Flow-Through-Felt Primer Dispensing System

Customer Product Manual
Part 1009200A
Issued 2/02

NORDSON CORPORATION • AMHERST, OHIO • USA

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address: http://www.nordson.com.

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Notice

Trademarks

Table of Contents

Controller Interface

Flow-Through-Felt Primer Dispensing System

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. 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 when 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.

Description

See Figure 1.

The Nordson Flow-Through-Felt primer dispensing system dispenses clear and black primer onto automotive glass prior to the urethane bonding of automotive glass to vehicle bodies. The primers serve to promote adhesion of the urethane to the glass and provide UV ray protection for the windshield seal. Using customer-supplied robotics, it is designed to meet the special production requirements for automotive glass retention.

NOTE: Throughout this manual the Flow-Through-Felt primer dispensing system is referred to as the dispensing system.

The dispensing system uses the flow-through-felt method of material application. Clear primer is applied first to clean the substrate. On the return pass, black primer is dispensed. The felt evenly spreads the primers onto the substrate.

The following paragraphs provide a description of the major components.

System Components

The dispensing system consists of three major components in addition to the customer-supplied robot:

- Controller (6)
- Primer pumping stand (3)
- Applicator tool (7)

A solvent pot (4) is used along with the applicator tool. A pour stand (1) is used with the primer delivery system.

Main Control Panel

See Figure 1.

The PLC-based controller interfaces the dispensing 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 has a touchscreen that can be used to manually operate 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. Refer to Appendix C, *Controller Interface*, for programming information.

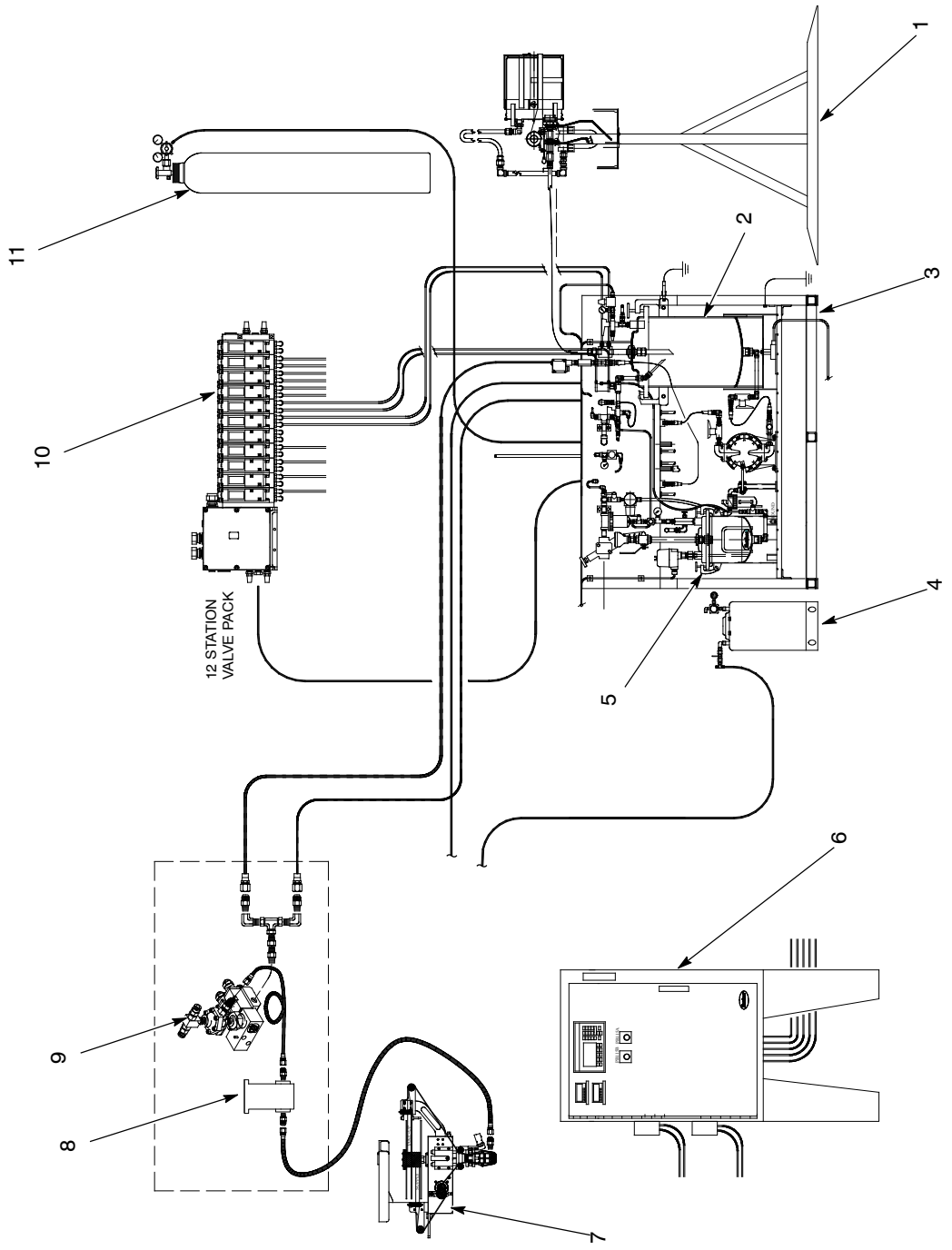

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Figure 1 Typical System

1. Pour stand
2. 10-gallon black primer pot
3. Primer pumping stand
4. 5-gallon solvent pot
5. 2-gallon clear primer pot
6. Controller
7. Applicator tool
8. Electromagnetic flowmeter
9. Recirculating manifold
10. Twelve-station valve pack
11. Bottled Nitrogen (Blanket gas)

System Terminology

Refer to Table 1.

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

Table 1 Definitions

Term	Definition
Air Slide Pressure	The amount of downward force applied to the top side of the air slide.
Flow-Through-Felt	A primer application process; primer flows through the back side of felt tape.
Flow Rate	The rate that primer is delivered to the dispense gun; usually expressed in cc/minute; typically refers to black primer and is measured using an electromagnetic flowmeter.
Dispense Pressure	The pressure in the line between the black primer circulation loop and the dispense point; controlled by a remote regulator.
Part ID	A 4-bit binary code that allows multiple paths and/or parts being coated to have their own drop count setpoint. **NOTE:** The number of drops dispensed is typically different for clear and black primer paths of the same part. Part IDs must correspond to the clear and black primer paths of the part being taught.
Part strobes	Provide inputs to the primer controller; send signals to the primer controller to begin counting dispensed drops of clear or black primer.
Setpoint	The high and low limits determined for best primer coverage. For example, if the clear primer setpoint is 20 drops in a certain interval, then the program must dispense primer within the set high and low limits without generating a dispense fault.
Stitching	The varying interval of dispense gun on/off time that is based upon stitch rates and Part ID; dispensing primer in a pattern similar to stitches in fabric.
Stitch rate	The length of time a gun is 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 flow-through-felt dispense operations. Stitch duration (gun ON time) should be $\geq$ 100 milliseconds.
Workpiece	Typically, a piece of automotive glass that requires primer using the flow-through-felt process.

Flow-Through-Felt Applicator Tool

See Figure 2 and refer to Table 2 . The applicator tool applies clear and black primer to a workpiece through the use of felt and two dispense guns. Refer to the *Flow-Through-Felt Applicator Tool* manual for detailed information.

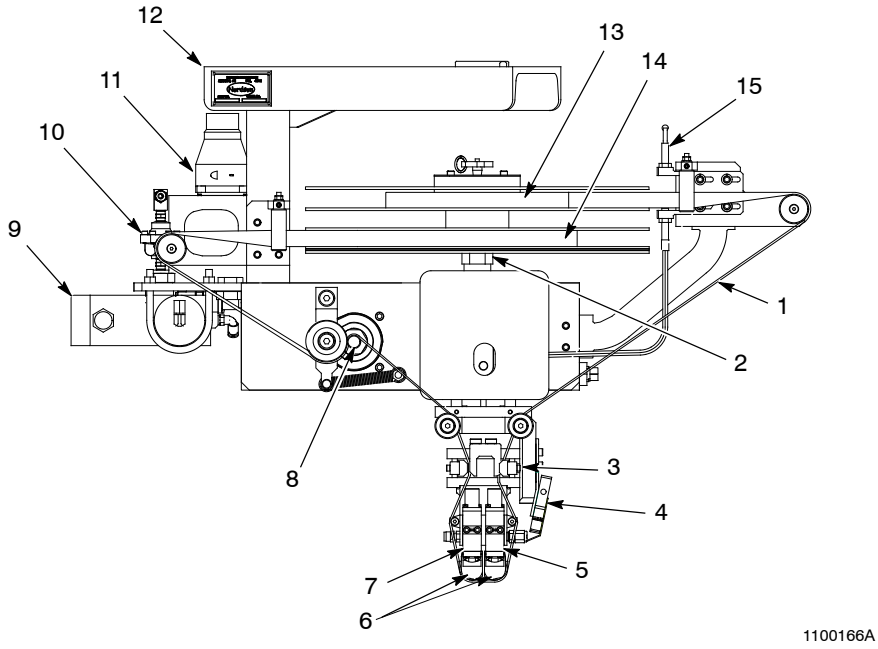

Figure 2 Typical Applicator Tool

Table 2 Flow-Through-Felt Applicator Tool Components

Item	Description
1	Felt—Applies primer to a workpiece
2	Take-up actuator—Pulls felt from the supply reel to the take-up reel
3	Gripper mechanism—Stabilizes the felt during the dispense process
4	Color sensor—Determines if black primer is deposited on the felt
5	Black primer dispense gun—Dispenses black primer
6	Rub blocks—Applies primer from the dispense guns onto the felt
7	Clear primer dispense gun—Dispenses clear primer
8	Payout actuator—Controls the amount of felt movement
9	Electromagnetic flowmeter—Records black primer flow from the black primer pressure regulator to the black primer dispense gun.
10	Black primer regulator—Controls black primer flow to the black primer dispense gun
11	Pneumatic connector—Connection for applicator tool pneumatic lines
12	Frame—Supports the applicator tool; mounts to a robot retention plate
13	Take-up felt reel—Retains used felt
14	Supply felt reel—Holds new felt
15	Low-felt sensor—Activates an alarm when the supply felt is low

Primer Delivery System

This section describes the basic operation of a primer delivery system.

NOTE: Several primer delivery systems are available and work on the same principle. Refer to the *Primer Delivery System* manual and the instruction sheets supplied with your system for specific information.

See Figure 3.

The system illustrated consists of the following:

- Pumping stand frame (1)
- 2-gallon clear primer pressure pot (2)
- Diaphragm pump (3) to circulate black primer
- 10-gallon black primer pressure pot (4)
- Pour stand (5) to fill the black primer pressure pot with black primer.

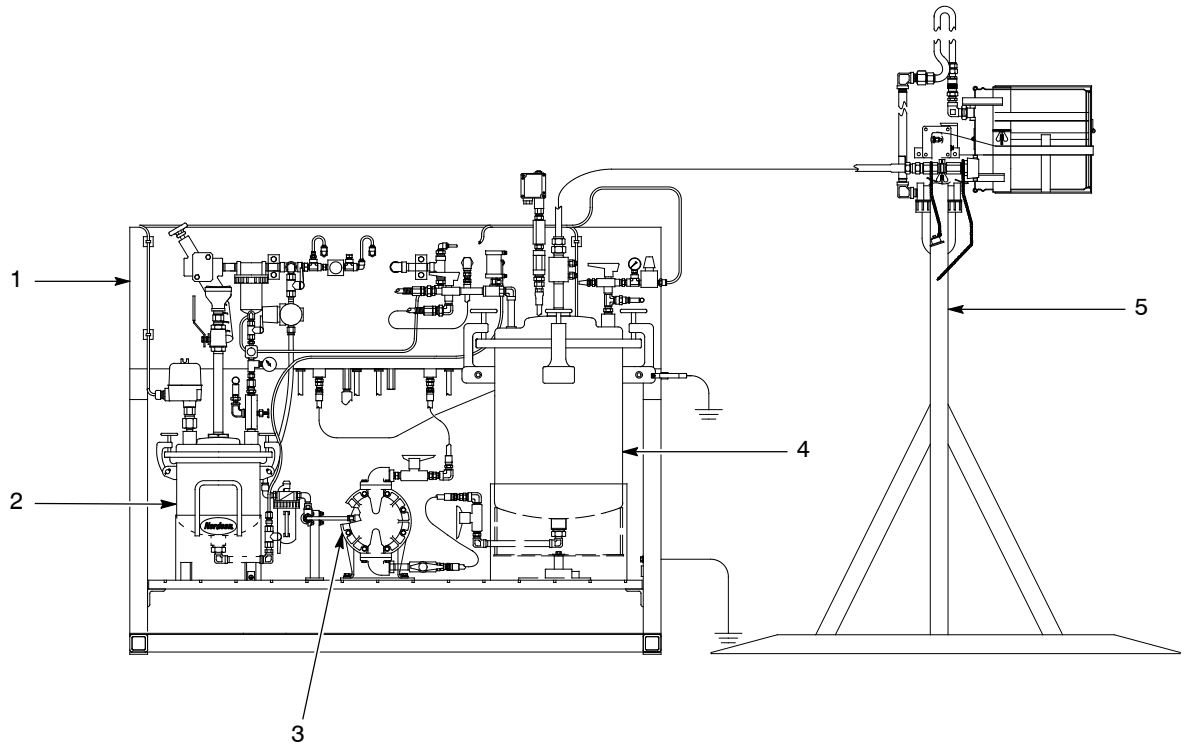

Figure 3 Typical Primer Delivery System

1. Pumping stand frame
2. 2-gallon pressure pot
3. Diaphragm pump
4. 10-gallon pressure pot
5. Pour stand

Black Primer Fluid Delivery

This section describes the basic operation of a 10-gallon pumping stand.

NOTE: Several pumping stands are available and work on the same principle. Refer to the *Primer Delivery System* manual and the instruction sheets supplied with your system for specific information.

See Figure 3.

The pour stand (5) supplies gravity-fed black primer to the 10-gallon pressure pot (4). A blanket gas isolates the black primer in the pressure pot from moist atmospheric conditions. The 10-gallon pressure pot is vented to allow blanket gas to escape during the pouring operation. Black primer is pumped from the 10-gallon pressure pot through the use of a diaphragm pump (3). The fluid pressure for the black primer system is typically 2.76–5.5 bar (40–80 psi). An 8.62 bar (125 psi) relief valve prevents over pressurizing the 10-gallon pressure pot.

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 mounted on the applicator tool. Black primer circulates back to the 10-gallon pressure pot to keep solids in suspension and minimize plugging of wetted components.

A dual-filter assembly after the diaphragm pump keeps the system free of foreign materials. The dual-filter assembly protects the dispense guns and other system components from blockage and premature wear. Two-way ball valves on both sides 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 robot black primer supply and return lines connect to a by-pass valve assembly to isolate the applicator tool from the recirculation loop. This allows an operator to perform applicator tool maintenance and keep primer recirculating.

An intrinsic barrier-protected load cell detects black primer fluid level and sends signals to the digital display on the system control panel. The digital display 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 Appendix B, *Equipment Calibration* for calibration data.

Clear Primer Fluid Delivery

This section describes the basic operation of a two-gallon pressure pot.

NOTE: Several pumping stands are available and work on the same principle. Refer to the *Primer Delivery System* manual and the instruction sheets supplied with your system for specific information.

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 detector 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 detector probe measures by means of impedance and is immune to material buildup. If using a level detector probe, final calibration must be performed when the system is filled with primer. Refer to Appendix B, *Equipment Calibration*.

NOTE: Because gravity-fed primer delivery systems do not use a level detector probe, calibration is not necessary.

Theory of Operation

Table 3 lists a typical operation sequence.

Table 3 Operation Sequence

Step	Sequence
1	A new workpiece is brought into the work position.
2	The controller receives a part strobe signal.
3	The felt gripper actuates and the applicator tool moves from the pounce station to a standoff position near the workpiece.
4	The clear primer dispense gun opens and close for a set time to pre-wet the felt.
5	The applicator tool moves from the standoff position and onto the workpiece. The clear primer dispense gun opens and the felt applies clear primer to the workpiece along a programmed path. Typically, the clear primer dispense gun is opened along the entire path. Depending upon the shape of the workpiece, stitching can be used in corner areas to prevent excessive primer coverage.
6	The following occurs if stitching is used in a corner area: a. The applicator tool moves up and away from the workpiece when it reaches a corner area. b. The clear primer dispense gun closes and the robot rotates the applicator tool 90 degrees. c. The applicator tool moves until the clear primer rub block presses the felt onto the workpiece. d. The clear primer dispense gun opens. e. The felt applies clear primer to the workpiece corner.
7	The applicator tool moves up and away from the workpiece and pauses about 1–2 seconds to allow the clear primer to flash-off. The black primer rub block presses the felt onto the workpiece. The black primer dispense gun opens and the felt applies black primer onto the workpiece along a programmed path. Typically, the black primer dispense gun is opened along the entire path. An electromagnetic flowmeter monitors the black primer dispense flow rate. Depending upon the shape of the workpiece, stitching is used in the corners to prevent excessive primer coverage. Black primer stitching is done in the same maaner as clear primer (step 6).
8	The workpiece indexes to the next station, the robot returns to the pounce station and the gripper jaws release.
9	The felt advances until the optic color sensor detects 3 states of felt color: black, white, black. The felt stops advancing when the color sensor detects the second black state. If the color sensor does not detect a black state after 7 advances, the system generates an alarm signal that locks the applicator tool. An operator must unlock the applicator tool. **NOTE:** Typically, about 5.7 cm (2.25 in.) of felt advances.
10	The robot and applicator tool remain at the pounce station in the standby mode until the next workpiece is ready and a part strobe signal is received. If the applicator tool remains stationary for more than two minutes, the felt advances an additional 25.4 cm (10 in.) to prevent saturated black primer felt from adhering to the griper assembly.

Installation

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

The dispensing system components that require installation are the primer delivery system and the applicator tool with the twelve-station valve pack. Use the following guidelines when installing dispensing system components:

- Refer to the system component manuals as needed for detailed installation information.
- Before operating the dispensing system, properly secure primer-related equipment to the foundation with the appropriate anchoring devices.
- Ground all equipment according to system diagrams.
- The applicator tool rotates during operation. Properly route the fluid and air lines to prevent kinks.

Component Installation

Refer to Table 4 for component connections.

NOTE: If nitrogen is used to blanket the material, the nitrogen tank and tank anchors are customer-supplied items.

Table 4 Component Connections

To Connect ...	Do This ...
Air (Pneumatics)	Supply shop air to 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 twelve-station valve pack and the applicator tool. Refer to the pneumatic diagram in the systems drawing package for more information.
Fluid (Hydraulics)	Fluid lines run from the solvent pressure pot and primer delivery system to the applicator tool. Ensure that all lines are PTFE or chemical resistant. Dress all lines to minimize abrasion. Do not use brass fittings on the clear primer system lines. These fittings must be stainless steel or nickel-plated brass. Connect the fluid lines as shown in the system diagram. Refer to the system diagram for any slight changes to the system.
Current (Electrical)	Connect all wires according to electrical system diagram. All connections must be in accordance with applicable NEMA and NFPA requirements.
Controls	Refer to the system interconnect schematic for the precise terminal locations. Using the cable supplied, connect the 24 V power and data terminals of the applicator tool twelve-station valve pack. Connect the twelve-station valve pack to the system control panel. A pair of 2-conductor cables are required for operation. The power cable supplies the twelve-station valve pack with 24 Vdc. The shielded communication cable transfers signals between the controller and the dispensing system.
Fiber Optics	Make sure that the fiber optic sensors on the applicator tool are properly installed and aligned. Refer to the fiber optic sensors component manuals for more information.

Operation

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

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.

NOTE: Refer to all dispensing system electrical, pneumatic, and hydraulic schematics and diagrams prior to startup. Refer to the *Primer Delivery System*, *Flow-Through-Felt Applicator Tool*, *ZCN Gun*, and all other component manuals as needed.

Before starting the primer system, verify that

- all fluid line fittings are tight to avoid leaks.
- the system has been flushed with MEK and pumped dry.
- that the pneumatic slide pressure is set to 0.69–1.03 bar (10–15 psi).

Clear Primer Startup

Perform the following procedures.

1. Add desired quantity of clear primer to the pot. Refer to the *Primer Delivery System* manual for detailed procedures.

NOTE: The primer level must exceed the trip point of the level detector probe.

2. If using a pressure pot, set the clear primer pressure pot pressure to 0.21–0.41 bar (3–6 psi).
3. Remove the felt and rub blocks from the dispense guns
4. Position the applicator tool over a waste container and purge air from the fluid line by manually actuating the clear gun via the touchscreen.
5. Adjust the needle valve at the clear primer gun manifold approximately $^1/_2$ turn out from closed position.
6. Install the rub blocks and felt.

Black Primer Startup

NOTE: Complete robot and cell control programming before loading primer into the dispensing system.

1. Before starting the black primer system, verify that the bypass valve assembly is configured to circulate to the applicator tool.
2. Add desired quantity of black primer to the pot. Refer to the *Primer Delivery System* manual for detailed procedures.

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 streaking occurs, carefully watch the applicator tool move through the path, observing the target point of the dispensed primer, especially in the places where streaking is noted.

   Common causes of voids and streaking:

   - Gun closes too soon.
   - Flow rate too low.
   - Dispense pressure too low.
   - Black primer contaminated with residual MEK.
   - Viscosity of black primer too high; usually a result of using material past its expiration date.
   - Normal applicator tool force on the workpiece is excessive.
   - Gun programmed to excessively stitch.
3. If puddling is observed, move the applicator tool through the programmed path and note the location of excessive primer deposits. This typically occurs on corners, or locations where the applicator tool must travel slower than usual.

   Common causes of puddling:

   - Flow rate (dispense pressure) too high for current robot speed.
   - Lack of stitching, or gun staying open too long moving along tight shapes.
   - Too much residual MEK in black primer.
4. After obtaining a satisfactory dispense path, teach the system the number and length of drops for the path via the primer controller touch screen. Refer to Appendix C, *Controller*, for more information about teaching drop count.
5. Assign an acceptable tolerance of the drop count and duration setpoint (typically ±10 %).
6. 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 applicator tool and hoses be unwound for a second application, or, that the glass be aborted, and the applicator tool return to a home position to await operator input.

Setting up Primer Beads

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.

For better coverage, tilt the applicator tool so that the pockets on the rub blocks are parallel to the work surface. An optimum bead has a thickness of approximately 0.3–1.0 mil, dry.

Considerations for 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 5 for a listing of the variables to consider.

Table 5 Primer Bead Variables

Variable	Consideration
Stitch rate	Stitch rate is seldom used because the guns are continuously open in most applications. Fluid pressure is a more important factor. Stitch rate can still be used to fine tune bead characteristics when working with complex shapes. There are 1–8 rates. Longer durations deposit more primer.
Robot speed	Slower robot speeds dispense a greater volume of primer in an area. Faster robot speeds dispense less volume of primer in an area. The robot speed must be slow at the corners of glass for precision. If stitching is used, it may be necessary to adjust the stitch rate to reduce gun ON time when the robot slows down for a corner. Typically, programming the robot to a slower speed results in a uniform film build.
Fluid pressure	Higher fluid pressures dispense more primer. Adjust fluid pressure to affect primer bead, keeping the pressure within the appropriate range.
Nozzle opening	For adjustable dispense guns—the larger the nozzle opening, the more primer passes through it. Adjust the nozzle opening to control the volume of primer.
Felt consistency	Felt consistency affects film buildup. If the felt is either too hard or smooth, primer will not wick through it properly, causing primer to leak out of the sides of the rub blocks. **NOTE:** Felt should have a rough nap and a thickness not much greater than 4.5 mm (0.180 in.) Typically, the felt should be 2 mm (0.09 in.) thick and comply to SAE J314, Grade 1 standards. Contact your Nordson representative for assistance with felt selection.
Rake angle	Rake angle is the angle between the applicator tool centerline and the workpiece. Rake angle affects primer buildup. Make sure that the applicator tool maintains a 10–12° rake angle when dispensing primer.

Maintenance

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

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

Subassemblies that transport or contain black primer require the most maintenance. Black primer 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.

Refer to Table 6 for the recommended maintenance schedule.

NOTE: Plant production rate may effect the frequency of certain procedures.

Table 6 Maintenance Schedule

Frequency	Component	Maintenance Task
First startup of the day	dispense guns	Purge each dispense gun separately: 1. Remove felt from rub blocks. 2. Remove the rub blocks from the ball nozzle assembly. 3. Purge each module for 10–15 sec. and check for a straight dispense stream. **NOTE:** Clear primer may only drip from the dispense gun due to low flow rates. 4. Lubricate rub block O-rings with a compatible O-ring lubricant. 5. Clean and install rub blocks to ball nozzle assembly. 6. Clean rollers; remove primer and lint. 7. Install felt. Index felt to make sure that is loaded properly.
		Continued...

Frequency	Component	Maintenance Task
Every 4 hours and Shutdown at end of the day	Ball nozzles	1. Remove felt from rub blocks. 2. Remove rub blocks from ball nozzle assembly. 3. Clean ball nozzle assemblies with a compatible solvent and soft brush. 4. Purge each dispense gun for 10–15 sec. and check for a straight dispense stream. **NOTE:** Clear primer may only drip from the dispense gun due to low flow rates. 5. Lubricate rub block O-rings with a compatible O-ring lubricant. 6. Clean and install rub blocks to ball nozzle assembly. 7. Clean rollers; remove primer and lint. 8. Install felt. Index felt to make sure that is loaded properly and that saturated felt is indexed away from moving components.
Each break	Clear primer level indicator	Inspect and verify if clear primer levels are adequate.
	Clear primer pressure pot	Verify if feed pressure is sufficient.
Each shift	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.
Daily	Clear primer fluid line	Inspect fluid line for air. If necessary, use the 3-way valve located on the applicator tool and purge the clear primer fluid line into a container.
	Black primer system	If desiccated air is used, check the sight glass for color change of desiccant pellets.
Bi-weekly	Clear and black hoses	Check hoses for wear, kinks, crimps, and proper routing. Replace damaged hoses. Reroute hoses, if necessary.
Weekly	Pump lubricator	Check lubricant level and add as needed.
	Dual filter assembly	Change the filter element.
Every three months	Solvent dispense gun	Rebuild or replace the solvent dispense gun.
	Clear and black primer hoses	Replace hoses.
	Black primer gun	If rebuilt every eight weeks instead of replacing it, replace the gun body and end cap.
	Applicator Tool Recirculation regulator	Replace. This may be more frequent, depending upon the installation.
	Pressure switch isolation line	If black primer fluid pressure switch is has an isolation line, refill the isolation line with MEK.

Continued...

Frequency	Component	Maintenance Task
Every six months	Solvent system	Replace the solvent lines.
	Ball valves	Replace—especially valves in the path of black primer flow.
	Diaphragm pump	Replace.
Periodically	Material pail	Depends upon production rate, suggested change rate is every two weeks. Shake black primer pail for at least one hour immediately prior to introduction into system. If dispensing system is down for an extended period, flush with MEK.
	Clear primer dispense gun	Replace every twelve weeks. Or, rebuild and replace gun seals, needle, and seat every twelve weeks.
	Black primer dispense gun	Replace every twelve weeks. Or, rebuild and replace the gun seals, needle, and seat every eight weeks.

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 leaks from sides of rub blocks	Felt either too smooth or hard	Obtain felt with more nap.
	Felt does not advance over rub blocks	Free felt from components in the transport mechanism. Make sure that the rollers and gripping components move freely.
2. Material streaking; bead too thin	Low dispense pressure	Increase dispense pressure.
	Excessive rake angle	Adjust robot program to achieve a 10–12° rake angle.
	Excessive gun stitch rate	Adjust the stitch rate to a continuous or near-continuous stream.
	Incorrect workpiece orientation	Adjust workpiece orientation.
3. Material puddling; bead either too thick or runny	Robot speed too slow for current dispense pressure.	Stitch dispense gun to reduce material flow rate. Increase robot speed. Reduce material pressure.
	Residual MEK in black primer dispense line	Perform the following: 1. Purge black primer dispense line with MEK. 2. Purge the black primer dispense line for 5 minutes using black primer.
4. False or shutdown condition	Optic color sensor does not detect primer-stained portions of felt.	Test sensor and reprogram if necessary. Check robot program and logic for proper operation.

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	Remove object for true reading of black primer level. Keep ten-gallon pot clear of objects and wedging positions that can restrict its vertical movement.
2. False readings from clear primer level detector—level probe in clear pot	Improper calibration	Calibrate level detector to a maximum reading of 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 level probe and recalibrate level detector, as necessary.
	Faulty level detector	Replace level detector.

Repair

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

Refer to Table 7

Repairs to dispensing system are performed at the component level. The following table details common repair procedures. Refer to the listed component manuals for more information.

Table 7 Repair Procedures

To ...	Refer to this manual ...
Replace the rollers and felt guides Replace the clear and black dispense guns Replace the black primer fluid regulator Purge the clear primer line Flush the black primer line with solvent Replace the take-up actuator Replace the payout actuator Replace electromagnetic flow sensor Replace the optic sensor	*Flow-Through-Felt Applicator Tool*
Replace the pressure switch Replace the clear primer level probe Replace the diaphragm pump Replace the filter element Replace the fluid lines	*Primer Delivery System*
Remove and replace the air cap Repair the gun hydraulic section Repair the gun pneumatic section Repair the needle Clean the gun	*ZCN Dispensing Gun*

Parts

Keep these parts on hand to reduce downtime. To order parts, call the Nordson Customer Service Center or your local Nordson representative.

See Figure 4 and refer to the following parts list.

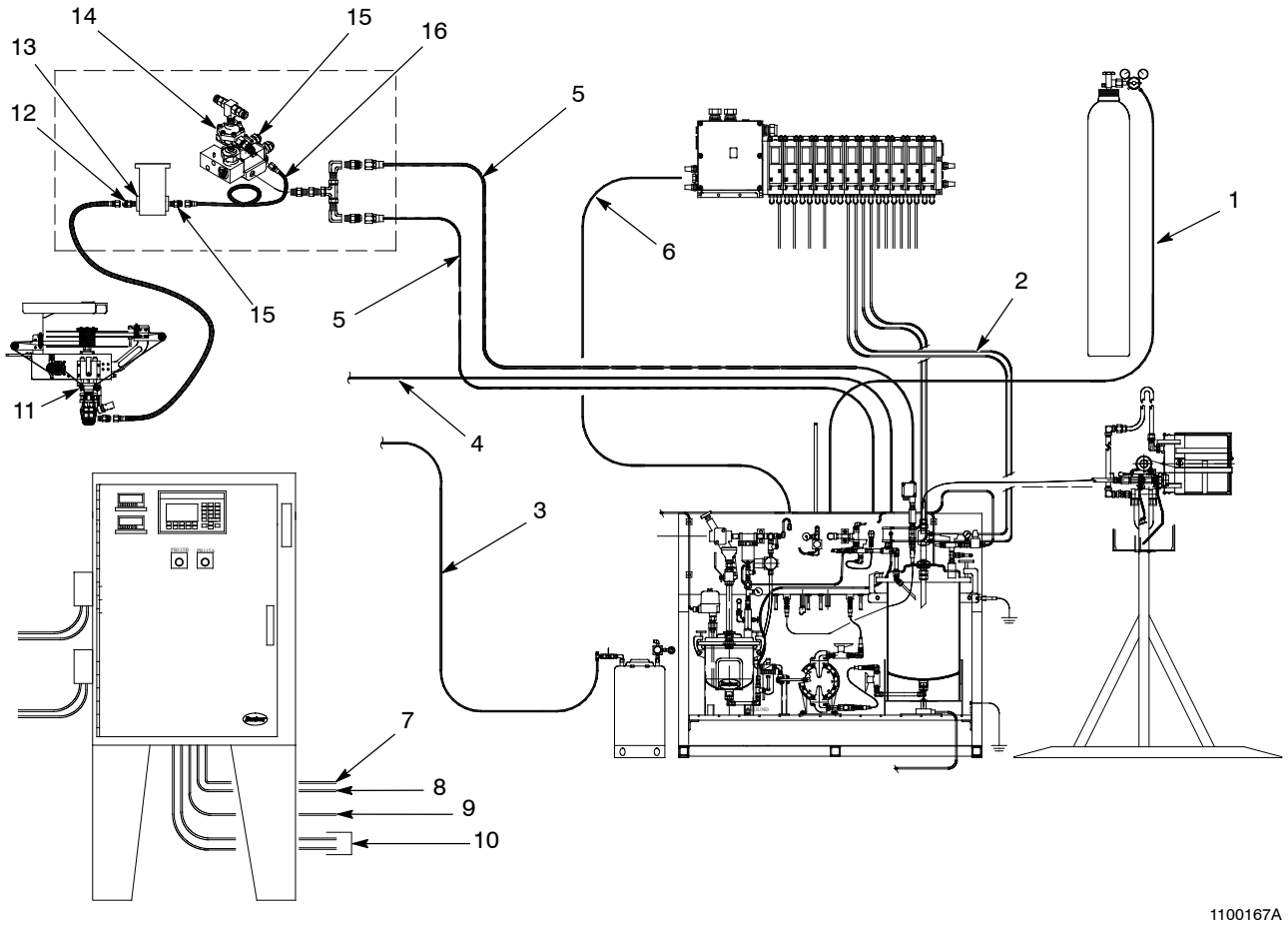

Figure 4 Spare Parts

Item	Part	Description	Quantity	Note
1	820300	Hose, nylon, $^1/_4$-in. OD x 25 ft	1	
2	282286	Tubing, $^1/_4$-in. blue, urethane	100 ft	
3	146133	Tubing, PTFE, $^1/_4$-in.	100 ft	
4	842300	Hose, PTFE, $^1/_4$-in. OD x 25 ft	2	
5	146131	Tubing, PTFE, $^3/_8$ ID x 1/2 OD	100 ft	
6	900602	Tubing, polyurethane, $^3/_8$ OD	50 ft	
7	245573	Cable, blue hose, 20 G,	50 ft	A
8	860112	Cable, 4 conductor, shielded	50 ft	B
9	1014765	Cable, 3-pin, 10 meters	1	C
10	1010812	Cable, 4-pin, 15 meters	2	D
11	1015367	Kit, roller, 19 mm	1	
12	972215	Connector, $^1/_8$ NPT x $^1/_4$ JIC	2	
13	1011279	Flange, flowmeter, E+H, Promag	2	
14	1003334	Primer, manifold assembly	1	
15	333058	Connector, PFA, male, $^1/_8$ NPT x $^1/_8$ tube	2	
16	900537	Tubing, PTFE, $^1/_8$ OD	2 ft	

NOTE A: Remote I/O cable
B: 24 Vdc power cable
C: Empty felt sensor cable
D: Black sensor and low felt sensor cables

Appendix A

Robot Programming Guidelines

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 flow-through-felt primer dispensing sequence. The programming sequences include

- General Guidelines
- Typical Robot Program Structure

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 the path points carefully to assure that the felt is in constant contact with the substrate.

The compliance of the slide and the rub blocks allows for some standoff tolerance. However, if programmed path points vary excessively, a poor bead definition may result.

Specifications

Refer to the following Tables for programming, felt, and miscellaneous specifications.

Programming

Table A-8 lists the programming specifications for the Flow-Through-Felt process values.

Table A-8 Programming Specifications

Programming Specification	Value
Clear Primer Path Speed	500–600 mm/sec (typical)
Black Primer Path Speed	400–500 mm/sec (typical)
Applicator Tool Stand-Off Distance	Adjust the standoff to mid-point of the slide travel; slide pressure range is 0.69–1.03 bar (10–15 psi). **NOTE:** The slide should never be fully extended or retracted.
Applicator Tool Rake Angle	10–12 degrees in direction of applicator tool movement
Applicator Tool Orientation	Perpendicular to glass, square to direction of tool movement

Felt

Table A-9 lists the specifications for the felt used in the applicator tool.

NOTE: Figures are typical and can vary depending upon application requirements.

Table A-9 Felt Specifications

Felt Specification	Specification
Length	44.5–57 mm (1.75–2.25 -in.) per job
Width	Typically 19 mm (0.75-in.)—Actual width is application specific
Thickness	2 mm (0.080 in.)
Grade	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

Table A-10 lists the miscellaneous specifications to consider when programming the dispensing system.

Table A-10 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)

Applicator Tool Rake Angle

See Figure A-5.

The proper applicator tool rake angle for the clear and black primer dispensing paths is 10–12 degrees.

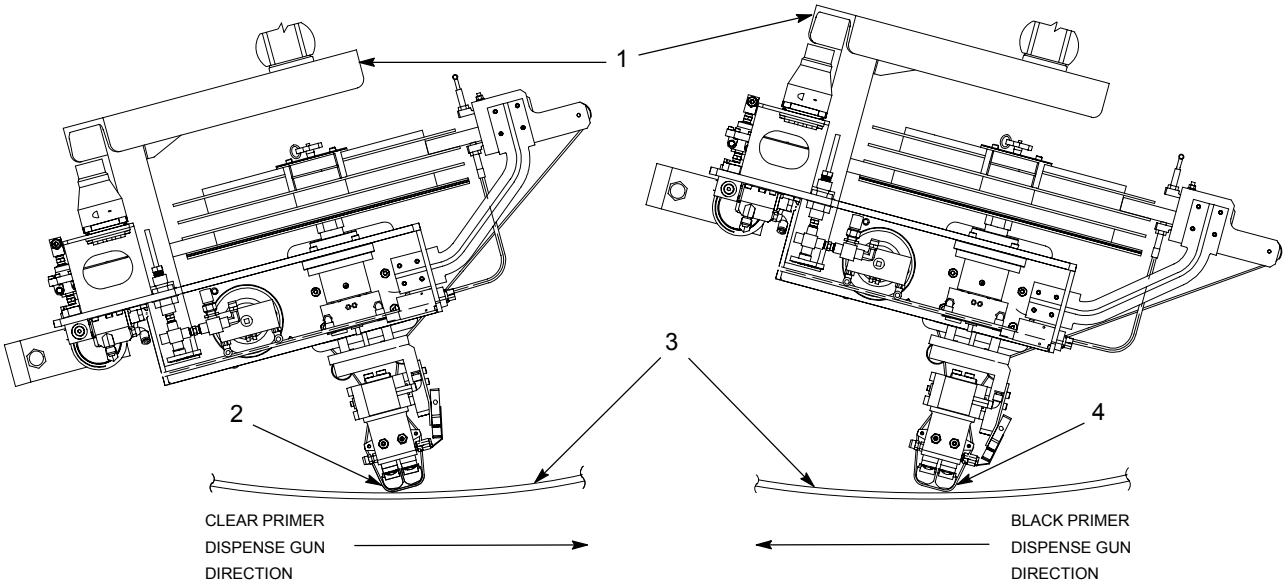

Figure A-5 Applicator Tool Rake Angle

1. Applicator Tool
2. Clear primer dispense gun
3. Glass
4. Black primer dispense gun

Applicator Tool Orientation to the Glass

See Figure A-6.

The applicator tool must be perpendicular to the glass.

Figure A-6 shows the incorrect and correct orientations of the applicator tool to the glass surface. Table A-11 lists why the different orientations are incorrect and correct.

Table A-11 Robot and Applicator Tool Position Guide

Robot/Applicator Tool Position	Orientation
A	Position A is incorrect because the applicator tool is not perpendicular to the glass. It is angled too sharply outward; the felt cannot make complete contact with the glass.
B	Position B is incorrect because the applicator tool is not perpendicular to the glass. It is angled too sharply inward; the felt cannot make complete contact with the glass.
C	Position C is correct because the applicator tool is perpendicular to the glass and its backside is facing the inboard side of the glass. **NOTE:** Use a straight edge to check for the proper orientation.

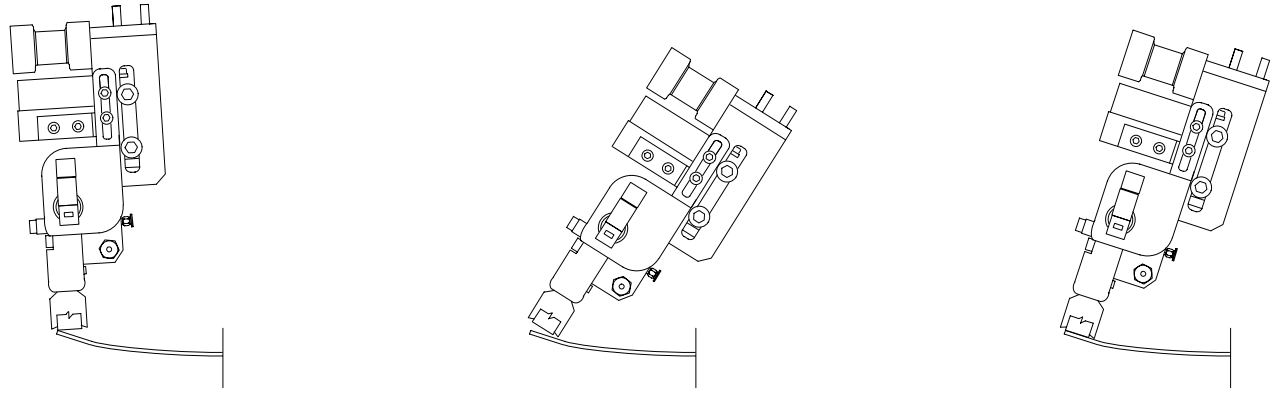

Figure A-6 Applicator Tool (side view) Orientation to Glass

Typical Robot Programming Routines

The following section provides information on the typical programmable routines for dispensing clear and black primer. The programmable routines are:

- Typical Sequence of Operation
- Go to Pounce Position
- Primer Program
- Cycle Felt Program
- Go to Purge Bucket
- Go to Maintenance Position

Typical Sequence of Operation

The following is a typical sequence of operation:

1. Reset all outputs
2. Wait for next request
3. Execute Go To Pounce Position routine
4. Execute Primer Program routine
5. Execute Cycle Felt Program routine

Go To Pounce Position

Refer to the following sequence:

1. Drop Robot Ready to cell.
2. Move robot to Pounce position. The Pounce position will be a point over the substrate close to the beginning of the primer path.
3. Set At Pounce Position.
4. Wait until signal goes low.
5. Rest At Pounce Position.
6. Set Robot Ready to cell.

Programming the Clear and Black Primer Paths

Refer to the following sequence:

1. Turn on Part ID (0–15). Wait 0.1 seconds.
2. Turn on Part Strobe. Wait 0.1 seconds.
3. Turn on Stitch Rate (1–8). Wait 0.1 seconds.
4. When the applicator tool is in position at the start of the path, turn on the clear primer gun.

Programming the Clear and Black Primer Paths (contd)

5. Execute the clear primer path, changing the stitch rates to turn the gun off and on as needed. If the substrate has sharp radius corners or other areas on the substrate that may cause the robot's velocity to greatly decrease, it may be necessary to perform the following to prevent a heavy film build or puddles:

   Continues Robot Path—Select a stitch rate that has the Gun Off and Gun On values set for continuous fluid flow when a Gun On Signal from the robot is initiated.

   a. Leave the gun on prior to the start of the area.

   b. At the start of the area, shut off the gun.

   c. Continue the robot path.

   d. Allow the gun to remain off until the end of the area is reached. Ensure that the felt is sufficiently saturated with primer so the desired amount of primer is applied to the substrate between the gun transitions.

   e. At the end of the area, turn the gun back on.

   f. Continue the primer path.

   Non Continues Robot Path—Select a stitch rate that has the Gun Off and Gun On values set for continuous fluid flow when a Gun On Signal from the robot is initiated.

   a. Leave the gun on until the start of the area.

   b. At the start of the area, shut off the gun and raise the applicator tool off of the substrate so the felt is not in contact with the substrate.

   c. Re–orientate the tool accordingly.

   NOTE: Allow the path to slightly overlap.

   d. Lower the applicator tool so that the felt is in contact with the substrate.

   e. Turn on the gun.

   f. Continue the primer path. For each sharp corner or similar area, repeat steps a–f.

6. At the completion of the clear primer path, ready the applicator tool for the black primer path. Ensure that the tool is properly orientated and is ready to begin the black primer path which moves in the opposite direction that the clear primer path was performed.

7. Turn on Stitch Rate (1–8). Wait 0.1 seconds.

8. Turn on the black primer gun.

NOTE: It may be necessary to program a Wait Time to allow the felt to saturate with the black primer.

9. Execute the black primer path, changing the stitch rates to turn the gun off and on as needed. If the substrate has sharp radius corners or other areas on the substrate that may cause the robot's velocity to greatly decrease, it may be necessary to perform the same steps detailed in the clear primer path for the black primer path.

10. At the completion of the black primer path, turn off the black primer gun.
11. Turn off the Stitch Rate.
12. Turn off the Part Strobe. Wait 0.1 seconds.
13. Turn off the Part ID.
14. Pulse the Cycle Complete.
15. Go to the Pounce Position. Wait 0.1 seconds.
16. Initiate the Cycle Felt Program routine. Wait 0.1 seconds.
17. Pulse Black Primer Present On Felt. Wait 0.1 seconds. If Black Not Present On Felt Fault, go to step 19.
18. Return to the Pounce Position.
19. If Black Not Present On Felt Fault, perform the following:
    a. Drop Dispense Ready to cell.
    b. Send Black Not Present On Felt alarm condition to cell.

Cycle Felt Program

Refer to the following sequence:

1. Move to the Pounce position.
2. Set Cycle Felt. Wait 0.1 seconds.
3. Reset Cycle Felt. Wait 0.1 seconds.
4. Return to Primer Program.

NOTE: If the cell does not initiate a Dispense Cycle for 2 minutes, perform a Cycle Felt program routine to allow the felt to advance approximately 25.4 cm (10 in.) This prevents the saturated felt areas from prolonged contact with mechanical items and adhering to the parts.

Go To Purge Bucket

Refer to the following sequence:

1. Chose a point in the work cell where there is ample room and an empty 5-gallon pail is available.
2. Move the applicator tool to this location.
3. Position the clear and black dispense guns directly above the pail. Allow ample room to remove the rub blocks.
4. Lock the applicator tool in this position until the program in manually restarted.
5. The following functions can be performed by an operator manually with the primer panel in Manual Mode:
   a. Black gun purge
   b. Clear gun purge
   c. Black gun test
   d. Clear gun test
   e. Flush black gun with solvent
   f. Open gripper
   g. Cycle felt

Go To Maintenance Position

Refer to the following sequence:

1. Chose a point in the work cell where there is ample room and an empty 5-gallon pail is available.

NOTE: It is desirable that this location be the same as the Purge Bucket Station.

2. Move the applicator tool to this location.
3. Position the clear and black dispense guns directly above the pail. Allow ample room to remove the rub blocks.
4. Lock the applicator tool in this position until the program in manually restarted.
5. All of the functions in step 5 of *Go To Purge Bucket* can be manually performed at this position.

Appendix B
Equipment Calibration

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 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.

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 Appendix A, *Robot 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 Appendix A, Robot *Programming Guidelines*.
2. Enter the values from the following tables.

Parameter	Value (Lb)	Value (Gal)
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
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.

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)
decPNt	0.0	0.0
round	0.1	0.1
SCALE	YES	YES
dSP 1	0.0	0.0

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	2.0	

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 accept 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	
dISP	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.

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.

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

Introduction

This section details the menu and screens accessible through the controller. The most current program and screens is detailed here. If you have any questions about your program, contact your Nordson representative for assistance.

Throughout this manual the Flow-Through-Felt primer dispensing system controller will be referred to as the controller.

Controller Components

See Figure C-1.

A typical controller consists of the following components:

- Main power switch (1)
- Control panel (10) with LCD display (9), numeric keys, arrow keys, and function keys
- Reset (6) and Emergency Stop (2) push buttons
- Red Lion 6-digit displays for both black primer volume (7) and clear primer volume (8)
- Alarm tower (11)

Controller Components *(contd)*

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

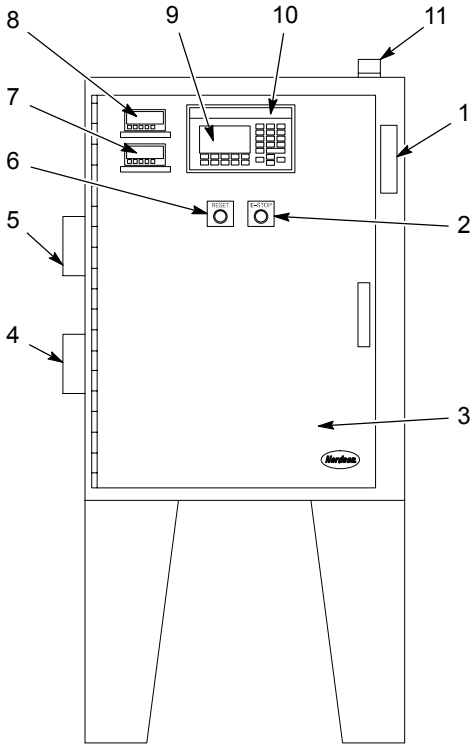

Figure C-1 Typical Controller Components

1. Main power switch
2. Emergency stop
3. Enclosure door
4. Clear primer meter
5. Black primer meter
6. Reset
7. Red Lion display (black primer volume)
8. Red Lion display (clear primer volume)
9. LCD display
10. Control panel
11. Alarm light tower

Controller Menus

See Figure C-2.

This figure shows the menu tree for the controller.

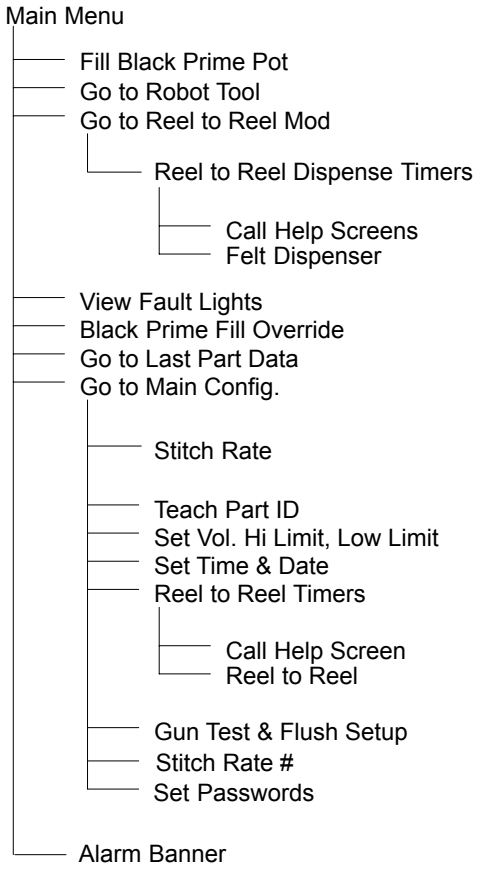

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Figure C-2 Controller Menu Tree

Controller Screens

This section details the menus accessible through the **Main Menu** screen on the controller.

Main Menu

See Screen C-1.

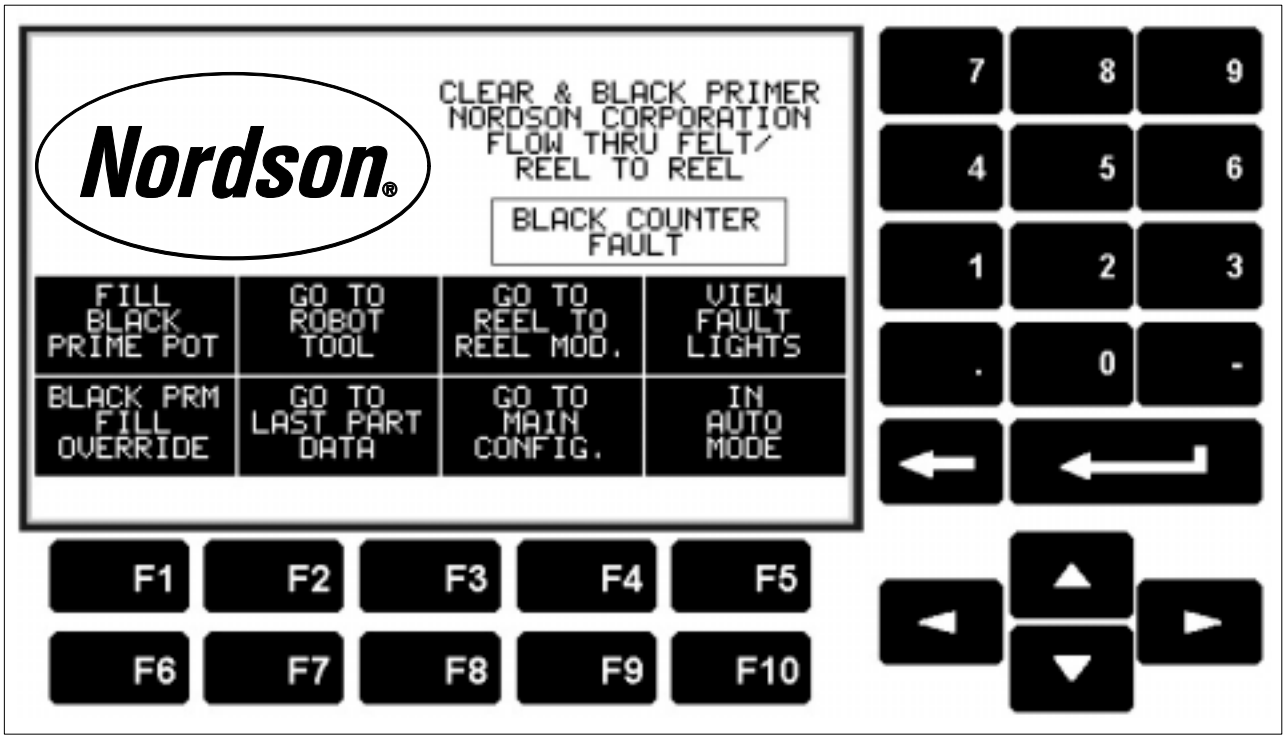
Use the **Main Menu** screen to access all other screens and functions in the controller program. The SYSTEM OK indicator is present when no fault conditions exist in the system. If fault conditions exist, they are listed in order of highest priority.

Refer to Table C-1.

This table lists the results of touching the buttons on the **Main Menu** screen.

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

Touch ...	To ...
FILL BLACK PRIME POT	Begin filling the black primer pressure pot only when the 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 touch the GO TO ROBOT TOOL button at the **Main Menu**.
GO TO REEL TO REEL MOD.	Access the **Reel To Reel** screen and its subscreens. Make sure that the system is in MANUAL MODE before you touch the GO TO REEL TO REEL MOD. at the main menu, unless you want 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 MAIN CONFIG.	Access **Main Configuration** screen and its subscreens.
IN AUTO MODE	Switch from AUTO MODE to MANUAL MODE; indicates the present status of the controller. Touching this button selects the controller mode; the **Main Menu** reflects the current status. IN MANUAL MODE may appear on this screen.



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Screen C-1 Main Menu

Robot Applicator Tool

See Screen C-2.

Use the **Robot Applicator Tool** 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 touch 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 lists the results of touching the buttons on the **Go to Robot Tool** screen. PRESETS displays the values that are set in the **Gun Test and Flush Setup** screen. ACTUALS displays the actual number of stitches from the test against the set rate. The MANUAL MODE indicates that the system is in the MANUAL MODE, not the AUTO MODE.

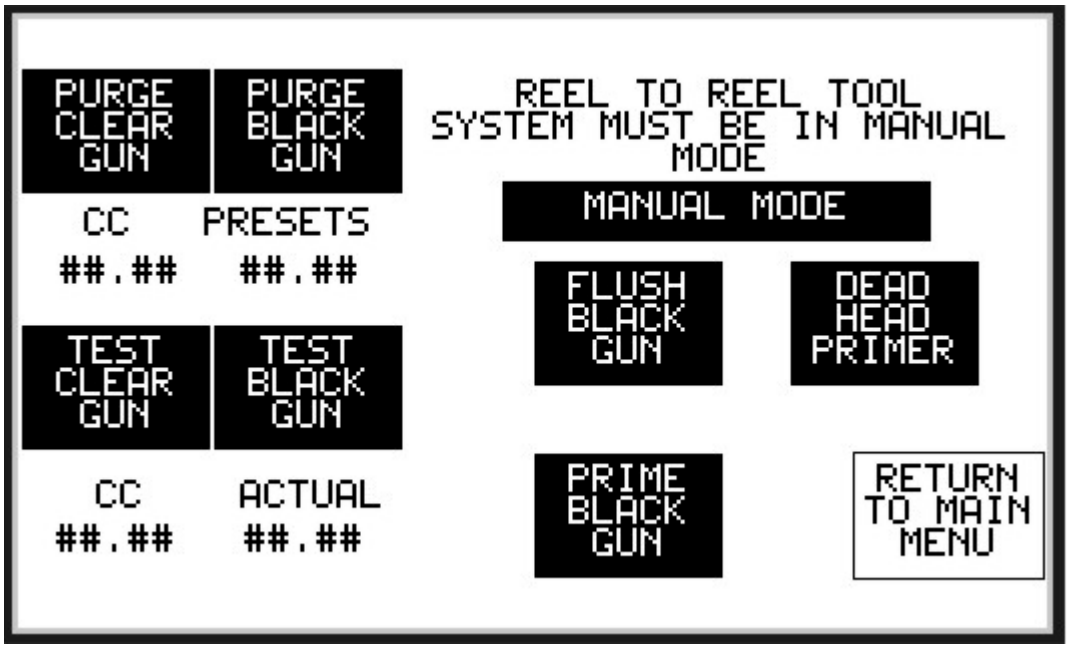
Robot Applicator Tool *(contd)*

Table C-2 **Go To Robot Tool** Screen Functions

Touch ...	To ...
PURGE CLEAR GUN	Purge the clear primer gun.
PURGE BLACK GUN	Purge the black primer gun.
TEST CLEAR GUN (A, B)	Test the clear primer gun.
TEST BLACK GUN (A, B)	Test the black primer gun.
DEAD HEAD PRIMER	Close the material supply valve at the black primer pressure pot.
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 TO MAIN MENU	Return to the **Main Menu**.

NOTE 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 must run a good test and fix the fault to deactivate the alarm.



1100003A

Screen C-2 Go to Robot Tool

Reel to Reel Dispenser

See Screen C-3.

Use the **Reel to Reel Dispenser** to manually initiate functions on the applicator tool.

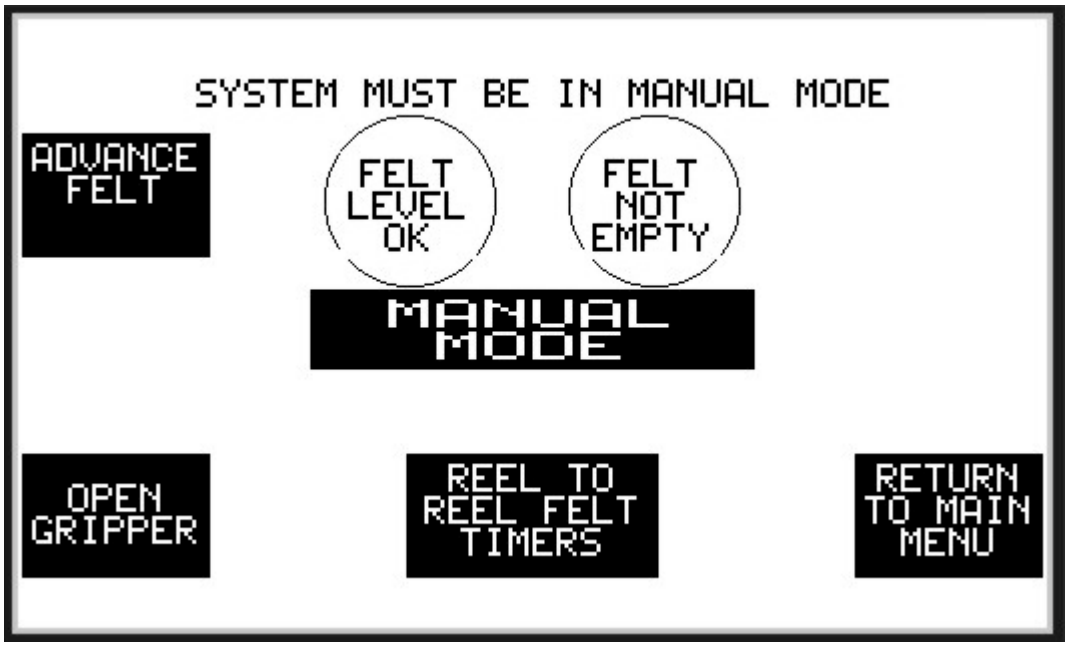
NOTE: The system must be in MANUAL MODE to access the information on this screen. Make sure that the system is in MANUAL MODE before pressing the GO TO REEL TO REEL MOD. button at the **Main Menu**.

Refer to Table C-3.

This table lists the results of touching the buttons on the **Reel to Reel Dispenser** screen. FELT LEVEL OK and FELT NOT EMPTY indicate the felt supply status of the dispenser. MANUAL MODE indicates the present status of the system—either MANUAL MODE or AUTO MODE.

Table C-3 **Reel to Reel Dispenser** Screen Functions

Touch ...	To ...
ADVANCE FELT	Dispense felt from the reel
OPEN GRIPPER	Open the gripper jaws on the applicator tool
REEL TO REEL FELT TIMERS	Display the **Reel to Reel Timers** screen
RETURN TO MAIN MENU	Return to the **Main Menu**



Screen C-3 Reel to Reel Dispenser

Reel to Reel Dispenser Timers

See Screen C-4.

Use the **Reel to Reel Dispenser Timers** screen to program delays for the applicator tool functions. This screen displays the length of time the program pauses until the air solenoid actuates and the next function occurs. These values are typically programmed when the system is set up for the first time and not changed.

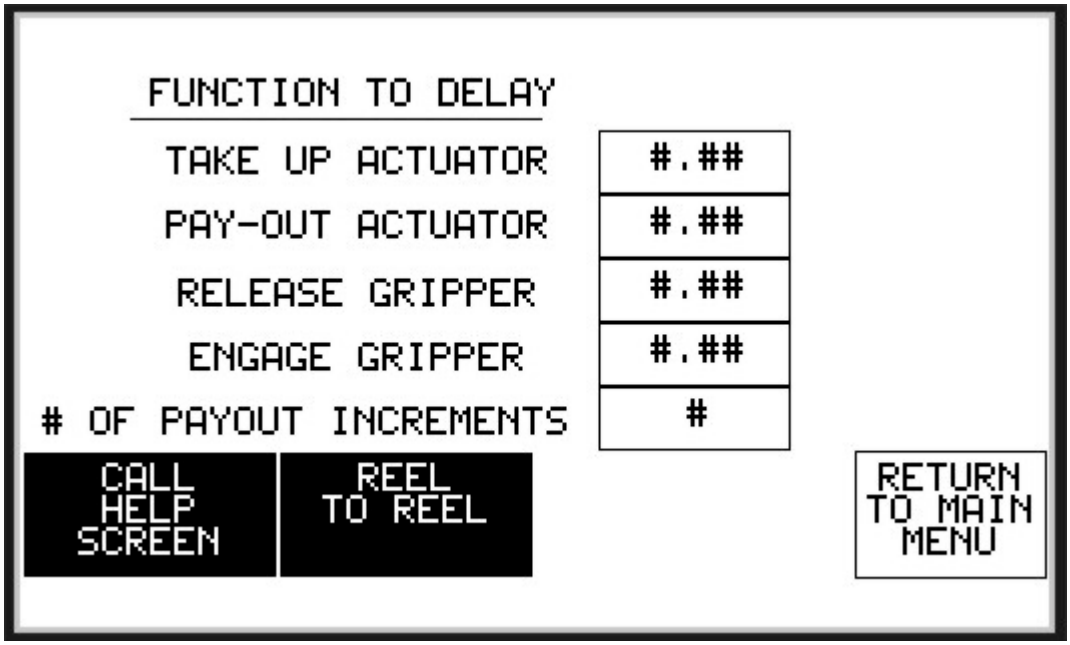
Refer to Table C-4.

This table lists the results of touching the buttons on the **Reel to Reel Timers** screen.

NOTE: Program the reel to reel dispenser functions to occur as slow or delayed as possible to protect components from unnecessary wear.

Table C-4 **Reel to Reel Timers** Screen Functions

Touch ...	To ...
TAKE UP ACTUATOR	Use the keypad to program the time delay in seconds between the TAKE UP and PAY-OUT functions—suggested starting default value is 0.50 seconds.
PAY–OUT ACTUATOR	Use the keypad to program the time delay in seconds before the reel to reel dispenser advances new felt into the dispense area—suggested starting default value is 0.50 seconds.
RELEASE GRIPPER	Use the keypad to program the time delay in seconds before the gripper on the reel to reel dispenser releases the felt—suggested starting default value is 0.50 seconds.
ENGAGE GRIPPER	Use the numbered keypad to program the time delay in seconds before the gripper closes on new felt—suggested starting default value is 0.50 seconds.
# OF PAYOUT INCREMENTS	Use the keypad to program the number of payout increments the system executes per Cycle Felt command—suggested starting default value is 4.
CALL HELP SCREEN	Go to the **Reel to Reel Dispenser Help** screen.
REEL TO REEL	Return to the **Reel to Reel Dispenser** screen.
RETURN TO MAIN MENU	Return to the **Main Menu**.



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Screen C-4 Reel to Reel Timers

Reel to Reel Dispenser Help

See Screen C-5.

Use the **Reel to Reel Dispenser Help** screen for a reminder of the basic programming sequence and to determine the static position of the applicator tool. The applicator tool does not receive any input signals in the static position.

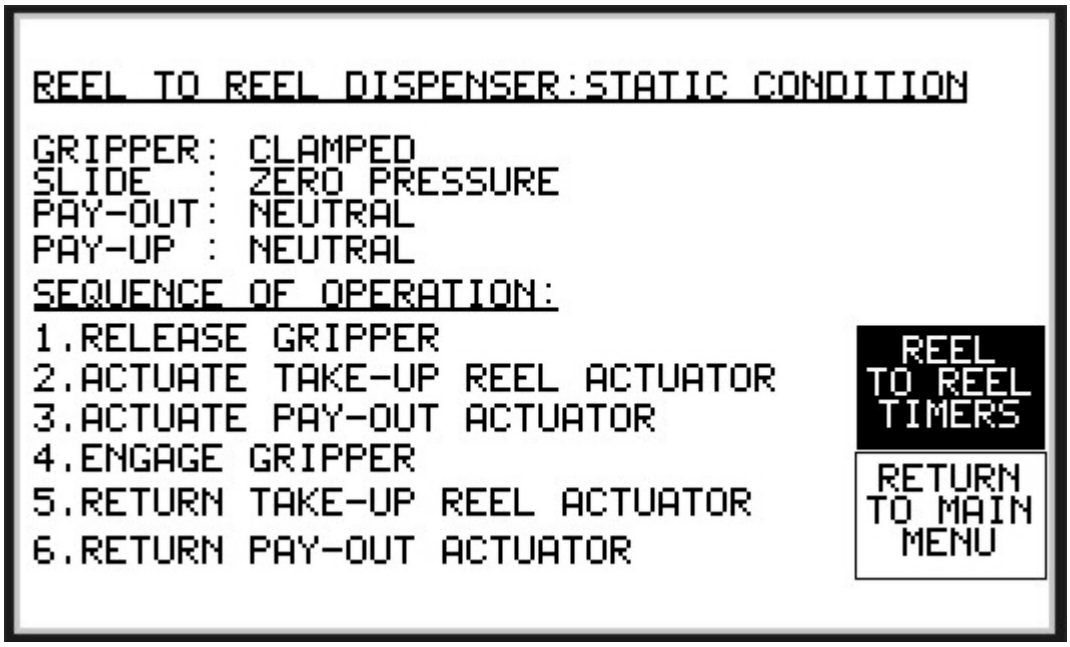
Refer to Table C–5.

This table list the results of touching the buttons on the **Reel to Reel Dispenser Help** screen.

Reel to Reel Dispenser Help *(contd)*

Table C-5 **Reel to Reel Dispenser Help** Screen Functions

Touch ...	To ...
REEL TO REEL TIMERS	Return to the **Reel to Reel Timers** screen.
RETURN TO MAIN MENU	Return to the **Main Menu.**



Screen C-5 Reel to Reel Help

Fault Lights

See Screen C-6.

Use the **Fault Lights** screen to determine fault conditions within the Flow-Through-Felt primer dispensing system. The **Main Menu** screen indicates the highest priority of these faults.

Table C-6 lists how to correct the faults indicated in the **Fault Lights** screen.

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

Fault	Corrective Action
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 SATURT FAULT	Add black primer. Check sensor.
BLACK PRIMER VOLUME FAULT	This fault remains until the next part is run and the part strobe detects a satisfactory part.
PLC BATT. LOW	Replace battery.
BLACK PRIMER LEVEL LOW	Prepare to add black primer.
CLEAR PRIMER LEVEL LOW	Prepare to add clear primer.
FELT SPOOL LOW	Prepare to load a new spool of felt.
FELT SPOOL EMPTY	Load a new spool of felt.
CLEAR PRIMER VOLUME FAULT	This fault remains until the next part is run and the part strobe detects a satisfactory part.
CLEAR COUNTER FAULT	Check meter or high-speed counter.
SYSTEM E-STOP PRESSED	Pull out the E-STOP button and press START.
MASTER RELAY OFF	Verify that the E-STOP button is out. Press START to turn on the MASTER RELAY.
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.
BLACK COUNTER FAULT	Check meter or high-speed counter.

Fault Lights *(contd)*

Table C-7 lists how to access the **Alarm History** screen and return to the **Main Menu**.

Table C-7 **Reel to Reel Dispenser Help** Screen Functions

Touch ...	To ...
F6	Go to the **Alarm History** screen.
F10	Return to the **Main Menu.**

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Screen C-6 Fault Lights

Black Primer Fill

See Screen C-7.

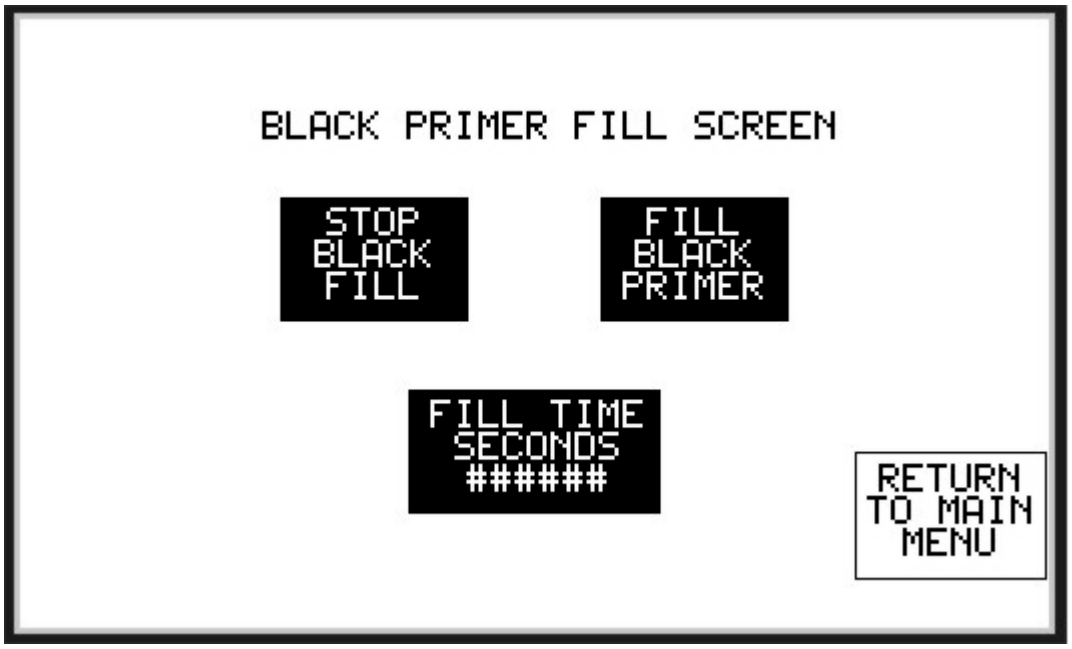
Use the **Black Primer Fill** screen during black primer fill operations.

Refer to Table C-8.

This table lists the results of touching the buttons on the **Black Primer Fill** screen.

Table C-8 **Black Primer Fill** Screen Functions

Touch ...	To ...
STOP BLACK FILL	Stop black primer filling operations before the timer expires.
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.
RETURN	Return to the **Main Menu** screen.



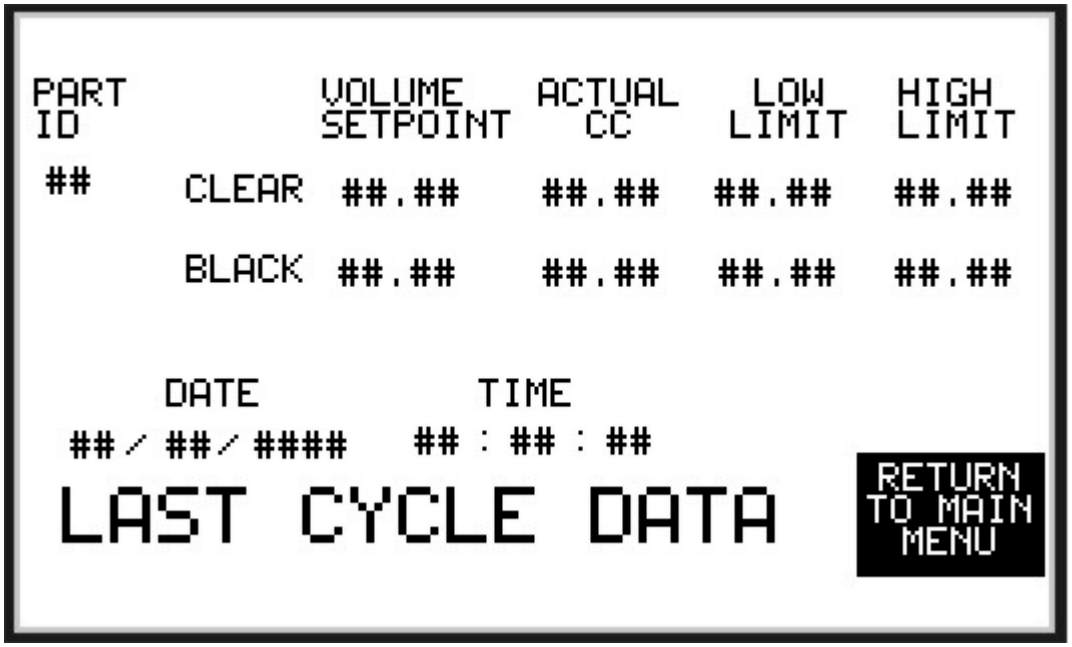
Screen C-7 Black Primer Fill

Last Cycle Data

See Screen C-8.

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

Touch RETURN TO MAIN MENU to display the **Main Menu** screen.



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Screen C-8 Last Cycle Data

Setup

See Screen C-9.

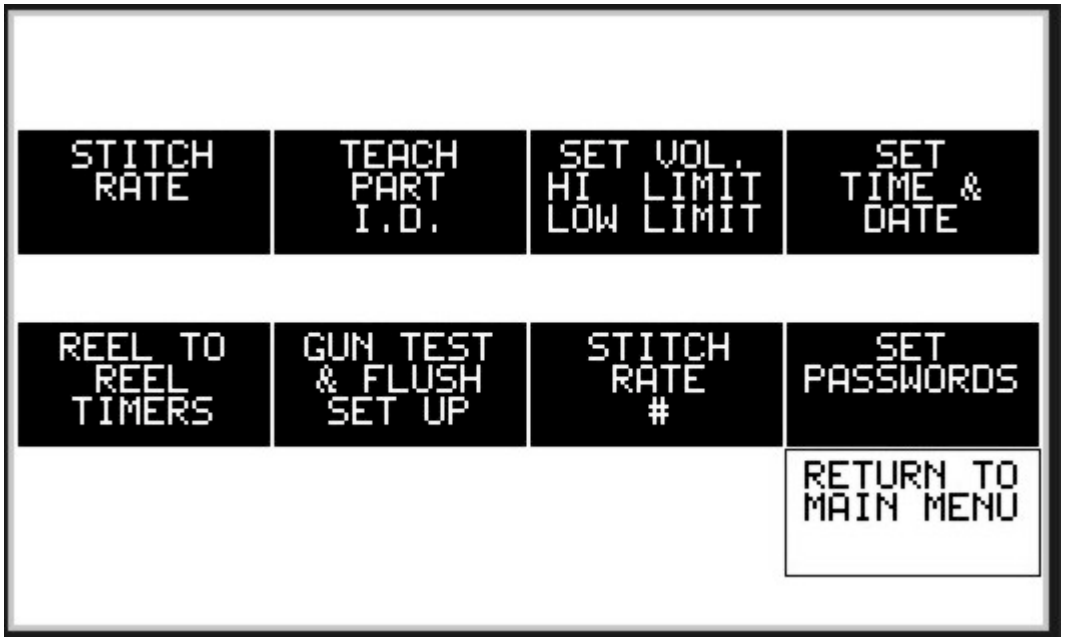
Use the **Go To Main Config.** screen to access any of the subscreens shown.

Refer to Table C-9.

This table lists the results of touching the buttons on the **Go To Main Config.** screen.

Table C-9 **Setup** Screen Functions

Touch ...	To ...
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.
SET TIME & DATE	Go to the **Set Time and Date** screen.
REEL TO REEL TIMERS	Go to the **Reel to Reel Timers** screen.
GUN TEST & FLUSH SETUP	Go to the **Gun Test and Flush Setup** screen.
STITCH RATE #	Enter a stitch rate number. Then, touch STITCH RATE to access the **Set Stitch Rate** screen
SET PASSWORDS	Go to the **Password** screen.
RETURN	Go to the **Main Menu** screen.



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Screen C-9 Main Configuration Menu

Set Stitch Rate

See Screen C-10.

Use the **Stitch Rate #. ##** 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. Set eight common stitch rates, then for each different Part ID, pick the common stitch rates necessary to run the appropriate pattern. Assign several stitch rates for use in the clear primer path, and others for the black primer path.

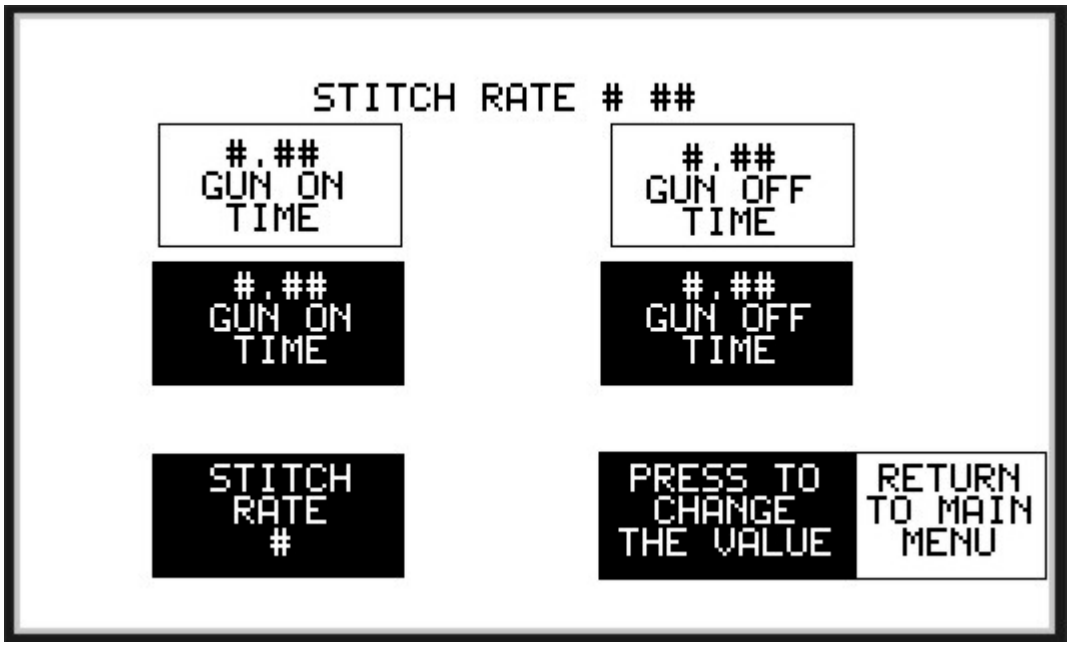
Stitch rate values can vary between the values of 0.05–2.00 seconds. These values will likely require fine-tuning as the dispensed paths are optimized.

Refer to Table C-10.

This table lists the results of touching the buttons on the **Stitch Rate #. ##** screen. The following values are provided as a starting point.

Table C-10 **Stitch Rate #. ##** Screen Functions

Touch ...	To ...
#.## GUN ON TIME and use the keypad	Program the length of time primer gun will be on for the applicable stitch rate.
#.## GUN OFF TIME and use the keypad	Program the length of time primer gun will be off for the applicable stitch rate.
STITCH RATE #	Select and set a stitch rate: **Stitch Rate #1**—suggested stitch rate for this is 200 ms ON and 0 ms OFF **Stitch Rate #2**—suggested stitch rate for this is 175 ms ON and 150 ms OFF **Stitch Rate #3**—suggested stitch rate for this is 150 ms ON and 150 ms OFF **Stitch Rate #4**—suggested stitch rate for this is 125 ms ON and 150 ms OFF **Stitch Rate #5**—suggested stitch rate for this is 200 ms ON and 200 ms OFF **Stitch Rate #6**—suggested stitch rate for this is 175 ms ON and 200 ms OFF **Stitch Rate #7**—suggested stitch rate for this is 150 ms ON and 200 ms OFF **Stitch Rate #8**—suggested stitch rate for this is 125 ms ON and 200 ms OFF
PRESS TO CHANGE VALUE	Change the stitch rate values.
RETURN	Return to the **Main Menu** screen.



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Screen C-10 Stitch Rate

Teach Setpoints

See Screen C-11.

Use the **Teach Setpoints** screen during programing of the Part into the robot program. To program Part ID, run a good parrt. Teach the Part ID to the robot. The controller calculates the cc's, dispensed for that Part ID and the programmer determines the high and low acceptable parameters on the **Set Limits** screen.

FLOW SET POINT displays the current value set for the primer cc setpoint for both clear and black primer. ###### FLOW LAST PART displays the actual volume of clear and black primer dispensed for the last part run. GUN OFF indicates the gun status. ## PART ID indicates the current Part ID signal being sent from the robot.

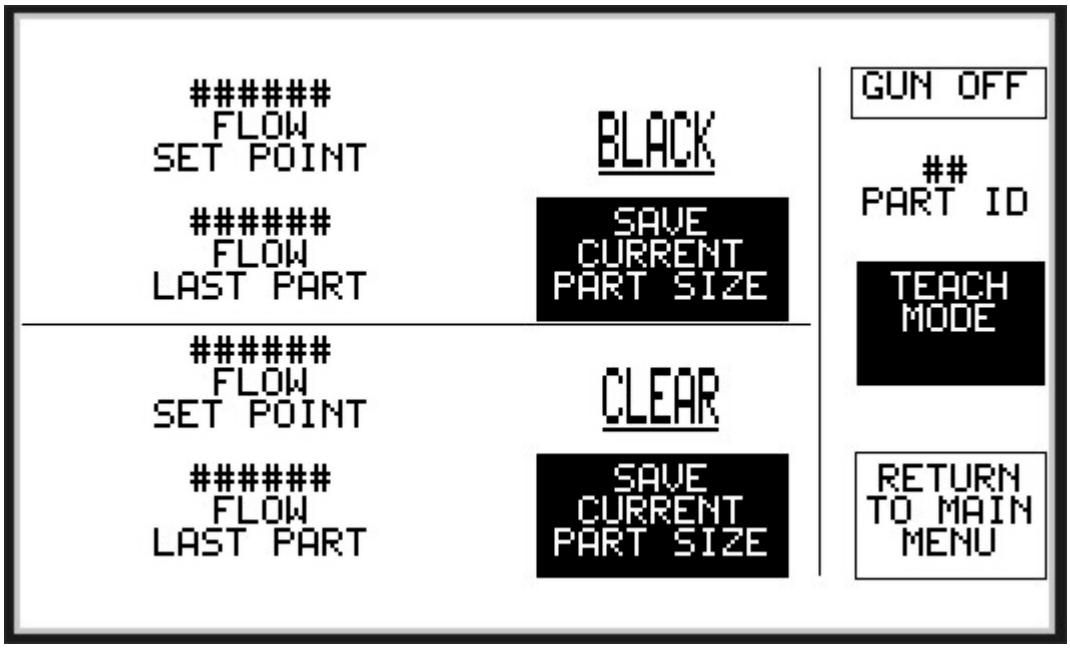
Teach Setpoints *(contd)*

Refer to Table C-11.

This table lists the results of touching the buttons on the **Teach Setpoints** screen.

Table C-11 **Teach Setpoints** Screen Functions

Touch ...	To ...
SAVE CURRENT PART SIZE	Save the FLOW LAST PART value as the new FLOW SET POINT.
TEACH MODE	Switch between TEACH and AUTO MODE.
RETURN	Return to the **Main Menu**.



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Screen C-11 Teach Setpoints

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 touch the GO TO REEL TO REEL MOD. button at the **Main Menu**.

1. Select **Go to Setup** screen.
2. Touch 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, touch the SAVE CURRENT PART SIZE button to save the dispense date for the clear and black primer guns.

Set Limits

See Screen C-12.

Use the **Set Limits** screen to set the high and low limits of the flow setpoint parameters. ###### CURRENT SET POINT displays the values currently set for flow setpoint.

Example of a Limit

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

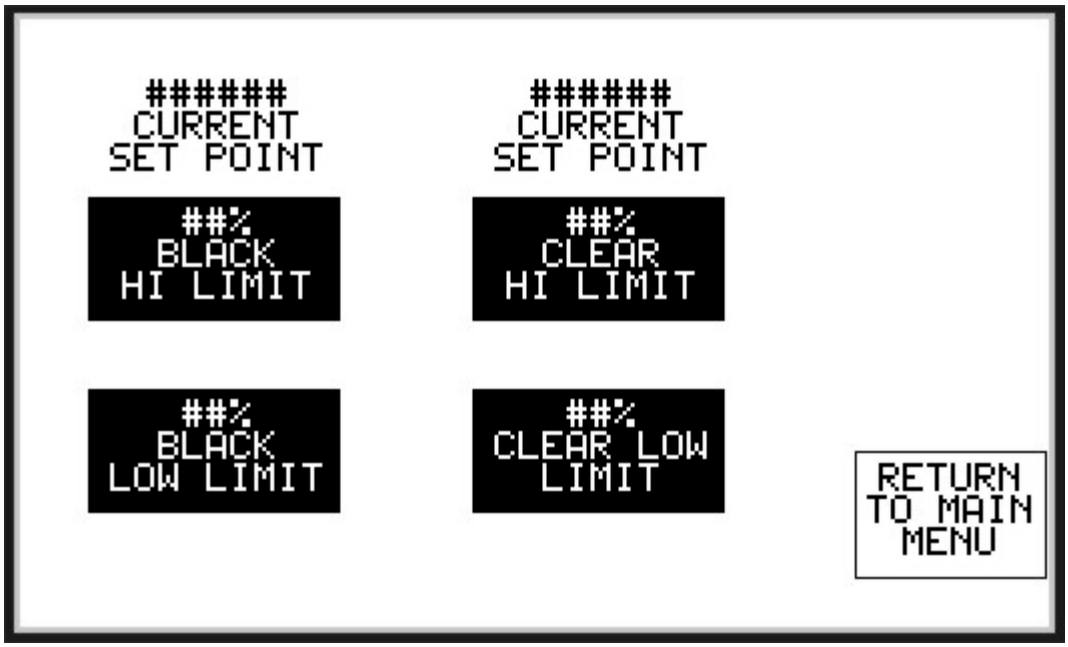
Set Limits (contd)

Refer to Table C-12.

This table lists the results of touching the buttons on the **Set Limits** screen.

Table C-12 **Set Limits** Screen Function

Touch ...	To ...
##% 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-12 Set Limits

Gun Test and Flush Setup

See Screen C-13.

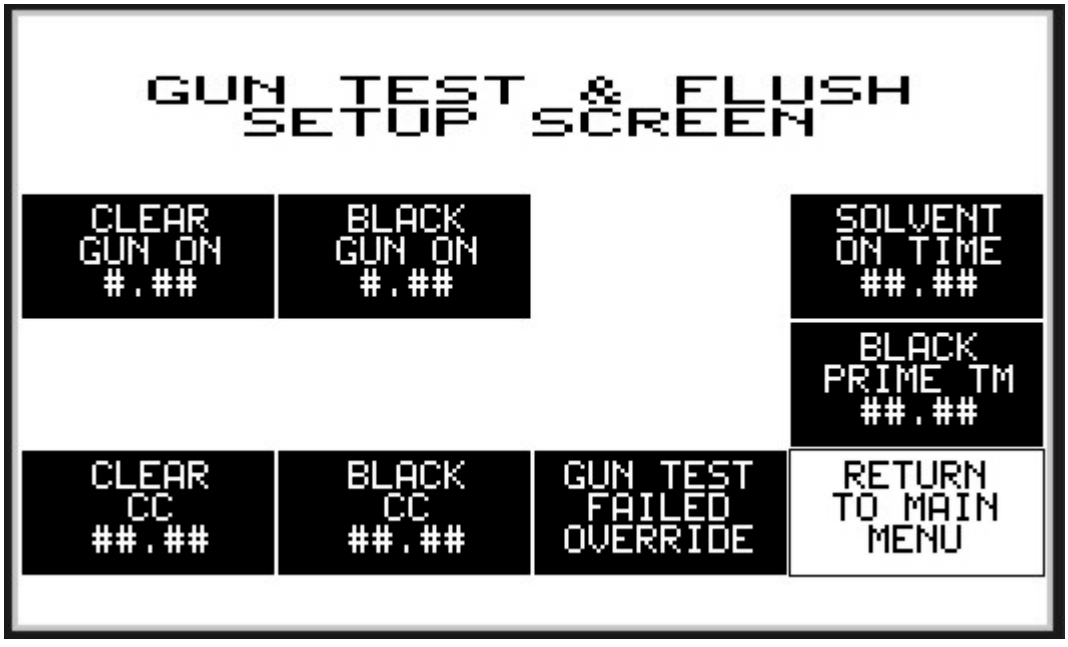
Use the **Gun Test and Flush Setup** screen to program the values shown on the **Robot Applicator Tool** screen.

Refer to Table C-13.

This table lists the results of touching the buttons on the **Gun Test and Flush Setup** screen.

Table C-13 **Gun Test and Flush Setup** Screen Function

Touch ...	To ...
CLEAR GUN ON #.##	Program the time in seconds that the clear primer gun will be on during the test.
BLACK GUN ON #.##	Program the time in seconds that the black primer gun will be on during the test.
SOLVENT ON TIME ##.##	Program the time in seconds that the solvent module will be on in order to flush the black primer gun.
BLACK PRIME TM ##.##	Program the time in seconds that the black primer gun will be on in order to prime itself.
CLEAR CC ##.##	Program the amount of clear primer to expect for the set Gun On time.
BLACK CC ##.##	Program the amount of black primer to expect for the set Gun On time.
GUN TEST FAILED OVERRIDE	Continue to dispense even though the gun test failed because the volumes did not stay within the parameters. In this state, the fault is still present but is being overridden. To clear the fault, correct the dispensing conditions and run a good test.
RETURN	Return to the **Main Menu.**



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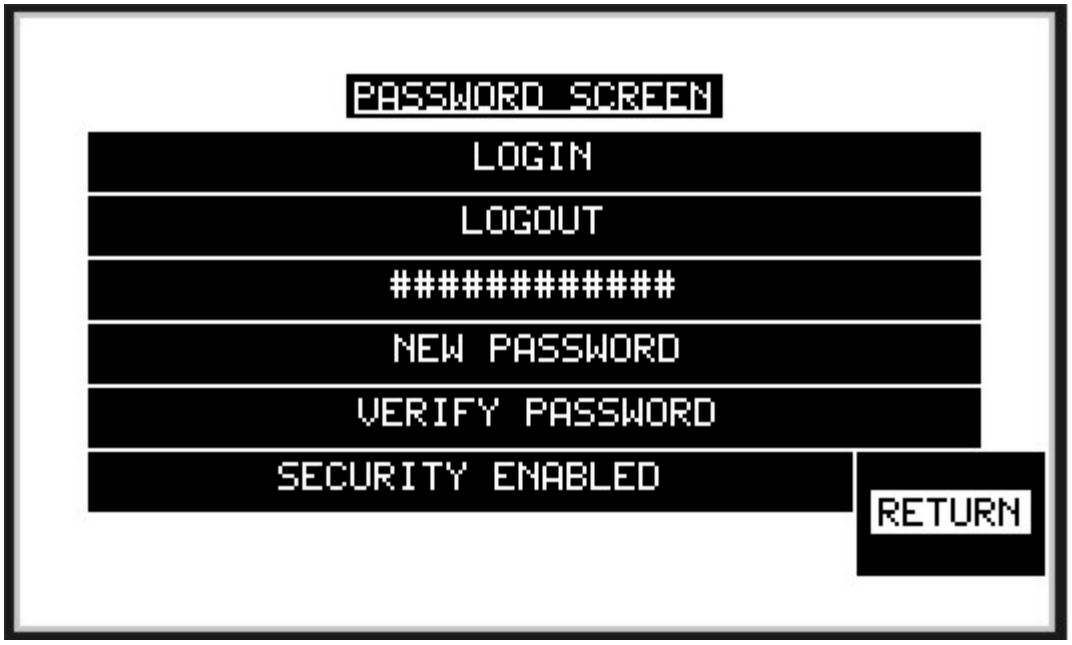
Screen C-13 Gun Test and Flush Setup

Password Screen

See Screen C-14.

Personnel with a Supervisor security level can assign passwords and security levels to users from this screen.



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Screen C-14 Password Screen

Security Levels

Refer to Table C-14.

The security levels determine which functions the user can access. There are three security levels.

Table C-14 Security Levels

At the ... Level	The user can access ...
Operator	the following screens: MAIN MENU FAULT LIGHTS ALARM HISTORY HELP MENU LAST CYCLE DATA MANUAL FEEDER MANUAL FLUID DISPENSE
Maintenance	all privileges at the Operator level, plus the following screens: MAIN CONFIGURATION MENU BLACK PRIMER FILL MENU GUN TEST AND FLUSH SETUP FTF TIME SETUP TIME SETUP SET LIMITS STITCH RATE SETUP TEACH SETPOINTS
Supervisor	all privileges at the Operator and Maintenance levels, plus the PASSWORD screen.