

APACHE

AS1010 and AS1210

2010 Owner's Manual



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

**EQUIPMENT
TECHNOLOGIES** 

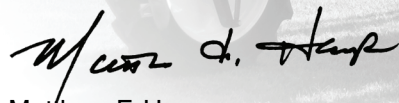
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EQUIPMENT TECHNOLOGIES

Dear Valued Customer,

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

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

Yours Faithfully,

A handwritten signature in black ink, appearing to read "Matthew F. Hays", is positioned over the lower part of the sprayer image.

Matthew F. Hays

Chief Executive Officer

NOTICE

Before applying chemicals or fertilizers with your Apache Sprayer, please check and calibrate the following precision agricultural products:

1. Check all console calibrations, including your Raven console (5000, Envizio Pro or Viper Pro) and check:
 - Swath Width
 - Boom Section Calibration
 - Receiver Fore/Aft Settings
 - Valve Calibration
 - Flow Meter Calibration
 - Rate Calibration
2. Please review your Autoboom and Accuboom settings, if equipped.
3. Calibrate the Raven SmarTrax™ autosteer, if equipped. SmarTrax calibration must be performed on a large, flat, open area. Make sure all settings are entered properly and that you perform the calibration in its entirety. This includes driving on an A-B line for roughly 20 minutes after automatic calibration is complete to allow the Yaw sensor to learn how to acquire the line properly.

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CHAPTER 1 SPECIFICATIONS

2010 AS1010 and AS1210 Specifications

	AS1010	AS1210
Tank Capacity	850 gallons (3217.6 liters) Optional - 1000 gallons (3785.4 liters)	1200 gallons (4542.4 liters), stainless steel
Engine	215 Cummins Tier III 655 lb-ft (888 N·m) @ 1500 rpm	275 Cummins Tier III 655 lb-ft (888 N·m) @ 1500 rpm
Transmission	Standard: ITL Powershift 6-speed torque converted Optional: Funk Powershift 6-speed torque converted	Funk Powershift 6-speed, torque converted
Speeds	ITL 6-Speed 1st: 0 to 5 mph (8.04 km/h) 2nd: 0 to 8 mph (12.8 km/h) 3rd: 0 to 11 mph (17.7 km/h) 4th: 0 to 18 mph (28.9 km/h) 5th: 0 to 29 mph (46.6 km/h) 6th: 0 to 36 mph (57.9 km/h)	Funk Transmission 1st: 0 to 6 mph (9.6 km/h) 2nd: 0 to 9 mph (14.4 km/h) 3rd: 0 to 11 mph (17.7 km/h) 4th: 0 to 15 mph (24.1 km/h) 5th: 0 to 22 mph (35.4 km/h) 6th: 0 to 35 mph (56.3 km/h)
Brakes	Internal, wet disc self-adjusting	
Suspension	Front Axle: Center oscillation with independent hydraulic accumulation. Rear Axle: Patented hydraulic load suspension with compensating anti-sway control, self-adjusting for diminishing/increasing load.	
Crop Clearance	42 or 48 in. (106.6 or 121.9 cm)	48 in. (121.9 cm)
Axles	120 - 144 in. (304.8 - 365.7 cm) [42 in. (106.6 cm) CC]; 120 - 144 in. (304.8 - 365.7 cm) 88 in. (223.5 cm) fixed, 120 in. (304.8 cm) fixed, 100 - 101 in. (254 - 256.5 cm), 102 - 104 in. (259.8 - 264.1 cm), 105 - 114 in. (266.7 - 289.5 cm) [with 48 in. (121.9 cm) CC]	120 in. (304.8 cm) fixed, Wide adjustable: 120 to 144 in. (304.8 - 365.7 cm) (Optional hydraulic adjust)
Final Drive	ITL/JBC planetary gearset (42 in. (106.6 cm) CC); gear drive drop box (48 in. (121.9 cm) CC)	Fairfield all gear drop box
Cab	ET custom pressurized cab	
Weight	18,500 lb (8391.4 kg) dry weight, poly tank	21,000 lb (9525.4 kg) dry weight, stainless steel tank
Width	12 ft (3.6 m)	
Height	12 ft (3.6 m) with 42 in. (106.6 cm) CC; 12 ft (3.6 m) - 4 in. (10.1 cm) with 48 in. (121.9 cm) CC	12 ft (3.6 m) - 4 in. (10.1 cm) with 48 in. (121.9 cm) CC
Length	27 ft (8.2 m)	
Booms	80 ft (24.3 m), 90 ft (27.4 m), 100 ft (30.4 m), 60/80 ft (18.2/24.3 m), 60/90 ft (18.2/27.4 m)	

	AS1010	AS1210
Boom Height	14 in. (35.5 cm) to 74 in. (187.9 cm) [42 in. (106.6 cm) CC]; 20 to 80 in. (50.8 to 203.2 cm) [48 in. (121.9 cm) CC]	20 to 80 in. (50.8 to 203.2 cm) [48 in. (121.9 cm) CC]
Wheel Base	14 ft - 5 in. (4.3 m)	
Tires	Standard Front: 380/80R38 Standard Rear: 380/90R46 Optional Front: 320/80R38 Optional Rear: 320/90R50	Standard Front: 380/80R38 Standard Rear: 380/90R46
Turning Radius	17 ft (5.1 m)	
Fuel Capacity	100 gallons (378.5 liters)	
Product Pump	Hypro 9306S HM1C, hydraulically driven centrifugal pump	

AS1010 Optional Equipment

Please contact your Apache dealer or www.apachesprayer.com for more information on optional equipment.

- Narrow axle (48 in. [121.9 cm] CC) fixed 88 in. (223.5 cm) or 90 in. (228.6 cm), 120 in. (304.8 cm) fixed, 100 - 101 in. (254 - 256.5 cm), 102 - 104 in. (259.8 - 264.1 cm), or 105 - 114 in. (266.7 - 289.5 cm)
- 120 - 144 in. (304.8 - 365.7 cm) manual adjust axles with 36 in. (91.4 cm) crop clearance
- Heavy-duty front axle with 380/80R38 tires, h.d. spindles, and hubs for all axle spacing
- Hydraulic on the go wheel adjust (only available on 120 - 144 in. (304.8 - 365.7 cm) axles)
- Funk 6-speed power shift transmission
- 1000 gallon (3785.4 liter) poly tank (must get heavy duty front axle with this tank)
- 850 gallon (3217.6 liter) stainless steel tank
- 1000 gallon (3785.4 liter) stainless steel tank (must get heavy duty front axle with this tank)
- Raven 5000 Rate controller, radar speed pickup or drive shaft sensor
- Raven Envizio Pro Controller (must choose GPS receiver)
- Raven SmarTrax Autosteer
- Raven GPS receivers 200 and 300
- Raven Autoboom PowerGlide Plus (wheel gauged)
- Raven Autoboom UltraGlide (optical eye)
- Raven Viper Pro Controller
- Raven AccuBoom (automatic boom shutoff)**
- Smucker Injection Foam Marker
- Additional 50 gallon (189.2 liter) poly rinse tank (rear mounted)
- Rotoflush, pump pressured (poly tank only)
- Fence row nozzles one side or both
- Hypro chemical eductor
- 5-way nozzle bodies
- Front fenders (not available on 36 in. (91.4 cm) CC)
- Rear fenders (not available on 36 in. (91.4 cm) CC)
- Auxiliary field light kit (mounts to cab roof)
- Narrow front tires 320/85R38 (for heavy duty front axle only)

- Narrow rear tires 320/90R50
- Dual rear tires and spacers either 380/90R46 or 320/90R50 (48 in. [121.9 cm] CC only)
- Product tank fill 3 in. (76.2 mm) (see wet system for more options on product side)
- Wide tires front, either 480/70R34 or 23.1 x 26 in. R-3 TORC TRAC TL*
- Wide tires rear, either 520/85R46 or 30.5 x 32 in. R-3 TORC TRAC TL*

* Only for use on 48 in. (121.9 cm) crop clearance models

** Must also choose controller and GPS options

Note: The AS1010 can be ordered with a Funk 6-speed power shift transmission option. This option allows for a second hydraulic pump to be mounted to the transmission for operating an air boom.

AS1210 Optional Equipment

Please contact your Apache dealer or www.apachesprayer.com for more information on optional equipment.

- Hydraulic on the go wheel adjust
- Raven 5000 Rate controller, radar speed pickup
- Raven Envizio Pro Controller (must choose GPS receiver)
- Raven SmarTrax Autosteer
- Raven GPS receivers 200 or 300
- Raven Autoboom PowerGlide Plus (wheel gauged)
- Raven Autoboom UltraGlide (optical eye)
- Raven Viper Pro Controller
- Raven AccuBoom (automatic boom shutoff)*
- Smucker Injection Foam Marker
- Additional 50 gallon poly rinse tank (rear mounted)
- Rotoflush, pump pressured (poly tank only)
- Fence row nozzles one side or both
- Hypro chemical eductor
- 5-way nozzle bodies
- Front fenders
- Rear fenders
- Auxiliary field light kit (mounts to cab roof)
- Dual rear tires 380/90R46
- Wide tires front, either 480/70R34 or 23.1 x 26 in. R-3 TORC TRAC TL
- Wide tires rear, either 520/85R46 or 30.5 x 32 in. R-3 TORC TRAC TL
- Product tank fill 3 in. (76.2 mm) (see wet system for more options on product side)
- New Leader L3020G4 stainless steel spinner box with (Apache dealer must purchase from Highway Equipment Company directly and mount the box to Apache)

* Must also choose a controller and GPS option

General Information

The graphics and text in this manual generally describe the AS1010 and AS1210 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.

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CHAPTER 2

SAFETY

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

DANGER

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

WARNING

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

CAUTION

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

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

Safety Precautions

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

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

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

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



WARNING

The safety messages that follow have WARNING level hazards.

Pre-Operation Hazards



- *Read and understand this Owner's Manual before operating or servicing the Apache Sprayer to ensure that safe operating practices and maintenance procedures are followed. If you do not understand any part of this manual and need assistance, see your Apache dealer for assistance.*
- *NEVER permit anyone to operate the Apache Sprayer without proper training. Obtain proper knowledge and training before attempting to perform any operation or service procedure in this manual.*
- *This Apache Sprayer and its attachments are designed to spray liquid product. Use of this Apache Sprayer in any other manner other than its intended use is prohibited.*
- *Remove or clean contaminated clothing before entering the cab.*

- *Some components and systems of Apache Sprayers are manufactured by companies other than Apache and have specific safety, inspection, adjustment and maintenance procedures outlined by their manufacturer. Carefully read and understand all non-Apache Sprayer and sprayer manufacturer instructions and manuals supplied with the Apache Sprayer. These include, but are not limited to the Engine Owner's Manual, Sprayer Monitor System Manual, Radio Manual, Chemical Eductor Manual, Product Pump Instructions and other optional equipment.*

Fire and Explosion Hazards



- *Diesel fuel is flammable and explosive under certain conditions. Store any containers containing fuel in a well-ventilated area, away from any combustibles or sources of ignition.*
- *NEVER use a shop rag to catch spilling fuel.*
- *Wipe up all fuel spills immediately.*
- *NEVER refuel with the engine running.*
- *ALWAYS have appropriate safety equipment available. Have all fire extinguishers checked periodically for proper certification, operation and/or charge capacity.*
- *ALWAYS read and follow safety-related precautions found on containers of hazardous substances like parts cleaners, primers, sealants and sealant removers.*

Burn Hazards



- *Some of the engine surfaces become very hot during operation and shortly after shutdown. 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 (317) 834-4500 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

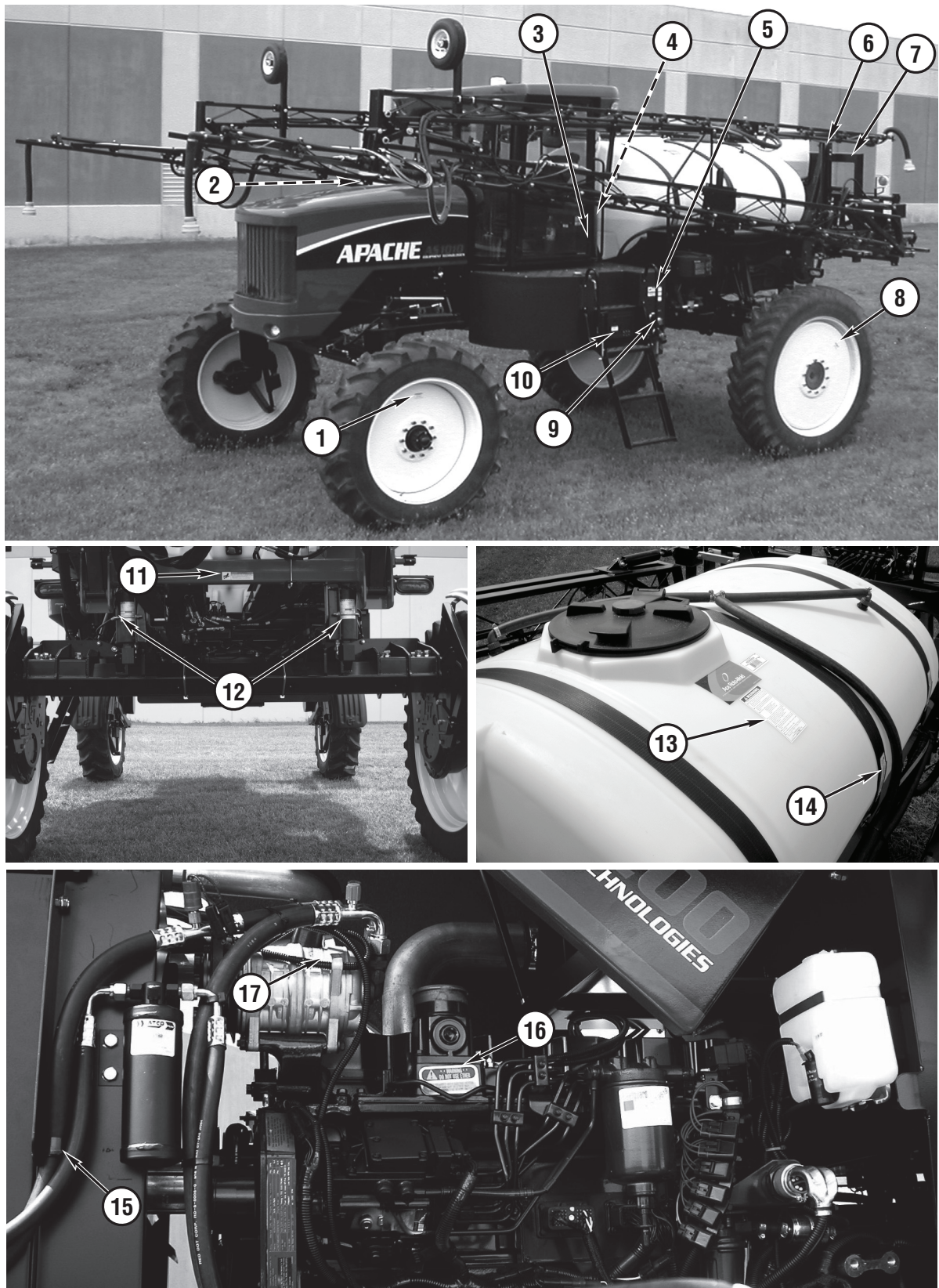

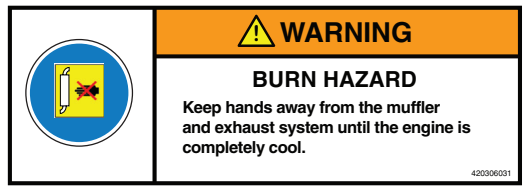
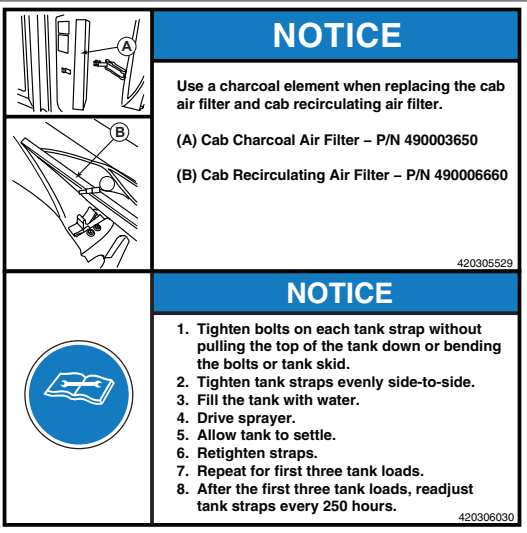
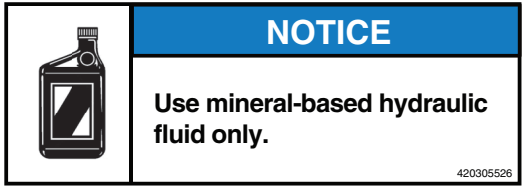
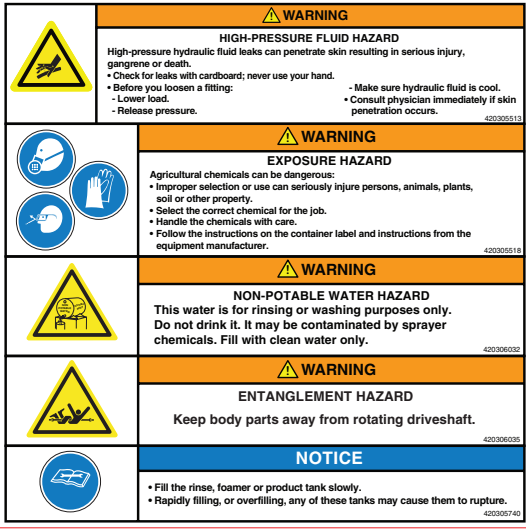




Figure 2-1

Exterior Decal Descriptions

1	 <p>WARNING</p> <p>TIRE HAZARD</p> <ul style="list-style-type: none"> • Torque wheel bolts to 240 ft-lb (326 N•m). Check torque daily for first week of operation and weekly thereafter. • Replacement tire must meet or exceed original tire specifications. Failure to comply may cause tire failure resulting in serious injury or death. <p>420306034</p>
2	 <p>WARNING</p> <p>BURN HAZARD</p> <p>Keep hands away from the muffler and exhaust system until the engine is completely cool.</p> <p>420306031</p>
3	 <p>NOTICE</p> <p>Use a charcoal element when replacing the cab air filter and cab recirculating air filter.</p> <p>(A) Cab Charcoal Air Filter – P/N 490003650</p> <p>(B) Cab Recirculating Air Filter – P/N 490006660</p> <p>420305529</p> <p>NOTICE</p> <ol style="list-style-type: none"> 1. Tighten bolts on each tank strap without pulling the top of the tank down or bending the bolts or tank skid. 2. Tighten tank straps evenly side-to-side. 3. Fill the tank with water. 4. Drive sprayer. 5. Allow tank to settle. 6. Retighten straps. 7. Repeat for first three tank loads. 8. After the first three tank loads, readjust tank straps every 250 hours. <p>420306030</p>
4	 <p>NOTICE</p> <p>Use mineral-based hydraulic fluid only.</p> <p>420305526</p>

5	 <p>WARNING</p> <p>HIGH-PRESSURE FLUID HAZARD</p> <p>High-pressure hydraulic fluid leaks can penetrate skin resulting in serious injury, gangrene or death.</p> <ul style="list-style-type: none"> • Check for leaks with cardboard; never use your hand. • Before you loosen a fitting: <ul style="list-style-type: none"> - Lower load. - Release pressure. • Make sure hydraulic fluid is cool. • Consult physician immediately if skin penetration occurs. <p>420305513</p> <p>WARNING</p> <p>EXPOSURE HAZARD</p> <p>Agricultural chemicals can be dangerous:</p> <ul style="list-style-type: none"> • Improper selection or use can seriously injure persons, animals, plants, soil or other property. • Select the correct chemical for the job. • Handle the chemicals with care. • Follow the instructions on the container label and instructions from the equipment manufacturer. <p>420305518</p> <p>WARNING</p> <p>NON-POTABLE WATER HAZARD</p> <p>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.</p> <p>420306032</p> <p>WARNING</p> <p>ENTANGLEMENT HAZARD</p> <p>Keep body parts away from rotating driveshaft.</p> <p>420306035</p> <p>NOTICE</p> <ul style="list-style-type: none"> • Fill the rinse, foamer or product tank slowly. • Rapidly filling, or overfilling, any of these tanks may cause them to rupture. <p>420305740</p>
6	 <p>WARNING</p> <p>FALLING HAZARD</p> <p>This is not a step. Only use the slip-resistant cab access ladder and grab handles as aids to enter and exit the machine.</p> <p>420305512</p>
7	 <p>WARNING</p> <p>FALLING HAZARD</p> <p>Never allow riders on the machine.</p> <p>420305530</p>

8

WARNING

TIRE HAZARD

- Torque wheel bolts to 420 ft-lb (570 N•m). Check torque daily for first week of operation and weekly thereafter.
- Replacement tire must meet or exceed original tire specifications. Failure to comply may cause tire failure resulting in serious injury or death.

420306033

9

WARNING

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

10

WARNING

STRIKING BYSTANDER
HAZARD

Keep bystanders away from
automatic ladder; it may move
unexpectedly.

420305527

11

WARNING

HIGH-PRESSURE FLUID HAZARD

High-pressure hydraulic fluid leaks can penetrate skin resulting in serious injury, gangrene or death.

- Check for leaks with cardboard; never use your hand.
- Before you loosen a fitting:
 - Lower load.
 - Release pressure.

- Make sure hydraulic fluid is cool.
- Consult physician immediately if skin penetration occurs.

420305513

12

WARNING

FAILURE TO READ AND FOLLOW THESE DIRECTIONS CAN CAUSE RAPIDLY DISCHARGING GAS AND/OR HYDRAULIC FLUID WHICH CAN RESULT IN DEATH, PERSONAL INJURY AND PROPERTY DAMAGE. BEFORE DISCONNECTING OR DISASSEMBLING THIS PRESSURIZED VESSEL:

- 1) DISCHARGE ALL GAS PRESSURE BY FOLLOWING THE INSTRUCTIONS AS LISTED IN PARKER HANNIFIN BULLETIN 1630M1 FOR PISTON AND 1632M1 FOR BLADDER ACCUMULATORS.
- 2) SLOWLY BLEED ALL HYDRAULIC PRESSURE FROM OTHER SIDE OF ACCUMULATOR. ALSO FOLLOW THE ABOVE MENTIONED BULLETIN FOR ALL SERVICING, INCLUDING RECHARGING AND MAINTENANCE. PRECHARGE ONLY WITH DRY INERT GAS SUCH AS HIGH PURITY NITROGEN.

PARKER HANNIFIN CORP.
ROCKFORD, ILL 61115

13

WARNING

PLEASE READ BEFORE USING THIS TANK

- ◆ This tank can be used only with polyethylene tolerant fluids. Bulkheads and gaskets also must be compatible with the fluids which are to be stored in the tank. Use of the tank with incompatible chemicals could cause tank failure.
- ◆ Fill tank with water prior to use to prevent loss due to unsecure fittings, shipping damage or manufacturing defects. Manufacturer is not responsible for loss of materials.
- ◆ SUPPORTS: Vertical flat bottom tanks on a solid, flat level surface.
HORIZONTAL SPRAY TANKS - support the bottom (1/3 of circumference) with a full pan saddle.
- ◆ This tank is designed for containment of fluids at atmospheric pressure only and *must be properly vented* to prevent pressure or vacuum loads. Vent opening must provide open area equal to or larger than fill or withdrawal connection. Inspect vents for proper operation before filling or emptying.
- ◆ Protect tank from impact, especially in cold temperatures. ALWAYS keep sharp objects away from tank as tank could be punctured and contents escape.
- ◆ Tank is NOT fire resistant. Never expose to open flame or heat.
- ◆ Always keep tank securely covered.
- ◆ Confined spaces must be considered hazardous. DO NOT enter tank without first taking PROPER PRECAUTIONS.

ACE ROTO-MOLD
 Division of Hartog Industries, Inc.
 Hospers, IA 51238

14

WARNING

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

15	<div><div>WARNING BURN / SEVER HAZARD Keep fingers clear of hot surfaces and rotating parts while engine cover is open and engine is running. <small>420306036</small></div></div>
16	<div>WARNING DO NOT USE ETHER ENGINE EQUIPPED WITH ELECTRIC HEATER STARTING AID. USE OF ETHER MAY CAUSE EXPLOSION AND SEVERE INJURY</div>
17	<div><div>CAUTION</div><div>SAE-J639</div><div>REFRIGERANT UNDER HIGH PRESSURE</div><div>SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL ONLY. IMPROPER SERVICE METHODS MAY CAUSE PERSONAL INJURY. CONSULT SERVICE MANUAL.</div></div>

Interior Decal Locations

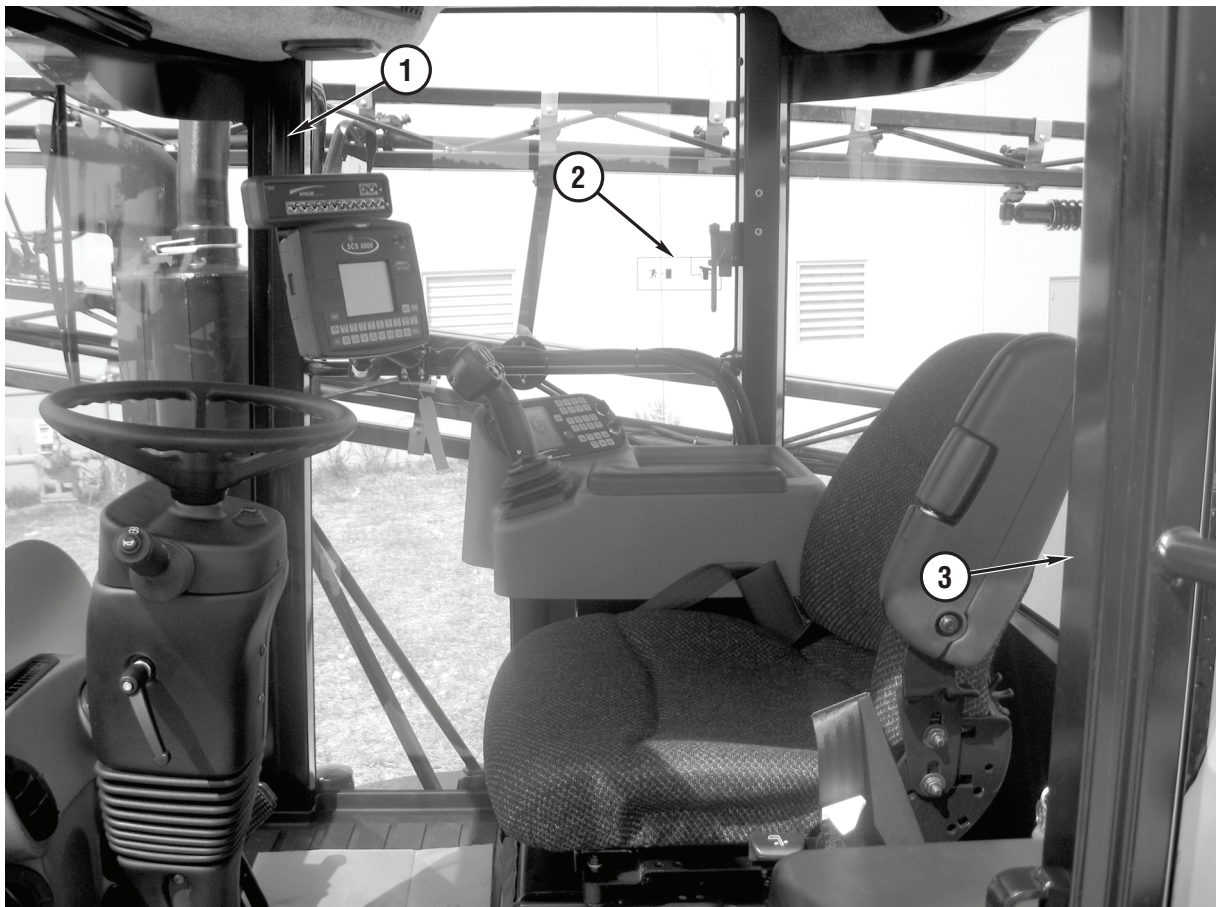
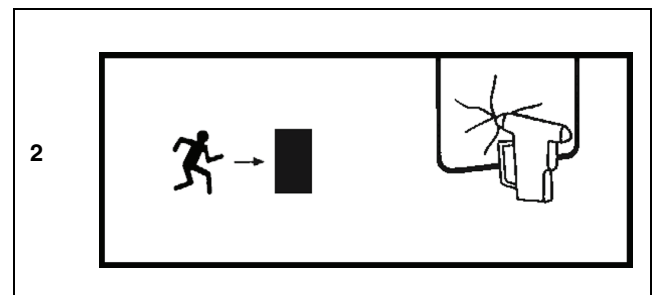
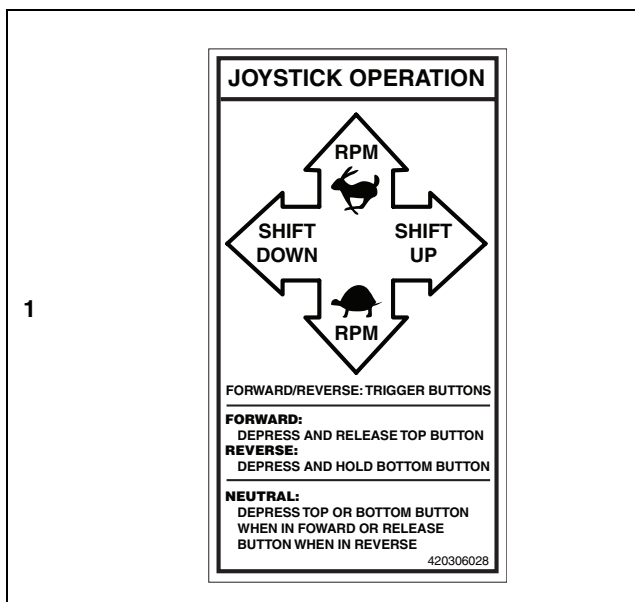



Figure 2-2

Interior Decal Descriptions



3

⚠ DANGER







ELECTROCUTION HAZARD

- This machine is not insulated.
- Death or serious injury will result from contact with or inadequate clearance to electrical power lines and apparatus.
- Maintain safe clearances from electrical power lines in accordance with applicable government regulations such as OSHA 1910.269.
- This machine does not provide protection from contact with or proximity to an electrically charged power line.

420305515

⚠ WARNING






OPERATION HAZARDS

- Read and understand operator's manual before operating, servicing or repairing the sprayer. Follow all safety rules and instructions. Manuals are available from dealer.
- Only operate sprayer from operator's seat with seat belt securely fastened.
- Before leaving the operator's seat, place gear shift in NEUTRAL position, apply parking brake, stop engine and remove the key.
- Do not allow children or untrained persons to operate the equipment.
- Reduce speed when turning or operating around hazards, on rough ground or steep slopes.
- Use flashing warning lights on highways unless prohibited by law.

420305514

⚠ WARNING

OPERATION HAZARDS

- Do not operate sprayer on public highways with fluid in product tank.
- Always drain and flush tank prior to transport.
- Do not exceed 40 mph unloaded.

420305516

3

NOTICE



- Do not run product pump (A) dry. Seal damage will occur.
- Do not intentionally dead-head the pump with high pressure. Seal damage will occur.

420305517

⚠ WARNING



STRIKING OBJECT OR BYSTANDER HAZARD

Do not fold or unfold booms while sprayer is moving.

420306029

NOTICE



All fluids must meet or exceed Equipment Technologies recommendations. Refer to the operator's manual or call (317) 834-4500. Use the following fluids when servicing sprayer:

- **Differential** - SAE GL- 4 Gear Lube or Hydraulic Oil
- **Hydraulic system** - Hydraulic Oil
- **Brake system** - Hydraulic Oil
- **Planetary / Dropbox** - SAE GL- 5 Gear Lube
- **Transmission** - Powershift Transmission Oil that meets or exceeds CAT T04

Change fluid at the following intervals:

- **Differential** - every 250 hours
- **Hydraulic system** - every 1000 hours
- **Planetary / Dropbox** - every 500 hours
- **Transmission** - every 500 hours

420306027

APACHE™

CHAPTER 3

OPERATION

Before performing any operation procedures, read the following safety messages and read the *Safety Section* on page 2-1.

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 come to a complete stop before reversing directions.**

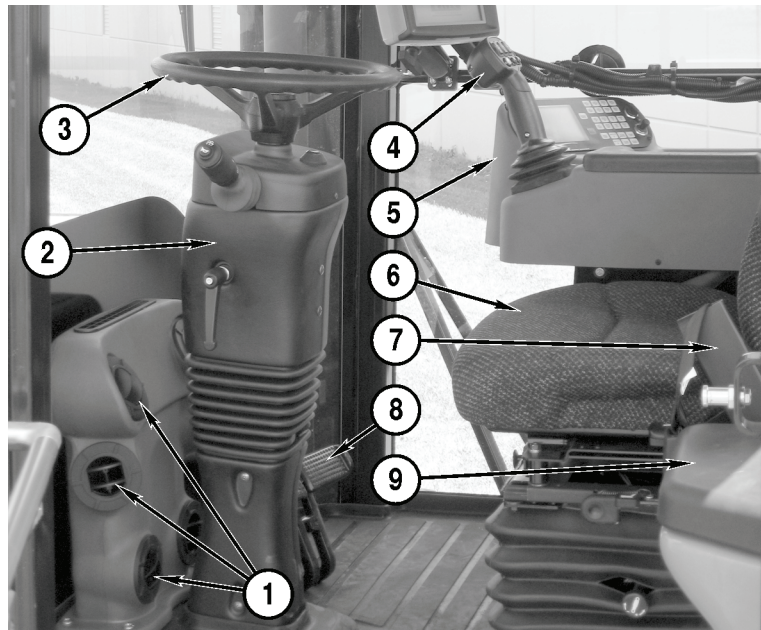
Pre-Operation Checks

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 and read *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 7-1.*
- 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 5-10.*
- Check engine oil level and add oil as needed. *See Check Engine Oil Level on page 5-10.*
- Check transmission fluid level and add fluid as needed. *See Check Transmission Fluid Level on page 5-11.*
- Check differential, gearboxes and/or planetaries fluid levels and add fluid as needed. *See Check Differential Fluid Level on page 5-15.*
- 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 5-12.*
- Check tank straps on poly product tank for tightness.

Cab Overview



- | | |
|--------------------|---|
| 1. Air Vents | 6. Air Seat |
| 2. Steering Column | 7. Fire Extinguisher
(behind seat) |
| 3. Steering Wheel | 8. Apache Sprayer Brakes |
| 4. T-Handle | 9. Padded Storage Unit with Cup
Holder |
| 5. Side Console | |

Figure 3-1

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.

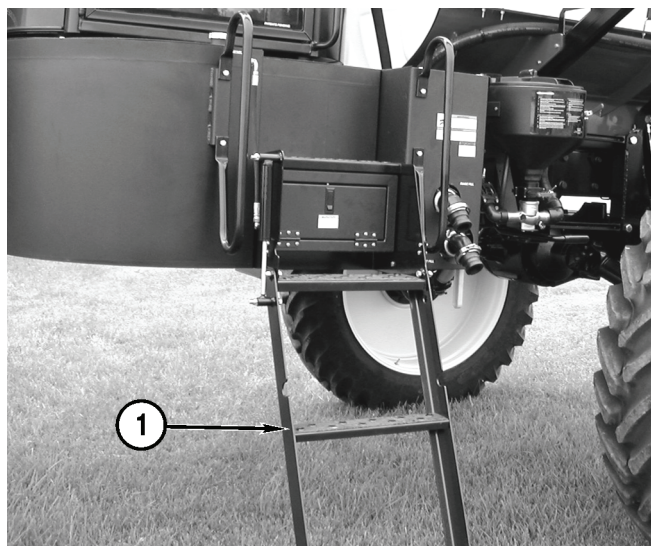


Figure 3-2

Steering Column

1. Adjustment Lever

- Turn the lever counterclockwise to release the column.
- Set the tilt and telescope to the desired position.
- Turn the lever clockwise to lock the column.

2. Steering Wheel

3. Hazard Flasher Button

4. Key Switch

Shown in the OFF position. See *Starting and Stopping the Engine* on page 3-11 for more details.

5. Turn Signal Lever

- Push lever up for right turn signal.
- Push down for left turn signal.

6. Windshield Wiper Switch

- Turn lever to the “I” position for low-speed wiper.
- Turn lever to the “II” position for high-speed wiper.

7. Windshield Washer

Push ring to operate washer.

8. Horn Button

Push to sound horn.

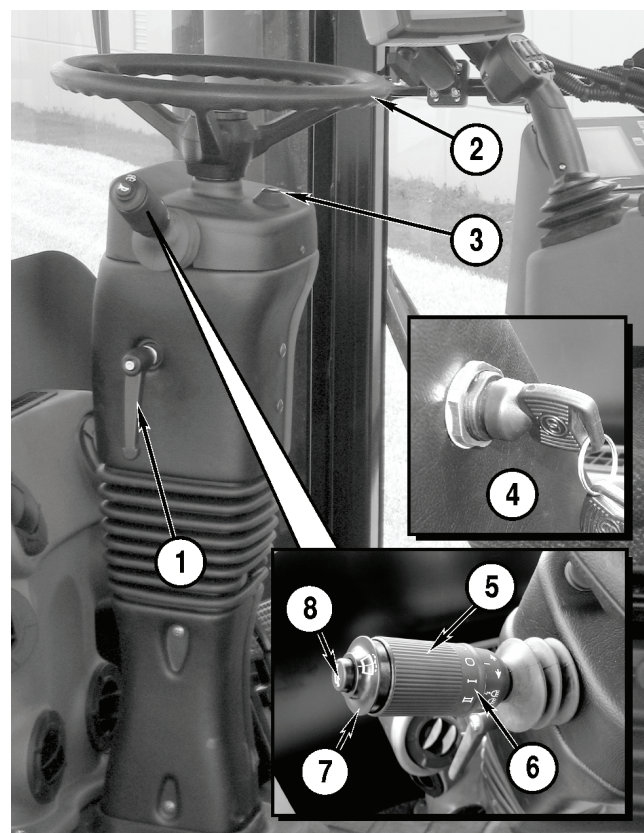


Figure 3-3

Fault Code Indicator:

1. Fault Code Indicator on Console

When a fault code is logged, the ET logo will disappear on the right side of the console display and one or more of the following fault codes will appear:

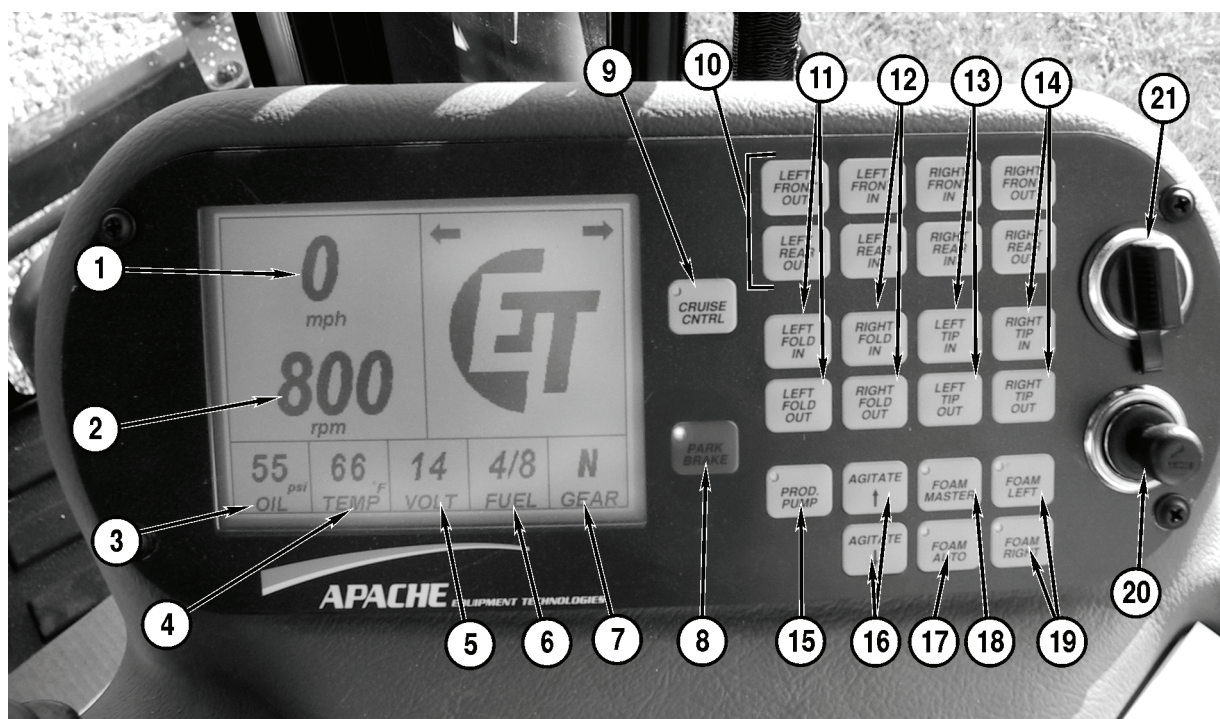
- Stop Engine
- Check Engine
- Water In Fuel
- Wait To Start
- Water Temperature
- Failed Fuse F11
- Low Oil Pressure
- Change Air Filter
- High Hyd Temp
- High Trans Temp
- Low Coolant
- ECU Failure
- SPN 00000 FMI 00

Refer to *Cummins Engine Fault Codes* on page 6-1.



Figure 3-4

Apache Sprayer Console



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

Figure 3-5

The console displays the machine hours and software revision when the key is in the RUN position and for 5 seconds at start-up.

1. **Number of Hours on Machine**
2. **Software Revision Number**
3. **Console Display Contrast Adjust**

To adjust the contrast of the console display:

- Press the agitate increase button and hold to increase the contrast of display.
- Press the agitate decrease button to decrease the contrast of display.

Both must be down before start-up of Apache Sprayer while the display is in this mode.

4. **Speed Calibration**

To calibrate the speed of the Apache Sprayer:

- Press the cruise master button (while the board is in this state).
- Press the cruise master a second time.
- Drive a measured mile, 5,280 ft (1.6 km).
- Drive through the mark at end of measure mile, pushing the cruise master when the front wheels are crossing the mile mark.

This will automatically reset the speed reading on the Apache Sprayer.

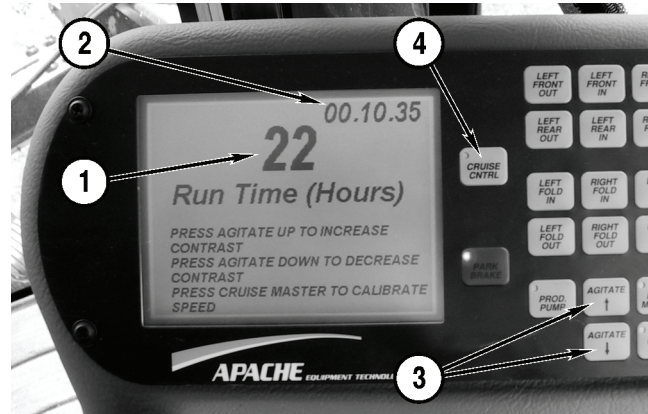
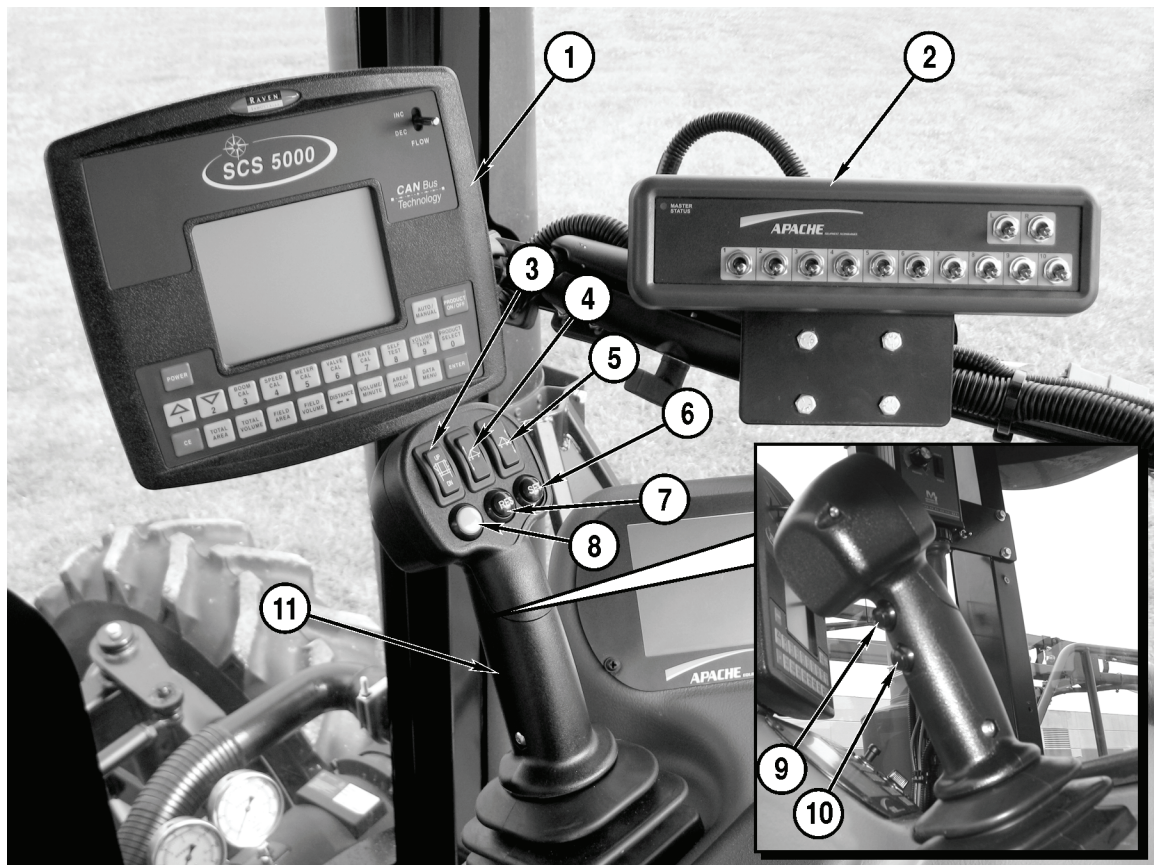


Figure 3-6

Raven 5000 Controller and T-Handle



1. **Raven 5000 Controller**
2. **Boom Switch Box**
3. **Boom Rack**
Press to move the boom rack up or down.
4. **Left Boom Tilt**
Press to tilt the left boom up or down.
5. **Right Boom Tilt**
Press to tilt the right boom up or down.
6. **Set Button for Cruise**
Press to set cruise control.
7. **Resume Button for Cruise**
Press to resume cruise control.
8. **Master Spray Switch**
Press to turn all five spray sections on or off.
9. **Forward Trigger Button**
10. **Reverse Trigger Button**
11. **T-Handle**
See Apache Sprayer Direction and Speed on page 3-12 for complete operations.

Figure 3-7

Fuse Block

The fuse block is located under a service cover inside the right, rear of the cab. The cover is shown removed in **Figure 3-8** for clarity.

1. Remove the thumbscrews and cover to access the fuse block.
2. Turn the knob (**Figure 3-8, 1**) to UNLOCK to access the fuses.

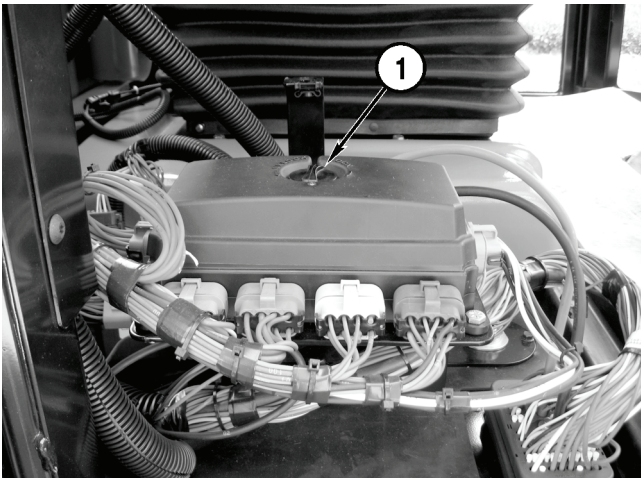


Figure 3-8

Climate Control and Light Switches

1. Cab Temperature Control

- Turn the switch toward blue (counterclockwise) for cool.
- Turn the switch toward red (clockwise) for warm.

2. Blower Fan Control

- Turn the switch counterclockwise for OFF.
- Turn the switch clockwise for ON.

3. Cab Front Lights

- Press the switch down to turn on the cab-mounted front-facing and work lights.
- Press the switch up to turn all the lights off.

4. Cab Inner Rear Lights

- Press the switch down to turn on the cab-mounted rear-facing and work lights.
- Press the switch up to turn all the lights off.

5. Cab Outer Rear Lights

- Press the switch down to turn on the turn and taillights.
- Press the switch up to turn off the lights.

6. Driving Lights

- Press the switch down to turn on the bumper-mounted driving lights.
- Press the switch up to turn off the lights.

7. Future Field Lights

This light switch is for future use. The wires are located in a two-pin Weatherpack® connector at the boom valves on the boom rack.

8. Auxiliary Power Outlet

9. Dome Light

Press the dome light lens to turn the light on and press again to turn off.

NOTICE: The dome light can drain the battery if left on without the engine running.

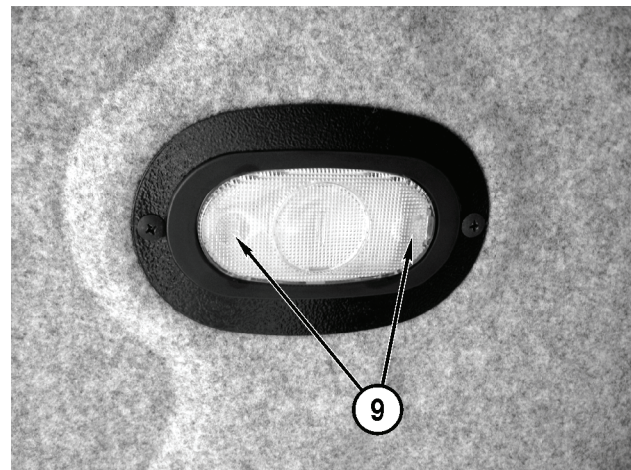
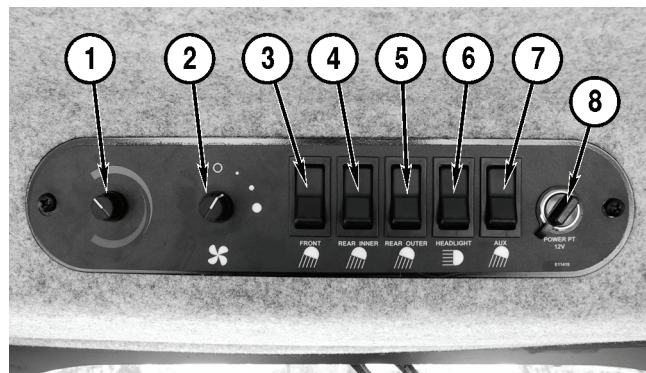


Figure 3-9

Apache Sprayer Lighting

1. Cab Front Work Lights
2. Cab Rear Work Lights
3. Rear Hazard and Turn Signal Lights
4. Brake Lights and Turn Signal Lights
When the brakes are applied, these lights will illuminate steady.
5. Front Hazard and Turn Signal Lights
6. Driving Lights

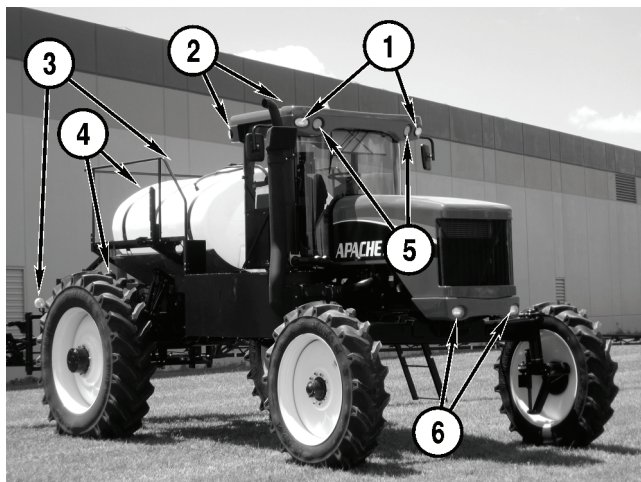


Figure 3-10

Turn Signal and Hazard Light Function:

- When the hazard lights are turned on, light sets #5, #3 and #4 will all flash.

Turn Signal Function:

- When the left turn signal is turned on, the left side of light sets #5, #3 and #4 will all flash.
- When the right turn signal is turned on, the right side of light sets #5, #3 and #4 will all flash.

If the hazard lights are already flashing when the turn signal is activated, the lights opposite the turn indicator will illuminate steady while the lights on the side of the turn will flash.

AM/FM Radio with Weather Band and CD Player

1. **AM/FM Radio with Weather Band and CD Player**
See the radio manufacturer's instructions for operation procedures.

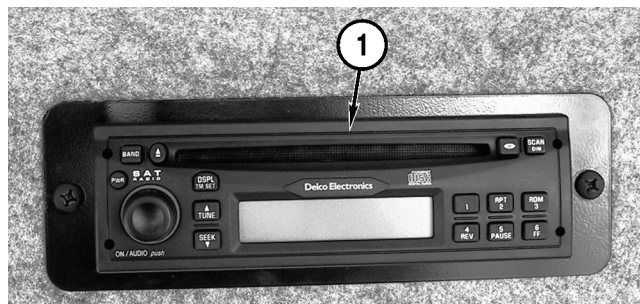


Figure 3-11

CB Radio Knockout

1. **CB Radio Knockout**

The cab features an available knockout and power supply behind the headliner.

The knockout location is in the upper left of the cab, mirrored from the AM/FM radio location.

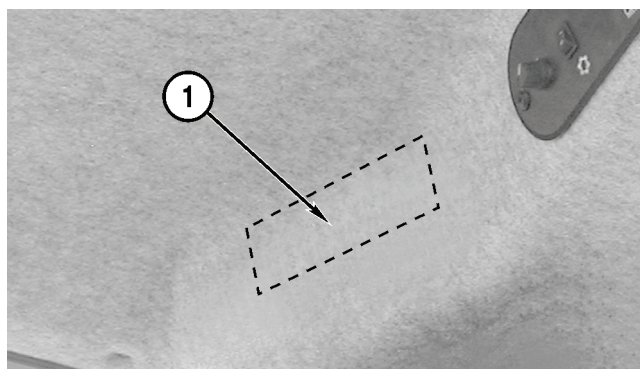


Figure 3-12

Seat Adjustment

1. Height

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

2. Fore-Aft Position

Pull the lever out to adjust seat forward or backward.

3. Lumbar Support

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

4. Backrest

To adjust the backrest:

- Lift lever
- Position backrest
- Release lever

5. Fore-Aft Isolator

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

6. Ride Firmness

- Turn the knob counterclockwise for a firm ride.
- Turn the knob clockwise for a soft ride.

7. Armrest

Turn knob to adjust armrest angle.

8. Seat Belt

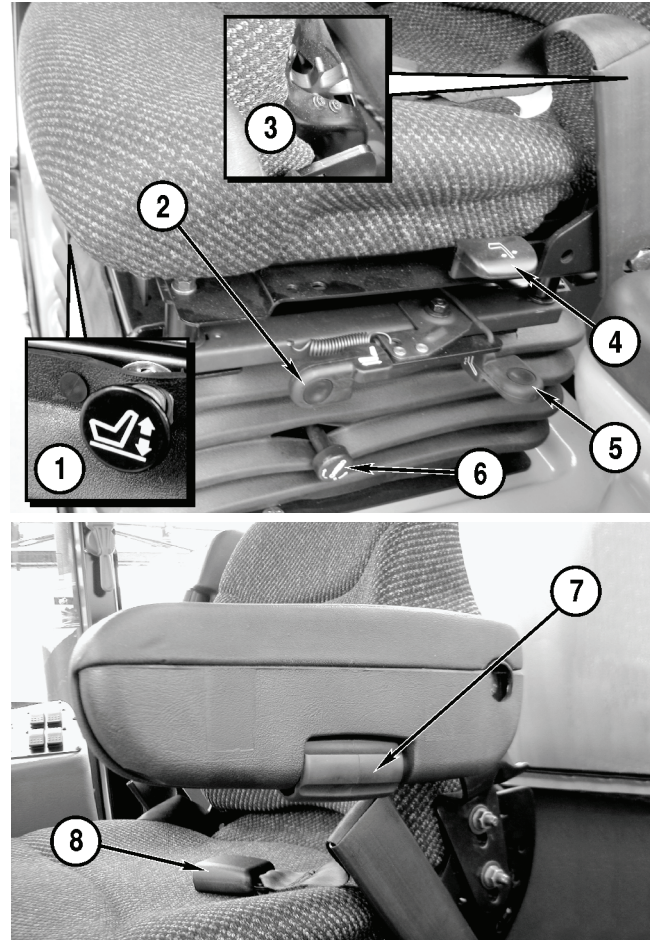


Figure 3-13

Starting and Stopping the Engine

Starting

WARNING! Impact Hazard. ALWAYS fasten your seat belt when operating the Apache Sprayer. The safety belt must be worn properly by the driver anytime the Apache Sprayer is in motion. Refer to Safety Belt on page 2-4.

WARNING! Sudden Movement Hazards

- **ALWAYS start the engine from the operator's seat.**
- **ALWAYS set the parking brake (Figure 3-14, 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.



Figure 3-14

The key switch has 4 positions:

- Position 1 - Not Used (**Figure 3-15, 1**)
- Position 2 - OFF position (**Figure 3-15, 2**)
- Position 3 - RUN position (**Figure 3-15, 3**)
- Position 4 - START position (**Figure 3-15, 4**)



Figure 3-15

1. Turn the key switch to the RUN position (**Figure 3-15, 3**) and wait for the "Wait-To-Start" lamp on the console display to go out.
2. Turn the key to the START position (**Figure 3-15, 4**) and crank the engine.
3. When the engine starts, release the key.

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.

4. If the engine does not start after four attempts, see the Troubleshooting section in the engine manufacturer's service manual or contact your dealer.
5. 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 (**Figure 3-16, 1**) as soon as the engine starts.

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

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

Check the engine coolant gauge (**Figure 3-16, 2**).

- Normal operating temperature is 180°F (82°C).
- If the engine coolant rises above 234°F (112°C), reduce the load on the engine.
- If the coolant temperature does not drop, stop the engine and determine the cause.



Figure 3-16

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:

1. Bring the Apache Sprayer to a complete stop.
2. Shift the transmission to NEUTRAL (**Figure 3-17, 1**).
3. Lower engine rpm.
4. Apply the parking brake (**Figure 3-17, 2**).
5. Turn the key to the OFF position and remove the key.

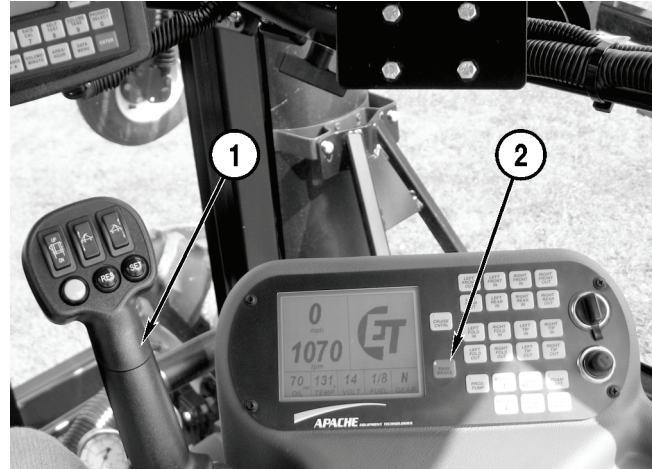


Figure 3-17

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 an indicator lamp on the console will indicate “N” (**Figure 3-18, 1**).

1. Squeeze and hold either one of the trigger buttons to put into gear.
 - Use the top button for FORWARD and the bottom button for REVERSE.
 - Once the transmission is in gear, the gear indicator will show the current gear.
2. Return to NEUTRAL by squeezing either of the trigger buttons.
 - The transmission will immediately shift to NEUTRAL.

NOTE: The T-handle will not shift the transmission into NEUTRAL.

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

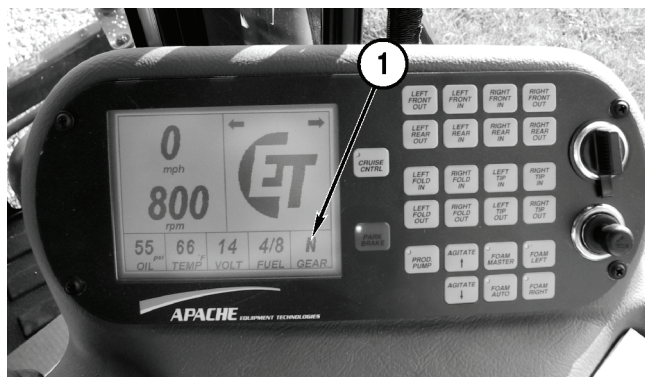


Figure 3-18

Forward

To move the Apache Sprayer forward:

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

To move forward:

1. Release the park brake.
2. Apply the Apache Sprayer brakes.
3. Squeeze and hold the top trigger button (**Figure 3-19, 1**) on the T-handle until the transmission shifts into first gear FORWARD.

The Apache Sprayer will begin rolling forward at this time.

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

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

NOTE: The T-handle will not shift the transmission into NEUTRAL.

- To obtain NEUTRAL from a FORWARD gear, squeeze either trigger button (**Figure 3-19, 1 or 2**) on the T-handle.

NOTE: If the Apache Sprayer is moving forward and either trigger button on T-handle is squeezed, the machine will shift to NEUTRAL. Once the Apache Sprayer is below 1400 rpm and 4 mph (6.4 km/h), squeezing and holding the top button on the back side of the T-handle shifts the transmission into the gear the Apache Sprayer was in before NEUTRAL.

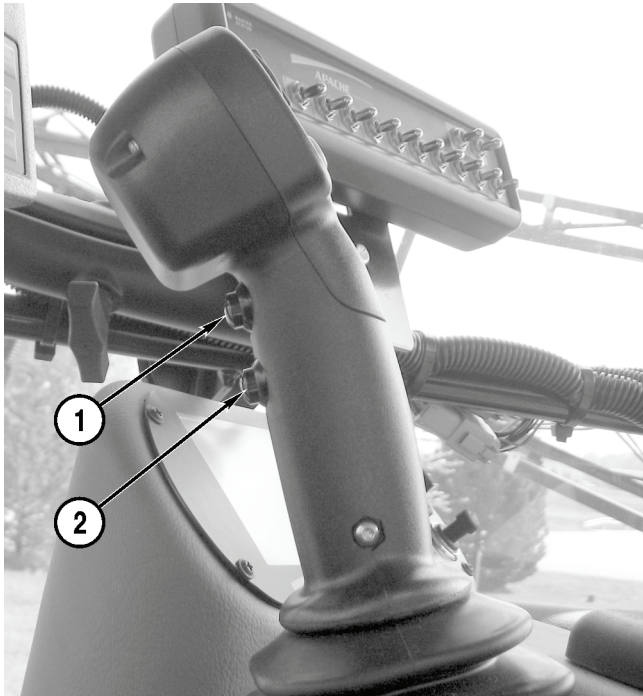


Figure 3-19

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 upshift (**Figure 3-19, 1**) or downshift (**Figure 3-19, 2**) without returning the transmission to the NEUTRAL position. The Apache Sprayer is equipped with six forward gears. Be aware of speed ranges for each gear. Use the following Gear Speed Ranges chart for reference.

Gear Speed Ranges		
Gear	Speed ITL Transmission	Speed Funk Transmission
1st	0 to 5 mph (8.04 km/h)	0 to 6 mph (9.6 km/h)
2nd	0 to 8 mph (12.8 km/h)	0 to 9 mph (14.4 km/h)
3rd	0 to 11 mph (17.7 km/h)	0 to 11 mph (17.7 km/h)
4th	0 to 18 mph (28.9 km/h)	0 to 15 mph (24.1 km/h)
5th	0 to 29 mph (46.6 km/h)	0 to 22 mph (35.4 km/h)
6th	0 to 36 mph (57.9 km/h)	0 to 36 mph (57.9 km/h)

Upshifting and downshifting are achieved with a sideways rock and release movement or bump of the T-handle (**Figure 3-20**). The T-handle should return to the center (side-to-side) position between shifts and some time must be allowed for the transmission to respond.

Upshifting:

- While the Apache Sprayer is in either the FORWARD or REVERSE direction, bump the T-handle to the right one time to shift up to the next highest gear. Repeat this motion to upshift the transmission one gear at a time.

Downshifting:

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

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

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.

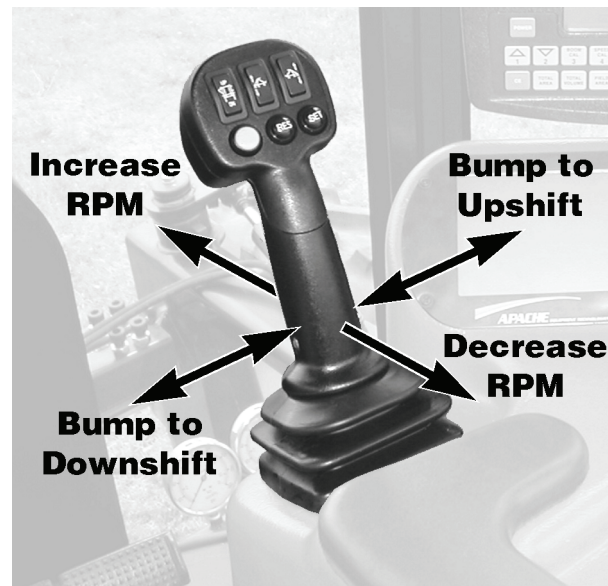


Figure 3-20

Reverse

To move the Apache Sprayer in REVERSE:

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

1. Apply the Apache Sprayer brakes.
2. Release the parking brake.
3. To shift into REVERSE from NEUTRAL, squeeze and hold the bottom trigger button (**Figure 3-21, 2**) on the T-handle.
 - Push the T-handle forward to increase the engine rpm and ground speed.
 - Pull the T-handle back to decrease the engine rpm.

The reverse button (**Figure 3-21, 2**) must be held at all times to move in REVERSE.

NOTE: The T-handle will not shift the transmission into NEUTRAL. To obtain NEUTRAL from a REVERSE gear, release the bottom trigger button (**Figure 3-21, 2**) on the T-handle

NOTE: If the Apache Sprayer is moving in REVERSE and the reverse button (**Figure 3-21, 2**) is released, the transmission will shift into NEUTRAL. Once the Apache Sprayer is below 1400 rpm and 4 mph (6.4 km/h), squeezing and holding the reverse button (**Figure 3-21, 2**) shifts the transmission into the gear the Apache Sprayer was in before NEUTRAL.

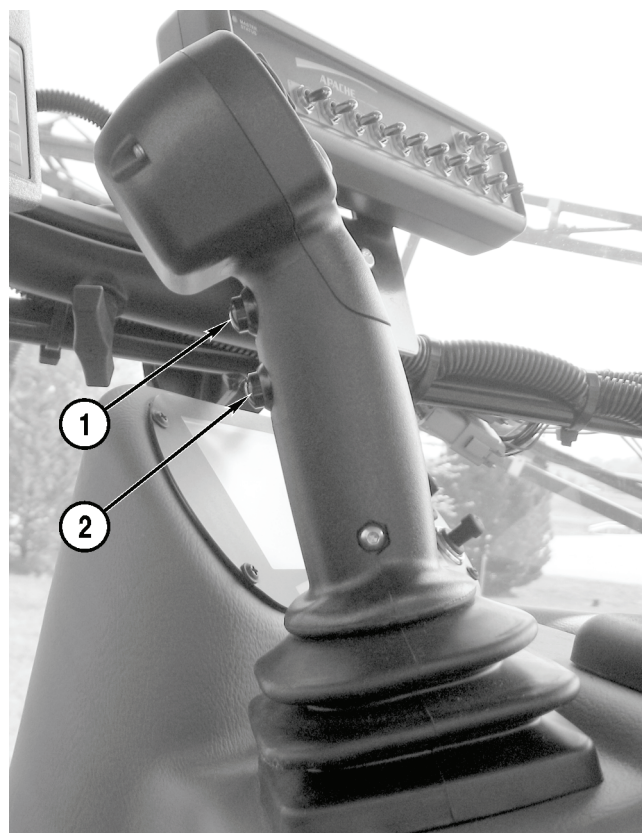


Figure 3-21

Cruise Control

To use the cruise control function:

1. Turn the master cruise button (**Figure 3-22, 1**) located on the console on.
2. Once the desired speed is reached, push and release the SET button (**Figure 3-22, 2**) on the T-handle.
3. If the engine rpms are decreased or increased, the cruise control will disengage; to resume cruise speed, press the RES button (**Figure 3-22, 3**) on the T-handle to return to the previously set cruise control speed.

If the transmission is upshifted or downshifted, the cruise control will disengage.

The cruise control will operate between 4 and 20 mph (6.4 and 32.2 km/h). If the SET button (**Figure 3-22, 2**) is pressed while the speed is out of range, the command will be ignored.

When the cruise control is set, pressing the RES button (**Figure 3-22, 3**) increases Apache Sprayer speed by one mph for each time it is pressed; pressing the SET button (**Figure 3-22, 2**) when the cruise control is set decreases Apache Sprayer speed by one mph for each time it is pressed.

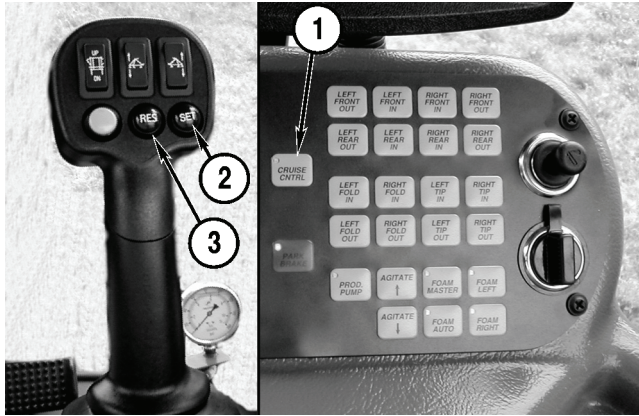


Figure 3-22

Towing

Always use towing safety equipment and proper emergency warning lighting when towing the Apache Sprayer.

If the Apache Sprayer should become disabled and there is no engine, transmission or differential failure, the Apache Sprayer 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 drive shaft between the differential and the 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: Do not tow the Apache Sprayer if the:

- driveshaft is connected.
- transmission is damaged.
- rear differential is damaged.

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 Release

NOTICE: Before operating the Apache Sprayer, securely latch the engine compartment hood with the nylon strap located under the hood.

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

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

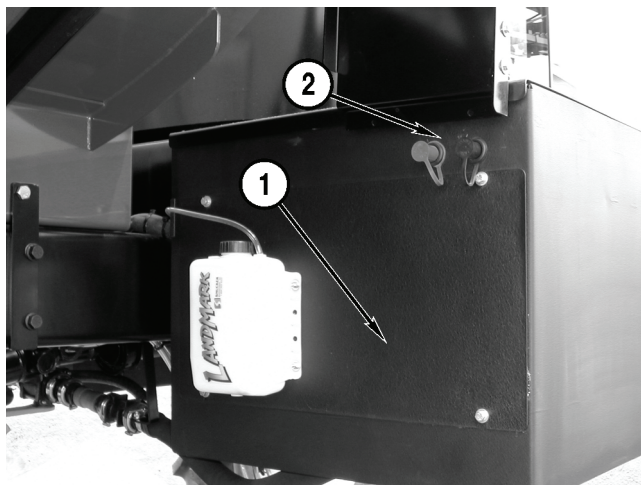


Figure 3-23

Battery

The batteries are located in the battery box (**Figure 3-24, 1**) on the right side of the Apache Sprayer.

Remove the four bolts and cover to access the batteries.



1. Battery Box
2. External Positive and Negative Battery Posts

Figure 3-24

Antenna Mounting Plate

A steel plate is mounted under the recess in the roof of the cab (**Figure 3-25, 1**) for magnetic base GPS and radio antennas.

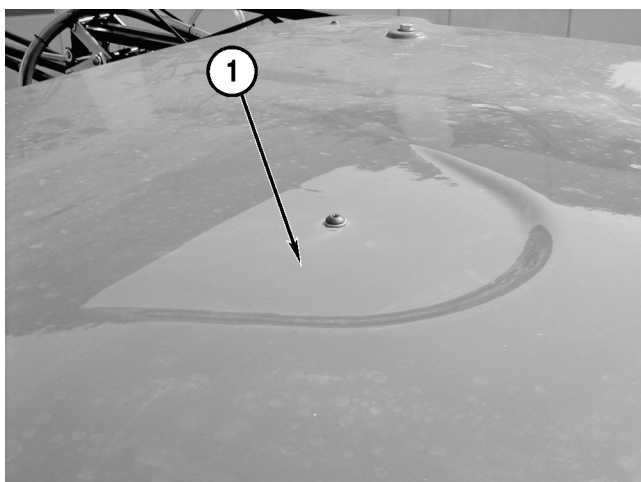


Figure 3-25

Raven Radar Gun

The Raven radar gun (**Figure 3-26, 1**) is located on the right side of the Apache Sprayer, mounted under the battery box.

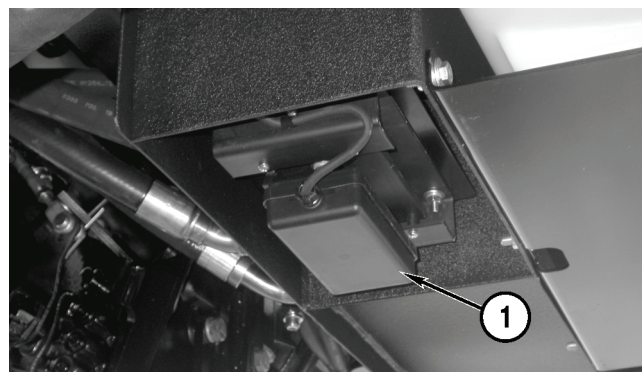


Figure 3-26

Axle Adjustment (Manual)

The front and rear axles on the Apache Sprayer are adjustable from 120 to 144 in. (304.8 to 365.7 cm) (center of left tire to center of right tire).

Front

1. Safely lift the front of the Apache Sprayer so the front tires are slightly off of the ground.
2. Remove the two inner bolts (**Figure 3-27, 1**) from the locking bar.
3. Loosen the six jam nuts (**Figure 3-27, 2**) and six bolts (**Figure 3-27, 3**) on the axle brace. The right front axle is shown in **Figure 3-27**.

NOTICE: Do not extend the axle beyond 144 in. (365.7 cm) from center of left tire to center of right tire.

4. Manually slide the wheel to the desired width, making sure the locking bar holes are aligned.
5. Tighten the six bolts (**Figure 3-27, 3**) to 80 lb-ft (108 N·m) to secure the axle in place.
6. Tighten the jam nuts (**Figure 3-27, 2**).
7. Install the two locking bar bolts (**Figure 3-27, 1**) and tighten.
8. Repeat the steps to adjust the other front axle.

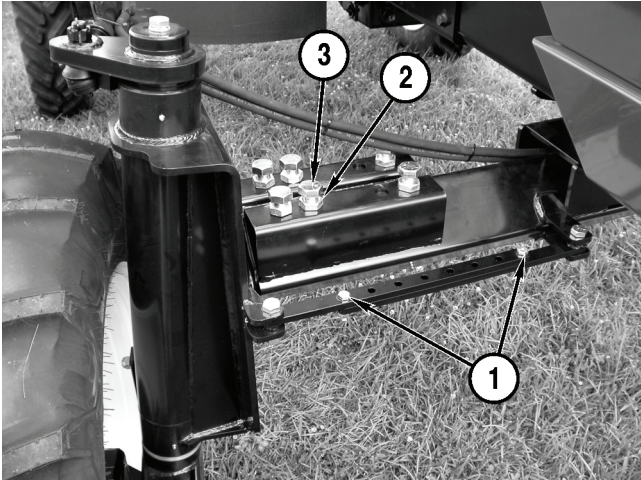


Figure 3-27

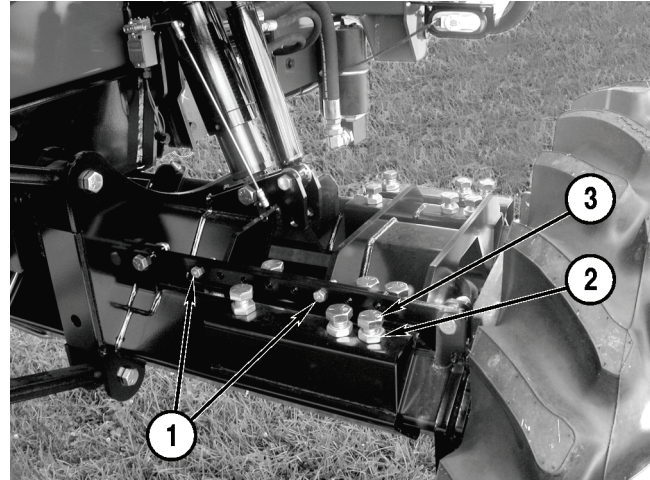


Figure 3-28

Rear

1. Safely lift the rear of the Apache Sprayer so the rear tires are slightly off of the ground.
2. Remove the two inner bolts (**Figure 3-28, 1**) from the locking bar.
3. Loosen the twelve jam nuts (**Figure 3-28, 2**) and twelve bolts (**Figure 3-28, 3**) on the two axle braces. The left rear axle is shown in **Figure 3-28**.

NOTICE: Do not extend the axle beyond 144 in. (365.7 cm) from center of left tire to center of right tire.

4. Manually slide the wheel to the desired width, making sure the locking bar holes are aligned.
5. Tighten the twelve bolts (**Figure 3-28, 3**) to 80 lb-ft (108 N·m) to secure the axle in place. Tighten the twelve jam nuts (**Figure 3-28, 2**).
6. Install the two locking bar bolts (**Figure 3-28, 1**) and tighten.
7. Repeat the steps to adjust the other rear axle.

Axle Adjustment (Optional) (Adjust On The Go)

The front and rear axles on the Apache Sprayer are adjustable from 120 to 144 in. (304.8 to 365.7 cm) (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 144 in. (365.7 cm).

To adjust the axles:

1. While the engine is idling, operate the Apache Sprayer in the forward direction at approximately 3 mph (4.8 km/h).
2. Press the desired switch(es) (**Figure 3-29, 1**) on the console to move the wheels in or out.
3. The axles can be adjusted individually, in combination or all together.



Figure 3-29

Front

When activated, the Adjust On The Go cylinder (**Figure 3-30, 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 in **Figure 3-30**.

NOTICE: The socket-head bolts (**Figure 3-30, 2**) should be torqued to 15 lb-ft (20 N·m) at all times. Check and adjust the torque weekly. See *Adjust On The Go* on page 5-17.

NOTE: Grease the axles daily when using the Adjust On The Go feature. See *Grease Axle Components* on page 5-14.

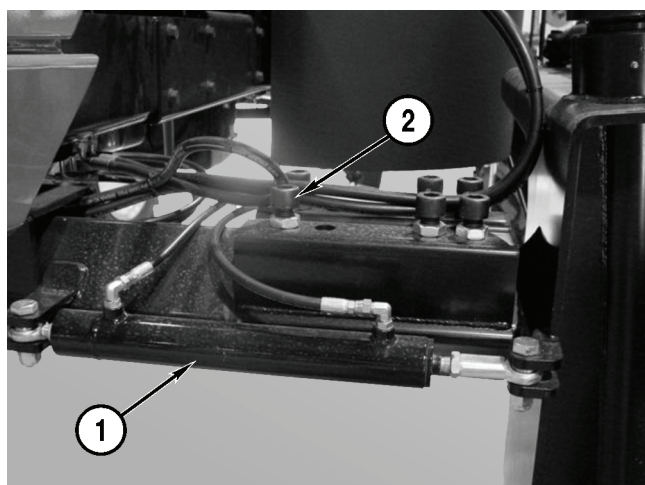


Figure 3-30

Rear

When activated, the Adjust On The Go cylinders (**Figure 3-31, 1**) adjust the axle inward or outward as desired. The rear wheels/axles are actuated by two cylinders per wheel. The left rear Adjust On The Go axle is shown in **Figure 3-31**.

NOTICE: The socket-head bolts (**Figure 3-31, 2**) should be torqued to 15 lb-ft (20 N·m) at all times. Check and adjust the torque weekly. See *Adjust On The Go* on page 5-17.

NOTE: Grease the axles daily when using the Adjust On The Go feature. See *Grease Axle Components* on page 5-14.

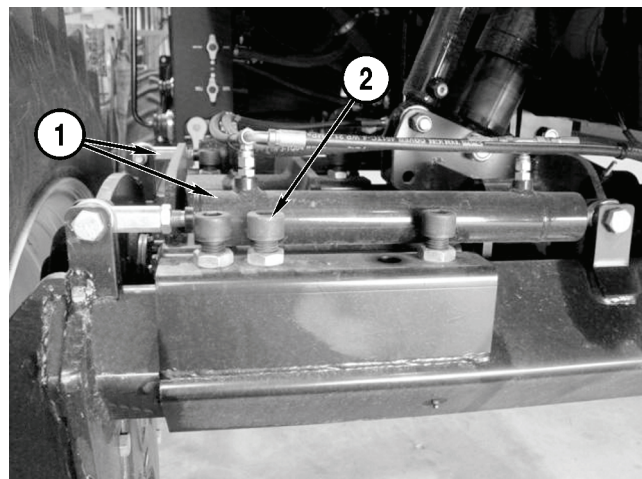


Figure 3-31

Optional Equipment

If your Apache Sprayer is equipped with the optional Raven SmarTrax Autosteer, Raven Envizio Pro or Viper Pro Smart Bar, or Raven Autoboom Height Control (PowerGlide Plus or UltraGlide), refer to the Raven operator's manual supplied with the Apache Sprayer.

The Raven SmarTrax Autosteer and Raven Envizio Pro or Viper Pro Smart Bar are the only factory-installed options for guidance. The Raven Autoboom Height Control (PowerGlide Plus or UltraGlide) are the only factory-installed options for height control.

If your Apache Sprayer is equipped with a different guidance system or height control system, please contact your dealer for assistance.

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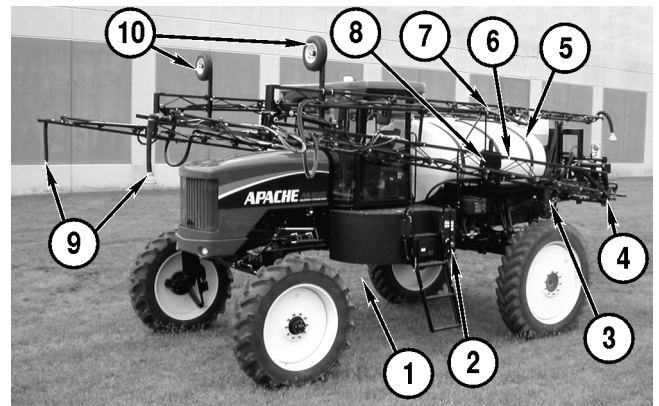
APACHE™

CHAPTER 4

WET SYSTEM OPERATION

Before performing any Wet System operation procedures, read the *Safety Section on page 2-1*.

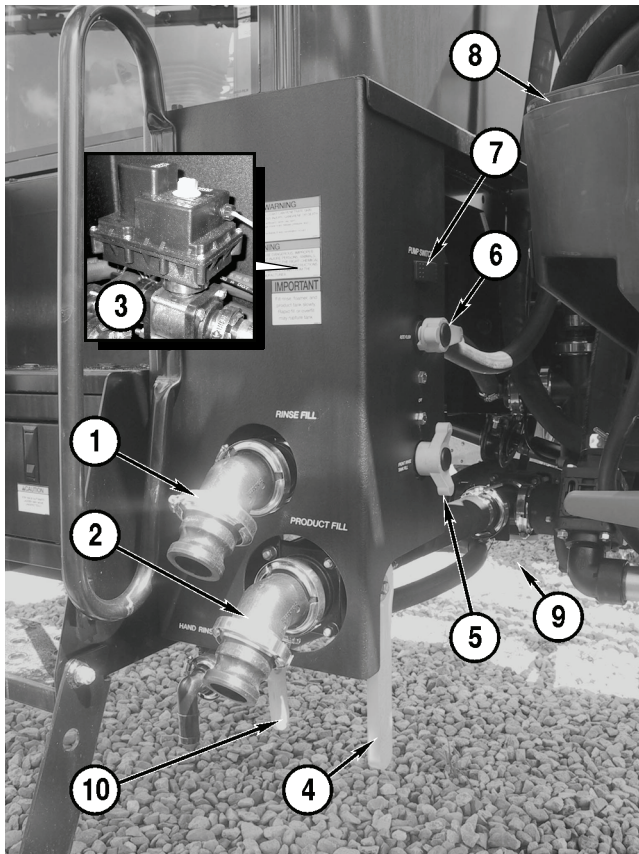
Wet System Overview



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

Figure 4-1

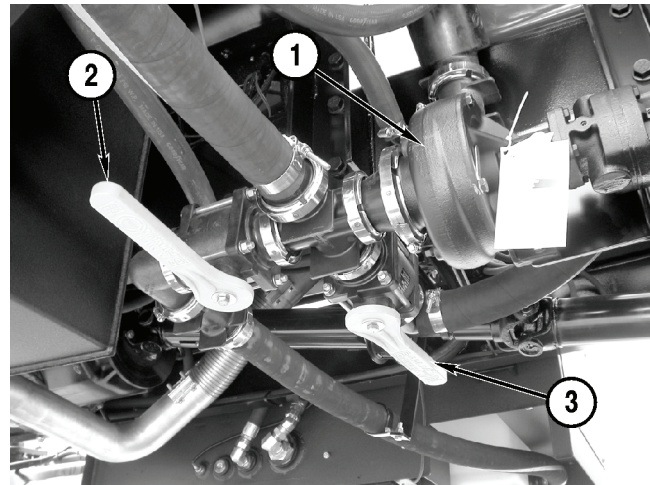
Fill Station



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

Figure 4-2

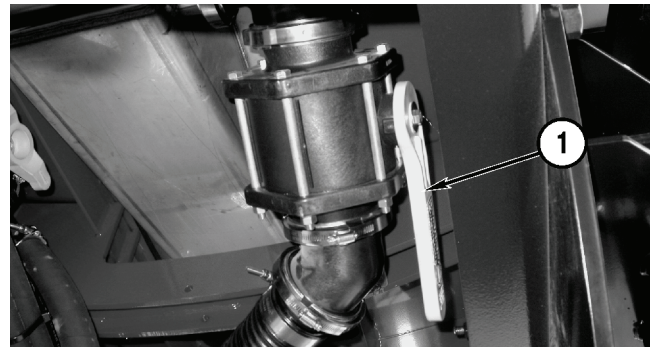
Product Pump and Valves



1. **Product Pump**
2. **Rinse Tank Shutoff Valve**
Shown in CLOSED position.
3. **Product Tank Shutoff Valve**
Shown in OPEN position.

Figure 4-3

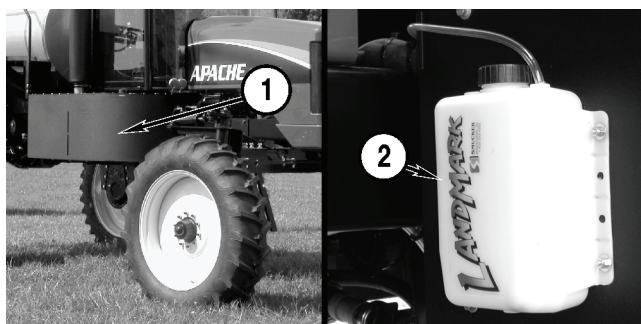
Sump Valve



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

Figure 4-4

Rinse and Foam Tank



1. Rinse Tank
2. Foam Concentrate Bottle

Figure 4-5

Second Rinse Tank (Optional)

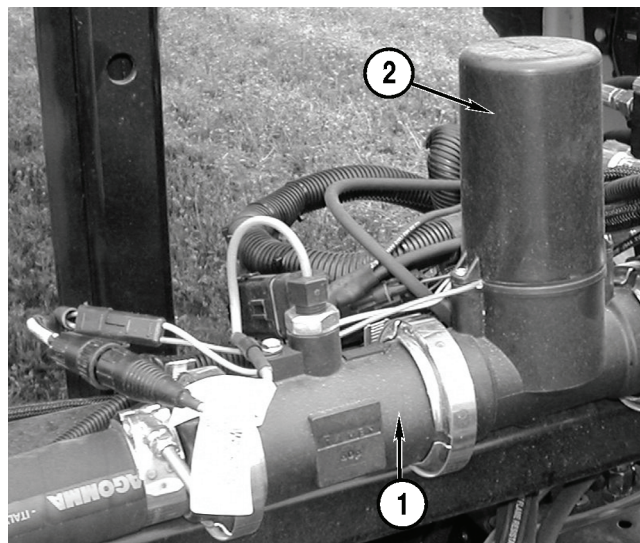
The optional second rinse tank (**Figure 4-6, 1**) is plumbed into the cross just above the product pump. This tank can be used to flush the product tank (with optional Roto-Flush) and/or the booms.



Figure 4-6

Flow Control

Standard Flow



1. Raven Flowmeter
2. Raven Servo Valve

Figure 4-7

Electronic Boom Valves

The strainers (**Figure 4-8, 1**) on the five electronic boom valves have 50 mesh screens which must be cleaned periodically.

NOTE: Different mesh screens may be needed depending on the product being applied and the rate at which it is applied.

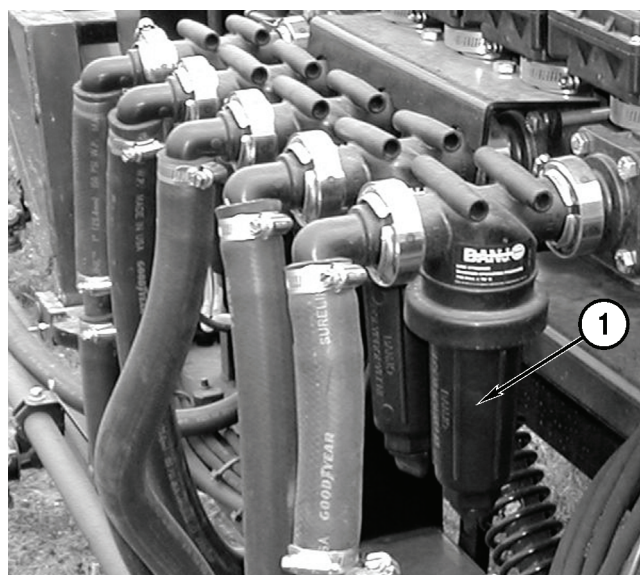


Figure 4-8

Raven 5000 Monitor

1. Raven 5000 Monitor and Switchbox

On equipped Apache Sprayer models, the Raven 5000 Monitor and Switchbox are located on the right side of the cab.

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

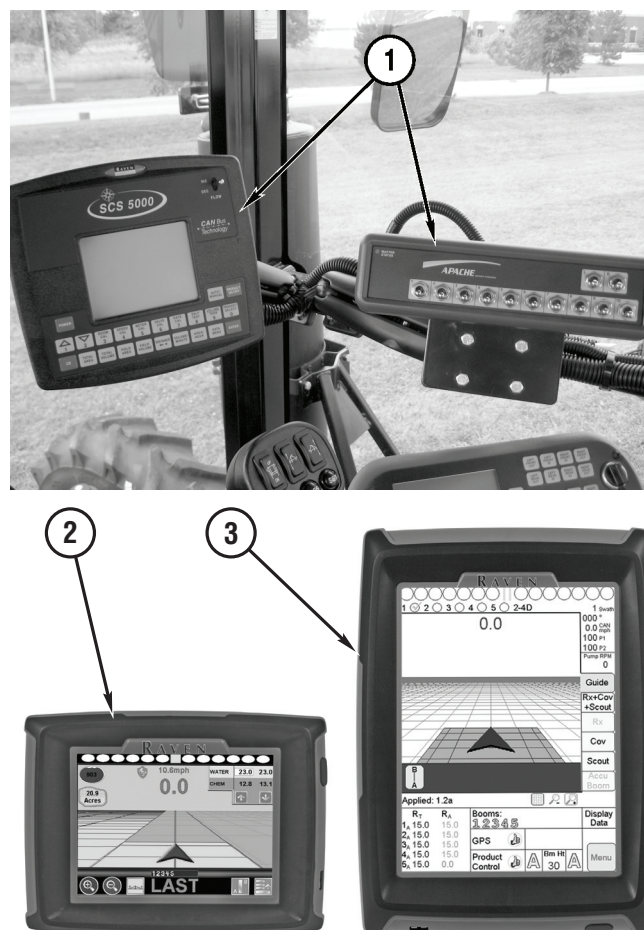
Monitor Calibration Information

- Valve cal - 2123
- Speed cal - 606 (radar gun equipped)
- Meter cal - See tag on the flowmeter, located on the rear boom rack. Record this number in a convenient location for future use.

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

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

NOTE: The Raven 5000 Monitor, Envizio Pro and Viper Pro are the only consoles installed by Equipment Technologies. If your Apache Sprayer has a different console, please contact your Apache dealer for information.

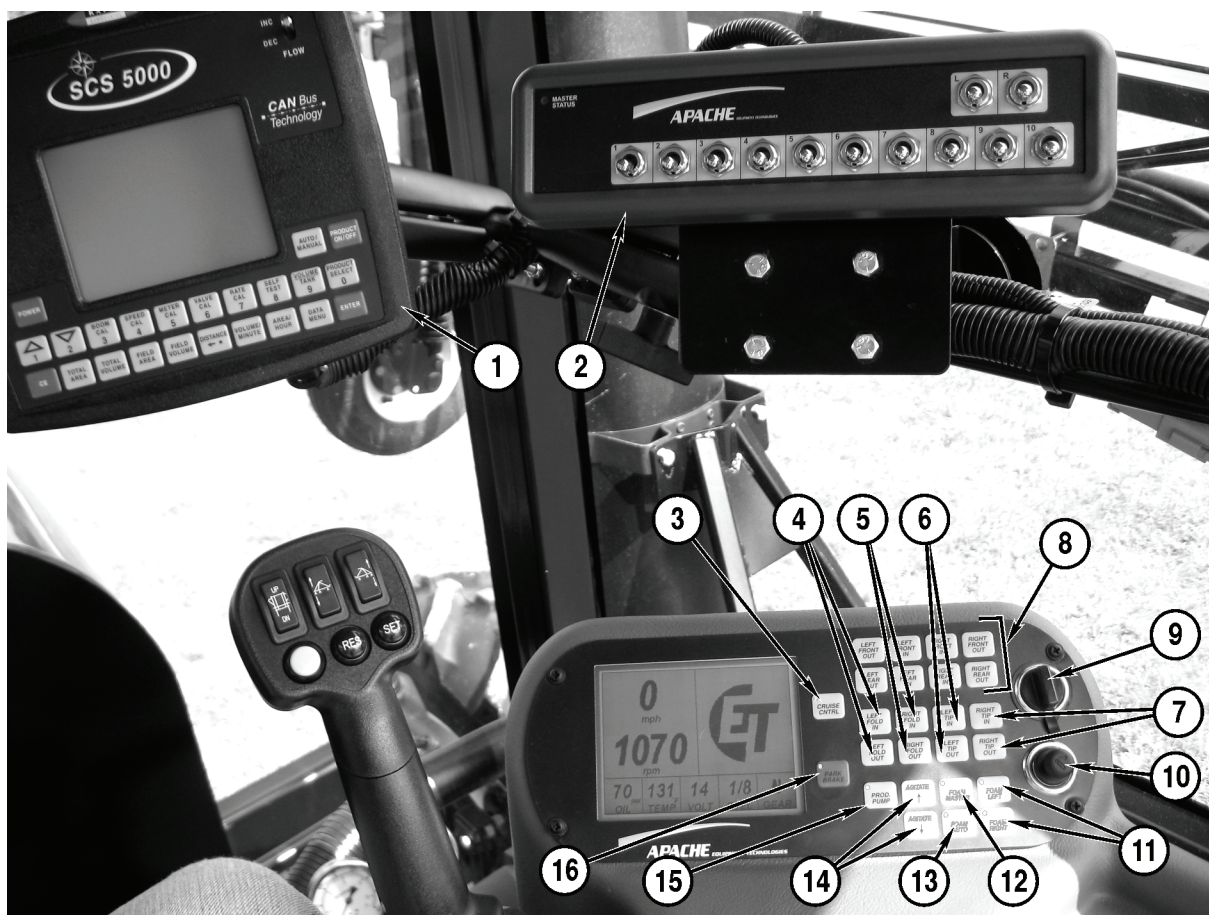


2. Raven Envizio Pro

3. Raven Viper Controller

Figure 4-9

Side Console



1. Raven 5000 Controller
2. Switchbox
3. Cruise Control Master Switch
4. Left Boom Fold In and Out
5. Right Boom Fold In and Out
6. Left Boom Tip In and Out
7. Right Boom Tip In and Out
8. Axle Width Adjustment Switches (Adjust On The Go - Optional)
9. Auxiliary Power Point
10. Cigarette Lighter

11. Foam Switch for Left and Right Side
12. Foam Master Switch
13. Foam Auto

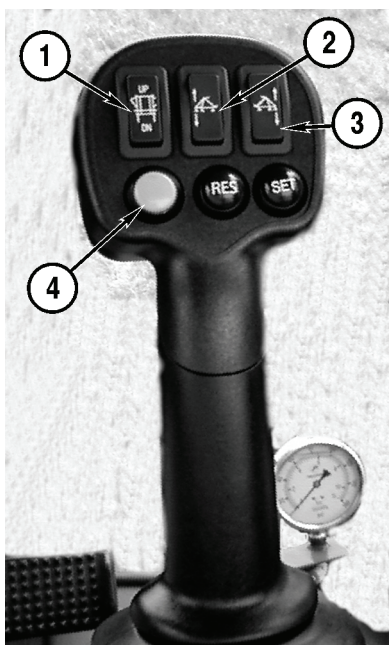
When switched on, foam can be switched from left to right using the yellow Master Switch on the T-handle.

14. Agitate Increase and Decrease
15. Product Pump Switch
16. Parking Brake Switch

A red light indicates when the parking brake is applied.

Figure 4-10

T-Handle



1. Boom Center Up/Down

Press to raise or lower the boom mast. Press the top of the switch to raise and press the bottom of the switch to lower.

2. Left Boom Tilt

Press to tilt the left boom up or down. Press the top of the switch to raise and press the bottom of the switch to lower.

3. Right Boom Tilt

Press to tilt the right boom up or down. Press the top of the switch to raise and press the bottom of the switch to lower.

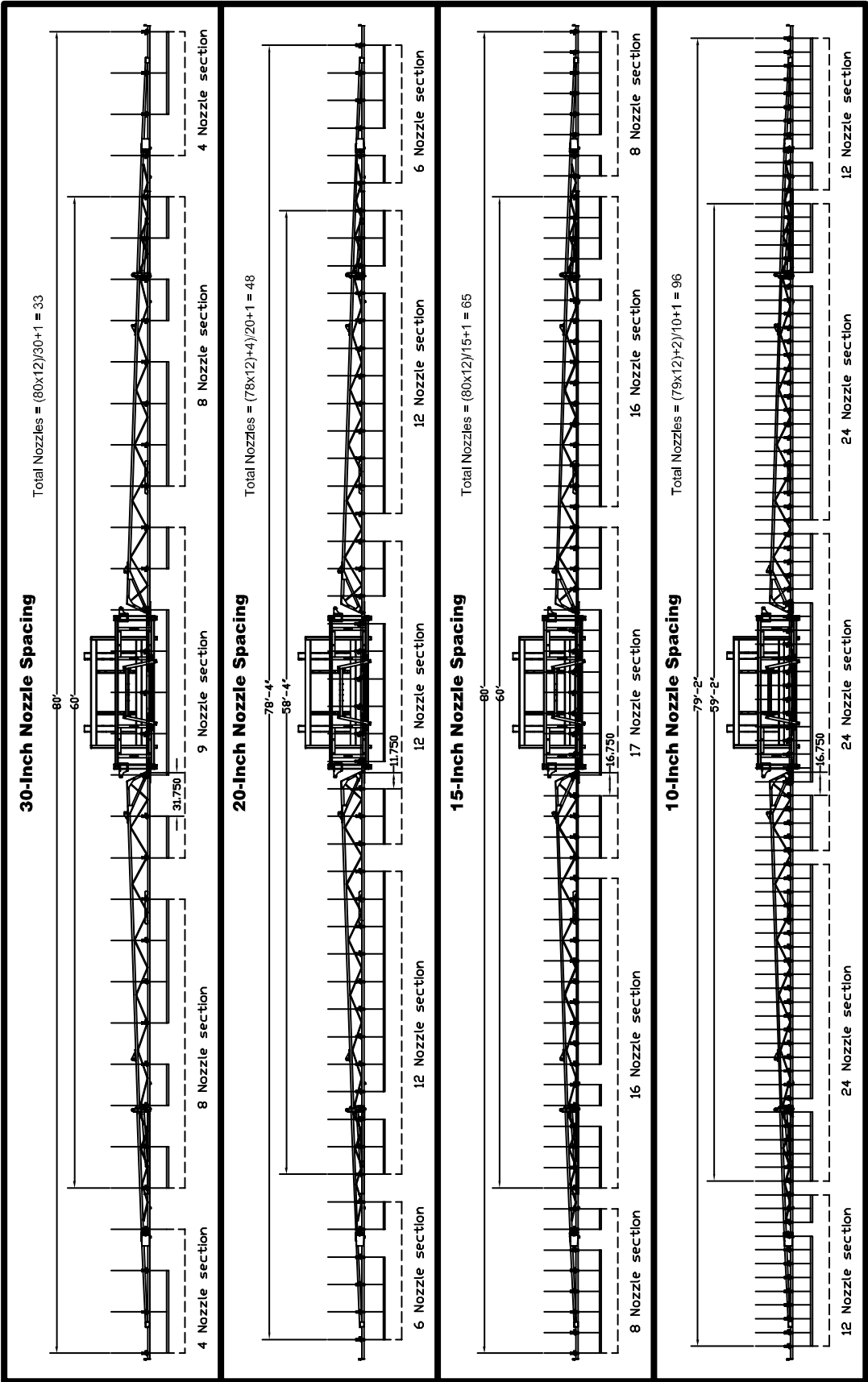
4. Master Spray Switch

Press to turn all spray sections on or off at the same time. This function requires that all boom sections be turned on and the master switch on the Raven 4400 controller be turned off.

Figure 4-11

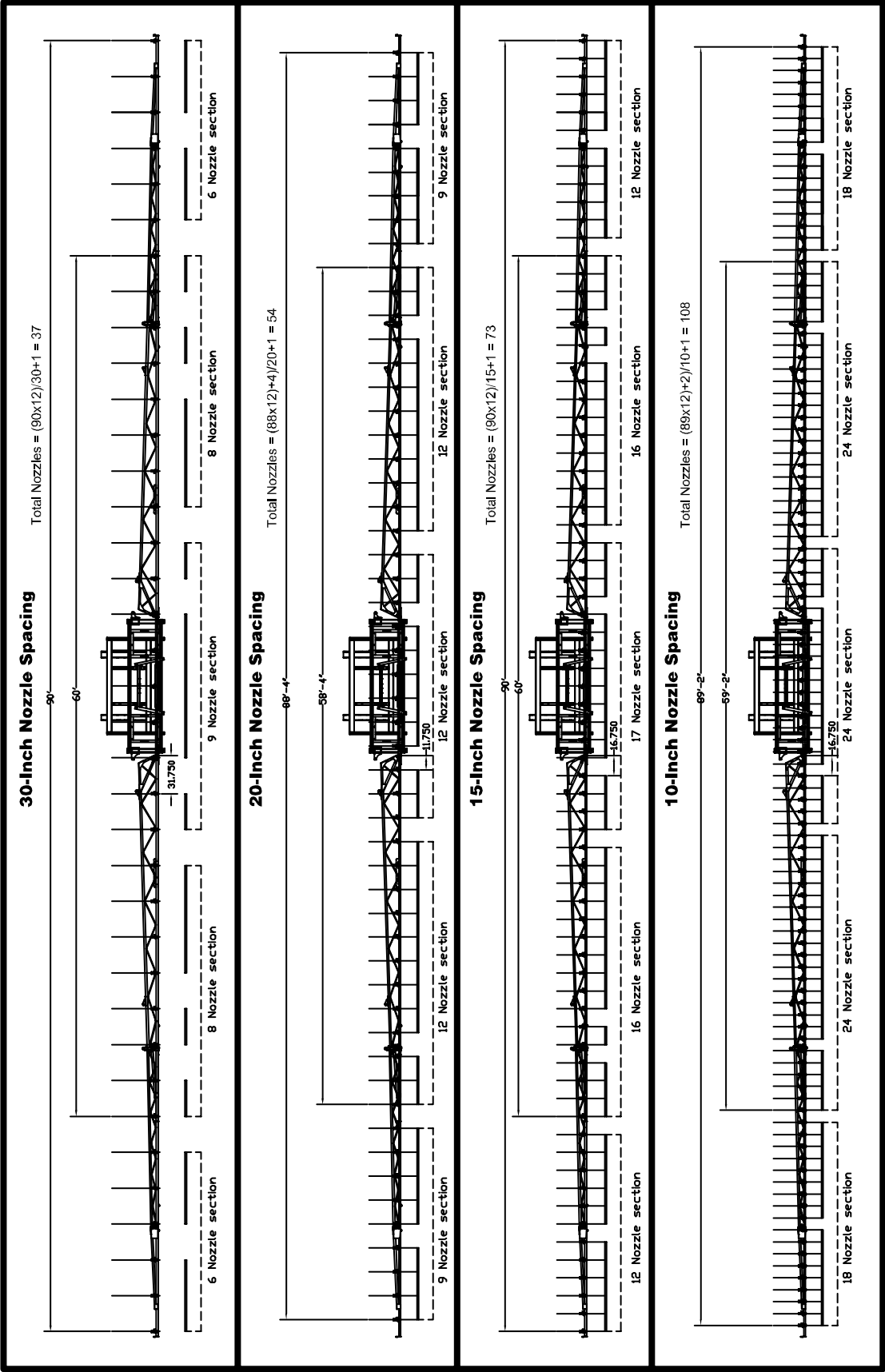
60’/80’ Nozzle Layout

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



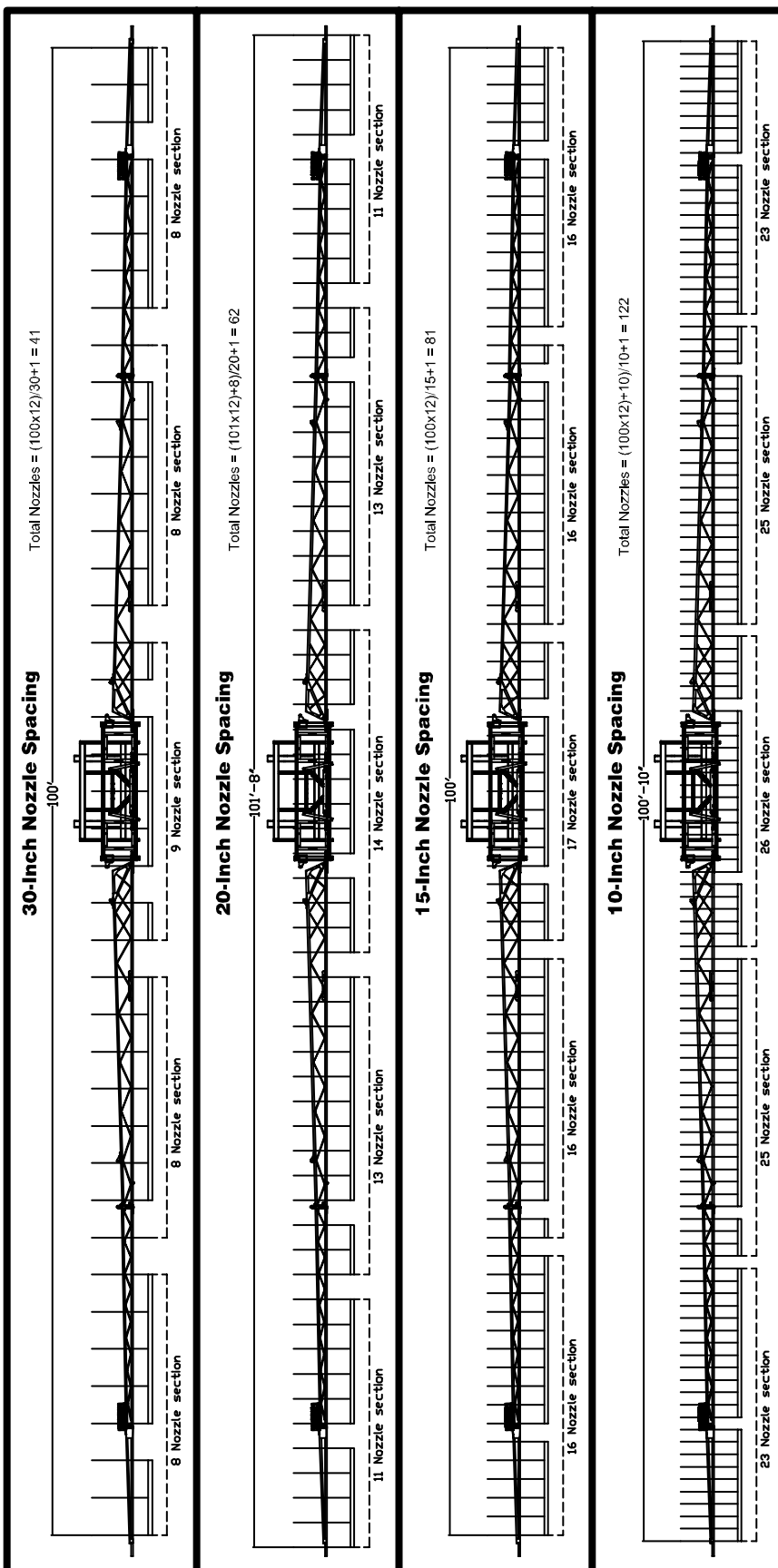
60’/90’ Nozzle Layout

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



100' Straight Nozzle Layout

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



Filling Product Tank

1. Open the sump valve (**Figure 4-12, 1**) on the underside of the product tank.

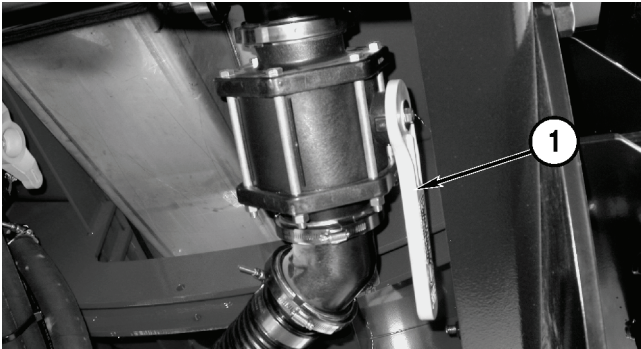


Figure 4-12

2. Remove the cap from the product quick fill inlet (**Figure 4-13, 1**) and connect the hose from the nurse tank to the inlet.
3. Close the rinse tank valve (**Figure 4-13, 2**).
4. Open the product fill valve (**Figure 4-13, 3**) (shown in the OPEN position) and fill tank to desired level.
5. When filling is complete, close the valve on the nurse tank, then close the product fill valve.
6. Disconnect the hose from the inlet and install the quick fill inlet cap.

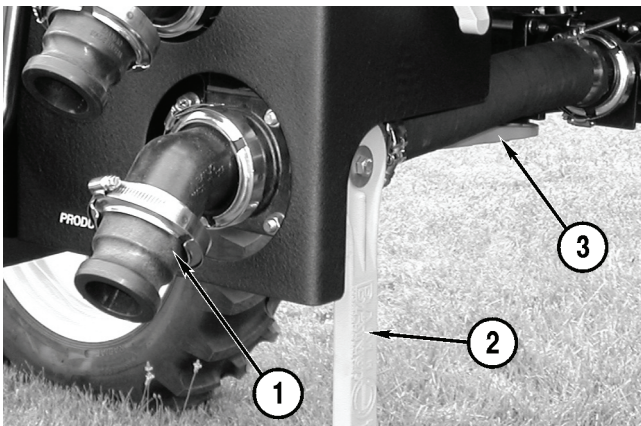


Figure 4-13

Filling Rinse Tank

1. Remove the cap from the foam/rinse quick fill inlet (**Figure 4-14, 1**) and connect the hose from the nurse tank to the inlet.
2. Set the rinse knob (**Figure 4-14, 2**), shown in the CLOSED position, to RINSE TANK FILL.

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

3. Open the valve on the nurse tank and fill to desired level.
4. When filling is complete, close the valve on the nurse tank, then set the rinse knob (**Figure 4-14, 2**) to CLOSED.
5. Disconnect the hose from the inlet and install the inlet cap.

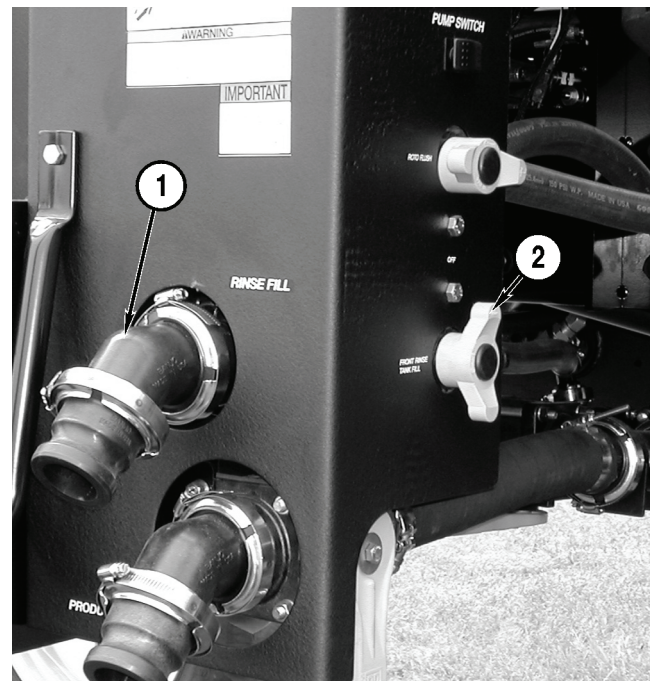
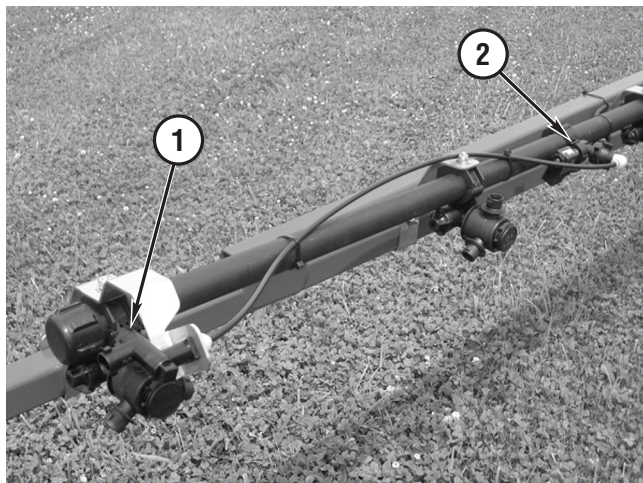


Figure 4-14

6. Remove the lid on the top of the foam tank (Figure 4-15), add the appropriate amount of foam concentrate and install the lid.

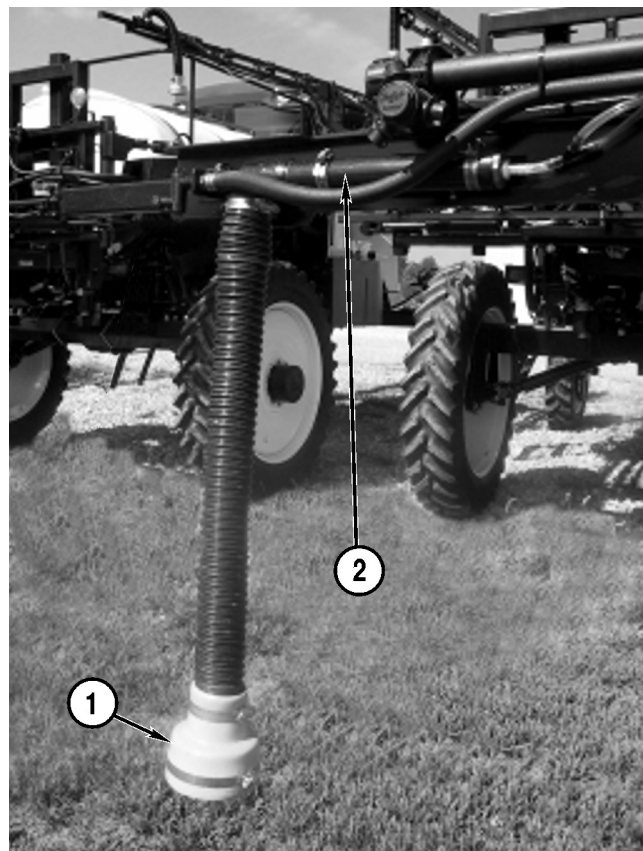


Figure 4-15



1. **Optional Fence Row Nozzle**
If your Apache Sprayer has optional fence row nozzles, they are located near the end of each boom.
2. **Fence Row Nozzle Electric Control**
The electric control valves for the nozzles are located near the end of each boom.

Figure 4-16



1. **Optional Foam Marker Boot and Drop**
If your Apache Sprayer is equipped with the LandMark injection foam marker, then the boot is located near the end of each boom.
2. **Foam Marker Mixing Chamber**
The foam marker mixing chamber is located near the end of each boom.

Figure 4-17

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! Electrocuting 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 before the booms can be retracted. The cab can be damaged if the boom tips are not folded properly.

Tilt to Remove Boom from Cradle

All Boom Sizes

On the T-handle, press the top of the left (Figure 4-18, 1) and right (Figure 4-18, 2) boom tilt raise/lower switches to tilt the boom and boom hangers (Figure 4-18, 3) off of the boom cradles (Figure 4-18, 4).

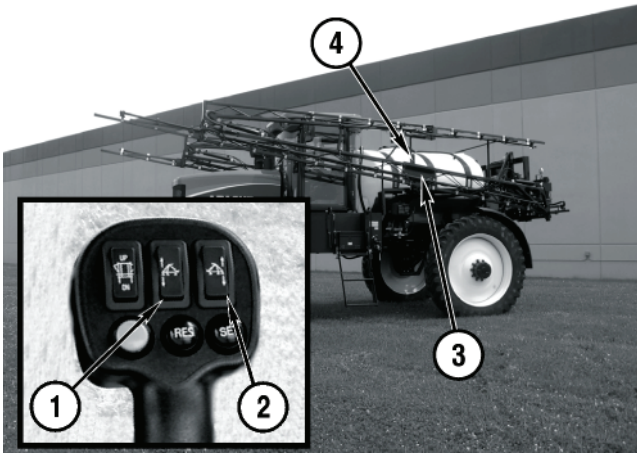


Figure 4-18

Unfold Booms

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

On the side console, press the top of the left and right boom fold switches (Figure 4-19, 1) until the booms are fully extended.

After the booms are fully extended, the boom tips can be unfolded.



Figure 4-19

Unfold Boom Tips

All Boom Sizes

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

On the side console, press the bottom of the left and right boom tip fold switches (Figure 4-20, 1) until the boom tips are fully extended.



Figure 4-20

Height Adjustment

All Boom Sizes

On the T-handle, press the bottom of the boom rack raise/lower switch (**Figure 4-21, 1**) to lower the boom rack (**Figure 4-21, 2**) to the desired height.

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

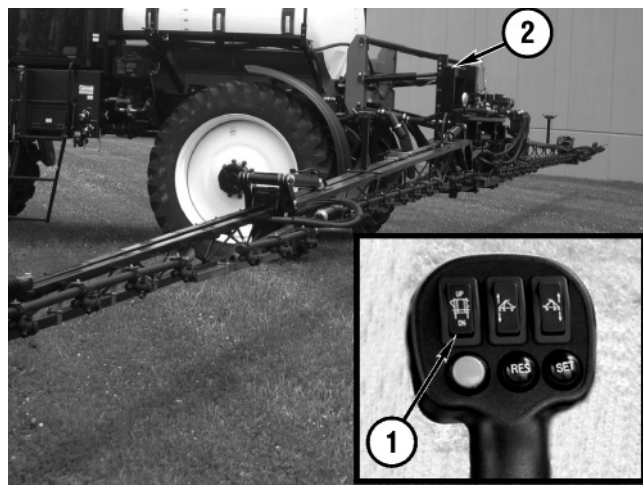


Figure 4-21

Tilt to Level Boom

All Boom Sizes

On the T-handle, use the left (**Figure 4-22, 1**) and/or right (**Figure 4-22, 2**) boom tilt raise/lower switches to adjust the booms to level.

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

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

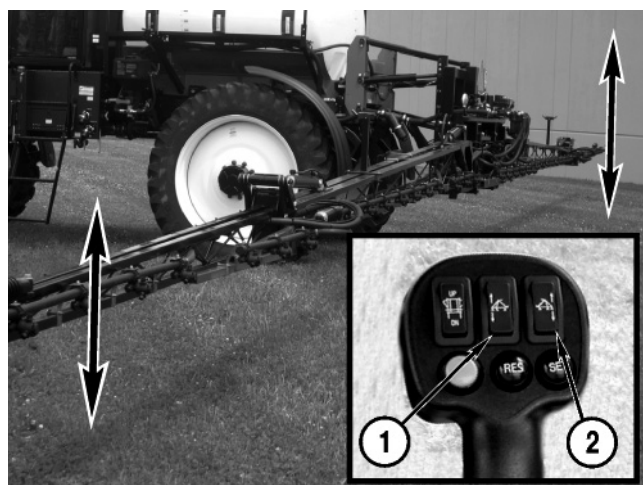


Figure 4-22

Fold Boom Tips

All Boom Sizes

On the side console, press the bottom of the left and right boom tip fold switches (**Figure 4-23, 1**) until the boom tips are fully folded.

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



Figure 4-23

Fold Booms

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

NOTICE: Always tilt the booms up before folding.

All Boom Sizes

On the side console, press the bottom of the left and right boom fold switches (**Figure 4-24, 1**) until the booms are fully folded.

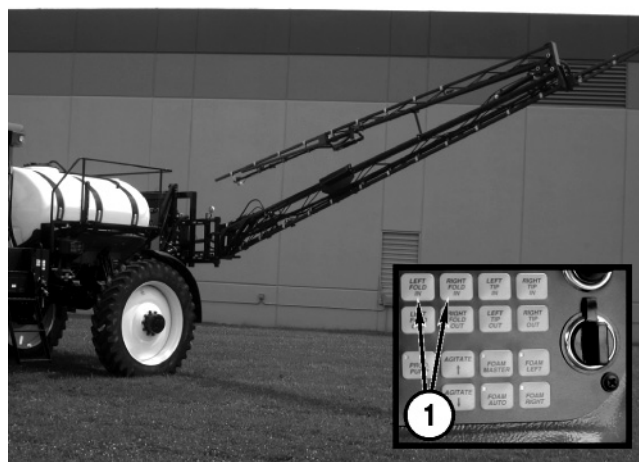


Figure 4-24

Tilt to Return Boom to Cradle

All Boom Sizes

On the T-handle, press the bottom of the left (Figure 4-25, 1) and right (Figure 4-25, 2) boom tilt raise/lower switches to tilt the booms (Figure 4-25, 3) onto the boom cradle (Figure 4-25, 4).

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

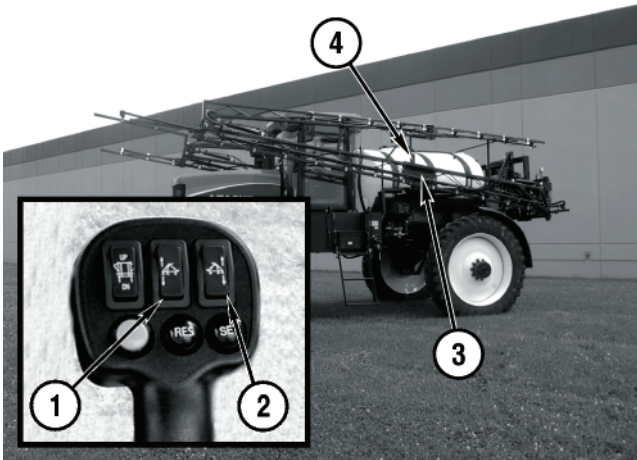


Figure 4-25

Adjust Poly Tank Straps (If Equipped)

1. Tighten the bolts on each tank strap without deforming the tank, bolts or tank skid. Tighten the bolts evenly from side to side.
2. Fill the product tank with water and drive the Apache Sprayer to allow the tank to settle.
3. Stop the Apache Sprayer and check the straps.
4. Adjust the straps as needed.

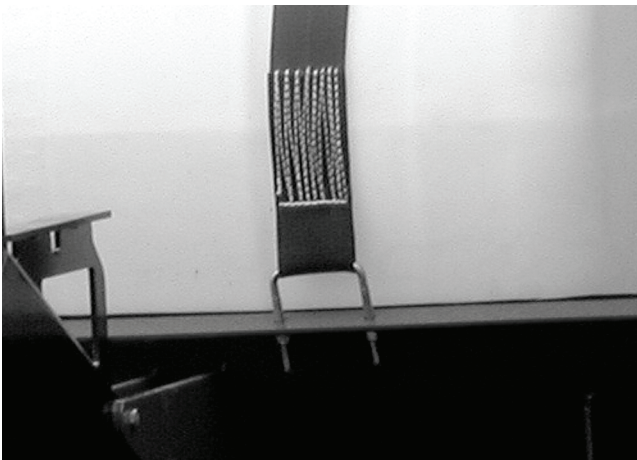


Figure 4-26

Spraying

1. Make sure the product, rinse and foam marker tanks are filled. *See Filling Rinse Tank on page 4-10 and Filling Product Tank on page 4-10.*
2. Level the booms and boom tips using the tilt and unfold switches. *See Operating Booms on page 4-12.*
3. Set the boom height using the boom rack switch. *See Height Adjustment on page 4-13.*
4. Open the sump valve (Figure 4-27, 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.

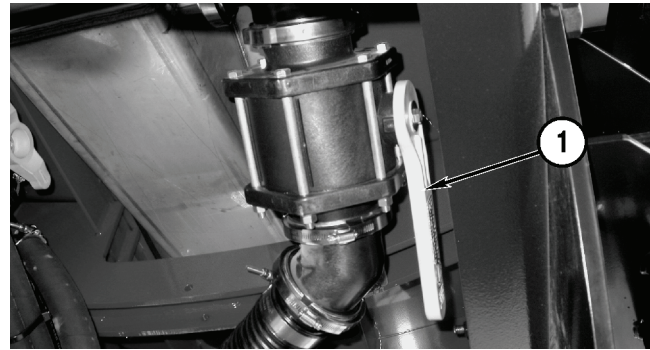


Figure 4-27

5. Close the rinse tank valve (Figure 4-28, 1).
6. Set the flush/agitation knob (Figure 4-28, 2), shown in the CLOSED position, to AGITATION.
7. Open the product valve (Figure 4-28, 3).

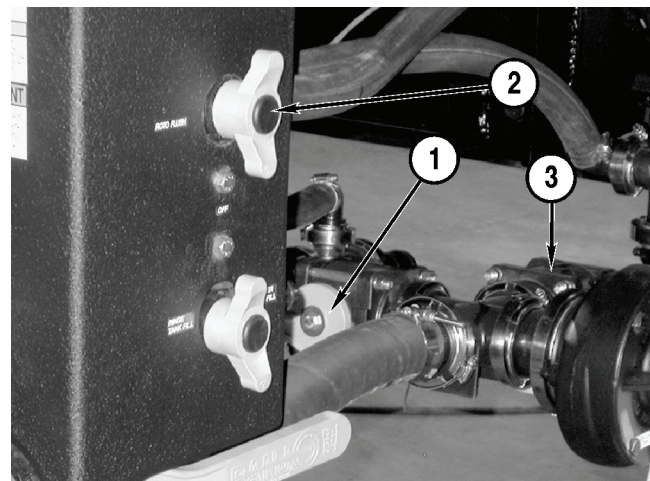


Figure 4-28

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

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



Figure 4-29

8. Set the Raven 5000 Monitor power switch to the ON position and check the settings. Select a saved flow rate or enter the desired rate. See the Raven manual supplied with the Apache Sprayer for complete operating instructions.



Figure 4-30

9. Set the product pump switch (**Figure 4-31, (1)**) to the ON position.
10. Set the desired boom section switches (**Figure 4-31, (2)**) to the ON position.

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.

NOTICE: The Raven 5000 Controller is preset to factory default settings from the manufacturer. The unit must be calibrated for speed and the boom sections checked for accuracy.



Figure 4-31

The agitation (**Figure 4-32, (2)**) and boom (**Figure 4-32, (1)**) pressure gauges are mounted outside at the lower right of the cab.

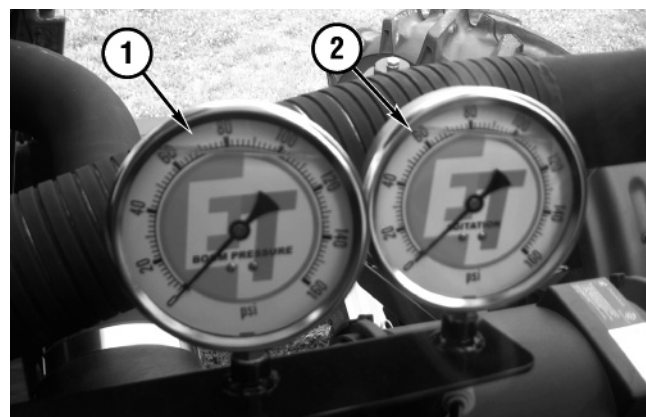


Figure 4-32

- The agitation gauge reads pressure at the agitation valve.
- The boom pressure gauge reads pressure from the five bank boom valves.

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

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

11. Select an appropriate gear for the desired Apache Sprayer speed during spraying. See *Shifting Forward Gears* on page 3-14. Under typical operating conditions, second or third gear is recommended.
12. Use the master product on/off switch (**Figure 4-33, 1**) on the T-handle to start and stop spraying.
13. Use the Raven Sprayer Control boom switches (**Figure 4-33, 2**) on the switchbox to start and stop product flow to individual boom sections. The Raven Sprayer Control will automatically adjust the product flow for the remaining sections.



Figure 4-33

Operating Foam Marker

To turn on the foam marker, push the foam master button (**Figure 4-34, 1**) on the console.

- Push the foam left button (**Figure 4-34, 2**) to drop foam on the left.
- Push the foam right button (**Figure 4-34, 2**) to drop foam on the right.

If the Apache Sprayer has the optional split boom, open the foam valves on each of the booms to drop foam at 60 ft (18.3 m). The valves are located at the midpoint of each boom.

NOTE: When the foam marker is turned on, foam will drop from the left side until the right side is chosen.

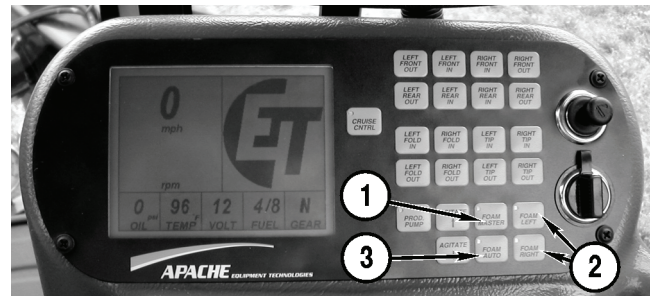


Figure 4-34

Auto Foam

To use the Auto Foam feature, turn on the foam master switch (**Figure 4-34, 1**), then turn on the auto foam button (**Figure 4-34, 3**). Foam will drop from whichever side was used last.

When you turn the boom section switches on or off with the yellow master spray switch on the T-handle, the foam will switch from left to right.

NOTE: The yellow master spray switch on the T-handle must be turned off before the Auto Foam feature is activated.

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

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

LandMark Injection Foam Marker

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

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

Injection Marker Operation Instructions

See **Figure 4-37** on page 4-19 for injection marker feature location.

1. Turn on the injection marker and allow the liquid pump to prime. If the liquid pump does not prime, open the priming valve until liquid begins to flow, then close the priming valve.
2. To adjust the foam quality, open the soap injection valve (**Figure 4-35, 1**) by turning the knob counterclockwise. Adjust the foam quality until foam is rich and thick.
3. To adjust the total foam output, open the output valve (**Figure 4-35, 2**) by turning the knob counterclockwise. Adjust as needed.
 - Opening the valve too far will flood the chambers and produce soupy foam.
 - Closing the valve too far will not produce enough foam.

NOTE: The water pump and air compressor are located behind this panel (**Figure 4-35, 3**), on the back side of the hydraulic tank.

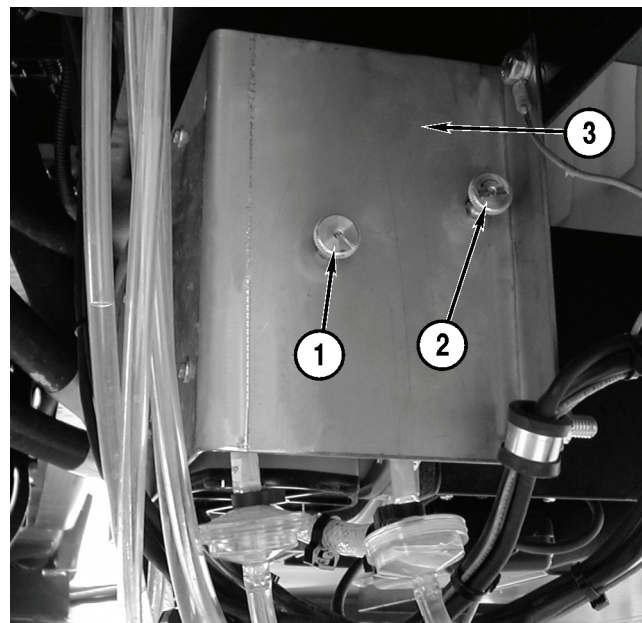


Figure 4-35

When the foam marker is set properly, quality foam will be produced at 60 drops per minute, see table on the following page for specifications.

NOTE: The foam should stick to your hand when turned upside down.

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



Figure 4-36

Output	Drops per Minute (based on a 3 in. (7.6 cm) boot)	Foam Spacing @ 5 mph (8.04 km/h)	Foam Spacing @ 10 mph (16 km/h)	Foam Spacing @ 15 mph (24.1 km/h)
5 gpm (18.9 lpm)	62	7.1 ft (2.16 m)	14.2 ft (4.32 m)	21.3 ft (6.49 m)

Maintenance

Clean and replace the air pump and inline solution filters regularly to extend the life of the pump. The air pump has one sponge and one felt filter.

Freezing

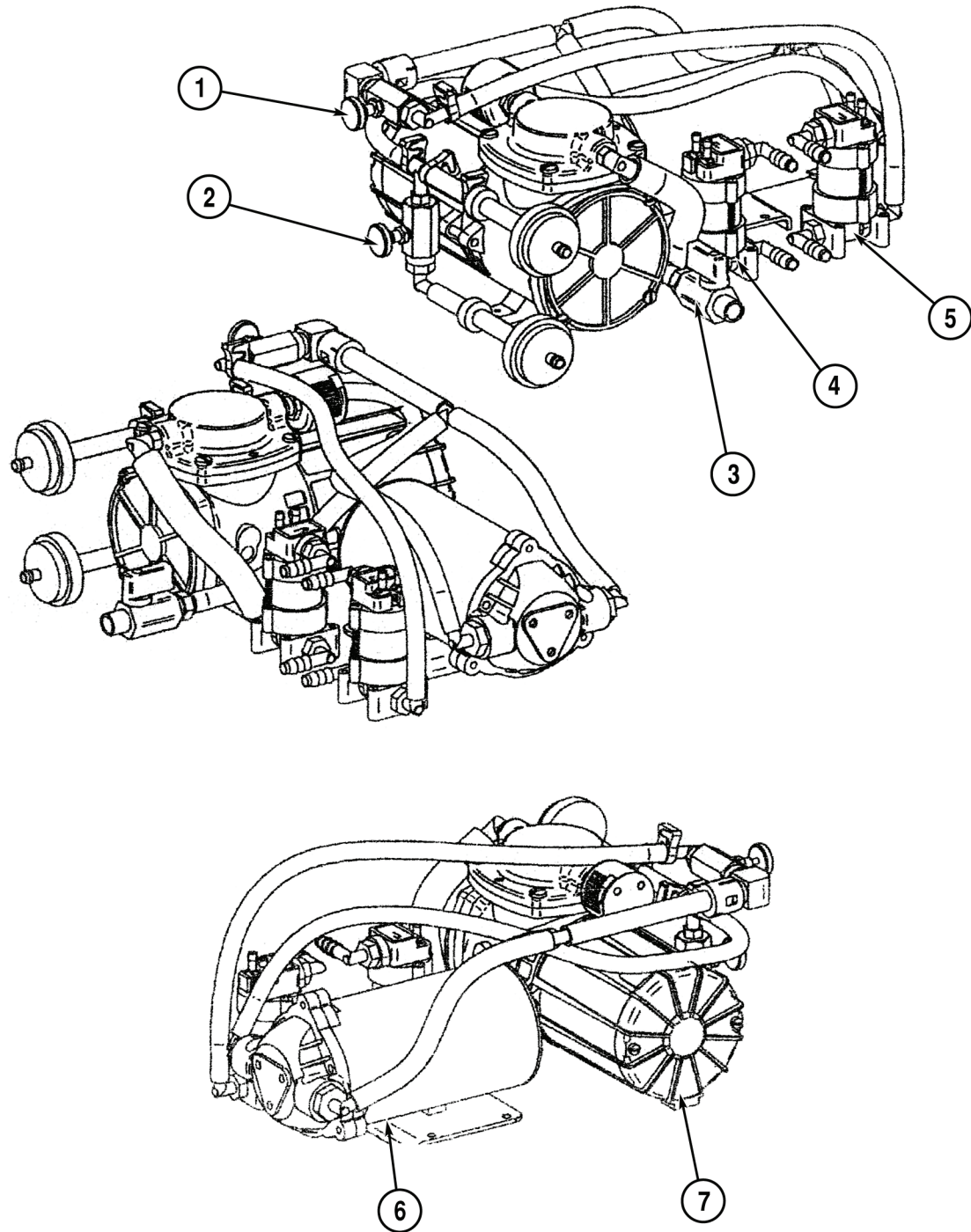
When operating in temperatures at or below freezing, ethylene-glycol-based antifreeze may be added to the water and soap tanks.

If the system will be exposed to freezing temperatures overnight:

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

For long-term storage:

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



- 1. **Output Valve**
Labeled "More Foam Less Foam"
- 2. **Soap Injection Valve**
- 3. **Priming Valve**

- 4. **Air Solenoid**
- 5. **Soap Solenoid**
- 6. **Liquid Pump**
- 7. **Thomas Air Compressor**

Figure 4-37

Flushing Product Tank (with Optional Roto-Flush)

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.

1. Fill the rinse tank with clean, fresh water. See *Filling Rinse Tank* on page 4-10.
2. Close the product valve (**Figure 4-38, 1**).
3. Open the rinse tank valve (**Figure 4-38, 2**).

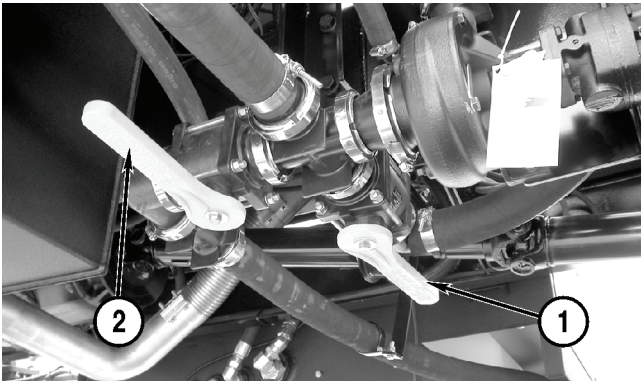


Figure 4-38

4. Turn the agitate/roto-flush knob to ROTO-FLUSH (**Figure 4-39, 1**).
5. Start the engine.
6. Use the agitation switch on the side console to increase agitation to its highest level.
7. Set the product pump switch to the ON position.
8. Use the T-handle to increase the engine speed to 1800 rpm.

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

9. After the tank is rinsed:
 - a. Return the T-handle to IDLE.
 - b. Set the product pump switch to OFF.
 - c. Close the rinse tank valve (**Figure 4-39, 2**).
 - d. Turn the agitate/roto-flush knob (**Figure 4-39, 1**) to OFF.



Figure 4-39

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:

1. Open the product valve (**Figure 4-40, 1**).
2. Set the product pump switch to the ON position.
3. Increase engine speed to 1800 rpm.
4. Unfold the booms.
5. Turn the agitate/roto-flush knob to roto-flush.
6. Set the boom section switches to the ON position.

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

After the booms are flushed:

1. Return the engine speed to IDLE.
2. Set the boom section switches to OFF.
3. Set the product pump switch to OFF.
4. Close the rinse tank valve (**Figure 4-40, 2**).
5. Set agitate/roto-flush knob to agitate.
6. Return agitate switch to original setting.
7. Fold the booms, and turn off the engine.

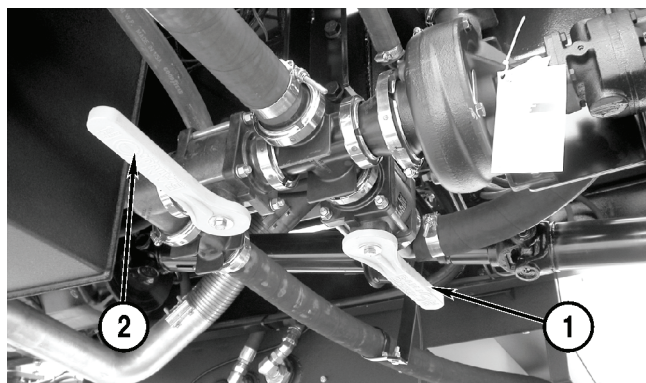


Figure 4-40

Flushing Wet System (without Optional Roto-Flush)

1. Fill the rinse tank with clean, fresh water. See *Filling Rinse Tank* on page 4-10.
2. Close the product valve (**Figure 4-41, 1**).
3. Open the rinse tank valve (**Figure 4-41, 2**).

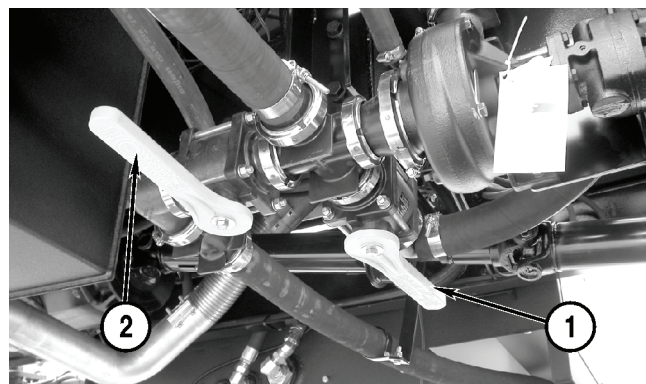


Figure 4-41

4. Start the engine.
5. Decrease the agitation to OFF using the switch on the side console.

NOTICE: Never fold or unfold the booms while the Apache Sprayer is moving over 5 mph (8.04 km/h).

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

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

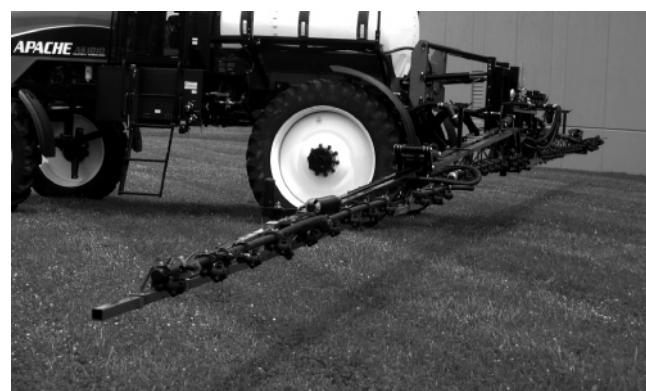


Figure 4-42

7. Set the product pump switch (**Figure 4-43, 1**) to the ON position.
8. Set all the boom section switches (**Figure 4-43, 2**) to the ON position.
9. Press the master spray button on the T-handle to begin spraying.
10. Use the agitation buttons (**Figure 4-43, 3**) to control agitation.



Figure 4-43

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.

11. After the booms are flushed:
 - a. Set the boom switches to OFF.
 - b. Return the T-handle to the IDLE position.
 - c. Set the product switch to OFF.
 - d. Fold the booms.
 - e. Return all valves to spraying positions.

Cleanload Chemical Eductor

Startup

1. All Cleanload valves must be closed prior to starting. Close the inlet ball valve (**Figure 4-44, 1**) and hopper ball valve (**Figure 4-44, 2**).
2. Open lid to check for foreign objects which may hinder performance or contaminate the system.
3. Close and lock lid by turning cover clockwise.
4. Divert pump flow to the Cleanload inlet line.

NOTE: A pressure of 30 psi (2.06 bar) minimum and 150 psi (10.3 bar) maximum must be used. Highest pressures increase eduction rate and available wand suction.

5. Turn the yellow handle of the inlet ball valve (**Figure 4-44, 1**) to the OPEN position.
6. Open the hopper ball valve (**Figure 4-44, 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 liquid to be used; see the applicable procedure: *Loading Liquid or Powdered Chemical into Hopper on page 4-23* or *Loading Liquid and/or Powdered Chemical with Suction Lance on page 4-23*.

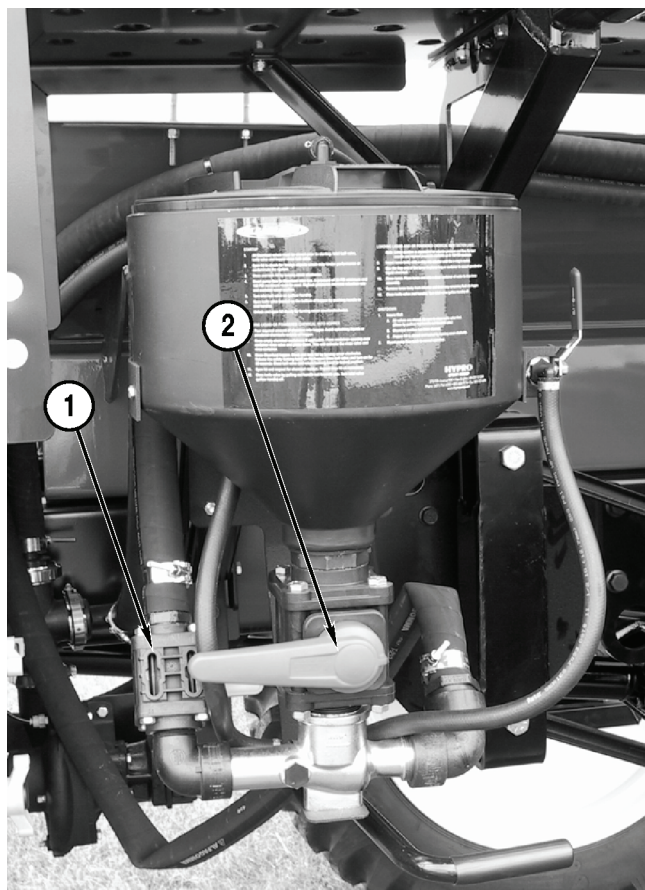


Figure 4-44

Loading Liquid or Powdered Chemical into 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. Release the safety locking band on the hopper rinse ball valve and open the valve for 20 seconds.
6. Close the ball valve and return the locking band to the locked position.
7. Open the lid and inspect for chemical residue. Repeat steps 3 to 6 as necessary.
8. Close the hopper ball valve (**Figure 4-44, 2**) by rotating the handle into a horizontal position (shown).

9. Turn the inlet valve (**Figure 4-44, 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.

Loading Liquid and/or Powdered Chemical with Suction Lance

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

NOTE: Lance suction is dependent on eductor pressure and flow. For best results, use highest pressure available (up to 150 psi [10.3 bar] maximum).

1. Insert lance body with O-ring into eductor until the O-ring is sealed.
2. Use the free end of the lance to pierce bag or container to vacuum powdered or liquid chemical.
3. Rinse lance. Place lance end into a clean container of water to rinse lance assembly.
4. Remove lance body from eductor and drain any remaining fluid into hopper.
5. Close hopper ball valve. Turn inlet valve (yellow handle) off.

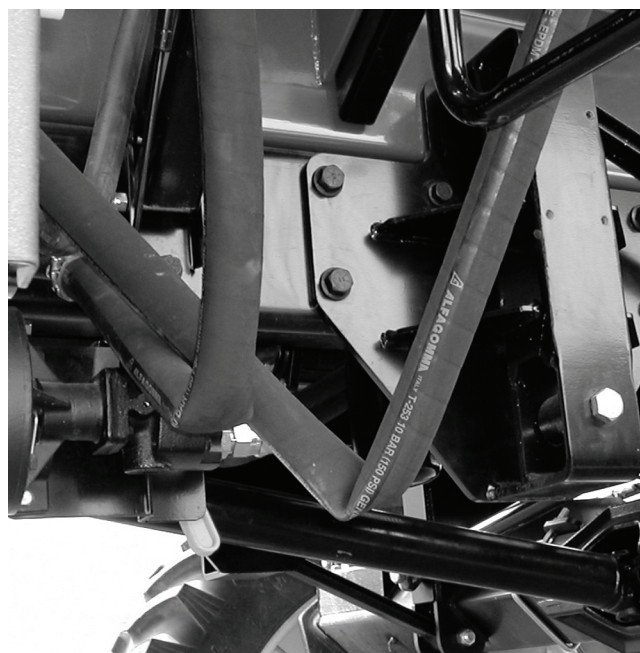


Figure 4-45

Shutdown

1. Before shutdown, make sure:
 - All valves are closed. Close the hopper ball valve first. (Close by moving handle into a horizontal position.)
 - Chemical residue has been cleaned.
 - Hopper lid is closed and locked by turning cover clockwise.
2. Divert pump flow back to normal operation.
3. Raise eductor to UP positions and insert latch pin.

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

APACHE™

CHAPTER 5

LUBRICATION AND MAINTENANCE

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

Maintenance Precautions

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

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

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

- **NEVER leave the key in the key switch when servicing the Apache Sprayer. 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 fuel 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 (if equipped) or disconnect the negative (-) battery cable before servicing the equipment.

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

WARNING! Exposure Hazard. ALWAYS wear safety goggles and protective clothing when servicing the battery.

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

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

WARNING! Shop Equipment Hazards

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

Environmental Precautions

The safety messages that follow have NOTICE level hazards.

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

Non-Apache Equipment Maintenance

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

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

Some non-Apache equipment operator's and maintenance manuals are included with the Apache Sprayer. These include, but are not limited to, the Engine Owner's Manual, Sprayer Monitor System Manual, Chemical Eductor Manual, Product Pump Instructions and other optional equipment manuals.

NOTICE: ALWAYS perform and reference the original equipment 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 ○ = Conditional Service ● = Regular Service NOTE: Do not overlook the "After First 100 Hours" interval.	Before Initial Use	After First 10 Hours	As Required	Daily	Every 40 Hours	After First 100 Hours	Every 100 Hours	Every 250 Hours	Every 500 Hours or Yearly	Every Year	Every 1000 Hours or Yearly
Grease Entire Boom	○			●							
Torque Lug Nuts	○	○			●						
Grease Steering Components	○				●						
Grease Axle Components	○		○		●						
Grease Driveline	○						●				
Check Axle Extension Bolt Torque	○		○				●				
Adjust Poly Tank Straps (AS1010 only)	○	○				○	●				
Adjust Boom	○	○	○								
Inspect Front Accumulators			○								●
Clean/Replace Primary Engine Air Filter				●				●			
Adjust Toe-In			○							●	
Replace Engine Safety Air Filter			○							●	
Winterize Wet System			○							●	
Replace Cab Filters			○							●	
Flush Wet System (including product pump)			○	●							
Check Tire Pressure (See back cover for values)				●							
Check Oil Engine Level				●							
Check Coolant Level, Cooling Package, and Hoses				●							
Check Transmission Fluid Level				●							
Check Hydraulic Fluid Level				●							
Check A/C Compressor Belt				●							
Torque Boom Lead Bolts					●						
Check Differential Fluid Level					●						
Check Differential for Leaks					●						
Re-Phase Steering Cylinders					●						
Replace Differential Fluid						○		●			
Replace Hydraulic Fluid Filter (Immediately if indicator is red)						○		●			
Replace Fuel Primary Filter							●				
Replace Fuel Separator Filter							●				
Clean Hydraulic Fluid								●			
Check Accumulator Fluid Level									●		
Replace Planetary Fluid (AS1010 only)									●		
Replace Steering Pressure Filter (Immediately if indicator is red)									●		
Replace Engine Oil and Filter						○			●		
Replace Transmission Fluid and Filter						○			●		
Recalibrate Raven Radar Gun									●		
Inspect and Repack Wheel Hub and Flex Bearings									●		
Replace Drop Box Fluid (AS1210 or 48 in. (121.9 cm) CC AS1010)									●		
Clean Transmission Fluid Strainer						○					●
Replace Hydraulic Fluid											●

Before Initial Use

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

- Grease Boom. See *Grease Boom* on page 5-8.
- Torque Lug Nuts. See *Torque Lug Nuts* on page 5-13.
- Grease Steering Components. See *Grease Steering Components* on page 5-14.
- Grease Axle Components. See *Grease Axle Components* on page 5-14.
- Grease Driveline. See *Grease Driveline Components* on page 5-16.
- Torque Axle Extension Bolt Torque. See *Torque Axle Extension Bolts* on page 5-16.
- Adjust Poly Tank Straps. See *Adjust Poly Tank Straps (If Equipped)* on page 5-17.
- 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* on page 5-5.

- Torque Lug Nuts. See *Torque Lug Nuts* on page 5-13.
- Adjust Poly Tank Straps. See *Adjust Poly Tank Straps (If Equipped)* on page 5-17.

Adjust Boom

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

Boom Lead

The outermost tip of the booms should lead the boom rack by 3 to 4 inches (76.2 to 101.6 mm) (**Figure 5-1**).

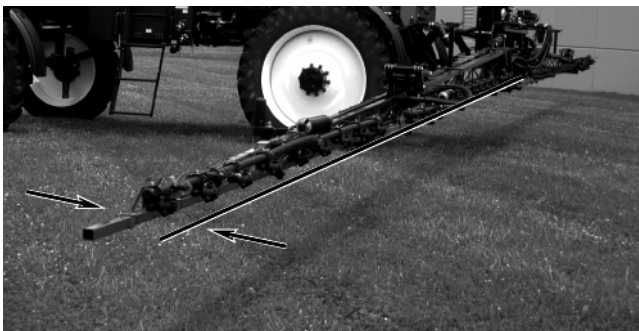


Figure 5-1

To adjust the boom lead:

1. Loosen the boom lead bolts (**Figure 5-2, 1**) near the bottom of the boom rack.
 - Turn the jam nuts (**Figure 5-2, 2**) toward the end of the boom to increase boom lead.
 - Turn the jam nuts toward the center of the boom rack to reduce boom lead.
2. Tighten the jam nuts and lead bolts after correct lead is set. Torque the boom lead bolts to 297 lb-ft (402.6 N-m).
3. Repeat the steps for the remaining boom, as required.

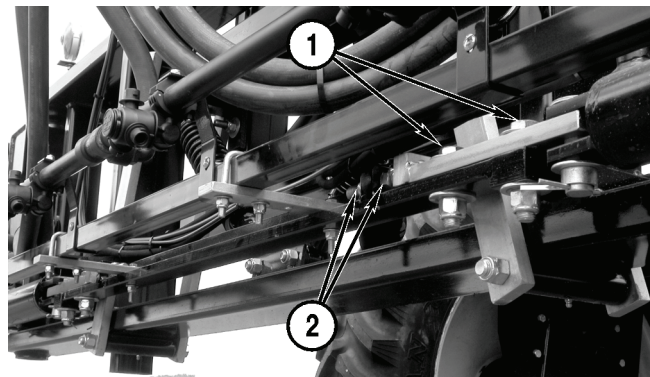


Figure 5-2

Boom Breakaway

Each left and right boom is equipped with one or two boom breakaways depending on boom configuration. A right, outer boom tip breakaway is shown in **Figure 5-3**.

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 (**Figure 5-3, 1**) and turn the adjusting screw (**Figure 5-3, 2**) to align the booms.
2. Tighten the jam nut.
3. Repeat the steps for the remaining breakaways, as required.

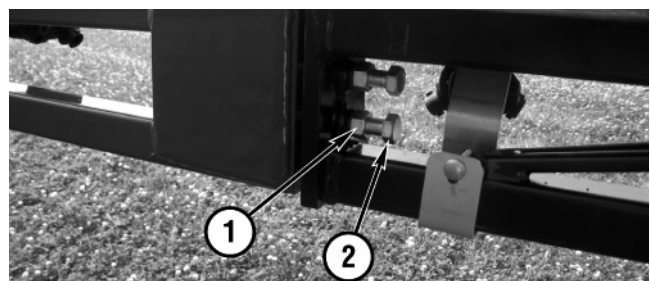


Figure 5-3

Boom Stabilizer

There are four boom stabilizers mounted on the boom rack. The upper and lower right-side stabilizers are shown (**Figure 5-4, 1**).

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 (**Figure 5-4, 2**) on the stabilizer.
2. Equally adjust the jam nuts (**Figure 5-4, 3**) until the gap is correct.
3. Tighten the lock nuts.
4. Repeat the steps for the other stabilizers, as required.

NOTE: For best performance adjust the jam nuts so the stabilizer halves are parallel and provide the 0.093 to 0.125 in. (2.4 to 3.2 mm) gap.

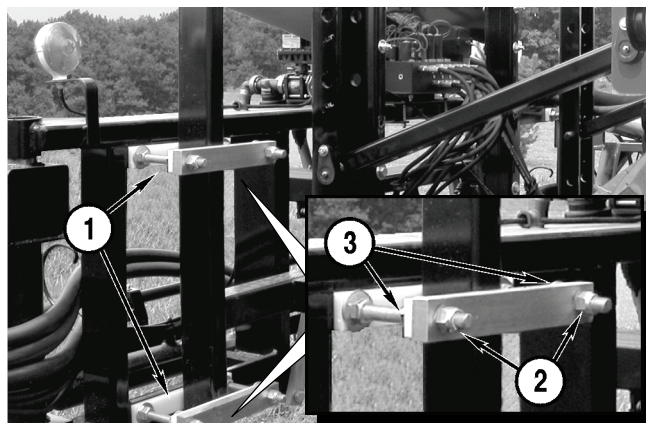


Figure 5-4

Boom Tip - 80 ft (24.3 m), 90 ft (27.4 m) and 100 ft (30.4 m) Booms

The boom tips should be level with the main boom.

The left boom tip is shown in **Figure 5-5**.

To adjust the boom tip level:

1. Loosen the jam nuts (**Figure 5-5, 1**) on the leveling bracket.
2. Turn the leveling bolts (**Figure 5-5, 2**) clockwise to raise 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.

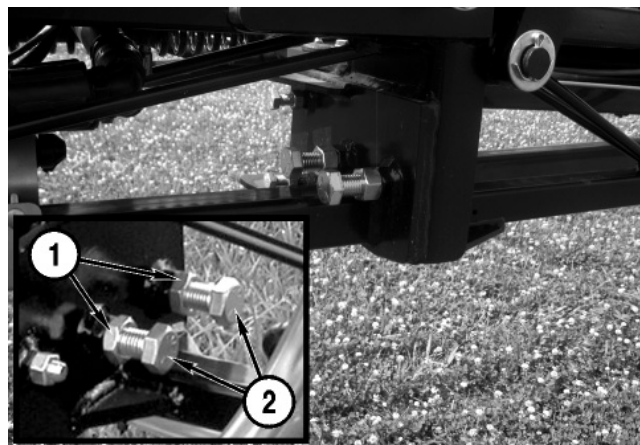


Figure 5-5

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* on page 5-5.

- Grease Axle Components. See *Grease Axle Components* on page 5-14.
- Adjust Poly Tank Straps. See *Adjust Poly Tank Straps (If Equipped)* on page 5-17.
- Torque Axle Extension Bolt Torque. See *Torque Axle Extension Bolts* on page 5-16.
- Adjust Boom. See *Adjust Boom* on page 5-6.
- Adjust Toe-In. See *Adjust Toe-In* on page 5-26.
- Clean or Replace Primary Engine Air Filter. See *Clean or Replace Engine Primary Air Filter* on page 5-18.
- Replace Engine Safety Air Filter. See *Replace Engine Safety Air Filter* on page 5-27.
- Winterize Wet System. See *Winterize Wet System* on page 5-27.
- Replace Cab Air Filters. See *Replace Cab Charcoal Air Filter* on page 5-30.
- Flush Wet System. *Flushing Wet System (without Optional Roto-Flush)* on page 4-21
- Inspect Front Accumulator. See *Inspect Front Accumulator* on page 5-31.

Daily

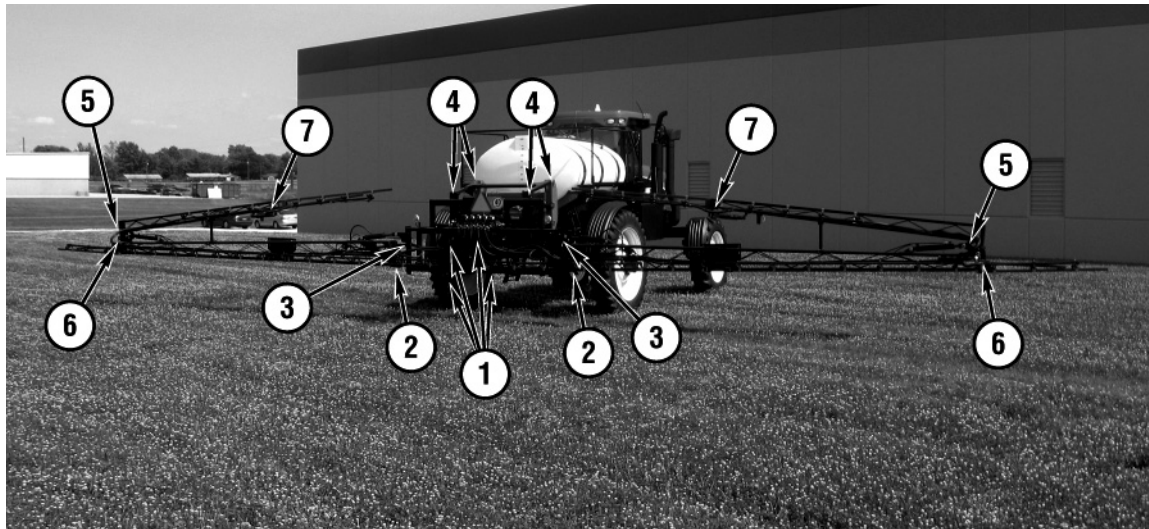
The following services must be performed daily, before operation of the Apache Sprayer.

Clean Primary Engine Air Filter

Clean or Replace Primary Engine Air Filter. See *Clean or Replace Engine Primary Air Filter* on page 5-18.

Grease Boom

The boom is equipped with seven sets of grease fittings (**Figure 5-6**). Apply an ample amount of lithium grease through each of the grease fittings.



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

Figure 5-6

Boom Stabilizer

There are two upper (**Figure 5-7, 1**) and two lower (**Figure 5-7, 2**) boom stabilizer grease fittings.

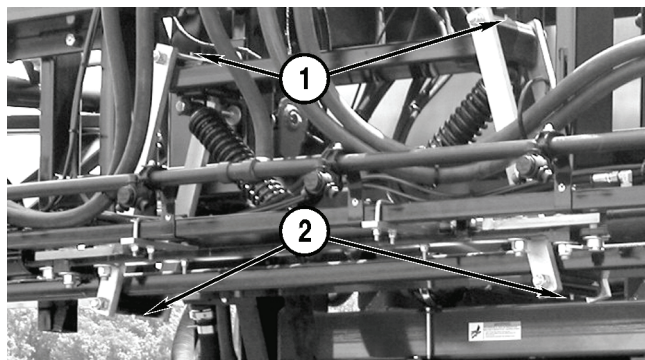


Figure 5-7

Boom Tilt

There are two boom tilt grease fittings (**Figure 5-8, 1**).

Boom Fold

There are four boom fold grease fittings (**Figure 5-8, 2**).

Boom Rack

There are two sets of six boom rack, flag-pin style grease fittings. The six left-side fittings (**Figure 5-8, 3**) are shown in **Figure 5-8**. The six right-side fittings are in the same orientation on the right side of the boom rack.

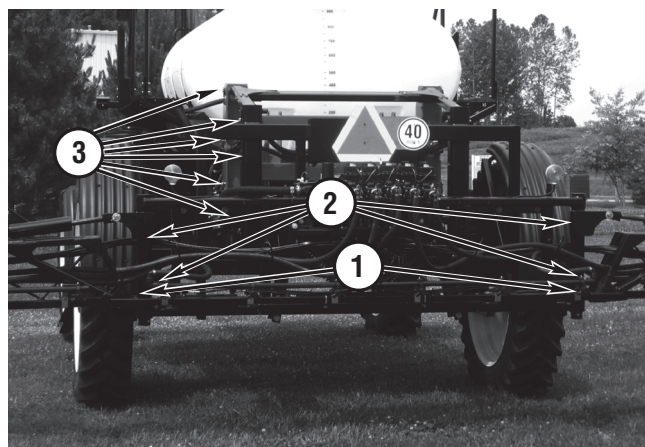


Figure 5-8

Boom Tip

There are four boom tip grease fittings (**Figure 5-9, 1**), two on each boom tip. The left side is shown in **Figure 5-9**.

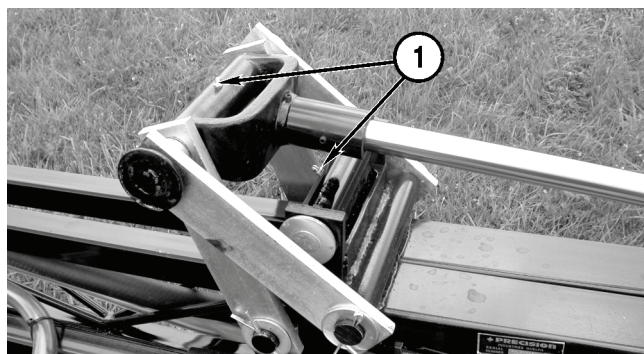


Figure 5-9

Boom Inner Breakaway

There are six boom inner breakaway grease fittings (**Figure 5-10, 1**), three on each boom. The left side is shown in **Figure 5-10**.



Figure 5-10

Boom Outer Breakaway (If Equipped)

There are six boom outer breakaway grease fittings (**Figure 5-11, 1**), three on each boom tip. The left side is shown in **Figure 5-11**.

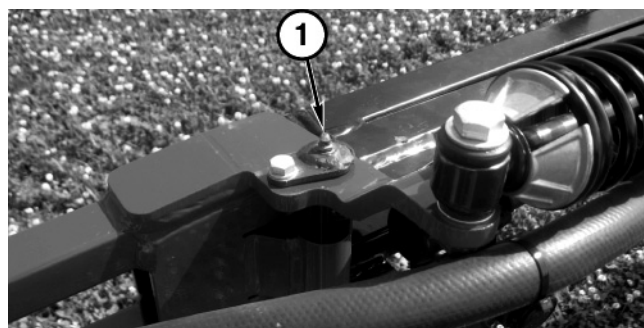


Figure 5-11

Flush Wet System

Drain and flush the product tank and wet system after use and when changing chemicals. See *Flushing Product Tank (with Optional Roto-Flush)* on page 4-20 and *Flushing Wet System (without Optional Roto-Flush)* on page 4-21.

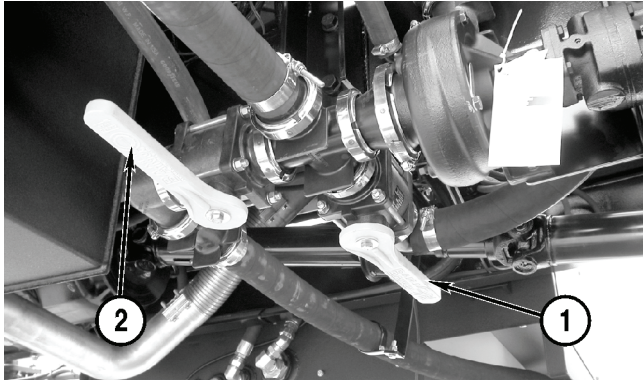


Figure 5-12

Check Tire Pressure

Perform the following:

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



Figure 5-13

Check Engine Oil Level

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

1. Remove the dipstick and check the oil level. The oil level should be within the hatched area on the dipstick. The dipstick is located in the engine compartment, on the left side of the engine.

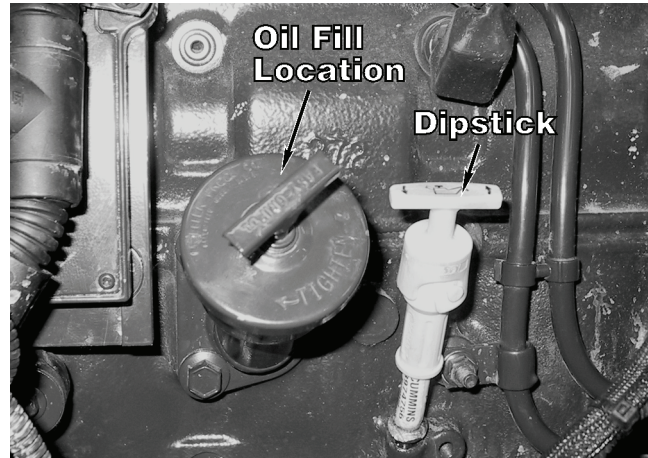


Figure 5-14

2. 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.
3. Reinstall 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.

1. 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.
2. 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.

3. 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.
4. 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.

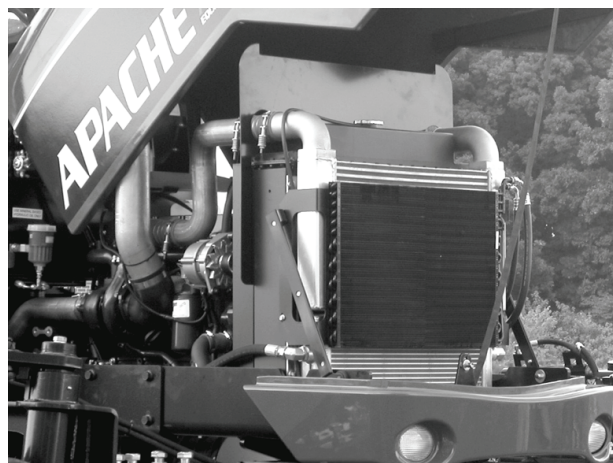


Figure 5-15

Check Transmission Fluid Level

NOTICE: ITL/JBC Transmission (AS1010) Check the transmission fluid level with the oil at operating temperature and the engine off.

NOTICE: Funk Transmission (AS1210 and optional equipped AS1010) Check the transmission fluid level with the oil at operating temperature and the engine running in NEUTRAL.

1. Turn the dipstick handle counterclockwise to loosen and remove the dipstick. The transmission fluid dipstick is located in the engine compartment, on the left side of the engine, toward the cab.
2. Check the transmission fluid level. The fluid level should be between the two dots on the dipstick.

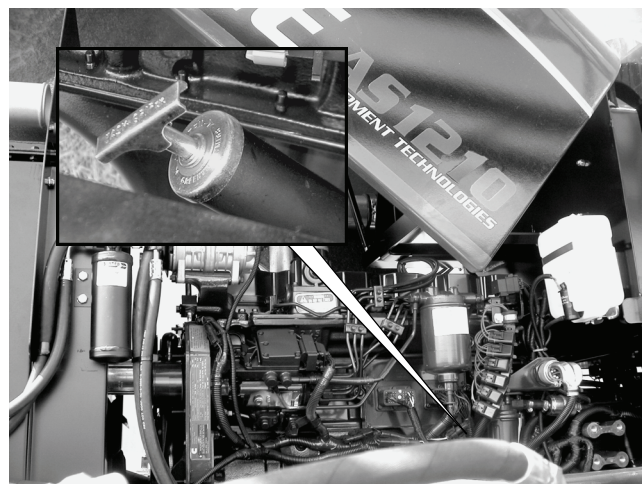


Figure 5-16

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.

3. If the fluid level is below the lower dot on the dipstick, use a funnel to add fluid through the dipstick tube. Add Lucas Universal Hydraulic Fluid to bring the level between the dots on the dipstick.
4. Reinstall the dipstick and turn the handle clockwise to tighten.

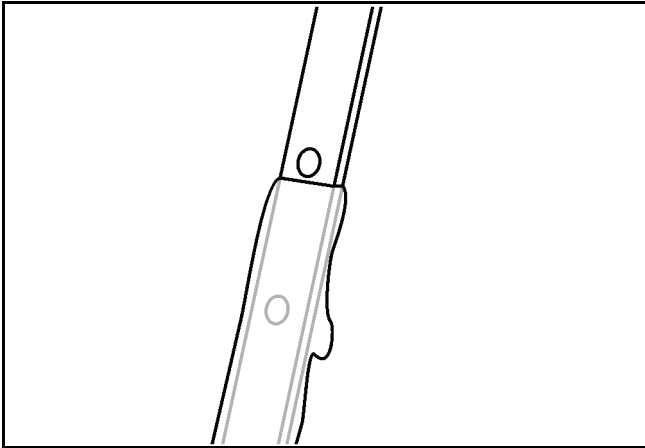


Figure 5-17

Check Hydraulic Fluid Level

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

The hydraulic fluid reservoir is located on the right side of the Apache Sprayer and a sight glass (**Figure 5-18, 1**) indicates the hydraulic fluid level.

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

If no fluid is visible in the sight glass, remove the fill cap (**Figure 5-18, 2**) and add Lucas Universal Hydraulic Fluid until fluid is visible in the bottom of the sight glass.

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

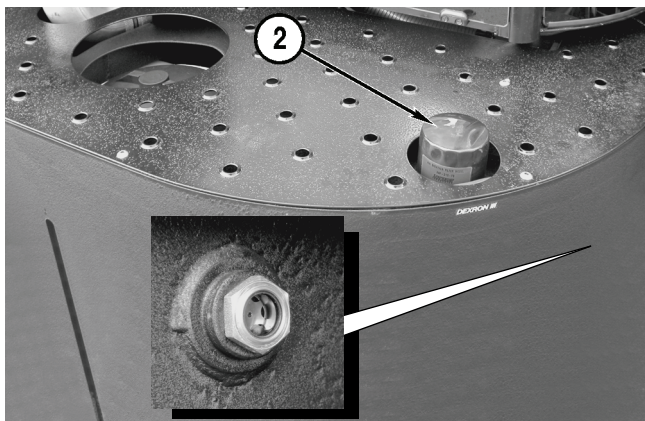


Figure 5-18

Check A/C Compressor Belt

Inspect

Check the A/C compressor belt (**Figure 5-19, 1**) for wear and damage. Replace as necessary.

Check the belt deflection at a point midway between two pulleys.

- The correct belt deflection is 0.750 to 1.00 in. (19.05 to 25.4 mm).

If the deflection is greater than 1.00 in. (25.4 mm), adjust the belt.

Replace

To remove the A/C compressor belt:

1. Loosen the mounting and adjusting hardware (**Figure 5-19, 2**).
2. Turn the adjustment screw (**Figure 5-19, 3**) until the belt can be removed.
3. To install the new compressor belt, turn the adjustment screw until the belt deflection is 0.750 to 1.00 in. (19.05 to 25.4 mm).
4. Tighten the mounting and adjusting hardware.

Adjust

To adjust the A/C compressor belt:

1. Loosen the mounting and adjusting hardware.
2. Turn the adjustment screw to tighten or loosen the belt as needed.
 - The correct belt deflection is 0.750 to 1.00 in. (19.05 to 25.4 mm).
3. When adjustment is complete, tighten the mounting and adjusting hardware.

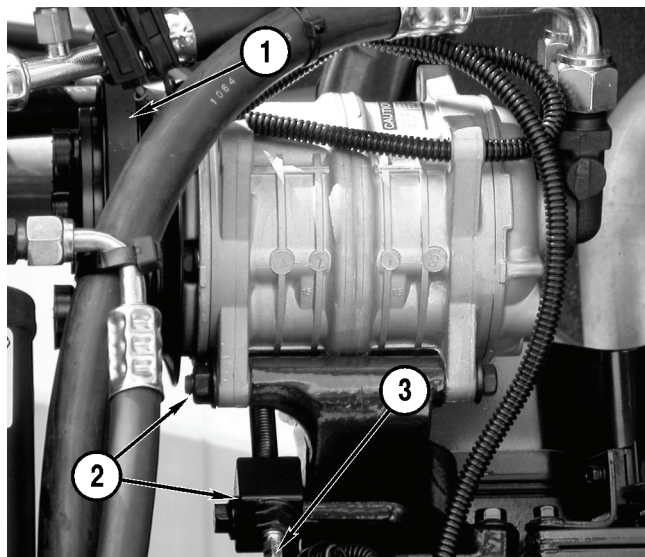


Figure 5-19

Every 40 Hours

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

Torque Lug Nuts

Torque 12.4 x 28 in. front wheel lug nuts to:

- 180 lb-ft (244 N·m)

Torque 14.9 x 38 in. front wheel lug nuts to:

- 315 lb-ft (427 N·m)

Torque all rear wheel lug nuts to:

- 460 lb-ft (624 N·m)



Figure 5-20

Grease Rear Suspension Cylinders

Apply lithium grease to the upper (**Figure 5-21, 1**) and lower (**Figure 5-21, 2**) grease fittings at each end of the suspension cylinder.

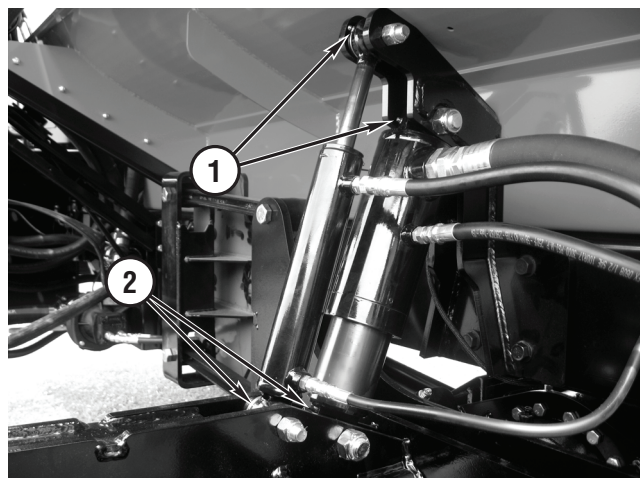


Figure 5-21

Grease Steering Components

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

Each steering cylinder has two ball joint grease fittings (**Figure 5-22, 1**), two king-pin grease fittings (**Figure 5-22, 2**), one inter-flex bearing grease fitting (**Figure 5-22, 3**), and one hub grease fitting (**Figure 5-22, 4**). The right wheel is shown.

1. Apply lithium grease through the ball joint grease fittings on each end of the tie rod.

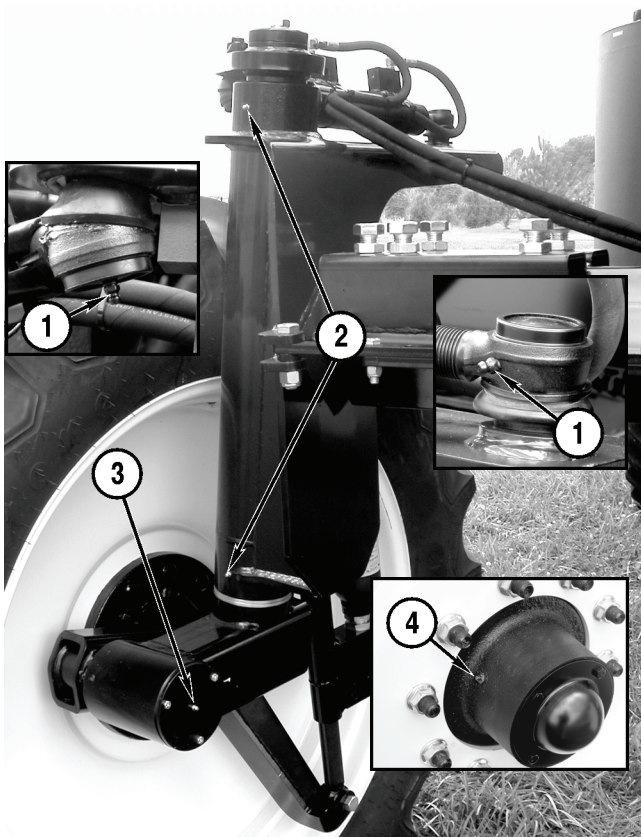


Figure 5-22

2. Apply lithium grease through the two king-pin grease fittings at each front wheel.

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

3. Apply lithium grease through the inter-flex bearing grease fitting.
4. Apply lithium grease through the hub grease fitting on each front wheel.

Grease Axle Components

The rear axle is equipped with eight grease fittings, installed in two square-tube axle extension assemblies. Four fittings (**Figure 5-23, 1**) point downward from the bottom face of each square tube (**Figure 5-23, 2**). Shown are the two rear-most fittings.

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

An axle pivot is located under the Apache Sprayer on the front axle. The pivot is equipped with a grease fitting (**Figure 5-24, 1**) on front and rear of the front axle.

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

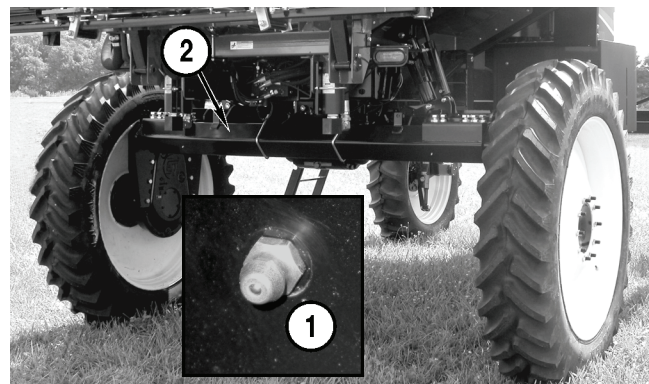


Figure 5-23



Figure 5-24

Torque Boom Lead Bolts

Torque the boom lead bolts (**Figure 5-25, 1**) on the boom rack to 297 ft-lb (402.6 N·m). Torque the bolts on both the right-hand side and left-hand side of the boom rack.

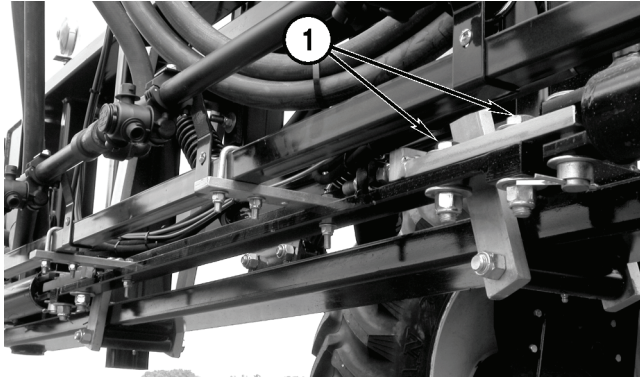


Figure 5-25

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.

1. Remove the differential fill/level plug (**Figure 5-26, 1**) and check the fluid level. The fluid should be level with the bottom of the fill/level hole.

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

2. If required, add Lucas Universal Hydraulic Fluid to fill the differential to the bottom of the fill/level hole.
3. Install the plug and tighten.

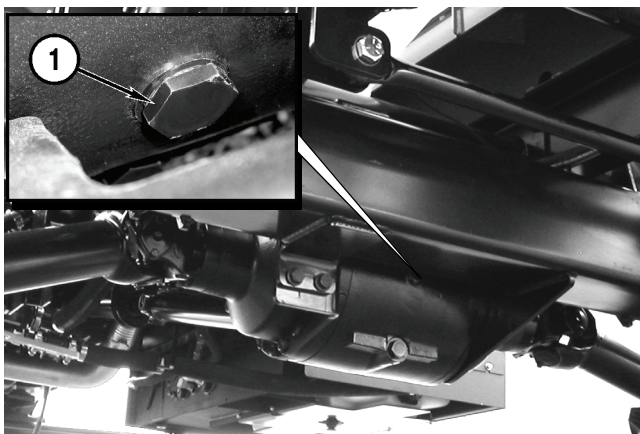


Figure 5-26

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.

Re-Phase Steering Cylinders

1. Start the engine and allow it to reach operating temperature.
2. Run engine at 1000 rpm.
3. Operate the vehicle in a forward direction and turn the steering wheel to the right until the steering cylinder bottoms out.
4. After the steering cylinder bottoms out, stop the vehicle but continue to turn the steering wheel.
5. Continue to turn the steering wheel toward the right for 5 minutes. This will be approximately 140 revolutions.
6. Repeat the above steps while turning toward the left to re-phase the left side steering cylinder.

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* on page 5-5.

- Adjust Poly Tank Straps. See *Adjust Poly Tank Straps (If Equipped)* on page 5-17.
- Replace Differential Fluid. See *Replace Differential Fluid* on page 5-19.
- Replace Hydraulic Fluid Filter. See *Replace Hydraulic Fluid Filter* on page 5-19.
- Replace Engine Oil and Filter. See *Replace Engine Oil and Filter* on page 5-22.
- Replace Transmission Fluid and Filter. See *Replace Transmission Fluid and Filter* on page 5-24.

Every 100 Hours

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

Grease Driveline Components

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

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

One slip joint grease fitting (**Figure 5-27, 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 (**Figure 5-27, 2**) is located on the U-joint connected to the slip joint.

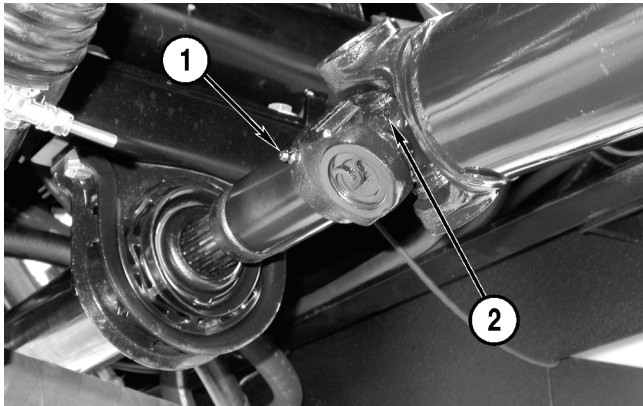


Figure 5-27

A U-joint fitting (**Figure 5-28, 1**) is located at the differential input.

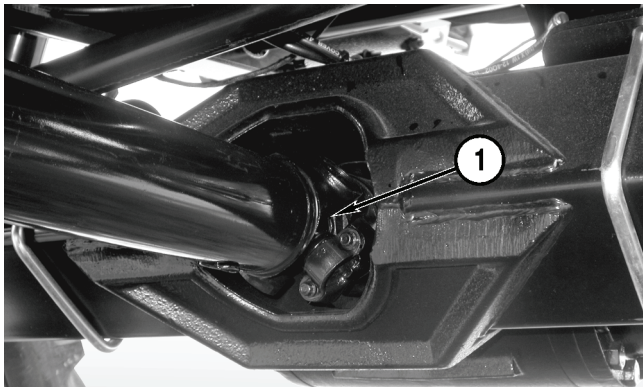


Figure 5-28

The other two slip joint grease fittings (**Figure 5-29, 1**) are located under the Apache Sprayer, between the differential and each drop box U-joint.

The remaining U-joint fittings (**Figure 5-29, 2**) are located on the U-joints at each end of the left and right axles.

The left axle is shown in **Figure 5-29**.

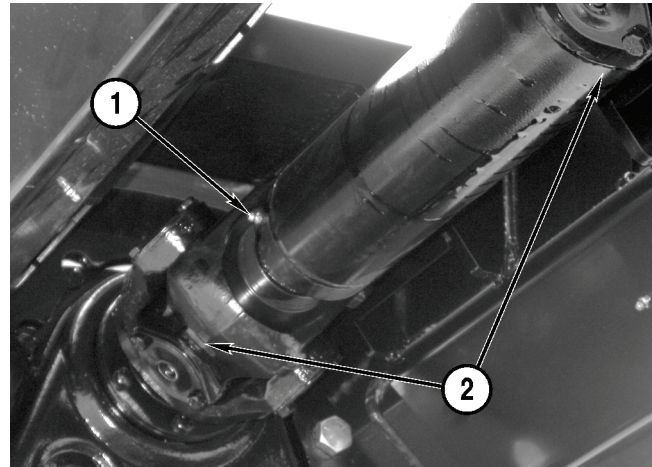


Figure 5-29

Torque Axle Extension Bolts

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

Manual Adjustment

Torque the axle extension brace bolts. There are six bolts on each front brace and twelve bolts on each rear brace. The left rear manual adjust brace is shown in **Figure 5-30**.

1. Loosen all the jam nuts.
2. Tighten the bolts to 80 lb-ft (108 N·m).
3. Tighten the jam nuts.

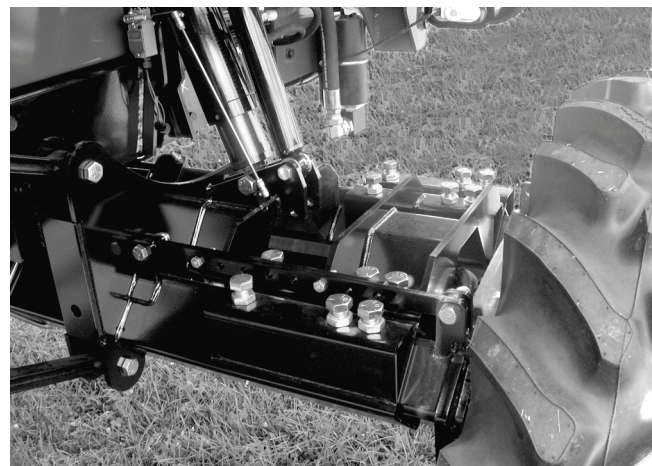


Figure 5-30

Adjust On The Go

Torque the axle extension brace bolts. There are six socket-head bolts on each front brace and twelve socket-head bolts on each rear brace. The left front Adjust On The Go brace is shown **Figure 5-31**.

1. Loosen all the jam nuts.
2. Torque the socket-head bolts to:
15 lb-ft (20 N·m)
3. Tighten the jam nuts.



Figure 5-31

Adjust Poly Tank Straps (If Equipped)

1. Tighten the bolts on each tank strap without deforming the tank, bolts or tank skid. Tighten the bolts evenly from side to side.
2. Fill the product tank with water and drive the Apache Sprayer to allow the tank to settle.
3. Stop the Apache Sprayer and check the straps.
4. Adjust the straps as needed.

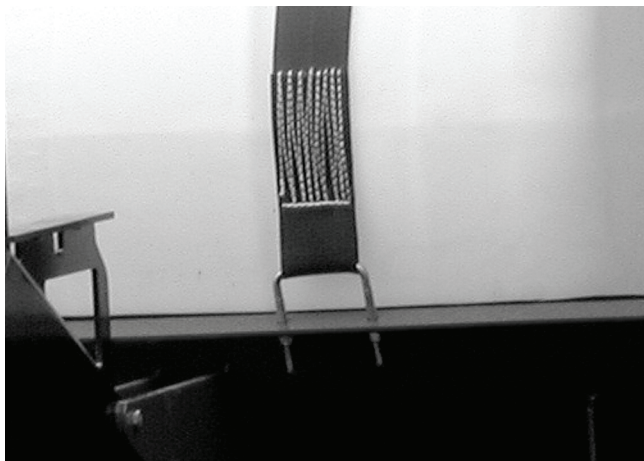


Figure 5-32

Replace Fuel Filter

The fuel filter (**Figure 5-33, 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.

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

- Fuel Filter Part Number: 201450242

Fill the new filter with diesel fuel before installing.

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

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

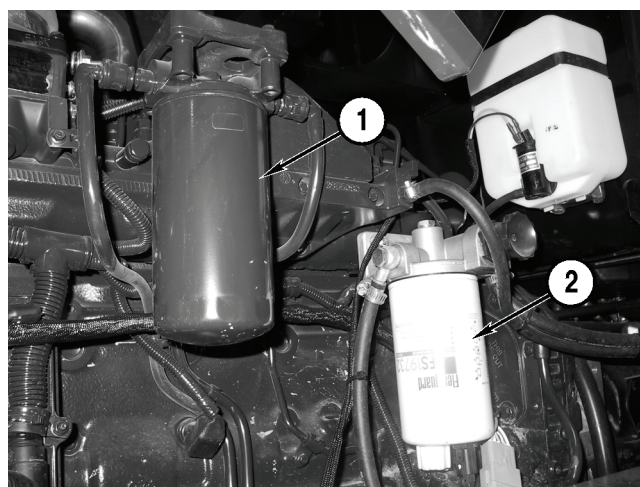


Figure 5-33

Replace Fuel Separator Filter

The fuel separator filter (**Figure 5-34, 2**) is located in the engine compartment on the left side of the engine.

1. Turn the filter counterclockwise to remove and dispose of the filter properly.

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

- Fuel Separator Filter Part Number: 201450243

2. Fill the new filter with diesel fuel before installing.

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

3. 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.

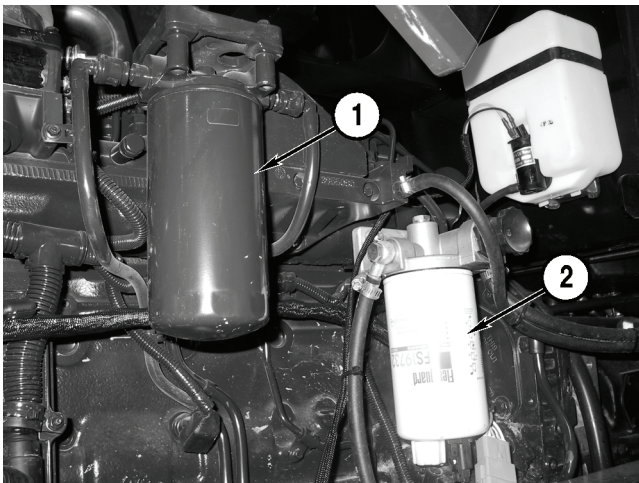


Figure 5-34

Every 250 Hours

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

Clean or Replace Engine Primary Air Filter

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

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

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

1. Clean the outside of the air cleaner and surrounding area to keep dust from entering the cleaner assembly.
2. Release the four latches (**Figure 5-35, 1**) and remove the cover from the air cleaner assembly.

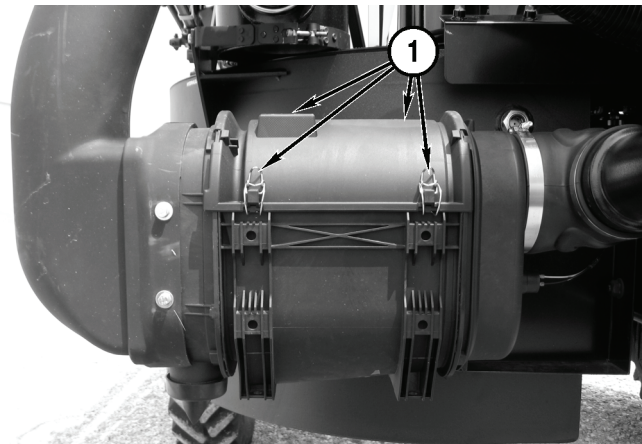


Figure 5-35

3. Use a rocking motion to raise the primary air filter (**Figure 5-36, 2**) from the assembly.
4. Clean the filter using compressed air. Blow the filter from the inside-out.
5. If installing a new primary engine air filter:
 - Primary Engine Air Filter Part Number: 201300116
6. Install the filter and the air cleaner cover, and engage the cover latches.



Figure 5-36

Replace Differential Fluid

The differential is located under the Apache Sprayer, on the rear axle. The fill/level plug (**Figure 5-37, 1**) is directly above the drain plug on the rear of the differential.

1. Remove the differential drain plug, drain the fluid into a suitable container and dispose of the fluid properly.
2. Install the drain plug and tighten.

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

3. Remove the differential fill/level plug (**Figure 5-37, 1**).
4. Add fluid until it is level with the bottom of the fill/level hole.
 - Differential Fluid Capacity:
26.4 quarts (25 liters) approximately
5. Install the fill/level plug (**Figure 5-37, 1**) and tighten.

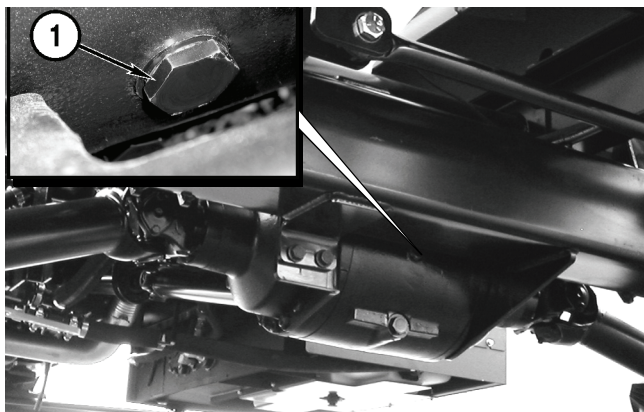


Figure 5-37

Replace Hydraulic Fluid Filter

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

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

1. Remove the four mounting bolts from the filter head and lower the filter canister (**Figure 5-38, 1**).
2. Remove the filter and canister O-ring from the canister.
3. Remove the spring and metal plate from the filter.
4. Discard the filter and fluid into an appropriate container.
5. Rinse the canister with diesel fuel.
6. Install the spring and metal plate onto the new filter and install the filter into the canister.
7. Install the O-ring on the canister and lubricate with clean Lucas Universal Hydraulic Fluid.
8. Install the canister onto the filter head and tighten the four bolts.
9. Use the sight glass to check the fluid level. See *Check Hydraulic Fluid Level* on page 5-12.

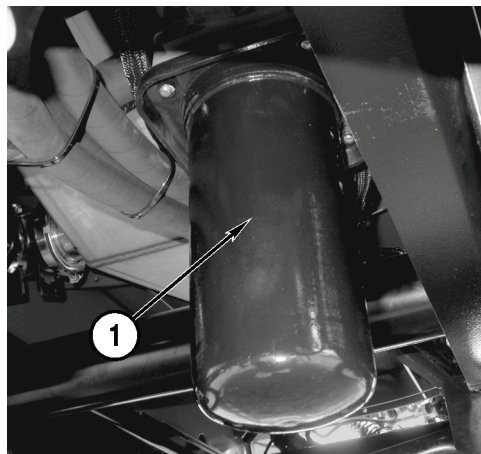


Figure 5-38

Clean Hydraulic Fluid Strainers

The hydraulic fluid strainers are located under the Apache Sprayer, on the side of the hydraulic fluid reservoir. The strainers are inline with the hydraulic fluid lines.

1. Remove the hydraulic fluid drain plug (**Figure 5-39, 1**) from the bottom of the reservoir and drain the fluid into a suitable container with a capacity of more than 30 gallons (113.5 liters).
2. Install the drain plug.

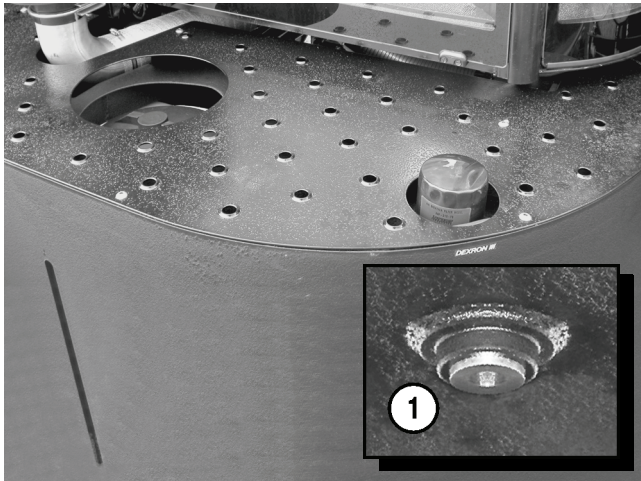


Figure 5-39

3. Remove the hydraulic fluid lines (**Figure 5-40, 1 and 2**).
4. Remove the strainers (**Figure 5-40, 3 and 4**).

NOTICE: Completely drain the hydraulic tank before removing the hoses or strainers.

5. Clean the strainers with diesel fuel and allow to air dry, then dispose of the fuel properly.

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

6. Install the small diameter hydraulic fluid strainer (**Figure 5-40, 3**).
 - Small Diameter Hydraulic Fluid Strainer Part Number: 840000010
7. Install the large diameter hydraulic fluid strainer (**Figure 5-40, 4**).
 - Large Diameter Hydraulic Fluid Strainer Part Number: 840000011
8. Install the hydraulic lines (**Figure 5-40, 1 and 2**).

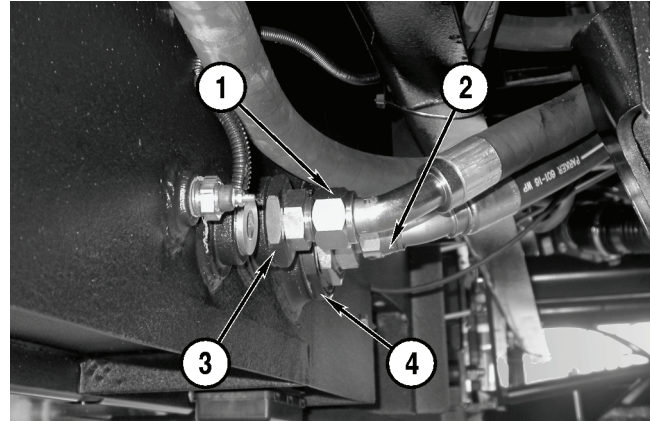


Figure 5-40

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

*NOTE: The hydraulic fluid fill location (**Figure 5-41, 1**) has a screen in the fill neck. Fill the reservoir slowly to reduce the possibility of spilling.*

9. Fill the hydraulic fluid reservoir with Lucas Universal Hydraulic Fluid.
 - Hydraulic Fluid Reservoir Capacity: 30 gallons (113.5 liters) approximately
10. Use the sight glass to check the fluid level. See *Check Hydraulic Fluid Level* on page 5-12.

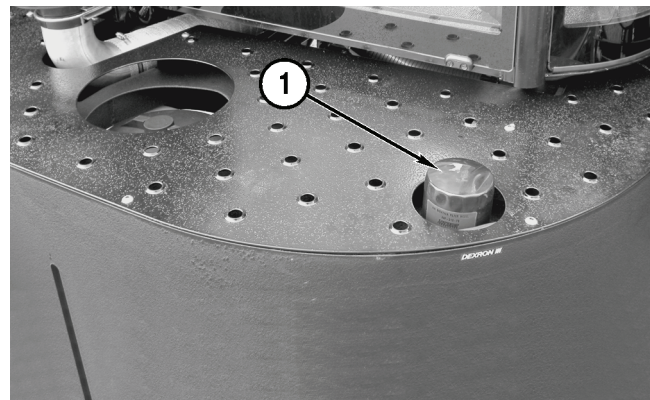


Figure 5-41

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.

Check Accumulator Fluid Level

1. Safely raise the front of the Apache Sprayer so the front tires are just off of the ground.
2. Remove the plug (**Figure 5-42, 1**) from the front of each front accumulator and check the fluid level. The fluid should be level with the bottom of the fill hole.

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

NOTICE: Use only Lucas Universal Hydraulic Fluid for the accumulator fluid.

3. If required, add Lucas Universal Hydraulic Fluid to fill the accumulator to the bottom of the fill hole.
4. Install the plug and tighten.
5. Safely raise the front of the Apache Sprayer so the front tires are just off of the ground.
6. Remove the cap (**Figure 5-42, 2**) and install a nitrogen valve and gauge on the accumulator.
7. Open the valve and check the nitrogen level.

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

- AS1010 Accumulator Nitrogen Pressure: 900 psi (62.0 bar)
- AS1210 Accumulator Nitrogen Pressure: 950 psi (65.5 bar)

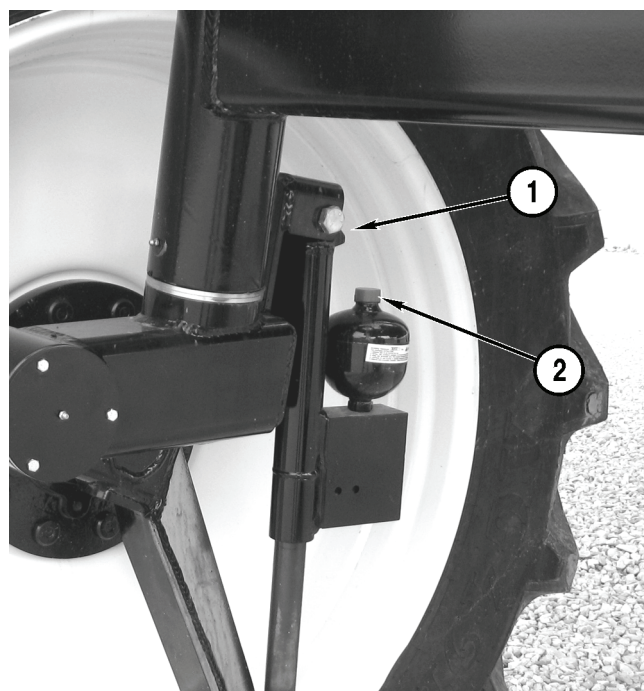


Figure 5-42

Replace Fuel Filter

See *Replace Fuel Filter* on page 5-17.

Replace Fuel Separator Filter

See *Replace Fuel Separator Filter* on page 5-18.

Replace Planetary Fluid (AS1010 Only)

The planetaries are located on each rear wheel. The plug (**Figure 5-43, 1**) on the planetary serves as the drain and fill location.

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

4. Fill each planetary with Lucas 80/90 Gear Oil to the bottom of the fill hole.
 - Planetary Fluid Capacity:
2.2 quarts (2.0 liters) approximately
5. Install the plug (**Figure 5-43, 1**) and tighten.

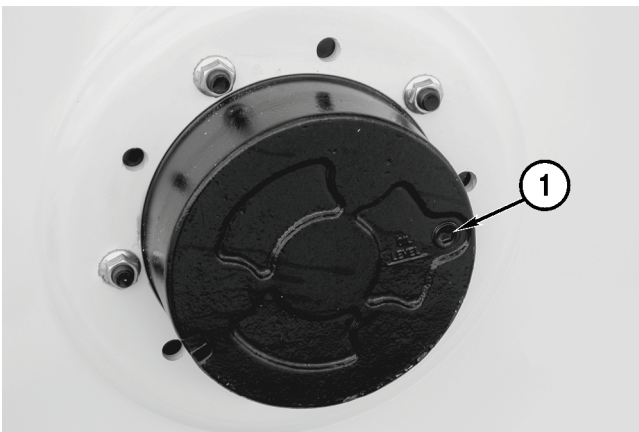


Figure 5-43

Replace Steering Pressure Filter

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

To change the steering pressure filter:

1. Loosen the filter bowl and remove the bowl and element.
2. Install a new filter element on the filter head.
3. Inspect the O-ring on the filter bowl and replace if damaged.
4. Install the filter bowl and tighten to 45 ft-lb (61 N·m).

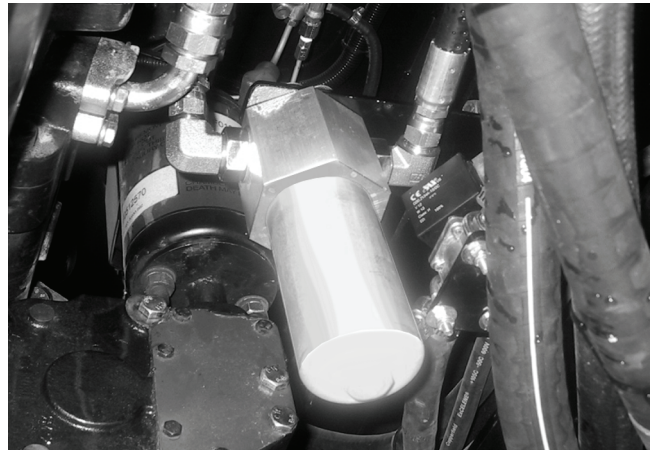


Figure 5-44

Replace 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.

1. Operate the engine for approximately 5 minutes to warm the engine oil.
2. Shut off the engine.
3. Remove the engine oil drain plug and drain the oil into a suitable container. The engine oil drain plug is located on the right side of the oil pan.
4. Properly dispose of the used engine oil.

NOTICE: Do not overtighten the drain plug. Damage to the plug or seal may result in leakage.

5. Install the drain plug and applicable seal, then torque to the following specifications:
 - Plug with Copper Washer (**Figure 5-45, 1**): 52 lb-ft (71 N·m)
 - Plug with O-ring (**Figure 5-45, 2**): 37 lb-ft (50 N·m)

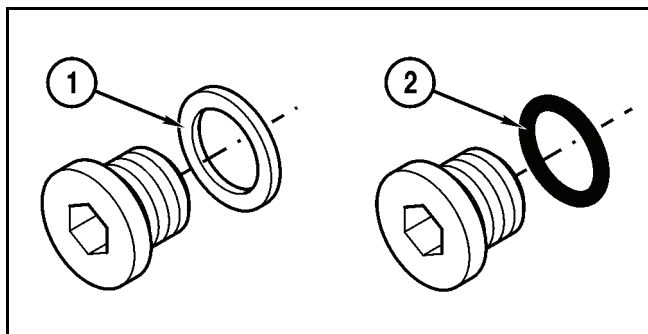


Figure 5-45

6. Turn the engine oil filter counterclockwise to remove. The engine oil filter is located on the right side of the engine.

7. Dispose of the filter properly.

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

8. Lubricate the seal on the engine oil filter.
 - Engine Oil Filter Part Number: 201450241
9. Install and tighten the filter by hand 3/4 to 1-1/4 turns after the seal contacts the filter housing.



Figure 5-46

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.

10. Fill the engine with high-quality Lucas 15W-40 Magnum motor oil at the oil fill location on the left side of the engine.
 - Engine Oil Capacity: 16 quarts (15 liters) approximately

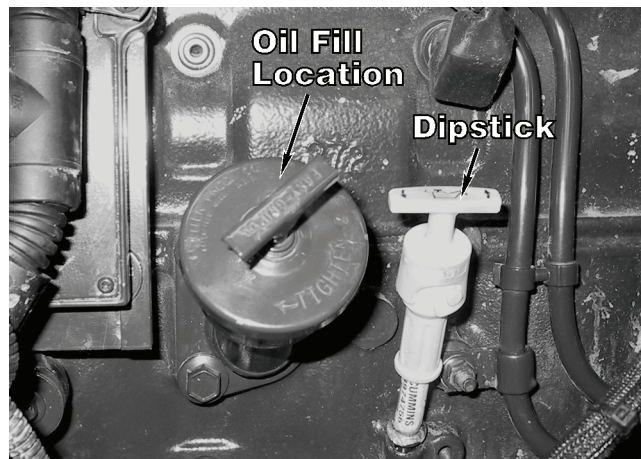


Figure 5-47

11. Add oil as needed to bring the level to the hatched area on the dipstick.
12. Reinstall the dipstick.
13. Operate the engine and check for leaks.
14. Shut off the engine and wait 10 minutes, then check the engine oil level and add oil as needed to bring the level to the hatched area on the dipstick.

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

Replace Transmission Fluid and Filter

ITL/JBC Transmission (AS1010)

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

1. Remove the drain plug (**Figure 5-48, 1**) and drain the transmission fluid into a suitable container.
2. Dispose of the fluid properly.
3. Install the drain plug.
4. Remove the strainer (**Figure 5-48, 2**), clean with diesel fuel and reinstall the strainer and plate.

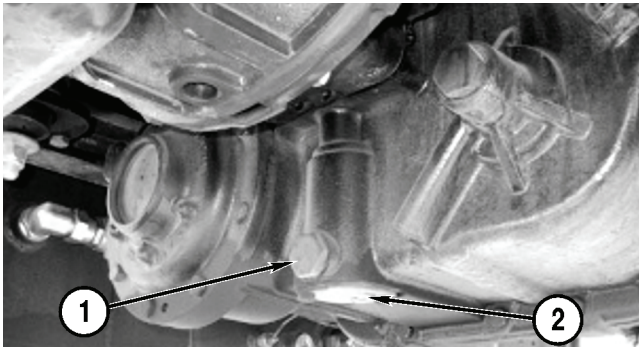


Figure 5-48

5. Turn the filter counterclockwise to remove. Dispose of the filter properly. The transmission filter is located on the right side of the transmission, next to the park brake canister.

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

6. Lubricate the seal on the transmission fluid filter
 - Transmission Fluid Filter Part Number: 300000101
7. Install and tighten the filter by hand 3/4 to 1-1/4 turns after the seal contacts the filter housing.



Figure 5-49

Funk Transmission (AS1210 and Optionally Equipped AS1010)

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

1. Remove the drain plug (**Figure 5-50, 1**) and drain the transmission fluid into a suitable container.
2. Dispose of the fluid properly.
3. Install the drain plug.

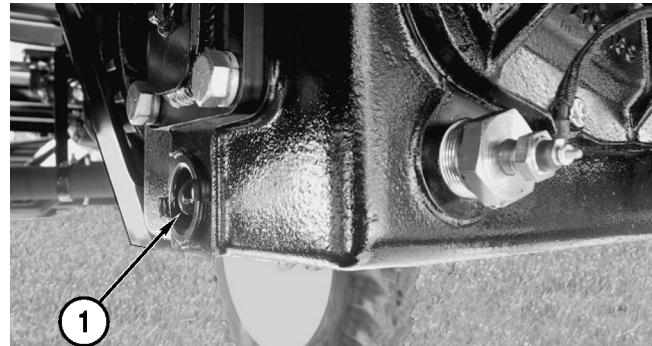


Figure 5-50

4. Turn the filter counterclockwise to remove. Dispose of the filter properly. The transmission filter is located on the left side of the transmission.

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

5. Lubricate the seal on the transmission fluid filter
 - Transmission Fluid Filter Part Number: 300100110
6. Install and tighten the filter by hand 3/4 to 1-1/4 turns after the seal contacts the filter housing.



Figure 5-51

Filling Transmission Fluid

The fluid capacity of the JCB and Funk transmissions are approximately 16 quarts (15 liters).

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.

NOTE: Fill slowly to allow trapped air to escape.

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

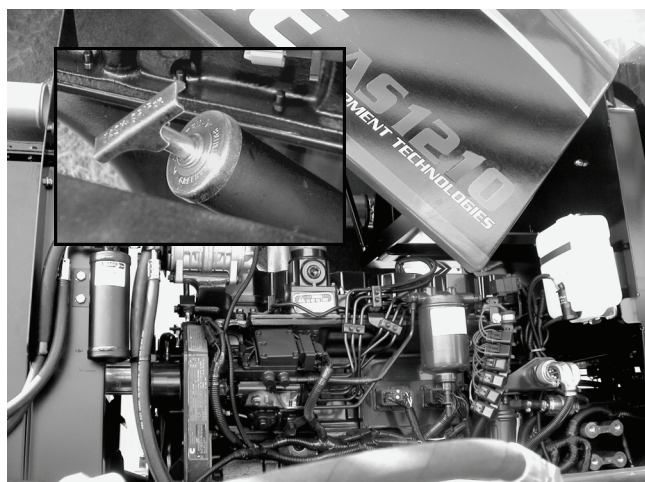


Figure 5-52

2. Check the transmission fluid level with the engine running in NEUTRAL and the oil at normal operating temperature. The fluid level should be between the two dots on the dipstick (**Figure 5-53**).
3. Reinstall the dipstick and turn the handle clockwise to tighten.

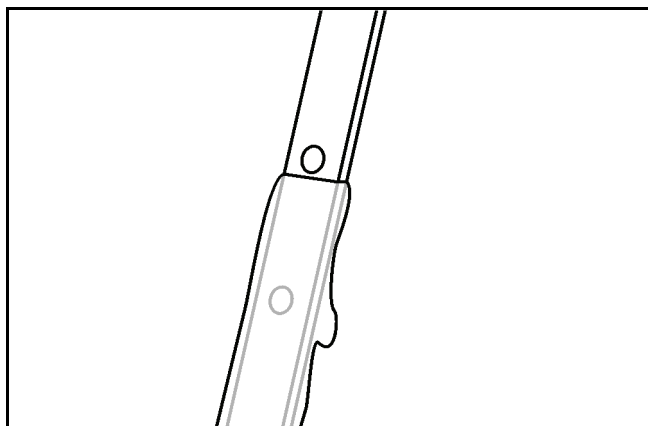


Figure 5-53

Recalibrate Raven Radar Gun

The Raven radar gun (**Figure 5-54, 1**) should be calibrated every year. See the Raven manufacturer's instructions, provided with the Apache Sprayer.

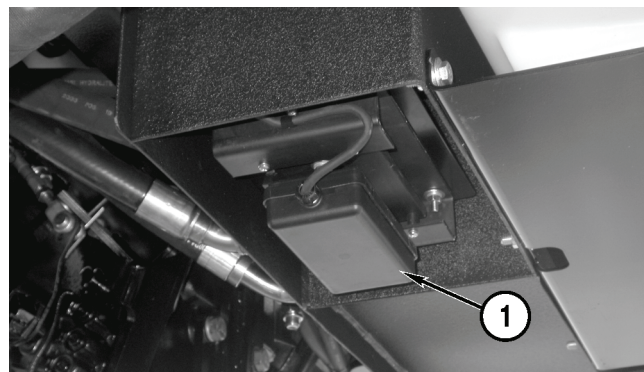


Figure 5-54

Inspect and Repack Wheel and Inter-Flex Bearings

Contact your dealer.

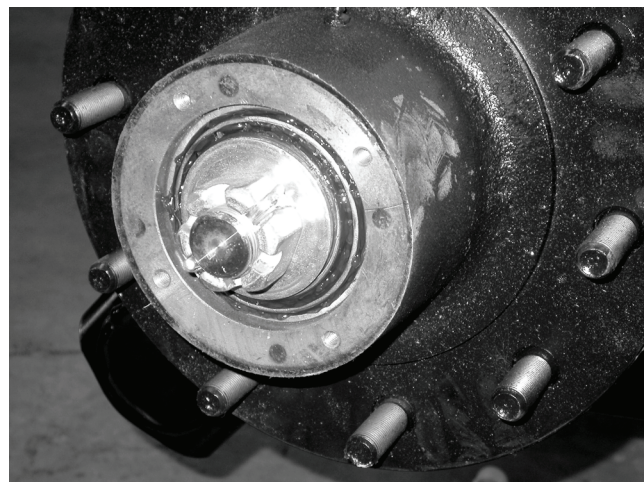


Figure 5-55

Every Year

The following services must be performed yearly.

Adjust Toe-In

Measure Tie Rods

Measure the rear tie rod ends on the left and right steering cylinder. The measurements must be equal and between 4.125 in. (104.7 mm) and 4.50 in. (114.3 mm). Adjust the tie rods if necessary.

1. Safely lift the front of the Apache Sprayer so the front tires are slightly off the ground and turn the steering wheel so the front wheels appear to be pointing straight.
2. Make sure the tie rod ends are fully seated in the taper.
3. Measure the distance that the steering cylinder ram is extended on the left and right wheel. The measurements must be equal and between 3.875 in. (98.4 mm) and 4.125 in. (104.7 mm).
4. Adjust the steering cylinder rams, if necessary, by turning the steering cylinders all the way to the left, then all the way to the right.



Figure 5-56

Measure Toe-in

1. Safely lift the front of the Apache Sprayer so the front tires are slightly off the ground.
2. Turn the steering wheel so the front wheels are pointing straight.
3. Measure and note the distance (**Figure 5-57, 1**) from the center of the left hub to the front of the right rim.
4. Measure and note the distance (**Figure 5-57, 2**) from the center of the left hub to the rear of the right rim.

If distance (**Figure 5-57, 1**) is 0.250 in. (6.35 mm) less than distance (**Figure 5-57, 2**), the toe-in is correct for the right wheel. If the toe-in is not correct, it must be adjusted.

5. Repeat the steps, measuring from the right hub to the left rim, to measure toe-in for the left wheel.
6. Adjust the toe-in on each wheel until it meets specification.

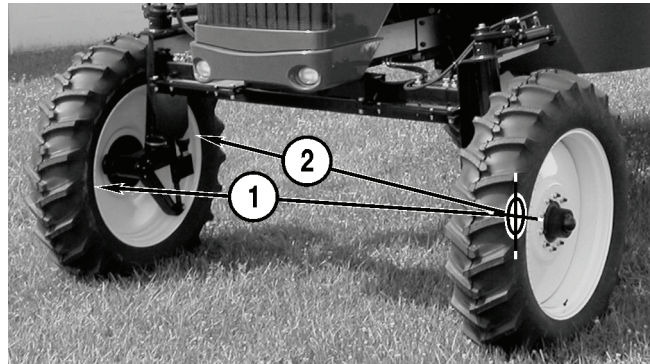


Figure 5-57

Adjust Toe-in

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

1. Loosen the nut and bolt on the tie rod clamp (**Figure 5-58, 1**).
2. Use a wrench on the end of the ram (**Figure 5-58, 2**) to increase or decrease toe-in.

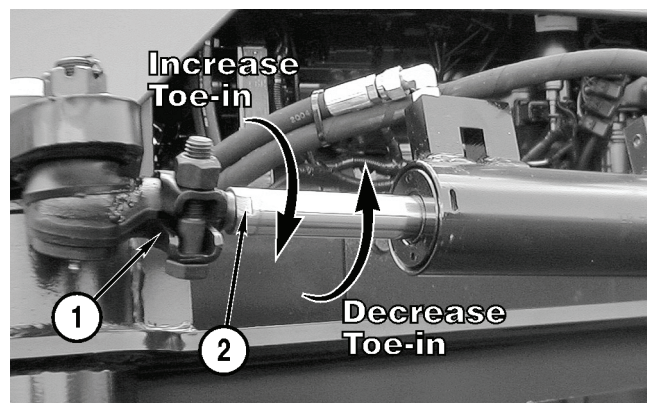


Figure 5-58

Replace 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 (**Figure 5-59, 1**) is mounted on the right side of the Apache Sprayer, in front of the hydraulic tank.

1. Release the four latches and remove the cover from the air cleaner assembly.
2. Use a rocking motion to remove the primary air filter and set aside.
3. Use a rocking motion to remove the safety air filter and discard the old filter.

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.

4. Install the new engine safety air filter.
 - Engine Safety Air Filter Part Number: 201300117
5. Install the primary filter and air cleaner cover, and engage the four latches.

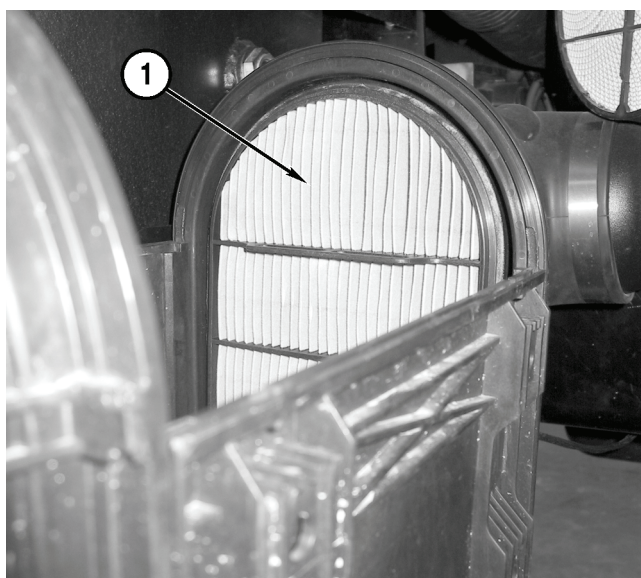


Figure 5-59

Winterize Wet System

NOTICE: The product tank and wet system must be flushed before winterizing. See *Flushing Product Tank (with Optional Roto-Flush)* on page 4-20 and *Flushing Wet System (without Optional Roto-Flush)* on page 4-21.

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

2. Close the rinse tank valve, foam marker valve and sump valve.
3. Set all boom section switches to the ON position and press the agitation decrease button to turn agitation off.

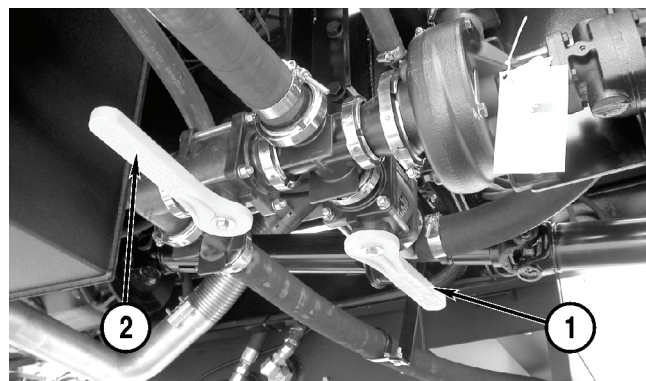


Figure 5-60

4. Connect a compressed air line to the main fill valve (**Figure 5-61, 1**). Apply compressed air at 40 psi (2.7 bar) to blow out the wet system and booms.
5. Cycle the boom section switches (**Figure 5-61, 2**) off and on several times to purge water from around the valves.
6. Disconnect the air line and close the product fill valve.

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

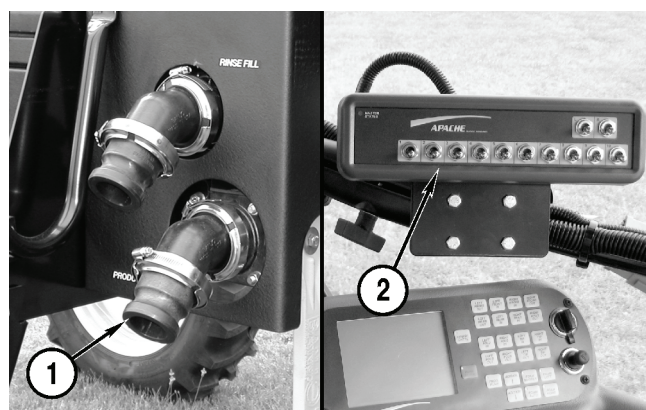
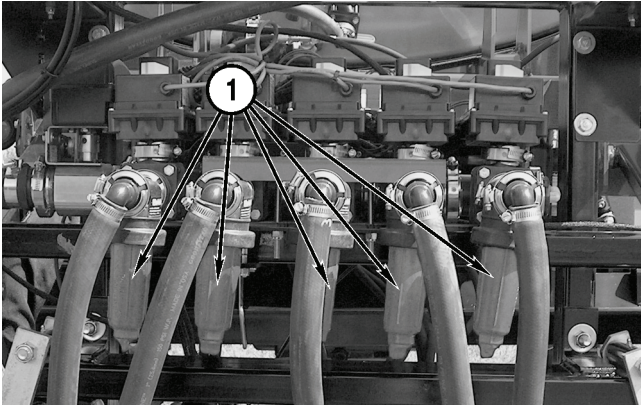


Figure 5-61

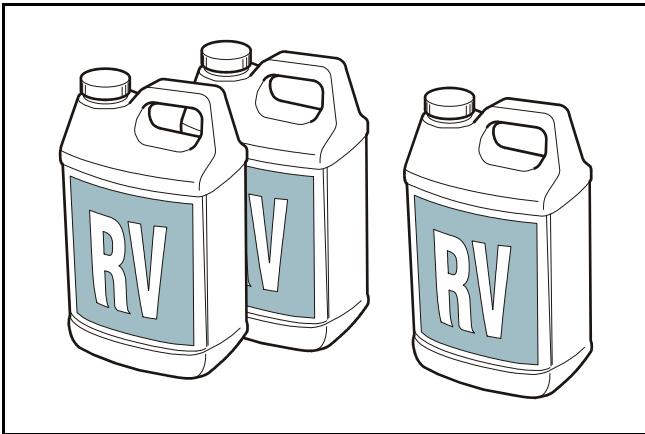
7. Remove all boom section strainers (**Figure 5-62, 1**) and the product strainer.
8. Reinstall the strainer bowls.
9. Store the strainers in a warm, dry location.

**Figure 5-62**

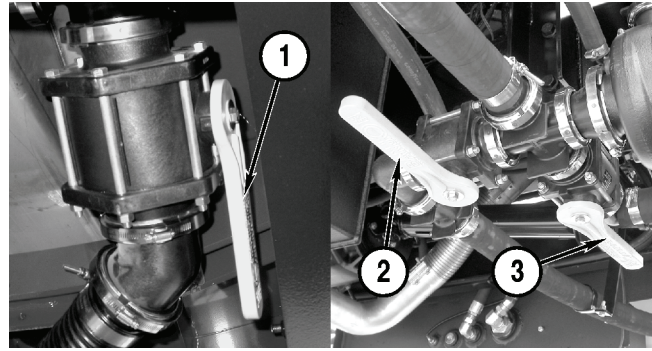
10. Pour approximately 20 gallons (76 liters) of RV antifreeze into the product tank.

NOTICE: Boom lengths over 60 ft (18.3 m) will require more than 20 gallons (76 liters) of antifreeze.

11. Pour 1 gallon (4 liters) of RV antifreeze into the rinse tank.

**Figure 5-63**

12. Repeatedly open and close the sump valve (**Figure 5-64, 1**), rinse tank valve (**Figure 5-64, 2**) and product valve (**Figure 5-64, 3**) to allow the antifreeze to surround the ball valves.
13. Close the rinse tank valve (**Figure 5-64, 2**) and open the sump valve (**Figure 5-64, 1**).
14. Except for one nozzle at the end of each boom section, turn off all the nozzle bodies.
15. Open all manual valves halfway and then close to allow any trapped water to escape.

**Figure 5-64**

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.

16. Start the engine.
17. Unfold and lower the booms as far as possible.
18. Set all boom section switches to the OFF position and press the agitation increase button.
19. Set the product pump switch (**Figure 5-65, 1**) to the ON position.
20. Press the agitation decrease button (**Figure 5-65, 2**) to turn agitation off.
21. One at a time, set the boom section switches (**Figure 5-65, 3**) to the ON position until antifreeze flows from the open nozzle in each boom section.
22. Turn the boom section switches (**Figure 5-65, 3**) to OFF.
23. Set the product pump switch (**Figure 5-65, 1**) to the OFF position.

NOTE: Excess antifreeze may be left in the sprayer.



Figure 5-65

24. Winterize the foamer. For additional information, see *LandMark Injection Foam Marker* on page 4-17.
 - Remove the 0.250 in. (6.35 mm) hose to both the agitation gauge (**Figure 5-66, 2**) and the boom pressure gauge (**Figure 5-66, 1**).
 - Remove the same 0.250 in. (6.35 mm) hose at the agitation valve at fill station.
 - Blow clean compressed air at 80 psi (5.5 bar) through the hose until no more fluid is visible at the gauge end.
 - Repeat this procedure for the boom pressure gauge hose by disconnecting the 0.250 in. (6.35 mm) hose at the gauge and five bank boom valve.
 - Once completed, reconnect the 0.250 in. (6.35 mm) hoses to the gauges and valves.

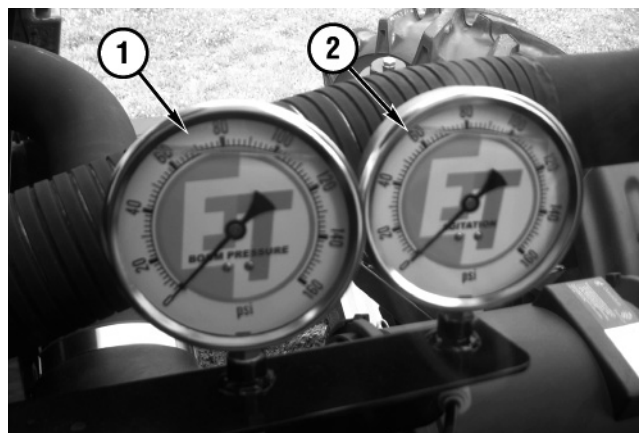


Figure 5-66

Replace Cab Recirculating Air Filter

NOTICE: Do not attempt to clean cab air filters. **ALWAYS** replace with a new filter.

The recirculating air filter (**Figure 5-67, 1**) is mounted in the cab, behind the driver's seat.

1. Grasp the edge of the filter and slide the old air filter up and out of the frame.
2. Discard the old filter.
3. Insert a new filter into the frame with the air flow arrow pointing toward the driver's seat.
 - Air Filter Part Number: 490006660



Figure 5-67

Replace Cab Charcoal Air Filter

The cab charcoal air filter is mounted outside the cab, just behind the entry door.



Figure 5-68

1. Release the latch and open the air filter cover.
2. Slide the old air filter out of the frame and discard.

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

NOTICE: Do not attempt to clean the cab air filter. ALWAYS replace with a new filter.

3. Insert a new filter into the frame with the air flow arrow pointing toward the driver's seat.
 - Charcoal Air Filter Part Number: 490003650
4. Reinstall the cover and engage the latch.

Check Front Suspension Accumulator Charge

Contact your Apache dealer for service.

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

- AS1010 Accumulator Nitrogen Pressure: 900 psi (62.0 bar)
- AS1210 Accumulator Nitrogen Pressure: 950 psi (65.5 bar)

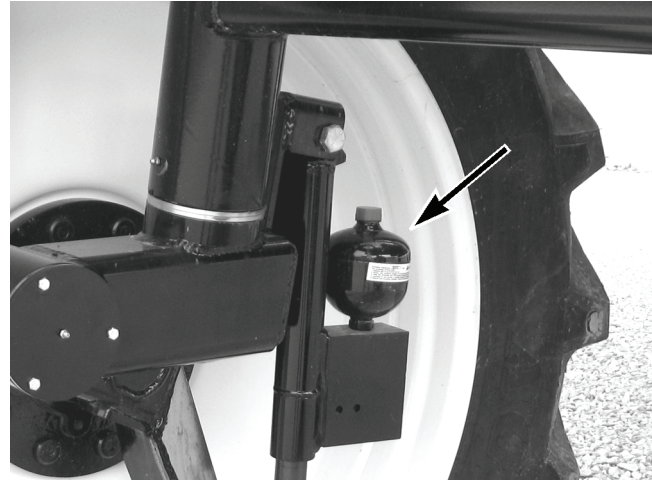


Figure 5-69

Replace Drop Box Fluid

The drop box drain, level and fill plugs are located on the drop box at each rear wheel. The left drop box is shown in **Figure 5-70**.

1. Remove the drain plug (**Figure 5-70, 1**) and drain the fluid into a suitable container.
2. Dispose of the fluid properly.
3. Install the drain plug.

NOTICE: Use only Lucas 80/90 Gear Oil for the drop box fluid.

4. Remove the drop box fill plug (**Figure 5-70, 2**) and level plug (**Figure 5-70, 3**).
5. Add fluid until it is level with the bottom of the level hole (**Figure 5-70, 3**).
 - Drop Box Fluid Capacity: 21 quarts (20 liters) approximately
6. Install and tighten the fill plug (**Figure 5-70, 2**) and the level plug (**Figure 5-70, 3**).
7. Repeat the steps for the other drop box.

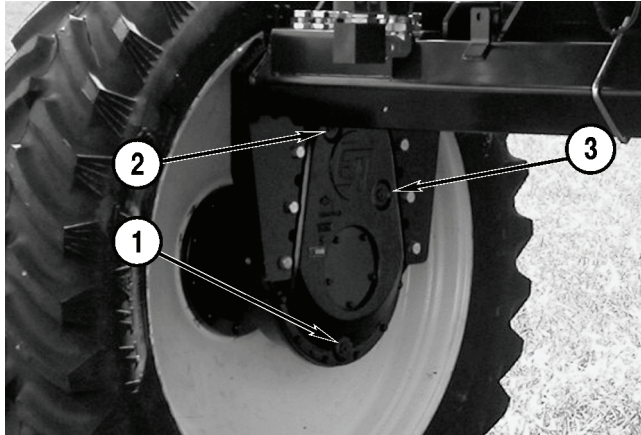


Figure 5-70

Every 1000 Hours or Yearly

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

Inspect Front Accumulator

Inspect the accumulators and 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 (**Figure 5-71**).

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

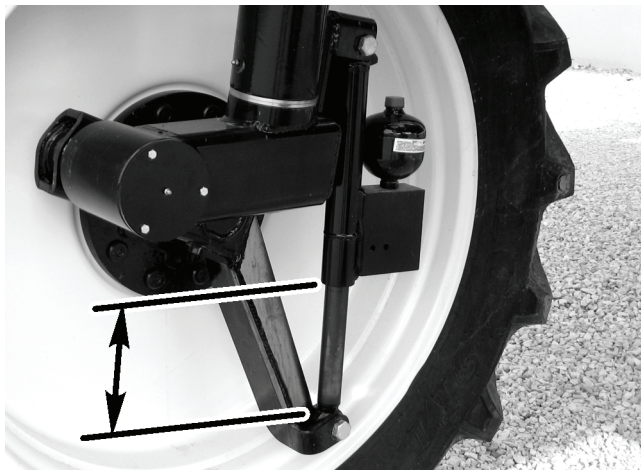


Figure 5-71

Clean Transmission Fluid Strainer

For transmission fluid strainer cleaning procedures, see *Replace Transmission Fluid and Filter* on page 5-24.

Replace Hydraulic Fluid

The hydraulic fluid drain plug (**Figure 5-72, 1**) is located under the Apache Sprayer, on the bottom of the hydraulic fluid reservoir. The hydraulic fluid fill location (**Figure 5-72, 2**) is on top of the reservoir.

1. Remove the hydraulic fluid drain plug.
2. Drain the fluid into a suitable container with a capacity of more than 30 gallons (113.5 liters).
3. Dispose of the fluid properly.
4. Install the drain plug.

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

5. Fill the hydraulic fluid reservoir with Lucas Universal Hydraulic Fluid.
 - Hydraulic Fluid Reservoir Capacity: 30 gallons (113.5 liters) approximately
6. Use the sight glass to check the fluid level. See *Check Hydraulic Fluid Level* on page 5-12.

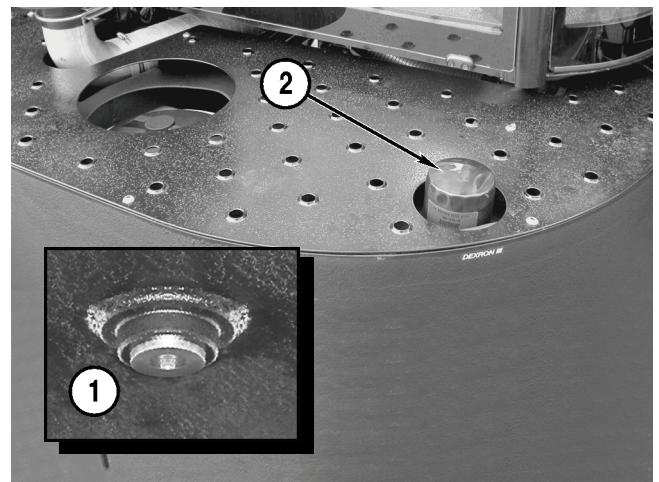


Figure 5-72

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CHAPTER 6

CUMMINS ENGINE FAULT CODES

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

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
418	97	15	Water in Fuel Indicator High - Data Valid but Above Normal Operational Range – Least Severe Level
428	97	3	Water in Fuel Sensor Circuit - Voltage Above Normal, or Shorted to High Source
429	97	4	Water in Fuel Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
135	100	3	Oil Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
141	100	4	Oil Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
143	100	18	Operational Range - Moderately Severe Level
415	100	1	Operational Range - Most Severe Level
435	100	2	Oil Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
122	102	3	Intake Manifold Pressure Sensor Circuit – Voltage Above Normal, or Shorted to High Source
123	102	4	Intake Manifold Pressure Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
433	102	2	Erratic, Intermittent, or Incorrect
2973	102	2	Erratic, Intermittent, or Incorrect
595	103	16	Turbocharger #1 Speed High - Data Valid but Above Normal Operational Range – Moderately Severe Level
687	103	18	Turbocharger #1 Speed Low - Data Valid but Below Normal Operational Range – Moderately Severe Level
2345	103	10	Turbocharger speed invalid rate of change detected - Abnormal Rate of Change
153	105	3	Intake Manifold Air Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
154	105	4	Intake Manifold Air Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
155	105	0	Intake Manifold Air Temperature High – Data Valid but Above Normal Operational Range - Most Severe Level
488	105	16	Intake Manifold 1 Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
2964	105	15	Severe Level
221	108	3	Barometric Pressure Sensor Circuit – Voltage Above Normal, or Shorted to High Source
222	108	4	Barometric Pressure Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
295	108	2	Barometric Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
231	109	3	Coolant Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
232	109	4	Coolant Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
233	109	18	Operational Range - Moderately Severe Level
144	110	3	Coolant Temperature Sensor Circuit – Voltage Above Normal, or Shorted to High Source
145	110	4	Coolant Temperature Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
146	110	16	Coolant Temperature High - Data Valid but Above Normal Operational Range - Moderately Severe Level
151	110	0	Coolant Temperature Low - Data Valid but Above Normal Operational Range - Most Severe Level
334	110	2	Coolant Temperature Sensor Circuit – Data Erratic, Intermittent, or Incorrect
2963	110	15	Engine Coolant Temperature High - Data Valid but Above Normal Operational Range - Least Severe Level
195	111	3	Coolant Level Sensor Circuit - Voltage Above Normal, or Shorted to High Source
196	111	4	Coolant Level Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
197	111	18	Operational Range - Moderately Severe Level
235	111	1	Operational Range - Most Severe Level
422	111	2	Coolant Level - Data Erratic, Intermittent, or Incorrect
449	157	0	Fuel Pressure High - Data Valid but Above Normal Operational Range – Moderately Severe Level
451	157	3	Injector Metering Rail #1 Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
452	157	4	Injector Metering Rail #1 Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
553	157	16	Injector Metering Rail #1 Pressure High – Data Valid but Above Normal Operational Range - Moderately Severe Level
554	157	2	Fuel Pressure Sensor Error - Data Erratic, Intermittent, or Incorrect
559	157	18	Injector Metering Rail #1 Pressure Low – Data Valid but Below Normal Operational Range - Moderately Severe Level
1911	157	0	Injector Metering Rail 1 Pressure - Data Valid but Above Normal Operational Range - Most Severe Level
2249	157	1	Injector Metering Rail 1 Pressure - Data Valid but Below Normal Operational Range - Most Severe Level
951	166	2	Cylinder Power Imbalance Between Cylinders - Data Erratic, Intermittent, or Incorrect
596	167	16	Electrical Charging System Voltage High – Data Valid but Above Normal Operational Range - Moderately Severe Level

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
597	167	18	Electrical Charging System Voltage Low – Data Valid but Below Normal Operational Range - Moderately Severe Level
598	167	1	Electrical Charging System Voltage Low – Data Valid but Below Normal Operational Range - Most Severe Level
441	168	18	Battery #1 Voltage Low - Data Valid but Below Normal Operational Range – Moderately Severe Level
442	168	16	Battery #1 Voltage High - Data Valid but Above Normal Operational Range – Moderately Severe Level
249	171	3	Ambient Air Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
256	171	4	Ambient Air Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
261	174	16	Engine Fuel Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
263	174	3	Engine Fuel Temperature Sensor 1 Circuit - Voltage Above Normal, or Shorted to High Source
265	174	4	Engine Fuel Temperature Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
212	175	3	Engine Oil Temperature Sensor 1 Circuit - Voltage Above Normal, or Shorted to High Source
213	175	4	Engine Oil Temperature Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
214	175	0	Engine Oil Temperature - Data Valid but Above Normal Operational Range - Most Severe Level
425	175	2	Engine Oil Temperature - Data Erratic, Intermittent, or Incorrect
234	190	0	Engine Speed High - Data Valid but Above Normal Operational Range - Most Severe Level
689	190	2	Primary Engine Speed Sensor Error – Data Erratic, Intermittent, or Incorrect
2321	190	2	Engine Speed / Position Sensor #1 - Data Erratic, Intermittent, or Incorrect
319	251	2	Real Time Clock Power Interrupt - Data Erratic, Intermittent, or Incorrect
293	441	3	Auxiliary Temperature Sensor Input # 1 Circuit - Voltage Above Normal, or Shorted to High Source
294	441	4	Auxiliary Temperature Sensor Input # 1 Circuit - Voltage Below Normal, or Shorted to Low Source
431	558	2	Data Erratic, Intermittent, or Incorrect
432	558	13	Out of Calibration
551	558	4	Voltage Below Normal, or Shorted to Low Source
238	611	4	Sensor Supply Voltage #3 Circuit – Voltage Below Normal, or Shorted to Low Source

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
523	611	2	OEM Intermediate (PTO) Speed Switch Validation - Data Erratic, Intermittent, or Incorrect
757	611	31	Electronic Control Module data lost - Condition Exists
2185	611	3	Sensor Supply Voltage #4 Circuit – Voltage Above Normal, or Shorted to High Source
2186	611	4	Sensor Supply Voltage #4 Circuit – Voltage Below Normal, or Shorted to Low Source
2292	611	16	Normal Operational Range - Moderately Severe Level
2293	611	18	Expected - Data Valid but Below Normal Operational Range - Moderately Severe Level
115	612	2	Engine Speed/Position Sensor Circuit lost both of two signals from the magnetic pickup sensor - Data Erratic, Intermittent, or incorrect
434	627	2	Power Lost without Ignition Off - Data Erratic, Intermittent, or Incorrect
1117	627	2	Power Lost With Ignition On - Data Erratic, Intermittent, or Incorrect
111	629	12	Engine Control Module Critical internal failure - Bad intelligent Device or Component
343	629	12	Engine Control Module Warning internal hardware failure - Bad Intelligent Device or Component
351	629	12	Injector Power Supply - Bad Intelligent Device or Component
341	630	2	Engine Control Module data lost - Data Erratic, Intermittent, or Incorrect
342	630	13	Electronic Calibration Code Incompatibility - Out of Calibration
2217	630	31	ECM Program Memory (RAM) Corruption - Condition Exists
2311	633	31	Fueling Actuator #1 Circuit Error – Condition Exists
285	639	9	SAE J1939 Multiplexing PGN Time-out Error - Abnormal Update Rate
286	639	13	SAE J1939 Multiplexing Configuration Error – Out of Calibration
2384	641	4	VGT Actuator Driver Circuit - Voltage Below Normal, or Shorted to Low Source
2385	641	3	VGT Actuator Driver Circuit - Voltage Above Normal, or Shorted to High Source
237	644	2	External Speed Input (Multiple Unit Synchronization) - Data Erratic, Intermittent, or Incorrect
245	647	4	Fan Control Circuit - Voltage Below Normal, or Shorted to Low Source
2377	647	3	Fan Control Circuit - Voltage Above Normal, or Shorted to High Source
322	651	5	Injector Solenoid Cylinder #1 Circuit – Current Below Normal, or Open Circuit
1139	651	7	Injector Cylinder #1 - Mechanical System Not Responding Properly or Out of Adjustment
331	652	5	Injector Solenoid Cylinder #2 Circuit – Current Below Normal, or Open Circuit

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
1141	652	7	Injector Cylinder #2 - Mechanical System Not Responding Properly or Out of Adjustment
324	653	5	Injector Solenoid Cylinder #3 Circuit – Current Below Normal, or Open Circuit
1142	653	7	Injector Cylinder #3 - Mechanical System Not Responding Properly or Out of Adjustment
332	654	5	Injector Solenoid Cylinder #4 Circuit – Current Below Normal, or Open Circuit
1143	654	7	Injector Cylinder #4 - Mechanical System Not Responding Properly or Out of Adjustment
323	655	5	Injector Solenoid Cylinder #5 Circuit – Current Below Normal, or Open Circuit
1144	655	7	Injector Cylinder #5 - Mechanical System Not Responding Properly or Out of Adjustment
325	656	5	Injector Solenoid Cylinder #6 Circuit – Current Below Normal, or Open Circuit
1145	656	7	Injector Cylinder #6 - Mechanical System Not Responding Properly or Out of Adjustment
584	677	3	Starter Relay Circuit - Voltage Above Normal, or Shorted to High Source
585	677	4	Starter Relay Circuit - Voltage Below Normal, or Shorted to Low Source
2557	697	3	Auxiliary PWM Driver #1 - Voltage Above Normal, or Shorted to High Source
2558	697	4	Auxiliary PWM Driver #1 - Voltage Below Normal, or Shorted to Low Source
527	702	3	Auxiliary Input/Output 2 Circuit - Voltage Above Normal, or Shorted to High Source
529	703	3	Auxiliary Input/Output 3 Circuit - Voltage Above Normal, or Shorted to High Source
779	703	11	Warning Auxiliary Equipment Sensor Input # 3 (OEM Switch) - Root Cause Not Known
2195	703	14	Auxiliary Equipment Sensor Input 3 Engine Protection Critical - Special Instructions
731	723	7	Mechanical System Not Responding Properly or Out of Adjustment
753	723	2	Engine Speed/Position #2 Camshaft sync error - Data Erratic, Intermittent, or Incorrect
778	723	2	Engine Speed Sensor (Camshaft) Erratic, Intermittent, or Incorrect
2322	723	2	Engine Speed / Position Sensor #2 - Data Erratic, Intermittent, or Incorrect
2555	729	3	Intake Air Heater #1 Circuit - Voltage Above Normal, or Shorted to High Source
2556	729	4	Intake Air Heater #1 Circuit - Voltage Below Normal, or Shorted to Low Source

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
133	974	3	Circuit – Voltage Above Normal, or Shorted to High Source
134	974	4	Circuit – Voltage Below Normal, or Shorted to Low Source
288	974	19	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Data Error - Received Network Data In Error
284	1043	4	Engine Speed/Position Sensor (Crankshaft) Supply Voltage Circuit - Voltage Below Normal, or Shorted to Low Source
387	1043	3	Accelerator Pedal or Lever Position Sensor Supply Voltage Circuit - Voltage Above Normal, or Shorted to High Source
443	1043	4	Accelerator Pedal or Lever Position Sensor Supply Voltage Circuit - Voltage Below Normal, or Shorted to Low Source
2362	1072	4	Engine Brake Actuator Circuit #1 – Voltage Below Normal, or Shorted to Low Source
2366	1072	3	Engine Brake Actuator Circuit #1 – Voltage Above Normal, or Shorted to High Source
2363	1073	4	Engine Brake Actuator Circuit #2 – Voltage Below Normal, or Shorted to Low Source
2367	1073	3	Engine Brake Actuator Circuit #2 – Voltage Above Normal, or Shorted to High Source
2265	1075	3	Fuel Priming Pump Control Signal Circuit – Voltage Above Normal, or Shorted to High Source
2266	1075	4	Fuel Priming Pump Control Signal Circuit – Voltage Below Normal, or Shorted to Low Source
352	1079	4	Sensor Supply Voltage #1 Circuit – Voltage Below Normal, or Shorted to Low Source
386	1079	3	Sensor Supply Voltage #1 Circuit – Voltage Above Normal, or Shorted to High Source
187	1080	4	Sensor Supply Voltage #2 Circuit – Voltage Below Normal, or Shorted to Low Source
227	1080	3	Sensor Supply Voltage #2 Circuit – Voltage Above Normal, or Shorted to High Source
697	1136	3	ECM Internal Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
698	1136	4	ECM Internal Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
691	1172	3	Turbocharger #1 Compressor Inlet Temperature Sensor Circuit – Voltage Above Normal, or Shorted to High Source
692	1172	4	Turbocharger #1 Compressor Inlet Temperature Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
338	1267	3	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage Above Normal, or Shorted to High Source

Cummins Fault Code	These codes will display on the console		Cummins Description
	J1939 SPN	J1939 FMI	
339	1267	4	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage Below Normal, or Shorted to Low Source
271	1347	4	High Fuel Pressure Solenoid Valve Circuit – Voltage Below Normal, or Shorted to Low Source
272	1347	3	High Fuel Pressure Solenoid Valve Circuit – Voltage Above Normal, or Shorted to High Source
275	1347	7	Fuel Pumping Element (Front) – Mechanical System Not Responding Properly or Out of Adjustment
281	1347	7	High Fuel Pressure Solenoid Valve #1 – Mechanical System Not Responding Properly or Out of Adjustment
497	1377	2	Multiple Unit Synchronization Switch Circuit - Data Erratic, Intermittent, or Incorrect
649	1378	31	Change Lubricating Oil and Filter – Condition Exists
296	1388	14	Auxiliary Pressure Sensor Input 1 - Special Instructions
297	1388	3	Auxiliary Pressure Sensor Input # 2 Circuit - Voltage Above Normal, or Shorted to High Source
298	1388	4	Auxiliary Pressure Sensor Input # 2 Circuit - Voltage Below Normal, or Shorted to Low Source
211	1484	31	Additional Auxiliary Diagnostic Codes logged - Condition Exists
1256	1563	2	Control Module Identification Input State Error - Data Erratic, Intermittent, or Incorrect
1257	1563	2	Control Module Identification Input State Error - Data Erratic, Intermittent, or Incorrect
1239	2623	3	Voltage Above Normal, or Shorted to High Source
1241	2623	4	Voltage Below Normal, or Shorted to Low Source
2347	2629	15	Turbocharger Compressor Outlet Temperature (Calculated) - Data Valid but Above Normal Operational Range – Least Severe Level
2346	2789	15	Turbocharger Turbine Inlet Temperature (Calculated) - Data Valid but Above Normal Operational Range – Least Severe Level
2115	2981	3	Coolant Pressure 2 Circuit - Voltage Above Normal, or Shorted to High Source
2116	2981	4	Coolant Pressure 2 Circuit - Voltage Below Normal, or Shorted to Low Source
2117	2981	18	Operational Range - Moderately Severe Level

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CHAPTER 7

TORQUE VALUE CHARTS

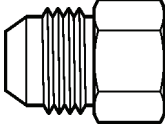
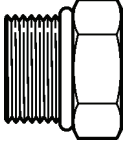
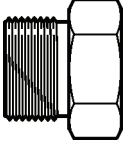
Fittings

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

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

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

Size Chart

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

Torque Value Chart

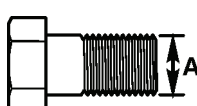
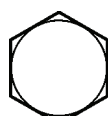


SAE Dash Size	TORQUE					
	SAE 37° Flare		O-ring Straight Thread		Face Seal	
	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m
2	4	5	4	5	----	----
3	8	11	9	12	----	----
4	12	16	16	22	18	25
5	15	20	22	30	---	---
6	18	25	35	48	27	37
8	37	50	60	82	40	54
10	48	65	105	143	63	86
12	74	100	140	190	92	125
14	88	120	184	250	----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

Bolts







Always tighten fittings to the values below unless a different torque value is specified. Fasteners must always be replaced with the same grade.

Make sure fitting threads are clean and threads are engaged properly. All torque values are adopted from SAE J1701 and SAE J1701M.

SAE Series Torque Value Chart

 A = Bolt Diameter		 SAE Grade 2 (No Markings)		 SAE Grade 5 (3 Radial Dashes)		 SAE Grade 8 (6 Radial Dashes)	
A Diameter (Inches)	Wrench Size (Inches)	GRADE					
		SAE 2		SAE 5		SAE 8	
		lb-ft	N-m	lb-ft	N-m	lb-ft	N-m
1/4	7/16	6	8	10	13	14	18
5/16	1/2	12	17	19	26	27	37
3/8	9/16	23	31	35	47	49	67
7/16	5/8	36	48	55	75	78	106
1/2	3/4	55	75	85	115	120	163
9/16	13/16	78	106	121	164	171	232
5/8	15/16	110	149	170	230	240	325
3/4	1 1/8	192	261	297	403	420	569
7/8	1 5/16	306	416	474	642	669	907
1	1 1/2	467	634	722	979	1020	1383

Metric Series Torque Value Chart

 Diameter & Thread Pitch (Millimeters)		 Metric Grade 8.8	 Metric Grade 10.9	 Metric Grade 8.8	 Metric Grade 10.9					 Diameter & Thread Pitch (Millimeters)
	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

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CHAPTER 8

TROUBLESHOOTING

Apache Sprayer Troubleshooting Symptoms and Solutions

SYMPTOM	SOLUTION
Parking brake will not engage.	Check brake pads for wear. Check electrical coil, on hydraulic junction block under the cab, for power. Check hose connections to brake canister on brake disc.
Vehicle will not move forward or backward.	Parking brake is engaged. Check electrical connections on parking brake and transmission. Contact your dealer.
Constant alarm sounds when vehicle moves forward or backward.	Check transmission fluid level. Check wire connection at sending unit. Contact your dealer.
Vehicle will not move forward.	Check driveshaft. Check transmission fluid level. Check electrical connections on transmission. Contact your dealer.
Vehicle will not move backward.	Check driveshaft. Check transmission fluid level. Check electrical connections on transmission. Contact your dealer.
Engine will not start.	Check diesel fuel level. Check neutral safety relay. Check electrical connections in side console, under T-handle
Vehicle steering does not work.	Check hydraulic fluid level. Check for hydraulic fluid leaks. Check steering column coupling on steering motor.

SYMPTOM	SOLUTION
Transmission will not shift gears.	Check transmission fluid level. Contact your dealer.
Vehicle brakes do not work.	Check differential fluid level. Check push rods on master cylinder. Contact your dealer.
No power to console in cab.	Check electrical connections in right rear corner of cab, near fuse box.
Road and service lights do not work.	Confirm light switches in ON position. Check electrical connections to switches. Check for power at light housings. Contact your dealer.
Turn signals and/or flashers do not work.	Confirm lever/switch in ON position. Check electrical connections at light housings. Check for power at light housings.
Booms will not fold or unfold.	Confirm engine is running. Check hydraulic fluid level. Confirm booms are greased properly. Check for hydraulic fluid leaks. Check electrical connections in cab and at boom manifold.
Booms will not tilt up or down.	Confirm engine is running. Check hydraulic fluid level. Check for hydraulic fluid leaks. Check electrical connections in cab and at boom manifold.
Apache will not spray.	Confirm engine is running. Confirm product in product tank. Confirm ball valves from tank to product pump are open. Confirm product pump is turned on. Check ground speed on Raven display. Confirm boom valves are opening.
Booms will not turn off.	Check boom valves for operation. Check electrical connections at boom valves. Check electrical connections in cab.
Seat will not raise or lower.	Check wire connections at right side of seat.
Raven monitor does not turn on.	Check fuse in back of console.

SYMPTOM	SOLUTION
Front suspension cylinder is flat.	Lift tire off ground and check accumulator fluid. If fluid is foaming, the accumulator has failed. If fluid is low, fill to top of plug. Check operation. Contact your dealer.
Rear suspension will not rise.	Check hydraulic fluid level. Check electrical connections at suspension block and switches.
Product pump will not turn on.	Confirm product pump switch in ON position. Check electrical connections at hydraulic valve block. Check electrical connections in cab.
A/C does not cool.	Confirm A/C switch in ON position. Confirm fan in ON position. Check belt to compressor. Contact your dealer.

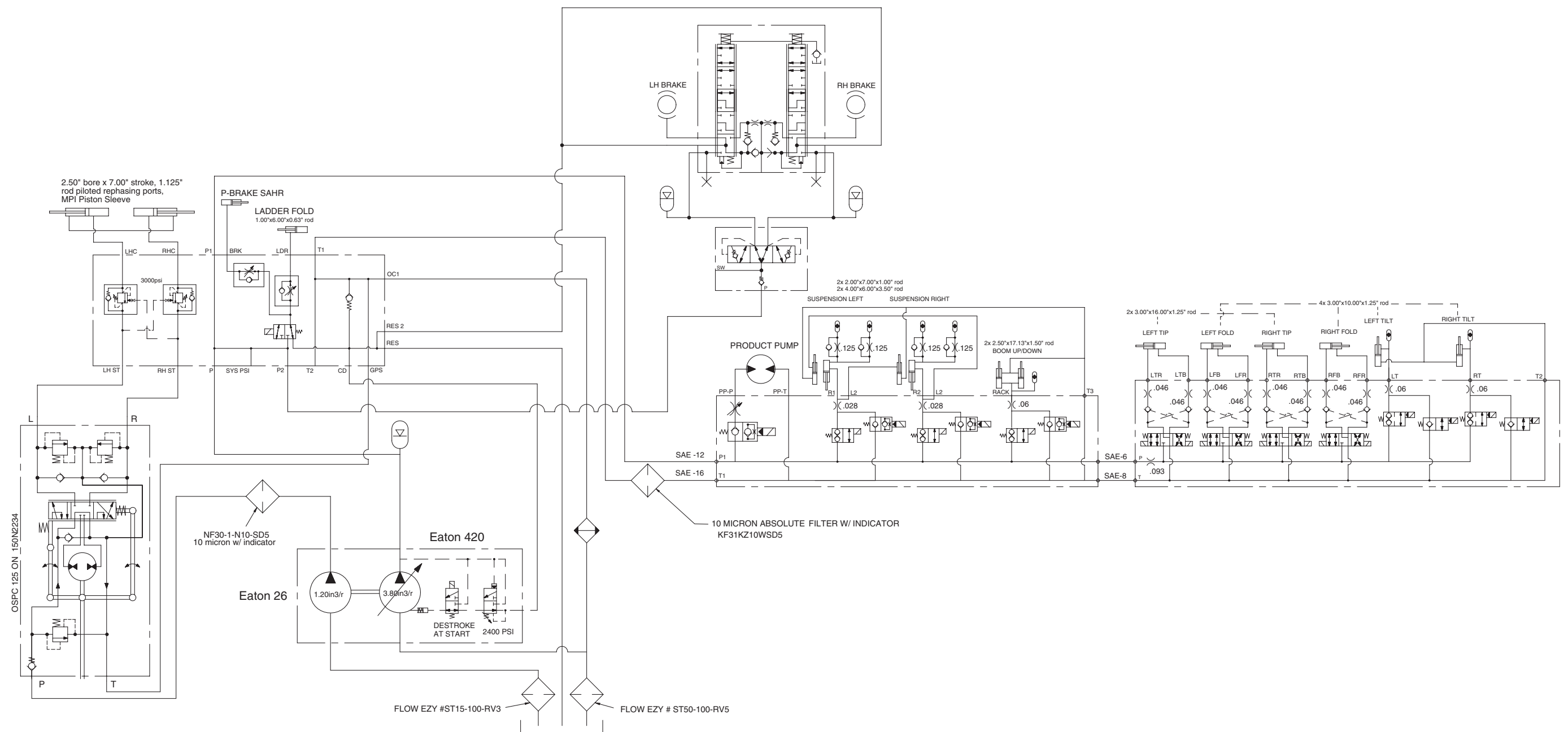
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APACHE™

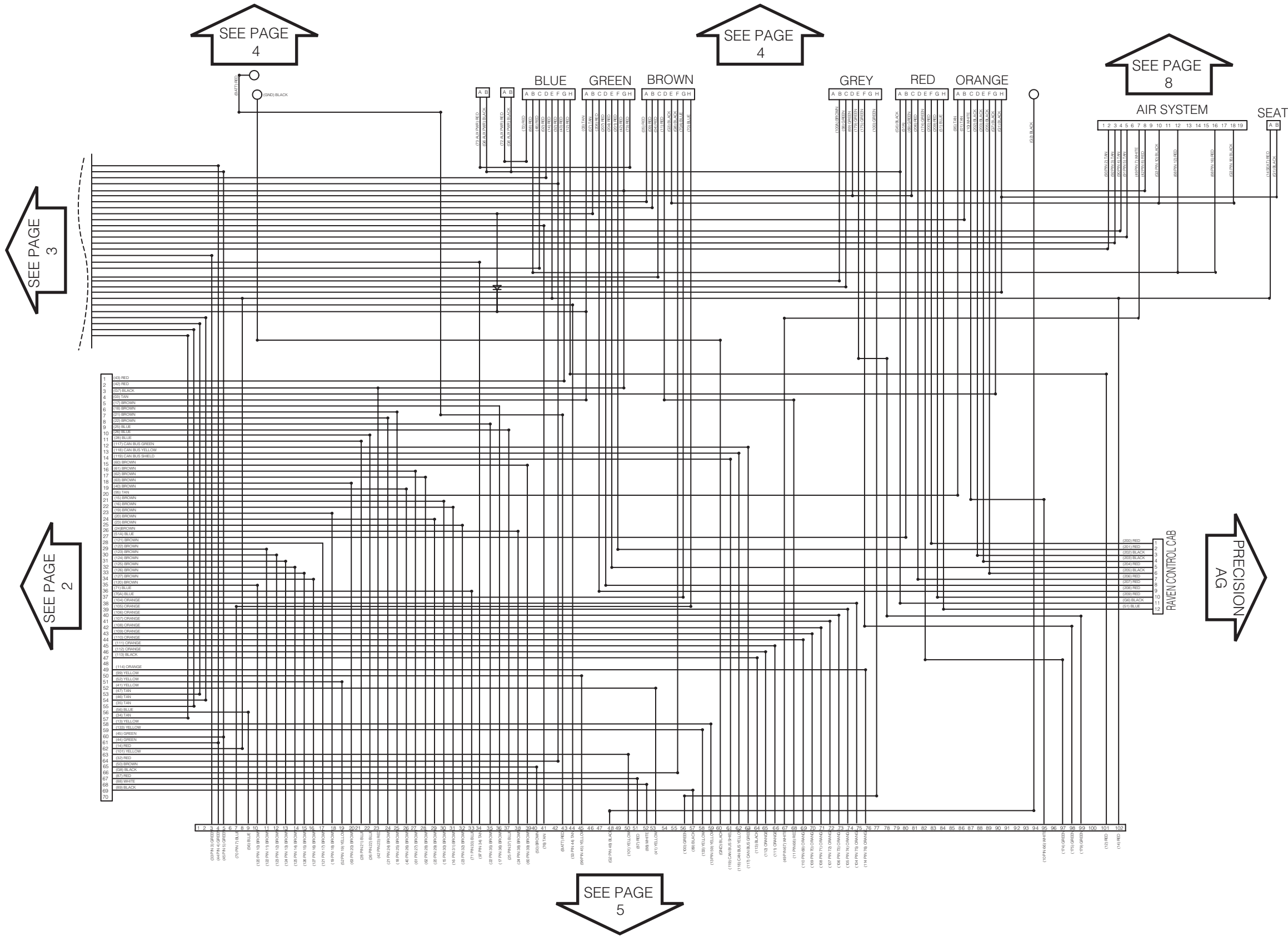
CHAPTER 9

SYSTEM SCHEMATICS

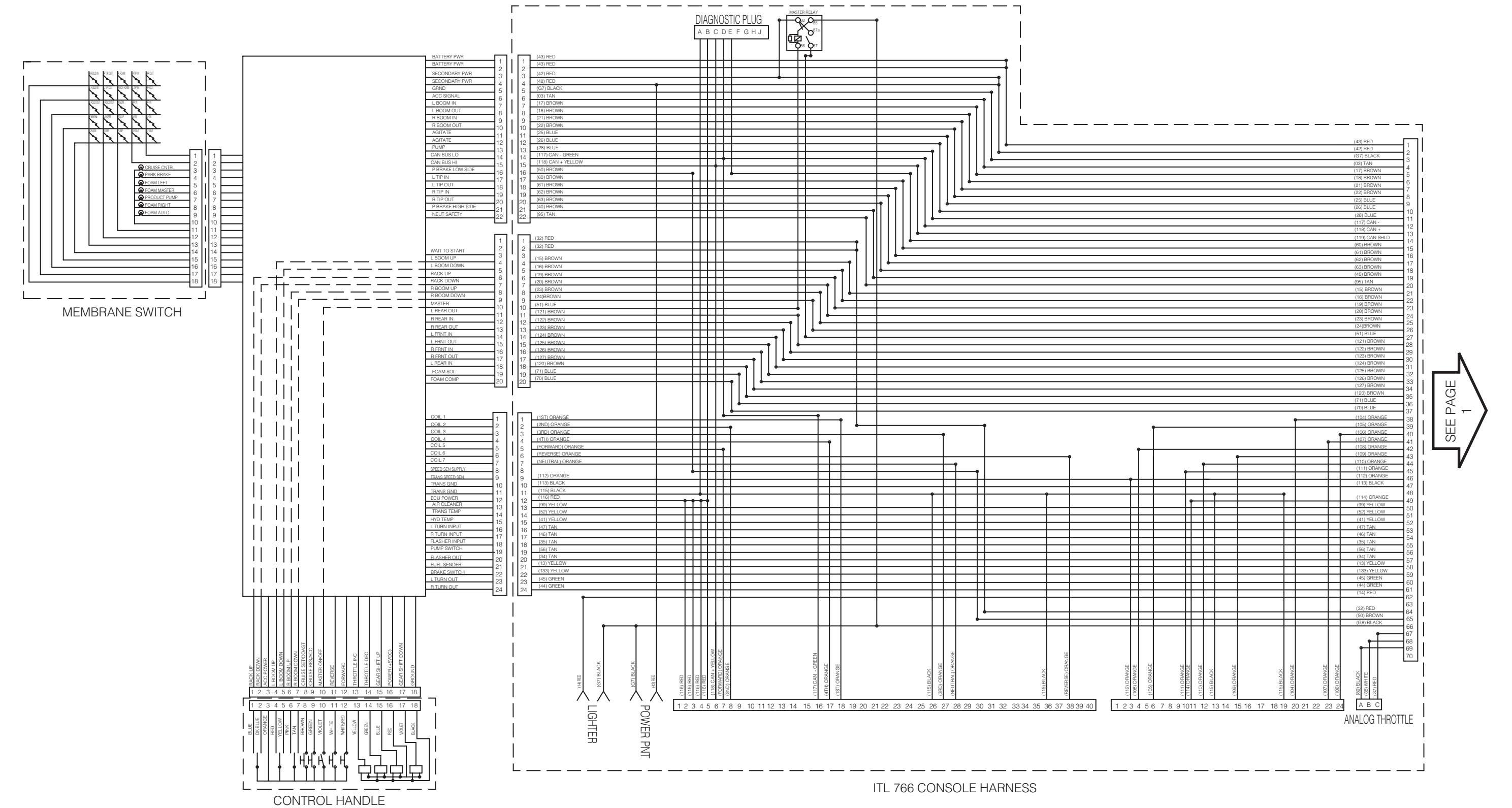
Hydraulic System



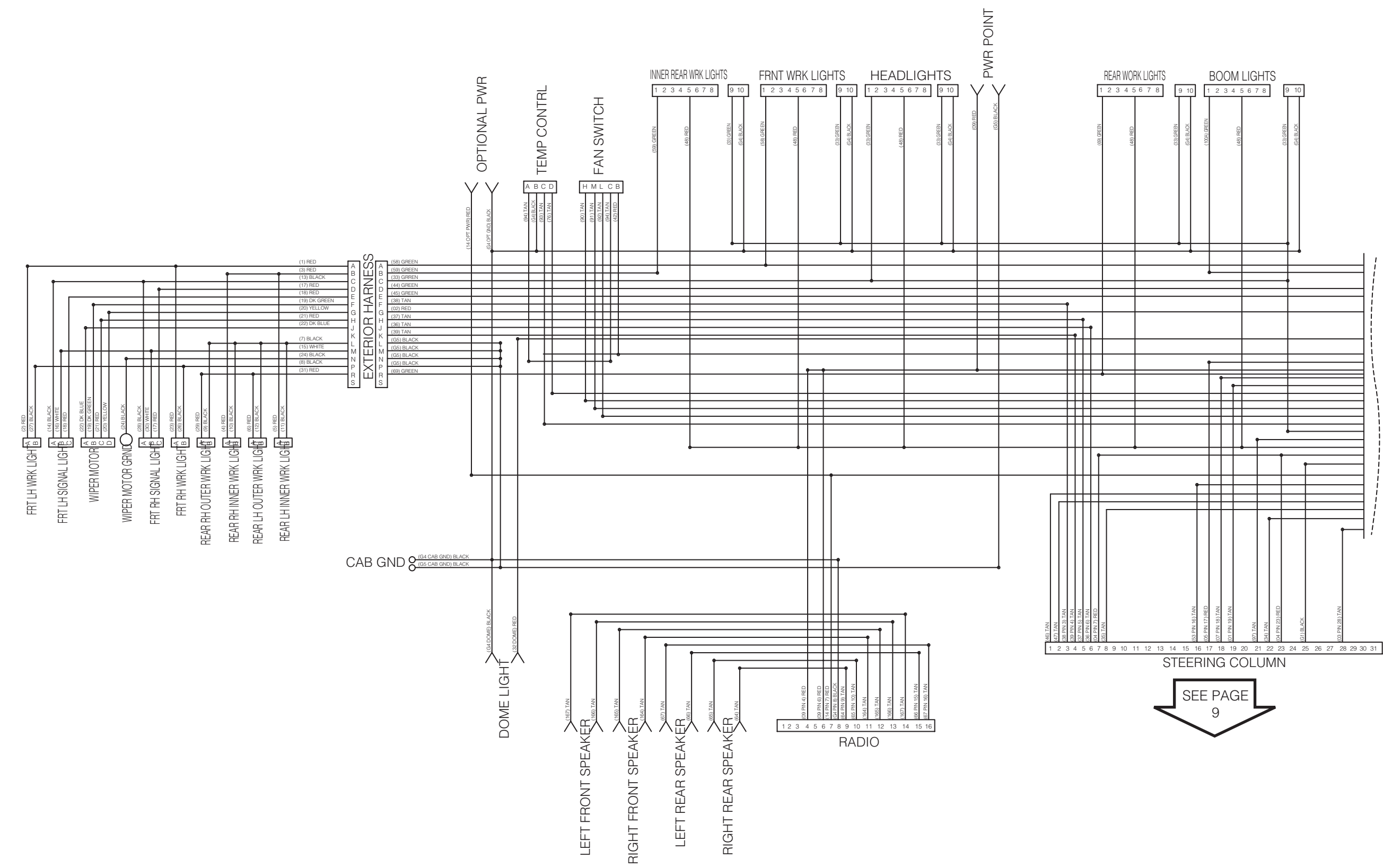
Electrical System (Sheet 1 of 14)



Electrical System (Sheet 2 of 14)



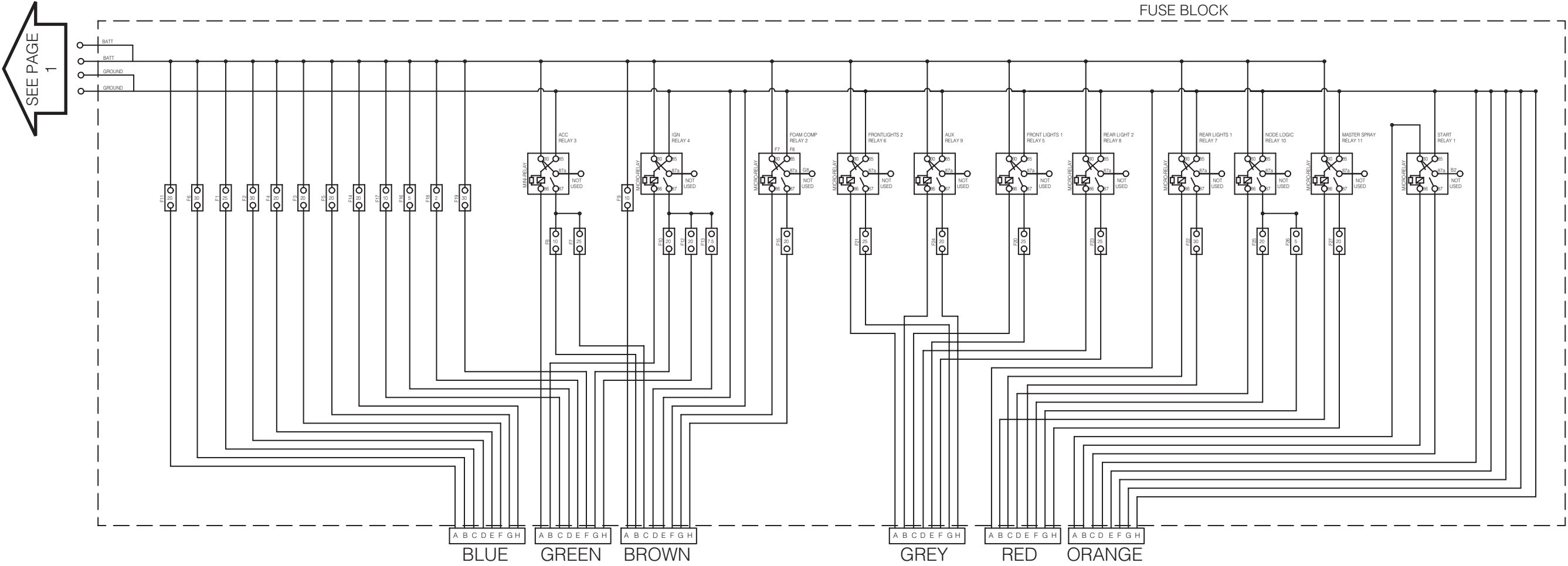
Electrical System (Sheet 3 of 14)



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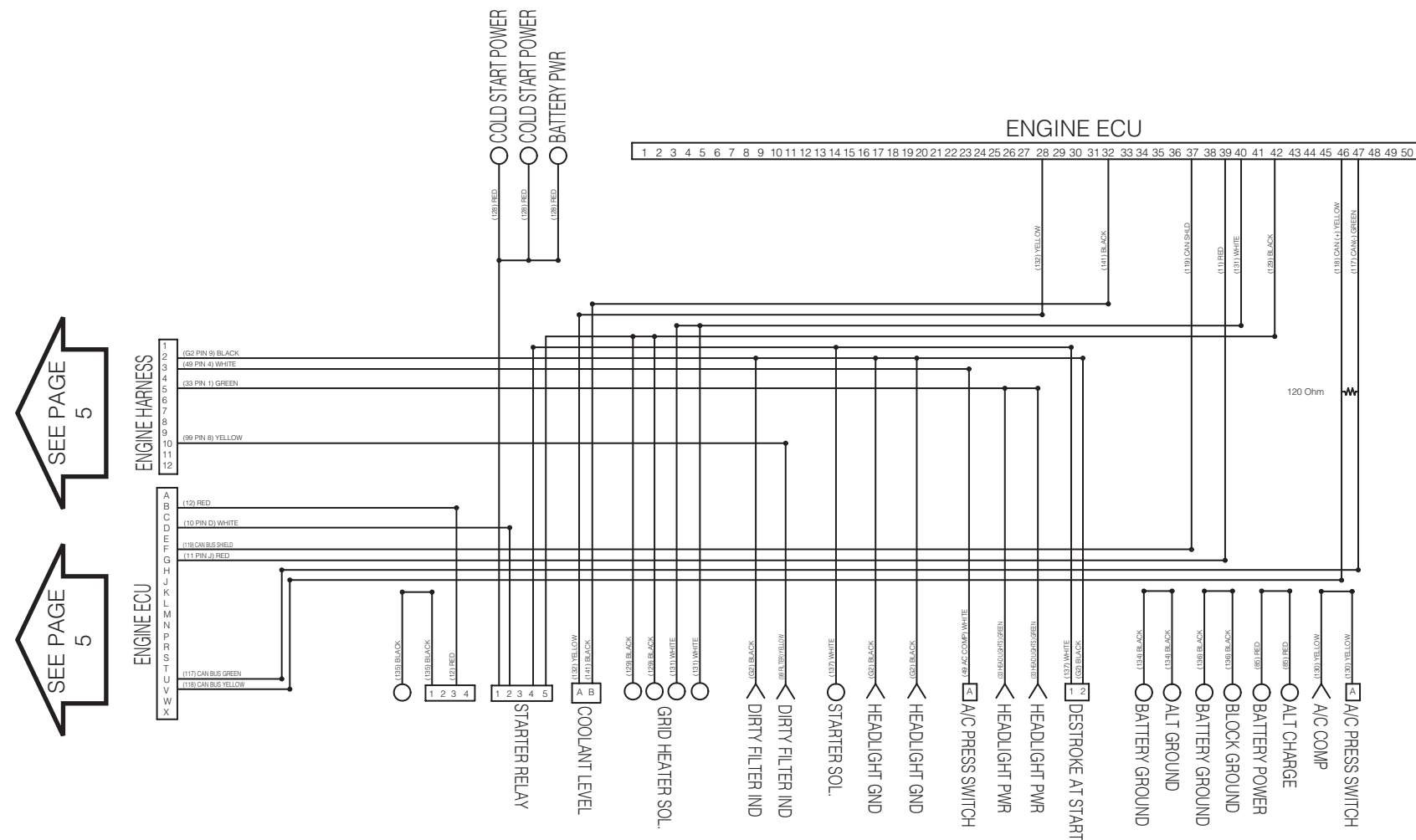
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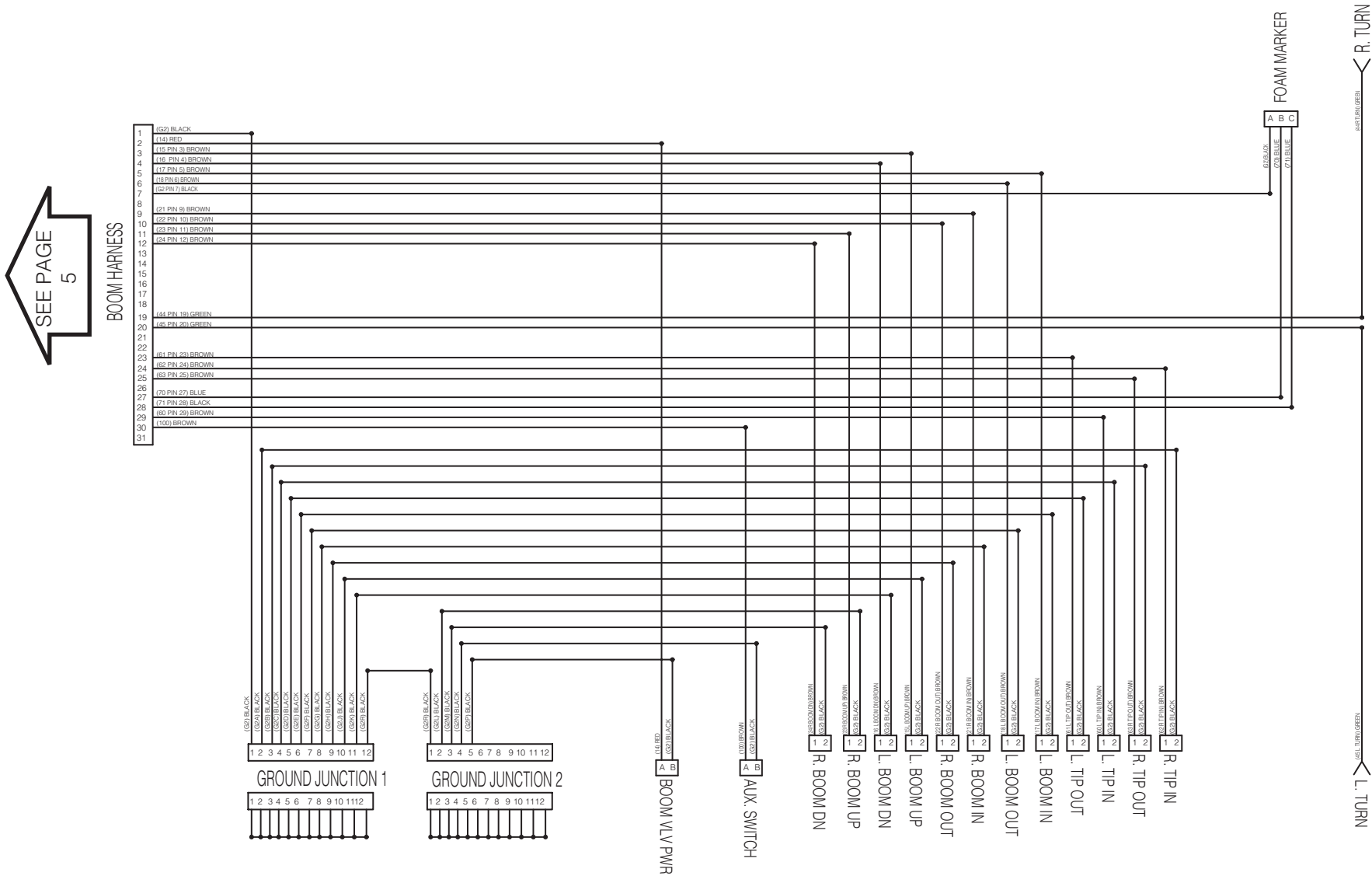
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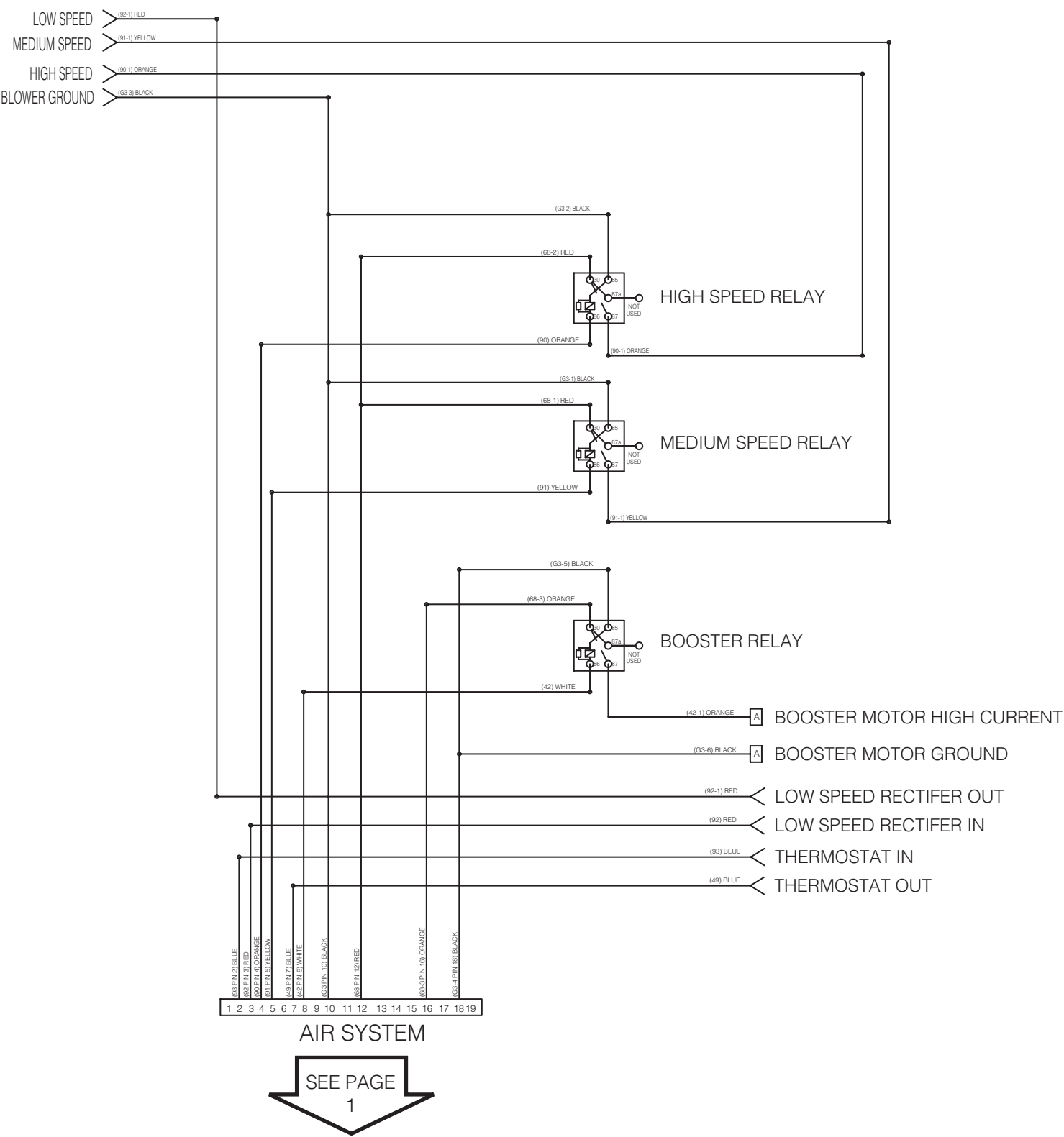
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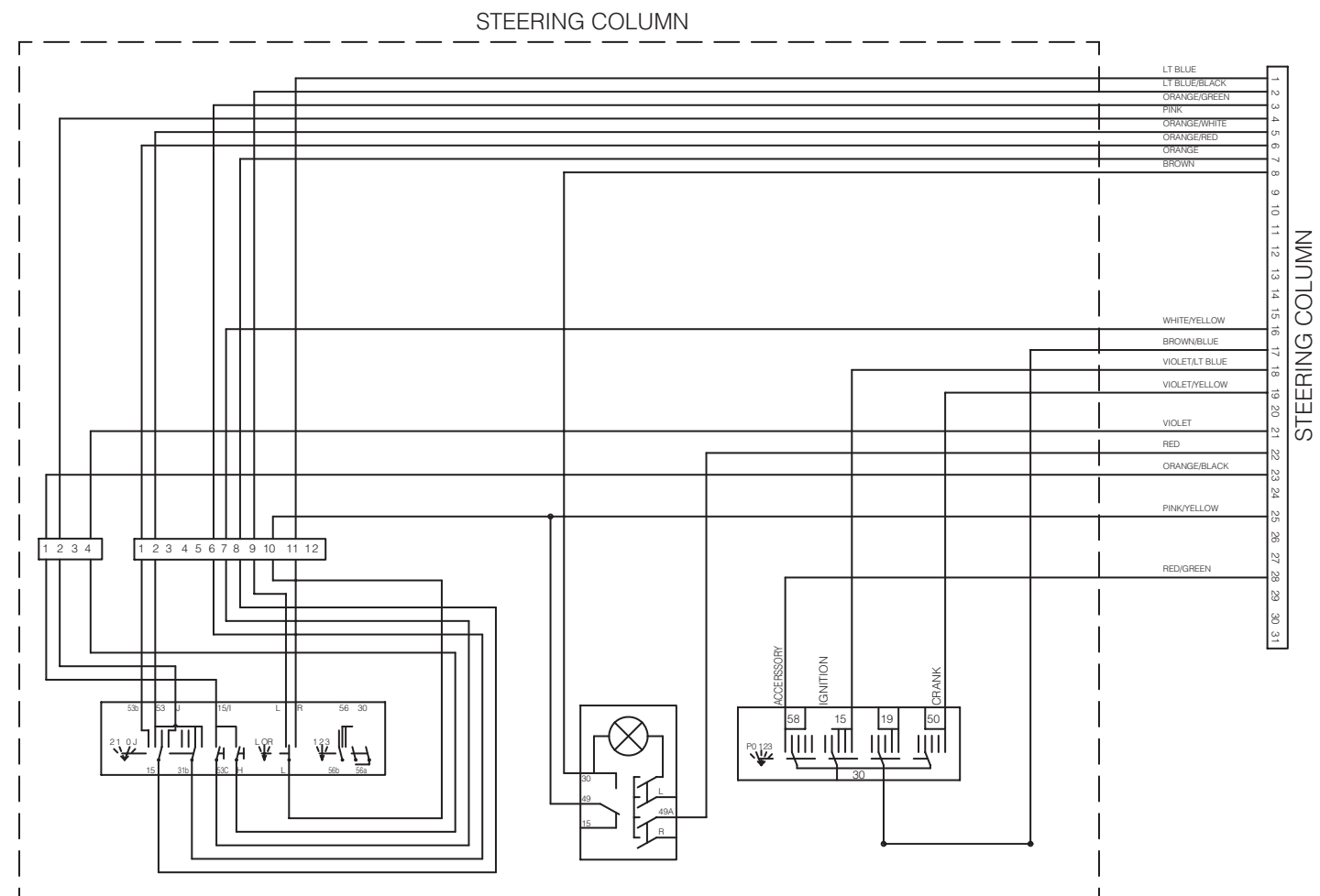


Electrical System (Sheet 7 of 14)



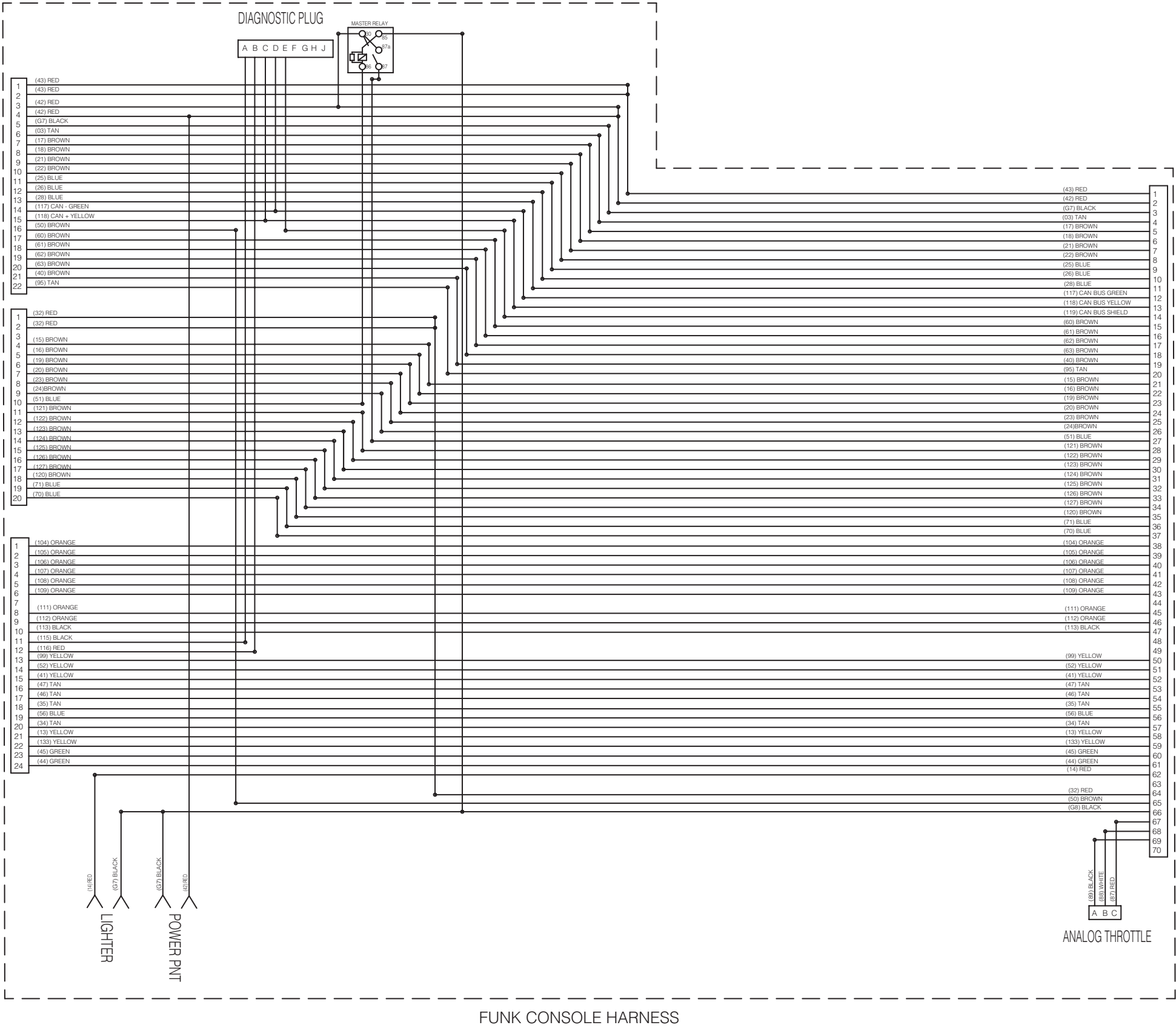
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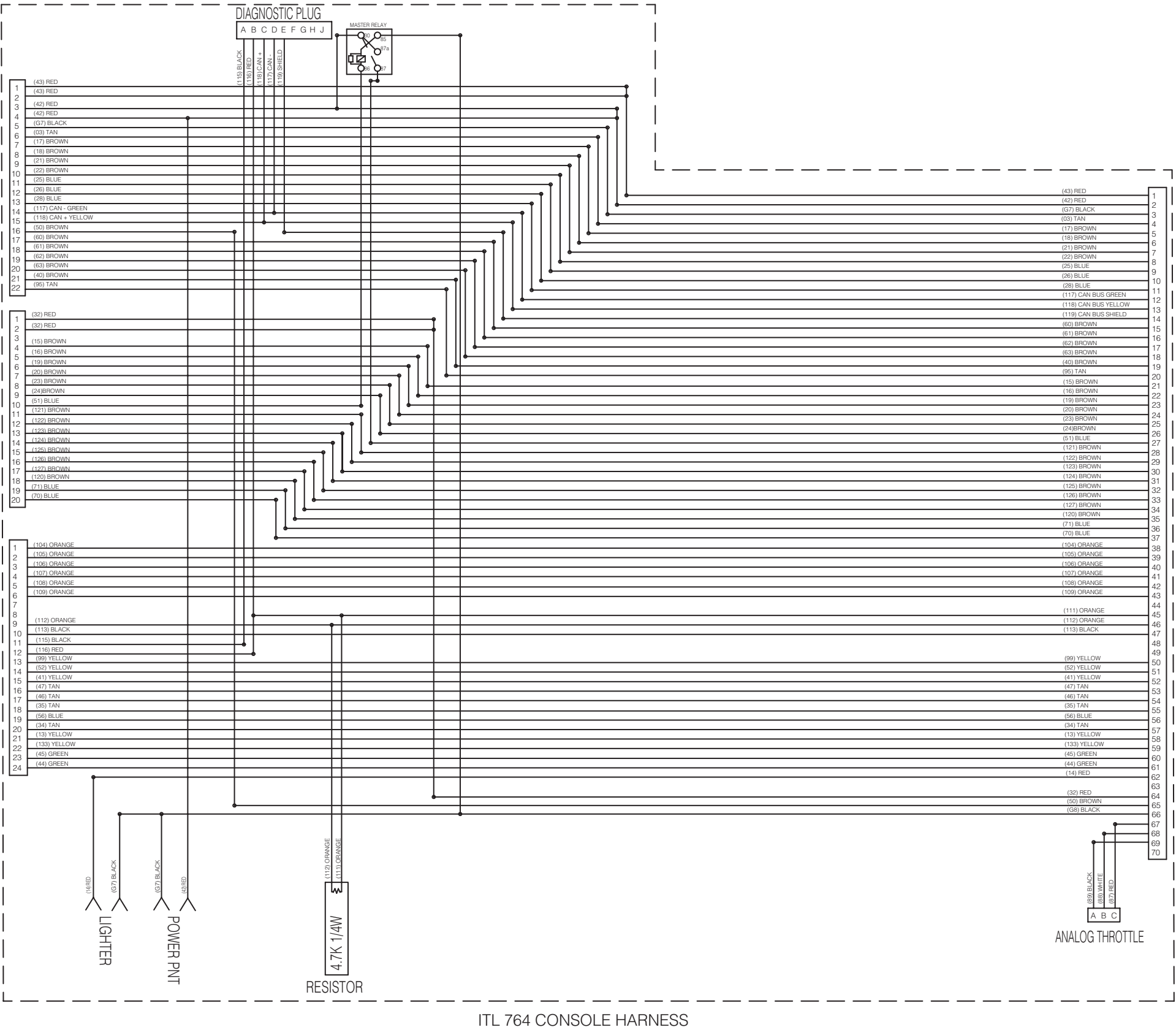


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Electrical System (Sheet 10 of 14)

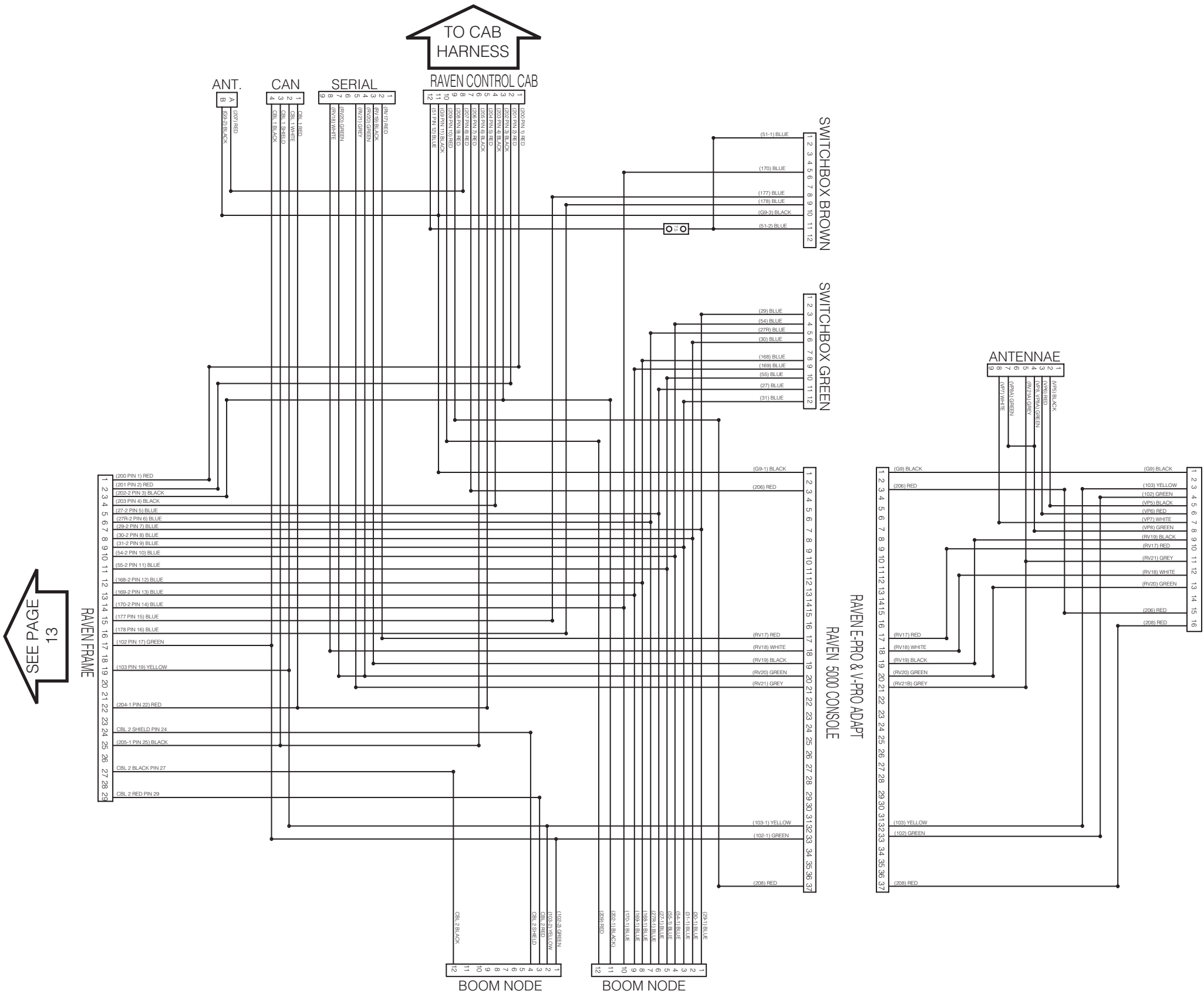


Electrical System (Sheet 11 of 14)

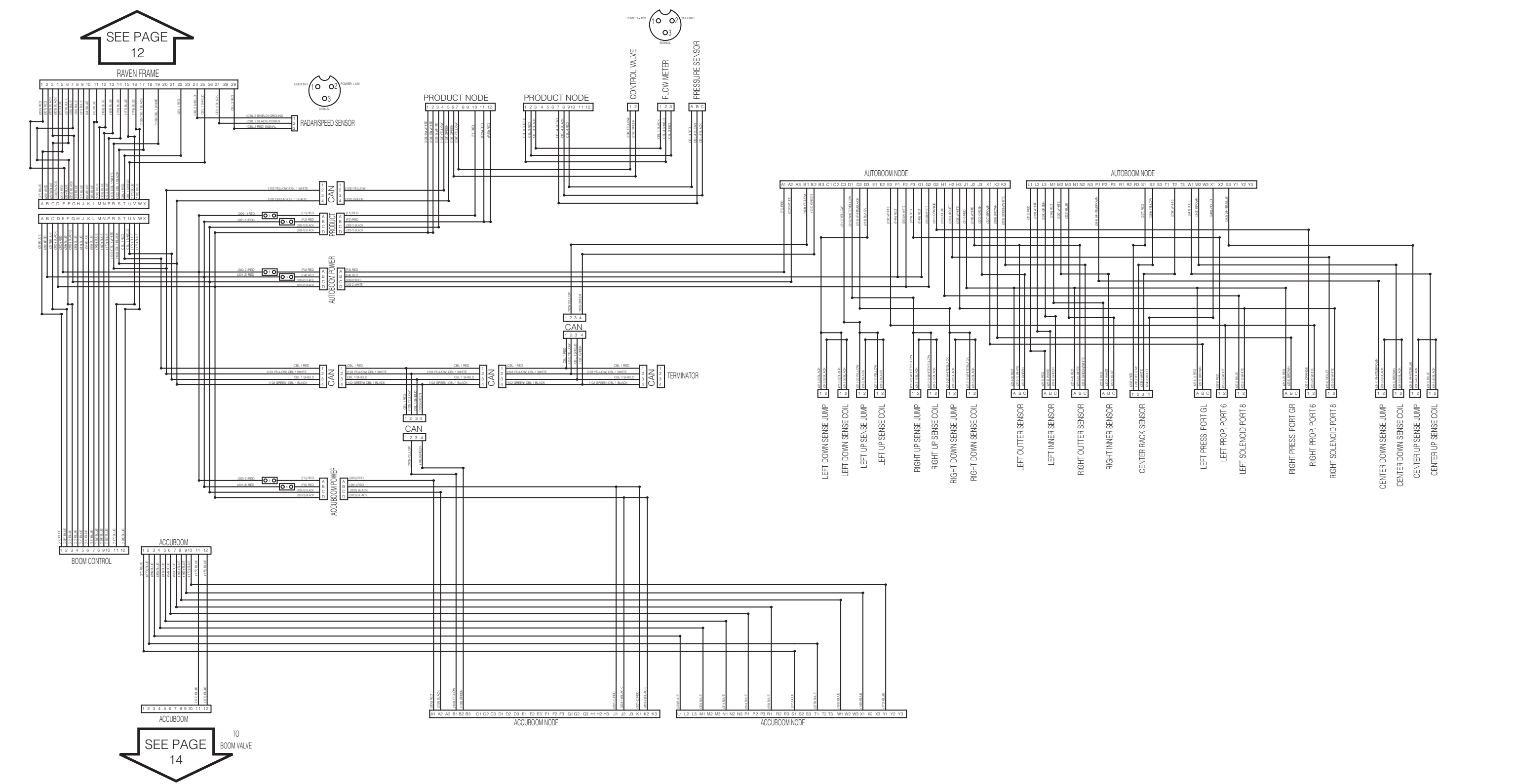


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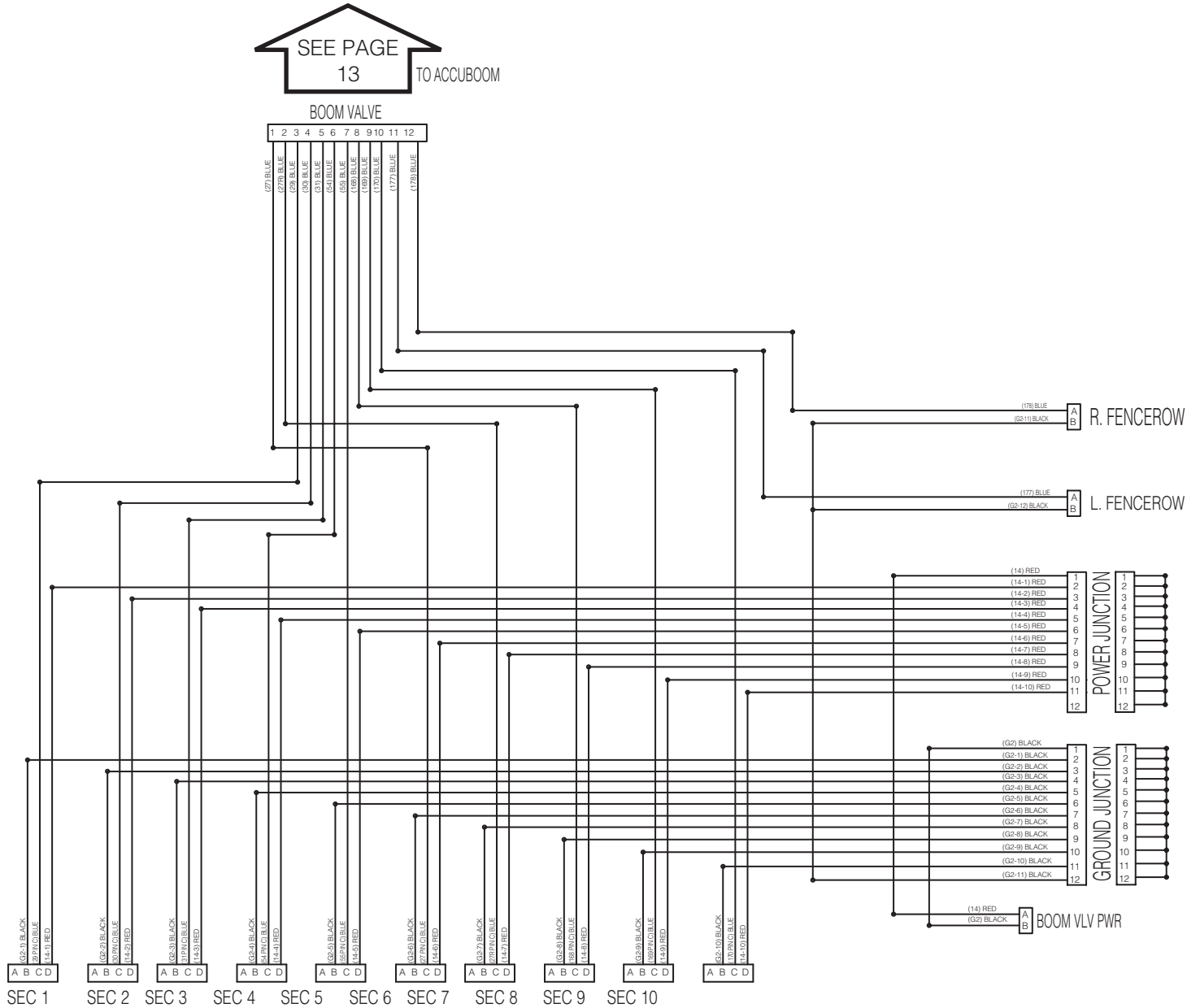
Electrical System (Sheet 12 of 14)



Electrical System (Sheet 13 of 14)



Electrical System (Sheet 14 of 14)



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APACHE™

CHAPTER 10

WARRANTY

Equipment Technologies Warranty Policy

For all 2010 Model Year

NEW APACHE LIMITED WARRANTY POLICY

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

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

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

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

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

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

Batteries - Batteries are warranted for thirty (30) months. Batteries are warranted through NAPA auto part stores. If you have no authorized NAPA auto part stores, then contact ET for warranty replacement information.

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

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

ET makes NO warranty of merchantability or fitness for a particular purpose.

This machine must be registered to both ET and engine manufacture within ten (10) working days from the date of delivery to the original purchaser.

All inquiries about this warranty policy should be addressed to:

Warranty Department • 2201 Hancel Parkway • Mooresville, IN • 46158 • Telephone: 317-834-4500

Apache Machine Warranty Registration

In the cab of each new Apache is a warranty registration sheet that is in triplicate. When the Apache is delivered to the end user this registration sheet must be completed, signed, and dated by both the dealer representative and the end user. This completed form starts the warranty period for this machine. The completed registration sheet one copy is for the end user, one copy for the dealer, and the white copy is to be faxed, emailed, or mailed to (ET) within ten (10) business days of it being signed. These forms are also on our web site www.apachesprayer.com under the dealer login. On the web site you can either download the registration form in PDF print it or complete or you may enter the information under warranty registration and submit it through our web site. If you submit through the web site, then we will still need the signed form by the customer fax or mailed to us at ET.

Engine Warranty Registration

There are two ways to register the engine warranty for Cummins. The first is a mail-in warranty registration card. In the cab of each new Apache with the engine book is a warranty registration card. This card needs to be completed and mailed or fax to the engine manufacture as directed on the card. The second registration method is to go online and register the engine for warranty.

To register the Cummins engine for warranty online: go to www.cummins.com, click on "product registration" and read the terms and conditions, if you agree with the terms and conditions, then click on "I accept", and follow the instructions to register.

APACHE™

CHAPTER 11

MAINTENANCE LOG

_____ Season

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

	Check front suspension cylinders for leaks around the seal and oil level in cylinder.
	Grease the front axle assembly including all king-pins, ball joints and center pivot pin. Check all front axle bolts for proper torque.
	Check hood latch adjustment and latching of hood, 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 filter.
	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 Controller calibrations:
	Flow meter
	Boom sections
	Control valve
	Speed cal
	Check A/C operation.
	Inspect frame for cracks and loose bolts.
	Inspect banjo valves for operation and wear.
List any major repair work this season and date it was performed:	

Season

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

	Check front suspension cylinders for leaks around the seal and oil level in cylinder.
	Grease the front axle assembly including all king-pins, ball joints and center pivot pin. Check all front axle bolts for proper torque.
	Check hood latch adjustment and latching of hood, 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 filter.
	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.
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	Inspect all hydraulic cylinders for leaks and proper operation.
	Inspect wiring harnesses for rub points.
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	Verify Raven Controller calibrations:
	Flow meter
	Boom sections
	Control valve
	Speed cal
	Check A/C operation.
	Inspect frame for cracks and loose bolts.
	Inspect banjo valves for operation and wear.
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	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.
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	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 Controller calibrations:
	Flow meter
	Boom sections
	Control valve
	Speed cal
	Check A/C operation.
	Inspect frame for cracks and loose bolts.
	Inspect banjo valves for operation and wear.
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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, ball joints and center pivot pin. Check all front axle bolts for proper torque.
	Check hood latch adjustment and latching of hood, 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 filter.
	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 Controller calibrations:
	Flow meter
	Boom sections
	Control valve
	Speed cal
	Check A/C operation.
	Inspect frame for cracks and loose bolts.
	Inspect banjo valves for operation and wear.
List any major repair work this season and date it was performed:	

Season

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

	Check front suspension cylinders for leaks around the seal and oil level in cylinder.
	Grease the front axle assembly including all king-pins, ball joints and center pivot pin. Check all front axle bolts for proper torque.
	Check hood latch adjustment and latching of hood, 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 filter.
	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 Controller calibrations:
	Flow meter
	Boom sections
	Control valve
	Speed cal
	Check A/C operation.
	Inspect frame for cracks and loose bolts.
	Inspect banjo valves for operation and wear.
List any major repair work this season and date it was performed:	

Apache AS1210

Component	Lubrication	Capacity Quarts (Liters)	Filter Part Number
Engine Oil	Lucas 15W-40 Magnum Motor Oil	16 (15)	201450241
Engine Coolant	KoostGuard Universal Antifreeze 5/50	23 (21.8)	----
Engine Primary Air Filter	----	----	201300116
Engine Safety Air Filter	----	----	201300117
Transmission*	Lucas Universal Hydraulic Fluid	16 (15)	300100110
Differential (Rear Axle)	Lucas Universal Hydraulic Fluid	26.4 (25)	----
Planetary	Lucas 80/90 Gear Oil	2.2 (2)	----
Rear Drop Box	Lucas 80/90 Gear Oil	21 (20)	----
Brake Reservoir	Lucas Universal Hydraulic Fluid	As required	----
Engine Fuel	Diesel	100 gallons (379 liters)	Filter: 201450242 Separator: 201450243
Hydraulic System	Lucas Universal Hydraulic Fluid	30 gallons (113.5 liters)	Filter: 840000013 Strainer: 840000010** Strainer: 840000011** Hydraulic Filter Kit: K65000156 Hydraulic Filter Kit with Oil: K65000157
Front Suspension	Lucas Universal Hydraulic Fluid	As required	----
Pressure Steering			Filter: 840000048
A/C System	R134a	3.5 lbs	----
Cab Filters	----	----	Cab Filter Kit: K65000066 Charcoal Filter: 490003650** Recirculating Filter: 490006660**
<p>* Check transmission fluid level with the engine running (fluid hot) and transmission in NEUTRAL. <i>See Check Transmission Fluid Level on page 5-11.</i></p> <p>** The hydraulic fluid strainers are mounted in the hydraulic reservoir and may be cleaned and reused. <i>See Clean Hydraulic Fluid Strainers on page 5-20.</i></p> <p>*** Included in kit K65000066.</p> <p>NOTE: Any oil and fluid substitutions must meet or exceed recommended fluid specifications.</p>			

Tire Pressure (Cold)

320/85 R38	41 psi (2.82 bar)
380/80 R38	35 psi (2.41 bar)
380/90 R46	49 psi (3.37 bar)
480/70R34	23 psi (1.58 bar)
520/85R46	27 psi (1.86 bar)

Lug Nut Torque

All Front	315 lb-ft (427 N-m)
All Rear	460 lb-ft (624 N-m)

Wet System Capacities

Product Tank	1200 gallons (4542 liters)
Rinse Tank	50 gallons (189 liters)
Hydraulic Pump Output	2450 psi (169 bar) @ maximum engine rpm

Apache AS1010

Component	Lubrication	Capacity Quarts (Liters)	Filter Part Number
Engine Oil	Lucas 15W-40 Magnum Motor Oil	16 (15)	201450241
Engine Coolant	KostGuard Universal Antifreeze 5/50	23 (21.8)	----
Engine Primary Air Filter	----	----	201300116
Engine Safety Air Filter	----	----	201300117
Transmission (ITL/JCB)*	Lucas Universal Hydraulic Fluid	16 (15)	300000101 300100110 (Filter for optional Funk Transmission)
Differential (Rear Axle)	Lucas Universal Hydraulic Fluid	26.4 (25)	----
Planetary	Lucas 80/90 Gear Oil	2.2 (2)	----
Rear Drop Box	Lucas 80/90 Gear Oil	21 (20)	----
Brake Reservoir	Lucas Universal Hydraulic Fluid	As required	----
Engine Fuel	Diesel	100 gallons (379 liters)	Filter: 201450242 Separator: 201450243
Hydraulic System	Lucas Universal Hydraulic Fluid	30 gallons (113.5 liters)	Filter: 840000013 Strainer: 840000010** Strainer: 840000011** Hydraulic Filter Kit: K65000156 Hydraulic Filter Kit with Oil: K65000157
Front Suspension	Lucas Universal Hydraulic Fluid	As required	----
Pressure Steering			Filter: 840000048
A/C System	R134a	3.5 lbs	----
Cab Filters	----	----	Cab Filter Kit: K65000066 Charcoal Filter: 490003650*** Recirculating Filter: 490006660***

* Check transmission (ITL/JCB) fluid level with the engine OFF and transmission fluid hot. *See Check Transmission Fluid Level on page 5-11.*

** The hydraulic fluid strainers are mounted in the hydraulic reservoir and may be cleaned and reused. *See Clean Hydraulic Fluid Strainers on page 5-20.*

*** Included in kit K65000066.

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

NOTE: A Funk Transmission is optional equipment on the AS1010. If your AS1010 is equipped with the optional Funk Transmission, see the Apache 1210 Component/Lubrication sheet.

Tire Pressure (Cold)

320/85 R38	41 psi (2.82 bar)
380/80 R38	35 psi (2.41 bar)
380/90 R46	49 psi (3.37 bar)
480/70R34	23 psi (1.58 bar)
520/85R46	27 psi (1.86 bar)

Lug Nut Torque

Front (12.4 x 28 in. tire)	180 lb-ft (244 N-m)
All Front 38 in. tires	315 lb-ft (427 N-m)
All Rear	460 lb-ft (624 N-m)

Wet System Capacities

Product Tank	850 or 1000 gallons (3218 or 3785 liters)
Rinse Tank	50 gallons (189 liters)
Hydraulic Pump Output	2450 psi (169 bar)



Your Apache Dealer: