

# **APACHE<sup>TM</sup>**

## **A5840**

### **2020 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** 

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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.*





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](http://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 Viper® 4+, field computers:
  - Swath Width
  - Boom Section Calibration
  - Receiver Fore/Aft Settings
  - Valve Calibration
  - Flow Meter Calibration
  - Rate Calibration
  - Low Limit Setting
2. Please review your AutoBoom® and AccuBoom™ settings, if equipped.
3. Calibrate the RS1® autosteer if equipped. RS1® autosteer 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® TDTO 30

#### **Cummins®**

#### **Raven Industries**

- AccuBoom™
- AutoBoom®
- FlowMax™
- RS1® Autosteer
- Viper® 4+

#### **Equipment Technologies (ET)**

- Apache™

#### **Lucas® Oil Products**

#### **SiriusXM™**

#### **Michelin®**

#### **Goodyear®**

#### **John Deere®**

- Autotrac™

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# APACHE™

## CHAPTER 1

## GENERAL INFORMATION

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The graphics and text in this manual generally describe the AS840 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.

### 2020 AS840 Specifications

|                       | AS840  |
|-----------------------|--|
| <b>Tank Capacity</b>  | 800 gallons [3030 liters]  |
| <b>Engine</b>         | 173 hp T4-F QSB6.7 Cummins   |
| <b>Transmission</b>   | JCB Power shift 4-speed, torque converted  |
| <b>Speed Ranges</b>   | 1st 0-5 mph [0-8.04 km/h]<br>2nd 0-9 mph [0-14.5 km/h],<br>3rd 0-16 mph [0-25.7 km/h]<br>4th 0-28 mph [0-45 km/h]  |
| <b>Brakes</b>         | Internal, wet disc self-adjusting  |
| <b>Suspension</b>     | Front Axle: Center oscillation with independent hydraulic, accumulated struts.<br>Rear Axle: Patented hydraulic load suspension with compensating anti-sway control, self-adjusting for diminishing/increasing load. |
| <b>Cab</b>            | ET custom pressurized cab  |
| <b>Crop Clearance</b> | 42 in. [106.6] or 50 in. [127 cm]  |
| <b>Axles</b>          | 120 in. [304.8 cm] Fixed Width Axle (Standard)<br>120 to 160 in. [304.8 to 406.4 cm] Adjustable Axle Width with Optional Hydraulic Adjust (50 in. clearance only)  |
| <b>Final Drive</b>    | JCB planetary gearset<br>(42 in. [106.6 cm] CC);<br>JCB all gear drop box<br>(50 in. [127 cm] CC)  |
| <b>Weight</b>         | 19,200 lbs [7892.5 kg] dry weight  |
| <b>Fuel Capacity</b>  | 90 gallons [340.69 liters]   |
| <b>Width</b>          | 12 ft [3.6 m]  |
| <b>Length</b>         | 24 ft [7.3 m]  |
| <b>Height</b>         | 144 in. [365.7 cm]   |
| <b>Wheel Base</b>     | 15 ft [4.6 m]  |
| <b>Turning Radius</b> | 17 ft [5.1 m]  |
| <b>Standard Tires</b> | Front: 380/80R38 and Rear: 380/90R46   |
| <b>Booms</b>          | 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]  |
| <b>Boom Height</b>    | 18 to 89 in. [45.6 to 226.1 cm]<br>(42 in. [106.6 cm] CC);<br>26 to 97 in. [66 to 246.4 cm]<br>(50 in. [127 cm] CC)  |
| <b>Product Pump</b>   | Hypro 9306C HM1C, hydraulically driven centrifugal pump  |
| <b>Roto-Flush</b>     | Pump pressured   |

## Apache AS840 Fluids, Filters and Capacities

| Component   | Lubrication                             | Capacity<br>Quarts [Liters]   | Filter Part Number  |
|---|---|-------------------------------|---|
| Engine Oil  | Lucas 15W-40 Magnum Motor Oil           | 16 [15]                       | 201450241   |
| Engine Coolant  | KostGuard Universal<br>Antifreeze 50/50 | 24 [22.7]                     | ----  |
| Engine Primary Air Filter   | ----                                    | ----                          | 230000001   |
| Engine Safety Air Filter  | ----                                    | ----                          | 230000002   |
| Transmission  | Lucas Universal Motor Oil               | 16 [15]                       | 300000101   |
| 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]                       | ----  |
| Engine Fuel   | Diesel                                  | 90 Gallons<br>[340.69 Liters] | Filter: 261000003<br>Separator: 211000000<br>Tank Strainer: 201450001           |
| Diesel Exhaust Fluid (DEF)  | ----                                    | 5 Gallons<br>[19 Liters]      | DEF Supply<br>Module Filter: 241000009<br>DEF Tank<br>Suction Screen: 241000008 |
| Hydraulic System  | Lucas Universal Hydraulic Fluid         | 40 Gallons<br>[151.42 Liters] | Filter: 880000026<br>Strainer: 840000010  |
| Front Suspension  | Lucas Universal Hydraulic Fluid         | as required                   | ----  |
| A/C System  | R134a                                   | 2.8 lbs                       | ----  |
| Cab Filters   | ----                                    | ----                          | Charcoal Filter: 490003651  |
| NOTE: Any oil and fluid substitutions must meet or exceed recommended fluid specifications. |   |                               |   |

### Michelin Tire Pressure (Cold)

|           |                    |
|-----------|--------------------|
| 380/80R38 | .29 psi [2.0 bar]  |
| 380/90R46 | .42 psi [5.9 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 AS840 | .800 gallons [3030 Liters] |
| Rinse Tank         | .100 gallons [379 Liters]  |

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

# APACHE™

## 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 this Apache Sprayer as a primary concern.

### Safety Symbols, Signal Words and Statements

Safety symbols, signal words and statements, and symbols 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 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.



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



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



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

*The italicized **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.

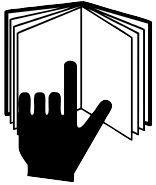
Keep this manual and all included literature in a safe and convenient location. Contact your Apache dealer or Apache at (800) 861-2142 to obtain replacement owner's manuals and safety decals.

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

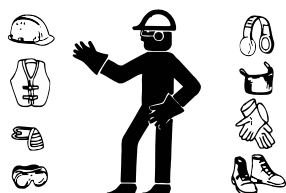


*Some of the engine surfaces become very hot during operation and shortly after shut-down. Keep hands and other body parts away from hot engine surfaces.*

## 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 precautions 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.



### **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.***

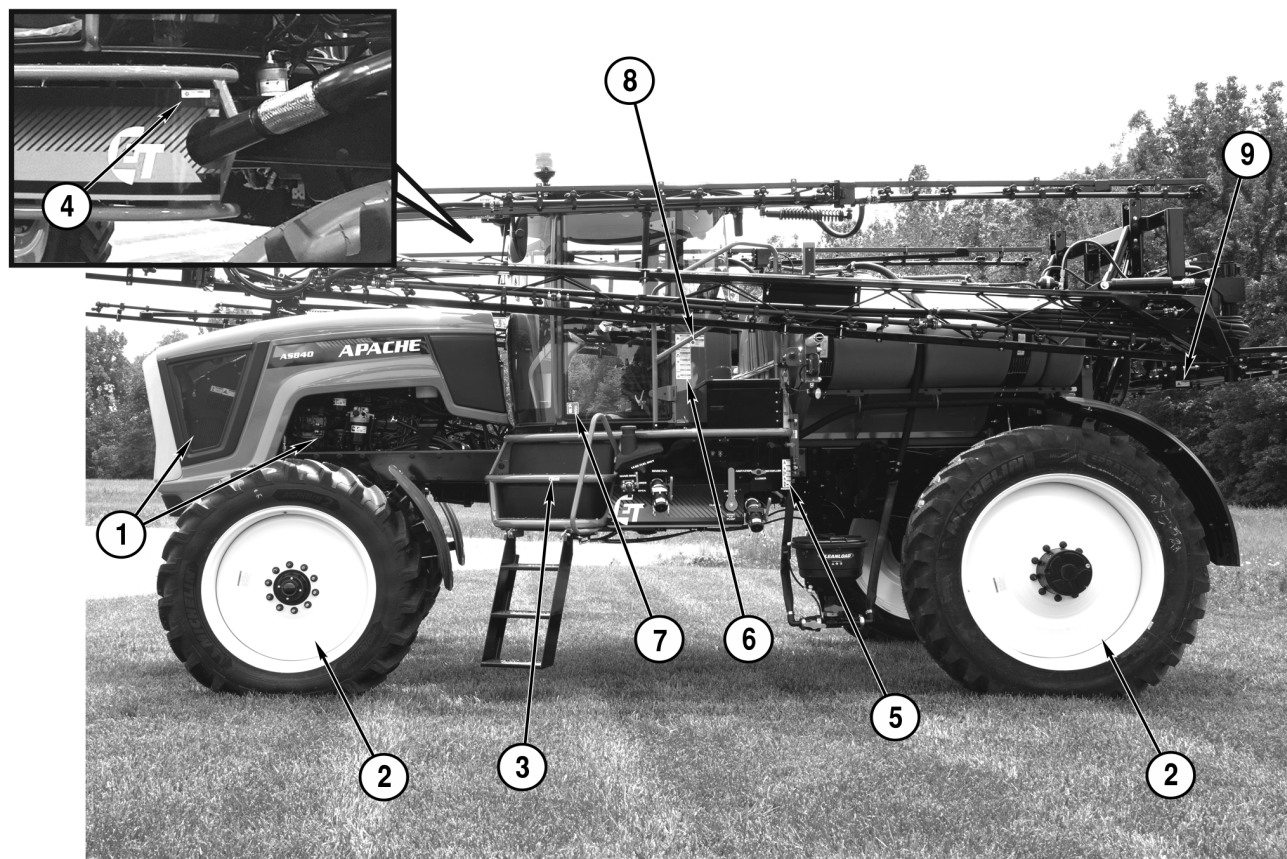
Safety decals are used to explain and inform you of potential personal injury hazards and provide precautionary instructions. Read, understand and follow all safety decals on the Apache Sprayer to prevent personal injury and ensure safe reliable Apache Sprayer operation.

*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.

## Exterior Decal Locations



1.

|  |   |
|--|---|
|  | <p><b>WARNING</b></p> <p><b>BURN / SEVER HAZARD</b></p> <p>Keep fingers clear of hot surfaces and rotating parts while engine cover is open and engine is running.</p> <p>420306036</p> |
|--|---|

3.

|  |   |
|--|---|
|  | <p><b>WARNING</b></p> <p><b>STRIKING BYSTANDER HAZARD</b></p> <p>Keep bystanders away from automatic ladder; it may move unexpectedly.</p> <p>420306059</p> |
|--|---|

2.

|  |
|--|
| <p><b>WARNING</b></p> <p><b>TIRE HAZARD</b></p> <ul style="list-style-type: none"> <li>Torque wheel bolts to 420 ft-lb (570 N•m). Check torque daily for first week of operation and weekly thereafter.</li> <li>Replacement tire must meet or exceed original tire specifications. Failure to comply may cause tire failure resulting in serious injury or death.</li> </ul> <p>420306033</p> |
|--|

4.

|  |  |
|--|--|
|  | <p><b>WARNING</b></p> <p><b>BURN HAZARD</b></p> <p>Keep hands away from the muffler and exhaust system until the engine is completely cool.</p> <p>420306058</p> |
|--|--|

5.

|  |  |
|--|--|
|  | <p><b>WARNING</b></p> <p><b>BATTERY TERMINAL POSTS HAZARD</b></p> <p>These battery terminals are for low amperage charging and accessory power only. Do not jump or boost machine from terminals.</p> <p>472000005</p> |
|--|--|

## Exterior Decal Locations (continued)

6.

|  |  |
|--|--|
|  | <b>⚠ DANGER</b><br><b>ELECTROCUTION HAZARD</b><br><ul style="list-style-type: none"> <li>This machine is not insulated.</li> <li>Death or serious injury will result from contact with or inadequate clearance to electrical power lines and apparatus.</li> <li>Maintain safe clearances from electrical power lines in accordance with applicable government regulations such as OSHA 1910.269.</li> <li>This machine does not provide protection from contact with or proximity to an electrically charged power line.</li> </ul> 420306050   |
|  | <b>⚠ WARNING</b><br><b>STRIKING OBJECT OR BYSTANDER HAZARD</b><br>Do not fold or unfold booms while sprayer is moving.<br>420306054  |
|  | <b>⚠ WARNING</b><br><b>OPERATIONS HAZARDS</b><br><ul style="list-style-type: none"> <li>Do not operate sprayer on public highways with fluid in product tank.</li> <li>Always drain and flush tank prior to transport.</li> <li>Do not exceed 40 mph unloaded.</li> </ul> 420306052  |
|  | <b>⚠ WARNING</b><br><b>OPERATIONS HAZARDS</b><br><ul style="list-style-type: none"> <li>Read and understand operator's manual before operating, servicing or repairing the tractor. Follow all safety rules and instructions. Manuals are available from dealer.</li> <li>Only operate tractor from operator's seat with seat belt securely fastened.</li> <li>Before leaving the operator's seat, place machine in neutral position, apply parking brake, and stop engine.</li> <li>Do not allow children or untrained persons to operate the equipment.</li> <li>Reduce speed when turning or operating around hazards, on rough ground or steep slopes.</li> <li>Use flashing warning lights on highways unless prohibited by law.</li> </ul> 420306051 |
|  | <b>⚠ WARNING</b><br><b>FALLING HAZARD</b><br>Never allow riders outside of the cab while operating machine.<br>420306050   |
|  | <b>NOTICE</b><br>Use a charcoal element when replacing the cab air filter and cab recirculating air filter.<br>(A) Cab Recirculating Air Filter - P/N 420000001<br>(B) Cab Charcoal Air Filter - P/N 490003651<br>420000007  |
|  | <b>NOTICE</b><br><ul style="list-style-type: none"> <li>Do not run product pump (A) dry. Seal damage will occur.</li> <li>Do not intentionally dead-head the pump with high pressure. Seal damage will occur.</li> </ul> 472000035   |
|  | <b>NOTICE</b><br><b>BATTERY DISCONNECT PROCEDURE</b><br><ul style="list-style-type: none"> <li>Wait 120 seconds to disconnect machine battery power post engine shut-down.</li> </ul> 472000008  |

7.



8.

|  |  |
|--|--|
|  | <b>⚠ WARNING</b><br><b>HIGH-PRESSURE FLUID HAZARD</b><br>High-pressure hydraulic fluid leaks can penetrate skin resulting in serious injury, gangrene or death.<br><ul style="list-style-type: none"> <li>Check for leaks with cardboard; never use your hand.</li> <li>Before you loosen a fitting: <ul style="list-style-type: none"> <li>Lower load.</li> <li>Release pressure.</li> <li>Make sure hydraulic fluid is cool.</li> </ul> </li> <li>Consult physician immediately if skin penetration occurs.</li> </ul> 420306043 |
|  | <b>⚠ WARNING</b><br><b>EXPOSURE HAZARD</b><br>Agricultural chemicals can be dangerous:<br><ul style="list-style-type: none"> <li>Improper selection or use can seriously injure persons, animals, plants, soil or other property.</li> <li>Select the correct chemical for the job.</li> <li>Handle the chemicals with care.</li> <li>Follow the instructions on the container label and instructions from the equipment manufacturer.</li> </ul> 420306048  |
|  | <b>⚠ WARNING</b><br><b>NON-POTABLE WATER HAZARD</b><br>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.<br>420306032  |
|  | <b>⚠ WARNING</b><br><b>ENTANGLEMENT HAZARD</b><br>Keep body parts away from rotating driveshaft.<br>420306038  |
|  | <b>NOTICE</b><br><ul style="list-style-type: none"> <li>Fill the rinse, foamer or product tank slowly.</li> <li>Rapidly filling, or overfilling, any of these tanks may cause them to rupture.</li> </ul> 420306040  |

9.

|  |  |
|--|--|
|  | <b>⚠ WARNING</b><br><b>Crush Hazard</b><br>Can cause serious injury or death.<br>Stay clear of moving mechanism<br>472000029 |
|--|--|




## Exterior Decal Locations (continued)

(Not shown in the picture)


10.

|   |   |
|---|---|
|  | <b>⚠ WARNING</b>  |
|   | <b>Falling Hazard</b> <ul style="list-style-type: none"> <li>• No guardrails present</li> <li>• Not to be used as walking surface</li> </ul> <p>472000031</p> |

11.

|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | <b>ROTATING FAN BLADES</b> <ul style="list-style-type: none"> <li>• Keep clear while engine is running</li> <li>• Contact may result in personal injury or death</li> </ul> <p>472000037</p> |


12.

|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | <b>Pinch Point</b><br><b>Keep hands clear during operation.</b> <p>472000034</p> |

13.

|   |  |
|---|--|
|  | <b>⚠ WARNING</b>   |
|   | <b>Never climb inside tank</b> <p>472000028</p>  |
|  | <b>NOTICE</b>  |
|   | <ol style="list-style-type: none"> <li>1. Tighten bolts on each tank strap without pulling the top of the tank down or bending the bolts or tank skid.</li> <li>2. Tighten tank straps evenly side-to-side.</li> <li>3. Fill the tank with water.</li> <li>4. Drive tractor.</li> <li>5. Allow tank to settle.</li> <li>6. Retighten straps.</li> <li>7. Inspect straps daily.</li> </ol> <p>472000027</p> |

14.

|   |  |
|---|--|
|  | <b>NOTICE</b>  |
|   | <ul style="list-style-type: none"> <li>• Check Torque Every 100 hours of machine operation and adjust as required</li> <li>• See Operator's manual for correct torque values</li> </ul> <p>472000030</p> |

# APACHE™

## CHAPTER 3

### OPERATION

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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

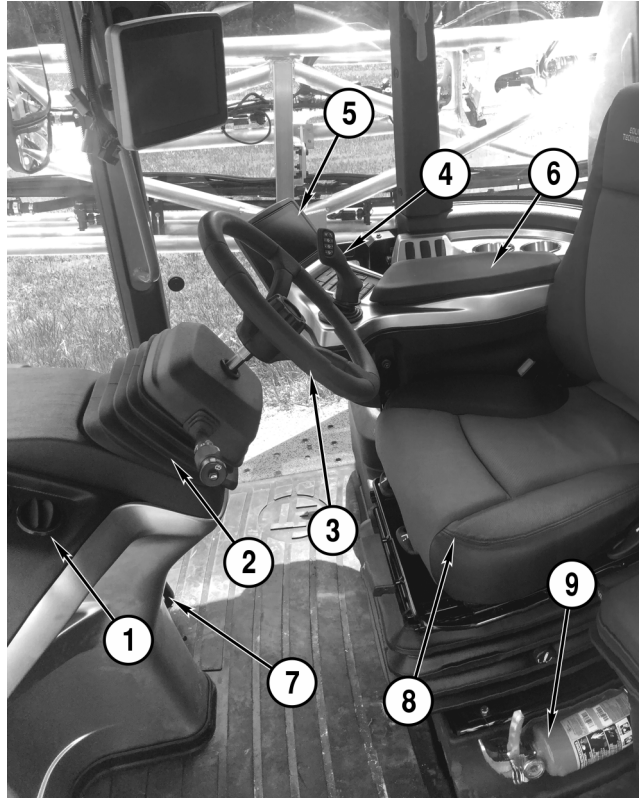
Before operating the Apache Sprayer, perform the following safety and equipment checks.

- 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 5-12.
- Check transmission fluid level and add fluid as needed. See "Check Transmission Oil Level" on page 5-14.
- Check differential, gearboxes and/or planetary fluid levels and add fluid as needed. See "Check Differential Fluid Level" on page 5-18.
- 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 (multiple points in the steering column) | 6. Arm Rest                         |
| 2. Steering Column                                    | 7. Brake Pedal                      |
| 3. Steering Wheel                                     | 8. Air Seat                         |
| 4. Joystick   | 9. Fire Extinguisher (left of seat) |
| 5. ET Pilot System                                    |                                     |

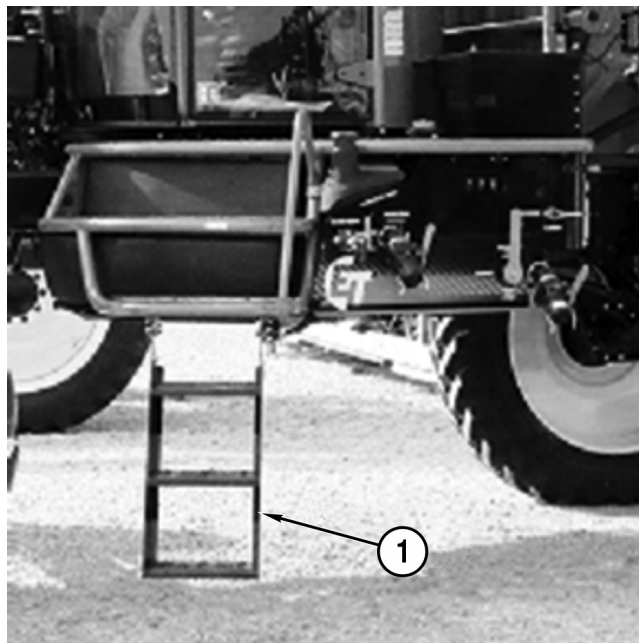


## Cab Access Ladder

### 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 foot lever to lock the column.

### 2. Steering Wheel

### 3. Steering Wheel Telescope Adjustment Knob

- Turn center knob counterclockwise to unlock.
- Position steering 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.

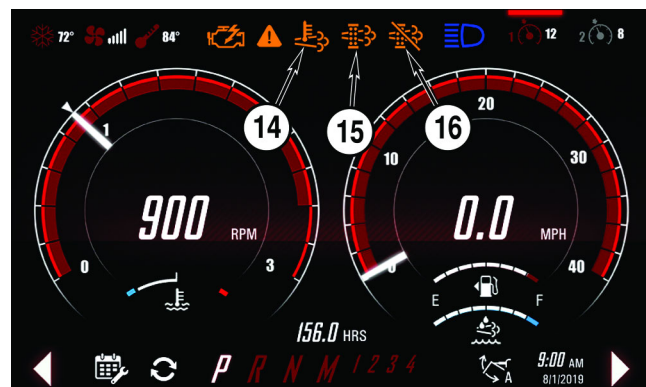
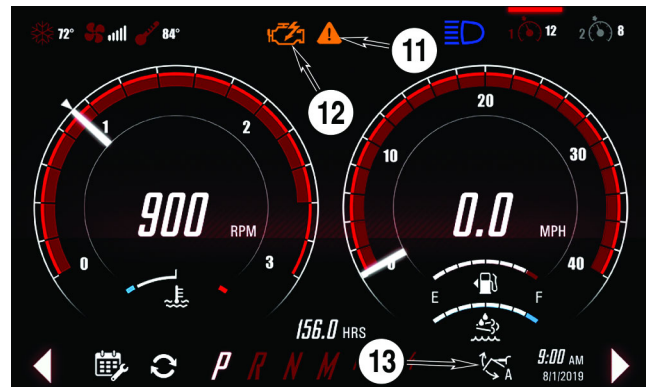
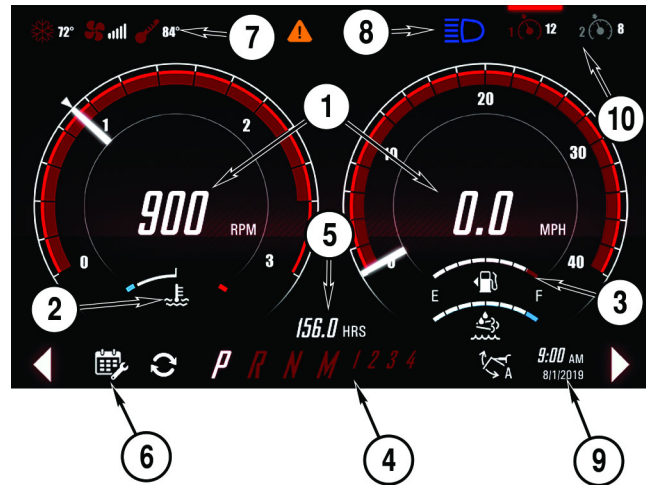
### 7. Windshield Wiper Switch

- 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.



## ET Pilot System

1. Engine RPM and MPH Readout
2. Temperature Gauge
3. Fuel Gauge
4. Direction and Gear Indicator  
(The gear indicator will remain solid when torque converter is locked in.)
5. Engine Hours
6. Scheduled Maintenance Icon  
(Appears only when there is Scheduled Maintenance required.)
7. Climate Control Readout
8. High Beams Indicator
9. Date and Time Indicator
10. Cruise Control Indicators
11. General Warning Indicator
12. Engine Fault Indicator
13. Autofold Icon
14. High Exhaust Temperature Lamp
15. Exhaust System Cleaning in Progress
16. Exhaust Cleaning Disabled

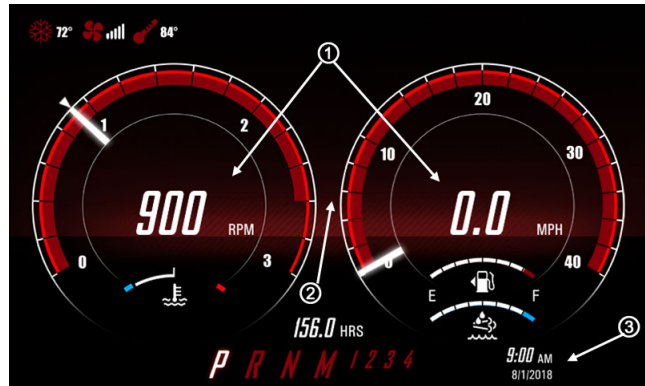


**ET Pilot System (continued)**

1. Cruise Control Buttons
2. Engine Start/Stop Button
3. Agitate and Product Pump Buttons
4. Boom Fold/Unfold Buttons
5. Park Brake Button
6. Climate Control Buttons

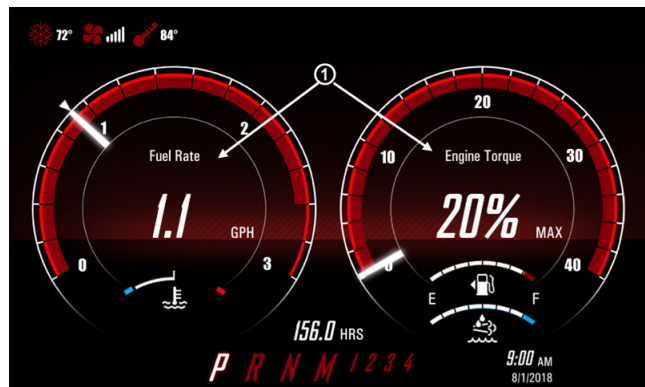
## ET Pilot System Touch Screen

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



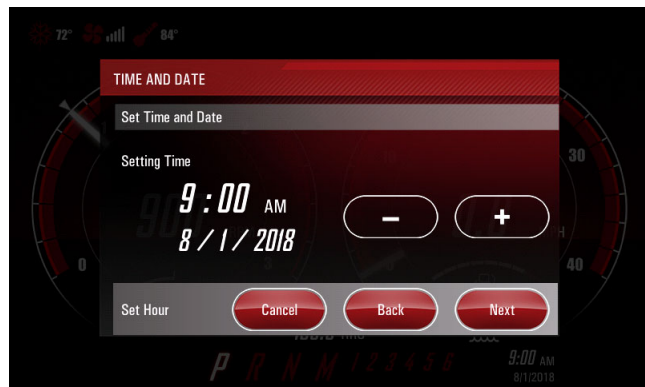
To change the items inside the gauges, touch the RPM or MPH icons (1) to display different options such as:

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 gauges (1). (3) is the Date and Time setting.

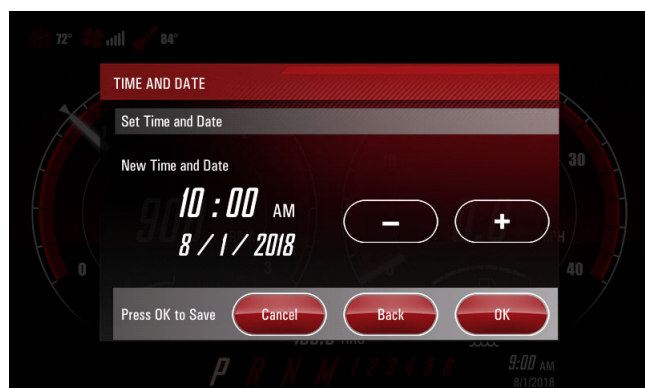


To change the date and time setting, tap the Date and Time indicated by (3) above.

This screen will appear. Use the plus and minus signs to change up or down. Use the Back and Next buttons to move among hours, minutes, date, etc. Cancel to return to the Home Screen.



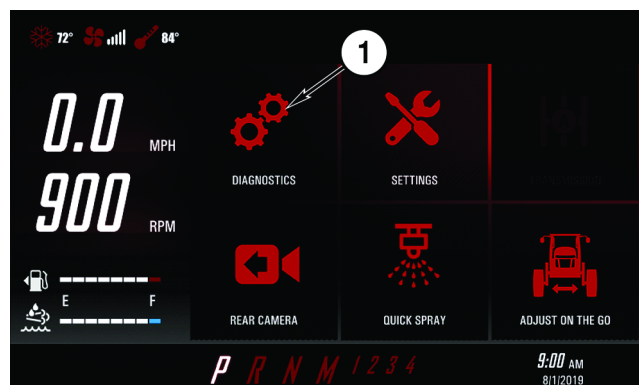
Adjust as needed, then click OK to Save your changes and return to Home Screen.



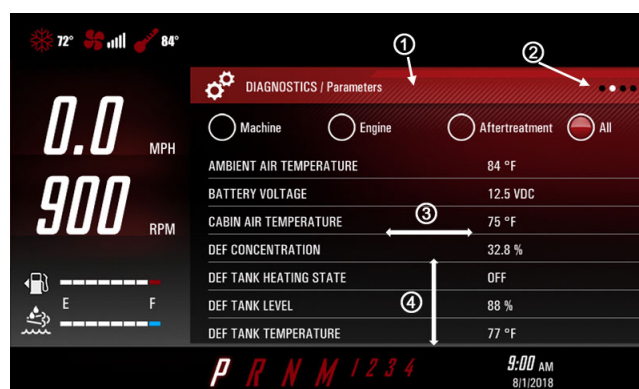


## ET Pilot System Touch Screen (continued)

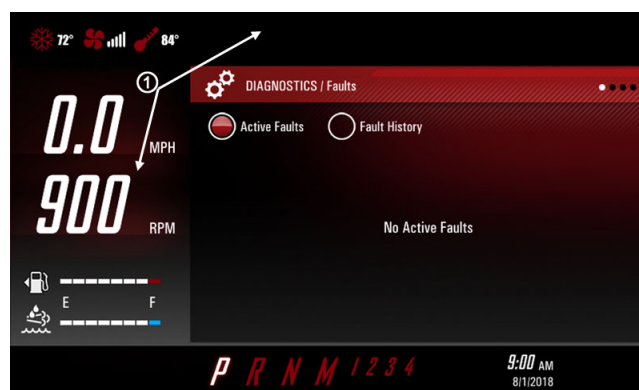
After moving to the App Screen (by swiping left, anywhere in the middle of the home screen, except for inside the gauges) select an App, by touching the desired icon (1) on the screen to move to the selected screen.



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).

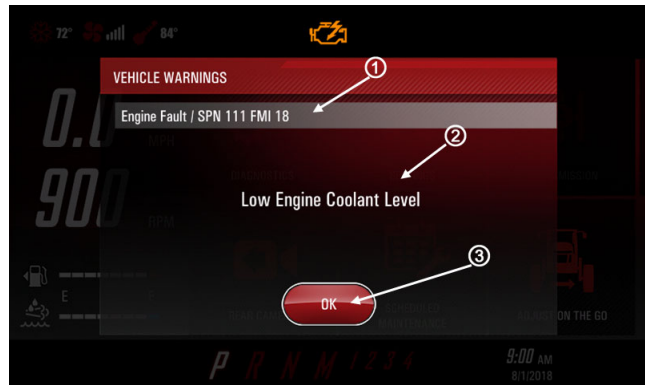


To return to the Home Screen, swipe the screen to right from the top or the left side (1). This will work on any of the screens.

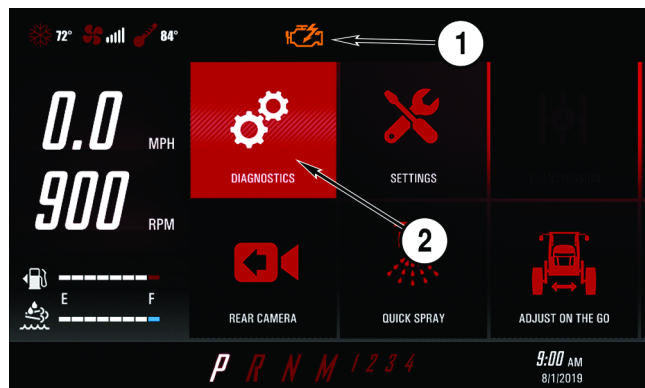


## Diagnostics Page 1: Vehicle Warnings

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).

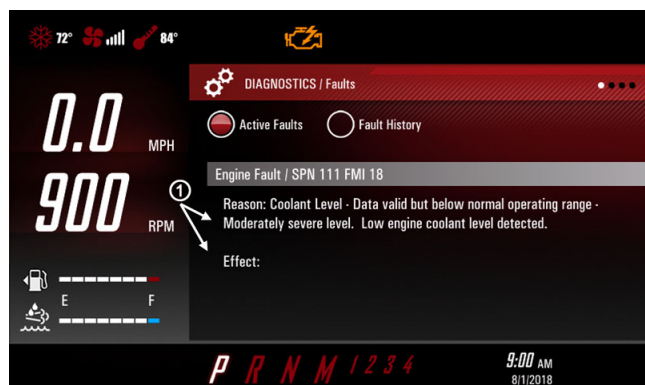


## Active Faults

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



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



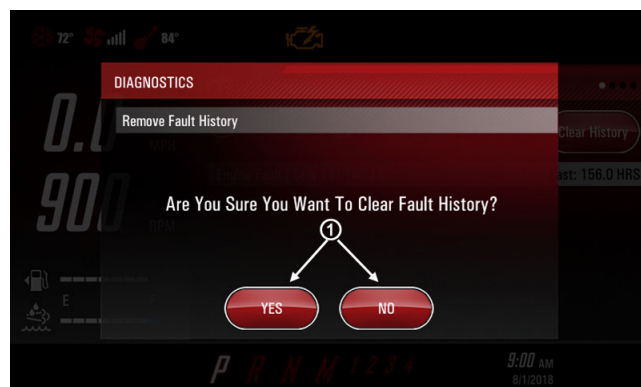
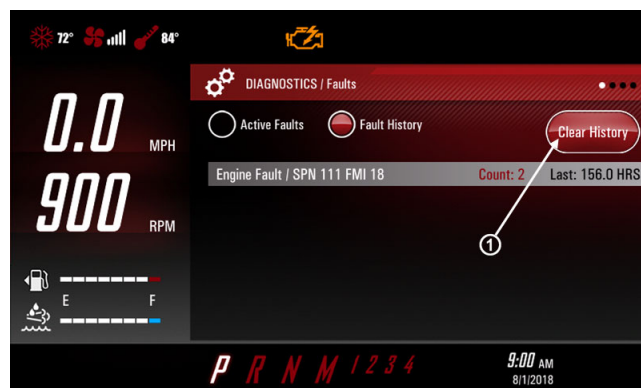
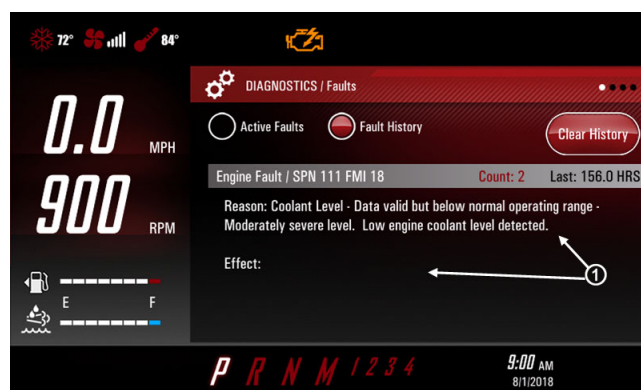
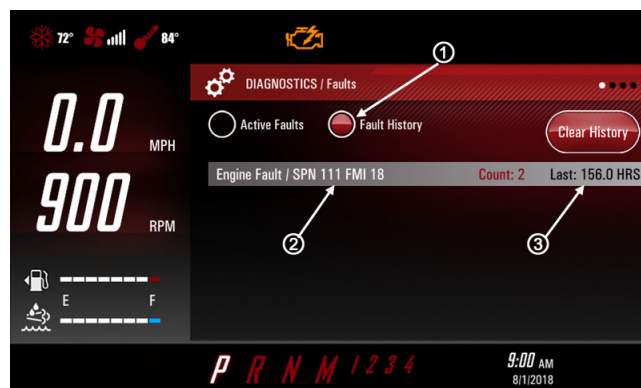
## Fault History

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). The last hours are shown when the fault was last active (3).

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.

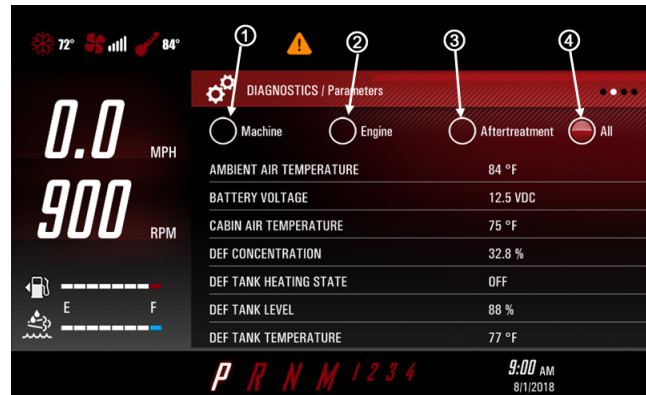
It will then display a prompt (1) to confirm whether or not you would like to clear the history.



## Diagnostics Page 2: Parameters

To filter for Machine Parameters only, select Machine button (1). To filter for Engine Parameters only, select Engine button (2). To filter Aftertreatment Parameters, select Aftertreatment button (3). To view All Parameters select All (4).

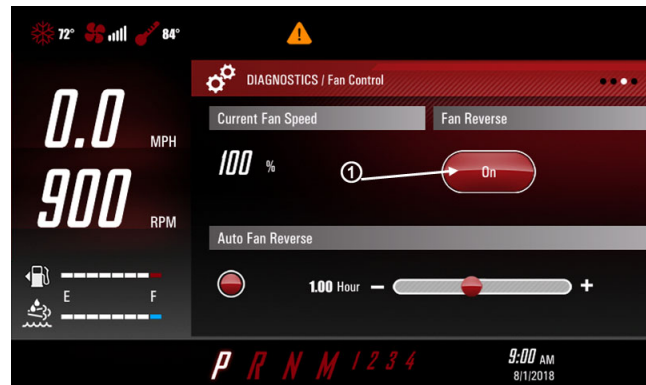
To view all the information on that page, swipe the screen up.



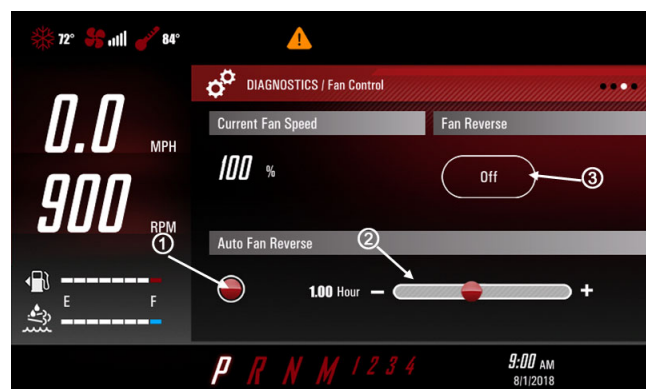
## Diagnostics Page 3: Fan Control

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 and off (3) while in Auto Mode.





## Diagnostics Page 4

Page 4 of the diagnostic app shows a system map diagram. This diagram indicates which ET machine processors are online or offline. A green circle with a ? indicates the processor is online. A red circle with an x indicates a processor is off line. Below are some of the features of the diagnostics app. Individual processors may be viewed after going into the full screen mode. In order to activate the full screen mode the engine must not be running and the park brake must be set.

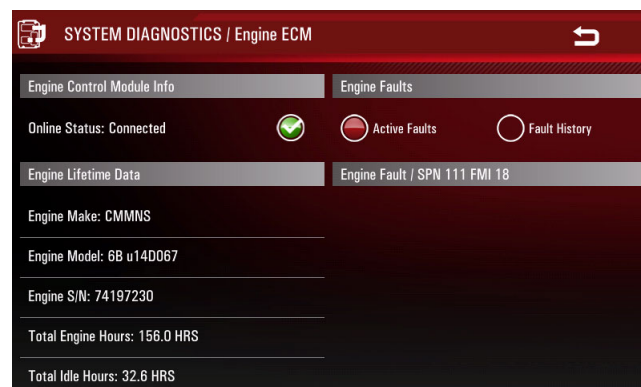
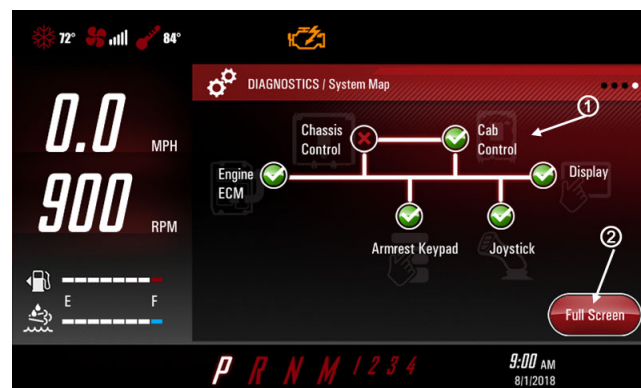
1. **“System Map”** indicating which processors are on or off line.
2. **“Full Screen”** button to allow for more detailed information to be accessed.

Touching the full screen button (1) will bring up the view on the right.

Touching each individual icon in the full screen mode will bring up more detailed information for each processor. For example, when the “Firewall” icon is touched, the “Firewall Box Controller Detail View” will show each processor available on the firewall box and its status. The “System Map” icon will bring up a full screen view of the system map indicating which processors are on or off line.

## Engine Control Module Detail View

The ECM view will show the ECM connection status and engine specific information on the left side of the screen and fault code information on the right side of the screen. Touching the fault code buttons will open up more detailed information about each fault code. Fault code history will need to be cleared from the first page of the diagnostic app.



Diagnostics Page 4 (continued)

Chassis Control Detail View

The left side of the screen will show the connection status for each processor that is visible on the firewall box along with the current software version. If a processor is not available (i.e. an AOG processor on a fixed axle machine), then it will be “hidden” from the processor detail menu.

On the bottom left of the screen, fuse/circuit detection faults are seen with the corresponding fuse and relay (if applicable) highlighted on the dynamic display on the right side of the screen. Scrolling the menu on the left side of the screen will bring up more information.



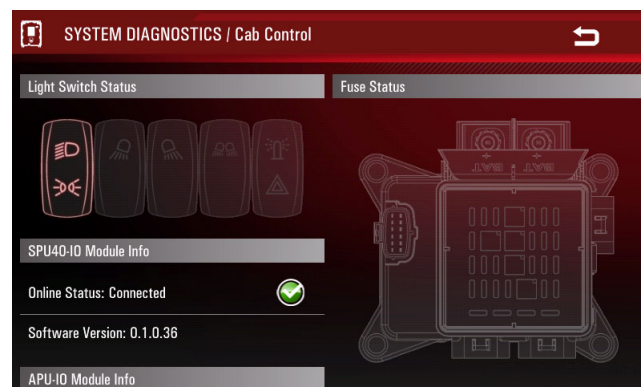
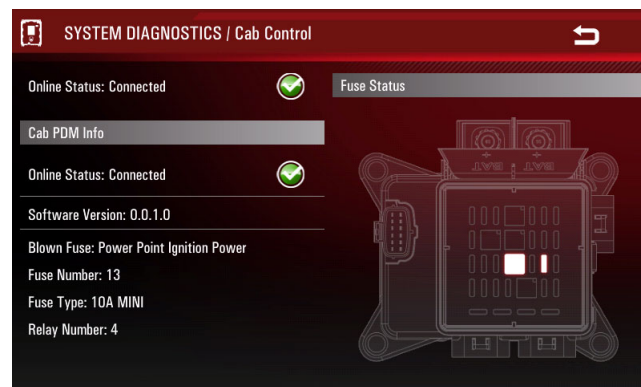
## Diagnostics Page 4 (continued)

### Cab Board Controller Detail View

On the bottom left of the screen, fuse/circuit detection faults are seen with the corresponding fuse and relay (if applicable) highlighted on the dynamic display on the right side of the screen. Scrolling the menu on the left side of the screen will bring up more information.

The top left of the screen is a “light button status” window. When pressing one of the buttons on the light pad located on the right wall console, the corresponding button on the diagnostic screen will highlight indicating that the cab board is seeing the signal from the light pad.

The bottom left of the screen indicates whether or not the cab board processor is online and displays the software version of the cab processor. Fuse/circuit fault detection is also displayed along with highlighting the corresponding fuse and relay (if applicable) on the right side of the screen.



Diagnostics Page 4 (continued)

Armrest Keypad Detail View

The top left side of the screen shows the connection status for the processor. Touching the function buttons on the armrest keypad will highlight the corresponding button on the dynamic display located on the right side of the screen. This will indicate whether or not the button touch is being seen by the CAN circuit.



Joystick Detail View

The top left side of the screen shows the connection status for the joystick processor. The dynamic joystick image on the left side of the screen will highlight button touches made on the joystick touch pad and from the transmission direction switches being pressed. The dynamic joystick image on the right side of the screen will correspond to movement of the joystick along the X and Y axis (forward or backward which will increase and decrease throttle or side to side movement which will upshift and downshift transmission).



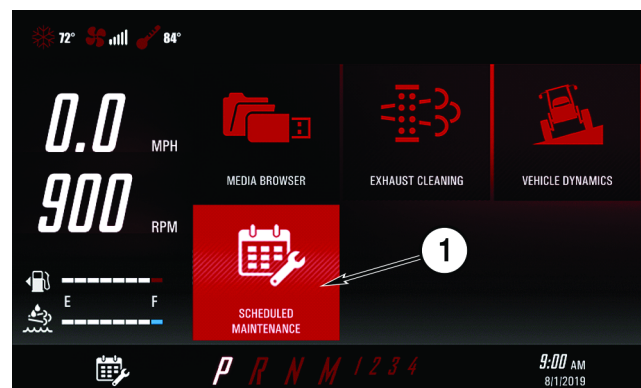
Display Detail View

The left side of the screen shows the connectivity status for the display processor, the Ethernet port, and the USB port. The USB connection status will show whether or not the USB driver on the processor is able to communicate with an installed USB stick (aka thumb drive). The right side of the screen displays fault code information for machine generated faults, not transmission or engine faults. They can be seen on their controller detail views or on the 1st page of the diagnostic app. Press each fault code button to view additional information. Fault code history will need to be cleared from the first page of the diagnostic app.



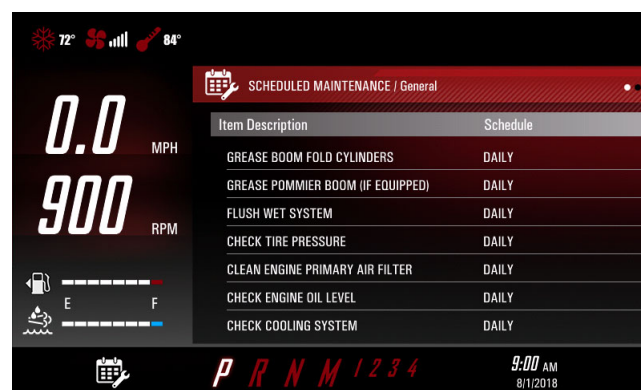
## Scheduled Maintenance App

The scheduled maintenance app is used to provide maintenance information and reminders. The app icon is located on the second page of the app menu. (1) This app can also be opened via a maintenance reminder icon on the bottom row (2).



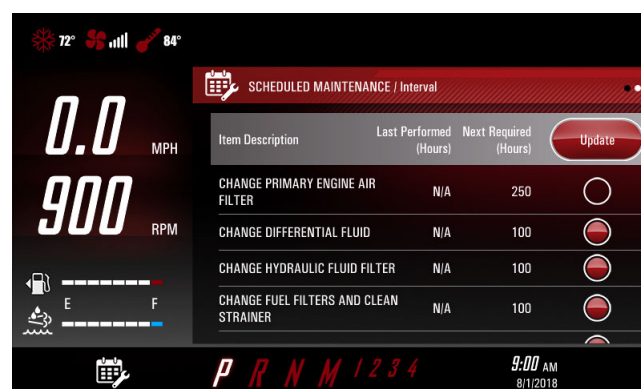
## General Maintenance App Page

The first page of the General Maintenance app is a table showing general maintenance items and recommended schedule.



## Interval Maintenance App Page

The second page of the app is a list of key maintenance items that run on engine hour based intervals. The lists shows the description, last time performed, and the next required maintenance. The last time performed is initially populated with "N/A", then the next time required is calculated assuming that maintenance was performed on schedule up and to the current engine hours.

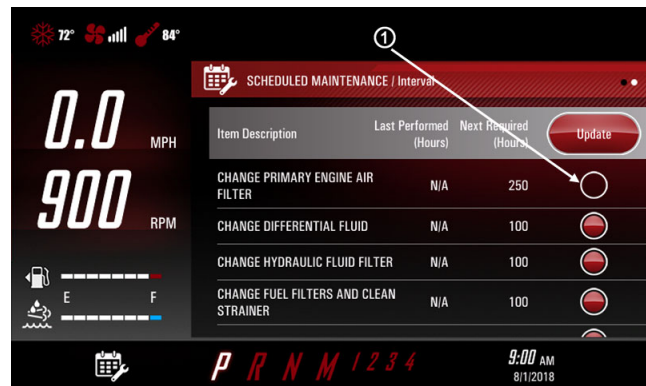




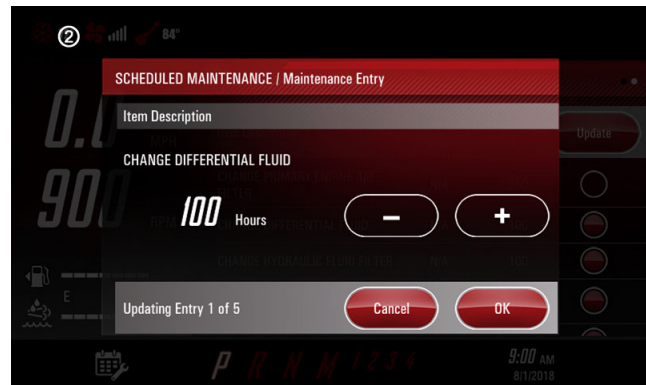
## Scheduled Maintenance App (continued)

### Maintenance Entry

Alongside each item on the interval maintenance page is a button that allows the user to enter a maintenance event for that item (1).

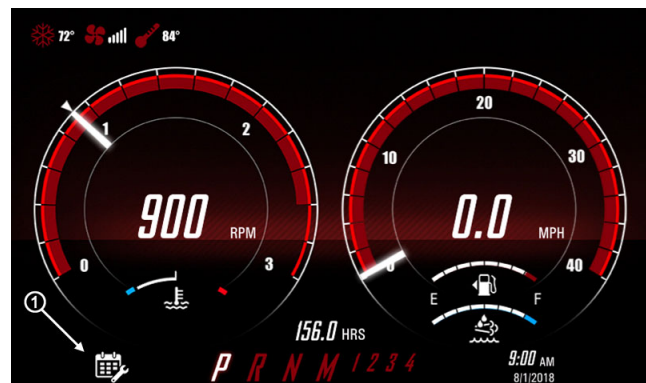


Selecting the entry button opens a dialog that asks the user if they would like to add a maintenance entry for that item description. Selecting Ok opens the screen shown on right as (2). This shows the current engine hours as well as up and down arrows. Click OK to indicate maintenance performed. (or change hours to if needed, then select OK.) Selecting Cancel closes the window and exits to the app page.

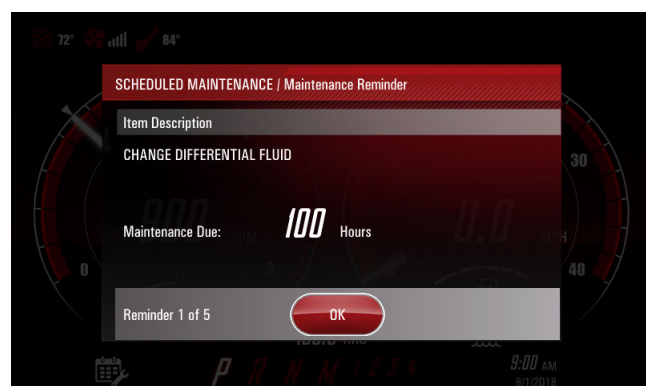


### Maintenance Reminders

When required maintenance is within 10 hours of the current engine hours, a maintenance icon is shown (1). Pressing the icon takes you directly to the interval maintenance app page.

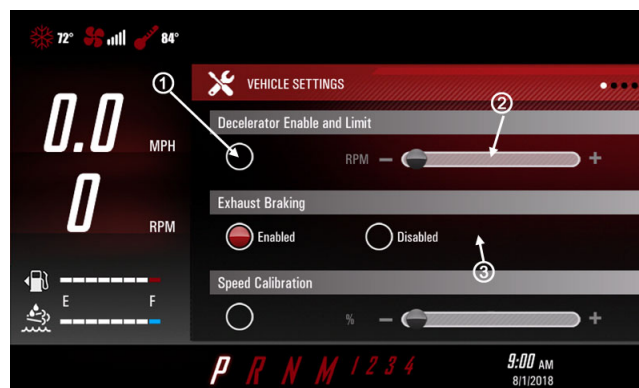


A maintenance reminder pop up is shown whenever there are scheduled items. You must press Ok to clear the screen.

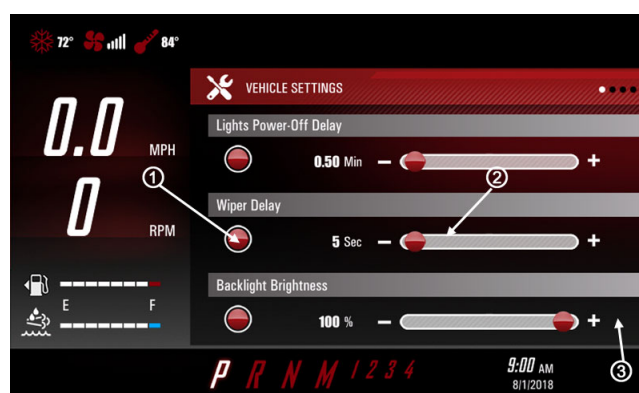


## Vehicle Settings Page 1:

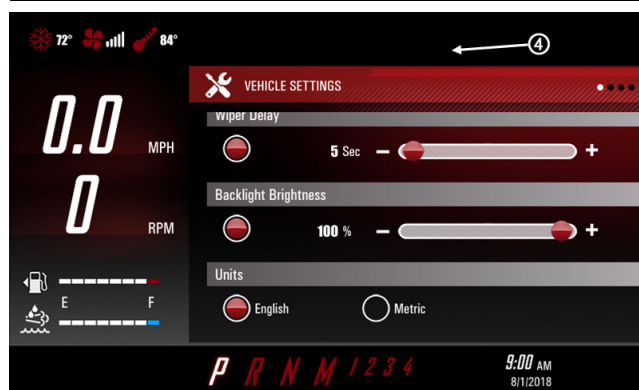
To activate these settings, touch the white circle (1). This will allow you to make adjustments to those settings by using the slider (2). Touch the red icon in the slider and swipe left or right to increase or decrease the value. To access the remaining options on this page, swipe the screen up (3).



The same applies for this screen. Touch the white circle (1) to activate and use the slider (2) to change the values. Scroll up and down on this page by swiping the screen up (3).



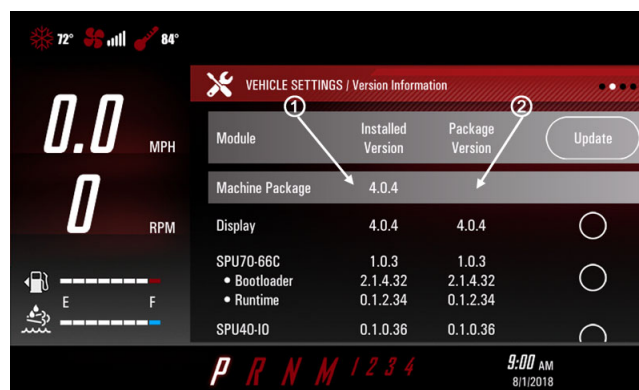
To continue to the next Vehicle Settings page, swipe the screen to the left (4).



## 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 (2). (none in this picture)

\*\*Please consult with your dealership about any updates.\*\*



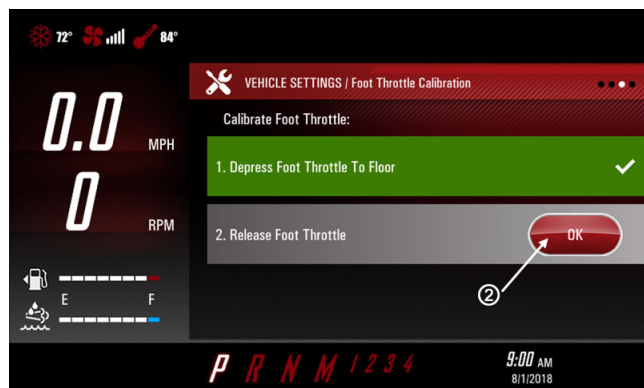
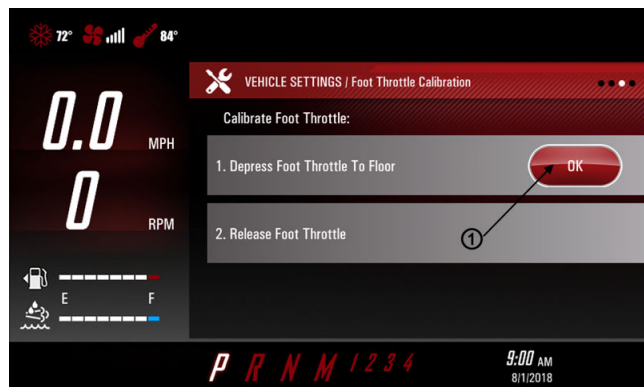
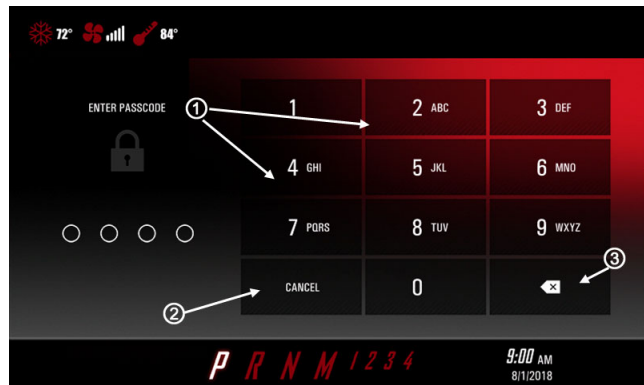
## Vehicle Settings Page 3: Foot Throttle Calibration

**\*\*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 backspace icon (3).

To calibrate the foot throttle, depress the foot throttle to the floor. Then touch OK (4) while holding the foot throttle down.

Step 2: Release the foot throttle, then touch OK (5) to complete the calibration process.

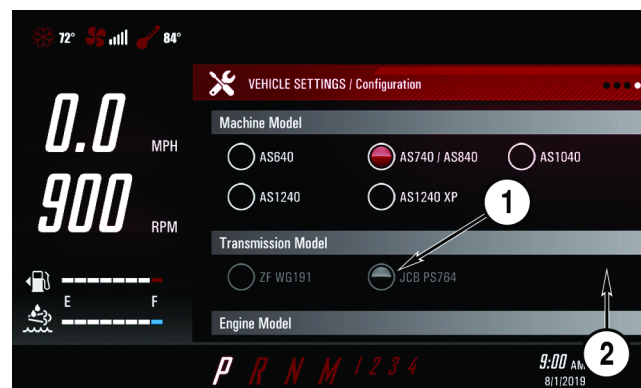




## Vehicle Settings Page 4: Configuration

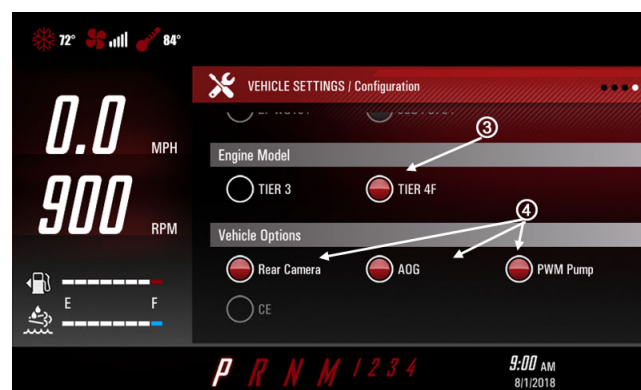
The selection for Transmission Model, must be the ZF WG191 (1). (AS840 shown)

Swipe the screen up to see all of the Vehicle Options (2).



The selection for the Engine Model, must be Tier 4F (3).

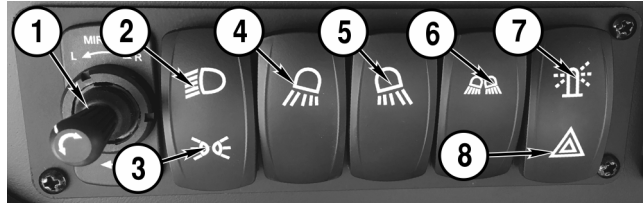
Only select the options equipped on the machine (4).



## Light Buttons and Adjustable Powered Mirrors

### 1. Adjustable Powered Mirrors

- Twist the control stem left to engage adjustment of the left mirror. Move stem up/down and left/right to adjust.
- Twist the control stem right to engage adjustment of the right mirror. Move stem up/down and left/right to adjust.



### 2. Headlights

- Press the button to turn on the hood-mounted headlights.
- Press the button again to turn off the lights.

### 3. Marker Lights

- Press the button to turn on the marker lights and tail lights.
- Press the button again to turn off the lights.

### 4. 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.

### 5. 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.

### 6. Boom Lights

- Press the button to turn on the dual beam boom lights.
- Press the button again to turn off the lights.

### 7. Beacon Light

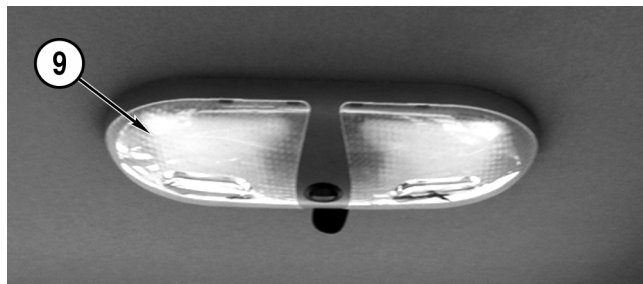
- Press the button to turn on the roof-mounted beacon light.
- Press the button again to turn off the light.

### 8. Hazard Lights

- Press the button to turn on flashing hazard lights.
- Press the button again to turn off the lights.

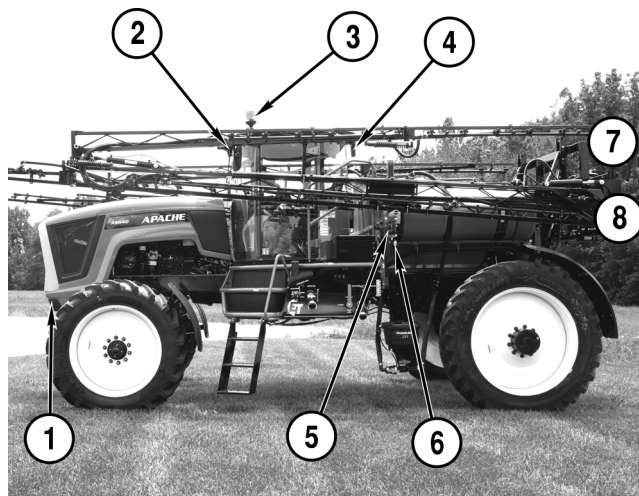
### 9. Dome Light

- 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 (not shown)**
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

- AM/FM
- SiriusXM-Ready™
- USB Playback
- Bluetooth Streaming Audio
- NOAA Weatherband Tuner with Alerts

For detailed instructions visit the manufacturer's website:  
<http://asaelectronics.com/manuals-guides> -- search for model number JHD1635BT



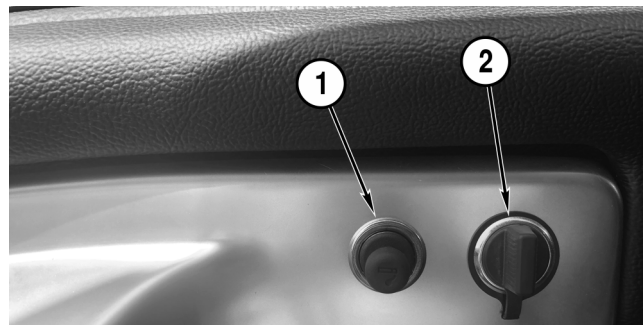
Equipment Technologies is pleased to provide you with 3-months of free Sirius Satellite Radio!

See "SiriusXM® Satellite Radio Activation Information" on page 3-22.

## Accessories

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

1. **Lighter.**
2. **Accessory power.**



## 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](http://www.siriusxm.com/activatenow) or call SiriusXM Listener Care at 1-866-635-2349. For subscriptions in Canada, please visit [www.siriusxm.ca/activatexm](http://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

### Leather Seat

#### 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 counterclockwise 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 counterclockwise for more lumbar support.
- Turn the knob clockwise for less lumbar support.

#### 9. Height:

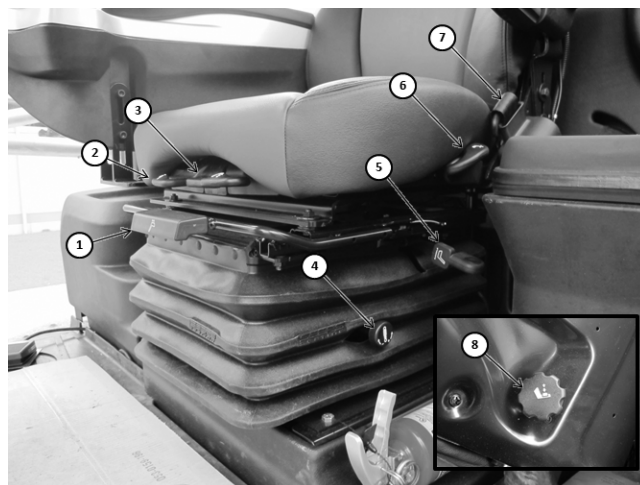
- Lift lever to raise the seat.
- Push the lever down to lower the seat.

#### 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 Viper® 4+ Console

1. **Viper® 4+ Console (option)**
2. **Joystick**  
See "Apache Sprayer Direction and Speed" on page 3-27.
3. **Auto Steer Engage Button**  
(If equipped)
4. **Master Spray Button**
5. **Boom Rack**  
Press to move the boom rack up or down.
6. **Right Boom Tilt**  
Press to tilt the right boom up or down
7. **Left Boom Tilt**  
Press to tilt the left boom up or down.
8. **Transmission Forward Direction Trigger Button**  
(back of joystick - not shown)
9. **Transmission Reverse Direction Trigger Button**  
(back of joystick - not shown)  
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. See "Safety Belt" on page 2-4.**



**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 auxiliary power on. The Start/Stop Button will turn red.
3. While in auxiliary 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

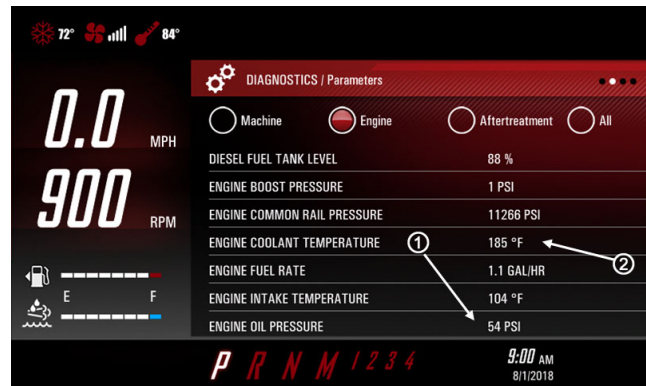
Check the engine oil pressure gauge (1) as soon as the engine starts. To do this, access the App Screen and choose the Diagnostics

- 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 54 psi [372.3 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 185°F [85°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 apply the parking brake 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.

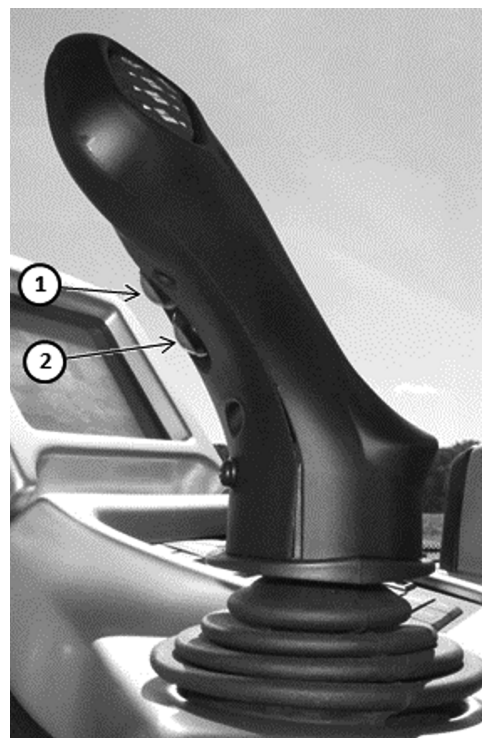
- Use the top button (1) for **FORWARD** and the bottom button (2) for **REVERSE**.
- Once the transmission is in gear, the gear indicator will show the current gear.

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:

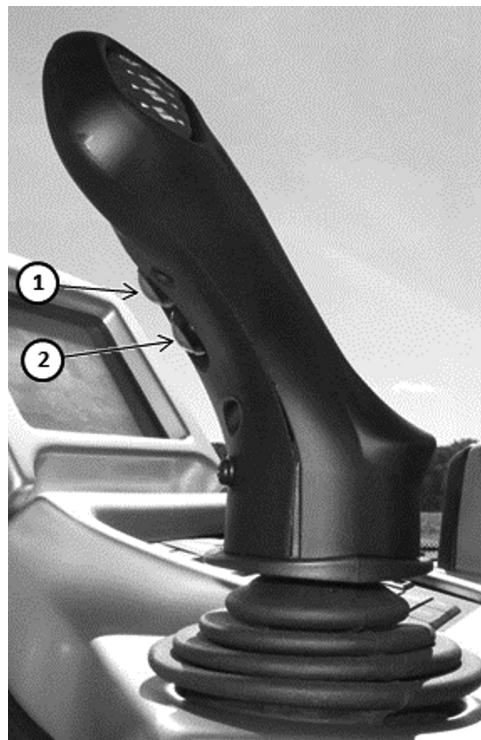
- Release the park brake.
- Apply the Apache Sprayer brakes.
- Squeeze and hold the top trigger button (1) on the joystick until the transmission shifts into first gear FORWARD. The machine will begin rolling forward at this time.

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

| Gear Speed Ranges |                         |
|-------------------|-------------------------|
| Gear              | Speed                   |
| 1st               | 0 to 5 mph [8.04 km/h]  |
| 2nd               | 0 to 9 mph [14.5 km/h]  |
| 3rd               | 0 to 16 mph [25.7 km/h] |
| 4th               | 0 to 28 mph [45 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 Apache Sprayer 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.

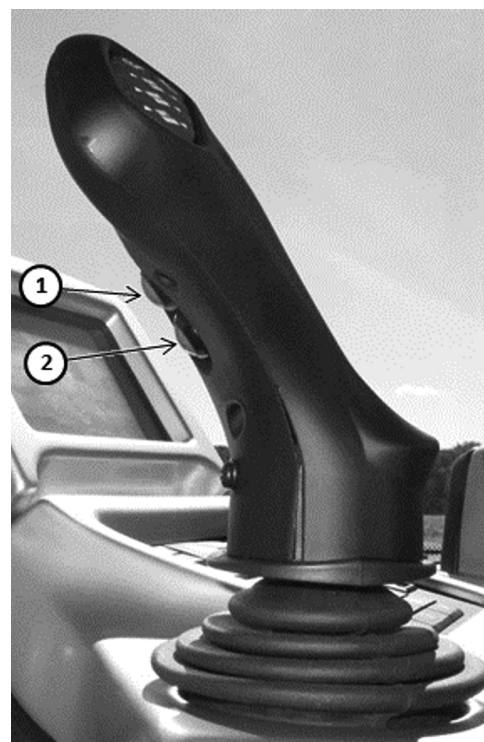
To shift into REVERSE from NEUTRAL, squeeze and hold the bottom trigger button (2) on the joystick.

- 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.

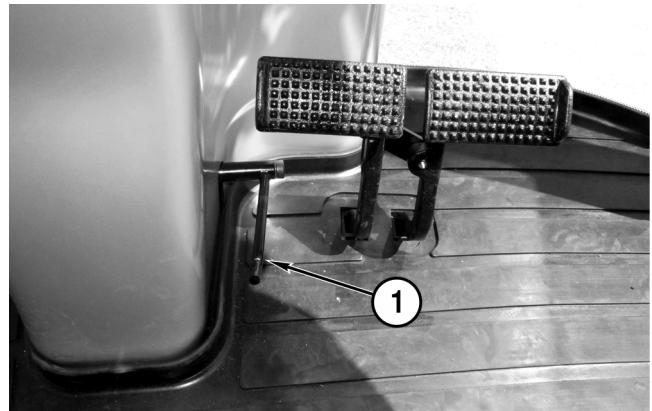
**NOTE:** The joystick will not shift the transmission into NEUTRAL. To obtain NEUTRAL from a REVERSE gear, release the bottom trigger button (2) on the joystick.

**NOTE:** If the Apache Sprayer is moving in REVERSE and the reverse button (2) is released, the transmission will shift to NEUTRAL. Once the Apache Sprayer 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.

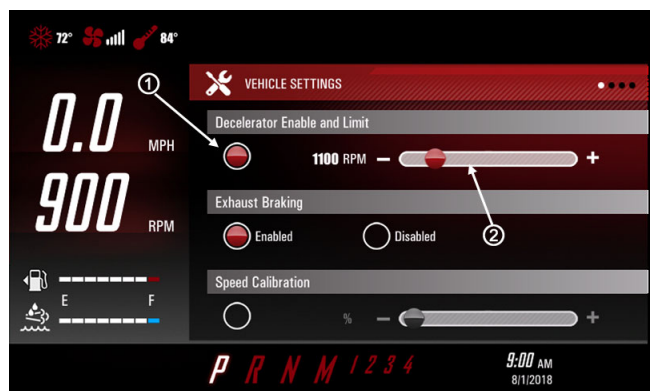


## Foot Throttle/Decelerator

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



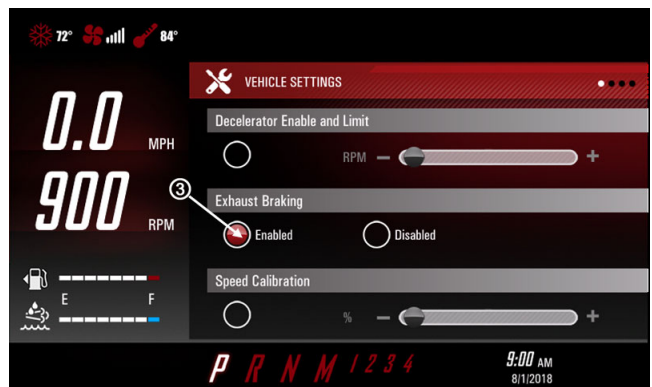
To enable the Decelerator, navigate to the first page of the Vehicle Settings screen and find the Decelerator Enable and Limit section. Click on the radial button (1) to enable this feature. Once enabled the RPM value can be adjusted with the slider (2). When the pedal is used, it will decelerate to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



## Exhaust Braking

Exhaust braking is a method which causes negative torque applied from the engine, which causes the drive-train to slow. The engine will initiate exhaust braking when the vehicle indicates that engine brake is enabled (3), 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 (3) 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. With cruise engaged, the joystick will control the vehicle speed from 0 mph (joystick all the way back) to the selected set speed (joystick all the way forward). The cruise control will only operate up to 30 mph.

Cruise control will disengage when:

- Master cruise button has been disabled
- The selected cruise button has been pressed

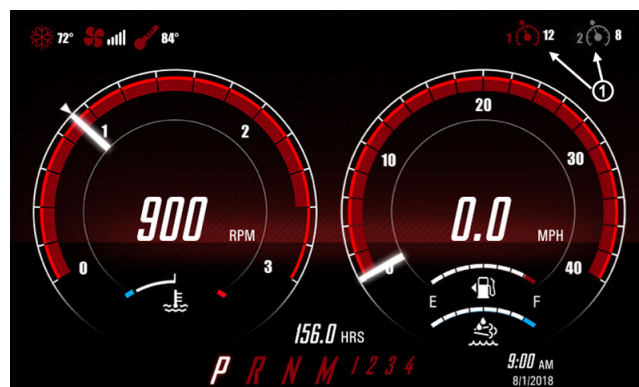
Cruise control will disengage temporarily when:

- Brake has been pressed
- Transmission is put in neutral or reverse

To resume the cruise control: select the desired set point one or two on the control pad (2). 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. The joystick must be pulled back to the current engine rpm to reengage normal throttle control.

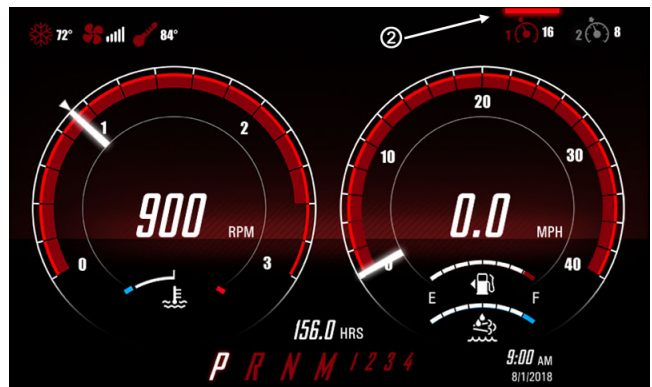
When the speed point icons (1) are visible, this indicates that the cruise master has been enabled. It will also indicate the set speed points for cruise one and two.



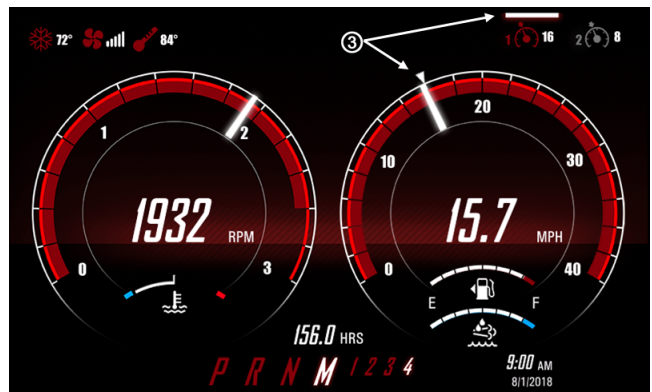
## OPERATION

**APACHE™**

There will be red bar (2) located over the speed point icons when a set point is preselected in neutral gear. The set point speed may be adjusted up or down when preselected.



There will be a white bar (3) located over the speed point icons when the cruise control is engaged. As well as an arrow on the speedometer (3).



## 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, remove the driveshaft 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 or drop boxes are removed, you will have no park or foot brakes. If the driveshaft between differential and park brake is removed, you will have no park brake.*

**NOTICE:** *DO NOT tow the Apache Sprayer if the:*

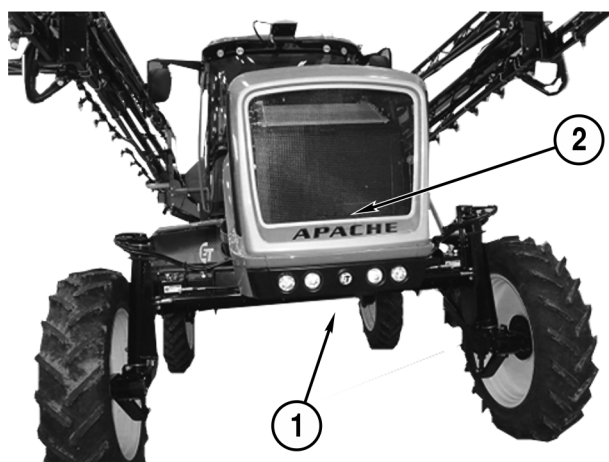
- Driveshaft is connected and it has no hydraulic supply to release parking brake.
- Rear differential is damaged (contact dealer for repair).

**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.*

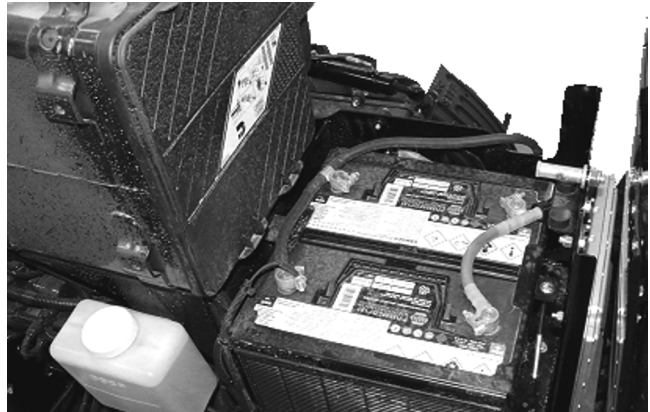
## Hood Tilt Latch

To raise the hood, pull the latch (1) down while pulling the 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 on the left side, near the rear of the engine compartment.

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

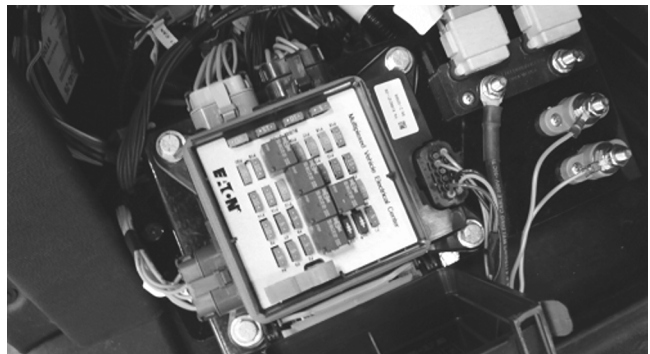
NOTE: The negative battery cable must still be disconnected when servicing the machine.



## The Cabin Power Distribution Module

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

For more information, see "Cabin Power Distribution Module" on page 8-2.



## The Chassis Power 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.

For more information, see "Chassis Power Distribution Module" on page 8-1.





## 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 right tire).*

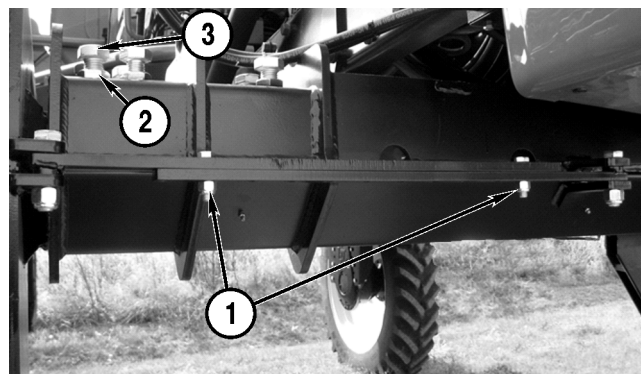
Manually slide the wheel to the desired width, making sure the locking bar holes are aligned.

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 left tire to center of right tire).*

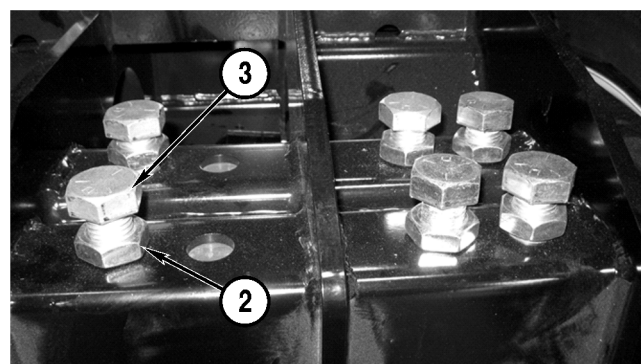
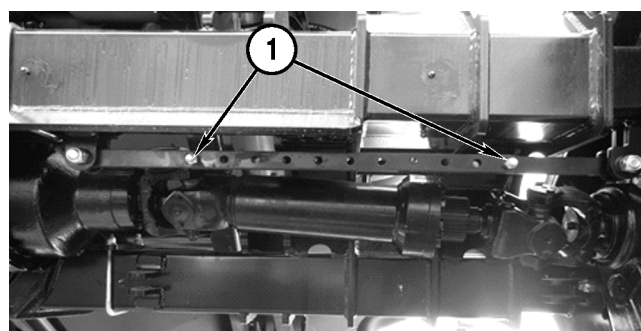
Manually slide the wheel to the desired width, making sure the locking bar holes are aligned.

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

Tighten the twelve jam nuts (2).

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

Repeat the steps to adjust the other rear axle.



## Adjust On The Go

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).

NOTE: The Adjust On The Go system will not allow the axle to be adjusted beyond 160 in. [406.4 cm].

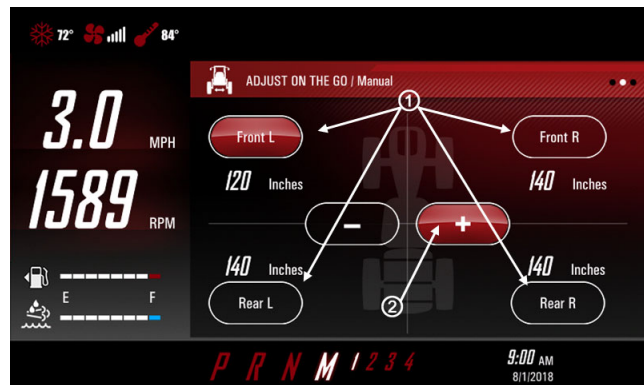
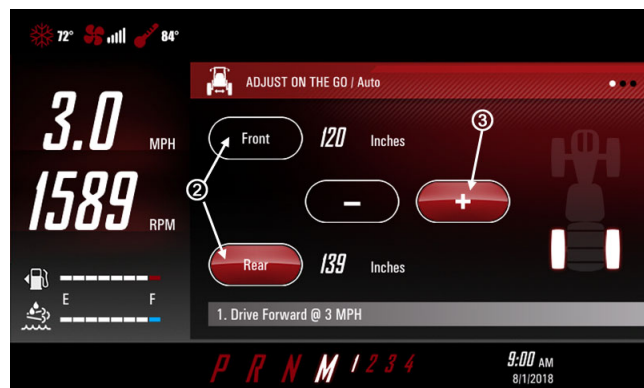
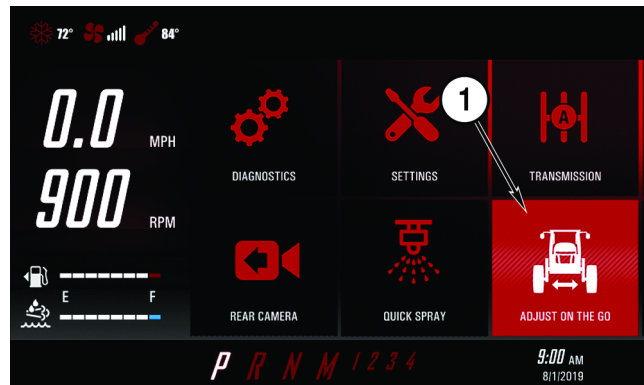
### To adjust the axles:

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 (2).

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

For manual mode, access the second screen by swiping the screen to the left. Manual mode allows for individual wheel adjustment. Select one wheel, or any combination to adjust (2). Begin driving forward at least 3 mph and press the (+) or (-) icon (3) 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.

Once finished click done (2).

Repeat the process to fully extend the axles.

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

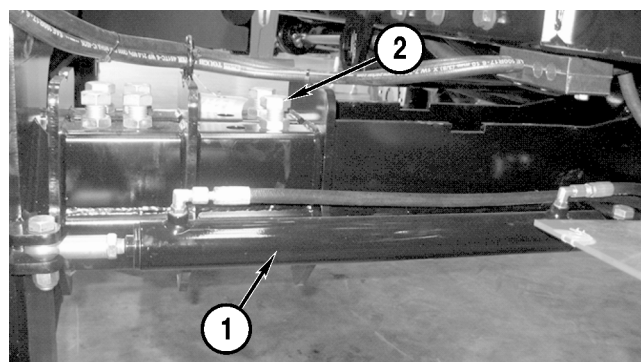


## Front Axle

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 left 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 5-21.

**NOTE:** Grease the axles daily when using the Adjust On The Go feature. See "Grease Axle Components (adjustable only)" on page 5-17.

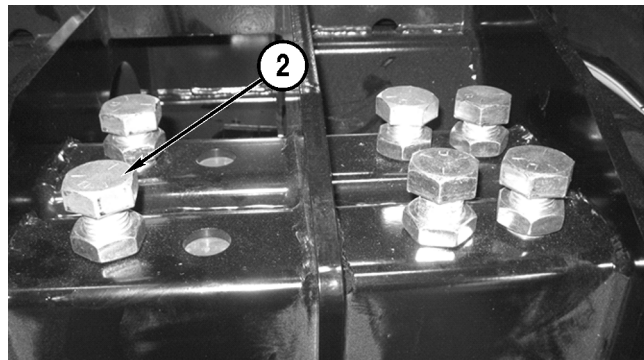
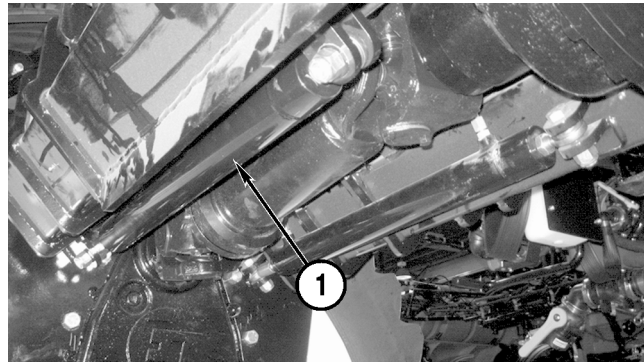


## Rear Axle

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.

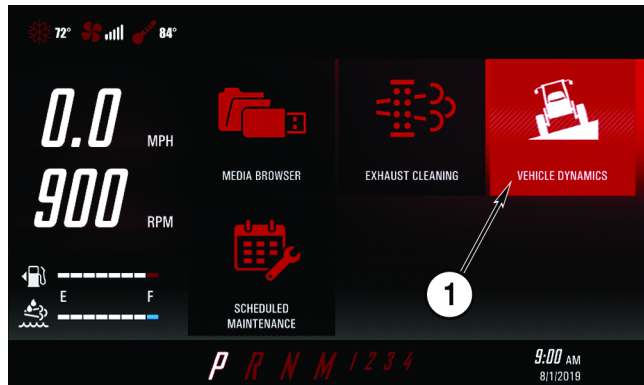
**NOTICE:** The bolts (2) should be torqued to 22 lb-ft [30 N•m] at all times. Check and adjust the torque weekly. See "Adjust On The Go Axles" on page 5-21.

**NOTE:** Grease the axles daily when using the Adjust-On-The-Go feature. See "Grease Axle Components (adjustable only)" on page 5-17.

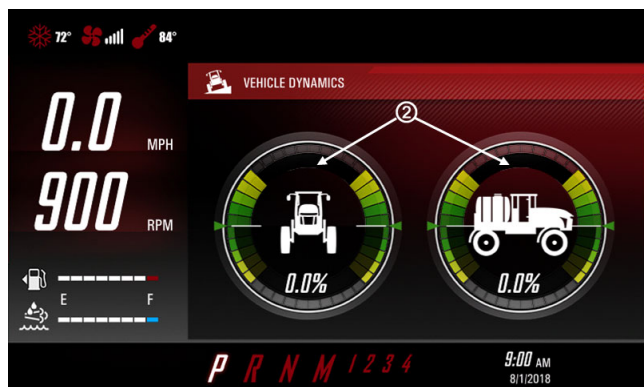


## Vehicle Dynamics

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 (2).



## 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.

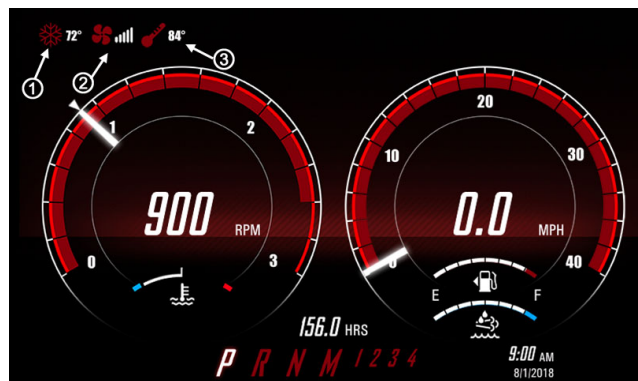
### 5. Manual Fan Controls.

- Controls fan speed.



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 Viper® 4+ (field computer)
- Raven RS1® Autosteer (integrated autosteer)
- Raven AccuBoom™ (sectional spray control)
- Raven Hawkeye™ (nozzle control system)
- Raven AutoBoom® (boom height control)
- John Deere® AutoTrac™ (integrated autosteer)

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

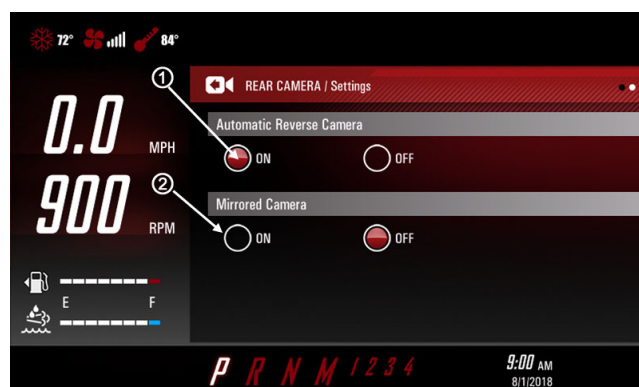
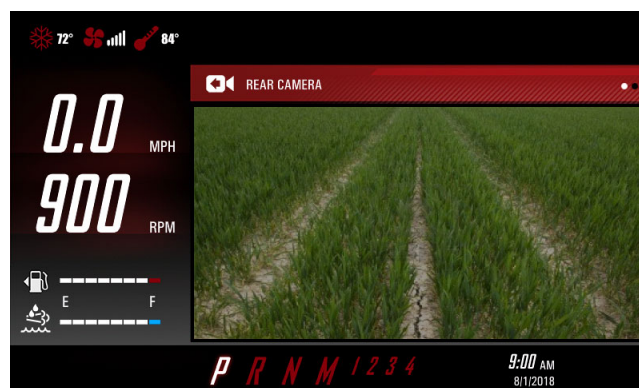
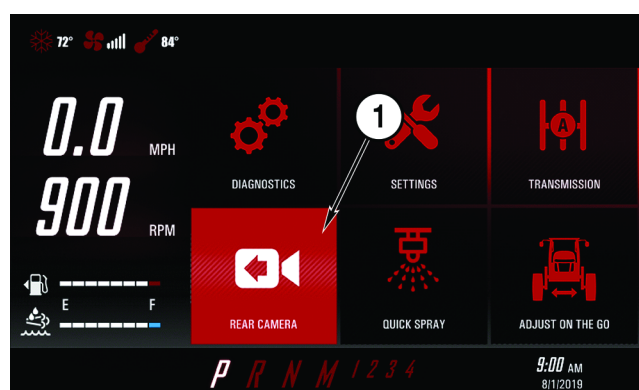
If the rear camera is enabled, the full screen image will display when the sprayer is in reverse.

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 (1). Also, the image can be reversed by turning On the Mirrored Camera button (2).



## 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.**

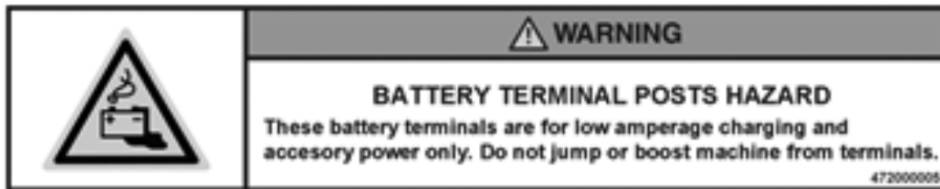


**WARNING! Safety Hazard. NEVER exceed 125 amps if boosting / charging a machine through the Fill Station battery terminal posts.**



**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.**

See "Safety Belt" on page 2-4.

### **WARNING! Sudden Movement Hazards**



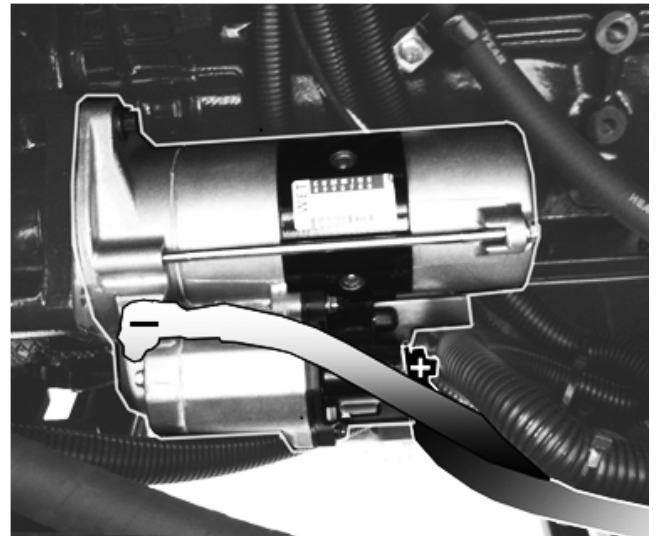
- ALWAYS start the engine from the operator's seat.
- ALWAYS set the parking brake before starting the engine.
- ALWAYS fasten your seat belt before starting the engine.

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 button.
- 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

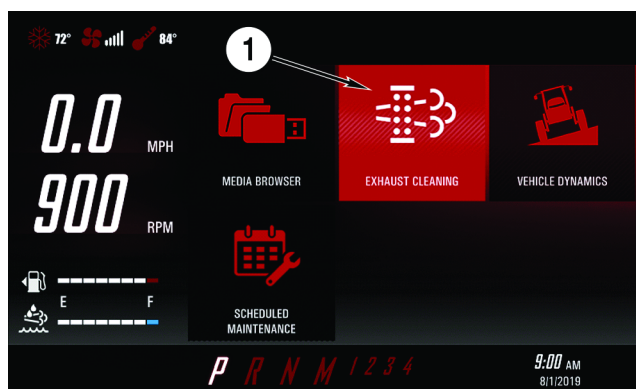


**Warning!** During exhaust system cleaning operations, the engine may run at elevated idle and hot temperatures for an extended period of time. Exhaust gases and exhaust system components reach temperatures hot enough to burn people, or ignite or melt common materials. Keep machine away from people, 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.



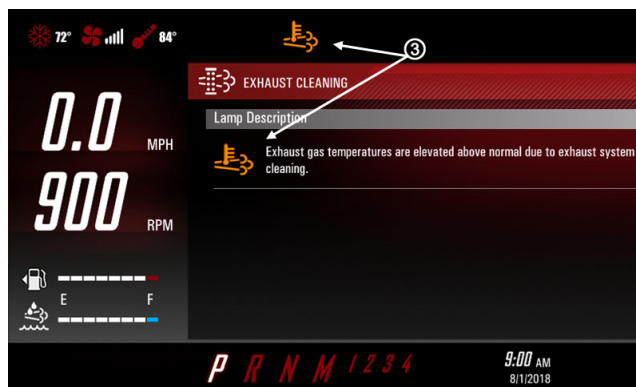
The button (2) will be filled in when in Automatic Mode. This will allow the machine to perform the exhaust cleaning when needed.

This is the recommended procedure for exhaust cleaning.



When the exhaust cleaning is in progress, the cleaning lamp (3) will be flashing. Also, the high exhaust temperature lamp (3) 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

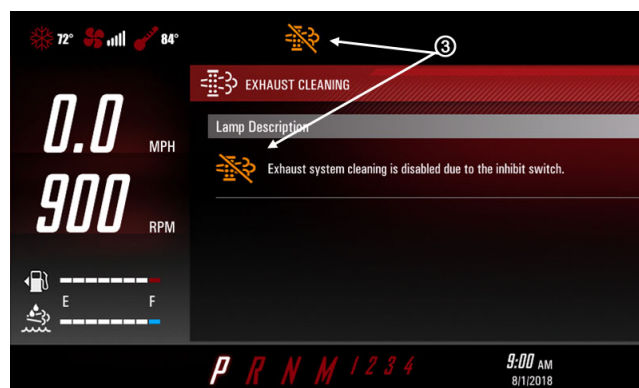
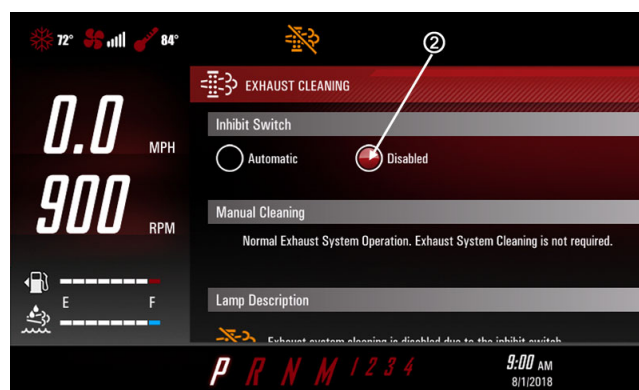
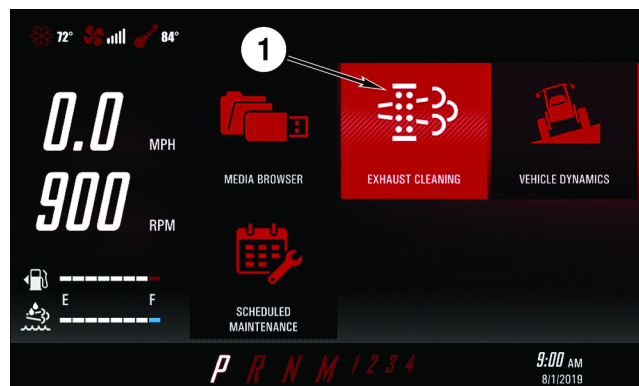
To access Disabled Mode, slide the main screen to the left until the Exhaust Cleaning app (1) is visible.

Touch the Exhaust Cleaning icon to continue to the next screen.

To change from Automatic mode to Disabled mode, touch the Disabled radial button (2). In this mode, the exhaust cleaning will not take place until it has been switched back to Automatic or activated manually. See "Manual Cleaning" on page 3-46.

The Cleaning Inhibit Switch lamp (3) 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.



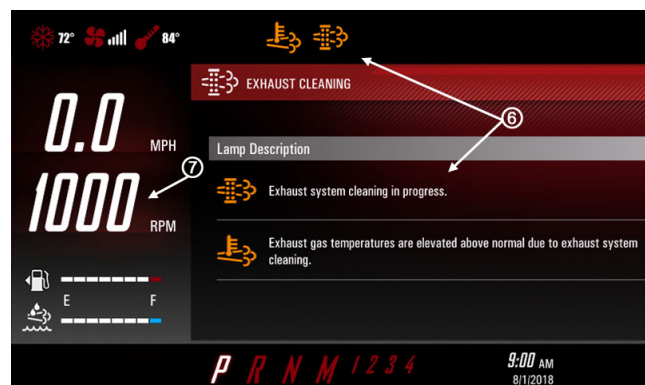
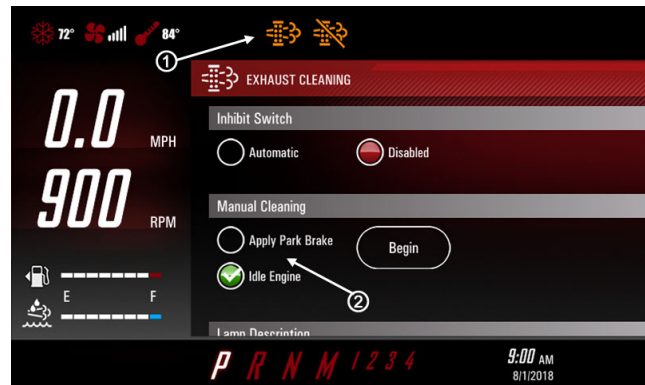
## Manual Cleaning

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 screen 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 (3) to start the Exhaust Cleaning procedure. After the Begin button (3) has been pressed, the Inhibit Switch will be changed to Automatic (4). This will revert back to Disabled once the cleaning is complete.

After the Begin button has been pressed, there will be a circle icon (5) 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 will begin to flash along with the solid High Exhaust Temperature lamp (6). The RPM's will also increase to 1000 (7) to assist in elevating the exhaust temperature.



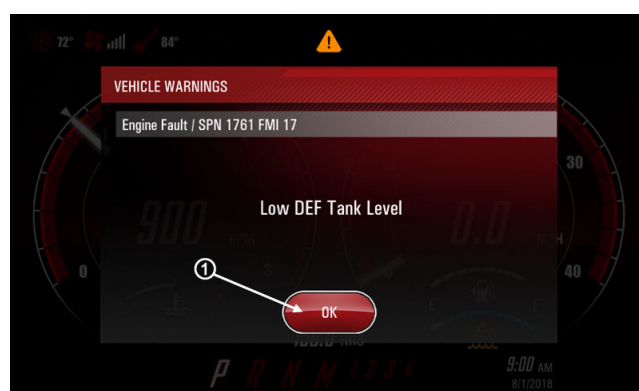
If the Park Brake is released or the Engine Idle is manually changed, the Exhaust Cleaning process will be aborted (8). Once the process has been aborted, the Inhibit Switch will revert back to Disabled (9). The process can be started again, once the criteria has been met.



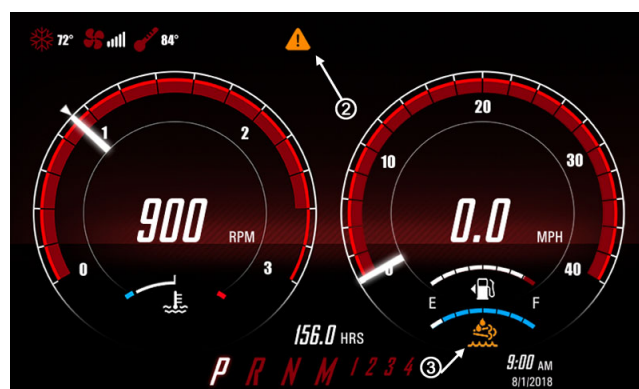
## Low DEF Fluid

### 10% DEF fluid level:

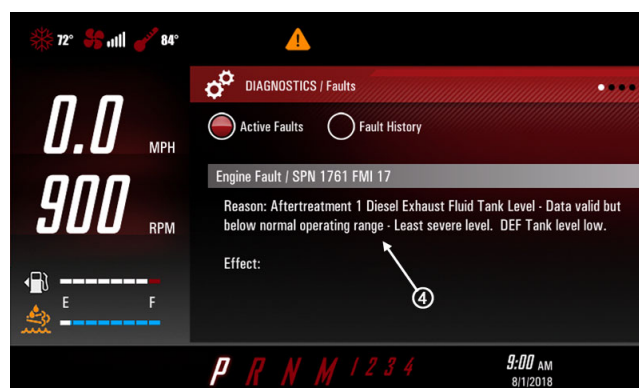
A vehicle warning will pop up on the screen with the engine fault code and a brief explanation of the fault. Click on the OK button (1) to return to the main screen.



The Yellow warning lamp (2) and the Amber DEF lamp (3) 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 (2).



The Diagnostics/Faults page will give a full description of the warning (4).

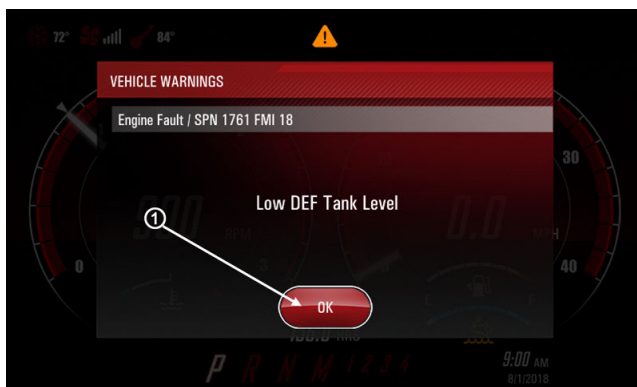




## 5% DEF fluid level:

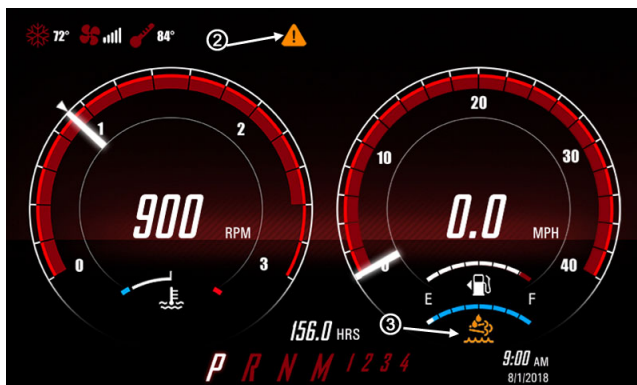
A vehicle warning will pop up on the screen with the engine fault code and a brief explanation of the fault.

Click on the OK button (1) to return to the main screen.



The Yellow warning lamp (2) and the flashing Amber DEF lamp (3) 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 (2).



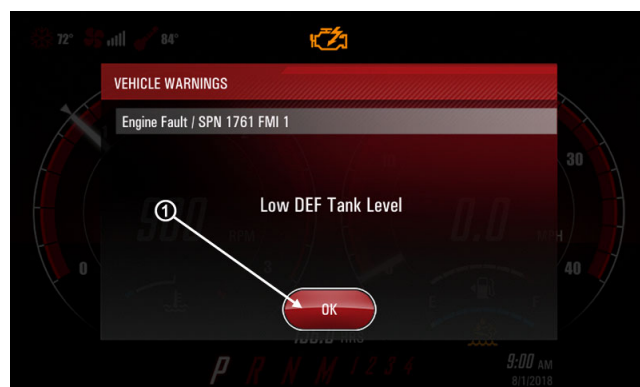
The Diagnostics/ Faults page will give a full description of the warning (4).





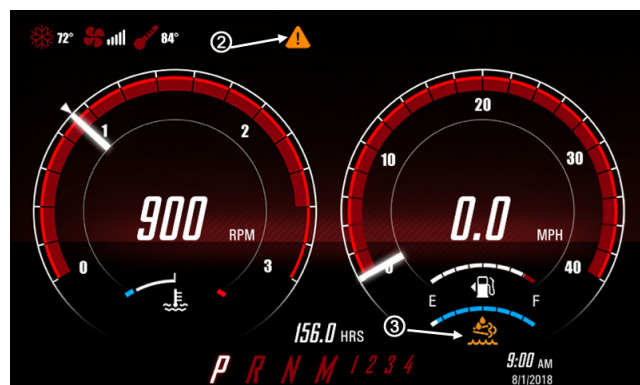
## 2.5% DEF fluid level:

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 main screen.

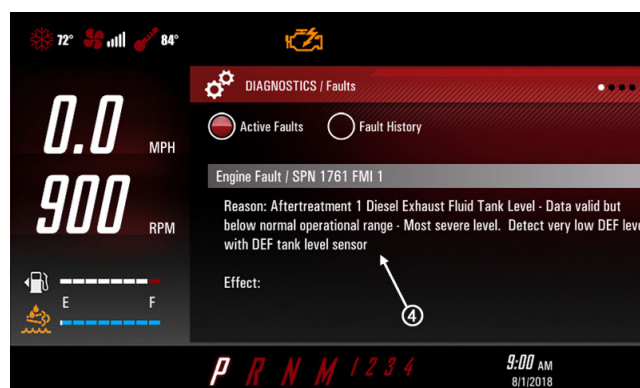


The Amber Engine Warning lamp (2) and the Flashing Amber DEF lamp (3) will be on. Both lamps will remain in this state until DEF fluid is added. **The first inducement derate will become active.**

To view a full description of the warning, press the Amber Engine Warning lamp (2).



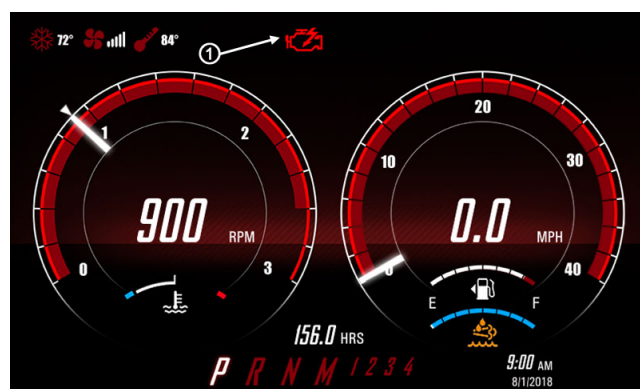
The Diagnostics/ Faults page will give a full description of the warning (4).



## 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).



## This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings present.

# APACHE™

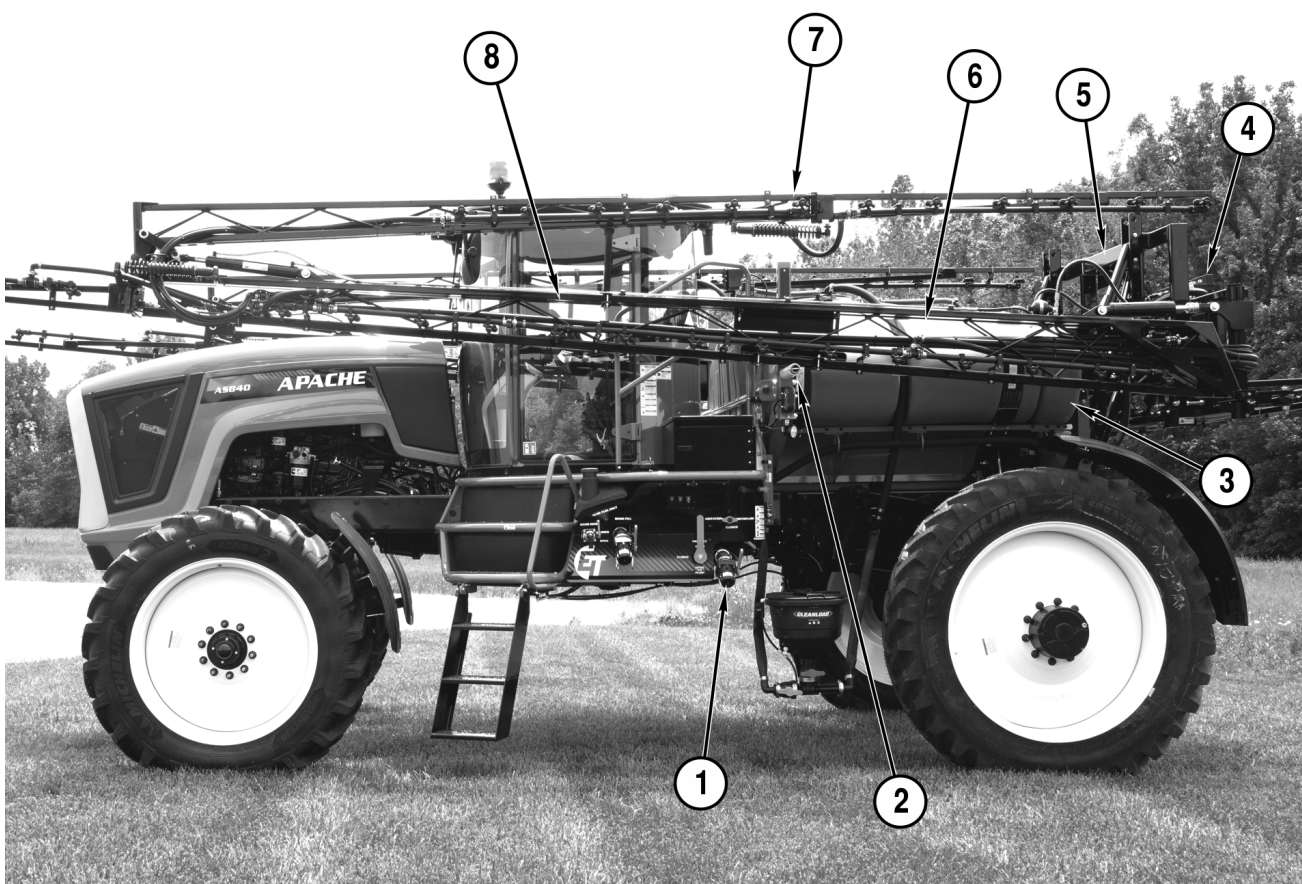
## CHAPTER 4

### WET SYSTEM OPERATION

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

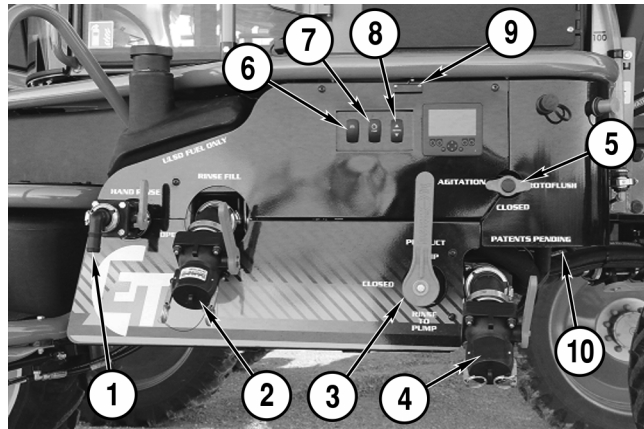
#### Wet System Overview



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

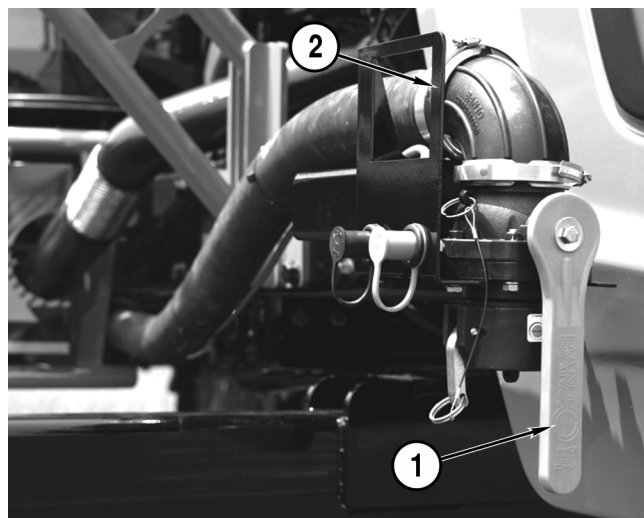
## Fill Station

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. Activation switch must be held down while adjusting.
9. **Fill Station Light**
10. **Agitation Valve (not shown in picture)**  
During normal spraying operation, this valve is electronically actuated and controlled by a switch on the side console in the cab.



## Front Fill Option

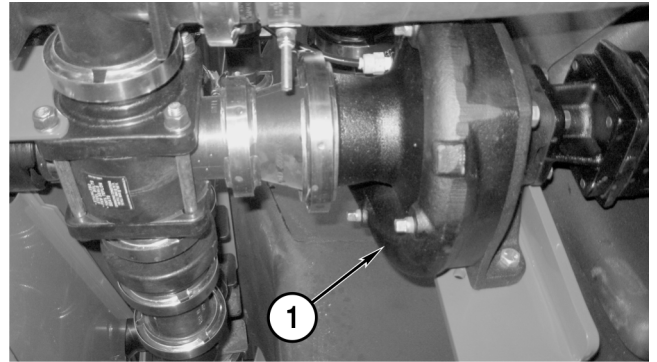
1. **Product Tank Fill**
2. **Flow Meter Bracket**





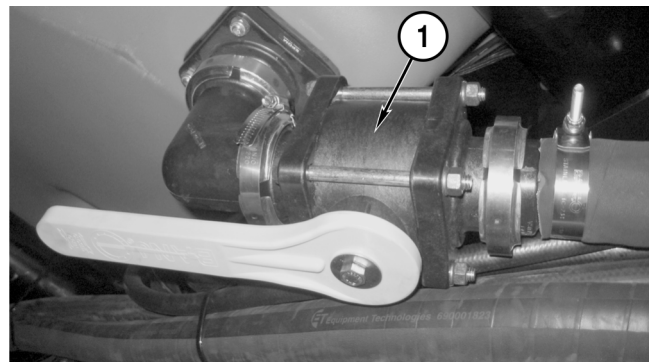
### Product Pump and Valves

#### 1. Product Pump



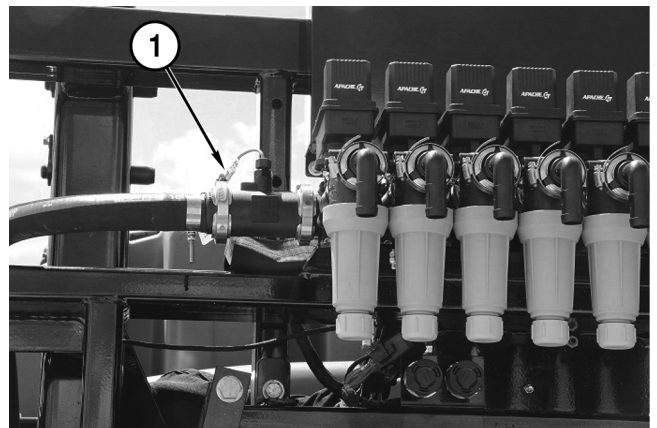
### Sump Valve

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

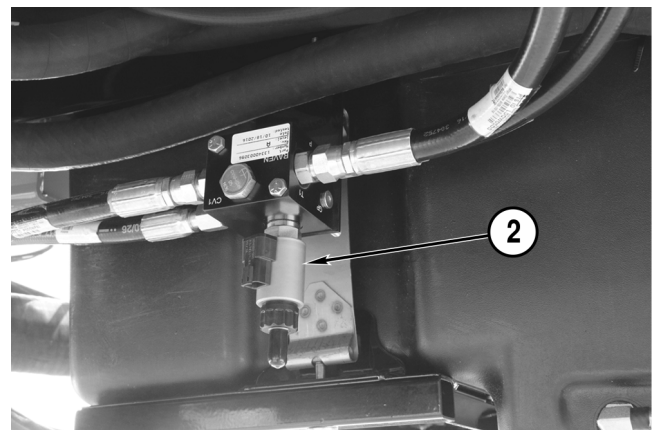


### Flow Control

#### 1. Raven Flowmeter



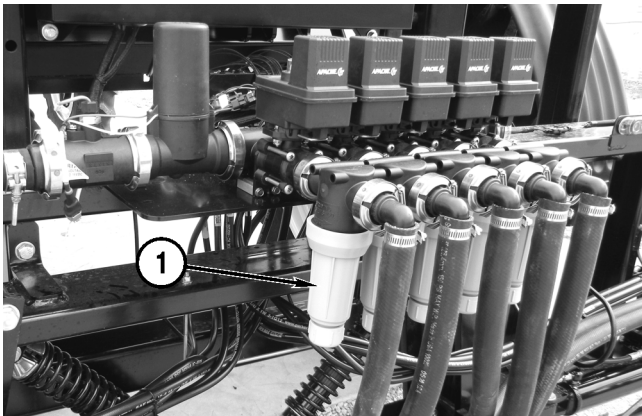
#### 2. PWM Valve





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.



Viper® 4+ Monitor

Viper® 4+ Monitor is the Raven field computer option.

This monitor is built for Equipment Technologies by Raven. 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)

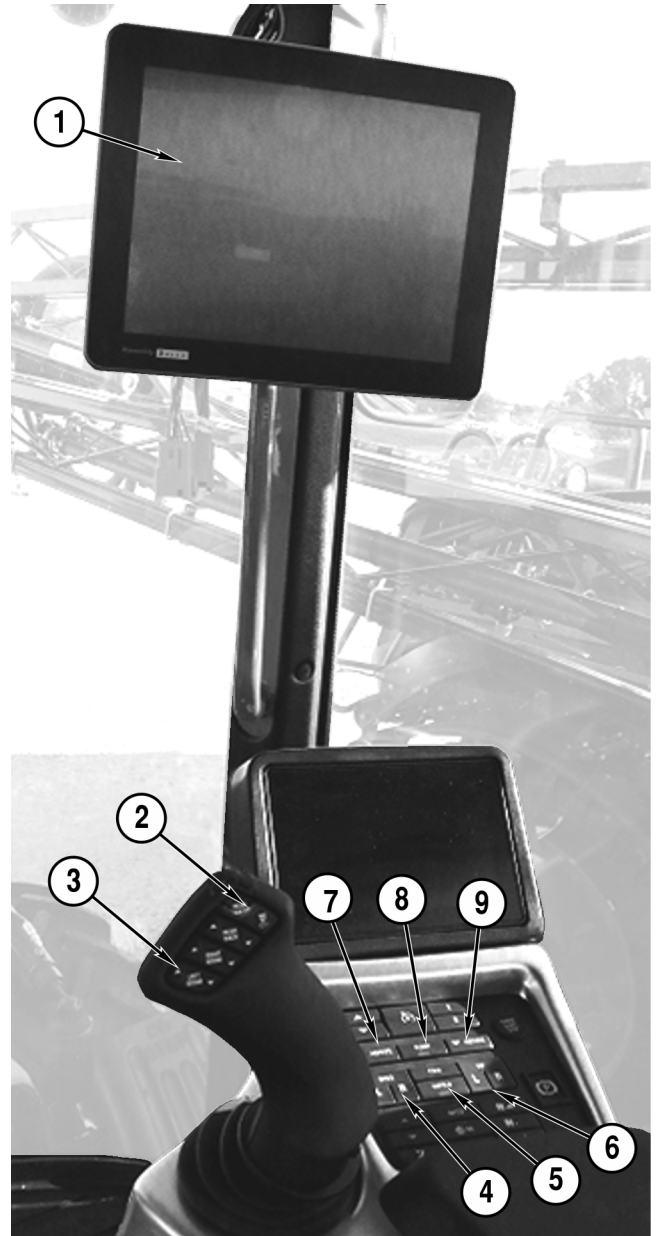
- Speed cal (GPS for speed) .....1000
- Meter cal.....See tag on the flowmeter, located on the rear boom rack.
- Boom cal .....The boom cal numbers are specific for each sprayer and are dependent on the boom width, number of sections and nozzle spacing.

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.

### Side Console

1. Viper® 4+ Controller (option)
2. Master Spray Button
3. Boom Tilt/ Rack Buttons
4. Left/Right Wing Buttons
5. Fold/Unfold Buttons
6. Left/Right Tip Buttons
7. Agitate Up Button
8. Product Pump Button
9. Agitate Down Button



## Joystick

### 1. 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.

### 2. 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.

### 3. 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.

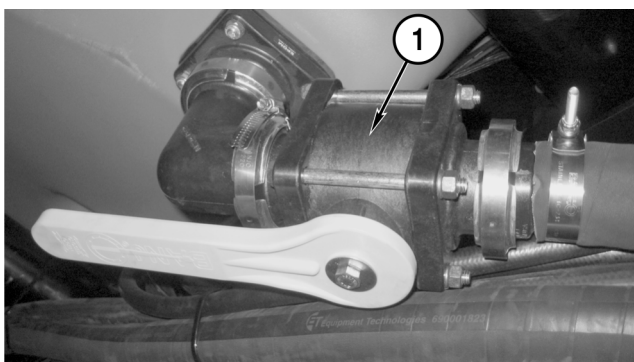
### 4. Master Spray Switch

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.

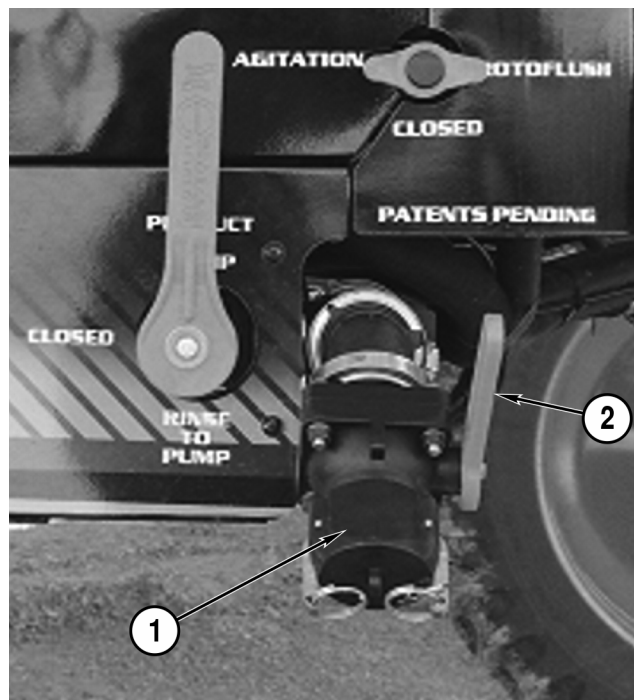


Remove the cap from the product quick fill inlet (1) and connect the hose from the nurse tank to the inlet.

Open the product fill valve (2), 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)

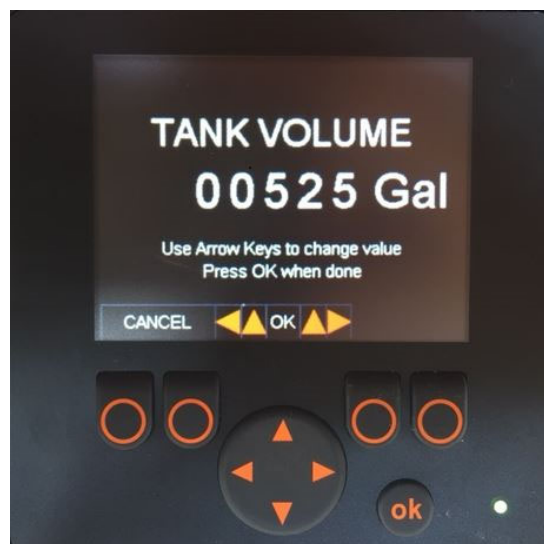
Screen 1:

The first screen shows the Tank Volume and Fill Volume in larger text. The Edit button allows you to adjust tank volume (see screen 2) The purpose of this is to add chemical to the tank that is not added through the secondary flow meter.



Screen 2:

After pushing the Edit button on Screen 1, you will see this screen and can use the arrow keys to change the value.



Screen 3:

The third screen is for information. It has Tank Capacity, Fill Volume, Tank Volume, Sparge Pressure and the Flow Rate.

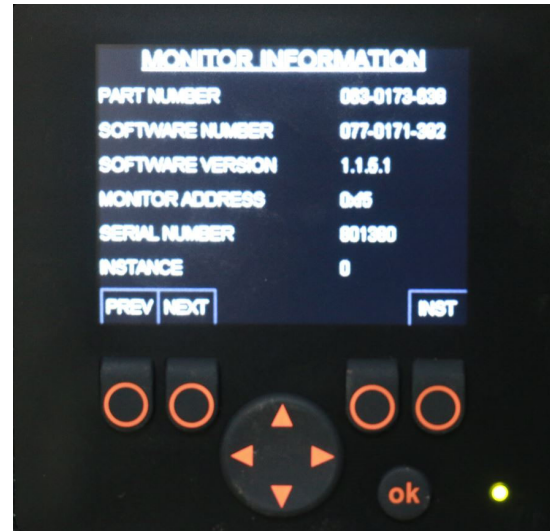




Screen 4:

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 (2) 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 (800 gal - 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

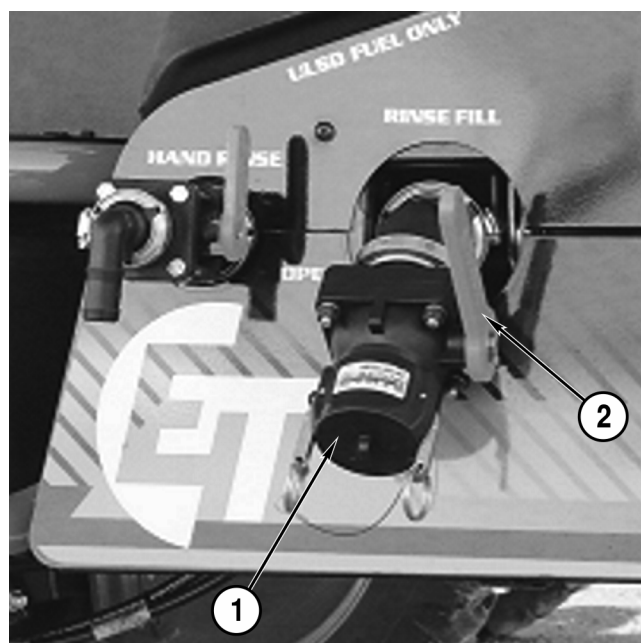
Remove the cap from the rinse quick fill inlet (1) and connect the hose from the nurse tank to the inlet.

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! Electrocutation Hazard. DO NOT** fold or unfold the booms near power lines.



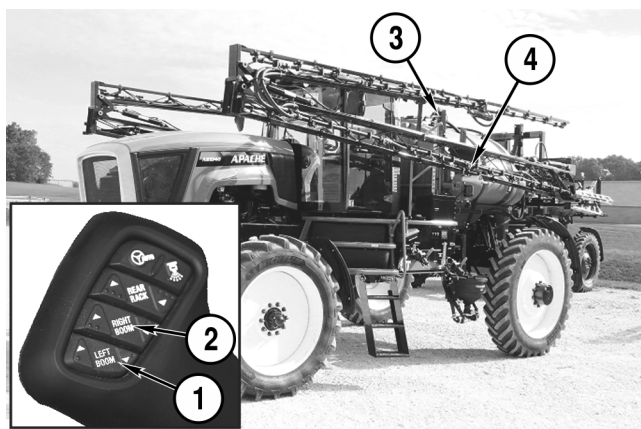
**WARNING! Control Hazard. NEVER** fold or unfold the booms while the Apache Sprayer is moving over 5 mph [8.04 km/h] or with the optional Auto Boom height control turned ON.

**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 switches 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.

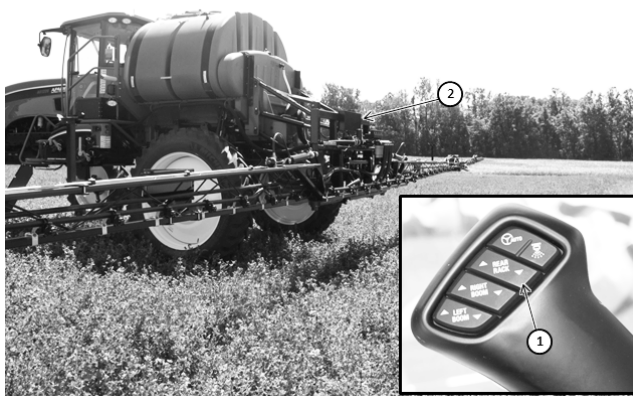
On the console keypad, make sure the Unfold button (1) is still activated. Then press and hold the Left and Right Tip buttons (2) until the boom tips are fully extended.



### Height Adjustment

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

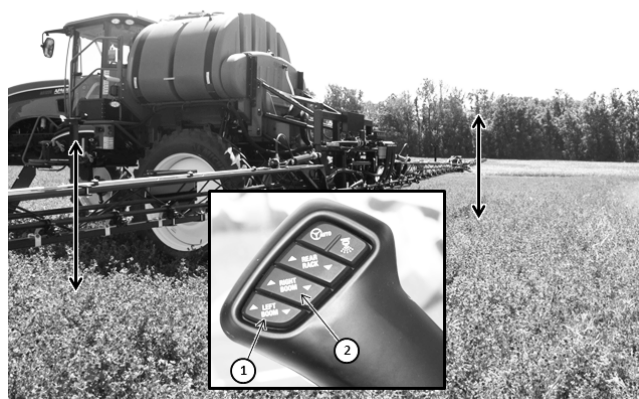
Press the top of the switch to raise the boom rack.



### Tilt to Level Boom

On the joystick, use the left (1) and/or right (2) boom tilt raise/lower switches to adjust the booms to level.

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



### Fold Boom Tips

On the console keypad, press the Fold button (1) to activate. Then 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 completely before folding the booms.

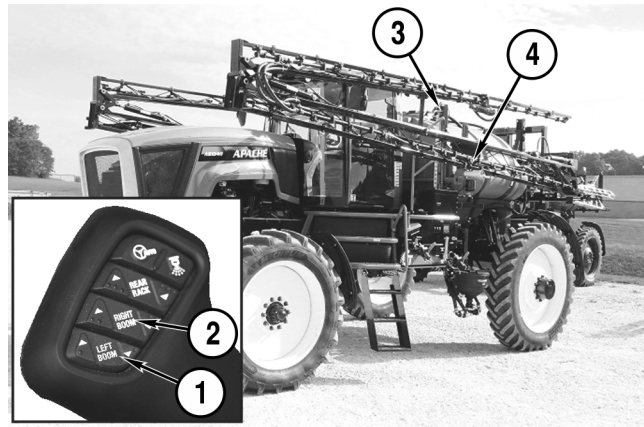
On the console keypad, make sure the Fold button (1) is activated. Then, press and hold the Left and Right Wing buttons (2) until the boom wings are fully folded.



### Tilt to Return Boom to Cradle

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

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



### AutoFold Option

The AutoFold function is accessed in the touch screen. The icon is located below the speedometer and to the left of the gear indicator.

Supplemental AutoFold information is in the Raven Viper 4+ screen. Refer to the Raven manual for additional information.

The AutoFold option is only available with the XRT package, but is not standard. The icon appears on the touch screen once AutoFold is unlocked and calibrated through the viper 4+.

**NOTE:** Booms can always be operated with the standard Unfold/Fold functions on the joystick and keypad. Using these buttons will abort the AutoFold function.

**NOTE:** The Unfold/Fold process will 'time-out' when an electrical process is taking too long. The screen will return to the start screen.

**NOTE:** The end user climate can impact AutoFold performance if it is considerably different from the climate of calibration. Contact dealer if you suspect this performance issue.

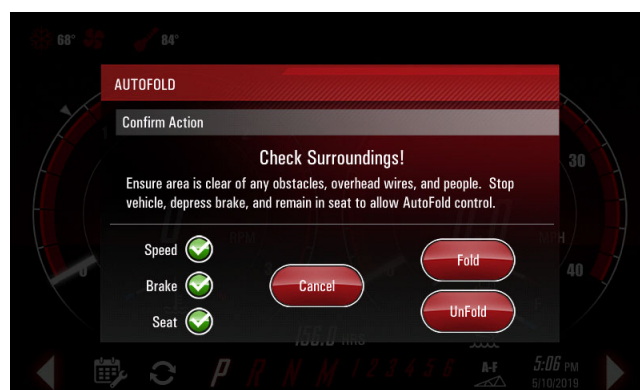
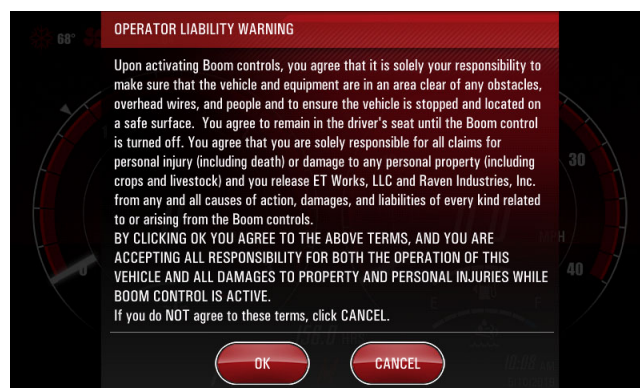


### Unfold

1. Touch the AutoFold icon on the touch screen or press and hold the unfold/fold button on keypad for 3 seconds.
2. When the Operator Liability screen appears, read and understand the liability warnings. Touch OK to accept the liability agreement.
3. The Safety Check screen appears next. In order for AutoFold to function the following safety requirements must be met:
  - Speed is zero
  - Brakes are engaged
  - Operator is sitting in seat
 A checkmark confirms the requirement has been met.
4. Touch and release the Unfold button. The booms will tilt and unfold automatically.

*NOTICE: If any of the three safety requirements are not met during unfold or if any boom button is pressed, the function will be aborted.*

The unfold function can be reengaged by once again meeting the three safety requirements and touching the Unfold button.



### Fold

1. Touch the AutoFold icon on the touch screen or press and hold the unfold/fold button on keypad for 3 seconds.
2. The Safety Check screen appears next. In order for AutoFold to function the following safety requirements must be met:
  - Speed is zero
  - Brakes are engaged
  - Operator is sitting in seat
 A checkmark confirms the requirement has been met.

A checkmark confirms the requirement has been met.

3. Touch and release the Fold button.

The booms will fold and return to cradles automatically.

*NOTICE: If any of the three safety requirements are not met during fold or if any boom button is pressed, the function will be aborted.*

The fold function can be reengaged by once again meeting the three safety requirements and touching the Fold button.



### 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 4-6. See “Operating Booms” on page 4-9.

Level the booms and boom tips using the tilt and unfold switches. See “Operating Booms” on page 4-9

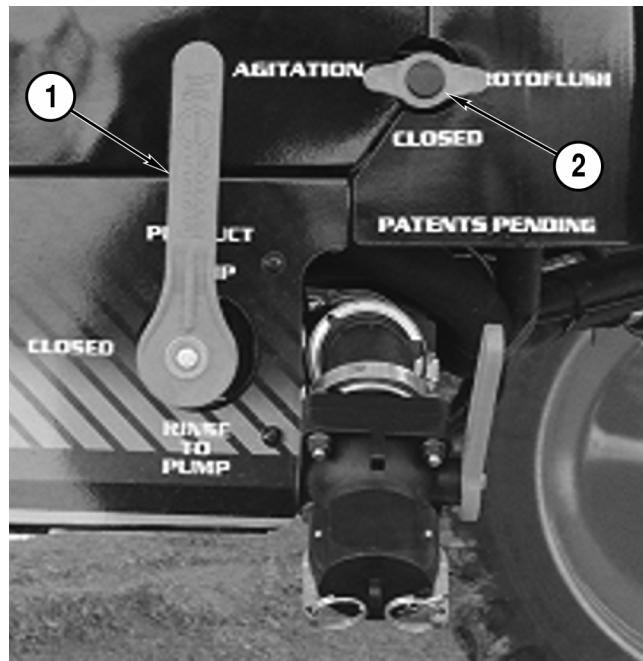
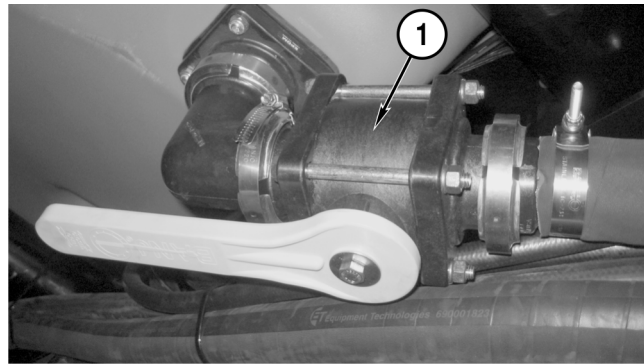
Set the boom height using the boom rack switch. See “Height Adjustment” on page 4-10.

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.

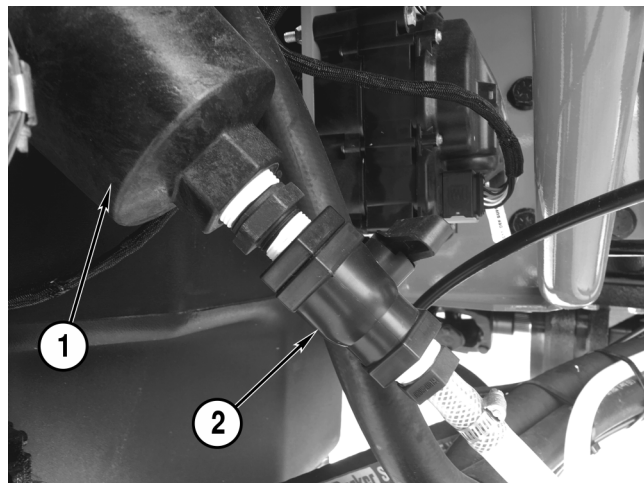
Set the flush/agitation knob (2) to AGITATION.



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 Viper® 4+, 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.

Using the Viper 4, set the desired boom section 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.*



Select an appropriate gear for the desired Apache Sprayer speed during spraying.

See “Shifting Forward Gears” on page 3-28. Under typical operating conditions, second or third gear is recommended.

Use the master spray on/off button on the joystick (2) to start and stop spraying.

Use the Viper 4 to control boom sections 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 Viper 4 to control the two optional fence row sections.



### Quick Spray Mode

Quick Spray Mode is a simple spraying function that does not use the Viper 4+.

Note: Quick Spray will only work if the Viper 4+ is OFF or is set to Manual mode.

From the main start screen, swipe left once.

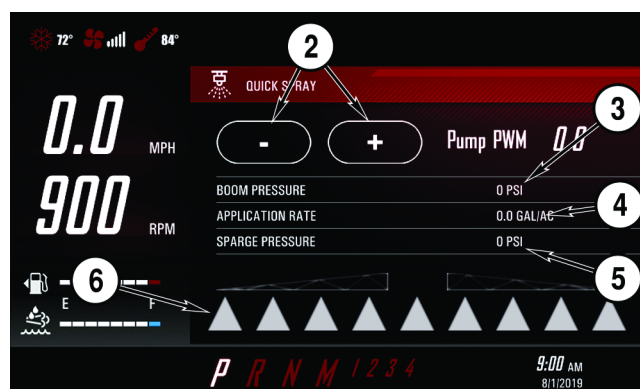
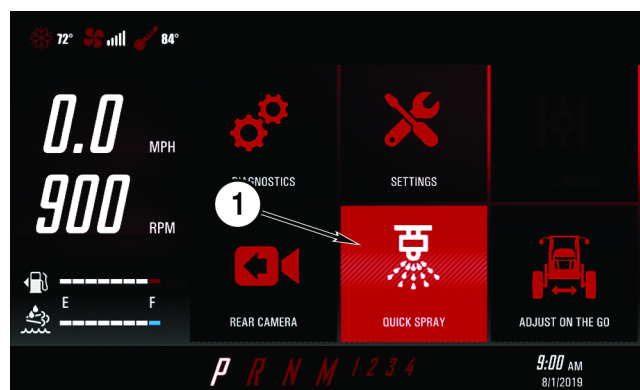
1. Select Quick Spray on the touch screen to go to the parameters screen.
2. The plus (+) and (-) buttons allow the operator to increase or decrease the pump **PWM** by 0.5% increments. Touching and holding the button will allow the value to change quickly.
3. **Boom Pressure**, (psi) as measured by the Raven product controller.
4. **Application Rate**, (gallons/acre) as calculated by the Raven product controller.
5. **Sparge Pressure**, (psi) as measured by the Raven product controller. This can be manipulated by the agitate buttons on the pilot system.
6. **Manual Section Control**, the nine boom sections can be controlled by the corresponding nine triangles when the Viper 4+ display is OFF or in Manual mode. Each triangle can be pressed to toggle that section valve on/off. Make sure the Master Spray on the joystick is pushed on. The valve status is indicated by color.

OFF = Gray

ON = Blue (both Master Spray and section valve)

NOTE: If Viper 4 + display is ON or in Automatic mode, the triangle icons **cannot** be used to toggle the valves. Color still indicates status of the valve being on or off.

NOTE: The fence row nozzle cannot be controlled with Quick Spray.



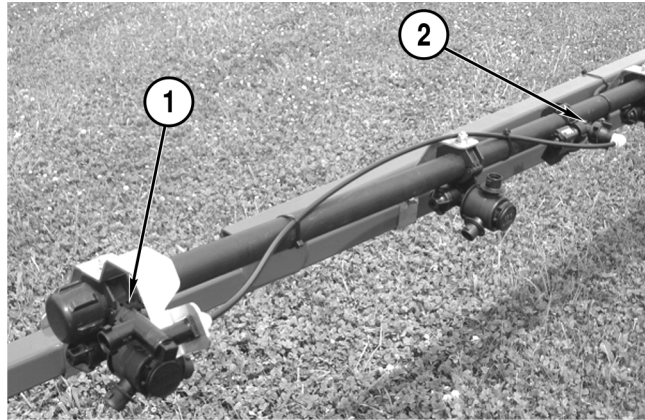


## Optional Fence Row Nozzle

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.

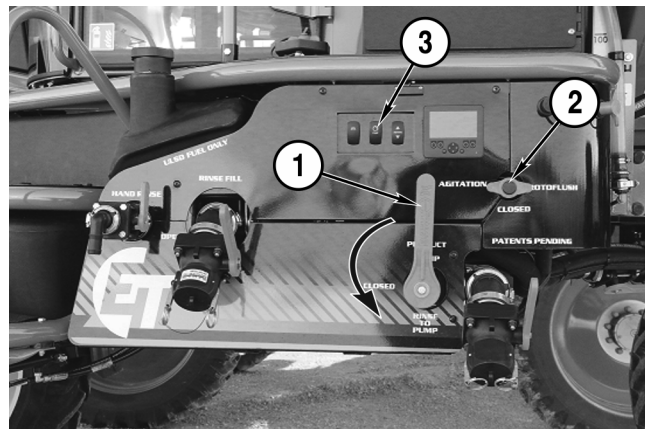
Turn the product valve to RINSE TO PUMP (1).

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

Start the engine.

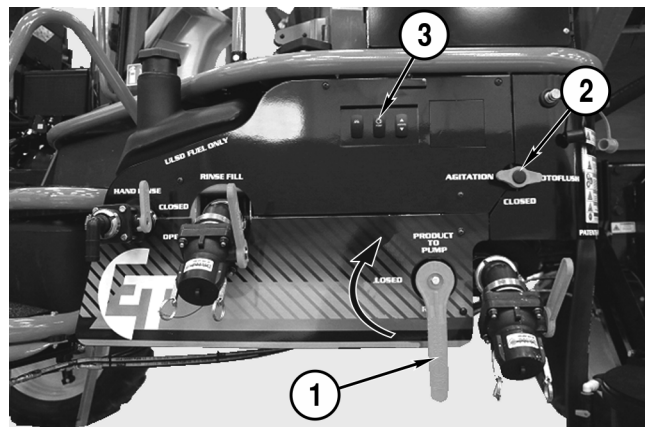
Set the product pump switch (3) to the ON position and increase the engine speed to approximately 1200 rpm.

**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

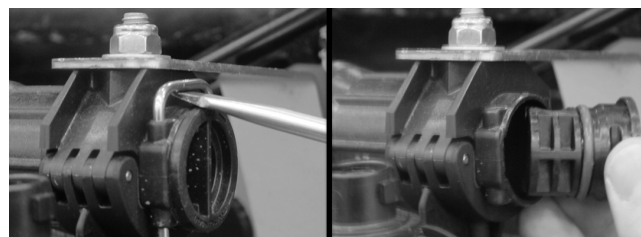
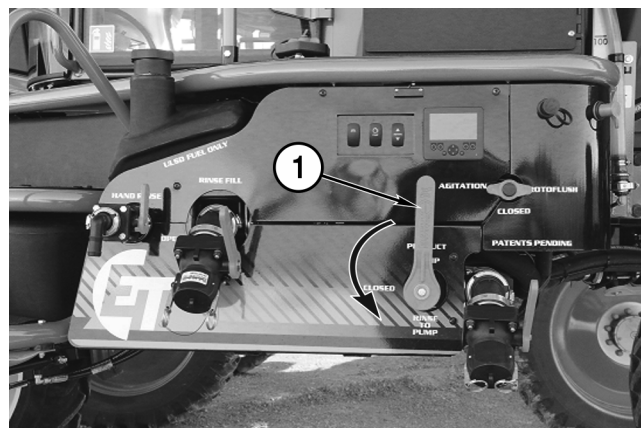
**NOTICE:** Read and follow chemical labels for proper usage, flushing, disposal and protective clothing requirement instructions. ALWAYS dispose of chemicals and contaminated rinse water in a safe location in accordance with chemical label recommendations and local laws.

**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:

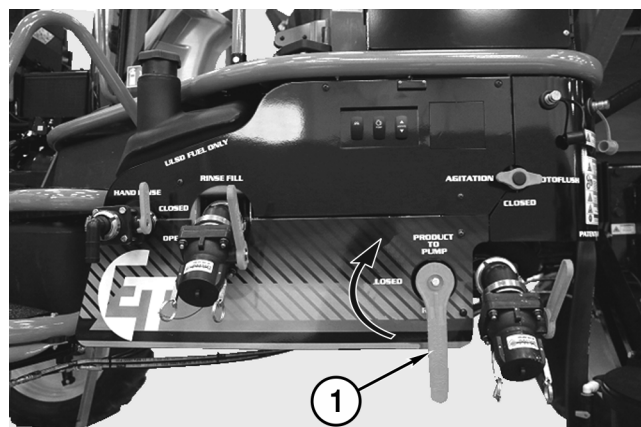
- Unfold the booms.
- Set the product valve (1) to RINSE TO PUMP.
- Remove Hypro Express Endcaps.
- Increase engine speed to 1200 rpm.
- Switch to Manual Spray in the field Computer.
- Turn the Product Pump switch to the ON position.
- Press the Master Spray Button to flush.



**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

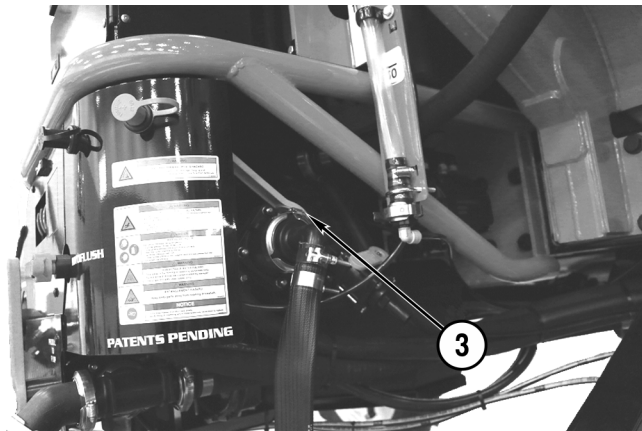
The eductor assembly is automatically lowered and raised with the use of the park brake button. When the park brake is activated, the eductor is lowered. When the park brake is deactivated, the eductor is raised.

#### 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.

# APACHE™

## CHAPTER 5

# LUBRICATION AND MAINTENANCE

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The Scheduled Maintenance Icon will illuminate when maintenance is required.

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

### Maintenance Precautions

- Parts found defective during 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 Educator Manual, Product Pump Instructions and other optional equipment manuals.

**NOTICE:** *ALWAYS perform and reference the original equipment manufacturers' 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 manufacturers' 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 noncombustible 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 insulations 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.<br>▲ = Conditional Service<br>○ = Conditional Service<br>● = Regular Service<br>NOTE: DO NOT overlook the "After First 100 Hours" interval. | Before Initial Use | After First 10 Hours | As Required | Daily | Every 40 Hours | After First 100 Hours | Every 100 Hours | Every 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  |                    |                      |             |       | ●              |                       |                 |                           |            |                            |                            |                             |
| 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<br>(Immediately if indicated by console screen)   |                    |                      |             |       |                | ▲                     |                 | ●                         |            |                            |                            |                             |
| Clean Hydraulic Fluid Strainer  |                    |                      |             |       |                |                       |                 | ●                         |            |                            |                            |                             |
| Change Engine Oil and Filter  |                    |                      |             |       |                | ▲                     |                 | ●                         |            |                            |                            |                             |
| Change Transmission 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   |                    |                      |             |       |                |                       |                 |                           |            | ●                          |                            |                             |
| Change Crankcase Ventilation Filter   |                    |                      |             |       |                |                       |                 |                           |            |                            | ●                          |                             |
| Change DEF Supply Module Filter   |                    |                      |             |       |                |                       |                 |                           |            |                            |                            | ●                           |

## Before Initial Use

The following services must be performed before initial use of the Apache Sprayer and repeated at the interval prescribed in the Apache Sprayer Service Interval Chart. 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 Front Axle Assembly” on page 5-17.
- Grease Axle Components. See “Grease Axle Components (adjustable only)” on page 5-17.
- Grease Driveline. See “Grease Driveline Components” on page 5-20.
- Adjust Poly Tank Straps. See “Adjust Poly Tank Straps” on page 5-15.
- Adjust Boom. See “Adjust Boom” on page 5-6.

## 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.

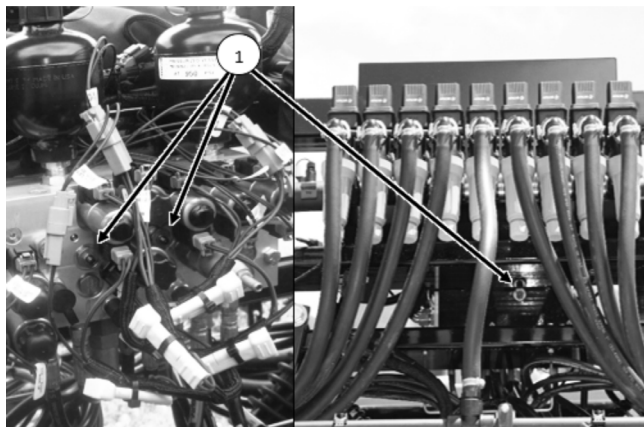
- Torque Lug Nuts. See “Torque Lug Nuts” on page 5-16.
- Adjust Poly Tank Straps. See “Adjust Poly Tank Straps” on page 5-15.

## Adjust Boom

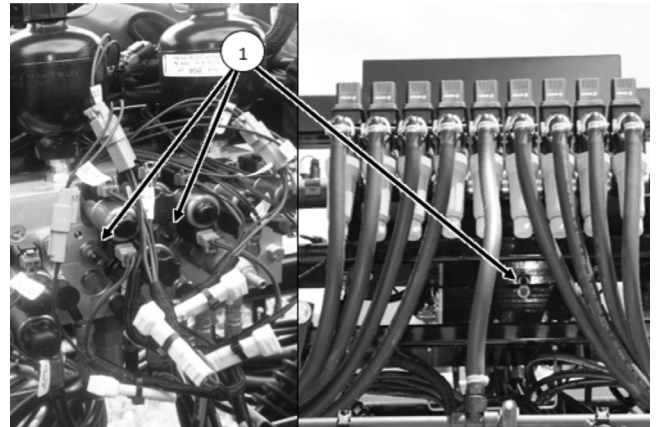
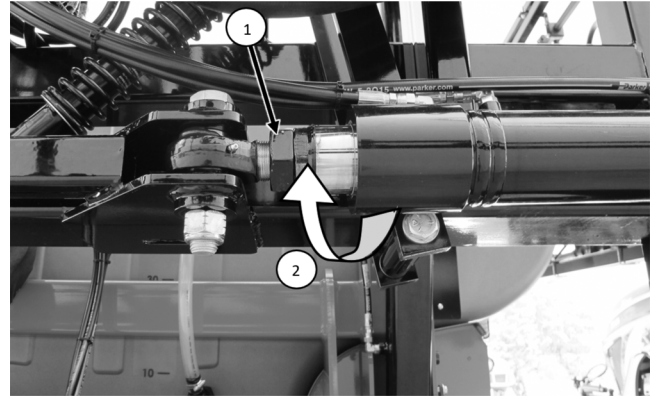
*NOTICE: All boom adjustments should be performed with the boom fully unfolded and lowered.*

### 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 rack, 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.





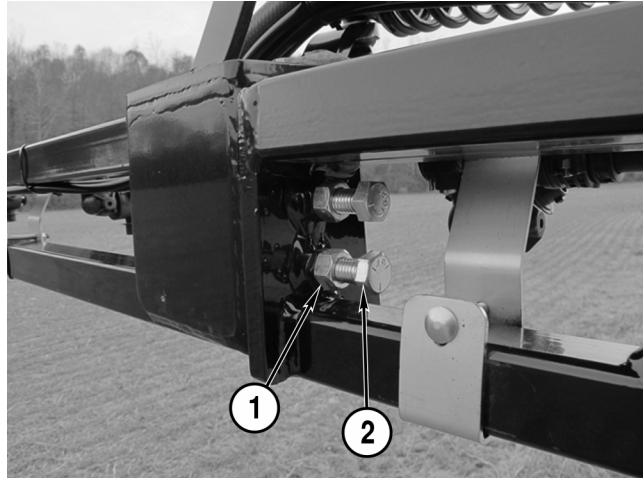
## Boom Breakaway

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.



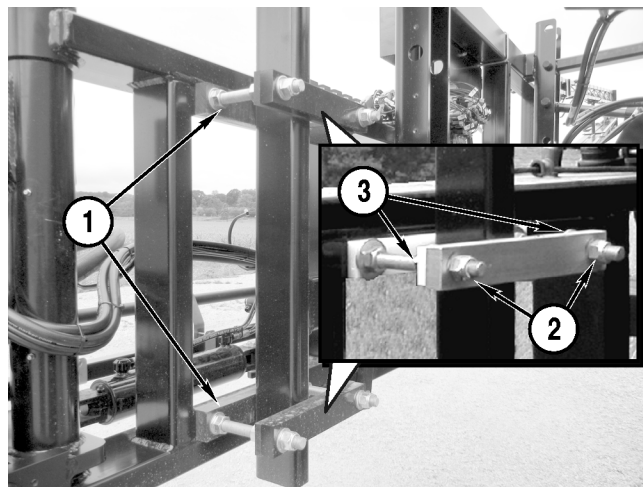
## Boom Stabilizer

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.

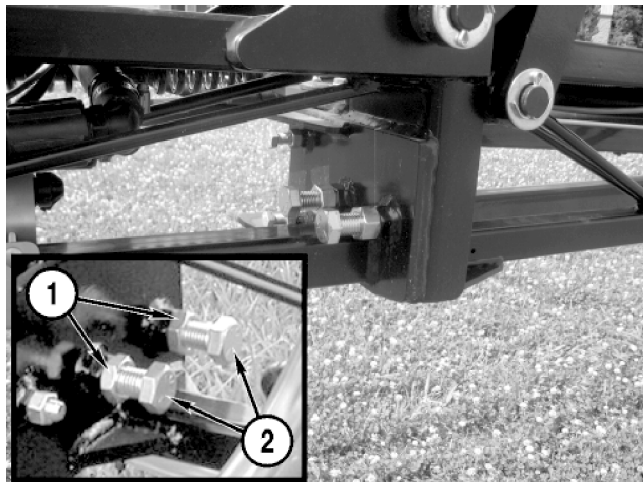
To adjust the boom tip level:

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 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 (adjustable only)” on page 5-17.
- Check Axle Extension Bolt Torque. See “Torque Axle Extension Brace Bolts” on page 5-21.
- Adjust Toe-In. See “Adjust Toe-In (Standard 120” Axles)” on page 5-33.
- Clean or Change the Primary Engine Air Filter. See “Clean or Change Engine Primary Air Filter” on page 5-24.
- Change Engine Safety Air Filter. See “Change Engine Safety Air Filter” on page 5-35.

*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 5-36.
- Change Cab Air Filters. See “Every 1000 Hours or Yearly” on page 5-38.
- Flush Wet System. See “Flushing Booms” on page 4-19.
- Inspect Front Accumulator. See “Inspect Front Accumulator and Suspension Cylinder” on page 5-27.
- Clean the Fuel Tank Strainer. See “Clean Fuel Tank Strainer” on page 5-23.

### Daily

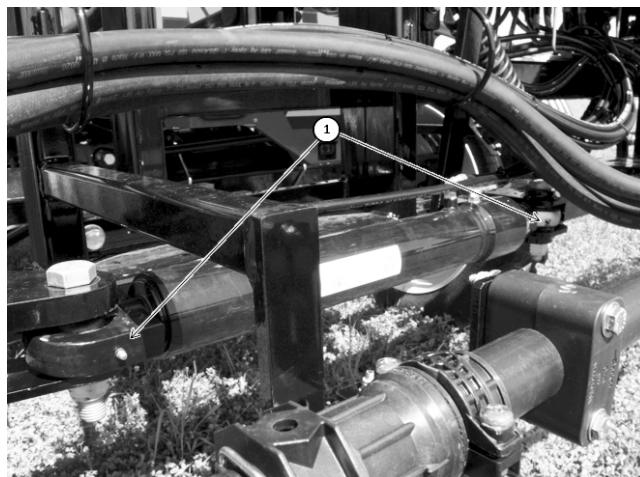
The following services must be performed daily, before operation of the Apache Sprayer.

- Clean or Change Primary Engine Air Filter as needed. See “Clean or Change Engine Primary Air Filter” on page 5-24.

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

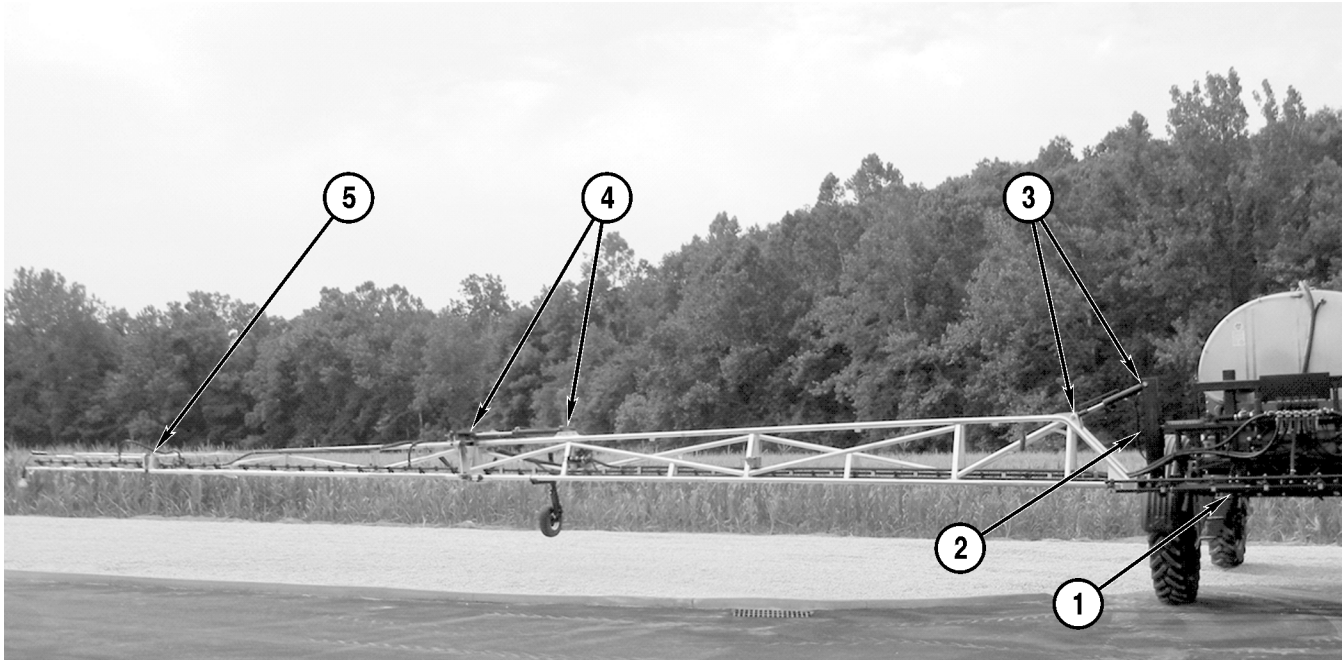
### Boom Fold Cylinder

Grease the bottom fold cylinder ball joints (1).



## Grease Pommier Boom

(Optional Equipment)

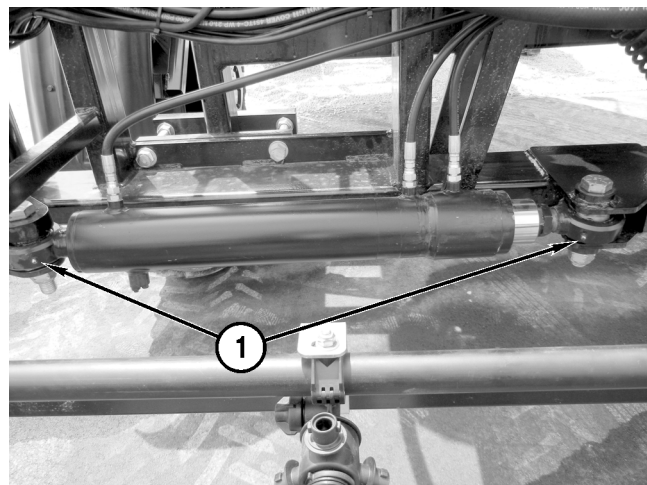


The Pommier boom is equipped with five sets of grease fittings. Apply an ample amount of lithium grease through each of the grease fittings.

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

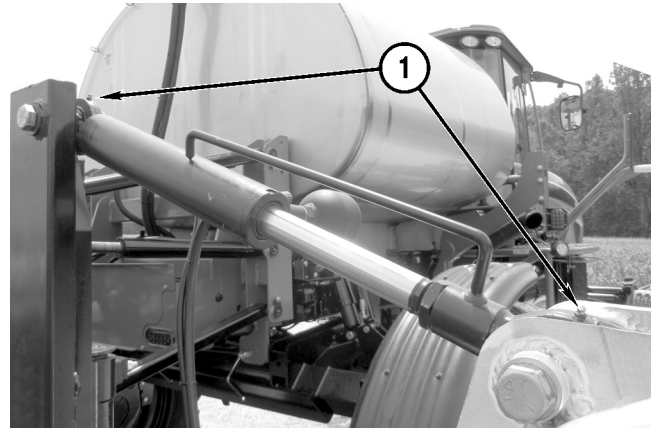
### Boom Fold Cylinder

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

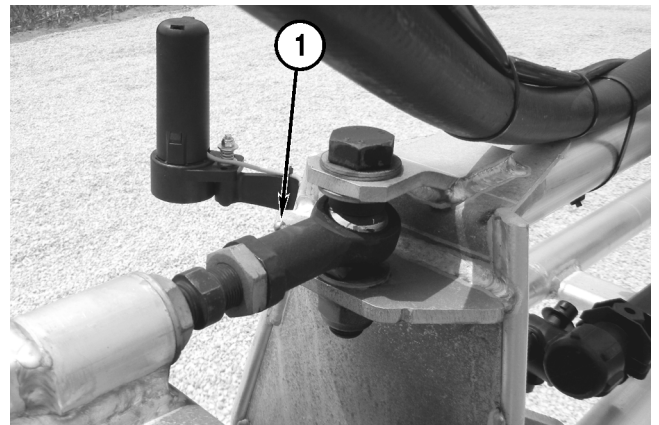
There are seven grease fittings in the boom tip fold area of each boom. The left side is shown.

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 4-18. See “Flushing Booms” on page 4-19.



### 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. See “Apache AS840 Fluids, Filters and Capacities” on page 1-2.
- 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.

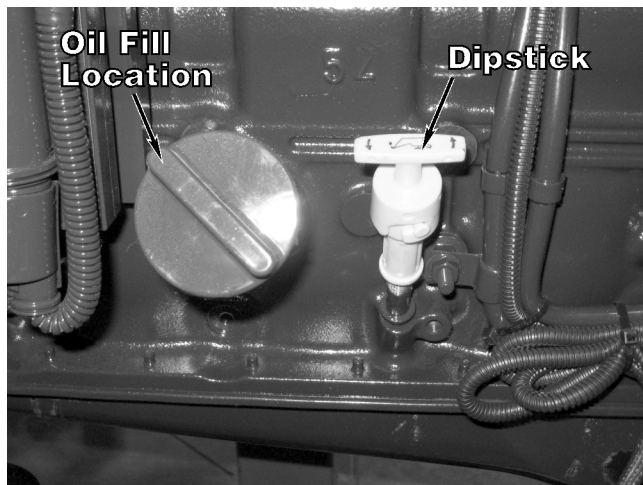
The oil level should be within the hatched area on the dipstick.

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 eyes or skin should occur, flush eyes and wash immediately with clean water.



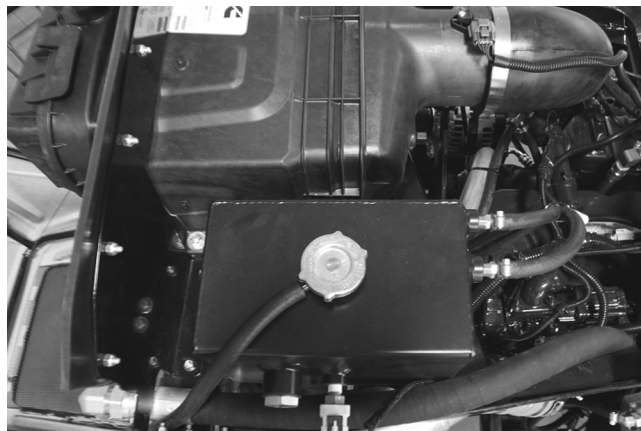
**WARNING! Burn Hazard.** **NEVER** remove the radiator cap if the engine is hot. Steam and hot engine coolant will spray out and seriously burn you. Allow the engine to cool down before you attempt to remove the cap.

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.**

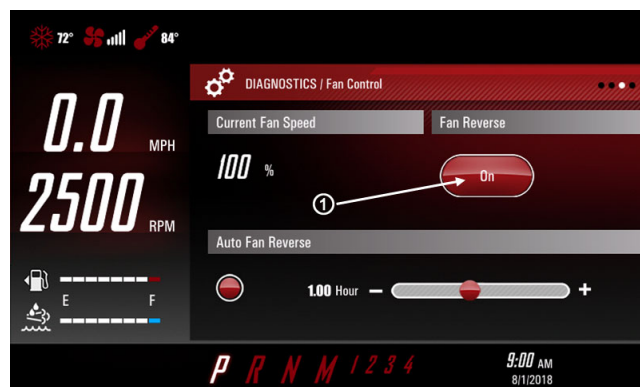
**ALWAYS** tighten the radiator cap securely after checking the coolant. Steam can spray out during engine operation if the cap is loose.

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. See "Diagnostics Page 3: Fan Control" on page 3-10.





### Check Transmission Oil Level

**NOTICE:** While parked on level ground, check the transmission fluid level with the oil at operating temperature and the engine off.

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

**NOTE:** The transmission fluid should be at operating temperature and the engine should be off.

Turn the dipstick handle counterclockwise to loosen.

Remove the dipstick and check the transmission fluid level.

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

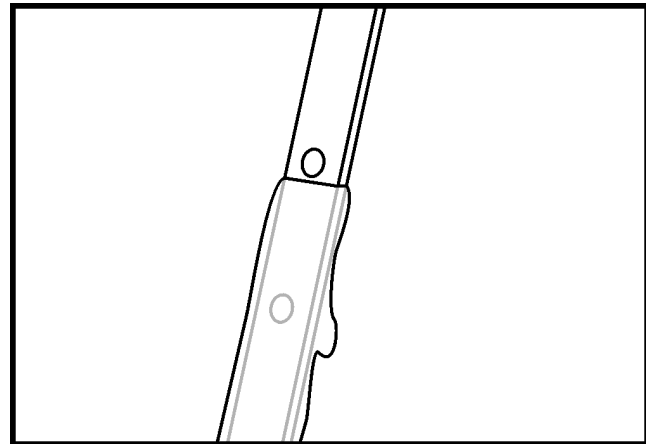
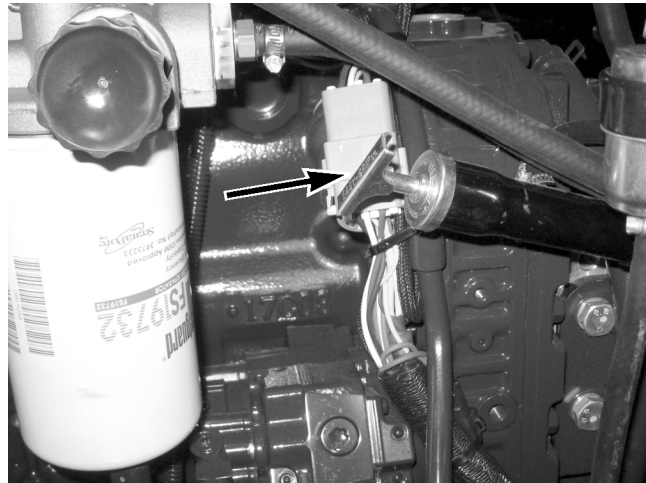
**NOTICE:** DO NOT overfill the transmission fluid. Overfilling can damage the transmission or cause the transmission to malfunction or overheat.

**NOTICE:** Use only Lucas Universal Hydraulic Fluid or equivalent.

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

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

Replace the dipstick and turn the handle clockwise to tighten.



### Check Hydraulic Fluid Level

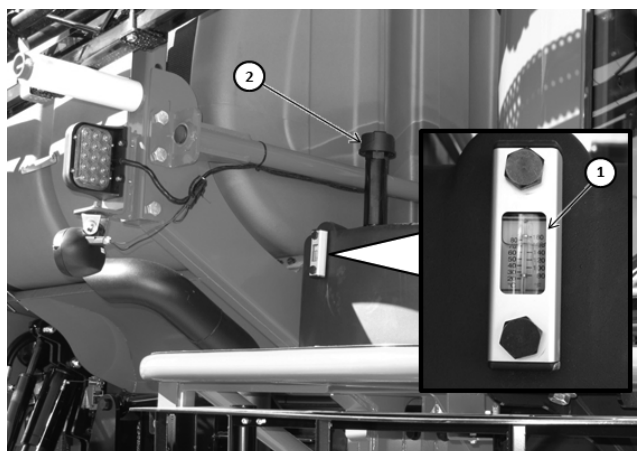
**NOTICE:** The machine must be on level ground with the booms folded and in the transport position for an accurate hydraulic fluid level reading.

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:** Oil should be topped off after the oil in reservoir is at operating temperature to avoid overfill. 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, the 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

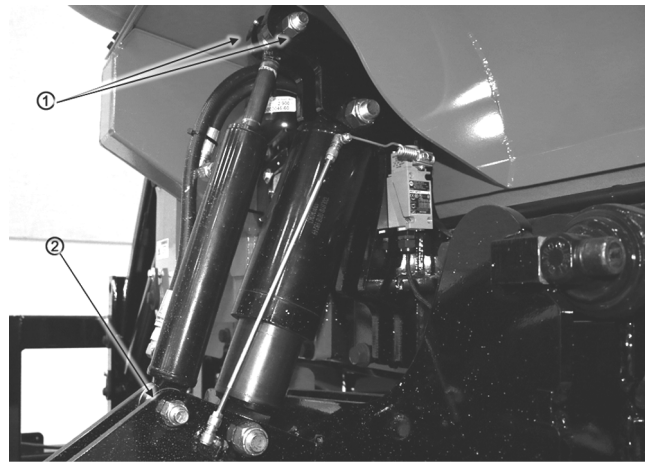
Torque wheel lug nuts to:

- 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 Front Axle Assembly

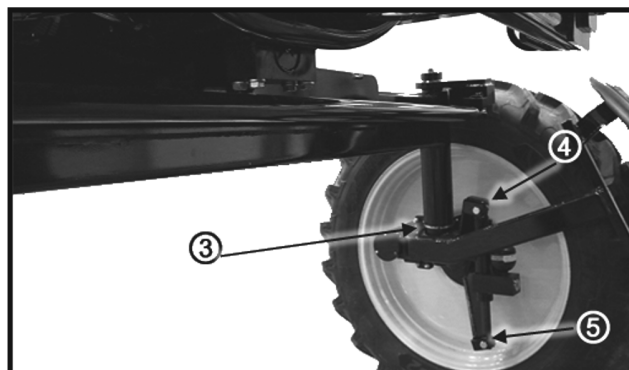
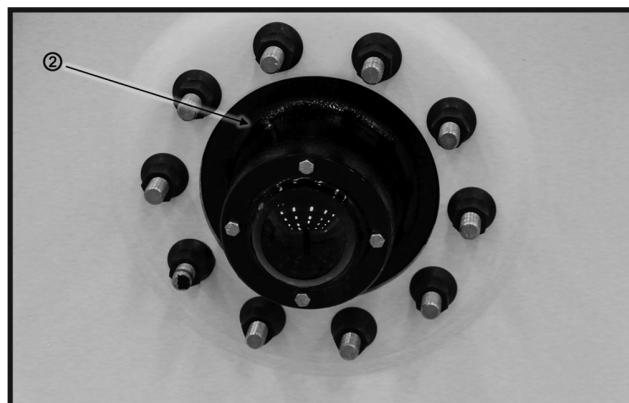
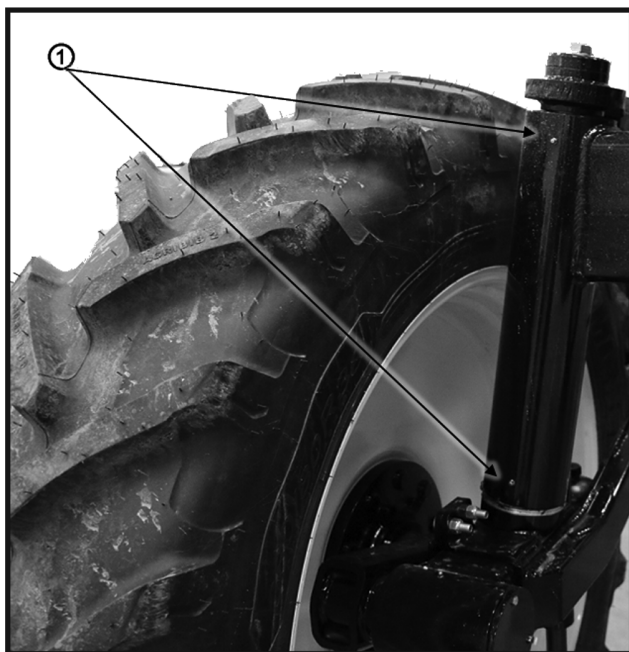
Each steering cylinder has two king-pin grease fittings (1), one hub grease fitting (2), and one inter-flex bearing grease fitting (3). The right wheel is shown.

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

Apply lithium grease through the hub bearing grease fitting (2).

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

NOTE: The inter-flex bearing are sealed chambers and once greased require very little grease to maintain.



The front strut is equipped with one upper (4) and one lower (5) grease fitting per side.

Apply Lucas lithium grease or equivalent through each grease fitting.

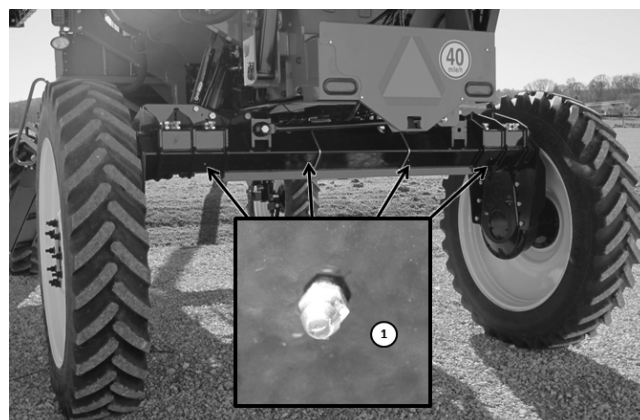
Repeat these steps for the other front wheel.

### 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.



## **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 5-15.
- Change Fuel Filter. See “Change Fuel Filter” on page 5-22.
- Change Fuel Separator Filter. See “Change Fuel Separator Filter” on page 5-22.
- Change Differential Fluid. See “Change Differential Fluid” on page 5-25.
- Change Hydraulic Fluid Filter. See “Change Hydraulic Fluid Filter” on page 5-25.
- Change Engine Oil and Filter. See “Change Engine Oil and Filter” on page 5-28.
- Change Transmission Oil and Filter. See “Change Transmission Oil and Filter and Clean Strainer” on page 5-29.

## Every 100 Hours

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

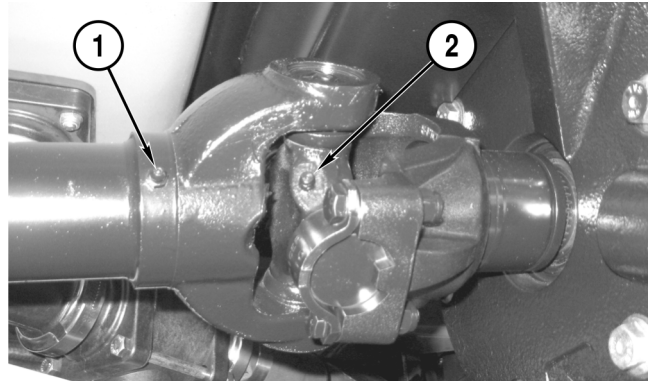
### Grease Driveline Components

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.

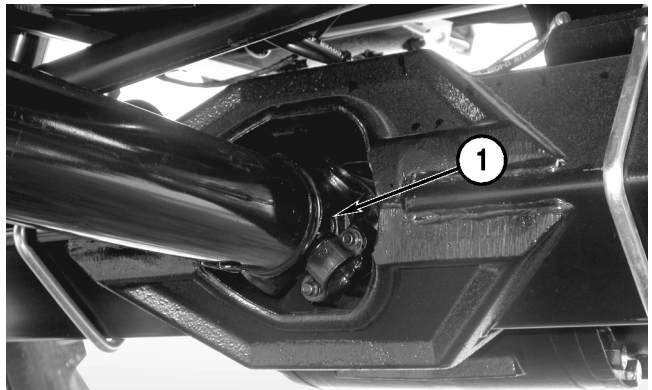
Apply an ample amount of Lucas lithium grease or equivalent through each of the fittings.

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.



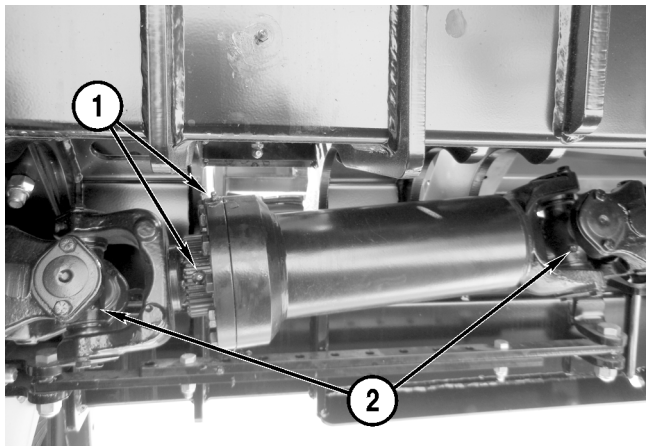
A U-joint fitting (1) is located at the differential input.



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

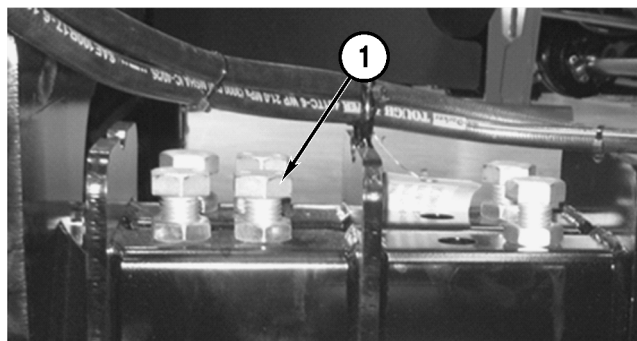
There are six axle brace bolts (1) on each front brace.

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 brace.



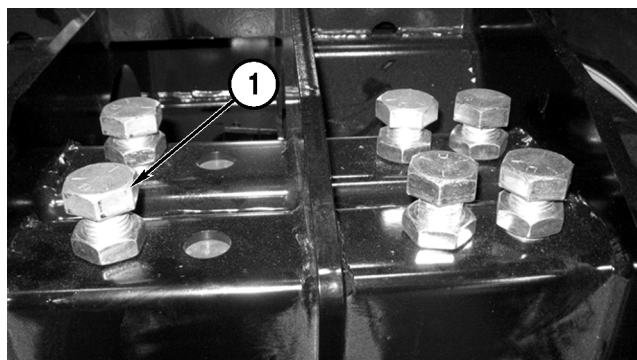
There are twelve axle brace bolts (1) on each rear brace.

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

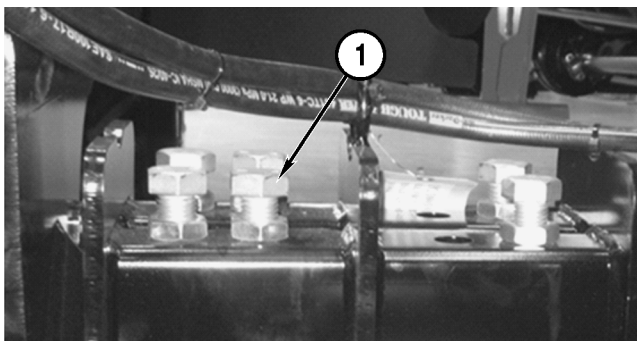
There are six axle brace bolts (1) on each front brace.

Loosen all the jam nuts.

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

Tighten the jam nuts.

Repeat the process for the other front axle brace.



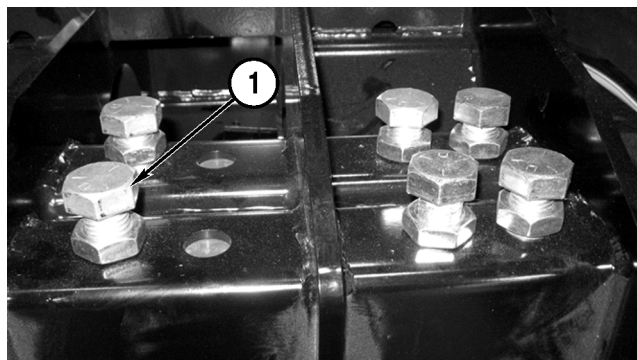
There are twelve axle brace bolts (1) on each rear brace.

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.

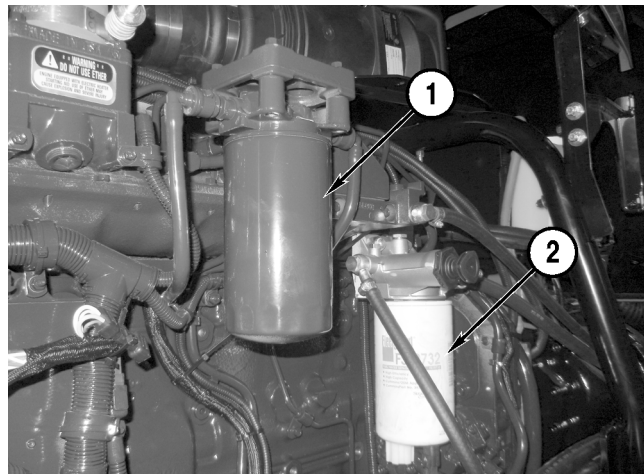
- Fuel Filter Part Number: 201450243

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 over-tighten 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).

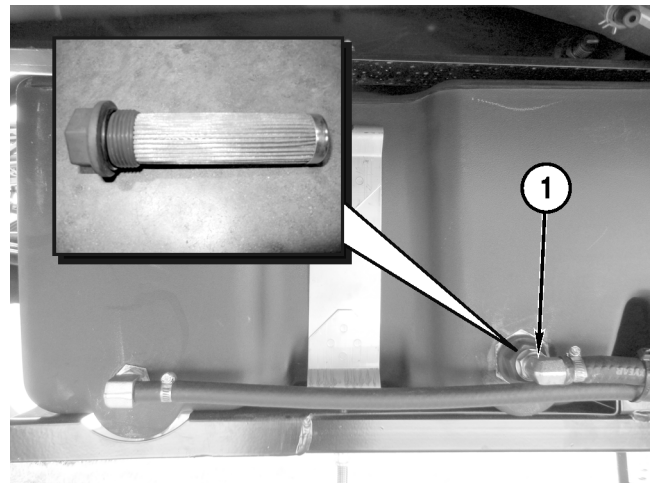
An opportune time to clean the fuel tank strainer is when the fuel level is low.

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 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.

### 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.

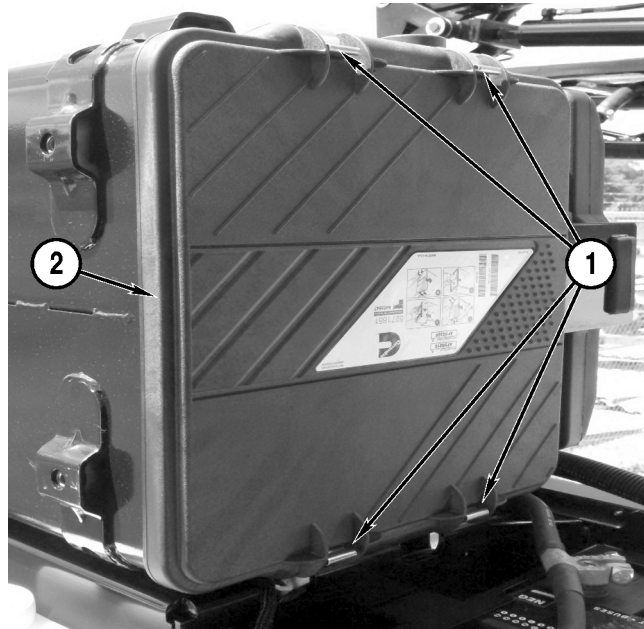
NOTICE: If a “Change Air Filter” fault is indicated on the touch screen display, stop immediately and remove and clean or replace the primary air filter as needed.

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.

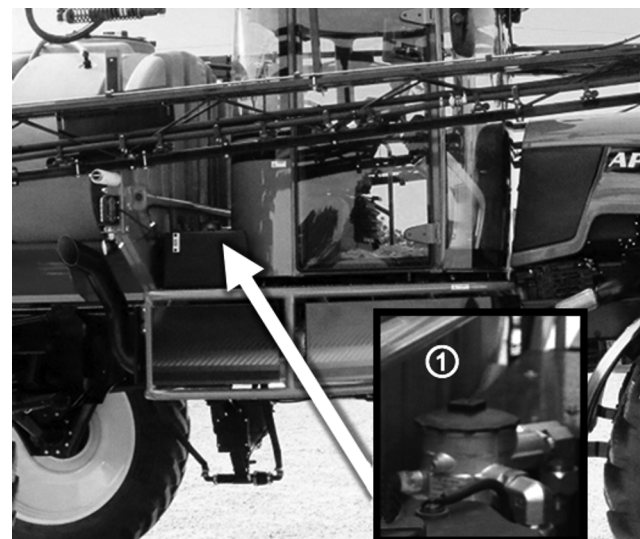
Discard the filter into an appropriate container.

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 5-15.



### 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 a strainer.

Install the hydraulic fluid strainer (2).

Hydraulic Fluid Strainer Part Number: 840000010.

Install the hydraulic line (1).



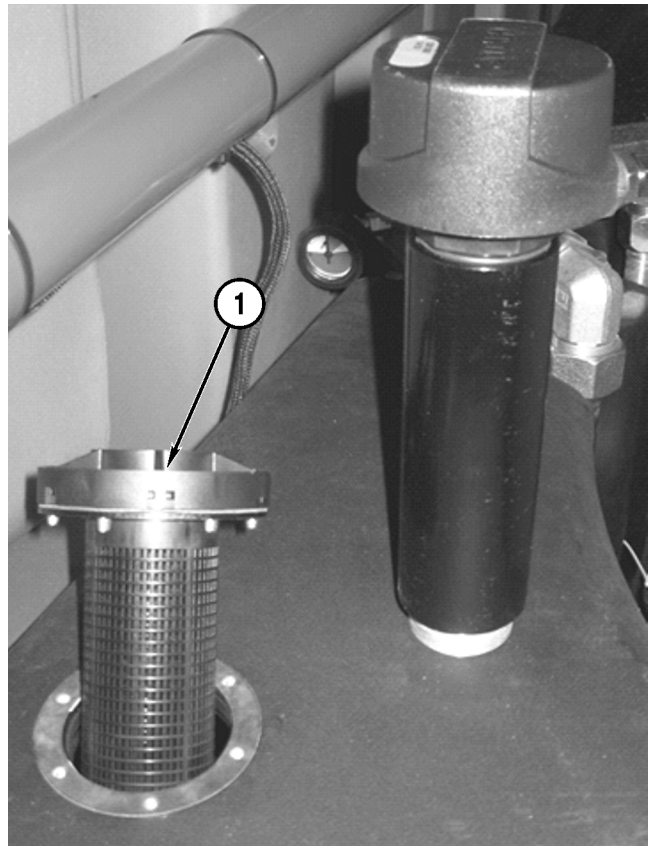
**NOTICE:** Use only Lucas Universal Hydraulic Fluid, or equivalent, for the Apache Sprayer hydraulic system.

**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].

**REMINDER:** Fluid level should be checked with hydraulic oil at operating temperature to avoid overfilling.

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

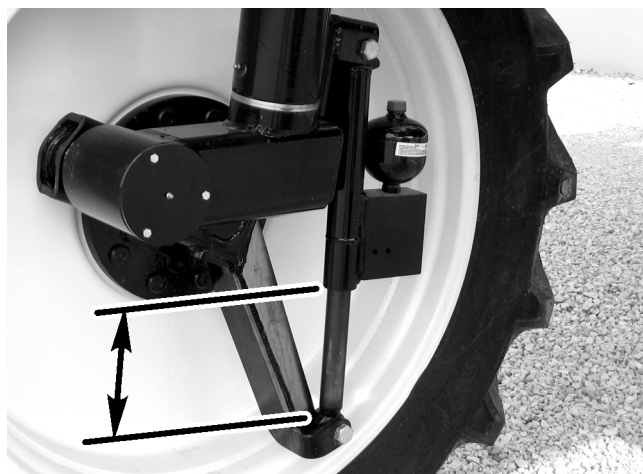




### Inspect Front Accumulator and Suspension Cylinder

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.

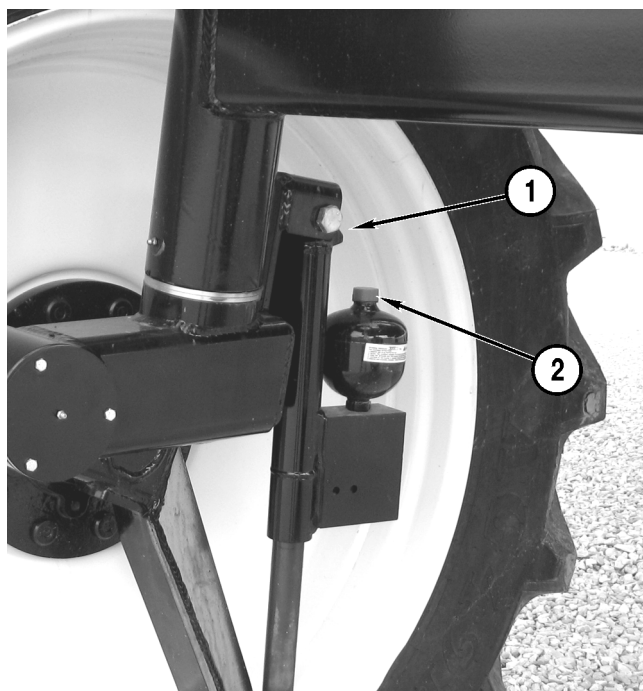
Remove the plug (1) from the front of each front suspension cylinder and check the fluid level. The fluid should be level with the bottom of the fill hole.

**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 fill 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.

- AS840 Accumulator Nitrogen Pressure:  
800 psi [55.2 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* over-tighten 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-40 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].

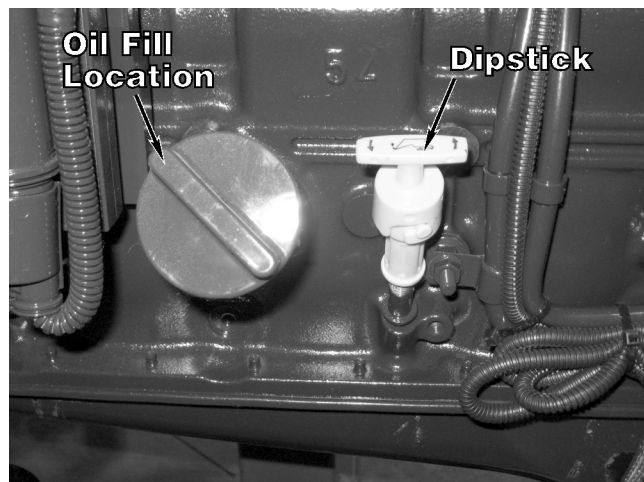
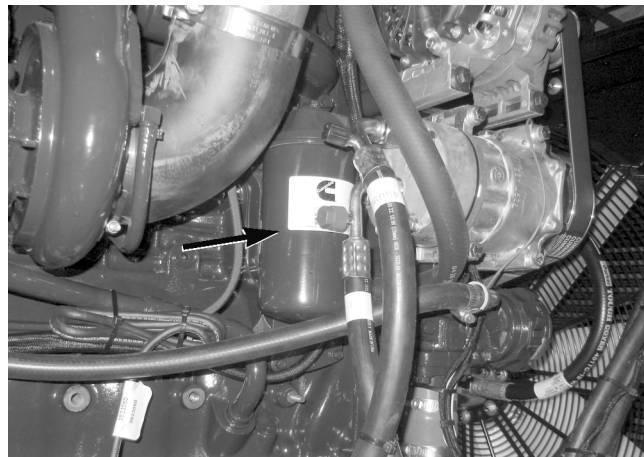
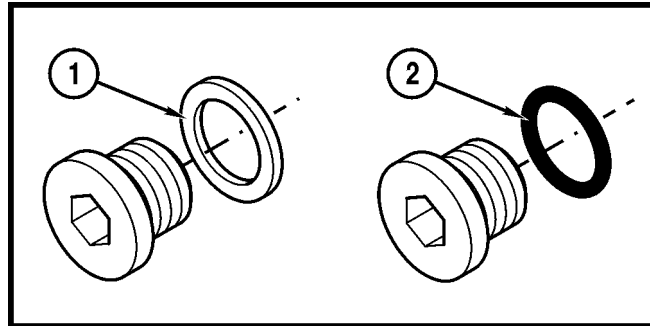
Add oil as needed to bring the level to the hatched area on the dipstick.

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 Oil and Filter and Clean Strainer

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

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

Install the drain plug (1) Remove the strainer cover plate (2) and clean the strainer with diesel fuel. Replace the strainer if it is damaged in any way.

Install the strainer and cover plate (2).

- Transmission Fluid Strainer  
Part Number: 300000095

The transmission filter is located on the right side of the transmission, next to the park brake canister.

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

**NOTICE:** *DO NOT over-tighten the filter. Damage to the seal can result.*

Lubricate the seal on the transmission fluid filter.

Transmission Fluid Filter Part Number: 300000101

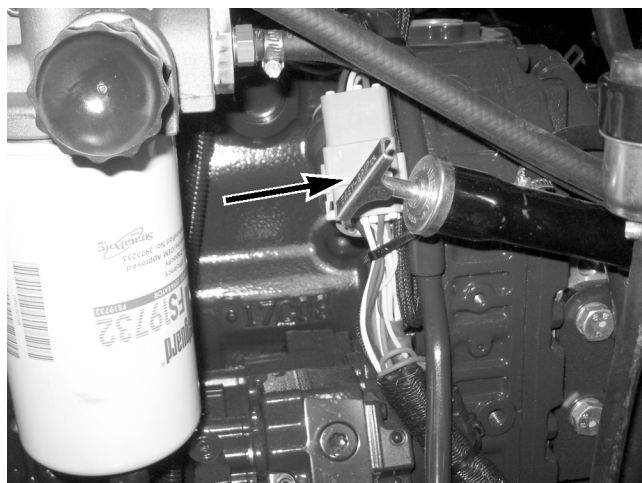
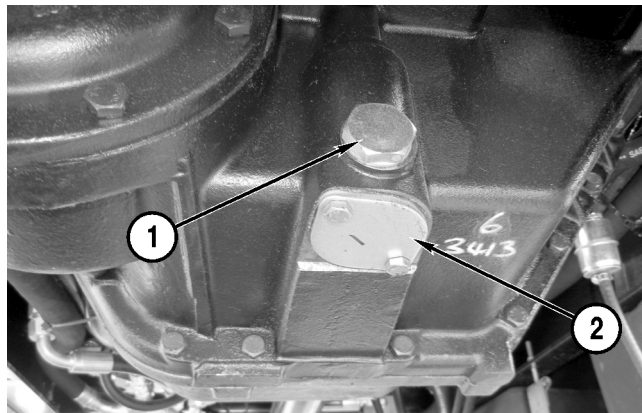
Install and tighten the filter, by hand, 3/4 to 1-1/4 turns after the seal contacts the filter housing.

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

**NOTICE:** *Use only Lucas Universal Hydraulic Fluid or equivalent.*

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

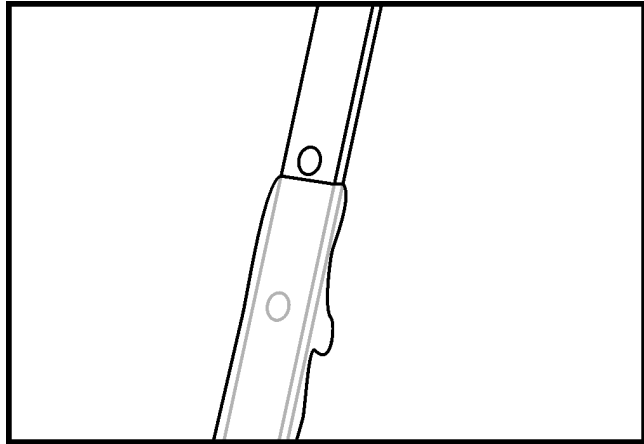
- Transmission Fluid Capacity: Approximately 16 quarts [15 liters].



Check the transmission fluid level with the transmission fluid at normal operating temperature, transmission in NEUTRAL position, and the engine off.

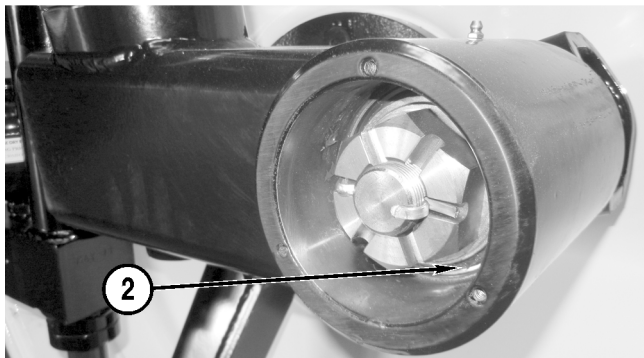
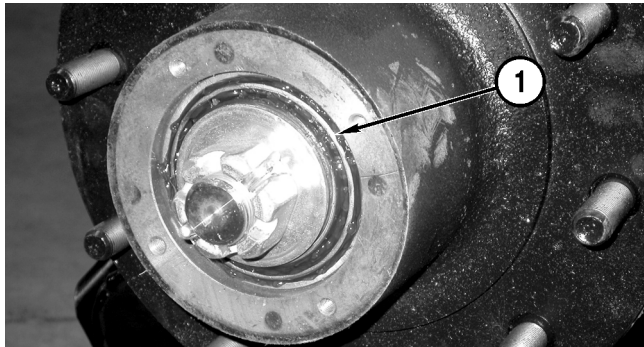
The fluid level should be between the two dots on the dipstick.

Install the dipstick and turn the handle clockwise to tighten.



### 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.

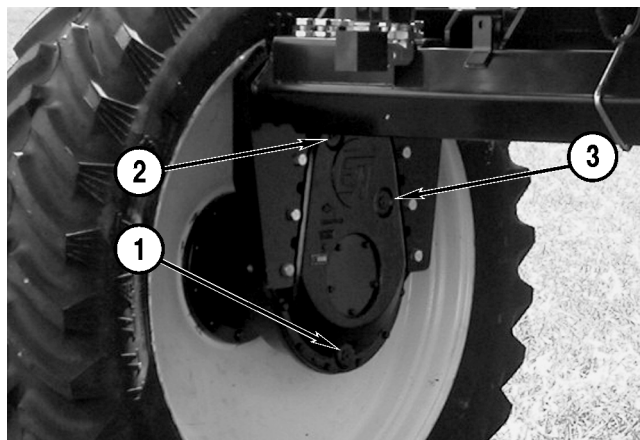
Remove the drop box fill plug (2) and level plug (3).

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

To drain the planetary fluid, position the wheel so the plug on the planetary is in the 6 o'clock position.

Remove the plug in the planetary, drain the fluid into a suitable container and dispose of the fluid properly.

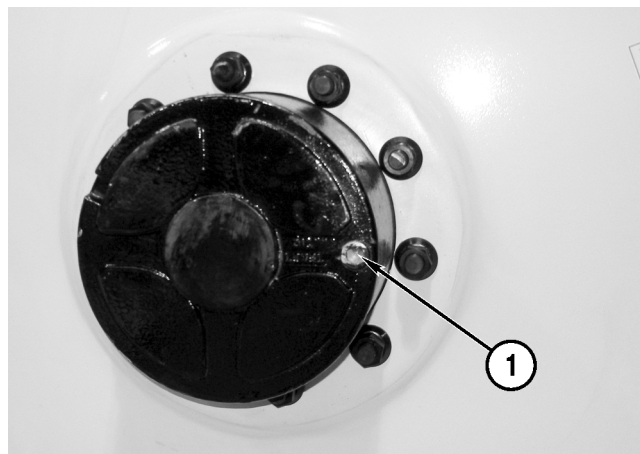
To fill the planetary fluid, position the wheel so the plug on the planetary is in the 3 o'clock position.

**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.

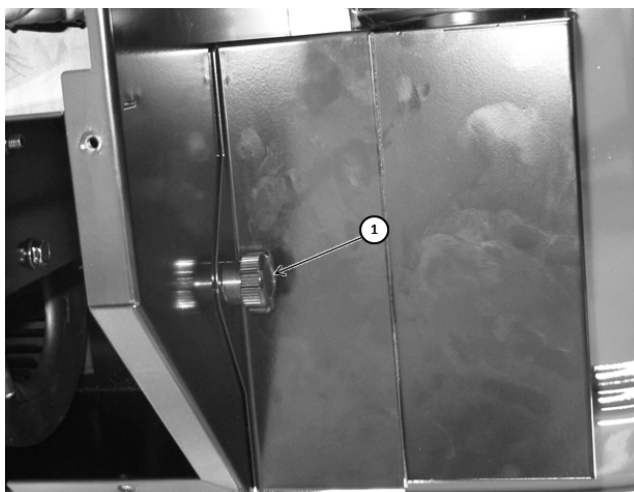


### Change Cab Charcoal Filter

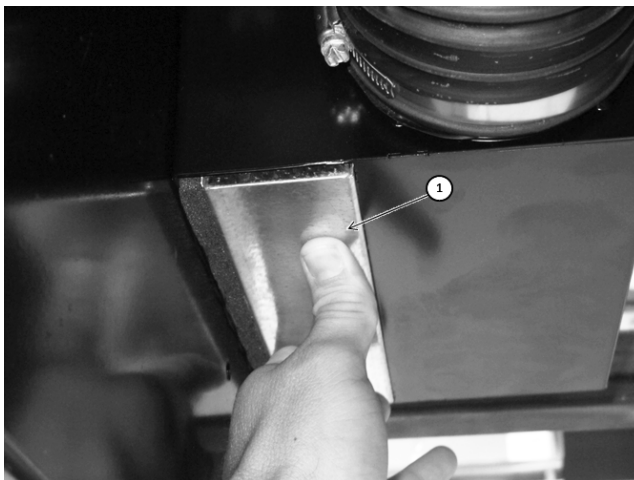
**NOTICE:** *DO NOT attempt to clean the old cab air filter. ALWAYS replace with a new filter.*

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

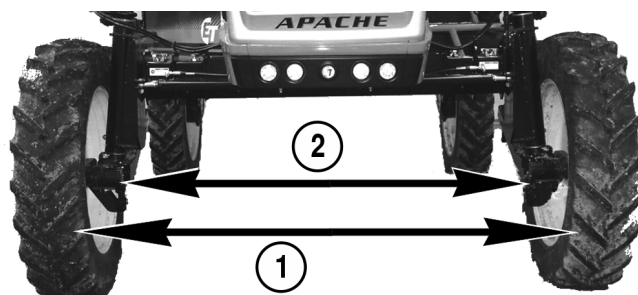
Safely lift the front of the Apache Sprayer so the front tires are slightly off of the ground.

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).

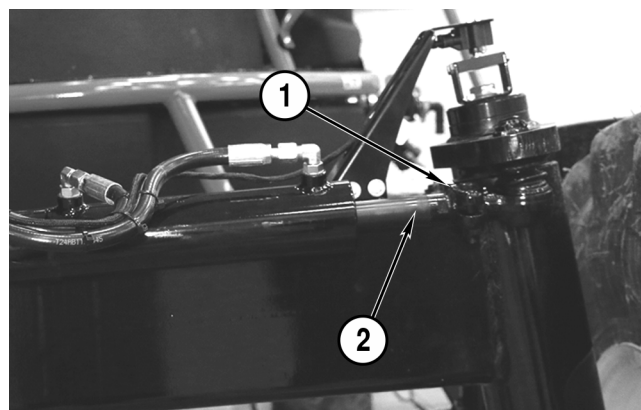
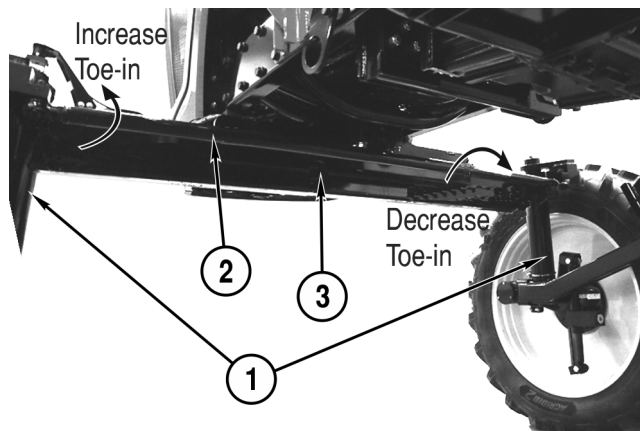
The distance should be equal on both sides. If the distance is not equal, the steering cylinder rod must be adjusted.

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

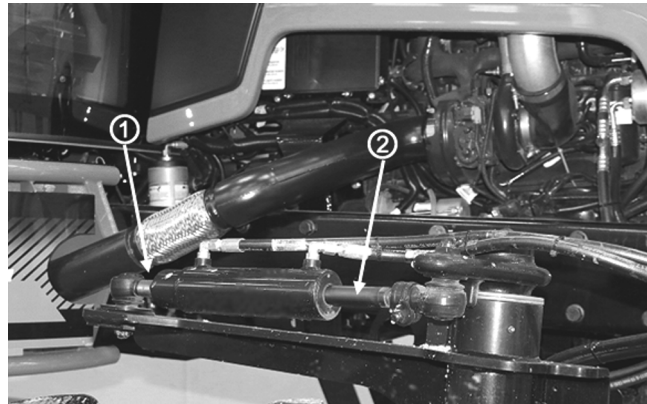
Measure the rear tie rod ends (1) on the left and right steering cylinder. The measurements must be equal and between 4.125 in. [104.7 mm] and 4.5 in. [114.3 mm]. Adjust the tie rods if necessary.

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 (2) 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.

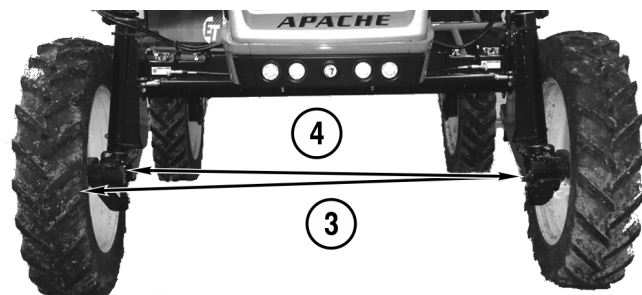
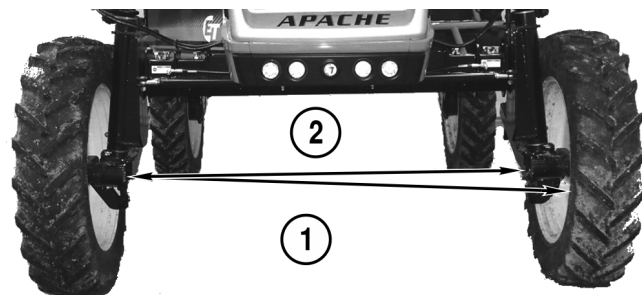
Measure and note the distance (1) from the center of the right hub to the front of the left rim.

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 (3&4), to measure toe-in for the right wheel.

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

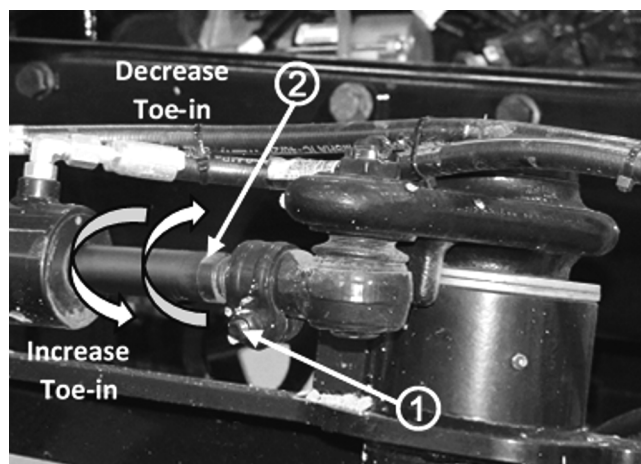


### Adjust Toe-in

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.



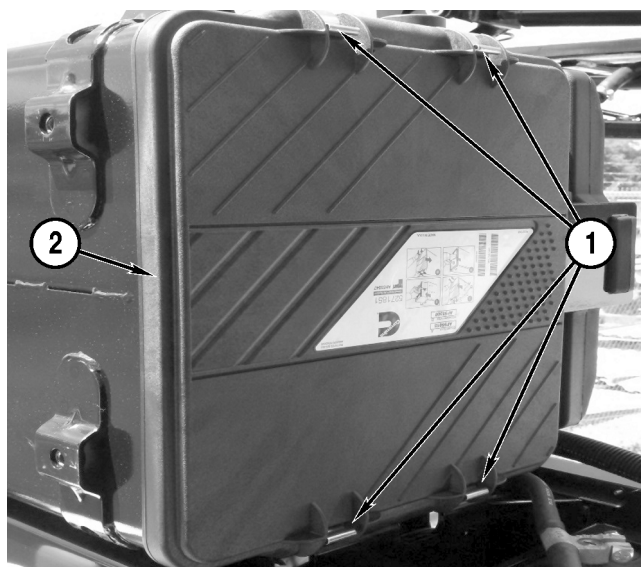
### Change Engine Safety Air Filter

**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.

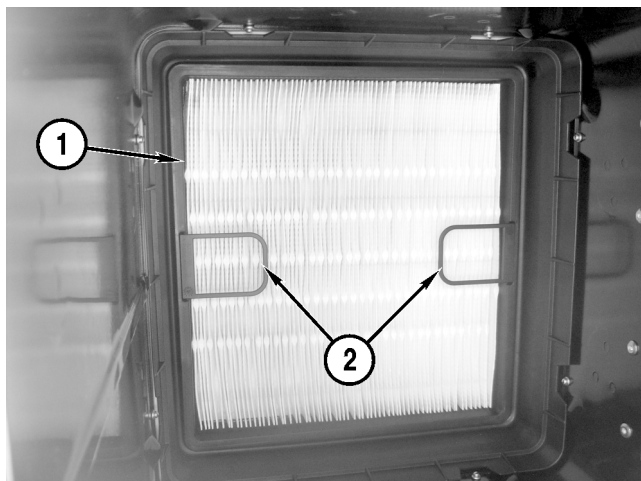


Use the pull tabs (2) to remove the engine safety air filter (1) and discard the old filter.

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 4-18.

Open the product tank 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, and sump valve.

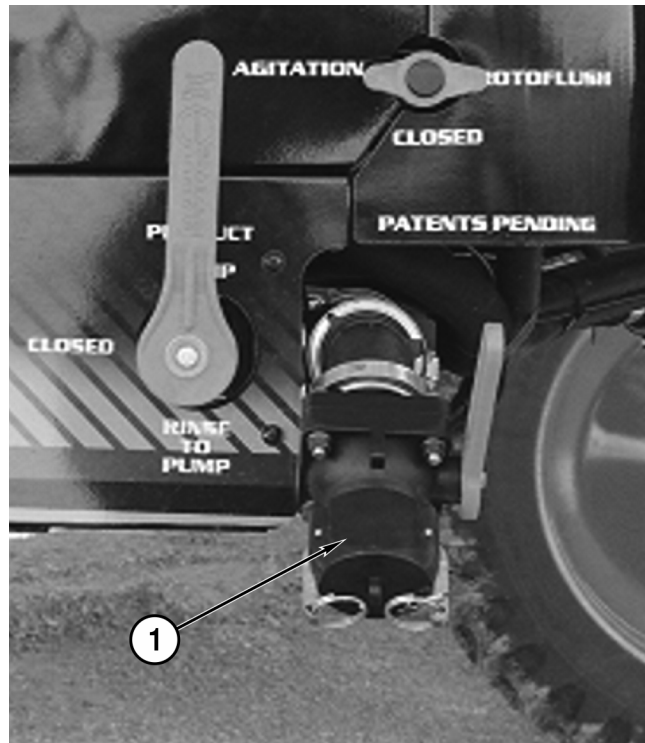
Set all boom sections to the ON position and press the agitation decrease button to turn agitation off.

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.

Use the Viper 4 to cycle the boom sections off and on several times to purge water from around the valves.

Disconnect the air line and close the product fill valve.

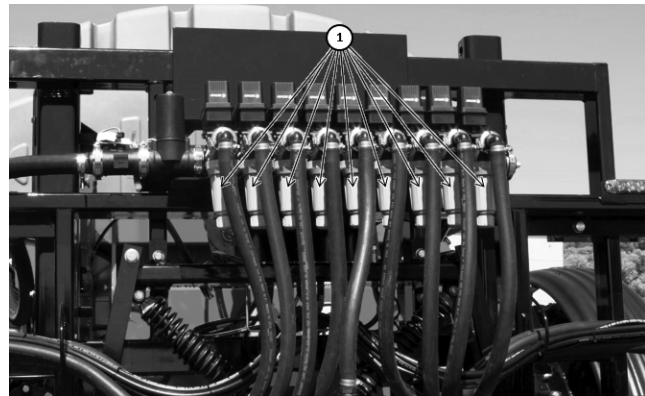
**NOTICE:** *Drain the rinse tank and foam tank to prevent damage during storage.*



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

Reinstall the strainer bowls.

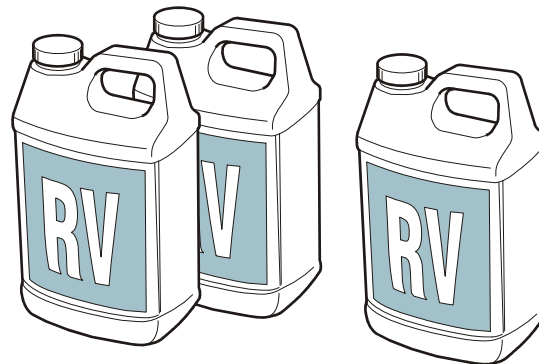
Store the strainers in a warm, dry location.



Pour approximately 20 gallons [76 liters] of RV anti-freeze into the product tank.

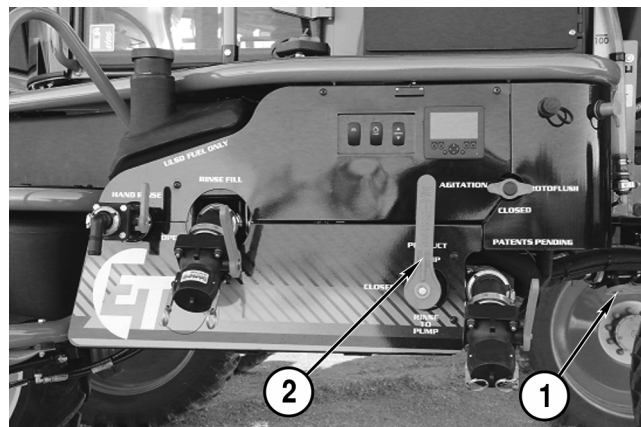
**NOTICE:** *Boom lengths over 60 ft will require more than 20 gallons [76 liters] of antifreeze.*

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





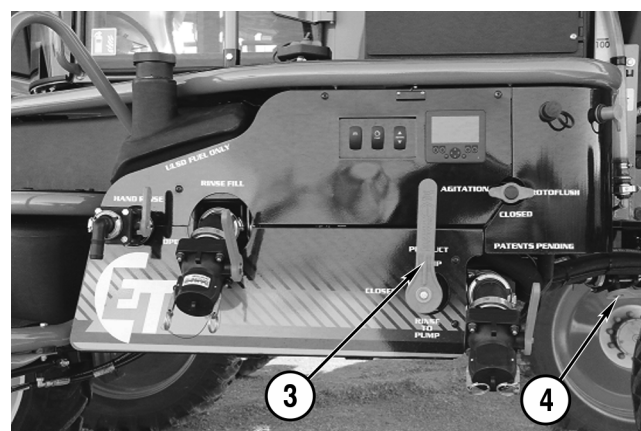
Repeatedly open and close the sump valve (1) and rinse tank/product valve (2), to allow the antifreeze to surround the ball valves.



Close the rinse tank valve (3) and open the sump valve (4).

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.

Using the Viper 4 monitor set all boom sections to the OFF position and press the agitation increase button (1).

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

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

Turn the boom sections OFF.

Set the product pump switch (2) to the OFF position.

NOTE: Excess antifreeze may be left in the sprayer.



## Every 1000 Hours or Yearly

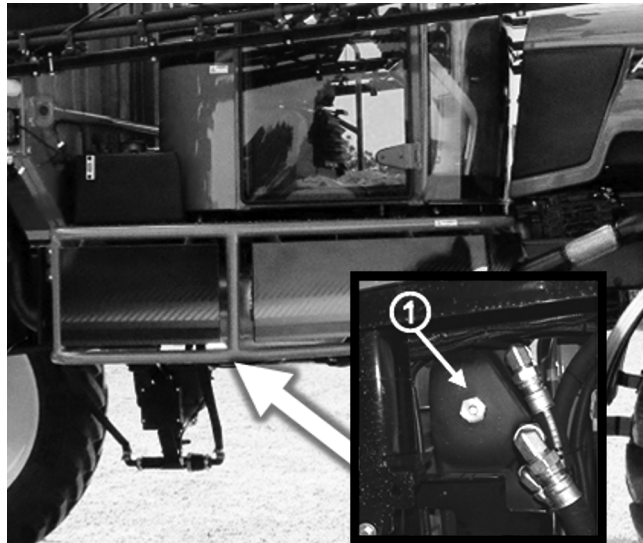
The following services must be performed after every 1000 hours of operation or yearly.

### Change Hydraulic Fluid

The hydraulic fluid drain plug (2) is located on the hydraulic fluid reservoir, between the cab and the product tank.

Remove the hydraulic fluid drain plug (2) 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 (2).



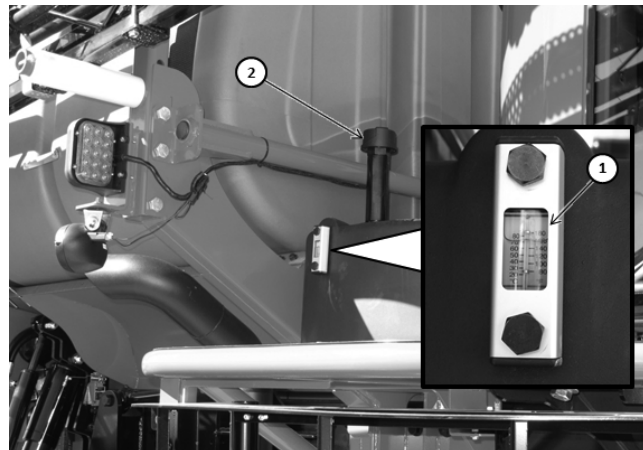
**NOTICE:** Use only Lucas Universal Hydraulic Fluid or equivalent for the Apache Sprayer hydraulic system.

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

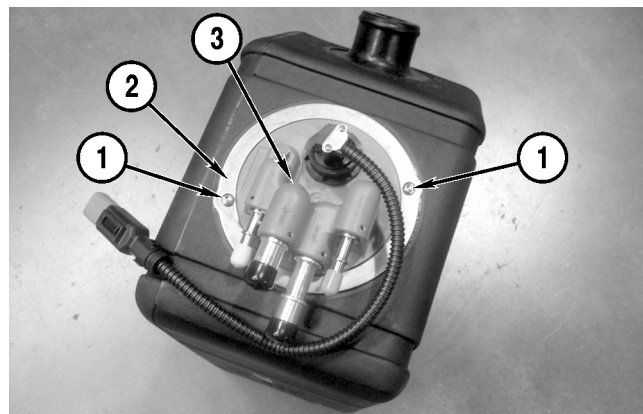
The DEF suction strainer is located in the DEF tank on the left side of the machine.

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 drain 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.





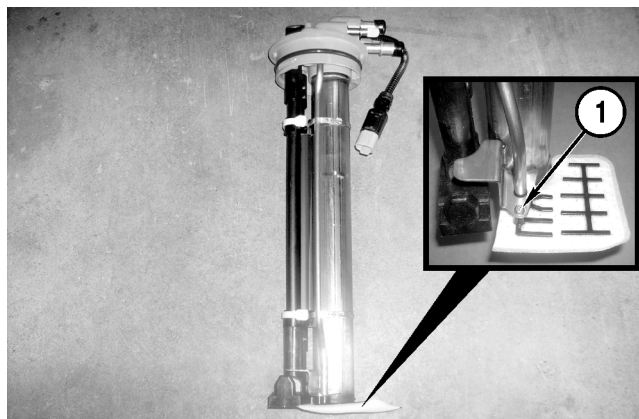
Lift the unit out of the tank and remove the suction screen retaining screw (1) from the foot of the suction tube. Remove the screen and replace it with a new one.

- 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

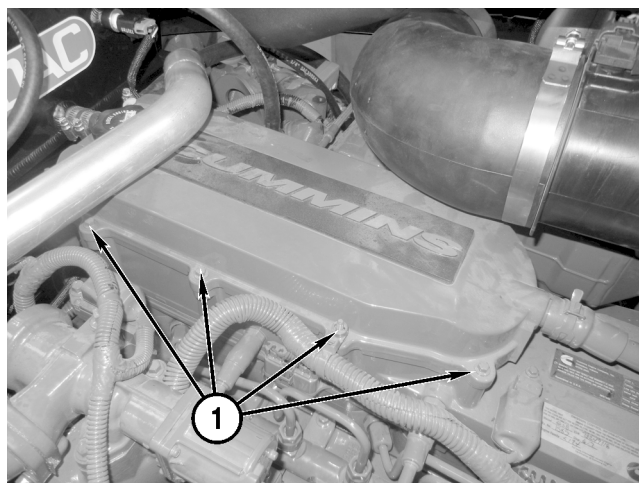
The following services must be performed after every 2000 hours of operation of the Apache Sprayer.

#### Change Crankcase Ventilation Filter

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

Remove the cover and change the filter.

- Crankcase Ventilation Filter  
Part Number: 272000001



### Every 4500 Hours or 3 Years

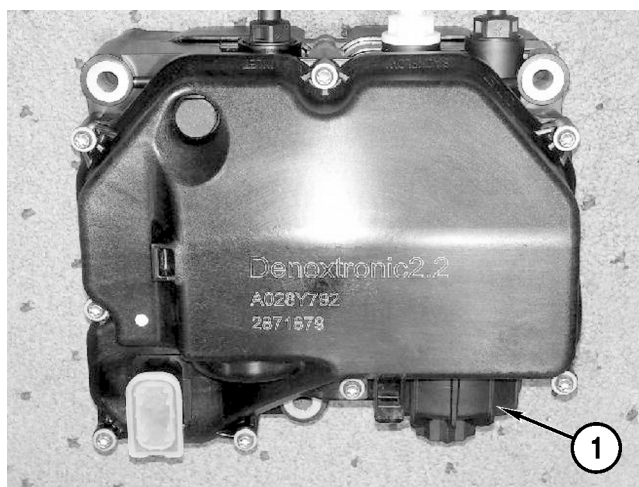
The following services must be performed after every 4500 hours or 3 years of operation.

#### 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



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# APACHE™

## CHAPTER 6

### TORQUE VALUE CHARTS

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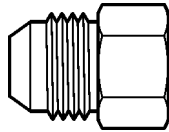
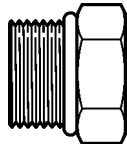
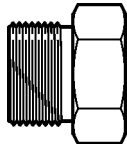
#### Fittings

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<br>Dash<br>Size |  |  |  |
|---------------------|--|---|--|
|                     | SAE (JIC)<br>37° Flare Thread  | O-ring Style<br>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  | ----   |

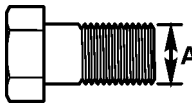
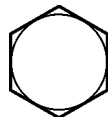
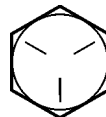
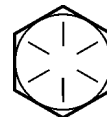
**Torque Value Chart**

| 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**

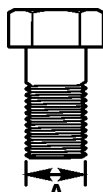




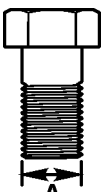
ALWAYS tighten fittings to the values below unless a different torque value is specified. Fasteners must ALWAYS be replaced with the same grade. Make sure fitting threads are clean and threads are engaged properly. All torque values are adopted from SAE J1701 and SAE J1701M.

**SAE Series Torque Value Chart**

| <br><b>A = Bolt Diameter</b> |                | <br><b>SAE Grade 2</b><br>(No Markings) |     | <br><b>SAE Grade 5</b><br>(3 Radial Dashes) |     | <br><b>SAE Grade 8</b><br>(6 Radial Dashes) |      |
|---|----------------|--|-----|--|-----|--|------|
| A<br>Diameter<br>(Inches)   | Wrench<br>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  | 570  |
| 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**

| <br>Diameter and Thread Pitch (Millimeters) |             | <br>Metric Grade 8.8 | <br>Metric Grade 10.9 | <br>Metric Grade 8.8 | <br>Metric Grade 10.9 | <br>Diameter and Thread Pitch (Millimeters) |             |       |             |           |
|--|-------------|---|--|--|--|--|-------------|-------|-------------|-----------|
|  | Wrench Size | Course Thread   |  |  |  |  | Fine Thread |       |             |           |
|  |             | Metric 8.8  |  | Metric 10.9  |  |  | Metric 8.8  |       | Metric 10.9 |           |
|  |             | N•m   | lb-ft  | N•m  | lb-ft  |  | N•m         | lb-ft | N•m         | lb-ft     |
| 6 x 1.0  | 10          | 8   | 6  | 11   | 8  | 8  | 6           | 11    | 8           | 6 x 1.0   |
| 8 x 1.25   | 13          | 20  | 15   | 27   | 20   | 21   | 16          | 29    | 22          | 8 x 1.0   |
| 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  |

## This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal black lines across its entire width, typical of notebook or primary writing paper. The background is a solid off-white color, and there are no margins, text, or other markings present.

# APACHE™

## CHAPTER 7

# TROUBLESHOOTING

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### 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.<br>Check hose connections to brake canister on transmission.                 |
| Apache Sprayer will not move forward or backward.                    | Parking brake is engaged.<br>Check electrical connections on parking brake and transmission.  |
| Constant alarm sounds when Apache Sprayer moves forward or backward. | Check transmission fluid level.<br>Check wire connection at sending unit.<br>Check transmission temperature sensor.                                   |
| Apache Sprayer will not move forward.                                | Check driveshaft.<br>Check transmission fluid level.<br>Check electrical connections on transmission.   |
| Apache Sprayer will not move backward.                               | Check driveshaft.<br>Check transmission fluid level.<br>Check electrical connections on transmission.   |
| Engine will not start.   | Confirm battery disconnect button is "ON".<br>Check diesel fuel level.<br>Check neutral safety relay.<br>Confirm Start/Stop Engine button is "Green". |
| Apache Sprayer steering does not work.                               | Check hydraulic fluid level.<br>Check for hydraulic fluid leaks.<br>Check steering column coupling on steering motor.                                 |

| SYMPTOM                                   | SOLUTION  |
|---|---|
| Transmission will not shift gears.        | Check transmission fluid level.   |
| Apache Sprayer brakes do not work.        | Check brake hoses for leaks.<br>Check push rods on master cylinder.   |
| No power to console in cab.               | Check electrical connections in right rear corner of cab, near fuse box.  |
| Road and service lights do not work.      | Confirm light buttons are "ON".<br>Check electrical connections to the light pad, cabin power distribution module, and the firewall distribution module.<br>Check for power at light bulbs.<br>Check appropriate fuses.   |
| Turn signals and/or flashers do not work. | Confirm lever/switch in "ON" position.<br>Check electrical connections at light housings.<br>Check for power at light housings.   |
| Booms will not fold or unfold.            | Confirm engine is running.<br>Check hydraulic fluid level.<br>Confirm booms are greased properly.<br>Check for hydraulic fluid leaks.<br>Check electrical connections in cab and at boom manifold.  |
| Booms will not tilt up or down.           | Confirm engine is running.<br>Check hydraulic fluid level.<br>Check for hydraulic fluid leaks.<br>Check electrical connections in cab and at boom manifold.   |
| Apache Sprayer will not spray.            | Confirm engine is running.<br>Confirm product in product tank.<br>Confirm ball valves from tank to product pump are open.<br>Confirm product pump is turned on.<br>Check ground speed on console controller display.<br>Confirm boom valves are opening. If they are not, check appropriate fuses and back rack electrical connections. |
| Product boom valves will not turn on.     | Unplug electric connection at valve for 20 seconds.<br>Check electrical connections in cab.<br>Check fuse block in cab.   |

| <b>SYMPTOM</b>                         | <b>SOLUTION</b>  |
|--|--|
| Product boom valves will not turn off. | Check boom valves for operation.<br>Check electrical connections at boom valves.<br>Check electrical connections in cab.<br>Check power module in cab.                     |
| Seat will not raise or lower.          | Check power module in cab.<br>Check wire connections at right side of seat.<br>Check for air leaks.  |
| Raven monitor does not turn on.        | Check power module in cab.<br>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.<br>Check operation. |
| Rear suspension will not rise.         | Check hydraulic fluid level.<br>Check electrical connections at suspension block and switches.   |
| Product pump will not turn on.         | Confirm product pump button is on and indicator is lit.<br>Check electrical connections at hydraulic valve block.<br>Check electrical connections in cab.                  |
| A/C does not cool.                     | Confirm A/C button is "ON".<br>Confirm fan is "ON".<br>Check belt to compressor.   |



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# APACHE™

## CHAPTER 8

### ELECTRICAL SYSTEM

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#### Chassis Power Distribution Module

| FUSE# | FUSE TYPE | RELAY #  | DESCRIPTION                  |
|-------|-----------|----------|------------------------------|
| F1    | 500A MEGA | ***      | Alternator Power             |
| F2    | 80A MIDI  | ***      | Auxiliary Battery Post Power |
| F3    | 250A MEGA | ***      | Cab / Boom Battery Power     |
| F4    | 250A MEGA | K2       | Cold Start Power             |
| F5    | 15A ATO   | K6       | DEF Supply Heater Power      |
| F6    | 40A ATO   | K5       | Starter Solenoid Power       |
| F7    | 15A ATO   | K8       | DEF Line Heater Power        |
| F8    | 20A ATO   | K7       | Chassis SPU Output Power     |
| F9    | 10A ATO   | K7       | AOG Power                    |
| F10   | 5A ATO    | K7       | Engine Ignition Power        |
| F11   | 10A ATO   | K7       | Engine A-T Sensor Power      |
| F12   | 10A ATO   | K7       | Fill Station Power           |
| F13   | 10A ATO   | K7       | Chassis Ignition Power       |
| F14   | 25A ATO   | ***      | HVAC Blower Power            |
| F15   | 30A ATO   | ***      | 12V/24V Converter Power      |
| F16   | 7.5A ATO  | ***      | ZF 24V Battery Power         |
| F17   | 7.5A ATO  | K9       | ZF 24V Ignition Power        |
| F18   | 15A ATO   | ***      | Chassis SPU Battery Power    |
| F19   | 20A ATO   | ***      | Chassis Light Power          |
| F20   | 15A ATO   | ***      | Drivetrain Power             |
| F21   | 30A ATO   | ***      | Engine ECU Power             |
| F22   | 20A ATO   | K10      | CAN Switched Power           |
| ***   | ***       | K1,K3,K4 | Battery Disconnect           |

**Cabin Power Distribution Module**

| FUSE# | FUSE TYPE | RELAY # | DESCRIPTION                    |
|-------|-----------|---------|--------------------------------|
| F1    | 5A MINI   | ***     | Antenna Battery Power          |
| F2    | 5A MINI   | Relay 1 | Node Logic Power               |
| F3    | 5A MINI   | Relay 1 | ISOBUS CAN Power               |
| F4    | 5A MINI   | ***     | HDU Battery Power              |
| F5    | 20A MINI  | Relay 2 | CAN Switched Power             |
| F6    | 5A MINI   | Relay 3 | Armrest Ignition Power         |
| F7    | 5A MINI   | Relay 3 | Console Ignition Power         |
| F8    | 10A MINI  | ***     | Console Battery Power          |
| F9    | 15A MINI  | ***     | Cab SPU Battery Power          |
| F10   | 10A MINI  | ***     | Power Point Battery Power      |
| F11   | 5A MINI   | ***     | Armrest Battery Power          |
| F12   | 20A MINI  | Relay 3 | Accessory Power                |
| F13   | 10A MINI  | Relay 4 | Power Point Ignition Power     |
| F14   | 20A MINI  | Relay 4 | Cab Auxiliary Ignition Power   |
| F15   | 20A MINI  | ***     | Cab Auxiliary Battery Power    |
| F16   | 20A MINI  | ***     | Front Worklight Power          |
| F17   | 20A MINI  | ***     | Rear Worklight Power           |
| F18   | 20A MINI  | ***     | Cab Roof Battery Power         |
| F19   | 10A MINI  | Relay 5 | Steering Column Ignition Power |
| F20   | 20A MINI  | Relay 5 | Seat Power                     |

**Boom Power Distribution Module**

| FUSE# | FUSE TYPE | RELAY #      | DESCRIPTION           |
|-------|-----------|--------------|-----------------------|
| F1    | 15A MINI  | Relay 1      | Hawkeye Nozzle Power  |
| F2    | 15A MINI  | Relay 2      | Hawkeye Nozzle Power  |
| F3    | 15A MINI  | Relay 3      | Hawkeye Nozzle Power  |
| F4    | 15A MINI  | Relay 4      | Hawkeye Nozzle Power  |
| F5    | 15A MINI  | Relay 5      | Hawkeye Nozzle Power  |
| F6    | 15A MINI  | Relay 6      | Hawkeye Nozzle Power  |
| F7    | 30A MINI  | Cab Batt Pwr | Aux Battery Power     |
| F8    | 15A MINI  | ***          | AutoboomPower         |
| F9    | 30A MINI  | ***          | Aux Battery Power     |
| F10   | 15A MINI  | ***          | Product Control Power |
| F11   | 30A MINI  | ***          | Boom Valve Power      |
| F12   | 30A MINI  | ***          | Aux Boom Valve Power  |

# APACHE™

## CHAPTER 9

### WARRANTY

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#### Apache Sprayer Warranty Registration and Policy For all 2020 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](http://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](http://www.etdealer.com), a link is provided to the Cummins website and all of the customer information auto-fills from the [etdealer.com](http://www.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**



# APACHE™

## CHAPTER 10

### MAINTENANCE LOG

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\_\_\_\_\_ 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 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: |  |
|   |  |
|   |  |
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|   |  |
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**Season**

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[illegible]

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