

Versa-Spray[®] IPS PRX[®] Automatic Powder Spray Gun

Customer Product Manual
Part 107015D

**For parts and technical support, call the Industrial Coating
Systems Customer Support Center at (800) 433-9319 or
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Section 1

Safety

Section 1

Safety

1. Introduction

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

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

2. Qualified Personnel

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

3. Intended Use

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

Some examples of unintended use of equipment include

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

4. Regulations and Approvals

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

5. Personal Safety

To prevent injury follow these instructions.

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

6. Fire Safety

To avoid a fire or explosion, follow these instructions.

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

7. Action in the Event of a Malfunction

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

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

8. Disposal

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

9. Safety Labels

Table 1-1 contains the text of the safety label on this equipment. The safety label is provided to help you operate and maintain your equipment safely.

Table 1-1 Safety Label

Item	Part	Description
	244 664	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">    </div> <div> <p>WARNING: The following procedures <u>MUST</u> be followed when working with this electrostatic spray equipment. Failure to follow these instructions may result in a fire and/or serious personal injury. Display this warning on the spray booth.</p> <ol style="list-style-type: none"> 1. NO SMOKING. Keep open flames, hot surfaces, and sparks from torches or grinding away from booth. 2. Turn the electrostatic power unit <u>off</u> when the spray gun is not in use. 3. Shut down immediately in event of fire. 4. Maintain ground circuit on all conductive objects below 1 meg ohm to prevent sparking. (ANSI/NFPA 33, Chapter 9, or local codes) 5. Shut down operation and correct grounds if sparking occurs. 6. Install fixed fire suppression system in accordance with ANSI/NFPA 33, Chapter 7 (or local codes), before operating with combustible powder. 7. Install automatic flame detectors in accordance with ANSI/NFPA 33, Chapter 7 (or local codes), before operating automatic guns. 8. Examine all equipment at the beginning of each work period and repair or replace any damaged, loose, or missing parts. 9. Before cleaning or performing any maintenance on the electrostatic spray gun, turn off the power unit and ground the nozzle. Maintain electrostatic spray equipment in accordance with instruction manual. Do not deviate. Do not substitute parts from other manufacturers. 10. Operator must be grounded to prevent shocks from static electricity. Floor surface must be conductive. Footwear and gloves must be static dissipative in accordance with ANSI Z41-1991 (or local codes). </div> </div>

Continued on next page

9. Safety Labels (contd.)

Item	Part	Description
		<div style="display: flex; align-items: center;">  <ol style="list-style-type: none"> <li data-bbox="630 346 1393 463">11. Air velocity through all booth openings must meet local requirements and contain powder within the booth. If powder escapes from the booth, shut down operation and correct the malfunction. <li data-bbox="630 478 1393 595">12. Powder may be toxic or be a nuisance dust hazard. Refer to supplier's MSDS. If exposed to dust during operation, maintenance, or clean up, operators must use appropriate personal protective equipment. <li data-bbox="630 610 1393 697">13. Do not use compressed air or organic solvents for removal of powder from skin or clothing. Do use soap and water. Wash hands before eating or smoking. <li data-bbox="630 712 1393 763">14. Guns, feeders, booths, etc., may be cleaned with clean dry air at 25 psig (1.7 bar). </div>

Section 2

Description

Section 2

Description

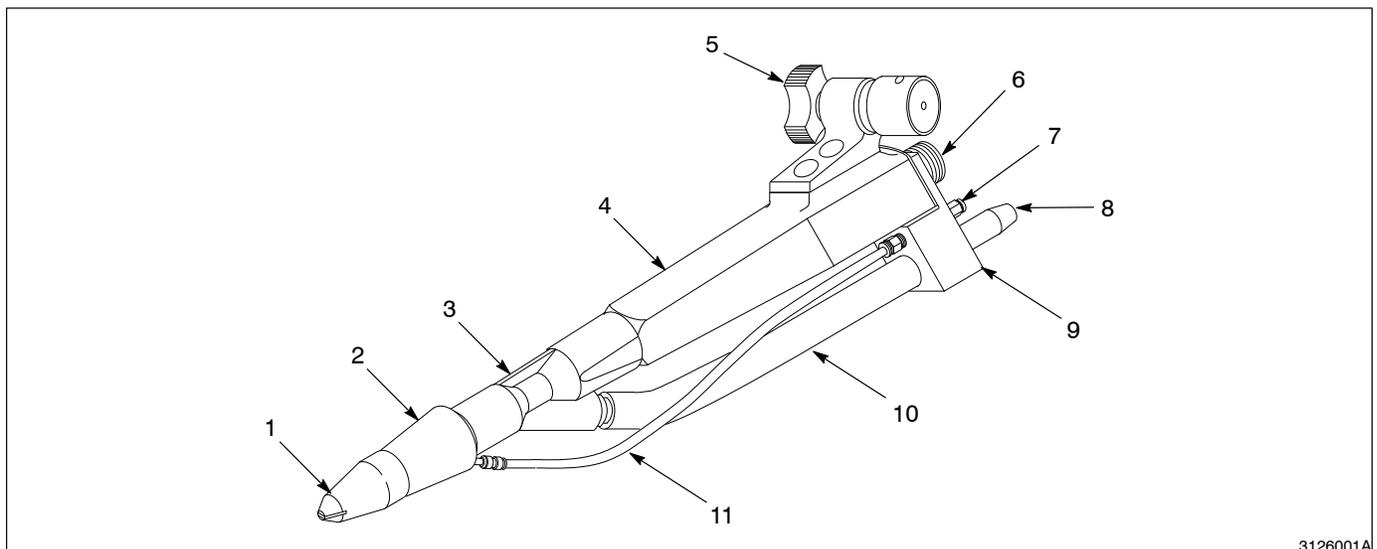
1. Introduction

The Versa-Spray II Integral Power Supply (IPS) PRX automatic powder spray gun electrostatically charges and sprays organic powder coatings. It is used for coating parts with deep recesses at close ranges. The integral power supply (multiplier) is user-replaceable. The gun is used with a Versa-Spray II 2-gauge IPS control unit and a standard or low-flow powder pump.

Versions

The gun is available with a positive or negative multiplier. It is also available with or without gun air. Versions with gun air have a diffuser and nozzle extension. The diffuser injects gun air into the powder-air mixture to evenly blend it before it reaches the nozzle.

From the diffuser, the gun air is routed to the nozzle extension. Gun air flows through the nozzle extension and out around the electrode to prevent some powder coatings such as metallics from collecting on the electrode.



3126001A

Fig. 2-1 Versa-spray II PRX Automatic Powder Spray Gun with Gun Air

- | | | |
|----------------------------------|-----------------------------------------|-----------------------------------|
| 1. Flat spray nozzle | 5. Gun mount | 9. Diffuser ¹ |
| 2. Nozzle extension ¹ | 6. Cable receptacle | 10. Powder feed hose ¹ |
| 3. Powder inlet body | 7. Gun air inlet connector ¹ | 11. Gun air tubing ¹ |
| 4. Multiplier | 8. Feed hose connector ¹ | |

Note: 1—Used only on guns with air.

2. Operation

The Versa-Spray II control unit supplies low-voltage dc power to the voltage multiplier housed in the gun's extension and body. The multiplier generates the high electrostatic voltage needed for powder coating. The voltage generates a high-strength electrostatic field between the gun and the grounded part in front of the gun. The electrostatic field produces a corona discharge around the electrode. A resistor in the gun between the multiplier and the electrode limits the current output to safe levels.

Compressed air pumps the powder from the feed hopper, conveys it through the feed hose to the gun, and propels it toward the workpieces. As the powder particles are sprayed through the corona, they pick up an electrostatic charge and stick to the workpieces.

The spray pattern is controlled by the shape of the nozzle used, the speed of the powder-conveying air as it exits the nozzle, and the electrostatic field generated between the electrode and the grounded workpiece. There are no controls on the gun. The voltage controls and the powder pump flow-rate and atomizing air pressure regulators are housed in the IPS control unit. A non-adjustable restrictor on the control unit rear panel controls the gun air pressure. The pump and gun air start flowing when the gun is triggered.

3. Options

Refer to the *Options* section for part numbers and illustrations of the options listed below. Contact your Nordson representative for more information about these options.

Nozzles and Deflectors

Standard guns are equipped with a Tivar flat-spray nozzle with 4-mm wide slot.

- Versa-Spray II conical nozzle, with 19-mm deflector
- 32- and 45-mm conical nozzles
- 2.5-, 3-, 4-, and 6-mm Tivar and GFT (glass-filled PTFE) flat spray nozzles for organic powders
- 60° and 90° Cross-Cut nozzles
- castle nozzle (six radial slots)
- 14-, 16-, 19-, and 26-mm deflectors for conical nozzles

Lance Extensions

Lance extensions are used to extend the length of the powder path to help spray powder into recesses and interior corners. The extensions are equipped with 26-mm conical nozzles and are available in 150- and 300-mm (6- and 12-in.) lengths.

Feed Hoses and Adapters

The gun is equipped with a feed hose adapter for 1/2-in. ID powder feed hose. A low-flow hose adapter can be ordered for use with low-flow hose (3/8-in. ID).

Purge Adapter

The purge adapter is used to clean accumulated powder from the powder inlet body and nozzle. It is installed in the powder inlet body in place of the hose adapter. The powder feed hose connects directly to the purge adapter.

Upgrade Kits

Five kits are available to add a diffuser and nozzle extension to a Versa-Spray II automatic gun. For guns used with a Versa-Spray II control unit, the following kits are available.

- Diffuser kit
- Nozzle extension kit
- Diffuser and nozzle extension kit

For guns used with a Versa-Spray control unit, the following kits are available.

- Manifold kit
- Diffuser kit
- Nozzle extension kit

In-Line Ball Mount Kits

The guns are shipped with the Nordson Shur-Lok gun mount shown in Figure 2-1. This mount can be replaced with an optional in-line ball mount or a combination in-line ball mount and ion collector kit.

Ion Collector Kits

The ion collector can improve the smoothness and appearance of cured powder coatings. It collects ions emitted from the gun's charging electrode instead of allowing them to deposit on the part. This can reduce the rate of charge buildup in the powder deposited on the part, which may reduce defects in the cured coating such as pinholing and orange peel.

Three kits are available: two retrofit kits for guns with Shur-Lok mounts or in-line ball mounts, and a combination in-line ball mount and ion collector kit. Installation and adjustment instructions are included with each kit.

4. Specifications

Maximum rated output voltage at the electrode: 80,000 volts \pm 10%
Maximum rated output current at the electrode: 0.180 mA \pm 10%

This equipment is rated for use in an explosive environment (Class II, Division I).

Air Quality

Powder spray systems require clean, dry, oil-free operating air. Moist or oil-contaminated air can cause the powder to clog in the pump venturi throat, feed hose, or gun passages.

Use 3-micron filter/separators with automatic drains and a refrigerated or regenerative desiccant-type air dryer that can produce a 3.4 °C (38 °F) or lower dewpoint at 6.89 bar (100 psi).

Section 3

Installation

Section 3

Installation

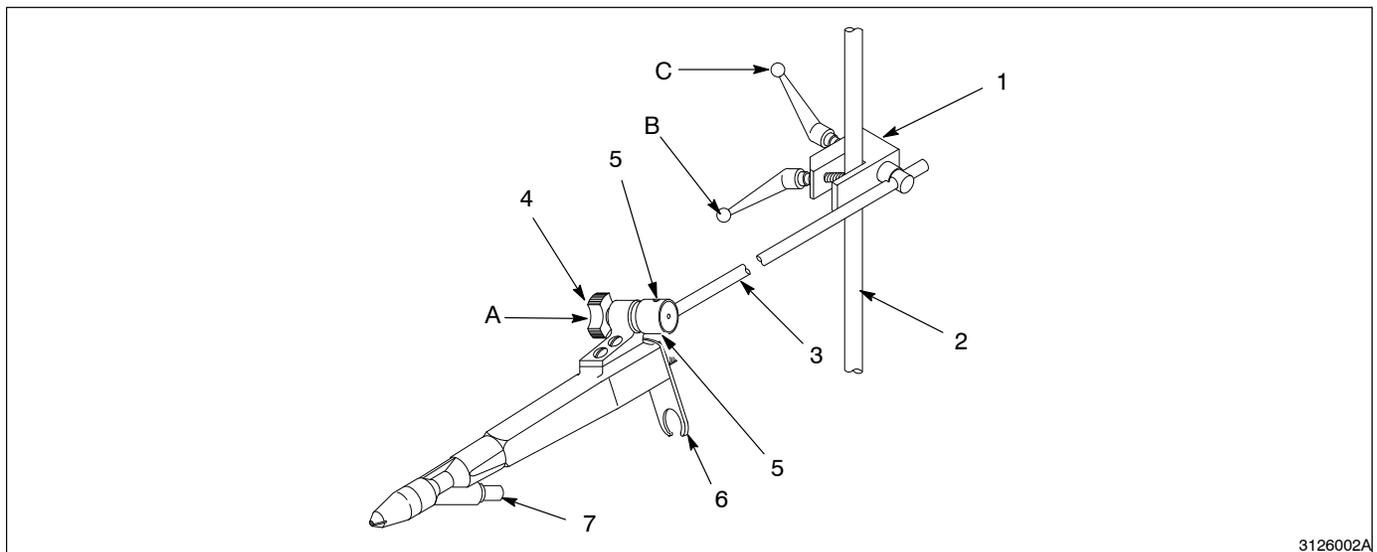


WARNING: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

1. Gun Mounting

Use the optional 16-mm ($\frac{5}{8}$ -in.) by 910-mm (36-in.) gun mounting bar listed in the *Options* section to mount the gun on a fixed gun stand or on an oscillating or reciprocating gun mover arm.

1. See Figure 3-1. Install the mounting bar clamp (1) on a 25.4-mm (1-in.) diameter bar (2). Tighten handle B.
2. Loosen the set screws (5) in the gun mount (4) and insert the end of the bar (3) in the mount. Tighten the set screws securely.
3. Use knob A to adjust the angle of the gun. Use handle B to position the clamp (1) vertically or horizontally. Use handle C to adjust the angle and length of the bar (3).



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Fig. 3-1 Gun Mounting—Shur-Lok Gun Mount (Gun without Air Shown)

- | | | |
|------------------------|-----------------------|-----------------|
| 1. Mounting bar clamp | 4. Shur-Lok gun mount | 6. Hose bracket |
| 2. 25.4-mm (1-in.) bar | 5. Set screws | 7. Hose adapter |
| 3. Mounting bar | | |

2. *Gun Connections*

Perform the following steps to install the gun cable, feed hose, and gun air tubing. See Figure 3-2.

1. Plug the 3-socket end of the gun cable (4) into the multiplier receptacle (1). Plug the 6-pin end of the gun cable into the GUN OUTPUT receptacle on the rear panel of the IPS control unit. Thread the cable retaining nuts at each end of the cable onto the receptacles and tighten them securely.
2. Install the feed hose. Secure the hose at both ends with snap clamps. Install spiral-cut tubing around the hose wherever necessary to prevent the hose from kinking and cutting off the flow of powder.
 - a. Guns with air — Connect the feed hose (6) to the connector (3) at the diffuser.
 - b. Guns without air — Pinch the feed hose and slide it into the hose bracket (see Figure 3-1, (6)) at the rear of the gun. Connect the feed hose to the hose adapter (see Figure 3-1, (7)) extending from the powder inlet body.

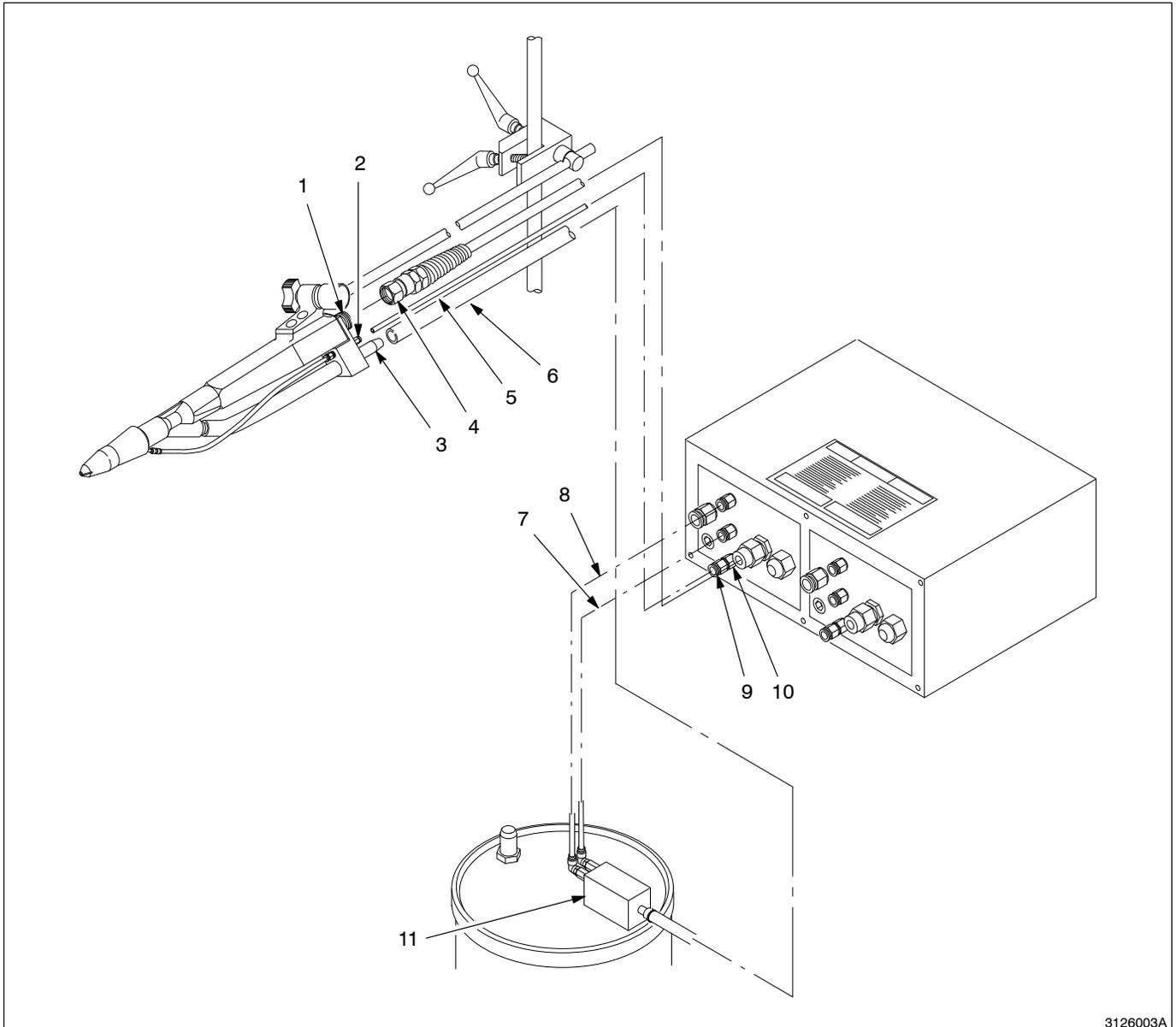
NOTE: To increase powder flow and keep the distribution of powder in the air even, keep the feed hose as short as possible. The hose should not be more than 8-m (25-ft) long.

3. Guns with air used with Versa-Spray II control units — install the restrictor and connector shipped with the guns in the control unit first, then install the gun air tubing. For instructions on connecting guns with air to Versa-Spray control units, refer to the instructions shipped with the upgrade kits.
 - a. Remove the plug from the GUN port on the control unit. Wrap the restrictor (10) threads with PTFE tape. Install the restrictor into the port. Install the 6-mm tube connector (9) into the restrictor.
 - b. Install the gun air tubing between the connector (9) and the tubing connector (2).
4. If not already done, install 6-mm atomizing air tubing (7) and flow-rate air tubing (8) between the control unit and the pump (11).
5. Anchor the feed hose, gun cable, and air tubing to the gun mounting bar and stand or to the reciprocator arm with spiral-cut tubing. Make sure that the hose and cable cannot be abraded, cut, or run over by moving equipment.



WARNING: All electrically conductive equipment in the spray area must be grounded. Ungrounded or poorly grounded equipment can store an electrostatic charge which can give personnel a severe shock or arc and cause a fire or explosion.

6. Connect all conductive equipment to a true earth ground.



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Fig. 3-2 Gun Installation—Feed Hose, Cable, and Air Tubing

- | | | |
|------------------------|-------------------------|------------------------|
| 1. Cable receptacle | 5. Gun air tubing | 9. 6-mm tube connector |
| 2. Tubing connector | 6. Feed hose | 10. Restrictor |
| 3. Feed hose connector | 7. Atomizing air tubing | 11. Powder pump |
| 4. Gun cable | 8. Flow-rate air tubing | |

3. Installing Optional Nozzles

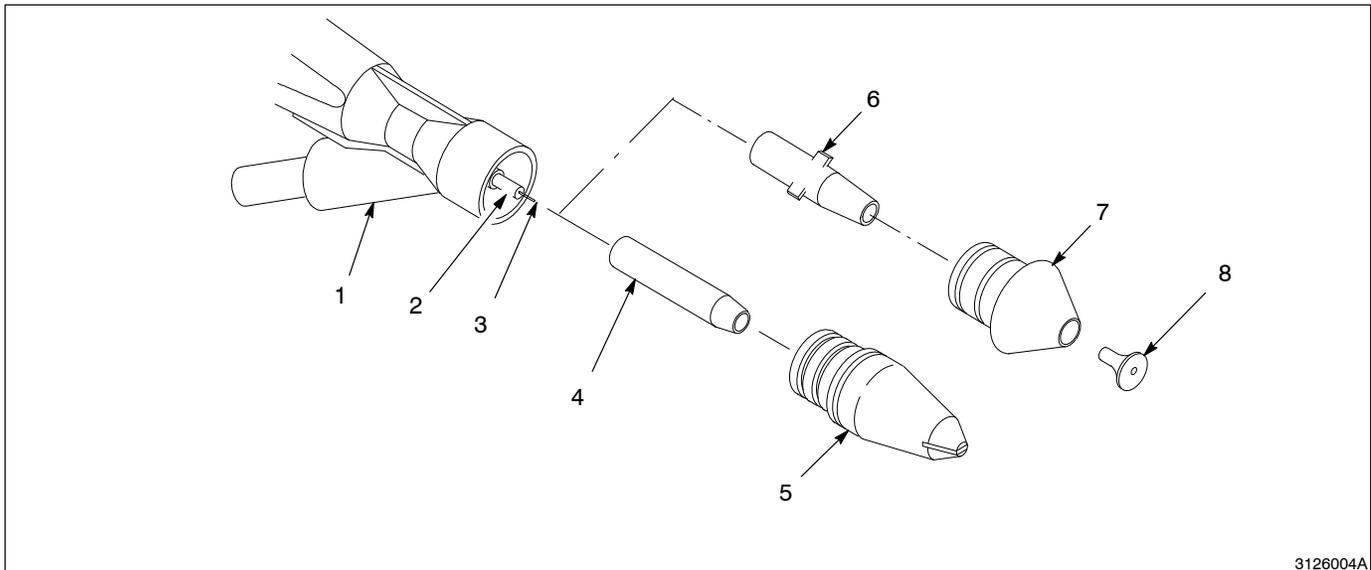


WARNING: Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a shock.

NOTE: Before changing nozzles, disconnect the powder feed hose from the pump. Blow out the feed hose, powder inlet body, nozzle extension (if used), and nozzle with low-pressure compressed air. Use a clean, dry cloth to wipe off the remaining powder after removing the nozzle parts.

Guns without Air

1. See Figure 3-3. Remove the flat-spray nozzle (5) and wear sleeve (4).
2. Install the conical nozzle wear sleeve (6) over the resistor probe (2). Be careful not to damage the electrode (3).
3. Install the conical nozzle (7) into the end of the powder inlet body. Install the deflector (8) on the end of the resistor probe. Be careful not to damage the electrode.



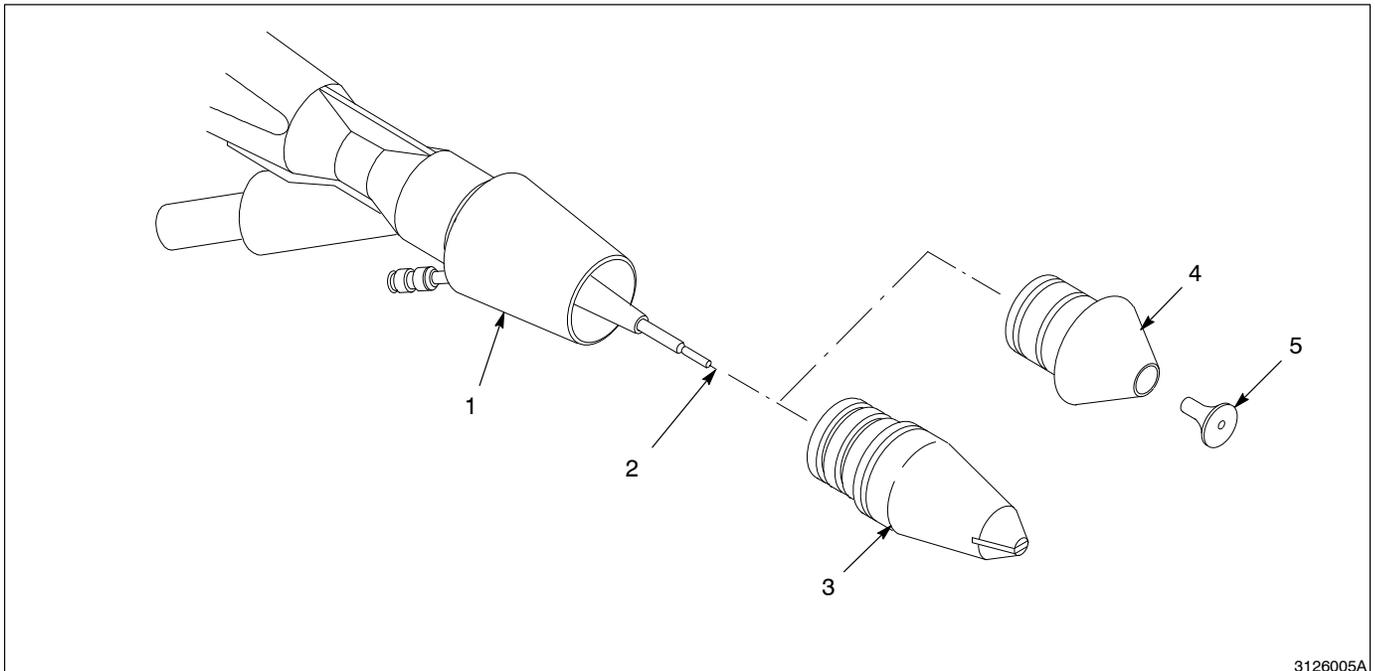
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Fig. 3-3 Installing Optional Nozzles on Guns without Air (Conical Nozzle Shown)

- | | | |
|----------------------|-------------------------------|-------------------|
| 1. Powder inlet body | 4. Wear sleeve | 7. Conical nozzle |
| 2. Resistor probe | 5. Flat-spray nozzle | 8. Deflector |
| 3. Electrode | 6. Conical nozzle wear sleeve | |

Guns with Air

1. See Figure 3-4. Remove the flat spray nozzle (3) from the nozzle extension assembly (1).
2. Install the optional nozzle (4) and deflector (5) into the end of the extension assembly. Be careful not to damage the electrode (2).



3126005A

Fig. 3-4 Installing Optional Nozzles on Guns with Air (Conical Nozzle Shown)

- | | | |
|------------------------------|----------------------|--------------|
| 1. Nozzle extension assembly | 3. Flat spray nozzle | 5. Deflector |
| 2. Electrode | 4. Conical nozzle | |

4. Installing Optional Lance Extensions



WARNING: Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a shock.

NOTE: Before changing nozzles, disconnect the powder feed hose from the pump. Blow out the feed hose, powder inlet body, nozzle extension (if used), and nozzle with low-pressure compressed air. Use a clean, dry cloth to wipe off the remaining powder after removing the nozzle parts.

Guns without Air

1. See Figure 3-5. Remove the flat-spray nozzle (5) from the powder inlet body (1).
2. Remove the wear sleeve (4) from the resistor probe (2).
3. Install the lance extension (6) into the end of the powder inlet body, guiding the resistor probe into the lance extension contact sleeve (8). Be careful not to damage the electrode (3).
4. Slide the support (7) over the end of the powder inlet body.
5. If desired, the pattern adjust sleeve, deflector, and nozzle (see Figure 3-6, (10, 9, and 8)) can be removed from the lance extension and replaced with a flat spray nozzle (5).

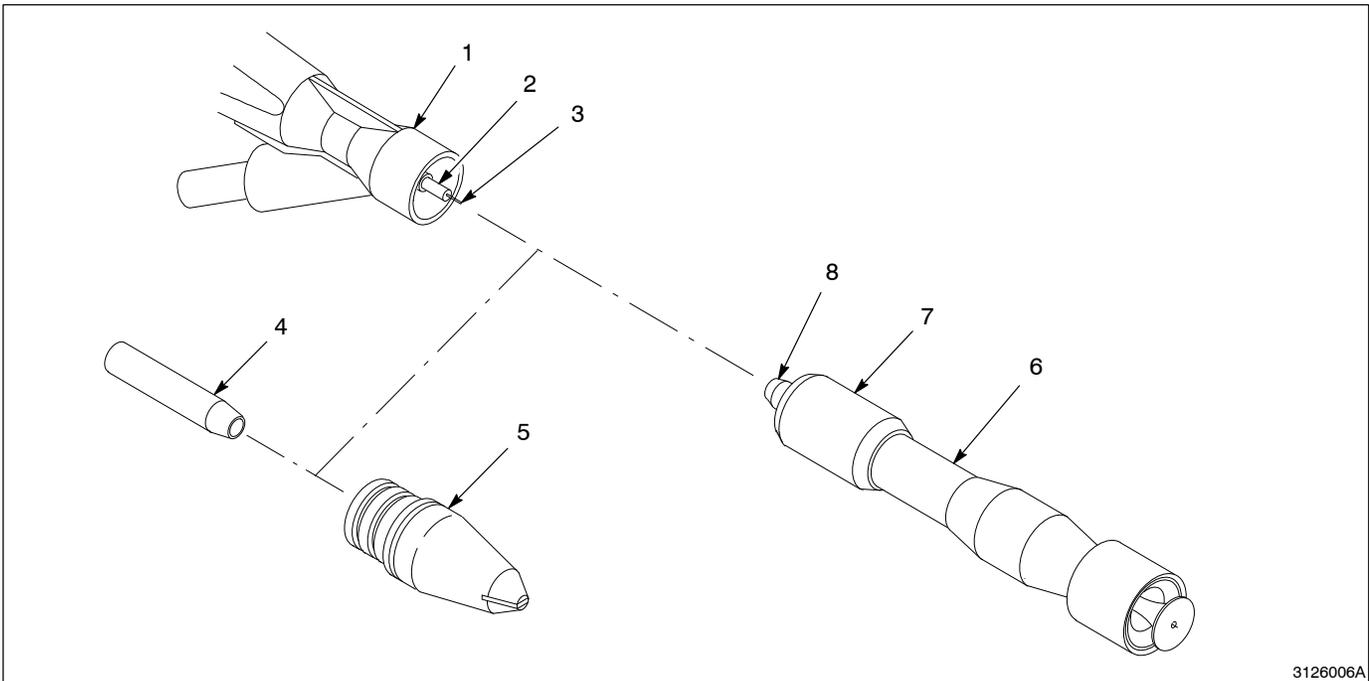
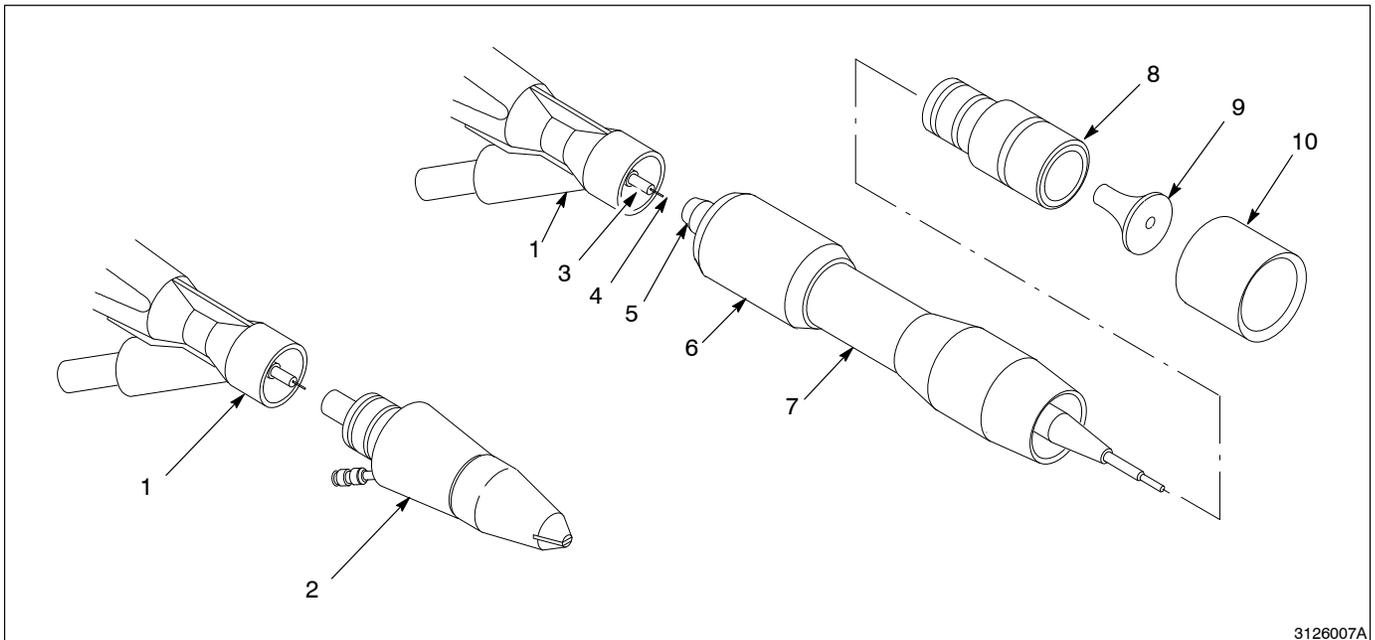


Fig. 3-5 Installing Optional Lance Extensions on Guns without Air

- | | | |
|----------------------|----------------------|-------------------|
| 1. Powder inlet body | 4. Wear sleeve | 7. Support |
| 2. Resistor probe | 5. Flat-spray nozzle | 8. Contact sleeve |
| 3. Electrode | 6. Lance extension | |

Guns with Air

1. See Figure 3-6. Disconnect the air tubing from the nozzle extension assembly (2), then remove it from the powder inlet body (1).
2. Install the lance extension (7) into the end of the powder inlet body (1), guiding the resistor probe (3) into the lance extension contact sleeve (5). Be careful not to damage the electrode (4).
3. Slide the support (6) over the end of the powder inlet body.
4. Remove the pattern adjust sleeve (10), deflector (9), and nozzle (8) from the end of the lance extension.



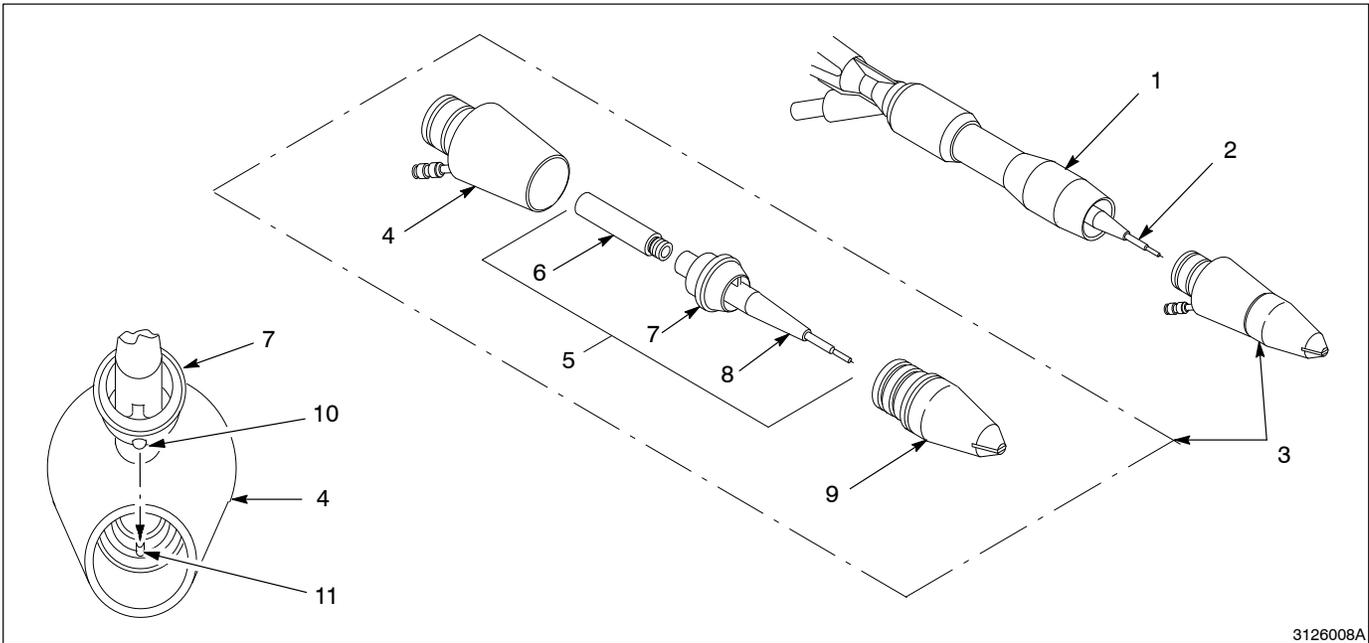
3126007A

Fig. 3-6 Installing Optional Lance Extensions on Guns with Air

- | | | |
|------------------------------|--------------------|---------------------------|
| 1. Powder inlet body | 5. Contact sleeve | 8. Nozzle |
| 2. Nozzle extension assembly | 6. Support | 9. Deflector |
| 3. Resistor probe | 7. Lance extension | 10. Pattern adjust sleeve |
| 4. Electrode | | |

Guns with Air (contd.)

5. See Figure 3-7. Unscrew the wear sleeve (6) from the spider (7). If you need to remove the wear sleeve/spider/resistor holder assembly from the nozzle adapter in order to remove the wear sleeve, perform the following steps.
 - a. Remove the flat-spray nozzle (9).
 - b. Push on the wear sleeve to get the wear sleeve/spider/resistor holder assembly (5) out of the nozzle adapter (4). Unscrew the wear sleeve (6) from the spider (7).
 - c. Align the small pin (10) on the spider with the slot (11) in the nozzle adapter. Press the spider/resistor holder assembly (7, 8) back into the nozzle adapter.
 - d. Install the flat-spray onto the extension assembly.
6. Install the nozzle extension assembly (3) onto the lance extension (1). The lance extension resistor probe (2) fits up into the spider.
7. Connect 6-mm air tubing between the diffuser and the nozzle extension.



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Fig. 3-7 Installing the Nozzle Extension on the Lance Extension (Guns with Air)

- | | | |
|-----------------------------------|---------------------------------------|----------------------|
| 1. Lance extension | 5. Wear sleeve/spider/resistor holder | 9. Flat-spray nozzle |
| 2. Lance extension resistor probe | 6. Wear sleeve | 10. Pin |
| 3. Nozzle extension | 7. Spider | 11. Slot |
| 4. Nozzle adapter | 8. Resistor holder | |

Section 4

Operation

Section 4

Operation

1. Startup



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



WARNING: Do not operate the spray gun if the resistor and multiplier resistances are not within the ranges specified in this manual. Failure to observe this warning may result in personal injury, fire, and property damage.



WARNING: This equipment can be dangerous unless it is used in accordance with the rules laid down in this manual.

Before turning on the IPS control unit, make sure that

- the booth exhaust fan is on,
- the powder recovery system is operating, and
- the powder supply in the feed hopper is adequately fluidized.

Refer to the appropriate equipment manuals for startup procedures.

1. Make sure the cable, feed hose, and air tubing are correctly connected to the gun, powder pump, and IPS control unit.
2. If the IPS control unit is controlled by a master control unit, turn on the master control unit power switch. Turn on the IPS control unit power switch.
3. Adjust the control unit air pressure regulators:

Flow rate	1.4 bar (20 psi)
Atomizing	2.1 bar (30 psi)

Flow-rate air pressure controls the volume of the powder delivered to the gun. Atomizing air pressure controls the velocity and density (powder-to-air ratio) of the powder. Gun air pressure (if used) is controlled by a fixed-orifice restrictor installed in the GUN port on the control unit rear panel.

1. Startup (contd.)

NOTE: The pressures given are average starting points. Pressures will vary according to required film build, line speed, and part configuration. Adjust the pressures to obtain the desired results.

4. With the gun aimed into the booth, trigger the control unit, and test the spray pattern. Adjust the flow-rate and atomizing air pressures until you obtain the desired pattern.

NOTE: The following steps describe electrostatic voltage settings made on a Versa-Spray II control unit that includes AFC controls. A Versa-Spray II gun can be used with older Versa-Spray control units without AFC controls, but only the kV mode will be available unless the optional current limit kit is installed.

5. Turn the control unit kV/AFC switch on. Push the kV/AFC switch in to put the unit in kV mode or pull it out to put the unit in AFC mode.
 - a. If the switch is set for the kV mode, rotate it fully clockwise for maximum voltage.
 - b. If the switch is set for the AFC mode, rotate it to position 4. This position represents approximately 40 microamps.
6. Coat a part and adjust the kV output or AFC settings and air pressures to achieve the desired results.



WARNING: Turn off the electrostatic voltage and ground the gun electrode before making adjustments to the gun or nozzle.

NOTE: When a new gun is put into service, or a multiplier is replaced, set the kV/AFC switch to the kV mode. Turn the switch to the maximum setting, and record the μA output with no parts in front of the gun. Monitor the μA output daily, under the same conditions. A significant increase in μA output indicates a probable short in the gun resistor. A significant decrease indicates a failing resistor or voltage multiplier.

2. Shutdown

NOTE: Voltage and air to the pump and gun will be turned on and off when the master control unit is turned on and off. The IPS control unit power switch, kV potentiometer, and air pressure regulators can be left on after the initial air pressure and kV settings are made.

1. Turn off the master control unit power switch or the IPS control unit power switch.
2. Perform the daily maintenance procedures.

For information on the operation of other system components, refer to their respective manuals.

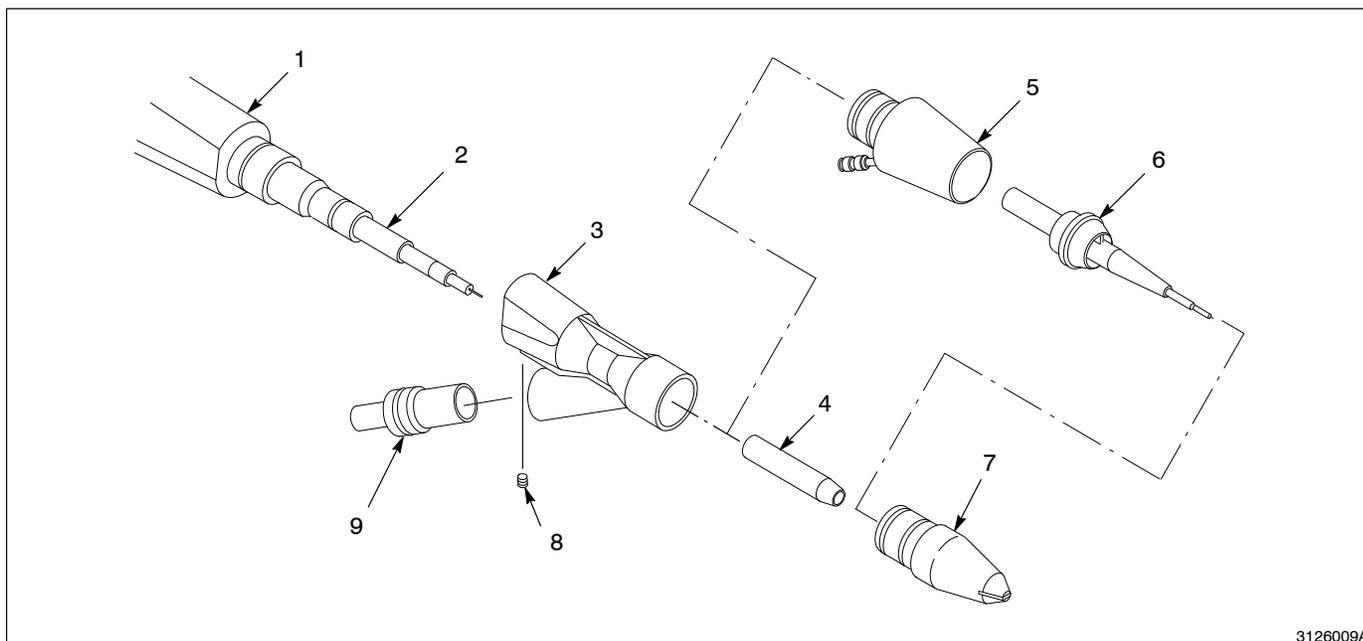
3. Maintenance



WARNING: Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a severe shock.

Daily

1. Disconnect the powder feed hose from the pump. Blow the powder out of the hose and gun with an OSHA-approved low-pressure compressed air. Never blow air through the powder feed hose from the gun into the pump.
2. See Figure 4-1. Remove the nozzle parts (4–7), set screw (8), and powder inlet body (3) from the gun. Clean them with a low-pressure air gun. Wipe the parts with a clean, dry cloth.
3. Blow powder off the resistor probe (2) and extension (1). Wipe them with a clean, dry cloth.
4. Carefully remove fused powder from the parts with a wooden or plastic dowel or similar tool. Do not use tools that will scratch the plastic. Powder will build up and impact-fuse on scratches.



3126009A

Fig. 4-1 Disassembling the Gun for Cleaning (Gun with Air Shown)

- | | | |
|----------------------|----------------------------------------------------|----------------------|
| 1. Extension | 4. Wear sleeve ¹ | 7. Flat spray nozzle |
| 2. Resistor probe | 5. Nozzle adapter ² | 8. Set screw |
| 3. Powder inlet body | 6. Wear sleeve/spider/resistor holder ² | 9. Hose adapter |

Note: 1—Used on guns without air only.

Note: 2—Used on guns with air only.

Daily (contd.)

NOTE: If necessary, use a cloth dampened with isopropyl or ethyl alcohol to clean the powder path parts. Remove the O-rings first. Do not immerse the gun in alcohol. Do not use any other solvents.

5. See Figure 4-2. If your gun is equipped with a diffuser, remove the diffuser hose connector (1) from the bracket (2). Disconnect the air tubing from the tubing connectors (3). Clean the bracket and the connector with low-pressure compressed air and a clean soft cloth.

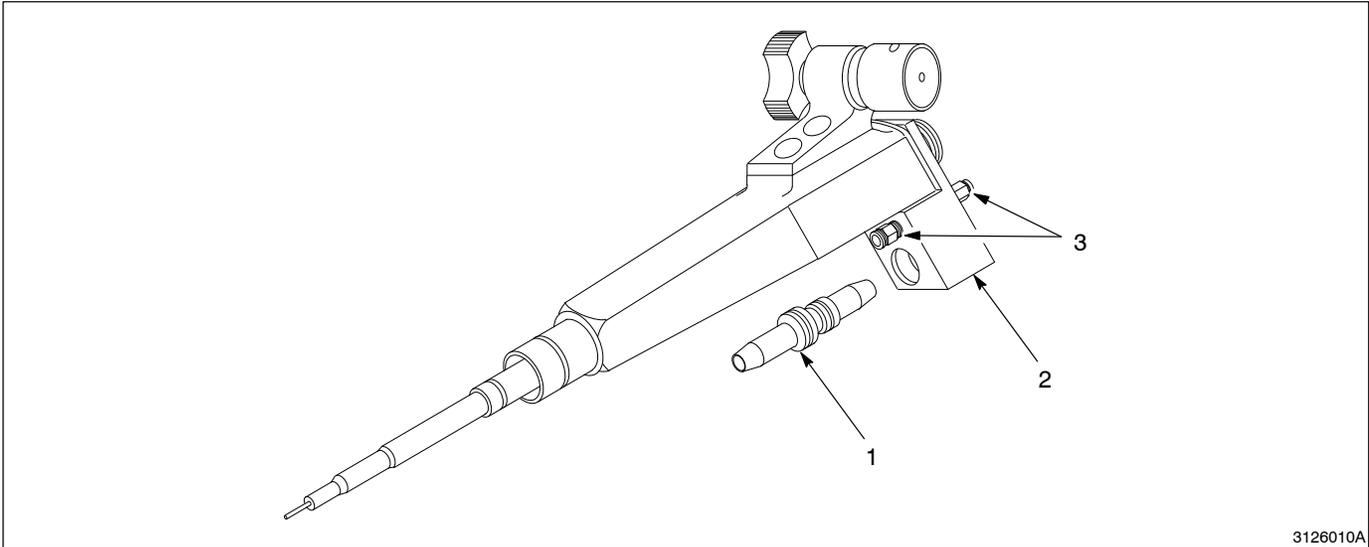


Fig. 4-2 Removing the Diffuser Hose Connector for Cleaning

1. Hose connector
2. Diffuser bracket
3. Tubing connectors

6. Inspect the powder path parts for wear. Replace worn parts.
7. Reassemble the gun. See Figure 4-1. Rotate items (4), (7), and (9) at least 30° from their previous position to prevent uneven wear and lopsided patterns.

Weekly

Check the resistance of the multiplier/resistor probe assembly with a megohmmeter, as described in the *Troubleshooting* section. Replace the multiplier, resistor, or both, if the resistance readings do not fall within the specified ranges.

Troubleshooting

Section 5 Troubleshooting

1. Introduction



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



WARNING: Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a severe shock.

This section contains troubleshooting procedures for the Versa-Spray II IPS automatic electrostatic powder spray gun. These troubleshooting procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Problem		Page
1.	Uneven pattern; unsteady or inadequate powder flow	5-2
2.	Voids in powder pattern	5-2
3.	Loss of wrap; poor transfer efficiency	5-2
4.	No kV output from gun	5-3

Continuity and Resistance Checks

Perform continuity and resistance checks if you are having problems with the electrostatic components of the gun. Use the procedures at the end of this section to perform these checks:

- multiplier/resistor assembly continuity and resistance
- resistor continuity and resistance
- nozzle extension resistor continuity and resistance
- gun cable continuity

2. Troubleshooting Charts

Problem	Possible Cause	Corrective Action
1. Uneven pattern; unsteady or inadequate powder flow	<p>Blockage in gun, feed hose, or pump</p> <p>Deflector or nozzle worn, or impact-fusion affecting pattern</p> <p>Damp powder</p> <p>Low atomizing or flow-rate air pressure</p> <p>Improper fluidization of powder in feed hopper</p>	<p>Remove the feed hose from the pump outlet. Blow out the hose and gun with compressed air. If necessary, disassemble the gun and pump and clean them.</p> <p>Remove the deflector and/or nozzle. Clean and inspect them. Replace worn parts. If parts are wearing excessively or impact-fusion is a problem, reduce the air pressure.</p> <p>Check the powder in feed hopper, air filters, and dryer. Correct the problem and replace the powder supply if it is contaminated.</p> <p>Increase the atomizing and/or flow-rate air pressure.</p> <p>Increase the fluidizing air pressure. Remove the powder from the hopper and clean or replace the fluidizing plate, if necessary.</p>
2. Voids in powder pattern	<p>Worn nozzle or deflector</p> <p>Plugged powder path</p>	<p>Remove the nozzle and deflector. Inspect and replace them if necessary.</p> <p>Disassemble the powder path and clean all parts.</p>

Problem	Possible Cause	Corrective Action
<p>3. Loss of wrap; poor transfer efficiency</p>	<p>Electrostatic voltage insufficient</p> <p>Dirty or broken electrode</p> <p>Resistor, multiplier, or IPS control unit failure</p> <p>Poorly grounded parts, hangers, or conveyor</p> <p>Failed nozzle extension resistor</p>	<p>Increase the electrostatic voltage.</p> <p>Clean or replace the electrode (contact tip)</p> <p>Use the optional shorting plug and a megohm meter to check the multiplier/resistor probe assembly for 195–260 megohms at 500 Volts. If the reading is out-of-range, check the resistor probe separately.</p> <p>Check the conveyor chain, rollers and part hangers for powder buildup. Clean them and check for 1 MΩ or less resistance between parts and ground. For best results, resistance should be no more than 500 Ω.</p> <p>Check resistor with a megohm meter for 18–22 megohms at 500 Volts.</p>
<p>4. No kV output from gun</p>	<p>Damaged gun cable</p> <p>Malfunctioning voltage multiplier</p> <p>Failed gun resistor</p> <p>Malfunctioning IPS control unit</p> <p>Failed nozzle extension resistor</p>	<p>Check the continuity of the cable wires, from pin to pin. Replace the cable if any opens or shorts found.</p> <p>Use the optional shorting plug and a megohm meter to check the continuity and resistance of the multiplier/resistor assembly for 195–260 megohms at 500 Volts. No burn-throughs or arc tracks should be visible on any gun parts.</p> <p>Check the resistor with a megohm meter for 153–187 megohms at 500 Volts. No burn-throughs or arc tracks should be visible on any gun parts.</p> <p>Repair or replace the control unit.</p> <p>Check resistor with a megohm meter for 18–22 megohms at 500 Volts.</p>

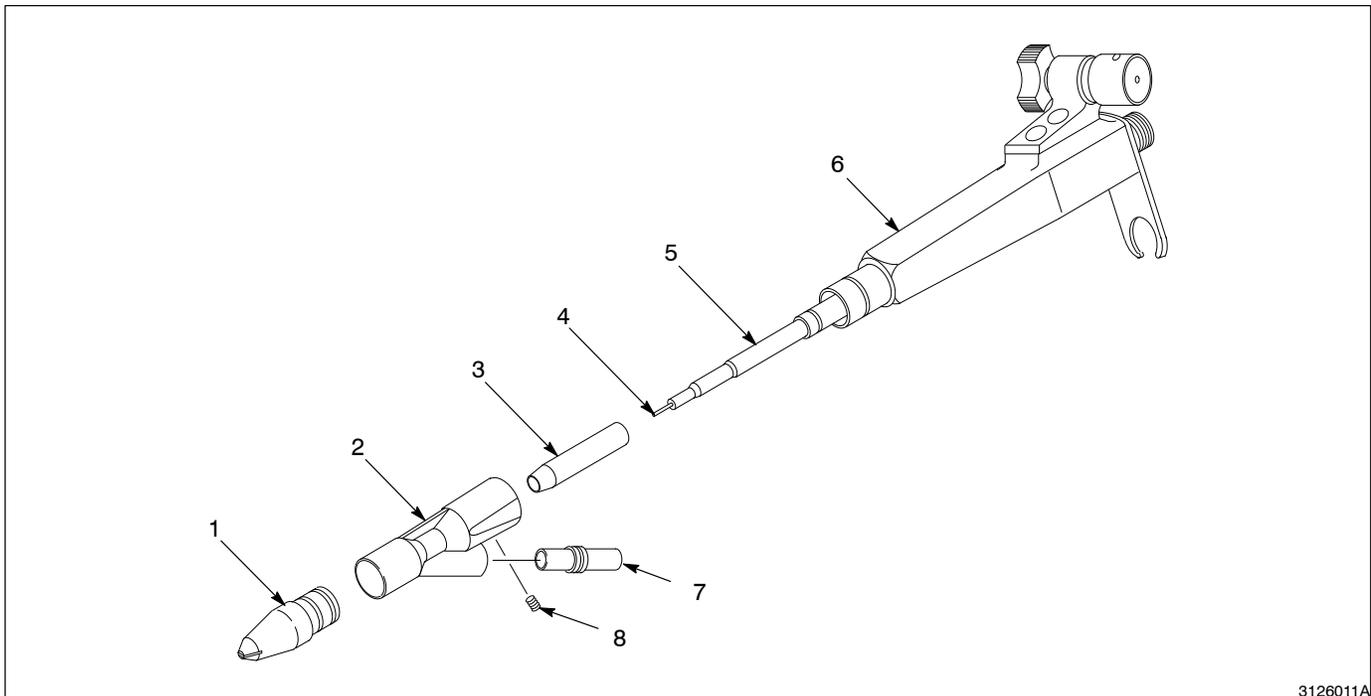
3. Continuity and Resistance Checks



WARNING: Do not operate the spray gun if the resistor and multiplier resistances are not within the ranges specified in this manual. Failure to observe this warning may result in personal injury, fire, and property damage.

Multiplier/Resistor Assembly Continuity and Resistance Check

1. See Figure 5-1. Disconnect the powder feed hose and gun cable from the gun. Remove the hose adapter (7) from the powder inlet body (2).
2. Loosen the set screw (8) in the underside of the powder inlet body with a flat-bladed screwdriver. Remove the powder inlet body and nozzle (1). Slide the wear sleeve (3) off the resistor probe (5).
3. Wipe powder off the electrode (4), resistor probe (5), and multiplier (6). Inspect the exterior and interior surfaces. Replace any parts with burn holes or arc tracks.



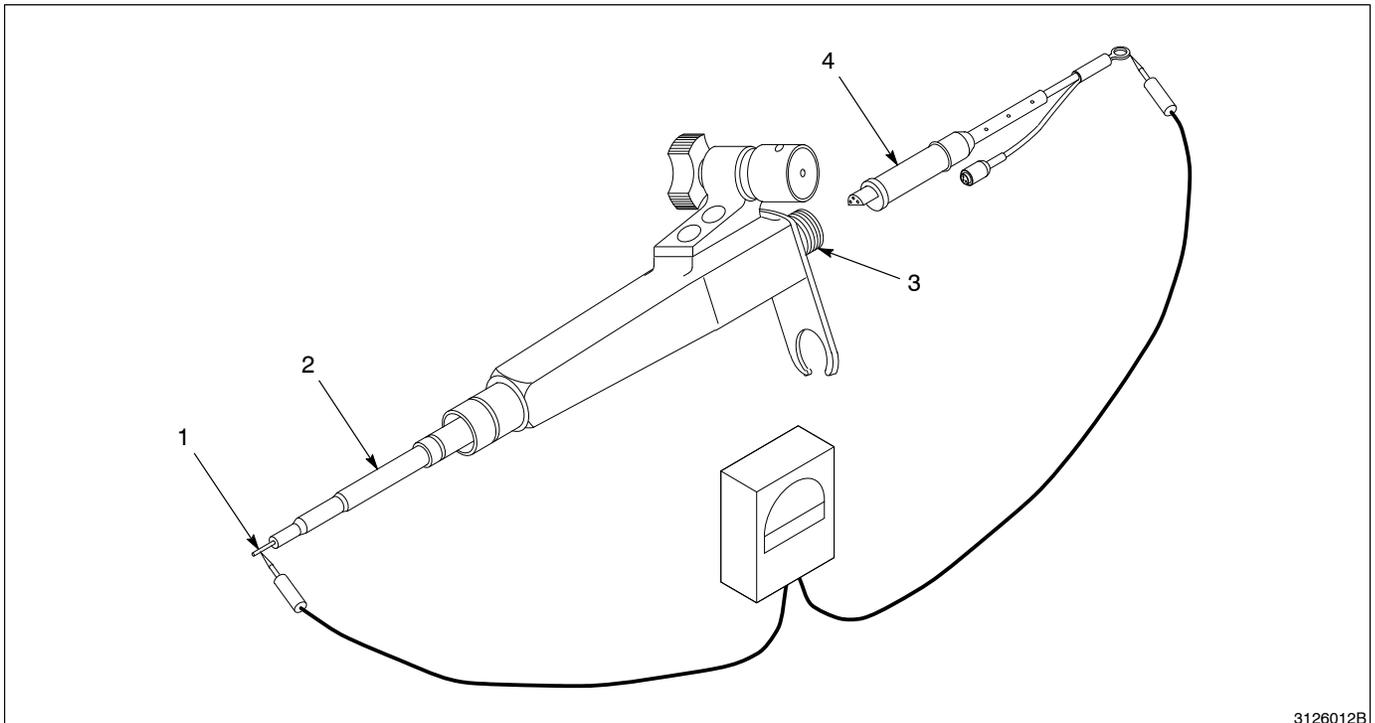
3126011A

Fig. 5-1 Preparing for Continuity and Resistance Checks (Gun without Air Shown)

- | | | |
|----------------------|-------------------|----------------------|
| 1. Flat spray nozzle | 4. Electrode | 7. Feed hose adapter |
| 2. Powder inlet body | 5. Resistor probe | 8. Set screw |
| 3. Wear sleeve | 6. Multiplier | |

- See Figure 5-2. Connect the shorting plug (4) to the multiplier receptacle (3). Connect the megohm meter probes to the shorting plug ring-tong terminal and electrode. If the reading is infinite, reverse the probes.

NOTE: This test can be made without a shorting plug. Connect all three multiplier pins together before taking a reading with a megohm meter. Failure to do so could damage the multiplier. Contact your Nordson representative for more information.



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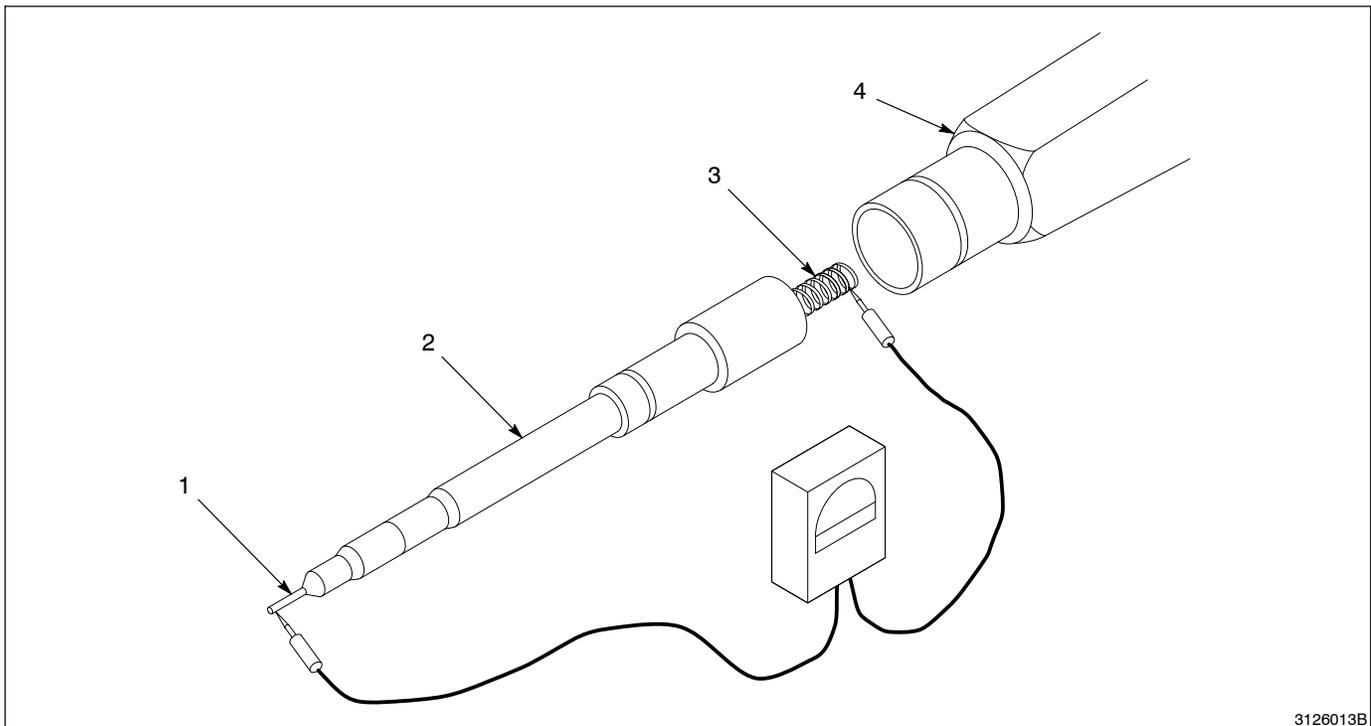
Fig. 5-2 Checking Multiplier/Resistor Assembly

- | | | |
|-------------------|--------------------------|------------------|
| 1. Electrode | 3. Multiplier receptacle | 4. Shorting plug |
| 2. Resistor probe | | |

- The megohm meter should read between 195 and 260 MΩ at 500 Volts. If the reading is out of this range, unscrew the resistor probe from the multiplier and check the resistor separately (refer to *Resistor Continuity and Resistance Check*). If the resistor reading is within the range specified, replace the multiplier.

Resistor Continuity and Resistance Check

1. Perform steps 1 through 3 in the *Resistor/Multiplier Assembly Continuity and Resistance Check* procedure.
2. See Figure 5-3. Unscrew the resistor probe (2) from the multiplier (4).
3. Connect the megohm meter probes to the electrode (1) and spring (3). The megohm meter should read between 153 and 187 M Ω at 500 Volts. If the reading is out of this range, replace the resistor probe.



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Fig. 5-3 Checking Resistor Resistance

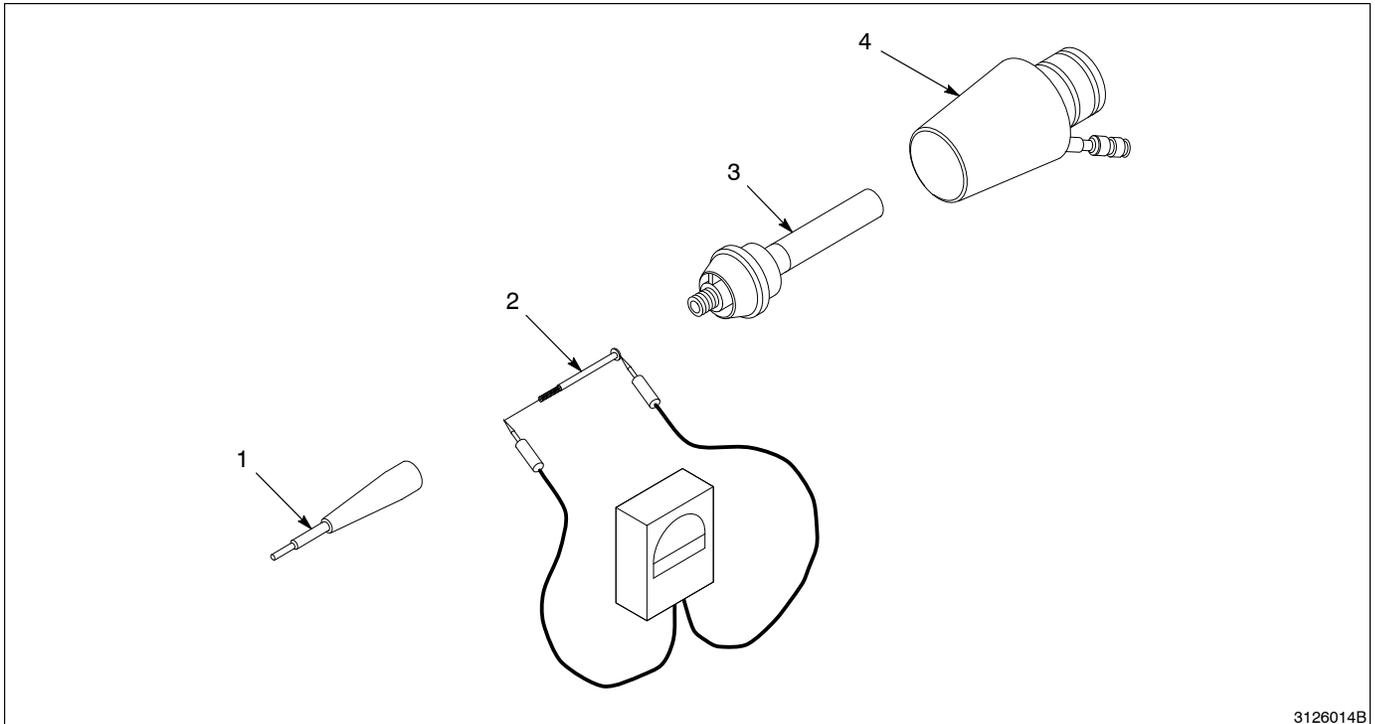
- 1. Electrode
- 2. Resistor probe

3. Resistor spring

4. Multiplier

**Nozzle Extension Resistor
Continuity and Resistance
Check**

1. See Figure 5-4. Remove the wear sleeve/spider/resistor holder assembly (1, 2, 3) from the nozzle adapter (4). Remove the resistor (2) from the wear sleeve/spider/resistor holder assembly (1, 3).
2. Check the resistor with a megohm meter. The megohm meter should read between 18 and 22 megohms at 500 Volts. If the reading is out of this range, replace the resistor.



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Fig. 5-4 Checking Nozzle Extension Resistor Continuity and Resistance

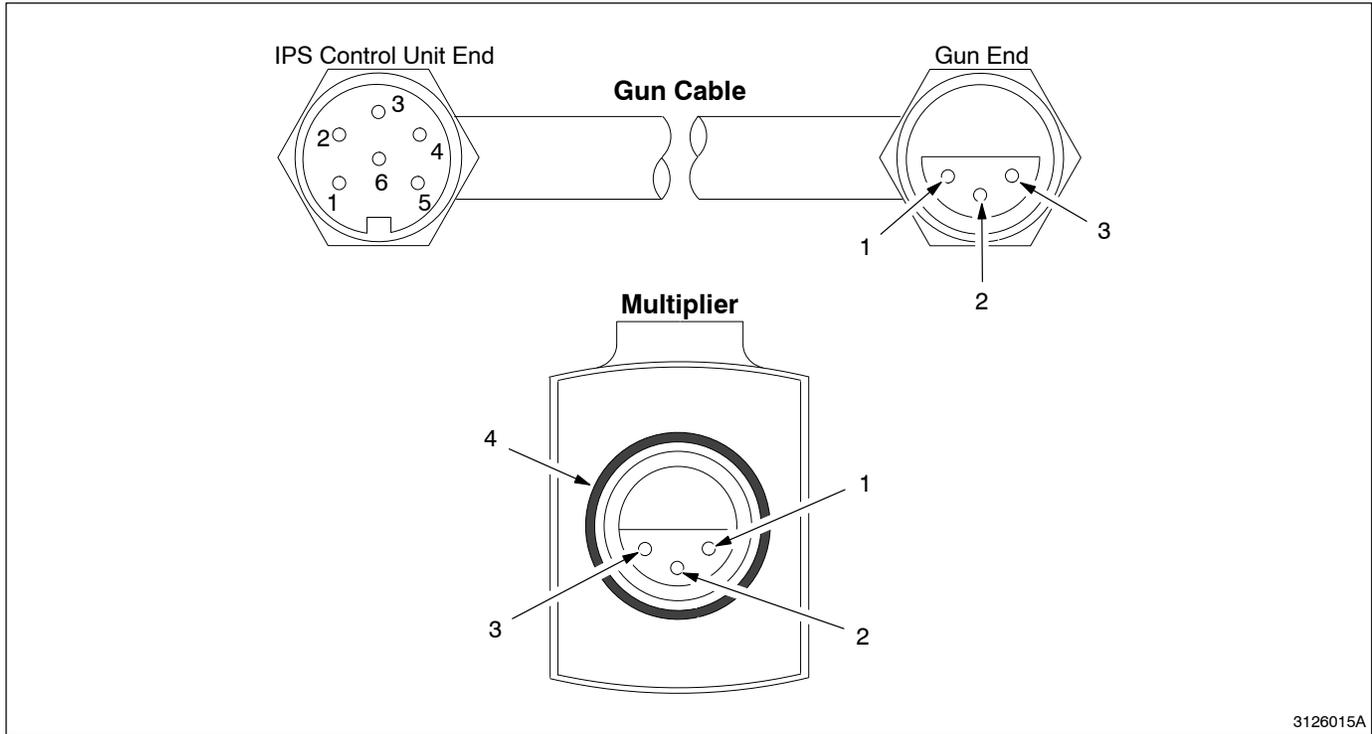
1. Resistor holder
2. Resistor

3. Spider/wear sleeve

4. Nozzle adapter

Gun Cable Continuity Check

Gun cable and multiplier pins, and their functions, are shown in Figure 5-5. Check the continuity of the cable leads from the pins in one end to the pins in the other with a standard ohmmeter. Check for continuity between the bottom pin (5-Vdc feedback) in the multiplier receptacle and the multiplier heatsink.



3126015A

Fig. 5-5 Gun Cable and Multiplier Pins

- 1. Negative (common)
- 2. 5 Vdc feedback

3. Positive (+21 Vdc)

4. Heatsink

Table 5-1 Gun Cable Pin Functions

Control Unit End Pins	Function
1	Open
2	Negative (Common)
3	Positive (+21 Vdc)
4	5 Vdc Feedback
5, 6	Jumpered

Section 6

Repair

Section 6

Repair



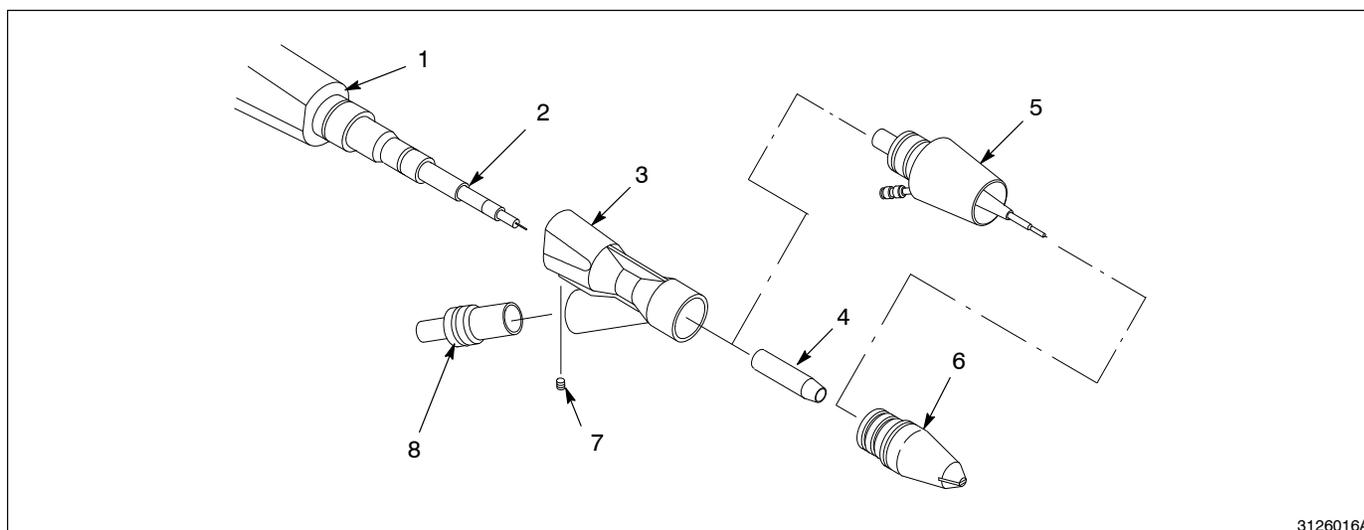
WARNING: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

1. Powder Path Repair



WARNING: Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a severe shock.

1. See Figure 6-1. Disconnect the powder feed hose from the hose adapter (8). Disconnect the air tubing from the nozzle extension (5), if it is used.
2. Remove the nozzle (6). Remove the nozzle extension (5), if it is used.



3126016A

Fig. 6-1 Disassembling the Powder Path

- | | | |
|----------------------|----------------------------------|-----------------|
| 1. Extension | 4. Wear sleeve ¹ | 7. Set screw |
| 2. Resistor probe | 5. Nozzle extension ² | 8. Hose adapter |
| 3. Powder inlet body | 6. Conical nozzle | |

Note: 1—Used on guns without air only.

Note: 2—Used on guns with air only.

1. Powder Path Repair

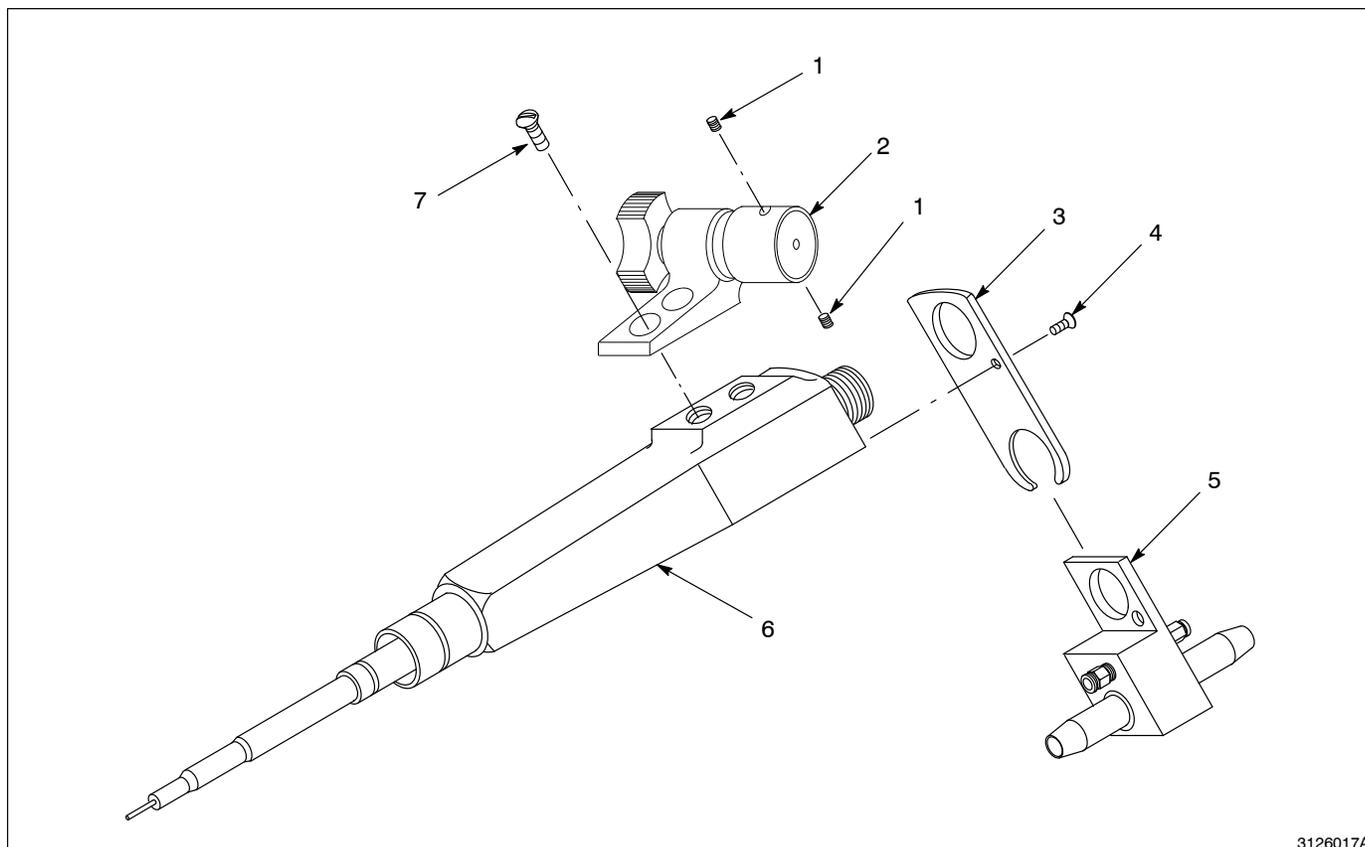
(contd.)

3. Loosen the set screw (7) and pull the powder inlet body (3) from the extension (1).
4. Remove the wear sleeve (4), if it is used, from the resistor probe (2). You may have to remove the powder inlet body (3) first.
5. Clean the powder path parts with an OSHA-approved low-pressure air gun and a clean cloth. Carefully remove fused powder from the parts with a wooden or plastic dowel or similar tool. Do not use tools that will scratch the plastic. Powder will build up and impact-fuse on scratches.
6. If necessary, wipe the parts with a cloth dampened with isopropyl or ethyl alcohol. Do not use any other solvent. Do not immerse the assembled gun or parts in alcohol.
7. Inspect all O-rings and replace them if damaged.
8. Inspect the powder path parts. Replace worn parts as necessary.
9. Reverse the disassembly procedure to reassemble the powder path.

2. Multiplier Replacement

The multiplier replacement kit consists of a new multiplier and a resistor probe with contact tip, filled with dielectric grease and assembled.

1. Disconnect the gun cable, feed hose, and air tubing (if it is used) from the gun.
2. See Figure 6-2. Loosen the set screws (1) in the gun mount (2). Remove the gun from the mounting bar.
3. Perform steps 1 through 4 in the *Powder Path Repair* procedure.
4. Remove the gun mount and the hose bracket (3) or diffuser (5) from the old multiplier (6). Save the screws (4, 7) for reuse.
5. Install the gun mount and the hose bracket or diffuser on the new multiplier with the screws removed from the old multiplier.
6. Reinstall the powder path parts.
7. Reinstall the gun on the mounting bar. Tighten the gun mount set screws (1) securely.
8. Reconnect the gun cable, feed hose, and air tubing (if it is used) to the gun.



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Fig. 6-2 Multiplier Replacement

- | | | |
|-----------------|-------------|---------------------------------|
| 1. Gun mount | 4. Screw | 6. Multiplier/resistor assembly |
| 2. Set screws | 5. Diffuser | 7. Screws |
| 3. Hose bracket | | |

3. Resistor Replacement

1. Perform steps 1 through 4 in the *Powder Path Repair* procedure.
2. See Figure 6-3. Unscrew the old resistor probe (2) from the multiplier (4). Clean the exposed threads in the end of the multiplier and wipe the multiplier well (5) with a clean cloth.
3. Inject $\frac{1}{2}$ to $\frac{3}{4}$ cc of dielectric grease into the well. Use the applicator shipped with the resistor kit.

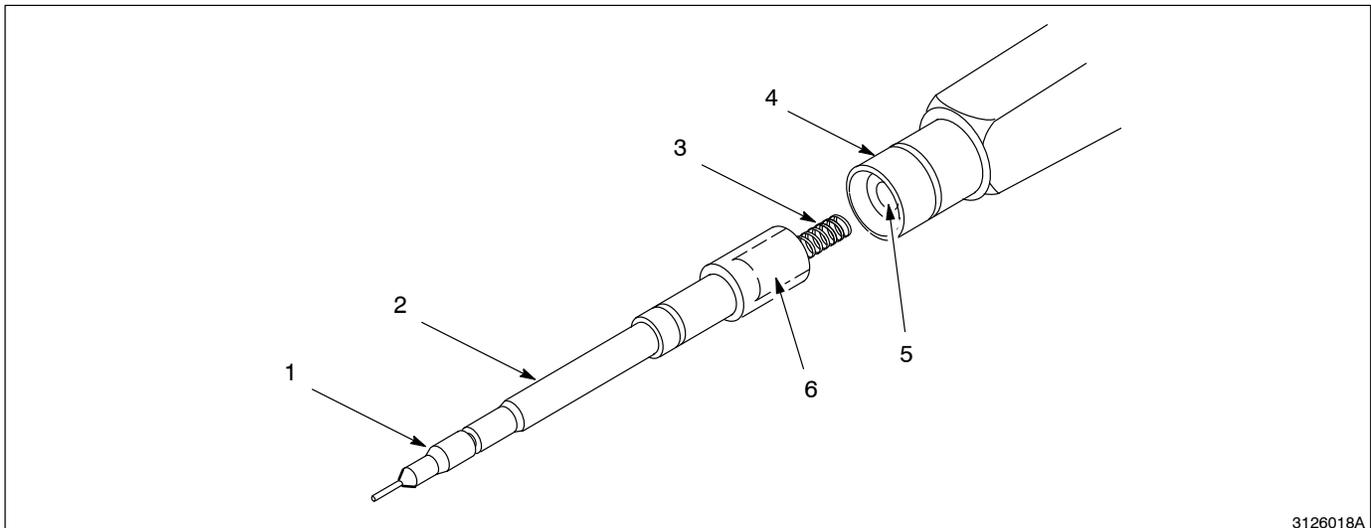
3. Resistor Replacement

(contd.)



WARNING: All air must be replaced by dielectric grease in the multiplier well, resistor holder, and contact tip. High voltage can arc through air pockets, burn through the multiplier or resistor probe, and create a fire or explosion hazard.

4. Fill the new resistor spring (3) and resistor probe cavity (6) with $\frac{1}{2}$ to $\frac{3}{4}$ cc of dielectric grease.
5. Unscrew the new contact tip (1) from the resistor probe.
6. Screw the new resistor probe onto the multiplier and tighten it securely.
7. Screw the contact tip into the resistor probe end and tighten it securely. Do not overtighten the tip or the threads will be stripped.
8. Wipe the dielectric grease off the contact tip, resistor probe, and multiplier.
9. Install the wear sleeve over the resistor probe. Install the powder inlet body, nozzle, and hose adapter.



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Fig. 6-3 Resistor Replacement

1. Contact tip

2. Resistor probe

3. Resistor spring

4. Multiplier

5. Multiplier well

6. Resistor probe cavity

Note: Clean and grease items 3, 5, and 6.

4. Contact Tip Replacement

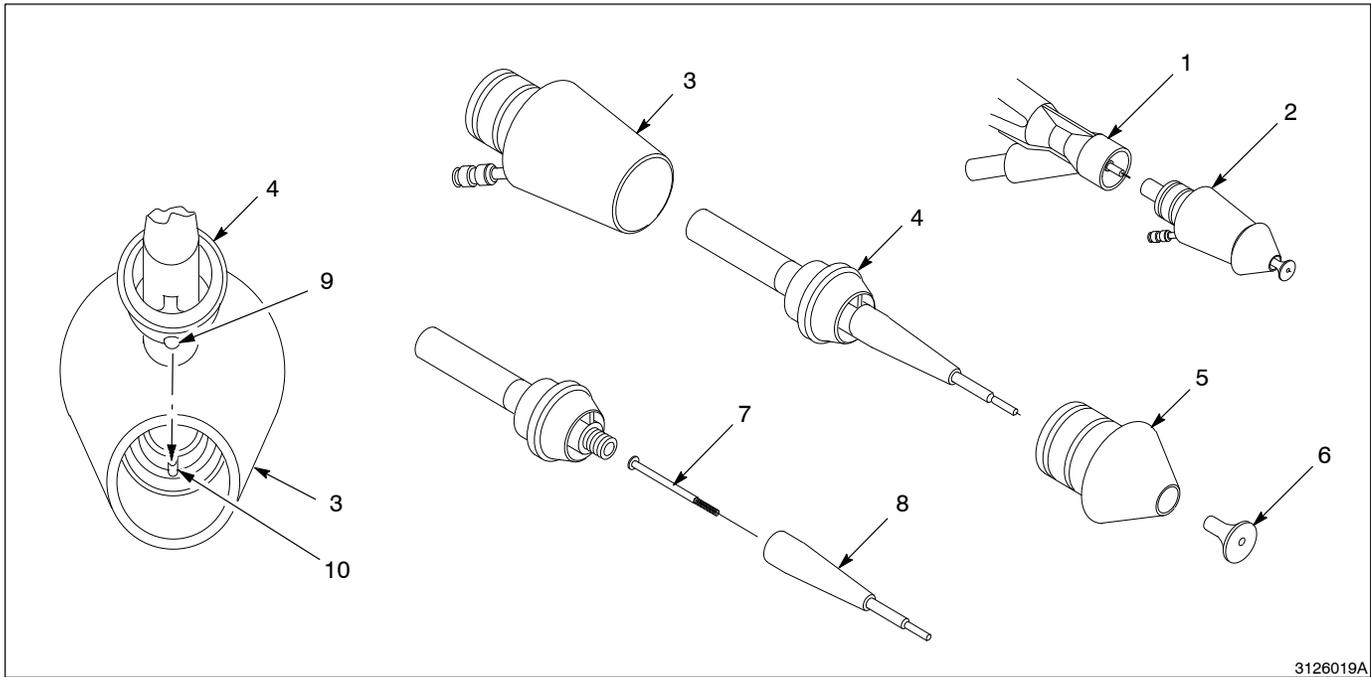
1. Perform steps 1 through 4 in the *Powder Path Repair* procedure.
2. See Figure 6-3. Unscrew the old contact tip (1) from the resistor probe (2).
3. Apply dielectric grease to the threads of the new contact tip and in the end of the probe.
4. Screw the new contact tip into the resistor probe and tighten it securely. Wipe the dielectric grease off the contact tip and probe.
5. Install the wear sleeve over the resistor probe. Install the powder inlet body, nozzle, and hose adapter.

5. Nozzle Extension Resistor Replacement

This procedure describes the replacement of the resistor and electrode housed in the nozzle extension. They are only used on guns with electrode cleaning air.

1. See Figure 6-4. Remove the nozzle extension (2) from the powder inlet body (1).
2. Remove the deflector (6) and nozzle (5).
3. Push the wear sleeve/spider/resistor holder assembly (4) out of the nozzle adapter (3).
4. Unscrew the resistor holder (8) from the spider and remove the resistor (7).
5. Install the new resistor in the holder and screw the resistor holder onto the spider finger-tight.
6. Align the pin (9) on the spider with the slot (10) in the nozzle adapter. Press the wear sleeve/spider/resistor holder assembly into the nozzle adapter.
7. Finish reassembling the nozzle extension and install it onto the powder inlet body.

**5. Nozzle Extension
Resistor Replacement**
(contd.)



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Fig. 6-4 Nozzle Extension Resistor Replacement

- | | | |
|---------------------------------------|-------------------|--------------------|
| 1. Powder inlet body | 5. Conical nozzle | 8. Resistor holder |
| 2. Nozzle extension | 6. Deflector | 9. Pin |
| 3. Nozzle adapter | 7. Resistor | 10. Slot |
| 4. Wear sleeve/spider/resistor holder | | |

Section 7

Parts

Section 7

Parts

1. Introduction

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

Using the Illustrated Parts List

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

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

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

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

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

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

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

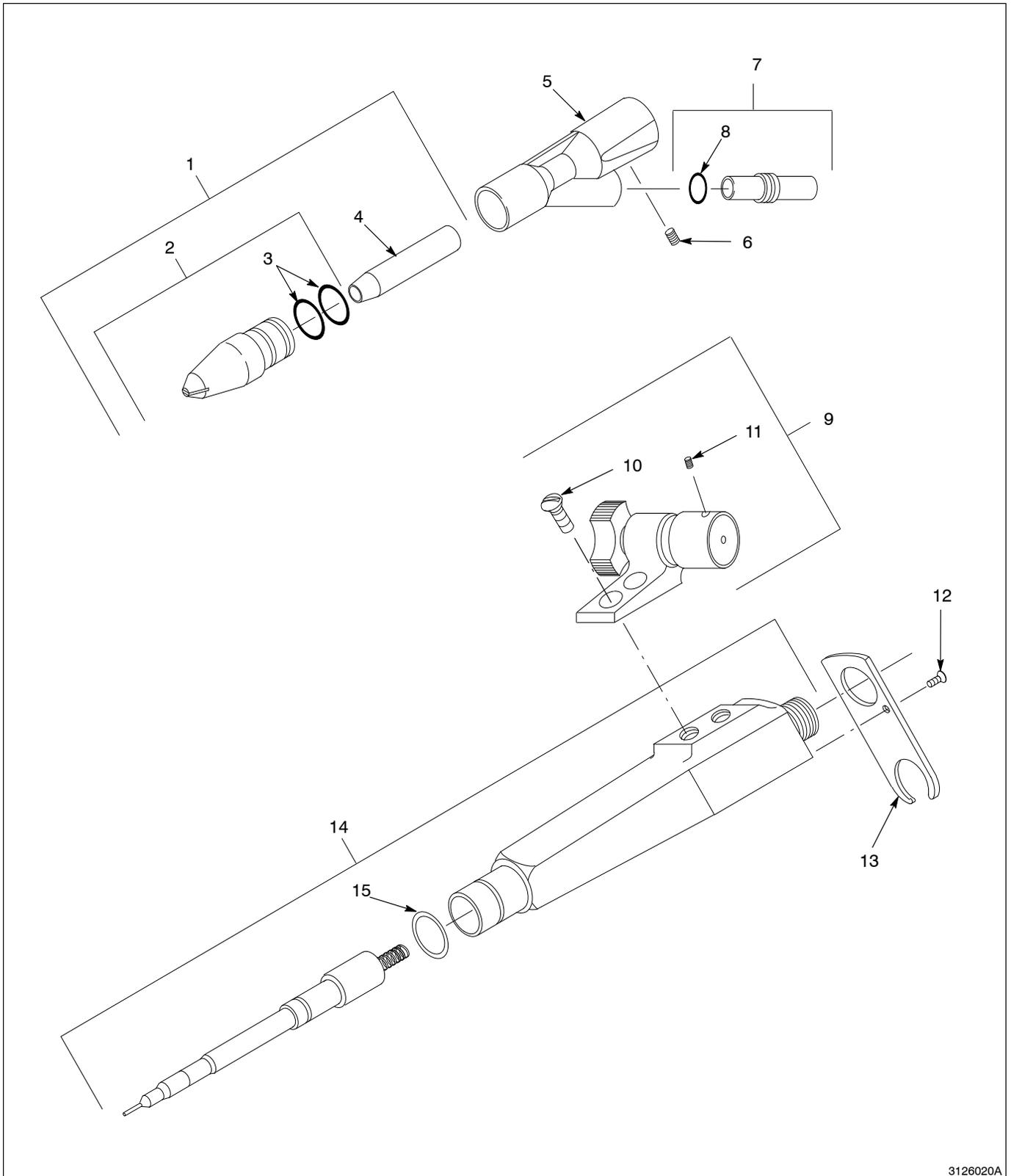
2. Guns without Air

See Figure 7-1.

Item	Part	Description	Quantity	Note
—	173 159	Gun, automatic, PRX, Versa-Spray II, negative	1	A
—	173 160	Gun, automatic, PRX, Versa-Spray II, positive	1	A
1	141 044	• Service kit, nozzle, flat spray, 4 mm	1	B
2	141 045	• • Nozzle, flat spray, 4 mm, with O-rings, Tivar	1	
3	941 181	• • • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
4	134 385	• • Sleeve, wear, flat spray, with O-ring	1	
5	125 612	• Body, inlet	1	
6	982 455	• Screw, set, M6 x 1.0 x 8 mm, nylon, black	1	
7	134 386	• Adapter, hose, with O-ring	1	
8	940 163	• • O-ring, silicone, 0.625 x 0.750 x 0.063 in.	1	
9	133 409	• Mount, gun, with pivot	1	
10	981 708	• • Screw, M8 x 1.25 x 20 mm, black	2	
11	982 067	• • Screw, set, cup, M5 x 5, black	2	
12	982 056	• Screw, flat head, M3 x 6	1	
13	140 562	• Bracket, tube	1	
14	-----	• Service kit, multiplier	1	A
15	940 243	• • O-ring, silicone, 1.125 x 1.250 x 0.062 in.	1	

NOTE A: Check gun part number on identification plate and note polarity before ordering multiplier service kit. Refer to service kit parts lists in this section.

B: Refer to service kit parts lists in this section.



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Fig. 7-1 Versa-Spray II IPS PRX Automatic Powder Spray Gun

3. Guns with Air

See Figure 7-2.

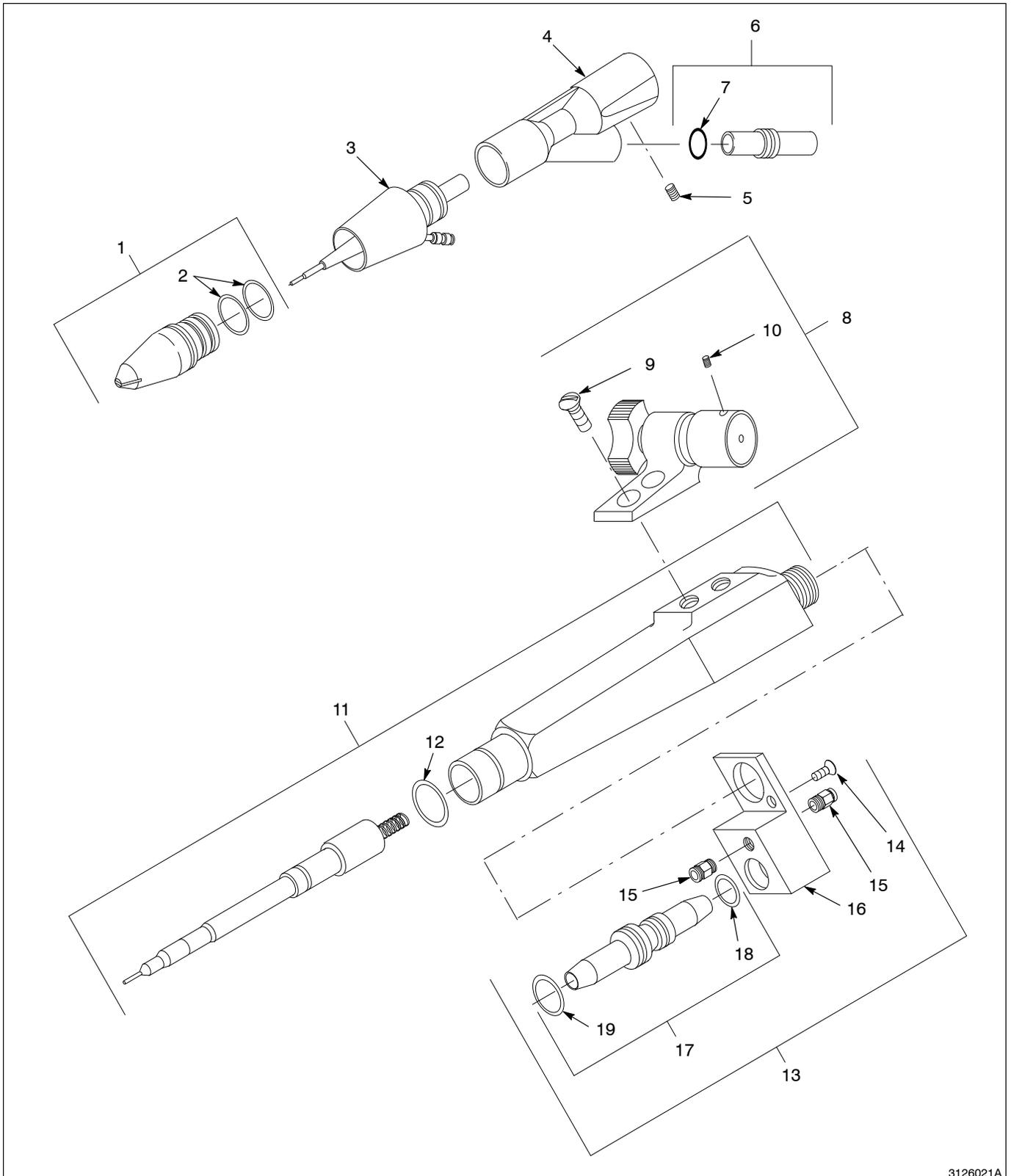
Item	Part	Description	Quantity	Note
—	173 161	Gun, auto, PRX, Versa-Spray II, negative, with air	1	A
—	173 162	Gun, auto, PRX, Versa-Spray II, positive, with air	1	A
1	141 045	• Nozzle, flat spray, 4 mm, with O-rings, Tivar	1	
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	183 334	• Kit, extension, nozzle	1	B
4	125 612	• Body, inlet	1	
5	982 455	• Screw, set, M6 x 1.0 x 8 mm, nylon, black	1	
6	134 386	• Adapter, hose, with O-ring	1	
7	940 163	• • O-ring, silicone, 0.625 x 0.750 x 0.063 in.	1	
8	133 409	• Mount, gun, with pivot	1	
9	981 708	• • Screw, M8 x 1.25 x 20 mm, black	2	
10	982 067	• • Screw, set, cup, M5 x 5, black	2	
11	-----	• Service kit, multiplier	1	A
12	940 243	• • O-ring, silicone, 1.125 x 1.250 x 0.062 in.	1	
13	-----	• Diffuser, Versa-Spray II	1	
14	982 142	• • Screw, flat head, M3 x 10	1	
15	972 141	• • Connector, male, 6 mm tube x 1/8 in. BSPT	2	
16	169 655	• • Bracket, VS2 gun diffuser	1	
17	169 661	• • Kit, connector, VS2 gun diffuser	1	
18	940 163	• • • O-ring, silicone, 0.625 x 0.750 x 0.063 in.	1	
19	940 182	• • • O-ring, silicone, 0.750 x 0.875 x 0.063 in.	1	
NS	-----	• Kit, orifice and connector, VS2, auto	1	C
NS	972 141	• • Connector, male, 6 mm tube x 1/8 in., BSPT	1	
NS	972 243	• • Orifice, 0.026 in., 1/8 in. NPT, brass	1	

NOTE A: Check gun part number on identification plate and note polarity before ordering multiplier service kit. Refer to service kit parts lists in this section.

B: Refer to service kit parts lists in this section.

C: Kit is shipped with gun. To use gun air, remove plug from control unit GUN port and install orifice and connector.

NS: Not Shown



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Fig. 7-2 Versa-Spray II IPS PRX Automatic Powder Spray Gun with Air

4. Service Kits

Service kits are used to replace parts on standard guns. Refer to the *Guns Used On* column and the notes in Table 7-1 before ordering.

Service Kit Reference Chart

Table 7-1 Service Kits

Part	Description	Guns Used On	Note
142 108	Cable, 8 meter	All	A
168 448	Cable, 12 meter	All	A
142 109	Cable, 16 meter	All	A
129 855	Service kit, multiplier, w/resistor probe, positive	Positive polarity	B
146 330	Service kit, multiplier, w/resistor probe, negative	Negative polarity	B
134 376	Service kit, holder, resistor	All	C
183 334	Kit, extension, nozzle	with air only	
183 645	Service kit, resistor, with holder, Versa-Spray II (Nozzle ext)	with air only	
183 646	Service kit, resistor, nozzle extension, Versa-Spray II	with air only	

NOTE A: Order according to length of cable desired.

B: Check multiplier polarity before ordering. Compare gun part number on label with gun part number and description in gun parts lists. Gun polarity can be switched by changing multiplier.

C: Replaces resistor connected to multiplier.

Gun Cables

Cables are not included with automatic guns. Order cables in the lengths desired.

Part	Description	Note
142 108	Cable, Versa-Spray, 100 kV, 8 m (25 ft)	
168 448	Cable, Versa-Spray, 100 kV, 12 m (38 ft)	
142 109	Cable, Versa-Spray, 100 kV, 16 m (50 ft)	

Multiplier Service Kits

Multiplier kits include the resistor holder and resistor. If replacing just the resistor, order a resistor service kit.

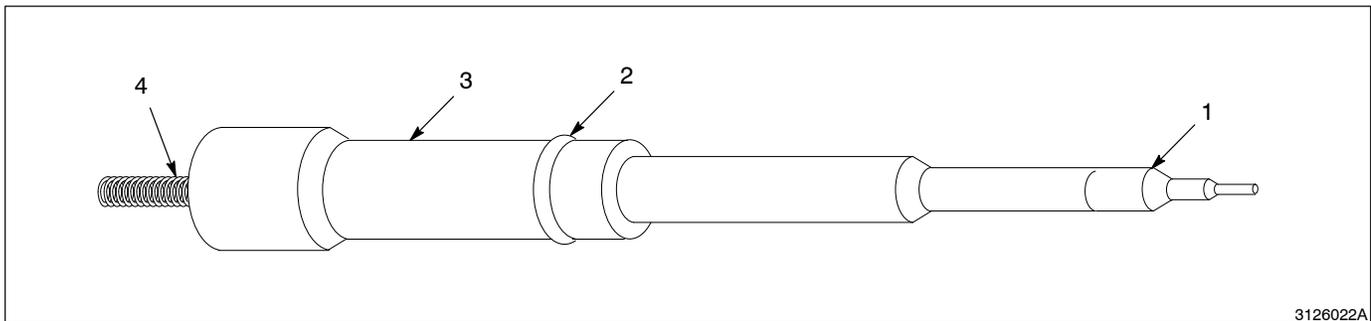
Part	Description	Note
129 855	Service kit, multiplier, with resistor probe, positive	
146 330	Service kit, multiplier, with resistor probe, negative	

Resistor Service Kit

See Figure 7-3.

Item	Part	Description	Quantity	Note
—	134 376	Service kit, holder, resistor	1	
1	132 748	• Contact, cable	1	
2	940 117	• O-ring, silicone, 0.312 x 0.438 x 0.063 in.	1	
3	-----	• Holder, resistor	1	
4	-----	• Resistor	1	
NS	245 733	• Grease, dielectric, 3 cc applicator	1	

NS: Not Shown



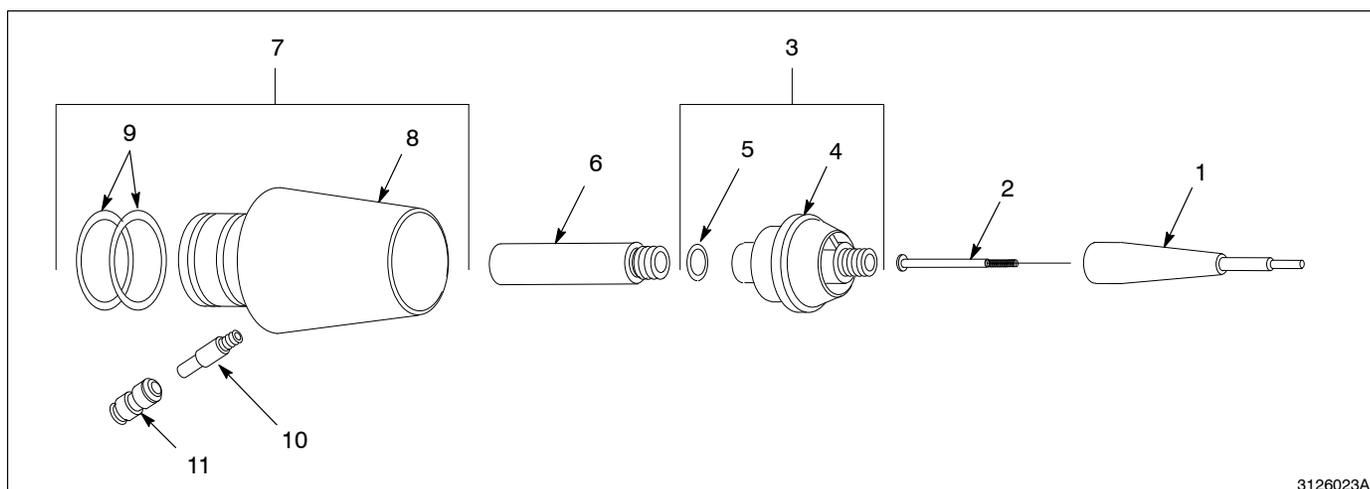
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Fig. 7-3 Resistor Service Kit

Nozzle Extension and Resistor Service Kits

See Figure 7-4.

Item	Part	Description	Quantity	Note
—	183 334	Kit, extension, nozzle	1	
1	173 182	• Holder, resistor	1	
2	-----	• Resistor, nozzle extension, VS2	1	
3	182 255	• Kit, spider, with O-ring	1	
4	-----	• • Spider, air inlet, VS2	1	
5	940 104	• • O-ring, silicone, 0.250 x 0.375 x 0.063 in.	1	
6	173 179	• Sleeve, wear, VS2	1	
7	182 254	• Kit, adapter, nozzle, VS2, with O-ring	1	
8	-----	• • Adapter, nozzle, VS2	1	
9	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
10	173 177	• Fitting, M6, straight	1	
11	971 790	• Union, straight, 6 mm, plastic	1	
—	183 645	Service kit, resistor, w/holder, VS2	1	
1	173 182	• Holder, resistor	1	
2	-----	• Resistor, nozzle extension, VS2	1	
—	183 646	Service kit, resistor, nozzle extension, VS2	1	
2	-----	• Resistor, nozzle extension, VS2	1	



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Fig. 7-4 Nozzle Extension Kit

Section 8

Options

Section 8

Options

1. Options Reference Chart

Options are listed in Table 8-1. Refer also to the *Options* and *Upgrades* parts lists and illustrations in this section before ordering.

Table 8-1 Options Reference Chart

Part	Description	Note
134 380	Kit, nozzle, flat spray, 2.5-mm slot, with O-rings, Tivar	A
139 935	Kit, nozzle, flat spray, 3-mm slot, with O-rings, Tivar	A
141 044	Kit, nozzle, flat spray, 4-mm slot, with O-rings, Tivar	A
139 937	Kit, nozzle, flat spray, 6-mm slot, with O-rings, Tivar	A
174 223	Nozzle, flat spray, 2.5-mm slot, with O-rings, glass-filled PTFE	B
174 225	Nozzle, flat spray, 3-mm slot, with O-rings, glass-filled PTFE	B
174 227	Nozzle, flat spray, 4-mm slot, with O-rings, glass-filled PTFE	B
174 229	Nozzle, flat spray, 6-mm slot, with O-rings, glass-filled PTFE	B
145 559	Kit, nozzle, conical, 32-mm diameter, with O-rings, Tivar	A
144 760	Kit, nozzle, conical, 45-mm diameter, with O-rings, Tivar	A
173 139	Nozzle, short, VS2, with O-rings	A, C
141 013	Kit, nozzle, Cross-Cut, 60°, Tivar	A
141 014	Kit, nozzle, Cross-Cut, 90°, Tivar	A
147 495	Kit, nozzle, castle	A
133 730	Extension, lance, 150-mm long	
133 731	Extension, lance, 300-mm long	
—	Tivar deflectors in different diameters, with O-rings	D
135 896	$\frac{3}{8}$ -in. ID hose adapter	
161 411	Shorting plug	
—	Powder feed and air tubing	
133 403	Gun mounting bar	
157 094	Adapter, purge Versa-Spray	
—	Upgrade kits—to add diffusers and nozzle extensions to guns	E
—	In-line ball mount kit or in-line ball mount and ion collector kit	
—	Ion collector retrofit kits for Shur-Lok or in-line ball mounts	

NOTE A: Nozzle kits include wear sleeves.
 B: Wear sleeves are not included with these nozzles.
 C: Use part 173 138 deflector with this nozzle.
 D: These deflectors can be used on all conical nozzles except the 45-mm conical nozzle.
 E: Refer to the upgrade kits in this section for usage and part numbers.

2. Flat-Spray Nozzles and Kits

Tivar Flat-Spray Nozzle Kits

Figure 8-1 applies to the 2.5-, 3-, 4-, and 6-mm Tivar flat spray nozzle kits.

Item	Part	Description	Quantity	Note
1	141 044	Service kit, nozzle, flat spray, 4 mm	1	
2	141 045	• Nozzle, flat spray, 4 mm, with O-rings, Tivar	1	
3	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
4	134 385	• Sleeve, wear, flat spray, with O-ring	1	

Item	Part	Description	Quantity	Note
5	134 380	Service kit, nozzle, flat spray, 2.5 mm	1	
6	134 384	• Nozzle, flat spray, 2.5 mm, with O-rings, Tivar	1	
7	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
8	134 385	• Sleeve, wear, flat spray, with O-ring	1	

Item	Part	Description	Quantity	Note
5	139 935	Service kit, nozzle, flat spray, 3 mm	1	
6	139 902	• Nozzle, flat spray, 3 mm, with O-rings, Tivar	1	
7	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
8	134 385	• Sleeve, wear, flat spray, with O-ring	1	

Item	Part	Description	Quantity	Note
5	139 937	Service kit, nozzle, flat spray, 6 mm	1	
6	139 903	• Nozzle, flat spray, 6 mm, with O-rings, Tivar	1	
7	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
8	134 385	• Sleeve, wear, flat spray, with O-ring	1	

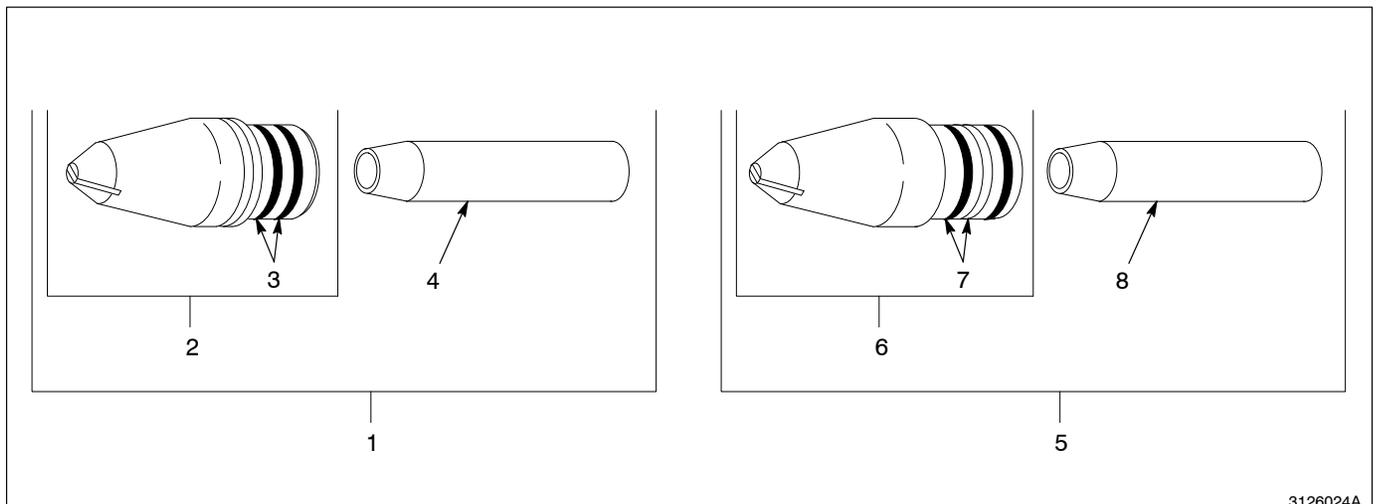


Fig. 8-1 Tivar Flat-Spray Nozzles

Glass-Filled PTFE Flat-Spray Nozzles

See Figure 8-2. These nozzles are available with slot widths of 2.5-, 3-, 4-, and 6-mm. They do not include a wear sleeve.

Item	Part	Description	Quantity	Note
1	174 227	Nozzle, flat spray, 4 mm, with O-rings, G-F PTFE	1	
2	941 181	• O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
3	174 223	Nozzle, flat spray, 2.5 mm, with O-rings, G-F PTFE	1	
4	941 181	• O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
3	174 225	Nozzle, flat spray, 3 mm, with O-rings, G-F PTFE	1	
4	941 181	• O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
3	174 229	Nozzle, flat spray, 6 mm, with O-rings, G-F PTFE	1	
4	941 181	• O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	

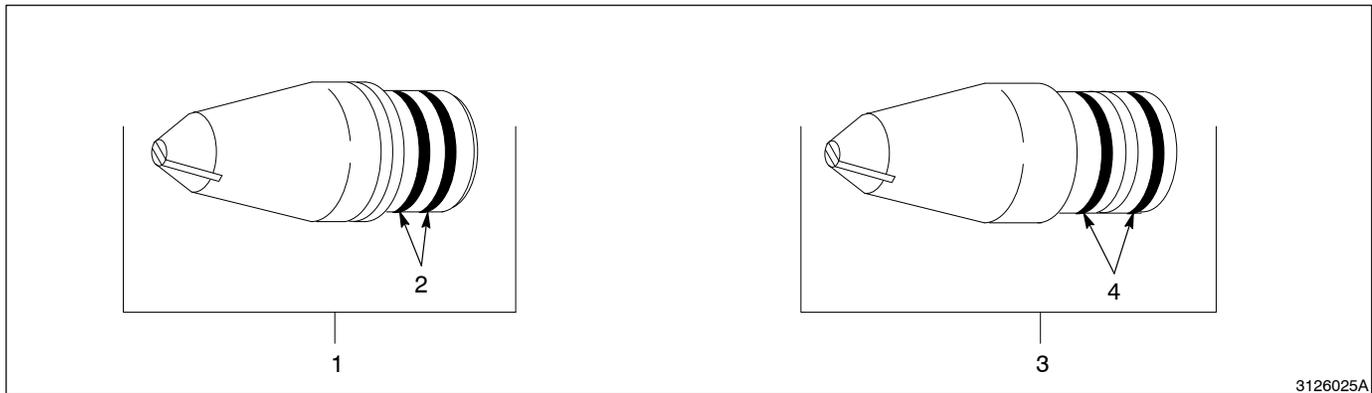


Fig. 8-2 Glass-Filled PTFE Flat Spray Nozzles

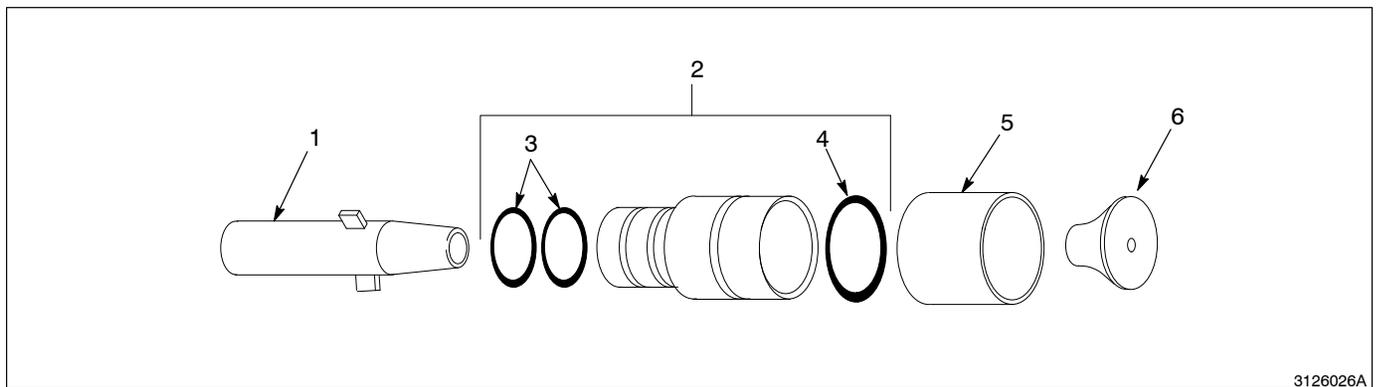
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3. Conical Nozzles

32-mm Conical Nozzle Kit

See Figure 8-3.

Item	Part	Description	Quantity	Note
—	145 559	Service kit, nozzle, 32 mm	1	
1	132 348	• Sleeve, wear, conical, Tivar	1	
2	145 558	• Nozzle, 32 mm dia, with O-rings, Tivar	1	
3	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
4	941 205	• • O-ring, silicone, 1.000 x 1.188 x 0.093 in.	1	
5	144 759	• Adjuster, pattern, 32 mm	1	
6	133 734	• Deflector, 26 mm dia, with O-ring, Tivar	1	



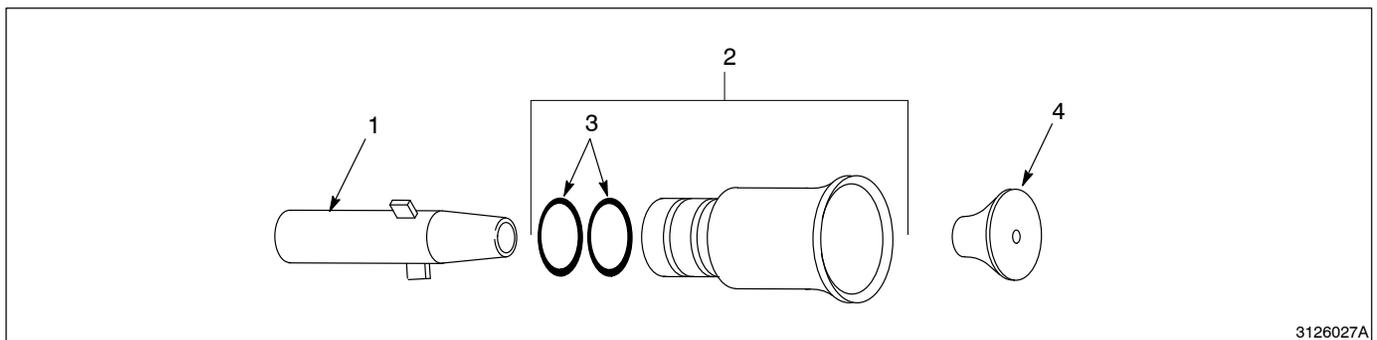
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Fig. 8-3 32-mm Conical Nozzle Service Kit

45-mm Conical Nozzle Kit

See Figure 8-4.

Item	Part	Description	Quantity	Note
—	144 760	Service kit, nozzle, 45 mm	1	
1	132 348	• Sleeve, wear, conical, Tivar	1	
2	144 789	• Nozzle, 45 mm dia, with O-rings	1	
3	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
4	249 233	• Deflector, 38 mm dia, Tivar, with O-ring	1	



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Fig. 8-4 45-mm Conical Nozzle

**Versa-Spray II Conical Nozzle
and Deflector**

See Figure 8-5.

Item	Part	Description	Quantity	Note
1	173 138	Deflector, 19 mm, VS2, with O-ring	1	
2	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.094 in.	1	
3	173 139	Nozzle, short, VS2, with O-ring	1	
4	941 181	• O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
5	132 348	Sleeve, wear, conical	1	A

NOTE A: Use only on guns without air.

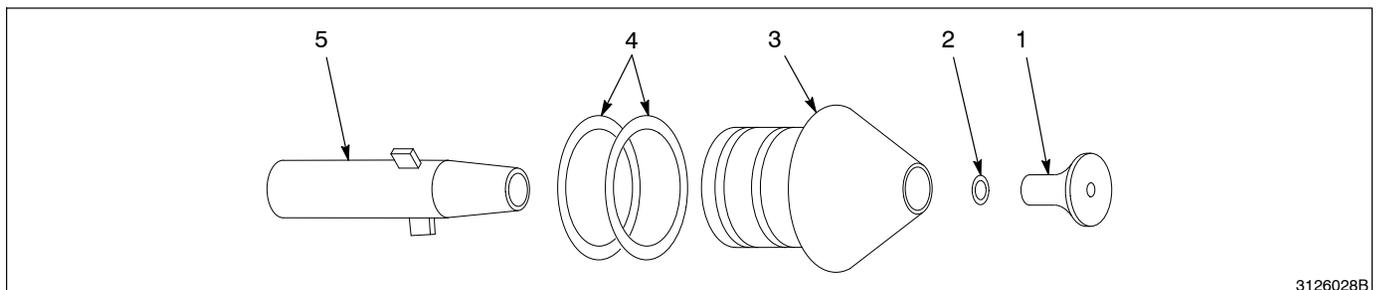


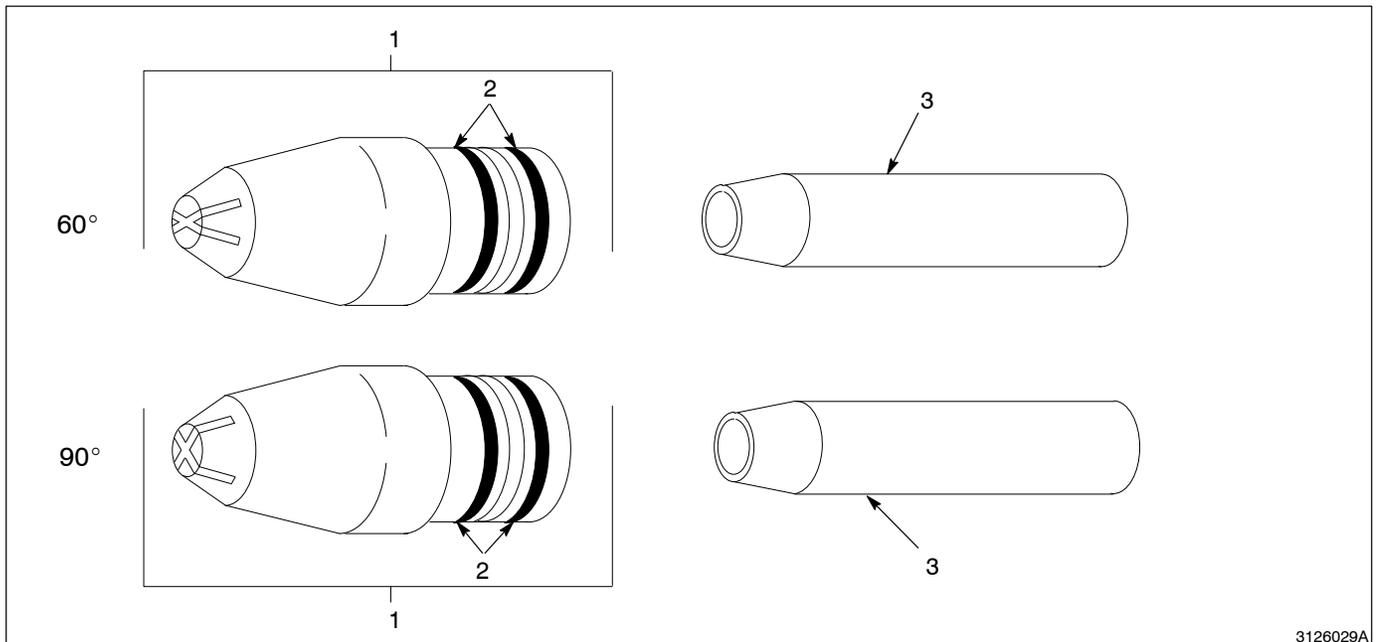
Fig. 8-5 Versa-Spray II Short Conical Nozzle

4. Cross-Cut Nozzle Kits

Figure 8-6 applies to 60° and 90° Cross-Cut nozzles.

Item	Part	Description	Quantity	Note
—	141 013	Service kit, nozzle, Cross-Cut, 60°	1	
1	141 017	• Nozzle, Cross-Cut, 60°, with O-rings	1	
2	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	

Item	Part	Description	Quantity	Note
—	141 014	Service kit, nozzle, Cross-Cut, 90°	1	
1	141 015	• Nozzle, Cross-Cut, 90°, with O-rings	1	
2	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	



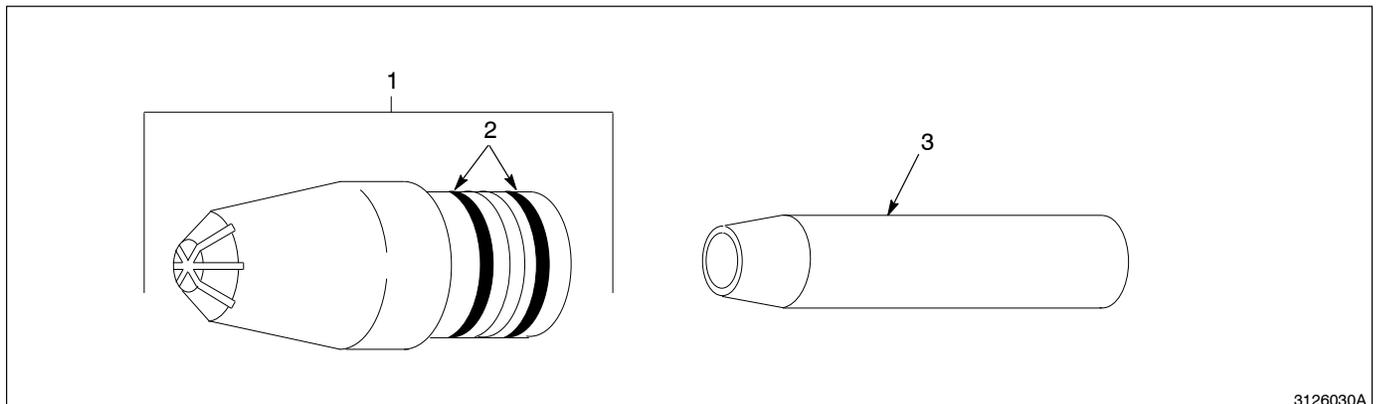
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Fig. 8-6 Cross-Cut Nozzles

5. Castle Nozzle Kit

See Figure 8-7.

Item	Part	Description	Quantity	Note
—	147 495	Service kit, nozzle, castle, 0.375	1	
1	147 877	• Nozzle, castle, 0.375, with O-rings	1	
2	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	



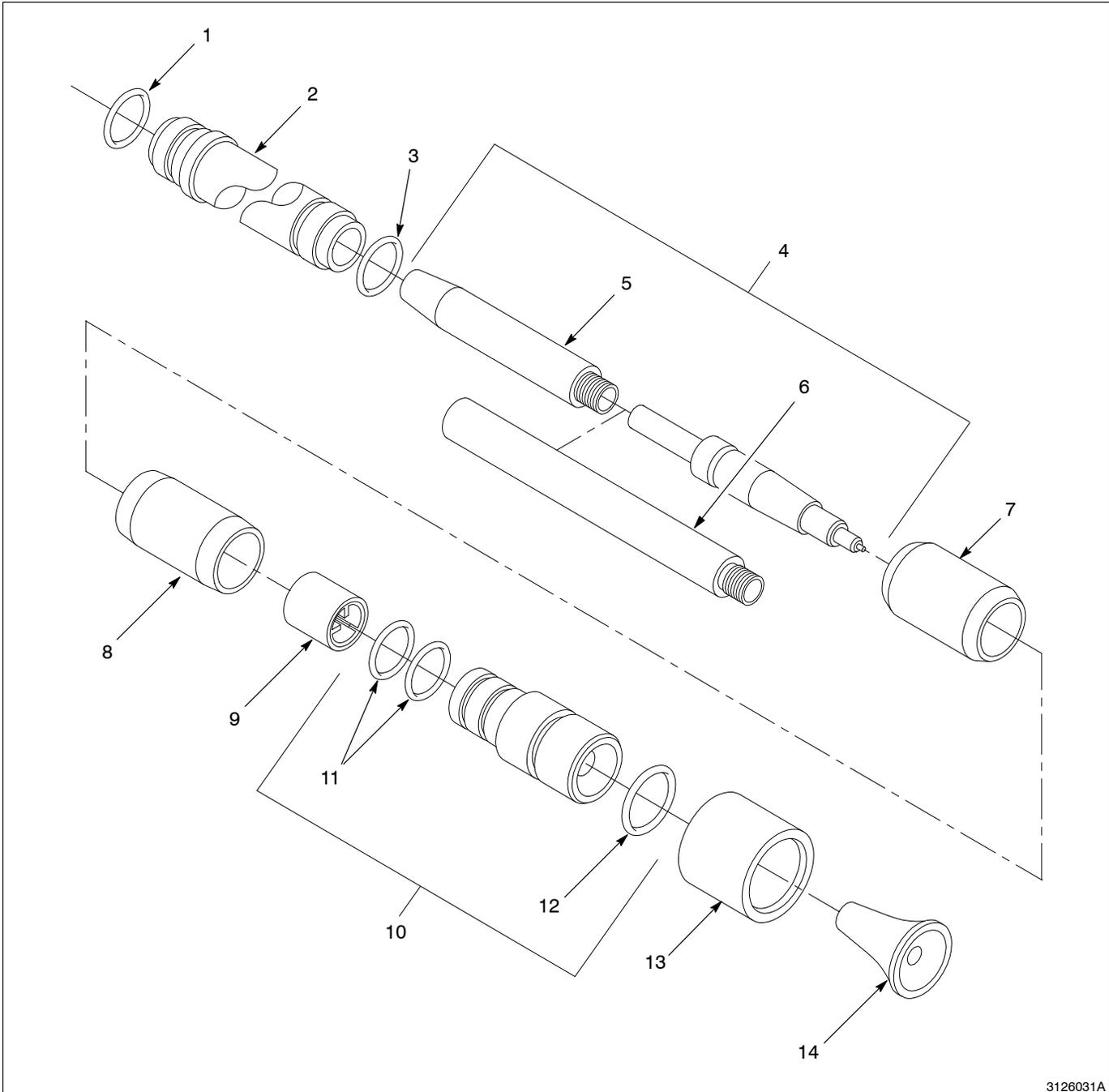
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Fig. 8-7 Castle Nozzle

6. Lance Extensions

See Figure 8-8.

Item	Part	Description	Quantity	Note
—	133 730	Extension, lance, 150 mm	1	
—	133 731	Extension, lance, 300 mm	1	
1	940 212	• O-ring, silicone, 0.938 x 1.063 x 0.063 in.	1	
2	133 728	• Tube, extension, 150 mm	1	
2	133 729	• Tube, extension, 300 mm	1	
3	940 224	• O-ring, silicone, 1.00 x 1.125 x 0.063 in.	1	
4	160 066	• Electrode, lance, 150 mm	1	
4	160 068	• Electrode, lance, 300 mm	1	
5	160 020	• Sleeving, contact	1	
6	160 021	• Link, adapter, 300 mm	1	
7	133 719	• Support, lance	1	
8	133 721	• Connector, nozzle	1	
9	249 194	• Support, cable	1	
10	145 558	• Nozzle, 32 mm, with O-rings	1	
11	941 181	• • O-ring, silicone, 0.875 x 1.062 x 0.093 in.	2	
12	941 205	• • O-ring, silicone, 1.000 x 1.188 x 0.093 in.	1	
13	144 759	• Adjuster, pattern, 26 mm	1	
14	133 734	• Deflector, 26 mm dia, with O-ring	1	



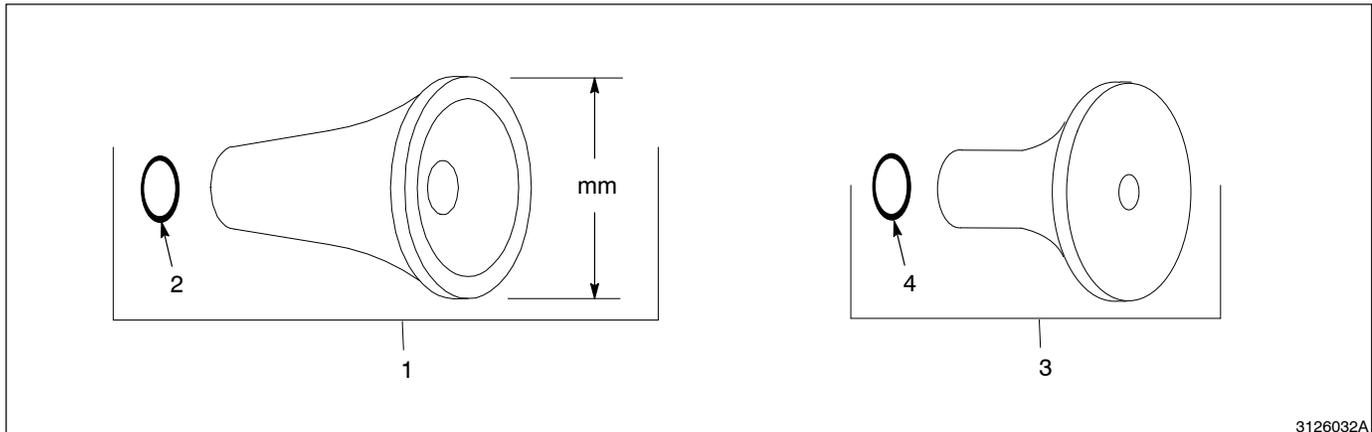
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Fig. 8-8 150- and 300-mm Lance Extensions

7. Deflectors

See Figure 8-9.

Item	Part	Description	Quantity	Note
1	135 865	Deflector, 14 mm dia, Tivar, with O-ring	1	
2	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.062 in.	1	
1	147 880	Deflector, 16 mm dia, Tivar, with O-ring	1	
2	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.062 in.	1	
1	133 714	Deflector, 19 mm dia, Tivar, with O-ring	1	
2	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.062 in.	1	
1	133 734	Deflector, 26 mm dia, with O-ring	1	
2	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.062 in.	1	
3	173 141	Deflector, 26 mm dia, VS2, with O-ring	1	
4	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.062 in.	1	



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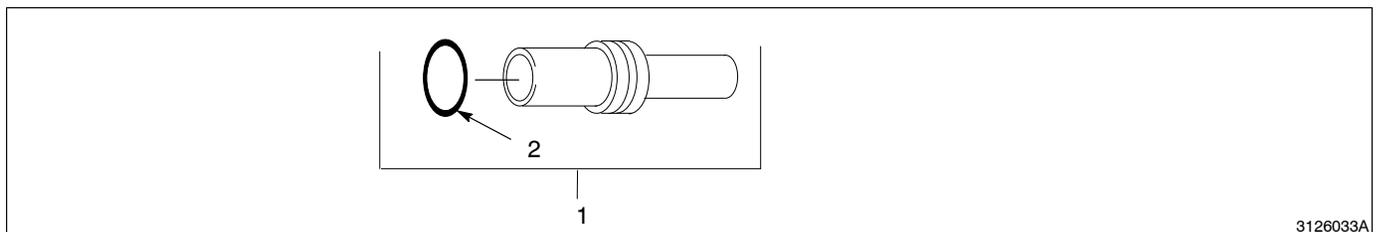
Fig. 8-9 Deflectors

8. Miscellaneous Options

$\frac{3}{8}$ -in. ID Hose Adapter

See Figure 8-10.

Item	Part	Description	Quantity	Note
1	135 896	Adapter, hose, $\frac{3}{8}$ in. ID, with O-ring	1	
2	940 163	<ul style="list-style-type: none"> O-ring, silicone, 0.625 x 0.750 x 0.063 in. 	1	



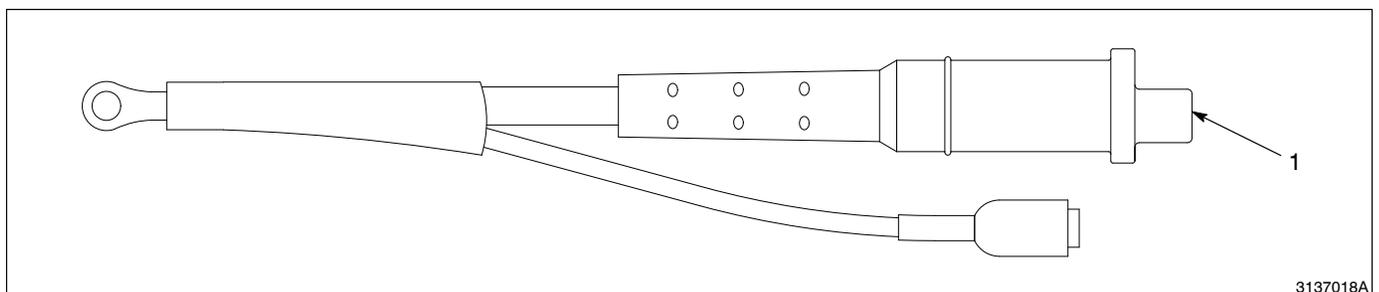
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Fig. 8-10 Hose Adapter for $\frac{3}{8}$ -in. ID Hose

Shorting Plug

See Figure 8-11.

Item	Part	Description	Quantity	Note
1	161 411	Plug, shorting, IPS	1	



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Fig. 8-11 Shorting Plug

Powder Feed and Air Tubing

Part	Description	Note
900 549	Tubing, powder, $\frac{3}{8}$ in. ID	A
900 550	Tubing, powder, $\frac{1}{2}$ in. ID	A
900 742	Tubing, polyurethane, 6 mm	A

NOTE A: Bulk part numbers. Order in 1-ft increments.

Gun Mounting Bar

See Figure 8-12.

Item	Part	Description	Quantity	Note
1	133 403	Bar, gun, mounting	1	

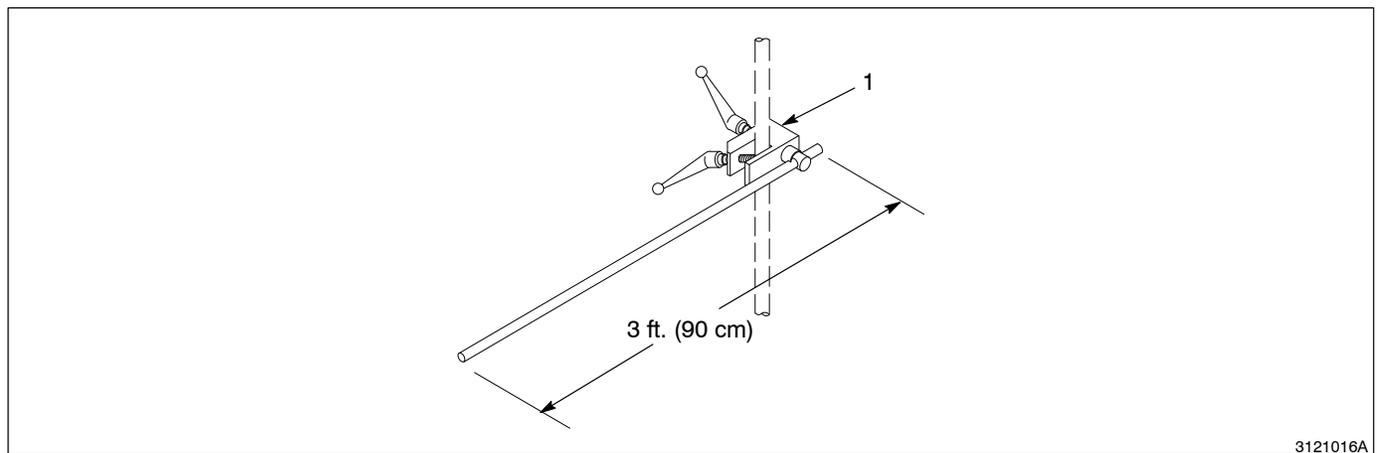


Fig. 8-12 Gun Mounting Bar

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9. Purge Adapter Kit

See Figure 8-13. The purge adapter kit is installed in the powder inlet body in place of the hose adapter. It is used to clean accumulated powder from the powder inlet body and nozzle. Air flow controls and $\frac{1}{4}$ -in. air tubing are not included. Refer to the manual shipped with the purge adapter for installation and operation instructions.

Item	Part	Description	Quantity	Note
1	157 094	Adapter, purge, Versa-Spray	1	

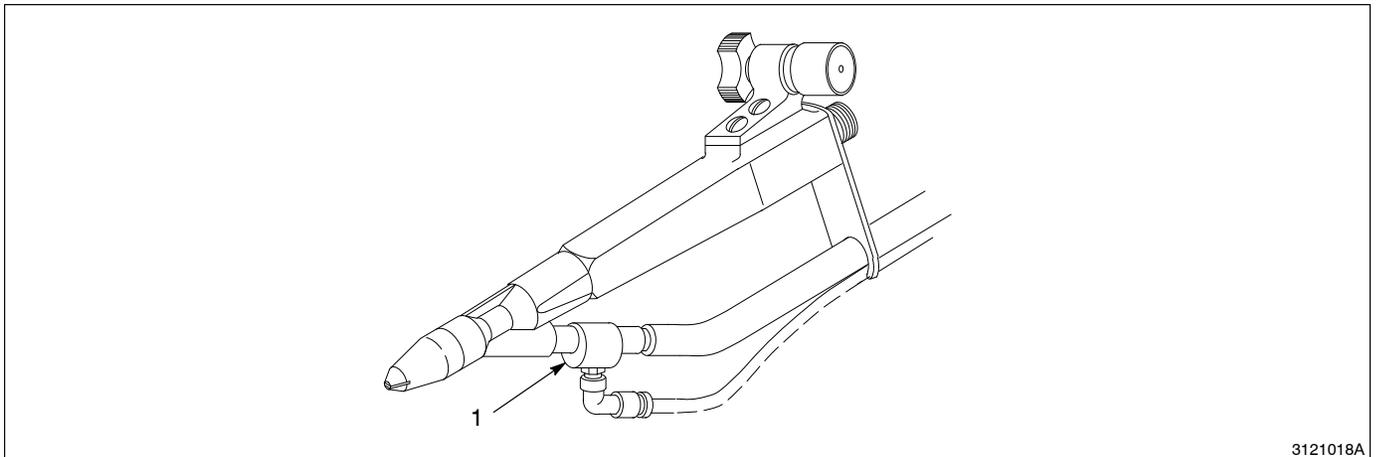


Fig. 8-13 Purge Adapter

3/8-in ID Hose Adapter for Purge Adapter

See Figure 8-14. This adapter replaces the standard (1/2-in. ID) hose adapter included with the purge adapter.

Item	Part	Description	Quantity	Note
1	140 907	Adapter, purge, inlet, 3/8 in. ID hose	1	

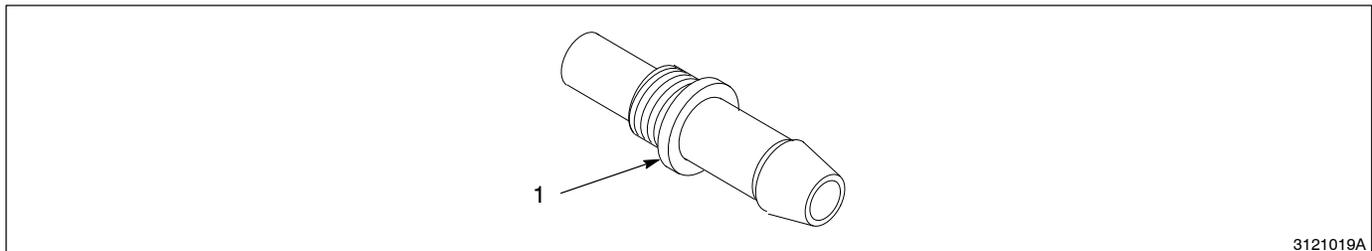


Fig. 8-14 3/8-in. ID Hose Adapter for Purge Adapters

10. Upgrade Kits

To upgrade guns without air, several upgrade kits are available. Order kits based on the control unit the guns are used with.

Reference Charts

To upgrade a gun used with a Versa-Spray II control unit, order one of the following kits. These kits are described on the following pages.

Part	Description
183 536	Kit, VS2 diffuser and extension
183 538	Kit, VS2 diffuser with hardware
183 537	Kit, VS2 extension, auto gun

To upgrade a gun used with a Versa-Spray control unit, order one of the following kits. These kits are described on the following pages.

Part	Description
169 658	Manifold, VS2 gun diffuser
169 659	Kit, VS2 diffuser, IPS auto gun
183 537	Kit, VS2 extension, auto gun

Kits For Guns Used with Versa-Spray II Control Units

Diffuser and Extension Kit

See Figure 8-15. This kit adds both a diffuser and a nozzle extension to a Versa-Spray or Versa-Spray II gun used with a Versa-Spray II control unit. To install the components, follow the instructions included with the kit.

NOTE: To use this kit, you must order a length of 6-mm air tubing, as long as the gun cable, to deliver air from the control unit to the gun.

Item	Part	Description	Quantity	Note
—	183 536	Kit, VS2 diffuser and extension	1	
1	972 243	• Orifice, 0.026, 1/8 in. NPT x 1/8 in. NPT	1	
2	972 141	• Connector, male, 6 mm tube x 1/8 in BSPT	1	
3	-----	• Diffuser, Versa-Spray II	1	
4	900 550	• Tubing, powder, 1/2 in. ID	AR	A
5	900 742	• Tubing, polyurethane, 6 mm, blue	AR	A
6	183 334	• Kit, extension, nozzle	1	

NOTE A: Bulk part number. Order length desired in 1-ft increments.

AR: As Required

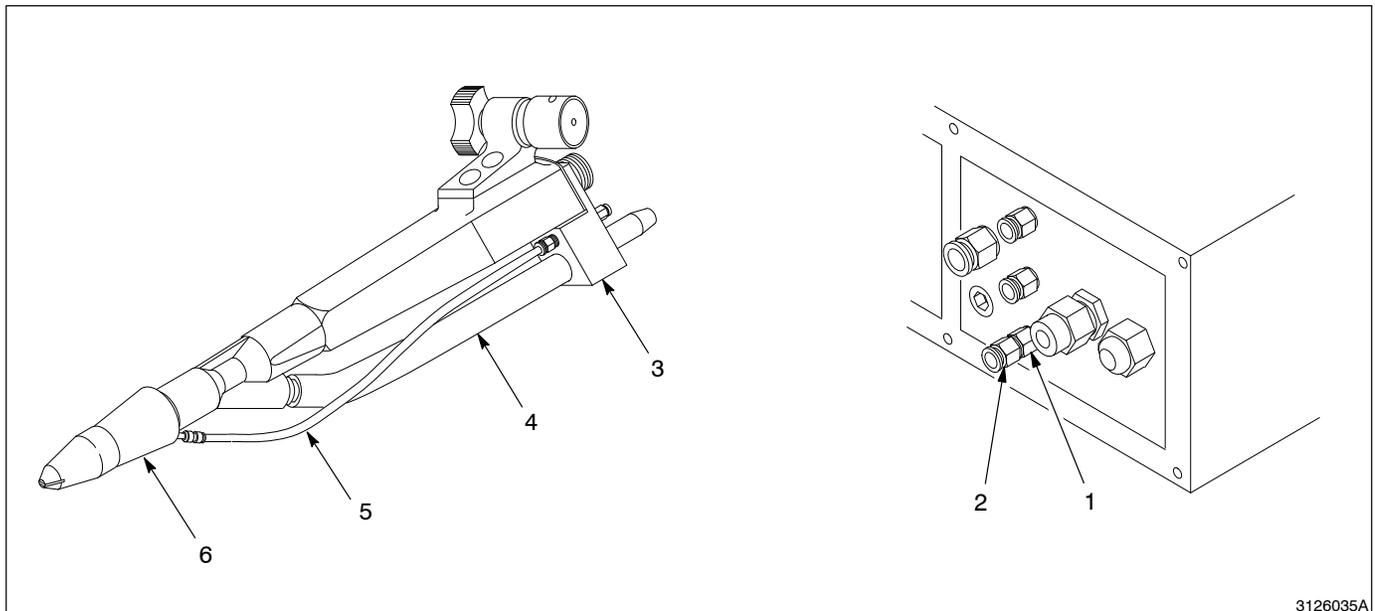


Fig. 8-15 Diffuser and Extension Kit

Diffuser Kit

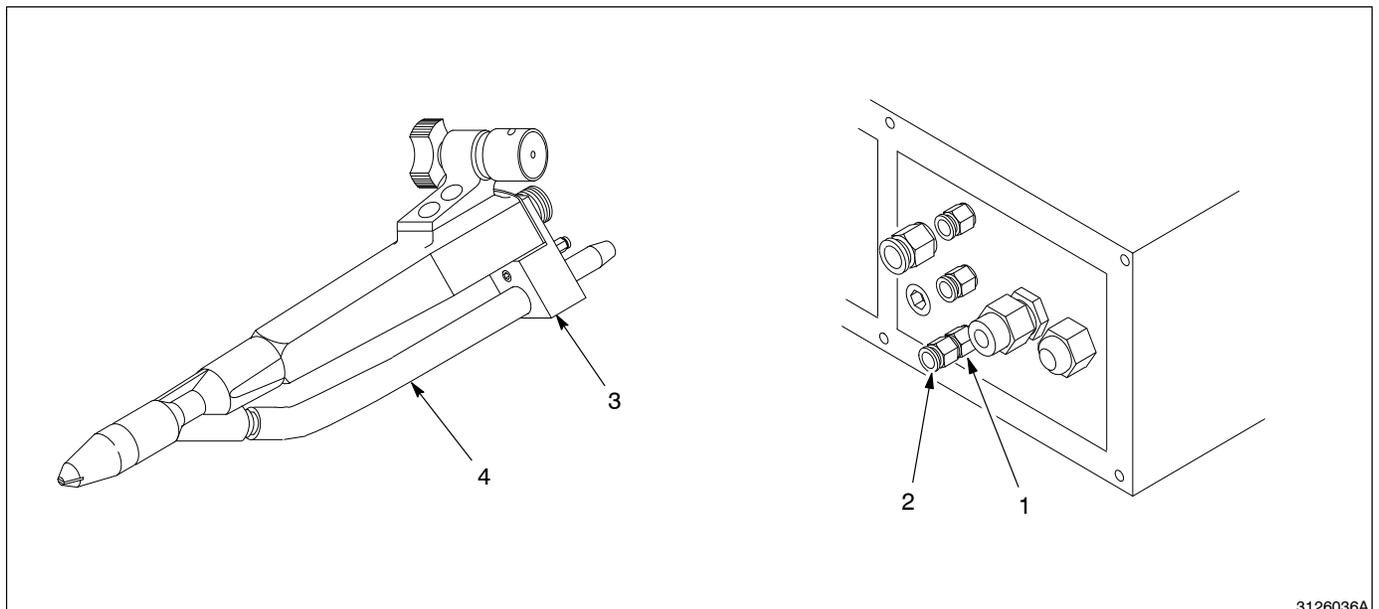
See Figure 8-16. This kit adds a diffuser to a Versa-Spray or Versa-Spray II gun without air used with a Versa-Spray II control unit. To install the components, follow the instructions included with the kit.

NOTE: To use this kit, you must order a length of 6-mm air tubing, as long as the gun cable, to deliver air from the control unit to the gun.

Item	Part	Description	Quantity	Note
—	183 538	Kit, VS2 diffuser with hardware	1	
1	972 243	• Orifice, 0.026, 1/8 in. NPT x 1/8 in. NPT	1	
2	972 141	• Connector, male, 6 mm tube x 1/8 in BSPT	1	
3	-----	• Diffuser, Versa-Spray II, plugged	1	
4	900 550	• Tubing, powder, 1/2 in. ID	AR	A

NOTE A: Bulk part number. Order length desired in 1-ft increments.

AR: As Required



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Fig. 8-16 Diffuser Kit

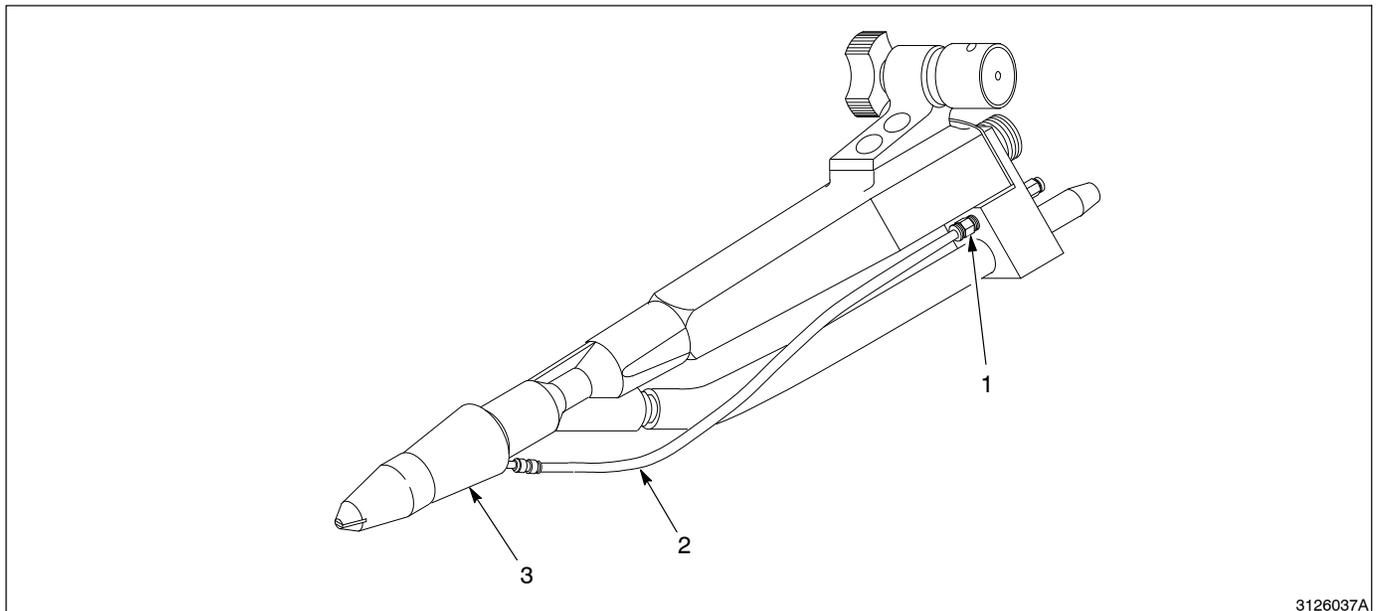
Kit For Guns Used with Versa-Spray or Versa-Spray II Control Units

Nozzle Extension Kit

See Figure 8-17. This kit adds a nozzle extension to a Versa-Spray or Versa-Spray II gun with a diffuser used with a Versa-Spray or Versa-Spray II control unit. To install the components, follow the instructions included with the kit.

Item	Part	Description	Quantity	Note
—	183 537	Kit, VS2 extension, auto gun	1	
1	972 141	• Connector, male, 6 mm tube x 1/8 in. BSPT	1	A
2	900 742	• Tubing, polyurethane, 6 mm, blue	AR	
3	183 334	• Kit, extension, nozzle	1	

NOTE A: Bulk part number. Order length desired in 1-ft increments.
AR: As Required



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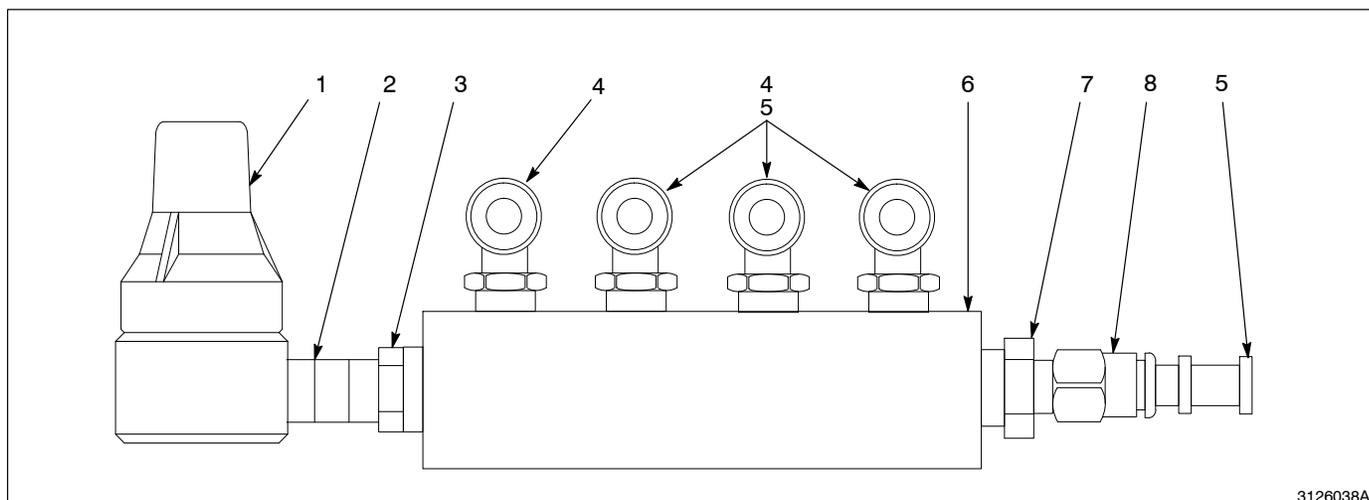
Fig. 8-17 Nozzle Extension Kit

Kits For Guns Used with Versa-Spray Control Units

Gun Air Manifold

See Figure 8-18. To use Versa-Spray II automatic guns already equipped with diffusers and extensions with Versa-Spray control units, order the manifold listed below. Up to five automatic guns can be supplied with regulated air from the manifold.

Item	Part	Description	Quantity	Note
—	169 658	Manifold, VS2 gun diffuser	1	
1	249 467	• Regulator, in line air	1	
2	973 117	• Nipple, steel, sched 40, 1/4 in. NPT x 1.50 in.	1	
3	973 370	• Bushing, reduction, 3/8 in. x 1/4 in.	1	
4	972 142	• Elbow, male, 6 mm tube x 1/4 in. BSPT	4	
5	183 804	• Plug, 6 mm tube	4	
6	248 105	• Manifold, air	1	
7	973 373	• Bushing, pipe, hydraulic, 3/8 x 1/8	1	
8	972 141	• Connector, male, 6 mm tube x 1/8 in. BSPT	1	



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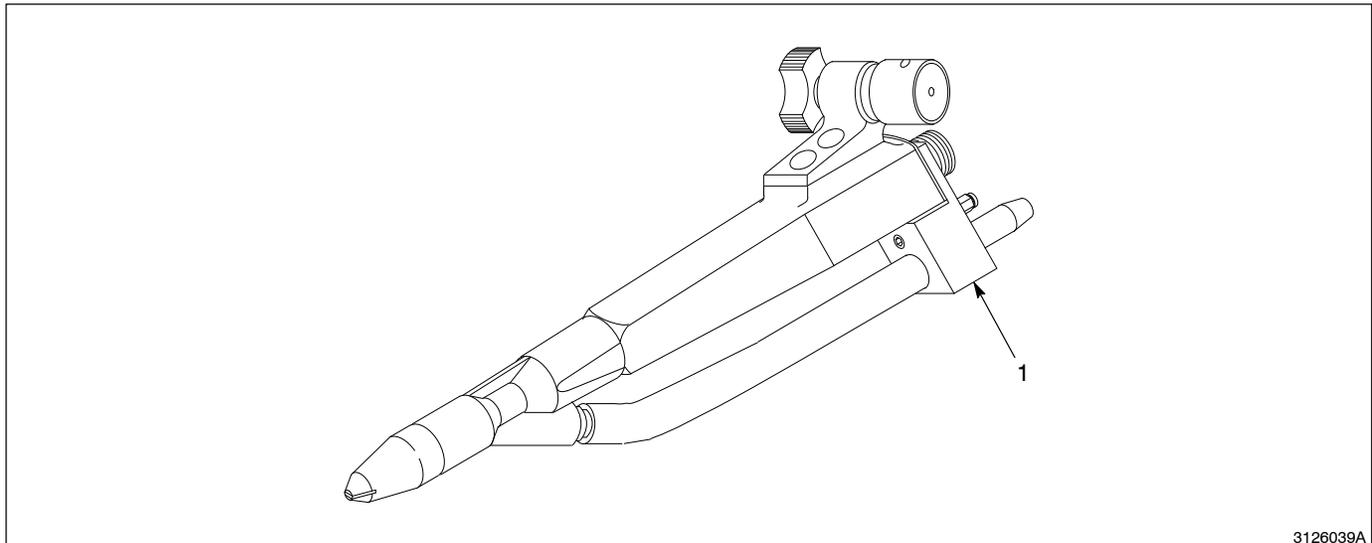
Fig. 8-18 Manifold

Diffuser Kit

See Figure 8-19. This kit adds a diffuser to a Versa-Spray or Versa-Spray II gun without air used with a Versa-Spray control unit. Use this kit with the manifold listed on the previous page. To install the components, follow the instructions included with the kit.

NOTE: To use this kit, you must order a length of 6-mm air tubing, as long as the gun cable, to deliver air from the manifold to the gun. A piece of feed hose 260-mm (10.25-in.) long must be installed between the diffuser and the adapter in the powder inlet body.

Item	Part	Description	Quantity	Note
—	169 659	Kit, VS2 diffuser, IPS auto gun	1	
1	-----	• Diffuser, plugged, assembly	1	



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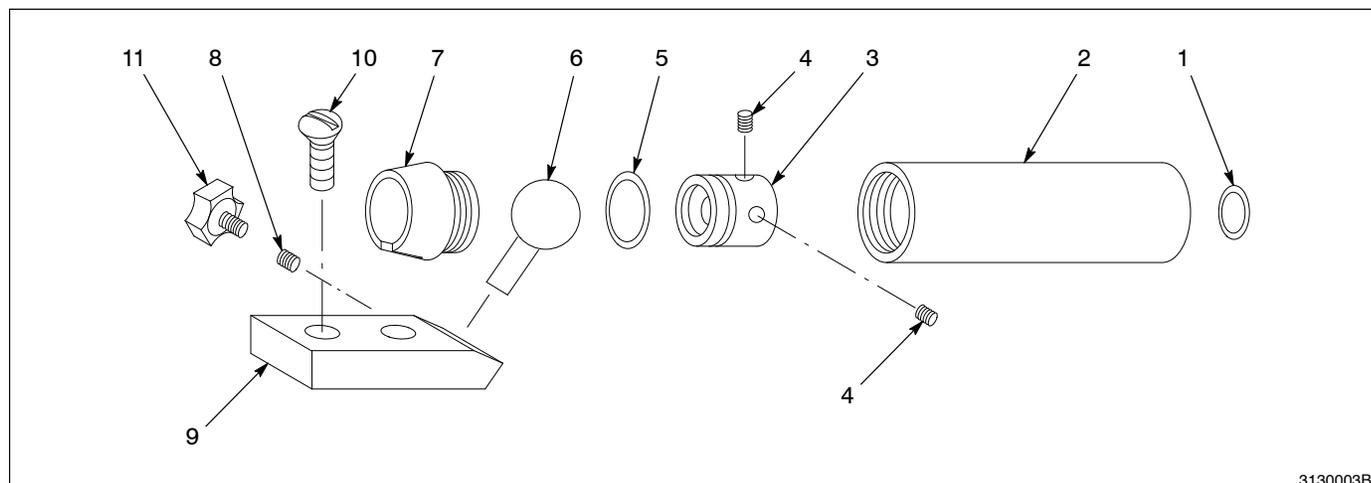
Fig. 8-19 Diffuser Kit

11. In-Line Ball Mount Kit

See Figure 8-20. This kit can be used with a Versa-Spray or Versa-Spray II automatic gun. Installation instructions are included with each kit.

Item	Part	Description	Quantity	Note
—	183 539	Kit, VS2 in line ball mount	1	
—	-----	• Mount, VS2, in line ball	1	
1	941 143	• • O-ring, silicone, 0.625 x 0.813 x 0.094 in.	1	
2	183 547	• • Adjuster, hand, ball mount	1	
3	183 546	• • Flange, bar, ball mount	1	
4	982 067	• • Screw, set, cup, M5 x 5, black	2	
5	941 176	• • O-ring, silicone, 0.813 x 1.00 x 0.094 in.	1	
6	183 818	• • Ball, pivot, VS2 gun mount	1	
7	183 549	• • Cap, ball mount	1	
8	982 595	• • Screw, set, cone, M6 x 8, stainless steel	1	
9	183 548	• • Plate, adapting, ball mount	1	
10	982 186	• Screw, flat head, M8 x 20	2	
11	129 592	Knob, clamping, M6 x 12	1	A

NOTE A: Optional, replaces item 8.



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Fig. 8-20 In-Line Ball Mount Kit

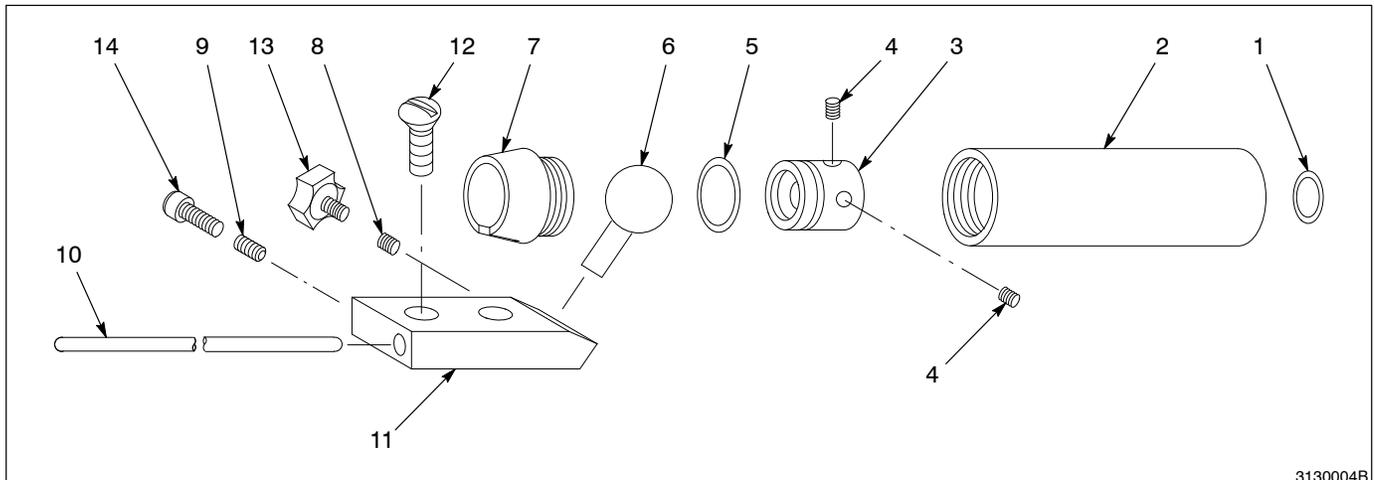
12. In-Line Ball Mount and Ion Collector Kit

See Figure 8-21. This kit can be used with a Versa-Spray or Versa-Spray II automatic gun. Installation and adjustment instructions are included with each kit.

Item	Part	Description	Quantity	Note
—	189 495	Kit, ball mount and ion collector	1	
—	-----	• Mount, VS2, in line ball, ion collector	1	
1	941 143	• • O-ring, silicone, 0.625 x 0.813 x 0.094 in.	1	
2	183 547	• • Adjuster, hand, ball mount	1	
3	183 546	• • Flange, bar, ball mount	1	
4	982 067	• • Screw, set, cup, M5 x 5, black	2	
5	941 176	• • O-ring, silicone, 0.813 x 1.00 x 0.094 in.	1	
6	183 818	• • Ball, pivot, VS2 gun mount	1	
7	183 549	• • Cap, ball mount	1	
8	982 595	• • Screw, set, cone, M6 x 8, stainless steel	1	
9	982 394	• • Screw, set, dog, M6 x 16, black	1	
10	189 482	• • Rod, ion collector, 11 in.	1	
11	189 486	• • Plate, ball mount, ion collector	1	
12	982 186	• Screw, flat head, M8 x 20	2	
13	129 592	Knob, clamping, M6 x 12	1	A
14	982 030	Screw, socket, M6 x 20, black	1	B

NOTE A: Optional, replaces item 8.

B: Optional, replaces item 9.



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Fig. 8-21 In-Line Ball Mount and Ion Collector Kit

13. Ion Collector Retrofit Kits

Installation and adjustment instructions are included with each kit.

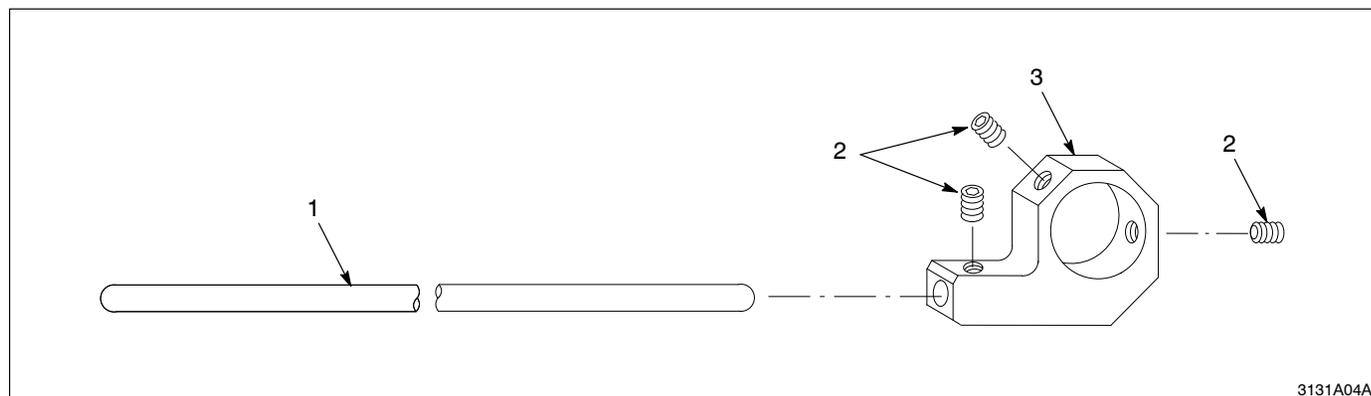
Shur-Lok Mount Ion Collector Kit

See Figure 8-22.

Item	Part	Description	Quantity	Note
—	189 491	Kit, Shur-Lok, ion collector	1	
1	189 482	• Rod, ion collector, 11 in.	1	
2	982 067	• Screw, set, cup, M5 x 5, black	3	
3	189 488	• Bracket, Shur-Lok, ion collector	1	
NS	982 628	Screw, socket, M5 x 10, stainless steel	3	A

NOTE A: Optional, replaces item 2.

NS: Not Shown



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Fig. 8-22 Shur-Lok Mount Ion Collector Kit

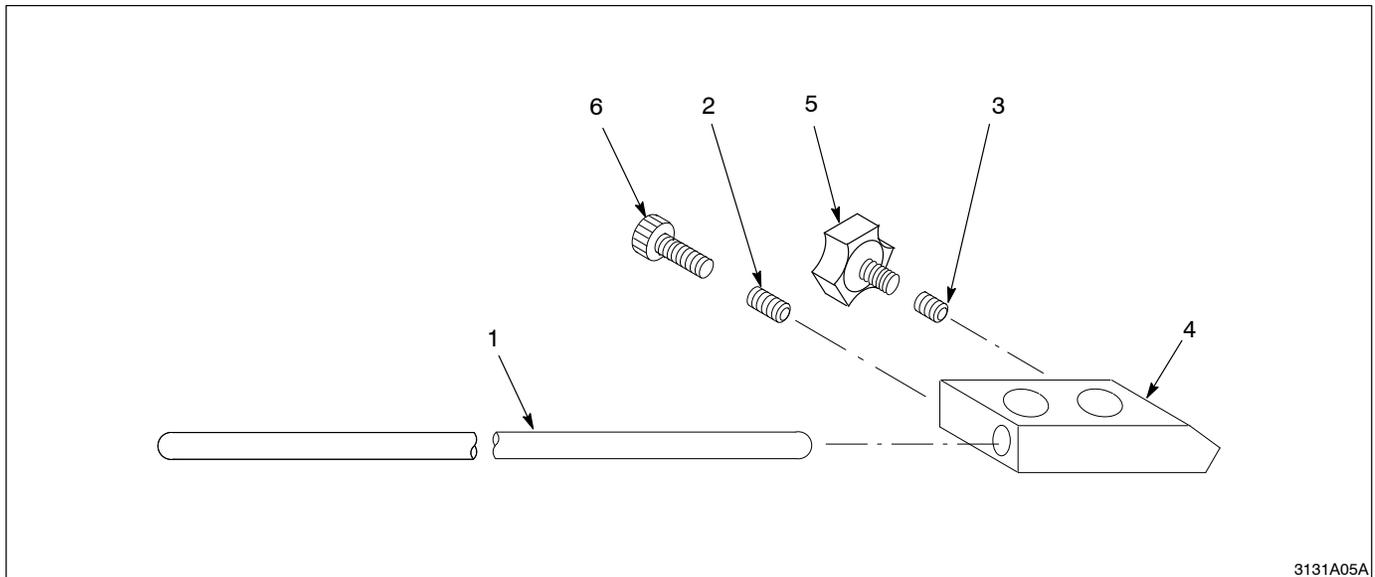
In-Line Ball Mount Ion Collector Kit

See Figure 8-23. This kit is used on guns already equipped with in-line ball mounts. Installation and adjustment instructions are included with each kit.

Item	Part	Description	Quantity	Note
—	189 490	Kit, ball mount, ion collector	1	
1	189 482	• Rod, ion collector, 11 in.	1	
2	982 394	• Screw, set, dog, M6 x 16, black	1	
3	982 595	• Screw, set, cone, 6 mm x 8 mm, stainless steel	1	
4	189 486	• Plate, ball mount, ion collector	1	
5	129 592	Knob, clamping, M6 x 12	1	A
6	982 030	Screw, socket, M6 x 20, black	1	B

NOTE A: Optional, replaces item 3.

B: Optional, replaces item 2.



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Fig. 8-23 In-Line Ball Mount Ion Collector Kit