Integral dx Spray Paver Factory Acceptance Test	
Document Number	**Rev B – 14 October 2016**
Customer	**Integral dx**
Test Item Model	**Spray Paver**

Client Name:	Integral dx	Date Started:	
Test Unit Serial Number and/or Revision Level:		Date Complete:	
SpecSys Project Number:		Nozzle Size Installed:	

Use an ink pen when completing entries in this document.

Contact the manufacturing or engineering project managers with any questions.

1. Introduction

Integral dx has contracted Specialty Systems Inc. (SpecSys) to manufacture a liquid asphalt spraying attachment (spray paver) for an asphalt paver. This test document is designed as a factory acceptance test that will be used to thoroughly check over the unit while recording machine data. This document will verify functionality and quality are acceptable before the product is delivered to Integral dx.

This test plan is designed to run the machine test in the order the test plan is written once machine assembly is believed to be complete.

Software should be thoroughly tested out before beginning this test. Although some software checks are included within this document the checks are not intended to be comprehensive and this document is not intended to specifically test or debug controls software. If changes/adjustments are made to the control system software after starting this test plan, then restarting the test plan is required. Improving the software in a certain condition may have unanticipated results in another condition which may have already been tested.

No asphalt emulsion or water will be used during this test. A small amount of diesel fuel will be circulated through the spray paving system, then drained and captured for reuse after this testing is complete.

Testing will take place at the SpecSys Granite Falls, MN location if not otherwise noted.

TEST LOCATION:_____

1a. Machine Illustration And Functional Description

The Integral dx spray paver (Figure 1.1) applies emulsion volumetrically to the road surface through a system of spray bars with nozzles.

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

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

The spray paving system has an easy-to-use display screen unit. The operator uses the display screen unit to set application rate and spray width. Using these inputs along with vehicle speed, the display screen unit works with a control unit to automatically apply emulsion at the set application rate.

Volumetric spraying is different from using a pressure system. With volumetric spraying, each revolution of the emulsion pump achieves a specified amount of flow in gallons; flow is directly related to the pump RPM. By monitoring the pump RPM using a sensor in the hydraulic pump drive motor, the control unit knows the exact amount of flow achieved. A flow meter is not needed when using the volumetric emulsion pump(s).

The spray system is “ground oriented,” meaning it is linked to the paver speed. The spray paving system monitors speed using the paver speed signal and the control unit reads the exact paver speed. As the paver speeds up or slows down, the pump also speeds up or slows down to ensure the exact application rate, measured in gallons per square yard (or liters per square meter) is achieved.

The emulsion application maximum width depends upon the specific model. Spray width can be adjusted incrementally.

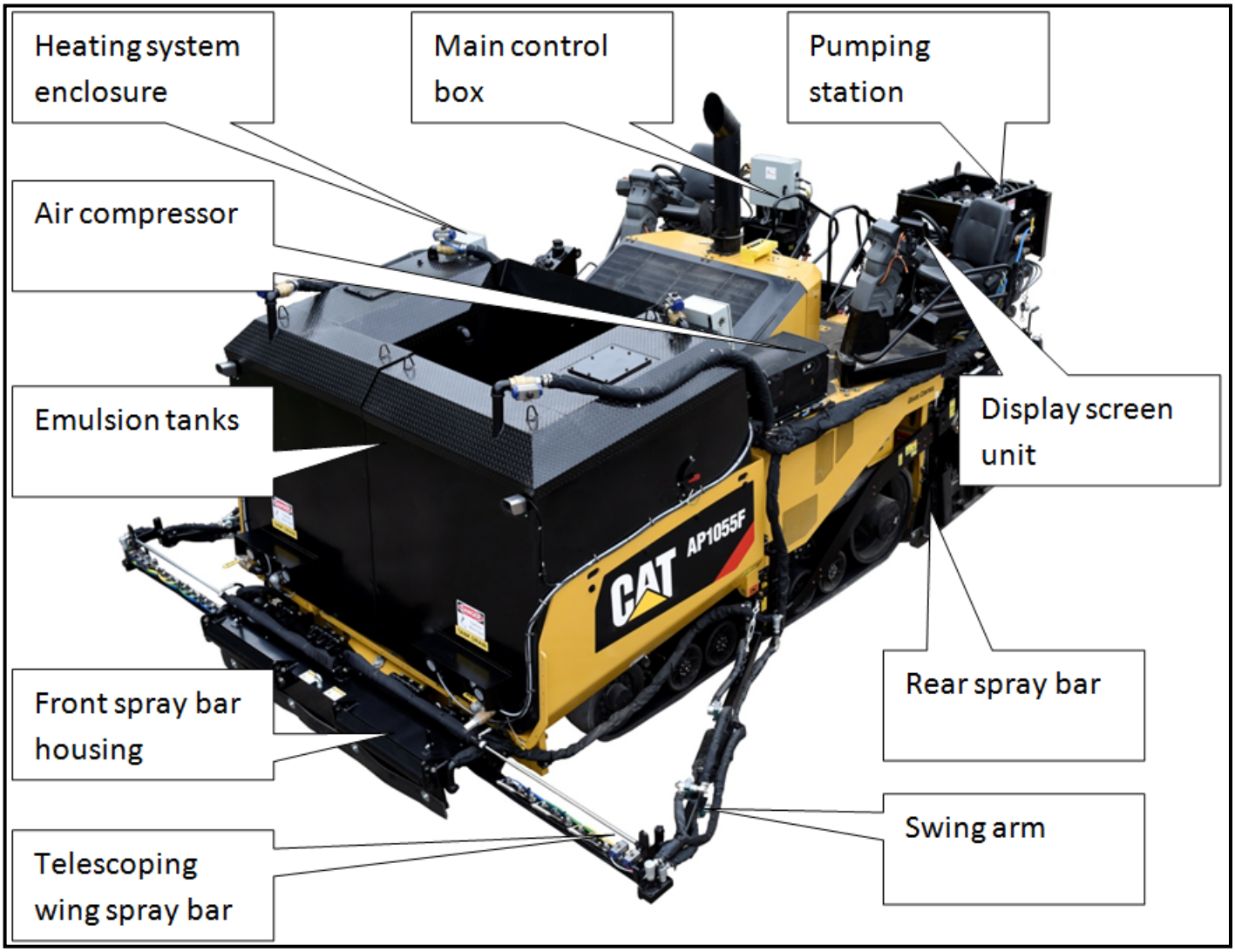

Figure 1.1 Component Identification

1b. Listing of Test Participants

Name	Department	Title or Function

Table 1.1 Test Participants

Signatures of Test Participants

Printed Name	Company	Signature

Table 1.2 Test Participant Signatures

2. Safety

2a. Safety Alert Classifications

These classifications and icons defined below work together to alert you to situations that could be harmful to you, job site bystanders, or your equipment. When you see these words and icons in the book or the machine, you must read, understand, and follow all instructions.

YOUR SAFETY IS AT STAKE. Watch for the three safety alert levels:

⚠ DANGER Indicates a hazardous situation that, if not avoided, **will** result in **death or serious injury.** This signal word is to be limited to the most extreme situations.

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

⚠ CAUTION Indicates a hazardous situation that, if not avoided, could result in **moderate or minor injury.**

NOTICE Indicates information considered important, but dealing exclusively with **property damage**, not hazards related to personal injury.

2b. General Safety Precautions

⚠ WARNING Wear safe work clothing. Do not wear clothing that is loose fitting or in poor repair when working on machinery. Do not wear rings, wristwatches, or other jewelry while working on machinery. They can catch moving parts, pulling the person into the machinery, causing serious injury or death.

⚠ DANGER Do not smoke around machines. Fuel, solvents, and fumes can explode when exposed to flames or heat from smoking and other sources.

- Read and fully understand the operator manuals and safety labels on machines before trying to operate or service equipment.
- Have a first-aid kit available and know how to use it.
- Keep a charged fire extinguisher within reach whenever you work in an area where fire may occur.
- Wear sturdy, rough-soled work shoes, safety glasses and any other protective gear that is warranted by the work environment.
- Reinstall safety devices, guards or shields after adjusting and/or servicing machines.
- After servicing machines be sure that all tools, parts, and servicing equipment are removed.

2c. Safety Requirements

Before attempting to operate the machine read and understand the operator manual for the spray paver, seek additional training on operation if necessary. Exercise care while operating the machine or working nearby. Remember to always keep safety in mind because it is impossible to predict every situation that may occur. All personnel involved with the testing must be familiar with and observe all safety related information for the test item, the work environment, and any test fixtures.

Understand all safety features & devices provided on this test item, work environment, and any test fixture. Know where safety devices and equipment are located (emergency stop devices, fire extinguishers, eyewash stations, spill kits, etc.).

Follow all safety regulations that apply for the property at which you are working.

Disconnect all electrical power before welding on an item.

Maintain a clean working environment.

- Immediately and appropriately address any fluid spills.
- Maintain a clear escape route for emergencies such as a fire.
- Keep floors swept to avoid slipping and falls.
- Return equipment and tools to their proper storage locations when done using them.

Before operating equipment:

- Observe devices and/or systems in a “Tag-out, lock-out” condition. Postpone operation until such devices and/or systems are in working order.
- Verify all guards, railings, gates, etc. are properly secured.
- Check the fluid levels and look for any leaks, loose or damaged parts, worn or damaged belts, fittings, fasteners etc.
- Perform visual inspections of equipment and attachments. For example check for broken, loose, or worn parts.
- Make sure that all work components and attachments are secured as necessary by the appropriate safety devices, such as safety locks.
- Make sure that all personnel are CLEAR OF ALL moving parts and at safe distance.
- Use horn (if equipped) or shout “ALL CLEAR” to indicate that equipment is about to be started or moved.

2d. PPE Considerations

Depending on the specific task at hand use the required Personal Protective Equipment (PPE). The list below is intended to help personnel remember the types of required PPE, but other specific equipment may be required.

- Safety Glasses
- Safety Shoes
- Ear Protection
- Hard Hat
- Hand Gloves
- Apron or Other Protective Clothing
- Safety Vest (High Visibility)
- Breathing Apparatus
- Task Specific PPE
- Removal of Jewelry Including Rings & Watches

3. Facilities and Equipment

3a. Facility Requirements Check List

No	Description	Responsible	Availability
1	Indoor Storage and Shop Area for the Spray Paver	SpecSys	
2	Outdoor Area to Perform Tests	SpecSys	
3	120 VAC Outlet – 15 or 20 Amp Capacity	SpecSys	
4	230 VAC Outlet – 20 Amp Minimum (17 Amp / 4 kW Tank Heater)	SpecSys	
5	Compressed Shop Air	SpecSys	
6	Brake Cleaner (Oil Leak Cleanup)	SpecSys	
7	Diesel Fuel (for Circulation and Also to Fill Paver Fuel Tank if Required)	SpecSys	

3b. Equipment Check List

No	Description	Responsible	Availability
1	Complete Assembled Spray Paver	SpecSys	
2	Human Machine Interface (HMI) and Control Unit Programming Equipment	SpecSys	
3	Inspection Equipment / Measuring Devices – 100’ Measuring Tape, Stopwatch, Flashlight	SpecSys	
4	Electrical Multi-Meter (Volts, Ohms, Amperes)	SpecSys	
5	Photo Tachometer	SpecSys	
6	Infrared Temperature Gun	SpecSys	
7	Camera (Photo and Video)	SpecSys	
8	Flowmeter (If New Emulsion Tank Design Requires Calibration)	SpecSys	

4. Document Check List

No	Description	Document #	Responsible	Availability
1	Operator's Manual (See Appendix D.1)	N/A	SpecSys	
2	Parts Manual (See Appendix D.2)	N/A	SpecSys	
3	Assembly Drawings (See Appendix D.3)	Varies by Model	SpecSys	
4	Asphalt Flow Schematics (See Appendix D.4)	IDX20168	SpecSys	
5	Electrical Schematics (See Appendix D.5)	IDX23001	SpecSys	
6	Pneumatic Schematics (See Appendix D.6)	IDX20029	SpecSys	
7	Hydraulic Schematics (See Appendix D.7)	IDX20030	SpecSys	
8	Hydraulic Design Booklet (See Appendix D.8)	N/A	SpecSys	
9	Electrical Design Booklet (See Appendix D.9)	N/A	SpecSys	
10	Pneumatic Design Booklet (See Appendix D.10)	N/A	SpecSys	
11	Pump Function Speeds & Flows (See Appendix D.11)	N/A	SpecSys	
12	Human Machine Interface Screens (See Appendix D.12)	N/A	SpecSys	
13	Decal Prints (See Appendix D.13)	Varies by Model	SpecSys	

5. General Inspections – Engine Off / Hydraulic Pump Off

5a. Hydraulic System Inspection

Verify that all tasks in Table 5.1 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Do all routings match the hydraulic schematic?		
Are all hydraulic hose ends properly crimped?		
Are all connections properly tightened?		
Is the spray paving system hydraulic reservoir filled?		
Have all leaks been corrected? List any leaks found before running the hydraulic pump in the notes section below.		
Notes:		

Table 5.1 Hydraulic System Inspection

5b. Pneumatic System Inspection

Use shop air to pressurize the pneumatic system, a connection is located on the spray paver's air compressor. Within each pneumatic valve bank enclosure actuate the manual override for each valve to check for leaks in the open and closed positions, or if the control system is functional actuating the valves in the opposite direction may be easier by accessing Test Mode through the HMI, see Figure 6.2 for instructions.

Note: If multiple emulsion tanks are installed, verify that any additional pneumatic valves are checked for air leaks.

Verify that all tasks in Table 5.2 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Do all routings match the pneumatic schematic?		
Are all connections properly tightened?		
Have all leaks been corrected in the closed position? List any leaks found in the notes section below.		
Have all leaks been corrected in the open position? List any leaks found in the notes section below.		
Notes:		

Table 5.2 Pneumatic System Inspection

5c. Asphalt System Inspection

Verify that all tasks in Table 5.3 can be answered with a yes and add notes as required.

Note: The asphalt system will be checked for leaks in Section 10 – Asphalt System Checks.

TASK	ENTRY	INITIALS
Do all routings match the asphalt schematic?		
Are all connections properly tightened?		
Notes:		

Table 5.3 Asphalt System Inspection

5d. Electrical System Inspection

Electrical schematics are followed during installation electrical functionality is checked later in the test. Verify that all tasks in Table 5.4 can be answered with a yes and add notes as required.

Note: Just because the HMI powers on at an operator station it does not mean functions will work, the CAN cable is required for functions to operate. Verify that the CAN connection between the HMI and the control unit is functional by activating something such as the Spray Master switch (indicator on HMI will change from off to on).

TASK	ENTRY	INITIALS
Are all connections properly secured?		
At operator station 1 does the HMI &PLC power on?		
At operator station 1 does the CAN connection function?		
Notes:		

Table 5.4 Electrical System Inspection

5e. Miscellaneous Inspections

Decal Inspection
Verify all decals are installed and located appropriately using the prints for the decals group and electrical enclosures. The Operator's Manual also includes decal information, but states the location may vary depending upon the model.

Decal Prints for an AP1055F Paver (These are listed in Appendix D):

- Decals Group: IDX20151
- Tank Heating System Enclosure: IDX21004
- Controls Enclosure: IDX23003

Verify that all tasks in Table 5.5 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Are all decals installed according to the decals group print?		
Is a complete set of Spanish decals packaged to ship with the paver?		
Are all decals installed according to the controls enclosure print?		
Are all decals installed according to the heating system enclosure print?		
Notes:		

Table 5.5 Decal Inspection

6. Software – 24 VDC Power On / Engine Off

The HMI and PLC each have their own software file and require programming, but this should have already been completed before installation. The HMI and PLC programming are independent – both software files do not need to be programmed at the same time. The Operator's Manual includes step by step instructions for operating the control system as well as programming the HMI and the PLC.

Note: When choosing pump functions on the Pump Function HMI screen, a pump function may be selected without turning on the asphalt pump(s). To define weather the asphalt pump(s) have been turned on or off the terms "select / selected" (pumps off) and "activate / activated" (pumps on) will be used within this document. For example, a pump function is "selected" if the enter button has been pressed for the pump function, but the pump button has not been pressed to "activate" the pump(s). If a pump function is "active / activated" the pump button has already been pressed to turn on the asphalt pump(s).

6a. Service Screen and Test Mode Access

Service Screen:
The Service screen is accessed by entering the default password of "1234" in the Password screen, see Figure 6.1. Some control system settings can be adjusted within this screen. Several sections in this test document will require settings to be adjusted in the Service screen.

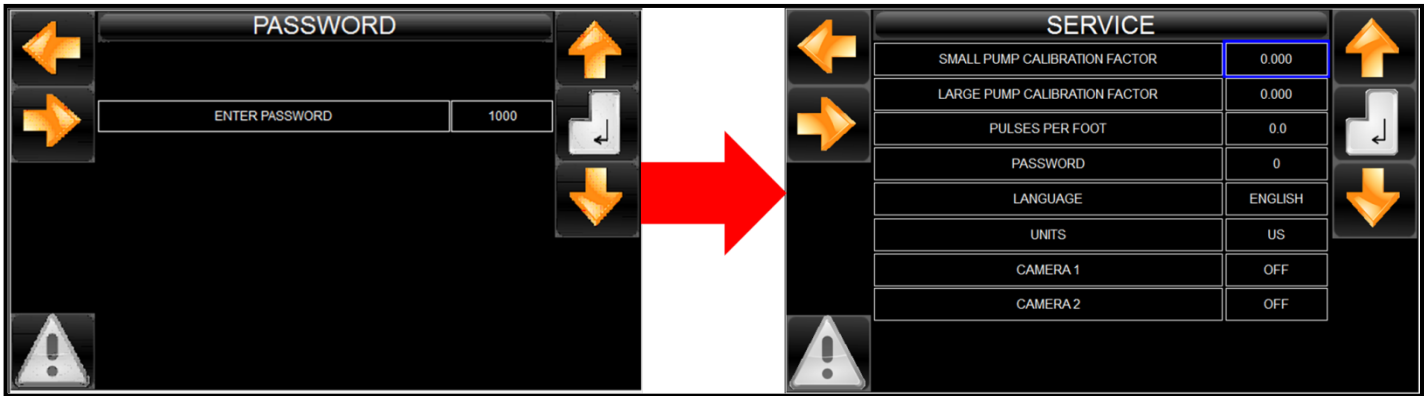

Figure 6.1 Service Screen Access – Default Password = "1234"

Test Mode:
Access to the HMI Test Mode screens is also required several times throughout this test document. Figure 6.2 provides access instructions for Test Mode. Figures 6.3 through 6.5 show the additional screens that are available while in Test Mode.

Note: Exit Test Mode with the same buttons used to access Test Mode.

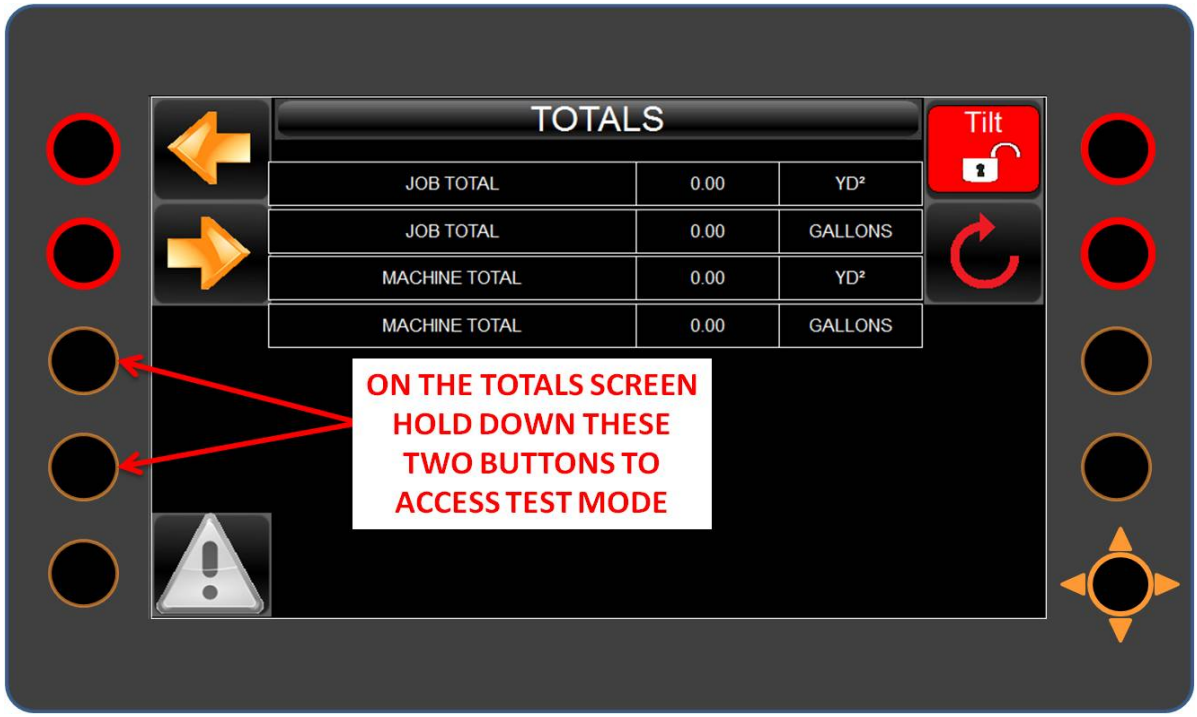

Figure 6.2 Access to Test Mode

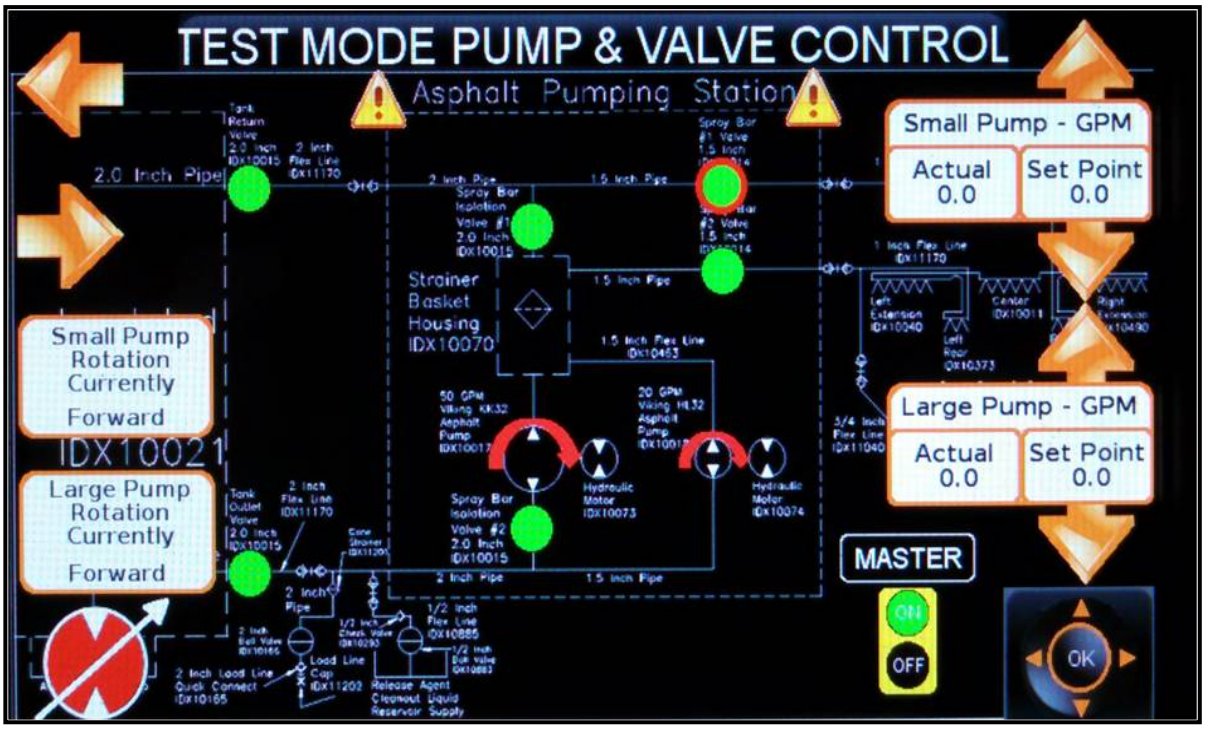

Figure 6.3 Test Mode Pump & Valve Control

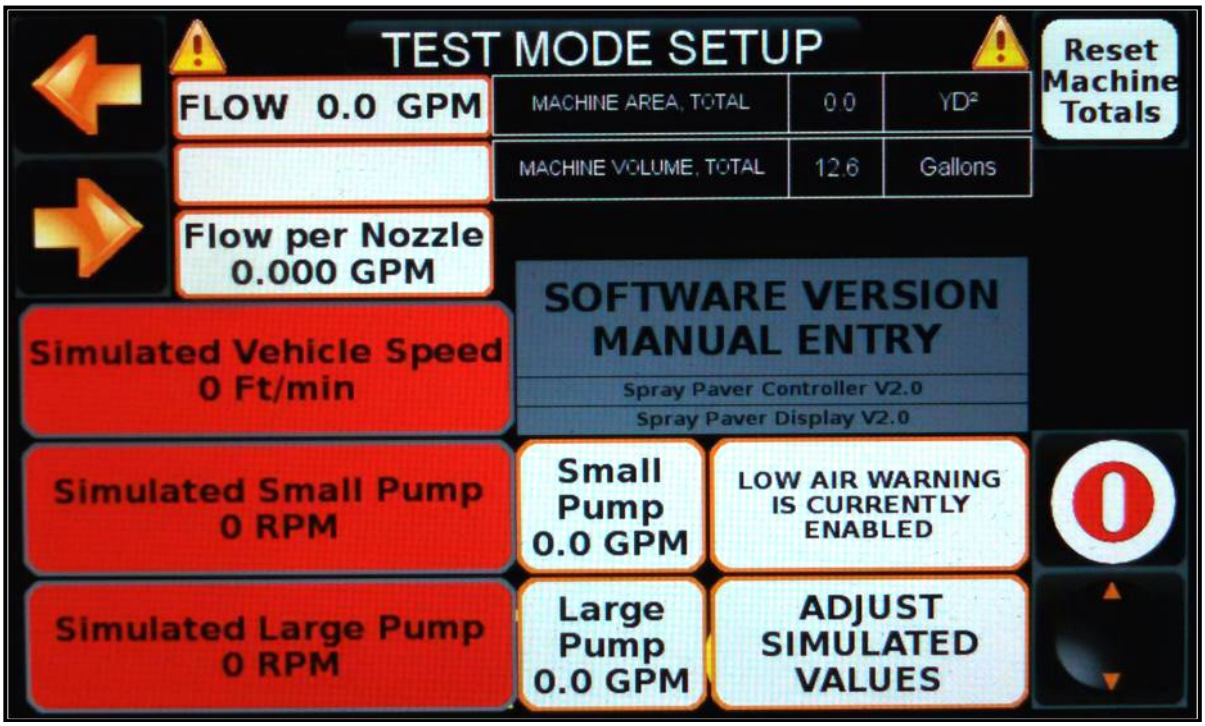

Figure 6.4 Test Mode Setup

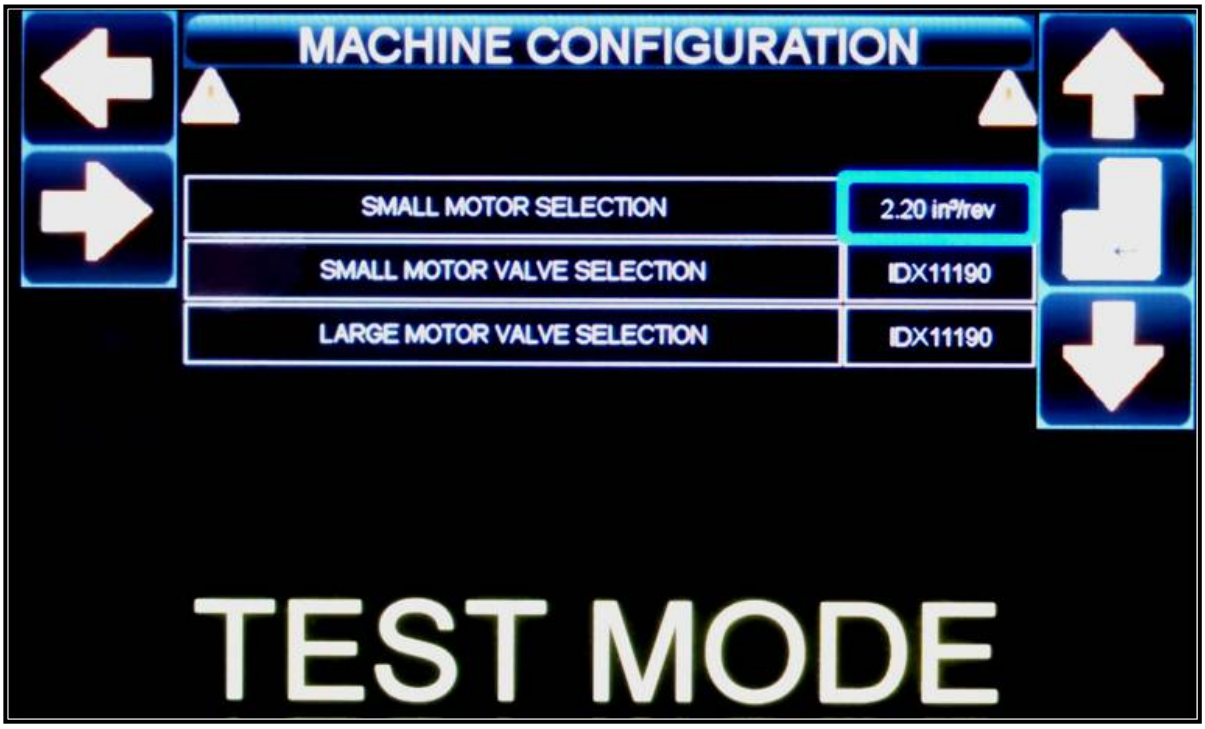

Figure 6.5 Test Mode Machine Configuration

6b. HMI and PLC Software Setup

Access to the HMI Test Mode screen is required to complete Table 6.1 and instructions to access Test Mode are shown above in Figure 6.2. Figures 6.3 through 6.5 show the additional screens that are available while in Test Mode.

Verify that all tasks in Table 6.1 include an entry and add notes as required.

TASK	ENTRY	INITIALS
HMI Software Version - Test Mode Setup Screen (Figure 6.3).		
PLC Software Version – Test Mode Setup Screen (Figure 6.3)		
Does the HMI Test Mode screen display the correct software versions? (check with project management)		
Is the correct small motor size entered? (log the small motor size from the Test Mode Machine Configuration Screen, Figure 6.5)		
Is the correct small motor valve entered? (log the small motor valve from the Test Mode Machine Configuration Screen, Figure 6.5)		
Is the correct large motor valve entered? (log the large motor size from the Test Mode Machine Configuration Screen, Figure 6.5)		
Notes:		

Table 6.1 Software Installation

6c. Camera Check

Verify that any camera(s) operate properly and are viewing the desired area. Cameras need to be selected as "ON" or "OFF" in the Service screen of the HMI.

Verify that all tasks in Table 6.2 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
At operator station 1 is camera 1 operating and aimed at the desired area?		
At operator station 1 is camera 2 operating and aimed at the desired area?		
Notes:		

Table 6.2 Camera Check

6d. Additional Operator Stations & Camera Check

Verify that HMI operates properly at any additional operator stations. Also verify that any cameras operate properly on additional operator stations.

Note: Just because the HMI powers on at an operator station it does not mean functions will work, the CAN cable is required for functions to operate. Verify that the CAN connection between the HMI and the control unit is functional by activating a something such as the Spray Master switch (indicator on HMI will change from off to on).

Verify that all tasks in Table 6.3 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
At operator station 2 does the HMI power on?		
At operator station 2 does the CAN connection function?		
At operator station 2 is camera 1 operating?		
At operator station 2 is camera 2 operating?		
Notes:		

Table 6.3 Multiple Operator Station Checks

7. Electrical System Checks – 24 VDC Power On / Engine Off

7a. Hydraulic Valves (While performing the checks in step 7a is recommended, the function checks in section 9 will identify components that are not functioning properly.)

The on voltage for hydraulic functions needs to be 24 VDC. If the voltage is not 24 VDC use the electrical schematic to troubleshoot the issue. Only the signal wire is listed for each hydraulic function, the ground wire number for every coil is 0032.

Valve for Air Compressor– IDX10837 (Hydraforce SV10-20-8T-N-24-ER V1 On Hydraulic Schematic)
This valve should be activated (on voltage) when the high pressure switch for the air compressor is closed, so if there is no pressure in the air compressor tank there should be 24 VDC at the valve. Shop air can be used to pressurize the pneumatic system and check the off voltage. A connection for shop air is located on the spray paver's air compressor.

HYDRAULIC FUNCTION	COIL LOCATION	WIRE NUMBER	OFF VOLTAGE	ON VOLTAGE	INITIALS
Open / Closed	Single Coil	0031			
Notes:					

Table 7.1 Air Compressor Valve Electrical Checks

Manifold Valve for Telescoping Spray Bar Cylinders – IDX10834 (Power Systems VA0991-04-2 V6 On Hydraulic Schematic)
Activate each hydraulic function with the HMI.

HYDRAULIC FUNCTION	COIL LOCATION	WIRE NUMBER	OFF VOLTAGE	ON VOLTAGE	INITIALS
Right (Port 2) Extend	Top (farthest from manifold)	0941			
Right (Port 2) Retract	Bottom (nearest manifold)	0951			
Left (Port 1) Extend	Top (farthest from manifold)	0961			
Left (Port 1) Retract	Bottom (nearest manifold)	0971			

Notes:

Table 7.2 Telescoping Spray Bar Manifold Electrical Checks

Valve for Spray Bar Tilt – IDX10835 (Hydraforce SV08-47D-6T-N-24-ER2 V7 On Hydraulic Schematic)
Activate each hydraulic function with the HMI.

HYDRAULIC FUNCTION	COIL LOCATION	WIRE NUMBER	OFF VOLTAGE	ON VOLTAGE	INITIALS
Extend	Top (farthest from manifold)	0981			
Retract	Bottom (nearest manifold)	0991			
Notes:					

Table 7.3 Spray Bar Tilt Valve Electrical Checks

Valve for Spray Bar Lock – IDX10835 (Hydraforce SV08-47D-6T-N-24-ER2 V9 On Hydraulic Schematic)
Activate each hydraulic function with the HMI.

HYDRAULIC FUNCTION	COIL LOCATION	WIRE NUMBER	OFF VOLTAGE	ON VOLTAGE	INITIALS
Extend (lock)	Top (farthest from manifold)	1110			
Retract (unlock)	Bottom (nearest manifold)	1120			

Notes:

Table 7.4 Spray Bar Lock Valve Electrical Checks

Large and Small Asphalt Pump Proportional Valves – IDX11190 (Hydraforce PV72-30A-10T-N-24-ER2 V2 = Small & V3 = Large On Hydraulic Schematic)
Fully energize these valves by activating the Spray Bar Vac pump function, this will provide maximum current to both the small and large pump proportional valves.

HYDRAULIC FUNCTION	COIL LOCATION	WIRE NUMBER	OFF VOLTAGE	ON VOLTAGE	INITIALS
Small Pump Variable Valve	Single Coil	1011			
Large Pump Variable Valve	Single Coil	1001			
Notes:					

Table 7.5 Large and Small Asphalt Pump Proportional Valves Electrical Checks

Large and Small Asphalt Pump Reversing Valves – IDX11189 (Hydraforce SV12-40R-12T-N-24-ER2 V4 = Small & V5 = Large On Hydraulic Schematic
Energize these valves by selecting (pressing enter for the pump function, but not turning the pump(s) on) the Spray Bar Vac pump function.

HYDRAULIC FUNCTION	COIL LOCATION	WIRE NUMBER	OFF VOLTAGE	ON VOLTAGE	INITIALS
Small Pump Reversing Valve	Single Coil	0501			
Large Pump Reversing Valve	Single Coil	0491			

Notes:

Table 7.6 Large and Small Asphalt Pump Reversing Valves Electrical Checks

7b. Pneumatic Solenoid Valves

The PLC provides electrical outputs to pneumatic solenoid valve manifolds which control air flow to pneumatic actuators for ball valves and pneumatic cylinders. The spray nozzles are actuated by pneumatic ball valves as well as pneumatic cylinders, while the asphalt flow direction for the pump functions are controlled by pneumatic ball valves only.

Use shop air to pressurize the pneumatic system, a connection is located on the spray paver's air compressor.

Pump Function Valve Position Checks
Using the HMI activate each pump function. For each pump function verify the valve positions shown in Table 7.7 are correct. Log a yes in Table 7.8 if correct, or troubleshoot and correct any issues until a yes can be logged.

VALVE AND ASPHALT PUMP CONFIGURATIONS FOR EACH PUMP FUNCTION

Pump Function	Tank Outlet Valve 2.0"	Tank Return Valve 2.0"	Spray Bar #1 Valve 1.5"	Spray Bar #2 Valve 1.5"	Large Pump Isolation Valve 2.0" (Tank Outlet Side)	Spray Bar Isolation Valve 2.0" (Tank Return Side)	Small Pump Rotation & Rate	Large Pump Rotation & Rate
OFF	Closed	Closed	Closed	Closed	Closed	Closed	OFF	OFF
TANK LOAD	Closed	Open	Closed	Closed	Open	Open	FWD 5 GPM	FWD 10-51 GPM
TANK CIRCULATE	Open	Open	Closed	Closed	Open	Open	FWD 5 GPM	FWD 10-51 GPM
SPRAY BAR CIRCULATE	Open	Open	Open	Open	Open	Closed	FWD 1-10 GPM	FWD 12 GPM
SPRAY AUTO	Open	Closed	Open	Open	Closed	Open	FWD Variable	OFF
SPRAY BAR VACUUM	Open	Closed	Open	Open	Open	Open	REV 18.6 GPM	REV 51 GPM
CLEAN OUT	Closed	Open	Open	Open	Open	Closed	FWD 5 GPM	FWD 12 GPM

Table 7.7 Asphalt Pumping Station Configurations for Each Pump Function

TASK	ENTRY	INITIALS
Are the valve positions for “OFF” correct?		
Are the valve positions for “TANK LOAD” correct?		
Are the valve positions for “TANK CIRCULATE” correct?		
Are the valve positions for “SPRAY BAR CIRCULATE” correct?		
Are the valve positions for “SPRAY AUTO” correct?		
Are the valve positions for “SPRAY BAR VACUUM” correct?		
Are the valve positions for “CLEANOUT” correct?		
Notes:		

Table 7.8 Pump Function Valve Position Checks

Spray Nozzle Actuator Checks

With shop compressed air supply connected and the Spray Auto pump function active (pump button pressed), select all spray nozzles on the Sprayer Selection screen, then turn on the Master Switch which should activate all spray nozzles. Verify the actuator for each spray nozzle will open and close each valve. Correct any issues until a yes can be logged in Table 7.9.

TASK	ENTRY	INITIALS
Do the actuators for every spray nozzle function properly to open / close nozzle flow?		
Notes:		

Table 7.9 Spray Nozzle Actuator Checks

7c. Emulsion Tank Selection Switch

The emulsion tank selection switch is located on the PLC enclosure. This switch enables only 1 emulsion tank at a time to be operated by the control system.

Activate the Tank Circulate pump function to open both the tank outlet and tank return valves of the selected emulsion tank. Use the emulsion tank selection switch to select the next tank. Verify that both valves on the tank that was initially selected close and that both valves on the newly selected tank open. Repeat this procedure for all emulsion tanks and correct any issues until a yes can be logged in Table 7.10.

TASK	ENTRY	INITIALS
Does the tank selection switch work properly for every emulsion tank installed?		
Notes:		

Table 7.10 Emulsion Tank Selection Switch Check

8. Machine Startup

8a. Pre-Operating Checks

Before starting the paver, verify that all tasks in Table 8.1 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Is the paver hydraulic oil level within the operating range?		
Is the paver engine oil level within the operating range?		
Is the paver engine coolant level within the operating range?		
Is the spray paver hydraulic oil level within the operating range?		
Is the spray paver air compressor oil level within the operating range?		
Close the needle valve that supplies hydraulic flow to the air compressor motor.		
Have all tools used during assembly been appropriately removed?		
Are all concerns resolved when performing a general walk-around of the machine?		
Does the paver have enough fuel to perform all tests?		
Are all people clear of the machine before the paver's engine is started?		
Notes:		

Table 8.1 Pre-Operating Checks

8b. Hydraulic Oil Leak Check & Recheck Hydraulic Oil Level

Check for proper hydraulic pump rotation immediately upon startup. The hydraulic pump shaft will most likely not be visually accessible. Rotation direction can be checked using the model number on the pump. For example, an AP1000F paver will have a "L" in the model number to identify left rotation, see Figure 8.1 for the model number location. Refer to the hydraulic design booklet (Appendix D) for the pump used on a specific application.

Immediately after the hydraulic pump is running quickly check for any large oil leaks. Immediately turn off the paver if leaks are found. After performing a quick check for large leaks thoroughly inspect all hydraulic routings for any leakage. If leaks are found identify the cause, perform repairs, and clean up the oil that had leaked out. Recheck areas where leaks were found after operating the machine a sufficient time period to verify that the leak has been completely stopped.

Turn off the paver and recheck both the paver hydraulic oil level and the spray paver hydraulic oil level.

⚠ CAUTION **No amount of hydraulic oil leakage is acceptable!**

Verify that all tasks in Table 8.2 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Is the spray paver hydraulic pump rotation correct?		
Is the spray paving hydraulic system leak free? (Add notes below for any leaks that were found)		
Is the paver hydraulic oil level within the operating range?		
Is the spray paver hydraulic oil level within the operating range?		
Notes:		

Table 8.2 Hydraulic Oil Leak Check & Recheck Hydraulic Oil Level

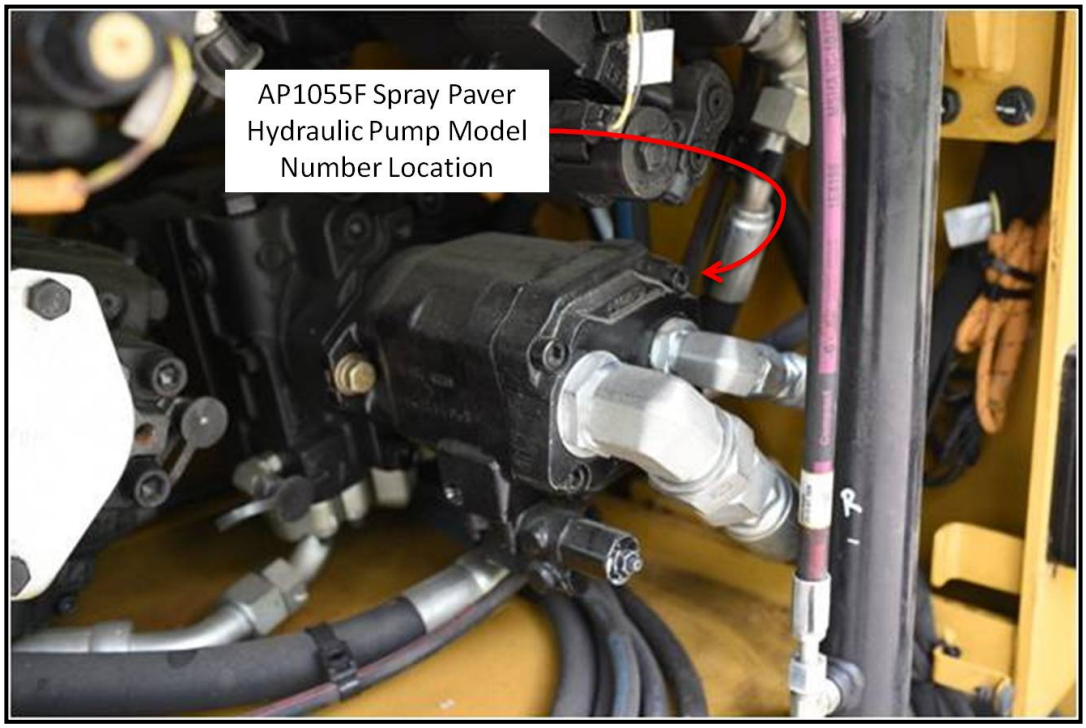

Figure 8.1 AP1055F Spray Paver Hydraulic Pump Model Number Location

8c. Set Hydraulic System Pressure

Set the hydraulic system pressure to 2450 psi, see the hydraulic design booklet for supporting information on the hydraulic pump.

Verify that all tasks in Table 8.3 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Has the hydraulic system pressure been set to 2450 psi?		
Notes:		

Table 8.3 Setting the Hydraulic System Pressure

8d. Air Compressor Hydraulic Setup

With the hydraulic pump running, slowly open the needle valve that supplies hydraulic flow to the air compressor motor. Verify that the air compressor is rotating counter clockwise when viewed from the shaft end, or the hydraulic motor driving the air compressor is rotating clockwise when viewed from the shaft end. With the hydraulic oil warmed up to operating temperature use a photo tachometer and set the air compressor shaft speed to 650 rpm by adjusting the needle valve. Log the hydraulic oil temperature when the shaft speed was set.

Verify that all tasks in Table 8.4 include an entry and add notes as required.

TASK	ENTRY	INITIALS
Is the air compressor shaft rotation correct? If rotation is not CCW from compressor shaft end check hydraulic schematic to correct.		
Is the air compressor shaft speed within 5% of 650 rpm (618 -682 rpm) on a normal pump-up/recharge?		
Log the air compressor shaft speed on a normal pump-up/recharge.		
Log the hydraulic oil temperature while setting the speed.		
Notes:		

Table 8.4 Air Compressor Hydraulic Setup

8e. Set Air Compressor Pressure Switches

Set the air pressure switches installed on the air compressor tank to 85 psi and 125 psi. This may be performed with shop air or after machine startup if the shop air pressure is not high enough.

Verify that all tasks in Table 8.5 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Has the air compressor low pressure switch been set to 85 psi?		
Has the air compressor low pressure switch set screw been tightened?		
Has the air compressor high pressure switch been set to 125 psi?		
Has the air compressor high pressure switch set screw been tightened?		
Does the compressor cycle on and off between the pressures correctly?		
Notes:		

Table 8.5 Compressed Air Regulated Pressure Setup

8f. Compressed Air Regulated Pressure

Set the air compressor pressure regulator at 90 psi.

Verify that all tasks in Table 8.6 can be answered with a yes and add notes as required.

TASK	ENTRY	INITIALS
Has the air compressor pressure regulator been set at 90 psi?		
Notes:		

Table 8.6 Compressed Air Regulated Pressure Setup

9. Function Tests – Engine On / Hydraulic Pump On

9a. Hydraulic Functions

Operate the hydraulic functions in Table 9.1 using the HMI and verify that all tasks can be answered with a yes, then add notes as required.

Locking Pin Automatic Mode:
While the tilt locking pin can be manually locked and unlocked, software version 2.0 includes a feature to automatically lock and unlock the pin when pressing the tilt up or down button. Here is how it works:

- Begin with the tilt locking pins engaged in the front spray bars.
- Hold down the desired tilt direction button.
- The tilt locking pins will disengage and the front spray bar will begin to tilt in the desired direction.
- The tilt direction button needs to be held for at least 3 seconds (or a sum of button presses equaling 3 seconds), then the tilt locking pins will engage when the tilt direction button is released

Note: During a previous test the left and right telescoping wings were plumbed according to the hydraulic schematic and wired according to electrical schematic. When a left or right wing extend button on the HMI was pressed the function would work normally, but if the wing was partially retracted and the HMI button was released, then the wing would continue to retract until fully retracted. This issue was corrected by restricting the hydraulic flow to the hydraulic cylinders by using the needle valves for extension / retraction speed located within the asphalt pumping station, see Section 9b for hydraulic function speed adjustment.

HYDRAULIC FUNCTION	TASK	ENTRY	INITIALS
Left Wing Extension	Does the left telescoping spray bar extend?		
Left Wing Retraction	Does the left telescoping spray bar retract?		
Right Wing Extension	Does the right telescoping spray bar extend?		
Right Wing Retraction	Does the right telescoping spray bar retract?		
Tilt Extend	Does the front spray bar assembly tilt up?		
Tilt Retract	Does the front spray bar assembly tilt down?		
Tilt Lock Pin Alignment	Is the tilt locking pin properly aligned?		
Tilt Lock Extend (both sides)	Does the tilt locking pin extend?		
Tilt Lock Retract (both sides)	Does the tilt locking pin retract?		
Auto Lock/Unlock With Tilt Up	When tilting up does the auto lock/unlock function normally?		
Auto Lock/Unlock With Tilt Up	When tilting down does the auto lock/unlock function normally?		

Notes:

Table 9.1 Hydraulic Operations

9b. <u>Hydraulic Function Speed Adjustment</u>

Adjust the hydraulic flow as closely as possible to the target time for each hydraulic function. Use the hydraulic schematic to identify the proper needle valve to adjust for each hydraulic function. If a needle valve is turned in clockwise to its stop, the hydraulic flow will be closed off.

Use a stopwatch to measure the hydraulic function time and log the values in Table 9.2.

HYDRAULIC FUNCTION	TARGET TIME (sec)	ACTUAL TIME (sec)	INITIALS
Left Wing Extension	5 – 6		
Left Wing Retraction	5 – 6		
Right Wing Extension	5 – 6		
Right Wing Retraction	5 – 6		
Tilt Extend (up)	2.5 – 3.0		
Tilt Retract (down)	2.5 – 3.0		
Tilt Lock Extend (lock)	0 – 0.5		
Tilt Lock Retract (unlock)	0 – 0.5		
Notes:			

Table 9.2 Hydraulic Function Speed Adjustment

9c. Check Asphalt Pump Speeds

Each pump function will be run to verify the large and small asphalt pumps operate at the speed setpoints requested by the control system. The instructions below will also verify that the asphalt pump shaft speed sensors are operating correctly.

Log an entry in each empty cell of Table 9.3 by activating each Pump Function and set the pump speed by selecting the corresponding percentage found in the table. Use the Pump Function screen of the HMI to view the large and small asphalt pump speeds. Acceptable speed ranges of ±5% are included in parenthesis in Table 9.3 along with the speed setpoints. In Table 9.4 verify all tasks can be answered with a yes and add notes as required.

A table similar to Table 9.3, but including all percentages and flow rates corresponding to pump speeds is included for reference in Appendix D.

Note: During a previous test the pump speed at the display was ½ of the speed measured with a photo tachometer. The cause of this issue was found to be the gap setting of the speed sensor mounted on the hydraulic motor.

To set the speed sensor at a distance that provided the correct speed at the HMI the following was performed:

1. With the pumps turned off loosen the locking nut for the speed sensor.
2. Turn the speed sensor in until it touches the encoder wheel.
3. Back out the speed sensor 1-1/4 turns (or 7 – 8 flats of the hex).
4. Secure the locking nut for the speed sensor.
5. As a note, at 2 turns out rather than 1-1/4 the displayed speed was still ½ of the measured speed.

ASPHALT PUMP SPEED SPOT CHECK

PUMP FUNCTION	PUMP SIZE	0%		50%		100%	
		SETPOINT RPM / (± 5%)	DISPLAYED RPM	SETPOINT RPM / (± 5%)	DISPLAYED RPM	SETPOINT RPM / (± 5%)	DISPLAYED RPM
TANK LOAD	SMALL	**301** / (286 – 316)		**301** / (286 – 316)		**301** / (286 – 316)	
	LARGE	**92** / (87 – 97)		**237** / (225 – 249)		**384** / (365 – 403)	
TANK CIRCULATE	SMALL	**301** / (286 – 316)		**301** / (286 – 316)		**301** / (286 – 316)	
	LARGE	**92** / (87 – 97)		**237** / (225 – 249)		**384** / (365 – 403)	
SPRAY BAR CIRCULATE	SMALL	**81** / (77 – 111)		**327** / (311 – 343)		**566** / (538 – 594)	
	LARGE	**106** / (101 – 111)		**106** / (101 – 111)		**106** / (101 – 111)	
SPRAY AUTO	SMALL	AFTER SPRAY AUTO ACTIVATED AND TRAVELING LESS THAN 7 FT - NOT DEPENDENT ON SPRAY MASTER SWITCH POSITION: 5 GPM @301 RPM AFTER SPRAY AUTO ACTIVATED AND TRAVELING MORE THAN 7 FT - SPRAY MASTER SWITCH OFF: 2 GPM @140 RPM AFTER SPRAY AUTO ACTIVATED AND TRAVELING MORE THAN 7 FT - SPRAY MASTER SWITCH ON: VARIABLE FROM 0 - 18.6 GPM				301 W/ SPRAY MASTER OFF & PAVER STATIONARY	
	LARGE	OFF	OFF	OFF	OFF	OFF	
SPRAY BAR VACUUM	SMALL	-	-	-	-	**1021** / (967 – 1072)	
	LARGE	-	-	-	-	**384** / (365 – 403)	
CLEAN OUT	SMALL	-	-	-	-	**301** / (286 – 316)	
	LARGE	-	-	-	-	**106** / (101 – 111)	

NOTES:

1. BE SURE ENGINE IS OPERATING AT HIGH IDLE SO THE HYDRAULIC PUMP CAN PRODUCE ENOUGH FLOW TO ACHIEVE THE PROPER ASPHALT PUMP SPEEDS.

2. THE CONDITIONS FOR SPRAY AUTO RESET EVERY TIME THE PUMP IS REQUESTED OFF.

3. SPRAY BAR VACUUM IS THE ONLY FUNCTION THAT RUNS WITH THE PUMP ROTATION IN REVERSE.

Table 9.3 Asphalt Pump Speed Spot Check

TASK	ENTRY	INITIALS
For each entry in Table 9.3 is the small pump displayed rpm within 5% of the setpoint rpm?		
For each entry in Table 9.3 is the large pump displayed rpm within 5% of the setpoint rpm?		
Notes:		

Table 9.4 Asphalt Pump Speed Verification

9d. Asphalt Pump Rotation Checks

For each pump function verify the pump rotation direction as shown in Table 7.7 is correct. Log results in Table 9.5. Note that in all functions except for Spray Auto both asphalt pumps will be operating. The Bi-Torq valve positions should have been previously verified in Section 7.b. The speed range of each asphalt pump does not need to be verified because it based on the software installed and this test document is not designed to test software.

TASK	ENTRY	INITIALS
Is the pump rotation for “SPRAY AUTO” correct (FWD)?		
Are the pump rotations for “SPRAY BAR CIRCULATE” correct (FWD)?		
Are the pump rotations for “TANK CIRCULATE” correct (FWD)?		
Are the pump rotations for “SPRAY BAR VACUUM” correct (REV)?		
Are the pump rotations for “CLEANOUT” correct (FWD)?		
Are the pump rotations for “TANK LOAD” correct (FWD)?		
Notes:		

Table 9.5 Pump Rotation Checks

9e. Pendant Operation

Spray pavers are available with a standard pendant or a deluxe pendant.

If a standard pendant (Figure 9.1) is installed the functions of the On/Off button and the Spray Master switch would have already been tested previously in this test plan.

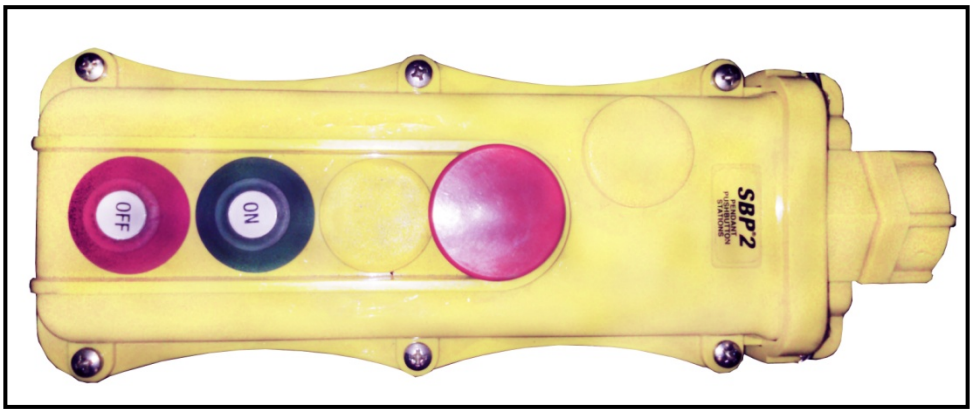

Figure 9.1 Standard Pendant

If a deluxe pendant (Figure 9.2) is installed operation of the deluxe functions needs to be verified.

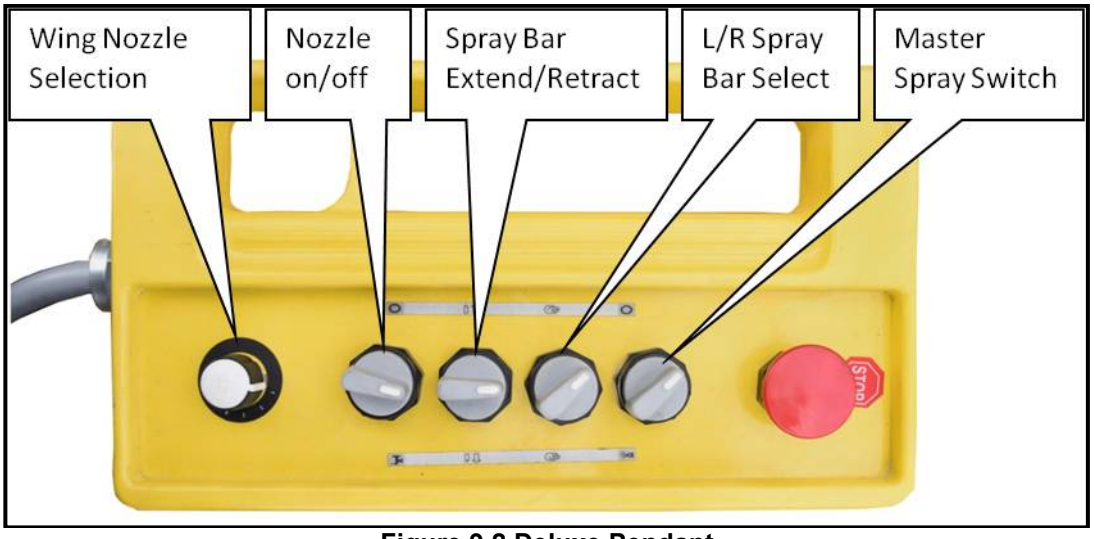

Figure 9.2 Deluxe Pendant

The deluxe pendant control includes 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. On/Off operation has been previously verified in this test plan to power on the control system.
- The Spray Master switch is a two-position switch and will open or close the spray nozzle valves selected on the HMI. Spray Master switch operation has been previously verified while checking the operation of the spray nozzle actuators.

- Left / Right Spray Bar Select is a two-position switch used to select either the right or the left telescoping spray bars.
- The Spray Bar Hydraulic Extend / Retract switch will extend / retract the selected telescoping spray bar.
- The rotating six position Wing Nozzle Selection switch selects a nozzle or gang of nozzles for turning on or off on the telescoping spray bar selected. The settings are from the inner most (1) to the outermost (6).
- The Nozzle On / Off buttons toggle the nozzle or gang of nozzles currently selected on the rotating Wing Nozzle Selection switch.

To verify the functionality of the deluxe pendant activate (pump on) the Spray Auto pump function and turn on the Spray Master switch with all the spray nozzles selected. This may be done with the paver stationary; it is not necessary to be moving (but a Turn Off Master Switch alarm will appear).

- Use the deluxe pendant to actuate the hydraulic extension and retraction of each telescoping spray bar.
- Use the deluxe pendant to turn on and off each actuator on each telescoping spray bar.

Verify that all tasks in Table 9.6 can be answered with a yes and add notes as required.

PENDANT FUNCTION	TASK	ENTRY	INITIALS
Left Wing Extension	Does the left telescoping spray bar extend?		
Left Wing Retraction	Does the left telescoping spray bar retract?		
Right Wing Extension	Does the right telescoping spray bar extend?		
Right Wing Retraction	Does the right telescoping spray bar retract?		
Left Wing Actuator Selection 1	Does the actuator open and close?		
Left Wing Actuator Selection 2	Does the actuator open and close?		
Left Wing Actuator Selection 3	Does the actuator open and close?		
Left Wing Actuator Selection 4	Does the actuator open and close?		
Left Wing Actuator Selection 5	Does the actuator open and close?		
Left Wing Actuator Selection 6	Does the actuator open and close?		
Right Wing Actuator Selection 1	Does the actuator open and close?		
Right Wing Actuator Selection 2	Does the actuator open and close?		
Right Wing Actuator Selection 3	Does the actuator open and close?		
Right Wing Actuator Selection 4	Does the actuator open and close?		
Right Wing Actuator Selection 5	Does the actuator open and close?		
Right Wing Actuator Selection 6	Does the actuator open and close?		
Notes:			

Table 9.6 Deluxe Pendant Checks

9f. Emulsion Tank Heat 120 & 230 VAC

⚠ DANGER Asphalt emulsion is water based, so it may boil or explode at temperatures above 212°F. While it is unlikely that temperatures will be anywhere near this during this factory acceptance test, keep this in mind when the final settings for the thermostat, low level switch, and high temperature switch are set. Settings for each are provided within the following checks.

All emulsion tank heating system enclosures checked within this section need to be checked with both 120 and 230 VAC power. The suggested method is to run through all tests for a tank heating system enclosure using 120 VAC power, then remove the 120 VAC power and repeat all tests with 230 VAC power.

The emulsion tank heating and rear spray bar heating are only connected to the PLC with 1 output that activates the rear spray bar heat.

Each emulsion tank with a heating system includes a low level switch and a high temperature switch. Before performing the tests below make sure that the low level switch is not activated (this will disable the tank heating system) and also make sure that the high temperature switch is not activated (this will also disable the tank heating system).

The emulsion tank heating elements may be damaged if they are operated without being submerged. For test purposes the emulsion tank heating elements will be operated without being submerged just long enough to verify that they are working (for a very short time period). If the spray paver installation does not support 230 VAC power supply from the paver's generator, use a shore power cord to connect to 230 VAC single phase and verify the tank heaters operate.

NOTICE Do not operate the emulsion tank heating elements longer than 30 seconds at a time if they are not submerged.

Electrical Connections at the heating system enclosure(s) are shown below in Figure 9.3.

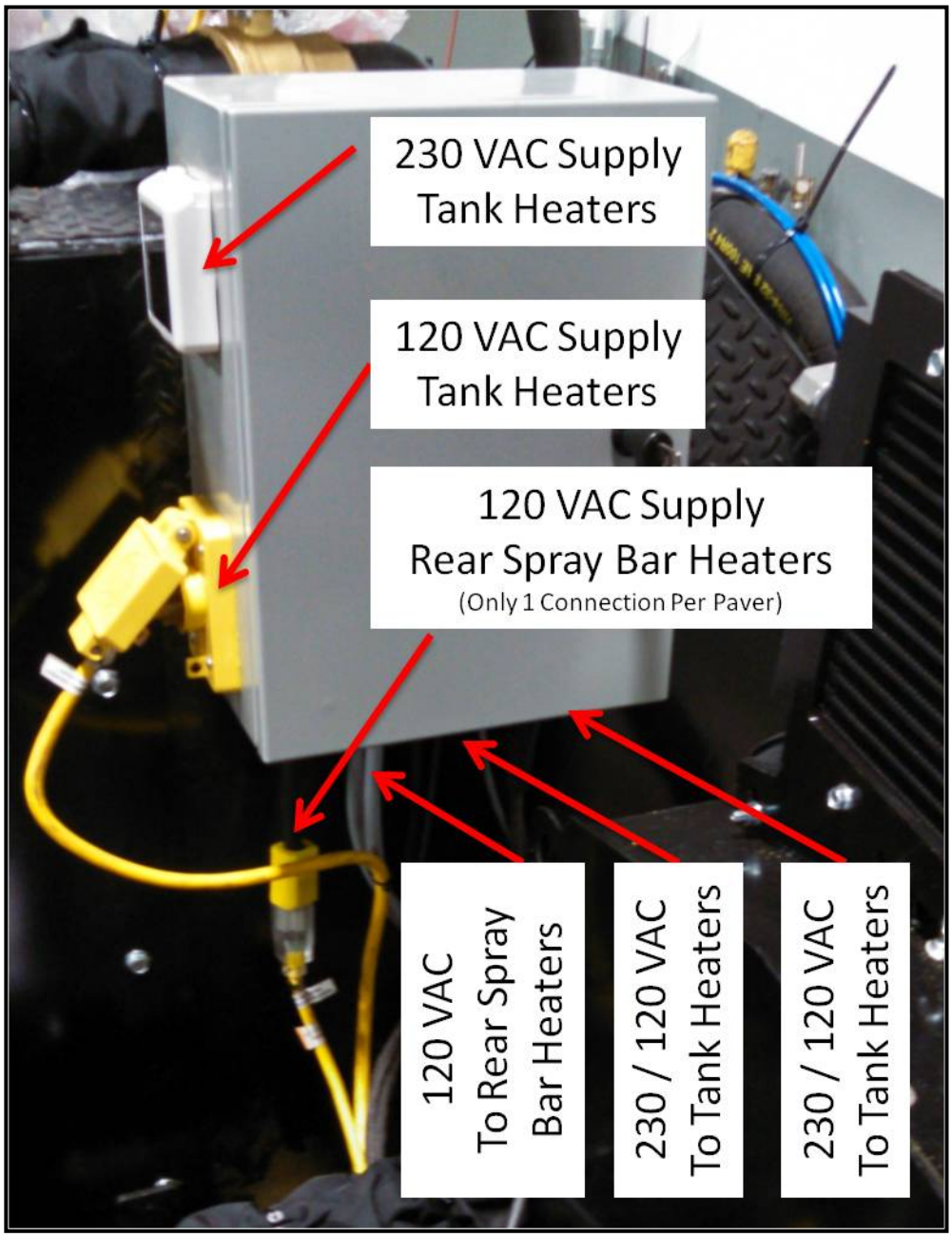

Figure 9.3 Heating System Enclosure Electrical Connections

Note: When performing the tests below, remember that in order to activate the emulsion tank heating elements the thermostat needs to be calling for heat and the tank low level switch cannot be activated.

Note: The thermostat may be adjusted as needed to perform the checks below, but after completing all checks, set the thermostat to 190°F.

Verify Thermostat Disables / Enables Heating Elements:
Each emulsion tank typically has an electrical enclosure which will contain a thermostat to set the emulsion temperature. The electrical enclosure and thermostat may control multiple heating elements. When verifying thermostat operation, use a multimeter to check the voltage at each heating element for operation, but be sure the heating element is not left on too long as explained above.

⚠WARNING When using a multimeter to check voltage at each heating element the cover for the heating element terminals is removed. This creates an electrical hazard because these terminals will have 120 or 230 voltage if the thermostat is calling for tank heat. After checking the voltage immediately reinstall the heating element cover so the electrical terminals are no longer exposed.

Verify Tank Heating System Enclosure LEDs Illuminate as Intended
There are 3 LEDs mounted on the side of the tank heating system enclosure, see Figure 9.4. These LEDs are indicators for the following:

- Top LED is for active 230 VAC power.
- Middle LED is for active 120 VAC power.
- Bottom LED is Illuminated when the heating element(s) are on.

Verify Tank Level Indicator Switch Disables / Enables Heating Elements
Each emulsion tank includes a mechanical tank level indicator (gauge) on the outside wall of the tank. The tank level indicators work with a switch that will shut off the tank heating system when activated. The switching position is adjustable and the switch is intended to be positioned so that it will turn off the heating system before the heating elements become exposed to air.

Verify Overtemp Switch Disables / Enables Heating Elements
Each emulsion tank with a heating system includes an over temperature switch. This switch is designed to turn off the tank heating system if the thermostat should fail to turn off the heating element(s). The switch is normally closed so if it is unplugged it will simulate being activated by high temperature. Although the switching set point may be adjustable, for this test the switch will likely need to be unplugged because ambient temperature is not within the sensing range of the temperature switch. After completing this test set the switch at 200°F for delivery to the customer, if the switch is adjustable.

Figure 9.4 Emulsion Tank Heating System LED Locations

9f.1.0 Tank Heating System Enclosure #1

9f.1.1 Enclosure #1 – 120 VAC

Verify all tasks in Table 9.7 can be answered with a yes.

TASK	ENTRY	INITIALS
Verify Thermostat Disables / Enables Heating Elements		
Does the thermostat turn on/off voltage to the emulsion tank heating element(s)?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Heating System Enclosure LEDs Illuminate as Intended		
Does the middle LED illuminate and also shut off when supply power is disconnected?		
Does the bottom LED illuminate if the thermostat is demanding heat and also shut off when the thermostat no longer calls for heat?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Level Indicator Switch Disables / Enables Heating Elements		
Does the tank low level switch turn off the heating system when activated?		
Is the tank low level switch adjusted so that it will turn off the heating elements before they are exposed to air?		
Verify Overtemp Switch Disables / Enables Heating Elements		
Does the tank high temperature switch turn off the heating system when activated?		
Was the switch plugged back in and set at 200°F (if adjustable)?		
Notes:		

Table 9.7 Tank Heating System Enclosure Verifications with 120 VAC

9f.1.2 Enclosure #1 – 230 VAC

Verify all tasks in Table 9.8 can be answered with a yes.

TASK	ENTRY	INITIALS
Verify Thermostat Disables / Enables Heating Elements		
Does the thermostat turn on/off voltage to the emulsion tank heating element(s)?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Heating System Enclosure LEDs Illuminate as Intended		
Does the top LED illuminate and also shut off when supply power is disconnected?		
Does the bottom LED illuminate if the thermostat is demanding heat and also shut off when the thermostat no longer calls for heat?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Level Indicator Switch Disables / Enables Heating Elements		
Does the tank low level switch turn off the heating system when activated?		
Is the tank low level switch adjusted so that it will turn off the heating elements before they are exposed to air?		
Verify Overtemp Switch Disables / Enables Heating Elements		
Does the tank high temperature switch turn off the heating system when activated?		
Was the switch plugged back in and set at 200°F (if adjustable)?		
Notes:		

Table 9.8 Tank Heating System Enclosure Verifications with 230 VAC

9f.2.0 Tank Heating System Enclosure #2

9f.2.1 Enclosure #2 – 120 VAC

Verify all tasks in Table 9.9 can be answered with a yes.

TASK	ENTRY	INITIALS
Verify Thermostat Disables / Enables Heating Elements		
Does the thermostat turn on/off voltage to the emulsion tank heating element(s)?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Heating System Enclosure LEDs Illuminate as Intended		
Does the middle LED illuminate and also shut off when supply power is disconnected?		
Does the bottom LED illuminate if the thermostat is demanding heat and also shut off when the thermostat no longer calls for heat?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Level Indicator Switch Disables / Enables Heating Elements		
Does the tank low level switch turn off the heating system when activated?		
Is the tank low level switch adjusted so that it will turn off the heating elements before they are exposed to air?		
Verify Overtemp Switch Disables / Enables Heating Elements		
Does the tank high temperature switch turn off the heating system when activated?		
Was the switch plugged back in and set at 200°F (if adjustable)?		
Notes:		

Table 9.9 Tank Heating System Enclosure Verifications with 120 VAC

9f.2.2 Enclosure #2 – 230 VAC

Verify all tasks in Table 9.10 can be answered with a yes.

TASK	ENTRY	INITIALS
Verify Thermostat Disables / Enables Heating Elements		
Does the thermostat turn on/off voltage to the emulsion tank heating element(s)?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Heating System Enclosure LEDs Illuminate as Intended		
Does the top LED illuminate and also shut off when supply power is disconnected?		
Does the bottom LED illuminate if the thermostat is demanding heat and also shut off when the thermostat no longer calls for heat?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Level Indicator Switch Disables / Enables Heating Elements		
Does the tank low level switch turn off the heating system when activated?		
Is the tank low level switch adjusted so that it will turn off the heating elements before they are exposed to air?		
Verify Overtemp Switch Disables / Enables Heating Elements		
Does the tank high temperature switch turn off the heating system when activated?		
Was the switch plugged back in and set at 200°F (if adjustable)?		
Notes:		

Table 9.10 Tank Heating System Enclosure Verifications with 230 VAC

9f.3.0 Tank Heating System Enclosure #3

9f.3.1 Enclosure #3 – 120 VAC

Verify all tasks in Table 9.11 can be answered with a yes.

TASK	ENTRY	INITIALS
Verify Thermostat Disables / Enables Heating Elements		
Does the thermostat turn on/off voltage to the emulsion tank heating element(s)?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Heating System Enclosure LEDs Illuminate as Intended		
Does the middle LED illuminate and also shut off when supply power is disconnected?		
Does the bottom LED illuminate if the thermostat is demanding heat and also shut off when the thermostat no longer calls for heat?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Level Indicator Switch Disables / Enables Heating Elements		
Does the tank low level switch turn off the heating system when activated?		
Is the tank low level switch adjusted so that it will turn off the heating elements before they are exposed to air?		
Verify Overtemp Switch Disables / Enables Heating Elements		
Does the tank high temperature switch turn off the heating system when activated?		
Was the switch plugged back in and set at 200°F (if adjustable)?		
Notes:		

Table 9.11 Tank Heating System Enclosure Verifications with 120 VAC

9f.3.2 Enclosure #3 – 230 VAC

Verify all tasks in Table 9.12 can be answered with a yes.

TASK	ENTRY	INITIALS
Verify Thermostat Disables / Enables Heating Elements		
Does the thermostat turn on/off voltage to the emulsion tank heating element(s)?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Heating System Enclosure LEDs Illuminate as Intended		
Does the top LED illuminate and also shut off when supply power is disconnected?		
Does the bottom LED illuminate if the thermostat is demanding heat and also shut off when the thermostat no longer calls for heat?		
Was the thermostat set to 190°F after the above checks were complete?		
Verify Tank Level Indicator Switch Disables / Enables Heating Elements		
Does the tank low level switch turn off the heating system when activated?		
Is the tank low level switch adjusted so that it will turn off the heating elements before they are exposed to air?		
Verify Overtemp Switch Disables / Enables Heating Elements		
Does the tank high temperature switch turn off the heating system when activated?		
Was the switch plugged back in and set at 200°F (if adjustable)?		
Notes:		

Table 9.12 Tank Heating System Enclosure Verifications with 230 VAC

9g. Rear Spray Bar Heat 120 VAC

WARNING The 120 VAC electrical terminals at the rear spray bar heating elements may be exposed, so use caution when working with or around the rear spray bars, see Figure 9.5. The rear spray bar design may vary with the paver model, so the rear spray bar shown in Figure 9.5 is shown for reference only.

The rear spray bars heaters operate using 120 VAC power only which is supplied with a standard 120 VAC extension cord to the emulsion tank heating system enclosure, see Figure 9.3. While all emulsion tank heating system enclosures contain the relay for the rear spray bars, only one emulsion tank heating system enclosure per paver is connected to heat the rear spray bars.

The rear spray bar heating elements are activated by an output from the PLC when the Spray Bar Circulate pump function is activated. The output from the PLC activates a relay inside the emulsion tank heating system enclosure which then provides 120 VAC power to the rear spray bar heaters

With the Spray Bar Circulate pump function active the rear spray bar heaters should be on. Use an infrared temperature gun, or touch the rear spray bars to confirm they are heating up and verify all tasks in Table 9.13 can be answered with a yes.

TASK	ENTRY	INITIALS
Does the left rear spray bar heater operate?		
Does the right rear spray bar heater operate?		
Notes:		

Table 9.13 Heating System Enclosure LED Checks

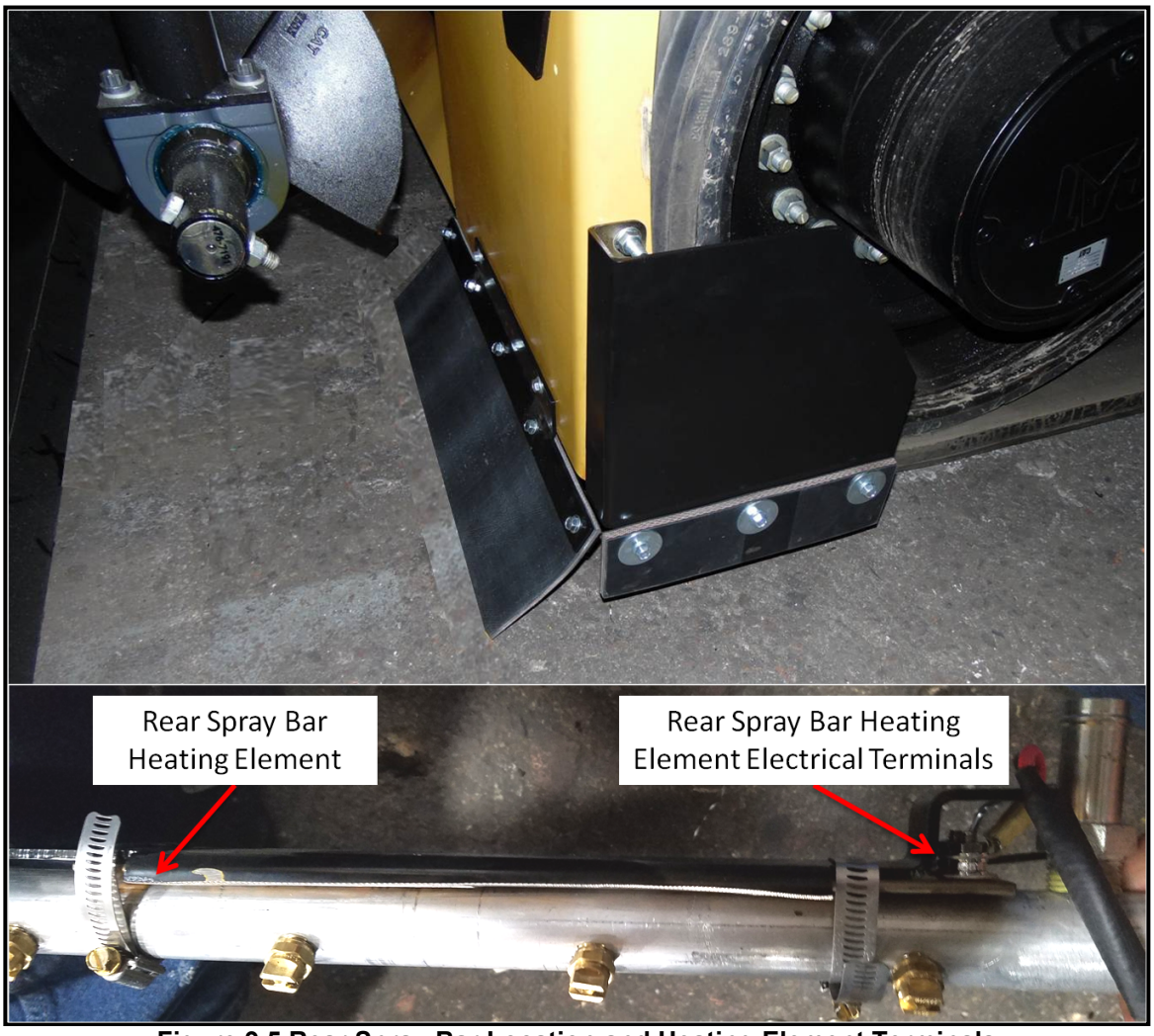

Figure 9.5 Rear Spray Bar Location and Heating Element Terminals

9h. Mechanical Interference Checks

With the spray paving system being used on several paver models and various options available on each paver, possibilities for components interfering with one another are increased. This section is intended to check for mechanical interference between spray paver components and the spray paver as well as checking over the manufacturing and assembly of the spray paver components for interference.

Complete all tasks in Table 9.14 and verify all entries can be answered with a yes. List notes as appropriate if a no is entered.

TASK	ENTRY	INITIALS
With the screed tow points fully lowered and the screed fully raised, is there adequate clearance for all components?		
With the screed tow points fully raised and the screed fully raised, is there adequate clearance for all components?		
With the screed tow points fully lowered and the screed lowered to the ground, is there adequate clearance for all components?		
With the screed tow points fully raised and the screed lowered to the ground, is there adequate clearance for all components?		
With the screed tow points fully lowered and the screed lowered to the ground, run the auger all the way up and down. Is there adequate clearance for all components?		
With the screed tow points fully raised and the screed lowered to the ground, run the auger all the way up and down. Is there adequate clearance for all components?		
Run the front left telescoping spray bar out and then back in. Is there adequate clearance at the spray bar and the supporting arm for all components?		
Run the front right telescoping spray bar out and then back in. Is there adequate clearance at the spray bar and the supporting arm for all components?		
Run the spray bar tilt up and then back down. Is there adequate clearance for all components?		
Can the engine hood and all other access panels be opened and closed without interfering with any components?		
If a canopy is installed, can it be raised and lowered without interfering with any components?		
Notes:		

Table 9.14 Interference Checks

10. Asphalt System Checks

Up to this point there should not have been any liquid in the spray bars or the emulsion tanks.

NOTICE There should not be a need to put water in the spray paver at any time, but if water is installed it will need to be drained, then immediately flushed with diesel fuel, see Section 10a.

10a. Diesel Fuel Circulation

Dust and debris from manufacturing may be present in the emulsion tanks and the spray bars. This step is designed to remove manufacturing debris as well as provide a coating to protect against rust on the inside of the spray bars and the bottom of emulsion tanks before machine delivery.

Note: Check for leaks in all asphalt lines while running the Cleanout pump function below. Place absorbent mats or a basin below the nozzles in each front spray bar section. A small amount of dripping from the front spray nozzle valves is considered normal. With use the tapered sealing surfaces of the spray nozzle valves are expected to wear-in and seal better, additionally, when asphalt rather than diesel fuel is used the dripping is eliminated or greatly reduced.

Procedure:

1. Begin with the cleanout tank filled with diesel fuel. If the cleanout tank capacity is below 20 gallons have extra diesel fuel readily available to refill the cleanout tank as the Cleanout pump function is running. If previously circulated/used diesel fuel is available it may be used, but make sure to filter it first with something like a funnel type paint filter for example. With the Cleanout pump function running, diesel fuel will circulate through all spray bars before flowing into the selected emulsion tank.

   Note: With new or unprimed asphalt pumps it may be difficult to vacuum diesel fuel from the cleanout tank using the Cleanout pump function. Test Mode may need to be activated to manually run the Cleanout pump function up to the maximum small and large pump speeds to vacuum diesel fuel from the cleanout tank.

2. Verify the selected emulsion tank is filled enough so air will not enter the tank's suction tube, see Figure 10.1 as an example. The required volume will vary with the spray paver model and tank design. After the Cleanout function has adequately filled one of the emulsion tanks the pump function may be turned off.

3. After confirming the selected emulsion tank is filled above the suction tube, activate the Spray Bar Circulate pump function. Allow the Spray Bar Circulate pump function to run at full speed for 15 minutes. Higher fluid velocities in the spray bars are intended to carry debris to the emulsion tank where they may settle in the sump due to lower fluid velocity. After running Spray Bar Circulate for 15 minutes the function may be turned off.

4. The spray nozzle valves are not specifically designed to be adjusted and as long as they seal reasonably well from the factory, then added use is expected to wear-in the sealing surfaces, similar to lapping.
    a. If any front spray nozzle valves are dripping excessively:
        i. As the first step make sure the valves are aligned properly so that the wrench flats of the valve are perpendicular to the bar and the top handle is flipped down the correct way to apply pressure to the spring.
        ii. If any of the outer 3 valves (with rotary actuators) on the telescoping front spray bars are excessively leaking, then tightening the adjusting the nut may increase the force on the wave washer and decrease the leaking.
        iii. All spray nozzle valves that are actuated in a “gang” rely on spring pressure to stay tight and seal. The only adjustment that may work for these valves would be to add a washer under the spring as a shim to increase the spring force, and thus the force on the sealing surface of the spray nozzle valve.

5. After Spray Bar Circulate has run for at least 15 minutes, then run Tank Circulate for at least 5 minutes.

6. If multiple tanks are installed, ensure each tank has been flushed with diesel fuel.
    a. Activate Test Mode and set the valve configuration to tank circulate for the selected tank – the tank with the diesel fuel in it. Using Test Mode, close the return valve to the selected tank and inside the correct pneumatic enclosure actuate the proper manual override to open the return valve for the tank you wish to pump the diesel fuel into.
    b. In Test Mode, activate the large asphalt pump to begin pumping diesel fuel from the selected emulsion tank to the dry emulsion tank.
    c. Once all diesel has been pumped out of the selected tank, then turn off the large asphalt pump and turn the rotary emulsion tank selector on the controls enclosure to select the tank that now contains diesel fuel. Inside the pneumatic enclosure, return the manual override that was opened to its closed position.
    d. Exit Test Mode and run Tank Circulate for at least 5 minutes to flush the tank.
    e. Complete steps a – d above for any additional emulsion tanks.

The diesel fuel in the spray bars and emulsion tank will be drained in a following section. Do not drain the diesel fuel until that test section is reached.

TASK	ENTRY	INITIALS
Was new or used & filtered diesel fuel used?		
Log the volume of diesel fuel used.		
Log the time Spray Bar Circulate was run.		
Tank #1: Log the time Tank Circulate was run.		
Tank #2: Log the time Tank Circulate was run.		
Tank #3: Log the time Tank Circulate was run.		
Has spray nozzle valve dripping been minimized? Add adjustment notes below.		
Notes:		

Table 10.1 Asphalt System Pressure / Leak Checks

Figure 10.1 Emulsion Tank With Suction Tube Submerged with Diesel Fuel 20 – 25 Gallons

10b. Pressure Check the Asphalt System

Diesel fuel should have been circulated through the entire asphalt system in the previous step at low pressure, and any observed leaks should have been corrected. Now the spray bars will be run under a higher pressure to check for other potential leaks.

Activate the Spray Auto pump function and immediately check the spray bars and asphalt hoses for leaks. With Spray Auto active and the spray master switch turned off, the small asphalt pump should run at a fixed speed to pressurize the spray bars. Although the pump's shaft speed is fixed, there is actually no flow because the pump is deadheaded without any spray nozzles open. Allow the function to continue running until maximum pressure is reached, as identified by using the pressure gauge on the asphalt pump outlet strainer basket housing, then check for leaks on the spray bars, asphalt hoses, and spray nozzle valves.

Verify all tasks in Table 10.2 can be answered with a yes.

TASK	ENTRY	INITIALS
Have all leaks been corrected? Note any leaks found below.		
Were all spray bars, asphalt hoses, and spray nozzle valves checked for leaks at the maximum pressure with the Spray Auto pump function active? Log the maximum pressure observed.		
Notes:		

Table 10.2 Asphalt System Pressure / Leak Checks

10c. Small Asphalt Pump Bypass Setting

Viking Pump brand pumps are used in the asphalt pumping station. These pumps include an internal pressure relief (sometimes called bypass) valve which will direct the flow from the valve back to the suction side of the pump when activated. Figure 10.1 shows illustrations of the pressure relief valve which was captured from Viking Pump Technical Service Manual TSM 000, see Appendix D for the entire document.

Relief Valve Operation:
The pressure relief is a spring loaded poppet design as shown in Figure 10.1. The spring (A) holds poppet (B) against the seat in the valve body (C) with a given force determined by the spring size and by how tightly it is compressed by the adjusting screw (D). The pump discharge pressure pushes against the underside of the poppet at point (E). When the force exerted by the liquid under the poppet exceeds that exerted by the spring, the poppet lifts and liquid starts to flow through the valve. As the discharge pressure builds up, more and more of the liquid flows through until a pressure is reached at which all of the liquid being pumped is going through the valve. This pressure is the relief valve setting.

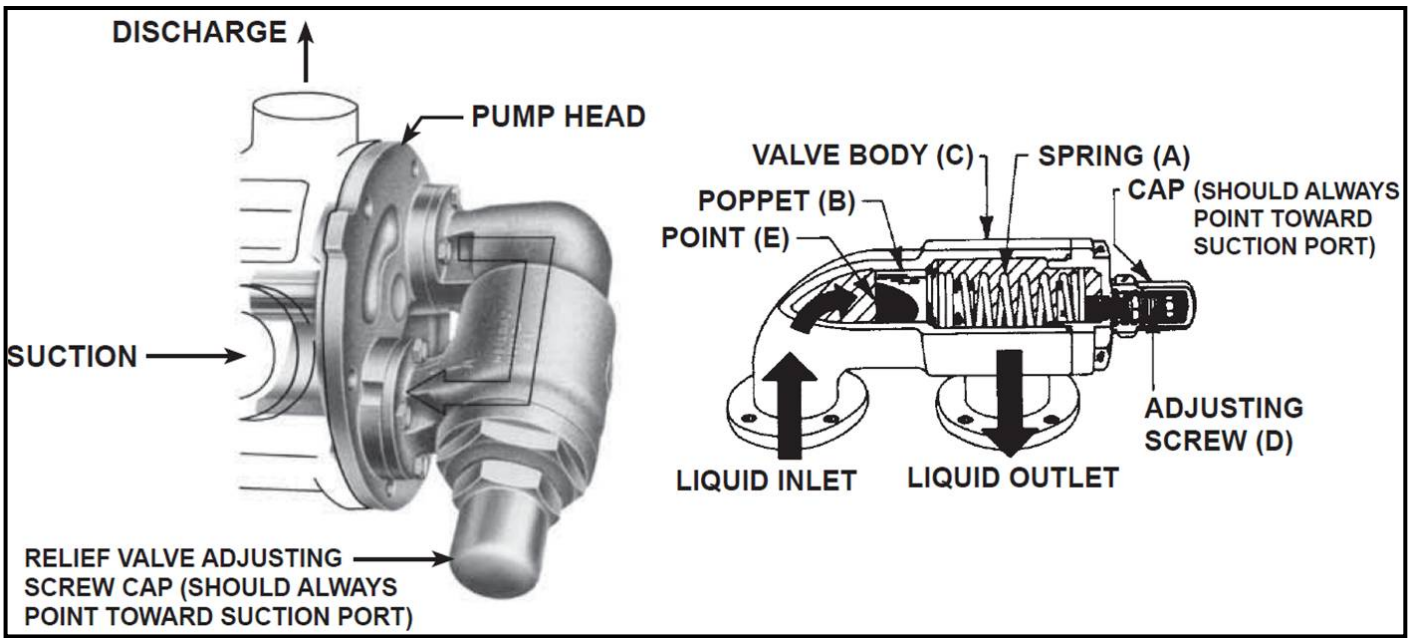

Figure 10.1 Asphalt Pump Relief Valve – Poppet Design

If the asphalt pump relief is set so emulsion bypasses within the pump at too low of a pressure, the flow rate will not be accurate. If the relief valve is activated on the small emulsion pump it is a problem because accurate flow is required to precisely control the application rate. The procedure below will setup the small asphalt pump relief and verify that the relief will not activate at pressures which are below normal operating conditions of the spray paver.

Information provided by Viking Pump, shows their asphalt pumps are delivered with the relief set to begin opening between 70 and 75 psi, and at 100 psi they are fully open. According to these specifications the reliefs should not need to be adjusted for use on a spray paver because the operating pressure at the small asphalt pump outlet is not expected to exceed 40 psi, however our experience has shown that the reliefs may need to be adjusted. To simplify specification for the relief valve setting, the relief should be set at the maximum (adjusting screw threaded in all the way) during pump installation. Previous tests have shown that a relief valve set at maximum pressure will produce a pressure of approximately 80 psi at the maximum flow rate of the small asphalt pump. The relief pressure at maximum flow will then be checked during this portion of the test to verify that the pump outlet pressure will not exceed 90 psi.

Procedure to check and set asphalt pump relief pressure setting:

To properly setup the small asphalt pump relief, follow the procedure below and reference Figure 10.1 for illustrations.

1. The relief should have already been set at the maximum (adjusting screw threaded in all the way) during pump installation.
2. Turn on the spray paver and let the compressed air reach system pressure.
3. Activate Test Mode and configure the valves as shown in Figure 10.2 using the Test Mode Pump & Valve Control screen (Figure 6.3 shows the Test Mode screen).
4. Use the Test Mode Pump & Valve Control Screen to regulate the small asphalt pump flow rate and use the gauge on the asphalt pump outlet strainer basket housing to complete the "Maximum Relief" column in Table 10.3. A maximum of approximately 80 psi is expected at a flow setting of 18.6 gpm.
   Note: If Test Mode is active and navigation away from the Test Mode Pump & Valve Control Screen occurs, then verify that the valve configuration still matches Figure 10.2.
5. If the pump outlet pressure exceeds 90 psi with the relief set at its maximum, complete the remaining steps to adjust the relief valve to 80 psi at a flow setting of 18.6 gpm. If the outlet pressure is less than 90 psi with the relief set at its maximum and a flow setting of 18.6 gpm, then the small asphalt pump setup is complete.
6. With the paver shut off, remove the relief valve adjustment screw cap and loosen the locknut which locks the adjusting screw.
7. Turn the relief valve screw in (clockwise) to increase pressure and out (counter-clockwise) to decrease pressure. To prevent injury from the rotating asphalt pump shafts, adjustments to the relief valve screw are not recommended while the paver is running.
8. With the valves configured as shown in Figure 10.2, adjust the relief so that the pump outlet pressure at 18.6 gpm is approximately 80 psi.
9. If the relief valve required adjustment (a reduced relief setting), then complete the "Adjusted Relief" column in Table 10.3.
10. Verify the relief valve adjustment screw locknut has been tightened and reinstall the adjustment screw cap.

Small Asphalt Pump Flow (GPM)	Maximum Relief - Small Asphalt Pump Outlet Pressure (PSI)	Adjusted Relief - Asphalt Pump Outlet Pressure (PSI)
2		
4		
6		
8		
10		
12		
14		
16		
18.6		

Notes:

Table 10.3 Small Asphalt Pump Relief Pressure Checks

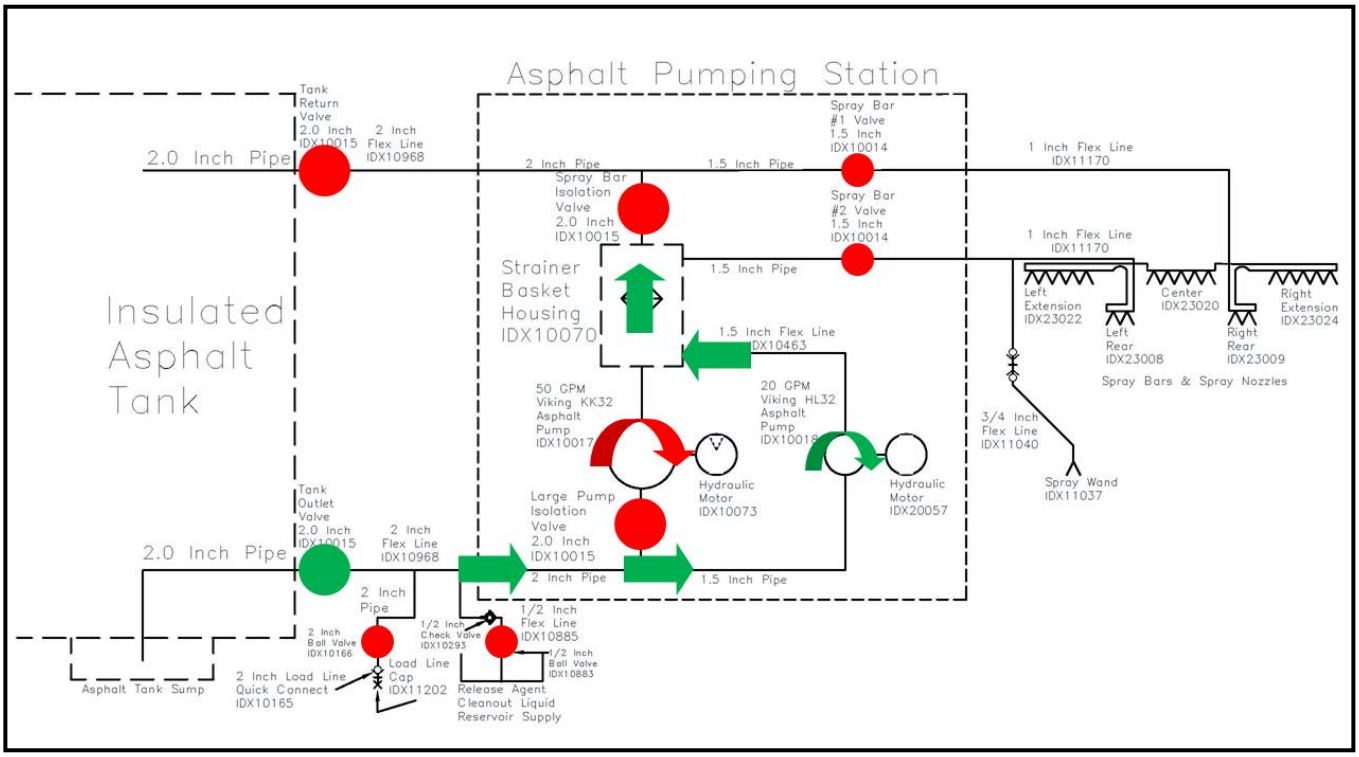

Figure 10.2 Small Asphalt Pump Bypass Setting - Pump and Valve Configuration

10d. Spraying Checks / Cycle Spray Nozzle Valves

Make sure each spray nozzle valve is aligned properly – wrench flats perpendicular to bar. With the Spray Auto pump function active, actuate each valve or gang of nozzles individually while a bucket or other basin is placed below the spray nozzles, to verify that the nozzles spray normally and there is no flow obstruction at any nozzle.

Be sure to cycle each spray nozzle several times to work the diesel fuel into all parts of the spray nozzle valve. Also press down on each spray nozzle valve stem to allow a small amount diesel fuel to flow out the top of the valve stem.

Verify all tasks in Table 10.4 can be answered with a yes.

TASK	ENTRY	INITIALS
Do all spray nozzles spray properly? Note any issues found below.		
Has each spray nozzle valve been cycled several times and pressed down to coat it with diesel fuel?		
Notes:		

Table 10.4 Spraying Checks / Cycle Spray Nozzle Valves

10e. Hydraulic Oil Maximum Temperature / Cooler Fan Operation / Spray Bar Vacuum

This section is intended to confirm that the hydraulic oil cooler fan operates as well as verify the maximum steady state hydraulic oil temperature while vacuuming out the diesel fuel from the spray bars.

As a reference, Table 10.5 below shows the maximum hydraulic flow rates for each pump function as controlled by software version 2.0.

MAXIMUM HYDRAULIC FLOW RATES
(For AP1055F Pavers with a 27 gpm Pump Capacity)

HYDRAULIC OPERATION	ASPHALT PUMP SIZE	Pump Function at 100%	
		Hydraulic Flow Per Pump (GPM)	Hydraulic Flow Total (GPM)
AIR COMPRESSOR	N/A	N/A	6.19
TANK LOAD	SMALL	2.87	13.18
	LARGE	10.31	
TANK CIRCULATE	SMALL	2.87	13.18
	LARGE	10.31	
SPRAY BAR CIRCULATE	SMALL	5.39	8.24
	LARGE	2.85	
SPRAY AUTO	SMALL	9.72	9.72
	LARGE	OFF	
SPRAY BAR VACUUM	SMALL	9.72	20.03
	LARGE	10.31	
CLEAN OUT	SMALL	2.87	5.72
	LARGE	2.85	

Table 10.5 Maximum Hydraulic Flow of Air Compressor and Pump Functions

Procedure:

1. Log the hydraulic reservoir oil temperature at the moment the hydraulic oil cooler fan turns on. The oil cooler fan operates based on a demand from the oil cooler thermostat which is preset to activate at 115°F. Note that without operating hydraulic components to create hydraulic system flow the oil cooler fan may not operate.

2. Stop operation and contact engineering if the hydraulic oil temperature exceeds 180°F.

3. To increase the hydraulic oil temperature run the Tank Circulate pump function at 100% with the paver at high idle (this will run the hydraulic motors for the small asphalt pump at 301 rpm and the large asphalt pump at full speed - 384 rpm).

4. Also create a small air leak on the pneumatic system so that the air compressor will cycle once every 3 minutes.

5. Allow the components to continue running until the hydraulic oil temperature has stabilized. This will be defined as a temperature rise over 3 minutes of 2°F or less.

6. Once oil temperature has stabilized, run the Spray Bar Vacuum pump function for approximately 5 minutes which will remove the diesel fuel from the spray bars and emulsion lines in preparation for draining the diesel fuel from the asphalt system.
    a. First run Spray Bar Vacuum for the center spray bar long enough to build a good vacuum, then turn on the master switch for a 20-30 seconds which will open the spray nozzles on the center spray bar.
    b. Next toggle Spray Bar Vacuum to the left and right telescoping spray bars and run long enough to build a good vacuum, then turn on the master switch for a 20-30 seconds which will open the spray nozzles on the left and right telescoping spray bars.
    c. Finally, toggle Spray Bar Vacuum to the left and right rear spray bars and run long enough to build a good vacuum, then turn on the master switch for a 20-30 seconds which will open the spray nozzles on the left and right rear spray bars

7. Record the hydraulic reservoir oil temperature.

Also verify that the oil cooler fan is wired to the main power disconnect key switch which is typically located under the paver's left side access panel above the tracks or wheels. To confirm proper wiring allow the hydraulic oil to get warm enough to activate the oil cooler fan, then turn off the paver's engine. The hydraulic oil cooler fan should continue to run until the oil temperature drops below the thermostat setpoint or the main power disconnect key switch is turned off.

Temperature can be measured using the gauge on the oil level sight glass or by using an infrared temperature gun.

For worst case conditions, this would be completed in direct sunlight on a hot summer day.

Verify all tasks in Table 10.6 have their entry cell completed.

TASK	ENTRY	INITIALS
Does the hydraulic oil cooler fan activate between 110° F and 120° F? Log the temperature below.		
Log the maximum hydraulic oil temperature observed.		
Log the ambient temperature and if the test was performed in sun or shade.		
Is the oil cooler fan is wired to the main power disconnect key switch?		

Notes:

Table 10.6 Hydraulic Oil Temperature & Oil Cooler Fan Checks

*** The air compressor cycle time was established from the worst case jobsite data available on previous pavers.

Jobsite air compressor cycle times are shown below:

- J04 – 6 min
- J15 – 3 min
- J15 – 9 min

10f. Drain Diesel Fuel From Asphalt System

This section lists a procedure to drain the diesel fuel from the asphalt system.

Procedure:

1. In the previous section, the Spray Bar Vacuum pump function was run to remove as much diesel fuel from the spray bars and emulsion lines as possible.
2. Drain the emulsion tank(s). Make sure to open all drain valves if more than 1 is present.
3. Drain any remaining diesel fuel from the spray bars.
    a. Remove, or at least loosen, the end cap of each front telescoping spray bar.
    b. Open the spray valves in the front center spray bar and allow any remaining diesel fuel to drip out.
    c. Open the spray valves for both rear spray bars and allow any remaining diesel fuel to drip out.
4. Make sure all spray nozzles are closed for shipping.
5. Save and properly store for future use, or properly dispose of any removed diesel fuel.

Verify all tasks in Table 10.7 have their entry cell completed.

TASK	ENTRY	INITIALS
Has as much diesel fuel as possible been removed from the asphalt system?		
Has all removed diesel fuel been properly disposed of or stored?		
Notes:		

Table 10.7 Draining Diesel Fuel From Asphalt System

11. Control System Checks

11a. Vehicle Speed Calibration

Verify the spray paver speed matches the asphalt paver displayed speed. The paver will need to be driven straight to get a good comparison because the spray paver only uses a signal from the left side of the machine while the original paver speed display uses signals from both the left and right sides of the machine.

Log results in Table 11.1 below while verifying the spray paver speed matches the original paver display speed. Make adjustments to the spray paver pulses/ft in the Service Screen of the HMI until the spray paver speed is less than 1% from the original paver display speed.

Note: Software version 2.0 has a default vehicle speed calibration value of 837 pulses per foot. This calibration value has not been established for any pavers delivered, so it is unlikely that the vehicle speed calibration value will remain at its default setting while software version 2.0 is used.

Once a calibration value in pulses/ft is established, run a minimum of 1 time at a low medium and high target speed and log the results in Table 11.1.

RUN NUMBER	APPROXIMATE DISTANCE	SPRAY PAVER PULSES / FT	TARGET SPEED FEET / MIN	SPRAY PAVER DISPLAY FEET / MIN	ORIGINAL PAVER DISPLAY FEET / MIN	INITIALS
1			10			
			10			
			10			
			35			
			35			
			35			
			60			
			60			
			60			
Notes:						

Table 11.1 Vehicle Speed Calibration Checks

Log the final values for the vehicle speed calibration test in Table 11.2

Previous Spray Paver Speed Calibration Values (for reference):

SPECSYS PROJECT NUMBER	PAVER BRAND	PAVER MODEL	CALIBRATION VALUE PULSES / FT
G35	Cat	AP655D	868
G35	Cat	AP655D	868
H60	Cat	AP1000D	550
J04	Cat	AP1055F	840
J05	Cat	AP1055F	831
J15	Cat	AP1000F	562
J36	Cat	AP1055F	831

Table 11.2 Vehicle Speed Calibration Data

11b. Totals Screen

Verify job and machine totals are accumulating in both square yards and gallons. This needs to be done with the paver driving and the Spray Auto pump function active.

Note: With software version 2.0 there is a known issue with the Machine Totals for gallons not functioning properly.

Verify all tasks in Table 11.3 have their entry cell completed with a yes.

TASK	ENTRY	INITIALS
Are Job Totals accumulating with at least 1 spray nozzle selected, Spray Auto active, the paver traveling, and the Master Switch ON?		
Are Machine Totals accumulating with at least 1 spray nozzle selected, Spray Auto active, the paver traveling, and the Master Switch ON?		
Are Job Totals NOT accumulating with at least 1 spray nozzle selected, Spray Auto active, the paver traveling, and the Master Switch OFF?		
Are Machine Totals NOT accumulating with at least 1 spray nozzle selected, Spray Auto active, the paver traveling, and the Master Switch OFF?		
Notes:		

Table 11.3 Totals Screen Check

11c. Alarm Checks

Manually activating each alarm will verify that the sensors and the control system are functioning properly.

1. The Low Air Pressure alarm can be activated by powering on the spray paver HMI without the paver's engine running, then wait 45 seconds for the startup timer plus an additional 20 seconds for the alarm timer. Verify the air pressure in the compressed air tank is below the low pressure switch setpoint, target a pressure of 40 psi to be certain the pressure is low enough.
2. The Small Pump No Speed Signal alarm can be activated if the Spray Auto pump function is active and the connector at the speed pickup for the small asphalt pump motor is disconnected.

Verify all tasks in Table 11.4 have their entry cell completed with a yes.

TASK	ENTRY	INITIALS
Does the Low Air Pressure alarm activate and also clear when not active?		
Does the Small Pump No Speed Signal alarm activate and also clear when not active?		
Notes:		

Table 11.4 Alarm Checks

12. Transportation Preparation

12a. Zero Totals

Zero the job totals and the machine totals.

1. The job totals are reset by holding down the reset button on the Totals screen.
2. The machine totals are reset in the Test Mode Setup screen, see Figure 6.4.

Verify all tasks in Table 12.1 have their entry cell completed with a yes.

TASK	ENTRY	INITIALS
Have the Job Totals been set to zero?		
Have the Machine Totals been set to zero?		
Notes:		

Table 12.1 Zero Totals

12b. Shipping Preparation

Verify all tasks in Table 12.2 have their entry cell completed with a yes.

TASK	ENTRY	INITIALS
Have the asphalt conveyors/drag chains been run to clear any debris that may have been sitting in them?		
Is the front spray bar tilted up?		
Is the front spray bar pinned up?		
Have all hydraulic gauges been removed from the test ports?		
If the rear spray bars are adjustable, are they fully raised?		
Is the HMI securely positioned for transportation at highway speeds?		
Is the pendant securely fastened for transportation at highway speeds?		
Are all electrical enclosures locked?		
Are all pneumatic enclosures tightened securely?		
Is the guard/cover installed on the air compressor and bolted in place?		
Have all asphalt pumping station guards been installed?		
Has the engine compartment ventilation stack been hinged down and pinned?		
Have all paver operator station vandal covers been installed?		
Have all screed operator station vandal covers been installed?		
Notes:		

Table 12.2 Shipping Preparation

12c. Shipping Component Checklist

Verify all tasks in Table 12.3 have their entry cell completed with a yes.

TASK	ENTRY	INITIALS
Is the spray wand packaged to ship?		
Is a Spanish decal set packaged to ship?		
Are all paver keys packaged to ship?		
Are all electrical enclosure keys packaged to ship?		
If included, is an operator's manual packaged to ship?		
If included, is a parts manual packaged to ship?		
If an alternate asphalt strainer screen is included is it packaged to ship?		
If any items were removed from the paver, are they packaged to ship?		
If any items were delivered with the paver, are they packaged to ship?		
If optional additional spray nozzles are requested, are they packaged to ship?		
If optional shore power cord(s) are requested, are they packaged to ship?		
Notes:		

Table 12.3 Shipping Component Checklist

13. Appendix A Overall Test Schedule / Timeline:

Once mechanical, electrical, and software updates are complete this test plan can be executed. The estimated time to complete these tests is three days for two people if no mechanical, electrical, or software adjustments are required; however, issues are expected. Plan to schedule 5 working days for completion of this test plan along with any mechanical or electrical adjustments.

14. Appendix B Spray Paver Configuration / Options:

B.1 Tracked / Wheeled

TBD

B.2 Pendant Type

TBD

B.3 Number of Operator Stations

TBD

B.4 Number of Cameras

TBD

B.5 Number & Location of Emulsion Tanks

TBD (calibrate tank level if new design)

15. Appendix C Illustrations:

C.1 TBD

16. Appendix D Supporting Documents:

D.1 Operator's Manual

Contact the manufacturing or engineering project managers for the most recent version.

D.2 Parts Manual

Contact the manufacturing or engineering project managers for the most recent version.

D.3 Assembly Drawings

Contact the manufacturing or engineering project managers for the most recent version.

D.4 Asphalt Flow Schematics

Asphalt Pump
Function Flow Schema

D.5 Electrical Schematics

Contact the manufacturing or engineering project managers for the most recent version.

D.6 Pneumatic Schematics

Contact the manufacturing or engineering project managers for the most recent version.

D.7 Hydraulic Schematics

Contact the manufacturing or engineering project managers for the most recent version.

D.8 Hydraulic Design Booklet

Contact the manufacturing or engineering project managers for the most recent version.

D.9 Electrical Design Booklet

Contact the manufacturing or engineering project managers for the most recent version.

D.10 Pneumatic Design Booklet

Contact the manufacturing or engineering project managers for the most recent version.

D.11 Pump Function Speeds & Flows

Pump Function Speeds & Flows.xlsx

D.12 Human Machine Interface (HMI) Screens

Screen Captures_Software V2

D.13 Decal Prints

AP1055F Decal Location Prints:

idx20151_B.pdf

IDX21004_REVF.pdf

IDX23003_REVF.pdf

D.14 Asphalt Pump Information

Viking Series 32 Pump Data Sheet.pdf

Viking Series 32 Pump Technical Servic

Viking Technical Service Manual pg 1-3

17. Appendix E Supplemental Test Results & Comments: