fold
There are four boom fold grease fittings (2).

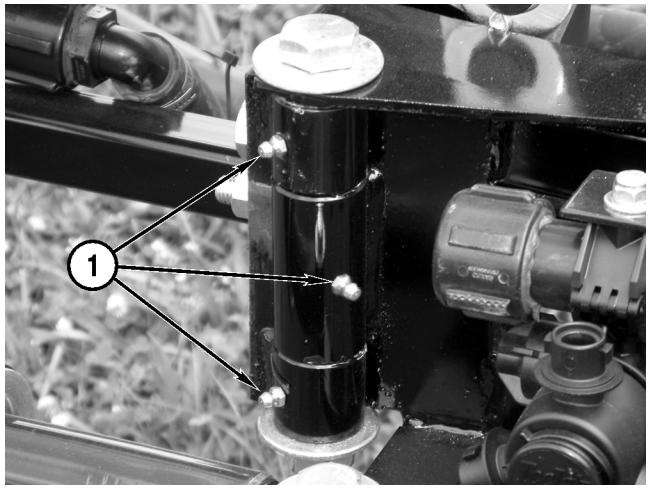
Boom Rack
There are two sets of six boom rack, flag-pin style, grease fittings. The six left side fittings (3) are shown. The six right side fittings are in the same orientation on the right side of the boom rack.



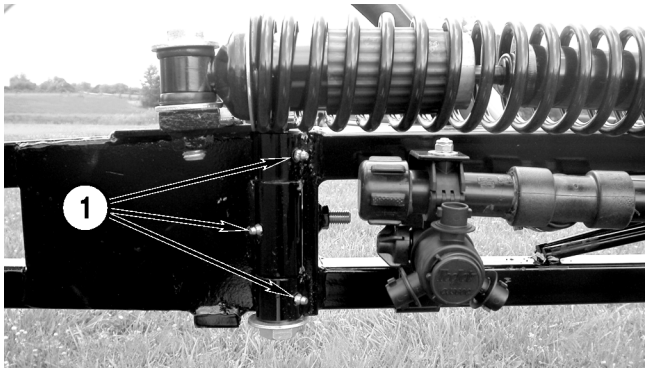
Boom Tip
There are four boom tip grease fittings (1), two on each boom tip. The left side is shown.



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

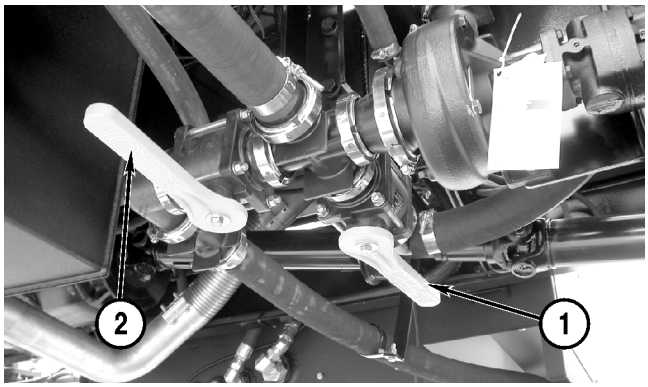


Boom Outer Breakaway (if equipped)
There are six boom outer breakaway grease fittings (1), three on each boom tip. The left side is shown.



Flush Wet System

Drain and flush the product tank and wet system after use and when changing chemicals. See “Flushing Product Tank” on page 4-23. See “Flushing Wet System” on page 4-25.



Check Tire Pressure

Check the tires for proper inflation pressure and damage. Tire pressures are 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.

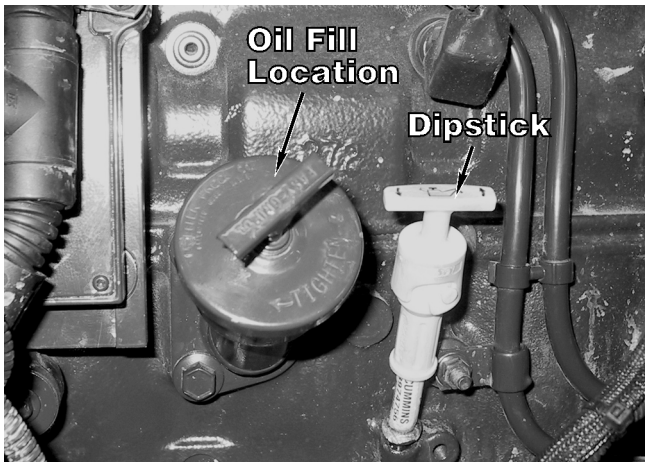
Check Engine Oil Level

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.

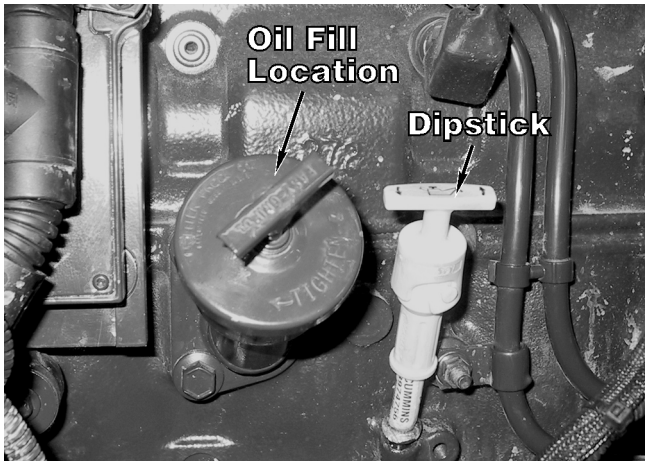


If the oil level is below the “ADD” mark, add high quality Lucas 15W-40 Magnum motor oil at the oil fill location on the left side of the engine.

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.

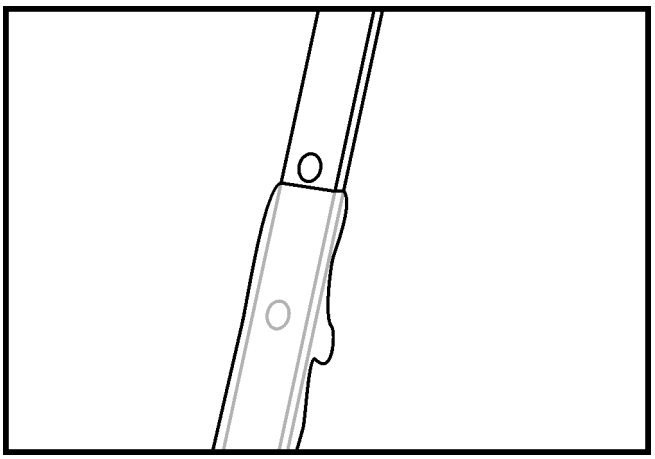
The reservoir is marked with “FILL” and “LOW” level indicators. Maintain the fluid level between these two marks.

If the brake fluid level drops to the “LOW” level, remove the reservoir cap and add Lucas Universal Hydraulic Fluid 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.

Check Transmission Fluid Level

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.

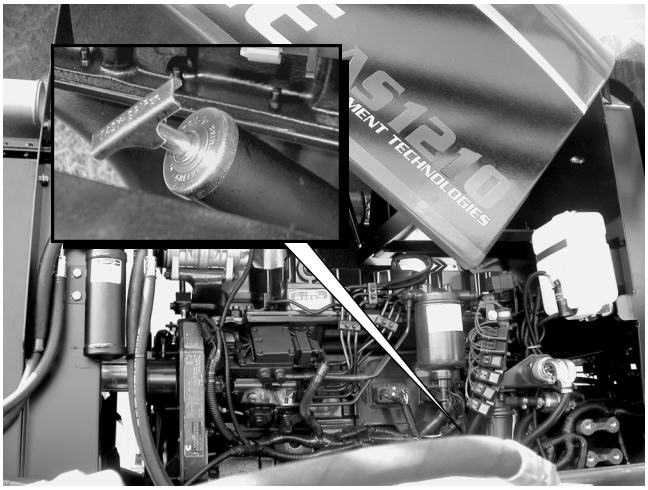
The fluid level should be between the two dots on the dipstick.

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

IMPORTANT: Use only Lucas Universal Hydraulic Fluid.

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

Add Lucas Universal Hydraulic Fluid to bring the level between the dots on the dipstick.



Replace the dipstick and turn the handle clockwise to tighten.

ITL/JBC Transmission (AS1010)
IMPORTANT: Check the transmission fluid level with the oil warm and the engine turned off.

Funk Transmission (AS1210 and optional equipped AS1010)
IMPORTANT: Check the transmission fluid level with the engine running, the transmission at normal operating temperature, and the transmission in neutral position.

Check Hydraulic Fluid Level

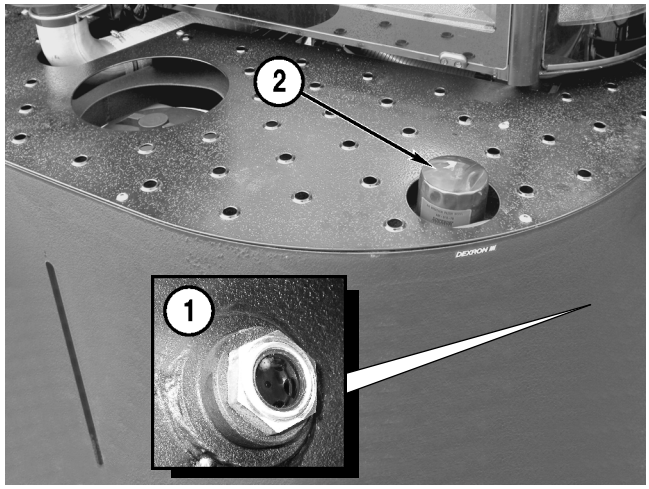
IMPORTANT: The booms must be folded and in the transport position for an accurate hydraulic fluid level reading.

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 Lucas Universal Hydraulic Fluid for the Apache Sprayer hydraulic system.

If no fluid is visible in the sight glass, remove the fill cap (2) and add Lucas Universal Hydraulic Fluid until fluid is visible in the bottom of the sight glass.

NOTE: Do not fill more than 3/4 up on the sight glass.



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.

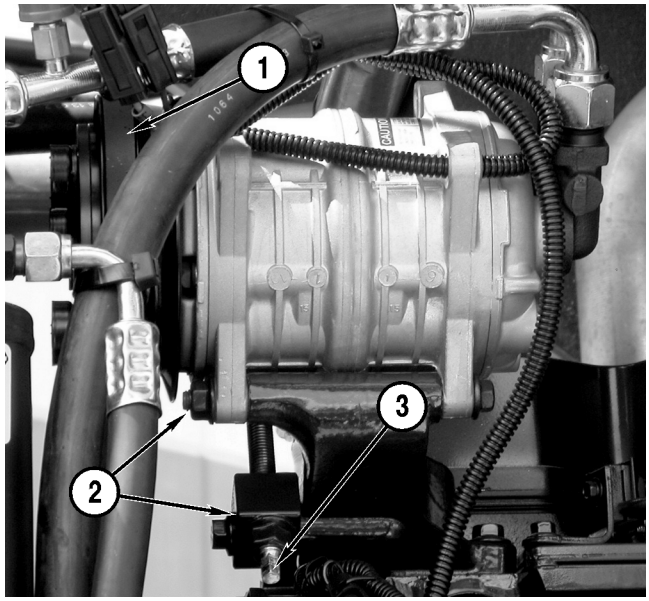
Replace

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).



Every 40 Hours

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

Torque Lug Nuts

Torque the 12.4” x 28” front wheel lug nuts to 180 lb-ft [244 N•m].

Torque the 36” or 42” crop clearance rear wheel lug nuts to 225 lb-ft [305 N•m].

Torque the 14.9” x 38” front wheel lug nuts to 315 lb-ft [427 N•m].

Torque the 48” crop clearance rear wheel lug nuts to 315 lb-ft [427 N•m].

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.

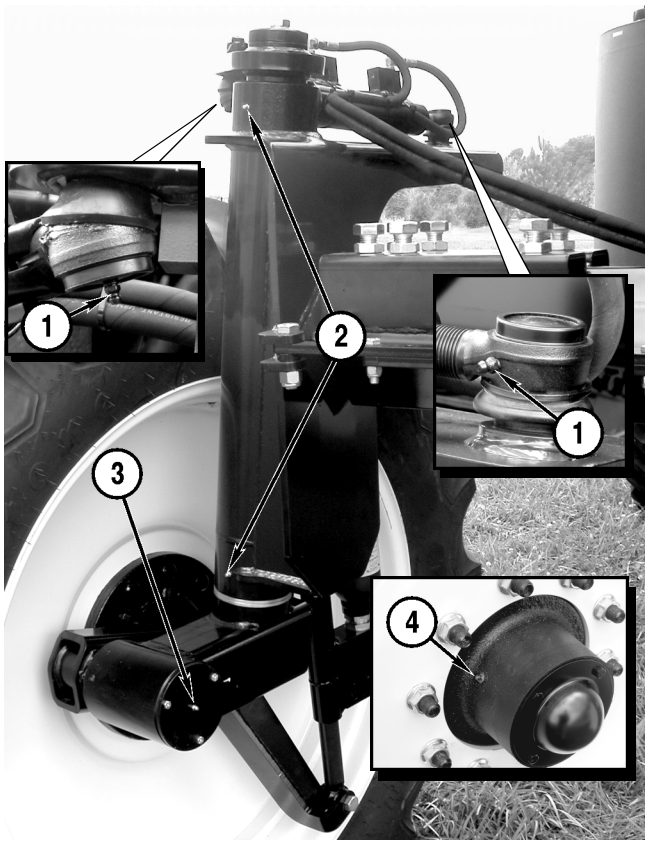
Apply lithium grease through the two king-pin grease fittings (2).

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).

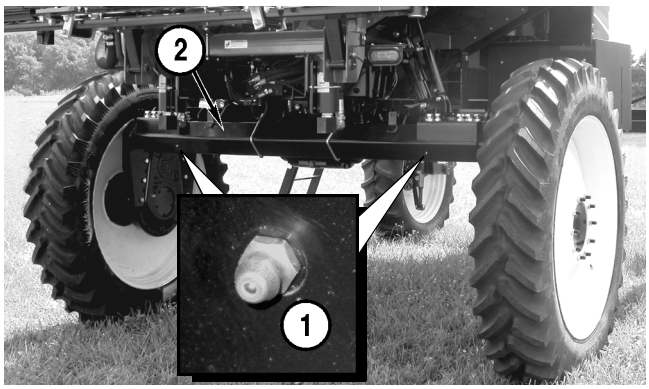
Apply lithium grease through the hub bearing grease fitting (4).

Repeat these steps for the other front wheel.



Grease Axle Components

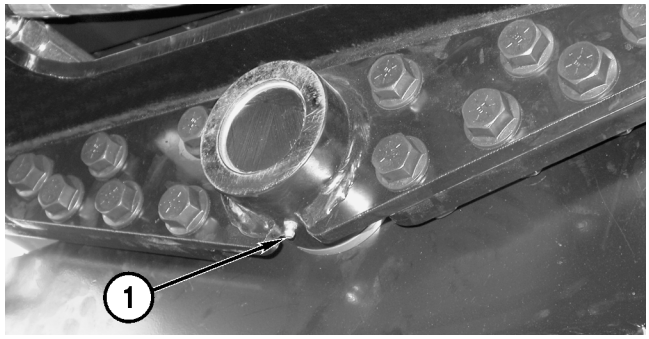
The rear axle is equipped with eight grease fittings, installed in two square-tube axle extension assemblies. Four fittings (1) point downward from the bottom faces of each square tube (2). Shown are the two rear-most fittings.



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.

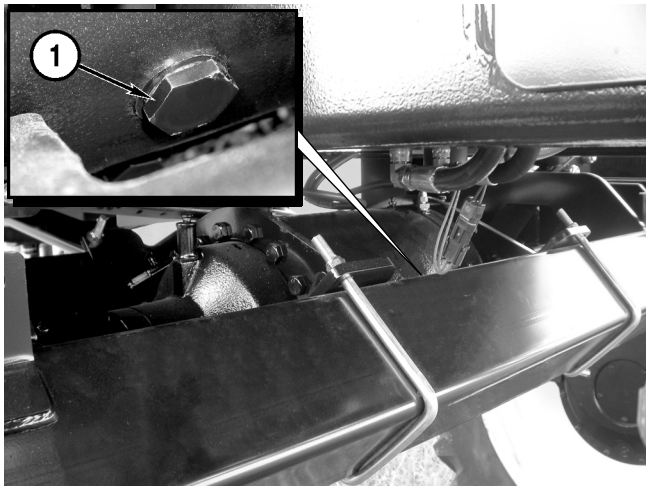
An axle pivot is located under the vehicle on the front axle. The pivot is equipped with a grease fitting (1) on front and rear of the front axle.



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

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 Lucas Universal Hydraulic Fluid for the differential fluid.

If required, add Lucas Universal Hydraulic Fluid 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.

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 5-22.
- Replace Transmission Fluid and Filter. See “Replace Transmission Fluid and Filter” on page 5-23.

Every 100 Hours

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

Grease Driveline Components

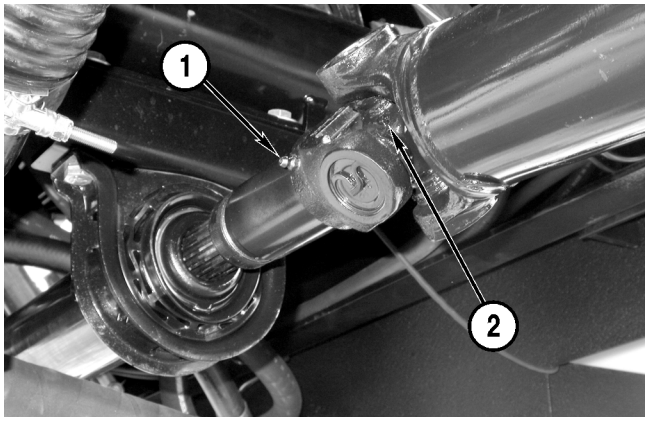
The Apache Sprayer has a total of ten driveline grease fittings. Three of these fittings are slip joint fittings and seven are U-joint fittings.

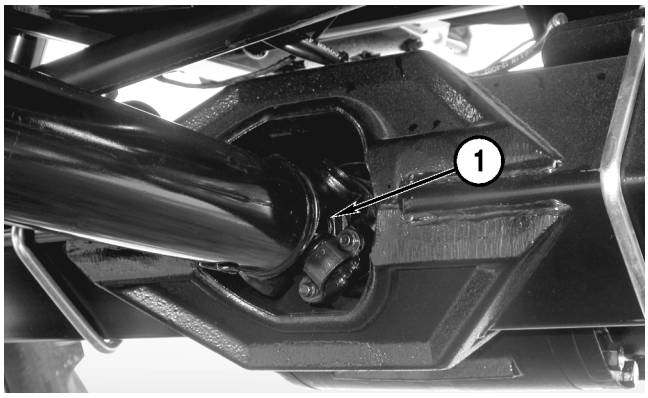
Apply an ample amount of lithium grease through each of the fittings.

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

A U-joint fitting is located at the transmission output U-joint (not shown) and another fitting (2) is located on the U-joint connected to the slip joint.

A U-joint fitting (1) is located at the differential input.

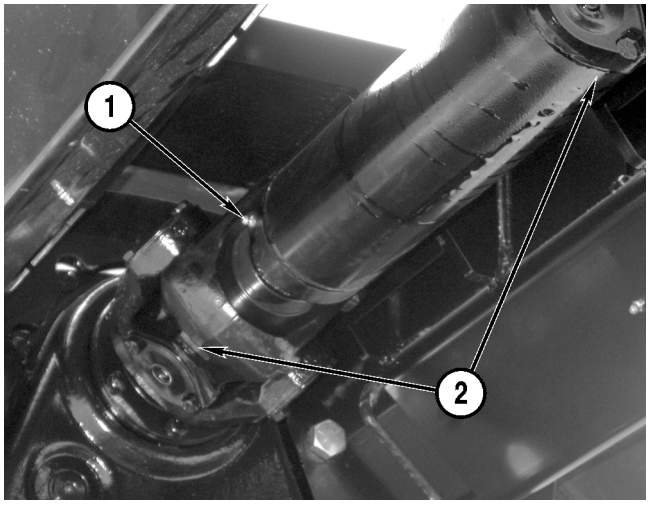




The other two slip joint grease fittings (1) are located under the vehicle, between the differential and each drop box U-joint.

The remaining U-joint fittings (2) are located on the U-joints at each end of the left and right axles.

The left axle is shown.



Check Axle Extension Bolt Torque

IMPORTANT: There are different bolt torque values for manual and Adjust On The Go axle braces. Follow the instructions for your application.

Manual Adjustment

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 manual adjust brace is shown.

Loosen all the jam nuts.

Tighten the bolts to 80 lb-ft [108 N•m].

Tighten the jam nuts.

Adjust On The Go

Check the bolt torque on the axle extension braces. There are six socket-head bolts on each front brace and twelve socket-head bolts on each rear brace. The left front Adjust On The Go brace is shown.

Loosen all the jam nuts.

Tighten the socket-head bolts to 15 lb-ft [20 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

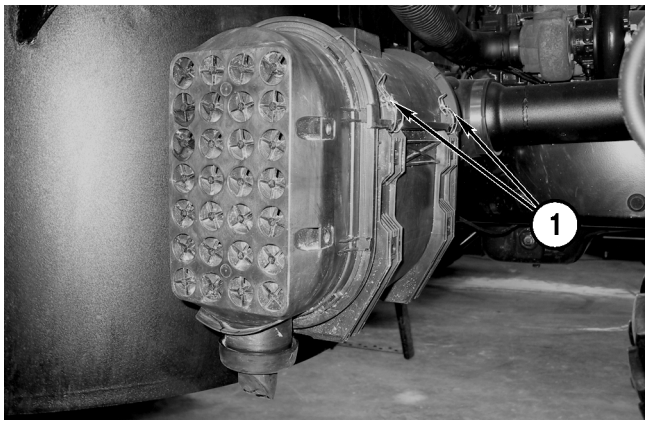
IMPORTANT: When operating in severe conditions, the primary air filter should be cleaned after every 40 hours of use or when indicated by the console display.

NOTE: If a “change air filter” fault is indicated on the console display, stop immediately to remove and clean the primary air filter. Replace if necessary.

The primary air filter is mounted on the right side of the vehicle, in front of the hydraulic tank.

Clean the outside of the air cleaner and surrounding area to keep dust from entering the cleaner assembly.

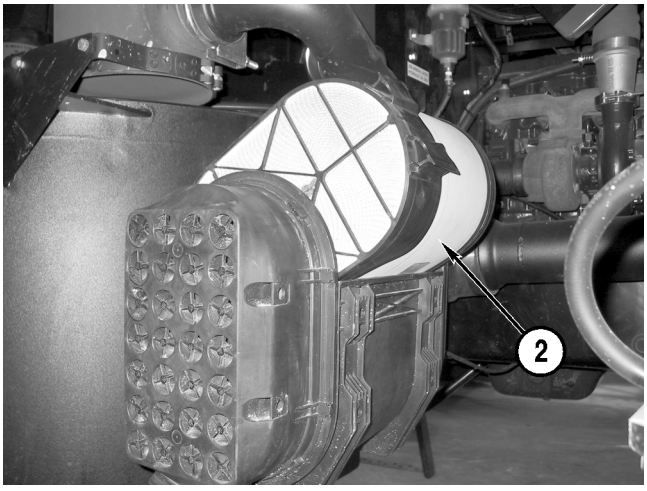
Release the four latches (1) and remove the cover from the air cleaner assembly.



Use a rocking motion to raise the primary air filter (2) from the assembly.

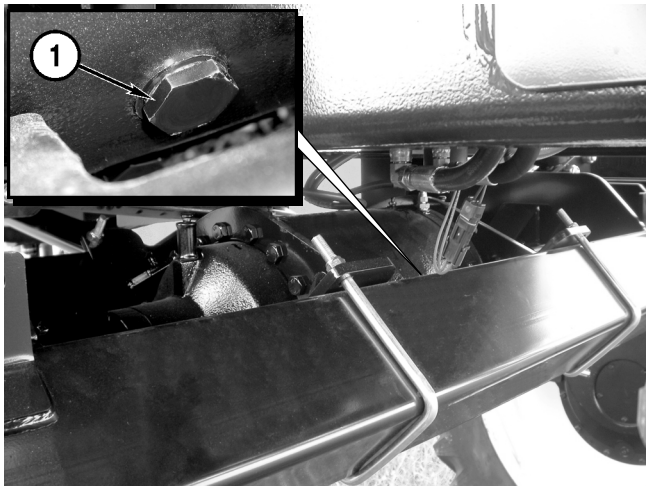
Clean the filter using compressed air. Blow the filter from the inside-out.

If installing a new primary engine air filter, use Part Number 201300116. Install the filter, the air cleaner cover, and engage the cover latches.



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.

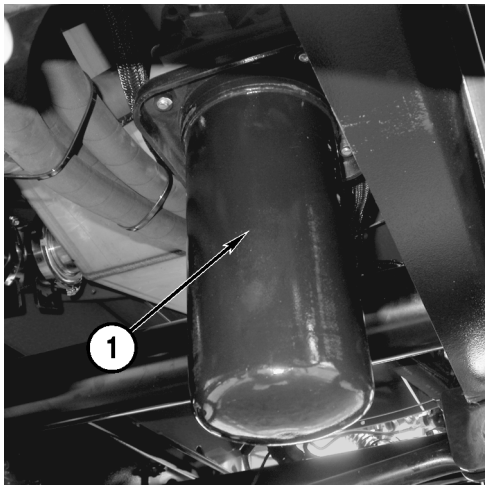
IMPORTANT: Use only Lucas Universal Hydraulic Fluid for the differential/planetary fluid.

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 Lucas Universal Hydraulic Fluid.

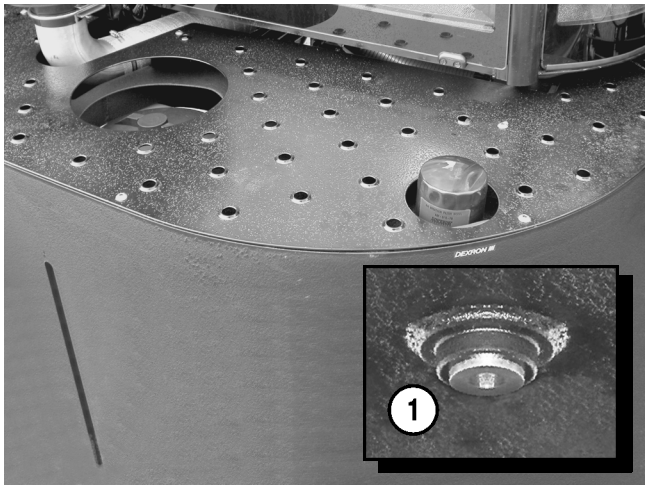
Install the canister onto the filter housing and tighten the four bolts.

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

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.



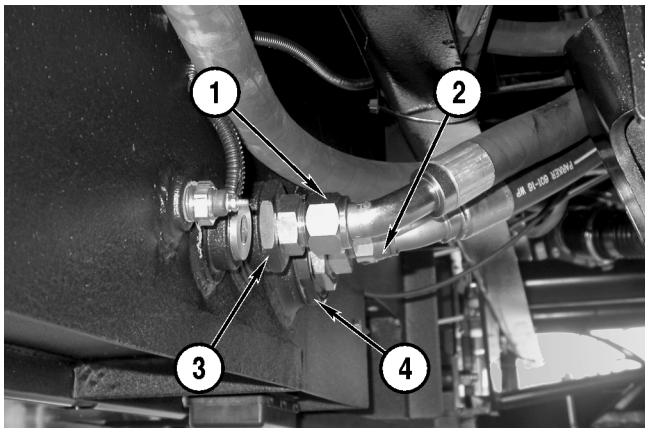
Remove the hydraulic fluid lines (1) and (2).

Remove the strainers (3) and (4).

NOTE: Make sure to completely drain the hydraulic tank before removing hoses or strainers.

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

If the strainers cannot be cleaned or have holes in the screen, replace with new strainers.



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

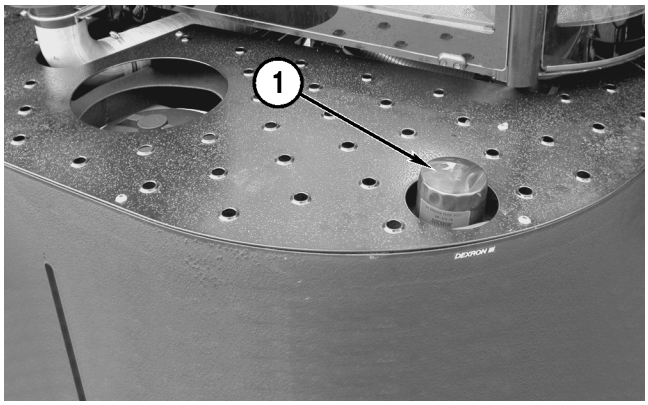
Install the hydraulic lines (1) and (2).

IMPORTANT: Use only Lucas Universal Hydraulic 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 Lucas Universal Hydraulic Fluid. 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.

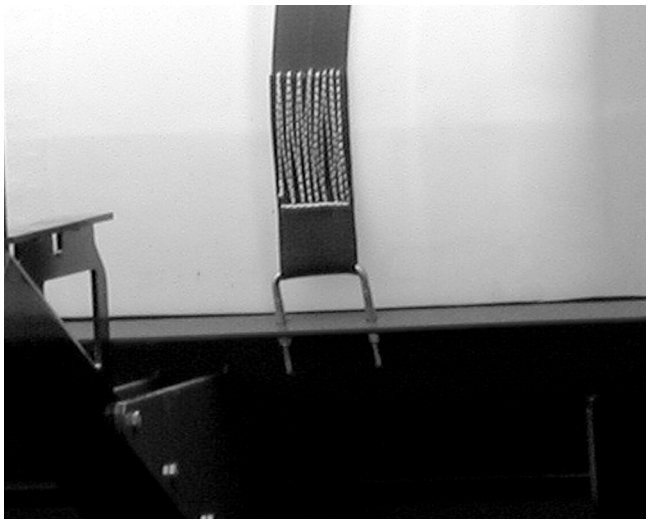


Every 500 Hours or Yearly

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 or yearly.

Adjust Poly Tank Straps (if equipped)

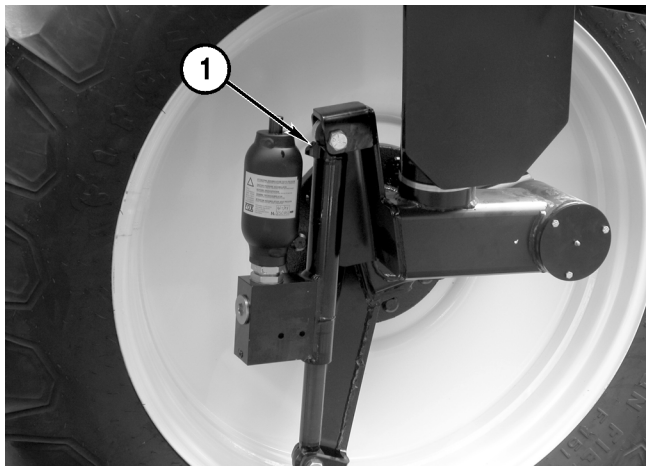


Tighten the bolts on each tank strap without deforming the tank, bolts or tank skid. Tighten the bolts evenly from side to side.

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.

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 Lucas Universal Hydraulic Fluid for the accumulator fluid.

If required, add Lucas Universal Hydraulic Fluid to fill the accumulator to the bottom of the fill hole.

Install the plug and tighten.

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

Remove the cap (2) and install a nitrogen valve and gauge on the accumulator.

Open the valve and check the nitrogen level.

It may be necessary to top off the nitrogen level yearly.

AS1010: 900 psi

AS1210: 950 psi

Replace Fuel Filter

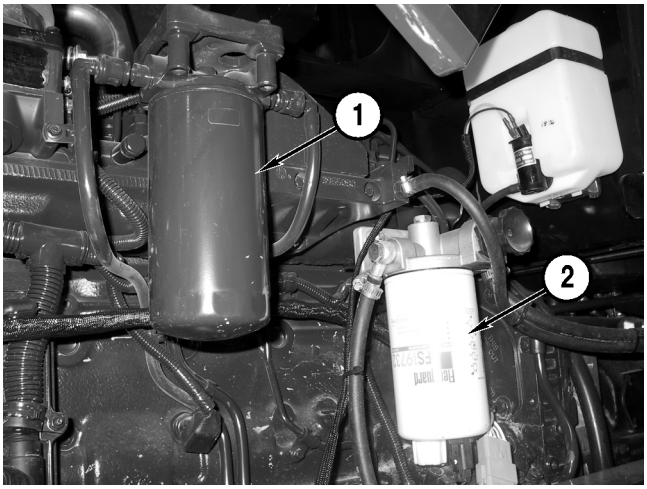
The fuel filter (1) is located in the engine compartment on the left side of the engine.

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

Use a new filter, Part Number 201450242. Fill the new filter with diesel fuel before installing.

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 Fuel Separator Filter

The fuel separator filter (2) is located in the engine compartment on the left side of the engine.

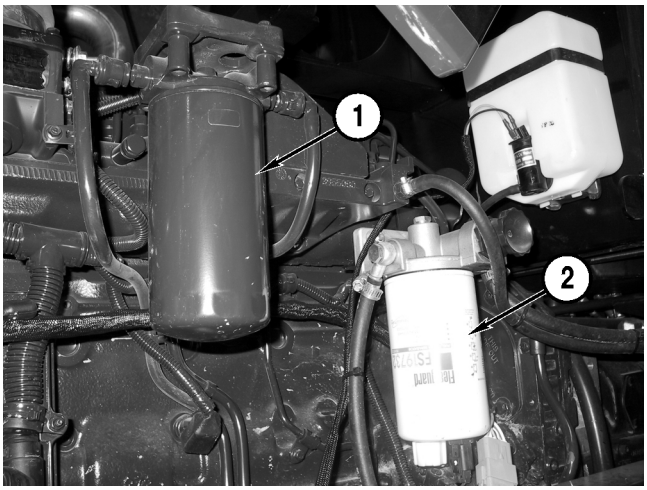
Turn the filter counter-clockwise to remove. Dispose of the filter properly.

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

Use a new filter, Part Number 201450243. Fill the new filter with diesel fuel before installing. Tighten the filter, by hand, 3/4 to 1-1/4 turns after the seal contacts the filter housing.

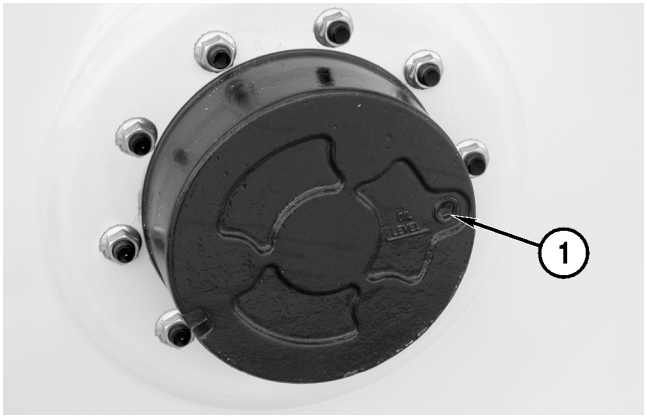
NOTE: It is not necessary to bleed the fuel system after replacing fuel filters.

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



Replace Planetary Fluid (AS 1010 Only)

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.

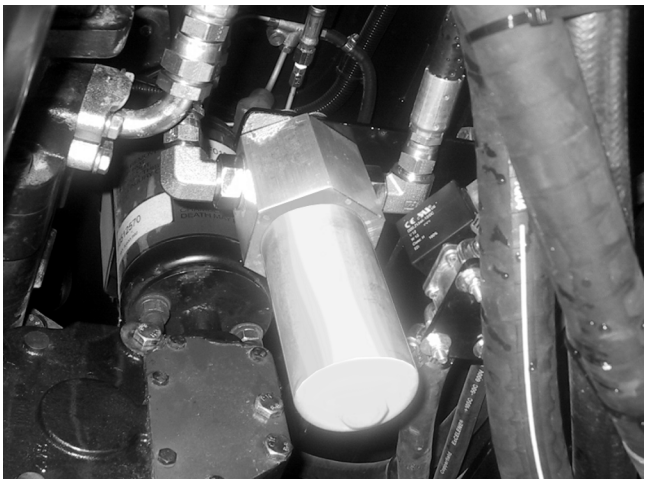
IMPORTANT: Use only Lucas 80/90 Gear Oil for the planetary fluid.

Fill each planetary with Lucas 80/90 Gear Oil to the bottom of the fill hole. The planetary capacity is approximately 2.2 quarts [2.0 liters].

Install the plug (1) and tighten.

Replace Steering Pressure Filter

Check the indicator on top of the filter head. If it is red, change the filter immediately; If the indicator is green, change the filter at the next 500 hours or yearly maintenance interval.

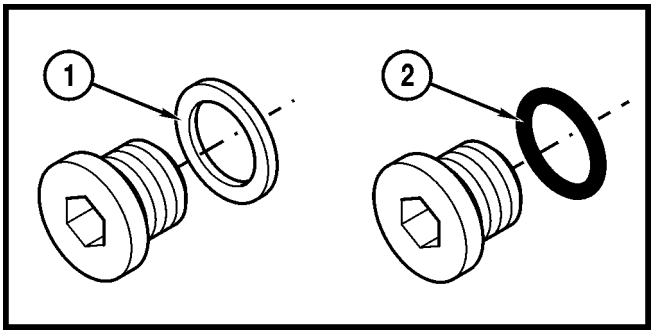


To change the steering pressure filter, loosen the filter bowl and remove the bowl and element. Install a new filter element on the filter head. Inspect the o-ring on the filter bowl and replace if damaged. Install the filter bowl and tighten to 45 ft-lb [61 N•m].

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]

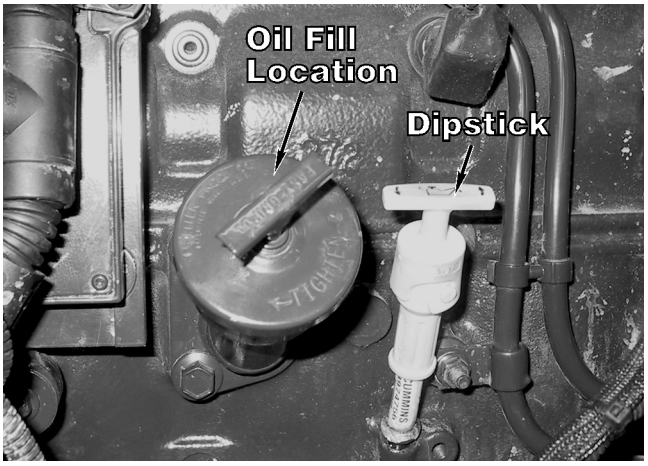
The engine oil filter is located on the right side of the engine.

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 Lucas 15W-40 Magnum motor oil at the oil fill location on the left side of the engine. The engine oil capacity is approximately 16 quarts [15 liters].

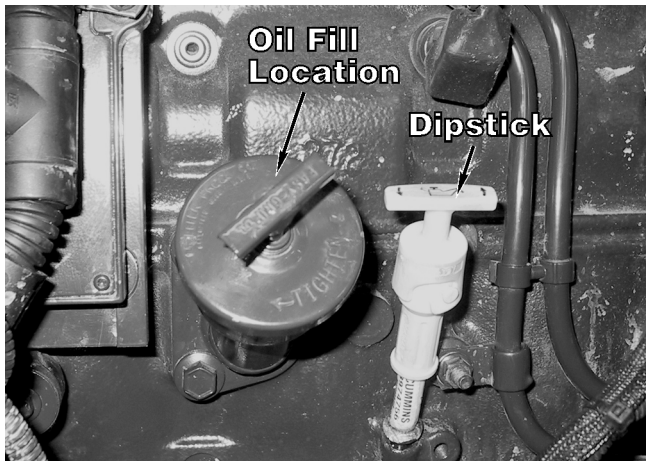
Add oil as needed to bring the level to the hatched area on the dipstick.

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 Transmission Fluid and Filter

ITL/JBC Transmission (AS1010)

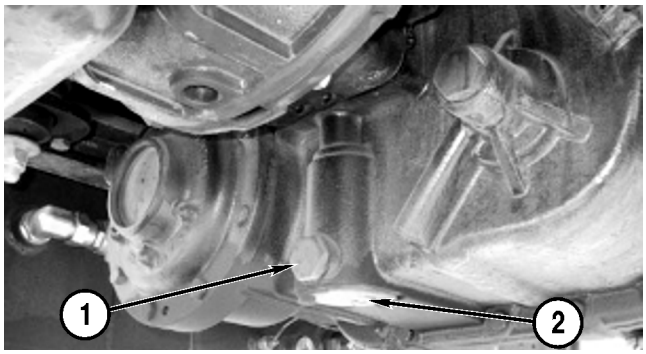
The transmission drain plug is located under the machine on the front side of the transmission.

Remove the drain plug (1) and drain the transmission fluid into a suitable container.

Dispose of the fluid properly.

Install the drain plug.

Remove the strainer (2), clean with diesel fuel, and reinstall the strainer and plate.

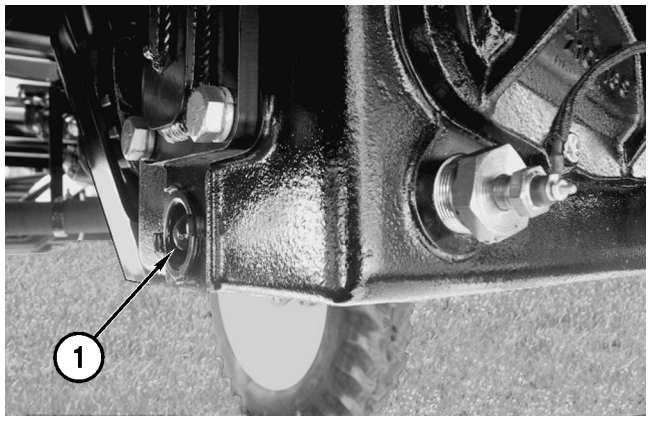


Funk Transmission (AS1210 and optionally equipped AS1010)

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

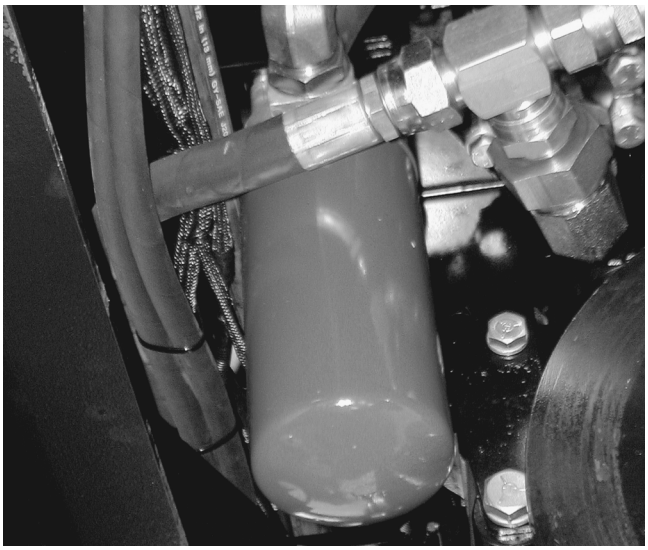
Remove the drain plug (1) and drain the transmission fluid into a suitable container. Dispose of the fluid properly.

Install the drain plug.



Funk Transmission (AS1210 and optionally equipped AS1010)

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

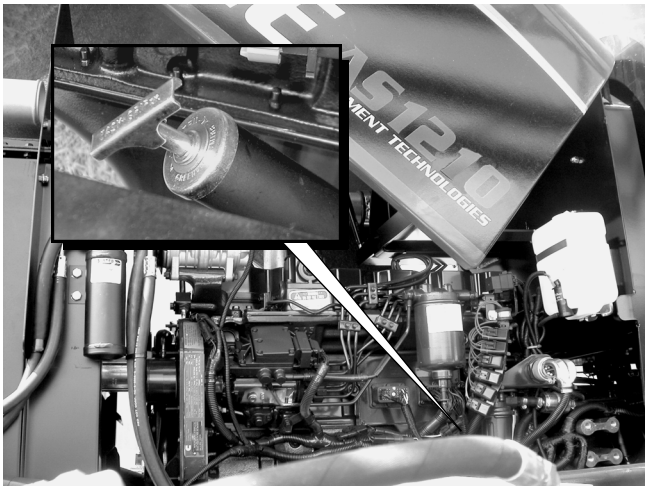


Turn the filter counter-clockwise to remove. Dispose of the filter properly.

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].

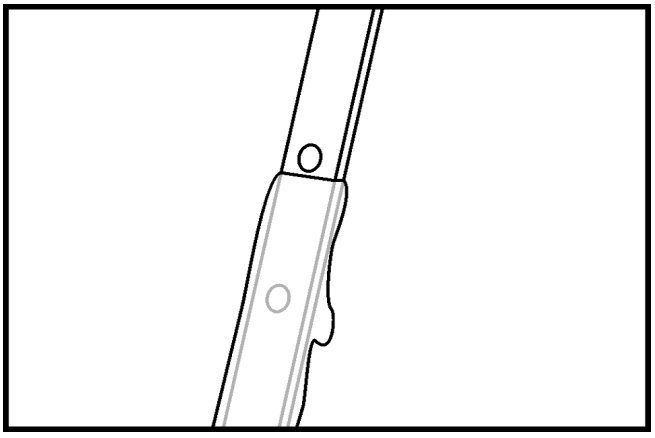


IMPORTANT: DO NOT overfill the transmission fluid. Overfilling can damage the transmission or cause the transmission to malfunction.

IMPORTANT: Use only Lucas Universal Hydraulic Fluid.

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

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

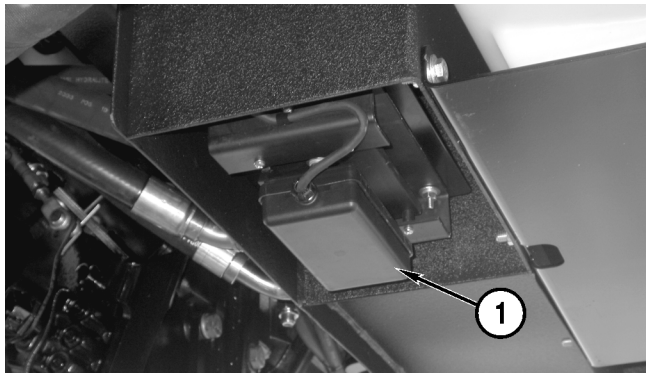


The fluid level should be between the two dots on the dipstick.

Replace the dipstick and turn the handle clockwise to tighten.

Recalibrate Raven Radar Gun

The Raven radar gun (1) should be calibrated every year. See the manufacturer's instructions, provided with the Apache Sprayer.



Inspect and Repack Wheel and Inter-Flex Bearings

Contact your dealer.

Every Year

The following services must be performed every year.

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.

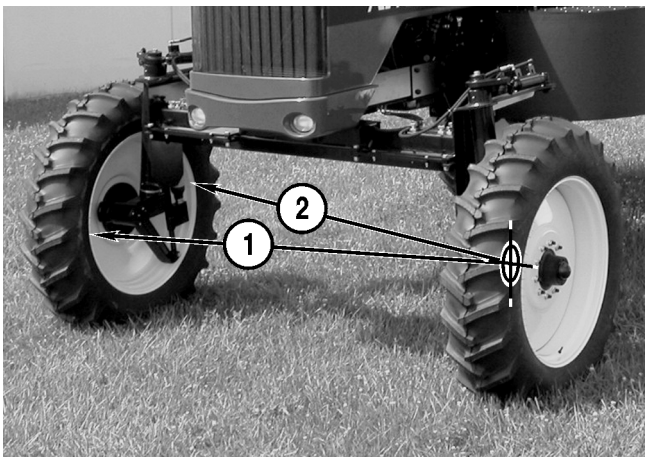
Make sure the tie rod ends are fully seated in the taper.

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.

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.

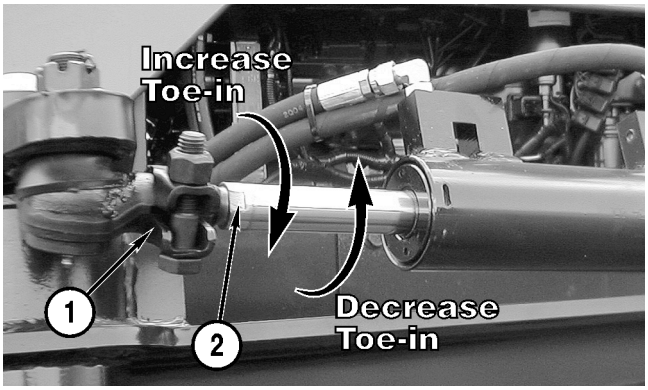
If distance (1) is 1/8” less than distance (2), the toe-in is correct for the right wheel. If the toe-in is not correct, it must be adjusted.

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.



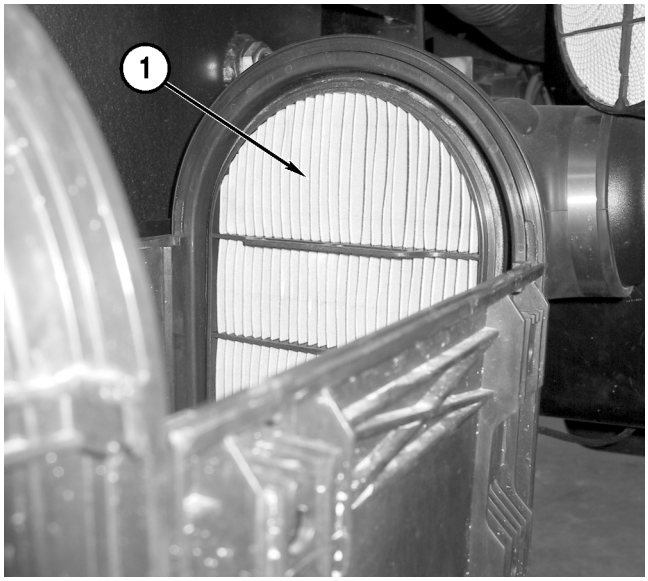
Loosen the nut and bolt on the tie rod clamp (1).

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

Replace Engine Safety Air Filter

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

The engine safety air filter (1) is mounted on the right side of the vehicle, in front of the hydraulic tank.



Release the four latches and remove the cover from the air cleaner assembly. Use a rocking motion to remove the primary air filter and set it aside.

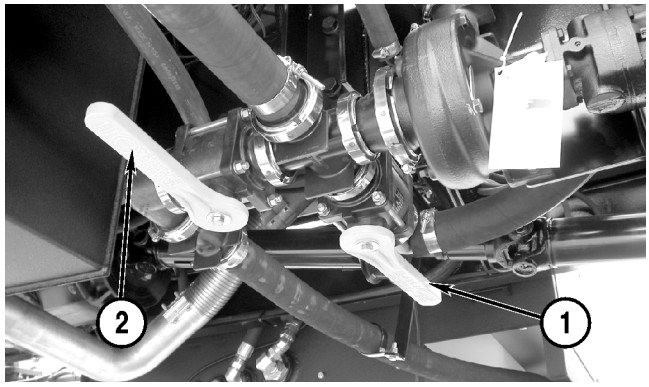
Use a rocking motion to remove the safety air filter and discard the old filter. Do not leave the intake opening uncovered. If not replacing the filter immediately, cover the opening to prevent dirt and debris entering the intake system.

Install the new engine safety air filter, Part Number 201300117.

Install the primary filter, air cleaner cover, and engage the four latches.

Winterize Wet System

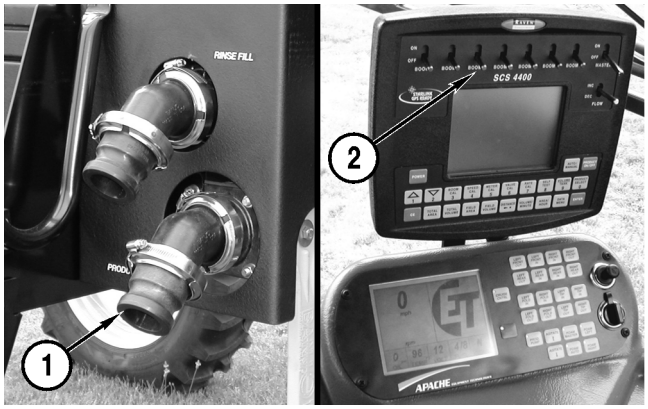
The product tank and wet system must be flushed before winterizing. See “Flushing Product Tank” on page 4-23. See “Flushing Wet System” on page 4-25.



Open the product tank fill valve (1), foam marker fill valve, rinse tank valve (2), and Roto-Flush valve to drain any remaining water in the tanks and Roto-Flush line.

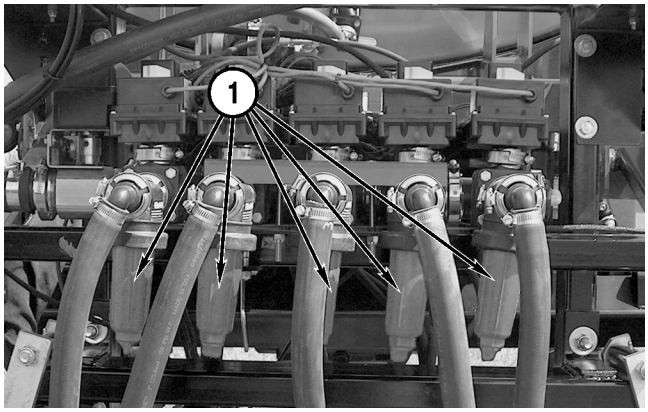
Close the rinse tank valve (2), foam marker valve, and sump valve. Set all boom section switches to the “ON” position and press the bottom half of the agitation switch to turn agitation off.

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.

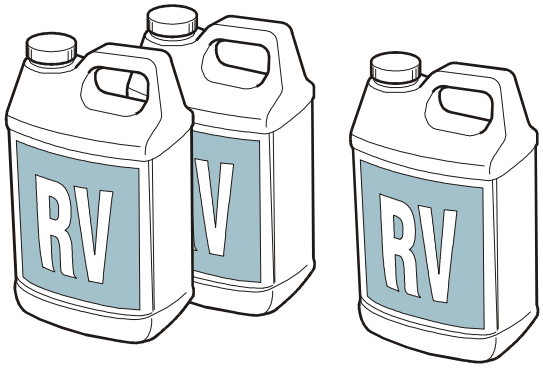


Disconnect the air line and close the product fill valve.

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



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.

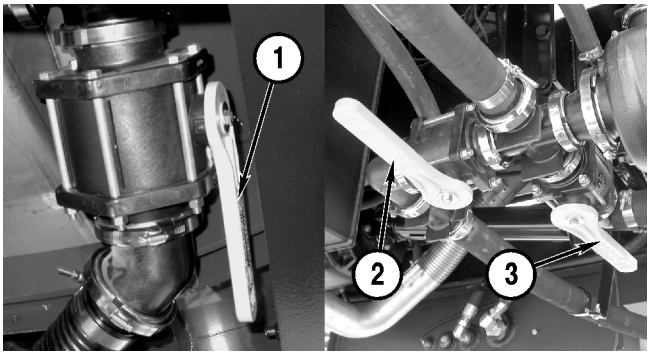


Repeatedly open and close the sump valve (1), rinse tank valve (2), and product valve (3), to allow the antifreeze to surround the ball valves.

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.

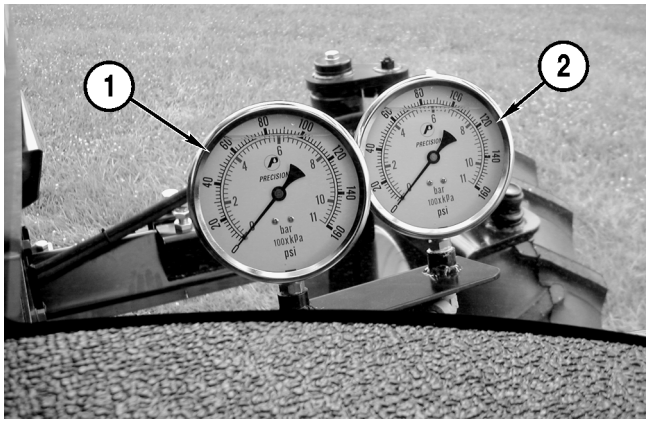
Start the engine. Unfold and lower the booms as far as possible. Set all boom section switches to the “OFF” position and press the top half of the agitation switch to increase agitation. Set the product pump switch to the “ON” position.

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.

It is acceptable to leave excess antifreeze in the sprayer.

NOTE: Information for winterizing the LandMark foam marker is in the Wet System section; See “LandMark Injection Foam Marker” on page 4-20.

Remove the 1/4” hose to both the agitation gauge (1) and the boom pressure gauge (2). Then remove the same 1/4” hose at the agitation valve at fill station and blow clean compressed air at 80 psi through the hose until no more fluid is visible at the gauge end. Repeat this procedure for the boom pressure gauge hose, by disconnecting the 1/4” hose at the gauge and five bank boom valve. Once completed, reconnect the 1/4” hoses to the gauges and valves.



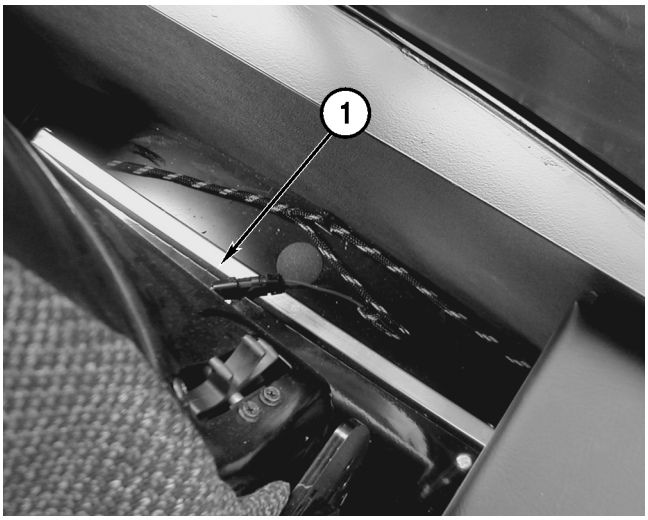
Replace Cab Recirculating Air Filter

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.

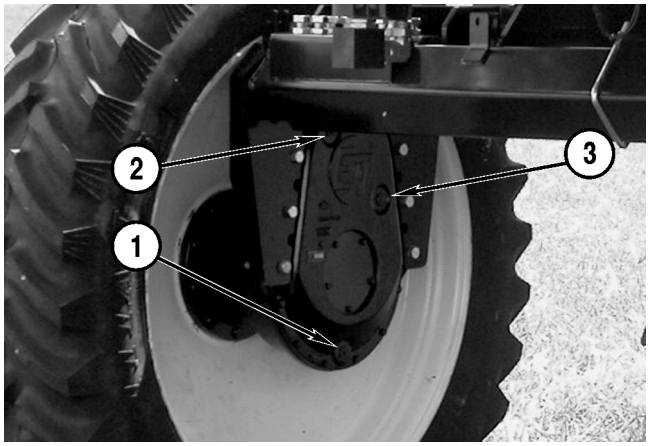
IMPORTANT: Do not attempt to clean the old cab air filter. Always replace with a new filter.

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.

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 Lucas 80/90 Gear Oil 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 21 quarts [20 liters].

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

Repeat the steps for the other drop box.

Check Front Suspension Accumulator Charge

The charge in the front suspension accumulators must be checked yearly.

Contact an Apache dealer for service.

AS1010: Charged at 900 psi

AS1210: Charged at 950 psi

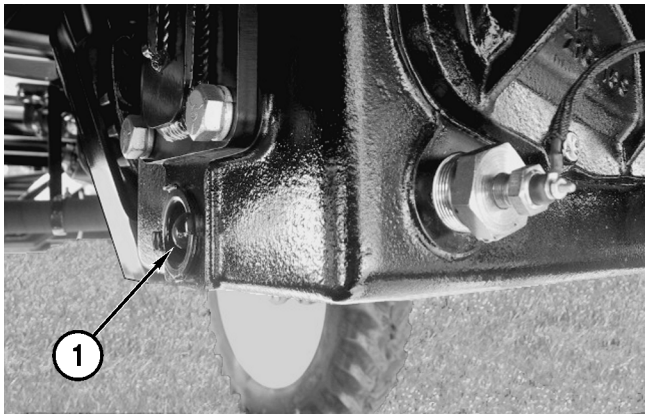
Every 1000 Hours or Yearly

The following services must be performed after every 1000 hours of operation or yearly.

Clean Transmission Fluid Strainer

Funk Transmission (AS1210 and optionally equipped AS1010)

The transmission fluid strainer is located behind the drain plug, under the vehicle, on the left side of the transmission fluid pan.



Remove the drain plug (1) and drain the transmission fluid into a suitable container.

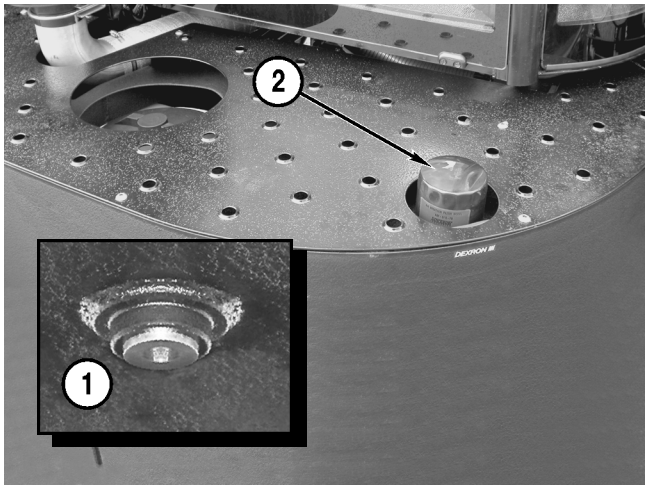
Remove the strainer and clean with diesel fuel. Dispose of the fuel properly.

Install the strainer and drain plug.

Fill the transmission to the appropriate level. See “Check Transmission Fluid Level” on page 5-10.

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 Lucas Universal Hydraulic Fluid for the Apache Sprayer hydraulic system.

Fill the hydraulic fluid reservoir with Lucas Universal Hydraulic Fluid. 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.

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
719	22	3	Extended Crankcase Blow-by Pressure Circuit - Voltage Above Normal, or Shorted to High Source
729	22	4	Extended Crankcase Blow-by Pressure Circuit - Voltage Below Normal, or Shorted to Low Source
2111	32	3	Coolant Temperature 2 Sensor Circuit - Voltage Above Normal, or Shorted to High Source
2112	52	4	Coolant Temperature 2 Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
2113	52	16	Coolant Temperature 2 - Data Valid but Above Normal Operational Range - Moderately Severe Level
2114	52	0	Coolant Temperature 2 - Data Valid but Above Normal Operational Range - Most Severe Level
241	84	2	Vehicle Speed Sensor Circuit - Data Erratic, Intermittent, or Incorrect
242	84	10	Vehicle Speed Sensor Circuit tampering has been detected ñ Abnormal Rate of Change
131	91	3	Voltage Above Normal, or Shorted to High Source
132	91	4	Voltage Below Normal, or Shorted to Low Source
147	91	1	Abnormal Frequency, Pulse Width, or Period
148	91	0	Abnormal Frequency, Pulse Width, or Period
287	91	19	SAE J1939 Multiplexing Accelerator Pedal or Lever Sensor System Error - Received Network Data In Error
1242	91	2	Data Erratic, Intermittent, or Incorrect
528	93	2	Auxiliary Alternate Torque Validation Switch - Data Erratic, Intermittent, or Incorrect
268	94	2	Fuel Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
2215	94	18	Fuel Pump Delivery Pressure - Data Valid but Below Normal Operational Range - Moderately Severe Level
2216	94	1	Fuel Pump Delivery Pressure - Data Valid but Above Normal Operational Range ñ Moderately Severe Level
418	97	15	Water in Fuel Indicator High - Data Valid but Above Normal Operational Range ñ Least Severe Level
428	97	3	Water in Fuel Sensor Circuit - Voltage Above Normal, or Shorted to High Source
429	97	4	Water in Fuel Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
135	100	3	Oil Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
141	100	4	Oil Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
143	100	18	Operational Range - Moderately Severe Level
415	100	1	Operational Range - Most Severe Level

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
435	100	2	Oil Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
122	102	3	Intake Manifold Pressure Sensor Circuit ñ Voltage Above Normal, or Shorted to High Source
123	102	4	Intake Manifold Pressure Sensor Circuit ñ Voltage Below Normal, or Shorted to Low Source
433	102	2	Erratic, Intermittent, or Incorrect
2973	102	2	Erratic, Intermittent, or Incorrect
595	103	16	Turbocharger #1 Speed High - Data Valid but Above Normal Operational Range ñ Moderately Severe Level
687	103	18	Turbocharger #1 Speed Low - Data Valid but Below Normal Operational Range ñ Moderately Severe Level
2345	103	10	Turbocharger speed invalid rate of change detected - Abnormal Rate of Change
153	105	3	Intake Manifold Air Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
154	105	4	Intake Manifold Air Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
155	105	0	Intake Manifold Air Temperature High ñ Data Valid but Above Normal Operational Range - Most Severe Level
488	105	16	Intake Manifold 1 Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
2964	105	15	Severe Level
221	108	3	Barometric Pressure Sensor Circuit ñ Voltage Above Normal, or Shorted to High Source
222	108	4	Barometric Pressure Sensor Circuit ñ Voltage Below Normal, or Shorted to Low Source
295	108	2	Barometric Pressure Sensor Circuit - Data Erratic,
231	109	3	Coolant Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
232	109	4	Coolant Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
233	109	18	Operational Range - Moderately Severe Level
144	110	3	Coolant Temperature Sensor Circuit ñ Voltage Above Normal, or Shorted to High Source
145	110	4	Coolant Temperature Sensor Circuit ñ Voltage Below Normal, or Shorted to Low Source
146	110	16	Coolant Temperature High - Data Valid but Above Normal Operational Range - Moderately Severe Level
151	110	0	Coolant Temperature Low - Data Valid but Above Normal Operational Range - Most Severe Level

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
334	110	2	Coolant Temperature Sensor Circuit ñ Data Erratic, Intermittent, or Incorrect
2963	110	15	Engine Coolant Temperature High - Data Valid but Above Normal Operational Range - Least Severe Level
195	111	3	Coolant Level Sensor Circuit - Voltage Above Normal, or Shorted to High Source
196	111	4	Coolant Level Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
197	111	18	Operational Range - Moderately Severe Level
235	111	1	Operational Range - Most Severe Level
422	111	2	Coolant Level - Data Erratic, Intermittent, or Incorrect
449	157	0	Fuel Pressure High - Data Valid but Above Normal Operational Range ñ Moderately Severe Level
451	157	3	Injector Metering Rail #1 Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
452	157	4	Injector Metering Rail #1 Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
553	157	16	Injector Metering Rail #1 Pressure High ñ Data Valid but Above Normal Operational Range - Moderately Severe Level
554	157	2	Fuel Pressure Sensor Error - Data Erratic, Intermittent, or Incorrect
559	157	18	Injector Metering Rail #1 Pressure Low ñ Data Valid but Below Normal Operational Range - Moderately Severe Level
1911	157	0	Injector Metering Rail 1 Pressure - Data Valid but Above Normal Operational Range - Most Severe Level
2249	157	1	Injector Metering Rail 1 Pressure - Data Valid but Below Normal Operational Range - Most Severe Level
951	166	2	Cylinder Power Imbalance Between Cylinders - Data Erratic, Intermittent, or Incorrect
596	167	16	Electrical Charging System Voltage High ñ Data Valid but Above Normal Operational Range - Moderately Severe Level
597	167	18	Electrical Charging System Voltage Low ñ Data Valid but Below Normal Operational Range - Moderately Severe Level
598	167	1	Electrical Charging System Voltage Low ñ Data Valid but Below Normal Operational Range - Most Severe Level
441	168	18	Battery #1 Voltage Low - Data Valid but Below Normal Operational Range ñ Moderately Severe Level
442	168	16	Battery #1 Voltage High - Data Valid but Above Normal Operational Range ñ Moderately Severe Level
249	171	3	Ambient Air Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
256	171	4	Ambient Air Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
261	174	16	Engine Fuel Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
263	174	3	Engine Fuel Temperature Sensor 1 Circuit - Voltage Above Normal, or Shorted to High Source
265	174	4	Engine Fuel Temperature Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
212	175	3	Engine Oil Temperature Sensor 1 Circuit - Voltage Above Normal, or Shorted to High Source
213	175	4	Engine Oil Temperature Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
214	175	0	Engine Oil Temperature - Data Valid but Above Normal Operational Range - Most Severe Level
425	175	2	Engine Oil Temperature -Data Erratic, Intermittent, or Incorrect
234	190	0	Engine Speed High - Data Valid but Above Normal Operational Range - Most Severe Level
689	190	2	Primary Engine Speed Sensor Error ñ Data Erratic, Intermittent, or Incorrect
2321	190	2	Engine Speed / Position Sensor #1 - Data Erratic, Intermittent, or Incorrect
319	251	2	Real Time Clock Power Interrupt - Data Erratic, Intermittent, or Incorrect
293	441	3	Auxiliary Temperature Sensor Input # 1 Circuit -Voltage Above Normal, or Shorted to High Source
294	441	4	Auxiliary Temperature Sensor Input # 1 Circuit -Voltage Below Normal, or Shorted to Low Source
431	558	2	Data Erratic, Intermittent, or Incorrect
432	558	13	Out of Calibration
551	558	4	Voltage Below Normal, or Shorted to Low Source
238	611	4	Sensor Supply Voltage #3 Circuit ñ Voltage Below Normal, or Shorted to Low Source
523	611	2	OEM Intermediate (PTO) Speed switch Validation -Data Erratic, Intermittent, or Incorrect
757	611	31	Electronic Control Module data lost - Condition Exists
2185	611	3	Sensor Supply Voltage #4 Circuit ñ Voltage Above Normal, or Shorted to High Source
2186	611	4	Sensor Supply Voltage #4 Circuit ñ Voltage Below Normal, or Shorted to Low Source
2292	611	16	Normal Operational Range - Moderately Severe Level

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
2293	611	18	expected - Data Valid but Below Normal Operational Range - Moderately Severe Level
115	612	2	Engine Speed/Position Sensor Circuit lost both of two signals from the magnetic pickup sensor - Data Erratic, Intermittent, or incorrect
434	627	2	Power Lost without Ignition Off - Data Erratic, Intermittent, or Incorrect
1117	627	2	Power Lost With Ignition On - Data Erratic, Intermittent, or Incorrect
111	629	12	Engine Control Module Critical internal failure - Bad intelligent Device or Component
343	629	12	Engine Control Module Warning internal hardware failure - Bad Intelligent Device or Component
351	629	12	Injector Power Supply - Bad Intelligent Device or Component
341	630	2	Engine Control Module data lost - Data Erratic, Intermittent, or Incorrect
342	630	13	Electronic Calibration Code Incompatibility - Out of Calibration
2217	630	31	ECM Program Memory (RAM) Corruption - Condition Exists
2311	633	31	Fueling Actuator #1 Circuit Error ñ Condition Exists
285	639	9	SAE J1939 Multiplexing PGN Time-out Error - Abnormal Update Rate
286	639	13	SAE J1939 Multiplexing Configuration Error ñ Out of Calibration
2384	641	4	VGT Actuator Driver Circuit - Voltage Below Normal, or Shorted to Low Source
2385	641	3	VGT Actuator Driver Circuit - Voltage Above Normal, or Shorted to High Source
237	644	2	External Speed Input (Multiple Unit Synchronization) -Data Erratic, Intermittent, or Incorrect
245	647	4	Fan Control Circuit - Voltage Below Normal, or Shorted to Low Source
2377	647	3	Fan Control Circuit - Voltage Above Normal, or Shorted to High Source
322	651	5	Injector Solenoid Cylinder #1 Circuit ñ Current Below Normal, or Open Circuit
1139	651	7	Injector Cylinder #1 - Mechanical System Not Responding Properly or Out of Adjustment
331	652	5	Injector Solenoid Cylinder #2 Circuit ñ Current Below Normal, or Open Circuit
1141	652	7	Injector Cylinder #2 - Mechanical System Not Responding Properly or Out of Adjustment
324	653	5	Injector Solenoid Cylinder #3 Circuit ñ Current Below Normal, or Open Circuit
1142	653	7	Injector Cylinder #3 - Mechanical System Not Responding Properly or Out of Adjustment
332	654	5	Injector Solenoid Cylinder #4 Circuit ñ Current Below Normal, or Open Circuit

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
1143	654	7	Injector Cylinder #4 - Mechanical System Not Responding Properly or Out of Adjustment
323	655	5	Injector Solenoid Cylinder #5 Circuit ñ Current Below Normal, or Open Circuit
1144	655	7	Injector Cylinder #5 - Mechanical System Not Responding Properly or Out of Adjustment
325	656	5	Injector Solenoid Cylinder #6 Circuit ñ Current Below Normal, or Open Circuit
1145	656	7	Injector Cylinder #6 - Mechanical System Not Responding Properly or Out of Adjustment
584	677	3	Starter Relay Circuit - Voltage Above Normal, or Shorted to High Source
585	677	4	Starter Relay Circuit - Voltage Below Normal, or Shorted to Low Source
2557	697	3	Auxiliary PWM Driver #1 - Voltage Above Normal, or Shorted to High Source
2558	697	4	Auxiliary PWM Driver #1 - Voltage Below Normal, or Shorted to Low Source
527	702	3	Auxiliary Input/Output 2 Circuit - Voltage Above Normal, or Shorted to High Source
529	703	3	Auxiliary Input/Output 3 Circuit - Voltage Above Normal, or Shorted to High Source
779	703	11	Warning Auxiliary Equipment Sensor Input # 3 (OEM Switch) - Root Cause Not Known
2195	703	14	Auxiliary Equipment Sensor Input 3 Engine Protection Critical - Special Instructions
731	723	7	Mechanical System Not Responding Properly or Out of Adjustment
753	723	2	Engine Speed/Position #2 Camshaft sync error -Data Erratic, Intermittent, or Incorrect
778	723	2	Engine Speed Sensor (Camshaft) Erratic, Intermittent, or Incorrect
2322	723	2	Engine Speed / Position Sensor #2 - Data Erratic, Intermittent, or Incorrect
2555	729	3	Intake Air Heater #1 Circuit - Voltage Above Normal, or Shorted to High Source
2556	729	4	Intake Air Heater #1 Circuit - Voltage Below Normal, or Shorted to Low Source
133	974	3	Circuit ñ Voltage Above Normal, or Shorted to High Source
134	974	4	Circuit ñ Voltage Below Normal, or Shorted to Low Source
288	974	19	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Data Error - Received Network Data In Error

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
284	1043	4	Engine Speed/Position Sensor (Crankshaft) Supply Voltage Circuit - Voltage Below Normal, or Shorted to Low Source
387	1043	3	Accelerator Pedal or Lever Position Sensor Supply Voltage Circuit - Voltage Above Normal, or Shorted to High Source
443	1043	4	Accelerator Pedal or Lever Position Sensor Supply Voltage Circuit - Voltage Below Normal, or Shorted to Low Source
2362	1072	4	Engine Brake Actuator Circuit #1 ñ Voltage Below Normal, or Shorted to Low Source
2366	1072	3	Engine Brake Actuator Circuit #1 ñ Voltage Above Normal, or Shorted to High Source
2363	1073	4	Engine Brake Actuator Circuit #2 ñ Voltage Below Normal, or Shorted to Low Source
2367	1073	3	Engine Brake Actuator Circuit #2 ñ Voltage Above Normal, or Shorted to High Source
2265	1075	3	Fuel Priming Pump Control Signal Circuit ñ Voltage Above Normal, or Shorted to High Source
2266	1075	4	Fuel Priming Pump Control Signal Circuit ñ Voltage Below Normal, or Shorted to Low Source
352	1079	4	Sensor Supply Voltage #1 Circuit ñ Voltage Below Normal, or Shorted to Low Source
386	1079	3	Sensor Supply Voltage #1 Circuit ñ Voltage Above Normal, or Shorted to High Source
187	1080	4	Sensor Supply Voltage #2 Circuit ñ Voltage Below Normal, or Shorted to Low Source
227	1080	3	Sensor Supply Voltage #2 Circuit ñ Voltage Above Normal, or Shorted to High Source
697	1136	3	ECM Internal Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
698	1136	4	ECM Internal Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
691	1172	3	Turbocharger #1 Compressor Inlet Temperature Sensor Circuit ñ Voltage Above Normal, or Shorted to High Source
692	1172	4	Turbocharger #1 Compressor Inlet Temperature Sensor Circuit ñ Voltage Below Normal, or Shorted to Low Source
338	1267	3	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage Above Normal, or Shorted to High Source
339	1267	4	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage Below Normal, or Shorted to Low Source
271	1347	4	High Fuel Pressure Solenoid Valve Circuit ñ Voltage Below Normal, or Shorted to Low Source
272	1347	3	High Fuel Pressure Solenoid Valve Circuit ñ Voltage Above Normal, or Shorted to High Source

CUMMINS ENGINE FAULT CODES

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
275	1347	7	Fuel Pumping Element (Front) ñ Mechanical System Not Responding Properly or Out of Adjustment
281	1347	7	High Fuel Pressure Solenoid Valve #1 ñ Mechanical System Not Responding Properly or Out of Adjustment
497	1377	2	Multiple Unit Synchronization Switch Circuit - Data Erratic, Intermittent, or Incorrect
649	1378	31	Change Lubricating Oil and Filter ñ Condition Exists
296	1388	14	Auxiliary Pressure Sensor Input 1 - Special Instructions
297	1388	3	Auxiliary Pressure Sensor Input # 2 Circuit - Voltage Above Normal, or Shorted to High Source
298	1388	4	Auxiliary Pressure Sensor Input # 2 Circuit - Voltage Below Normal, or Shorted to Low Source
211	1484	31	Additional Auxiliary Diagnostic Codes logged - Condition Exists
1256	1563	2	Control Module Identification Input State Error - Data Erratic, Intermittent, or Incorrect
1257	1563	2	Control Module Identification Input State Error - Data Erratic, Intermittent, or Incorrect
1239	2623	3	Voltage Above Normal, or Shorted to High Source
1241	2623	4	Voltage Below Normal, or Shorted to Low Source
2347	2629	15	Turbocharger Compressor Outlet Temperature (Calculated) - Data Valid but Above Normal Operational Range ñ Least Severe Level
2346	2789	15	Turbocharger Turbine Inlet Temperature (Calculated) - Data Valid but Above Normal Operational Range ñ Least Severe Level
2115	2981	3	Coolant Pressure 2 Circuit - Voltage Above Normal, or Shorted to High Source
2116	2981	4	Coolant Pressure 2 Circuit -Voltage Below Normal, or Shorted to Low Source
2117	2981	18	Operational Range - Moderately Severe Level

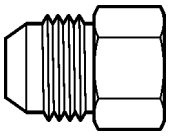
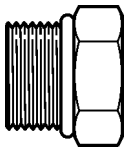
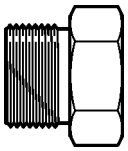
Fittings

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 Size	 O-ring Style Straight Thread Size	 Face Seal 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	----

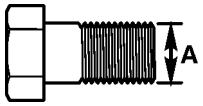
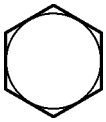
Torque Value Chart

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	----	----	----	----

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	48	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)
		Course Thread				Fine Thread				
	Wrench Size	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 1.0
10 x 1.5	16	39	29	54	40	41	30	57	42	10 x 1.25
12 x 1.75	18	68	50	94	70	75	55	103	76	12 x 1.25
14 x 2.0	21	109	80	151	111	118	87	163	120	14 x 1.5
16 x 2.0	24	169	125	234	173	181	133	250	184	16 x 1.5
18 x 2.5	27	234	172	323	239	263	194	363	268	18 x 1.5
20 x 2.5	30	330	244	457	337	367	270	507	374	20 x 1.5
22 x 2.5	34	451	332	623	460	495	365	684	505	22 x 1.5
24 x 3.0	36	571	421	790	583	623	459	861	635	24 x 2.0
30 x 3.0	46	1175	867	1626	1199	1258	928	1740	1283	30 x 2.0

Apache Sprayer Troubleshooting Symptoms and Solutions

SYMPTOM	SOLUTION
Parking brake will not engage.	Check brake pads for wear. Check electrical coil on hydraulic junction box, under cab, for power. Check hose connections to brake canister on brake disc.
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 transmission fluid level. Check wire connection at sending unit. Contact your dealer.
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.	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.

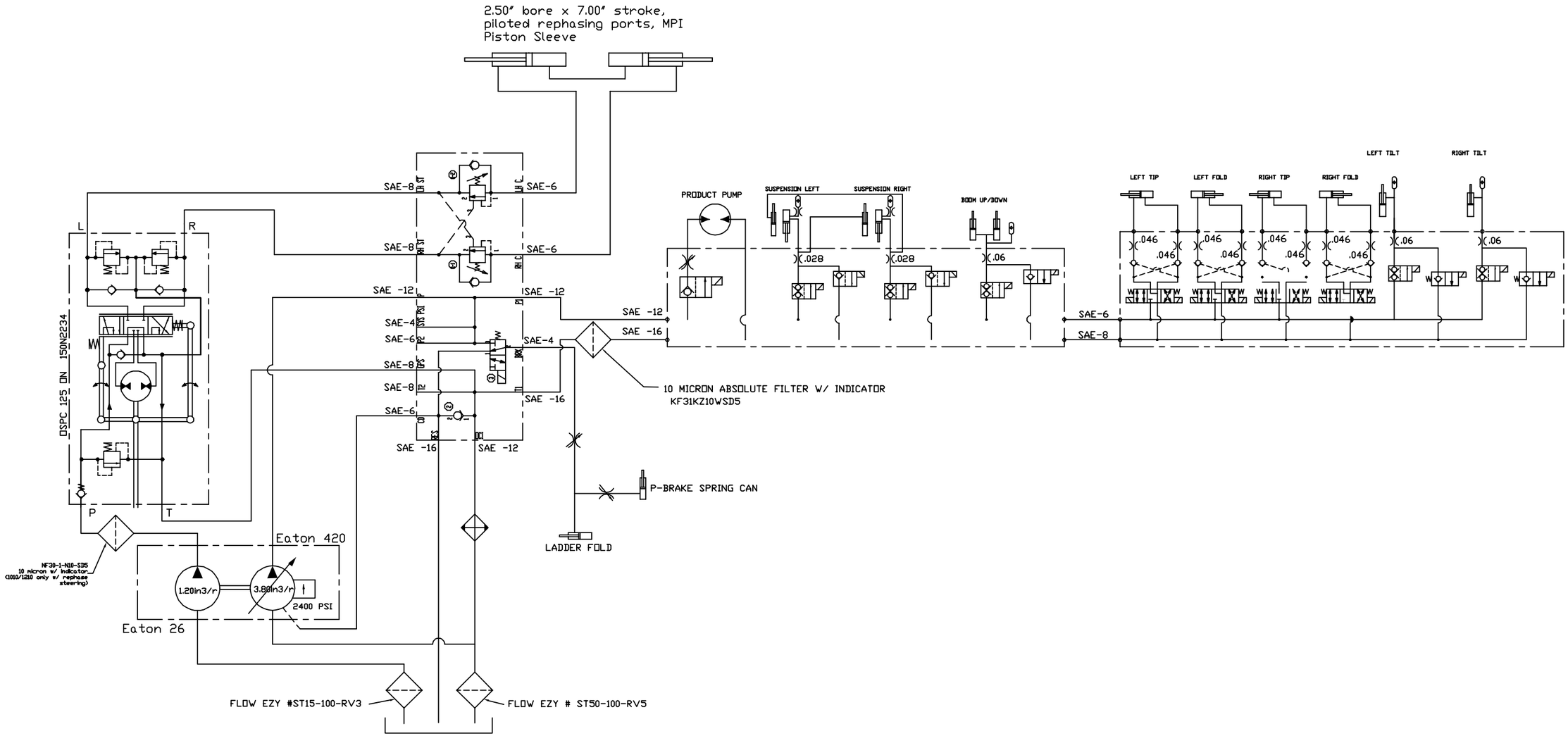
TROUBLESHOOTING

SYMPTOM	SOLUTION
Transmission will not shift gears.	Check transmission fluid level. Contact your dealer.
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.

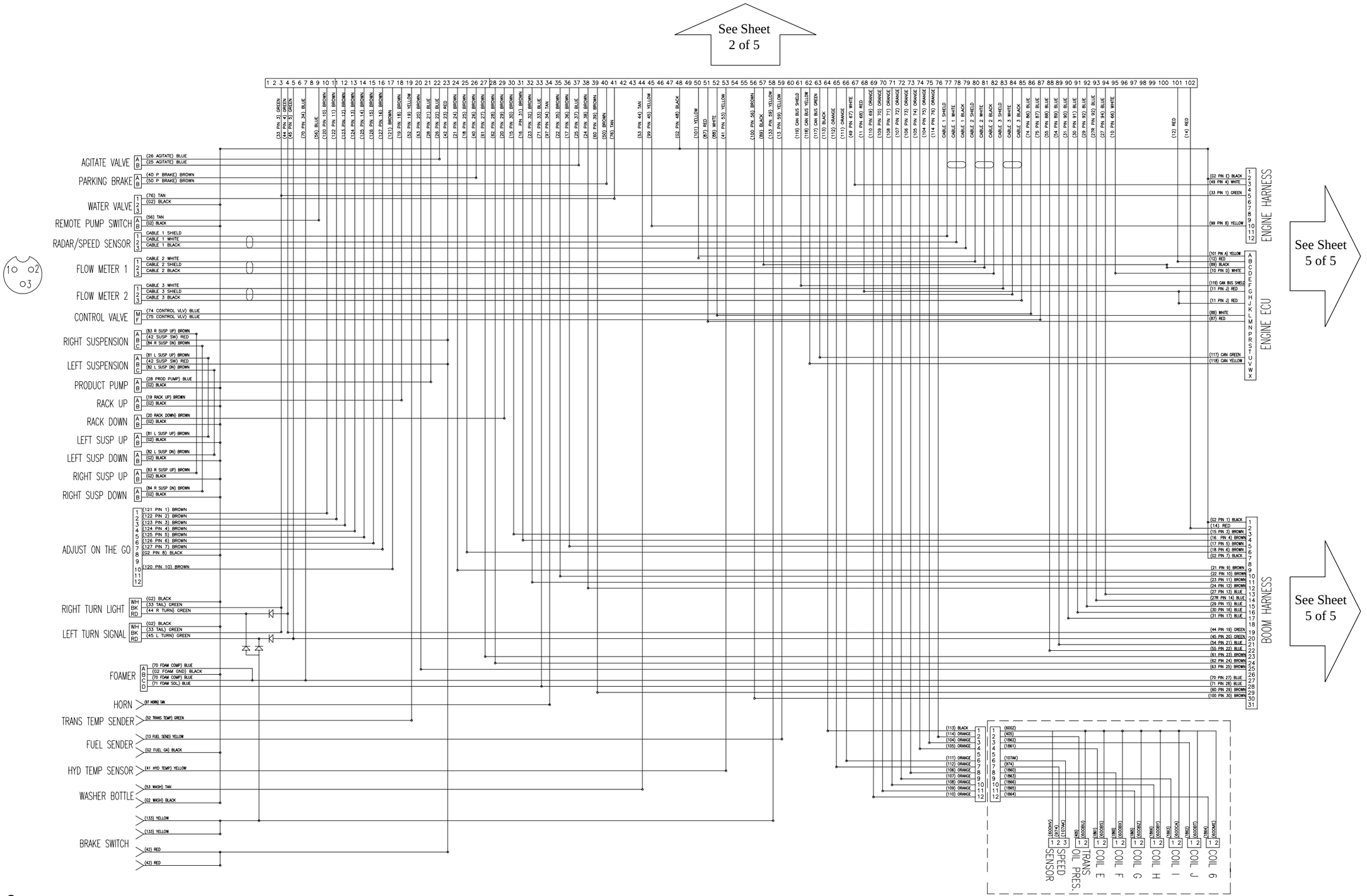
TROUBLESHOOTING

SYMPTOM	SOLUTION
Apache Sprayer 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.

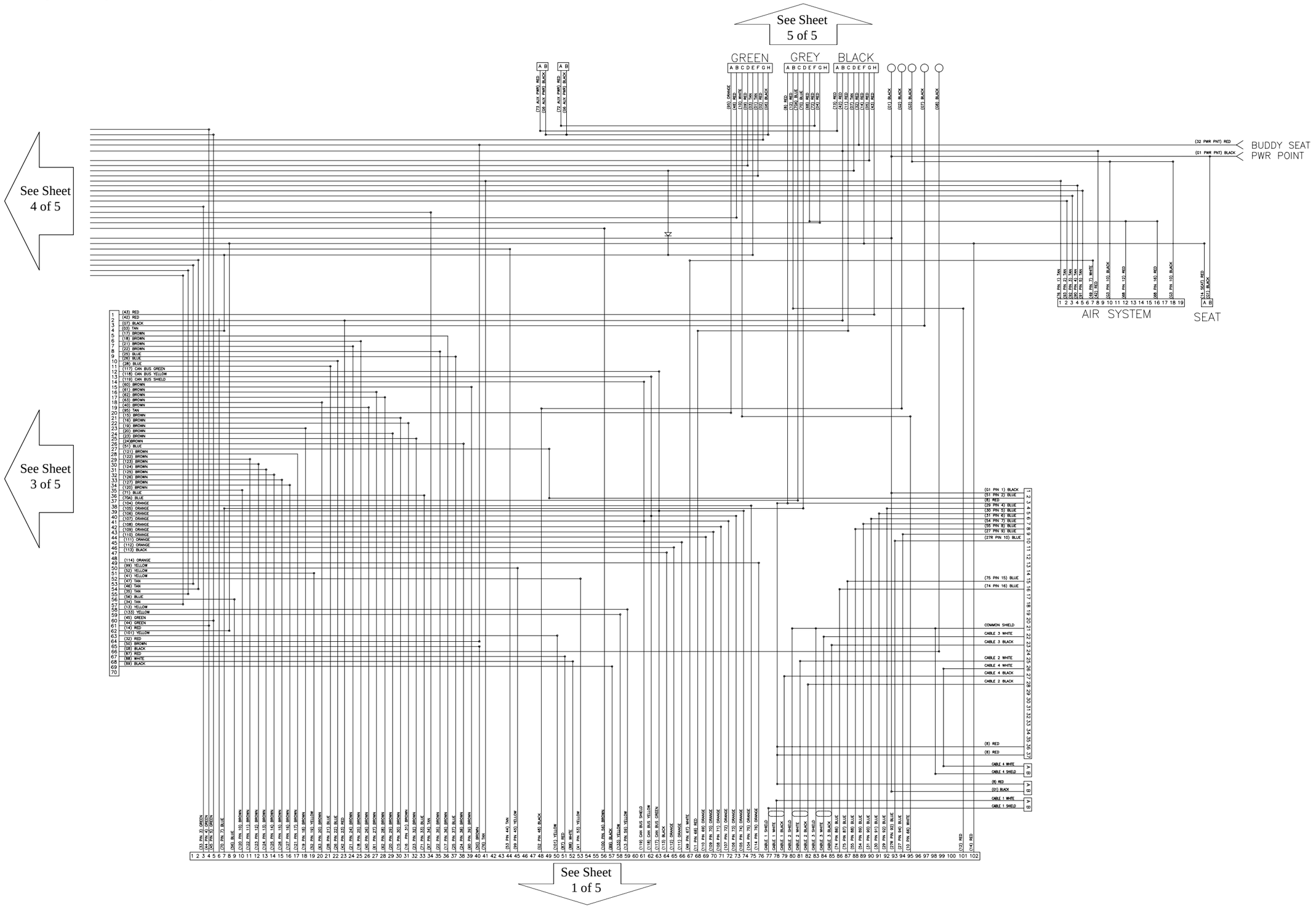
Hydraulic System



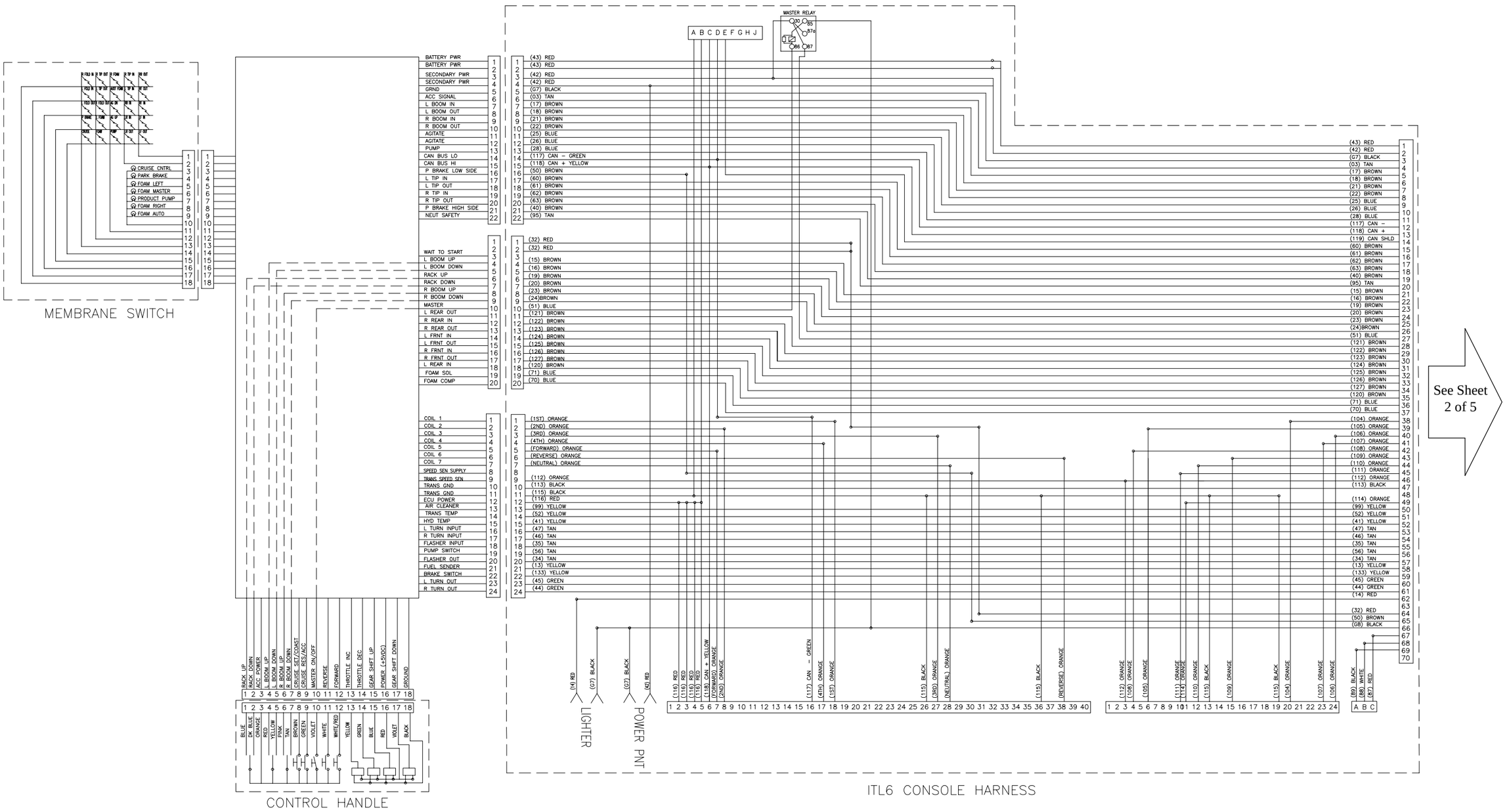
Electrical System (Sheet 1 of 5)



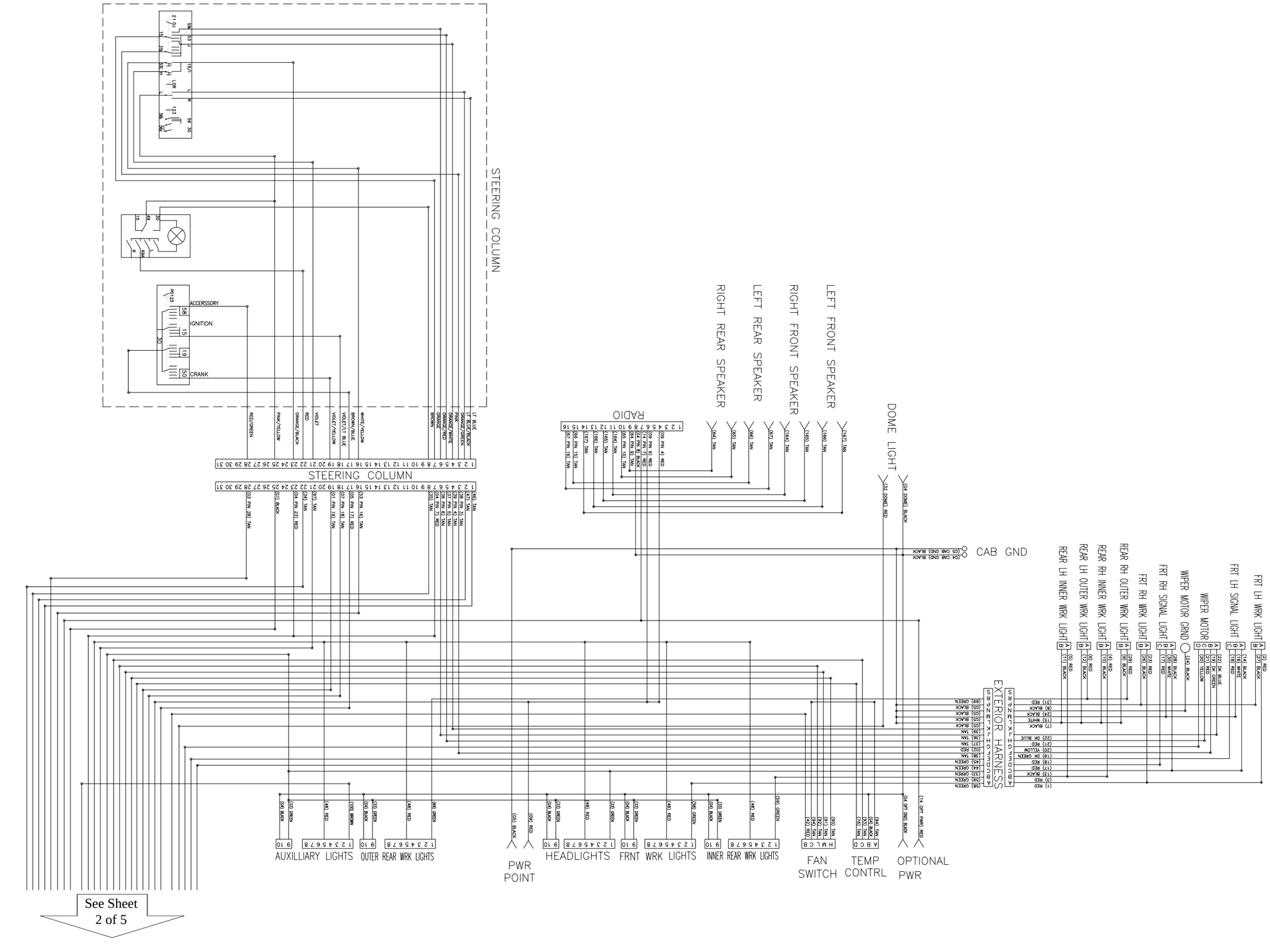
Electrical System (Sheet 2 of 5)



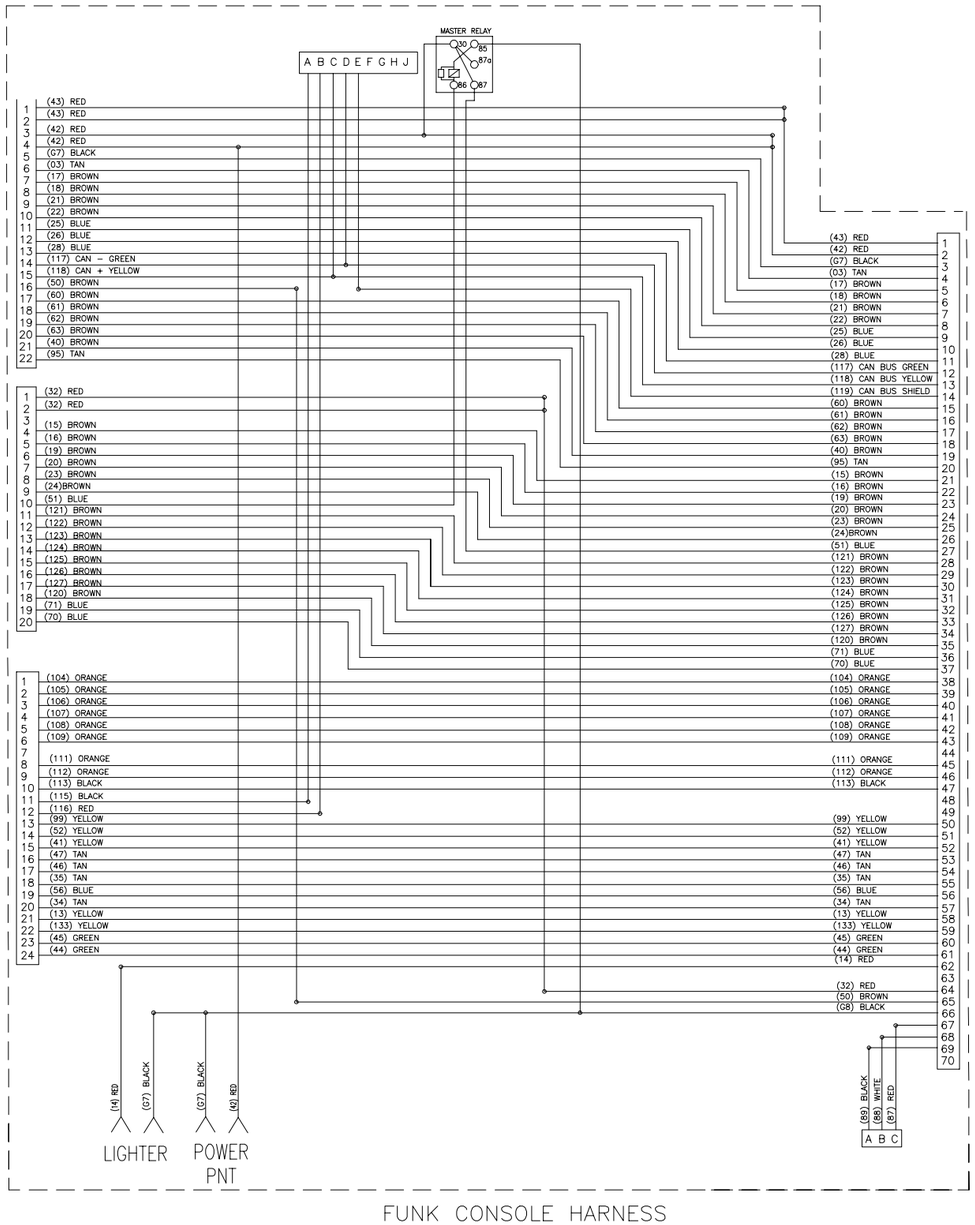
Electrical System (Sheet 3 of 5)

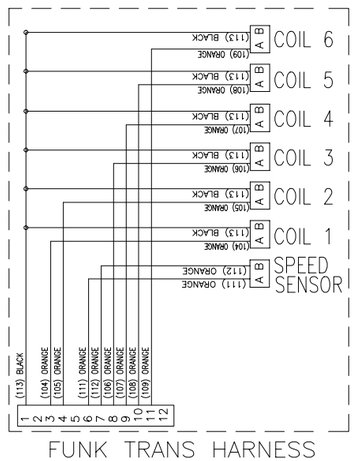


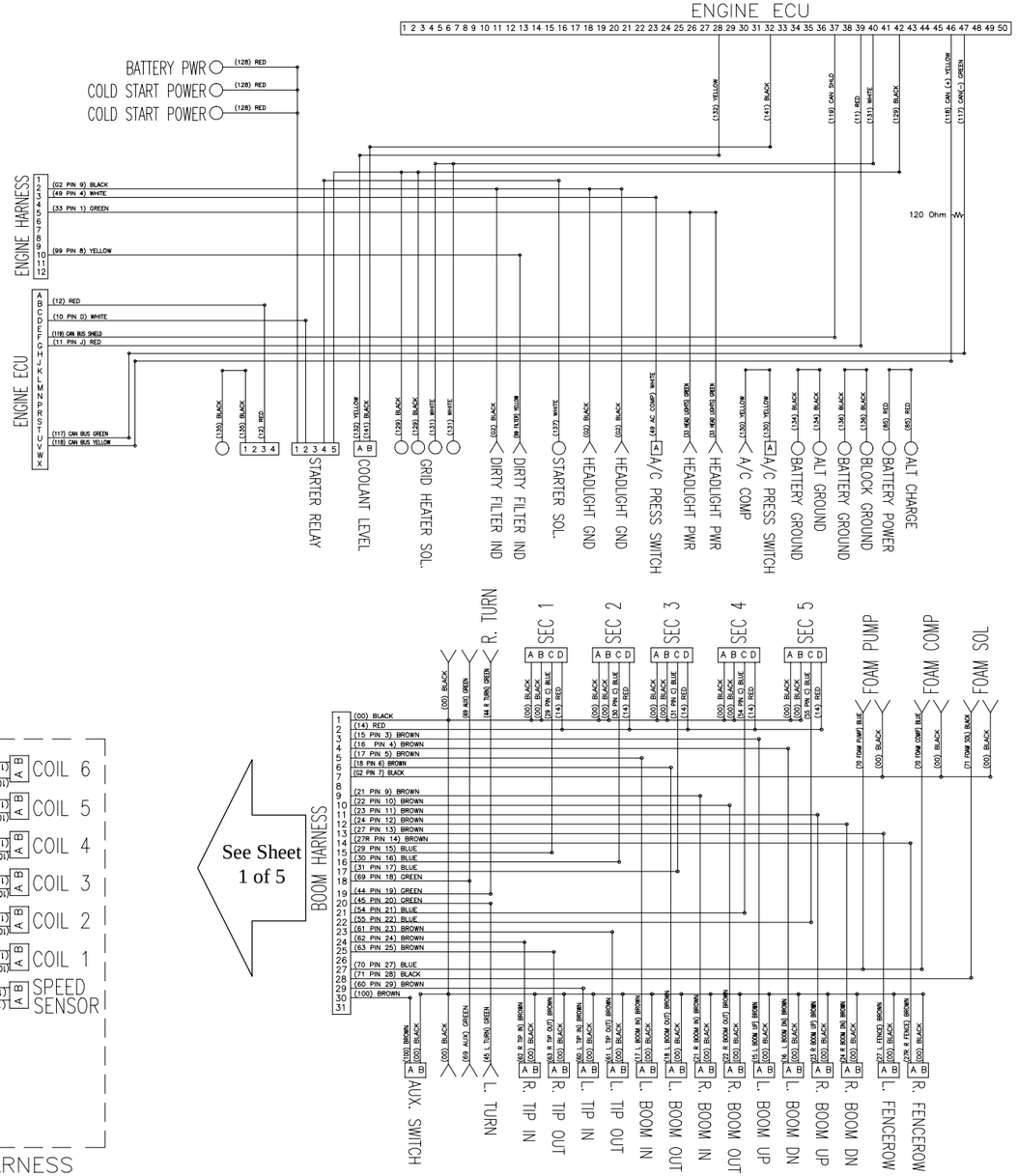
Electrical System (Sheet 4 of 5)



Electrical System (Sheet 5 of 5)







Equipment Technologies Warranty Policy

For all 2003 Model year and newer Apaches

NEW APACHE LIMITED WARRANTY POLICY

Equipment Technologies (hereinafter called ET) 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 ET, 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 ET. 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 ET, 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 ET. 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 its internal components, rear differential and its 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 years three through five of warranty. Transmission and its internal components, rear differential and its 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. ET 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 ET for warranty replacement information.

ET's obligation under this limited warranty is limited to repairing or replacing free of charge to the original purchaser, at a location designated by ET, any part that in ET's sole judgment, shows evidence of defect or improper workmanship, provided that the part is returned to ET within thirty (30) days of the repair

date. Parts must be returned through the authorized selling dealer, transportation charges prepaid. All returned parts must be clean from all chemicals and/or oils.

ET'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. ET 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 ET's behalf. This limited warranty is void if ET's limited warranty policy maintenance standards are violated.

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

All inquires about this warranty policy should be addressed to:

Warranty Department
2201 Hancel Parkway
Mooresville, IN 46158

Telephone: 317-834-4500

Apache AS1210

Component	Lubrication	Capacity Quarts [Liters]	Filter Part Number
Engine Oil	Lucas 15W-40 Magnum Motor Oil	16 [15]	201450241
Engine Coolant	KostGuard Universal Antifreeze 50/50	23 [21.8]	----
Engine Air Filter	----	----	201300116
Engine Safety Air Filter	----	----	201300117
Transmission*	Lucas Universal Hydraulic Fluid	16 [15]	300100110
Differential (Rear Axle)	Lucas Universal Hydraulic Fluid	26.4 [25]	----
Rear Drop Box	Lucas 80/90 Gear Oil	21 [20]	----
Brake Reservoir	Lucas Universal Hydraulic Fluid	as required	----
Engine Fuel	Diesel	100 Gallons [341 Liters]	Engine Mounted: Standard: 201450242 Separator: 201450243
Hydraulic System	Lucas Universal Hydraulic Fluid	30 Gallons [113.5 Liters]	Filter: 840000013 Strainer: 840000010** Strainer: 840000011**
Front Suspension	Lucas Universal Hydraulic Fluid	as required	----
Pressure Steering	----	----	Filter: 840000048
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 5-10.
** - 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)
- 380/80R38 . . . . . 35 psi [241 kPa]
- 380/90R46 . . . . . 54 psi [372 kPa]

Lug Nut Torque
- Front and Rear . . . . . 315 lb-ft [427 N•m]

Wet System Capacities
- Product Tank . . . . . 1200 gallons [4542 liters]
- Rinse Tank . . . . . 50 gallons [189 liters]

Hydraulic Pump Output
- . . . . . .2450 psi [169 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

Apache AS1010

Component	Lubrication	Capacity Quarts [Liters]	Filter Part Number
Engine Oil	Lucas 15W-40 Magnum Motor Oil	16 [15]	201450241
Engine Coolant	KostGuard Universal Antifreeze 50/50	23 [21.8]	----
Engine Air Filter	----	----	201300116
Engine Safety Air Filter	----	----	201300117
Transmission (ITL/JCB)*	Lucas Universal Hydraulic Fluid	16 [15]	300000101
Differential (Rear Axle)	Lucas Universal Hydraulic Fluid	26.4 [25]	----
Planetary	Lucas 80/90 Gear Oil	2.2 [2]	----
Rear Drop Box	Lucas 80/90 Gear Oil	21 [20]	----
Brake Reservoir	Lucas Universal Hydraulic Fluid	as required	----
Engine Fuel	Diesel	100 Gallons [379 Liters]	Engine Mounted: Standard: 201450242 Separator: 201450243
Hydraulic System	Lucas Universal Hydraulic Fluid	30 Gallons [113.5 Liters]	Filter: 840000013 Strainer: 840000010** Strainer: 840000011**
Front Suspension	Lucas Universal Hydraulic Fluid	as required	----
Pressure Steering	----	----	Filter: 840000048
A/C System	R134a	3 Lbs.	----
Cab Charcoal Filter	----	----	490003650
Cab Recirculating Filter	----	----	490006660

* - Check transmission (ITL/JBC) fluid level with the engine turned off and the transmission fluid hot. See ”Check Transmission Fluid Level” on page 5-10.
** - 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.
NOTE: A Funk transmission is optional equipment on the AS1010. If your AS1010 is equipped with the optional Funk transmission, see the Apache 1210 Component/Lubrication sheet.

Tire Pressure (Cold)
- 12.4 x 28” . . . . . 30 psi [207 kPa]
- 320/85R38 . . . . . 41 psi [283 kPa]
- 380/80R38 . . . . . 35 psi [241 kPa]
- 380/90R46 . . . . . 49 psi [338 kPa]

Lug Nut Torque
- Front 12.4 x 28” . . . . . 180 lb-ft [244 N•m]
- Front 14.9 x 38” . . . . . 225 lb-ft [305 N•m]
- Rear 36 or 42” CC . . . . . 225 lb-ft [305 N•m]
- Rear 48” CC . . . . . 315 lb-ft [427 N•m]

Wet System Capacities
- Product Tank . . . . . . 850 or 1000 gallons [3218 or 3785 liters]
- Rinse Tank. . . . . .50 gallons [189 liters]

Hydraulic Pump Output . . . . . 2450 psi [169 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
2201 Hancel Parkway
Mooresville, IN 46158
Tel: (317) 834-4500
Fax: (317) 834-4501

Your Apache Dealer: