APACHE™

AS1030 and AS1230

2016 Operator'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

FORM # 580000123
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EQUIPMENT TECHNOLOGIES

Apache Sprayer Information

The password for the locked screens on the ET Pilot Touchscreen is "2201".

Dealer: _____

Main Phone # _____

Service Contact: _____

Phone # _____

Parts Contact:_____

Phone# _____

Shop Contact: _____

Phone #_____

Sales Rep:_____

Phone # _____

Precision Rep: _____

Phone # _____

ET / Apache Phone #: _____

Guidance Width/Inches:_____

# of Sections:_____

Boom 1 Cal:_____

Boom 2 Cal:_____

Boom 3 Cal:_____

Boom 4 Cal:_____

Boom 5 Cal:_____

Boom 6 Cal:_____

Boom 7 Cal:_____

Boom 8 Cal:_____

Boom 9 Cal:_____

Product Control:

Speed Cal#:_____

Valve Cal#:_____

Meter Cal#:_____

Valve Advance:_____

Valve Delay:_____

Section Control:

On Look Ahead:_____

Off Look Ahead:_____

Machine Model: _____

Machine Serial #:_____

Engine Serial #: _____

Rate Controller Model:_____

Aux Controller/Display:_____

GPS Antenna Model:_____

GPS Source:_____ GPS Satellite:_____

Height Control:_____

Software Version:_____

Offset: LH Outer:_____ LH Inner:_____

Center:_____ RH Inner:_____

RH Outer:_____

Sensitivity:_____ Speed:_____ Stability:_____

Autosteer: _____ Module Orientation:____

Software Version:_____

Implement Offsets:

Fore/Aft:_____ Height:_____

Wheelbase:_____

Low Limit/ Minimum Flow:

Nozzle Size/Color/Rate_____ = _____

Nozzle Size/Color/Rate_____ = _____

Nozzle Size/Color/Rate_____ = _____

Nozzle Size/Color/Rate_____ = _____

**To maintain minimum spray pattern adjust when changing nozzle size.*

Foam Marker Mixing Ratio:

Soap :_____open

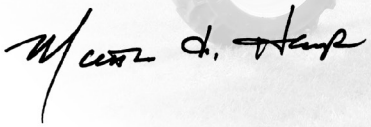
Water:_____open

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 Apache Sprayer exceeds your expectations, and gives you years of satisfaction. We invite you to visit us at www.etsprayers.com or in person at our plant in Mooresville, Indiana.

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

Yours Faithfully,



Matthew F. Hays
Chief Executive Officer

NOTICE

Before operating your Apache Sprayer, please check and calibrate the following precision agricultural equipment depending on the machine configuration. Always operate the Apache within the state and local guidelines and regulations.

1. Check all settings and calibrations in your Envizio Pro II™, Viper 4®, or FmX® field computers:

    - Swath Width
    - Boom Section Calibration
    - Receiver Fore/Aft Settings
    - Valve Calibration
    - Flow Meter Calibration
    - Rate Calibration
    - Low Limit Setting
    - Valve Advance and Delay

2. Please review your Autoboom® and Accuboom™ settings, if equipped.

3. Calibrate the SmarTrax™ and Autopilot™ autosteer, if equipped. SmarTrax™ and Autopilot™ calibration must be performed on a large, flat, and open area. Make sure all settings are entered properly, and that calibration is performed in its entirety. This includes driving on an A-B line for roughly 20 minutes after automatic calibration is completed to allow the yaw sensor to learn how to acquire the line properly.

Trademark Information

Caterpillar®

- Cat® TO-4

Cummins®

Raven Industries

- AccuBoom™
- AutoBoom®
- Envisio Pro II™
- FlowMax™
- SmarTrax™
- Viper 4®

Equipment Technologies (ET)

- Apache™

Lucas® Oil Products

SiriusXM™

Trimble®

- FmX®
- Field IQ™
- AutoPilot™

Michelin®

Goodyear®

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CHAPTER 1

GENERAL INFORMATION

The graphics and text in this manual generally describe the AS1030 and AS1230 Apache Sprayer. 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 it.

2016 AS1030 and AS1230 Specifications

	AS1030	AS1230
Tank Capacity	1000 gallons [3785.4 liters]	1200 gallons [4542.4 liters]
Engine	225 hp T4-F QSB6.7 Cummins	260 hp T4-F QSB6.7 Cummins
Transmission	Standard: ZF Powershift 6-speed with lock-up torque converter	
Speed Ranges	1st 0 to 5 mph [8.04 km/h], 2nd 0 to 7 mph [11.27 km/h], 3rd 0 to 11 mph [17.7 km/h], 4th 0 to 17 mph [27.36 km/h], 5th 0 to 27 mph [43.45 km/h], 6th 0 to 35 mph [56.3 km/h]	
Brakes	Internal, wet disc self-adjusting	
Suspension	Front Axle: Center oscillation with independent hydraulic accumulated struts. Rear Axle: Patented hydraulic load suspension with compensating anti-sway control, self-adjusting for diminishing/increasing load.	
Cab	ET custom pressurized cab	
Crop Clearance	42 in. [106.6 cm] or 50 in. [127 cm]	50 in. [127 cm]
Axles	120 in. [304.8 cm] Fixed Width Axle (Standard) 120 to 160 in. [304.8 cm to 406.4 cm] Adjustable Axle Width with Optional Hydraulic Adjust	
Final Drive	JCB planetary gearset (42 in. [106.6 cm] CC); JCB all gear drop box (50 in. [127 cm] CC)	JCB all gear drop box (50 in. [127 cm] CC)
Weight	19,500 lbs [8391.4 kg] dry weight	20,300 lbs [9480.1 kg]
Fuel Capacity	90 gallons [340.69 liters]	
Width	12 ft [3.65 m]	
Length	24 ft [7.3 m]	
Height	143 in. [3.63 m]	
Wheel Base	15 ft [4.6 m]	
Turning Radius	17 ft [5.1 m]	
Standard Tires	Standard Front: 380/80R38 and Standard Rear: 380/90R46	
Booms	90 ft [27.4 m], 100 ft [30.4 m], 120 ft [36.6 m], 132 ft [40.2 m], 60/90 ft [18.2/27.4 m]	
Boom Height	18 to 89 in. [45.6 to 226.1 cm] (42 in. [106.6 cm] CCO; 26 to 97 in. [66 to 246.4 cm] (50 in. [127 cm] CC)	26 to 97 in. [66 to 246.4 cm] (50 in. [127 cm] CC)
Product Pump	Hypro 9306C HM1C, hydraulically driven centrifugal pump	
Roto-Flush	Pump pressured	

Apache AS1030 and AS1230 Fluids, Filters and Capacities

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	24 [22.7]	----
Engine Primary Air Filter	----	----	201300116
Engine Safety Air Filter	----	----	201300117
Transmission	Lucas 15W-40 Magnum Motor Oil	21 [19.9]	310100001
Differential (Rear Axle)	Lucas Universal Hydraulic Fluid	11.9 [11.26]	----
Planetary	Lucas 80/90 Gear Oil	2.9 [2.7]	----
Rear Drop Box	Lucas 80/90 Gear Oil	21 [20]	----
Park Brake Oil	Cat® TO-4 30W Transmission and Drive Train Oil	14.5 Ounces [428.8 Milliliters] initial fill*	----
Engine Fuel	Diesel	90 Gallons [340.69 Liters]	Filter: 201450303 Separator/Filter: 211000000 Tank Strainer: 201450001
Diesel Exhaust Fluid (DEF)	-----	5 Gallons [19 Liters]	DEF Supply Module Filter: 241000009 DEF Tank Suction Screen: 241000008
Hydraulic System	Lucas Universal Hydraulic Fluid	40 Gallons [151.42]	Filter: 880000026 Strainer: 840000010 Hydraulic Filter Kit: K65000209 Hydraulic Filter Kit with Oil: K65000210
Front Suspension	Lucas Universal Hydraulic Fluid	as required	----
A/C System	R134a	2.8 lbs	----
Cab Filter	----	----	Charcoal Filter: 490003651
NOTE: Any oil and fluid substitutions must meet or exceed recommended fluid specifications. * Please see park brake oil fill/ check procedure.			

Michelin Tire Pressure (Cold)

- 380/80R38.....29 psi [2.0 bar]
- 380/90R46.....42 psi [2.9 bar]
- 480/70R34.....20 psi [1.38 bar]
- 620/70R42.....35 psi [2.83 bar]
- 800/65R32.....23 psi [1.59 bar]

Goodyear Tire Pressure (Cold)

- 320/85R38 .....35 psi [2.41 bar]
- 320/90R50 .....75 psi [5.17 bar]

Lug Nut Torque

- All Wheels.....420 lb-ft [570 N•m]

Wet System Capacities

- Product Tank AS1030.....1000 gallons [3785 liters]
- Product Tank AS1230.....1200 gallons [4542 liters]
- Rinse Tank.....100 gallons [379 liters]

Hydraulic Pump Output.....2400 psi [165 bar]

AS1030 and AS1230 Optional Equipment

The following chart lists optional kits available for all 2016 Apache Sprayers including the AS1030 and AS1230. Please note that some of the kits are machine model specific. The kits include all parts, brackets and mounting hardware needed for installation.

Apache Sprayer Kit List 2016		
Part Number	Description	Model Year of Apache
K65000172	KIT, FENCE ROW NOZZLE ONE-SIDE 60/90, 90', OR 100' BOOM	2016
K65000197	KIT, FOAM MARKER COMBO BOOM 60/90	2016
K65000198	KIT, FOAM MARKER STRAIGHT 90' OR 100' BOOM	2016
K65000202	KIT, FRONT FENDERS 42" & 50" CC	2016
K65000203	KIT, REAR FENDER 42" CC	2016
K65000204	KIT, REAR FENDERS 50" CC	2016
K65000209	KIT, HYDRAULIC FILTER WITH OUT OIL	2016
K65000254	KIT, 3" QUICK FILL POLY TANKS	2016
K65000255	KIT, 3" QUICK FILL SS TANKS	2016
K65000257	KIT, POWER GLIDE AUTOBOOM	2016
K65000258	KIT, ULTRAGLIDE AUTOBOOM 3 EYE	2016
K65000259	KIT, ULTRAGLIDE AUTOBOOM W/WHEELS	2016
K65000260	KIT, ULTRAGLIDE W/ 5-EYES	2016
K65000261	KIT, POWER GLIDE W/CENTER EYE	2016
K65000289	KIT, FENCE ROW NOZZLE ONE-SIDE POMMIER 120' BOOM	2016
K65000290	KIT, FENCE ROW NOZZLE ONE-SIDE POMMIER 132' BOOM	2016
K65000291	KIT FOAM MARKER POMMIER 120' & 132' BOOM	2016
K65000299	KIT, FLOWMETER AND DISPLAY 2"	2016
K65000300	KIT, FLOWMETER AND DISPLAY 3"	2016
K65000301	KIT, 2016 ADJUST ON THE GO	2016
K65000302	KIT, ENVIZIO PRO II CONSOLE WITH SCALABLE GPS	2016
K65000303	KIT, VIPER 4 CONSOLE	2016
K65000304	KIT, 2016 AUTO STEER SMARTRAX	2016
K65000305	KIT, CHEMICAL EDUCTOR, POLY TANK 2016	2016
K65000306	KIT, CHEMICAL EDUCTOR, SS TANK 2016	2016
K65000307	KIT, CONVERSION PG TO UG ISO	2016
K65000308	KIT, ISO POWER GLIDE AUTOBOOM	2016
K65000309	KIT, ISO POWER GLIDE W/CENTER EYE	2016
K65000310	KIT, ISO ULTRAGLIDE AUTOBOOM 3 EYE	2016
K65000311	KIT, ISO ULTRAGLIDE AUTOBOOM 3 EYE W/WHEELS	2016

K65000312	KIT, ISO ULTRAGLIDE AUTOBOOM 5 EYE	2016
K65000313	KIT, TRIMBLE AUTOPILOT AUTO GUIDANCE 2016	2016
K65000314	KIT, TRIMBLE FMX CONSOLE	2016
K65000315	KIT, ISO CONNECTION FOR DEERE 2630	2016
K65000316	KIT, ISO CONNECTION FOR CASE 700	2016
K65000317	KIT, ISO CONNECTION FOR AG LEADER INTEGRA	2016
K65000318	KIT, DUAL EXTENSION, MICHELIN NARROW TIRES	2016
K65000319	KIT, STANDARD DUAL EXTENSION, MICHELIN TIRES	2016
K65000320	KIT, ISO ULTRAGLIDE AUTOBOOM 5-EYE	2016
K65000325	KIT, REAR 620" FLOATS WHITE RIMS MICHELIN MEGAXBIB 620/70R42	2016
K65000326	KIT, REAR 800" FLOATS WHITE RIMS MICHELIN MEGAXBIB 800/65R32	2016
K65000327	KIT, FRONT 320" NARROW WHITE RIMS GOODYEAR TIRES 320/85 R38	2016
K65000328	KIT, REAR 320" NARROW WHITE RIMS GOODYEAR TIRES 320/90 R50	2016
K65000344	High Flow Kit for Wet System	2016
K65000349	KIT, 2015 AS1030 and AS1230 YEARLY SERVICE FILTER	2016
K65000350	KIT, SPRAY SURVIVAL AS1030 and AS1230	2016

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CHAPTER 2

SAFETY

Apache is committed to the safe design and operation of its products. This Apache Sprayer has been designed and manufactured with your personal safety while operating the Apache Sprayer as a primary concern.

Safety, Symbols, Signal Words and Statements

Safety symbols, signal words, and statements, are used in this manual and on the Apache Sprayer to identify and alert you of potential hazards where personal safety precautions are required.



The safety alert symbol is used to alert you of potential personal injury hazards. Carefully read the safety message associated with safety symbol and follow any instructions provided to ensure your safety.

Safety signal words are used to alert you of the potential personal injury hazards. Carefully read the safety message associated with safety signal word and follow any instructions provided to ensure your safety.

Safety statements are used to explain and inform you of potential personal injury hazards and provide precautionary instructions. Read, understand and follow all safety messages and information contained in this manual and on the Apache Sprayer to prevent personal injury and ensure safe reliable Apache Sprayer operation.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

*The italicised **NOTICE**, indicates a potentially hazardous situation which, if not avoided, may result in improper Apache Sprayer operation and/or damage to equipment, property and the environment.*

Safety Precautions

There is no substitute for common sense and following careful operation and service practices. Improper practices and carelessness can cause personal injury or even death.

The following safety precautions and guidelines must be followed in addition to the specific safety precautions listed throughout this manual and on the Apache Sprayer to reduce the risk of personal injury.

Keep this manual and all included literature in a safe and convenient location. Contact your Apache dealer or Apache at (317) 834-4500 to obtain replacement owner's manuals and safety decals.

To ensure your safety, the safety of others, and the safe operation of the sprayer, read, follow and practice the following:

⚠ WARNING

The safety messages that follow have WARNING level hazards.

Pre-Operation Hazards



Read and understand this Owner's Manual before operating or servicing the Apache Sprayer to ensure that safe operating practices and maintenance procedures are followed. If you do not understand any part of this manual and need assistance, see your Apache dealer for assistance.

- ***NEVER permit anyone to operate the Apache Sprayer without proper training. Obtain proper knowledge and training before attempting to perform any operation or service procedure in this manual.***
- ***This Apache Sprayer and its attachments are designed to spray liquid product. Use of this Apache Sprayer in any other manner other than its intended use is prohibited.***
- ***Remove or clean contaminated clothing before entering the cab.***
- ***Some components and systems of Apache Sprayers are manufactured by companies other than Apache and have specific safety, inspection, adjustment and maintenance procedures outlined by their manufacturer. Carefully read and understand all non-Apache Sprayer and 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.***

Fire and Explosion Hazards





Diesel fuel is flammable and explosive under certain conditions. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ignition.

- ***NEVER use a shop rag to catch spilling fuel.***
- ***Wipe up all fuel spills immediately.***
- ***NEVER refuel with the engine running.***

- ***ALWAYS have appropriate safety equipment available. Have all fire extinguishers checked periodically for proper certification, operation and/or charge capacity.***
- ***ALWAYS read and follow safety-related precautions found on containers of hazardous substances like parts cleaners, primers, sealants and sealant removers.***

Burn Hazards



Some of the engine surfaces become very hot during operation and shortly after shut-down. Keep hands and other body parts away from hot engine surfaces.

Lifting Hazards

- ***ALWAYS use lifting equipment with sufficient capacity to lift the Apache Sprayer or equipment.***
- ***If transport is needed for repair, acquire assistance when using a hoist and when loading and unloading.***

Exposure Hazard



ALWAYS wear the appropriate personal protective equipment as required by the task at hand, including but not limited to:

- ***Relatively tight and belted clothing***
- ***Safety gloves***
- ***Safety shoes/boots***
- ***Safety eye glasses/goggles/shields***
- ***Hearing protection, ear plugs***
- ***Head protection, hard hats***
- ***ALWAYS wear a respirator, goggles and gloves in addition to wearing long shirt sleeves and long pants when handling chemicals. Read the chemical safety label or instructions before usage.***

Entanglement / Sever Hazard



NEVER wear jewelry, watches, unbuttoned cuffs, ties or loose-fitting clothing and ALWAYS tie long hair back when working near moving/rotating parts.



- ***ALWAYS Keep hands, feet, hair and clothing away from all moving/rotating parts.***
- ***NEVER operate the engine without the guards in place.***

Alcohol and Drug Hazard

- ***DO NOT operate or service the Apache Sprayer while under the influence of alcohol, awareness-altering drugs or medications that would affect your ability to operate or maintain the sprayer safely.***

Exhaust Emissions Safety

Carefully read all safety information and observe any exhaust or pollution safety instructions. Be aware of and follow all regulations and policies as outlined by the engine OEM to maintain exhaust emission compliance with the Environmental Protection Agency (EPA), California Air Resources Board (CARB) and Environment Canada where applicable.
It is the owner's responsibility to keep the Apache Sprayer maintained and within compliance.
The state of California, U.S., has special regulations that may exceed the EPA regulations. If the Apache Sprayer is operated or serviced in the state of California, observe all exhaust and pollution regulations.



WARNING! Exhaust Gas Exposure Hazards

- ***All internal combustion engines create carbon monoxide gas during operation and special precau tions are required to avoid carbon monoxide poisoning. Prolonged exposure to carbon monoxide will cause brain damage or death.***
- ***ALWAYS operate the engine outside in a well-ventilated area.***
- ***NEVER block windows, vents or other means of ventilation if the engine is operating in an enclosed area.***
- ***ALWAYS ensure that all connections are tightened to specifications after repair is made to the exhaust system.***

Environmental Precautions

The safety messages that follow have NOTICE level hazards.

- *Thoroughly clean any spilled fluids from the equipment and/or ground after service is completed. Dispose of used fluids and filters as required by law.*
- *ALWAYS be environmentally responsible. Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.*
- *NEVER dispose of hazardous materials by dumping them into a sewer, on the ground, or into ground water or waterways.*

Safety Belt



WARNING! Impact Hazards.

- ***ALWAYS fasten your seat belt when operating the Apache Sprayer. The safety belt must be worn properly by the driver anytime the Apache Sprayer is in motion.***
- ***NEVER alter or tamper with any safety belt system components.***

Safety belt systems are designed to limit occupant motion by restraining occupants' bodies within the cab and prevent, or reduce the severity of, injuries during most types of collisions. When safety belts are used properly, they are effective in reducing the risk of injury.
Inspect the safety belt system regularly for cuts, frays, wear, discoloration or abrasion. The hardware, mounts, retractor and belt should work freely. The belt and/or components must not show signs of deterioration. If you suspect any part of the system is in need of repair, have the system repaired or replaced immediately and use only parts designed for the safety system.
Safety belt systems are designed to limit occupant motion by restraining occupants' bodies within the cab and prevent, or reduce the severity of, injuries during most types of collisions. When safety belts are used properly, they are effective in reducing the risk of injury.
Inspect the safety belt system regularly for cuts, frays, wear, discoloration or abrasion. The hardware, mounts, retractor and belt should work freely. The belt and/or components must not show signs of deterioration. If you suspect any part of the system is in need of repair, have the system repaired or replaced immediately and use only parts designed for the safety system.

Safety Belt (ctnd.)

WARNING! Impact Hazard.

DO NOT operate the Apache Sprayer if any part of the seat belt system is damaged. The system must be repaired or replaced before operating the Apache Sprayer.

NOTICE: DO NOT use harsh cleaners, bleach or any products which could cause the safety belt material to deteriorate.

Safety Decals

CAUTION!

ALWAYS read and follow the safety decals on the Apache Sprayer. Safety decals are additional reminders for safe operating and maintenance techniques.

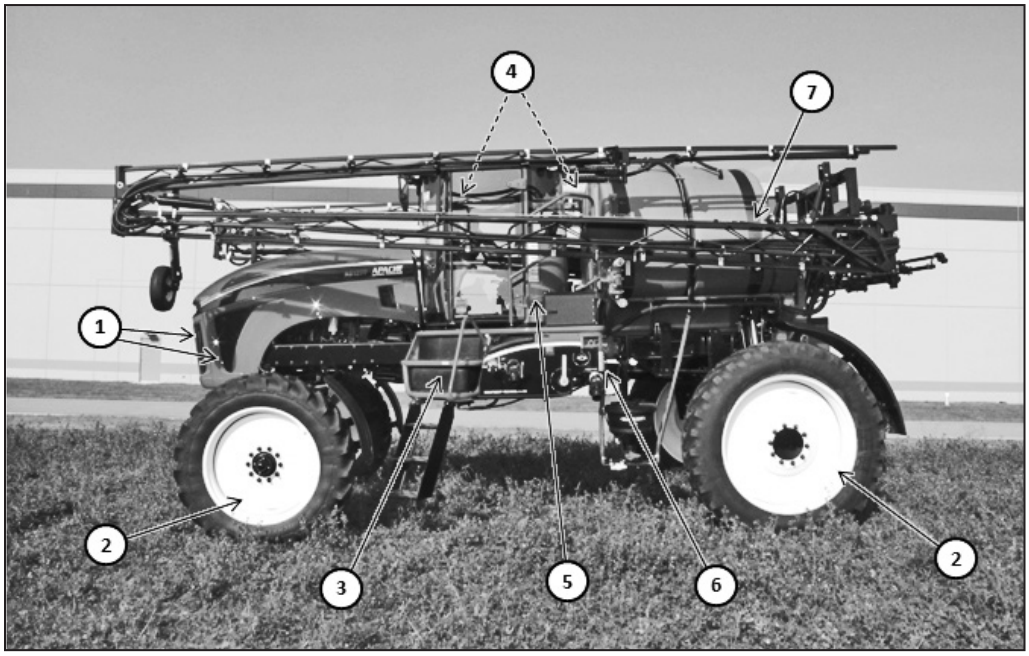
Safety decals are used to explain and inform you of potential personal injury hazards and provide precautionary instructions. Read, understand and follow all safety decals on the Apache Sprayer to prevent personal injury and ensure safe reliable Apache Sprayer operation.

NOTICE: Prevent safety decals from becoming dirty or damaged and replace them immediately should they become damaged or are missing. Should an Apache Sprayer part that has a decal attached to it need replacement, obtain a new decal with the new part.

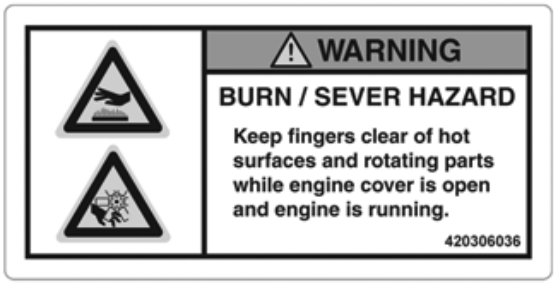
Contact your Apache dealer or Apache at (800) 861-2142 to obtain replacement safety decals.

To ensure your safety, the safety of others and the safe operation of the sprayer, read, follow and observe the following safety decals shown on subsequent pages.

Exterior Decal Locations



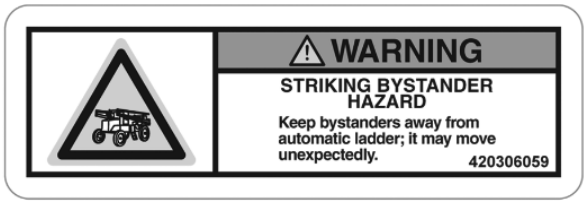
1.



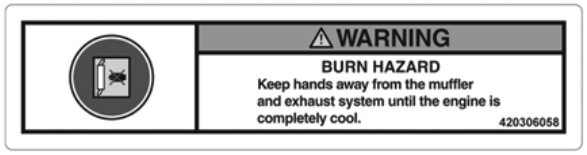
2.



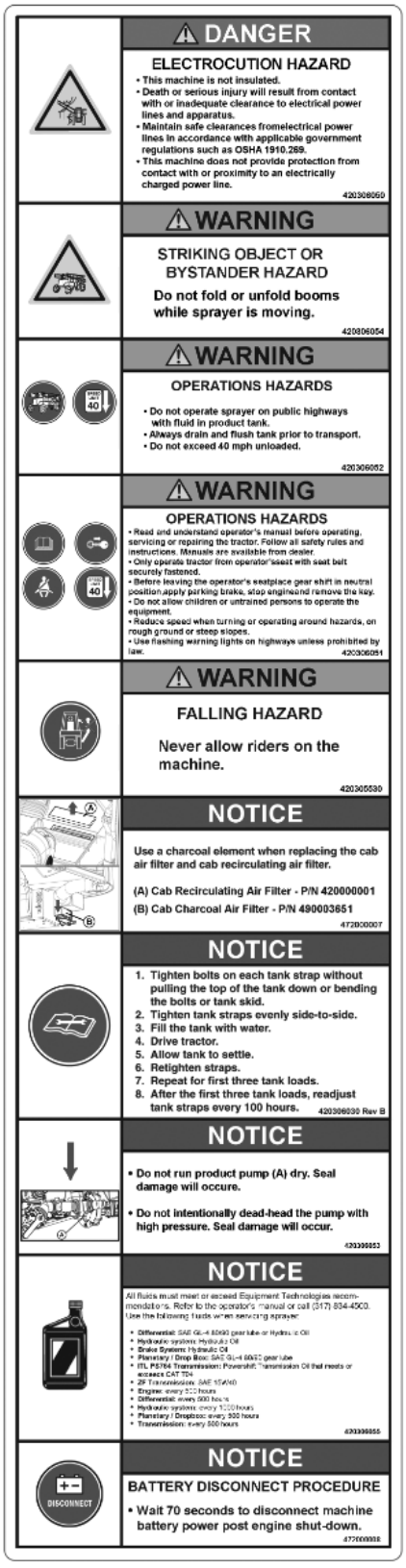
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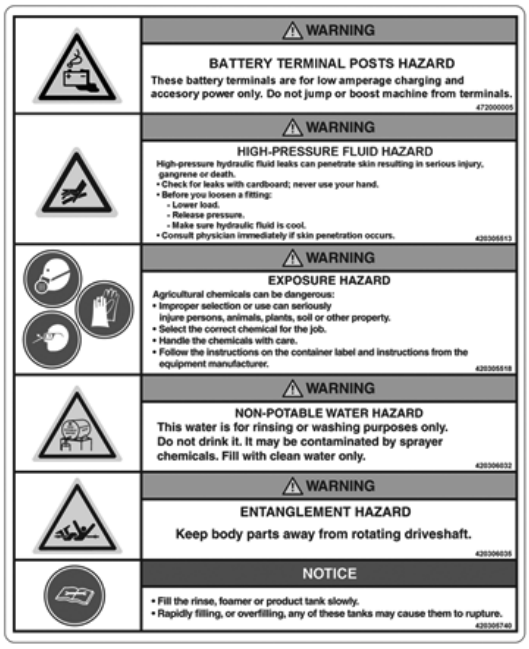
4.



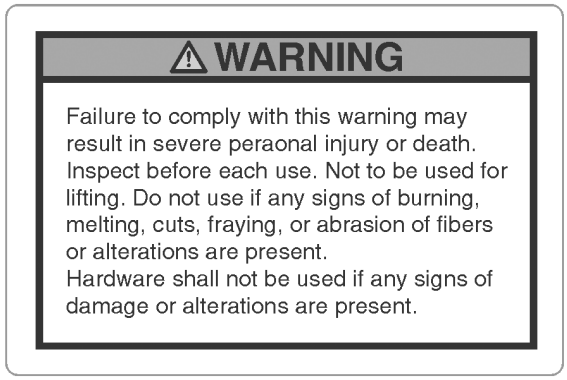
5.


DANGER
ELECTROCUTION HAZARD
• This machine is not insulated.
• Death or serious injury will result from contact with or inadequate clearance to electrical power lines and apparatus.
• Maintain safe clearances fromelectrical power lines in accordance with applicable government regulations such as OSHA 1910.269.
• This machine does not provide protection from contact with or proximity to an electrically charged power line.
420306050
WARNING
STRIKING OBJECT OR BYSTANDER HAZARD
Do not fold or unfold booms while sprayer is moving.
420306054
WARNING
OPERATIONS HAZARDS
• Do not operate sprayer on public highways with fluid in product tank.
• Always drain and flush tank prior to transport.
• Do not exceed 40 mph unloaded.
420306052
WARNING
OPERATIONS HAZARDS
• Read and understand operator's manual before operating, servicing or repairing the tractor. Follow all safety rules and instructions. Manuals are available from dealer.
• Only operate tractor from operator'sseat with seat belt securely fastened.
• Before leaving the operator's seatplace gear shift in neutral position,apply parking brake, stop engineand remove the key.
• Do not allow children or untrained persons to operate the equipment.
• Reduce speed when turning or operating around hazards, on rough ground or steep slopes.
• Use flashing warning lights on highways unless prohibited by law.
420306051
WARNING
FALLING HAZARD
Never allow riders on the machine.
420306030
NOTICE
Use a charcoal element when replacing the cab air filter and cab recirculating air filter.
(A) Cab Recirculating Air Filter - P/N 420000001
(B) Cab Charcoal Air Filter - P/N 490003651
472000007
NOTICE
1. Tighten bolts on each tank strap without pulling the top of the tank down or bending the bolts or tank skid.
2. Tighten tank straps evenly side-to-side.
3. Fill the tank with water.
4. Drive tractor.
5. Allow tank to settle.
6. Retighten straps.
7. Repeat for first three tank loads.
8. After the first three tank loads, readjust tank straps every 100 hours.
420306030 Rev B
NOTICE
• Do not run product pump (A) dry. Seal damage will occure.
• Do not intentionally dead-head the pump with high pressure. Seal damage will occur.
420306053
NOTICE
All fluids must meet or exceed Equipment Technologies recommendations. Refer to the operator's manual or call (317) 834-4500.
Use the following fluids when servicing sprayer:
• Differential: SAE GL-4 80W90 gear lube or Hydraulic Oil
• Hydraulic system: Hydraulic Oil
• Brake System: Hydraulic Oil
• Planetary / Drop Box: SAE GL-4 80W90 gear lube
• ITL PS764 Transmission: Powershift Transmission Oil that meets or exceeds CAT TO4
• ZF Transmission: SAE 15W40
• Engine: every 500 hours
• Differential: every 500 hours
• Hydraulic system: every 1000 hours
• Planetary / Dropbox: every 500 hours
• Transmission: every 500 hours
420306055
NOTICE
BATTERY DISCONNECT PROCEDURE
• Wait 70 seconds to disconnect machine battery power post engine shut-down.
472000008

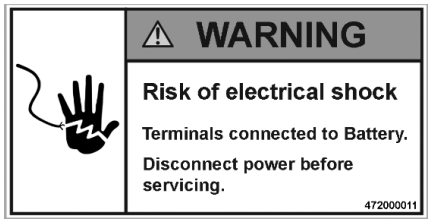
6.

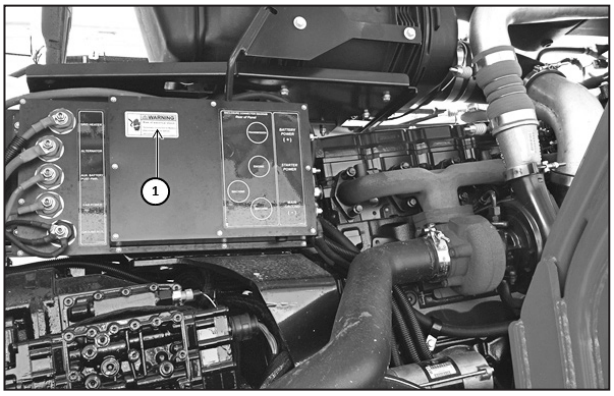

WARNING
BATTERY TERMINAL POSTS HAZARD
These battery terminals are for low amperage charging and accesory power only. Do not jump or boost machine from terminals.
472000005
WARNING
HIGH-PRESSURE FLUID HAZARD
High-pressure hydraulic fluid leaks can penetrate skin resulting in serious injury, gangrene or death.
• Check for leaks with cardboard; never use your hand.
• Before you loosen a fitting:
- Lower load.
- Release pressure.
- Make sure hydraulic fluid is cool.
• Consult physician immediately if skin penetration occurs.
420306513
WARNING
EXPOSURE HAZARD
Agricultural chemicals can be dangerous:
• Improper selection or use can seriously injure persons, animals, plants, soil or other property.
• Select the correct chemical for the job.
• Handle the chemicals with care.
• Follow the instructions on the container label and instructions from the equipment manufacturer.
420306518
WARNING
NON-POTABLE WATER HAZARD
This water is for rinsing or washing purposes only. Do not drink it. It may be contaminated by sprayer chemicals. Fill with clean water only.
420306032
WARNING
ENTANGLEMENT HAZARD
Keep body parts away from rotating driveshaft.
420306036
NOTICE
• Fill the rinse, foamer or product tank slowly.
• Rapidly filling, or overfilling, any of these tanks may cause them to rupture.
420306740

7.


WARNING
Failure to comply with this warning may result in severe peraonal injury or death. Inspect before each use. Not to be used for lifting. Do not use if any signs of burning, melting, cuts, fraying, or abrasion of fibers or alterations are present.
Hardware shall not be used if any signs of damage or alterations are present.

1.

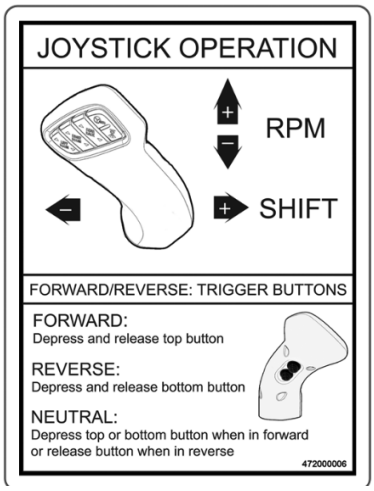




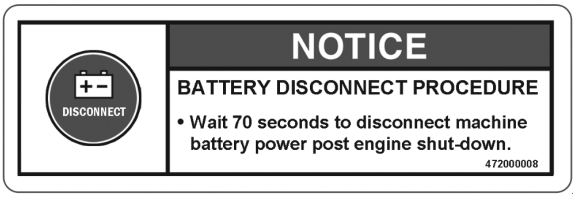
Interior Decal Locations



1.



2.



APACHE™

CHAPTER 3

OPERATION

Before performing any operation procedures, read the following safety messages and read the Safety Section.



WARNING! Control Hazard. DO NOT operate the Apache Sprayer while wearing a headset to listen to music or radio because it will be difficult to hear the warning signals.



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



WARNING! Roll-Over Hazards

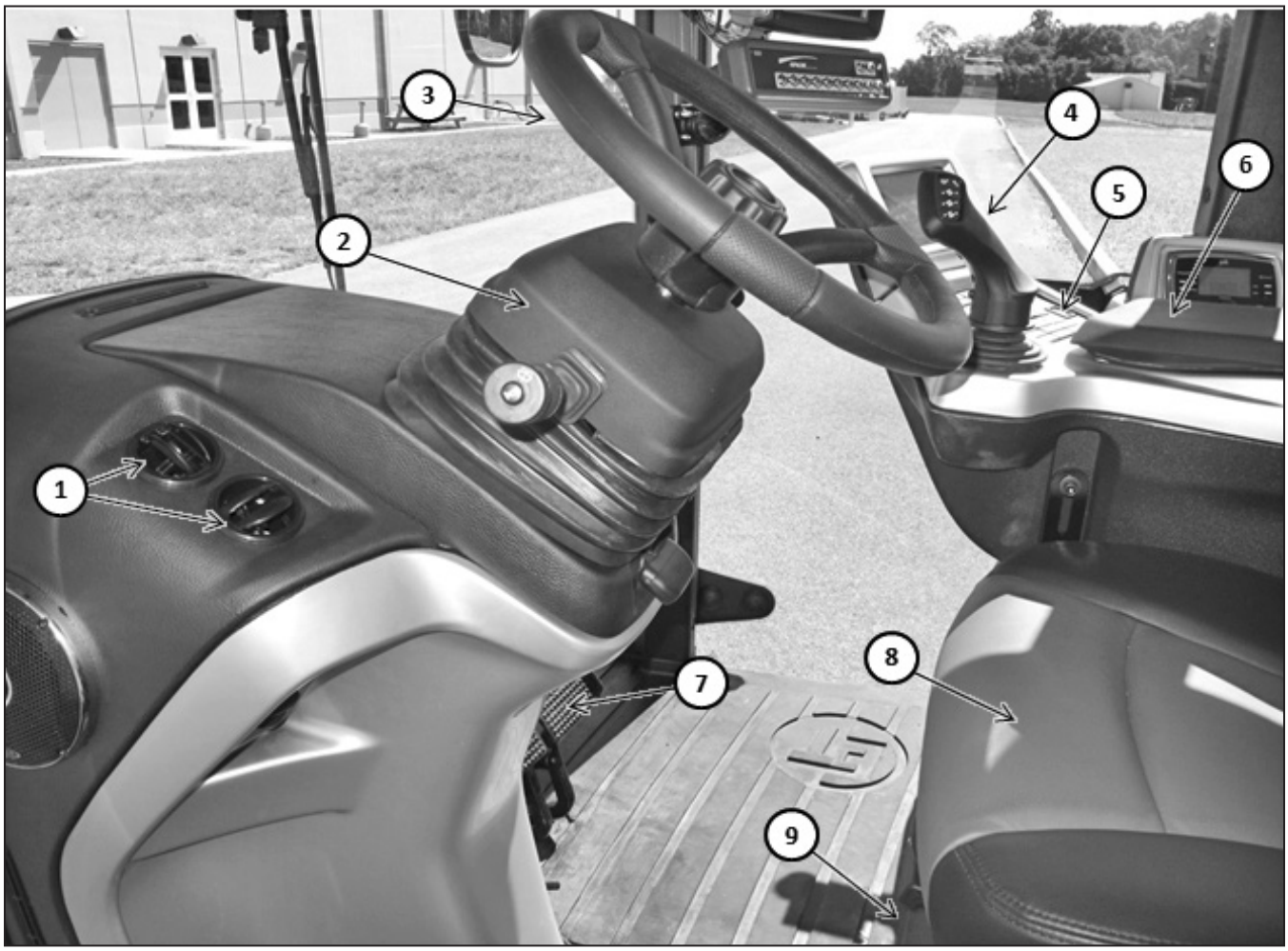
- **DO NOT operate on steep slopes.**
- **DO NOT drive across a slope. Drive up and down slopes.**
- **DO NOT turn down a slope.**
- **Slow down when turning.**
- **Keep booms as close to the ground as possible.**
- **Drive slowly across rough ground.**
- **DO NOT operate on public roads or highways with product in the product tank.**
- **ALWAYS use 4 way flashers on public roads or highways**
- **ALWAYS come to a complete stop before reversing directions.**

Pre-Operation Checks

Before operating the Apache Sprayer, perform the following safety and equipment checks.

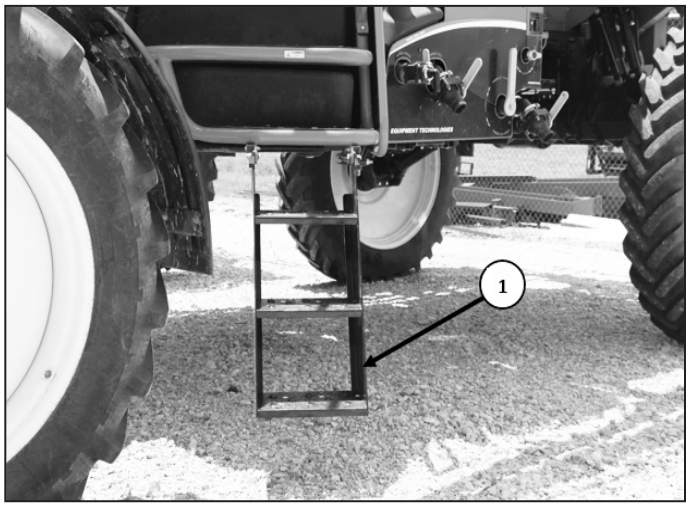
- Read and understand this manual before operating the Apache Sprayer.
- Read and follow all safety messages and safety decal instructions in this section. See “Safety” on page 2-1.
- Check the condition of all safety decals. Replace if damaged.
- Check that all shields and guards are properly installed and in good working condition. Replace if damaged.
- Check all hardware for proper installation and torque. See ”Torque Value Charts” on page 6-1.
- Check the operating area for bystanders and obstruction before operating.
- Check that all hydraulic hoses and fittings are in good condition and not leaking. Make sure the hoses are routed to prevent damage, not twisted, sharply bent, kinked, frayed, or pulled tight or rubbing, before starting the Apache Sprayer. Replace any damaged hoses or fittings immediately.
- Check the operation and condition of the seat belt. Immediately repair or replace the seat belt if damaged or if it does not operate properly.
- Check tires for proper inflation pressure according to tire manufacturer’s recommendations. Specifications are also provided on the back cover of this manual. See ”Check Tire Pressure” on page 5-12.
- Check engine oil level and add oil as needed. See ”Check Engine Oil Level” on page 5-13.
- Check transmission fluid level and add fluid as needed. See ”Check Transmission Fluid Level” on page 5-15.
- Check differential, gearboxes and/or planetaries fluid levels and add fluid as needed. See ”Check Differential Fluid Level” on page 5-19.
- Check coolant level and add coolant as needed. See the engine manufacturer’s manual for details.
- Check hydraulic reservoir fluid level and add fluid as needed. See ”Check Hydraulic Fluid Level” on page 5-15.

Cab Overview



1. Air Vents
2. Steering Column
3. Steering Wheel
4. Joystick
5. ET Pilot System
6. Arm Rest
7. Brake Pedal(s)
8. Air Seat
9. Fire Extinguisher (left of seat)

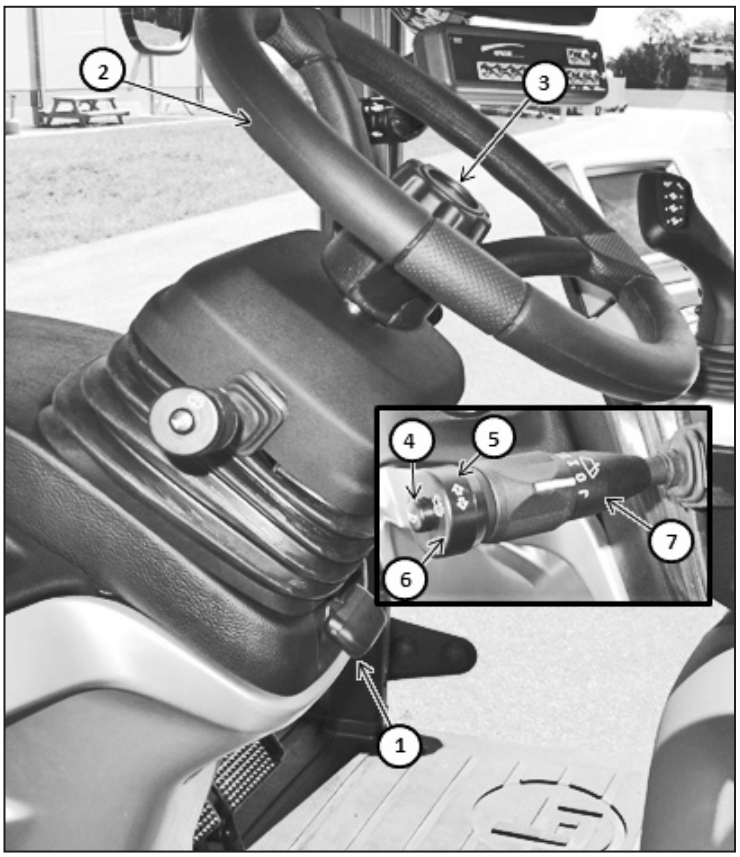
Cab Access Ladder



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

NOTE: DO NOT drill the plastic of the steering column, or alter in any way.



1. **Steering Column Tilt Adjustment Lever**
   - Lift up on the lever.
   - Adjust the tilt to the desired position.
   - Release the liver to lock the column.
2. **Steering Wheel**
3. **Steering Wheel Telescope Adjustment Knob**
   - Turn center knob counterclockwise to unlock.
   - Positionsteering wheel to desired height.
   - Turn center knob clockwise to lock.
4. **Horn Button**
   - Push to sound horn.
5. **Turn Signal Lever**
   - Push lever up for right turn signal.
   - Push lever down for left turn signal.
6. **Windshield Washer**
   - Push ring to operate washer.
7. **Windshield Wiper Switch**
   - Turn lever to the "I" position for low-speed wiper.
   - Turn lever to the "II" position for high-speed wiper
   - Turn lever to the "J" position for delay wiper. (15 second intervals)

ET Pilot System



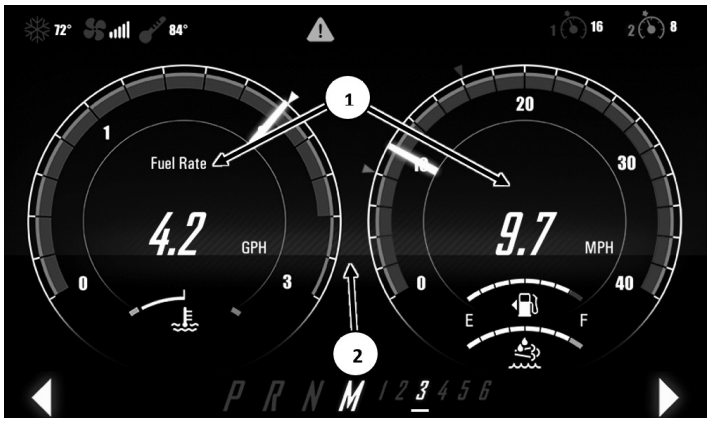
1. Engine RPM
2. MPH Readout
3. Temperature Gauge
4. Fuel Gauge
5. Direction and Gear Indicator
   (The gear indicator will remain solid when torque converter is locked in.)
6. Stylus/Pen
   (The eraser end can be used to touch the screen.)
7. Climate Control Readout
8. Fault Code Indicator
9. Cruise Control Indicator



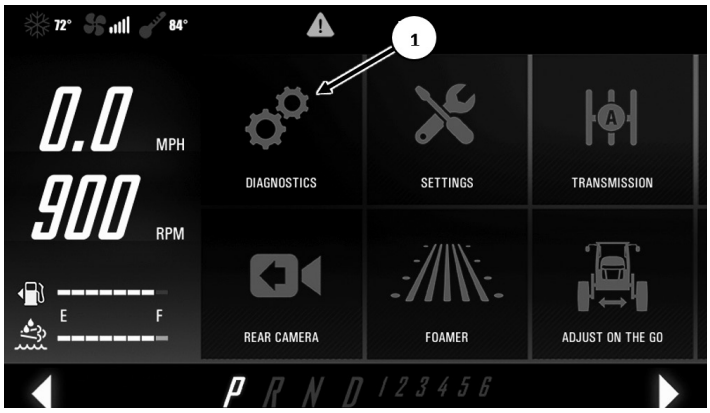
10. Cruise Control Buttons
11. Agitate and Product Pump Buttons
12. Boom Fold/Unfold Buttons
13. Climate Control Buttons
14. Engine Start/Stop Button
15. Park Brake Button

ET Pilot System Touch Screen

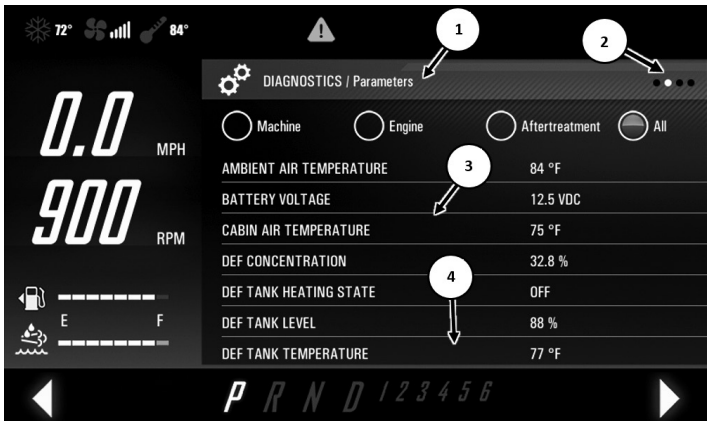
To use the screen there are a few things to know.



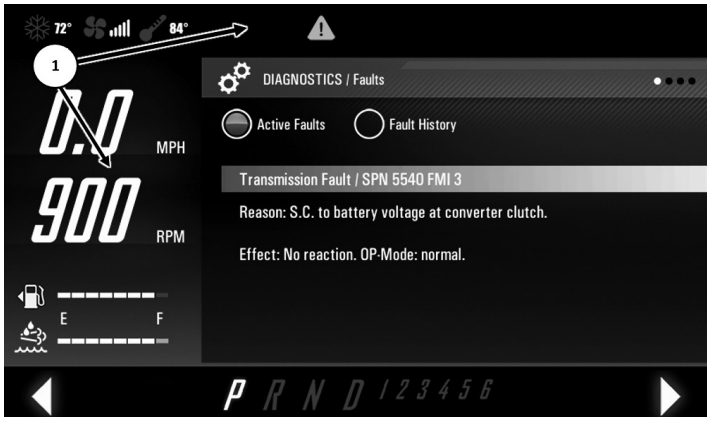
To change the items inside the gauges, touch the RPM or MPH icons (1) to display different options such as: Average GPH, Torque, MPH and RPM. To move to the App Screen, swipe left, anywhere in the middle of the screen (2) except for inside the guages (1).



To select an App, just touch the desired icon (1) on the screen to move to the selected screen.



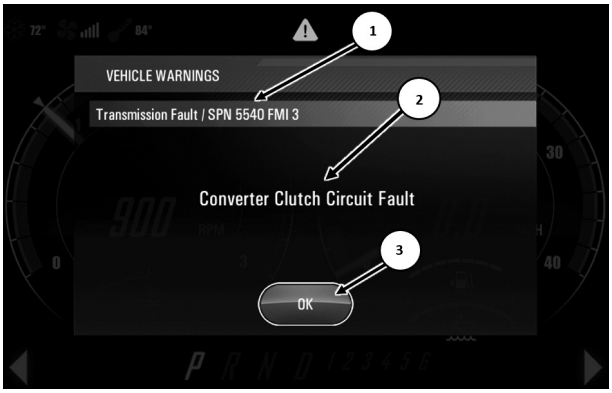
Once in an App screen, there are a few options to choose from. To return to the App Screen, swipe the header bar (1) to the right. To see what page you are within the App, look at the page indicator (2). To move from page to page, swipe left or right in the middle of the screen (3). To scroll the page, swipe the middle of the screen up or down (4).



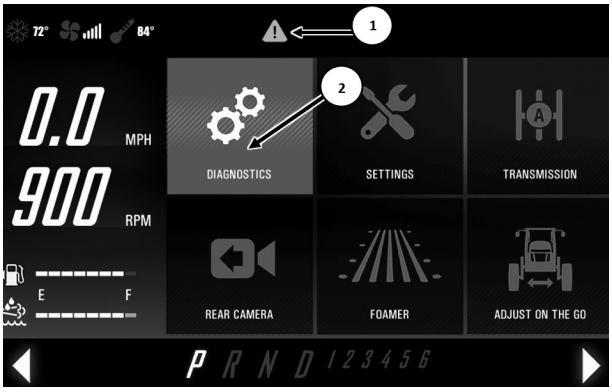
To return to the Home Screen, swipe the screen to right from the top or the left side (1). This will work on any of the screens.

Diagnostics Page 1: Vehicle Warnings

When a new vehicle warning happens, the touchscreen will display a warning screen. It will indicate the fault code (1) and general description of that code (2). Touch the OK icon (3) to close the screen.

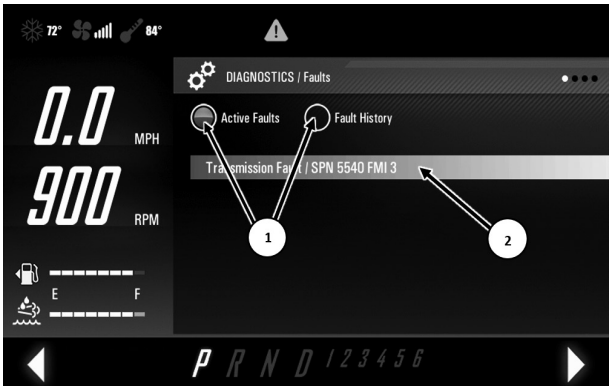


To access the Active Faults screen, either touch the fault indicator (1) at the top of the screen or touch the Diagnostics App icon (2).

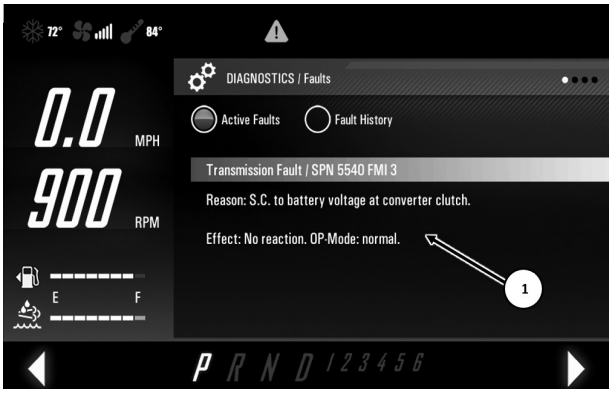


Active Faults

This page will display the option to choose active faults or fault history (1). Choose active faults. Then touch the fault information bar to expand for further detail (2).

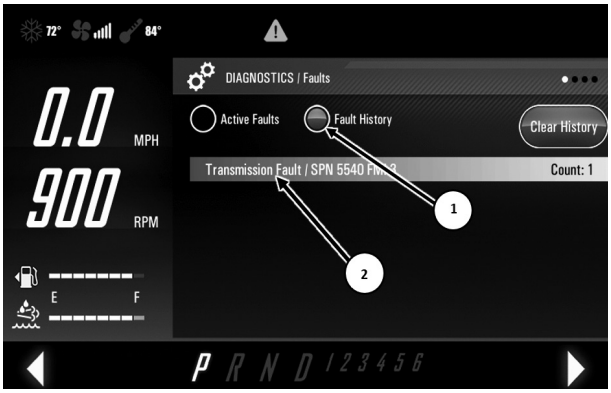


Once the information has expanded, the page will display more detail. This will include the Reason and Effect (1) on the machine.

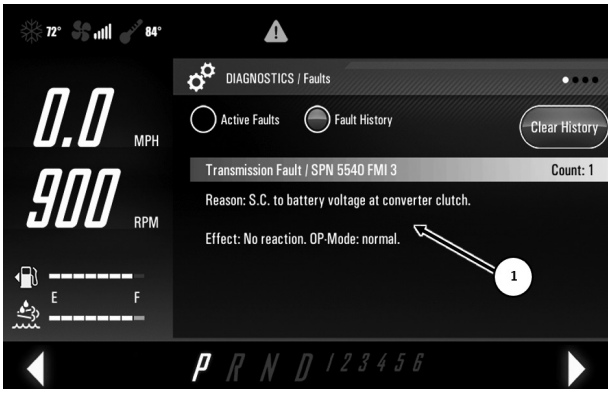


Fault History

This page will display the option to choose active faults or fault history. Choose fault history (1). Then touch the fault information bar to expand for further detail (2).



Once the information has expanded, the page will display more detail. This will include the Reason and Effect (1) on the machine.



Press the Clear History (1) button to clear all saved history.

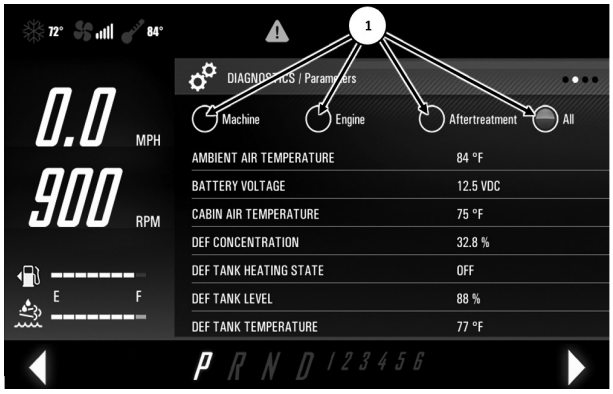


It will then display a prompt (1) to confirm whether or not you would like to clear the history.



Diagnostics Page 2: Parameters

To filter for Machine Parameters only, select Machine button. To filter for Engine Parameters only, select Engine button. To view All Parameters select All (1). To view all the information on that page, swipe the screen up.



Some of the Information included on page 2:

- Ambient Air Temperature
- Battery Voltage
- Engine Coolant Temperature
- Engine Cooling Fan Speed
- Engine Boost Pressure
- Engine Fuel Rate
- Cabin Air Temperature

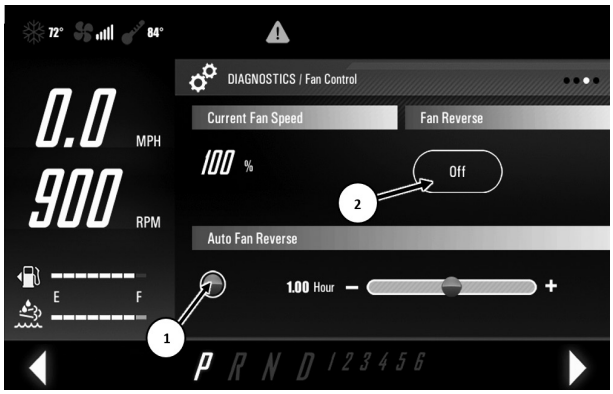
Diagnostics Page 3: Fan Control

The Apache is equipped with a fan reverser. This function can be used to reverse the airflow through the radiator and coolers in order to remove dust and debris.



While the engine is running, touch the icon (1) to turn the fan reverse on. It will run approximately for 20 seconds and then return to normal operation.

The fan reversal has Auto Mode as an option. Touch the icon (1) to activate. Use the slider icon (2) to set how frequent the fan will reverse. The fan reversal can still be manually turned on (3) while in Auto Mode.



Diagnostics Page 4: Engine Info

For more engine information, swipe to page 4.

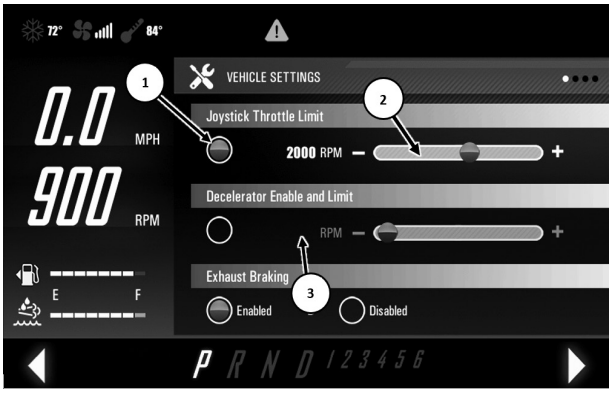


Information included on page 4:

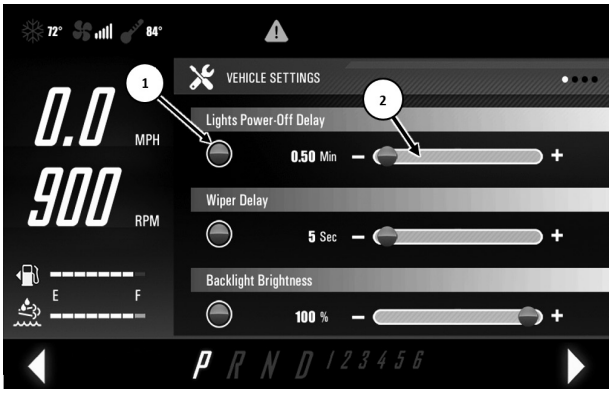
- Total Engine Hours
- Total Idle Hours
- Average Fuel Rate

Vehicle Settings Page 1:

To activate these settings, touch the white circle (1). This will allow you to make adjustments to those settings by using the slider (2). Touch the red icon in the slider and swipe left or right to increase or decrease the value. To access the remaining options on this page, swipe the screen up (3).

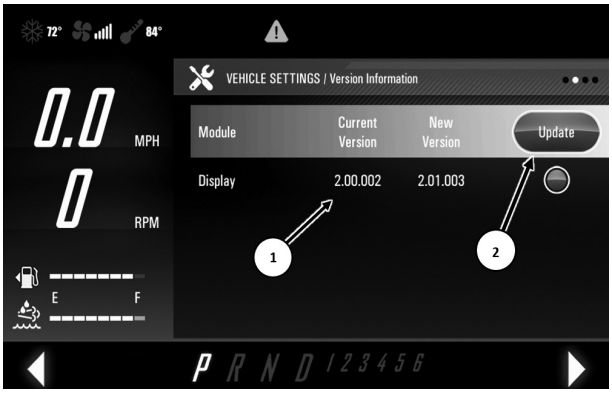


Same applies for this screen. Touch the white circle (1) to activate and use the slider (2) to change the values. To continue to the next Vehicle Settings page, swipe the screen (3) to the left.

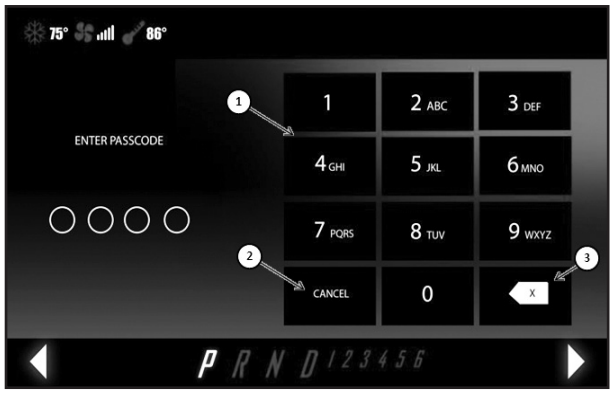


Vehicle Settings Page 2: Version Information

This screen will display the current version of the machines software (1). It will also display the new version if there is a machine software USB drive loaded. ***Please consult with your dealership about any updates (2).

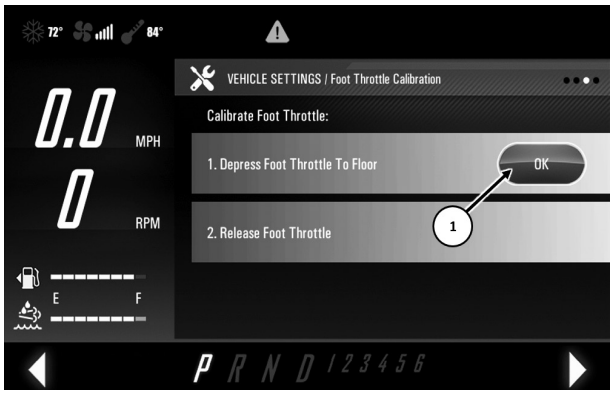


Vehicle Settings Page 3: Foot Throttle Calibration

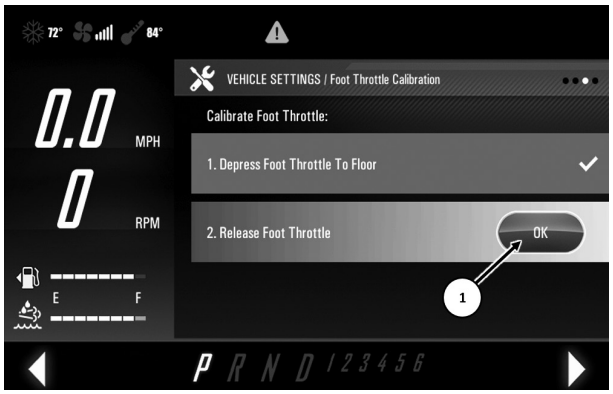


***To be able to continue to the next page, a passcode is needed. This is a warning that the changes that are going to be made, will effect the machine's function.*

Enter the code "**2201**" by touching the number icons (1). To cancel and return to the previous screen, touch the cancel icon (2). To delete a previous typed number, touch the back-space icon (3).

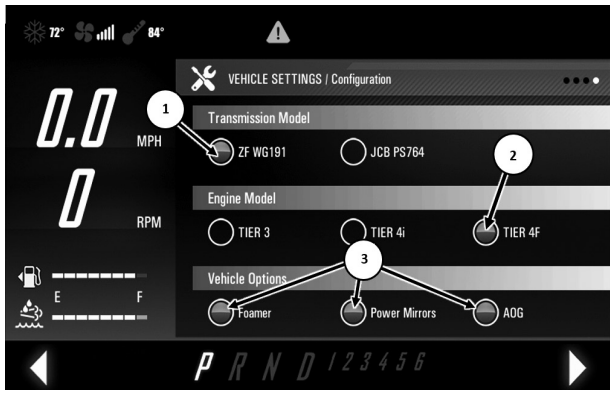


To calibrate the foot throttle, depress the foot throttle to the floor. Then touch OK (1) while holding the foot throttle down.



Step 2: Release the foot throttle, then touch OK (1) to complete the calibration process.

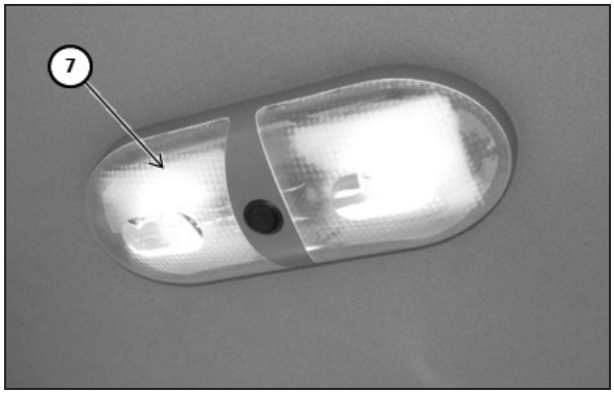
Vehicle Settings Page 4: Configuration



The selection for Transmission Model, must be the ZF WG191 (1). The selection for the Engine Model, must be Tier 4F (2). The Vehicle Options (3) should only be selected if the option is equipped on the machine.

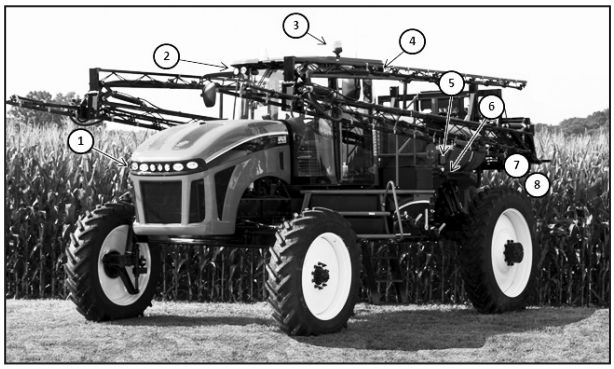
Light Buttons





1. **Cab Front Lights**
   - Press the button to turn on the cab-mounted, front-facing work lights.
   - Press the button again to turn off the lights.
2. **Beacon Light**
   - Press the button to turn on the roof-mounted beacon light.
   - Press the button again to turn off the light.
3. **Cab Rear Lights**
   - Press the button to turn on the cab-mounted, rear-facing work lights.
   - Press the button again to turn off the lights.
4. **Headlights**
   - Press the button to turn on the hood-mounted headlights, marker lights and tail lights.
   - Press the button again to turn off the lights.
5. **Hazard Lights**
   - Press the button to turn on flashing hazard lights.
   - Press the button again to turn off the lights.
6. **Boom Lights**
   - Press the button to turn on the dual beam boom lights.
   - Press the button again to turn off the lights.
7. **Dome Light**
   - Press the switch to turn the light on and off.

Apache Sprayer Lighting



1. **Headlights**
2. **Cab Front Work Lights**
3. **Beacon Light**
4. **Cab Rear Work Lights**
5. **Side hazard and Turn Signal Lights**
6. **Dual Beam Boom Work Lights**
7. **Rear Hazard and Turn Signal Lights**
   (Mounted to back rack - not shown)
8. **Brake Lights**
   (Mounted to back of chassis - not shown)

Turn Signal and Hazard Light Function:

- When the hazard lights are turned on, light sets #5, #7, and #8 will all flash.

Turn Signal Function:

- When the left turn signal is turned on, the left side of light sets #5, #7, and #8 will all flash.
- When the right turn signal is turned on, the right side of light sets #5, #7 and #8 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 Streaming Player



1. **AM/FM, SiriusXM-Ready™, USB Playback, Bluetooth Streaming Audio, and NOAA Weatherband Tuner with Alerts.**
   For further detailed instructions visit the manufacturers website:
   http://asaelectronics.com/manuals-guides

2. **Equipment Technologies is pleased to provide you with 3-months of free Sirius Satellite Radio!** See Activation Information on the next page or find the instructions at the bottom of page 2 of the quick reference guide of your Apache's Polk audio system.

Accessories

(Located behind the right-side arm rest on the back wall.)



1. USB and 1/8" Jack radio input.
2. Accessory power.
3. Lighter.

SiriusXM® Satellite Radio Activation Information

Activation is easy and does not start until you are ready. This way, you are able to enjoy 120+ channels of crystal clear satellite radio throughout the majority of your application season.

Activating your SiriusXM® Subscription
Before you can listen to SiriusXM® Satellite Radio, you must subscribe to the service.

1. With the radio power ON, press the MODE button to enter SiriusXM Ready mode. After displaying the SiriusXM logo, the receiver may update the SiriusXM software.

2. Once the update is complete, the display will change to "Call 1-866-635-2349 to Subscribe" and will show the Preview Channel on channel 1. You will not be able to tune to any other SiriusXM Radio channels until you activate your subscription.

3. You will need to access your SiriusXM Radio ID, which is displayed on channel 000. Press and hold the Encoder Knob on the radio to enter Direct Tuning mode. Rotate the knob to 0 and press to enter. Once tuned to channel 0 it will display your unit's unique 8-digit SiriusXM Radio ID.

4. Write the Radio ID number down and have your credit card handy.

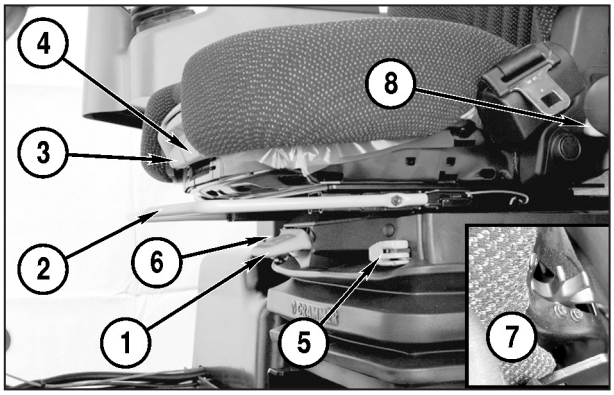
5. For subscriptions in the United States please visit www.siriusxm.com/activatenow or call SiriusXM Listener Care at 1-866-635-2349. For subscriptions in Canada, please visit www.siriusxm.ca/activatexm or call XM Listener Care at 1-877-438-9677.

Renewal Information
There is absolutely no obligation to renew. At the end of your 3-months of free service, you will be contacted by a SiriusXM representative or you may contact your Apache dealer ahead of time to have the billing transferred to you directly. It is entirely up to you, but again, there is no obligation to renew.

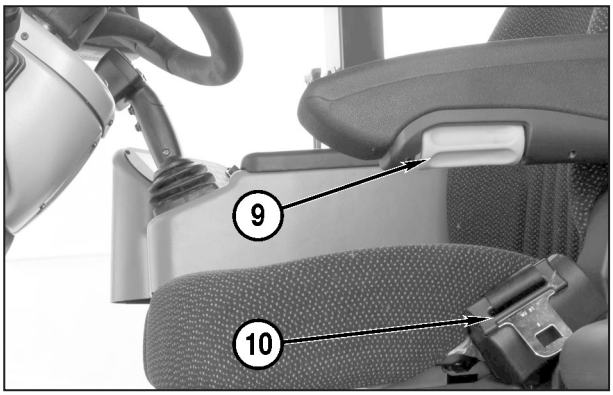
Channel Information
Visit http://www.siriusxm.com/channellineup for an up-to-date listing of channels.

Enjoy!

Seat Adjustment



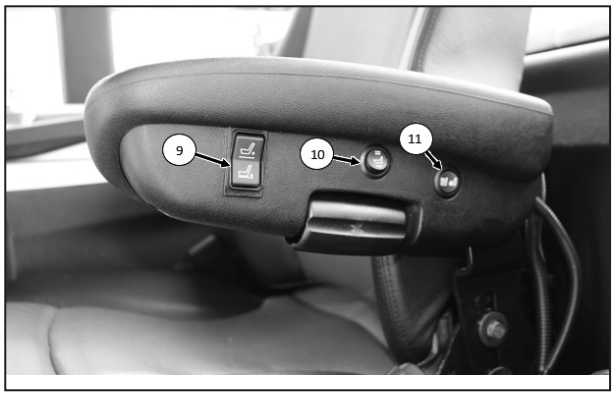
1. **Height**
   - Lift lever to raise the seat.
   - Push the lever down to lower the seat.
2. **Fore-Aft Position of Whole Seat**
   - Pull lever up to adjust seat forward or backward.
3. **Fore-Aft Position of the Seat Cushion Only**
   - Pull lever up to adjust seat custion forward or backward.
4. **Seat Cushion Tilt**
   - Pull lever up to tilt seat cushion up or down.
5. **Fore-Aft Isolator**
   - Turn the lever to the left to allow front-to-back movement of the seat.
   - Return the lever to the right to lock-out movement.
6. **Ride Firmness**
   - Turn the knob counter-clockwise for firm ride.
   - Turn the knob clockwise for soft ride.
7. **Lumbar Support**
   - Turn the knob counter-clockwise for more lumbar support.
   - Turn the knob clockwise for less lumbar support.
8. **Backrest**
   - Lift the lever.
   - Position the backrest.
   - Release the lever.
9. **Armrest**
   - Turn knob to adjust armrest angle.
10. **Seat Belt**



Leather Seat (option)



1. **Slide Release Lever:**
   - Pull, hold and slide forward or rearward.
   - Release to stop slide.
2. **Fore-Aft Position of the Seat Cushion Only**
   - Pull up and hold to adjust, release to stop.
3. **Seat Cushion Tilt:**
   - Pull up and hold to adjust, release to stop.
4. **Ride Firmness:**
   - Turn the knob counter-clockwise for soft ride.
   - Turn the knob clockwise for firm ride.
5. **Fore-Aft Isolator:**
   - Turn the lever to the left to allow front-to-back movement of the seat.
   - Return the lever to the right to lock-out movement.
6. **Backrest:**
   - Lift the lever.
   - Position the backrest.
   - Release the lever.
7. **Seat Belt**
8. **Lumbar Support:**
   - Turn the knob counter-clockwise for more lumbar support.
   - Turn the knob clockwise for less lumbar support.
9. **Height:**
   - Lift lever to raise the seat.
   - Push the lever down to lower the seat.
10. **High/Low/Off Button for Seat Cooling/Heat**
    - Top position is high, Center position is off, Bottom position is low.
11. **Activate** Seat **Heat/Cool Button:**
    - Select fan to activate cooling. Select Seat with lines to activate heat.



Joystick and Envizio Pro II Console



1. **Joystick**
   See "Apache Sprayer Direction and Speed" on page 3-18 for complete operations.
2. **Envizio Pro II Console (option)**
3. **Boom Switch Box**
4. **Left Boom Tilt**
   Press to tilt the left boom up or down.
5. **Right Boom Tilt**
   Press to tilt the right boom up or down
6. **Boom Rack**
   Press to move the boom rack up or down.
7. **Auto Steer Engage Button**
   (If equipped)
8. **Master Spray Button**
9. **Transmission Forward Direction Trigger Button**
10. **Transmission Reverse Direction Trigger Button**
    The reverse button must be held in to move.

Starting and Stopping the Engine

WARNING! Impact Hazard. ALWAYS fasten your seat belt when operating the Apache Sprayer. The safety belt must be worn properly by the driver anytime the Apache Sprayer is in motion. Refer to Safety Belt on page 3-14.

WARNING! Sudden Movement Hazards. ALWAYS start the engine from the operator's seat. ALWAYS set the parking brake (1) before starting the engine. ALWAYS fasten your seat belt before starting the engine.



WARNING! Fire Hazard NEVER start the engine by shorting across the starter terminals.

Starting

1. Press the Battery Disconnect button (1) to allow power to the machine.
2. Press Start/Stop Button (2) to turn auxillary power on. The Start/Stop Button will turn red.
3. While in auxillary power mode, the machine will go through a series of system checks. After the checks have been completed, the Start/Stop Button will turn green. Once the Start/Stop Button turns green, the machine will be ready to start.
4. Press and hold the Start/Stop Button (2) to crank the engine.
5. When the engine starts, release the Start/Stop button.



*******Safety feature: Must depress the brakes to put into gear the first time.***

Notice: NEVER continuously crank the starter more than 30 seconds. Stop cranking and allow the starter to cool for 2 minutes between cranking to avoid damaging the starter.

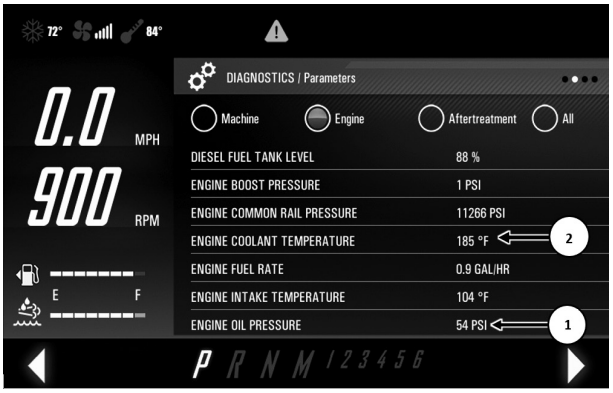
Notice: If the engine stalls under load, immediately stop the Apache Sprayer and shift the transmission into NEUTRAL. Restart the engine immediately to avoid damaging the turbocharger.

- If the engine does not start after four attempts, see the Troubleshooting section in the engine manufacturer's service manual or contact your dealer.
- 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 (1) as soon as the engine starts. To do this, access the App Screen and choose the Diagnostics App. Swipe left to page two.

- If the oil pressure reading does not reach the minimum pressure of 15 psi [103.4 kPa], stop the engine and determine the cause.
- Normal engine oil pressure is 50 psi [344.7 kPa] 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 temperature (2), which is located on the same Diagnostics screen.

- 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

NOTICE: After operating the engine under load, allow the engine to idle for 2 minutes before stopping to avoid damaging the turbocharger.

To stop the Apache Sprayer:



- Lower the engine rpm.
- Bring the Apache Sprayer to a complete stop.
- Shift the transmission to NEUTRAL by squeezing either trigger button on the joystick (1).
- Apply the parking brake (2).
- Press and hold engine Start/Stop button (3) to shutoff the machine.

Apache Sprayer Direction and Speed

WARNING! Sudden Movement Hazards

- ***NEVER leave the operator's seat or cab when the Apache Sprayer is in gear. ALWAYS stop the Apache Sprayer, shift the transmission into NEUTRAL and then apply the parking brake before exiting the cab.***
- ***ALWAYS stop the Apache Sprayer and depress the brakes before changing direction. The Apache Sprayer must be at a complete stop before shifting the transmission into or from FORWARD, REVERSE OR NEUTRAL.***

NOTICE: NEVER shift the transmission into NEUTRAL when the Apache Sprayer is moving. The transmission is only lubricated when in gear. Coasting will damage the transmission.

Neutral

At start-up, the Apache Sprayer transmission is reset to NEUTRAL and will be indicated at the bottom of the touch screen (1).



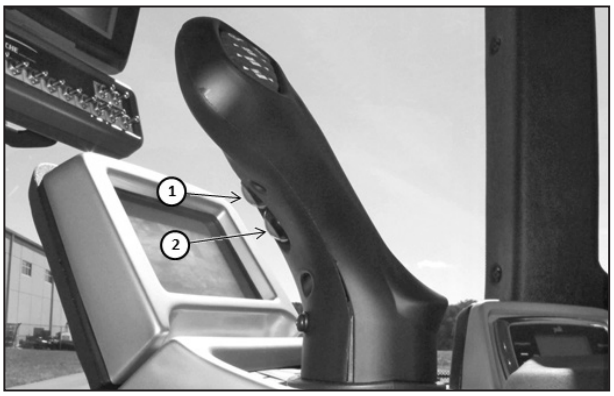
*******Safety feature: Must depress the brakes to put into gear the first time.***

Squeeze and hold either one of the trigger buttons to put into gear.

- Use the top button (1) for FORWARD and the bottom button (2) 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 joystick will not shift the transmission into NEUTRAL. The trigger buttons must be used.

- To obtain NEUTRAL from a forward gear, squeeze either trigger button on the joystick.
- To obtain NEUTRAL from a reverse gear, release the bottom trigger button on the joystick.

Forward

To move the Apache Sprayer forward:
Apply the foot 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 Apache Sprayer brakes.
- Squeeze and hold the top trigger button (1) on the joystick until the transmission shifts into first gear FORWARD. The machine will begin rolling forward at this time.

Once the Apache Sprayer is in first gear FORWARD, release the button.

- Push the joystick forward to increase the engine rpm and ground speed.
- Pull the joystick back to decrease the engine rpm.

NOTE: The joystick will not shift the transmission into NEUTRAL. To obtain NEUTRAL from a FORWARD gear, squeeze either trigger button (1 or 2) on the joystick.

NOTE: If the Apache Sprayer is moving forward and either trigger button on the joystick is squeezed, the machine will shift to NEUTRAL. Once the Apache Sprayer is below 1200 rpm and 4 mph [6.4 km/h], squeezing and holding the top trigger button on the joystick shifts the Apache Sprayer into the gear the transmission was in before NEUTRAL.

Shifting Forward Gears

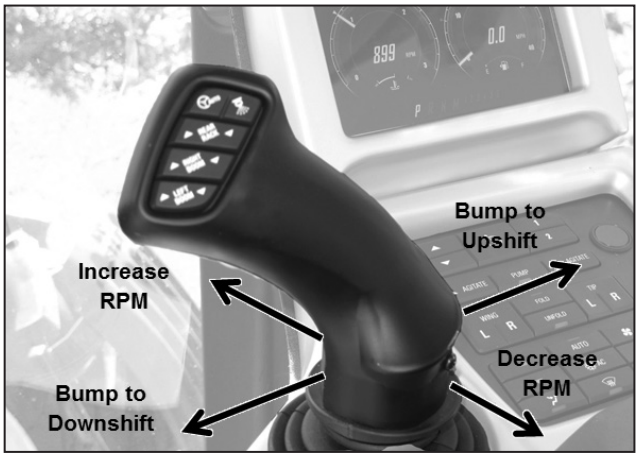
The Apache Sprayer is equipped with a torque converter. This allows the machine to take off in any gear. Once the machine is moving, you may up shift or down shift without returning the transmission to the neutral position. The machine is equipped with six forward gears. Be aware of speed ranges for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

The torque converter is a lock-up style converter, so you may notice that the transmission feels as if it is shifting gears on its own, even in manual mode. This feeling is actually the converter locking or unlocking.

The lock up feature will not engage until the engine controller and transmission controller get to operating temperature and power usage range, therefor you may notice slower top speeds (especially in colder climates) until the oil reaches operating temperature.

Gear Speed Ranges	
Gear	**Speed**
1st	0 to 5 mph [8.04 km/h]
2nd	0 to 7 mph [11.27 km/h]
3rd	0 to 11 mph [17.7 km/h]
4th	0 to 17 mph [27.36 km/h]
5th	0 to 27 mph [43.45 km/h]
6th	0 to 35 mph [56.3 km/h]

Upshifting and downshifting are achieved with a sideways rock and release movement or bump of the joystick. The joystick 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 Apache Sprayer is in either the FORWARD or REVERSE direction, bump the joystick to the right one time to shift up to the next higher gear. Repeat this motion to upshift the transmission one gear at a time.

Downshifting:

- Pull back on the joystick slightly to decrease engine rpm, lightly apply the machine brakes, then bump the joystick to the left one time to downshift to the next lower gear. Repeat this motion to downshift the transmission one gear at a time.

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

NOTICE: NEVER shift the transmission into NEUTRAL while the Apache Sprayer is in motion. The transmission is only lubricated while in gear. Coasting will cause damage to the transmission.

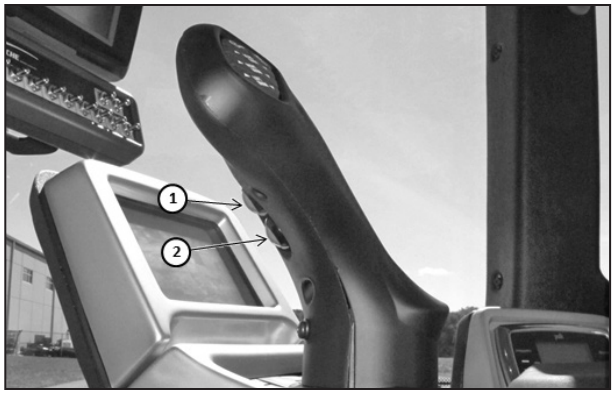
Reverse

To move the Apache Sprayer in REVERSE:

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

- Apply the foot brakes.
- Release the parking brake.

To shift into REVERSE from NEUTRAL, squeeze and hold the bottom trigger button (2) on the joystick.



- Push the joystick forward to increase the engine rpm and ground speed.
- Pull the joystick back to decrease the engine rpm.

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

NOTE: The joystick will not shift the transmission into NEUTRAL. To obtain NEUTRAL from a REVERSE gear, release the bottom trigger button (2) on the joystick.

NOTE: If the machine is moving in REVERSE and the reverse button (2) is released, the transmission will shift to NEUTRAL. Once the machine is below 1200 rpm and 4 mph [6.4 km/h], squeezing and holding the bottom trigger button (2) shifts the transmission into the gear the transmission was in before NEUTRAL.

Shift Assist Mode

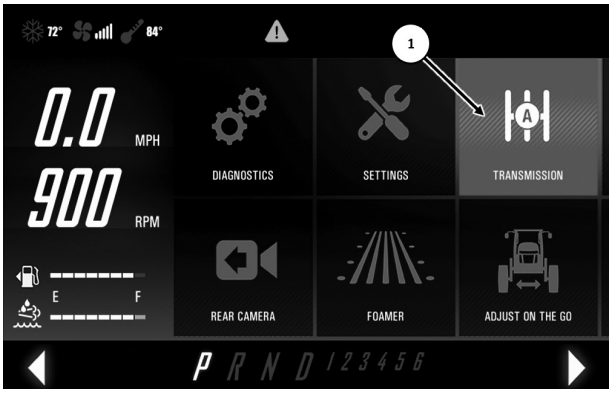
Notice: Transmission must be in manual mode during calibration.
Notice: The park brake must be engaged to make and save changes in the shift assist mode.

The ZF transmission can be operated as a manual or a shift assist transmission. All joystick functions remain the same in either setting (forward, neutral, reverse, and throttle). Setting the transmission in shift assist mode allows you to optimize the best torque and rpm performance in each gear. This option could be considered as "Semi"-Automatic mode; allowing the operator complete flexibility in shifting.

Note: Factory settings default the transmission to 2nd gear for initial forward gear selection in both manual and shift assist modes.

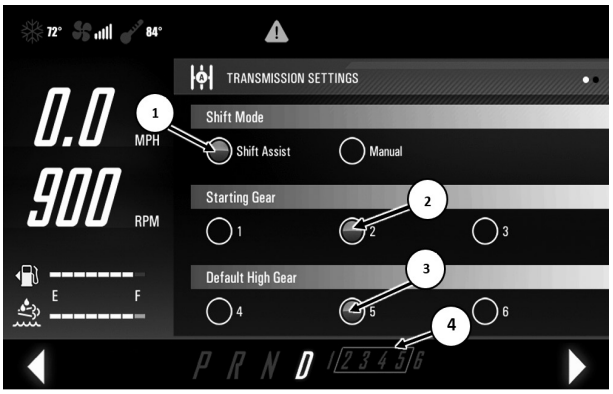
In shift assist mode you must set a starting gear and a default high gear that you want the transmission to operate in. Those will be the lowest and highest gears that the transmission will shift to, until you manually shift up or down.

To be able to create these settings, swipe the home screen to the left to access the first app page. Select the Transmission App (1). (Note: The Apache Sprayer must be in park to access the transmission app).



Next, select the Shift Assist button (1). Then choose the Starting Gear (2). Followed by the Default High Gear (3). Once these gears have been selected, there will be a white box around those gears at the bottom of the screen in the gear indicator (4).

You may change the Default High Gear manually while operating in Shift Assist mode, by shifting the joystick up or down. This will expand or contract the box around the gear indicator.



Example: If you choose the Default High Gear to be 5th gear and the Starting Gear to be 2nd gear, the transmission will only reach 5th gear. When you slow down, the transmission will automatically downshift until it reaches 2nd gear. The gears utilized in this example would include 2nd, 3rd, 4th and 5th gears.

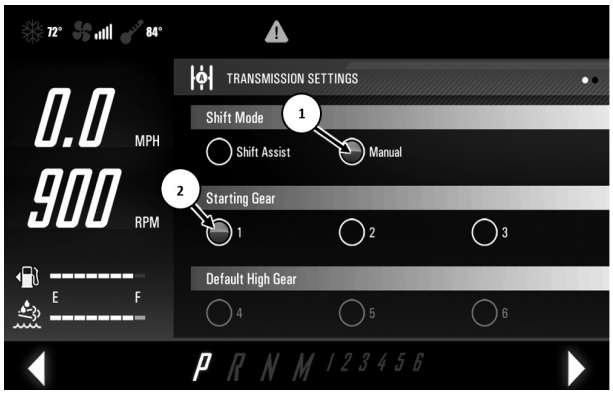
Field conditions can have an effect on the machine if it is in manual mode or shift assist mode. Here are examples of operating in Shift Assist mode navigating through various field conditions while spraying.

Example 1: You have received several days of rain and have allowed the ground to dry slightly but need to spray. Some areas of the field are dry but there are a few wet spots. You select 4th gear as your high gear to spray in. You reach an area of the field that you know is wet and know the machine will navigate through best in 2nd gear, so before entering the wet area shift down to 2nd gear. Once you have passed through the wet area shift back up to 4th gear. Downshifting before entering the wet area will allow you to avoid any loss of traction that could occur due to momentary loss in torque when the transmission automatically shifts to 3rd gear followed by a surge in torque when the converter locks up.

Example 2: You have just finished spraying and will be driving the machine on the road. You can set 6th gear as your high gear or when you pull onto the road shift through the gears like you were in manual mode until you reach 6th gear. Remember that when you pull into the next field to spray that your high gear is still set at 6th gear and you need to downshift to the gear you would like to spray in.

Manual Starting Gear

To set the Starting Gear in Manual Shift mode, access the Transmission App screen as described page 3-19. Select the Manual button (1). Then select the Starting gear (2).



Changing ZF Transmission Between Shift Assist and Manual Modes

The ZF transmission can be switched between Manual and Shift Assist modes at any time while operating the machine. To change between modes, touch the “D” (1), at the bottom of the screen to change to “M”. (Note: “M” refers to Manual Mode, “D” refers to Shift Assist Mode).

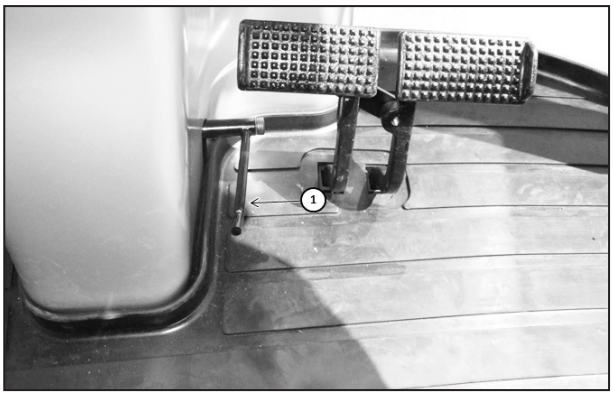


To return to Shift Assist Mode, press “M” (1) and it will change to a “D”.

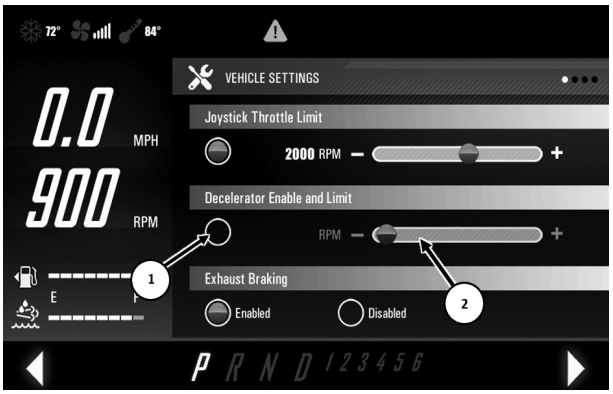


Foot Throttle/Decelerator

The foot throttle/decelerator can be used to overide the joystick throttle. Depending on which setting is chose for the foot pedal, it will overide the joystick. Once the foot throttle/decelerator is released, the engine RPM will return to the joystick's last RPM position.



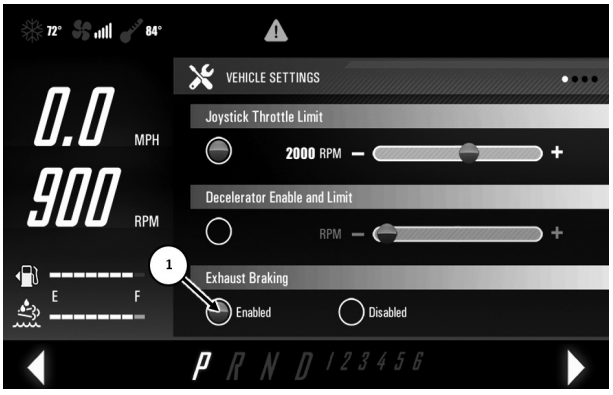
To enable the Decelerator, navigate to the first page of the Vehicle Settings screen and find the Decelerator Enable and Limit section. Click on the radial button (1) to enable this feature. Once enabled the RPM value can be adjusted with the slider (2). When the pedal is used, it will decelerate to the RPM value selected.



Exhaust Braking

Exhaust braking is a method which causes negative torque applied from the engine, which causes the drivetrain to slow. The engine will initiate exhaust braking when the vehicle indicates that engine brake is enabled (1), throttle is at idle, and an engine overspeed is detected. All conditions must be met before it will be activated.

To enable exhaust braking, navigate to the first page of the Vehicle Settings screen and locate the Exhaust Braking section. Click the Enabled radial button (1) to activate.



Cruise Control

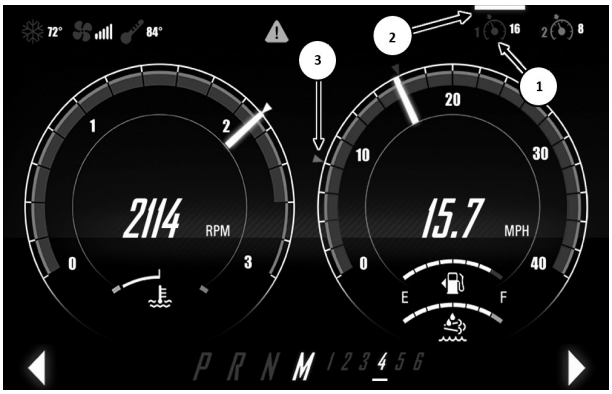
The Apache offers the ability to set two cruise control points. To use the cruise control function, the machine must be in gear to operate. Press the master cruise button (1) to enable. Next, select cruise: one or two (2) on the control pad. To adjust the set speed, click the up and down arrow buttons (3). It will adjust in one mile per hour increments. Once the speed points are set, they will remain at those positions until they have been readjusted. The cruise control will only operate between 6 and 20 mph.



Cruise control will disengage when:

- RPM's are decreased or increased manually
- Brake has been pressed
- Master cruise button has been disabled
- The selected cruise button has been pressed

To resume the cruise control: select the desired set point one or two (2) on the control pad. Using the foot throttle can be beneficial in areas that you might want more rpm's. This will not disengage the cruise control, but will return to the chosen set speed after use.
Note: Once cruise control has been disengaged, speed and throttle will become manual. The rpm/throttle position will remain at the same position when cruise control was disengaged.



When the speed point icons (1) are visible, this indicates that the cruise master has been enabled. It will also indicate the set speed points for cruise one and two. There will be a white bar (2) located over the speed point icons when the cruise control is engaged. There are also two additional indicators (3) located around the speedometer.

Towing

ALWAYS use towing safety equipment and proper emergency warning lighting when towing the Apache Sprayer.
If the Apache Sprayer's transmission should become disabled, it may be towed for approximately 1 mile [1.6 km] at speeds less than 3 mph [4.8 km/h]. While towing the Apache Sprayer, 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, chock the wheels to insure the machine will not roll and remove the drive shaft between the differential and transmission. The Apache Sprayer may be towed up to 1 mile [1.6 km] at speeds less than 3 mph [4.8 km/h].

NOTICE: The brakes depend on supply oil from the hydraulic system. If the engine is not running, you will have no brakes.

NOTICE: The brakes are located in the rear differential housing. If the driveshafts from the rear differential to the planetaries/ drop boxes are removed, you will have no brakes.

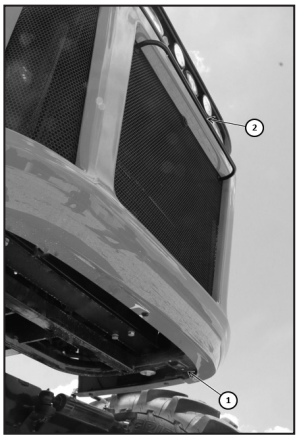
NOTICE: DO NOT tow the Apache Sprayer if the:
- *Driveshaft is connected and it has no hydraulic supply to release parking brake.*
- *Rear differential is damaged (contact dealer for repair).*

NOTICE: DO NOT use the Apache Sprayer as a tow vehicle.

NOTICE: DO NOT use any part of the Apache Sprayer as a tow bar which is not designed for use as a tow bar or tow hook-up.

Hood Tilt Latch

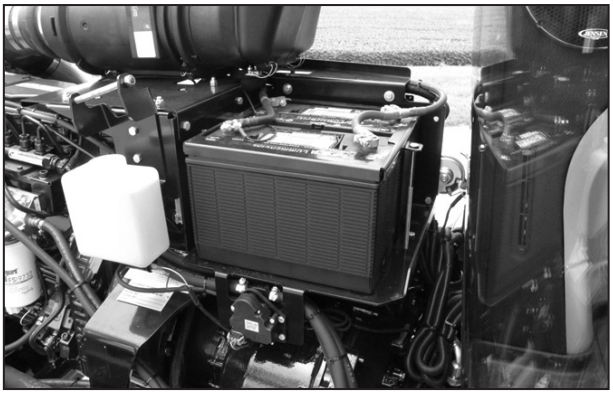
To raise the hood, pull the latch (1) down while pulling the handle (2) on the front of the hood down.





Battery

The batteries are located under the hood, between the engine and the cab.



The Apache Sprayer features a battery disconnect button, located in the cab on the post above the light buttons.

Only turn the battery disconnect button off when working on the machine. It will automatically shutoff when the battery voltage reaches 12.4 volts.

NOTE: The negative battery cable must still be disconnected when servicing the machine.



The Cabin Power Distribution Module

Located beneath the armrest, the module includes a circuit board, relays, and fuses that power the cabin's operations.

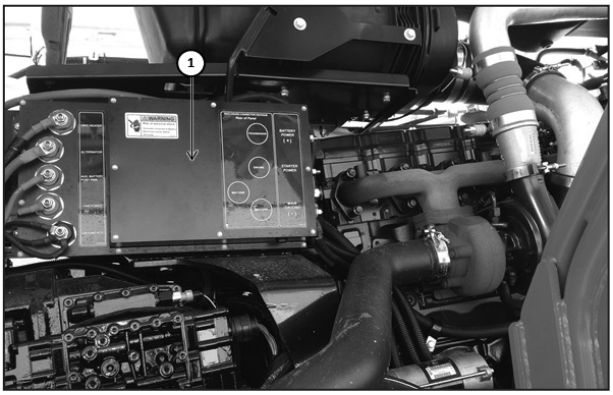
See "Cabin Power Distribution Module Chart" on page 8-3 for more information.



The Firewall Distribution Module

Located on the right-side, above the transmission, the module includes a circuit board, relays, and fuses that supply power the cab and control chassis operations.

See "Firewall Power Distribution Module Chart" on page 8-1, 8-2, and 8-3, for more information.

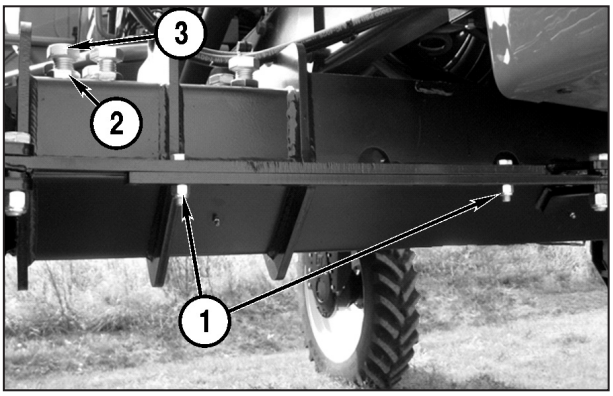


Axle Adjustment (optional)

Manual

The front and rear axles on the Apache Sprayer are adjustable from 120 to 160 in. [304.8 to 406.4 cm] (measured from 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.

NOTICE: DO NOT extend the axle beyond 160 in. [406.4 cm] (measured from center of left tire to center of the right tire).

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

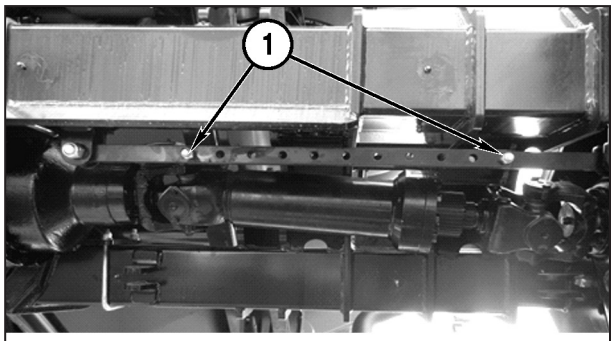
Tighten the six bolts (3) to 80 lb-ft [108 N•m] to secure the axle in place.

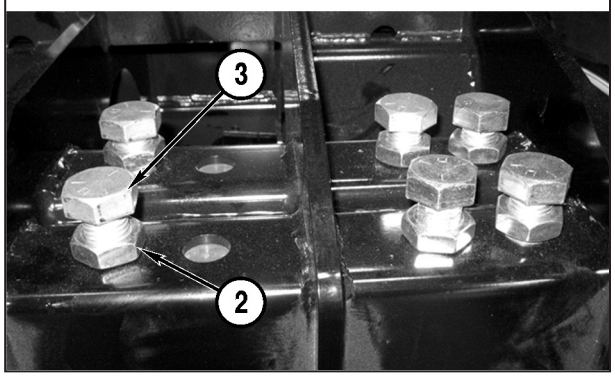
Tighten the jam nuts (2).

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.

NOTICE: DO NOT extend the axle beyond 160 in. [406.4 cm] (measured from center of the left tire to center of the 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)

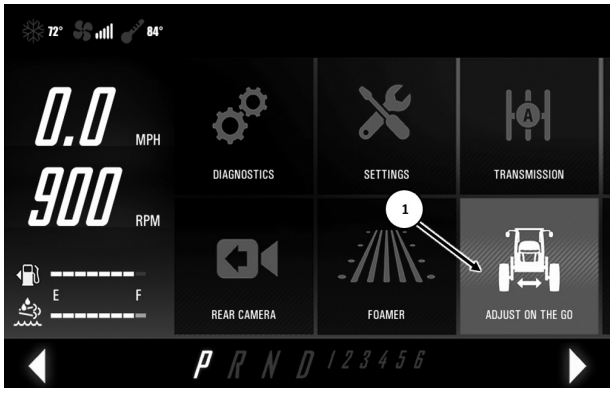
(Adjust-On-The-Go)

The front and rear axles on the Apache Sprayer are adjustable from 120 to 160 in. [304.8 to 406.4cm] (measured from center of left tire to center of right tire).

NOTE: The Adjust-On-The-Go system will not allow the axle to be adjusted beyond 160 in. [406.6cm].

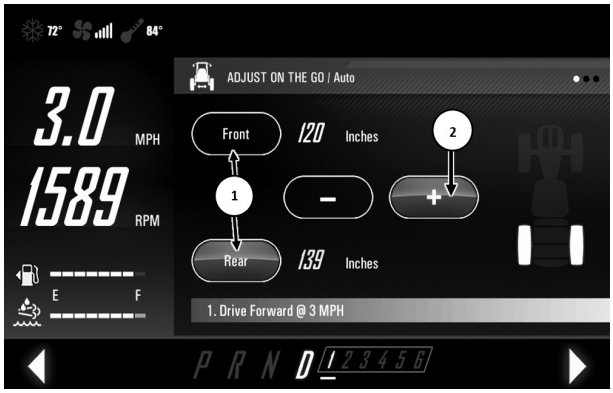
To adjust the axles:

While the engine is idling, select the Adjust-On-The-Go icon (1) from the main screen.

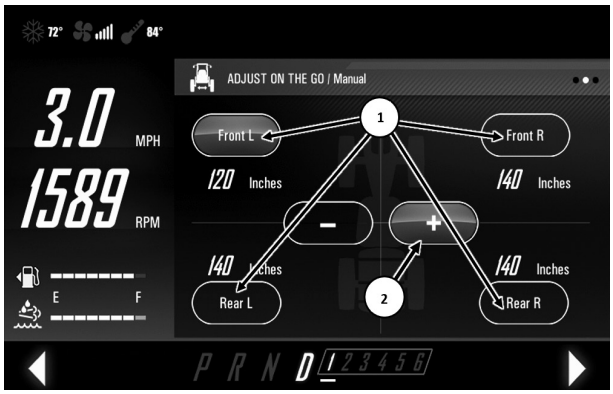


For automatic mode, select front, rear, or both axles at the same time (1).

Begin driving forward at least 3 mph and press the (+) or (-) icon (2) to adjust the axles in or out.



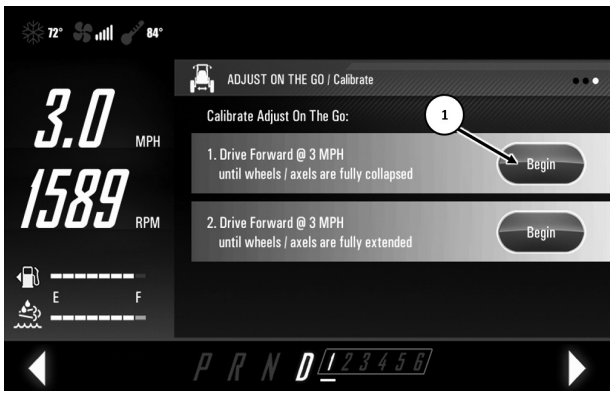
Manual mode allows for individual wheel adjustment. Select one wheel, or any combination to adjust (1). Begin driving forward at least 3 mph and press the (+) or (-) icon (2) to adjust the axles in or out.



Adjust-On-The-Go Calibration

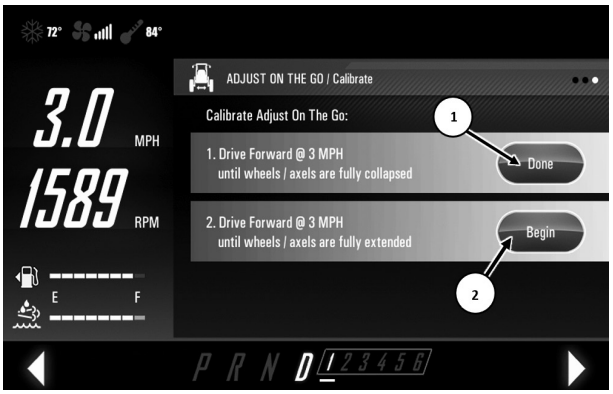
To calibrate adjust Adjust-On-The-Go, access the third screen by swiping the screen to the left. Follow the on screen instructions.

Click begin (1) to fully collapse the axles while moving at least 3 mph (2).

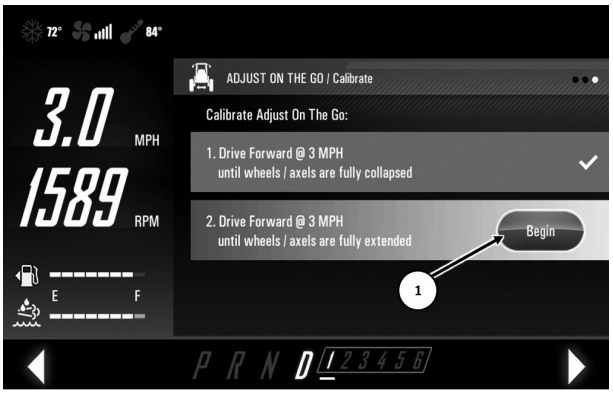


Adjust-On-The-Go Calibration (ctnd.)

Once finished click done (1).



Repeat the process to fully extend the axles. Click begin (1) while still moving at least 3 mph. Once finished, click done for the process to be completed (2).

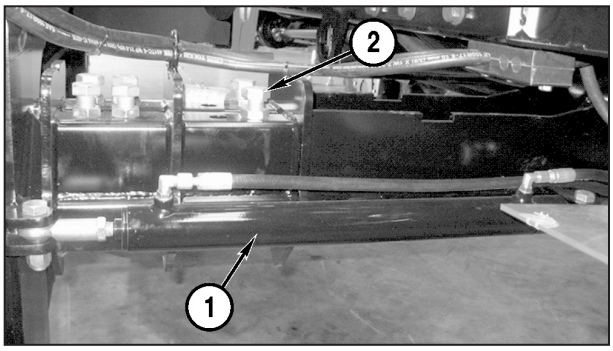


Front Axle

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 right front Adjust On The Go axle is shown.

NOTICE: The bolts (2) should be torqued to 22 lb-ft [30 N-m] at all times. Check and adjust the torque weekly. See "Adjust-On-The-Go Axles" on page 5-22.

NOTE: Grease the axles daily when using the Adjust-On-The-Go feature. See "Grease Axle Components" on page 5-19.

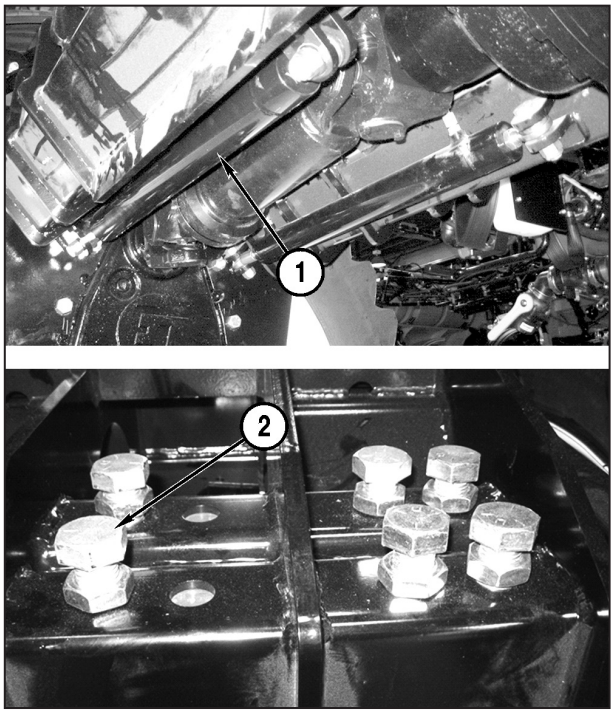


Rear Axle

When activated, the Adjust-On-The-Go cylinder (1) adjusts 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.

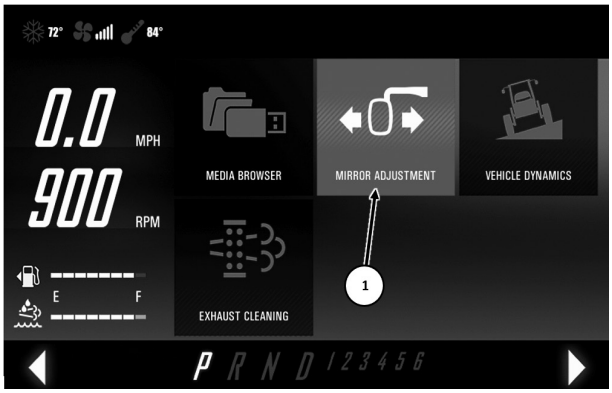
NOTICE: The bolts (2) should be torqued to 22 lb-ft [30 N•m] at all times. Check and adjust the torque weekly. See "Adjust On The Go Axles" on page 5-22.

NOTE: Grease the axles daily when using the Adjust On The Go feature. See "Grease Axle Components" on page 5-19.



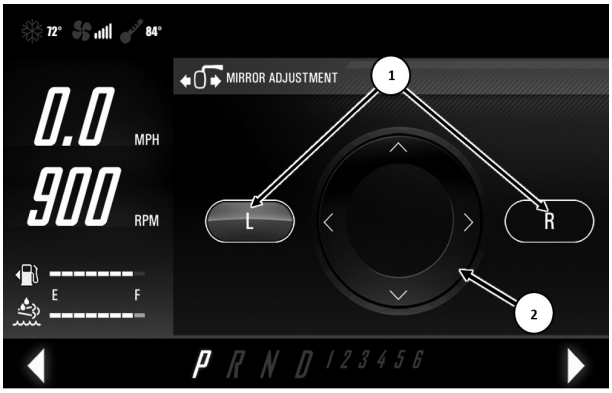
Adjustable Powered Mirrors (optional)

The Apache Sprayer has optional power adjust mirrors. If equipped, select the Mirror Adjustment icon on the second page of the Apps Screen.



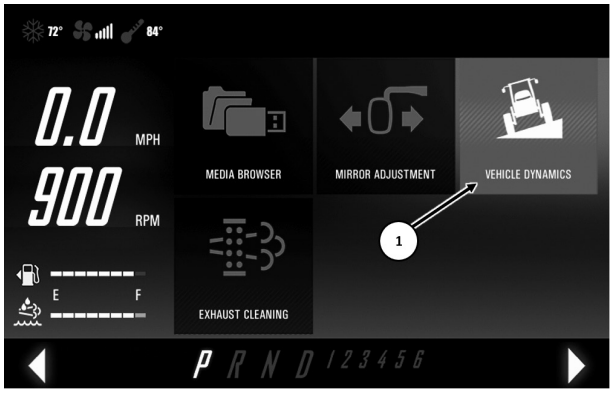
Next, touch either the Left or Right icon (1) to select which mirror to adjust.

Use the arrow pad (2) to adjust the selected mirror.

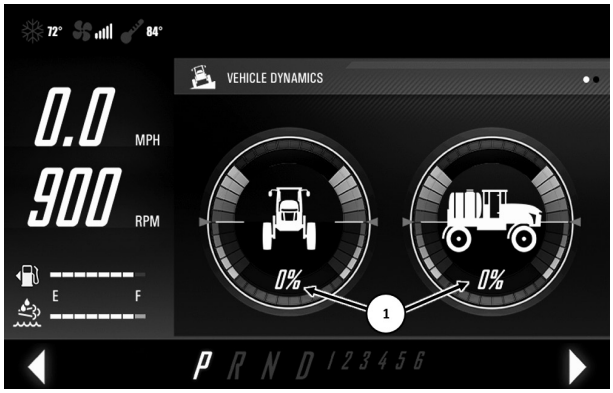


Vehicle Dynamics

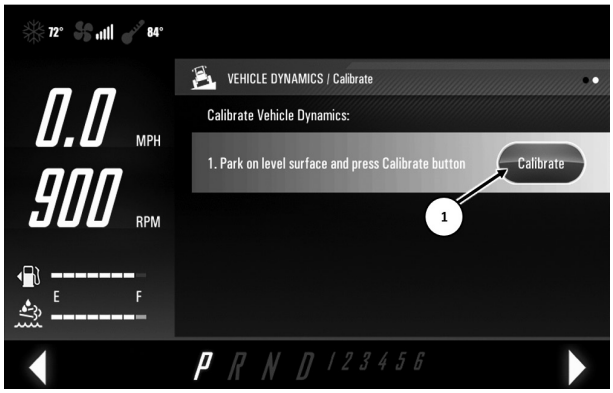
To access the vehicle dynamics data, swipe to the second APP page. Touch the Vehicle Dynamics icon (1).



The Vehicle Dynamics screen will show the Degrees or Percentage of grade that the machine is on. To change between Degrees and Percentage, touch the screen on either value (1) to make the change.



To calibrate the Vehicle Dynamics, swipe the screen to the left to advance to the second page. Park the Apache Sprayer on a level surface, then touch the Calibrate icon (1).

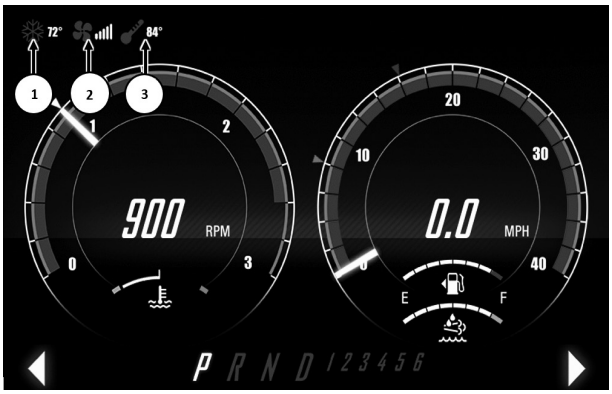


Climate Controls

1. **Temperature Buttons.**
   - Sets the desired temperature.
2. **Vent Selection Buttons.**
   - Selects which vents are on.
3. **Auto Climate Control.**
   - Automatically controls the fan.
4. **A/C Activation Button.**
   - Turns A/C on.
5. **Manual Fan Controls.**
   - Controls fan speed.



Climate Controls (ctnd.)



Located at the top of the touch screen are the climate control indicators. When raising or lowering the desired temperature (1), it will be reflected in the top left corner. The fan speed (2) will be reflected in the center fan icon. The outside temperature (3) will be reflected on the right of the fan icon.

Note: Maximum available heating or cooling can be achieved regardless of ambient temperature, by cycling temperature buttons to "Low" or "Hi", when controlling the climate manually.

Precision Equipment

The following are factory installed precision sprayer control options.

- Raven Envizio Pro II (field computer)
- Raven Viper 4 (field computer)
- Raven SmarTrax (integrated autosteer)
- Raven AccuBoom (sectional spray control)
- Raven Hawkeye (nozzle control system)
- Raven AutoBoom (boom height control)
- Trimble FmX (field computer)
- Trimble Autopilot (integrated autosteer)
- Trimble Field IQ (sectional spray control)

Refer to the respective operators manual included with the machine before use.

NOTE: Raven-based precision equipment is designed in a joint effort with Equipment Technologies and Raven and contains items that are specific to Apache Sprayers. Please note this with your service provider when seeking service.

If your Apache Sprayer is equipped with anything other than factory installed precision equipment, please contact your dealer for assistance.

Antenna Mounting Plate

On machines equipped with GPS, a steel plate is mounted at the roof-line at the front, center of the cab for magnetic base GPS antennas.

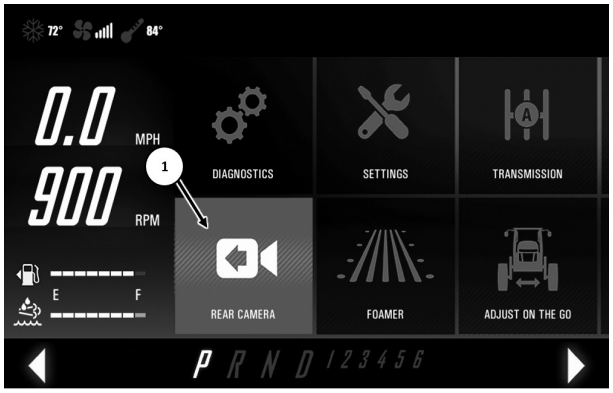


Rear Camera

If the rear camera is enabled, the full screen image will display when the sprayer is in reverse.



To manually access the camera, press the Rear Camera App icon (1).

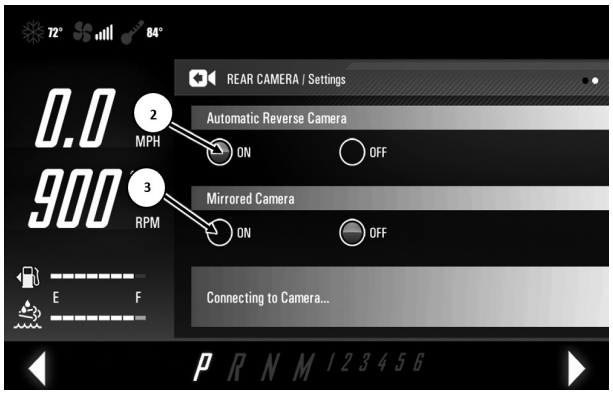


The rear camera will display as well as the left information panel, regardless which direction the sprayer is moving. The camera will remain on the screen until a different function is chosen.

To access the Settings screen, slide the screen to the left.



The Rear Camera Settings screen allows the operator to turn On and Off the Automatic Reverse Camera (2). Also, the image can be reversed by turning On the Mirrored Camera button (3).



Jumpstarting The Engine

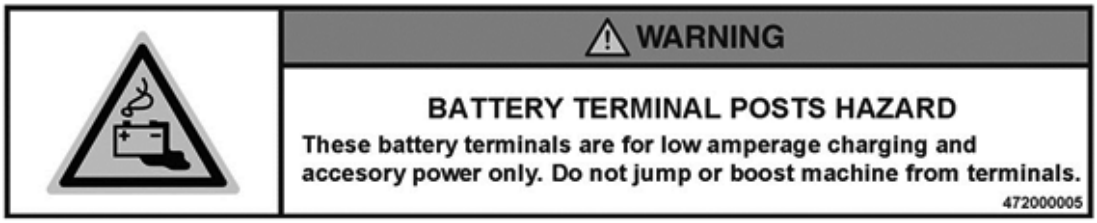
Before performing any operation procedures, read the following safety messages and read the Safety Section.

WARNING! Fire Hazard. NEVER start the engine by SHORTING ACROSS the starter terminals.

WARNING! Safety Hazard. NEVER exceed 125 amps if boosting / charging a machine through the Fill Station battery terminal posts.

WARNING! Fire Hazard. NEVER exceed 125 amps if boosting / charging a machine through the Fill Station battery terminal posts.

NOTE: Boosting / charging the battery through the Fill Station battery terminals is not the recommended method of Jumpstarting the engine. Doing so poses safety risks to the operator and can potentially damage the machine if the electrical current exceeds 125 amps. If boosting / charging from this location take all necessary safety precautions and make certain the amperes are within the limit.



WARNING! Impact Hazard. ALWAYS fasten your seat belt when operating the Apache Sprayer. The safety belt must be worn properly by the driver anytime the Apache Sprayer is in motion.

Refer to Safety Belt on page 3-14.

WARNING! Sudden Movement Hazards

- ALWAYS start the engine from the operator's seat.
- ALWAYS set the parking brake before starting the engine.
- ALWAYS fasten your seat belt before starting the engine.

ET recommends Jumpstarting the engine through the starter terminals, using a Booster Battery.

- The Starter is located on the engine's right-hand side and can be accessed within the front, right wheel well.
- Connect one jumper cable to the positive (+) terminal on the booster battery. Connect the other end to the starter's positive terminal (+).

- Connect the second jumper cable to the negative (-) terminal on the booster battery. Connect the other end to the starter's negative terminal (-).
- Connect the battery via the battery disconnect switch.
- Set the parking brake.
- Engage the ignition.



NOTICE: NEVER continuously crank the starter more than 30 seconds. Stop cranking and allow the starter to cool for 2 minutes between cranking to avoid damaging the starter.

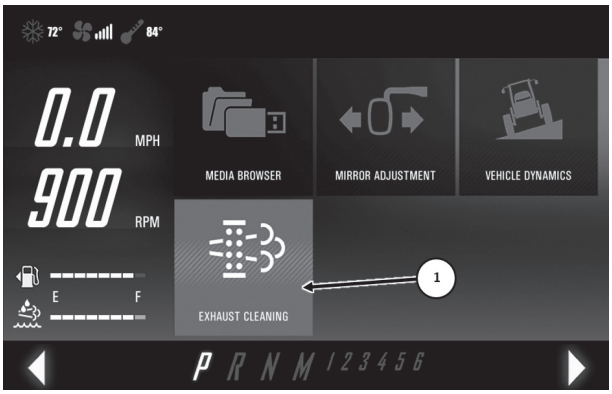
- If the starter motor still operates slowly, check the jumper connections to make sure they have good metal-to-metal contact.
- Once the engine is running, disconnect the negative cable from the starter, then from the booster battery. Disconnect the positive cable from the starter, then from the booster battery.
- 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.
- If the engine fails to start after several attempts, check connections and retry or contact your dealer.

Exhaust Cleaning

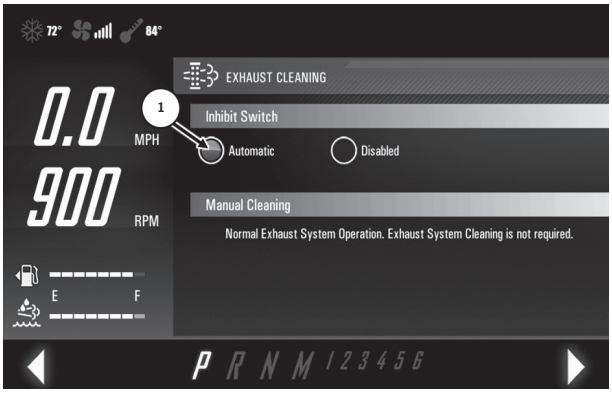
Warning! During exhaust system cleaning operations, the engine may run at elevated idle and hot temperatures for an extended period of time. Exhaust gases and exhaust system components reach temperatures hot enough to burn people, or ignite or melt common materials. Keep machine away from people, animals, or structures which may be susceptible to harm or damage from hot exhaust gases or components. Avoid potential fire or explosion hazards from flammable materials and vapors near the exhaust. Keep exhaust outlet away from people and anything that can melt, burn, or explode.
Closely monitor machine and surrounding area for smoldering debris during and after exhaust filter cleaning.

Automatic Cleaning

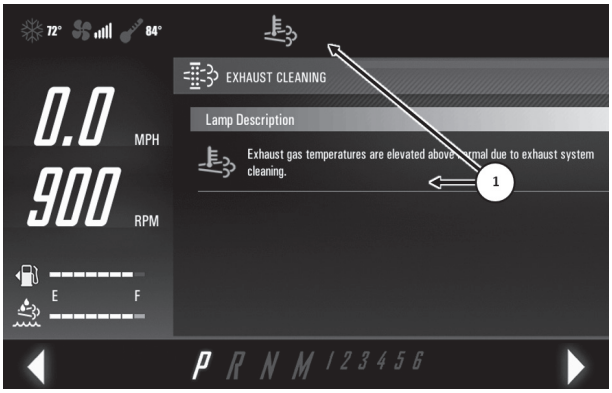
To access the Exhaust Cleaning app, slide the main screen to the left until the Exhaust Cleaning app is visible. Touch the app icon (1) to continue to the next screen.



The button (1) will be filled in when in Automatic Mode. This will allow the machine to perform the exhaust cleaning when needed.
This is the recommended procedure for exhaust cleaning.

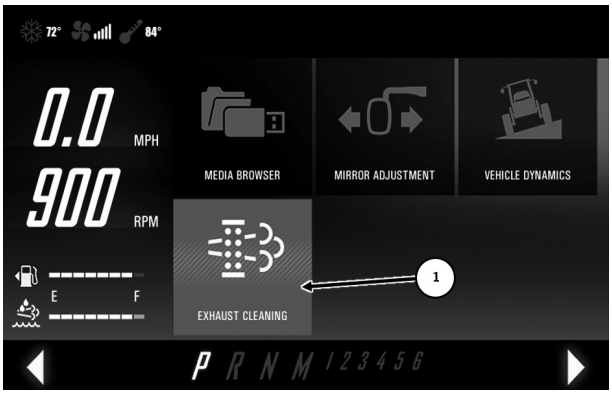


When the exhaust cleaning is in progress, the cleaning lamp (1) will be flashing. Also, the high exhaust temperature lamp (2) will be on.
Both lamps will be indicated at the top of the screen as well as under the Lamp Description section of the Exhaust Cleaning app.

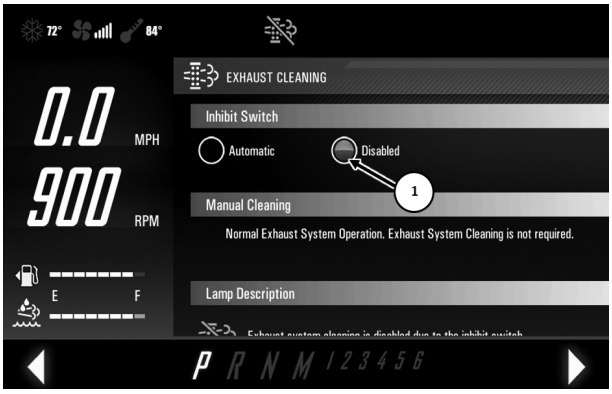


Disabled Mode

To access Disabled Mode, slide the main screen to the left until the Exhaust Cleaning app (1) is visible. Touch the Exhaust Cleaning icon to continue to the next screen.

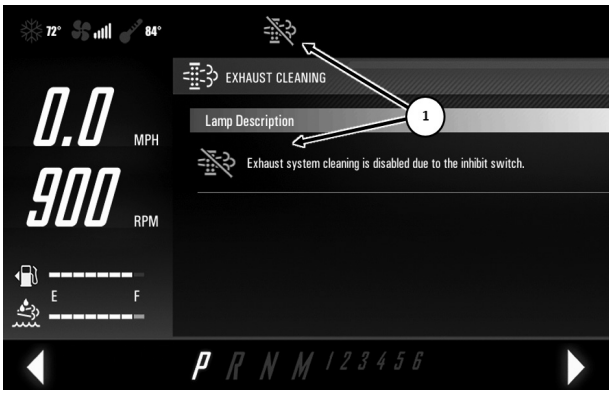


To change from Automatic mode to Disabled mode, touch the Disabled radial button (1). In this mode, the exhaust cleaning will not take place until it has been switched back to Automatic or activated manually (See Manual Mode)



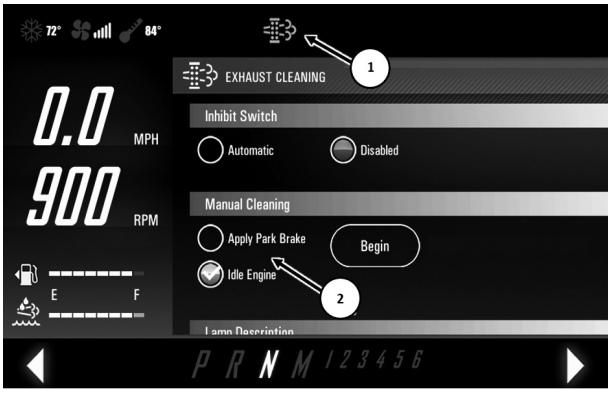
The Cleaning Inhibit Switch lamp (1) will be indicated at the top of the screen as well as under the Lamp Description section of the Exhaust Cleaning app.

It is recommended to switch to Disabled Mode if the machine will be running in confined locations such as a shop for maintenance.

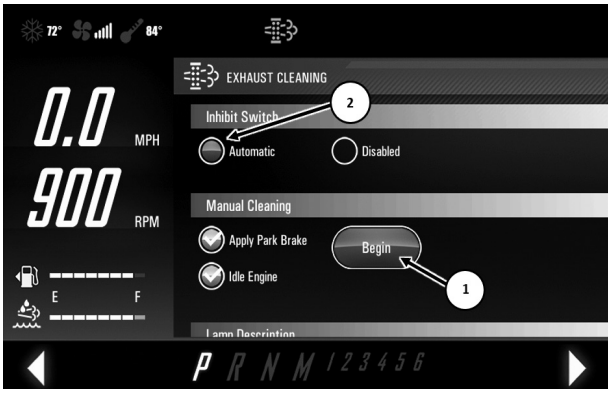


Manual Cleaning

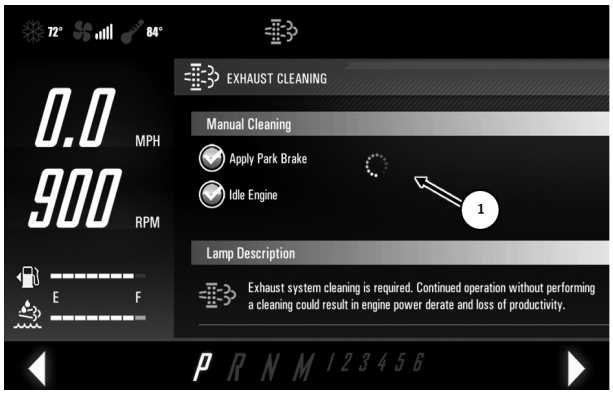
When the machine Exhaust Cleaning is disabled, the machine will determine when it is time to perform a cleaning. It will be indicated at the top of the screeen with the Cleaning Required lamp (1). The manual cleaning option will then be available. Once the two criteria are met, Apply Park Brake and Idle Engine (2), the Begin button will be active to start the process.



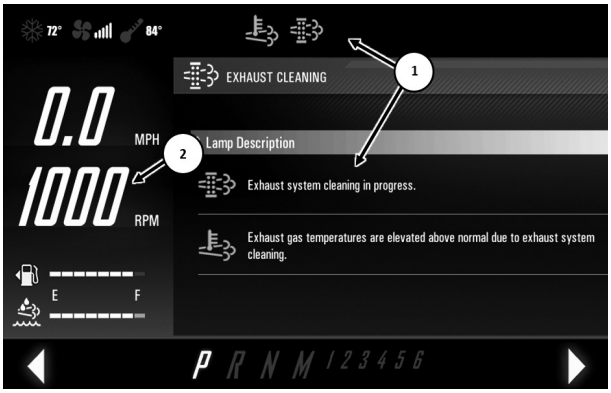
Press the Begin button (1) to start the Exhaust Cleaning procedure. After the Begin button (1) has been pressed, the Inhibit Switch will be changed to Automatic (2). This will revert back to Disabled once the cleaning is complete.



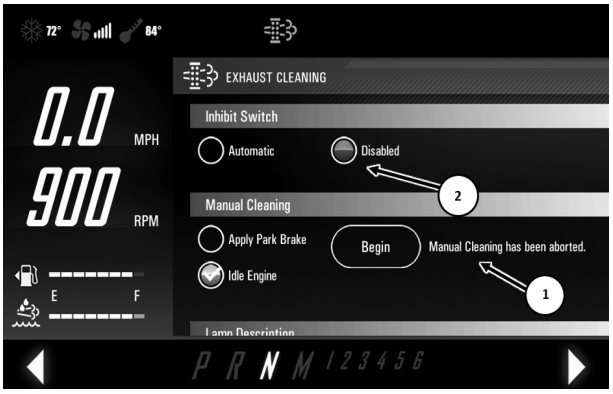
After the Begin button has been pressed, there will be a circle icon (1) that indicates that the process has begun. It will take a few seconds as the systems begin to communicate before the mechanical items begin to run through the steps of cleaning.



As the process moves to the next steps, the lamps will appear at the top of the screen as well as in the Exhaust Cleaning app screen. The Cleaning lamp (1) will begin to flash along with the solid High Exhaust Temperature lamp (1). The RPM's will also increase to 1000 (2) to assist in elevating the exhaust temperature.

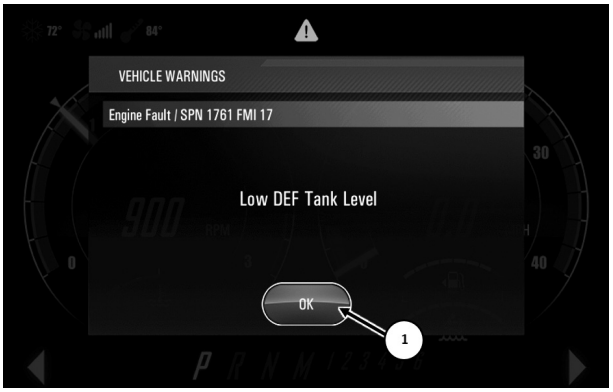


If the Park Brake is released or the Engine Idle is manually changed, the Exhaust Cleaning process will be aborted (1). Once the process has been aborted, the Inhibit Switch will revert back to Disabled (2). The process can be started again, once the criteria has been met.

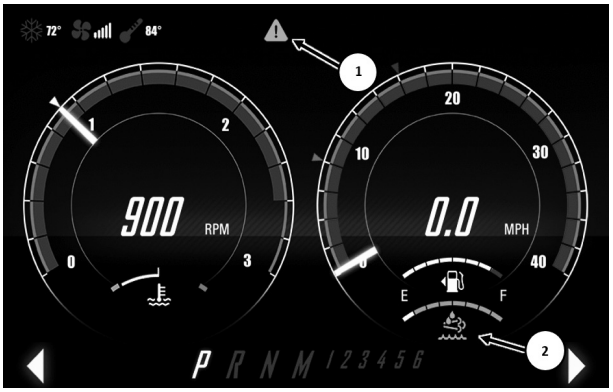


Low DEF Fluid

10% DEF fluid level-
A vehicle warning will pop up on the screen with the engine fault code and a brief explanation of the fault. Click on the OK button (1) to return to the mainscreen.



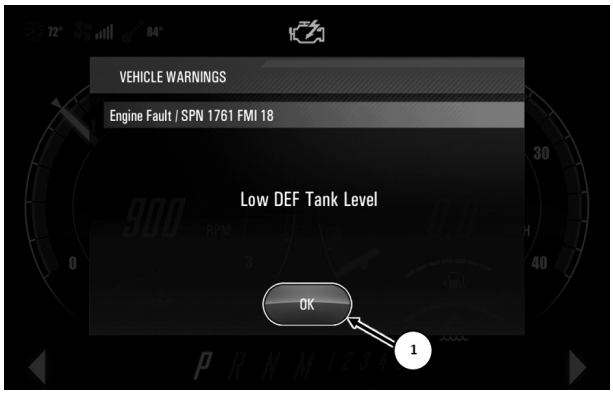
The Yellow warning lamp (1) and the Amber DEF lamp (2) will be on. Both lamps will remain in this state until DEF fluid is added.
To view a full description of the warning, press the Yellow warning lamp (1).



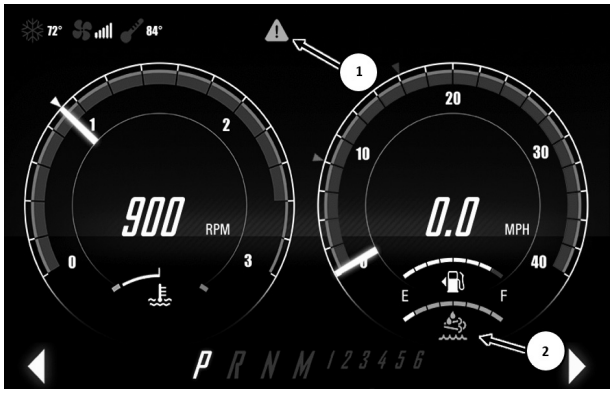
The Diagnostics/ Faults page will give a full description of the warning.



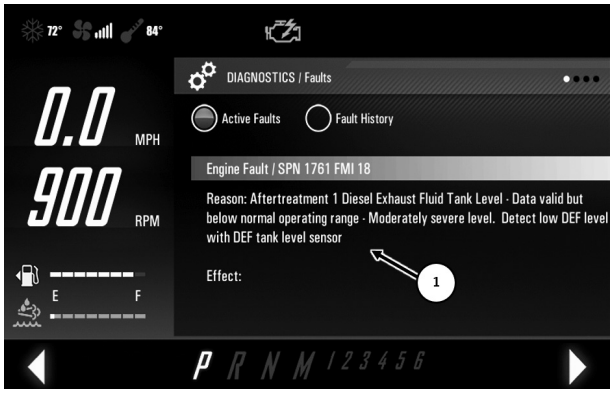
5% DEF fluid level-
A vehicle warning will pop up on the screen with the engine fault code and a brief explanation of the fault. Click on the OK button (1) to return to the mainscreen.



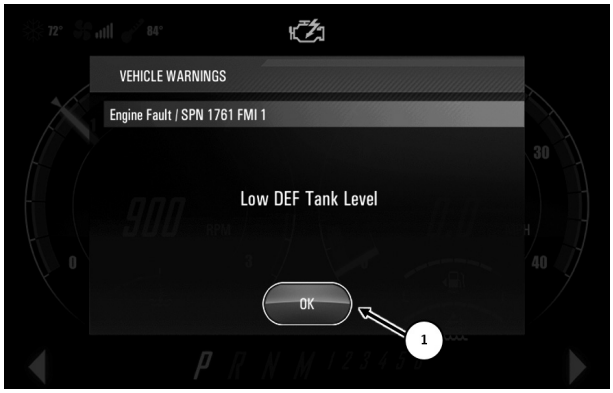
The Yellow warning lamp (1) and the flashing Amber DEF lamp (2) will be on. Both lamps will remain in this state until DEF fluid is added.
To view a full description of the warning, press the Yellow warning lamp (1).



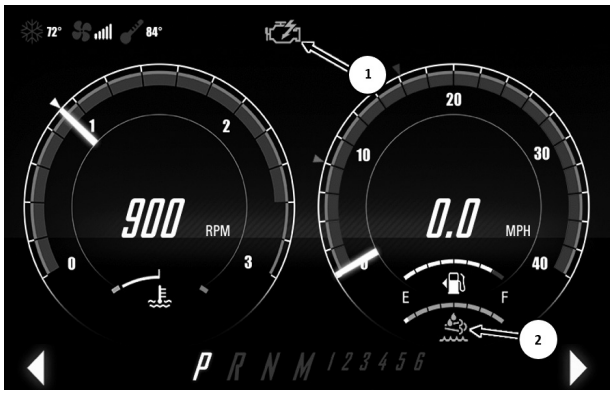
The Diagnostics/ Faults page will give a full description of the warning.



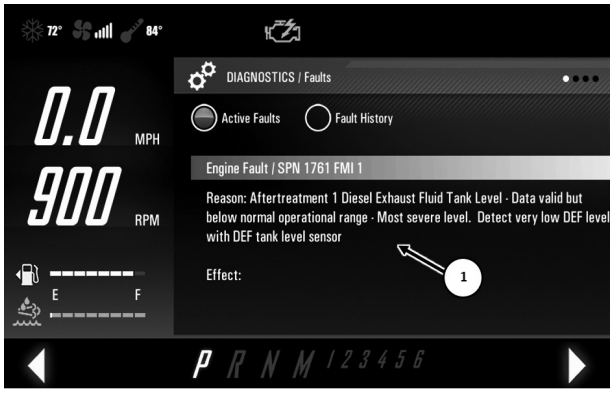
2.5% DEF fluid level-
A vehicle warning will pop up on the screen with the engine fault code and a brief explanation of the fault. Click on the OK button (1) to return to the mainscreen.



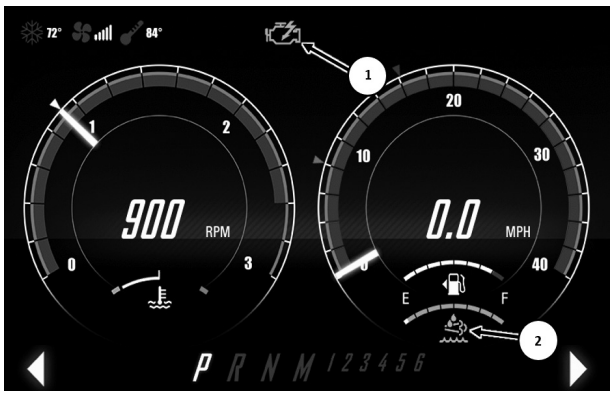
The Amber Engine Warning lamp (1) and the Flashing Amber DEF lamp (2) will be on. Both lamps will remain in this state until DEF fluid is added. ***The first inducement derate will become active.***
To view a full description of the warning, press the Amber Engine Warning lamp (1).



The Diagnostics/ Faults page will give a full description of the warning.



0% DEF fluid level-
Soon after the fluid is depleted, the Amber Engine lamp (1) will change to Red Stop Engine Warning. ***The final inducement derate will be applied (Engine torque derate, Low Idle lock).***



NOTES

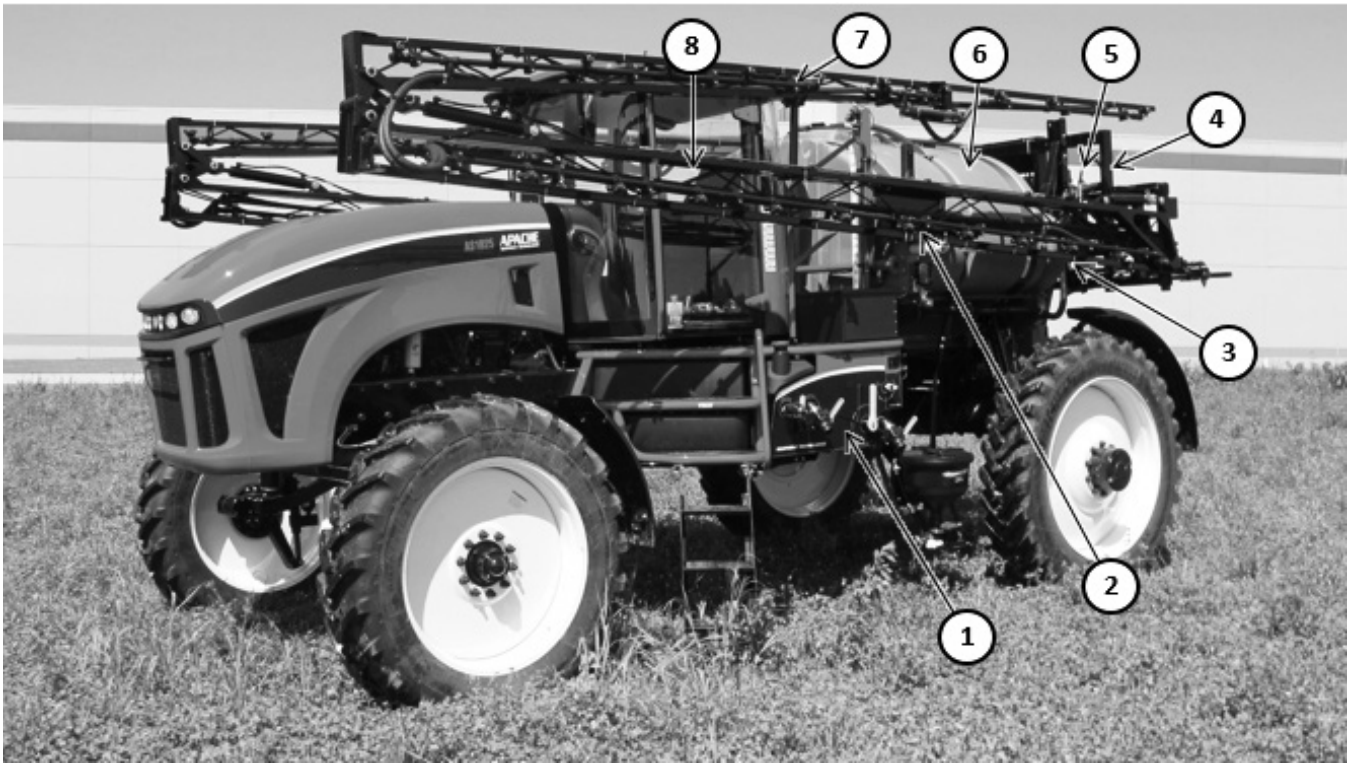
APACHE™

Chapter 4

WET SYSTEM OPERATION

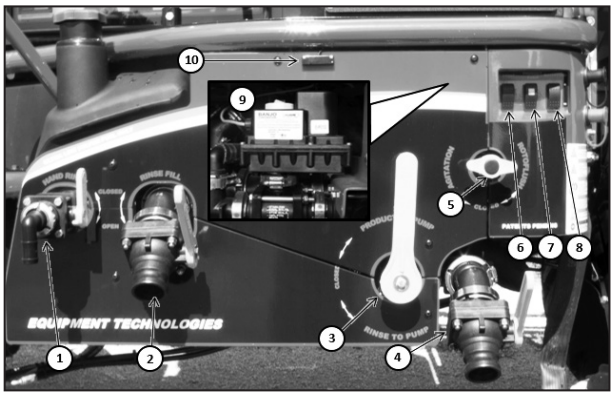
NOTICE: Before performing any wet system operation procedures, read the Safety Section on page 2-1.

Wet System Overview



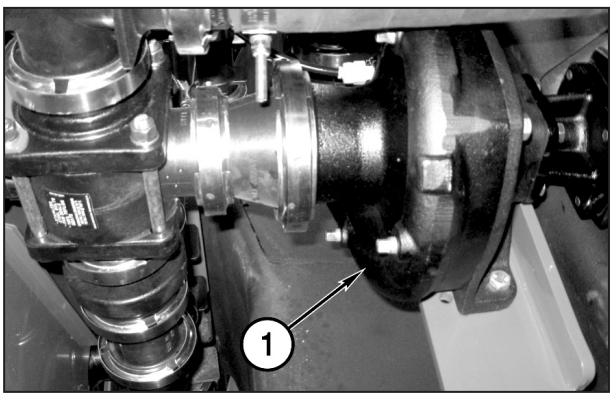
1. Fill Station
2. Boom Cradle
3. Rinse Tank
4. Boom Rack
5. Flow Controls
6. Product Tank
7. Left Boom Tip
8. Left Boom Wing

Fill Station



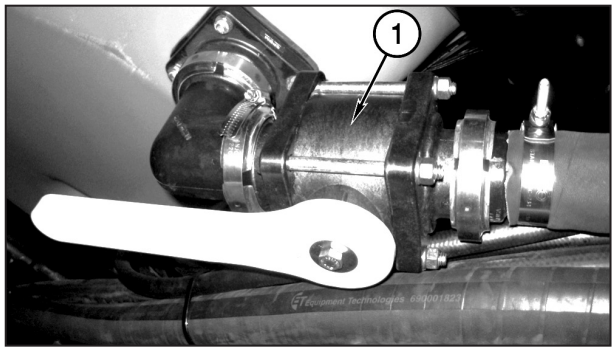
1. **Hand Rinse Valve**
   This valve allows water from the rinse tank on the right side to be used for hand rinsing.
2. **Rinse Tank Quick Fill**
3. **Product Valve (shown in CLOSED position)**
   This valve directs flow from the product tank to the pump or from the rinse tank to the pump.
4. **Product Tank Quick Fill**
5. **Roto-Flush/Agitate Valve**
   Directs flow between the roto-flush and agitation.
6. **Fill Station Light Switch**
7. **Remote Product Pump Switch**
   This switch turns the product pump while outside of the cab.
8. **Increase/Decrease Agitation Switch**
   Used to increase or decrease agitation from the fill station. Must hold down while adjusting.
9. **Agitation Valve**
   During normal spraying operation, this valve is electronically actuated and controlled by buttons on the console keypad in the cab.
10. **Fill Station Light**

Product Pump and Valves



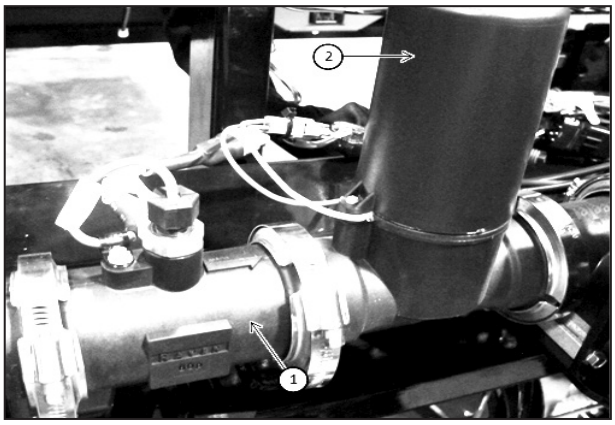
1. **Product Pump**

Sump Valve



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

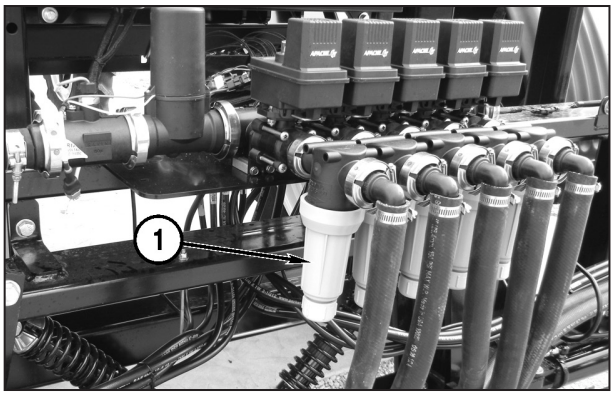
Flow Control



1. **Raven Flowmeter**
2. **Raven Standard Flow Control Valve (Servo Valve)**

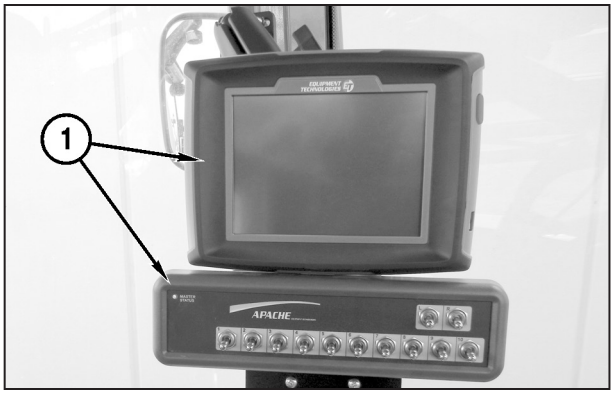
Electronic Boom Valves

The strainers (1) on the electronic boom valves (five section boom valve shown) have 50 mesh screens, that must be cleaned periodically.



Envizio Pro II Monitor

Envizio Pro II Monitor and Apache Switchbox
This monitor is built for Equipment Technologies by Raven. On equipped Apache Sprayer models, the monitor and switch-box are located in the right side of the cab.
See the manufacturer's instructions, provided with the Apache Sprayer, for complete operating, calibration, and service information.



Monitor Calibration Information
(for all Raven built monitors)

Valve cal 2123

Speed cal (radar gun equipped).....606

Speed cal (GPS for speed).....1000

Meter cal .....See tag on the flowmeter, located on the rear boom rack.

Boom cal .....The boom cal numbers are specific for each sprayer and are dependent on the boom width, number of sections and nozzle spacing.

NOTE: All console calibration numbers should be recorded in the Apache owner's manual for future reference.

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

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

The Envizio Pro II and Viper 4 are the two Raven field computer options.

Envizio Pro II



Viper 4



The FmX is the Trimble field computer option.

FmX

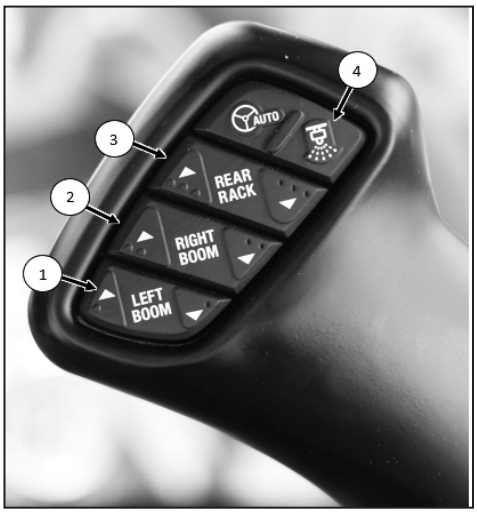


Side Console



1. Envizio Pro II Controller (option)
2. Switchbox
3. Master Spray Button
4. Boom Tilt/ Rack Buttons
5. Left/Right Wing Buttons
6. Fold/Unfold Buttons
7. Left/Right Tip Buttons
8. Agitate Up Button
9. Product Pump Button
10. Agitate Down Button
11. Foamer App Screen

Joystick



1. Boom Center Rack Up/Down
Press to raise or lower the boom mast. Press the top of the button to raise and press the bottom of the button to lower.

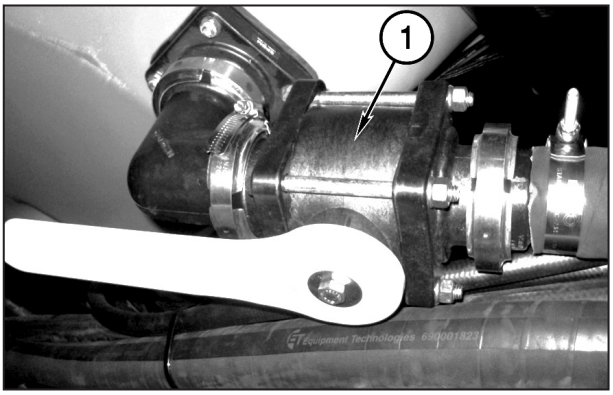
2. Left Boom Tilt
Press to tilt the left boom up or down. Press the top of the button to raise and press the bottom of the button to lower.

3. Right Boom Tilt
Press to tilt the right boom up or down. Press the top of the button to raise and press the bottom of the button to lower.

4. Master Spray Button
Press to turn on or off all boom sections that are in the on position on the switchbox.

Filling Product Tank

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

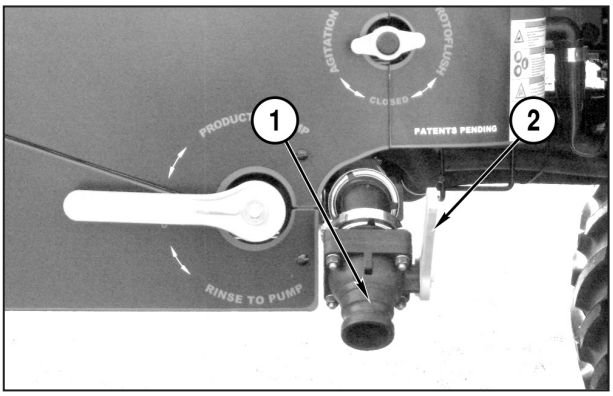


Remove the cap from the product quick fill inlet (1) and connect the hose from the nurse tank to the inlet.

Open the product fill valve (2), shown in the CLOSED position, and fill tank to desired level. There is a product tank sight gauge on the front of the tank.

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.



Tank Fill Monitor (optional)

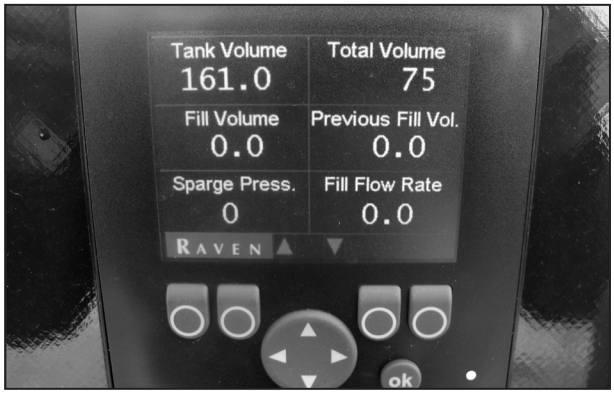
Screen 1:

The first screen shows the Tank volume and fill Volume in larger text. The two buttons on the bottom right (+1, +10) can be used to increment the tank and fill volume. The purpose of this is to add chemical to the tank that is not added through the secondary flow meter.



Screen 2:

The second screen is for information. It has Tank Volume, Total Volume, Fill Volume, Previous Fill Volume, Sparge Pressure and the flow rate.



Screen 3:

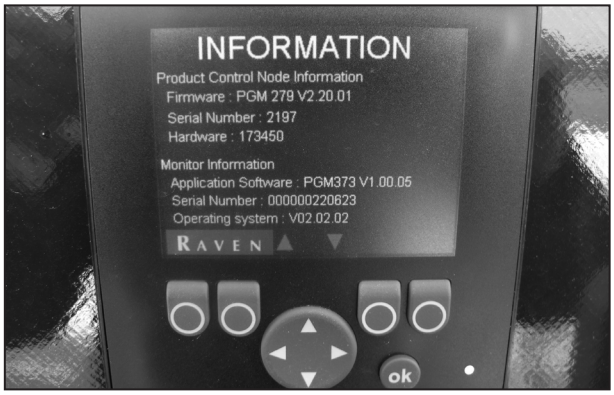
The third screen is for entering the meter cal for the fill line flow meter. Use the buttons (+1, +10, +100 and +1000) to increment the meter cal value. The meter cal must be entered for the flow through this flow meter to be added to the tank volume.



Screen 4:

The fourth screen is just a node information screen. It has the Product Controller node information and fill meter display information.

Once calibrated, the flow through the secondary flow meter will automatically be added to the tank volume.



Product Tank Sight Gauge

The product tank sight gauge is located on the side of the fill station leading up to the hand rail above the tool box. The gauge (1) indicates the amount of product in the tank, beginning at 50 gallons and up to 250 gallons on the side.



The remaining part of the gauge (1) can be seen from the ground or the cab of the machine. The maximum capacity of the gauge depends on the size of the product tank (750gal - 1200 gal).



The product tank sight gauge shut off valve is located under the sprayer, on the front left corner of the product tank.

Filling Rinse Tank

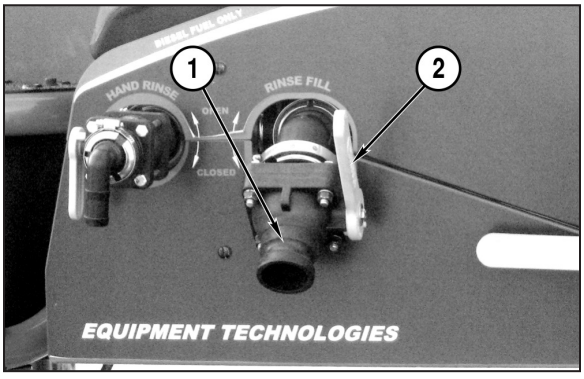
Remove the cap from the rinse quick fill inlet (1) and connect the hose from the nurse tank to the inlet.

Open the rinse valve (2), shown in the CLOSED position and fill to the desired level. There is a tank level indicator tube on the back side of the tank.

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

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

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



Operating Booms

Before performing any boom operations, read all the following safety messages and take all necessary precautions to avoid personal injury and equipment damage.

WARNING! Electrocution Hazard. DO NOT fold or unfold the booms near power lines.

WARNING! Control Hazard. NEVER fold or unfold the booms while the Apache Sprayer is moving over 5 mph [8.04 km/h] or with the optional Auto Boom height control turned ON.

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

Tilt to Remove Boom from the Cradle

All Boom Sizes

On the joystick, press the top of the left (1) and right (2) boom tilt raise/lower buttons to raise the booms and boom hangers (3) off of the boom cradles (4).



Unfold Boom Wings

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

On the console keypad, press the Unfold button (1) to activate. Then press and hold the Left and Right Wing buttons, (2) until the boom wings are fully extended. After the boom wings are fully extended, the boom tips can be unfolded.



Unfold Boom Tips

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

On the console keypad, make sure the Unfold button (1) is still activated. Then press and hold the Left and Right Tip buttons (2) until the boom tips are fully extended.



Height Adjustment

On the joystick, press the bottom of the boom rack raise/lower button (1) to lower the boom rack (2) to the desired height.

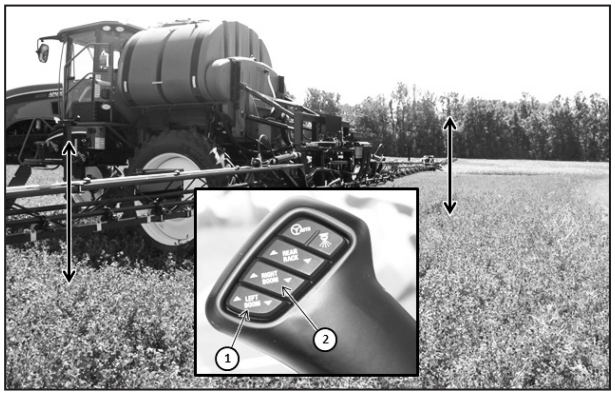
Press the top of the button to raise the boom rack.



Tilt to Level Boom

On the joystick, use the Left (1) and/or Right (2) boom tilt raise/lower buttons to adjust the booms to level.

Press the top of the buttons to tilt the boom up and the bottom of the buttons to tilt the booms down.



Fold Boom Tips

On the console keypad, press the Fold button (1) to activate. The press and hold the Left and Right Tip buttons (2) until the boom tips are fully folded.

After the boom tips are fully folded, the boom wings can be folded.



Fold Boom Wings



NOTICE: ALWAYS raise the rack and the left and right boom tips completly before folding the booms.

On the console keypad, make sure the Fold button (1) is activated. Then, press and hold the Left and Right Wing buttons (2) until the boom wings are fully folded.

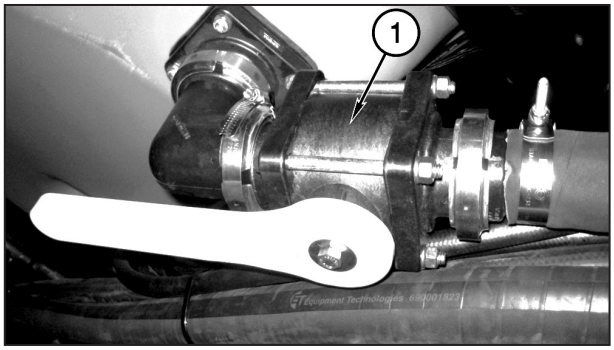
Tilt to Return Boom to Cradle



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

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

Spraying



Make sure the product, rinse, and foam marker tanks are filled. See “Filling Rinse Tank” on page 4-9. See “Filling Product Tank” on page 4-7.

Level the booms and boom tips using the tilt and unfold buttons. See “Operating Booms” on page 4-10.

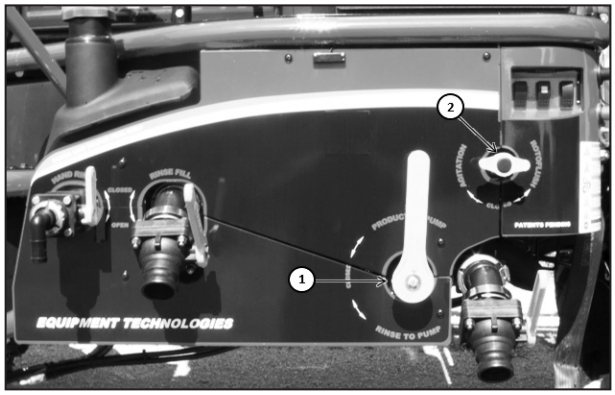
Set the boom height using the boom rack button. See “Height Adjustment” on page 4-11.

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

NOTICE: ALWAYS read and follow all chemical labels and follow all federal and state laws when applying chemicals.

Set the product valve (1) to PRODUCT TO PUMP.

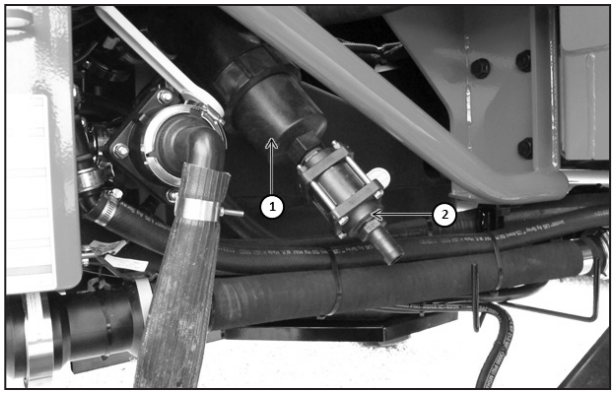
Set rotoflush/agitation knob (2) to AGITATION.



The product strainer (1) features 50 mesh screens, which should be checked and cleaned after every 50 hours of operation or as needed.

The strainer also features a drain valve (2). This valve can be used to ease the draining of the strainer housing before removal for cleaning, or while flushing, or winterizing.

NOTE: Depending on the chemicals being applied, it may be necessary to substitute the 50 mesh screen with a more coarse strainer. See the chemical manufacturer's instructions for complete details.



Power up the Envizio Pro II, Viper 4, or FmX field computer (Envizio Pro II is shown) and check the settings.

Select a saved flow rate or enter the desired rate. See the respective controller's manual supplied with the Apache Sprayer for complete operating instructions.



Set the product pump button (1) to the ON position.

Set the desired boom section switches (2) 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. Product pump dead-head pressure with agitation closed should be 120 psi with the hydraulic oil at operating temperature.

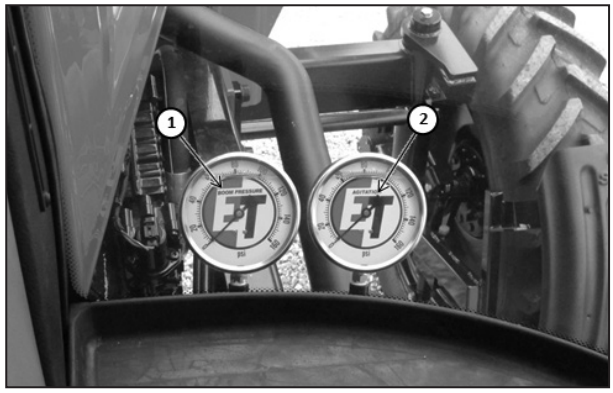


The boom pressure (1) and agitation (2) gauges are mounted outside at the lower right of the cab.

- The boom pressure gauge reads pressure at the right side of the boom valve manifold.
- The agitation gauge reads pressures at the agitation valve.

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 Apache Sprayer speed during spraying. See "Shifting Forward Gears" on page 3-19. Under typical operating conditions, second or third gear is recommended.

Use the master spray on/off button on the joystick to start and stop spraying.

Use the Apache boom control switchbox (2) to start and stop product flow to individual boom sections if necessary. The console controller will automatically adjust the product flow for the remaining sections.

Use the Apache boom control switchbox to control the two optional fence row sections (3).

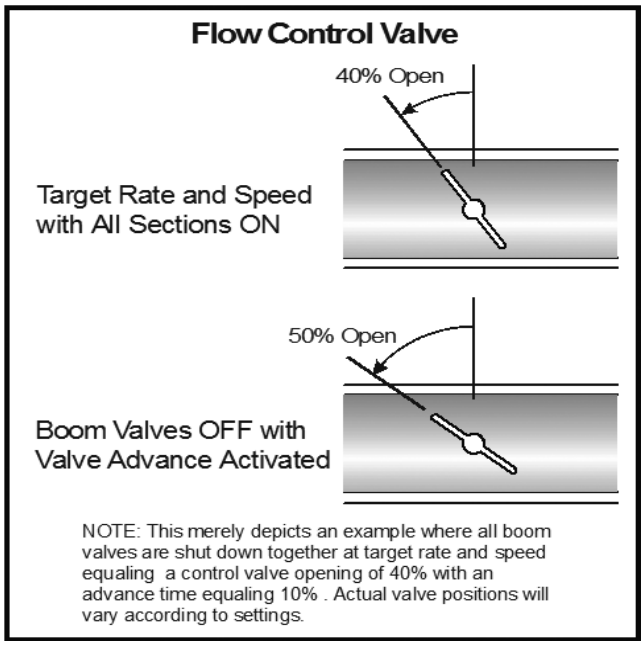


Valve Advance and Valve Delay

There are two settings that are available in the Raven controllers that will help with valve settings. The settings are called Valve Advance and Valve Delay.

Valve Advance

The valve advance feature allows the user to set the amount of time (in seconds) in which the valve will be opened upon all boom sections being turned OFF and control in automatic mode. A value of 1-9 means an advance of 1-9 seconds respectively. A value of 0 means no advance.This setting will open the control valve back up for "X" seconds after all boom sections have been turned off; resulting in quicker turn. For example, you have entered your headlands area to make a turn and switched the Master Button OFF, the Valve Advance setting will now open the control valve back up for the amount of time you have entered into the controller to build up pressure for when the Master Button is turned on.



NOTE: The Advance button is only displayed if a Standard, Fast, or Fast Close valve is selected and if the product control node has a software version 1.50 or higher.

To set Valve Advance in the Envizio Pro II:

Start by selecting the "Product Control" menu, then choose the "Valve" box. Inside the "valve Calibration" menu choose "Valve Advance" and enter a number of "2".

To set Valve Advance in the Viper 4:

Start by selecting the "Node" icon with gears. Slide the screen to the second page. Click "Product Control". Click the second tab at the top. This will now be the "Valve Control" screen. Select "Valve Advance" icon and enter a number of "2".

NOTE: Valve Advance is preset from Equipment Technologies at "0".

Valve Delay

The Valve Delay feature allows the user to set a delay between the time the booms are turned on and when the console begins to control the flow rate. A value of 1-9 means a delay of 1-9 seconds respectively. A value of 0 means there is no delay. This delay is active if the time between turning OFF and turning ON the booms is less than 30 seconds. For example, when turning around on headlands this will leave the control valve at a fixed setting for the allotted time.

To set Valve Delay in the Envizio Pro II:

Start by selecting the "Product Control" menu, then choose the "Calibration Settings" box. Inside the Calibration Settings menu, choose the "Valve Delay" box and enter a number of "1".

To set Valve Delay in the Viper 4:

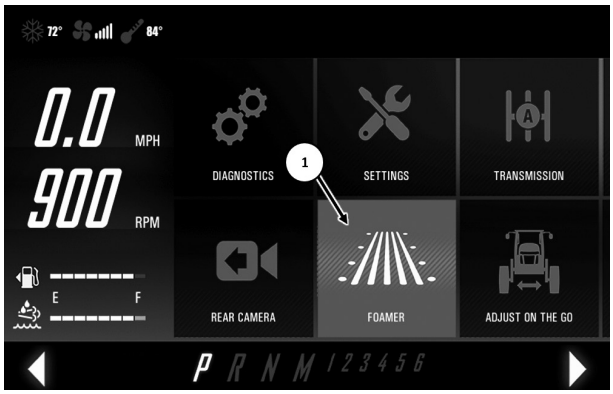
Start by selecting the "Node" icon with gears. Slide the screen to the second page. Click "Product Control". Click the second tab at the top. This will now be the "Valve Control" screen. Select "Valve Delay" icon and enter a number of "1".

NOTE: Valve Delay is preset from Equipment Technologies at "0".

NOTE: The numbers suggested above for Valve Advance and Valve Delay are only good starting points and may need to be adjusted. These settings will need to be tailored to each individual user because they are based on application rates, speed, and pressure. For best results, approach the headlands at consistent speeds while turning all boom sections OFF.

Operating Foam Marker

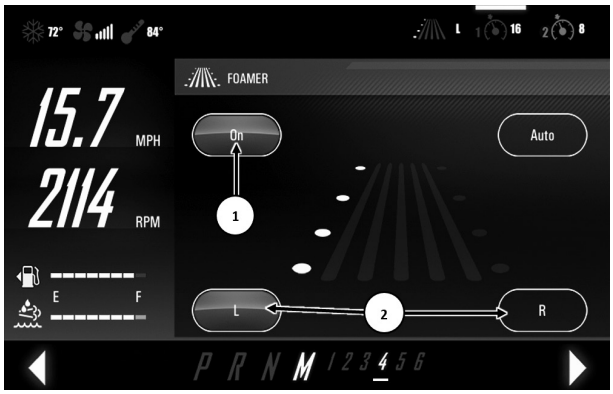
To turn on the foam marker, touch the Foamer App icon (1) to access the foam marker page.



To turn on, touch the OFF icon to activate to the ON (1) position.

- Touch the Foam Left icon (2) to drop foam on the left.
- Touch the Foam Right icon (2) to drop foam on the right.

If the Apache Sprayer has the optional combo 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

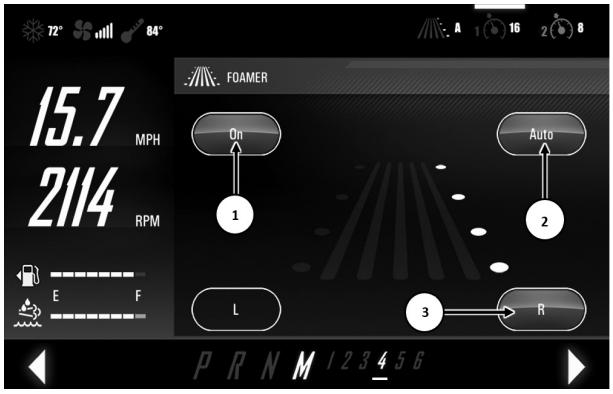
To use the Auto Foam feature, turn on the Foam Master icon (1), then turn on the Foam Auto icon (2). Foam will drop from whichever side was used last (3).

When the boom section switches are turned on or off with the Master Spray button on the joystick, the foam will switch from left to right.

NOTE: The Master Spray button on the joystick must be turned on before the Auto Foam is activated.

NOTE: The LandMark injection foam marker is the only factory-installed foam marker. If your Apache Sprayer is equipped with a different foam marker, contact your dealer.

NOTE: After filling the foam tank, the foam marker may need to run for 1 to 2 minutes before the foam begins.

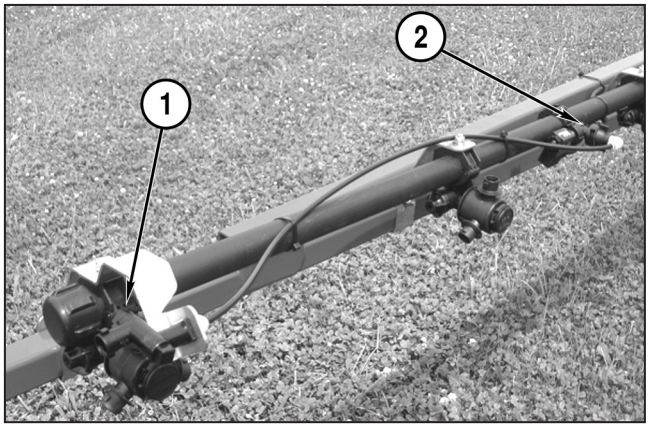


Optional Fence Row Nozzle

The Apache sprayer can be equipped with optional left, and/or right fence row nozzles. If equipped, the fence row nozzles (1) and actuator solenoids (2) are plumbed into the first boom section on the left and the last boom section on the right (left side shown). Therefore, the respective section must be on for the fence row nozzle to operate.

To operate the left fence row nozzle, boom section 1 and boom section L must both be switched on.

To operate the right fence row nozzle, the highest configured boom section and boom section R must both be switched on.



Flushing Product Tank

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

NOTICE: 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 4-9.

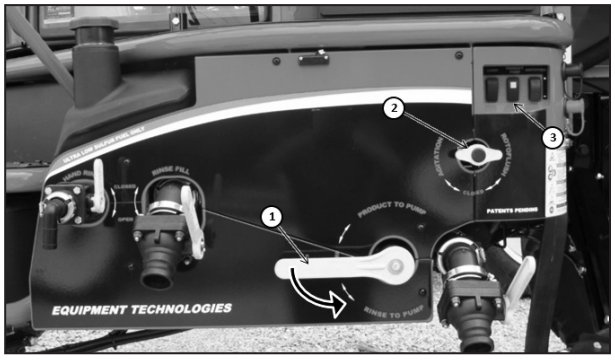
Turn the product valve to RINSE TO PUMP (1).

Turn the Agitate/Roto-Flush knob to ROTO-FLUSH (2).

Start the engine.

Set the product pump switch (3) to the ON position and increase the engine speed to approximately 1200 rpm.

> *NOTICE: 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:

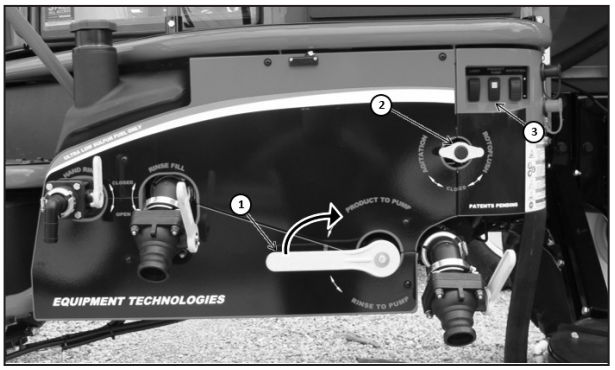
Return the engine to IDLE.

Set the product pump switch (3) to OFF.

Turn the product lever (1) to PRODUCT TO PUMP.

Turn the Agitate/Roto-Flush knob (2) to OFF.

Drain tank safely through the Product Tank Fill Valve.



Flushing Booms

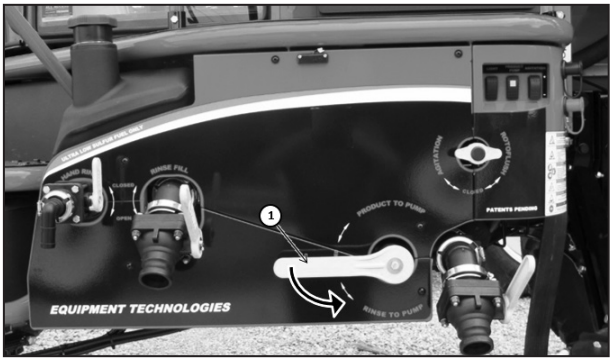
NOTICE: Read and follow chemical labels for proper usage, flushing, disposal and protective clothing requirement instructions. ALWAYS dispose of chemicals and contaminated rinse water in a safe location in accordance with chemical label recommendations and local laws.

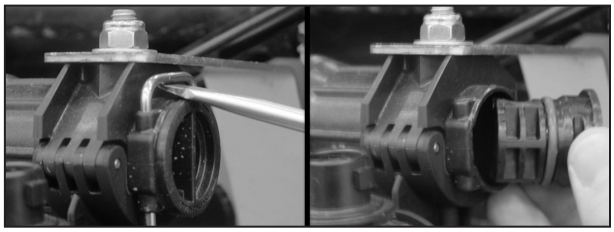
NOTICE: Some chemicals may require multiple tank flushings.

NOTICE: 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.

To flush the booms:

- Unfold the booms
- Set the product valve (1) to RINSE TO PUMP.
- Remove Hypro Express Endcaps.
- Increase engine speed to 1200 RPM.
- Switch to Manual Spray in the field Computer.
- Turn the Product Pump switch to the ON position.
- Press the Master Spray Button to flush.

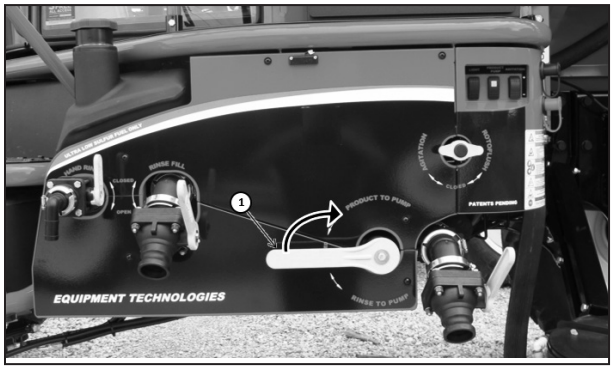




NOTE: If the Apache Sprayer is equipped with an optional chemical eductor, flush the eductor at the same time as the booms.

After the booms are flushed:

- Turn OFF Master Spray Button
- Return the engine speed to IDLE.
- Set the product pump switch to OFF.
- Set the product valve (1) to PRODUCT TO PUMP.
- Replace the Hypro Express Endcaps
- Fold the booms, and turn off the engine.

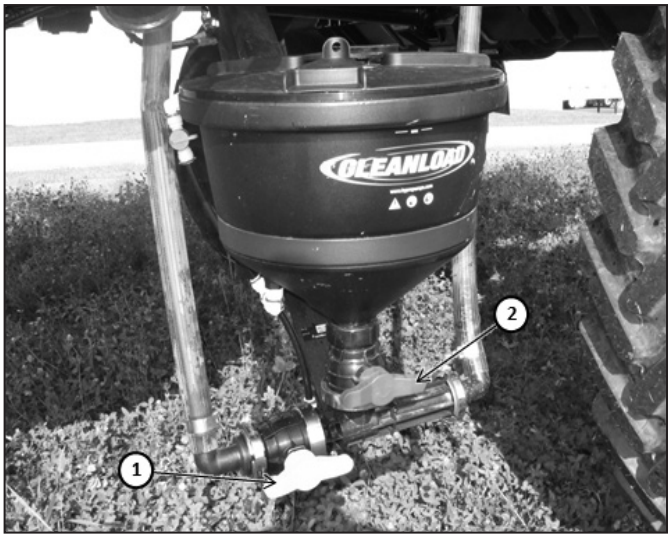


Cleanload Chemical Eductor

The eductor assembly is automatically lowered and raised with the use of the park brake button. When the park brake is activated, the eductor is lowered. When the park brake is deactivated, the eductor is raised.

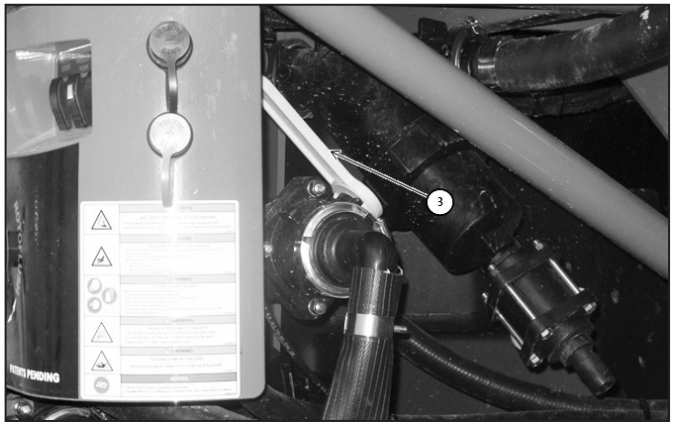
Startup

1. All eductor valves must be closed prior to starting. Close the inlet ball valve (1) and the hopper ball valve (2).
2. Open the lid to check for foreign objects which may hinder performance or contaminate the system.
3. Close and lock the lid by turning the cover clockwise.
4. Divert pump flow to the eductor inlet line by pulling the valve (3) to the open position.



NOTICE: A pressure of 30 psi [2.06 bar] minimum and 150 psi [10.3 bar] maximum must be used. Higher 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 hopper ball valve (2), located on the bottom of hopper, by rotating the handle into a vertical position.
7. Unlock and open the lid slowly by turning the cover counterclockwise.
8. Load the eductor. Loading instructions differ for eductors equipped with an optional suction lance. Use the procedure that is appropriate for your application.



Loading Liquid or Powdered Chemical into Hopper

NOTICE: DO NOT at any point put your face directly over the hopper.

NOTICE: Avoid splashing liquids or powdered chemicals outside of the hopper.

1. Pour required amount of chemical into the hopper.
2. 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.
3. Rinse the Cleanload hopper.
4. Close and lock the lid by turning the cover clockwise.
5. Open the eductor valve (3) for 20 seconds, then close the valve.
6. Open the lid and inspect for chemical residue. Repeat steps 3 to 5 as necessary.
7. Close the hopper ball valve (2) by rotating the handle into a vertical position. Turn the inlet valve (1) (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. Make sure that the inlet valve (3) behind the fill station has been shutoff before raising the eductor.

NOTES

APACHE™

CHAPTER 5

LUBRICATION AND MAINTENANCE

Before performing any maintenance procedures, read the Safety Section on page 2-1.

Maintenance Precautions

- Any part which is found defective as a result of inspection or any part whose specifications are not adequate must be replaced.
- ALWAYS tighten components to the specified torque. Loose parts can cause equipment damage or cause it to operate improperly.
- Only use Apache-approved replacement parts. Other replacement parts may affect warranty coverage.
- NEVER attempt to modify the Apache Sprayer design or safety features.
- If a warning alarm or indicator activates during engine operation, stop the Apache Sprayer and engine immediately and contact your Apache dealer. Determine the cause and repair the problem before continuing operation. To ensure your safety, the safety of others, and the safe operation and maintenance of the sprayer, read, follow, and practice the following:



WARNING! Exposure Hazards

- ***ALWAYS wear appropriate eye protection to prevent the risk of eye injury. Wear safety glasses to prevent eye contact with debris, chemicals and fluids.***
- ***ALWAYS wear ear plugs when working around loud noises to prevent hearing loss.***
- ***ALWAYS wear the appropriate gloves to protect your hands, especially when handling extremely hot or cold equipment and fluids.***



WARNING! Entanglement Hazards

- ***ALWAYS attach a "Person working on vehicle. DO NOT Start or Operate" tag near the key switch while performing maintenance on the equipment.***
- ***ALWAYS stop the engine before beginning service.***
- ***NEVER operate the engine without the guards in place.***
- ***ALWAYS remove any tools or shop rags used during maintenance from the area before operation.***
- ***NEVER engage the transmission or driven equipment by hand from underneath the Apache Sprayer when the engine is running.***



WARNING! Piercing Hazards

- ***Avoid skin contact with high-pressure diesel fuel spray caused by a fuel system leak such as a broken fuel injection line. High-pressure fuel can penetrate your skin and result in serious injury. If you are exposed to high-pressure fuel spray, obtain prompt medical treatment.***
- ***NEVER check for a hydraulic leak with your hands. ALWAYS use a piece of wood or cardboard.***



WARNING! Flying Object Hazard

- ***ALWAYS wear eye protection when servicing the engine or when using compressed air or high-pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.***



WARNING! Crush Hazards

- ***ALWAYS make sure the Apache Sprayer is on flat, solid ground before getting under the Apache Sprayer.***
- ***ALWAYS block front and rear axle wheels before getting under the Apache Sprayer.***
- ***If using a hydraulic jack or jack stands, ensure they are of the proper capacity and used in a proper manner under the frame of the Apache Sprayer.***
- ***Use a hoist or use assistance when lifting components that weigh 50 lb [23 kg] or more. Make sure all lifting devices such as chains, hooks or slings are in good condition, of the correct capacity, positioned correctly and have current, valid inspection labels.***
- ***ALWAYS use lifting equipment with sufficient capacity to lift the Apache Sprayer or equipment.***
- ***If transport is needed for repair, acquire assistance when using a hoist and when loading and unloading.***



WARNING! Fire/Explosion Hazards

- ***While the engine is running or the battery is charging, hydrogen gas is being produced and can be easily ignited. Keep the area around the battery well-ventilated and keep sparks, open flame and any other form of ignition out of the area.***
- ***ALWAYS turn off the battery switch or disconnect the negative (-) battery cable before servicing the equipment.***



WARNING! Explosion Hazard

- ***Batteries contain sulfuric acid. NEVER allow battery fluid to come in contact with clothing, skin or eyes. Severe burns could result. If battery fluid contacts the eyes and/or skin, immediately flush the affected areas with a large amount of clean water and obtain prompt medical treatment.***



WARNING! Exposure Hazard

- ***ALWAYS wear safety goggles and protective clothing when servicing the battery.***



WARNING! High-Pressure Compressed Air - Exposure and Impact Hazards

- ***Pneumatic components store compressed air and can separate violently during disassembly or removal. Before servicing any part of the pneumatic (air) system, slowly release all compressed air from the system.***
- ***NEVER exceed the recommended working air pressure.***
- ***NEVER connect or disconnect a hose or line containing air pressure.***
- ***ALWAYS wear safety glasses when working with compressed air systems. NEVER look into the area of escaping air when draining air tanks or disconnecting lines. Dirt or moisture may be expelled, causing eye injury.***



WARNING! Shop Equipment Hazards

- ***ALWAYS check before starting the engine that any tools or shop rags used during maintenance have been removed from the area.***
- ***ALWAYS use tools appropriate for the task at hand and use the correct size tool for loosening or tightening machine parts.***
- ***ALWAYS use the proper tools and equipment for servicing the Apache Sprayer. Ensure the tools are rated and approved for use with this Apache Sprayer.***
- ***If an Apache sprayer is to be operated with test equipment connected, precautions must be taken to ensure that all equipment and related components are securely attached to prevent movement and interference.***
- ***Before performing any maintenance procedure, have all the correct tools you need to perform the required tasks.***
- ***Ensure that the work area is adequately illuminated. ALWAYS install wire cages on portable safety lamps.***

Environmental Precautions

The safety messages that follow have NOTICE level hazards.

- Thoroughly clean any spilled fluids from the equipment and/or ground after service is completed. Dispose of used fluids and filters as required by law.
- ALWAYS be environmentally responsible. Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.
- NEVER dispose of hazardous materials by dumping them into a sewer, on the ground, or into ground water or waterways.

Non-Apache Equipment Maintenance

Some components and systems of Apache Sprayers are manufactured by companies other than Apache and have specific safety, inspection, adjustment and maintenance procedures outlined by their manufacturer.

NOTICE: ALWAYS perform maintenance procedures for all OEM equipment in addition to procedures for the Apache Sprayer.

Some non-Apache equipment operator's and maintenance manuals are included with the Apache Sprayer. 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 manuals.

NOTICE: ALWAYS perform and reference the original equipment manufacturer's service information when performing service or maintenance procedures on equipment manufactured by companies other than Apache. Before servicing original equipment manufacturer (OEM) systems or components, properly identify the OEM model and serial number to ensure correct service and replacement part information is referenced.

Cleaning Guidelines

The following guidelines are recommended when cleaning mechanical and electrical parts of the cab.



WARNING! Fire Hazard

- ***Cleaning solvents can cause death or serious injury.***
- ***Cleaning solvents are extremely flammable and toxic if inhaled.***
- ***DO NOT use near sparks or flame and avoid inhaling.***
- ***Use in a well-ventilated area and follow the manufacturer's warnings on use and handling.***



WARNING! Exposure Hazard

- ***Wear safety glasses, gloves, and other proper protective clothing or gear when handling part cleaners or other hazardous cleaning agents.***

The safety messages that follow have NOTICE level hazards.

- Use caution when using power washers to avoid damaging rubber, plastic or electrical components.

Mechanical Parts

- Clean mechanical parts with a non-combustible cleaning agent.
- Clean mating surfaces thoroughly after removing a part to which an O-ring or gasket is attached. If you replace a part, ALWAYS use a new O-ring or gasket.

Electrical Parts

- NEVER spray water or cleaners directly on electrical parts.
- Electrical parts are susceptible to water damage and insulation leaks. Current leakage can develop if electrical parts become wet or the insulation is damaged.

Body and Cab Exterior

- The use of a low-pressure water supply system and mild automotive-type soap is recommended to wash and rinse the Apache Sprayer.
- DO NOT use abrasive cleaning materials on the Apache Sprayer, as brushes, chemicals and cleaners may damage the finish or components.
- DO NOT remove ice or snow from painted surfaces with a scraper or blade.
- DO NOT allow diesel fuel, oils, lubricants or antifreeze to come in contact with painted surfaces.
- When cleaning chrome, stainless-steel or aluminum parts, use clean water and a soft cloth.
- Avoid scratching or damaging polished metal finishes; DO NOT use abrasive cleaners.
- NEVER use pressurized water or cleaners to clean the cab interior.
- NEVER use corrosive cleaning solutions or any type of abrasives. Part or equipment damage caused by use of corrosive cleaners or abrasives is not covered under Apache warranty.
- Periodically clean the interior dash, gauge panels, floor and seat with a mild cleanser or water-dampened cloth.
- Periodically clean all interior glass with a water-dampened cloth or approved glass cleaning materials.

Apache Sprayer Service Interval Chart

Perform and repeat the prescribed maintenance at each interval. ▲ = Required Service ○ = Conditional Service ● = Regular Service NOTE: DO NOT overlook the "After First 100 Hours" interval.	Before Inital 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	Every 2000 Hours or Yearly	Every 4500 Hours or 3 Years
Check (and adjust as needed) Poly Tank Straps	○	○		●									
Torque Lug Nuts	○	○			●								
Grease Steering Components	○				●								
Grease Axle Components	○		○		●								
Grease Driveline	○						●						
Adjust Boom			○										
Change Cab Filters			○						●				
Adjust Toe-In			○							●			
Change Engine Safety Air Filter			○							●			
Winterize Wet System			○							●			
Flush Wet System (including product pump)			○	●									
Check Tire Pressure				●									
Grease Boom Fold Cylinder				●									
Check Oil Engine Level				●									
Check Coolant Level, Cooling Package, and Hoses				●									
Check Transmission Fluid Level				●									
Check Hydraulic Fluid Level				●									
Cycle Fan Reverser				●									
Grease Rear Suspension					●								
Grease Front Strut and King-pins					●								
Check Differential Fluid Level					●								
Check Differential for Leaks					●								
Check Park Brake Oil	○				●								
Torque Axle Extension Bolts			○				●						
Change Fuel Primary Filter							●						
Change Fuel Separator							●						
Clean Fuel Tank Strainer			○				●						
Clean/Change Primary Engine Air Filter								●					
Change Differential Fluid						▲		●					
Change Hydraulic Fluid Filter (Immediately if indicated by console screen)						▲		●					
Change Park Brake Oil						▲		●					
Clean Hydraulic Fluid Strainer								●					
Change Engine Oil and Filter						▲		●					
ChangeTransmission Fluid and Filter and Clean Strainer						▲		●					
Inspect Front Accumulator and Suspension Cylinder								●					
Check Front Suspension Cylinder Fluid Level								●					
Check Front Accumulator Charge								●					
Inspect and Repack Wheel Hub and Flex Bearings								●					
Change Final Drive Fluid (drop box or planetary)								●					
Change Hydraulic Fluid											●		
Clean DEF Tank Strainer											●		

Perform and repeat the prescribed maintenance at each interval. ▲ = Required Service ○ = Conditional Service ● = Regular Service NOTE: DO NOT overlook the "After First 100 Hours" interval.	Before Inital 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	Every 2000 Hours or Yearly	Every 4500 Hours or 3 Years
Change Crankcase Ventilation Filter												•	
Change DEF Supply Module Fillter													•

Before Inital Use

The following services must be performed before initial use of the Apache Sprayer and repeated at the interval prescribed in the Apache Sprayer Service Interval Chart. See "Apache Sprayer Service Interval Chart" on page 5-5.

- Torque Lug Nuts. See "Torque Lug Nuts" on page 5-16.
- Grease Steering Components. See "Grease Steering Components" on page 5-17.
- Grease Axle Components. See "Grease Axle Components" on page 5-19.
- Grease Driveline. See "Grease Driveline Components" on page 5-21.
- Adjust Poly Tank Straps. See "Adjust Poly Tank Straps" on page 5-16.
- Adjust Boom. See "Adjust Boom" on page 5-6.
- Check Park Brake Fluid Level. See "Check Park Brake Fluid Level" on page 5-20.

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. See "Apache Sprayer Service Interval Chart" on page 5-5.

- Torque Lug Nuts. See "Torque Lug Nuts" on page 5-16.
- Adjust Poly Tank Straps. See "Adjust Poly Tank Straps" on page 5-16.

Adjust Boom

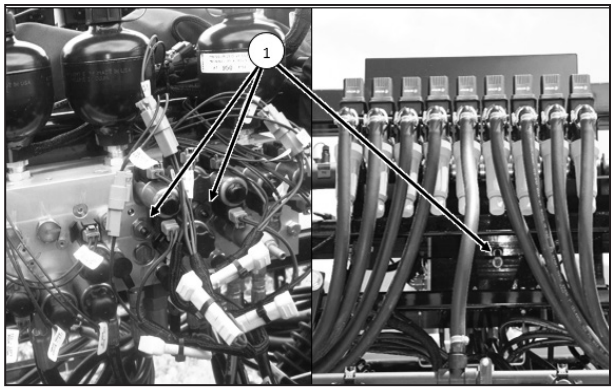
NOTICE: All boom adjustments should be performed with the boom fully unfolded and lowered.

Boom Lead Adjustment

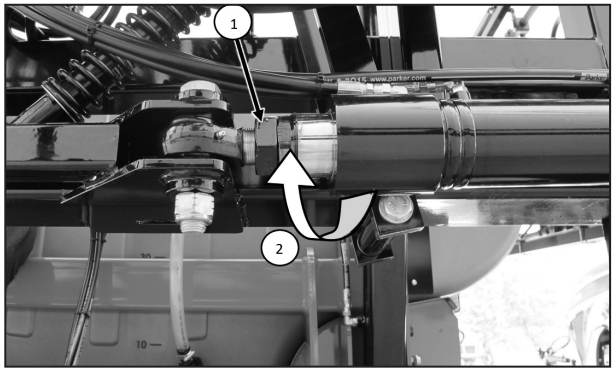
1. Unfold the boom wings and boom tips, then lower the back rack.



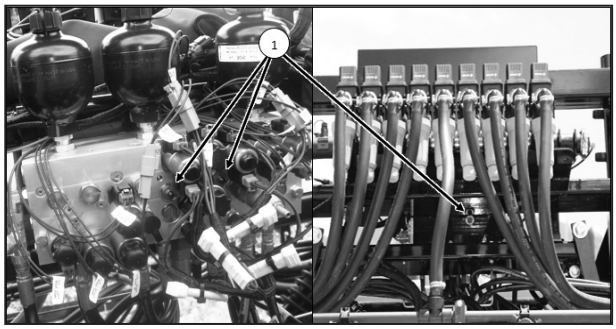
2. Loosen the 3 bleed screws (1) for the boom fold and cushion circuits.



3. Loosen the jam nut (1) on the fold cylinder cushion rod.
4. Rotate the fold cylinder cushion rod (2) to adjust the boom lead. Decreasing the number of visible threads on the fold cylinder clevis will reduce the boom lead. Increasing the number of visible threads on the fold cylinder clevis will increase the boom lead.
5. After adjusting the boom lead so that the tips are even with the back reack, tighten the jam nuts (1).



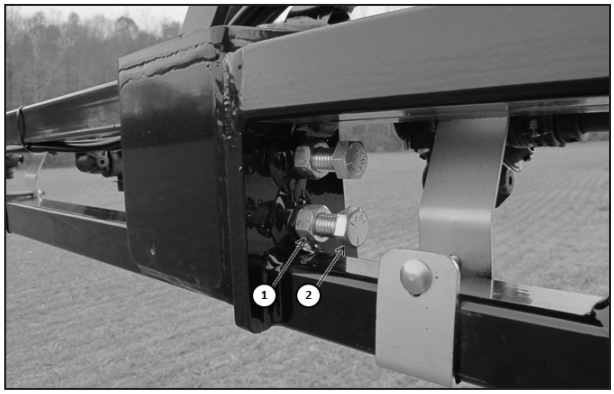
6. Tighten the three bleed screws (1) and their jam nuts.



7. To check the boom lead adjustments, raise the back rack and fold the booms all the way in. Then repeat the unfold process and recheck the boom lead. Readjust if needed.



Boom Breakaway



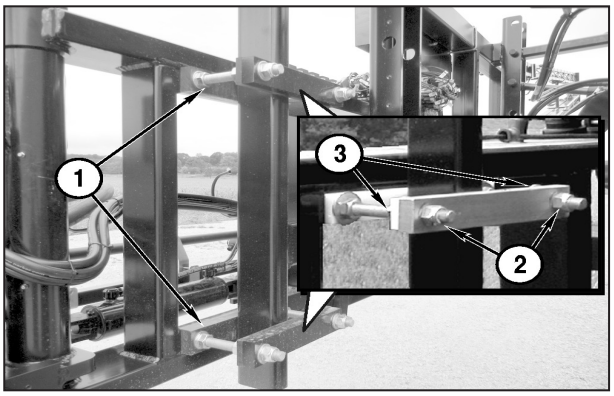
Each left and right boom is equipped with one or two boom breakaways depending on boom configuration. A right, boom tip breakaway is shown.

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

To adjust the breakaway:

1. Loosen the jam nut (1) and turn the adjusting screw (2) to align the booms.
2. Tighten the jam nut.
3. Repeat the steps for the remaining breakaways, as required.

Boom Stabilizer



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

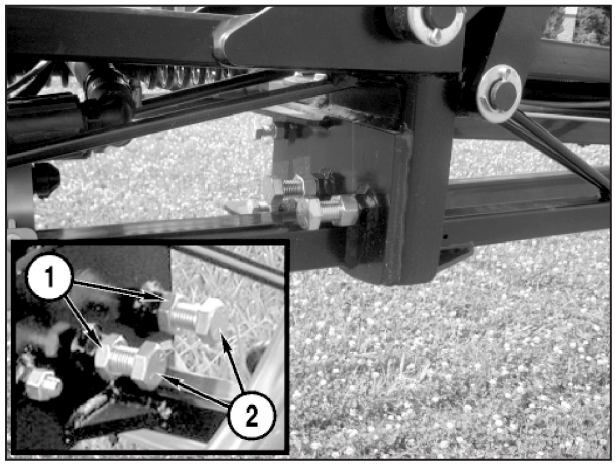
The gap between the nylon wear pads and the steel frame should be 0.093 to 0.125 in. [2.4 to 3.2 mm] with the booms unfolded.

To adjust the gap:

1. Loosen both lock nuts (2) on the stabilizer and equally adjust the jam nuts (3) until the gap is correct.
2. Tighten the lock nuts (2)
3. 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 0.093 to 0.125 in. [2.4 to 3.2 mm] gap.

Boom Tip
(90 ft and 100 ft Booms)



The boom tips should be level with the main boom.

The left boom tip is shown.

To adjust the boom tip level:

1. Loosen the jam nuts (1) on the leveling bracket.
2. Turn the leveling bolts (2) clockwise to raise the boom tip or counterclockwise to lower the boom tip.

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: Adjust the bolts equally for best performance.

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

As Required

The following services will be required at various intervals depending on both Apache Sprayer use and environmental conditions. Repeat these services as prescribed by the Apache Sprayer Service Interval Chart. See "Apache Sprayer Service Interval Chart" on page 5-5.

- Adjust Boom. See "Adjust Boom" on page 5-6.
- Grease Axle Components. See "Grease Axle Components" on page 5-19.
- Check Axle Extension Bolt Torque. See "Torque Axle Extension Brace Bolts" on page 5-22.
- Adjust Toe-In. See "Adjust Toe-In (Standard 120" Axles)" on page 5-37.
- Clean or Change the Primary Engine Air Filter. See "Clean or Change Engine Primary Air Filter" on page 5-25.
- Change Engine Safety Air Filter. See "Change Engine Safety Air Filter" on page 5-39.

NOTICE: When operating in severe conditions, the primary air filter should be cleaned after every 40 hours of use or if indicated by the console display. Filter usage should not exceed 250 hours.

- Winterize Wet System. See "Winterize Wet System" on page 5-40.
- Change Cab Air Filters. See "Change Cab Charcoal Filter" on page 5-36.
- Flush Wet System. See "Flushing Booms" on page 4-18.
- Inspect Front Accumulator. See "Inspect Front Accumulator and Suspension Cylinder" on page 5-28.
- Clean the Fuel Tank Strainer. See "Clean Fuel Tank Strainer" on page 5-24.

Daily

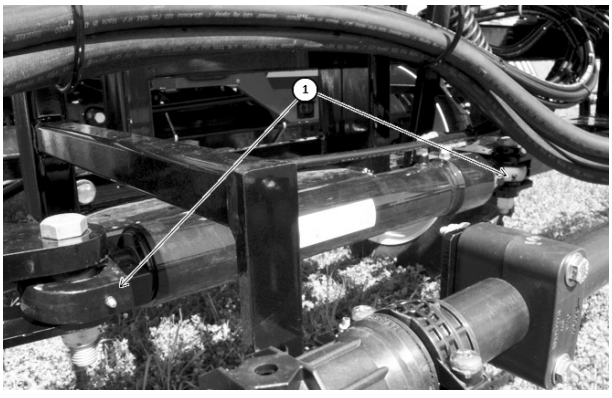
The following services must be performed daily, before operation of the Apache Sprayer.

- Clean or Change Primary Engine Air Filter as needed. See "Clean or Change Engine Primary Air Filter" on page 5-25.

NOTICE: NEVER clean the inner engine air filter (engine safety air filter). When it is dirty, ALWAYS replace it with a new one.

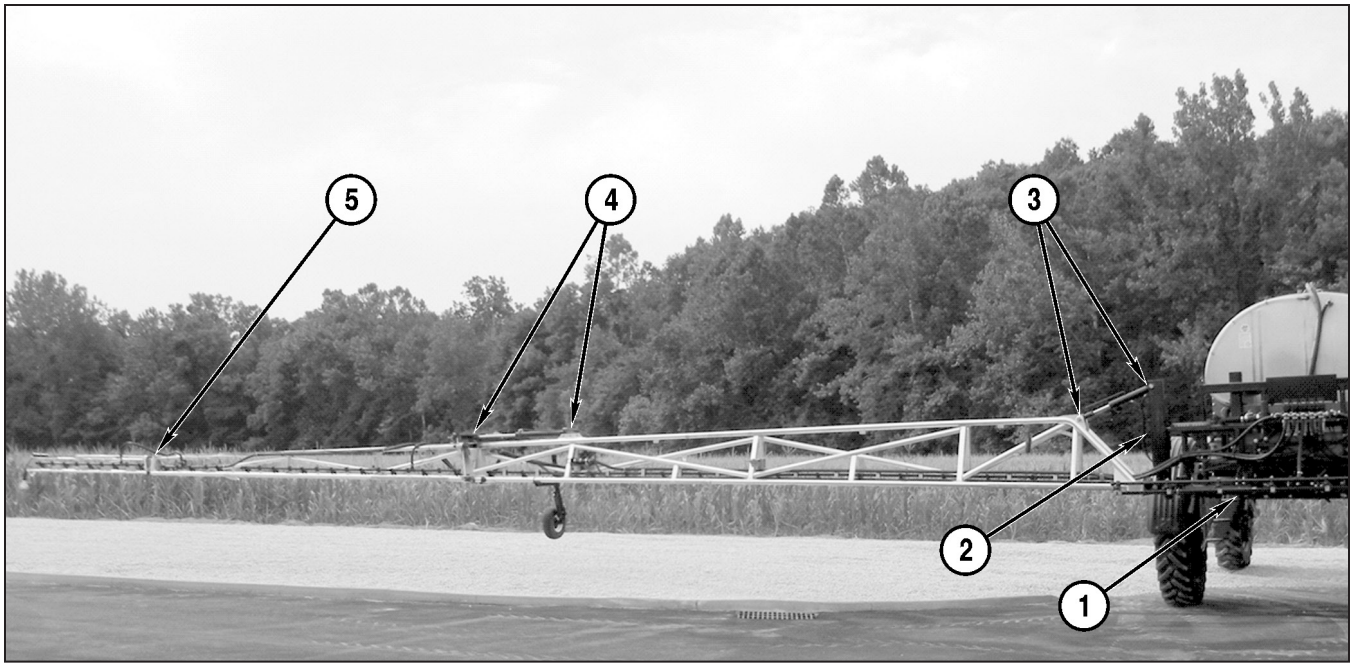
Boom Fold Cylinder

Grease the boom fold cylinder ball joints (1).



Grease Pommier Boom

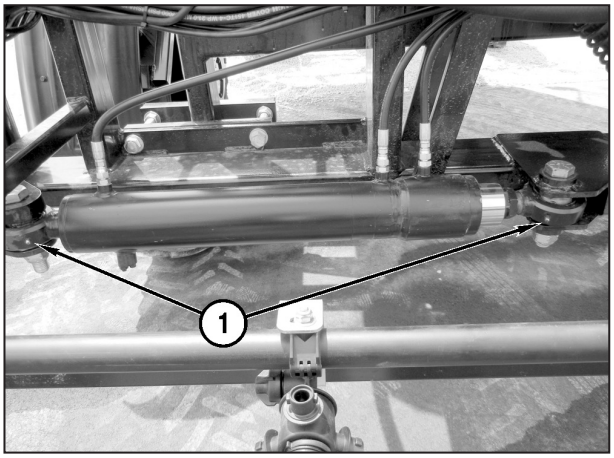
(Optional Equipment)



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

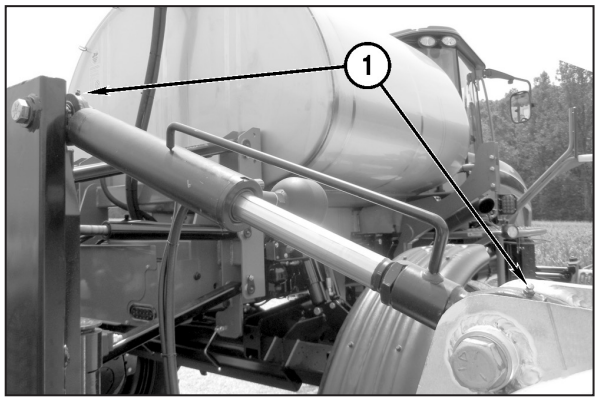
1. **Boom Fold Cylinder (2 fittings)**
2. **Boom Hinge (4 fittings)**
3. **Tilt Cylinder (2 fittings)**
4. **Boom Tip Fold (7 fittings)**
5. **Boom Breakaway (1 fitting)**

Boom Fold Cylinder
There are two grease fittings (1) on each boom fold cylinder. The left side is shown.



Tilt Cylinder

There are two grease fittings (1) on each tilt cylinder. The right side is shown.



Boom Tip Fold

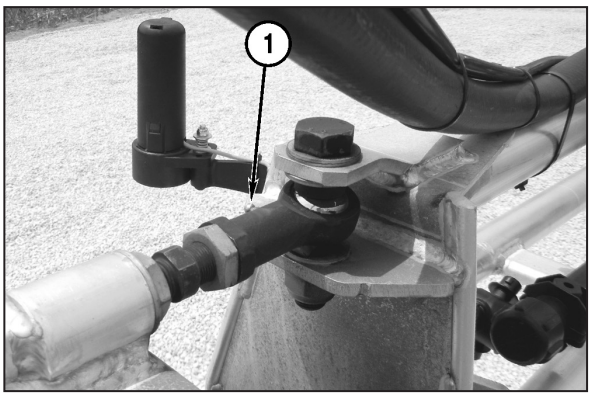
There are seven grease fittings in the boom tip fold area of each boom. The left side is shown.

NOTE: The booms must be placed in the open position to access some fittings and in the folded position to access the remaining fittings.



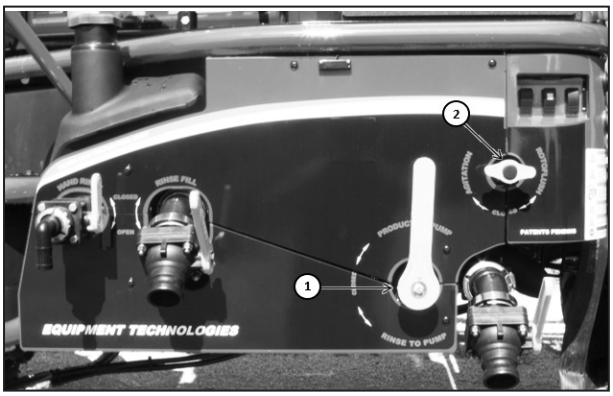
Boom Breakaway

There is one grease fitting (1) on each boom breakaway. 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 4-17. See “Flushing booms” on page 4-18.



Check Tire Pressure

Perform the following:

- Check the tires for damage. Replace tires that have cuts or bubbles.
- Check the tires for proper inflation pressure. Inflate tires according to the tire manufacturer’s recommendations. Tire pressures are listed on page “1-2” of this manual.
- Check the rims for cracks and other damage. Replace damaged rims.



Check Engine Oil Level

NOTICE: 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.

While parked on level ground, remove the dipstick and check the oil level.

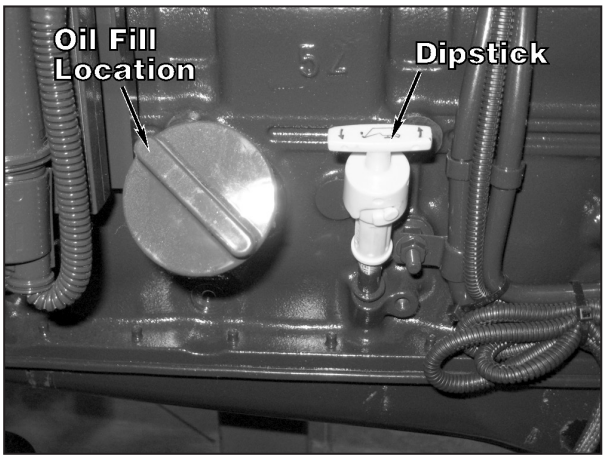
The oil level should be within the hatched area on the dipstick.

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

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

Replace the dipstick.

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



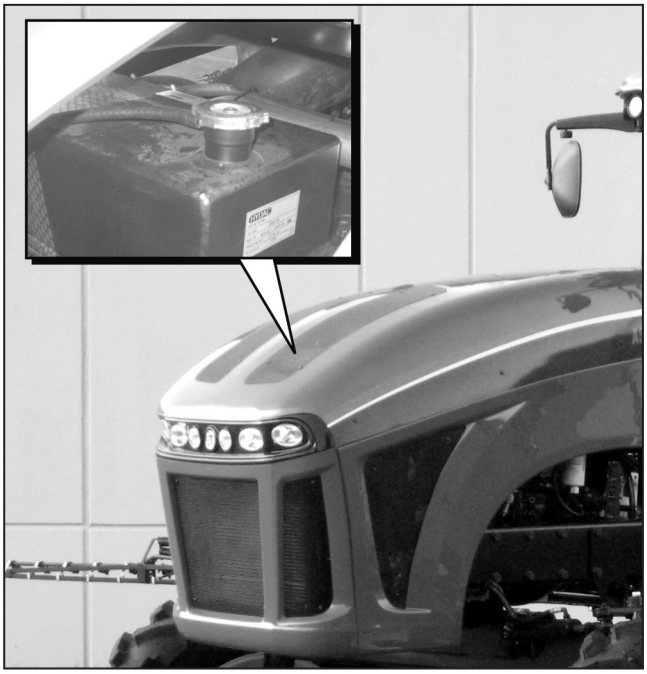
Check Cooling System

WARNING! Fire Hazard. Coolant may be flammable under certain conditions. NEVER allow coolant to come into contact with hot surfaces.

WARNING! Exposure Hazard. Wear eye protection and rubber gloves when handling engine coolant. Avoid skin contact with coolant. If contact with the eys or skin should occur, flush eyes and wash immediately with clean water.

WARNING! Burn Hazard. NEVER remove the radiator cap if the engine is hot. Steam and hot engine coolant will spray out and seriously burn you. Allow the engine to cool down before you attempt to remove the cap.

Remove the radiator cap and check the coolant level. Remove the radiator cap slowly to relieve internal pressure. The coolant should be level with the bottom of the fill neck.



Add coolant as necessary. DO NOT overfill the cooling system, as this may cause the coolant to spray from the system during operation.

NOTICE: See the engine manufacturer's manual for coolant requirements and additional cooling system information. Coolant specifications must meet or exceed ASTM D3306 / D6210 or RP-329.

Install the radiator cap.

WARNING! Burn Hazard.

ALWAYS tighten the radiator cap securely after checking the coolant. Steam can spray out during engine operation if the cap is loose.

Inspect the cooling system 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.

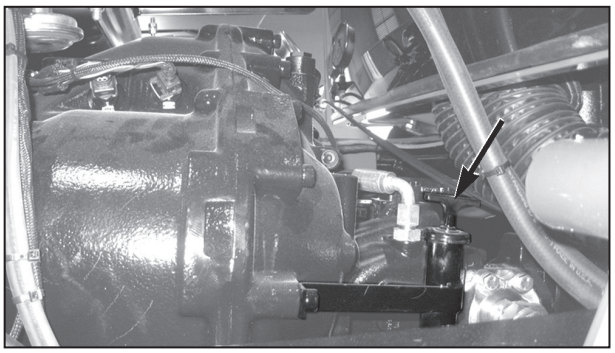


Cycle Fan Reverser

Operate this function until the radiator and coolers are free of dust and debris. For operation instructions see "Diagnostics Page 3: Fan Control" on page 3-8.

Check Transmission Fluid Level

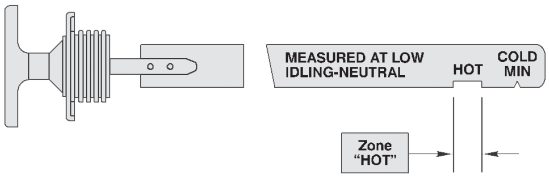
The transmission oil dipstick is located in the engine compartment, on the left side of the engine, and toward the cab.



NOTE: All measurements must be taken with the engine running at low idle.

The transmission oil level check must be carried out as follows:

- Check transmission oil level weekly
- Machine on level ground
- Transmission in Neutral position
- In the cold start phase, the engine must be running approximately 2 to 3 minutes at idle speed. The transmission oil level must be above the cold start mark "COLD MIN".



Turn the dipstick handle counterclockwise to loosen.

Remove the dipstick and check the transmission level.

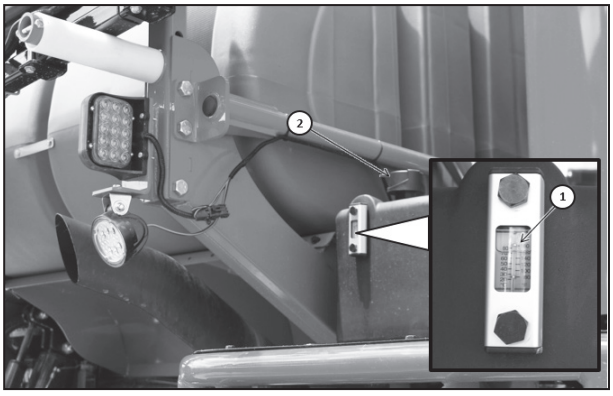
NOTICE: DO NOT overfill the transmission fluid. Overfilling can damage the transmission or cause the transmission to malfunction or overheat.

NOTICE: Use only Lucas 15W-40 Magnum motor oil.

Check Hydraulic Fluid Level

NOTICE: The machine must be on level ground with the booms 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 Apache Sprayer and a sight glass (1) indicates the hydraulic fluid level and temperature.



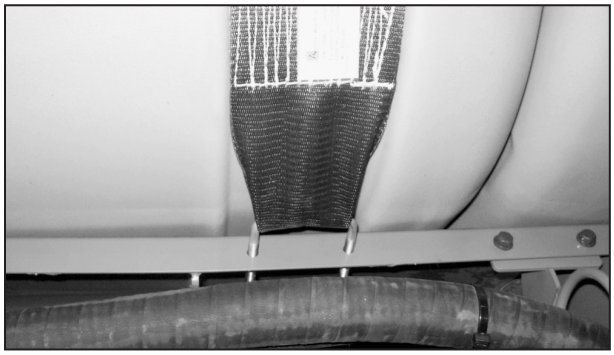
NOTICE: Use only Lucas Universal Hydraulic Fluid, or equivalent, for the Apache Sprayer hydraulic system.

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

NOTICE: DO NOT fill more than 3/4 up on the sight glass.

Adjust Poly Tank Straps

Check the poly tank straps while the tank is at least 50% full. If the straps feel or appear loose, tighten them evenly from side to side without deforming the tank, bolts, or the tank cradle.



Every 40 Hours

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

Torque Lug Nuts

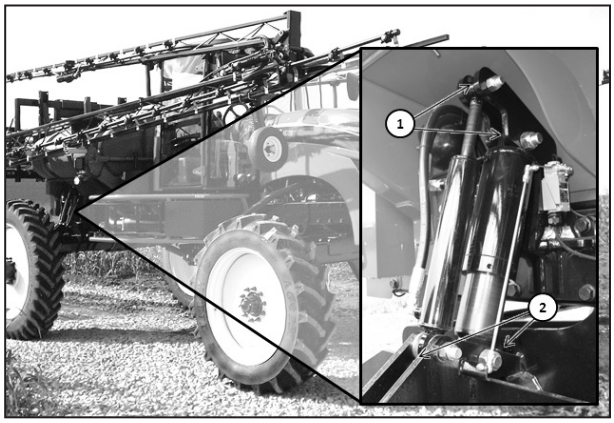
Torque all the wheel lug nuts to:

- 420 lb-ft [569 N•m]



Grease Rear Suspension

Apply Lucas lithium grease or equivalent to the upper (1) and lower (2) grease fittings at each end of the suspension cylinders.



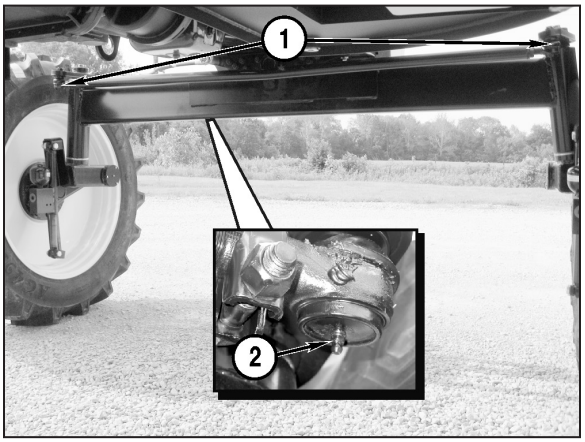
Note: A block can be used between the frame rail and rear axle to relieve load from the suspension cylinder ball joints. By disconnecting the suspension switch ball joint, the suspension can be manually lowered onto the block between the axle and frame. This will allow the ball joints to take an adequate amount of grease.

Grease Steering Components

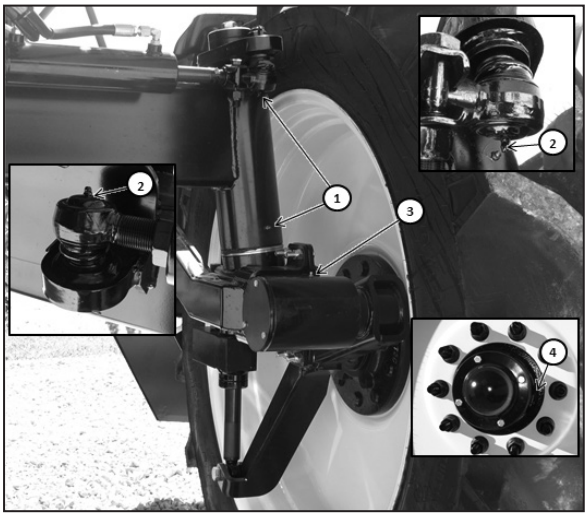
NOTICE: DO NOT over-grease the ball joints. Damage to the dust cover will result.

The Apache Sprayer has four ball joint grease fittings, four king-pin grease fittings and two hub grease fittings.

Apply Lucas lithium grease or equivalent through the ball joint grease fittings on each end of the tie rod (1) and on the steering cylinder (2).



Grease Front Strut and King-pins



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

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

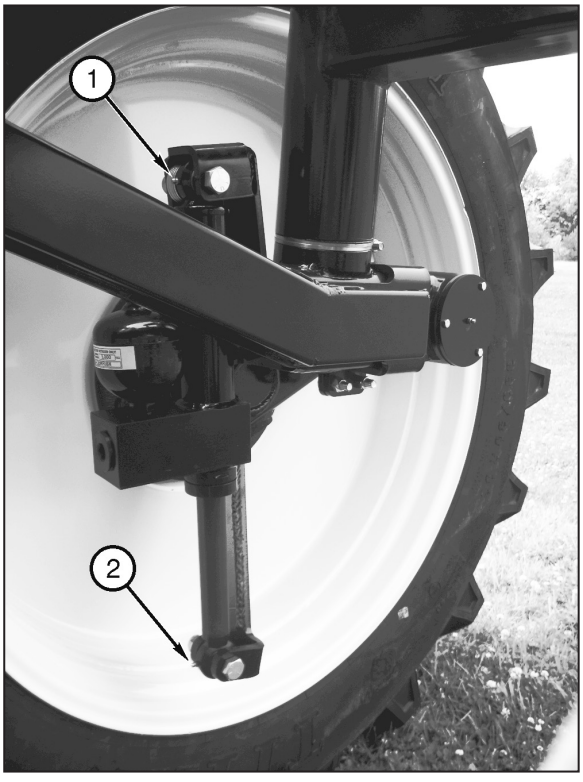
Apply lithium grease through the two king-pin grease fittings (1).

Apply lithium grease through the two ball-joint grease fittings (2) on the tie rod ends.

NOTE: The inter-flex (3) and hub (4) bearing 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).



The front strut is equipped with one upper (1) and one lower (2) grease fitting per side.

Apply Lucas lithium grease or equivalent through each grease fitting.

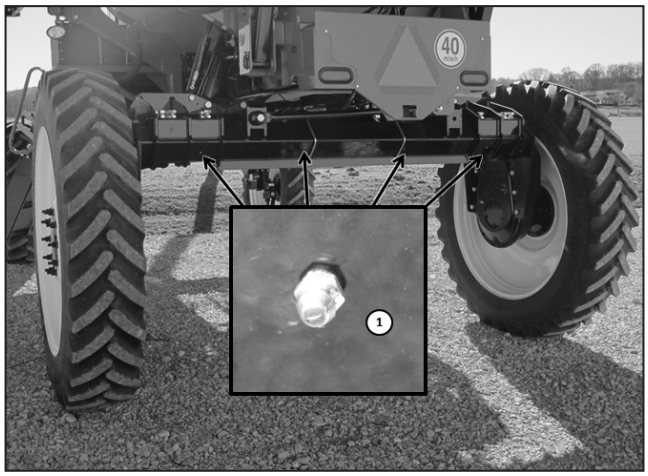
Repeat these steps for the other front wheel.

Grease Axle Components (adjustable only)

The rear axle is equipped with 24 grease fittings, installed in two square-tube axle extension assemblies. Eight fittings point downward from the bottom faces of each square tube. Shown are the four rear-most fittings (1).

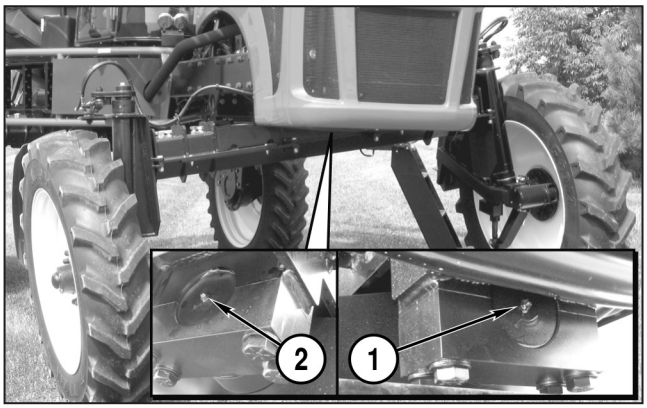
The front axle is equipped with 12 grease fittings.

Apply an ample amount of Lucas lithium grease or equivalent 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 on front (1) and rear (2) of the front axle.

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



Check Differential Fluid Level

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

With the machine parked on level ground, 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.

Install the plug and tighten.



Check Rear Differential for Leaks

Inspect the differential for leaks at the U-joint, near the drop boxes, and between inner and outer housings. Repair the leaks before operating the Apache Sprayer.

Check Park Brake Fluid Level

The park brake is located under the Apache Sprayer, between the front and rear drive shafts. The fluid fill/ level plug (1) is located on the side of the brake housing, above the brake drain plug (2).

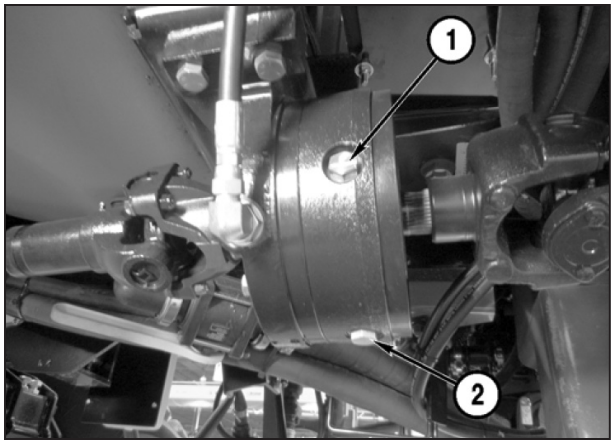
With the machine parked on level ground, remove the park brake fill/level plug (1) and check the oil level. The oil should run out of the fill port.

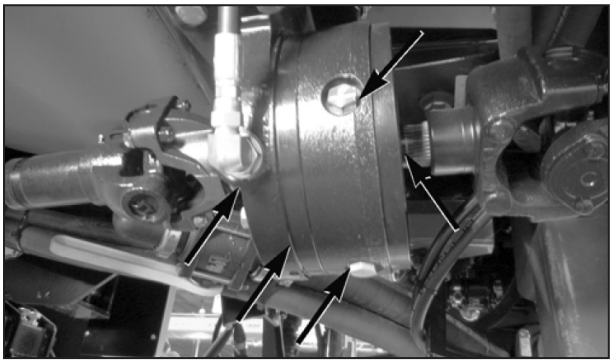
Initial fill capacity of brake housings is 14.5 ounces [428.8 ml] of Cat® TO-4 30 weight oil (or equivalent).

NOTICE: Use only fluid that meets or exceeds Cat® TO-4 30W Transmission and Drive Train Oil.

If required, add Cat TO-4 30W Transmission and Drive Train Oil, or equivalent, to fill the park brake until the oil runs out of the fill port.

Install the plug (1) and tighten.





Check Park Brake for Leaks

Inspect the park brake for leaks around the input and output shafts, around the drain and fill plugs, and around the brake housing.

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.

- Adjust Poly Tank Straps. See “Adjust Poly Tank Straps” on page 5-16.
- Change Fuel Filter. See “Change Fuel Filter” on page 5-23.
- Change Fuel Separator Filter. See “Change Fuel Separator Filter” on page 5-23.
- Change Differential Fluid. See “Change Differential Fluid” on page 5-25.
- Change Hydraulic Fluid Filter. See “Change Hydraulic Fluid Filter” on page 5-26.
- Change Park Brake Oil. See “Change Park Brake Oil” on page 5-27.
- Change Engine Oil and Filter. See “Change Engine Oil and Filter” on page 5-29.
- Change Transmission Fluid and Filter. See “Change Transmission Fluid and Filter and Clean Strainer” on page 5-30.

Every 100 Hours

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

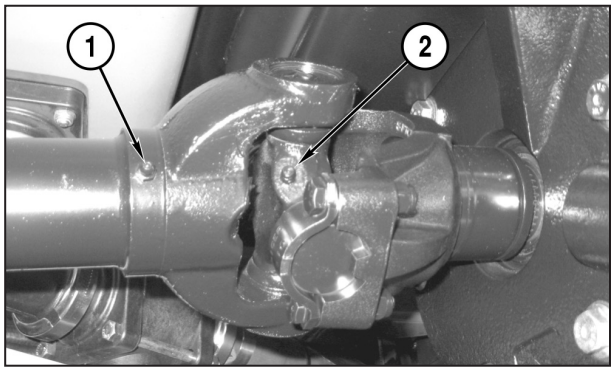
Grease Driveline Components

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.

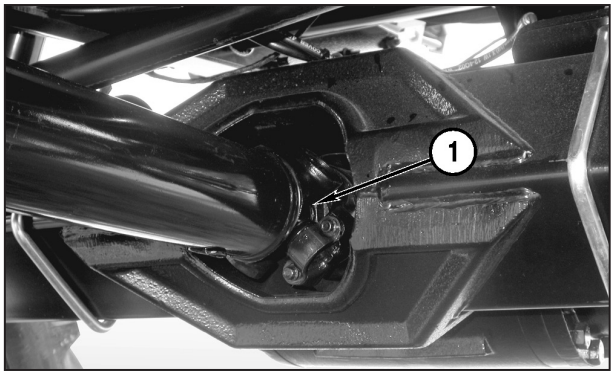
Apply an ample amount of Lucas lithium grease or equivalent through each of the fittings.

One slip joint grease fitting (1) is located under the Apache Sprayer, 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.



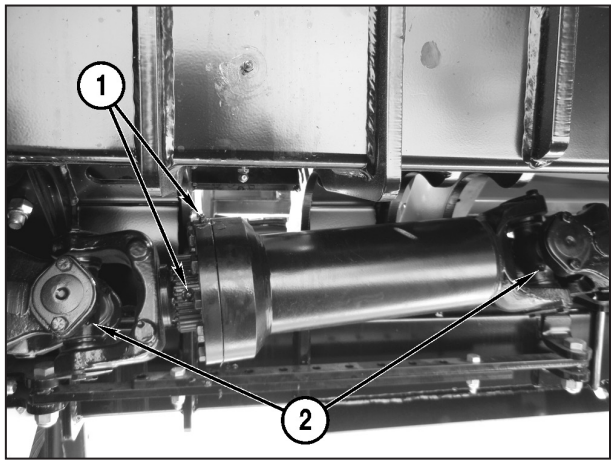
A U-joint fitting (1) is located at the differential input.



The other two slip joint grease fittings (1) are located under the Apache Sprayer, 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.



Torque Axle Extension Brace Bolts

NOTICE: There are different axle brace bolt torque values for manual and Adjust-On-The-Go axles. Follow the instructions for your application. Also, it is recommended to thread all bolts down until they make contact with the wedge blocks, verify the slider tube is centered, then tighten in a cross pattern similar to wheel lug nuts.

Manual Adjust Axles

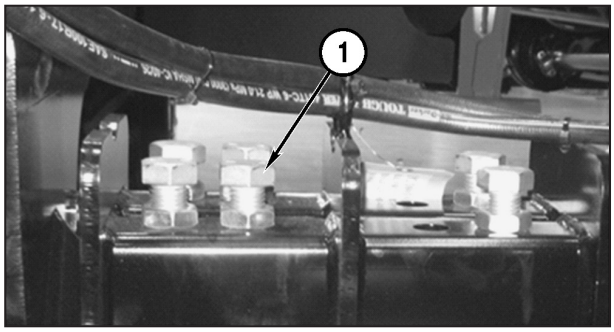
There are six axle brace bolts (1) on each front brace.

Loosen all the jam nuts.

Tighten the axle brace bolts (1) to 80 lb-ft [108 N•m].

Tighten the jam nuts.

Repeat the process for the other front axle.



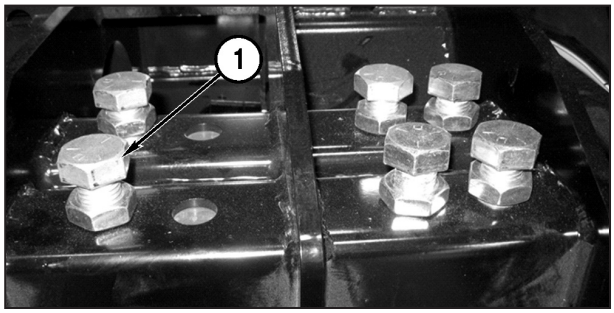
There are twelve axle brace bolts (1) on each rear brace.

Loosen all the jam nuts.

Tighten the bolts (1) to 80 lb-ft [108 N•m].

Tighten the jam nuts.

Repeat the process for the other rear axle brace.



Adjust-On-The-Go Axles

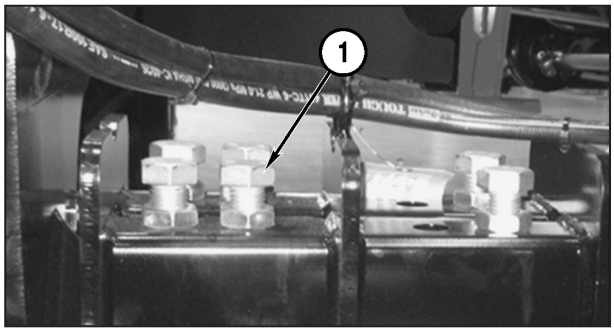
There are six axle brace bolts (1) on each front brace.

Loosen all the jam nuts.

Tighten the axle brace bolts (1) to 22 lb-ft [30 N•m].

Tighten jam nuts.

Repeat the process for the other front axle brace.



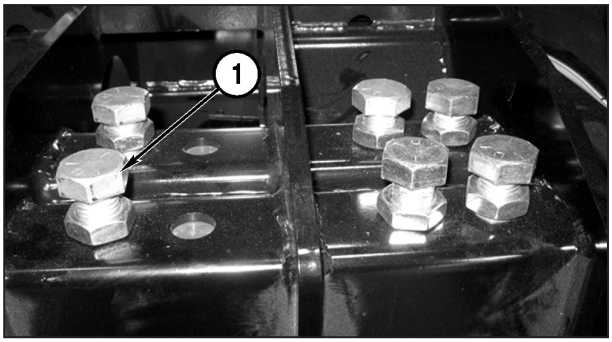
There are twelve axle brace bolts (1) on each rear brace.

Loosen all the jam nuts.

Tighten the bolts (1) to 22 lb-ft [30 N•m].

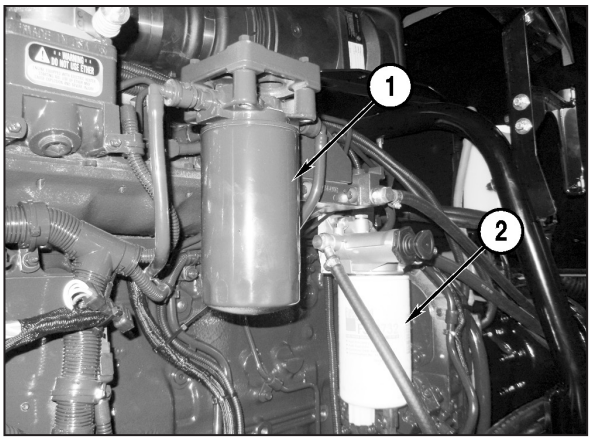
Tighten the jam nuts.

Repeat the process for the other rear axle brace.



Change Fuel Filter

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



WARNING! Fire Hazard. Wipe up fuel spills immediately. Fuel will spill from the filter and fuel lines when loosened or removed. Use a suitable container to collect the fuel and dispose of properly.

Turn the filter counterclockwise to remove. Dispose of the filter properly.

NOTICE: ALWAYS replace the fuel filter with a new fuel filter.

- Fuel 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.

Change Fuel Separator Filter

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

Turn the filter counterclockwise to remove.

Dispose of the filter properly.

NOTICE: ALWAYS replace the fuel separator filter with a new separator filter.

- Fuel Separator Filter Part Number: 201450242

Fill the new filter with diesel fuel before installing.

NOTICE: DO NOT overtighten the filter. Damage to the seal can result.

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.

Clean Fuel Tank Strainer

The fuel tank strainer is located in the fuel tank, behind the fuel supply line fitting (1).

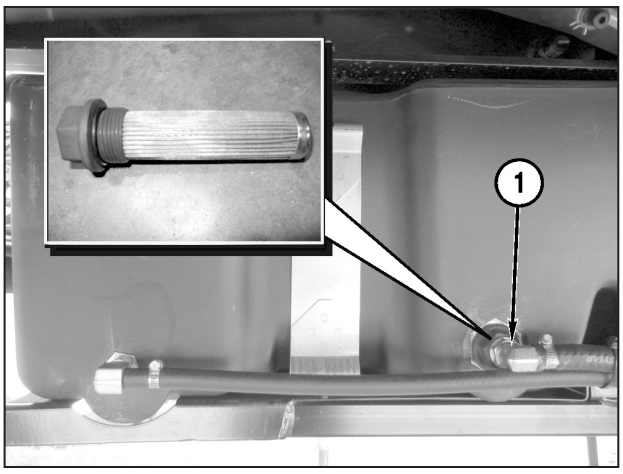
The best time to clean the fuel tank strainer is when the fuel level is low.

Drain the fuel tank and remove the 1/2" supply line fitting (1) from the tank strainer.

Unscrew the strainer from the tank and clean any debris from inside or outside of the screen. The strainer has a bypass built into the end that can potentially let debris into the inside of the strainer if it becomes completely clogged.

NOTICE: Replace the strainer if it has a hole or is damaged in any way.

- Fuel Strainer Part Number: 201450001



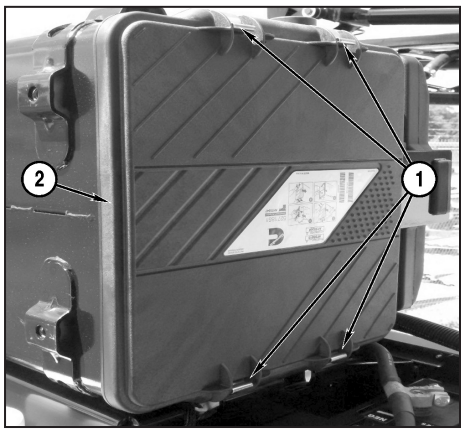
Every 250 Hours

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

Clean or Change Engine Primary Air Filter

NOTICE: When operating in severe conditions, the primary air filter should be cleaned if indicated by the console display.

NOTICE: If a "Change Air Filter" fault is indicated on the touch screen display, stop immediately and remove and clean or replace the primary air filter as needed.

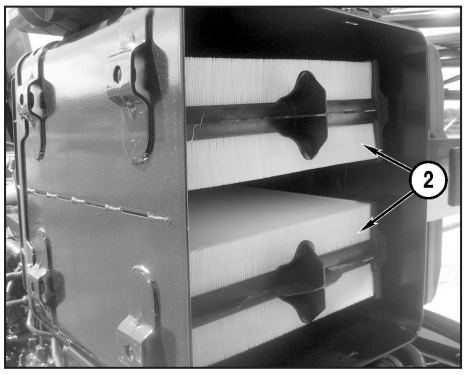


The primary air filter is mounted in the engine compartment, above the engine and toward the cab.

Clean the outside of the air cleaner assembly.

Release the four latches (1) and remove the cover from the air cleaner assembly (2).

NOTICE: NEVER clean the inner engine air filter (engine safety air filter). When it is dirty, ALWAYS replace it with a new one.



Use a rocking motion to release 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:

- Primary Engine Air Filter Part Number: 230000001

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

Change Differential Fluid



The differential is located under the Apache Sprayer, 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.

NOTICE: Use only Lucas Universal Hydraulic Fluid, or equivalent, for the differential fluid.

Remove the differential fill/level plug (1). Add fluid until it is level with the bottom of the fill/level hole.

- Differential Fluid Capacity: Approximately 11.9 quarts [11.26 liters].

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

Change Hydraulic Fluid Filter



The hydraulic fluid filter is located between the cab and product tank on the right side of the Apache Sprayer.

Remove the cover (1) from the filter housing.

Remove the filter from the assembly.

Discard the filter into an appropriate container.

Install an o-ring on the filter housing and lubricate it with clean Lucas Universal Hydraulic Fluid or equivalent.

Install the filter into the filter housing.

Install and tighten the filter housing cover.

Use the sight glass to check the fluid level. See "Check Hydraulic Fluid Level" on page 5-16.

Clean Hydraulic Fluid Strainer

The hydraulic fluid strainer is located under the Apache Sprayer, on the side of the hydraulic fluid reservoir. The strainer is in line with the hydraulic fluid line.



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 40 gallons [151.42 liters].

Install the drain plug.



Remove the hydraulic fluid line (1).

Remove the strainer (2).

Clean the strainer with diesel fuel and allow to air dry.

Dispose of the fuel properly.

NOTICE: If the strainer cannot be cleaned or has holes in the screen, replace with new strainer.

Install the hydraulic fluid strainer (2).

Hydraulic Fluid Strainer Part Number: 840000010.

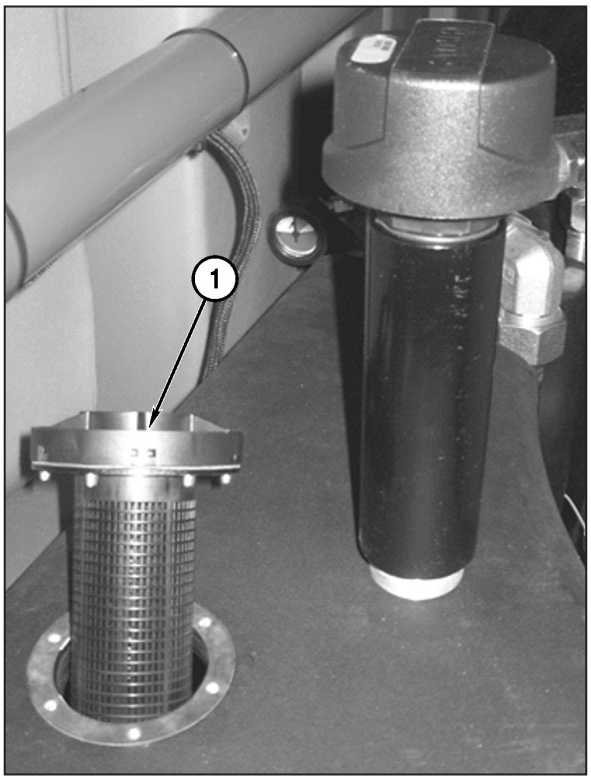
Install the hydraulic line (1).

NOTICE: Use only Lucas Universal Hydraulic Fluid, or equivalent, for the Apache Sprayer hydraulic system.

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

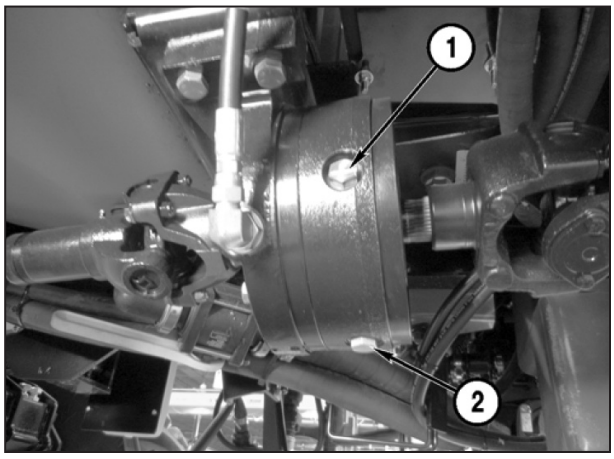
Fill the hydraulic fluid reservoir with Lucas universal Hydraulic Fluid or equivalent. The reservoir capacity is approximately 40 gallons [151.42 liters].

Use the sight glass to check the fluid level. See "Check Hydraulic Fluid Level" on page 5-15.



Change Park Brake Oil

The park brake is located under the Apache Sprayer, between the front and rear drive shafts. The park brake fluid fill/level plug (1) is located on the side of the brake housing, above the brake drain plug (2).



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

Install the drain plug (2) and tighten.

Remove the fluid fill/level plug (1) and fill with Cat TO-4 30W Transmission and Drive Train Oil, or equivalent.

Initial fill of the park brake is 14.5 oz. When changing the oil and refilling the brake, add enough oil to the brake to allow it to run out of the fill port.

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

NOTICE: Use only fluid that meets or exceeds Cat TO-4 30W Transmission and Drive Train Oil.

Check the torque of the 6 brake assembly bolts. Torque them to 85 ft.lb.

Drive the Apache Sprayer for 10 minutes then check the fluid level. The oil should be running out the fill port. If it is not, add enough oil to the brake so that the oil will run out of the fill port. Then re-install and tighten the fill port plug.

Every 500 Hours or Yearly

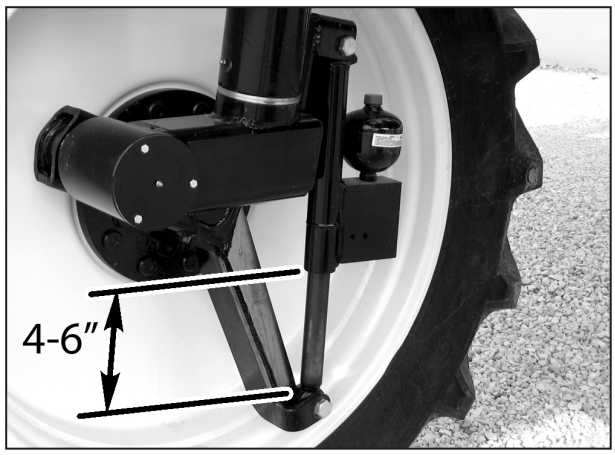
NOTE: Some services at this interval were performed at the "After First 100 Hours" interval. If the service was performed as prescribed, measurement of 500 hours should begin at the 100 hour mark.

The following services must be performed after every 500 hours of operation or yearly.

Inspect Front Accumulator and Suspension Cylinder

Inspect the front accumulators and suspension cylinders for hydraulic leaks and correct operation. Typically, the cylinder should have 4 to 6 in. [101.6 to 152.4 mm] of the cylinder ram showing while the Apache Sprayer 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.



Check Front Suspension Cylinder Fluid Level

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

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

NOTICE: If the fluid is foamy, the cylinder has failed. Contact your dealer for repair.

NOTICE: Use only Lucas Universal Hydraulic Fluid, or equivalent, for the suspension cylinder fluid.

If required, add Lucas Universal Hydraulic Fluid, or equivalent, to fill the suspension cylinder to the bottom of the hole.

Install the plug (1) and tighten.



Check Accumulator Charge

Safely raise the front of the Apache Sprayer 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 pressure.

- AS1030 and AS1230 Accumulator Nitrogen Pressure: 900 psi [62 bar]

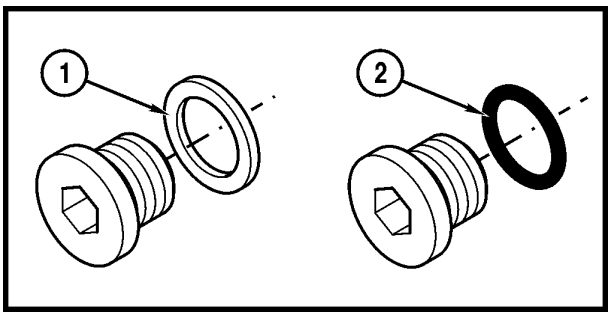
NOTE: It may be necessary to top off the nitrogen level yearly.

NOTICE: If oil comes out of the accumulator charge port, the accumulator has failed. Contact your dealer for a replacement accumulator.

Change Engine Oil and Filter

WARNING! Burn Hazard. If you must drain the engine oil while it is still hot, stay clear of the hot engine oil to avoid being burned. ALWAYS wear eye protection.

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

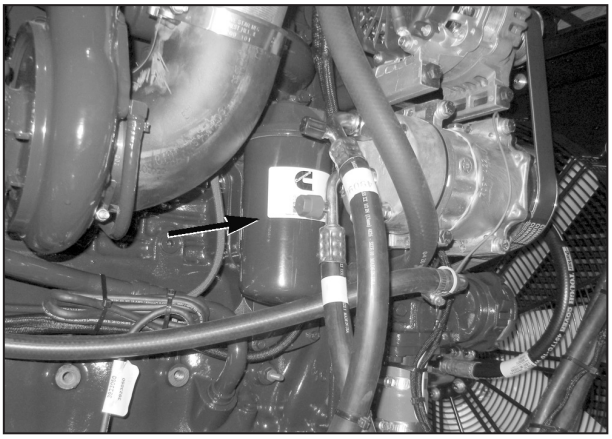


The engine oil drain plug is located on the bottom of the oil pan. Remove the engine oil drain plug and drain the oil into a suitable container. Properly dispose of the used engine oil.

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 counterclockwise to remove. Dispose of the filter properly.

NOTICE: DO NOT overtighten the filter. Damage to the seal can result.

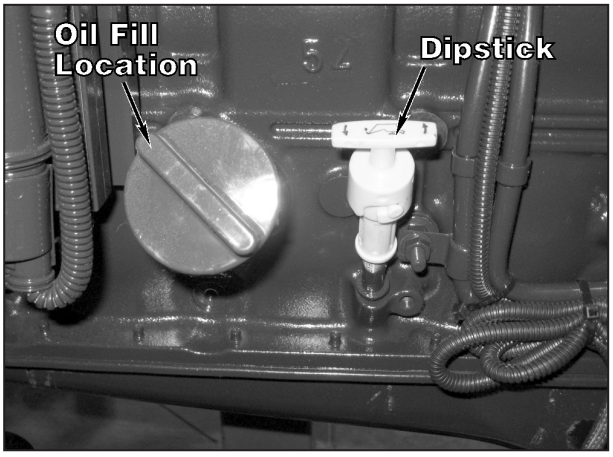
Lubricate the seal on the engine oil filter.

- Engine Oil Filter part Number: 201450241.

Install and tighten the filter, by hand, 3/4 to 1-1/4 turns after the seal contacts the filter housing.

NOTICE: DO NOT overfill the engine oil. Crankcase oil capacity can vary. ALWAYS use the dipstick to determine if the engine oil is to the appropriate level.

Fill the engine with high quality Lucas 15W-Magnum motor oil or equivalent at the oil fill location on the left side of the engine.



- Engine Oil Capacity: Approximately 16 quarts [15 liters]

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

Install the dipstick.

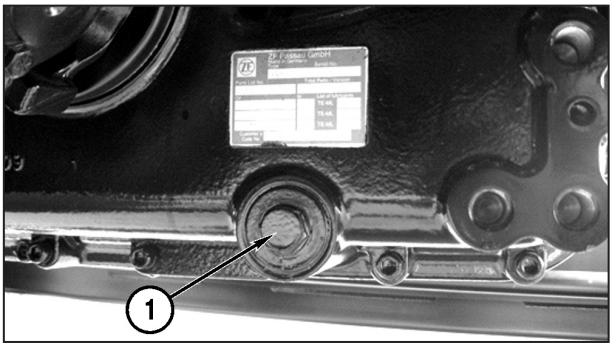
Operate the engine and check for leaks.

Shut off the engine and wait 10 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.

Change Transmission Fluid and Filter and Clean Strainer

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



Park the machine on firm, level ground and apply the parking brake. Turn engine OFF and disconnect the battery.

Note: The transmission should be at operating temperature and the Apache Sprayer on level ground.

Drain the oil as follows:

- Place a used oil container of suitable size under the transmission.
- Remove the transmission oil drain plug (1) and drain the used oil.
- The drain plug contains a magnetic insert. Be sure to clean any debris clinging to the plug. Clean the sealing surface on the housing.
- Install the plug with new o-ring.



Unscrew and remove the filter.

Do not allow any dirt or oil sludge to enter the transmission oil system.

NOTICE: Do not install damaged filters.

NOTICE: Due to high system pressure, only use filters approved by ZF or Equipment Technologies.

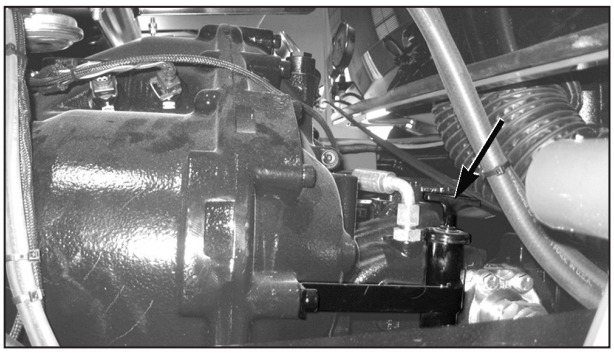
The filter differential pressure valve (bypass valve) is equipped with a filter contamination switch which informs the driver of ZF-Fine filter contamination. When the warning lamp is illuminated, the ZF-Fine filter must be changed.

NOTICE: The transmission oil filter must be changed at every transmission oil change.

Lubricate the seal on the transmission oil filter.

- Transmission Oil Filter

  Part Number: 310100001



Install and tighten the filter, by hand, 1/3 to 1/2 turns after the seal contacts the filter housing.

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

Fill the system with new transmission oil through the dipstick tube.

- Transmission oil capacity: 27 quarts [25.6 liters]

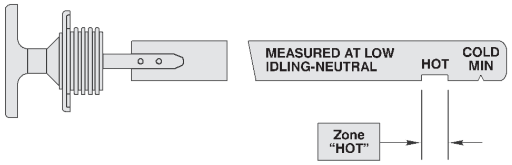
NOTICE: DO NOT overfill the transmission oil. Overfilling can cause damage to the transmission or cause the transmission to malfunction.

NOTICE: Use only Lucas 15W-40 Magnum engine oil or equivalent.

NOTE: All measurements must be taken with the engine running at low idle.

The transmission oil level check must be carried out as follows:

- Check transmission oil level weekly
- Machine on level ground
- Transmission in Neutral position
- In the cold start phase, the engine must be running approximately 2 to 3 minutes at idle speed. The transmission oil level must be above the cold start mark “COLD MIN”.



Turn the dipstick handle counterclockwise to loosen and remove the dipstick.

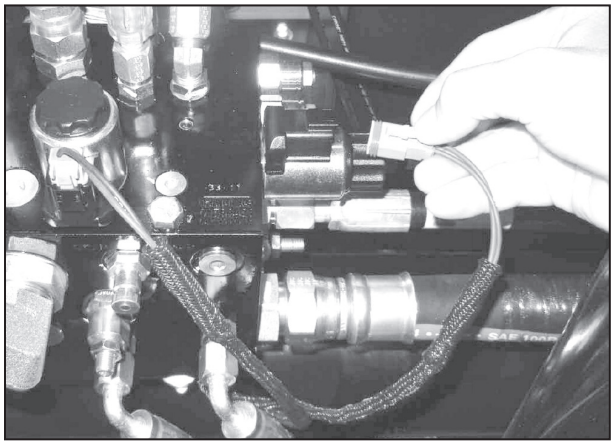
Check the transmission oil level. Add oil as needed.

Install the dipstick and turn the handle clockwise to tighten.

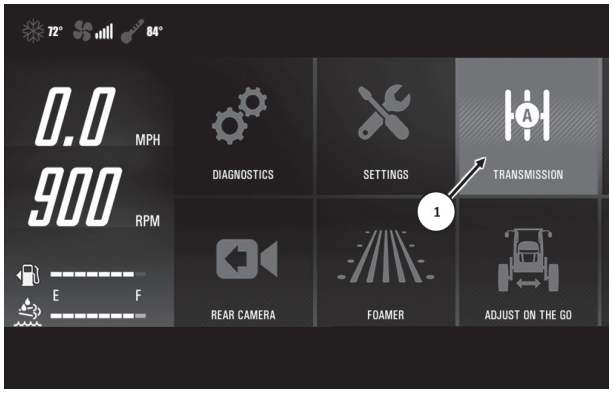
NOTE: The transmission must be calibrated after every oil and filter change.

Transmission Calibration Procedure

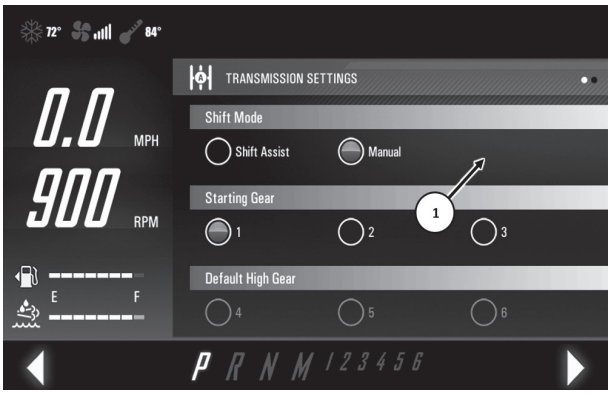
1. Start the machine and operate until the engine reaches normal operating temperature.
2. Move the machine to a safe, level area.
3. Shut the machine OFF.
4. Disconnect the parking brake coil (2-pin Deutsch plug on the junction block, under the cab).
5. Start the machine.



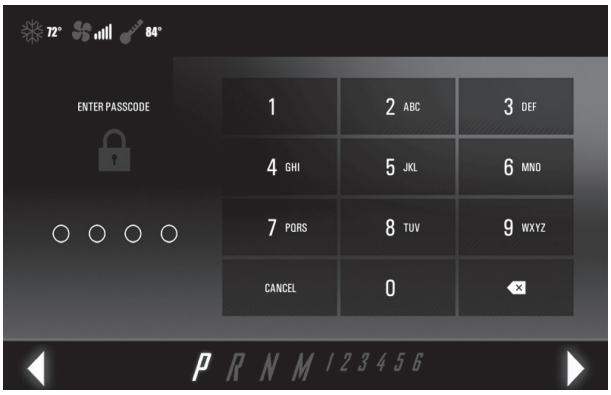
6. Slide the Home Screen to the left to access the App Screen. Then touch the Transmission App (1).



7. Swipe the first Transmission Settings Screen to the left to access the Passcode page.



8. Enter the Passcode "2201" to access the Transmission Calibration page.



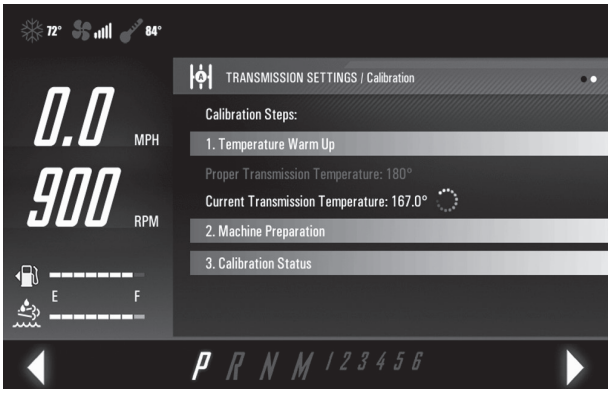
9. Warm the transmission oil to 180˚F [82˚C].

   A. Depress the brakes and shift the transmission into 6th gear.

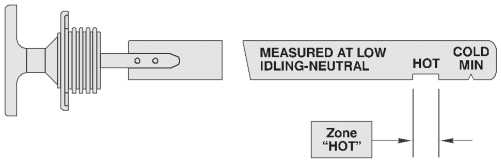
   B. While still holding the brakes, rev the engine to full throttle and hold for a maximum of 30 seconds (parking brake still unplugged).

   C. Idle down and shift into neutral. Wait at least 15 seconds to allow the hot oil in the torque converter to properly distribute.

   D. Repeat steps A through C until the transmission temperature is 180˚F [82˚C]. Do not extend step B beyond 30 seconds. Damage to the transmission could occur.



10. With the parking brake applied, engine idling and transmission in neutral, check the transmission oil level. It should be within the hot zone. Fill or drain as required.



11. Warm the transmission oil to 185˚F [85˚C].

    A. Depress the brakes and shift the transmission into 6th gear.

    B. While still holding the brakes, rev the engine to full throttle and hold for a maximum of 30 seconds (parking brake still unplugged).

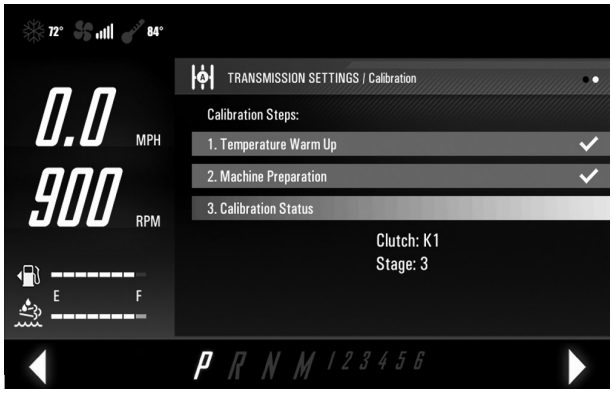
    C. Idle down and shift into neutral. Wait at least 15 seconds to allow the hot oil in the torque converter to properly distribute.

    D. Repeat steps A through C until the transmission temperature is 185˚F [85˚C]. Do not extend step B beyond 30 seconds. Damage to the transmission could occur.

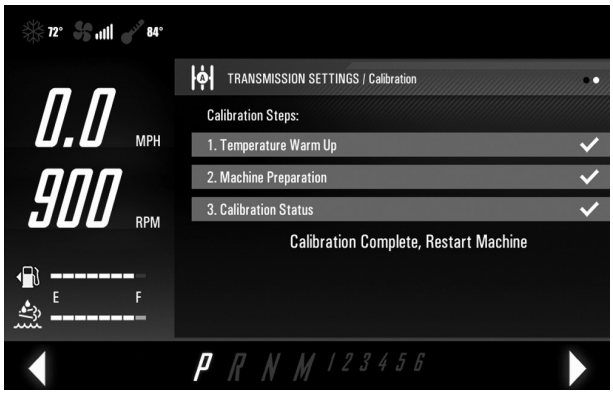
12. Calibrate the transmission. With the transmission temperature at 185˚F [85˚C], parking brake applied, engine idling, and transmission in neutral, touch the "Begin" button.



13. The cal sequence will take a few minutes as it runs through 7 clutches; K1, K2, K3, K4, KV, KR and WK. The current clutch and stage are displayed on the screen.The transmission temperature will decrease during calibration.

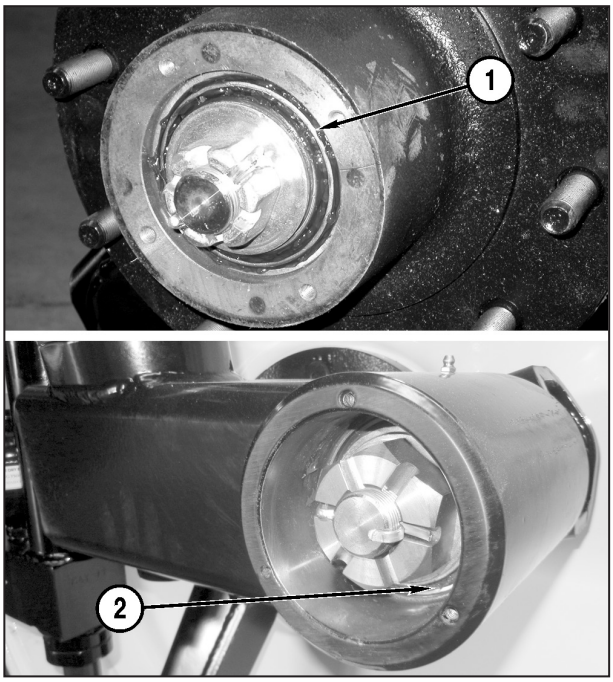


14. If there is an error during the calibration, the calibration will stop and an error code will be displayed on the screen. Refer to the ZF Fault Code List to determine the error code. Resolve the error, restart the machine and return to step 11 to rerun the calibration.
15. Calibration Complete will be displayed if there are no error codes.
16. Turn the engine OFF and WAIT at least 30 seconds.
17. Reconnect the parking brake 2-pin Deutsch plug on the junction block under the cab.
18. Start the machine and verify the functionality of the transmission.



Inspect and Repack Wheel and Inter-Flex Bearings

Contact your dealer to inspect and repack the wheel (1) and inter-flex (2) bearings.

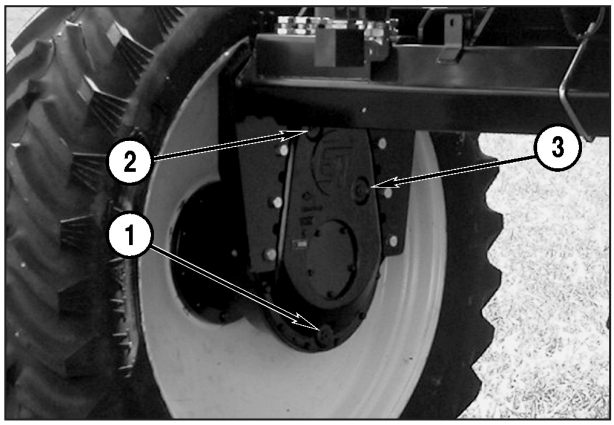


Change Final Drive Fluid

Depending on the machine's crop clearance, the Apache Sprayer is equipped with either a drop box or planetary final drive.

Drop Box

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 (1).

NOTICE: Use only Lucas 80/90 Gear Oil or equivalent 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).

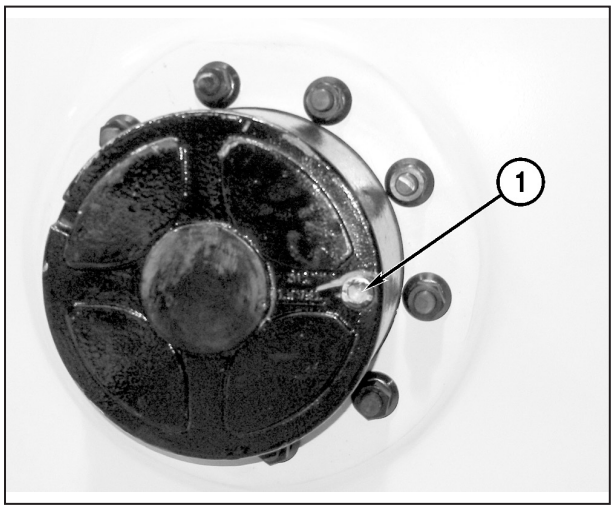
- Drop Box Fluid Capacity: Approximately 21 quarts [20 liters]

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

Repeat the steps for the other drop box.

Planetary

The planetaries 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, drain the fluid into a suitable container and 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.

NOTICE: Use only Lucas 80/90 Gear Oil or equivalent for the planetary fluid.

Fill each planetary with Lucas 80/90 Gear Oil or equivalent to the bottom of the fill hole.

- Planetary Fluid Capacity: Approximately 2.9 quarts [2.7 liters].

Install the plug (1) and tighten.

Change Cab Charcoal Filter

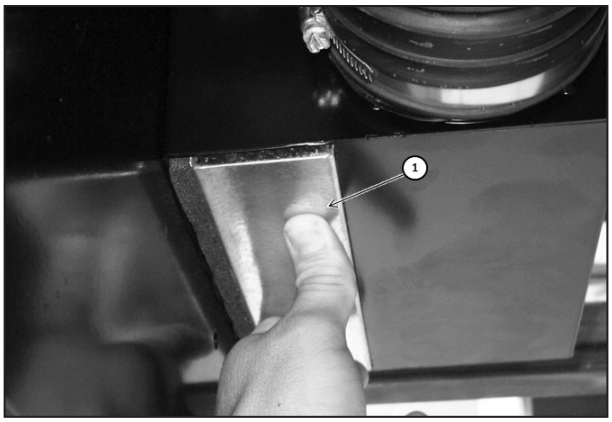
NOTICE: DO NOT attempt to clean the old cab air filter. ALWAYS replace with a new filter.

The charcoal air filter is located under the cab, connected to the A/C box.

Remove the knob screw (1) by turning to the left to loosen.



Remove and discard the filter (1) by sliding it out.



Insert the new filter into the frame with the air-flow arrow pointing toward the A/C box.

- Charcoal Air Filter
  Part Number: 490003651



Close the cover and install the knob screw by turning to the right to tighten.

Every Year

The following services must be performed every year.

Adjust Toe-In (Standard 120" Axles)

Measure Toe-In

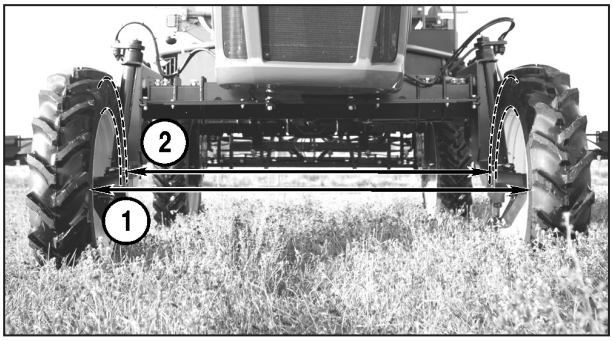
Safely lift the front of the Apache Sprayer so the front tires are slightly off of the ground.

Turn the steering wheel so the front wheels are pointing straight.

Measure and note the distance between the left and right tires at the front (1) of the tires and at the rear (2) of the tires.

The distance at the front (1) of the tires should be 0.25 in. [6.35 mm] less than at the rear (2) of the tires.

If the toe-in is not approximately 0.25 in. [6.35 mm], the toe-in must be adjusted.



Adjust Toe-In

Loosen the jam nut (1) at each end of the tie rod (2).

Turn the tie rod clockwise (as viewed from the left side) to increase toe-in.

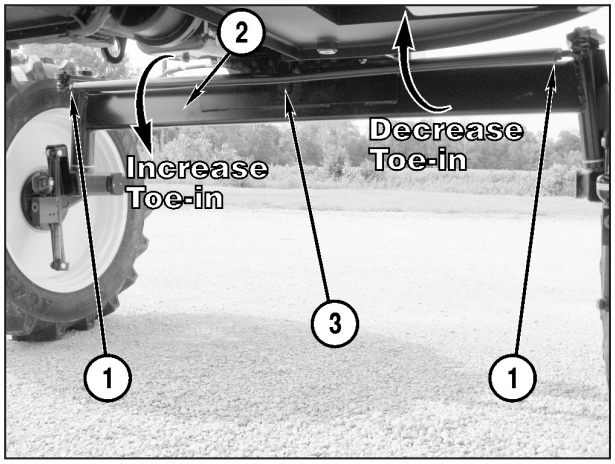
Turn the tie rod counterclockwise (as viewed from the left side) to decrease toe-in.

Position the tie rod so the bend (3) is pointing downward and tighten the jam nuts.

Once the toe-in is set, turn the wheels all the way to the left and measure the distance between the left strut tower (1) and the axle tube (2).

Turn the wheels all the way to the right and measure the distance between the right strut tower and axle tube (2).

The distance should be equal on both sides. If the distance is not equal, the steering cylinder rod must be adjusted.

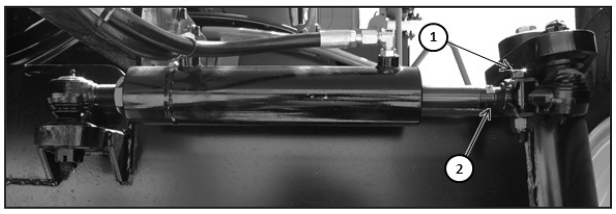


To adjust the steering cylinder rod:

Loosen the nut and bolt on the steering cylinder clamp (1).

Use a wrench on the ball joint end (2) to adjust the spacing.

- If distance between the strut tower and axle tube is greater on the left wheel, turn the ram counterclockwise (as viewed from the ram end of the cylinder).
- If distance between the strut tower and axle tube is greater on the right wheel, turn the ram clockwise (as viewed from the ram end of the cylinder).



Adjust Toe-In (120" to 160" Adjustable Axles)

NOTICE: On adjustable axle machines, the steering must be re-phased before measuring or adjusting the toe-in.

Rephase the Steering

NOTE: This process will be easier with warm oil.

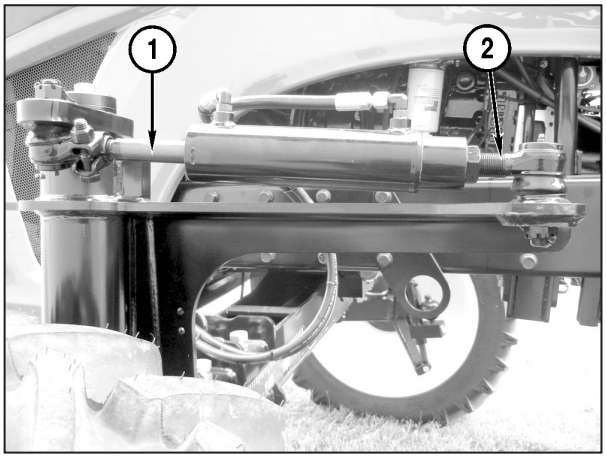
Lift the front wheels off the ground.

Turn the wheel to the right extreme and continue to turn 100 complete revolutions.

Turn the wheel to the left extreme and continue to turn 100 complete revolutions.

Measure Tie Rods

Measure the rear tie rod ends (2) on the left and right steering cylinder. The measurements must be equal and between 4.125 in. [104.7 mm] and 4.5 in. [114.3 mm]. Adjust the tie rods if necessary.



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.

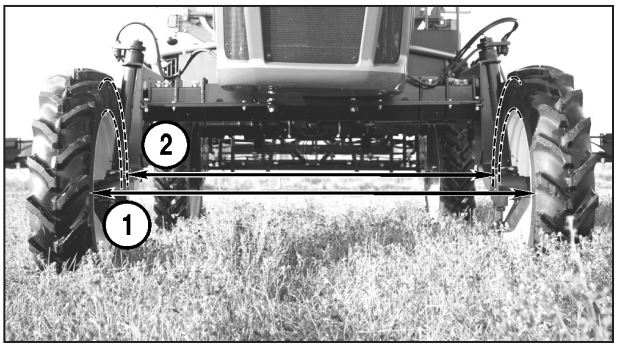
Make sure the tie rod end's ball joints are fully seated in the taper.

Measure the distance that the steering cylinder ram is extended on the left and right wheel. The measurements must be equal and between 3.87 in. [98.4 mm] and 4.125 in. [104.7 mm].

Adjust the steering cylinder rams by turning the wheel to the left or to the right until they have an equal amount of ram protruding.

Measure Toe-In

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



Turn the steering wheel so the front wheels are pointing straight.

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

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

If distance (1) is 0.25 in. [6.35 mm] 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 left hub to the right rim, to measure toe-in for the right wheel.

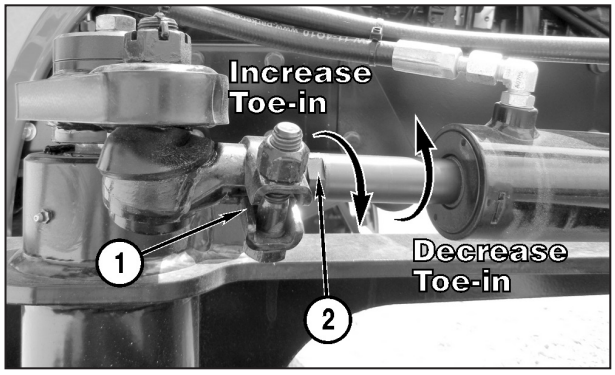
Adjust the toe-in on each wheel until it meets specification.

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.



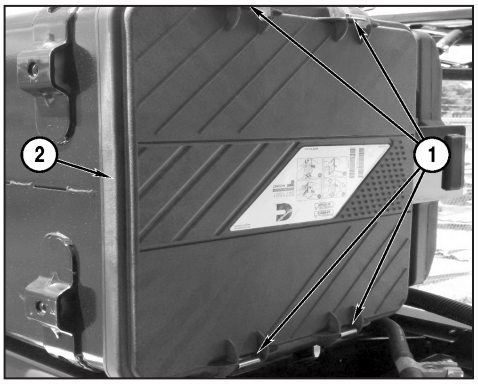
Change Engine Safety Air Filter

NOTICE: DO NOT attempt to clean the engine safety air filter. ALWAYS replace with a new filter.

The engine safety air filter is mounted in the engine compartment, above the engine and toward the cab. It is in the same housing as the primary engine air filter.

Release the four latches (1) remove the cover from the air cleaner assembly and remove the primary air filter and set it aside.

NOTICE: 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.



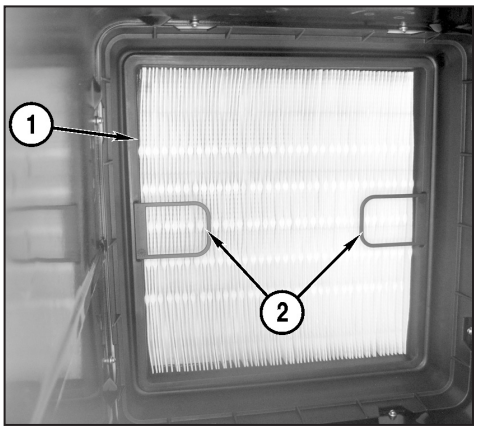
Use the pull tabs (2) to remove the engine safety air filter (1) and discard the old filter.

Install the new engine safety air filter.

- Engine Safety Air Filter

  Part Number: 230000002

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 4-21.

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

Close the rinse tank valve, foam marker valve, and sump valve.

Set all boom section switches to the ON position and press the agitation decrease button to turn agitation off.

Connect a compressed air line to the main fill valve (1). Apply compressed air at 40 psi [2.7 bar] to blow out the wet system and booms.

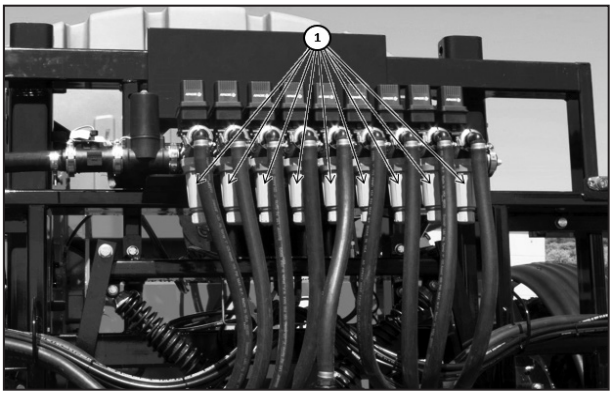


Cycle the boom section switches (2) off and on several times to purge water from around the valves.

Disconnect the air line and close the product fill valve.

NOTICE: Drain the rinse tank and foam tank to prevent damage during storage.

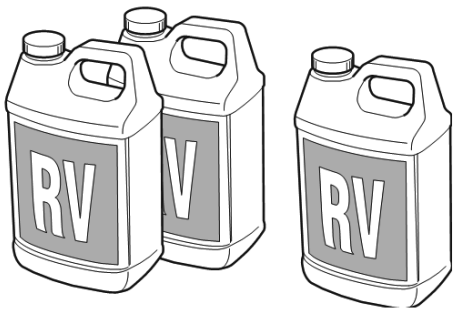
Remove all boom section strainers (1) and the product strainer.



Reinstall the strainer bowls.

Store the strainers in a warm, dry location.

Pour approximately 20 gallons [76 liters] of RV antifreeze into the product tank.



NOTICE: Boom lengths over 60 ft will require more than 20 gallons [76 liters] of antifreeze.

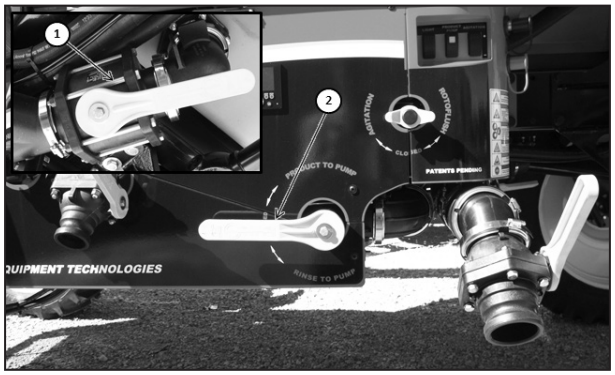
Pour 1 gallon [4 liters] of RV antifreeze into the rinse tank.

Repeatedly open and close the sump valve (1) and rinse tank/product valve (2), 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.



NOTICE: 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 (2) to the OFF position and press the agitation increase button (3).

Set the product pump switch (1) to the ON position.

Press the agitation decrease button (3) to turn agitation off. One at a time, set the boom section switches (2) to the ON position until antifreeze flows from the open nozzle in each boom section.

Turn the boom section switches (2) to OFF.

Set the product pump switch (1) to the OFF position.

NOTE: Excess antifreeze may be left in the sprayer.



Every 1000 Hours or Yearly

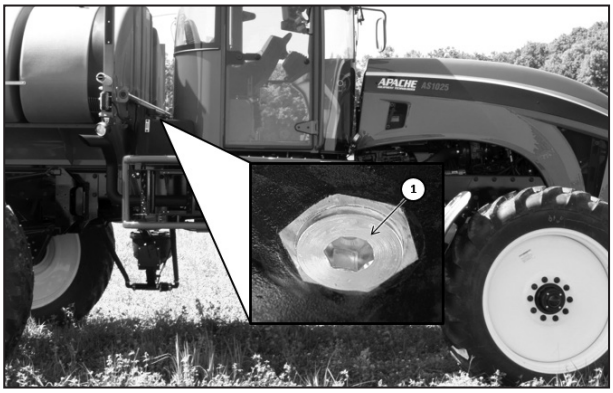
The following services must be performed after every 1000 hours of operation or yearly.

Change Hydraulic Fluid

The hydraulic fluid drain plug (1) is located on the hydraulic fluid reservoir, between the cab and the product tank.

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 more than 40 gallons [151.42 liters]. Dispose of the fluid properly.

Install the drain plug (1).



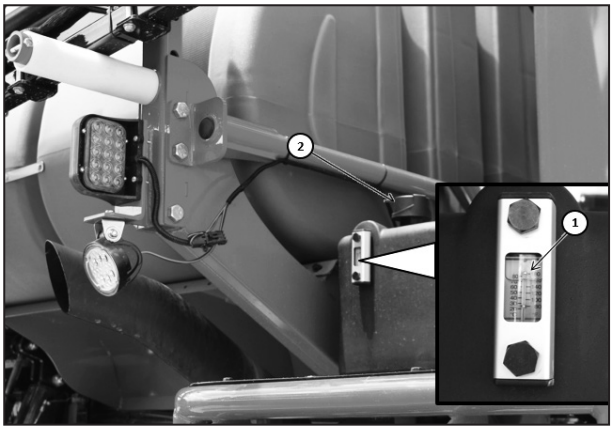
NOTICE: Use only Lucas Universal Hydraulic Fluid, or equivalent, for the Apache Sprayer hydraulic system.

Remove the hydraulic fluid reservoir cap (2) and fill with Lucas Universal Hydraulic Fluid or equivalent.

- Hydraulic Fluid Reservoir Capacity: Approximately 40 gallons [151.42 liters]

Use the sight glass (1) to check the fluid level. See "Check Hydraulic Fluid Level" on page 5-15.

NOTE: The sight glass also shows hydraulic fluid temperature.



Change DEF Suction Strainer

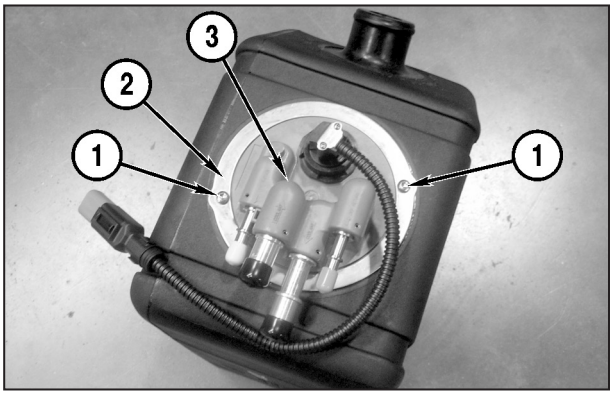
The DEF suction strainer is located in the DEF tank on the left side of the machine.

To reduce the possibility of injury from hot coolant spray, turn the engine off and, with locking pliers, pinch the DEF heater hoses closed. The heater hoses are a larger diameter hose and connect to the larger fittings on the unit.

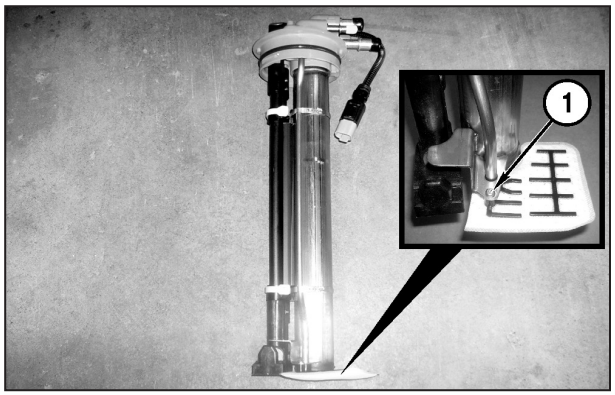
Note hose location for assembly.

Disconnect all the hoses and frain the fluids into a suitable container. Dispose the fluids properly.

Remove the two screws (1) and retaining ring (2) that hold the DEF level/temperature unit (3) in place.



Lift the unit out of the tank and remove the suction screen retaining screw (1) from the foot of the suction tube. Remove the screen and replace it with a new one.



- DEF Suction Strainer

  Part Number: 241000008

Place the DEF level/temperature unit back into the tank and orient the hose barbs as they were originally.

Install the retaining ring and mounting screws. Tighten the screws to 20 to 30 in. lb. [2.26 to 3.38 N•m]

Connect the hoses and release to clamps on the heater hoses.

Every 2000 Hours

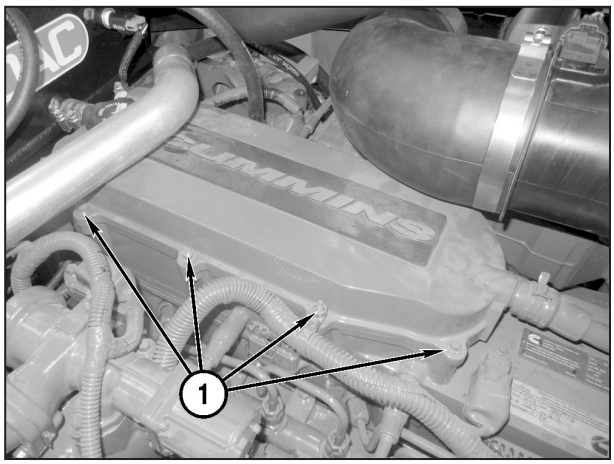
The following services must be performed after every 2000 hours of operation of the Apache Sprayer.

Change Crankcase Ventilation Filter

Remove the perimeter capscrews (1) on the crankcase ventilation filter cover.

Remove the cover and change the filter.

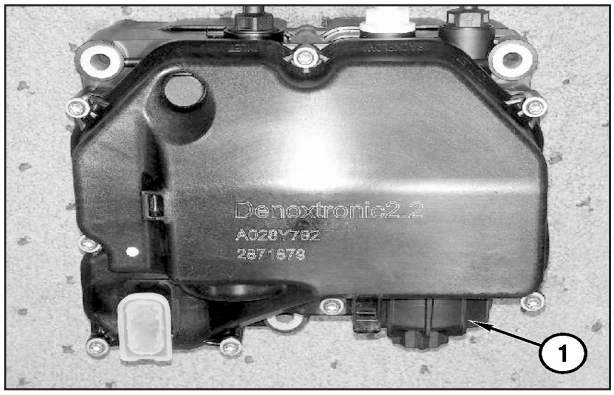
- AS1030 and AS1230 Crankcase Ventilation Filter Part Number: 272000001



Every 4500 Hours or 3 Years

The following services must be performed after every 4500 hours or 3 years of operation.

Change DEF Supply Module Filter



Remove the DEF filter cap (1) and filter from the supply module.

Install the new filter and replace the cap.

- DEF Supply Module Filter

  Part Number: 241000009

APACHE™

Chapter 6

TORQUE VALUE CHARTS

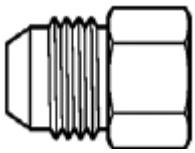
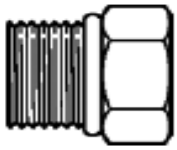
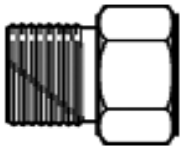
Fittings

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

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

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

Size Chart

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

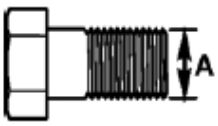
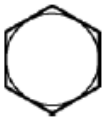
Torque Value Chart

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

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

									
		Metric Grade 8.8		Metric Grade 10.9		Metric Grade 8.8		Metric Grade 10.9		
Diameter and Thread Pitch (Millimeters)	Wrench size	Course Thread				Fine Thread				Diameter and Thread Pitch (Millimeters)
		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

NOTES

APACHE™

Chapter 7

TROUBLESHOOTING

Apache Sprayer Troubleshooting Symptoms and Solutions

If your issue was not resolved by using the troubleshooting guide, contact your dealer for more help.

SYMPTOM	SOLUTION
Parking brake will not engage.	Check electrical coil on hydraulic junction block, under cab, for power. Check hose connections to brake canister on transmission.
Apache Sprayer will not move forward or backward.	Parking brake is engaged. Check electrical connections on parking brake and transmission.
Constant alarm sounds when Apache Sprayer moves forward or backward.	Check transmission fluid level. Check wire connection at sending unit. Check transmission temperature sensor.
Apache Sprayer will not move forward.	Check driveshaft. Check transmission fluid level. Check electrical connections on transmission.
Apache Sprayer will not move backward.	Check driveshaft. Check transmission fluid level. Check electrical connections on transmission.

SYMPTOM	SOLUTION
Engine will not start.	Confirm battery disconnect switch is “ON”. Check diesel fuel level. Check neutral safety relay. Confirm Start/Stop Engine button is “Green”.
Apache Sprayer steering does not work.	Check hydraulic fluid level. Check for hydraulic fluid leaks. Check steering column coupling on steering motor.
Transmission will not shift gears.	Check transmission fluid level.
Apache Sprayer brakes do not work.	Check brake hoses for leaks. Check push rods on master cylinder.
No power to console in the cab.	Check electrical connections in right rear corner of cab, near fuse box.
Road and service lights do not work.	Confirm light buttons are “ON”. Check electrical connections to the light pad, cabin power distribution module and the firewall distribution module. Check for power at light bulbs. Check appropriate fuses.
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.

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 console controller display. Confirm boom valves are opening. If they are not, check the power module in the cab and back rack electrical connections.
Product boom valves will not turn on.	Unplug electric connection at valve for 20 seconds. Check electrical connections in cab. Check power module in cab.
Product boom valves will not turn off.	Check boom valves for operation. Check electrical connections at boom valves. Check electrical connections in cab. Check power module in cab.
Seat will not raise or lower.	Check power module in cab. Check wire connections at right of seat. Check for air leaks.
Raven or Trimble monitor does not turn on.	Check power module in cab. Check electrical connections at the monitor.
Front suspension cylinder is flat.	Lift tire off ground and check suspension cylinder fluid level. If fluid is foaming, the accumulator has failed. If fluid is low, fill to top of plug. Check operation.
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 button is on and indicator is lit. Check electrical connections at hyrdraulic valve block. Check electrical conntions in cab.
A/C does not cool.	Confirm A/C button is “ON”. Confirm fan is “ON”. Check belt to compressor.

NOTES

APACHE™

Chapter 8

ELECTRICAL SYSTEM

Firewall Power Distribution Module

Source	Function	Circuit		
		Pwr Source	To	Circuit #
F1 (350A)	Alternator Pwr	Batt	Alternator Pwr	85
F2 (125A)	Aux Batt Post Pwr	Batt	Aux Batt Post Pwr	148
F3 (40A)	Starter Solenoid Pwr	K2 Relay	Starter Motor/Destroke at Start Coil	137
F4 (250A)	Cold Start Pwr	K4 Relay	Intake Grid Heater	128
F5 (2A)	Cab Batt Pwr	K3 Relay	Cabin Power Distribution Module	7
F6 (30A)	Engine ECU Pwr	K1 Relay	Engine ECU Pwr	12
F7 (5A)	Engine Ignition Pwr	K3 Relay	Engine Ignition Pwr	11
F8	Not Used	***	***	***
F9	Not Used	***	***	***
F10	Not Used	***	***	***
F11 (30A)	ZF 12/24v Converter	K1 Relay	ZF 12/24v Converter	990
F12 (7.5A)	ZF 24v Batt Pwr	ZF 12/24v Converter Output	ZF VPE1 24v Batt Pwr/ZF VPE2 24v Batt Pwr	423/468
F13 (7.5A)	ZF 24v Ignition Pwr	K7 Relay	ZF VPI 24v Ignition Pwr/ZF Diagnostic Display Plug/ Output Speed Sensor	900
F14 (2A)	Transmission Sensor Pwr	K3 Relay	Transmission Sensor Pwr/ Speed Sensor Pwr	111/107AK
F15 (7.5A)	A/C Compressor	K8 Relay	A/C Compressor Pwr / Thermostat Out / A/C Pressure Binary Switch / A/C Compressor Solenoid	93 / 49A / 49B / 130
F16 (5A)	HVAC Ignition Pwr	K3 Relay	HVAC Water Valve	78
F17 (10A)	Fill Station Pwr	K3 Relay	Fuel Sender / Fill Station Light Switch	8
F18 (20A)	Foamer Compressor Pwr	K9 Relay	Smucker Injection Foam Marker/ SKS Foam Marker Connector	70
F19 (10A)	Chassis Ignition	K3 Relay		42
F20 (30A)	Boom Valve Pwr	K1 Relay	Boom Valve Pwr	77

Firewall Power Distribution Module

Source	Function	Circuit		
		Pwr Source	To	Circuit #
F21 (250A)	Cabin Batt Pwr	K1 Relay	Cabin Pwr Distribution Module	5
F22 (30A)	Headlight Pwr	K10 Relay	Headlight Pwr	33 GRN
F23 (20A)	Boom Light Pwr	K11 Relay	Left Boom Light / Right Boom Light	57
F24 (5A)	Rearview Light Pwr	K12 Relay	Rearview Light Pwr	79
F25 (5A)	Marker Light Pwr	K13 Relay	Ront Right Turn Marker Light / Front Left Turn Marker Light / Right Turn Stop Light / Left Turn Stop Light / Rear Right Turn Marker Light / Rear Left Turn Marker Light	69
K1 Relay	Batt Disconnect Pwr	Batt	F6, F11, F20, F20, F21, K2, K3, K4, K8, K9, K10, K11, K12, K13, Starter Pwr	12, 990, 77, 5, 137, 7, 42, 78, 11, 8, 111, 128, 93, 70, 33, 57, 79, 69, 149
K2 Relay	Starter Solenoid and Destroke Coil Pwr	K1 Relay	F3	137
K3 Relay	Machine On Pwr	K1 Relay	F5, F7, F14, F16, F17, F19, K7	7, 11, 111, 78, 8, 42, 900
K4 Relay	Cold Start Pwr	K1 Relay	F4	128
K5 Relay	Not Used	***	***	***
K6 Relay	Not Used	***	***	***
K7 Relay	ZF 24v Pwr	12/24v Con-verter	F13	900
K8 Relay	A/C Compressor Pwr	K1 Relay	F15	93
K9 Relay	Foamer Compressor Relay	K1 Relay	F18	70
K10 Relay	Headlight Pwr	K1 Relay	F22	33
K11 Relay	Boom Light Pwr	K1 Relay	F23	57
K12 Relay	Rearview Light Pwr	K1 Relay	F24	79
K13 Relay	Marker Light Pwr	K1 Relay	F25	69

Firewall Power Distribution Module

Ground	Function
Gnd G1	Headlight Gnd
Gnd G2	Horn, Rearview Camera, Left and Right Brake Pedal Proximity Switch, Hydraulic Filter Restriction Switch, Rack Coil Gnd, Suspension Coil, Marker Light, Boom, Foamer, Adjust On the Go Option
Gnd G3	Destroke At Start Coil
Gnd G4	Fill Station, Smucker Injection Foam Option
Gnd G50	Park Brake Coil
Gnd G91	HVAC Blower Motor
Gnd G134	Alternator
Gnd 902	ZF Transmission Control Unit
Gnd 995	DC-DC Converter

Cabin Power Distribution Module

Source	Function	Circuit		
		Pwr Source	To	Circuit #
F1 (20A)	Cab Auxiliary Battery Pwr Stud	Cab Batt Pwr	Cab Auxiliary Battery Pwr Stud	***
F2 (20A)	Cab Auxiliary Ignition Pwr Stud	Cab Batt Pwr	Cab Auxiliary Pwr Stud	***
F3 (5A) Armrest Ignition Pwr	Armrest Ignition Pwr	K1 Relay	Armrest Keypad, Joystick, Display CPU	48
F4	Wiper High Speed	K8 Relay	Wiper High Speed	36
F5 (40A)	Front Worklight Pwr	K3 Relay	Front Left Outer Worklight, Front Left Inner Worklight, Front Right Inner Worklight, Front Right Outer Worklight	58
F6 (40A)	Rear Worklight Pwr	K4 Relay	Rear Left Inner Worklight, Rear Left Outer Worklight, Rear Right Inner Worklight, Rear Right Outer Worklight	59
F7 (10A)	Ceiling Pwr	Cab Batt Pwr	Dome Light, Wiper Motor	32
F8 (10A)	Beacon Light	K5 Relay	Beacon Light	100
F9 (10A)	Pwr Point Batt Pwr	Cab Batt Pwr	Pwr Point Batt Pwr	6
F10 (15A)	Radio Acc Pwr	Cab Batt Pwr	Radio Tuner	9
F11 (20A)	Seat Pwr	Cab Batt Pwr	Seat Pwr	14
F12 (40A)	Node High Current	Cab Batt Pwr	Node High Current Pwr	201

Cabin Power Distribution Module

Source	Function	Circuit		
		Pwr Source	To	Circuit #
F13 (25A)	Console Batt Pwr	Cab Batt Pwr	Console Batt Pwr	208
F14 (2A)	Raven Can Pwr	Cab Batt Pwr	Raven Can Pwr	204
F15 (5A)	Console Ignition Pwr	Cab Batt Pwr	Console Ignition Pwr	80
F16 (7.5A)	Master Spray Pwr	K6 Relay	Master Spray Pwr	51
F17 (5A)	Antenna Pwr	K7 Relay	Antenna Pwr	207
F18 (10A)	Trimble Switched Pwr	K7 Relay	Trimble Switched Pwr	539
F19 (20A)	Node Logic Pwr	K7 Relay	Node Logic Pwr	200
F20 (5A)	Armrest Batt Pwr	Cab Batt Pwr	Display CPU	43
F21 (10A)	Pwr Point Ignition Pwr	K1 Relay	Cigar Lighter, Ambient LED	10
F22 (10A)	Steering Column Ignition Pwr	K1 Relay	Upper / Defrost Vent Actuator, Lower / Defrost Vent Actuator, Wiper / Turn Lever	4

K1 Relay	Ignition Pwr	Cab Batt Pwr	F2, F3, F10, F15, F21, F22	48, 9, 80, 10, 4
K2 Relay	Wiper High/Low Relay	K8 Relay	Wiper High/Low	36, 37
K3 Relay	Front Worklight	Cab Batt Pwr	F5	58
K4 Relay	Rear Worklight	Cab Batt Pwr	F6	59
K5 Relay	Beacon Pwr	Cab Batt Pwr	F8	100
K6 Relay	Master Spray Pwr	Cab Batt Pwr	F16	51
K7 Relay	Precision Pwr	Cab Batt Pwr	F17, F18, F19	207, 539, 200
K8 Relay	Wiper On/Park Relay	F4	Wiper On/Park	36
Gnd G5	Cab Roof Gnd	***	Wiper Motor, Dome Light, Beacon Light, Ambient Temp Sensor, All Cab Work Lights, AM/FM Antenna Shield	G5
Gnd G7	Cab Low Current Gnd	***	Defrost Upper and Lower Vent Actuator, Foot Throttle, Wiper/Turn Lever, Armrest Keypad, Joystick, Display CPU	G7
Gnd G8	Cab High Current Gnd	***	Seat, Radio Tuner, DC Pwr Point, Cigar Lighter, Ambient LED	G8
Precision Gnd	Node Logic Gnd	***	Node Logic Gnd	202
Precision Gnd	Node High Current Gnd	***	Node high Current Gnd	203
Precision Gnd	Raven CAN Gnd	***	Raven CAN Gnd	205
Ground Stud	Cab Auxiliary Gnd Stud	***	Cab Auxiliary Gnd Stud	***

APACHE™

Chapter 9

WARRANTY

Apache Sprayer Warranty Registration and Policy

For all 2016 Model Year

Apache Sprayer Machine Warranty Registration

This is performed by the selling Apache Sprayer dealer and must be completed within fourteen (14) calendar days from delivery to end user.

Apache Sprayer Engine Warranty Registration

This is performed by the selling Apache Sprayer dealer: To register the Cummins engine for warranty first have the engine serial number, then go to www.cummins.com click on "product registration" read the terms and conditions. If you agree with the terms and conditions, then click on "I accept", and follow the instructions to register. This must be completed within fourteen (14) calendar days from delivery to end user. (When registering the sprayer on www.etdealer.com, a link is provided to the Cummins website and all of the customer information auto-fills from the etdealer.com registration form.)

APACHE SPRAYER LIMITED WARRANTY POLICY

Equipment Technologies (hereinafter called ET) warrants each new Apache Sprayer 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 warranty start date, 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 negligence, 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 or discs, brake linings, filters, oils, product pump seals, product pump bearings, rubber product hoses, pressure gauges or ground engaging accessories such as auto boom wheels and related bearings, shocks, or springs.
Components, systems, or accessories that are installed by the dealer and were not installed by ET when the machine was originally manufactured are not covered by this warranty.

First and Second Year- Limited warranty covers the total machine for the first two years from warranty start date or one thousand (1000) hours whichever occurs first, for parts, labor, and mileage. Under no circumstances does this limited warranty cover any merchandise or component parts, which, in the sole opinion of ET, have been subject to negligence, 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.

Years Three through Five- Limited warranty covers some power train and chassis components for parts only from the warranty start date or two thousand (2000) hours whichever comes first. The following components are covered under years three through five of warranty: Transmission and its internal components (excludes park brake components, harness, electrical components, main drive shafts and u-joints), differential and its internal components, front axle assembly (excludes seals, bearings, wear pads, suspension cylinder (i.e. front strut), outer flex, hubs, accumulator, and steering cylinders), frame rails, engine bolster, rear axle assembly (excludes wear pads, output drive shafts, and rear suspension components), planetary and its internal components (excludes bearings, seals, and o-rings), drop boxes and their internal components (excludes bearings and seals), 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, and all park brake components.

Engine Warranty- The limited engine warranty is covered by Cummins Inc. for two (2) years or two thousand (2000) hours from the warranty start date, whichever comes first. ET does warrant the a/c compressor and alternator for first and second year. Cummins Inc. warrants all other bolt on and engine components. See engine warranty for complete details.

Tires- Warranty for Michelin tires will be handled through your local authorized Michelin dealer. Please contact ET if you have any questions.

Batteries- Batteries are warranted for thirty (30) months through NAPA auto part stores.

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) calendar days of the issue of an automatically or manually generated RMA. 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.

All inquiries about this warranty policy should be addressed to:

Warranty Department • 455 Merriman Road • Mooresville, IN • 46158
Telephone: 317-834-4500

NOTES

APACHE™

Chapter 10

MAINTENANCE LOG

_____ Season

Check and inspect each of the following items on your Apache Sprayer. Put the date on the line next to each item as it is completed.

	Check front suspension cylinders for leaks around the seal and oil level in cylinder.
	Grease the front axle assembly including all king-pins, ball joints, and center pivot pin. Check all front axle bolts for proper torque.
	Check adjustment of all hood panels and make sure all screws are present and tightened. Clean radiator and cooling package of all debris, check all radiator and cooling package hoses to make sure they are tight and not leaking.
	Change engine oil and replace filters.
	Service fuel system and replace filters.
	Service transmission; change oil and replace filter, remove suction screen, clean and inspect for damage.
	Replace cab filters with new.
	Remove and replace engine air filters, check intake clamps to make sure they are tight.
	Grease the U-joints on all driveshafts and inspect each U-joint for wear and missing caps. Inspect carrier bearing on the front driveshaft for wear and damaged rubber.
	Service rear differential and bleed brake system.
	Grease the rear axle assembly and check all rear axle bolts for proper torque.
	Service the hydraulic system oil, replace return filters, remove suction screens, clean and inspect for damage.
	Remove all product screens from strainers, clean and inspect for damage. Replace as needed. Flush the wet system with clean water, remove inspection plug from product pump and inspect impeller for damage. Turn on pump and dead-head the pressure and check at gauge outside of cab, increase and decrease agitation and check gauge for operation. Fold booms out and adjust and grease.

	Inspect booms for cracks, breaks, and worn hinge points.
	Inspect boom plumbing for worn hoses and bad nozzles.
	Inspect all hydraulic hoses for rubs, worn spots, and leaks.
	Inspect all hydraulic cylinders for leaks and proper operation.
	Inspect wiring harnesses for rub points.
	Inspect foam marker components for leaks and operation (if equipped).
	Verify Raven and Trimble controller calibrations:
	Flow Meter
	Boom Sections
	Control Valve
	Speed Cal
	Check A/C operation.
	Inspect frame for cracks and loose bolts.
	Inspect Tee Jet valves for operation and wear.
List any major repair work this season and date it was performed:	

_____ Season

Check and inspect each of the following items on your Apache Sprayer. Put the date on the line next to each item as it is completed.

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	Service fuel system and replace filters.
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	Inspect frame for cracks and loose bolts.
	Inspect Tee Jet valves for operation and wear.
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EQUIPMENT TECHNOLOGIES

WWW.ETSPRAYERS.COM