Drip and Drag
Primer Dispensing System

Customer Product Manual
Part 303 829A

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

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1. Safety

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- Make sure the spray area is adequately ventilated.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

High-Pressure Fluids

High-pressure fluids, unless they are safely contained, are extremely hazardous. Always relieve fluid pressure before adjusting or servicing high pressure equipment. A jet of high-pressure fluid can cut like a knife and cause serious bodily injury, amputation, or death. Fluids penetrating the skin can also cause toxic poisoning.

If you suffer a fluid injection injury, seek medical care immediately. If possible, provide a copy of the MSDS for the injected fluid to the health care provider.

The National Spray Equipment Manufacturers Association has created a wallet card that you should carry when you are operating high-pressure spray equipment. These cards are supplied with your equipment. The following is the text of this card:

WARNING: Any injury caused by high pressure liquid can be serious. If you are injured or even suspect an injury:

- Go to an emergency room immediately.
- Tell the doctor that you suspect an injection injury.
- Show him this card.
- Tell him what kind of material you were spraying.

MEDICAL ALERT—AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

Injection in the skin is a serious traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream.

Consultation with a plastic surgeon or a reconstructive hand surgeon may be advisable.

The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin microflora residing in the paint or gun which are blasted into the wound. If the injected paint contains acrylic latex and titanium dioxide that damage the tissue's resistance to infection, bacterial growth will flourish. The treatment that doctors recommend for an injection injury to the hand includes immediate decompression of the closed vascular compartments of the hand to release the underlying tissue distended by the injected paint, judicious wound debridement, and immediate antibiotic treatment.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment in the spray area. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.
- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Halogenated Hydrocarbon Solvent Hazards

Do not use halogenated hydrocarbon solvents in a pressurized system that contains aluminum components. Under pressure, these solvents can react with aluminum and explode, causing injury, death, or property damage. Halogenated hydrocarbon solvents contain one or more of the following elements:

Element	Symbol	Prefix
Fluorine	F	“Fluoro-”
Chlorine	Cl	“Chloro-”
Bromine	Br	“Bromo-”
Iodine	I	“Iodo-”

Check your material MSDS or contact your material supplier for more information. If you must use halogenated hydrocarbon solvents, contact your Nordson representative for information about compatible Nordson components.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out system electrical power. Close hydraulic and pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the system.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

2. Description

The Nordson Drip and Drag primer dispensing system dispenses two different primer materials (clear and black primer) for preparing the urethane bond of automotive glass to vehicle bodies. Using customer-supplied robotics, this system is engineered to meet the special production requirements for automotive glass retention.

The system controls are designed to meet application safety codes and automation interlocks have been built into the system. These interlocks can be interfaced to ensure that ventilation and other system controls are operational prior to use of the dispensing system.

The dispensing system uses the Drip and Drag method of material application, where primer material is dispensed on the glass and spread to a specific width by a felt wick. Clear primer is applied first, which cleans the substrate using one side of the wick. On the return pass, black primer is dispensed in front of the wick and the wick spreads material uniformly on the glass surface. The primers serve to promote adhesion of the urethane to the glass and provide UV ray protection for the windshield seal.

The system operates by pumping fluid to an applicator tool, which applies the fluid using a piece of felt. The applicator tool is moved across the workpiece by means of a robot. Felt is supplied by means of a felt wick dispenser. The felt wick dispenser indexes the felt and cuts it to size so that it can be picked up by the applicator tool.

System Components

See Figure 1.

The Drip and Drag primer dispensing system consists of four major components in addition to the customer-supplied robot. They are: the main system controller (7), the primer delivery system (6), the Drip and Drag applicator tool (2), and the felt wick dispenser (3). A solvent system (4) is used in conjunction with the felt wick dispenser and a pour stand (5) is used in conjunction with the primer delivery system.

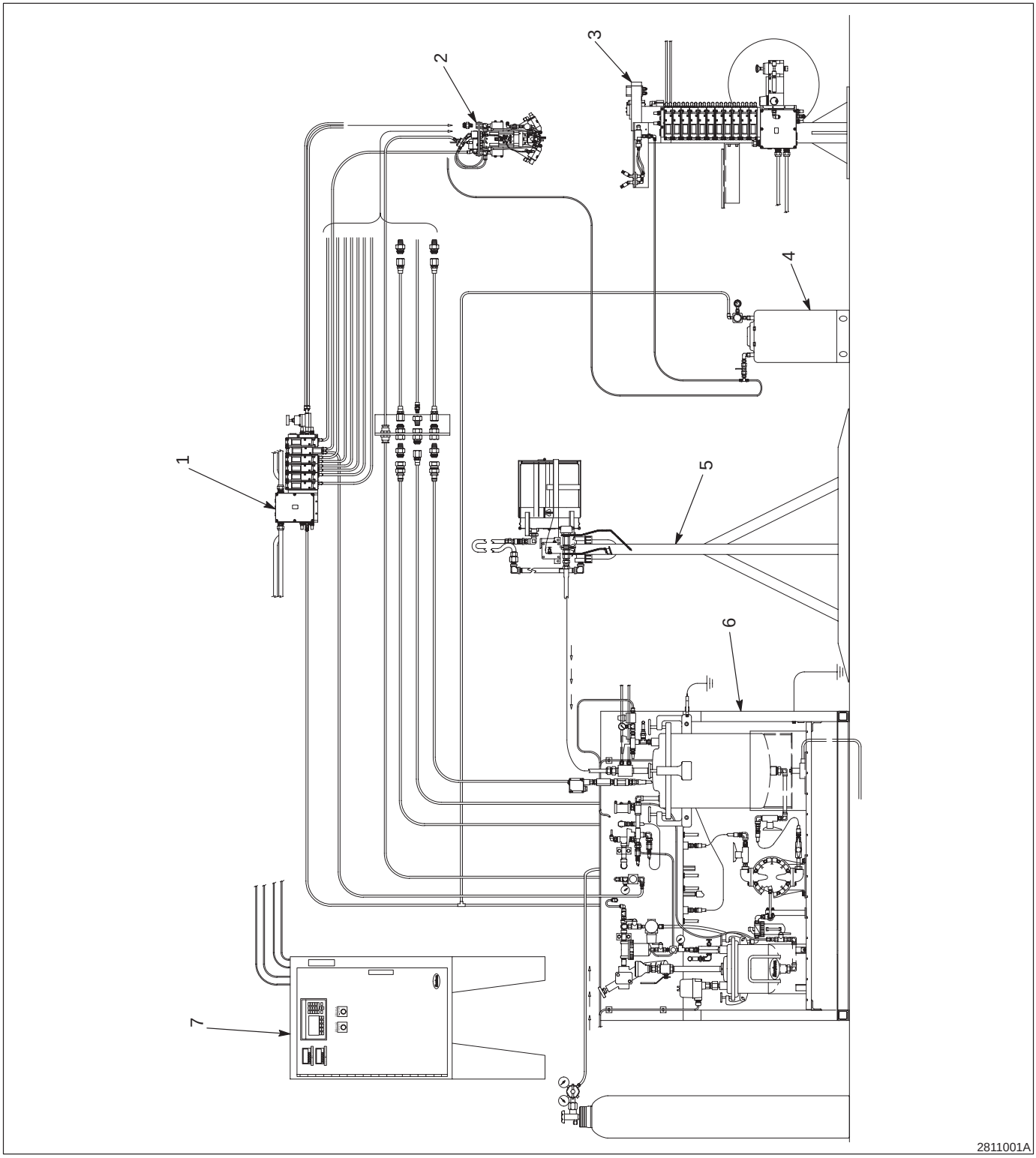


Fig. 1 Drip and Drag Primer Dispensing System Components

1. Valve pack
2. Drip and Drag applicator tool
3. Felt wick dispenser
4. Solvent system
5. Pour stand
6. Primer delivery system (Two-gallon/Ten-gallon)
7. System controller

Main Control Panel

See Figure 1.

The primer system controller (7) is a Programmable Logic Controller-(PLC-) based device used to interface the Drip and Drag system components to the robot and workcell PLC. The control panel communicates with the robot and the main workcell controller via remote or discrete I/O. The control panel also features a touchscreen which can be used in the manual operation of the entire system, monitor production status of the primer system, teach the system different part styles, monitor fault status, or make various adjustment to the operating parameters of the system. Refer to Appendix C, *Controller Screens*, for programming information.

Drip and Drag Applicator Tool

See Figure 2.

The Drip and Drag applicator tool is engineered specifically to meet the requirements of primer application. All of the components that make up the tool are powered pneumatically by the 24 Vdc seven-station solenoid valve pack (1) mounted near the applicator tool. The valve pack air supply comes from the pumping stand of the primer delivery system.

The clear primer dispense module (3) is pressure-fed from a 2-gallon pressure pot. The black primer dispensing module (5) is connected at the end of a circulation loop. Black primer is circulated through a fluid pressure regulator (7) mounted near the black primer gun manifold. Mounted between the dispensing modules are the felt gripper jaws (2) and slide actuator (6). During system operation, the slide moves up and down and the gripper jaws open and close to hold and drop felt.

The applicator tool also includes a felt wick blow-off nozzle and fiber optic sensors (4) for drop counting. The valve assembly includes all the equipment required to actuate the various components on the applicator tool. The valves are solenoid powered and operated by a remote I/O board that is in direct communication with the primer system main control panel.

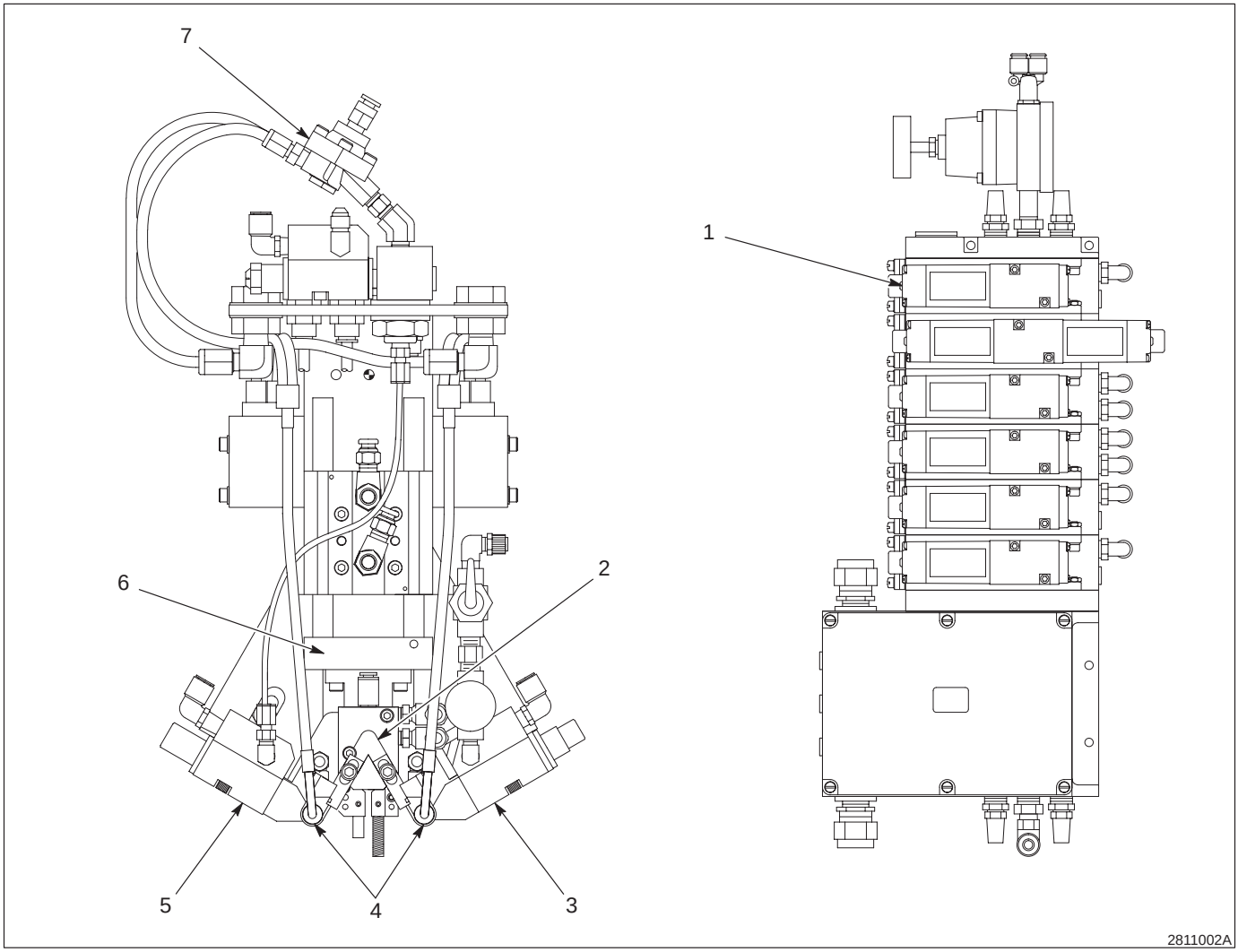


Fig. 2 Drip and Drag Applicator Tool and Seven-Station Valve Pack

1. Seven-station valve pack
2. Felt gripper jaws
3. Clear primer dispense module
4. Fiber optic sensors
5. Black primer dispense module
6. Slide actuator
7. Black primer fluid regulator

Felt Wick Dispenser

See Figure 3.

The felt wick dispenser is specifically engineered to dispense felt used in the primer application process. The felt wick dispenser features two independent felt dispense blade assemblies (1), two felt spool mounts (5), and a nozzle brushing station (6). An 11-station valve pack (2) with lockout valve (4) and air pressure regulator (3) powers the felt wick dispenser.

The nozzle brushing station consists of two brushes that are wetted by actuating a solenoid on the felt wick dispenser. A standard Nordson H200 module (7) feeds the brushes and is pressure-fed with solvent from a 5-gallon pressure pot (See Figure 1, (4)).

Through input signals to the primer system main control panel either felt dispenser can cycle. Output signals from the wick dispenser indicate empty spools or if the wick is not present in the gripper jaws.

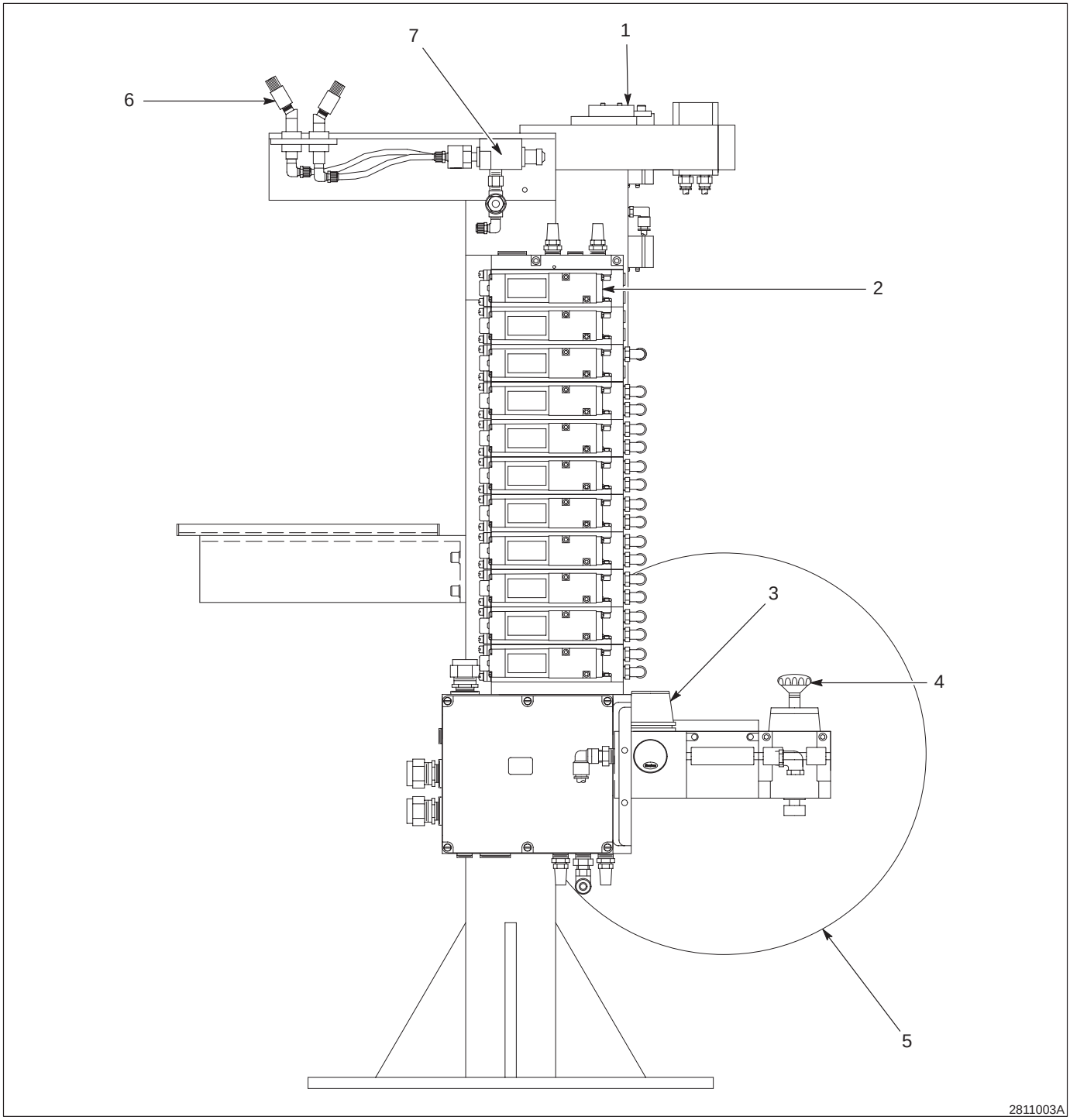


Fig. 3 Felt Wick Dispenser

1. Felt dispense blade assemblies
2. 11-station valve pack
3. Air pressure regulator
4. Lockout valve
5. Felt spool mounts
6. Nozzle brushing station
7. Solvent dispense module

Primer Delivery System

See Figure 4.

The primer delivery system used in the Drip and Drag process is a two-gallon/ten-gallon pumping stand frame (1) with a pour stand (5). In this system, clear primer in a two-gallon pressure pot (2) is pressurized and black primer in a ten-gallon pot (4) is circulated by a diaphragm pump (3) to the applicator tool. A pour stand assembly is used to add black primer to the pressure pot.

This section describes basic operational information about the primer delivery system. For more information, refer to the *Primer Delivery System* manual.

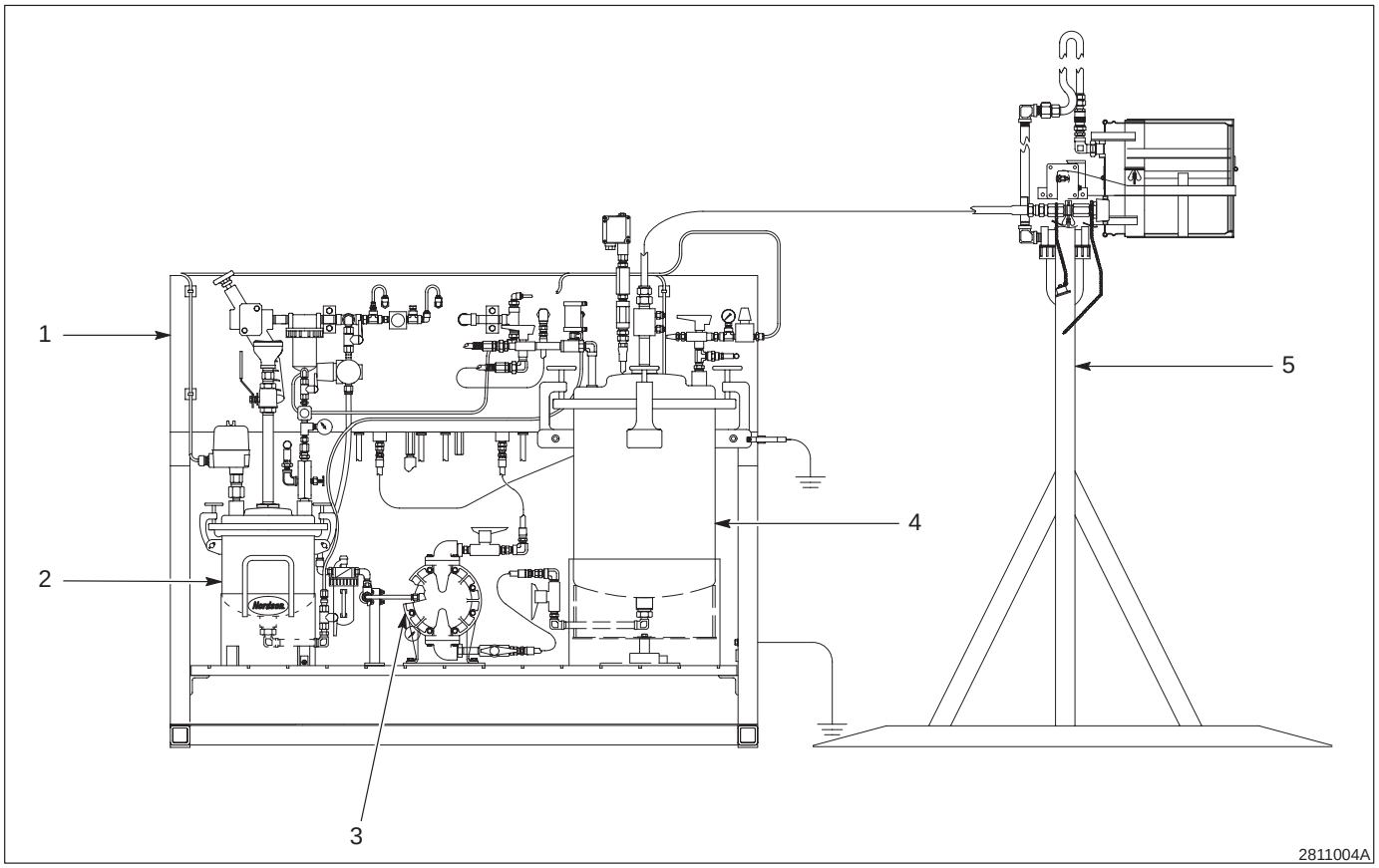


Fig. 4 Two-Gallon/Ten-Gallon Primer Delivery System with Pour Stand

1. Pumping stand frame
2. Two-gallon pressure pot
3. Diaphragm pump
4. Ten-gallon pressure pot
5. Pour stand

Black Primer Fluid Delivery

Black primer is pumped by means of a diaphragm pump from a ten-gallon pressure pot. Black primer is gravity-fed to the pot. The make up air used during the pour operation is desiccated. The pot is vented during the pour filling operation, which allows blanket gas to escape. The pot features an 8.62 bar (125 psi) relief valve to prevent overpressurization. The fluid pressure for the black primer system is typically 2.76–8.28 bar (40–120 psi). If nitrogen is used to blanket the material, the nitrogen tank and tank anchors are customer-supplied items.

Filtered, regulated air drives the diaphragm pump. The pump strokes about 10–12 times per minute. It circulates black primer to the fluid pressure regulator, which is mounted on the applicator tool. Black primer is then circulated back into the primer pail to keep solids in suspension and to minimize plugging of wetted components.

A dual filter assembly after the diaphragm pump keeps the system free of any foreign material large enough to be trapped in the filter. The filter assembly protects the dispensing guns and other system components from blockage and premature wear. Two-way ball valves on either side of the filter isolate it for element changes.

A pressure switch is located on the output of the filter. As the filter becomes coated with trapped particles, pressure at its outlet will begin to decrease. As pressure falls below a factory-set limit, switch contacts will close sending a FILTER PRESSURE LOW signal to the robot. Failure to maintain the filter could cause a loss of system fluid pressure. The filters should be changed when a new pail is installed in the system.

The robot's black primer supply and return lines are connected to a by-pass valve assembly to allow the applicator tool to be isolated from the recirculation loop, allowing maintenance to be performed on the tool while keeping the primer recirculating.

The black primer fluid level is detected via an intrinsic barrier-protected load cell, which signals a digital display on the system control panel. The display unit also provides programmable BLACK PRIMER LOW and EMPTY signals to panel-mounted warning lights and to the robot. The load cell can be calibrated to detect fluid level in pounds or gallons. Refer to the Appendix B, *Equipment Calibration*.

Clear Primer Fluid Delivery

Clear primer is bottom-fed from a two-gallon pressure pot to the system. Nitrogen or desiccated air is used to pressurize the clear primer and supply it to the dispensing lines and gun.

A level probe provides current loop level detection that sends a 4–20 milliamp signal corresponding to primer level to a panel-mounted digital display. The level probe measures by means of impedance and is immune to material buildup. The level detector requires that final calibration be performed at the time that the system is filled with primer. Refer to Appendix B, *Equipment Calibration*.

Terms Defined

Table 1 defines the important terms used in this manual. Refer to the definitions to gain a basic understanding of the drip and drag process and primer application terminology.

Table 1 Important Terms Defined

Term	Definition
Drip and Drag	A process of primer application where primer is dripped onto glass (substrate). The primer is dispensed at the contact point of felt and glass to eliminate splashing. A felt wick drags across the surface, spreading the primer.
Drop count	The value determined by the fiber optic sensors, which count the number of drops of primer dispensed during a set interval.
Part ID	A 4-bit binary code that allows multiple paths and/or parts to be coated to have their own drop count setpoint. NOTE: The number of drops dispensed is usually different for the clear and black primer paths of the same part. Set Part IDs to correspond to the clear and black primer paths of the part being taught.
Part strobes	Provide input to the primer controller — they send signals that tell the primer controller to begin counting dispensed drops of clear or black primer.
Setpoint	The value determined for best primer coverage. The clear primer setpoint may be 20 drops in a certain interval — the program must dispense 20 drops (within high and low variable limits) to be successful and not generate a dispense fault.
Stitching	When the primer guns dispense, they turn off and on at varying intervals (based on stitch rates and part ID), dispensing primer in a pattern similar to stitches in fabric.
Stitch rate	The stitch rate is the length of time a gun will be on and off during dispense operations. When stitch rates are combined in a part ID, the primer is stitched onto the glass (on and off and on and off at varying lengths of time). The stitch rate is a 4-bit binary number. Eight different stitch rates are programmed during Drip and Drag dispense operations. Stitch duration (gun ON time) should be $\geq$ 100 milliseconds.
Workpiece	The piece of automotive glass (typically) that primer is applied to in the Drip and Drag process.

Drip and Drag Process Theory of Operation

Most major components in the Drip and Drag primer dispensing system are air-powered. The sequence of operation is as follows:

1. A new workpiece is brought into the work position.

2. The robot moves the work head with attached Drip and Drag applicator tool to the felt wick dispenser. The felt wick dispenser indexes a new piece of felt and cuts it off. The air slide is moved out into position so that the gripper accepts the felt and clamps it into position in its jaws.

3. The robot moves the applicator tool to the workpiece.

4. Determined by a programmed stitch rate, primer is applied to the workpiece:

   a. The clear primer is dispensed from the clear primer dispense module. The primer is under pressure in the two gallon pressure pot and is pushed by the nitrogen pressure to the dispense gun. When the gun is pneumatically actuated, the fluid flows from the gun onto the felt. The felt is then brought in contact with the workpiece and moved around the workpiece while the gun is stitched. The wetted felt applies and spreads the clear primer to the glass.

   b. The robot returns to the start position on the workpiece. The black primer dispense module begins dispensing black primer onto the opposite side of the felt from the clear primer. While fluid is being dispensed, fiber-optic sensors detect the flow, or stitch rate of the primer. As black primer is stitched onto the felt, the robot moves the applicator around the workpiece creating the desired primer bead. At the end of the bead, the applicator is retracted from the workpiece.

5. The workpiece is indexed to the next station.

6. The robot moves the applicator tool to a waste station where the used felt is ejected from the applicator tool jaws.

7. The robot moves the applicator tool to a cleaning station where the slide retracts the gripper and jaws. The robot then moves the applicator tool dispense guns across two solvent-fed brushes. The brushes clean the tips of the dispense guns. The robot can be programmed to occasionally move the applicator tool in a manner that cleans the mountings for the fiber-optic cables.

8. The robot now moves back into the start position and waits for the next piece of felt to index.

3. Installation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

The main Drip and Drag primer dispensing system components that require installation are the primer delivery system, the felt wick dispenser and its solvent brush system, and the Drip and Drag applicator tool with the seven-station valve pack.

Use the following general guidelines when installing the Drip and Drag primer dispensing system components.

- Properly secure all primer-related equipment to the foundation with the appropriate anchoring devices. Do not operate any equipment unless it is anchored first.

- Ground all equipment according to system diagrams.

Component Installation

Refer to Table 2 for installation guidelines when connecting the various system components. The individual component manuals may contain more detailed installation information. Refer to the component manuals as needed.

NOTE: Refer to all electrical, pneumatic, and hydraulic schematics and diagrams prior to system startup.

Table 2 Component Connection Guidelines

To Connect . . .	Do This . . .
Air (Pneumatics)	Supply shop air to the felt wick dispenser ($^3/_4$-14 female NPT inlet), the pump stand inlet ($^1/_2$-14 female NPT inlet), and the pressure vessel for the solvent pot. Outlets from the primer delivery system can also be connected to the seven-station valve pack and the applicator tool. Air line routing to the applicator tool must ensure that rotation of the tool during application does not risk kinking. Refer to the pneumatic diagram in the systems drawing package for more information.
Fluid (Hydraulics)	Attach the fluid lines as shown in the system diagram. Dress all lines to minimize abrasion. Ensure that all lines are PTFE or chemical resistant. Do not use brass fittings where connecting lines in the clear primer system, these fittings must be CRES (corrosion resistant steel) or nickel-plated brass. Fluid lines run from the solvent pressure pot to the felt wick dispenser. Fluid lines run from primer delivery system to the applicator tool. Route the fluid line to the applicator tool so that rotation of the tool during application does not kink the fluid line. Refer to the system diagram for any slight changes to the system.
Current (Electrical)	Connect all wires according to electrical system diagram. All connections shall be in accordance with applicable NEMA and NFPA requirements.
Controls	Using the cable supplied, connect the 24 V power and data terminals of the applicator tool valve pack. Connect the felt wick dispenser valve pack to the system control panel. Refer to the system interconnect schematic for the precise terminal locations. A pair of 2-conductor cables are required for operation. The power cable supplies the valve packs with 24 Vdc. The shielded communication cable transfers signals between the controller and the Drip and Drag primer dispensing system.
Fiber Optics	Make sure that the fiber optic sensors on the felt wick dispenser and the applicator tool are properly installed and aligned. Refer to the fiber optic sensors component manuals for more information.

4. Operation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Introduction

This section is intended to serve as a guide to setting up the system parameters. These parameters tend to vary from system to system with regard to type of glass being primed, cycle time, primer path, and other variables. Some adjustment after installation is usually necessary. These final adjustments are made when material is being dispensed onto parts during robot path optimization.

For more complete information, be sure to refer to the *Primer Delivery System* manual, *Drip and Drag Applicator Tool with Felt Wick Dispenser* manual, *ZCN Gun* manual, and all other component manuals as needed.

Clear Primer System Startup

Adhere to these parameters when starting up the clear primer system:

- Verify that all fluid line fittings are tight to avoid leaks.
- Add desired quantity of clear primer to the pot. The primer level must exceed the trip point of the level detector probe.
- Set the clear primer pressure pot pressure to 0.21–0.55 bar (3–8 psi).
- With the tool positioned over a waste container, purge air from the fluid line by manually actuating the clear gun via the touchscreen.
- Adjust the needle valve at the clear gun manifold to approximately $^1/_4$ turn out from closed position.

  NOTE: Small changes in the position of this valve result in large changes in the fluid dispense rate.

- Verify the operation of the clear primer drop counter fiber optics by observing the LED signal strength display on the sensor unit as the clear primer gun is actuated.

Black Primer System Startup

Adhere to these parameters when starting up the black primer system:

Verify that

- all fluid line fittings are tight to avoid leaks;
- the system has been flushed with MEK and pumped dry; and
- the bypass valve assembly is configured to circulate out to the applicator tool.

NOTE: Robot and cell control programming should be completed before loading primer into the dispensing system.

Follow these procedures to start up the black primer system:

Add Primer

1. Load a freshly shaken pail of black primer into the pour stand.
2. Connect the pour stand to the pressure pot via a $^{3}/_{4}$-in. PTFE line.
3. Turn off the nitrogen supply to the pot.
4. Open the vent valve on the pot.
5. Open the 2-way valve on the desiccator.
6. Use the pour stand to add black primer:
   a. Raise the five-gallon pail so that it is horizontal.
   b. Allow black primer to pour for five minutes, then raise the pail to near vertical and allow it to pour five more minutes.
   c. Shake the pail to verify that it is empty.
   d. Lower the pail.

Vent and Purge the Primer Pot

1. Close the vent valve on the pot.
2. Close the 2-way valve on the desiccator.
3. Disconnect the line connecting the pail and pot.
4. Put the cover back on the fill line.
5. Turn on the nitrogen supply to the pot.
6. Vent the pot for 30 seconds.
7. Turn the 3-way ball valve at the return port of the pressure pot to direct the primer return stream to the purge port. Connect tubing to dispense primer into a waste container.
8. Open the air lockout valve to the diaphragm pump and set the pressure regulator to 2.07 bar (30 psi).
9. As primer displaces any residual solvent used in flushing the system, turn the 3-way valve at the return port of the pressure pot to return primer to the primer pail within the pressure pot.

Set Regulators to Operating Levels

1. Adjust the pump pressure regulator to achieve a pump stroke rate of around 10–12 strokes per minute.
2. Set the dispense pressure regulator to approximately 0.34–0.69 bar (5–10 psi) and the nitrogen blanket pressure to 0.21 bar (3 psi) maximum.

Solvent Brush System Startup

Adhere to these parameters when starting up the solvent brush system:

- Verify that the pressure pot has been filled with a sufficient amount of MEK.
- Set pressure regulator to 0.21–0.34 bar (3–5 psi). Verify that the flow control needle valve is open.
- Actuate the SOLVENT BRUSH solenoid to purge air from fluid lines and to wet the brushes.

Path Finalization

Refer to Appendix A, *Robot Programming Guidelines*, for comprehensive robot programming information. Follow these procedures when finalizing the robot path.

1. Modify stitch rates and gun ON/OFF points as necessary to achieve uniform coverage.

2. If splashing is observed, carefully watch the tool move through the path, observing the target point of the dispensed primer, especially in the places where splashing is noted.

   Common causes of splashing are:

   - Gun targeting the glass too far ahead of the felt, striking the glass at too great an angle, causing the primer to bounce off
   - Gun targeting too high, striking the felt wick directly
   - Stitch rate on time is too long for the robot travel speed used, causing a pool of primer to form in front of the felt

3. After obtaining a satisfactory dispense path, teach the system the number of drops for the path via the primer controller touch screen. Refer to Appendix C, *Controller*, for more information about teaching drop count.

4. Assign an acceptable tolerance of the drop count setpoint (typically ±10 %).

5. Robot program logic to the end of the path should look for the input signal CLEAR VOLUME OK, indicating that the number of drops dispensed was within the setpoint tolerance range.

   The presence of this signal should allow the robot to continue with application of black primer. The absence of this signal will require customer-approved disposition.

   Possible actions are that the tool and hoses be unwound for a second application, or, that the glass be aborted, and the tool return to a home position to await operator input.

Setting Up Primer Beads

This section provides information about setting up clear and black primer beads. A primer bead is the flow of primer that hits the glass. The appearance of the black primer bead is more important than that of the clear primer bead. However, you do want to avoid runs of clear primer.

When you set up the primer beads, aim the primer to hit the glass directly in front of the felt rather than to hit the felt itself. This will allow for better coverage. An optimum bead has a thickness of approximately 0.3–1.0 mil, dry.

Considerations for Variables

When setting up the primer beads, you must make considerations for certain variables. Once you have set the primer bead, you can adjust the bead, as necessary, to obtain the most satisfactory coverage of the glass or substrate. Refer to Table 3 for a listing of the variables to consider.

Table 3 Variables to Consider When Setting Up Primer Beads

Variable	Consideration
Stitch rate	You program the stitch rates (1–8) to have varying gun ON and OFF times. Consider that a stitch rate with a longer gun ON time dispenses more primer onto the glass. Adjust the stitch rate according to the bead desired.
Robot speed	The slower the robot is moving, the greater the volume of primer that is dispensed in that area. The faster the robot speed, the less the volume of primer dispensed. Robot speed needs to slow at the corners of glass for precision's sake. You may need to adjust the stitch rate to reduce gun ON time when the robot slows for a corner. Program the robot speed to achieve a uniform film build, typically by slowing.
Fluid pressure	The higher the fluid pressure, the more primer is dispensed. Adjust fluid pressure to affect primer bead, keeping the pressure within the appropriate range.
Nozzle opening	If you use an adjustable dispensing gun on the applicator tool, the larger the opening of the nozzle, the more primer passes through it. Adjust the nozzle opening to control the volume of primer.
Felt consistency	The more absorbent the felt is, the more primer will wick into the felt and not stay on the glass. Felt consistency directly affects film buildup. If the felt is too stiff, it will push material to the sides of the path creating a railroad track or a snow plow-type pattern. If the felt is too limp, you will not get proper scrub-in from the clear primer path. Contact your Nordson representative if you require assistance with felt selection. Select the stiffest felt possible for your application, to achieve optimum scrub-in of the clear primer. This is typically felt in accordance with SAEJ314, grade F1.
Standoff	The angle that the felt is presented to the glass (the standoff) affects primer buildup. Nordson Corporation recommends that you present the felt wick at a 5–10 degree angle.

5. Maintenance

This section lists only the most basic maintenance procedures necessary to keep the Drip and Drag primer dispensing system operating properly. Refer to any maintenance schedules provided by your Nordson representative for more in-depth information.

Maintenance is required on all components in the system. The subassemblies requiring the most maintenance are those that transport or contain black primer. This material cures on contact with moisture. It is very important to keep all moisture out of the system. Failure to do so will result in premature clogging of components.

Every consideration is being taken in the design of this system to minimize maintenance and downtime. Procedures for preventative maintenance are listed below and must be strictly followed. Plant production rate may effect the frequency of certain procedures.

Refer to Table 4 for the recommended maintenance schedule for your system.

Table 4 Maintenance Schedule

Frequency	Component	Maintenance Task
Each break	Fiber optic cables	Inspect the fiber optic signal levels and surface. If the fiber optics become covered with black primer, they can yield false readings that result in shutdown or alarm conditions. Keep these components clean. Refer to the *Drip and Drag Applicator Tool with Felt Wick Dispenser* manual for cleaning procedures.
	Fiber optic sensor	Verify operation of the fiber optic sensor. Clean, as needed.
	Gripper jaws, load rods, load springs	Check for residue or buildup. Clean lightly, as needed.
	Felt spool	Check felt spool levels.
	Gun tips	Ensure that the gun tips are relatively free of black primer at each break (typically after two hours of continuous operation). Clean them with MEK and a nozzle brush, toothbrush, or soft cloth. Make sure that the aperture of the gun is free of any residue and that the gun is not damaged. This can cause the dispense stream to splash or overspray.
	Black primer stream	Visually inspect the black primer dispense stream for accuracy and repeatability.
	Clear primer stream	Visually inspect the clear primer dispense stream for accuracy and repeatability.
	Black primer fiber optic output	Verify the output.
	Clear primer level indicator	Inspect and verify if clear primer levels are adequate.
	Clear primer pressure pot	Verify if feed pressure is sufficient.

Continued on next page

5. Maintenance (contd)

Each break *(contd)*	Black primer feed pressure	Verify that the air pilot pressure to the recirculation fluid regulator is a minimum of 0.69 bar (10 psi).
	Nitrogen supply	Verify that the nitrogen level in the supply bottle is sufficient. Verify that the blanket pressure is 0.07–0.21 bar (1–3 psi), maximum, for black primer and 0.21–0.55 bar (3–8 psi), maximum, for clear primer.
Each shift	Solvent brush system	Check the brushes for signs of deterioration. Pulse the solvent brush solenoid to wet the nozzle brushes and ensure proper operation. The robot must wipe the primer dispense guns over the solvent brushes at least three times after every dispense cycle. It is recommended that the guns pass over the brushes in a circular or elliptical pattern, for the most effectiveness.
	Pump stroke	Verify that the pump stroke rate is approximately 10–12 strokes per minute, pump dependent. If you have the pump set to 10 strokes per minute and the pump is stroking significantly fewer times than that, troubleshoot the pump components and fluid lines for a restriction or blockage.
	Black primer stream	Inspect the black primer dispense stream stitch rate and bead quality.
	Clear primer stream	Inspect the clear primer dispense stream stitch rate.
	Felt wick dispenser	Clean residual felt lint from the moving components. Loosen the lint with a soft brush and blow away with shop air. Wipe any lint that has settled on a lubricated surface away with a soft cloth. Relubricate the surfaces after cleaning.
	Air knife regulator	Verify that the air pressure reading on the regulator gauge located on the applicator valve assembly indicates 0.07–0.14 bar (1–2 psi).
Daily	Clear primer fluid line	Inspect fluid line for the presence of air and purge, as necessary, into a container. Purge via the 3-way valve located on the applicator tool.
	Black primer system	If desiccated air is used, check the sight glass for color change of desiccant pellets.
	Solvent brush system	Check the system solvent lines for leaks.
Weekly	Gripper jaws, Load rods, Load springs	Clean extensively. Abrade the gripper jaws with a wire wheel to keep free of felt lint and black primer buildup and to ensure a better grip. Replace gripper jaws as necessary, due to wear.
	Solvent brush system	Replace the solvent brushes. Refill the pressure pot with methyl ethyl ketone (MEK). This is done approximately every five working days or as needed.
	Pump lubricator	Check level and add as needed.
	Dual filter assembly	Change the filter element.

Continued on next page

Bi-weekly	Clear and black fluid lines	Flush applicator tool lines with MEK solvent.
	Clear and black hoses	Check hoses for wear and proper routing. Inspect all fluid lines for crimps and kinks that might restrict fluid flow.
	Fiber optic cable	Check functionality and replace, as needed.
Periodically	Blade set	Ensure blades are sharp. Lubricate the grease fittings in the blade set, as needed.
	Material pail	Driven by production rate (suggested change rate is every two weeks). Black primer pail must be shaken for at least one hour immediately prior to introduction into system. If system is to be down for an extended period, the system should be flushed with MEK.
	Clear primer gun	Replace the gun every six weeks. Or, rebuild the gun and replace the gun seals, needle, and seat every six weeks.
	Black primer gun	Replace the gun every four weeks. Or, rebuild the gun and replace the gun seals, needle, and seat every four weeks.
Every three months	Solvent brush system	Rebuild or replace the solvent dispense gun.
	Clear and black primer hoses	Replace hoses.
	Clear primer gun	If you rebuild the gun every six weeks instead of replacing it, replace the gun body and end cap.
	Black primer gun	If you rebuild the gun every four weeks instead of replacing it, replace the gun body and end cap.
	Recirculation regulator	Replace. (located on applicator tool) This may be more frequent, depending upon your installation.
	Pressure switch isolation line	If your black primer fluid pressure switch is equipped with an isolation line, refill the isolation line with MEK.
Every six months	Solvent brush system	Replace the solvent lines.
	Ball valves	Replace. (especially those valves in the path of black primer flow)
	Blade set	Replace.
	Diaphragm pump	Replace.
Annually	Solvent brush system	Replace the needle valve at the brush manifold.

6. Troubleshooting

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Dispensing Problems

Dispensing problems are usually characterized by misdirected primer stream or primer overspray typically caused by cured black primer on various dispensing components.

Problem	Possible Cause	Corrective Action
1. Material fouling (missing its target)	Black primer gun tip fouled (or clear primer gun tip fouled with black primer overspray)	Clean the gun tips.
	Gripper jaws fouled	Clean the gripper jaws of any residual black primer.
2. Material splashing	Incorrect robot orientation	Adjust robot position and programming, as necessary.
	Incorrect dispense gun orientation	Make sure that the gun and manifold are installed and aligned properly on the applicator tool. Make sure that the dispense stream is targeted 1–2 mm (0.04–0.08 in.) in front of the felt contact point on the workpiece.
	Applicator tool too vertical (splashing especially on corners of workpiece)	Adjust robot programming to hold the applicator tool at a more appropriate angle for your application.
	Incorrect workpiece orientation	Adjust workpiece orientation, as appropriate to your application.
3. Fluid streaming from gun at an angle	Needle misaligned (gun with adjustable air caps)	Turn the needle inside the dispense gun. Insert a 0.040-in. hex key in the hole in the end of the air cap and turn the needle until the dispense stream is straight.
4. Erroneous alarm or shutdown condition	Fiber optic cable ends covered with primer or felt residue	Using a soft plastic tool, clean the residue or dried primer from the ends of the fiber optic cables.

Level Detection Problems

Level detection problems are characterized by inaccurate primer level readings caused by malfunctioning or inappropriate use of level detection equipment.

Problem	Possible Cause	Corrective Action
1. False readings from black primer level detector (load cell under black pot)	Object placed on ten-gallon pot on load cell	Remove the object for true reading of black primer level. The ten-gallon pot should be kept free of any sort of object (or wedging position) that could restrict its vertical movement.
2. False readings from clear primer level detector (level probe in clear pot)	Improper level detector calibration	Calibrate the level detector so that the maximum reading is 2.5 gallons. If you use 2.0 gallons or 8.0 quarts as the maximum and you overfill the container, the full pot will yield non-linear readings and not reflect the true content of the pot.
	Excessive buildup on sensor probe	Clean the level probe and recalibrate the level detector, as necessary.
	Faulty level detector	Replace the level detector.

Dispense and Drop Detection Problems

Dispense and drop detection problems are characterized by alarms sounding or workcells shutting down erroneously. The system does not detect that primer is being dispensed and thus, stops production.

Problem	Possible Cause	Corrective Action
1. Fiber optic sensor failure	Cable end fouled (black primer overspray)	Clean the ends of the fiber optic cables with a soft cloth periodically. Follow these guidelines: • Never use sharp instruments or harsh solvents to clean the cable ends. • Remove cured black primer with a plastic scraper. • Do not attempt to wipe away uncured black primer. • Do not clean the ends of the cable with MEK.
	Fiber optic glass fibers in cable broken	Replace fiber optic sensor cable. Fiber optic cables cannot be repaired.

7. Repair

Refer to Table 5.

Repairs for the Drip and Drag Primer Dispensing System are performed on a component level. The following table details common repair procedures. Refer to the listed component manuals for more information.

Table 5 Repair Procedure Locations

Refer to . . .	To find the procedure for . . .
Drip and Drag Applicator Tool with Felt Wick Dispenser manual	On the Applicator Tool: • Cleaning the fiber optic sensor • Replacing the fiber optic cable • Replacing the felt gripper jaws • Replacing the black primer fluid regulator • Removing the clear and black primer dispensing modules • Purging the clear primer line On the Felt Wick Dispenser: • Replacing the blade set • Replacing the felt shear cylinder • Replacing the upper felt clamp cylinder • Replacing the lower felt clamp cylinder • Replacing the felt shuttle slide On the Solvent Brush System: • Replacing the solvent brushes
Primer Delivery System manual	Replacing the pressure switch Replacing the clear primer level probe Replacing the diaphragm pump Replacing the filter element Replacing the fluid lines
ZCN Dispensing Gun manual	Removing and replacing the air cap Disassembling and assembling the gun (hydraulic section) Disassembling and assembling the gun (pneumatic section) Disassembling and assembling the needle Cleaning the gun

8. Parts

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use the parts list, and the accompanying illustration, to describe and locate parts correctly.

Using the Illustrated Parts List

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The number in the Part column is the Nordson Corporation part number. A series of dashes in this column (- - - - - -) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

Item	Part	Description	Quantity	Note
—	000 0000	Assembly	1	
1	000 000	• Subassembly	2	A
2	000 000	• • Part	1	

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

Drip and Drag Primer Dispensing System Parts

See Figure 5.

In addition to the spare parts list provided by your Nordson representative, refer to the following list to order replacement tubing and miscellaneous parts for your Drip and Drag primer dispensing system.

Item	Part	Description	Quantity	Note
1	860 112	Control cable	AR	A
2	295 973	Blue cable	AR	A
3	282 286	Tubing, 1/4-in. blue, urethane	AR	B
4	972 029	Connector, male, 37, 1/2-20 x 1/4-in. NPT, stainless steel	4	
5	146 133	Tubing, PTFE, 3/16-in. ID x 1/4-in. OD	AR	B
6	842 120	Hose, 1/4-in., 3-ft	2	
7	971 616	Tee, branch, 1/4 T x 1/8 NPT, brass	1	
8	971 415	Connector, male, 1/4-in. T x 1/8-in. NPT	1	
9	973 626	Reducer, 1/4-in. NPT-M x 1/8-in. NPT-F	1	
10	972 516	Connector, bulkhead, 37 d, 1/4-in. NPT, stainless steel	3	
11	973 208	Nipple, male, 3/8-in. NPS x 1/4-in. NPT	2	
12	972 035	Connector, female, 3/8-in. tube x 3/8-in. NPSM	4	
13	973 896	Union, bulkhead, 1/4-in. tube	1	
14	146 131	Tubing, PTFE, 1/2-in.	AR	A
15	842 300	Hose, PTFE with stainless steel braid, 1/4-in. ID x 25-ft	1	
16	972 177	Elbow, male, 37, 1/2-20 x 1/4 NPT-M	1	
17	973 207	Nipple, male, 3/8-in. NPT x 3/8-in. NPS	2	
18	971 266	Elbow, 1/4-in. tube x 1/4-in. NPT	2	
19	972 671	Tee, 1/4-in. SMC	1	
20	820 300	Hose, nylon with stainless steel braid, 1/4-in. ID x 25-ft	1	
21	138 134	Regulator, pressure gasses	1	
22	- - - - - -	Controller	1	C
NS	901 905	Brush	AR	D

NOTE A: The required length is approximately 200 feet. Order according to the actual length of tubing or cable in your system.

B: The required length is approximately 150 feet. Order according to the actual length of tubing or cable in your system.

C: Contact your Nordson representative to determine the proper part number for your controller. Controllers vary from system to system, depending upon specific applications and programs.

D: Order this brush for use when cleaning the dispensing gun components, as required.

AR: As Required

NS: Not Shown

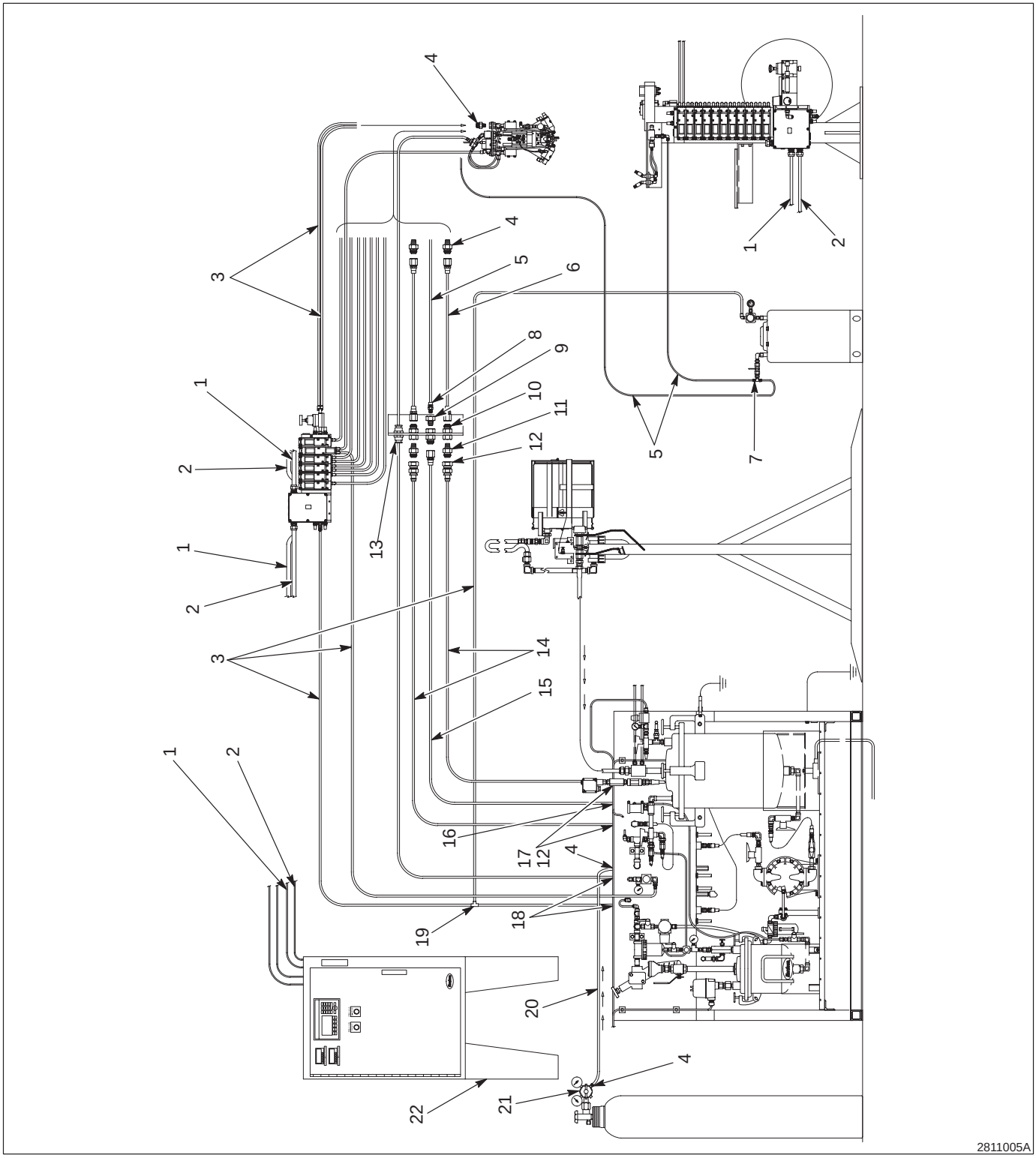


Fig. 5 Drip and Drag Dispensing System Parts

Appendix A

Robot Programming Guidelines

Appendix A
Robot Programming Guidelines

1. Introduction

Achieving a high quality, repeatable application of clear and black primer requires that attention be given to robot programming. Follow the guidelines in this section when programming various robot actions during the Drip and Drag primer dispensing sequence. The programming sequences include

- General Guidelines
- Typical Robot Program Structure

2. General Guidelines

Refer to the general guidelines below when programming the robot:

- To avoid insufficient coverage at the beginning of the clear and black primer path, where the felt is dry, it is necessary to program the path to overlap the first few inches, either by raising the tool after its first few points and repeating them; or, preferably, to overlap the first few points at the end of the path, when the felt is most saturated.
- Route hoses properly to avoid kinks as the tool follows the path.
- Program felt wick pickup points carefully to assure that the wick is centered in the gripper jaws, and that a slightly curled wick can still be gripped. A curl may be present in felt from a nearly empty spool due to the small radius of the spool hub.
- The compliance of the felt wick allows for some standoff tolerance. However, if programmed path points vary excessively, splashing can result.
- Refer to Tables A-1–A-4 for programming specifications.

Programming Specifications

Refer to Table A-1.

This table and the following section include the programming specifications for the Drip and Drag process values.

Table A-1 Programming Specifications

Programming Specification	Value
Clear Primer Path Speed	500–600 mm/sec (typical)
Black Primer Path Speed	400–500 mm/sec (typical)
Tool Stand-Off Distance	approx. 20-mm (approx. $^1/_2$-in. of felt wick length in contact with substrate) **NOTE**: The compliance of the felt wick allows for some standoff tolerance. However, if programmed path points vary excessively, splashing can result.
Tool Angle	5–10 degrees in direction of tool movement (See Figure A-1.)
Tool Orientation	Perpendicular to glass, square to direction of tool movement (See Figure A-2.)
Dispense Gun Target Area	The substrate area immediately in front of the felt (adjusted by moving the gun manifold up/down/tilt as required)

Applicator Tool Rake Angle

See Figure A-1.

This figure shows the proper rake angle of the applicator tool for both clear and black primer dispensing paths.

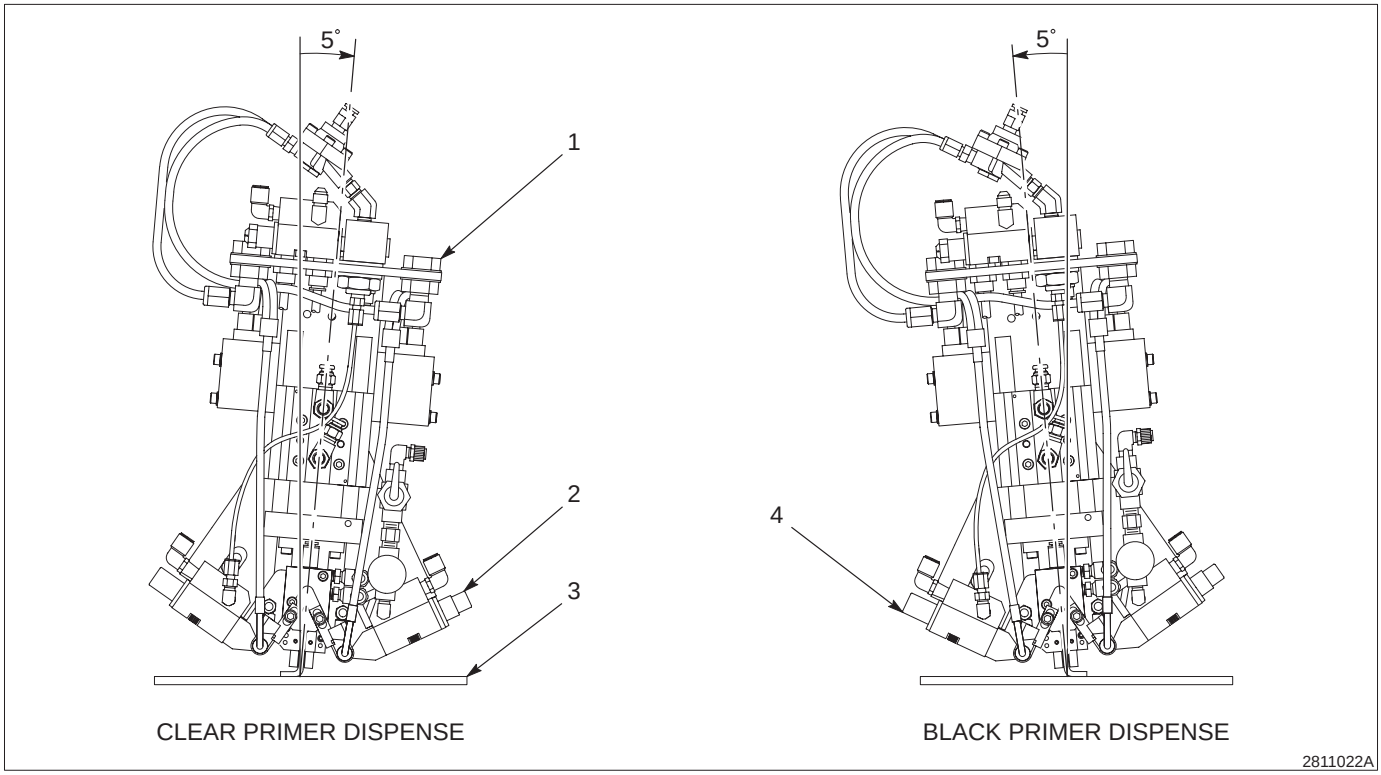


Fig. A-1 Applicator Tool Rake Angle

1. Applicator tool
2. Clear primer dispensing gun
3. Glass
4. Black primer dispensing gun

Applicator Tool Orientation to the Glass

See Figure A-2.

This figure shows incorrect and correct orientations of the applicator tool to the glass surface.

Refer to Table A-2.

This table explains why the different orientations are correct or not. The applicator tool must be perpendicular to the glass. Use a straight edge to check for perpendicularity. The back side of the tool should be facing towards the inboard side of the glass.

Table A-2 Robot and Applicator Tool Position Guide

Robot/Tool Position (See Figure A-2)	Correct or Incorrect?	Why
A	Incorrect	Position A is incorrect because the applicator tool is not perpendicular to the glass (angled too sharply outward), causing the felt to not make complete contact with the glass.
B	Incorrect	Position B is incorrect because the applicator tool is not perpendicular to the glass (angled too sharply inward), causing the felt to not make complete contact with the glass.
C	Not Recommended	Position C is correct because the applicator tool is perpendicular to the glass. However, this position is not recommended because the backside of the applicator tool is not facing the inboard side of the glass.
D	Correct	Position D is correct because the applicator tool is perpendicular to the glass and the backside of the tool is facing the inboard side of the glass. **NOTE:** You can use a straight edge to check perpendicularity to the glass.

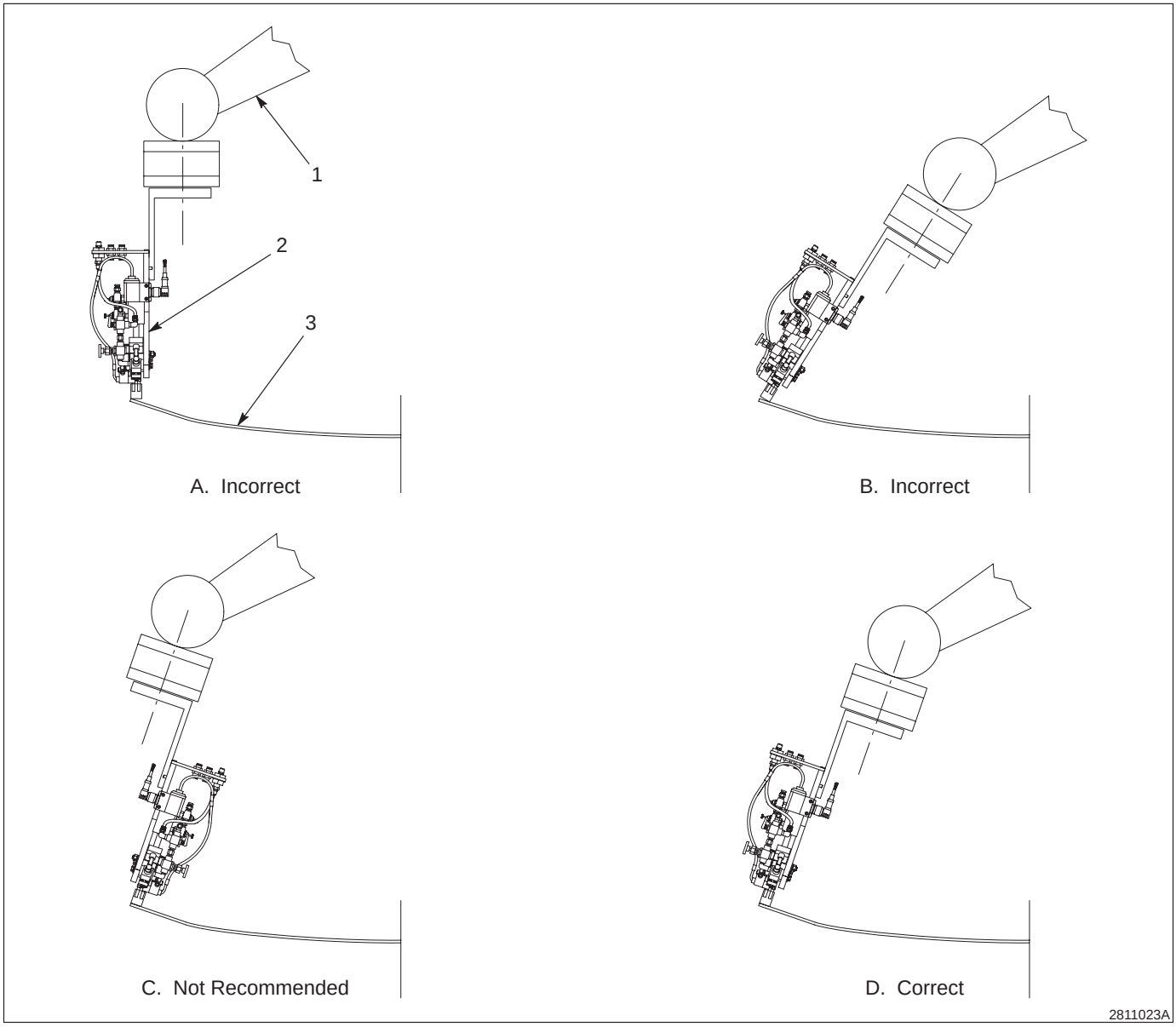


Fig. A-2 Applicator Tool Orientation to the Glass

1. Robot
2. Applicator tool (backside)
3. Glass

Felt Specifications

Refer to Table A-3.

This table provides the specifications for the felt used in the felt wick dispenser and with the applicator tool. Figures are typical and can vary depending upon application requirements.

Table A-3 Felt Specifications

Felt Specification	Specification
Length	1.75–2.25 -in.
Width	0.75-in.
Thickness	0.25–0.38-in.
Grade	F5 (based on SAE standard #J314) standard. Actual SAE specification may vary due to application.
Extra Components	Felt backup springs or pins may be specified due to the nature of the application

Miscellaneous Specifications

Refer to Table A-4.

This table provides miscellaneous specifications to take into consideration when programming the Drip and Drag primer dispensing system.

Table A-4 Miscellaneous Specifications

Miscellaneous Specification	Specification Value
Distance between applicator tool and pressure pots	7.6–15.2 m (25–50 ft), max. radius
Air pressure to pneumatic control valves	4.14–5.52 bar (60–80 psi)
Air pressure to drop count sensors	0.069–0.21 bar (1–3 psi)
Air pressure to felt wick dispenser	4.14–5.52 bar (60–80 psi)

3. Typical Robot Program Structure

The following section details the typical routines programmed into the robot for dispensing clear and black primer using the Drip and Drag process.

The typical robot programming routines include:

- Typical Sequence of Operation
- Go to Purge Bucket
- Go to Cleaning Program
- Go to Pick Up Felt Program
- Primer Program
- Purge Black Primer Program
- Move to a Maintenance Position

Typical Sequence of Operation

Following is a typical sequence of operation for the Drip and Drag robot program.

1. Reset all outputs.
2. Wait for next request.
3. Execute **Go to Purge Bucket** routine.
4. Execute **Go to Cleaning Program** routine.
5. Execute **Go to Pick Up Felt Program** routine.
6. Execute **Primer Program** routine.
7. Execute **Purge Black Primer Program** routine.

Go to Purge Bucket

Follow this suggested sequence of operations for the **Go to Purge Bucket** robot command:

1. Drop **Robot Ready** to cell.
2. Move robot to **Purge** position. **Purge** position will be a felt drop off point over a waste collection container.
3. Set **At Purge Position** output.
4. Wait until signal goes low.
5. Reset **At Purge Position** output.
6. Move robot to **Pounce** position.
7. Set **Robot Ready** to cell.
8. Return to **Main** program.

Go to Cleaning Program

Follow this suggested sequence of operations to program a nozzle cleaning routine:

1. Tell cell **In Cleaning Cycle**.
2. Move to **Purge** position.
3. Open gripper jaws to release the felt wick.
4. Pulse blow-off to eject a felt wick that may be stuck due to primer adhesion to the gripper jaws.
5. Wait 0.5 seconds.
6. Close gripper jaws.
7. Retract slide.
8. Move robot to nozzle brushing station.
9. Turn solvent brush on for 0.5 seconds to wet the nozzle brushes.
10. Move robot across brush five times to thoroughly clean the clear and black primer gun nozzle tips. The movement should have a slightly elliptical pattern to ensure thorough cleaning.
11. Move robot to **Pounce** position.
12. Extend slide.
13. Reset **In Cleaning Cycle**.
14. Return to **Main** program.

Go to Pick Up Felt Program

Keep the following guidelines in mind when programming the felt pick up routine:

- Use robot program logic to process SPOOL EMPTY signals and to avoid sending the robot to an empty felt shear position.
- Move the robot precisely into position to fill the jaws with the felt. Make sure that the felt wick is centered in the jaws.
- Program the robot to examine the primer controller output FELT PRESENT. If this signal is not active, the robot should move to the felt drop-off station and open jaws, blow-off, and return to the felt dispense module to try again. If a second attempt fails to pickup a felt wick, the program should send the robot to the other felt dispense module.

Follow this suggested sequence of operations for the **Go to Pick Up Felt Program** robot command:

1. Move to **Purge** position.
2. Open gripper.
3. Pulse blow-off.
4. If **Feeder A Active** is set:
   a. If **Felt A Empty**:
      1. Reset internal **Felt A Active**.
      2. Set internal **Felt B Active**.
      3. Go to step 5.
   b. Move to **Felt Wick Dispenser A**.
   c. Set **Cycle Felt Wick Dispenser A**. May be done during step 4b.
   d. Wait 1.0 second. May be done during step 4b.
   e. Reset **Cycle Felt Wick Dispenser A**. May be done during step 4b.
   f. Close gripper jaws, grasping the felt wick.
   g. Wait 0.2 seconds.
   h. Set **Shear Felt A**.
   i. Wait 0.5 seconds.
   j. Reset **Shear Felt A**.
   k. Move robot to **Check Felt** position (the felt-in gripper jaws fiber optic station). Program the robot to place the felt wick into the station, breaking the fiber optic beam.
   l. Wait 0.5 seconds.
   m. Pulse **Check Felt Signal**.
   n. Wait 1.0 second.
   o. If **Felt Present Fault**, go to step 5.
   p. Return to **Primer Program**.

Go to Pick Up Felt Program
(contd)

5. If Feeder B Active is set:

   a. If **Felt B Empty**:

   1. Reset internal **Felt B Active**.
   2. Set internal **Felt A Active**.
   3. Go to step 4.

   b. Move to **Felt Wick Dispenser B**.

   c. Set **Cycle Felt Wick Dispenser B**. May be done during step 5b.

   d. Wait 1.0 second. May be done during step 5b.

   e. Reset **Cycle Felt Wick Dispenser B**. May be done during step 5b.

   f. Close gripper jaws, grasping the felt wick.

   g. Wait 0.2 seconds.

   h. Set **Shear Felt B**.

   i. Wait 0.5 seconds.

   j. Reset **Shear Felt B**.

   k. Move robot to **Check Felt** position (the felt-in gripper jaws fiber optic station). Program the robot to place the felt wick into the station, breaking the fiber optic beam.

   l. Wait 0.5 seconds.

   m. Pulse **Check Felt Signal**.

   n. Wait 1.0 second.

   o. If **Felt Present Fault**, go to step 4.

   p. Return to **Primer Program**.

Primer Program

Follow these guidelines when programming the primer paths:

- Keep the tool perpendicular to the surface, as viewed from the plane of the path of movement.
- Keep a 5–10 degree tilt of the tool in the direction of movement.
- Keep the standoff as consistent as possible, with the dispense gun targeting the substrate immediately ahead of the felt wick contact point.
- The end of the path must overlap the start by at least several inches to assure coverage of the start zone.
- You can change stitch rates as needed to compensate for the increasing saturation of the felt as the path progresses.
- It is usually necessary to turn off the dispense gun output as the tool moves around sharp corners, to avoid heavy coverage as the tool slows down for the corner.
- Use a separate group of stitch rates for optimizing the ON/OFF times for the black primer path without affecting the clear primer path.

Follow this suggested sequence of operations for programming the clear and black primer paths:

1. Perform the steps in the **Go to Pick Up Felt Program** first.
2. Turn on **Part ID** (0–15).
3. Wait 0.1 second.
4. Turn on **Part Strobe**.
5. Wait 0.1 second.
6. Turn on **Stitch Rate** (1–8).
7. Wait 0.1 second.
8. When tool is in position at start of path, turn on clear primer gun.
9. Execute clear primer path program, changing stitch rates to turn gun off and on as needed.
10. Turn off clear primer gun.
11. Ready applicator for black primer.

Primer Program (contd)

12. Turn on **Stitch Rate** (1–8).
13. Turn on black primer gun.
14. Execute black path program, changing stitch rates to turn gun off and on as needed.
15. Turn black primer gun off.
16. Turn **Stitch Rate** off.
17. Turn **Part Strobe** off.
18. Wait 0.1 second.
19. Turn **Part ID** off.
20. Pulse **Cycle Complete**.
21. Return to the **Go to Cleaning Program**.

Purge Black Primer Program

The purge routine is recommended because the black primer gun manifold is downstream of the recirculating black primer pressure regulator. This routine helps to prevent the settling out of carbon black in the manifold and dispense gun as the tool sits idle over break times, weekends, etc.

NOTE: Use robot timing logic to determine if the black primer gun has been actuated in the past 15 minutes. Actuation of the black primer gun (manual or automatic) should reset the timer to zero.

If the time period is reached, the **Purge Black Primer Program** should be executed. Follow this suggested sequence of operations to program a periodic purge of the black primer dispensing gun:

NOTE: The robot should execute the **Go to Cleaning Program** prior to executing this routine.

1. Move to **Purge** position.
2. Turn on **Stitch Rate** (1–8), preferably a rate with a longer ON time (>250 milliseconds).
3. Wait 0.1 second.
4. Turn on black primer gun.
5. Wait 5.0 seconds.
6. Turn off black primer gun.
7. Wait 0.1 second.
8. Return to the **Go to Cleaning Program**.

Move to a Maintenance Position

Use the following procedure to program the robot to move to a maintenance position:

1. Choose a point in the workcell where there is ample room to work.
2. Move the applicator tool to this location.
3. Lock the applicator tool in this position until the program is manually restarted.
4. Make sure that you have made the necessary safety lockouts so that you can safely enter the work cell and service the applicator tool.

Appendix B

Equipment Calibration

Appendix B
Equipment Calibration

1. Introduction

Calibration of the black primer load cell display and clear primer level detector is performed during system staging at the factory. The following procedures are included for reference in the event of component replacement.

NOTE: Detailed information on the load cell display and level detector can be found in the manufacturer's manuals located in the overall system manual. For a detailed description of the parameters described in the calibration procedures, refer to the Red Lion Controls Model IMS instruction manual.

General Programming Guidelines

Perform the calibration procedure whenever you replace the load cell or level detector to assure accurate weight measurement and alarm signaling.

NOTE: You must remove and reinstall the jumper wire as explained in the following paragraph.

A jumper wire is located on the lower connector (TBA) of the display, from pins 3–5. This jumper disables access to the programming menus. You must remove the jumper to allow calibration. Be sure to reinstall the jumper when finished to limit access to programmed values.

Please take note of the following programming guidelines:

- Pressing the **[P]** button will cause the word `Pro` to flash on the display.
- Pressing the **[↑]** up arrow button will display the number `1`, the calibration menu.
- Pressing **[P]** at this time will enter the calibration menu.
- The **[P]** button will now serve to accept displayed values and to move you to the next parameter, while the **[↑]** up and **[↓]** down arrow buttons will allow values to be changed. The tables on the following pages contain the values to be used.

2. Black Primer Load Cell and Display

The black primer pail weight is monitored with a strain gage display (typically a Red Lion Model IMS Display) that monitors the signal from a load cell located below the ten-gallon black primer pressure pot. The display is calibrated to the load cell at the factory, with the display reading in pounds. Alternately, you can calibrate the display to read in gallons.

Calibrating the Black Primer Display

Follow this procedure to calibrate the black primer display in pounds [**Value (Lb)**] or gallons [**Value (Gal)**], depending on your material containers or system setup. This procedure can be used to calibrate for systems using a five-gallon pail with T-handle assembly or a ten-gallon pressure pot.

NOTE: In order to calibrate the display, you need an empty primer pail and a ready-to-load full pail on hand.

1. Select **Menu 1** to enter the values for calibrating the black primer display.

2. Enter the values from the following tables. Calibrate the display to read in pounds or gallons, as desired.

Parameter	Value (Lb)	Value (Gal)	Comment
decPNt	0	0.0	
round	1	0.1	
SCALE	YES	YES	
dSP 1	0	0.0	Display 0 lb or 0 gal
INP 1	*	*	Refer to key below (* or **)
dSP 2	50	5.0	Display 50 lb or 5 gal
INP 2	**	**	Place a ready-to-load full pail with handle assembly on load cell pedestal and close lid
SEGt	1	1	

* — This value is generated by the load cell with empty primer pail and handle or the empty ten-gallon pressure pot on the tray.

** — This value is generated by either of the following on the tray: the load cell with the full pail and handle assembly or the pressure pot with five gallons of material loaded.

3. Press the **[P]** button to display the word `END`, which indicates that the menu is complete and that values have been stored. After a few seconds the display will read the value of the weight currently on the scale.

Adjusting the Low and Empty Signal

Follow this procedure to adjust the low and empty signal in pounds [**Value (Lb)**] or gallons [**Value (Gal)**], depending upon your material containers or system setup.

1. Select **Menu 6** to enter the values at which low and empty signals are sent to the robot. The procedure for entering values is the same as that detailed in *General Programming Guidelines*.

2. Enter the values from the following tables. Calibrate the display to read in pounds or gallons, as desired.

Parameter	Value (Lb)	Value (Gal)	Comment
trAc	NO	NO	
dISP	YES	YES	
LatC-1	NO	NO	
ASN-1	INPUT	INPUT	
AL-1	16	2.0	Black primer low alarm
HYS-1	1	0.1	
Act-1	LO	LO	
LATC-2	NO	NO	
ASN-2	INPUT	INPUT	
AL-2	8	1.0	Black primer empty alarm
HYS-2	1	0.1	
Act-2	LO	LO	

3. Press the **[P]** button to display the word END, which indicates that the menu is complete and that values have been stored. After a few seconds the display will read the value of the weight currently on the scale.

Programming the Tare Function

Follow this procedure to program the tare function.

1. Select **Menu 4** to enter the values for the tare function. The procedure for entering values is the same as that detailed in *General Programming Guidelines*.

2. Enter the values from the following tables.

Parameter	Value (Lb)	Value (Gal)	Comment
FILter	0	0	
E1-CON	0	0	
E2-CON	0	0	

Programming Lockout Accessible Functions

Some of the functions of the black primer Red Lion display which are not necessary for day-to-day operations can be locked out. This procedure describes how they can be rendered inoperative. Program the lockout accessible functions as follows:

1. At the flashing `Pro` prompt, press the **[↑]** up arrow until the number 3 flashes. Press **[P]** button to enter **Menu 3**, the lockout functions.

2. Enter the following parameters:

Parameter	Value	Comment
dSP AL	YES	
Ent AL	NO	
dSPHYS	NO	
ENtHYS	NO	
rSt AL	NO	
dSPbUF	NO	
rStbUF	NO	
SELdSP	NO	
rSttOt	NO	
tArE	NO	

3. When the last parameter is entered, the flashing `Pro` prompt will be displayed. Pressing the **[P]** button again will cause the word `End` to be displayed briefly, indicating that the programmed values have been stored.

NOTE: Be sure to replace the lockout jumper on TBA terminals 3–5 when you are finished with all calibration procedures.

3. Clear Primer Level Detector (Current-Loop)

The clear primer level is monitored by a current-loop detector. Follow the procedures in this section for calibrating and adjusting the current-loop level detector. The clear primer level can be calibrated in gallons or quarts, as desired.

Prior to performing the calibration procedures,

- Open the pressure vessel and verify it is empty. Ensure all packing material is removed from the inside of the pressure pot. Close the vessel and secure all clamps.
- New clear primer need not be shaken immediately prior to loading.

Calibrating the Clear Primer Level Detector

Follow this procedure to calibrate the clear primer display in gallons [**Value (Gal)**] or quarts [**Value (Qt)**], depending upon your material containers or system setup.

1. Loosen the lid of the clear primer pot and lift the probe out of the primer.
2. Press the **[P]** button on the clear primer display panel briefly until the word `Pro` flashes. Press the **[↑]** up arrow once. The number `1` will then appear in the display. Press the **[P]** button to enter **Menu 1**.
3. Program each of the following parameters by stepping through the menu with the **[P]** button and changing values, when necessary, using the **[↑]** up and **[↓]** down arrow buttons.

Parameter	Value (Gal)	Value (Qt)	Comment
decPNt	0.0	0.0	
round	0.1	0.1	
SCALE	YES	YES	
dSP 1	0.0	0.0	

Calibrating the Clear Primer Level Detector *(contd)*

4. Verify that the probe is not touching any surface. Adjust the FINE ZERO potentiometer on the transmitter until the display reads 4.100 ± 0.050 mA (gallons) or 4.00 ± 0.050 mA (quarts).

NOTE: You may have to adjust the STEP ZERO potentiometer as well to achieve calibration.

Parameter	Value (Gal)	Value (Qt)	Comment
INP 1	*	*	* — Press **[P]** to accept the displayed value
dSP 2	2.0	8.0	

5. With 2 gallons or 8 quarts of primer in the pot, replace the lid and tighten the clamps. Adjust the SPAN pot of the transmitter until the display reads 20.00 mA.

NOTE: If the SPAN pot will not reach 20.00, set the STEP SPAN pot located on the transmitter circuit board to the next higher setting. Recheck the zero setting by lifting the probe from the pot and readjusting the zero pot as necessary.

Parameter	Value (Gal)	Value (Qt)	Comment
INPT 2	*	*	* — Press **[P]** to enter the displayed value.

6. After entering the last parameter from the above list, the flashing `Pro` prompt will be displayed. Press the **[P]** button again, the display will read `End`, indicating that programmed values have been accepted.

Clear Primer Low and Empty Setpoints

Program clear primer low and primer empty setpoints as follows, in gallons [**Value (Gal)**] or quarts [**Value (Qt)**], depending upon your material containers or system setup:

1. At the flashing `Pro` prompt, press **[↑]** up arrow button until 6 is displayed. Press **[P]** to enter **Menu 6**.

2. Program parameters using these values:

Parameter	Value (Gal)	Value (Qt)	Comment
trAc	NO	NO	
dlSP	YES	YES	
LAtC-1	NO	NO	
ASN-1	N/A	INPUT	N/A — Not applicable
AL-1	0.5	2.0	
HYS-1	0.1	0.1	
Act-1	LO	HI	
LAtC-2	NO	NO	
ASN-2	N/A	INPUT	N/A — Not applicable
AL-2	0.3	1.2	
HYS-2	0.1	0.1	
Act-2	LO	LO	

3. After entering the last parameter from the above list, the flashing `Pro` prompt will be displayed. Press **[P]** button again to accept programmed values.

Programming Lockout Accessible Functions

Some of the functions of the clear primer Red Lion display which are not necessary for day-to-day operations can be locked out. This procedure describes how they can be rendered inoperative. Program the lockout accessible functions as follows:

1. At the flashing `Pro` prompt, press the **[↑]** up arrow until the number 3 flashes. Press **[P]** button to enter **Menu 3**, the lockout functions.

2. Enter the following parameters in gallons [**Value (Gal)**] or quarts [**Value (Qt)**], depending upon your material containers or system setup.:

Parameter	Value (Gal)	Value (Qt)	Comment
dSP AL	YES	YES	
Ent AL	NO	NO	
dSPHYS	NO	N/A	N/A — Not applicable
sSPHYS	N/A	NO	N/A — Not applicable
ENtHYS	N/A	NO	N/A — Not applicable
rSt AL	NO	NO	

3. When the last parameter is entered, the flashing `Pro` prompt will be displayed. Pressing the **[P]** button again will cause the word `End` to be displayed briefly, indicating that the programmed values have been stored.

NOTE: Be sure to replace the lockout jumper on TBA terminals 3–5 when you are finished with all calibration procedures.

4. Verifying Calibration and Lockout

Once you have finished calibrating and locking out the displays, return power to the panel. Verify the following:

- Pressing the **[↑]** up and **[↓]** down arrow buttons has no effect on the displays.

- Pressing the **[P]** button allows viewing only of the values of alarms setpoints one and two.

5. Primer Drop Detectors

The following conditions should be present at the primer drop detectors:

- The fiber optic cable end must be fully seated in the sensor bracket.
- The sensor signal strength LEDs should be off when no primer stream is present.

Adjusting Sensor Gain

If one or more of the LEDs are on when no primer stream is present, the gain of the sensor is probably set too high. To reduce the gain of the sensor, remove the plastic window on the sensor and turn the adjustment screw labeled GAIN counterclockwise until all LEDs are out.

Adjusting Bracket Position

The position of the fiber optic cable bracket is adjustable in two planes. This allows the sensor to be accurately positioned to see the dispensed primer stream.

1. **Initial adjustment**: Visually adjust the sensor bracket to intersect the path of the primer stream.
2. **Final adjustment**: Once clear and black primer has been loaded into the system, actuating the dispense gun should cause the sensor LEDs to light.
   a. Adjust the bracket position, as needed, to maximize the number of LEDs lit by the primer stream.
   b. Lock the brackets at the position of maximum indication.
   c. Adjust the sensor GAIN pot to repeatedly light the maximum number of LEDs as the primer stream is dispensed.

6. Black Primer Filter Pressure Switch

The black primer filter pressure switch closes a set of contacts as fluid pressure at the outlet side of the filter drops below a set value, indicating that the filter element is plugged. The closure of the contacts sends a signal to the controller activating a fault indication on the **View Faults** screen.

The switch is factory-set to 1.38 bar (20 psi). To adjust the switch, loosen the locknut at the top of the pressure switch and turn the screw as needed. A scale on the front of the switch indicates the setpoint.

NOTE: Do not use conduit when wiring the switch. If you use a conduit when wiring the switch, you will incur additional NFPA requirements for explosion-proof enclosures.

Appendix C

Controller Interface

Appendix C
Controller Interface

1. Introduction

See Figure C-1.

This figure shows the Drip and Drag primer dispensing system controller. This section details the menu and screens accessible through the controller. The controller and its programs are subject to change without notice. The most current program and its screens is detailed here. If you have any questions about your program, contact your Nordson representative for assistance.

The Drip and Drag primer dispensing system controller includes a steel cabinet (2) with a hinged front door (3). On the system controller, the following components are customer accessible:

- Main power switch (1)
- Control panel (9) with LCD display (8), numeric keys, arrow keys, and function keys
- Reset (5) and Emergency Stop (4) push buttons
- Red Lion 6-digit displays for both black primer volume (6) and clear primer volume (7)

NOTE: Front panel configuration can change according to your specific system setup.

1. Introduction (contd)

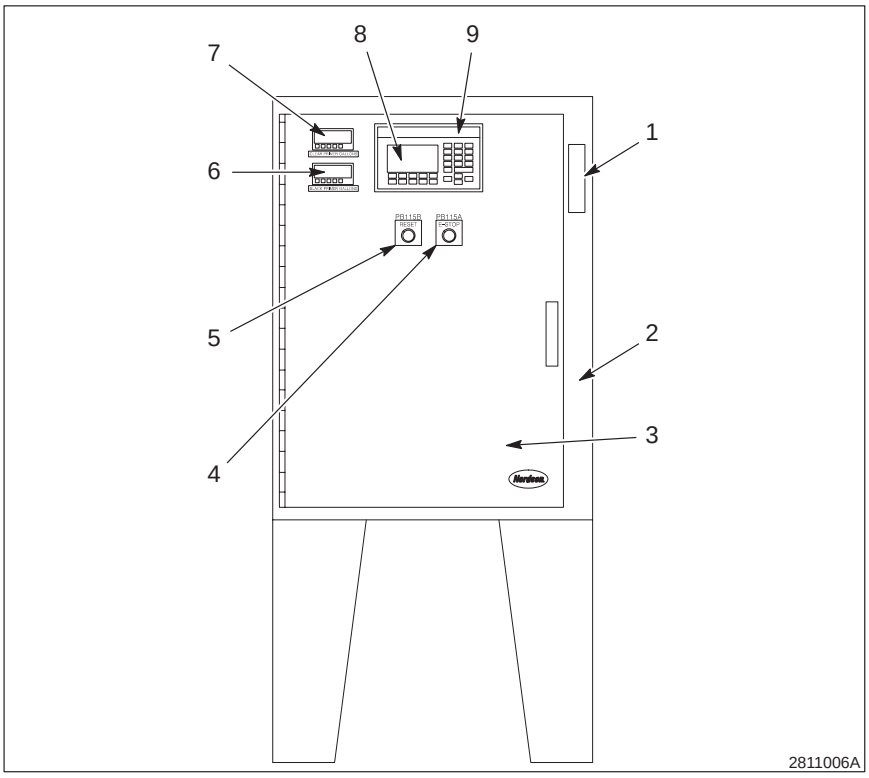


Fig. C-1 Drip and Drag Primer Dispensing System Controller

1. Main power switch
2. Controller cabinet
3. Front door
4. Emergency stop
5. Reset
6. Red Lion display (black primer volume)
7. Red Lion display (clear primer volume)
8. LCD display
9. Control panel

2. Controller Menus

See Figure C-2.

This figure shows the menu tree for the Drip and Drag primer dispensing system controller.

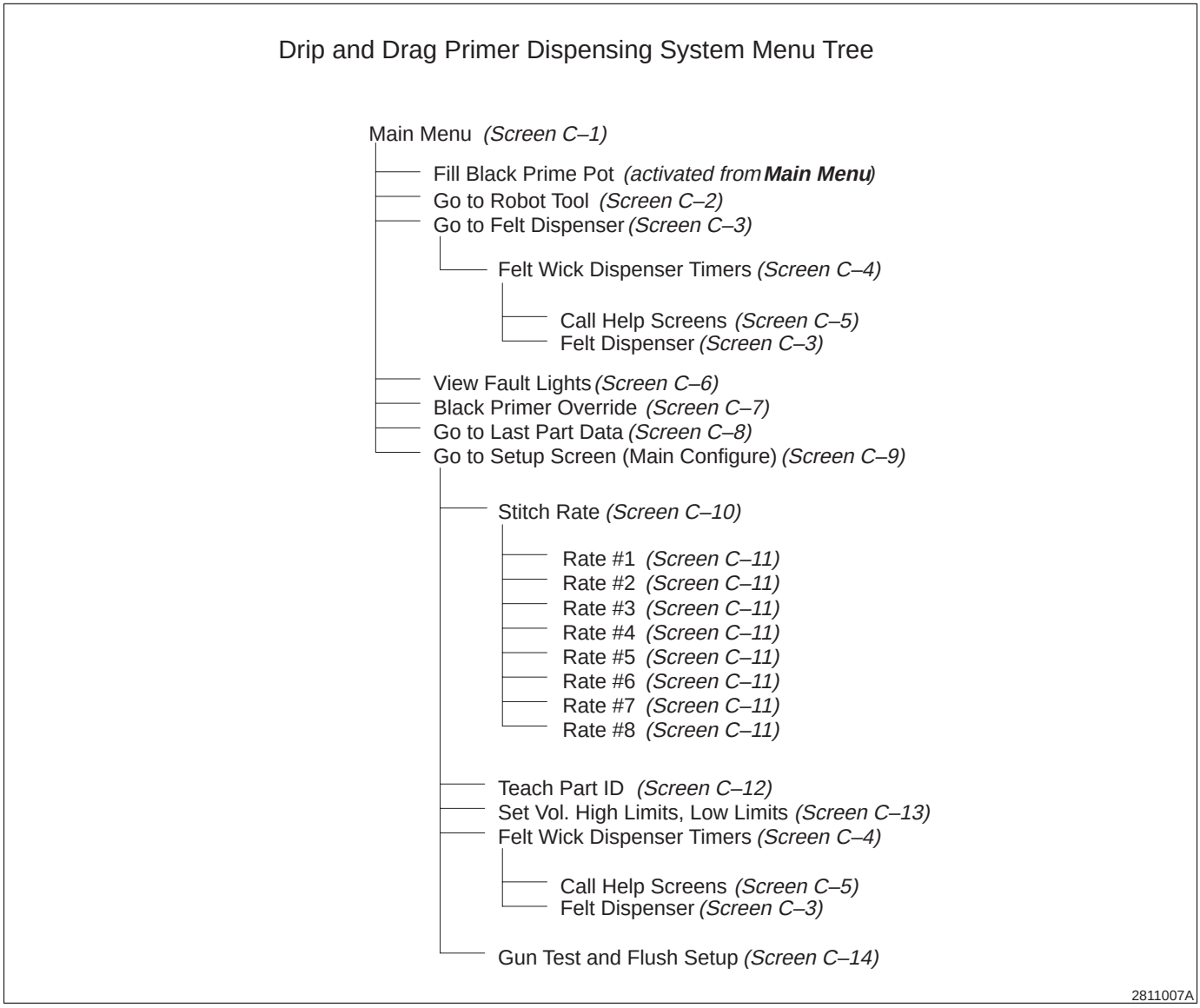


Fig. C-2 Drip and Drag Primer Dispensing System Controller Menu Tree

3. Controller Screens

This section details the various menu screens accessible through the **Main Menu** in the Drip and Drag dispensing system controller.

Main Menu

See Screen C-1.

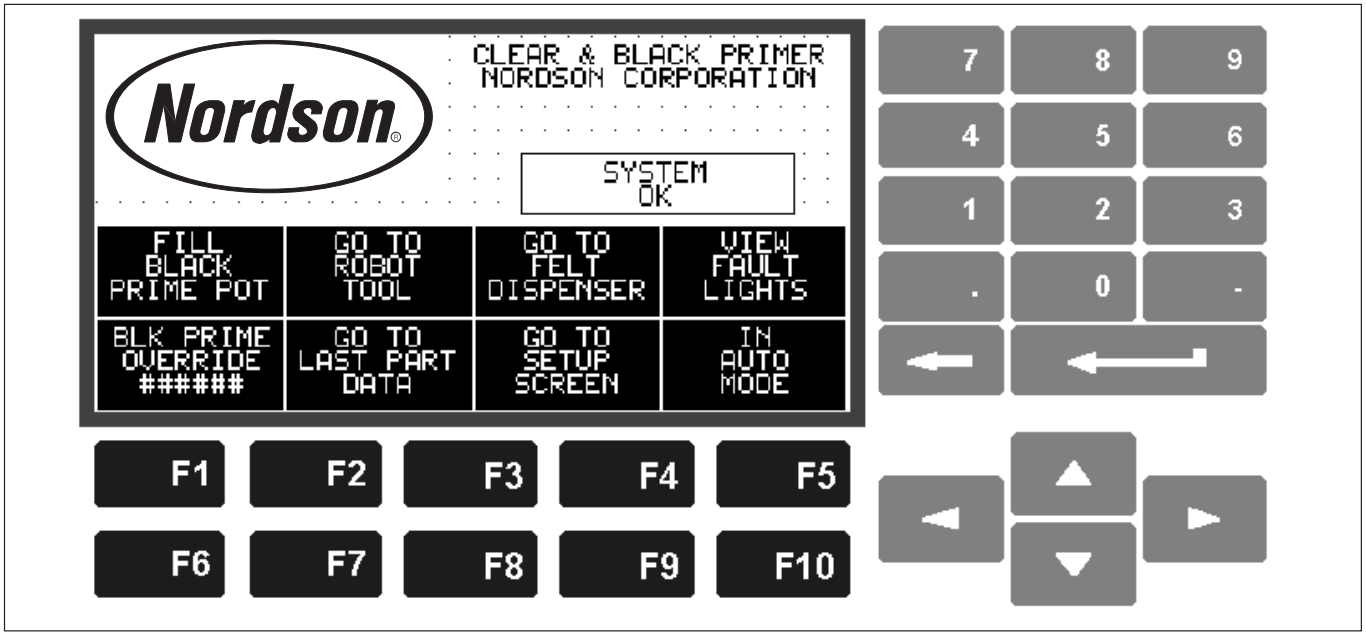
This screen shows the **Main Menu** screen. Use this screen to access all other screens and functions in the controller program. The SYSTEM OK indicator is present when no fault conditions exist in the system. If fault conditions exist, they are listed in order of highest priority.

Refer to Table C-1.

This table explains the results of pressing the various buttons on the **Main Menu** screen.

Table C-1 **Main Menu** Screen Functions

Press This Button . . .	To Do This . . .
FILL BLACK PRIME POT	Begin filling the black primer pressure pot (only works when black primer pressure pot is empty) If the FILL BLACK PRIME POT button is touched, the FILL BLACK PRIME POT routine will be activated for a predetermined time. To access the **Black Primer Fill** screen and setup information, touch the BLK PRIME OVERRIDE button.
GO TO ROBOT TOOL	Access the **Robot Applicator Tool** screen Make sure that the system is in MANUAL MODE before you press the GO TO ROBOT TOOL button at the **Main Menu**.
GO TO FELT DISPENSER	Access the **Felt Wick Dispense**r screen (and its subscreens) Make sure that the system is in MANUAL MODE before you press the GO TO FELT DISPENSER button at the main menu unless you wish to refill the felt in the AUTO MODE.
VIEW FAULT LIGHTS	Access the **Fault Lights** screen
BLK PRIME OVERRIDE ######	Enter password to access the **Black Primer Fill** screen
GO TO LAST PART DATA	Access **Last Cycle Data** screen
GO TO SETUP SCREEN	Access **Setup** screen (and its subscreens)
IN AUTO MODE	Switch from AUTO MODE to MANUAL MODE (this button indicates the present status of the controller) Pressing this button selects which mode the controller is in and the **Main Menu** reflects the current status. (You may see IN MANUAL MODE on this screen.)



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Screen C-1 Main Menu

Robot Applicator Tool

See Screen C-2.

This screen shows the **Robot Applicator Tool** screen. Use the screen when you need to manually trigger actions at the applicator tool.

NOTE: The system must be in MANUAL MODE before accessing the information on this screen. Make sure that the system is in MANUAL MODE before you press the GO TO ROBOT TOOL button at the **Main Menu**.

NOTE: You must return the system to the AUTO MODE when you are finished in this screen.

Refer to Table C-2.

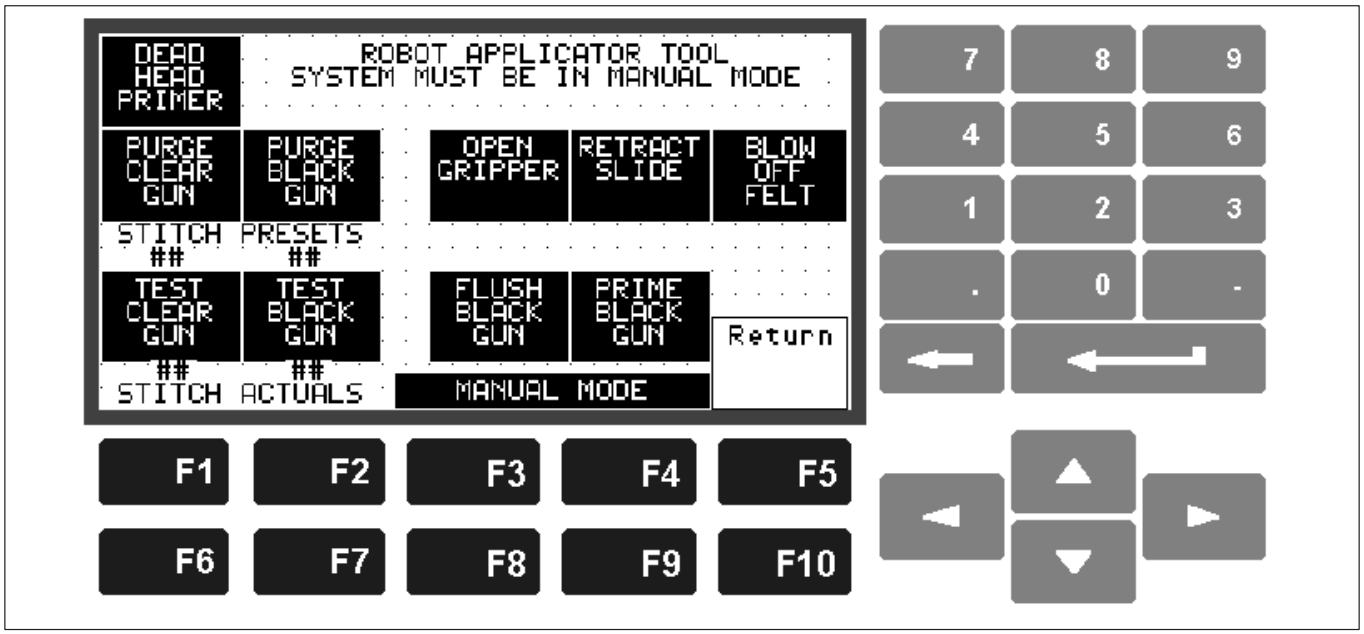
This table explains the results of pressing the various buttons on the **Robot Applicator Tool** screen. STITCH PRESETS displays the values that are set in the **Gun Test and Flush Setup** screen. STITCH ACTUALS displays the actual number of stitches from the test (vs. the set rate). MANUAL MODE is an indicator that communicates the present status of the system (in MANUAL MODE vs. AUTO MODE).

Table C-2 **Robot Applicator Tool** Screen Functions

Press This Button . . .	To Do This . . .
DEAD HEAD PRIMER	Close the material supply valve at the black primer pressure pot
PURGE CLEAR GUN	Purge the clear primer gun (mounted on the applicator tool)
PURGE BLACK GUN	Purge the black primer gun (mounted on the applicator tool)
OPEN GRIPPER	Open the felt gripper jaws on the applicator tool
RETRACT SLIDE	Retract the slide on the applicator tool
BLOW OFF FELT	Blow off the felt from the gripper jaws
TEST CLEAR GUN [A, B]	Test the clear primer gun
TEST BLACK GUN [A, B]	Test the black primer gun
FLUSH BLACK GUN [A]	Flush the black primer gun with MEK
PRIME BLACK GUN [A]	Prime the black primer gun by dispensing a small amount of black primer
RETURN	Return to the **Main Menu**

[A] Make sure that the applicator tool is in the **Service** or **Purge** position before performing these functions. Gun tests are not typically performed during production. They are done prior to the start of production or at the beginning of the shift.

[B] If the TEST CLEAR GUN or TEST BLACK GUN tests fail, the GUN TEST FAILED alarm will be activated. You need to run a good test (and fix the fault) to deactivate the alarm.



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Screen C-2 Robot Applicator Tool

Felt Wick Dispenser

See Screen C-3.

This screen shows the **Felt Wick Dispenser** screen. Use this screen to manually initiate various functions on the felt wick dispenser.

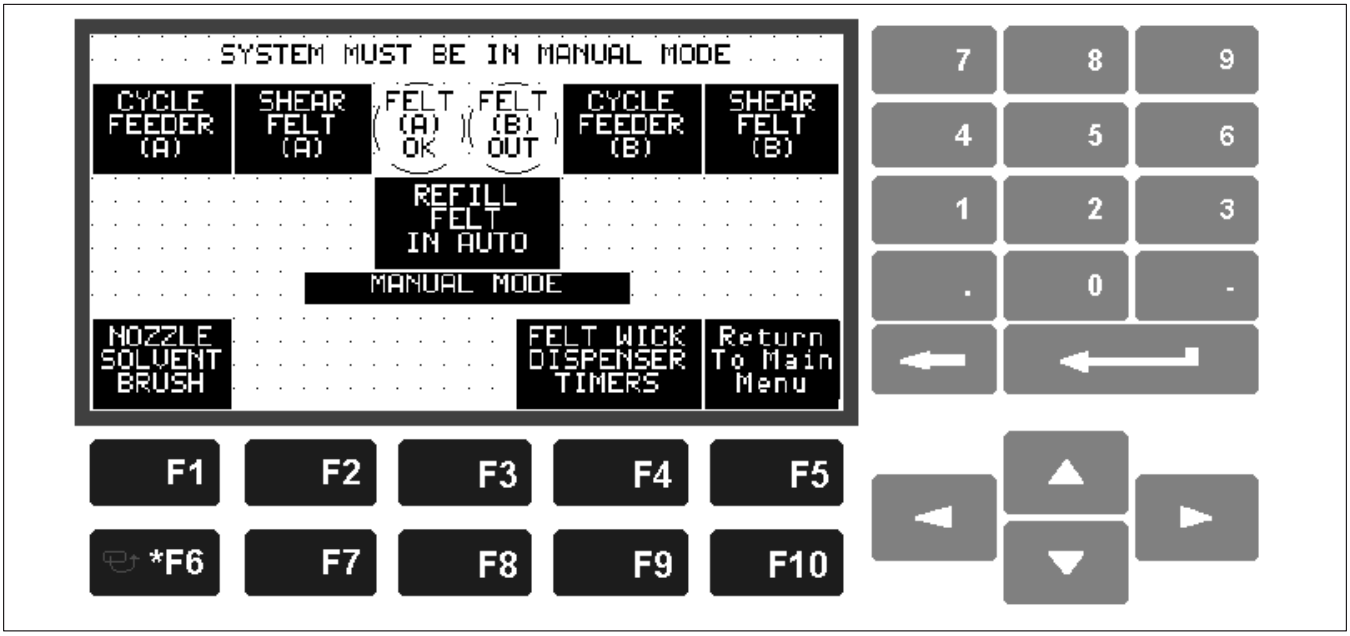
NOTE: The system must be in MANUAL MODE when accessing all of the information on this screen except for REFILL FELT IN AUTO. Make sure that the system is in MANUAL MODE before you press the GO TO FELT DISPENSER button at the **Main Menu**.

Refer to Table C-3.

This table explains the results of pressing the various buttons on the **Felt Wick Dispenser** screen. FELT (A) OK and FELT (B) OUT are indicators that communicate the felt supply status of both A and B dispensers. MANUAL MODE is an indicator that communicates the present status of the system (in MANUAL MODE vs. AUTO MODE).

Table C-3 **Felt Wick Dispenser** Screen Functions

Press This Button . . .	To Do This . . .
CYCLE FEEDER (A)	Dispense felt from Feeder A (to check felt length or for other reasons)
SHEAR FELT (A)	Shear the felt from Feeder A without running a complete robot program
CYCLE FEEDER (B)	Dispense felt from Feeder B (to check felt length or for other reasons)
SHEAR FELT (B)	Shear felt from Feeder B without running a complete robot program
REFILL FELT IN AUTO	Open the grippers on any and all empty felt reels while keeping the system in AUTO MODE
NOZZLE SOLVENT BRUSH	Pulse solvent at the solvent module (solvent brush system)
FELT WICK DISPENSER TIMERS	Go to the **Felt Wick Dispenser Timers** screen
RETURN TO MAIN MENU	Return to the **Main Menu**



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Screen C-3 Felt Wick Dispenser

Felt Wick Dispenser Timers

See Screen C-4.

This screen shows the **Felt Wick Dispenser Timers** screen. Use this screen to program the delays for the various functions of the felt wick dispenser. This screen displays the length of time the program pauses until the air solenoid actuates and the next function happens. These values are typically programmed when the system is set up for the first time and not changed.

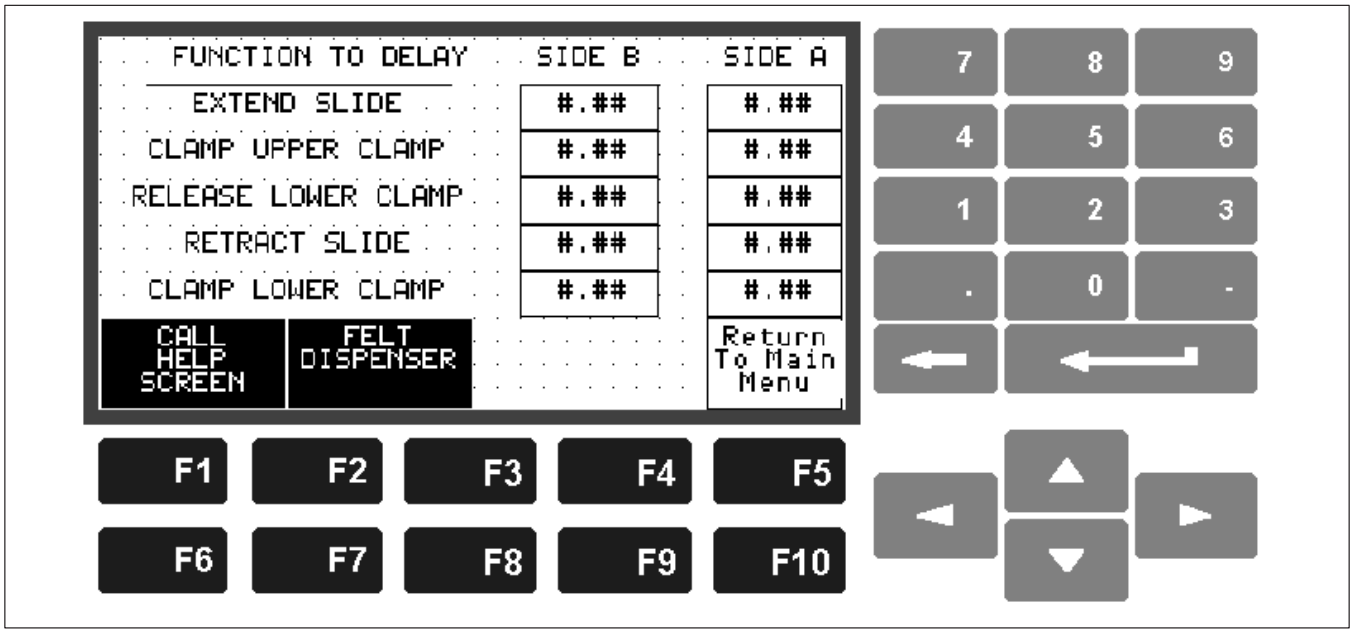
NOTE: Program felt wick dispenser functions to occur as delayed, or slow, as possible to protect components from unnecessary wear.

Refer to Table C-4.

This table explains the results of pressing the various buttons on the **Felt Wick Dispenser Timers** screen.

Table C-4 **Felt Wick Dispenser Timers** Screen Functions

Press This Button . . .	To Do This . . .
EXTEND SLIDE #.## (SIDE B or SIDE A, as needed)	Use the numbered keypad to program the length of the delay (in seconds) until the slide extends (suggested starting default value is 0.50 seconds)
CLAMP UPPER CLAMP #.## (SIDE B or SIDE A, as needed)	Use the numbered keypad to program the length of the delay (in seconds) until the upper clamp closes on the felt (suggested starting default value is 0.50 seconds)
RELEASE LOWER CLAMP #.## (SIDE B or SIDE A, as needed)	Use the numbered keypad to program the length of the delay (in seconds) until the lower clamp on the felt wick dispenser releases the felt (suggested starting default value is 0.50 seconds)
RETRACT SLIDE #.## (SIDE B or SIDE A, as needed)	Use the numbered keypad to program the length of the delay (in seconds) until the slide retracts (suggested starting default value is 0.50 seconds)
CLAMP LOWER CLAMP #.## (SIDE B or SIDE A, as needed)	Use the numbered keypad to program the length of the delay (in seconds) until the lower clamp closes on a new area of felt (suggested starting default value is 1.20 seconds)
CALL HELP SCREEN	Go to the **Felt Wick Dispenser Help** screen
FELT DISPENSER	Return to the **Felt Wick Dispenser** screen
RETURN TO MAIN MENU	Return to the **Main Menu**



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Screen C-4 Felt Wick Dispenser Timers

Felt Wick Dispenser Help

See Screen C-5.

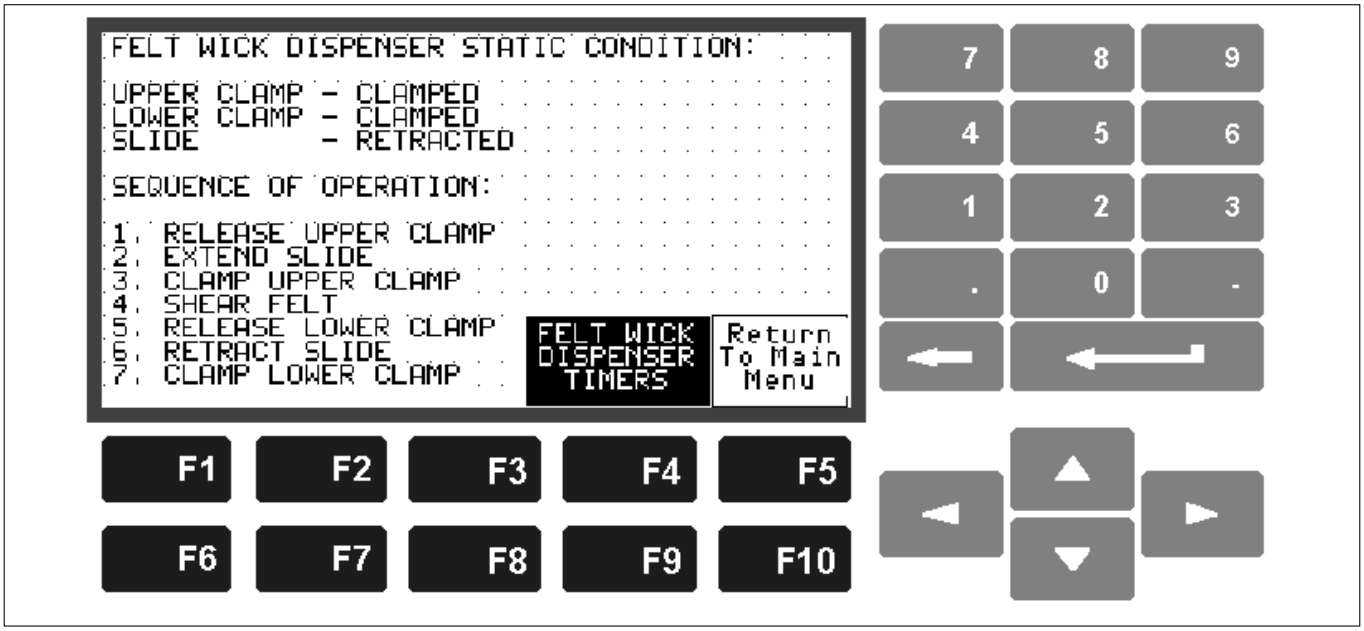
This screen shows the **Felt Wick Dispenser Help** screen. Use this screen for a reminder of the basic programming sequence and to determine the static position of the felt wick dispenser. The static position is the position the dispenser is in when it is receiving no input signals.

Refer to Table C–5.

This table explains the results of pressing the various buttons on the **Felt Wick Dispenser Help** screen.

Table C-5 **Felt Wick Dispenser Help** Screen Functions

Press This Button . . .	To Do This . . .
FELT WICK DISPENSER TIMERS	Return to the **Felt Wick Dispenser Timers** screen
RETURN TO MAIN MENU	Return to the **Main Menu**



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Screen C-5 Felt Wick Dispenser Help

Fault Lights

See Screen C-6.

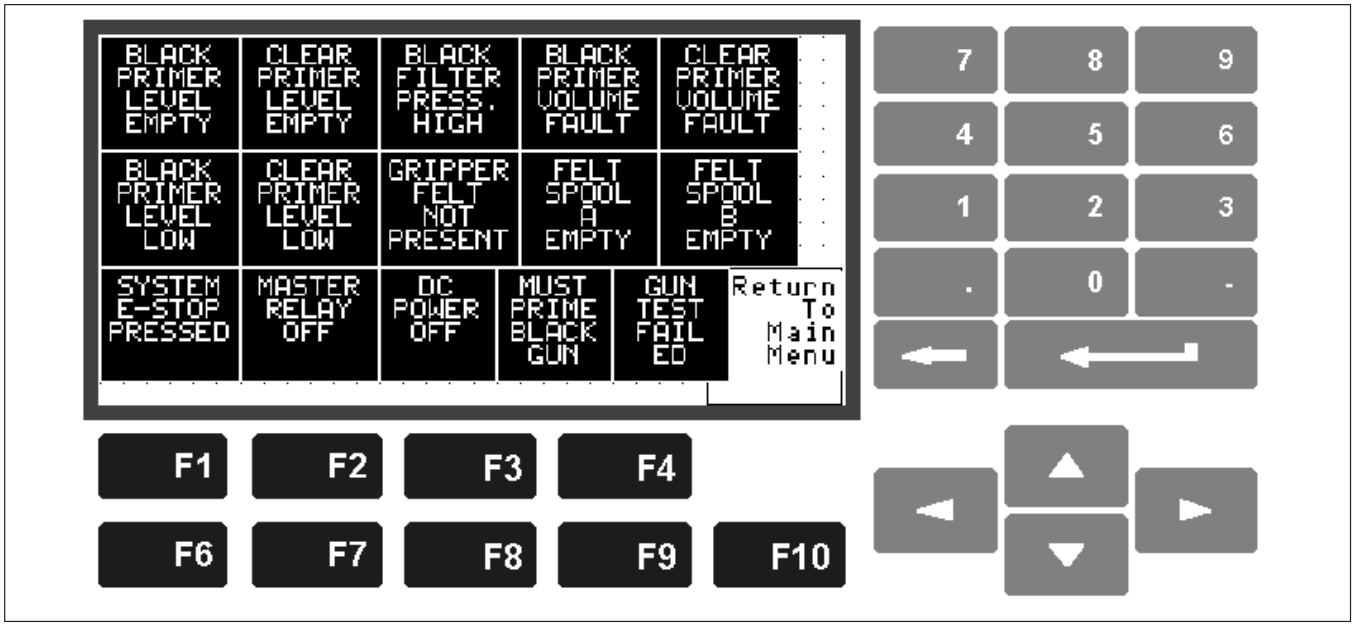
This screen shows the **Fault Lights** screen. Use this screen to determine fault conditions at the various components in the Drip and Drag primer dispensing system. The highest priority of these faults will be indicated on the **Main Menu** screen.

Refer to Table C-6.

This table explains how to correct the various faults indicated in the **Fault Lights** screen.

Table C-6 **Felt Wick Dispenser Help** Screen Functions

Fault	How to Correct
BLACK PRIMER LEVEL EMPTY	Add black primer.
CLEAR PRIMER LEVEL EMPTY	Add clear primer.
BLACK FILTER PRESS. HIGH	Clean or replace the black primer filters in the dual filter assembly.
BLACK PRIMER VOLUME FAULT	This fault remains until the next part is run and the part strobe detects a satisfactory part.
CLEAR PRIMER VOLUME FAULT	This fault remains until the next part is run and the part strobe detects a satisfactory part.
BLACK PRIMER LEVEL LOW	Add black primer.
CLEAR PRIMER LEVEL LOW	Add clear primer.
GRIPPER FELT NOT PRESENT	Verify that the felt spools have felt and check to make sure that the felt has not slipped from the gripper.
FELT SPOOL A EMPTY	Load a new spool of felt at spool A.
FELT SPOOL B EMPTY	Load a new spool of felt at spool B.
SYSTEM E-STOP PRESSED	Pull out the E-STOP button and press START.
MASTER RELAY OFF	Turn on the MASTER RELAY and verify that the E-STOP button is out. Press START.
DC POWER OFF	Turn on DC power.
MUST PRIME BLACK GUN	Perform the PRIME BLACK GUN procedures from the **Robot Applicator Tool** screen.
GUN TEST FAILED	Run another gun test. Monitor actual versus set readings and make any necessary adjustments.



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Screen C-6 Fault Lights

Black Primer Fill

See Screen C-7.

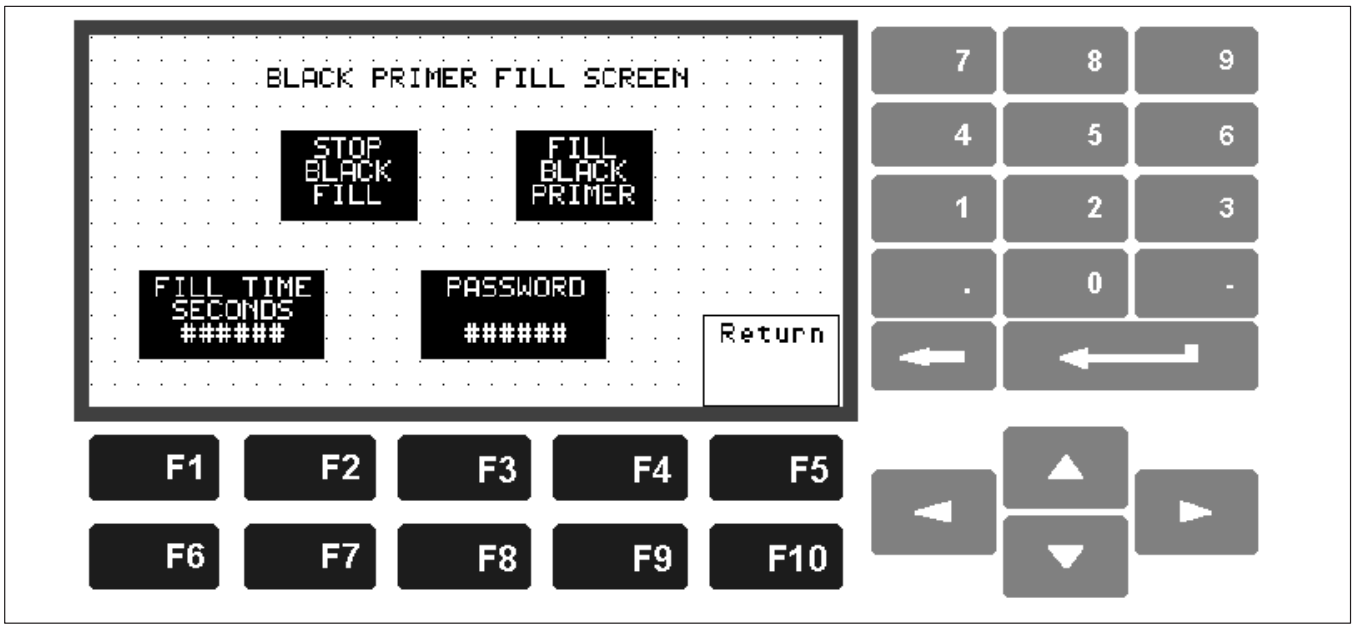
This screen shows the **Black Primer Fill** screen. Use this screen during black primer fill operations.

Refer to Table C-7.

This table explains the results of pressing the various buttons on the **Black Primer Fill** screen.

Table C-7 **Black Primer Fill** Screen Functions

Press This Button . . .	To Do This . . .
STOP BLACK FILL	Stop black primer filling operations before the timer has expired
FILL BLACK PRIMER	Activate black primer filling for the number of seconds the timer was programmed for; or to override and fill the black primer pressure pot even if it is not empty
FILL TIME SECONDS ######	Program the number of seconds (0–1200) desired for the black primer inlet valve to be open during black primer filling operations
PASSWORD ######	Change the password needed to access this screen from the **Main Menu** screen
RETURN	Return to the **Main Menu** screen



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Screen C-7 Black Primer Fill

Last Cycle Data

See Screen C-8.

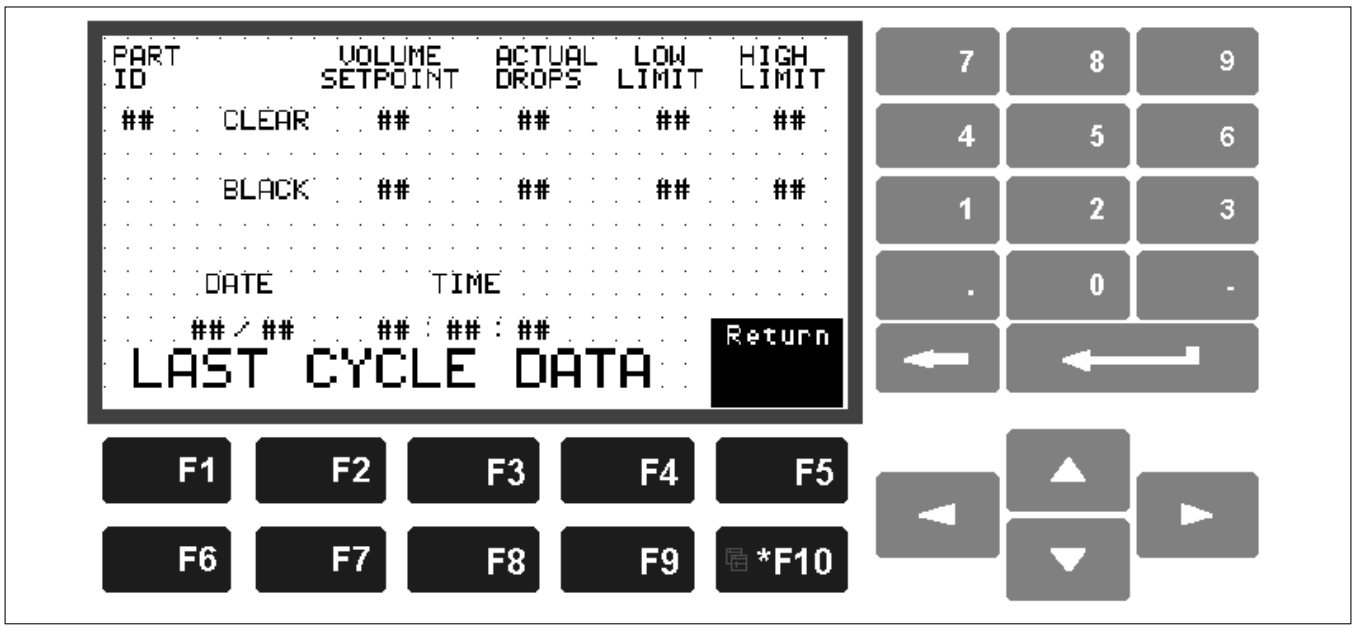
This screen shows the **Last Cycle Data** screen. Use this screen to access dispensing information about the last part run.

Refer to Table C-8.

This table explains the results of pressing the various buttons on the **Last Cycle Data** screen.

Table C-8 **Last Cycle Data** Screen Functions

Press This Button . . .	To Do This . . .
RETURN	Return to the **Main Menu** screen



2811015A

Screen C-8 Last Cycle Date

Setup

See Screen C-9.

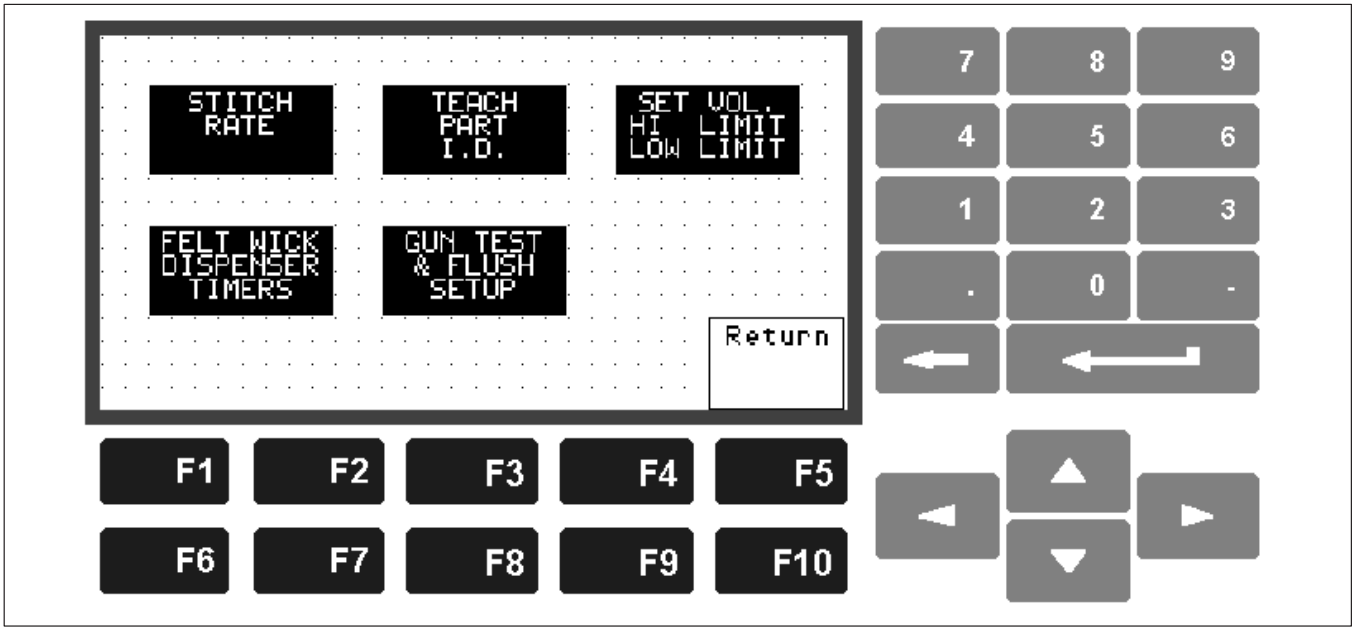
This screen shows the **Setup** screen. Use this screen to access any of the subscreens shown on the **Setup** screen.

Refer to Table C-9.

This table explains the results of pressing the various buttons on the **Setup** screen.

Table C-9 **Setup** Screen Functions

Press This Button . . .	To Do This . . .
STITCH RATE	Go to the **Set Stitch Rate** screen
TEACH PART I.D.	Go to the **Teach Setpoints** screen
SET VOL. HI LIMIT LOW LIMIT	Go to the **Set Limits** screen
FELT WICK DISPENSER TIMERS	Go to the **Felt Wick Dispenser Timers** screen
GUN TEST & FLUSH SETUP	Go to the **Gun Test and Flush Setup** screen
RETURN	Return to the **Main Menu** screen



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Screen C-9 Setup

Set Stitch Rate

See Screen C-10.

This screen shows the **Set Stitch Rate** screen. Use this screen to access the eight individual stitch rate screens in order to set stitch rates.

Using the control panel touch screen, assign on and off time values to stitch rates 1–8. You set 8 common stitch rates, then for each different Part ID, you pick which of the 8 common stitch rates you need to run the appropriate pattern. Assign several stitch rates for use in the clear primer path, and others for the black primer path.

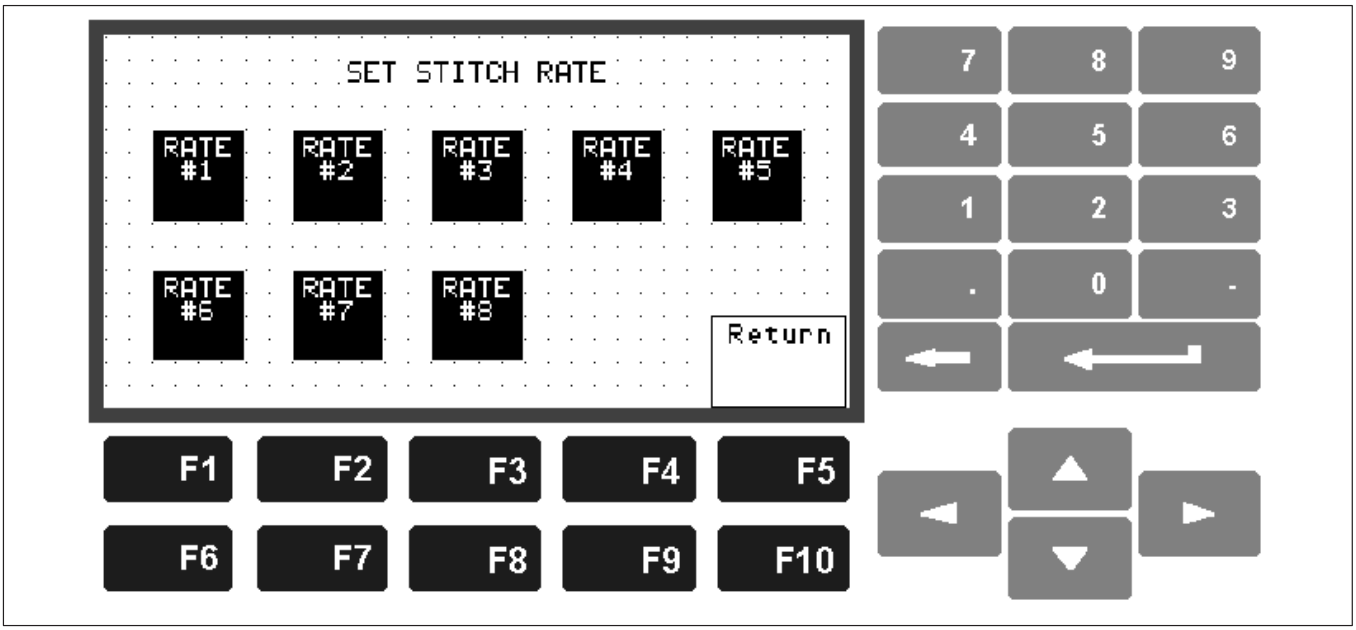
Stitch rate values can vary between the values of 0.05–2.00 seconds. These values will likely require fine-tuning as the dispensed paths are optimized. The following values are provided as a starting point:

Refer to Table C-10.

This table explains the results of pressing the various buttons on the **Set Stitch Rate** screen.

Table C-10 **Set Stitch Rate** Screen Functions

Press This Button . . .	To Do This . . .
RATE #1	Go to the **Stitch Rate #1** screen (suggested stitch rate for this is 200 mS ON and 150 mS OFF)
RATE #2	Go to the **Stitch Rate #2** screen (suggested stitch rate for this is 175 mS ON and 150 mS OFF)
RATE #3	Go to the **Stitch Rate #3** screen (suggested stitch rate for this is 150 mS ON and 150 mS OFF)
RATE #4	Go to the **Stitch Rate #4** screen (suggested stitch rate for this is 125 mS ON and 150 mS OFF)
RATE #5	Go to the **Stitch Rate #5** screen (suggested stitch rate for this is 200 mS ON and 200 mS OFF)
RATE #6	Go to the **Stitch Rate #6** screen (suggested stitch rate for this is 175 mS ON and 200 mS OFF)
RATE #7	Go to the **Stitch Rate #7** screen (suggested stitch rate for this is 150 mS ON and 200 mS OFF)
RATE #8	Go to the **Stitch Rate #8** screen (suggested stitch rate for this is 125 mS ON and 200 mS OFF)
RETURN	Return to the **Main Menu** screen



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Screen C-10 Set Stitch Rate

Stitch Rate #1

See Screen C-11.

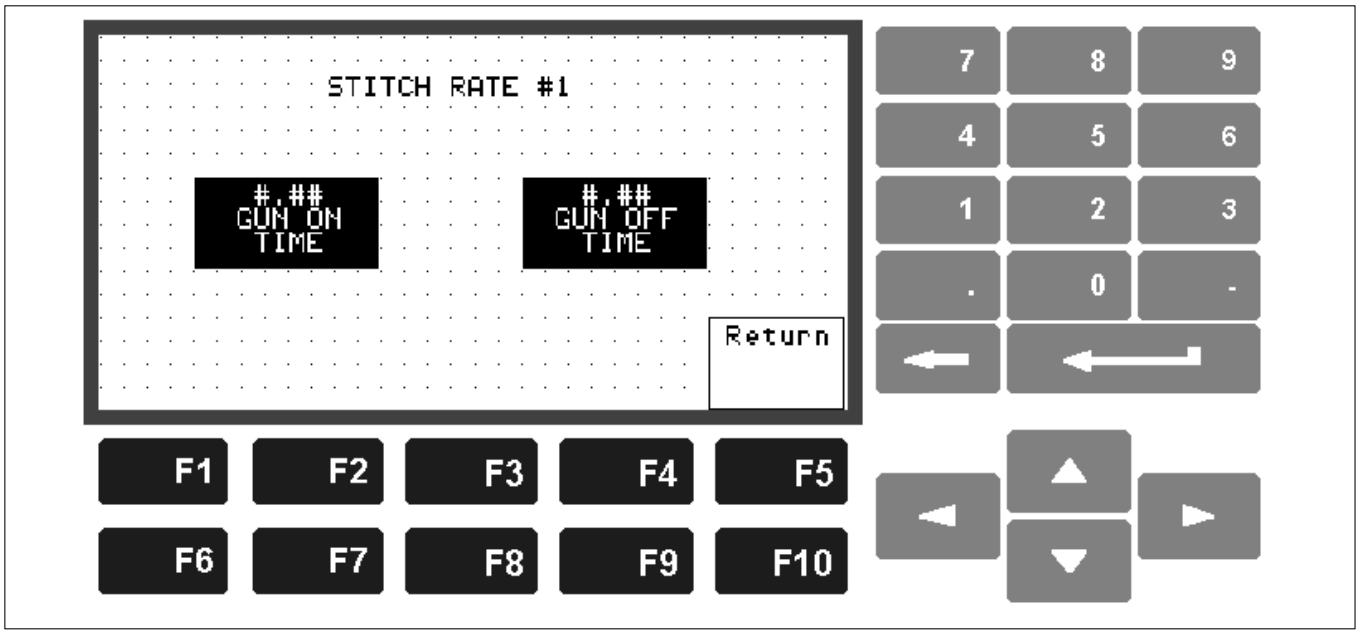
This screen shows the **Stitch Rate #1** screen. Use this screen to program the stitch rate you want to assign to #1. Stitch rates 1–8 are identical in screen appearance. This screen is representative of all the other screens.

Refer to Table C-11.

This table explains the results of pressing the various buttons on the **Stitch Rate #1** screen.

Table C-11 **Stitch Rate #1** Screen Functions

Press This Button . . .	To Do This . . .
#.## GUN ON TIME	Use the numbered keypad to program the length of time the primer gun will be on for this stitch rate
#.## GUN OFF TIME	Use the numbered keypad to program the length of time the primer gun will be off for this stitch rate
RETURN	Return to the **Set Stitch Rate** screen



2811018A

Screen C-11 Stitch Rate #1 (Typical)

Teach Setpoints

See Screen C-12.

This screen shows the **Teach Setpoints** screen. Use this screen while you are programming the Part ID into the robot program. To program Part ID, you pick a combination of the 8 common stitch rates and determine the stitch rates you are going to use for clear and black primer and teach the Part ID to the robot. Then the Drip and Drag controller counts the number of drops dispensed for that Part ID and then programmer determines the high and low acceptable parameters on the **Set Limits** screen.

DROP COUNTER SET POINT displays the current value set for the primer drop counter for both clear and black primer. ###### DROP COUNTER LAST PART displays the actual number of drops dispensed (for both clear and black primer) for the last part run. GUN OFF is an indicator that communicates the gun status. ## PART ID indicates the current Part ID signal being sent from the robot.

Teaching Setpoints Procedure

Follow this procedure to teach setpoints for a Part ID:

NOTE: The system must be in AUTO MODE when teaching setpoints. Make sure that the system is in AUTO MODE before you press the GO TO FELT DISPENSER button at the **Main Menu**.

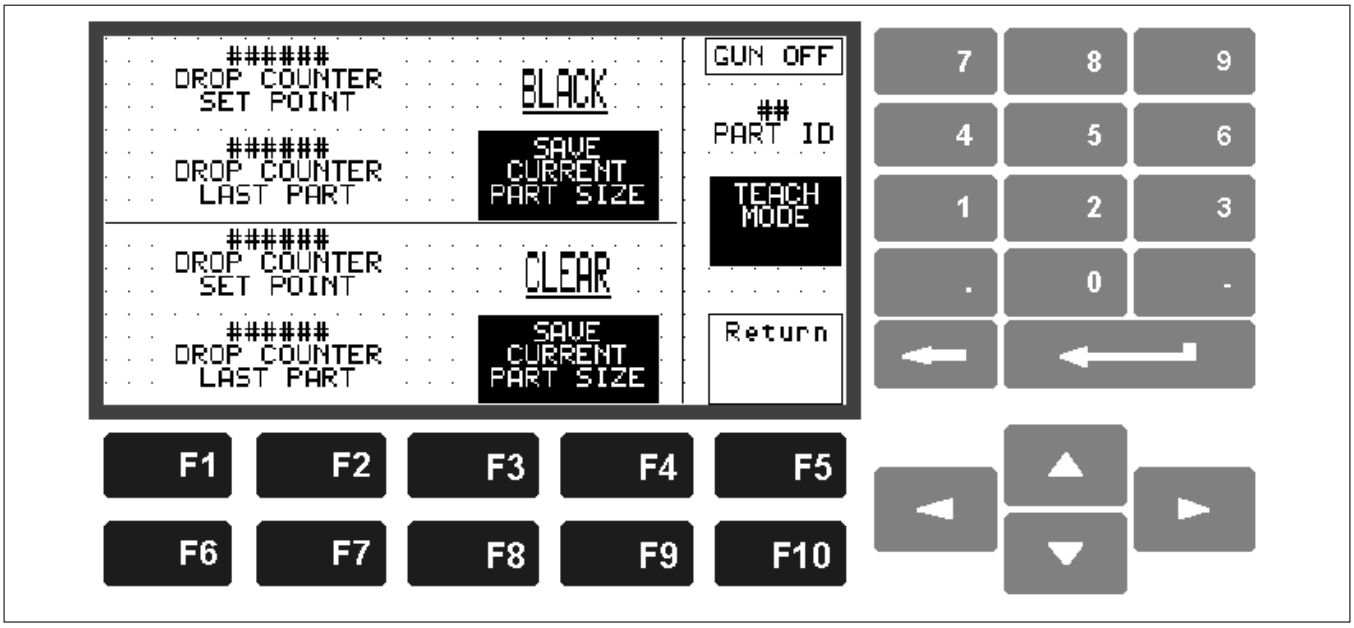
1. Select **Go to Setup** screen.
2. Press the AUTO MODE button to switch to the TEACH MODE.
3. Run the DISPENSE routine for the black and clear primer guns.
4. After completion of the DISPENSE routine, press the SAVE CURRENT PART SIZE button to save the dispense date for the clear and black primer guns.

Refer to Table C-12.

This table explains the results of pressing the various buttons on the **Teach Setpoints** screen.

Table C-12 **Teach Setpoints** Screen Functions

Press This Button . . .	To Do This . . .
SAVE CURRENT PART SIZE	Save the DROP COUNTER LAST PART value as the new DROP COUNTER SET POINT
TEACH MODE	Switch between TEACH and AUTO MODE
RETURN	Return to the **Main Menu**



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Screen C-12 Teach Setpoints

Set Limits

See Screen C-13.

This screen shows the **Set Limits** screen. Use this screen setting the high and low limits to determine the acceptable drop dispensing parameters. ###### CURRENT SET POINT displays the values currently set for drop dispensing.

Example of a Limit

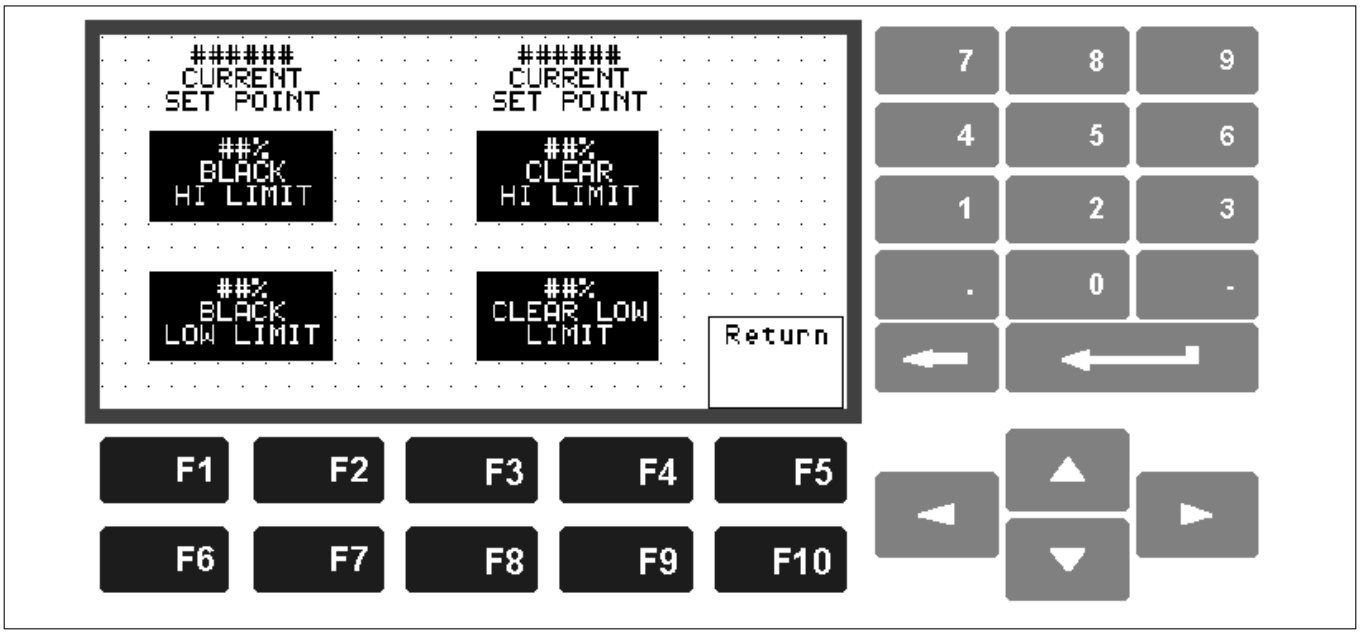
If the BLACK VOLUME SET POINT is 20 and the user chooses a BLACK HI LIMIT of 30%, the BLACK HI LIMIT will be 26 (which is 30% higher than the set point).

Refer to Table C-13.

This table explains the results of pressing the various buttons on the **Set Limits** screen.

Table C-13 **Set Limits** Screen Functions

Press This Button . . .	To Do This . . .
##% BLACK HI LIMIT	Use the numeric keypad to change the high limit percentage for black primer
##% CLEAR HI LIMIT	Use the numeric keypad to change the high limit percentage for clear primer
##% BLACK LOW LIMIT	Use the numeric keypad to change the low limit percentage for black primer
##% CLEAR LOW LIMIT	Use the numeric keypad to change the low limit percentage for clear primer
RETURN	Return to the **Main Menu**



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Screen C-13 Set Limits

Gun Test and Flush Setup

See Screen C-14.

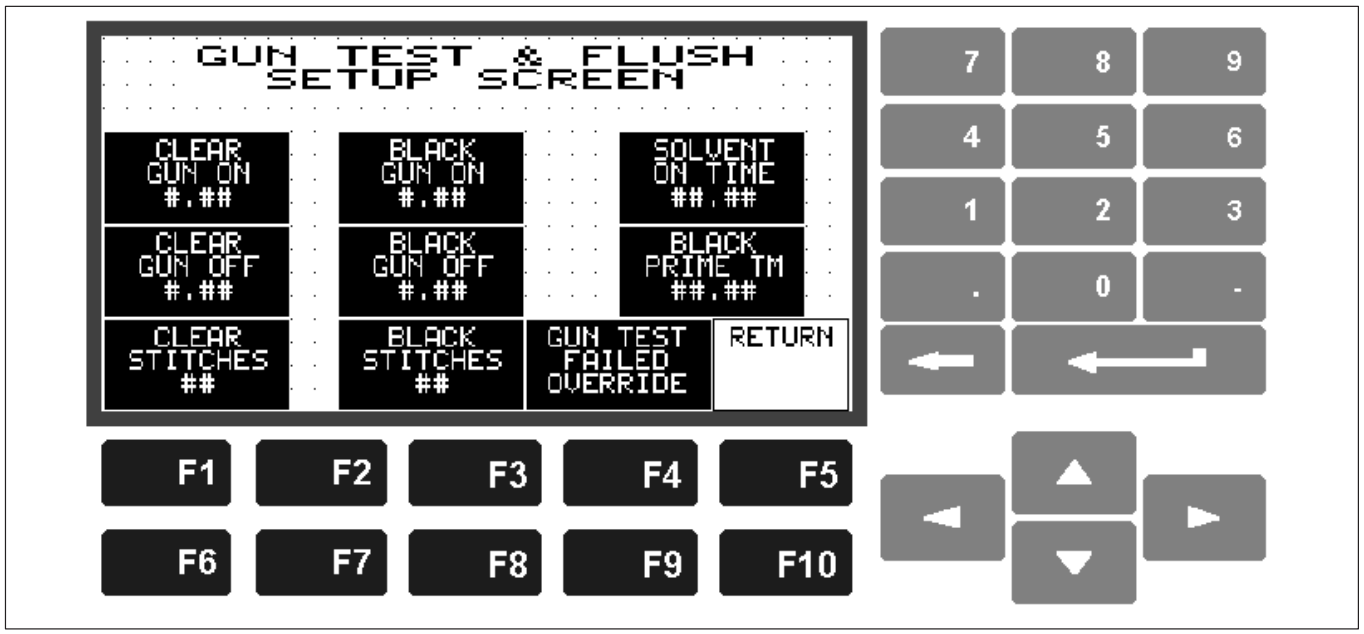
This screen shows the **Gun Test and Flush Setup** screen. Use this screen to program the values shown in the **Robot Applicator Tool** screen.

Refer to Table C-14.

This table explains the results of pressing the various buttons on the **Gun Test and Flush Setup** screen.

Table C-14 **Gun Test and Flush Setup** Screen Functions

Press This Button . . .	To Do This . . .
CLEAR GUN ON #.##	Program the length of time (in seconds) that the clear primer gun will be on during the test
BLACK GUN ON #.##	Program the length of time (in seconds) that the black primer gun will be on during the test
SOLVENT ON TIME ##.##	Program the length of time (in seconds) that the solvent module will be on in order to flush the black primer gun
CLEAR GUN OFF #.##	Program the length of time (in seconds) that the clear primer gun will be off during the test
BLACK GUN OFF #.##	Program the length of time (in seconds) that the black primer gun will be off during the test
BLACK PRIME TM ##.##	Program the length of time (in seconds) that the black primer gun will be on in order to prime itself
CLEAR STITCHES ##	Set the number of stitches the clear primer gun should dispense during the testing interval
BLACK STITCHES ##	Set the number of stitches the black primer gun should dispense during the testing interval
GUN TEST FAILED OVERRIDE	Continue dispensing despite the gun test having failed (stitch rates did not stay within the parameters) In this state, the fault is still present; you are simply overriding the fault. To clear the fault, you have to correct dispensing conditions and run a good test.
RETURN	Return to the **Main Menu**



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Screen C-14 Gun Test and Flush Setup