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In this manual, the words **WARNING**, **CAUTION** and **NOTE** are used to emphasize important safety information as follows:

**WARNING**
- Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

**CAUTION**
- Hazard or unsafe practices which could result in minor injury or equipment damage.

**NOTE**
- Important installation, operation or maintenance instructions information.

### WARNING

**STATIC CHARGE**
Fluid may develop a static charge that must be dissipated through proper grounding of the equipment, objects to be sprayed and all other electrically conductive objects in the dispensing area. Improper grounding or sparks can cause a hazardous condition and result in fire, explosion or electric shock and other serious injury.

**ELECTRIC SHOCK / GROUNDING**
Improper equipment grounding, poor ventilation, open flame or sparks can cause hazardous conditions and result in fire or explosion and serious injury.

**PINCH POINT HAZARD**
Moving parts can crush and cut. Pinch points are basically any areas where there are

**HIGH PRESSURE CONSID**
High pressure can cause serious injury. Relieve all pressure before servicing. Spray from the spray gun, hose leaks, or ruptured components can inject fluid into your

**WEAR RESPIRATOR**
Toxic fumes can cause serious injury or death if inhaled. Wear a respirator as recommended by the fluid and solvent manufacturer's Material Safety Data Sheet.

**TOXIC FLUID & FUMES**
Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, injected or swallowed. **LEARN and KNOW** the specific

**FIRE AND EXPLOSION HAZARD**
Improper equipment grounding, poor ventilation, open flame or sparks can cause a

**PROP 65 WARNING**
WARNING: This product contains chemicals known to the State of California

---

**READ THE MANUAL**
Before operating finishing equipment, read and understand all safety, operation and

**OPERATOR TRAINING**

**EQUIPMENT MISUSE HAZARD**
Equipment misuse can cause the equipment to rupture, malfunction, or start unexpect-

**LOCK OUT / TAG-OUT**
Failure to de-energize, disconnect, lock out and tag out all power sources before performing equipment maintenance could cause serious injury or death.

**AUTOMATIC EQUIPMENT**
Automatic equipment may start suddenly without warning.

**PRESSURE RELIEF PROCEDURE**
Always follow the pressure relief procedure in the equipment instruction manual.

**KEEP EQUIPMENT GUARDS IN PLACE**

**KNOW WHERE AND HOW TO SHUT OFF THE EQUIPMENT IN CASE OF AN EMERGENCY**

**WEAR SAFETY GLASSES**
Failure to wear safety glasses with side shields could result in serious eye injury or

**INSPECT THE EQUIPMENT DAILY**
Inspect the equipment for worn or broken parts on a daily basis. Do not operate the

**NEVER MODIFY THE EQUIPMENT**
Do not modify the equipment unless the manufacturer provides written

**NOISE HAZARD**
You may be injured by loud noise. Hearing protection may be required when using

**PROJECTILE HAZARD**
You may be injured by venting liquids or gases that are released under

---

It is the responsibility of the employer to provide this information to the operator of the equipment.

For further safety information regarding this equipment, see the General Equipment Safety Booklet (77-5300).
1: Introduction

The GEMS system is designed to accurately mix most two component (2K) liquid coatings. It will supply any low or medium-pressure manual or automatic spray gun up to 1000 psi fluid pressure and can easily handle very low flow rates or high ratio materials (greater than 20:1). The system uses real-time metering to accurately dispense and mix the resin and hardener on-ratio regardless of varying flow rate as seen in real world paint applications such as feathering or rapid triggering with manual guns.

The system is easily set up and operated with a 7” touch screen. Access to system parameters and usage data is restricted via password protection. The Acid-Catalyst version of the machine allows the unit to be used with 2K paints that utilize organic acid catalysts.

GEMS systems are configurable with many options and accessories:
- Up to 5 paint colors
- Gun flush boxes
- Pedestal Stand
- Stack light
- Atomizing air cut-off
- 2nd gun capability

See section 14 in this manual for information on accessory equipment.

1.1: Features

The GEMS System has unique features that provide superior benefits:

Continuous Flow—The mix manifold is designed to optimize mix quality and minimize internal volume by receiving Resin (Component A) and Hardener (Component B) continuously.

Accurate Dispensing—Control and positioning of the B metering pump is precise. An electronically controlled stepper motor with integral linear actuator allow for dispense from 2cc to 200cc per minute, and ratios from 10:1 to 100:1. Ratio tolerance down to 1% is possible.

Ease of Use—The touchscreen user interface is easy to learn and efficient to use. It provides control of the system with few actions, along with real-time data and in-depth troubleshooting when alarms occur.

Easily Configurable—Use up to five different paint resins and up to two spray guns. Flush boxes, atomizing air control, and other options and accessories can be added at any time.

Programmable Flushing—Set unique flushing options specific to material needs.

Mounting Options—The system can be mounted to a wall and plumbed into an existing workspace, or it can be bolted to the floor with an available pedestal stand.

Alarm Warnings—The alarm system warns the user of system errors and suggests possible solutions. Help screens provide troubleshooting information to remedy system alarms.

Modular Design—Sub-assemblies are easily and quickly removed for maintenance and repair.
1.2: System Part Numbering

**E2A-1101**

- **Number of Colors:**
  - 1 = 1 Color
  - 2 = 2 Color
  - 3 = 3 Color
  - 4 = 4 Color
  - 5 = 5 Color

- **Gun Flush Boxes:**
  - 0 = none
  - 1 = 1 Flush Box
  - 2 = 2 Flush Boxes

- **In-booth fluid panel:**
  - 0 = no in-booth capability
  - 1 = In-booth color changer and fluid panel setup with 50' (15.2m) cables and tubing bundle

- **Low / High Pressure:**
  - 0 = 250 psi max
  - 1 = 1000 psi max

If the example number shown above was ordered the customer would receive the following:
Binks GEMS AC system for 1 color, one gun flush box, no in-booth capability, and 0-1000 psi range.

1.3: Technical Specifications

<table>
<thead>
<tr>
<th>TECHNICAL SPECIFICATIONS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Working Air Pressure</td>
<td>105 psi</td>
<td>7.2 bar</td>
</tr>
<tr>
<td>Optimal Working Air Pressure</td>
<td>75-105 psi</td>
<td>5.2—7.2 bar</td>
</tr>
<tr>
<td>Max Inlet Fluid Pressure</td>
<td>1000 / 250 psi</td>
<td>69 / 17.2 bar</td>
</tr>
<tr>
<td>Max Dispense Pump Flow Rate</td>
<td>7 oz/min</td>
<td>200 cc/min</td>
</tr>
<tr>
<td>Min Dispense Pump Flow Rate</td>
<td>0.07 oz/min</td>
<td>2 cc/min</td>
</tr>
<tr>
<td>&quot;A&quot; Side Flowmeter Range</td>
<td>1.3-64 oz/min</td>
<td>40-1900 cc/min</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>41-122 Fahrenheit</td>
<td>5-50 Celsius</td>
</tr>
<tr>
<td>System Weight</td>
<td>130-150 lbs.</td>
<td>59-68 Kg</td>
</tr>
<tr>
<td>Viscosity Range of Fluid</td>
<td>20-3000 cPs</td>
<td></td>
</tr>
<tr>
<td>Mixing Ratio Range</td>
<td>10:1 – 100:1</td>
<td></td>
</tr>
<tr>
<td>Ratio Tolerance Range</td>
<td>Up to +/- 1%</td>
<td></td>
</tr>
<tr>
<td>Wetted Parts</td>
<td>300 series stainless steel, PTFE, perfluoroelastomer, UHMW polyethylene</td>
<td></td>
</tr>
<tr>
<td>External Power Requirements</td>
<td>100-240 VAC, 50-60Hz. 1.4 Amp, 16 AWG power</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>Indoor use, pollution degree (2)</td>
<td></td>
</tr>
</tbody>
</table>
2: Wall Mount Dimensions

Shown with standard wall mount and accessory stack light kit (240-3115)

Wall mounting requirements:

- Ensure wall is able to support weight of complete system, including air and fluid hoses and other connected devices. (Minimum 200 lbs. [91 kg])
- Ensure clearance for electrical and fluid connections to unit, and door swing radius.
- Bolt frame sections to wall or panel using minimum 4 each of 3/8” lag screws or cap screws with flat washers.
2.1: Floor Stand Dimensions

Shown with accessory floor stand kit (240-3160) and accessory stack light kit (240-3115)

Stand mounting requirements:

Bolt stand to floor per recommendations in **77-3092 Stand Assembly Instructions**.
3: Installation Diagram for Non-Hazardous Locations

Wall or stand-mounted systems

3.1: Connecting Direct Power

If direct connection to power disconnect is preferred to AC power cord, use AC Conduit Kit (part#: 76453). Installation should only be performed by a qualified electrician. Connect power as follows:

1. Remove AC Inlet assembly. Install 76453 kit.
2. Use a compatible cord grip / strain relief.
3. Connect power cord to the appropriate terminals as shown at left.
4. For the complete electrical schematic please see the electrical diagram section in the Maintenance and Repair Manual 77-2983.

AC LOCK OUT SWITCH: Top right corner of control enclosure
**WARNING**

Before making electrical, air, and fluid connections to GEMS, be sure to understand and verify all requirements for installation, including but not limited to: electrical codes, OSHA requirements, NFPA requirements, and all applicable local codes and ordinances.

Read and understand all operating manuals for connected equipment. Do not supply GEMS with higher fluid or air pressures than recommended in the technical specifications section of this manual.

---

**WARNING**

Control enclosure cannot be placed in a hazardous location. Do not use equipment not approved for hazardous locations. Do not modify system equipment.

---

**WARNING**

To maintain non-hazardous classification of this equipment, the dispense pump and fluid panel components and assemblies must be monitored for leaks and serviced regularly to prevent leaks from occurring. If a leak is discovered the system must be immediately shut down, de-energized, and repaired to correct the problem.

---

**WARNING**

This equipment is only to be used in the manner specified. If not used in the specified manner the protection provided by the equipment may be impaired.

---

**WARNING**

Do not replace the detachable mains supply power cord with inadequately rated cords.
4 : Component Overview

Optional equipment shown for illustration
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Universal AC– Inlet. Select the appropriate cable as needed (USA / Canada cable Part # 76449).</td>
<td>240-3052</td>
</tr>
<tr>
<td>2</td>
<td>AC Lock Out Switch. The on/off lock out switch for system power. Can be locked off for lockout / tagout.</td>
<td>A12411-00</td>
</tr>
<tr>
<td>3</td>
<td>Air Cutoff Valve that controls gun atomizing air. Standard with gun flush boxes, but also available as add on kit.</td>
<td>Kit P/N: 240-3118</td>
</tr>
<tr>
<td>4</td>
<td>Catalyst Pump. Driven by a motor, the pump dispenses the calculated volume of hardener or catalyst to the mix manifold to provide the correct ratio of mixed material.</td>
<td>240-3208 (Fluid End)</td>
</tr>
<tr>
<td>5</td>
<td>Hardener Tube Assembly. Tube assembly from output of catalyst pump to mix manifold.</td>
<td>240-3242</td>
</tr>
<tr>
<td>6</td>
<td>Mix Manifold contains a valve to start and stop the flow of paint to the gun, a built-in check valve for catalyst, and a central chamber to pre-mix the coating components.</td>
<td>240-3240</td>
</tr>
<tr>
<td>7</td>
<td>Static mix assembly. Contains replaceable mix elements.</td>
<td>240-3231</td>
</tr>
<tr>
<td>8</td>
<td>Resin hose assembly. Component A hose connects flow meter to AE valve.</td>
<td>240-3241</td>
</tr>
<tr>
<td>9</td>
<td>Gear flow meter with up to 1900cc / min measurement capability.</td>
<td>A12712-01</td>
</tr>
<tr>
<td>10</td>
<td>Solvent Meter. Measure flushing solvent usage with accessory solvent meter.</td>
<td>Accessory Kit: 240-3213</td>
</tr>
<tr>
<td>11</td>
<td>Color Stack. A series of color change valves (CCV’s) and manifold blocks for up to 5 different coating resin colors and solvent valve.</td>
<td>240-3230</td>
</tr>
<tr>
<td>12</td>
<td>Touch Screen Display. 7” resistive touch interface includes USB and Ethernet capability. See section 7 for operating instructions.</td>
<td>240-3172</td>
</tr>
<tr>
<td>13</td>
<td>Stack Light. Accessory stack lights for 360 degree visibility of in-use/alarm indication.</td>
<td>Accessory Kit: 240-3115</td>
</tr>
<tr>
<td>14</td>
<td>Optional Floor Pedestal Stand</td>
<td>Accessory Kit: 240-3160</td>
</tr>
</tbody>
</table>

**NOTE**

Accessory items not included in system part number; may be installed by distributors.
4.1: Control Enclosure Detail

- **USB flash drive**: stores all Job and Alarm history.
- **Main board**: contains all input, output, and control processing.
- **Power supply rail**: contains 24V DC power supply, fuses, and terminal blocks.
- **Solenoid stack**: operates fluid panel and air cutoff valves.
- **Pressure switches**: used with gun flush boxes to signal “gun in the box” and allow safe flushing.
- **Air flow switches**: used to indicate triggering of a spray gun to the system control.
- **Linear actuator**: controlled by the Main Board to move the B Pump. An attached linear potentiometer indicates the pump’s position at any time.
5 : Air Connections

Air pressure for the control enclosure should range from 75-100 psi (5 to 7 bar) for proper actuation of the system valves. Clean, dry (-40F [-40C] dew point), regulated compressed air is recommended for use with all pneumatic components in this system. Air filters, coalescers, regulators, and dryers are not included with the system. Consult your representative for details concerning air control equipment.

Air pressure for spray gun atomizing air should be greater than 10 psi (1.5 bar) for proper function of the air flow switches.

5.1: Control Enclosure Air Connections

<table>
<thead>
<tr>
<th>Number</th>
<th>Hose #</th>
<th>Connecting Bulk</th>
<th>Description</th>
<th>Tube OD</th>
<th>Connecting Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>—</td>
<td>A1</td>
<td>Main air inlet</td>
<td>—</td>
<td>1/4 npt female</td>
</tr>
<tr>
<td>A2</td>
<td>—</td>
<td>A2</td>
<td>Main air exhaust</td>
<td>—</td>
<td>1/4 npt female</td>
</tr>
<tr>
<td>A3</td>
<td>—</td>
<td>—</td>
<td>Gun 1 Atomizing air inlet</td>
<td>—</td>
<td>1/4 nps male</td>
</tr>
<tr>
<td>A4</td>
<td>—</td>
<td>—</td>
<td>Gun 1 Atomizing air outlet</td>
<td>—</td>
<td>1/4 nps male</td>
</tr>
<tr>
<td>A5</td>
<td>—</td>
<td>—</td>
<td>Gun 2 Atomizing air inlet</td>
<td>—</td>
<td>1/4 nps male</td>
</tr>
<tr>
<td>A6</td>
<td>—</td>
<td>—</td>
<td>Gun 2 Atomizing air outlet</td>
<td>—</td>
<td>1/4 nps male</td>
</tr>
<tr>
<td>A7</td>
<td>—</td>
<td>—</td>
<td>Solenoid manifold air inlet</td>
<td>1/4”</td>
<td>—</td>
</tr>
<tr>
<td>A8</td>
<td>—</td>
<td>—</td>
<td>Solenoid manifold exhaust</td>
<td>1/4”</td>
<td>—</td>
</tr>
<tr>
<td>A9</td>
<td>ACO</td>
<td>B16</td>
<td>Gun 1 Atomizing air control</td>
<td>5/32”</td>
<td>—</td>
</tr>
<tr>
<td>A10</td>
<td>ACO</td>
<td>B16</td>
<td>Gun 2 Atomizing air control</td>
<td>5/32”</td>
<td>—</td>
</tr>
<tr>
<td>A11</td>
<td>GIB1</td>
<td>B15</td>
<td>Gun In Box 1 (GIB1) Air Signal</td>
<td>5/32”</td>
<td>—</td>
</tr>
<tr>
<td>A12</td>
<td>GIB2</td>
<td>B16</td>
<td>Gun In Box 2 (GIB2) Air Signal</td>
<td>5/32”</td>
<td>—</td>
</tr>
</tbody>
</table>
### 5.2: Fluid Panel Air Connections

<table>
<thead>
<tr>
<th>Location</th>
<th>Hose #</th>
<th>Connecting Bulk-</th>
<th>Description</th>
<th>Tube OD</th>
<th>Connecting Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>A14</td>
<td>B1</td>
<td>B01</td>
<td>Dispense pump top inlet signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A15</td>
<td>B3</td>
<td>B03</td>
<td>Dispense pump bottom inlet signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A16</td>
<td>B2</td>
<td>B02</td>
<td>Dispense pump top outlet signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A17</td>
<td>B4</td>
<td>B04</td>
<td>Dispense pump bottom outlet signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A19</td>
<td>A0</td>
<td>B06</td>
<td>Solvent flush signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A20</td>
<td>AE</td>
<td>B07</td>
<td>Resin Enable Valve signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A21</td>
<td>A1</td>
<td>B08</td>
<td>Color 1 signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A22</td>
<td>A2</td>
<td>B09</td>
<td>Color 2 signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A23</td>
<td>A3</td>
<td>B10</td>
<td>Color 3 signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A24</td>
<td>A4</td>
<td>B11</td>
<td>Color 4 signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A25</td>
<td>A5</td>
<td>B12</td>
<td>Color 5 signal</td>
<td>5/32&quot;</td>
<td>1/8 npt</td>
</tr>
<tr>
<td>A26</td>
<td>TRG2</td>
<td>B13</td>
<td>Gun Box—Trigger gun 2 signal</td>
<td>5/32&quot;</td>
<td>---</td>
</tr>
<tr>
<td>A27</td>
<td>TRG1</td>
<td>B14</td>
<td>Gun Box—Trigger gun 1 signal</td>
<td>5/32&quot;</td>
<td>---</td>
</tr>
</tbody>
</table>

---

*View of fluid panel*
5.2: Air Connection Descriptions

Use this list for additional information regarding the GEMS air connections. If needed, refer to the previous pages for detail regarding hose numbering, and the physical locations of each of these air connections. For information regarding fluid connections, see 6.1: Fluid Panel Connections.

A1 - Main air to the control enclosure; powers all solenoids for unit operation. Make sure clean and dry 75-100psi air is supplied to the unit. 1/4” NPT female connection.

A2 - Control Enclosure exhaust port. 1/4” NPT with muffler.

A3 - Atomizing air inlet to gun 1. 1/4” NPS male connection. Requires clean, regulated air from 20 to 100 psi (1.5 to 7 bar) as appropriate for paint atomization.

A4 - Atomizing air outlet (to gun 1). 1/4” NPS male connection. Connect air hose to air inlet of spray gun 1.

A5 - Atomizing air inlet to gun 2. 1/4” NPS male connection. Requires clean, regulated air from 20 to 100 psi (1.5 to 7 bar) as appropriate for paint atomization.

A6 - Atomizing air outlet (to gun 2). 1/4 NPS male connection. Connect air hose to air inlet of spray gun 2.

A7 - Solenoid Manifold air inlet. Must be energized with minimum pressure of 75psi for proper operation. 1/4” OD tube.

A8 - Solenoid manifold exhaust port. All exhaust air should be vented out of the control enclosure to prevent moisture contamination of electrical components. 1/4” OD tube.

A9 & A10 - Optional atomization air shut-off signal (ACO). Signal comes from Solenoid ACO, or from Gun Box ACO if present. Signal is split with y-connector if two guns are used without gun flush boxes.

A11 - Gun In Box 1 signal (GIB1). Lets the system know that the gun is locked in the flush box and is ready to flush or load.

A12 - Gun In Box 2 signal (GIB2) lets the system know that the gun is locked in the flush box and is ready to flush or load.

A14 - Top inlet valve of dispense pump (B1). Sequencing of pump controlled by the board, and solenoid valves trigger operation so that the proper fluid pathways are opened and closed. 1/4” NPT female.

A15 - Bottom inlet valve of dispense pump (B2). Air signal from control opens the CCV. 1/4” NPT female.

A16 - Top outlet valve of dispense pump (B3). Air signal from system opens the CCV. 1/4” NPT female.

A17 - Bottom outlet valve of dispense pump (B4). Air signal from the system opens the CCV. 1/4” NPT female.

A19 - Solvent valve signal (A0). Controls the use of solvent for flushing, color changes, and during air/solvent chops.

A20 - Resin Enable valve signal (AE). Controls the flow of resin for normal spraying and when not in use such as in Alarm states, and when performing a Hardener Prime.

A21 - Color 1 signal (A1). Controls the flow of resin color 1.

A22 - Color 2 signal (A2). Controls the flow of resin color 2.

A23 - Color 3 signal (A3). Controls the flow of resin color 3.

A24 - Color 4 signal (A4). Controls the flow of resin color 4.

A25 - Color 5 signal (A5). Controls the flow of resin color 5.

A26 - Gun 2 trigger signal (TRG2). For use with gun flush boxes, aids in the automatic flushing process.

A27 - Gun 1 trigger signal (TRG1). For use with gun flush boxes, aids in the automatic flushing process.
6 : Fluid Connections

Material resins and hardeners may be supplied to the Binks GEMS circulating systems or pumping systems. Fluid must be delivered free from pressure spikes and surges, and entrained air must be avoided. If feeding directly from a pump, a fluid regulator is recommended upstream from the color stack so that pulsations are not measured through the flow meter.

Fluid supplied to the Binks GEMS must also be free of contaminants and solid particles that may clog or jam the flow meter gears or other downstream components. Typical filtration for paint resins is 100 mesh or smaller. Contact your Binks representative for information regarding fluid supply and conditioning equipment.

For compression fittings with ferrules, tighten the ferrule nut 1 to 1.5 turns past finger tight. Do not over tighten, as exceeding 1.5 turns will likely cause the ferrules to cut through the tubing.

For pipe threads (NPT) use PTFE tape or other pipe thread sealant for stainless steel connections. If using tape, wrap clockwise two to three times around the threads. Ensure tape does not protrude beyond threads. If using liquid sealant, apply sealant bead completely around 2nd male thread.

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Connection Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Solvent Inlet</td>
<td>1/4&quot;NPT female</td>
</tr>
<tr>
<td>F2</td>
<td>Color 1 Inlet</td>
<td>1/4&quot; NPT female</td>
</tr>
<tr>
<td>F3</td>
<td>Color 2 Inlet</td>
<td>1/4&quot; NPT female</td>
</tr>
<tr>
<td>F4</td>
<td>Color 3 Inlet</td>
<td>1/4&quot; NPT female</td>
</tr>
<tr>
<td>F5</td>
<td>Color 4 Inlet</td>
<td>1/4&quot; NPT female</td>
</tr>
<tr>
<td>F6</td>
<td>Color 5 Inlet</td>
<td>1/4&quot; NPT female</td>
</tr>
<tr>
<td>F8</td>
<td>Dispense Pump Inlet</td>
<td>1/4&quot; NPT female</td>
</tr>
<tr>
<td>F9</td>
<td>Mix manifold outlet (end of static mixer)</td>
<td>1/4&quot; NPS Male</td>
</tr>
<tr>
<td>F10</td>
<td>Solvent inlet (Accessory solvent meter)</td>
<td>1/4” NPS Male</td>
</tr>
</tbody>
</table>

**NOTE**

The inlet fluid pressure of the Dispense Pump should always be maintained 5 to 10% above the outlet pressure. This ensures proper operation of the Dispense Pump.
6.1: Fluid Panel Fluid Connections

F1 - Solvent inlet (color stack). The flush solvent inlet is located at the top right side of the color stack. A 1/4” NPT male threaded check valve is supplied in the inlet of the color stack. Attach solvent supply line or solvent meter hose to 1/4” NPT elbow.

F2-F6 — The optional number of colors (1-5). Port threads are 1/4” NPT female with plugs supplied in the back.

F8 - Inlet to Dispense Pump. 1/4” NPT female inlet. Connect hardener/catalyst supply directly or to Dispense Pump Flow Sensor if equipped. If feeding directly from a pump, a fluid regulator between the pump and resin flow meter / color stack is recommended.

F9 - Mix manifold outlet. Connected to static mixer assembly (240-3122). The end of the static mixer will have a 3/8” NPS male connector. Connect the spray gun’s fluid hose to this fitting.

F10 - Solvent Meter Kit inlet. Fitting used is a 1/4” NPS for solvent inlet line. Outlet of meter connects to F1.

CAUTION

The check valve at F1 is required for proper operation, do not remove!
6.2: Valve Numbering

These labels are related to the solenoids located inside the control enclosure. Note that resins are referred to Component A material, and the valves are labeled accordingly with “A” for individual colors. Valves on the dispense pump control the catalyst/hardener component B and are labeled B1-B4. See below for additional detail.

**Component A**

A0: Solvent enable valve. Controls flushing solvent.

A1: Component A color #1 enable valve. Activates when color is selected.

A2: Component A color #2 enable valve. Activates when color is selected.

A3: Component A color #3 enable valve. Activates when color is selected.

A4: Component A color #4 enable valve. Activates when color is selected.

A5: Component A color #5 enable valve. Activates when color is selected.

A7: Flushing air valve. Controls flushing air for color loads and flush sequences.

AE: Component A Enable valve. Allows resin material to be set to the mix manifold for static mixing.

**Component B**

B1: Component B upper inlet valve.

B2: Component B upper outlet valve. Material travels through the body of this valve and out of the pump.

B3: Component B lower inlet valve. Material enters the pump through the body of this valve.

B4: Component B lower outlet valve.
7 : User Interface Guide

The touch screen display is used to control GEMS. The following pages identify the various screens and their associated controls. Read through this guide to understand how to use the user interface and operate GEMS on a daily basis. Press the corresponding buttons for an action, as described in the following pages.

7.1 : Home Screen Buttons

1. **Home**: This button can be pushed at any time to return the display to the Home Screen.

2. **Color**: Used to perform color changes and programmed flush sequences. Advances to the Color Change screen. Always visible.

3. **Mute**: Silence a sounding alarm. This button will NOT reset the alarm, it will only silence it until the alarm has been reset.

4. **Alarms**: Advances to the alarms screen to reset alarms or view alarm history and troubleshooting.

5. **Usage**: Advances to the usage and jobs screens for paint usage totals and job functions.

6. **Prime**: Advances to the Prime screen for loading paint colors, solvent, and hardener into the system.

7. **Settings**: Advances to the settings screens (password protected) to change system settings.

**NOTE**

If an alarm has not been reset, a flashing yellow background will display on the Home Screen. If so, the machine will not spray, and the Reset button (        ) should be used. See 8.6: Alarm Screen.
7.2: Home Screen Information

The Home Screen displays the GEMS current conditions and status. Valuable information like current flow rate, color number, ratio, pot life, pressures, and gun status are visible here.

1. Current flow rate: Flow rate (cc/minute) also displayed on the graph below.

2. Current Color: This is the color currently loaded. Zero (0) will be displayed if solvent is loaded, a color change failed, or a “A only” calibration has been performed.

3. Flow rate graph: Combination bar and line graphs that show current and last 75 seconds of spraying. The graph freezes when spraying stops or an alarm is triggered. The graph scale is adjustable via system settings.

4. Usage/Job Data: Shows the current job number, whether the job is active or paused, and current color usage for the job shown.

5. Target ratio: the programmed ratio of paint resin (A) to hardener (B)

6. Measured ratio: The ratio calculated by comparing the motion of the hardener pump and comparing it to the flow rate of paint resin through the flow meter.

7. B Pump inlet pressure: Monitors the inbound supply pressure to the hardener pump from the hardener supply. The upper and lower pressure transducers are used to measure the pressure depending on the direction of the Dispense Pump piston.

8. B Pump Outlet Pressure: Monitors the outbound pressure from the B pump to the mix manifold. The upper and lower pressure transducers are used to measure the pressure depending on the direction of the Dispense Pump piston.

9. Gun status: Shows if gun 1 or gun 2 is currently spraying with an animation. If the system is configured with only 1 gun, then gun 2 will not be displayed.

10. Pot Life display: Display the pot life remaining for each gun (if active).

11. Background Color: The background color will be white until an alarm is triggered, when it will change to flashing yellow.

12. USB Status: Indicates if USB is active.

13. Current time and date: Unit name and time stamp of unit.
7.3: Color Change Screen

Only this screen and the Home screen are accessed directly from every screen of the display. It is used for changing colors and flushing the system with the flush / load sequences programmed in the settings screens.

1. **Current/ Active Color**: This is the current color loaded in the system.

2. **New Color**: This is the field where the next color number to load is entered. See below.

3. **Stop**: Stop the Color change action.

4. **1 Gun GO**: Starts the flush / load sequence for gun #1 only. The color # entered in the **New Color** field will be loaded.

5. **2 Gun GO**: Starts the flush / load sequence for gun #1 and gun #2. The color # entered in the **New Color** field will be loaded. Only available if the system is configured for 2 guns and both guns are enabled.

6. **Batch**: Advances to the Batch screen. Only visible if a color other than 0 is loaded. See section 7.11 for Batch screen details.
### 7.4: Usage Screen

This screen tracks the global usage of resin and hardener, sorted by color number. If the solvent meter is installed the solvent usage will be visible at the bottom of this list. For additional information regarding jobs, see 7.10: Jobs.

1. **Resin (A):** The total volume of paint resin dispensed for each color. Measured in cc’s.

2. **Hardener (B):** The total volume of paint hardener dispensed for each color. Measured in cc’s.

3. **Jobs:** Advances to the Jobs screen. See section 7.10 for Jobs screen details.

4. **Reset:** The button used to reset the usage totals. Note this action requires the administrator password.

---

**NOTE:**
The clear/reset command is only accepted if the Administrator password is provided.
8.5: Prime Screen

Use this screen to prime the GEMS unit with Resin (A) and Hardener (B). Buttons will independently operate the Resin color valves (A0-A5), or the B Pump for material loading. Gun atomizing air must be off while priming. For resin priming, the active color valve will blink yellow for easy recognition. During catalyst priming, the open valves will turn green and an arrow will show the current direction of the pump rod motion.

1. **Color Valve**: The icon displaying which color valve is being opened when pressed.
   - Color 0 is reserved for flushing solvent
   - Colors 1-5 are for A material (resins)

2. **Color Stack Prime**: Press the button once to open the AE and selected color valve. Trigger the spray gun with atomizing air off to allow resin to flow. Press the button again to stop.

3. **B Pump Prime**: When pressed, the B Pump valves will open and the Pump will cycle. The gun must be triggered with atomizing air off for successful component B priming. Press the button again to stop.

4. **Flush Mode**: Use the Flush button to put the system in a continuous solvent chop process for flushing. It will timeout after 5 minutes.

**CAUTION**

Always follow the Prime mode with a color 0 (solvent) load to flush out the fluid lines and prevent unmixed material from being sprayed or hardening in the system.
This screen displays all of the available system alarms. If an alarm sounds it will be highlighted, and the Reset button must be pushed before the unit can spray again. Alarm history is also saved. Additional alarm information and troubleshooting can be found in 10: Alarm Guide. If an alarm has been disabled, the highlighted status will still display but the alarm will not sound. Tap the individual alarm icons for troubleshooting help.

1. **History**: Touch the History button to access a timeline of alarms and events. The last 40 events will be recorded. For more information see 7.7: Alarm History.

2. **Reset Button**: This button will reset all active alarms except for pot life. Pot life can only be reset by spraying out the load volume of material or starting a continuous flush. The reset button must be pushed if an Alarm has sounded to reset the state of the machine. Only reset if the alarm has been corrected.
7.7: Alarm History

Use this screen to see the system’s last 40 events. All events are saved to the system USB flash drive. To view alarms before the last 40 copy the alarm log from the USB.

Additional alarm information and troubleshooting can be found in section 10.

An alarm may be directly highlighted by tapping it on the touch screen. Tapping the selected alarm enables the Alarm Help screen for that alarm. See 7.8: Alarm Help Screen. Disabled alarms will show in the list.

1. **Back Arrow**: Press the back arrow to return to the alarm screen.

2. **Arrow Up**: Moves the highlighted bar up (back) in time. The last 40 events will be shown in the Alarm History. The entry at the bottom of the screen is the most recent.

3. **Arrow down**: Moves the highlighted bar down (forward) in time.

4. **HELP**: Pressing [HELP] will bring up a help screen for the given highlighted alarm.

---

### Alarm History

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Reset</td>
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<tr>
<td>2000 Jan01</td>
<td>00:00:00</td>
<td>Reset</td>
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<tr>
<td>2000 Jan01</td>
<td>00:00:00</td>
<td>Reset</td>
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<tr>
<td>2000 Jan01</td>
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<td>Reset</td>
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<td>2000 Jan01</td>
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<td>2000 Jan01</td>
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<td>2000 Jan01</td>
<td>00:00:00</td>
<td>Reset</td>
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<tr>
<td>2000 Jan01</td>
<td>00:00:00</td>
<td>Reset</td>
</tr>
<tr>
<td>2014 Nov21</td>
<td>11:39:33</td>
<td>Power ON</td>
</tr>
<tr>
<td>2014 Nov21</td>
<td>13:53:09</td>
<td>Power ON</td>
</tr>
<tr>
<td>2014 Nov21</td>
<td>13:54:33</td>
<td>Power ON</td>
</tr>
</tbody>
</table>
The Alarm Help screen is a quick reference guide to suggest possible causes of an alarm. If the system is in an alarm state the home screen background will flash white/yellow. For additional details regarding alarms, see the Maintenance and Repair Manual 77-2985. This example shows a No Resin Flow alarm.

1. **Cause:** A description of the alarm condition.

2. **Troubleshooting:** Troubleshooting tasks are listed in order of difficulty. Easier tasks are listed first. Items with lower probability or checks requiring disassembly are listed last.

3. **Back Arrow:** To return to the alarm history page, press the back arrow.
Select the settings button from the Home screen to access system settings and configuration. The button will bring the user to a password prompt for access. Access to view or change settings requires the use of a password.

### 7.9.1: Password Prompt

Passwords are required to perform certain system functions:
- Accessing setup screens to view or change settings.
- Erasing Job or Usage data.

There are two levels of password protection: User and Administrator.

The **User** password allows the user to:
- Change system settings (see section 8.11)
- Change gun flush / load sequence settings
- Perform a resin + hardener calibration

The **Administrator** password allows the user to perform the above, plus:
- Change ratios and cc/pulse values
- Perform resin only calibration
- Reset job and usage values
- Change time, password, name, and FTP settings
- Enable / disable alarms
- Set pump limits
- Change system configuration

Type the password then press the enter key (ENT) to accept it.

The default User password is 0 and the default Administrator password is 1.

---

**NOTE**

User and administrator passwords may be changed after entering the default Administrator password. Proceed to the set up password screen and enter the new password.
1. **Pot Life (min)**: Indicates the time remaining before mixed material becomes unusable, represented in minutes. The end of the pot life will result in a *Pot Life* alarm. The system will not reset the pot life value until the specified volume of material has been dispensed through the spray gun(s), either through spraying or flushing. The pot life will not reset if a second gun is loaded with paint but not spraying.

2. **Blow Off Time (sec)**: The time in seconds atomizing air may be triggered without spraying material. If the time is exceeded, the *No Resin Flow* alarm will sound. Useful for dusting parts immediately prior to spraying.

3. **Minimum Inlet Pressure (psi)**: This sets the low limit (in psi) that will trigger a *Low Inlet Pressure* alarm. Default is 10 psi.

4. **Maximum Outlet Pressure (psi)**: This sets the high limit (in psi) that will trigger a *High Outlet Pressure* alarm. Default is 150 psi.

5. **Solvent Meter (cc/pulse)**: Changes the pulse count for the accessory solvent meter. To verify this value, perform a color 0 Resin Only calibration.
6. **Ratio Alarm Tolerance %**: When the calculated ratio falls out of this tolerance, the ratio alarm will be triggered. The default value is 5%. Set this number in accordance with paint supplier recommendations.

7. **Resin Enable Hold Time (sec)**: The duration that the A Enable valve (AE) will stay open after the air flow switch signal is lost. Default is 15 seconds.

8. **Max Resin Flow Rate (cc/min)**: The limit of resin flow through the flow meter. Default is 2000 cc/min. This limit can vary depending on the flow meter equipped.

9. **Flow Rate Graph Scale (cc/min)**: The scale of the flow rate graph shown on the home screen. Default is 1000; max value is 4600.

10. **Flow Sensor Delay Time (sec)**: Not used with 1000 psi systems. For low pressure systems, this represents the ramp up time for the accessory Dispense Pump Flow Sensor. For high ratios where flow is very low, a longer time such as 5-10 seconds is recommended to prevent nuisance alarms.

11. **Gun Air Delay (sec)**: The amount of time delay of Atomizing Air Control before spray-able air is allowed to the gun(s).

12. **Next Arrow**: Pressing the next arrow will advance to the next screen.
### 7.9.3: Color Setup Screen

This screen sets the A:B ratio for each color loaded into the system. Ratios are programmed as the part of component A (resin) relative to one part component B (hardener or catalyst). The CC/pulse value may be changed individually for each color so paint flow is measured accurately.

1. **Entered Ratio**: Tap the box to enter the A:B ratio. The ratio shown in the box is as entered, in terms of A:B, percent, or decimal format.

2. **Calculated Ratio**: The ratio calculated into A:1 decimal form. This ratio is displayed on the Home screen.

3. **CC/pulse**: Enter the individual cc’s per pulse for each color if they differ. Default value is .123, but this should be verified by performing an A+B Calibration. Only an administrator can change the CC/Pulse values on this screen.

---

**NOTE**

When changing paint resins and / or loading a new material into the system always perform a Flow Meter Calibration - Resin + Hardener, especially when starting up the unit for the first time.

If changing the ratio of a loaded color, the materials must be reloaded for the changes to take effect.
7.9.4: Ratio Entry Screen A:B

This screen sets the A:B ratio for each color loaded into the system. Ratios may be programmed three ways:

1) **A:B Entry** - A and B entered independently. For example 5:2

2) **Percent Entry** - B percent entered. For example 7% = 100 parts A and 7 parts B, or 100/7 = 14.28:1
   Useful for high ratio materials where catalyst is expressed as volume percent.

3) **Decimal Entry** - only A entered. Used for ratios expressed as A:1; for example 3:1

Use the ratio entry method best suited to your material application information.

**1K operation:** The GEMS system may be operated as a single component system (vs. plural component). Select the 1K option by use of the slider at the top left.
This screen designates gun 1 flush and load times. If the system has 2 spray guns, a second, identical screen will appear after pressing the next arrow. The setup page for gun 2 will be identical. For more information on flush sequences and recommended settings, see 9.4: Flushing Setup.

### 7.9.5: Load Sequence

1. **First Flush**: Touch the toggle to switch the First Flush between solvent and air. This is the initial flush of the mix manifold and fluid lines. Note: the 1000 psi system will typically not use air flushing.

2. **First Flush Time (sec)**: This is the duration of the first flush for gun 1.

3. **Air Chop Time (sec)**: After the first flush is completed, the system will go into an alternating solvent and air flush, also known as a chop. This value determines the duration that the air valve remains open during the chop.

4. **Solvent Chop Time (sec)**: Determines the solvent valve duration for the chop.

5. **Chop Duration (sec)**: The total duration of the alternating solvent and air chop. The air and solvent valves will repeat their respective chop times until the duration is complete.

6. **Last Flush Time (sec)**: The total duration of the Last Flush of solvent.

7. **Load Volume (cc)**: This is the volume required for new material to properly fill the fluid lines for gun 1. See table below for starting point. This value is also used to calculate the volume sprayed for pot life reset.

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### NOTE

GEMS acid-compatible units do not ship with an air flush valve on the color stack. The instructions below should be followed for solvent-only usage unless an air valve is installed.

---

<table>
<thead>
<tr>
<th>HOSE SIZE</th>
<th>15 FEET</th>
<th>25 FEET</th>
<th>50 FEET</th>
<th>75 FEET</th>
<th>100 FEET</th>
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<tbody>
<tr>
<td>1/4” ID estimated volume</td>
<td>225 cc</td>
<td>325 cc</td>
<td>600 cc</td>
<td>875 cc</td>
<td>1150 cc</td>
</tr>
<tr>
<td>3/8” ID estimated volume</td>
<td>400 cc</td>
<td>625 cc</td>
<td>1200 cc</td>
<td>1775 cc</td>
<td>2350 cc</td>
</tr>
</tbody>
</table>
7.9.6: Calibration - Resin+Hardener

This screen is used to check the ratio of the mixed material without interrupting the flow of mixed material through the system. It is also used to calibrate the Flow Meter when loading a new color.

1. **Active Color**: The color being calibrated.
2. **Flow Meter cc/pulse**: This is the pulse count per cc delivered in the system. **This number will need to be calibrated for each individual color.** Default value is .1230
3. **Pulse Count**: The number of flow meter pulses received during a calibration test.
4. **Expected Volume (cc)**: This is the calculation of total expected volume at the current Flow Meter cc/pulse and programmed ratio.
5. **Measured Volume (cc)**: This is a user input. Enter the measured volume after triggering the gun for a specified time. Press Save (the floppy disc) after entering the Measured Volume.
6. **Calculated cc/pulse**: After a new measured volume is entered, the new cc/pulse will be displayed in this box. This is a preview of the new cc/pulse. **The Save button must be pressed to accept the new value.**
7. **START**: This button will reset the expected volume and pulse count to zero. Press this button twice before every calibration.
8. **SAVE**: This key is used after a new value is typed into the Measured Volume field and the enter key is pressed. Pressing SAVE stores the new cc/pulse value.

**NOTE**

Always follow any saved calibration with a paint reload. Administrator password required.
7.9.7: Calibration - Resin Only

This screen is used to check the Flow Meter calibration ONLY. Performing a calibration using this screen will flow paint resin without hardener through the system, and should be followed by a color 0 flush / load. This screen is used to more accurately calibrate the Flow Meter or troubleshoot the B Pump.

1. **Active Color**: The color being calibrated.

2. **Flow Meter cc/pulse**: This is the pulse count per cc delivered in the system. **This number will need to be calibrated for each individual color.** Default value is .1230

3. **Pulse Count**: The number of Flow Meter pulses received during a calibration test.

4. **Expected Volume (cc)**: This is the calculation of total expected volume at the current Flow Meter cc/pulse and programmed ratio.

5. **Measured Volume (cc)**: **This is a user input.** Enter the measured volume after triggering the gun for a specified time. Press Save (the floppy disc) after entering the Measured Volume.

6. **Calculated cc/pulse**: After a new measured volume is entered, the new cc/pulse will be displayed in this box. This is a preview of the new cc/pulse. **The Save button must be pressed to accept the new value.**

7. **START**: This button will reset the expected volume and pulse count to zero. Press this button twice before every calibration.

8. **SAVE**: (not shown) This key is used after a new value is typed into the Measured Volume field and the enter key is pressed. Pressing SAVE stores the new cc/pulse value.

---

**NOTE**

*Use the Resin + Hardener Calibration first. This calibration procedure will load un-catalyzed material in fluid lines and will require a solvent flush / load after performing.*

*Always follow Resin Only calibrations with a Color 0 flush / load.*
7.9.8: Alarm Enables

This screen displays all of the active alarms in the system and allows any listed alarm to be enabled or disabled. For example, if the Pump flow sensor cable gets damaged, this screen allows the user to disable the No Hardener Flow alarm temporarily so spraying may continue and production is not halted.

1. **Alarm Toggle**: By pressing the toggle button, alarms can be activated or deactivated as needed. If the alarm indicator is green, as shown, the alarm is active.

**CAUTION**

It is not recommended to turn off any alarm during normal operations.

This page is only accessible with the Administrator password.
7.9.9: B Pump Limits

This screen is used to set the upper and lower limits of motion of the B Pump. Limits may be saved after moving the piston in the direction and position desired. This screen is typically used when the potentiometer bracket assembly is replaced. See the Maintenance and Repair Manual 77-2985 for more information regarding this procedure.

1. **Jog Up**: By pressing this button, the Stepper Motor will move the piston upward. Press again to stop movement.

2. **Jog Down**: By pressing this button, the Stepper Motor will move the piston downward. Press again to stop movement.

3. **Top limit**: This number is the upper limit. The default value is set between 0.40 and 0.60.

4. **Current position**: This number displays the current position of the piston. This number ranges between 0.3 and 4.2.

5. **Bottom limit**: This number is the lower limit. The default value is set between 3.40 and 3.50.

6. **Save**: Pressing save will record the position of the piston. Push when the roller has reached the desired location for either the top or bottom limit. Must move the pump in the up direction to save the top limit.

**WARNING**

The JOG function could potentially damage the motor. Have trained personnel familiar with pump operations adjust these settings to prevent the risk of damage.
7.9.10: Time/Password Setup

Passwords and current date and time can be entered here. The current date and time is used to time stamp events in the Alarm History screen. The time is displayed in 24h time (2:34pm=14:34).

1. **Administrator Password**: This password will allow access to all options in the set up menus. Acceptable password ranges are numbers from 0 to 99999.

2. **User Password**: This password will allow access to everything needed for day to day operations. Acceptable password ranges are numbers from 0 to 99999.

3. **Unit ID**: Press this button to change the name of the system. Enables a popup keyboard (see facing page)

4. **Job Control**: Toggle the Job quick access of the Home screen to be on or off.

5. **Date/Time**: Enter the current date and time for timestamp data.

6. **FTP Configuration**: Press to enter the FTP configuration screen.

**NOTE**

This screen is only accessible with the administrator password.

Tap on the desired box to change values. A number pad or keyboard will pop up to change the value. Always press “ENT” to accept the new value.
An FTP server for data collection and read/write access may be configured here. FTP enable, username/password configuration and read/write access may be changed on this screen.

1. **Username/Password**: Enter Username and password information for FTP users. A keyboard popup (shown below) will allow text entry.

2. **Toggle**: Press the toggle button to change read/write access or enable/disable server.
**7.9.12: Configuration**

Settings on this screen are used to enable or disable Bar pressure (vs. PSI), gun flush boxes, and second spray gun capability.

1. **Enable Bar Pressure**: Select pressure display in BAR or PSI.
2. **Enable Gun Flush Box**: If the system is built to accept gun flush boxes this setting will enable or disable flush box function. If the system is not built to accept flush boxes this option will not appear.
3. **Gun 2 Enabled**: If the system is built for 2 gun capability this toggle enables or disables the 2nd gun.

**NOTE**

This screen is only accessible with the administrator password.
To access the jobs information, select the usage icon from the Home screen. This button will select the Usage screen.

From the usage screen, select the box icon to advance to the Jobs screen.
This Jobs screen shows paint usage for a selected elapsed time, or “job”. Jobs may be used to track paint usage for a batch of parts or a work period for example. Jobs capture events, paint usage, solvent usage (if system is equipped with a solvent meter), color change success / failure / time, and painter trigger times for 1 or 2 guns. All data is stored on the USB drive and may be read via USB or FTP.

1. **Job Number**: Show the current job being displayed. 100,000 possible jobs allowed. Tapping the box allows change to a job number entered via the pop up number pad. If a job does not exist with the entered number a new job will be created with that number.

2. **Total CC’s**: Total count of material mixed for all colors sprayed for the current job.

3. **Color Usage for Job**: Total cc’s of individual colors for the current job, both Component A (Resin) and Component B (Hardener). The total average ratio will also display on the color usage screen for each color. Flush solvent is also counted if the solvent flow meter is installed and configured.

4. **Toggle**: Use the toggle slider to switch between color usage information and color change / flush information. Color usage information explained on the following page.

5. **Job Information**: Job name and label may be changed here. Job status (active or paused), job starting date, job data (*.csv), and job log (*.log) file names and path are also displayed.
6. **Job Reset**: Clear job totals by pressing this button and entering the advanced password.

7. **Previous Job**: Move to the previous job in the list.

8. **Job Start/Pause**: Start or pause a job with this button.

9. **Next Job**: Advances to the next job screen. If the next job number does not already exist it will be created and started.

10. **Color Change Information**: The current job's number of successful color changes, average and last color change time.

11. **Flow And Triggering**:

   - Gun trigger time is captured by the air flow switch.
   - Paint flow time is captured by the flow meter.
   - Average flow rate is calculated by dividing total paint cc's by flow time. Note: when two guns are triggered at the same time the flow rate is split equally between the gun totals.
   - The number of trigger pulls is shown.
This screen is accessed through the Color Change screen; see section 7.3. Batch mode provides dispensing of mixed material through the spray gun nozzle with atomizing air turned off. This function is useful for:

- Providing material for a touch-up or gravity gun for spot repair.
- Dispensing a pre-determined “shot” or quantity of paint.

Shut off atomizing air for Batch dispensing.

1. **Quantity field:** Tap to enter a volume of paint to be dispensed.

2. **Quantity Batch GO:** Starts the quantity Batch dispense. Trigger the spray gun into a container to dispense mixed paint. The flow will stop when the requested quantity has been dispensed. To stop this process press the STOP button.

3. **Infinite Batch GO:** Dispenses mixed paint continuously until the STOP button is pressed. The Quantity field changes to a counter to show cc’s dispensed.

4. **STOP:** Stops dispensing and returns the counter to zero.
7.12: Language Selection

This screen is accessed from the Home screen; press **Settings** then enter password 3 when prompted. The screen below will appear and allow selection of a language available for your region.

- **US English**
- **Français**
- **日本語**
- **Español**

Tap the flag of the language desired - it will show at the bottom as Selected Language.

Press the Home button to return to the Home screen. The new language will be displayed on all control and troubleshooting screens.
8: Startup Guide

Use the following pages as a quick reference to make electrical, air, and fluid connections to GEMS and begin operation. Be familiar with the configuration of the machine and any options or accessories attached. Return to the 7.0: User Interface Guide portion of this manual for information on configuration and settings.

Startup checklist:

1. Verify the frame is secured to the ground or wall and that all components are mounted securely to the enclosure, fluid panel or mast.
2. Check that all cables for pressure transducers, flow meter, flow sensor and any other electrical components are connected. Connect the enclosure ground stud to earth ground.
3. Verify all energy sources are de-energized. Inspect for loose wires anywhere inside the enclosure. Do not attempt to operate with loose wiring. Refer to the Maintenance and Repair Guide: 77-2985 for wiring diagrams. After wiring verification, it is safe to plug in the system to a proper grounded AC receptacle.
4. Verify all CCV signal lines are properly connected. See the 5.0: Air Connection pages for reference.

Air connections:

Connect the external air connections before use (see below). For more information, see the 5.0: Air Connections pages:

1. Regulated air supply to the MAIN AIR IN connection. Air pressure should be between 75-100 psi [5 - 7 bar].
2. Regulated air supply to GUN 1/2 AIR IN on control enclosure. For atomizing, typically 20-75 psi [1.3 - 5 bar].
3. GUN 1/2 AIR OUT directly to the spray gun(s).
4. Regulated air supply to the color stack flushing air (CHOP).
5. If the system is equipped with gun flush boxes:
   a. Regulated air supply to gun flush box(es) “air” connection.
   b. Gun trigger (TRG) 1 to Bulkhead 14(B14) and (TRG) 2 to Bulkhead13 (B13).
   c. Gun in box (GIB) signal lines to pressure switches (B16, B15).
   d. Air Cut Off (ACO) trigger lines to Air Cut Off Valve(s) (ACO)

Fluid Connections:

Perform the following fluid connections before use. For more information, go the 6.0: Fluid Connections pages. Oil Reservoirs should be filled with pump packing lube supplied with the system.

1. Connect hardener supply line to inlet of dispense pump or flow sensor (B IN).
2. Verify dispense pump outlet is connected to mix manifold.
3. Connect solvent supply line to the color stack solvent inlet (F0).
4. Connect resin material supply to color stack ports (F1-F5).
5. Confirm flow meter outlet hose is tightly connected to the mix manifold material inlet.
6. Connect static mix tube to outlet of mix manifold (MIX). Connect spray gun fluid line(s) to static mix tube.
7. Energize all fluid lines and check for leaks of any kind. If any are present, be sure to remove pressure and repair the leak before continuing with the 8.1: Startup Procedure.
8.1: Startup Procedure

When air and material connections have been tested for leaks the machine should be ready to power on.

**Startup for systems without gun flush boxes:**
1. Ensure all compressed air and fluid sources are connected to GEMS and energized.
2. Turn the AC lock out switch to the on position. Select the PRIME button on the home screen.
3. With atomizing air off for this step, trigger the spray gun into a grounded metal waste container. Press the B Pump enable button and allow the pump to stroke for at least 2 full cycles (typically about 30 seconds), allowing all air to be removed from the inner chambers.
5. Ensure Color 0 shows in the display box and press Resin enable to open the solvent valve. Trigger the gun until solvent is loaded in the fluid lines.
6. Repeat the Resin load process for all system colors to ensure functionality and to clear air from the fluid lines. After each color has been loaded into the fluid lines, be sure to load with solvent (color 0) so that the inner passageways remain clean and all air is removed.
7. Return to the Home screen by pressing the HOME button.
8. Press the SETUP button on the home screen. Proceed through each page and enter the desired values. Refer to 7.0: User Interface Guide for more information about each screen.
9. Verify the Load Volume (cc) setting is correct for the fluid line setup. Refer to the Hose Size table below.
10. For each color used in the system, an initial calibration must be performed to maintain a proper mixed ratio. Advance to the 7.9.6: Resin + Hardener Calibration page, and perform the test.
11. Press the Color button and load the desired color.
12. After the completion of the color load energize atomizing air and spray.
13. When spraying is complete, shut off atomizing air and perform a color change or flush as required.

**Startup for systems with gun flush boxes:**
1. Ensure all compressed air and fluid sources are connected to GEMS and energized.
2. Turn the AC lock out to the on position. Select the PRIME button on the home screen.
3. Place the spray gun in the gun box and close the lid.
4. Press B Pump enable and allow the pump to cycle for about 30 seconds to prime the pump and hardener line to the mix manifold. Press F2 again when the Pump is primed and no air bubbles or spitting is visible exiting the spray gun.
5. Ensure color 0 shows in the display box and press Resin prime to prime solvent. Press prime again when solvent is visible downstream from the mix manifold.
6. Repeat this process for the remaining paint colors. Follow up this prime process with a color 0 (solvent) prime again to clear resin from the lines and mix manifold.
7. Press the HOME button to return to the HOME screen.
8. Press the SETUP button. Proceed through each page and enter the desired values. Refer to 7.0: User Interface Guide for more information about each screen.
9. Verify Load Volume (cc) using the chart below.
10. For each color used in the system, an initial calibration must be performed to maintain a proper mixed ratio. Advance to the 7.9.6: Resin + Hardener Calibration page, and perform the test.
11. Press the Color button on the home screen and load the desired color.
12. Remove the gun from the gun box, close the gun box lid, and spray.
13. When spraying is complete, place the gun in the gun box and close the lid. Perform a color change or flush as required.

### CAUTION

**Priming of 1000 psi systems should be performed with the lowest fluid pressure allowable, to prevent blowback, splashing and/or injection hazards. Return to operating pressure after priming.**

<table>
<thead>
<tr>
<th>Hose Size</th>
<th>15 feet</th>
<th>25 feet</th>
<th>50 feet</th>
<th>75 feet</th>
<th>100 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4” ID estimated volume</td>
<td>225 cc</td>
<td>325 cc</td>
<td>600 cc</td>
<td>875 cc</td>
<td>1150 cc</td>
</tr>
<tr>
<td>3/8” ID estimated volume</td>
<td>400 cc</td>
<td>625 cc</td>
<td>1200 cc</td>
<td>1775 cc</td>
<td>2350 cc</td>
</tr>
</tbody>
</table>
9: Daily Operations

Daily use of the GEMS system involves several procedures. Understanding how the system works and knowing the properties of the paint materials in use is the best way to ensure continuous use with few alarms and repairs. Study the procedures and tips below to better understand the function of the system. Read the Maintenance & Repair Manual 77-2983 to review maintenance schedules and repair procedures.

9.1: Daily Start Up Procedure

Follow the steps below during startup to ensure proper operation and optimal safety. These daily procedures assume paint solvents, resins, and hardeners have been loaded into the machine, have already been calibrated, and remain connected between each use of the system.

1. Ensure all fluid and air connections on the system are tight and secure. Ensure fluid supply is adequate for duration of operations.

2. Check all valves on the system for fluid supply leaks. Correct if necessary.

3. Connect regulated pressurized air to the system and open. Maintain 75psi [5 bar] minimum at all times to the enclosure main air inlet.

4. Energize fluid supplies and open valves supplying GEMS with resin(s), hardener, and solvent.

5. Connect power and turn the power switch to the ‘On’ position.

6. Navigate to the Alarms History page. Verify no alarms have occurred recently. If an alarm has occurred, verify that the problem has been resolved.

7. Load the desired color. Go to 10.2: Loading a Color for additional detail.

8. Verify Inlet and Outlet hardener pressures are correct for the application, and that the Inlet Pressure is 2-5% higher than the Outlet.

9. If using a gun flush box, remove the gun from the box and begin to spray. If not using a gun box, turn on atomizing air and begin to spray.

10. Fine tune gun settings for the application (flow rate, atomizing air pressure, fan control). Remember that changing the resin pressure to adjust flow rate at the spray gun should be followed by a matching change to the hardener pressure to maintain the 2 to 5% higher target inlet pressure.

CAUTION

If using a GUN BOX, ensure gun is in box with the lid closed. If loading a color or flushing without a gun box, ensure atomizing air is turned off, and trigger material into a grounded metal waste container.
9.2: Loading a Color

1. Follow steps 1 through 8 of **9.1: Daily Start Up Procedure** before proceeding.

2. Go to the Home screen and ensure atomizing air is turned off. For systems with gun flush boxes, place the gun in the box and close the lid.

3. Press the Color Change button on the Home screen to access the Color Change screen.

4. Enter the color number desired, and press 1 GUN GO or 2 GUN GO to load the color to one or both guns respectively. If not using a flush box, trigger the gun into a grounded metal waste container. When loading a color if the current color is 0, the fluid lines will not be flushed, since it is assumed there is no material in the lines following the **9.5: End of Day Flushing Procedure**.

5. The color should be loaded and ready to spray. If adjustments need to be made to the flush sequence, go to **9.4: Flushing Setup**. If an alarm occurs, correct the problem and restart the procedure.

NOTE

For a color change with gun flush boxes, the GO button will not display if:

- The spray gun(s) are not in the Gun Box(es).
- The Gun Box lids are not closed.

9.3: Color Change Procedure

1. To change colors, the initial color must be loaded per **9.2: Loading a Color** procedure.

2. Press the Color Change button on the Home screen to access the Color Change screen.

3. Enter the color number desired, and press 1 GUN GO or 2 GUN GO to load the color. The system will proceed to flush the gun(s) in sequence and then load the desired color at the mix ratio for that color.

4. The color selected will be loaded, completing the color change procedure. Enable atomizing air to start spraying. If an ACO valve is installed it will enable atomizing air after the gun air delay time has passed. If a gun flush box is installed the atomizing air will enable when the gun is removed from the box.
9.4: Flushing Setup

1. The GEMS AC system does not include a standard air flush valve on the color stack but one may be added. Solvent flushing only is recommended for the 1000 psi system, but an air / solvent chop is useful for reducing solvent usage in low-pressure systems.

2. To set up, press the Settings button on the Home screen and enter the Administrator password.

3. Advance to the Gun 1 Flush / Load Sequence screen, and adjust the settings as needed using the table below as a guide. The recommended settings are a baseline for 25 foot x 1/4” ID fluid hose. Adjust the values accordingly.

<table>
<thead>
<tr>
<th>Name</th>
<th>Suggested Initial Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Flush</td>
<td>Low pressure: AIR High pressure: SOLVENT</td>
<td>Air or Solvent to initially flush fluid lines.</td>
</tr>
<tr>
<td>First Flush Time</td>
<td>15 seconds</td>
<td>Duration of first flush. This flush is used to move paint out of the system before attempting to &quot;clean&quot; with the chop process.</td>
</tr>
<tr>
<td>Air Chop Time</td>
<td>1 second</td>
<td>Duration of each air burst in the chop process</td>
</tr>
<tr>
<td>Solvent Chop Time</td>
<td>1 second</td>
<td>Duration of solvent burst in the chop process</td>
</tr>
<tr>
<td>Chop Duration</td>
<td>Low pressure: 30 seconds High Pressure: 0 (skip)</td>
<td>Total duration of chop process.</td>
</tr>
<tr>
<td>Last Flush</td>
<td>SOLVENT</td>
<td>Last flush with Solvent. Final clearing of system - this is also the fluid left in the system when properly shut down.</td>
</tr>
<tr>
<td>Last Flush Time</td>
<td>20 seconds</td>
<td>Duration of last solvent flush - should be timed to minimize solvent waste but still completely load the fluid lines with solvent.</td>
</tr>
<tr>
<td>Load Volume</td>
<td>300cc—Use the chart from 8.1: Start Up Procedure</td>
<td>Volume needed to load mixed material into the fluid lines.</td>
</tr>
</tbody>
</table>

The following factors will influence the choices listed above:

**Worst case flushing** - Always set up the flush parameters using the most viscous/worst case resin material.

**Flushing air and solvent pressure** - Higher pressures may reduce the time needed to flush the system, but can create significant spitting from the spray gun during the process.

**Material viscosity** - Viscous materials move more slowly and may require additional time to be purged from the system.

**Hose volume/ length** - Longer fluid lines have a larger volume and may require a longer flush time. Also, pressure drop through a longer hose or smaller diameter hose will affect the time required to purge paint and clean the system.

**Spray gun tip size** - Small tips may restrict flow during a flush.

Try to optimize the system to minimize solvent usage during color changes and flushes by:

- Using air instead of solvent for the first flush (applies to low pressure only; installation of air flush valve required)
- Let the “chop” process do most of the cleaning (low pressure with air valve installed)
- Don’t use more solvent than necessary for the last solvent flush.
9.5: End of Day Flushing Procedure

To shut down the machine for longer periods or overnight follow the steps below.

1. Flush the Mixed Material using one of the methods below.
   A. Color 0 Load: Perform a color 0 load to clear the fluid lines of material and load with solvent. For information on loading, see 9.2: Loading a Color.
      i. If the fluid lines are not fully flushed, adjust the Flush / Load Sequence values as necessary. Repeat the color 0 load if necessary.
   B. Flush Mode:
      i. Press the button for Flush mode (found on the Prime screen) and allow the valves to cycle until the fluid lines have been cleared of mixed material. Perform a color 0 load to fill the fluid lines with solvent. Flush mode will continue until the button is pressed again or 5 minutes has elapsed. Flush mode is a continuous chop mode so if a flushing air valve is installed the air and solvent valves will alternate for 1 second intervals.

2. Always ensure there are no mixed materials remaining in the fluid lines when shutting down for the day.
   i. Optionally, power off GEMS using the AC Lock Out Switch.

3. Depressurize all fluid supplies and close fluid supply valves. Depressurize system air pressure.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always shut down the GEMS with flushed fluid lines that are loaded with solvent (color 0). Leaving air or paint in the system may cause clogging or sticking of system components.</td>
</tr>
</tbody>
</table>
9.6: System Depressurization Procedure

1. Flush the system if it will not be used for extended periods. Ensure all guns are in gun flush boxes, and that lids are securely closed. If not using flush boxes or ACO, shut off atomizing air for the next steps and use a grounded metal waste container.

2. From the Home Screen, press the Color Change button. Enter Color 0 (Solvent) and press 1 GUN GO (or 2 GUN GO if two guns are in use). If not using a flush box trigger the spray gun.

3. Wait for the system to flush the fluid lines and load the solvent. This will purge resin from the color stack and flow meter and also remove mixed material from the mix manifold. If there is still material visible in the lines, Load color 0 again, or switch the system to Flush mode as long as needed to clear any debris from the fluid lines.

4. Shut supply of all paint resin and hardener. Do NOT shut off solvent supply yet - it will be needed in a later step.

5. The fluids in the Color Stack and Dispense Pump are still under pressure. To release this pressure, go to the Prime screen.

6. On the Prime screen press B Pump Prime to engage the B Pump and cycle it to release any internal pressure. Allow it to run for 5 seconds, and then press B Pump Prime again to stop.

7. Press Color Stack Prime with the spray gun triggered and open color stack valves 1 through 5 to bleed pressure. Finally, open valve 0 to allow solvent through the system until all lines have been flushed with solvent. Press Color Stack Prime again to close valves.

8. Shut off Solvent supply to the system. Trigger gun and press Color Stack Prime again, opening valve 0 to bleed remaining pressure in the solvent valve.

9. Power off the system. Shut the main air supply to the system.
System alarms are used to alert the user to conditions which may result in off-ratio spraying or fluid pressure out of range. Refer to the table below to troubleshoot GEMS alarms. Troubleshooting suggestions are listed in order of difficulty with the easier solutions presented first.

If at any time the alarm issue cannot be immediately corrected, the fault may be temporarily disabled until the problem can be resolved. Alarms should never be left disabled.

### 10: Alarm Guide

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Suggested Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Inlet Pressure</td>
<td>B Pump inlet pressure is below the set limit during operation.</td>
<td>Confirm B supply valve is open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B supply pressure correct / matches Home Screen reading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B supply material present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check Minimum Inlet Pressure setting on System Settings screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCVs B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm solenoids B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B Pump pressure transducers are functioning properly</td>
</tr>
<tr>
<td>High Outlet Pressure</td>
<td>B Pump outlet pressure is above the set limit at any time.</td>
<td>Trigger spray applicator to relieve pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm main air inlet pressure into GEMS is 75-100 psi (5-7 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCVs B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm solenoids B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for restrictions leading to Mix Manifold</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm A supply pressure is below Maximum Outlet Pressure on System Settings screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B supply pressure is below Maximum Outlet Pressure on System Settings screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove and inspect Static Mixer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove and inspect Mix Manifold components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B pump pressure transducers are functioning properly</td>
</tr>
<tr>
<td>Ratio Fault</td>
<td>Measured A:B ratio is outside of tolerance</td>
<td>Check for air in the A supply line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for air in the B supply line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCVs B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coating flow rate too high</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjust Ratio Alarm Tolerance on System Settings screen. Increase as needed or perform a Resin + Hardener Calibration.</td>
</tr>
</tbody>
</table>
### 10: Alarm Guide (continued)

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Suggested Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resin Flow</td>
<td>Component A flow sensed when system is not spraying</td>
<td>Confirm CCV AE is closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check CCV AE for leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm flow meter is not detecting pulses—refer to DIN0 LED on control board</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm fluid panel is not being vibrated</td>
</tr>
<tr>
<td>No Hardener Flow</td>
<td>No Flow is detected through B Pump Flow Transducer when the B Pump is running</td>
<td>Confirm B supply valve is open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B pressure in the supply line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm B material in the supply line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check Connection of Flow Transducer cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCVs B1-B4 are functioning properly — opposite valves should be open (B1 &amp; B3 or B2 &amp; B4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm solenoids B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flow Transducer out of adjustment—see Flow Transducer calibration procedure in manual</td>
</tr>
<tr>
<td>Upper Transducer Fault</td>
<td>Improper electrical signal from upper pressure transducer on B Pump</td>
<td>Check electrical connection and wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm top pressure transducer on B Pump is functioning properly</td>
</tr>
<tr>
<td>Lower Transducer Fault</td>
<td>Improper electrical signal from lower pressure transducer on B Pump</td>
<td>Check electrical connection and wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm bottom pressure transducer on B Pump is functioning properly</td>
</tr>
<tr>
<td>Check Pump</td>
<td>B Pump movement does not match potentiometer output</td>
<td>Check for air in all fluid lines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCVs B1-B4 are functioning properly — opposite valves should be open (B1 &amp; B3 or B2 &amp; B4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm solenoids B1-B4 are functioning properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perform a calibration procedure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inadequate B Pump inlet pressure — increase to 5 ~ 10% greater than outlet pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coating flow rate too high</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm wiper is properly engaged with potentiometer — check Dispense Pump Limits screen</td>
</tr>
<tr>
<td>No Resin Flow</td>
<td>Atomizing air flow detected with no fluid flow</td>
<td>Confirm no air leaks including spray applicator, air flow switch, and air hoses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm Blow Off Time has not been exceeded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCV AE opens when spray gun is triggered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check connections on flow meter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check solenoid AE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for stuck flow meter gears</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for excessive component A pressures - check A supply pressures and regulation are working properly</td>
</tr>
<tr>
<td>Upper Balancing Fault</td>
<td>B Pump top fluid pressure not balanced at pump direction change</td>
<td>Air in top of B Pump — if air is present perform a Component B prime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive B Pump inlet pressure — reduce to 5 ~ 10% greater than outlet pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inadequate B Pump inlet pressure — increase to 5 ~ 10% greater than outlet pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm pressure transducers are functioning properly</td>
</tr>
</tbody>
</table>
## 10: Alarm Guide (continued)

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Suggested Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Balancing Fault</td>
<td>B Pump bottom fluid pressure not balanced at pump direction change</td>
<td>Air in bottom of B Pump – if air is present perform a Component B prime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive B Pump inlet pressure – reduce to 5 ~ 10% greater than outlet pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inadequate B Pump inlet pressure – increase to 5 ~ 10% greater than outlet pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm pressure transducers are functioning properly</td>
</tr>
<tr>
<td>Pot Life</td>
<td>Mixed material programmed pot life timer expired</td>
<td>If possible spray out load volume of material in line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flush mixed material from fluid lines with Color 0 load on Color Change screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flush mixed material from fluid lines with Flush Mode on Prime Screen</td>
</tr>
<tr>
<td>Color Change Fault</td>
<td>A color change sequence has been interrupted</td>
<td>Confirm red stop button was not pressed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm spray applicator was triggered within 3 minutes of color change start</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If equipped – confirm gun(s) are in Gun Flush Box and lid has been closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If equipped – confirm proper operation of Gun Flush Box</td>
</tr>
<tr>
<td>High Resin Flow Rate</td>
<td>Component A flow rate above set limit during operation</td>
<td>Check for air in fluid lines to CCVs A1-A5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm no leaks in fluid lines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify Max Resin Flow Rate on System Settings screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjust fluid pressure / flow to A1-A5 valves to ensure limit is not exceeded</td>
</tr>
<tr>
<td>Component B Flow Fault</td>
<td>Component B flow detected without pump operation</td>
<td>Check component B supply for fluid leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm component B supply valve is open and supply adequate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm component B pressure correct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjust Flow Transducer so display returns to red signal after spray applicator stops triggering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjust Flow Transducer at minimum flow rate so display moves off red signal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm CCVs B1-B4 are functioning properly – opposite valves should be open (B1 &amp; B3 or B2 &amp; B4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm solenoids B1-B4 are functioning properly</td>
</tr>
<tr>
<td>Air Flow Detected</td>
<td>Atomization air detected during Color Change or Flush mode</td>
<td>Turn off atomizing air during flush or color change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check operation of Air Flow Switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If equipped – check operation of Gun Flush Box</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If equipped – verify operation of Air Cut Off Valves</td>
</tr>
</tbody>
</table>
11: Flow Meter

240-3276

The flow meter is a gear-type positive displacement meter specially designed for paint and will measure flow up to 1900cc per minute. A sensor detects the movement of the inner gears and sends an electronic signal in the form of a pulse to the controller.

**Flow Meter Do's:**
- Filter the paint with a minimum 100 mesh filter. Change filter screens regularly.
- Use pressure regulators upstream from the flow meter to prevent false readings from fluctuating pump pressure spikes.
- Make sure the system is properly grounded and avoid electrical noise at the machine location.
- Calibrate the flow meter cc's/pulse frequently. Even different batches of the same paint can have different flow characteristics.
- Always store the meter filled with solvent.
- The flow meter is mounted to the base of the color stack using a tube fitting. Always remove the tube / nut when removing the flow meter from the fluid panel. Leave inlet and outlet fittings intact.

**Flow Meter Don'ts:**
- Never run the meter dry or spin the gears for a prolonged time with air only.
- Never leave the meter to sit / stagnate with air or water inside.
- Never let the meter hang by the cable.
- Never let the meter drop onto the floor.

**Flow Meter Calibration**
Perform flow meter calibration regularly as described in the GEMS Operation Manual 77-2984. The A+B calibration will verify ratio and flow meter calibration in one simple operation.

<table>
<thead>
<tr>
<th>#</th>
<th>PART #</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A12712-01</td>
<td>FLOW METER</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>240-3237</td>
<td>DM NIPPLE #6 X #4 JIC</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>76628-00</td>
<td>ADAPTER #6 JIC X 3/8 ODT</td>
<td>1</td>
</tr>
</tbody>
</table>

**Troubleshooting**

**Flowmeter problems can be caused by improperly filtered fluid.** Particulates in the fluid can cause gear binding, resulting in incorrect flow rate signals. Maintain the fluid filters per the filter manufacturer’s instructions. If repeated flow meter disassembly and cleaning for removal of solids and particulates occurs, inspect the entire fluid supply system and evaluate the system cleaning cycle.

Fluid back-up, or reverse flow, may cause reacted/catalyzed material to enter the flow meter. The flow meter should be cleaned immediately before the fluid gels or hardens.

Under normal operation and care the sensors or electrical connections will not require replacement.
The GEMS system uses a gear flow meter to measure the flow rate of resin through the system. The control uses the resin flow rate to calculate the required flow of hardener to be dispensed by the B Pump. To maintain ratio accuracy it is very important to ensure the gear flow meter is calibrated for each paint resin used in the system. Follow the steps below to calibrate the flow meter and check proper operation of the dispense pump. Repeat for each color.

1. Ensure the desired color to be tested has been loaded. The correct ratio values should be entered into the system for all colors to be calibrated.
2. Use the Administrator password to access the Resin + Hardener Calibration screen.
3. Shut off atomizing air so a continuous fluid stream can be captured by a beaker.
4. Place a beaker or graduated cylinder under the fluid tip of the spray gun. Use caution to avoid exposure to high pressure fluid!
5. Press the start icon to start the test. This will reset the pulse count and expected volume values to zero. Trigger the gun into the beaker.
6. Trigger the gun long enough to capture a convenient measurable fluid volume, such as 100-500cc. High ratios will require higher volumes. This volume will be the total volume of BOTH A+B components at the specified ratio.
7. If the measured beaker volume matches the expected volume then no further action is necessary. If different, input the beaker volume into the Measured Volume field and press enter. The program will then display the calculated cc/pulse. The calculated cc/pulse should be entered into the Flow Meter cc/pulse field.
8. Press the Save button to use the new Flow Meter cc/pulse value.
9. Repeat steps 1-9 to verify the new cc/pulse value is repeatable. The new Measured Volume should match the Expected Volume. If these values match, the Flow Meter Calibration has been completed successfully. If the values do not match, continue to the next step.
10. If the two volumes are not close together (1% difference) proceed to Flow Meter Calibration - Resin Only. The Resin Only calibration will verify proper flow meter operation. Repeat the above procedure for the Resin only calibration, the difference being that the total volume will be the volume of the Resin component ONLY.
11. If the resulting actual volume is significantly different than the calculated volume after repeated tests, it is possible the Flow Meter may be clogged or sticking and may require cleaning or repair.
12. Conversely, if the Resin Only calibration results in accurate measured volumes but the Resin+Hardener calibration does not, there may be a problem with the Dispense Pump. Review the steps in 13.0: B Pump Troubleshooting Checklist to verify proper operation of the pump.

### NOTE

After performing a ratio test, mixed material will be loaded in the fluid lines. If a resin+hardener ratio test results in a changed value, be sure to reload the paint again to bring mixed paint into the line at the new ratio.


12: B Pump Operation

Material is delivered to be mixed by a piston and cylinder pump. An inlet and an outlet valve on each end of the pump controls the material flow. When the piston is moving down, the bottom inlet valve is closed, and the bottom outlet valve is open. As the material in the cylinder below the piston is dispensed through the bottom outlet valve, the top outlet valve is closed, and the top inlet is open. This allows material to be drawn into the top of the cylinder above the piston. When the piston gets to the bottom of its stroke, the valve settings and the piston direction reverse. This causes the material in the top of the cylinder to be dispensed, and the bottom of the cylinder to be filled.

A balance mechanism is programmed into the system controller to minimize pressure fluctuations at piston reversals. This logic assumes that the inlet material pressure is higher than the dispenser output pressure. When the dispenser reaches the direction change set point, the inlet valve will close, and the outlet valve will open. This continues dispensing material on the output side while filling material on the inlet side. At the point where the inlet side pressure is drawn down to match the output pressure, the direction will reverse. The appropriate valves will open, and the side which was filling begins to dispense.

The dispense pump is fitted with a linear potentiometer with a wiper. Movement of the piston slides the wiper on the potentiometer and communicates the position of the piston.
12.1: B Pump Troubleshooting Checklist

Use this checklist to help identify potential problems with the B pump - avoid unnecessary disassembly. If the problem is still not corrected, it may be necessary to remove the B Pump and clean it thoroughly after flushing it with a solvent. Look for clogged passageways and evidence of fluid leaks. See the **77-2983 Maintenance & Repair Manual** for B Pump disassembly / assembly instructions.

<table>
<thead>
<tr>
<th>Description</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check that the system is not in an Alarm state. It is possible an Alarm is not allowing the pump to run.</td>
<td></td>
</tr>
<tr>
<td>Verify there are no leaks anywhere on the pump fluid end.</td>
<td></td>
</tr>
<tr>
<td>Examine the Oil Reservoir. Look for overflowing or hints of hardener / catalyst material in the reservoir.</td>
<td></td>
</tr>
<tr>
<td>Check for air in all fluid lines. There must be no air bubbles anywhere.</td>
<td></td>
</tr>
<tr>
<td>Visually inspect the threaded actuator rod; look for wear or damage. Check rod for adequate lubrication.</td>
<td></td>
</tr>
<tr>
<td>Verify the ball plunger is properly contacting the linear potentiometer. Do this by observing the center value change on the Dispense Pump Limits screen during Jog Up or Jog Down movement.</td>
<td></td>
</tr>
<tr>
<td>Go to the PRIME screen. Turn off atomizing air. Trigger the gun and B Pump. Confirm valve operation, look for a constant stream of material exiting the gun. Ensure material does not flow from the gun when the pump is stopped.</td>
<td></td>
</tr>
<tr>
<td>Examine the stepper motor. Verify smooth operation when the pump is running. There should not be any ‘stuttering’ movement of the pump. Unusual movement could be attributed to a flow meter that needs cleaning.</td>
<td></td>
</tr>
<tr>
<td>Verify DIN0 LED lights up and flashes when resin material is travelling through the flow meter. See the <strong>77-2985 Maintenance &amp; Repair Manual</strong> for more detail.</td>
<td></td>
</tr>
</tbody>
</table>
13: Power Outage Cleaning Procedure

In the event of a facility power outage GEMS can be cleared of mixed material manually if air pressure supply continues. If the fluid lines are not cleared it is possible that the mix manifold, downstream fluid lines, and spray gun may become clogged with hardened material. Valves may be manually triggered to open passageways in the unit. Trigger the gun into a grounded waste receptacle. For systems with gun flush boxes add TRG1 and TRG2 solenoids to the instructions below, or remove the gun from the box for flushing.

Pressing up on the blue manual solenoid triggers will open the corresponding CCV if there is enough residual air pressure available. With the aid of a helper, trigger according to the references below while triggering the gun.

Air Flush: AE, A7 (if installed)
Solvent Flush: AE, A0

![Diagram of solenoid connections]

Solenoid Connection Reference

Use the reference below to reconnect the solenoid air lines to their bulkheads and CCVs. Refer to your system configuration to see which solenoids and CCVs are in use.

<table>
<thead>
<tr>
<th>Solenoid Number</th>
<th>Location</th>
<th>Description</th>
<th>Bulkhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Dispense Pump</td>
<td>Top Inlet</td>
<td>B01</td>
</tr>
<tr>
<td>B2</td>
<td>Dispense Pump</td>
<td>Top Outlet</td>
<td>B02</td>
</tr>
<tr>
<td>B4</td>
<td>Dispense Pump</td>
<td>Bottom Inlet</td>
<td>B03</td>
</tr>
<tr>
<td>B4</td>
<td>Dispense Pump</td>
<td>Bottom Outlet</td>
<td>B04</td>
</tr>
<tr>
<td>AE</td>
<td>Mix Manifold</td>
<td>Resin Enable Valve</td>
<td>B05</td>
</tr>
<tr>
<td>A7</td>
<td>Color Stack</td>
<td>Air Enable</td>
<td>B06</td>
</tr>
<tr>
<td>A0</td>
<td>Color Stack</td>
<td>Solvent Enable</td>
<td>B07</td>
</tr>
<tr>
<td>A1</td>
<td>Color Stack</td>
<td>Color 1</td>
<td>B08</td>
</tr>
<tr>
<td>A2</td>
<td>Color Stack</td>
<td>Color 2</td>
<td>B09</td>
</tr>
<tr>
<td>A3</td>
<td>Color Stack</td>
<td>Color 3</td>
<td>B10</td>
</tr>
<tr>
<td>A4</td>
<td>Color Stack</td>
<td>Color 4</td>
<td>B11</td>
</tr>
<tr>
<td>A5</td>
<td>Color Stack</td>
<td>Color 5</td>
<td>B12</td>
</tr>
<tr>
<td>TRG2</td>
<td>Gun Box</td>
<td>Trigger Gun 2</td>
<td>B13</td>
</tr>
<tr>
<td>TRG1</td>
<td>Gun Box</td>
<td>Trigger Gun 1</td>
<td>B14</td>
</tr>
<tr>
<td>ACO</td>
<td>Enclosure/Air Inlet</td>
<td>Air Cut Off Control</td>
<td>B16</td>
</tr>
</tbody>
</table>
14: Accessories

These accessories provide unique functionality for specific applications, such as a light indicator visible from 360 degrees, or solvent usage tracking. Your distributor will install and configure these accessories. Below is additional information regarding these part numbers, and the corresponding manual number for installation and use instructions.

**Stack Light**— A 360 degree visible LED light that mounts to the top of the control enclosure. It will display green when spraying, or will alert an operator to alarms with a flashing amber LED.
Kit # 240-3115
Manual # 77-3086

**Solvent Meter Kit**—Transmits solvent flow information to the system for usage and job data collection.
Kit # 240-3213
Manual 77-3101

**Pedestal Stand**— When desired, the unit may be moved away from a wall and bolted to the floor.
Kit # 240-3160
Manual # 77-3092

**Atomizing Air Control**— This kit is installed with gun flush boxes, but is also available for other systems as an upgrade to control gun atomizing air. It will help prevent atomization of solvents and reduce “air flow detected” alarms.
Kit # 240-3118
Manual # 77-3087

**Gun Flush Box Kit**— Used for automatic gun flushing procedures for up to two guns. May be ordered as part of original system or as separate kit.
Kit # 240-3119-1 for single gun or
Kit # 240-3119-2 for two gun.
Includes Atomizing Air Control Valves.
Manual # 77-3090

**Other accessories**: Remote color change (240-3053), screen protector install (240-3187), screen protector refill (240-3199). Contact your distributor for details.
15: Glossary of Terms

**ACME Lubricant**— Lubricant used on the threaded rod of the stepper motor rod. The lubricant reduces friction and prevents damage to the threads.

**Air Cut Off (ACO) Valve** - A pneumatically (pilot) operated valve that stops the flow of atomizing air to the spray gun during a flush, batch, or color change. Accessory equipment.

**Air Flow Switch**— A device used to send a signal to GEMS control when the spray gun atomizing air is triggered. The switch is located inside the control enclosure.

**Alarm**— Alarms sound when certain monitored values fall out of the operating range, such as the pot life or mixture ratio. Also known as a fault.

**Atomizing Air**— The air supplied to the spray gun that is used to atomize the mixed material. This air is routed through the Air Flow Switch(es), where recommended supply pressure is between 20 and 75 psi [1.4 - 5 bar].

**Atomizing Air Cut Off (ACO)**— The system used to control gun atomizing air. Uses the Air Cutoff Valve when an optioned solenoid stack is ordered.

**Air Flush Valve**— The color change valve (CCV) located on the color stack that controls flushing air. It controls the air used to flush the fluid lines and aid in the chop process. Valve number is 7.

**B Pump**— Dispenses hardener to the Mix Manifold at the flow rate proportional to Component A flow and the programmed A:B ratio. Also known as Dispense Pump.

**Blow Off Time**— Time allotted for the triggering of atomizing air with no fluid flow. This is a parameter set in the GEMS system to allow a painter to use the gun atomizing air for a short time to dust a part immediately prior to spraying mixed material.

**Calibration**— The process of setting a device to measure accurately. The Flow Meter is the only GEMS component that requires calibration. See 11.1: Flow Meter Calibration to verify the proper performance of the flow meter.

**Catalyst**— A coating component that initiates a chemical reaction in the coating to accelerate the hardening process. Catalysts are typically identified by high mix ratios such as 10:1 or 50:1. Sometimes the catalyst-to-resin ratio is expressed as a percentage such as 10% or 2%.

**Check Valve**— Valves used to limit the flow of fluid or air to one direction. The valve is typically held in the closed position by a spring until opened using fluid pressure. Check valves should be cleaned or replaced frequently as they are more likely to become clogged with hardened paint particles than other components.

**Chop**— The term used to describe short bursts of air or solvent in the fluid lines, typically in sequence at varying specified intervals. Chop durations are set in 7.9.5: Flush / Load Sequence.

**Circulation System**— A circulation system is fluid plumbing with the ability to circulate paint material in a continuous loop so particles remain in suspension. GEMS Color Stack CCVs allow paint circulation through the valve body.

**Color Change Valve (CCV)**— The pneumatic valves used to open and close ports throughout the system. Found on the Color Stack, Mix Manifold, and B Pump. Actuation pressure is 75-100 psi [5-7 bar].

**Color Stack**— The combination of manifolds and CCVs used to control up to 5 paint resins and flushing air and solvent.

**Component A**— The paint resin that is sent through the color stack and flow meter.

**Component B**— The term used to describe the hardener material or catalyst that is metered by the Dispense Pump. Hardeners as used in Urethane or Epoxy paints become part of the final product, whereas catalysts are typically used to initiate a reaction in the crosslinking process of the paint material.

**Controller**— A digital computer used for control of devices, such as the operation of the dispense pump, solenoids, and other hardware. Accepts inputs from devices such as pressure sensors and the Pendant.
Crossover— Describes the backward flow of material through the system. In the GEMS system, this condition is prevented by the use of check valves to limit the direction of fluid flow. Ensure proper function of the check valves to prevent crossover and the corresponding damage that could occur to the B Pump, Flow Meter, or other components.

Depressurized — No residual fluid or air pressure.

GEMS - Acronym for Global Electronic Mix Solutions.

Enclosure— The box that surrounds the electrical components of the system and houses the electrical end of the dispense pump.

Fault— see Alarm.

Floor Stand— The pedestal stand used to mount the unit together with the fluid panel and machine components. Allows the machine to be placed anywhere if the surface is flat and level.

Flow Meter— The device used to measure the volume flow rate of resin when the machine is running.

Fluid Lines— Describes the fluid hoses throughout the machine and out to the spray guns. These hoses are used to transport the mixed and unmixed fluids.

Fluid Panel— The panel used to mount the Color Stack, Mix Manifold and protective shroud. It is mounted to the support mast of GEMS.

Flushing— The process used to clean out the fluid lines and other GMS components when changing colors or shutting down for the day. Typically will involve an air and/or solvent chop to remove mixed materials. Always complete flushing with a solvent (color 0) load.

Gun Flush Box— The optional equipment that can be ordered to complete a fully automatic fluid line flush procedure. Sends and receives signal to the control in order to complete the flushing procedure.

Gun Lubricant— A low viscosity lubricant used to assemble and protect machine components and spray gun parts.

Hardener— The paint component that chemically reacts with the resin to provide a coating with superior properties to air-drying single component coatings. Also known as the “B” component.

HMI— Acronym for Human Machine Interface. See User Interface.

Jog Down— The command used to push the piston of the dispense pump downwards to set the B Pump lower limit.

Jog Up— The command used to pull the piston of the dispenser pump upwards to set the B Pump upper limit.

Load Volume— After completing a flushing procedure, the load volume is the volume of material (in cc's) required to load the mixed material into the fluid lines so that spraying may begin.

Manual Flush— Describes the manual triggering of solenoid stack valves when power is not available. Using air pressure to the system, it is possible to flush fluid lines if air/solvent and Resin Enable valves are triggered.

Mast— The term used to describe the support that connects the enclosure to the fluid panel and routes hoses/wiring.

Mix Manifold— The combining location of the resin and hardener components.

Oil Reservoir— The region of the upper B Pump block containing lubricating oil for the pump rod and seals. Includes the clear tubes extending upward from the block. The tubes should be periodically checked for changes to the oil or signs of seal leaks.

Petroleum Gel— A lubricant used to protect parts from galling and damage upon reassembly. Follow callouts where labeled.

Polytetrafluoroethylene (P.T.F.E)— A chemically inert plastic commonly used for o-rings, gaskets, and thread tape.
**Potentiometer**— The device used to indicate the location of the B Pump piston. The potentiometer upper and lower limits must be reset if the potentiometer is ever removed or replaced.

**Pot Life**— The period of time during which mixed coatings remain sprayable. Not to be exceeded.

**Power Switch**— The On / Off AC power and lock out switch on the side of the enclosure.

**Pressure Transducer**— The device mounted on the dispense pump measuring B fluid pressure. Two pressure transducers are used on the B Pump to monitor inlet and outlet pressure for proper ratio control.

**Prime Screen**— Prime refers to running material through the machine and removing all air bubbles from the fluid lines. Prime the system by flowing hardener or resin material through the system via the prime screen.

**Pulse Count**— A count of pulses sent from the resin flow meter. One pulse per gear tooth.

**Resin**— The A Component that flows through the color stack and flow meter. The paint resin provides color and flexibility and other properties to plural component coatings. Polyols are resins used for urethane paints, and epoxy resins are used for epoxy paints.

**Resin Enable Valve**— The CCV used to enable resin flow through the mix manifold. Also known as AE valve.

**Shroud**— The protective covering of the fluid panel. Removable for better access to fluid panel components.

**Solenoid**— The device used to convert electrical signals to pneumatic trigger signals for CCVs. Can be manually triggered if needed.

**Solvent**— The material used to dissolve and remove mixed material from the fluid lines. Known as color 0 on the GEMS system.

**Static Mixer**— A device used in a fluid line to mix fluids together. The static mixer divides, rotates, and re-combines the flow many times to provide efficient mixing with minimal pressure drop.

**Stepper Motor**— Used to control movement of the dispense pump piston, the stepper motor engages the ACME threaded rod and moves the piston up and down. Universal for both sizes of the dispense pump.

**Target Ratio**— The current A:B ratio the system has loaded and ready to spray. Visible on the Home screen.

**Thread Sealant**— P.T.F.E tape or liquid pipe thread sealant is required on pipe threads to lubricate and prevent leaks. If using tape, wrap 2-3 times around the male threads. If using liquid, add a bead of sealant around entire 2nd male thread before tightening into female thread. Follow callouts where labeled.

**User Interface**— The touch screen device used to operate GEMS and configure machine settings.

**Wall Mount**— The frame and mast used to mount GEMS to the wall.
WARRANTY POLICY

Binks products are covered by Carlisle Fluid Technologies one year materials and workmanship limited warranty. The use of any parts or accessories, from a source other than Carlisle Fluid Technologies, will void all warranties. For specific warranty information please contact the closest Carlisle Fluid Technologies location listed below.

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