Spray Paver

Operator's Manual

Operation • Maintenance • Troubleshooting

09.16.2016 Rev F

www.integraldx.com

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Introduction

Thank you!

Thank you for choosing the Integral dx spray paver.

The spray paver is an accessory for an asphalt paving machine that applies emulsified asphalts (emulsion) to surfaces before paving. The spray paver sprays emulsion uniformly, at specified application rates, and without the paver wheels or tracks running over the applied emulsion.

The spray paver was designed and manufactured in the USA with quality materials and workmanship. With proper use and care, it will provide many years of trouble-free service.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Contact Integral dx if you need assistance, information or additional copies of the manuals.

The information in this operator's manual is in effect at time of printing. It is subject to change without notice. Configurations of specific models may vary.

Limited warranty

Integral dx warrants products of its manufacture, when used correctly under normal operating conditions, to be free of defects in materials and workmanship. Integral dx makes no other warranty expressed or implied. This warranty shall be for a period of 6 months from the date the product is put into service, provided Integral dx is supplied with the in-service date. The warranty shall not apply to any products that have been altered, changed, or repaired in any manner whatsoever, except by an authorized Integral dx repair facility; nor to any product which has been subject to misuse, negligence, or accident. The exclusive and sole remedy for breach of contract shall be limited to repair, modification, or replacement at the sole discretion of Integral dx. Integral dx shall not in any event be liable for the cost of any special, direct or consequential damages. Integral dx reserves the right to make changes or improvements in the design or construction of any part without incurring

All claims must be submitted within 30 days of service on an Integral dx claim form with the authorized providers work order attached.

All repair part orders will require a purchase order and will be billed at a normal rate. Credit will be issued when warranty is approved.

Original Equipment Manufacturer (OEM) parts will be warranted according to the OEM warranty upon shipment date of product.

Indemnity

Buyer agrees to indemnify and hold Integral dx harmless for all loss, cost including but not limited to legal and other cost of proceedings, and damages suffered by Buyer or claimed by third parties by or related to Buyer's use of Integral dx products.

Product Improvement Liability Disclaimer

Integral dx reserves the right to make any changes in or improvements to its products without incurring any liability or obligation whatsoever and without being required to make any corresponding changes or improvements to products previously manufactured or sold.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED AND OF ANY OTHER OBLIGATION OR LIABILITY OF INTEGRAL DX. THE REMEDY SET FORTH ABOVE IS BUYER'S EXCLUSIVE REMEDY FOR A BREACH OF THE WARRANTY.

UNDER NO CIRCUMSTANCES WILL INTEGRAL DX BE RESPONSIBLE FOR INCIDENTAL, CONSEQUENTIAL, SPECIAL OR OTHER INDIRECT DAMAGE.

Safety

How you operate and maintain your equipment directly affects your safety and the safety of others. Therefore, read and understand this manual and any other safety information provided, including safety decals on the equipment.

Integral dx cannot anticipate every possible circumstance that might involve a potential hazard. The safety alerts in this manual are therefore not all inclusive. If you use an operating procedure, installation or work method not specifically recommended, you must satisfy yourself that it is safe for you and for other persons. You must also ensure that the product will not be damaged or made unsafe by the procedure that you use.

Safety alerts

Safety alert symbols in this manual or on the machine indicate important messages regarding safety. When you see the safety alert symbol and the signal word after, carefully read the message that follows and understand there is a possibility of injury or death if you do not adhere to the requirements of the safety message.

 **Danger:** Indicates a hazardous situation that, if not avoided, will likely result in death or serious injury.

 **Warning:** Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 **Caution:** Indicates a hazardous situation that, if not followed, could result in minor or moderate injury.

Damage warning, notes and tips

 **Avoid damage:** Indicates a situation that could cause damage to the spray paver or property damage.

Note: A note contains information that is important for operating or maintaining the spray paver.

 **Tip:** A tip contains useful information that can improve or optimize use of the spray paver.

General safety rules

The general safety rules are included in this section of the manual. Specific safety rules appear throughout the manual.

 **Danger:** Before operating or servicing this equipment, complete proper training. Also read and fully understand the operator's manual and the safety labels on the machine.

 **Danger:** Do not smoke around the machine. Fuel, emulsion, and fumes can explode when exposed to flames or heat from smoking or other sources.

 **Warning:** Have a first-aid kit available and know how to use it.

 **Warning:** Keep a charged fire extinguisher within reach whenever you work in an area where fire may occur**.**

Safety decals

The Integral dx Spray Paver is equipped with a number of safety decals indicating hazards to be avoided when operating the spray paver. Understand the decals before using the spray paver:

Hot material is present. Take care to avoid contact with it during spray paver operations.

Moving parts could pinch a hand, foot, etc. Take care to not get body parts trapped between the parts.

An electrical hazard exists that could potentially provide a serious shock. Avoid the hazard during operation.

Hot pipes are present that could provide serious burns to exposed skin. Avoid contact with them.

Ensure covers are in place for safe operation of the spray paver.

The operator cannot see this part of the machine. Stay away during operation.

Do not disconnect lines. Doing so during spray paver operation will cause death or serious injury.

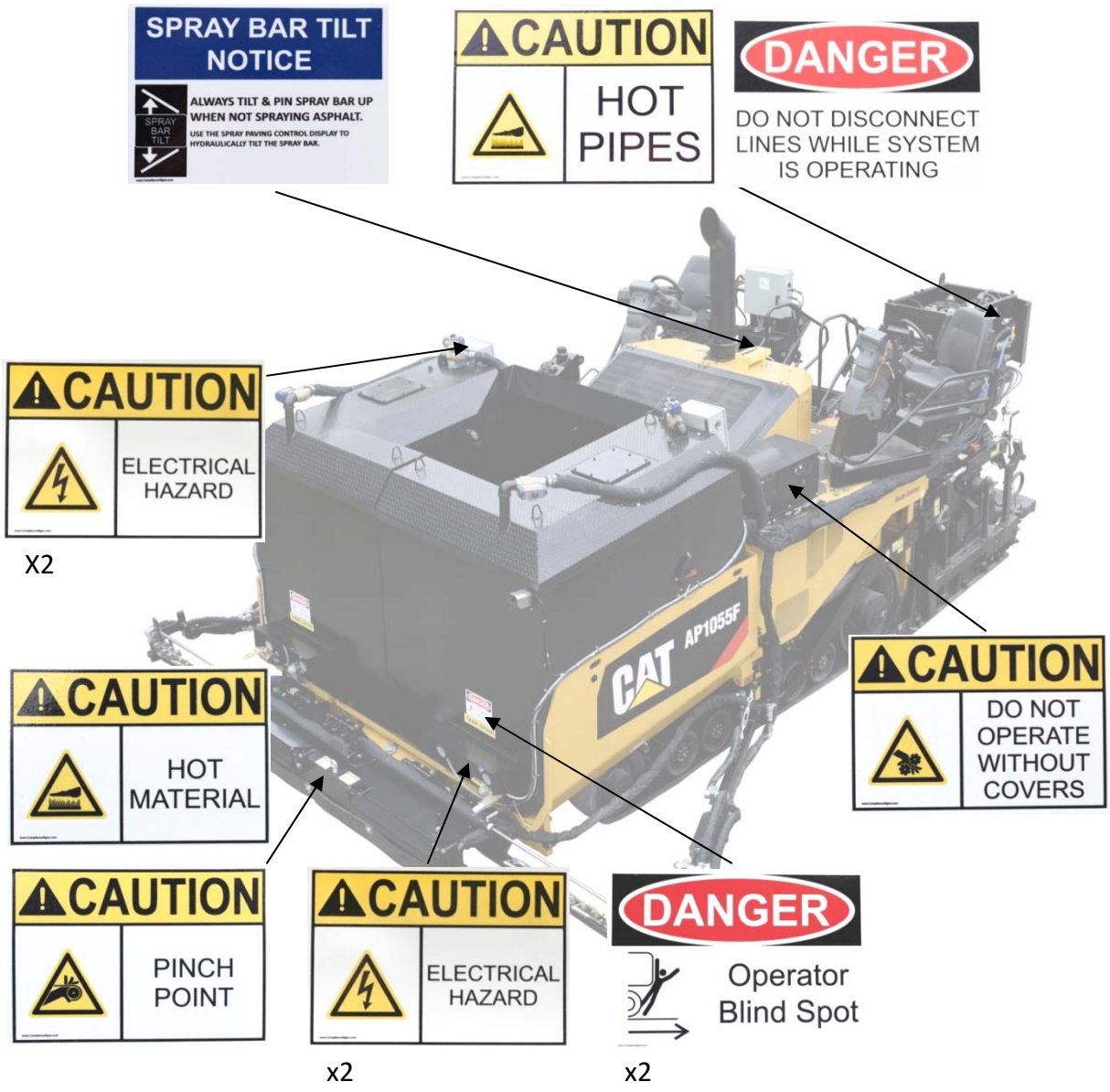

Figure 1: Safety decal location (may vary depending upon model)

General description

The Integral dx spray paver (Figure 2) applies emulsion volumetrically to the road surface through a system of spray bars with nozzles.

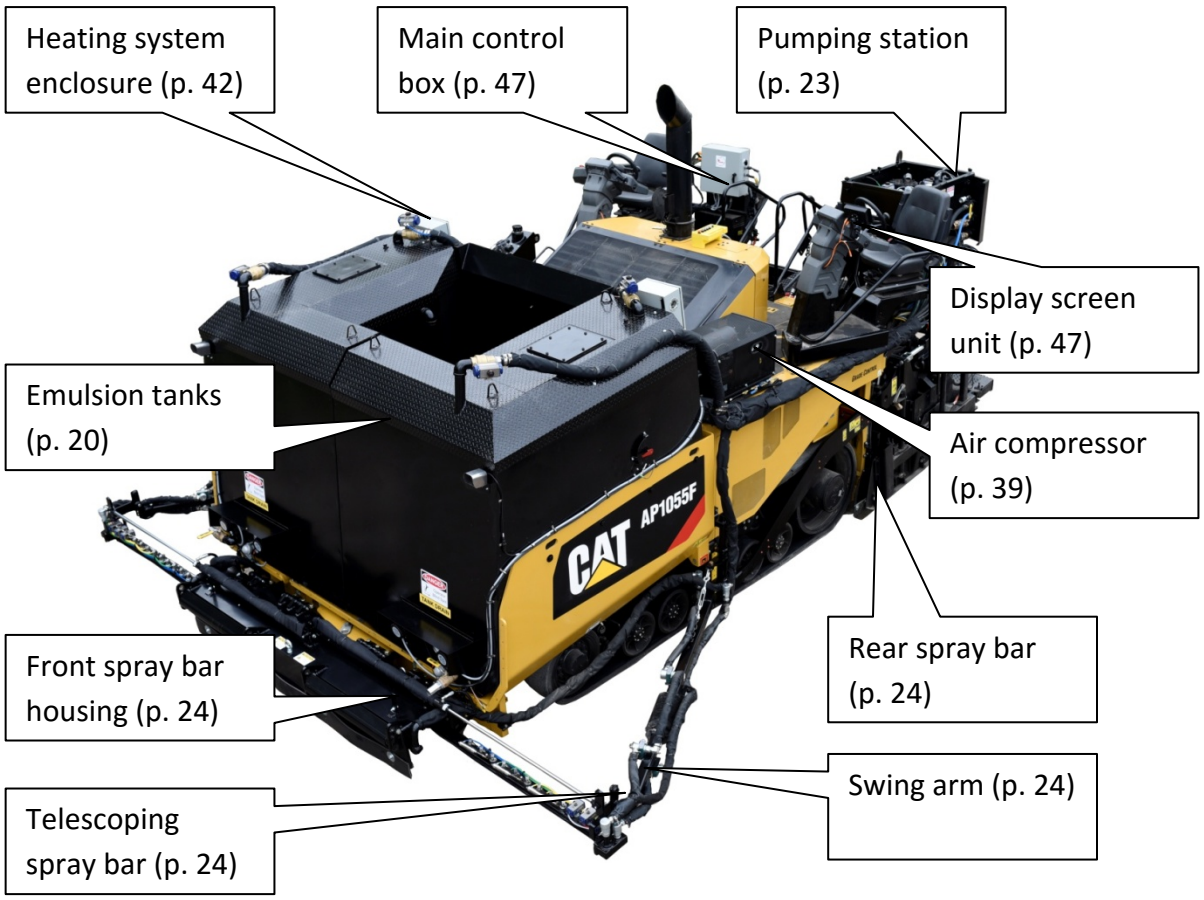

Figure 2: Spray paver major components

The spray paving system is mounted on the paving machine and operates independently:

- The paver can pave with or without the spray paving system operating.
- The spray paver can operate with or without the paver operating.

The spray paver's emulsion pump(s) are capable of handling products ranging from light applications of emulsified asphalt to heavy asphalt cements heated to spraying viscosity.

Components

The spray paver is made up of three groups and four systems:

Groups:

- Emulsion tank
- Pump
- Emulsion spray

Systems:

- Hydraulic
- Pneumatic
- Heating
- Control

Emulsion tank group

The emulsion tank group includes the emulsion tank(s) and associated equipment:

 **Avoid damage:** If the paver is configured with emulsion tanks mounted in the asphalt hopper, do not tilt the hopper. Attempting to tilt the hopper will damage the tanks and/or paver**.**

Emulsion tank(s)

The emulsion tank is an insulated vessel that holds the hot emulsion for spraying.

One tank can be mounted on the paver deck (Figure 3), and/or two tanks can be mounted in the asphalt hopper (Figure 4).

 **Note:** If emulsion tanks are to be removed, first drain them. Use all the lifting eyes when lifting to distribute their weight as evenly as possible.

Each tank has a dipstick and a large level indicator on the side for checking emulsion level.

Pump group

The pump group's function is to control the flow direction and rate of the emulsion and cleaning agent. It consists of emulsion pump(s), the strainer housing, pneumatic ball valves, all located within the pumping station (Figure 5).

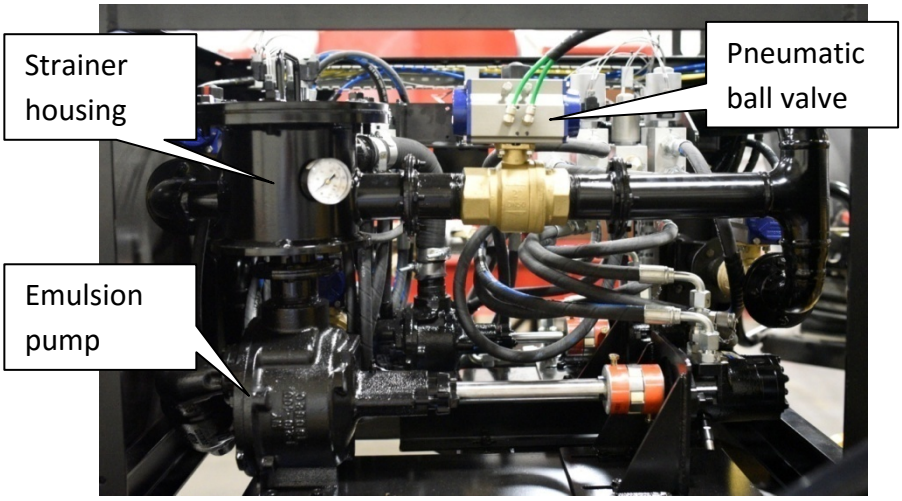

Figure 5: Emulsion pumping station (right-side view)

The pump group controls the six basic pump functions:

- Tank load
- Tank circulate
- Spray bar circulate
- Spray auto
- Spray bar vacuum
- Spray bar clean out

Valve and pump configurations for the pump functions are shown in Appendix 1: Valve and emulsion pump configurations for the pump functions, page 121.

Front spray bar housing: The front spray bar housing (Figure 6) contains the right and left telescoping spray bars and the center spray bar. The front spray bar housing is mounted in front of the paver hopper and replaces the paver's original push bar.

Tip: Cover the front spray bar housing with a thin rubber mat to help with spillage cleanup and prevent damage to the spray bar hoses, cylinders, and valves.

Figure 6: Front spray bar housing, telescoping spray bars retracted

Avoid damage: When the paver is used to push a dump truck, the front spray bar housing must be down and pinned in place.

Right and left telescoping spray bars: The right and left telescoping spray bars (Figure 7) are mounted in the front spray bar housing. Retracted, they are behind the center spray bar.

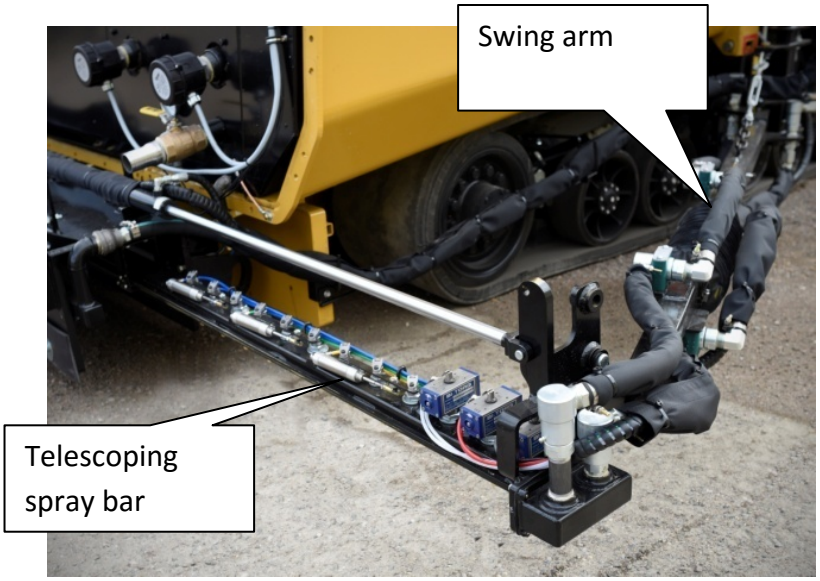

Figure 7: Telescoping spray bar (left) extended and swing arm

Swing arms are attached to the side of the paver and support the telescoping spray bars.

The telescoping spray bars each extend hydraulically up to 48 inches. To modify spray width, nozzles on the telescoping spray bars can be turned on or off.

- The outer three spray nozzles are turned on or off individually.
- The inner nozzles are turned on or off with other nozzles on the telescoping spray bar in "gangs."

Avoid damage: If the telescoping spray bars are allowed to strike an object, they can cause severe damage to property or the spray paver. Release of hot emulsion may also occur, which could injure those near the machine. Be aware of obstacles during spray paving.

Center spray bar: The center spray bar is mounted in the front spray bar housing. It spans the inside distance between the paver tracks or wheels. All of the center spray bar nozzles are turned on or off as a single gang.

Nozzle alignment: To achieve an even surface coverage, turn the long access of the nozzles at a slight angle (~10°) from the horizontal access of the spray bars (see Figure 10). This prevents interference of the spray pattern.

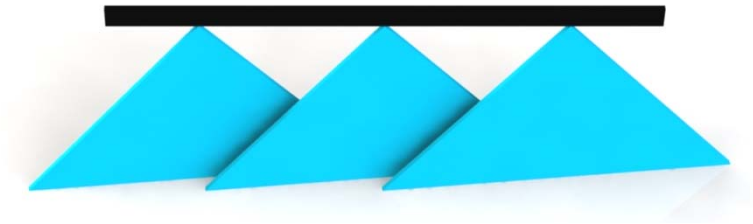

Figure 10: Spray pattern with 100% overlap and at a slight angle

Nozzle height adjustment: Set the height of the spray bars to achieve a 100 % (double) overlap; the fan reaches the center of the adjacent fan(s) (see Figure 10).

Note: Emulsion viscosity varies with temperature and type. Heavier emulsions require a higher nozzle height than lighter material to achieve a double overlap.

1. Adjust the height of the center and telescoping spray bars using method 1 and/or method 2.

   Method 1: Add or remove spacers

   a. Support the spray bar housing using the lifting eyes.

   b. Remove the three fasteners on each of the four mounting hinges (see Figure 11).

   c. Add or remove one or more spacers (maximum four) below each mounting hinge.

   d. Adjust the swing arm height to match by removing the pin that attaches the swing arm to the telescoping spray bars and/or loosening the top/bottom nut on the adjustment bolt, which is located at the rear of the swing arms (see Figure 12).

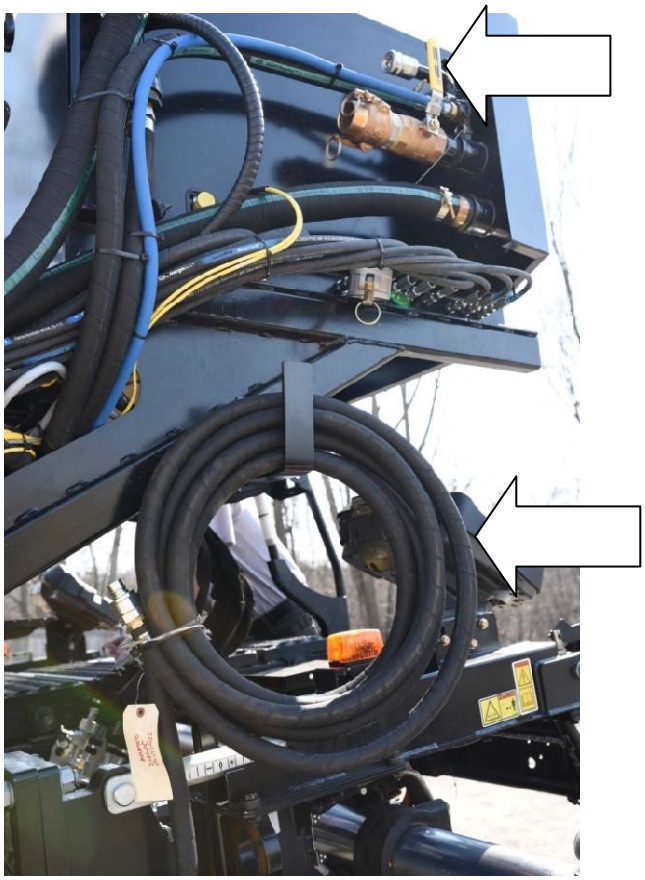

Figure 16: Spray wand connection and hose

Emulsion lines

Emulsion lines connect the emulsion tank(s) to the pumping station and the pumping the station to the spray bars.

Warning: Only use factory-supplied emulsion lines, emulsion line connections and hose clamps. Other hoses may rupture due to heat and cause serious injury. In most cases, a specific type of hose barb fitting is used to prevent the hose from disconnecting from the fitting. Do not use a standard worm-gear hose clamp, which will not meet requirements.

Asphalt hopper extensions (option)

For conventional paving, where a dump truck is pushed along by the paver's push bar, the spray group includes an asphalt hopper extension (see Figure 17).

The hopper extensions maintain proper interface with asphalt trucks. Since the center spray bar runs between the hopper and the rollers that push the asphalt truck, the asphalt hopper extension allows for correct depth of dumping into the paver, minimizing spillage.

Figure 17: Asphalt hopper extensions

Hydraulic system

The hydraulic system is pressurized by a piston pump. The pump provides fluid power to the hydraulic motors and hydraulic cylinders. A hydraulic reservoir supplies hydraulic fluid to the system. Valves control motor and cylinder function.

Piston pump

The piston pump (Figure 18) is dedicated to the spray paving hydraulic system. The pump is typically powered by an unused PTO located on the paver engine. It is pressure compensated to 2500 psi.

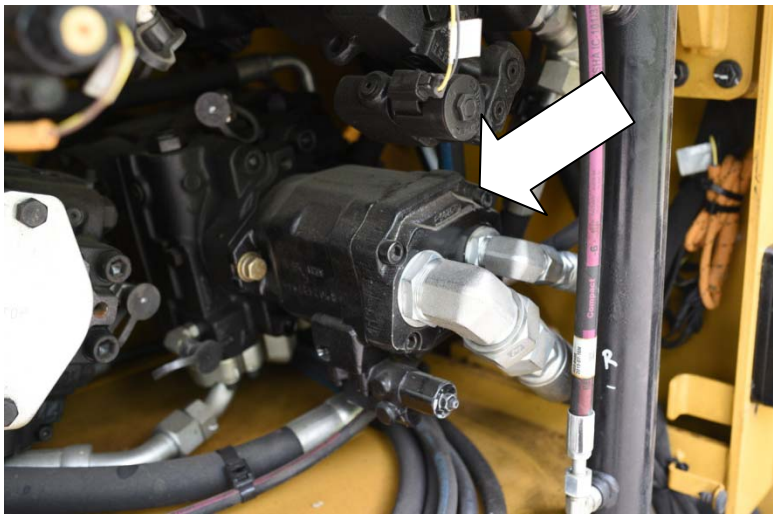

Figure 18: Hydraulic piston pump

Hydraulic reservoir

The 25-gallon hydraulic reservoir with an integral cooler (Figure 19) supplies hydraulic oil to the pump as well as cools and filters the hydraulic oil.

Warning: The oil cooler fan is thermostatically controlled. It may startup at any time, even if the paver is not running. To prevent injury or damage, keep fingers and objects away from the fan**.**

Figure 19: Hydraulic reservoir

Needle valves

Needle valves in the pumping station adjust the hydraulic flow to the cylinders.

There are four: one for each telescoping spray bar extension/retraction cylinder, one for both cylinders that lock the front spray bar housing, and one for the cylinders that tilt the front spray bar housing.

 **Note:** The needle valves are set at the factory and likely will not need adjustment**.**

Pneumatic system

The pneumatic system includes an air compressor (Figure 20), which is powered by a hydraulic motor. This system also includes the solenoid valves, which control the various valves.

Some models have an auxiliary connection at the compressor for a compressed air supply.

Air compressor

The air compressor is located on the paver or screed deck. It provides compressed air to the solenoid valves and ultimately to the pneumatic valves that control many of the spray paver functions.

When there is low pressure, a switch on the air compressor triggers a relay to open the hydraulic valve for the air compressor's hydraulic motor. The low pressure switch also sends a signal to the control unit and in turn to the display screen unit as a warning (delayed 45 seconds on startup).

Another pressure switch triggers the relay to close the valve when the high pressure is reached. The compressor cycles between 85 psi and 125 psi.

Figure 20: Air compressor (top view, cover off)

Solenoid valves

The solenoid valves turn the pneumatic valves on/off based on signals from the control system. The solenoid valves are grouped in four manifolds. Color-coded air lines facilitate troubleshooting. The manifolds are mounted in four enclosures and control the following:

- Pneumatic actuators, cylinders or rotary actuators that turn on or off the spray nozzles (individuals or gangs) on the front spray bars and ball valves that turn on/off the rear spray bars.
- Emulsion tank valves (one valve on each tank for drawing emulsion and another valve on each tank for returning emulsion).
- Pneumatic ball valves in the pumping station.

Note: If air pressure is lost for any reason, including compressor malfunction, the pneumatic valves will no longer operate and will remain in their last position.

Note: If electrical signal to the valve is lost, the valve can be manually operated by turning the screw with a flat-tipped screwdriver.

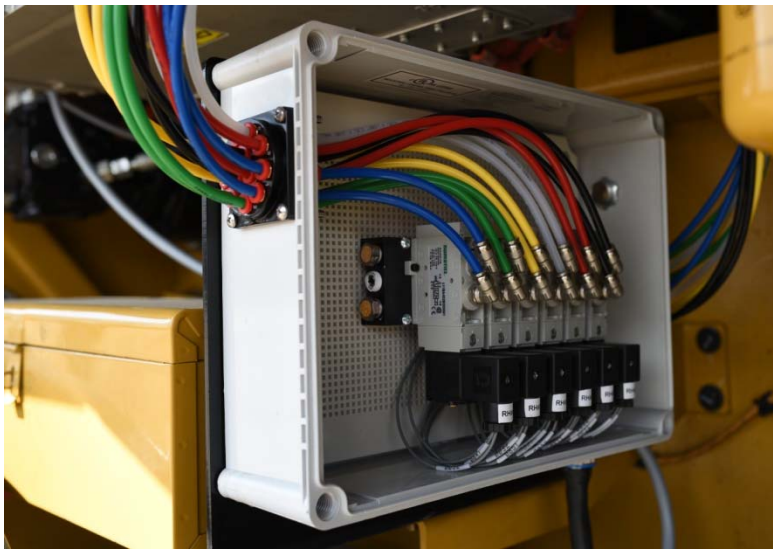

Figure 21: Solenoid valve manifold in its enclosure

Emulsion tank heating system

The emulsion tank heating system consists of the heating elements, the heating system enclosure with the thermostat, the emulsion tank low level switch, the emulsion tank over-temperature switch, and the temperature gauge.

The heating system is powered either by the paver's 120 or 240-VAC generator or external power of 120 or 240 VAC.

Note: Breaker selection on your paver is unique and needs to be reviewed by the installer.

Heating elements

At least one emulsion tank in the system will include heating elements. Other tanks may or may not have heating elements, depending upon the options chosen. The heating elements are controlled by a thermostat with temperature sensor (see Figure 22).

Tip: Keep emulsion above 165° F (typically) to prevent it from solidifying and clogging the system.

A heating element has a heating capacity of 4 kW at 240 volts or 2 kW at 120 volts. The tank can be held at 50° F to 200° F.

- Using a 500-gallon emulsion tank with two heating elements at 240 VAC, the heating system will maintain 180° F.

Tip: Because the heating elements are sized to maintain temperature, heating cold emulsion to spray temperature may be very slow. Therefore, the tank should be drained before overnight or prolonged storage.

- 120 VAC (external power) will only limit the temperature drop of the emulsion. For example, with a 500-gallon emulsion tank using two heating elements, if the emulsion starting temperature is 180° F at 70° F ambient, the operator can still expect a 20 to 30° F drop over 12 hours. Ambient temperatures below 70° F can hasten cooling and increase the time required for reheat.

Tip: If ambient temperature is expected to be well below 70° F, and 220 VAC external power is not available, remove emulsion from the tank for the overnight. Note that clean out or release agent rinse is advised when emulsion is removed.

Warning: Never plug the emulsion tank into external power unless the paver is in a well-ventilated, outside location and there is enough emulsion to cover the heating elements.

Warning: Never leave the emulsion tank plugged into external power overnight unless the paver unit is in a secured location. The plugged-in unit must not be accessible by untrained people. Provide security, or drain the emulsion tank and do not plug in overnight.

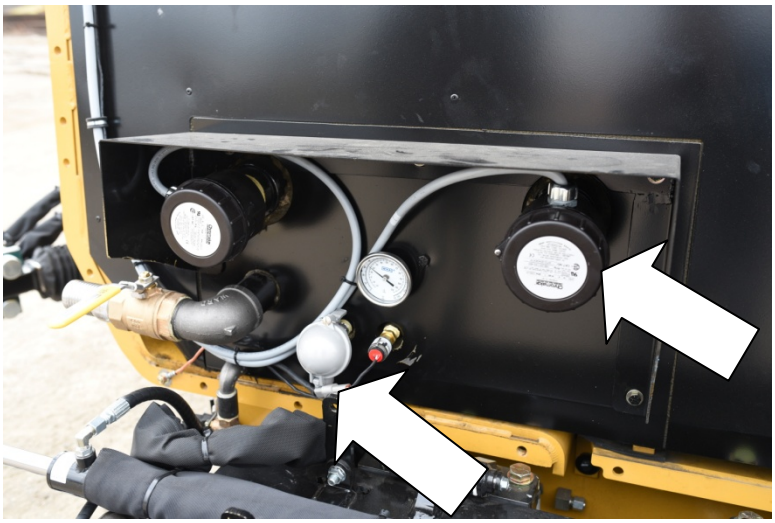

Figure 22: Tank heating elements and thermostat temperature sensor

Heating system enclosure

A heating system enclosure (Figure 23) is mounted on each tank. Inside is the thermostat for regulating the tank heating temperature as required by the emulsion type.

Warning: Never let the emulation get above 200° F. Boiling will occur if the temperature is too high and potentially cause burn injuries. Also, the water base will evaporate, changing the properties of the emulsion.

On some models, LEDs on the enclosure light when the heat elements are on (see Figure 23).

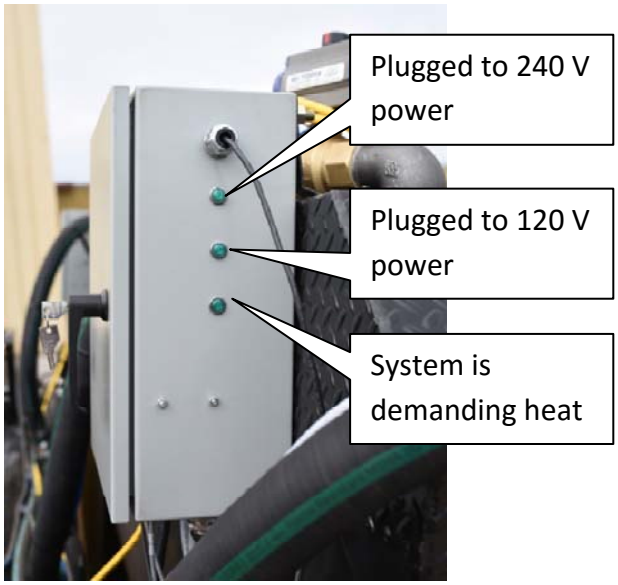

Figure 23: Heating system enclosure and LED designation

Emulsion tank low-level switch

Avoid Damage: Never operate the tank heating elements unless they are fully submerged**.**

The emulsion tank low-level switch (Figure 24) is attached to the tank level indicator. It shuts off the heating elements when the emulsion in the tank is low enough that the heating elements will be exposed.

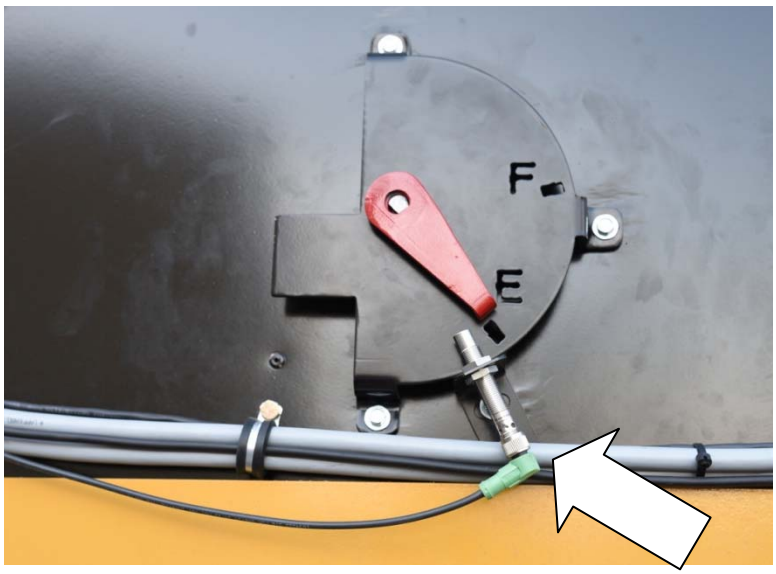

Figure 24: Emulsion tank low-level switch

Emulsion tank over-temperature switch

The emulsion tank over-temperature switch (Figure 25) is attached to the tank next to the thermostat temperature sensor. It is a backup that turns off tank heat in case of thermostat failure.

To adjust the switch, loosen the ring, turn the dial to the desired temperature setting, and tighten the ring.

Avoid Damage: Always set the emulsion tank over-temperature switch below the boiling point of the emulsion.

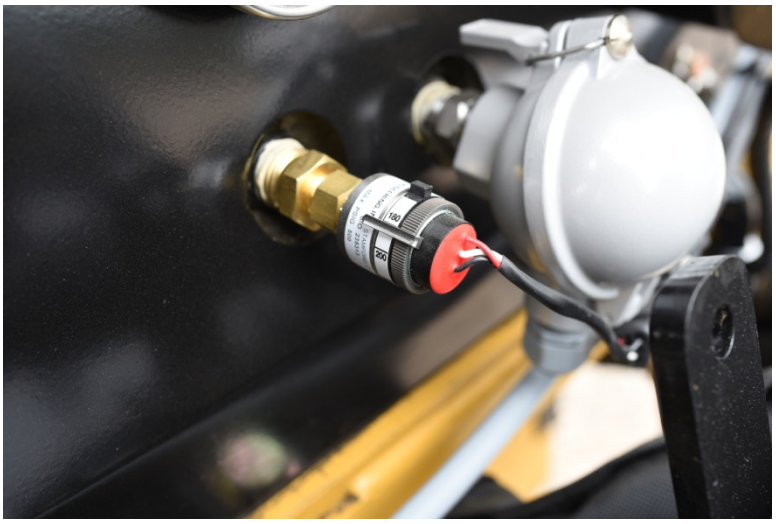

Figure 25: Emulsion tank over-temperature switch.

Temperature gauge

The temperature gauge is mounted near the heating elements.

Control system

The spray paver's control system operates pump functions and maintains the emulsion application rate as set by the operator. The control system is powered by the paver's 24 VDC electrical circuit.

Emulsion flow rate determination

The control system sets the emulsion flow rate by regulating the speed of the emulsion pumps. It does this by regulating the hydraulic flow rate delivered to the pump hydraulic drive motors.

The following inputs are used by the control system to set emulsion flow rate:

- Application rate (in gal/yd^2 or L/m^2) – Set by the operator
- Spray bar width – Calculated from operator's spray nozzle selection
- Vehicle speed – Determined by input from the paver
- Emulsion pump speed – Measured by the speed sensor in the hydraulic motors that drive the small and large emulsion pumps

If vehicle speed is increased or decreased, pump speed will increase or decrease to maintain the desired application rate.

Components

The control system consists of these major components:

- Display screen unit
- Pendant control
- Control unit
- Fuse panel
- Signal splitter
- Emulsion pump speed pickups
- Tank selector switch

Display screen unit

Using the 7-inch (178 mm) display screen unit (Figure 26), the operator selects variables and controls the functions of the spray paver.

The display screen unit is located near the operator control console, but its location varies with the configuration.

Figure 26: Display screen unit

The following are some of the tasks an operator performs through the display screen unit (see page 58 for specific operation):

- Operate pump functions
- Extend & retract the left and right telescoping spray bars, tilt the front spray bar housing, lock the front spray bar housing (some models only)
- View and adjust spray width through nozzle selection
- See if the master spray switch (on the pendant control) is on or off
- Display machine totals and job totals, and reset job totals.
- View alarms that alert operators of dangers or system issues
- Display optional video camera(s) output (up to two video cameras may be installed)
- View speeds of small and large pumps

- View emulsion flow rate
- Enter small and large emulsion pump calibration factors
- Change vehicle speed calibration factors
- Select the language used by the display screen unit
- Change measurement units

Pendant control

The pendant control is a hand control for the spray paver. Two different models are available:

Standard pendant control: The standard pendant control (Figure 27) is used by the seated operator or an operator riding on the screed. It has the following controls:

- The red mushroom (on/off) button serves as the power switch for turning on/off the spray paving system and also is the emergency stop button. Pull it up to power on. Press it down to disable power.
- The green (on) and red (off) buttons are the master spray switch and will open or close the spray nozzle valves selected on the display screen unit.

  Off (red) must be selected before starting the pump in Spray Auto and opening the nozzles in Spray Bar Vacuum.

  On (green) turns selected spray nozzles on.

  Note: In certain pump functions the master spray switch is disabled. For example, an operator should not be operating the spray nozzles while running the Tank Load function, so the master spray switch is disabled for this pump function. See page 58 for more detail.

Using the display screen unit

Start screen

The start screen (Figure 31) will come up initially when turning on the red mushroom (on/off) button on the pendant control.

Note: Settings last used when powered down are retained and activated during startup.

Note: Keys may change function depending upon the screen. Figure 31 shows the key naming (1L - 5L and 1R - 5R) that will be used in this manual.

Note: Active keys on the display are illuminated. Keys that are not enabled are dimmed.

Figure 31: Start screen showing key naming

Display navigation

The Sprayer Selection screen (Figure 32) is the first to appear.

Use keys [1L] and [2L] to move forward and backward through the display screens:

<>Sprayer Selection<>Pump Function<>Totals<>Camera1<>Camera2<>Password

Note: Keys [1L] and [2L] are dedicated; arrows are always present (except on the camera screens) but are disabled when certain pump functions are active.

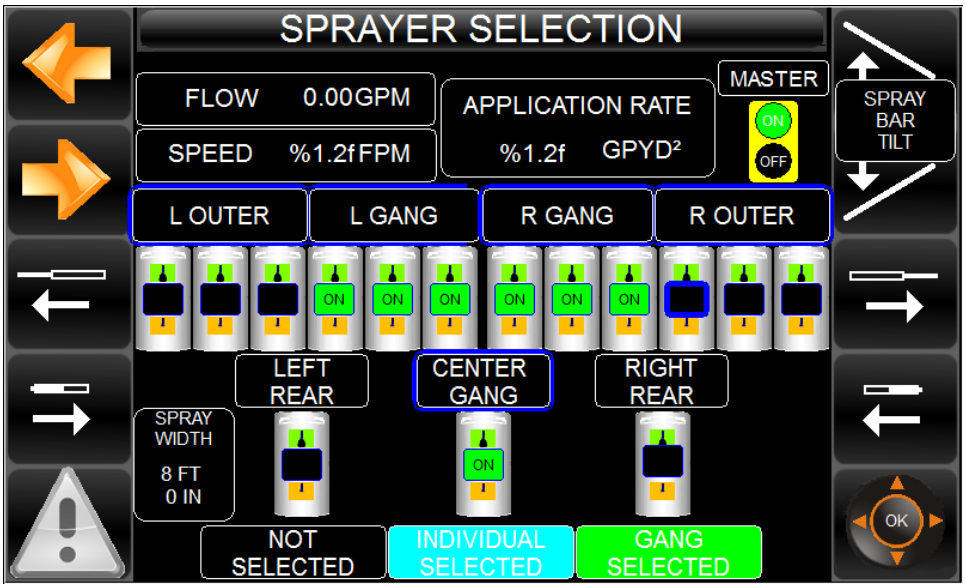

Figure 32: Display navigation keys on Sprayer Selection screen

Sprayer selection screen

Use the Sprayer Selection screen (Figure 33) to select/deselect the spray nozzles or gangs of nozzles that will spray.

Also use this screen to extend or retract the telescoping spray bars and to tilt the front spray bar housing up and down.

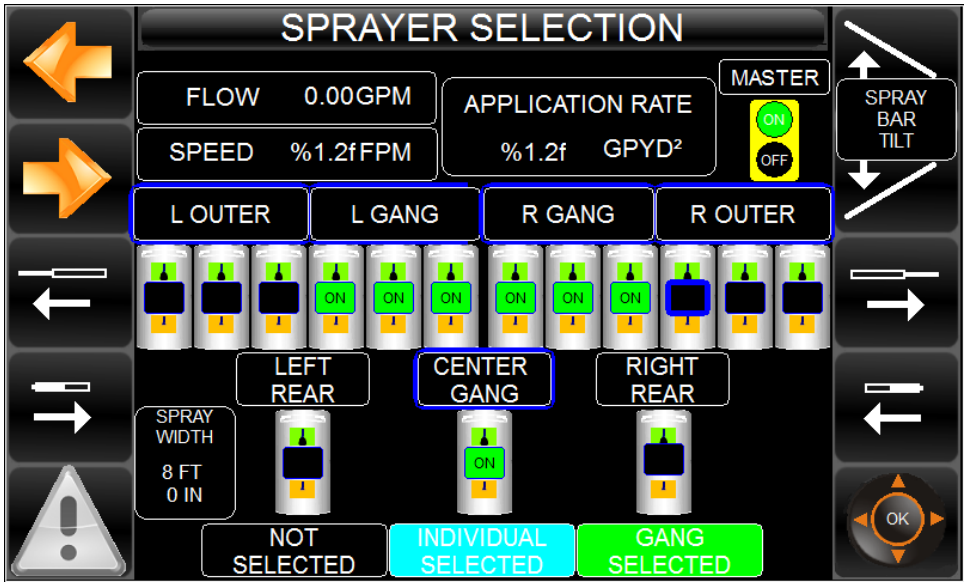

Figure 33: Sprayer Selection screen: some switches selected, pump on in Auto Spray, and master spray switch on

The upper row of switches is for the left and right telescoping spray bars. Each of the telescoping spray bars has a group of switches that control an individual nozzle (the outer nozzles) and a group of switches that control a "gang" of nozzles (the inner nozzles).

The bottom row of switches is for the front center section and the left and right rear spray bar sections. All of these switches control a "gang" of nozzles.

As noted on the bottom of the screen, the color of the switch also indicates whether it is for an individual nozzle (blue) or a gang of nozzles (green).

Flow, speed and application rates are readouts only. Change application rate by selecting **Pump Function**>**Spray Auto**.

Selecting operation of spray nozzle (or group of nozzles)

1. Use the multi-navigation key [5R] to move through the range of nozzle valve switches. The current selection is highlighted with a dark blue box.

   Note: With the telescoping spray bars, you can select a complete spray bar by selecting [L outer and L gang] or [R outer and R gang], or you can select an individual switch**.**

2. Press the center of the multi-navigation key to select or deselect an individual switch or an entire spray bar. A switch is blackened when it is deselected.

   Tip: To select combinations of spray bar sections, push the up arrow on the multi-navigation key. The selections are highlighted with a dark blue box.

   Note: Master (the master spray switch) status on/off is also indicted and will apply to all the selected switches. However the only way to turn the master spray switch on/off is with the pendant control**.**

   Figure 33 shows some switches selected, all of which are turned on because 1) the master spray switch is on, and 2) the pump in Spray Auto is on (see the Pump Function section below).

   Figure 34 shows all switches selected, but the master switch is off.

Setting the flow rate

1. Activate the pump function as outlined above.
2. Press the value scrolling keys [1R] and [3R] to set the flow rate.

 **Note:** Spray Bar Vacuum and Clean Out - Spray Bar have fixed rates.

 **Note:** In Spray Auto, rate is the application rate and is in gal/yd^2 or L/m^2. With all other pump functions, the rate is a percentage of full pump capability.

Tilting the front spray bar housing

- Press and hold key [3L] to tilt the front spray bar housing down for spraying.
- Press and hold key [4L] to tilt the spray bar assembly up after spraying is complete.

 **Note:** From Totals screen (page 68), unlock the front spray bar hosing before tilting. Lock it back in place after tilting from the same screen.

Spray bar vacuum screen

Use the Spray Bar Vacuum screen (Figure 37) to set the spray bar to be vacuumed and initiate the pump.

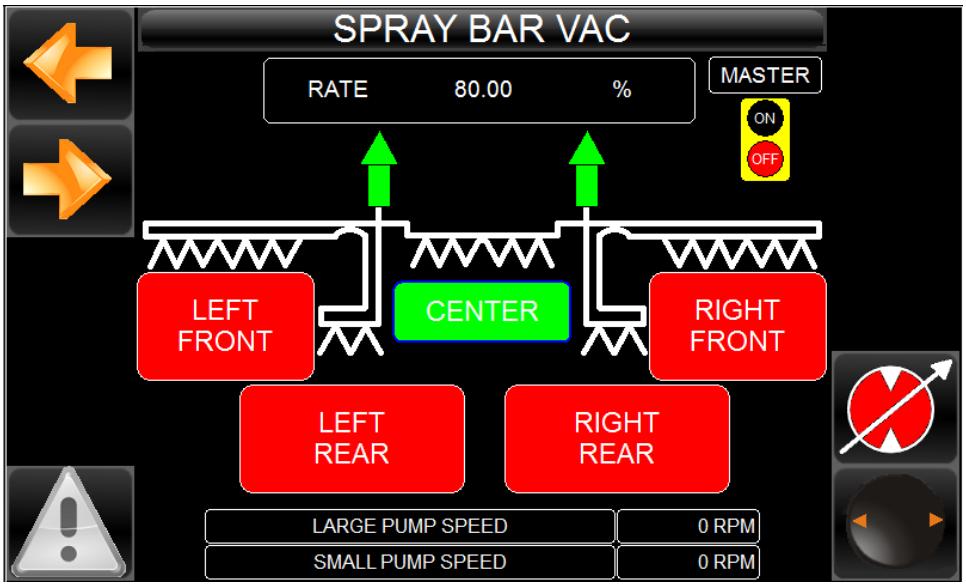

Figure 37: Spray bar vacuum screen

Vacuuming a section of the spray bar

1. Use the **multi-navigation key** [5R] to select spray bars: left and right front, center, or left and right rear. They will highlight in green.
2. Press the **Pump** key [4R] to activate the Spray Bar Vacuum pump function. “Warning pump will start!” will appear.
3. Press the **Yes** key [1R] to start the pump. The rate will turn green.

Note: The rate is fixed.

Note: If the spray master switch on the pendant control is on, the display will advise “Turn off the master switch!”

Spray paving steps

There are six basic sequential steps to spray paving (details of each step are described below):

1. Load emulsion in the tank(s): Fills the tanks with emulsion (page 74)
2. Circulate the tank(s): Heats up the pumps and valves before spraying (page 80)
3. Circulate the spray bar: Heats and charges the spray bars before spraying and prevents emulsion cooling and clogging when spraying is paused (page 81)
4. Spray emulsion: Applies emulsion to the paving surface (page 82)
5. Vacuum the spray bars: Pulls emulsion back in the tank when spraying is complete (page 84)
6. Clean out and rinse the spray bars: Cleans the system after use to prevent clogging (page 85)

Loading emulsion in the tank(s)

 **Warning:** Wear protective gear for face, hands, feet and body when working with hot material.

 **Warning:** Take extra care when cutback emulsions are used. They have a much lower flash point thereby posing a greater risk of explosion. Verify maximum temperature allowed of product and spray paver before heating.

 **Warning:** Do not mix different asphalt emulsion materials in the tank. Clean tank and the circulating system before adding a different substance.

 **Warning:** Asphalt emulsion is a water base product. As such it will boil at 212° F, causing steam inside pipes and possibly resulting in an explosion. Keep emulsion from boiling.

 **Danger:** When working around asphalt emulsion, first you must immediately be aware of the danger of steam explosions. Second, you must consider you are near a hot material that can burn skin, eyes, face, & hands. Always be aware of the position of hoses you are handling relative to yourself and those around you and the hot material inside.

 **Danger:** Handle emulsion with care. It can be highly flammable. Do not overfill the tank. Expansion and spillage creates a fire hazard. Clean up spilled emulsion before operating the machine. A spark could ignite the spillage.

 **Danger:** Do not smoke while loading the machine. Do not load the machine near open flame or sparks. Death or serious injury will occur from explosion or fire.

 **Danger:** Fill tank outdoors to reduce the chance of fumes accumulating and causing a fire or explosion. Prevent fires by keeping machine clean of accumulated grease and debris.

 **Danger:** Do not fill tank to absolute capacity. To reduce the risk of expansion and spilling from the tank, allow a minimum of 10 percent of the tank capacity for expansion.

 **Danger:** Before loading new hot emulsion, diesel or release agent left in piping and emulsion pumps from prior clean out needs to be vacuumed back and discarded so hot emulsion does not come in contact with a cold liquid that can steam and explode.

Spraying emulsion

Spraying a specific amount of emulsion on the pavement surface is the purpose of the spray paver. When Spray Auto is selected, the emulsion pump will turn slightly to pre-pressurize the spray bar system, so that immediate application occurs when the master power switch on the pendent control is selected.

The schematic in the Appendix (page 126) shows the pump group valving when the display screen unit is set to Spray Auto.

Using the spray bars

 **Note:** See page 31 for adjusting the spray nozzles.

1. Use the Sprayer Selection screen to extend the telescoping spray bars to the screed width, tilt the front spray bar down, and select spray nozzles.
2. Select **Pump Function**>**Spray Auto**, and activate the pump, and set the application rate
3. Turn on the master spray switch on the pendant control to start spraying.
4. When the paver stops, the “Turn off the master switch!” will appear. Turn off the master spray switch to prevent the emulsion from draining through the nozzles.

 **Tip:** Starts and stops during spraying occur many times on a job site. If another spray application is not going to be started within a few minutes, select Pump function>Spray Bar Circulate. This prevents emulsion from cooling down and clogging the piping.

Note: While operating in the Spray Auto function under standard conditions, all emulsion passing through the emulsion pump flows through the spray nozzles. Bypassing emulsion is not possible unless a control valve for the pumping station malfunctions or the pump outlet pressure exceeds the pump bypass set point of 80 psi (5.5 bar), which is about five times the typical spraying pressure.

Using the spray wand

1. Select **Pump Function**>**Spray Auto**, and activate the pump.
2. Use an arc spraying motion to coat the surface until the desired coverage is reached.

Tip: If the master spray switch on the pendant is off, there will be higher pressure to the spray wand because the pump runs at a fixed speed to build pressure within the spray bars. If the master spray switch is on, the spray wand will operate at a lower pressure, and coverage will be below the set amount.

Maintenance

Recommended spare parts

Part number	Description	Quantity
Spray bar components		
IDX23107	ASSY, CYL, PNEU (1")	3
IDX23116	ASSY, ROTARY ACTUATOR	3
IDX23081	ASSY, VALVE, SHORT, SPRAYBAR (center)	2
IDX23075	ASSY, VALVE, OUTER, SPRAYBAR (outer wing)	2
IDX23079	ASSY, VALVE, LONG, SPRAYBAR (inner wing)	2
IDX10517	CLEVIS PIN, 1/2"DIA	2
IDX23193	BAR, LATCH LINK (tilk lock)	0
IDX10333	FLANGE GASKET J15, J36	10
IDX23045	GASKET, END CAP (Spray Bar)	4
IDX10122	SCREEN BASKET GASKET, 1/16" THK	4
Spray nozzles		
IDX10056-06	SPRAY NOZZLE 06 CAPACITY	125
IDX10056-07	SPRAY NOZZLE 07 CAPACITY	125
IDX10056-08	SPRAY NOZZLE 08 CAPACITY	125
Emulsion hose		
IDX11040	HOSE, 0.75" SUCTION - 12 GMV (rear spray bars & spray wand)	10
IDX11170	HOSE, 1" SUCTION - 16 GMV (to spraybars)	10
IDX10968	HOSE, 2" SUCTION - 32 GMV (to tanks)	10
IDX10965	COUPLING, PIPE 0.75" NPT BLK IRON	2
IDX11502	COUPLING, PIPE 1" NPT BLK IRON	2
IDX10158	COUPLING, PIPE 1.5" NPT BLK IRON	2
IDX10299	COUPLING, PIPE 2" NPT BLK IRON	2
IDX11179	HOSE CLAMP, 1.5"ID T-BOLT (spray bar)	10
IDX10972	HOSE CLMP, T BOLT 2 6/16-2 5/8 (tank supply, return)	10
IDX10448	T-BOLT HOSE CLAMP (for 1.5" hose in pump station)	5
IDX10886	HOSE CLMP, PINCH 45/64-55/64 (pump station cleanout hose)	5
IDX23334	HOSE CLAMP, UP TO 1.25" (rear spray bar)	5
Pneumatics		
IDX10866	TUBING,1/4"OD BLK 1000' REEL	25'
IDX11050	FITTING ,AIR 1/4 UNION (push-in splice)	2
IDX20291	FILTER, AIR REPLACEMENT	2
Electrical		
IDX20002	FLIGHT SIMULATOR	1
IDX10791	ATC AUTOMOTIVE FUSE 10 AMP	4
IDX20141	RELAY LATCH DPDT 24VDC 2A 2 CO (for compressor)	1
IDX20032	SWITCH, PNEUMATIC PRESSURE (compressor hi/lo)	2

Table 4: Recommended spare parts

Service interval

Task	Ref. page	Frequency				
		As required	Every day	Every week	Every month	Every year or 400 hours
Clean the spray wand.	92	X				
Clean the machine.	92	X				
Clean the strainer screen in the pumping station.	93	X				
Check the hydraulic oil level.	93		X			
Inspect hydraulic hoses and emulsion hoses.	93		X			
Check the fluid level in the clean out tank.	94		X			
Clean blockage from the emulsion tank overflow tubes.	94		X			
Clean the hydraulic cylinder rods.	94		X			
Check the oil in the air compressor.	94		X			
Drain the air compressor tank and air filter.	95		X			
Inspect the packing gland on the emulsion pumps.	95			X		
Inspect the emulsion pump coupler.	96			X		
Lubricate the emulsion pump bearings	97			X		
Inspect the packing gland on the emulsion tank.	97			X		
Check the tightness of the tank tie-down hardware.	97			X		
Check spray nozzle alignment.	97			X		
Check the spray bar hardware.	97			X		

Routine maintenance procedures

 **Warning:** Do not attempt repairs unless properly trained to do so. Refer to manuals and experienced repair personnel for assistance.

 **Warning:** Do not service the machine while it is in motion or while the engine is running. If the engine must be running to service a component, apply parking brake, block wheels, and use extreme caution.

 **Warning:** Allow machine to cool as necessary before repairing or servicing working components.

 **Warning:** Wear protective glasses and other required safety equipment when servicing or repairing the machine.

 **Warning:** Follow good shop practices: Keep service area clean and dry. Be sure electrical outlets and tools are properly grounded. Use adequate light for the job at hand.

 **Warning:** Clear the area of bystanders when carrying out any maintenance, repairs, or adjustments.

 **Warning:** Support the machine with blocks or safety stands when working beneath it. Death or serious injury can result from the machine falling off a jack and crushing you.

 **Warning:** Keep hands, feet, hair, and clothing away from moving parts. Death or serious injury can occur from entanglement in moving parts.

 **Warning:** Do not make repairs on pressurized components until the pressure has been properly released. Use extreme caution when working on hot or pressurized plumbing.

 **Danger:** Do not make repairs using tape, clamps, or cements. The hydraulic system operates under extremely high pressure. Such repairs will fail suddenly and create a hazardous condition.

 **Warning:** Before applying pressure to a hydraulic system, be sure all lines, fittings, and couplers are tight and in good condition. Leaking fittings are a fire hazard. Hydraulic fluid under pressure can pierce skin, resulting in serious injury or toxic reaction. Do not feel for hydraulic leaks with your hands.

 **Warning:** After servicing, make sure all guards are in place and properly secured. Serious injury can occur from being caught in unguarded moving parts.

 **Warning:** After servicing, be sure that all tools and parts or servicing equipment are removed from the unit. Loose equipment left in the machine can get caught in moving components and cause injury or equipment damage.

Cleaning the strainer screen in the pumping station

1. Remove the cover from the pumping station.
2. Unbolt and remove the strainer housing lid.
3. Pull out the strainer screen (Figure 45).
4. Manually remove debris or rinse. Use an appropriate solvent such as diesel fuel or clean out tank fluid.
5. Replace the screen, lid and pumping station cover.

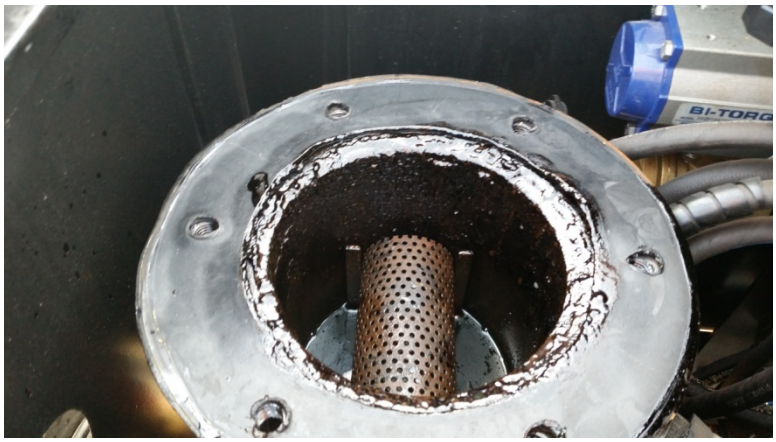

Figure 45: Strainer screen in the pumping station

Checking the hydraulic oil level

1. When hydraulic oil is cool, the oil level should be visible at the bottom of the sight glass but no higher than halfway up the sight gauge.
2. If additional hydraulic oil is needed, fill with CAT Hydro Advanced 10 hydraulic oil.

Inspecting hydraulic hoses and emulsion hoses

Warning: Hydraulic oil under pressure is a skin injection hazard and can cause serious injury or death. Do NOT use your hands or other body parts to check for leaks. If hydraulic oil is injected under the skin, it can cause gangrene. Seek medical help immediately.

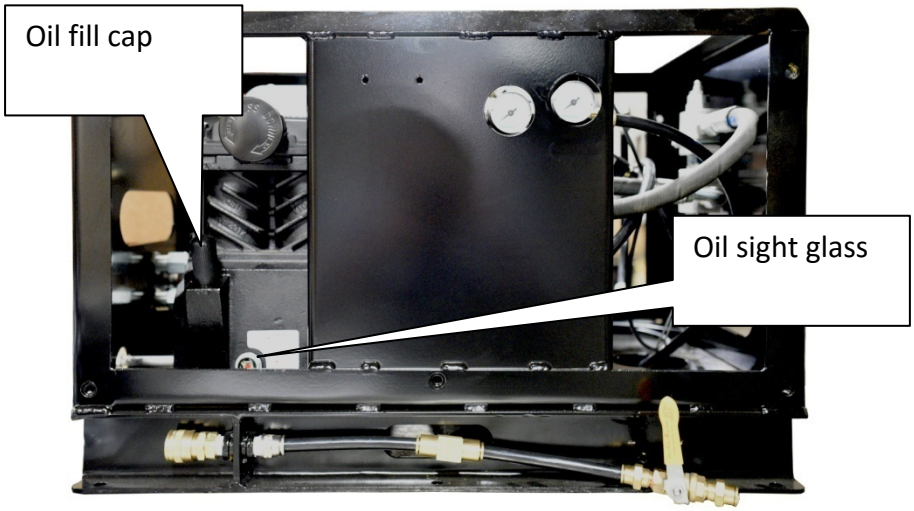

Figure 46: Air compressor oil sight glass and fill cap

Draining the air compressor tank and air filter

1. Open the drain cock on the compressed air tanks to drain any water condensate.
2. Drain the compressed air filter.
    - If the system does not have an automatic drain, open the drain cock on the filter bowl to drain any water condensate.
    - If the system has an automated drain, leave the drain cock open for the automated drain to work.

Inspecting the packing gland on the emulsion pumps

Inspect for leaking below the pump. If there is leaking, tighten the packing gland nuts (located near the driveshaft, see Figure 47) until leaking at the driveshaft is no longer observed. Do not over tighten.

Lubricating the emulsion pump bearings

1. Use a grease gun to grease the zerk on the large emulsion pump (the small pump does not have a grease zerk).
2. Wipe away excess grease.

Inspecting the packing gland on the emulsion tank

Check for leaks around the sight gauge. If there are leaks, remove the sight gauge, and tighten the nut until leaking stops.

Checking the tightness of the tank tie-down hardware

Examine the bolts that hold the tanks to the paver hopper. Make sure they are tight and secure.

Checking spray nozzle alignment

1. View the spray pattern to see if all nozzles spray at the same angle.
2. Set nozzles as shown in Figure 10.

Checking the spray bar hardware

1. Make sure bolts are tight.
2. Make sure actuators and linkages operate freely and are not worn.
3. Make sure valves open and close correctly.

Checking the condition of the hydraulic filter

1. Look at the hydraulic filter cleanliness indicator, which is found on the hydraulic filter housing.
2. Change the filter as necessary by twisting off the filter cover, replacing the filter and reinstalling the cover.

for your paver in the Appendix 4: Emulsion tank configuration (page 140) to determine the volume of fluid in the tank.

Note: When measuring fluid level with the dipstick, place the dipstick into its bore, but DO NOT thread the dipstick into the bore.

3. In the Totals screen of the display screen unit, zero the job totals by holding down the circular arrow key [2R] (see Figure 48) for at least 5 seconds.

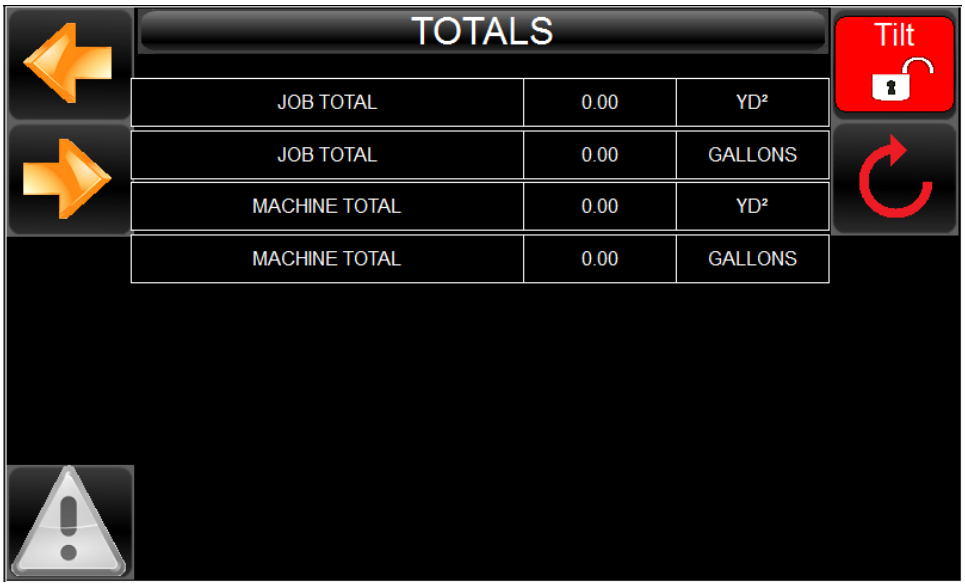

Figure 48: Zeroing the job totals

4. Begin spraying in the Spay Auto mode. Continue until the tank gets low. Be sure to not run the tank too low, or a dipstick measurement will not be possible. Stop and start spraying as necessary during this process to check the tank level.

5. With the paver parked on a level surface, use the emulsion tank dipstick to measure the volume of fluid in the tank. Use the tables in Appendix 4: Emulsion tank configuration to determine the amount of emulsion in the tank from the dipstick value.

Note: Measure the fluid level with the dipstick placed in the bore, but do not thread the dipstick into the bore.

6. In the Totals screen of the display screen unit, note the Job Total volume (gallons or liters).
7. Calculate the Small Pump Calibration Factor.

$$\frac{(\textit{Start Volume} - \textit{End Volume})(\textit{Old Calibration Factor})}{\textit{Job Total}} = \textit{Calibration Factor}$$

8. On the Password screen of the display screen unit, enter the password. The Service screen will appear.
9. On the Service screen, use up and down arrows [1R] and [3R] to select the Small Pump Calibration Factor.
10. Use the keys corresponding to the up and down arrows [1R] and [3R] to enter the new calibration factor. Press the Enter button [2R].

Tip: For greatest accuracy use all three decimal places.

Example:

Starting tank volume = 425 gallons

Ending tank volume = 50 gallons

Measured volume = 375 gallons

Job total = 378 gallons

Old calibration factor = 1000

$$\frac{(425 - 50)(1000)}{378} = 992$$

Storage

Before and after a storage period of 6 months or longer, perform the following procedure:

1. Follow the tank and pump clean out procedures if emulsion remains in the spray paving system. If the spray paving system is already cleaned out proceed to step 2.
2. Fill the emulsion tank with approximately 20 gallons (76 L) of diesel fuel. This should be enough to fill the sump of the tank and submerge the floor of the tank.
3. Run the **Tank Circulate** pump function. Adjust the pump flow rate to 100%.
4. Remove one of the emulsion tank covers, and look into the emulsion tank to see if diesel fuel is circulating in the tank. Add diesel fuel to the tank if the suction line for the pump is not submerged and sucking air.
5. Continue running **Tank Circulate** for 10 to 15 minutes.
6. Run the **Spray Bar Circulate**. Adjust the pump flow rate to 100%.
7. Continue running **Spray Bar Circulate** for 10 to 15 minutes, and then turn the pump off.
8. Run the spray bar vacuum procedure (page 84).
9. Turn off the pump.
10. Remove the diesel fuel from the emulsion tank before adding hot emulsion to the tank.

Startup after storage

Hydraulics system check

1. Before starting the paver, check the spray paving system hydraulic reservoir fluid level and perform a visual inspection of all hydraulic components.
2. Power on the spray paver display screen unit using the power button on the pendant, and start the paver's engine.
3. Verify the right and left telescoping spray bars extend and retract and the front spray bar tilt functions.

   Note: Retract the locking pin on the right side of the front spray bar to tilt. In some models this must be done manually.

Cleaning agent check

If the machine was properly stored, there will be cleaning agent (typically diesel fuel) inside all spray bar pipes and in the emulsion tank(s).

To ensure Tank Circulate and Spray Bar Circulate can be run without pulling air on the suction side, unbolt and remove an emulsion tank cover, and look into the tank to be certain that the tank suction (outlet) port is submerged with release agent.

- If the spray bars contain cleaning agent, but the level in the emulsion tank is not high enough to cover the suction port, directly add cleaning agent to the tank.
- If there is no cleaning agent inside the spray bars, run the Clean Out pump functions to circulate cleaning agent through the spray bars and back into the emulsion tank.

  Note: Open the manual ball valve at the cleaning agent tank when running the Clean Out functions, and then close the ball valve when complete.

Function check

Verify proper operation of each spray paver function.

Tank Load

1. Activate the **Tank Load** pump function to verify operation.

    **Note:** If the cleaning agent within the tank is above the suction (outlet) port, the emulsion tank will not need to be loaded at this time.

2. Verify both the small and large asphalt pumps shafts are rotating. The small pump flow rate is fixed at a low speed, but the large pump speed can be adjusted using the up and down arrows.

3. Verify valve actuator (open & closed) positions using the diagram in Appendix 2: Pump group flow paths (page 123).

Tank Circulate

1. Activate the **Tank Circulate** pump function to circulate cleaning agent from the emulsion tank to the asphalt pumping station and then back to the emulsion tank. Circulate for a minimum of 5 minutes at a high flow rate.

2. Verify both the large and small asphalt pump shafts are rotating. The small pump flow rate is fixed at a low speed, but the large pump speed can be adjusted using the up and down arrows.

3. Verify valve actuator (open & closed) positions using the diagram in Appendix 2: Pump group flow paths (page 124).

Spray Bar Circulate

1. Activate the **Spray Bar Circulate** pump function to circulate cleaning agent from the emulsion tank to the asphalt pumping station, through all the spray bars and back to the emulsion tank.

2. Verify both the small and large asphalt pump shafts are rotating. The large pump flow rate is fixed at a low speed, but the small

pump speed can be adjusted using the up and down arrows. Circulate for a minimum of 15 minutes at a high flow rate.

3. Verify valve actuator (open & closed) positions using the diagram in Appendix 2: Pump group flow paths (page 125).

Spray Auto

1. Install clean spray nozzles of the appropriate nozzle opening for the application rate and paving speed of the job.
2. Activate the **Spray Auto** pump function and verify proper operation. The spray nozzles will not spray until the master spray switch on the pendant is turned on.
    - If the master spray switch is off and the Spray Auto pump function is active, the small asphalt pump will run at a constant flow rate of 10 gpm.
    - With the master spray switch on, the small asphalt pump speed is regulated to supply the application rate based on the vehicle speed and the selected spray width. If the vehicle is not moving, the flow rate from the asphalt pump will be reduced to zero.
3. Verify valve actuator (open & closed) positions using the diagram in Appendix 2: Pump group flow paths (page 126).
4. Verify all spray nozzle actuators function properly (observe them open and close), by turning them on and off with the navigation arrow and the OK button on the Sprayer Selection screen.

Spray Bar Vacuum

1. With the paver engine running at high idle (full speed), activate the Spray Bar Vacuum pump function. Verify both the large and small asphalt pump shafts are rotating.
2. Verify valve actuator (open & closed) positions using the diagram in Appendix 2: Pump group flow paths (page 127).

Clean Out

1. Activate the Clean Out function. Verify the small and large asphalt pump shafts are rotating.
2. Verify valve actuator (open & closed) positions using the diagram in Appendix 2: Pump group flow paths (page 128).

Troubleshooting

Problem	Root Cause	Solution
Resin in the emulsion tank hardened.	Tank not properly emptied after use	Clean the emulsion tank (see page 112).
Blocked nozzles or nozzles spraying unevenly across spray bars	Spray bar cold due to poor circulation of hot emulsion through the spray bars, which is in turn caused by blockage or incorrect valve alignment	Make sure emulsion in the tank is 180° F or hotter. 1. Run Tank Circulate to heat the plumbing in the pump station. 2. Run Spray bar Circulate. If the spray bar begins to warm slowly, continue to run Spray bar Circulate for 10 minutes to melt any hard emulsion in the spray bar. If hot emulsion is not flowing through the spray bar, check alignment of the pump station valves (see Appendix 1).
	Nozzles mismatched	Verify all nozzles are the same size and style.
	Flow rate for nozzles too low	Increase flow through nozzles by 1, increasing application rate and/or 2, increasing travel speed. If 1 and 2 cannot be done or do not resolve the problem, install lower capacity nozzles.
Nozzles spray stopping sporadically	Clogged nozzle	Remove the nozzle, and rinse it with clean out fluid to flush out any solid particles and dissolve hardened emulsion.
Spray nozzles continue to drip although closed	With center or inner spray bar nozzles: Spring tension too low	Clean emulsion from the top of the valve to free spring. If still too loose, add washers to increase tension.
	With outer spray bar nozzles: locknut too loose	Tighten the locknut on valve stem.
Emulsion pump stuck	System not cleaned after use	Clean the pump (see page 116).
Emulsion small pump	New pump installed	Set the small pump bypass

 **Warning:** If a torch is used be sure to remove any flammable solvents from the area to prevent fires or explosions. An infrared temperature gun is required to be sure that the pump is not heated above 212° F (100° C). If the asphalt emulsion boils it may explode and cause bodily injury.

Setting the small emulsion pump bypass pressure

The emulsion pump bypass pressure is set at the factory and normally will not need to be adjusted. However, if the bypass pressure is set so emulsion bypasses within the pump at too low of a pressure, the flow rate will not be accurate. This is a problem with the small emulsion pump, which requires accurate flow for accurate control of the application rate.

Check and reset the small emulsion pump bypass pressure as follows:

1. With the paver shut off, remove the screw cap that covers the adjustment screw on the small emulsion pump relief valve.
2. Loosen the lock nut on the adjustment screw.
3. Turn the bypass adjustment screw all the way clockwise.
4. Tighten the lock nut.
5. Reinstall the adjustment screw cap.

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