Versa-Spray® IPS Automatic Electrostatic Powder Spray Gun

Customer Product Manual
Part 108 250C

For parts and technical support, call the Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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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 labels on this equipment. The safety labels are provided to help you operate and maintain your equipment safely.

Table 1-1 Safety Label

Item	Part	Description
	244 664	 **WARNING:** The following procedures MUST 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.  1. NO SMOKING. Keep open flames, hot surfaces, and sparks from torches or grinding away from booth. 2. Turn the electrostatic power unit off 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). 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.  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. 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. 14. Guns, feeders, booths, etc., may be cleaned with clean dry air at 25 psig (1.7 bar). If you have any questions concerning this electrostatic spray equipment, call (216) 988–9411, and ask to speak with the Powder Systems Group Technical Service Department.

Section 2

Description

Section 2
Description

1. Introduction

The Nordson Versa-Spray Integral Power Supply (IPS) automatic electrostatic powder spray gun electrostatically charges and sprays organic powder coatings. The gun houses a user-replaceable voltage multiplier.

See Figure 2-1. The gun is used with a Nordson Versa-Spray IPS control unit, which supplies low voltage dc power to the voltage multiplier (6) in the gun. The multiplier generates the high electrostatic voltage needed for powder coating. The electrostatic voltage is adjusted at the control unit by the operator and generates an electrical field (corona) around the gun electrode. As the powder particles are sprayed through this field, they pick up an electrical charge and are attracted to the grounded parts in front of the gun. The current at the electrode is limited to safe levels by a resistor installed between the multiplier and the electrode.

The spray pattern is controlled by the electrostatic field, the shape of the nozzle used, and air velocity. Powder is supplied to the gun by a powder pump. The pump uses compressed air to draw the powder from a feed hopper, atomize it, and force it through feed hose to the gun.

The gun can be ordered with either a negative or a positive voltage multiplier. The powder inlet body (5), feed hose adapter (6), and nozzles are interchangeable with those used on Versa-Spray IPS manual guns.

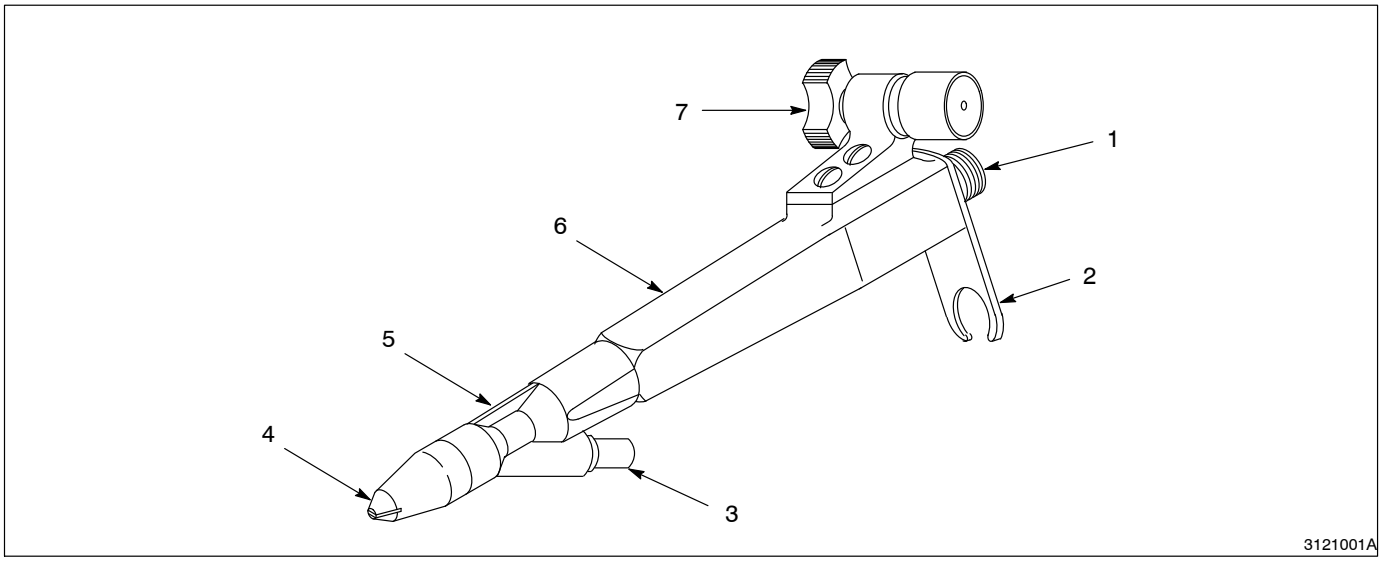

Fig. 2-1 Versa-Spray IPS Automatic Powder Spray Gun

1. Gun cable connection
2. Feed hose bracket
3. Feed hose adapter
4. Flat spray nozzle
5. Powder inlet body
6. Multiplier
7. Gun mount

2. Options

Options include three gun cable lengths, various nozzle types and sizes, a gun mounting bar, feed hoses, deflectors, hose adapters, and a purge adapter. Refer to *Parts* for part numbers and illustrations. Contact your local Nordson Corporation representative if you need additional information about these options.

Cables

The gun cable carries low-voltage dc power from the IPS control unit to the multiplier. Gun cables are available in 8-, 12-, and 16-m lengths (25-, 38-, and 50-ft).

Nozzles

Nozzles are available in the following sizes and configurations:

- single-slot Tivar and GFT (glass-filled PTFE) flat spray nozzles with 2.5-, 3-, 4- (standard), and 6-mm slot widths
- Cross-Cut nozzles with two 4-mm slots at 60- or 90-degrees from each other
- castle nozzle with three slots at equal angles from each other
- conical nozzles with 32- or 45-mm diameters

The standard conical nozzle deflector is 26-mm in diameter. Optional deflectors are available with of 14-, 16-, and 19-mm diameters.

Lance extensions

Lance extensions are used to spray powder into recesses and deep 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.

3. Specifications

Maximum rated output voltage at the electrode	100,000 volts ±10%
Maximum rated output current at the electrode	0.150 mA ±10%

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

Section 3

Installation

Section 3
Installation

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

1. Gun Mounting

Use the optional 16 x 910 mm ($^5/_8$ x 36-in.) gun mounting bar listed in *Parts* 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 to clamp the mounting bar securely in place.

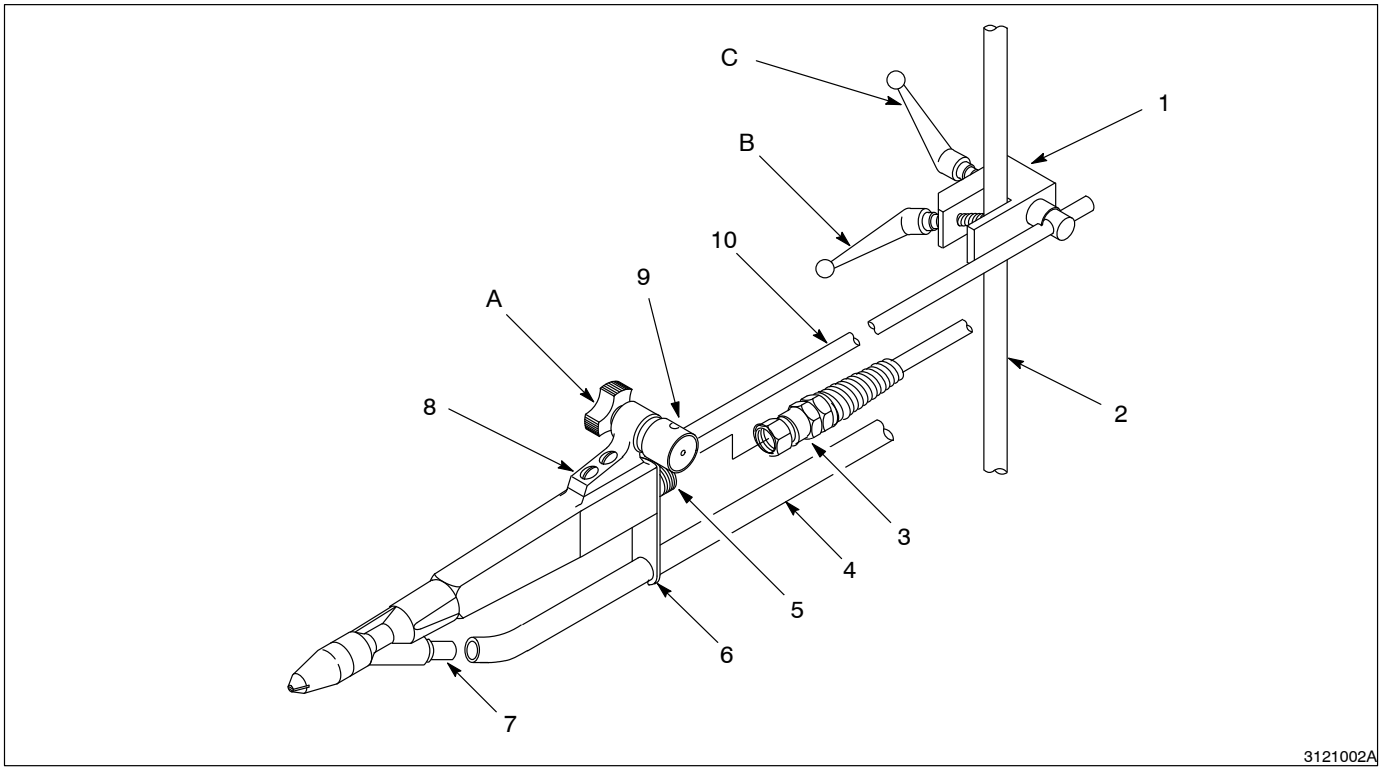

Fig. 3-1 Gun Installation

1. Mounting bar clamp
2. 25.4 mm (1 in.) bar
3. Gun cable
4. Feed hose
5. Multiplier receptacle
6. Feed hose bracket
7. Hose adapter
8. Gun mount
9. Set screws
10. Mounting bar

1. Gun Mounting (contd.)

2. Loosen the set screws (9) in the gun mount (8) with a hex key and insert the end of the bar (10) in the mount. Tighten the set screws securely.

3. Use knob A to adjust the angle of the gun. Use handle B to adjust the position of the mounting bar clamp (1) vertically or horizontally. Use handle C to adjust the angle and length of the bar (10).

2. Gun Connections

See Figure 3-1. Perform the following steps to install the gun cable and feed hose.

1. Plug the 3-socket end of the gun cable (3) into the multiplier receptacle (5). Plug the six-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. Pinch the feed hose (4) and slide it into the feed hose bracket (6). Connect the feed hose to the hose adapter (7). Secure the hose to the adapter with a snap clamp.

3. Connect the other end of the feed hose to the powder pump outlet. Secure the hose to the outlet with a snap clamp. Install spiral-wrap around the hose wherever necessary to prevent the hose from kinking and cutting off the flow of powder.

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.

4. Anchor the feed hose and gun cable to the gun mounting bar and stand or to the reciprocator arm with spiral-wrap tubing. Make sure that the hose and cable cannot be abraded, cut, or run over by moving equipment.

5. Connect supply air tubing from the air supply to the control unit, flow-rate tubing and atomizing air tubing from the control unit to the powder pump, and fluidizing air tubing from the control unit to the feed hopper. Refer to the control unit, powder pump, and hopper manuals for more detailed instructions.

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

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.

3. Air Quality

Powder spray systems require clean, dry operating air. Contaminated air can cause the powder to clog in the pump venturi throat, feed hose, or gun passages. Moist air can also cause grounding or arcing.

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

Section 4

Operation

Section 4
Operation

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

1. Startup

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

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.

Air pressure and the kV level adjustments (steps 5 through 8) are normally required only the first-time you use a new gun and control unit or when you change powders or parts.

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. 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.

2. Adjust powder-pump air pressures with the regulators and gauges on the IPS control unit front panel. Flow-rate air pressure controls the volume and velocity of the powder-and-air mixture delivered to the gun, while atomizing air pressure controls the density (powder-to-air ratio) of the mixture.

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

1. Startup (contd.)

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

3. Spray powder and observe the spray pattern. Adjust the flow-rate and atomizing air pressures to obtain the desired pattern.

4. Turn on the high-voltage switch on the control unit and adjust the kV output to its maximum setting.

5. Coat a few parts and adjust the air pressures and kV output to obtain the desired film build and coverage.

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

NOTE: If the IPS control unit is controlled by a master control unit, 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. Electrostatic voltage, flow-rate air, and atomizing air will be turned on and off when the master control unit is turned on and off.

2. Shutdown

1. Turn off the master control unit power switch if the IPS control unit is controlled by a master control unit. If it is not, turn off 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

The following maintenance procedures are for the gun only. Add these procedures to your routine maintenance schedule.

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

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

Clean the powder path, consisting of the nozzle, powder inlet body, wear sleeve, and hose adapter.

1. See Figure 4-1. Disconnect the powder feed hose from the powder pump outlet. Blow the powder out of the feed hose with compressed air.
2. Disconnect the feed hose from the gun. Remove the hose adapter (4) from the powder inlet body (2).
3. Use a flat-bladed screwdriver to loosen the set screw (5) in the underside of the powder inlet body. Remove the powder inlet body from the multiplier (7).

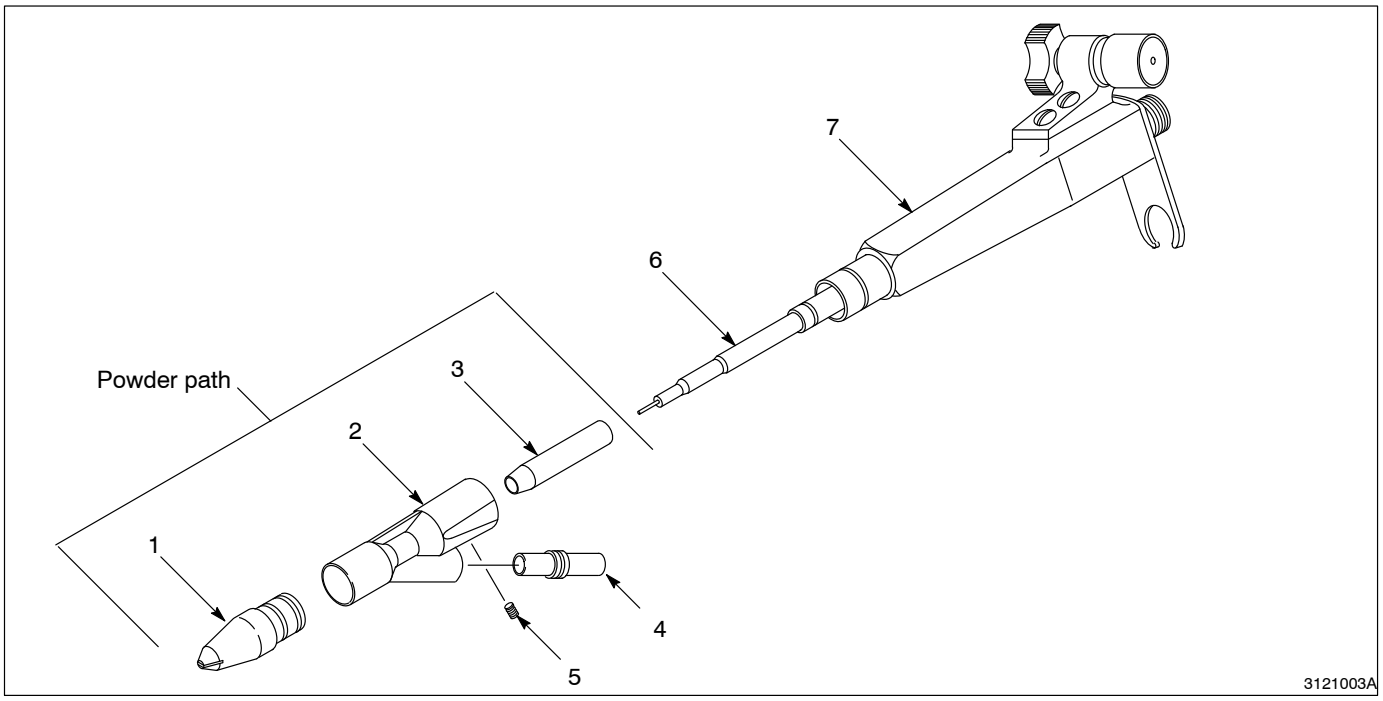

Fig. 4-1 Daily Maintenance (Clean Parts Shown)

1. Flat spray nozzle
2. Powder inlet body
3. Wear sleeve
4. Hose adapter
5. Set screw
6. Resistor probe
7. Multiplier

3. Maintenance (contd.)

4. Slide the wear sleeve (3) off the resistor probe (6). Remove the flat spray nozzle (1) from the powder inlet body.

5. Blow powder off the powder path parts, the resistor probe, and the multiplier with an OSHA-approved low-pressure blow gun. Wipe the parts with a clean, lint-free cloth.

6. 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 because powder will build up and impact-fuse on scratches.

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.

7. Inspect the powder path parts for wear. Replace worn parts.

Weekly

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

Section 5

Troubleshooting

Section 5
Troubleshooting

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

1. Introduction

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

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
- gun cable continuity

2. Troubleshooting Charts

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

Problem	Possible Cause	Corrective Action
3. Loss of wrap, poor transfer efficiency	Electrostatic voltage insufficient	Increase the electrostatic voltage.
	Dirty or broken electrode	Clean or replace the electrode (contact tip).
	Resistor, multiplier, or IPS control unit failure	Check the multiplier/resistor probe assembly with a shorting plug and megohmmeter. If the reading obtained is out of the correct range, check the resistor separately.
	Poorly grounded parts, hangers, or conveyor	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.
4. No kV output from gun	Damaged gun cable	Check the continuity of the gun cable wires from pin to pin.
	Malfunctioning voltage multiplier	Perform a continuity check.
	Failed gun resistor	Perform a continuity check.
	Malfunctioning IPS control unit	Repair or replace the control unit.

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.

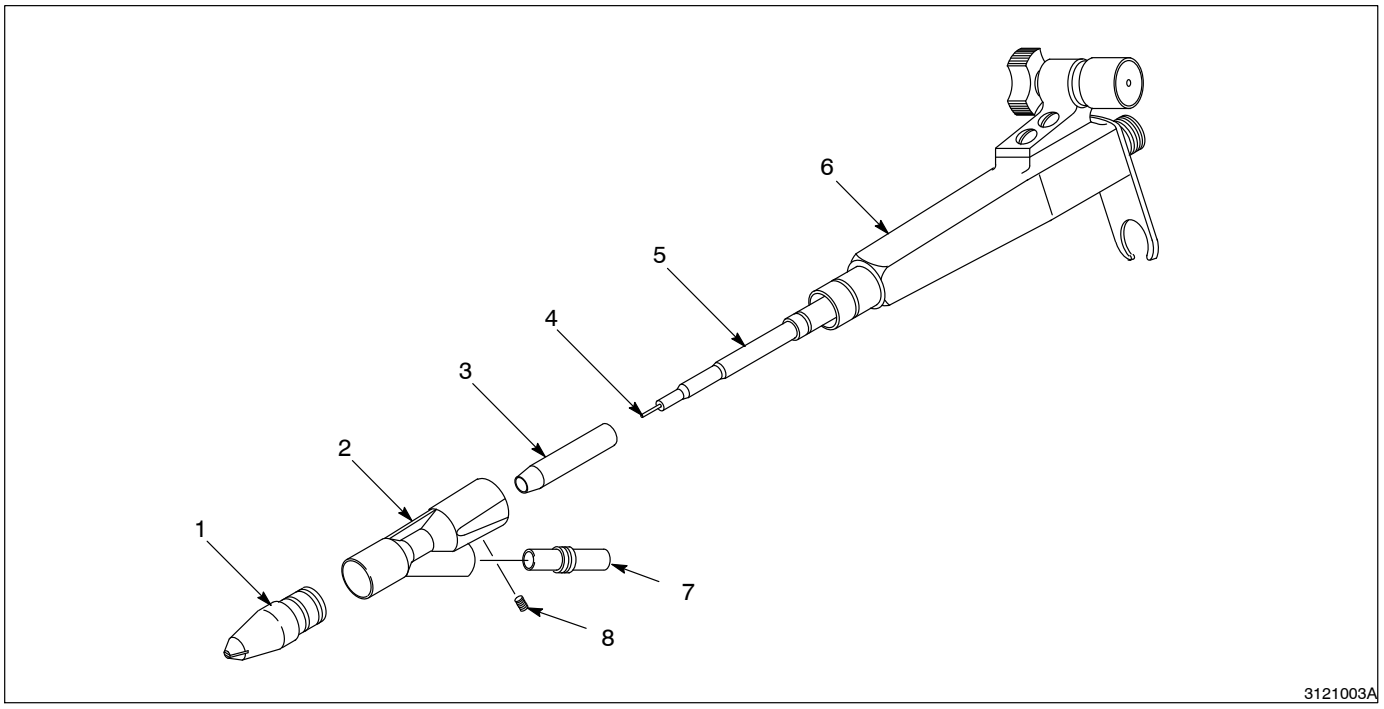

Fig. 5-1 Preparing for Continuity and Resistance Checks

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

4. See Figure 5-2. Connect the shorting plug (4) to the multiplier receptacle (3). Connect the megohmmeter 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 together all three multiplier pins before taking a reading with a megohmmeter. Failure to do so could damage the multiplier. Contact your Nordson Corporation representative for more information.

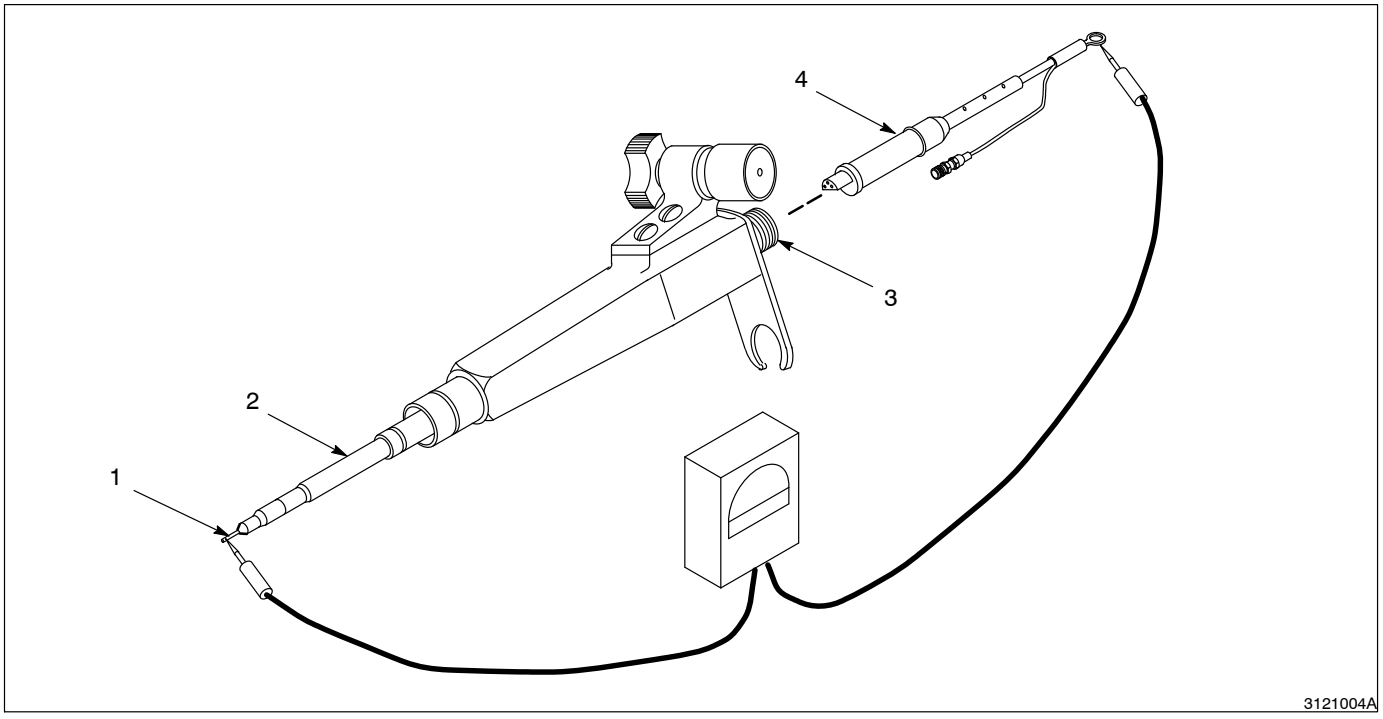

Fig. 5-2 Checking the Multiplier/Resistor Assembly

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

5. The megohmmeter should read between 208 and 312 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.

6. See Figure 5-4. Check for continuity between the bottom pin (5-Vdc feedback) in the multiplier receptacle and the heatsink.

Resistor Continuity and Resistance Check

1. Perform steps 1 through 3 under *Multiplier/Resistor Assembly Continuity and Resistance Check.*
2. See Figure 5-3. Unscrew the resistor probe (2) from the multiplier (4).
3. Check the resistor with a megohmmeter. The megohmmeter should read between 153 and 187 MΩ at 500 volts. If the reading is out of this range, replace the resistor probe.

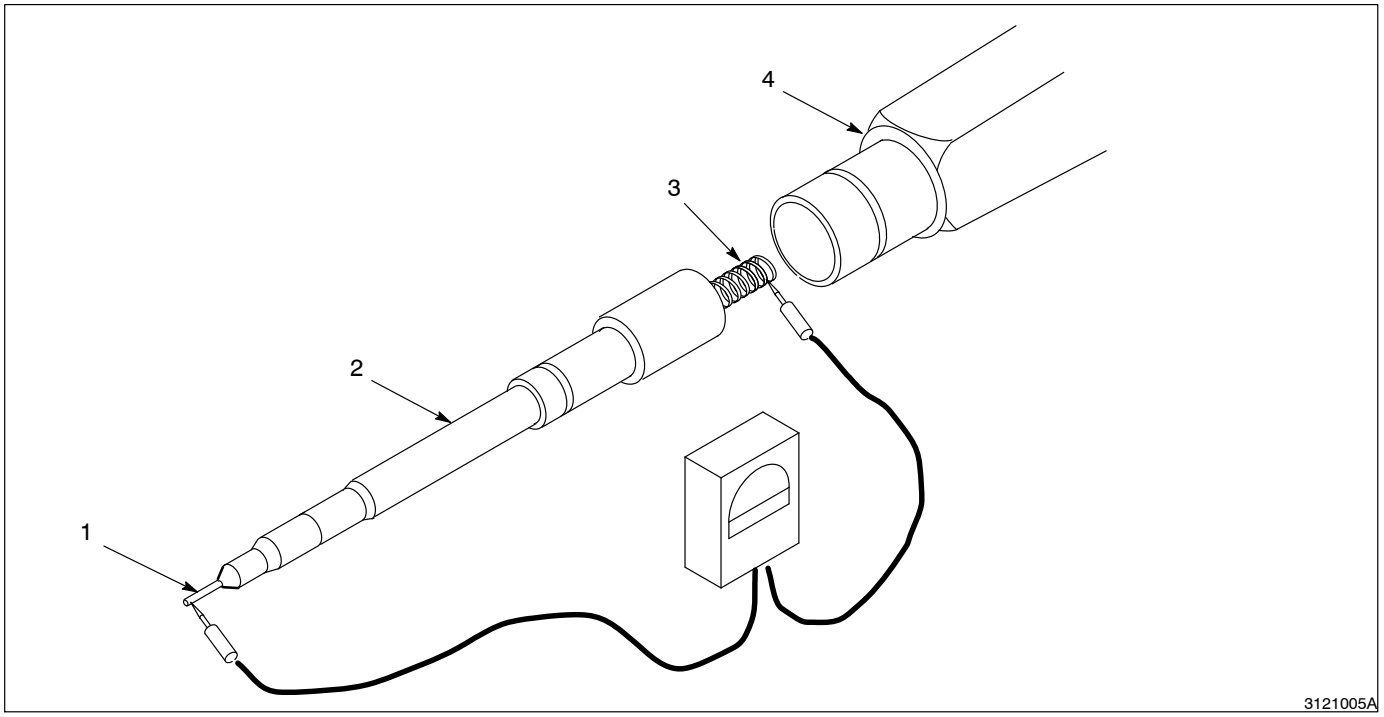

Fig. 5-3 Checking Resistor Resistance

1. Electrode
2. Resistor probe
3. Resistor spring
4. Multiplier

Gun Cable Continuity Check

Gun cable and multiplier pins, and their functions, are shown in Figure 5-4. 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.

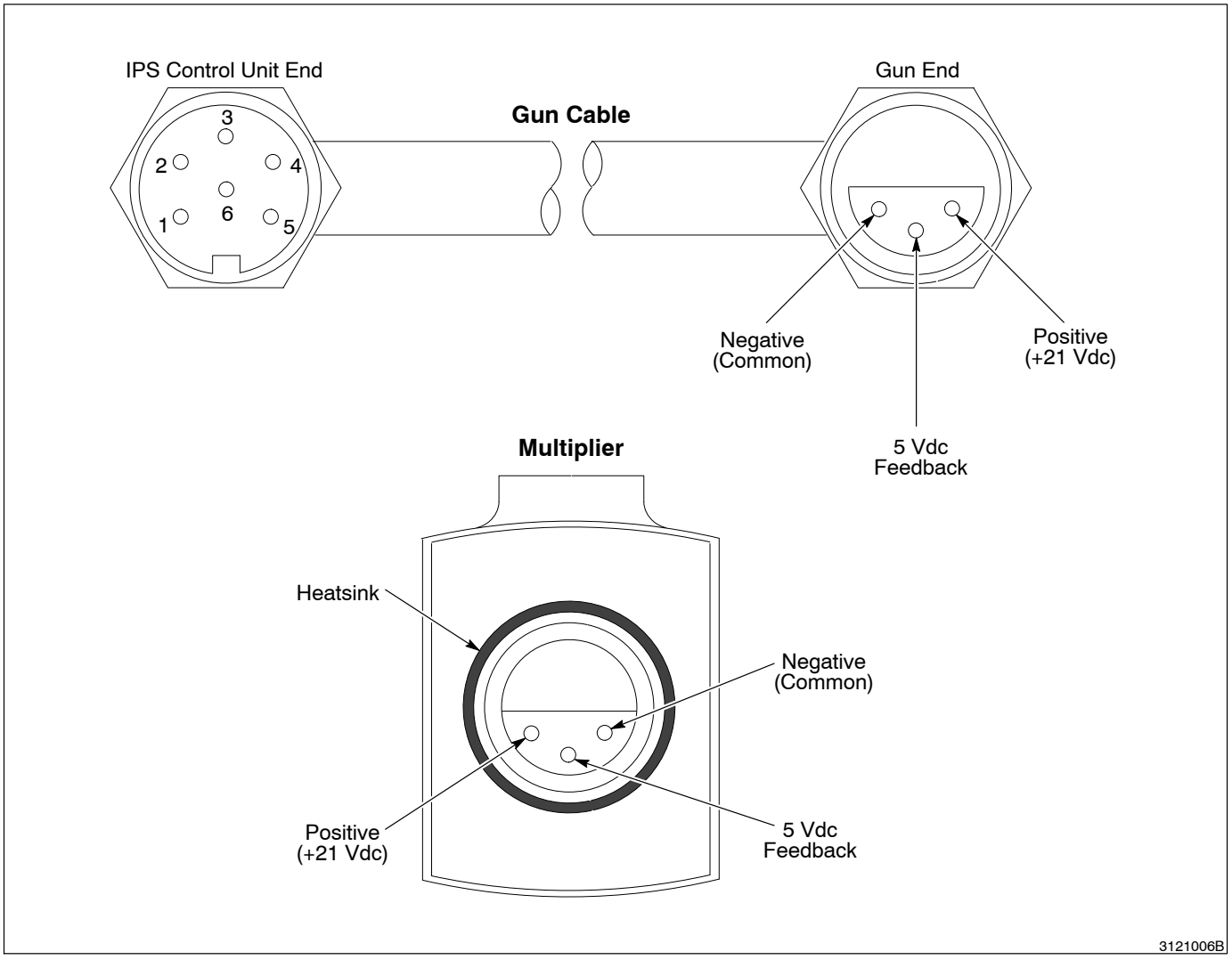

Fig. 5-4 Gun Cable and Multiplier Pins

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. 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 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 (2) with a flat-bladed screwdriver. Remove the powder inlet body and nozzle (1).

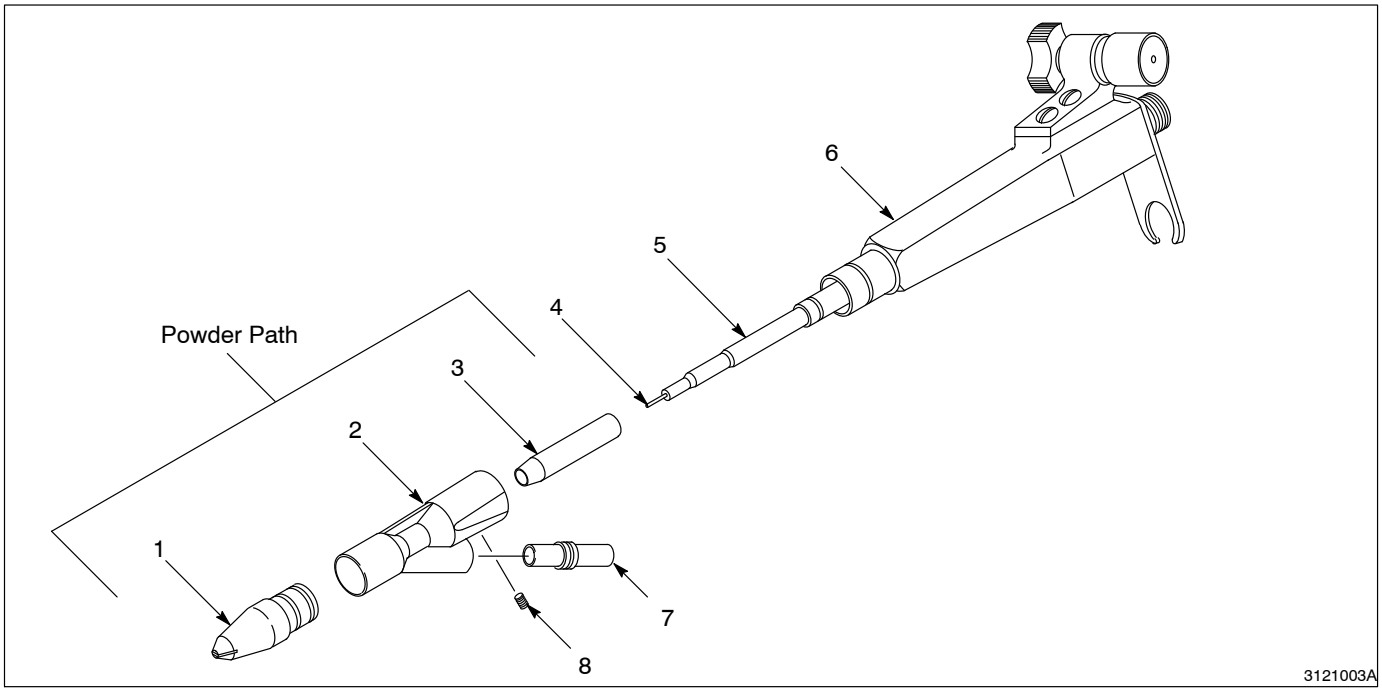

Fig. 6-1 Powder Path Repair

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

1. Powder Path Repair (contd)

3. Slide the wear sleeve (3) off the resistor probe (5).

4. Wipe powder off the electrode (4), resistor probe (5), and multiplier (6). Inspect the exterior and interior surfaces of all parts. Replace any parts with burn holes or arc tracks.

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, remove the O-rings and 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. Resistor Replacement

1. Perform steps 1 through 4 under *Powder Path Repair*.

2. See Figure 6-2. 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 $^1/_2$- to $^3/_4$-cc dielectric grease into the well. Use the applicator shipped with the resistor kit.

4. Fill the new resistor spring (3) and resistor probe cavity (6) with $^1/_2$- to $^3/_4$-cc dielectric grease.

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, affect electrostatic performance, possibly burn through the gun, and create a fire or explosion hazard.

5. Unscrew the new contact tip (1) from the resistor probe.

6. Screw the new resistor probe onto the multiplier and tighten it securely.

2. Resistor Replacement *(contd)*

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 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.

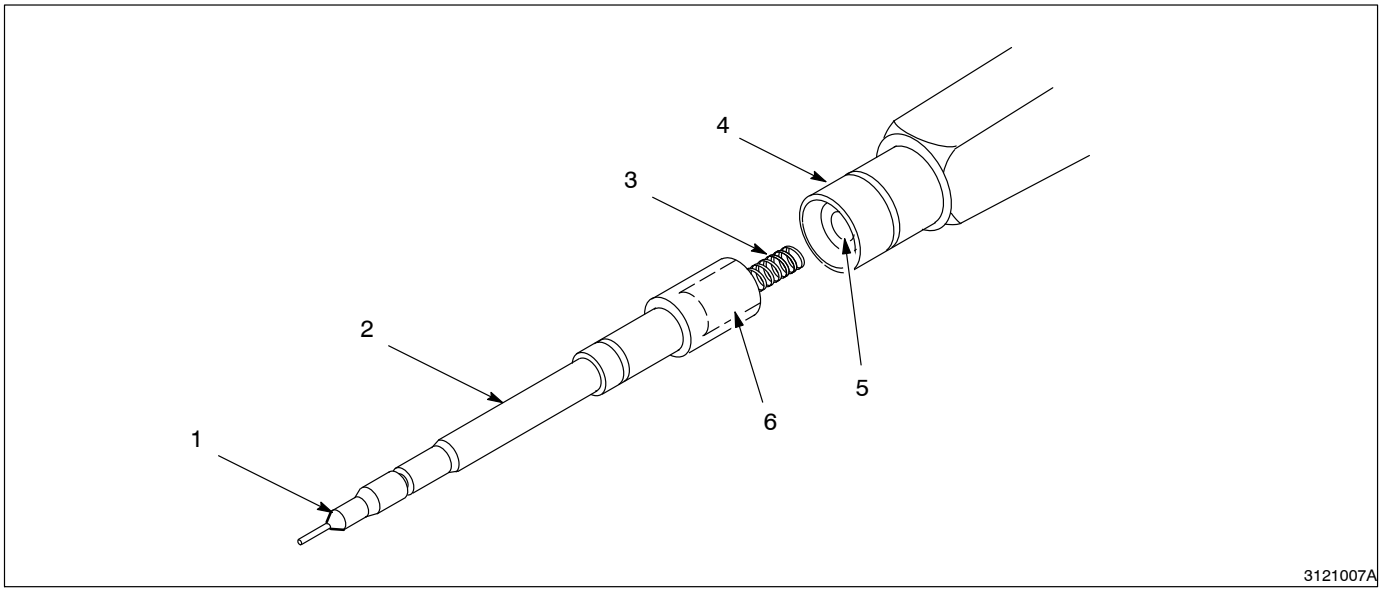

Fig. 6-2 Resistor Replacement

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.

3. Contact Tip Replacement

1. Perform steps 1 through 4 under *Powder Path Repair*.
2. See Figure 6-2. 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 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.

4. 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 powder feed hose and gun cable from the gun.
2. See Figure 6-3. Loosen the set screws (1) in the gun mount (11) with a hex key. Remove the gun from the mounting bar.
3. Perform steps 1 through 4 under *Powder Path Repair*.

NOTE: When performing step 4., save the screws (3, 12) for reuse.

4. Remove the gun mount (11) and the hose bracket (2) from the old multiplier (10).

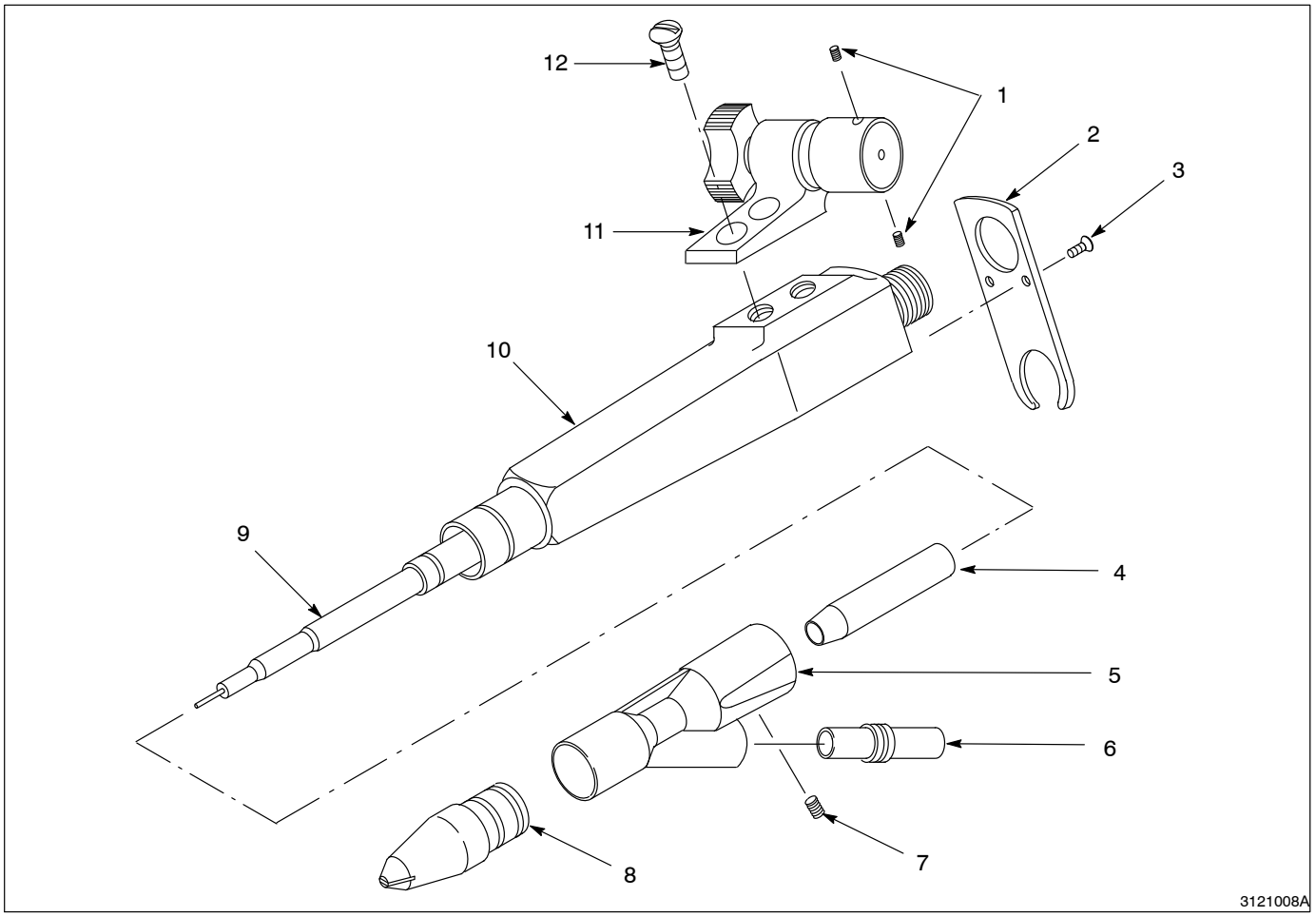

Fig. 6-3 Multiplier Replacement

1. Set screws
2. Hose bracket
3. Screws
4. Wear sleeve
5. Powder inlet body
6. Hose adapter
7. Set screw
8. Flat spray nozzle
9. Resistor probe
10. Multiplier
11. Gun mount
12. Screws

4. Multiplier Replacement
(contd)

5. Install the gun mount (11) and the hose bracket (2) on the new multiplier (10) with the screws (3, 12) removed from the old multiplier.

6. Install the wear sleeve (4) over the resistor probe (9). Install the powder inlet body (5), nozzle (8) , and hose adapter (6). Tighten the set screw (7) to secure the powder inlet body to the multiplier.

7. Install the gun on the mounting bar. Tighten the gun mount set screws (1) securely with a hex key.

8. Connect the gun cable and feed hose to the gun.

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. Gun

See Figure 7-1.

Item	Part	Part	Description	Quantity	Note
—	146 051		Gun, automatic, Versa-Spray, negative, flat	1	A
—		146 050	Gun, automatic, Versa-Spray, positive, flat	1	B
1	141 044	141 044	• Service kit, nozzle, flat spray, 4 mm	1	
2	141 045	141 045	• • Nozzle, flat spray, 4 mm, w/O-rings, Tivar	1	
3	941 181	941 181	• • • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
4	134 385	134 385	• • Sleeve, wear, flat spray, w/O-ring	1	
NS	940 084	940 084	• • • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	
5	125 612	125 612	• Body, inlet, powder	1	
6	982 455	982 455	• Screw, set, M6 x 1.0 x 8 mm, nylon, black	1	
7	134 386	134 386	• Adapter, hose, w/O-ring	1	
8	940 163	940 163	• • O-ring, silicone, 0.625 x 0.750 x 0.063 in.	1	
9	133 409	133 409	• Mount, gun, w/pivot	1	
NS	983 527	983 527	• • Washer, flat, 0.344 x 1.125 x 0.063 in., zinc	1	
NS	133 415	133 415	• • Knob, gun mount	1	
10	981 708	981 708	• • Screw, oval, slot, M8 x 20 mm, black	2	
11	982 067	982 067	• • Screw, set, cup, M5 x 5, black	2	
12	982 056	982 056	• Screw, flat head, slotted, M3 x 6, zinc	1	
13	140 562	140 562	• Bracket, tube	1	
14	146 009	- - - - - -	• Service kit, multiplier, w/probe, negative	1	C
14	- - - - - -	146 008	• Service kit, multiplier, w/probe, positive	1	C
15	940 243	940 243	• • O-ring, silicone, 1.125 x 1.250 x 0.063 in.	1	
16	134 376	134 376	• • Service kit, resistor	1	
17	940 117	940 117	• • • O-ring, silicone, 0.312 x 0.438 x 0.063 in.	1	
18	132 748	132 748	• • • Contact, cable	1	

NOTE A: Obsolete; replaced by Versa-Spray II configured automatic gun, part 173 155. Configurations (and part numbers) depend on choice of nozzle or other parameters.

B: Obsolete; replaced by Versa-Spray II configured automatic gun, part 173 156. Configurations (and part numbers) depend on choice of nozzle or other parameters.

C: Check part number on existing multiplier identification plate and note polarity before ordering service kit.

NS: Not Shown

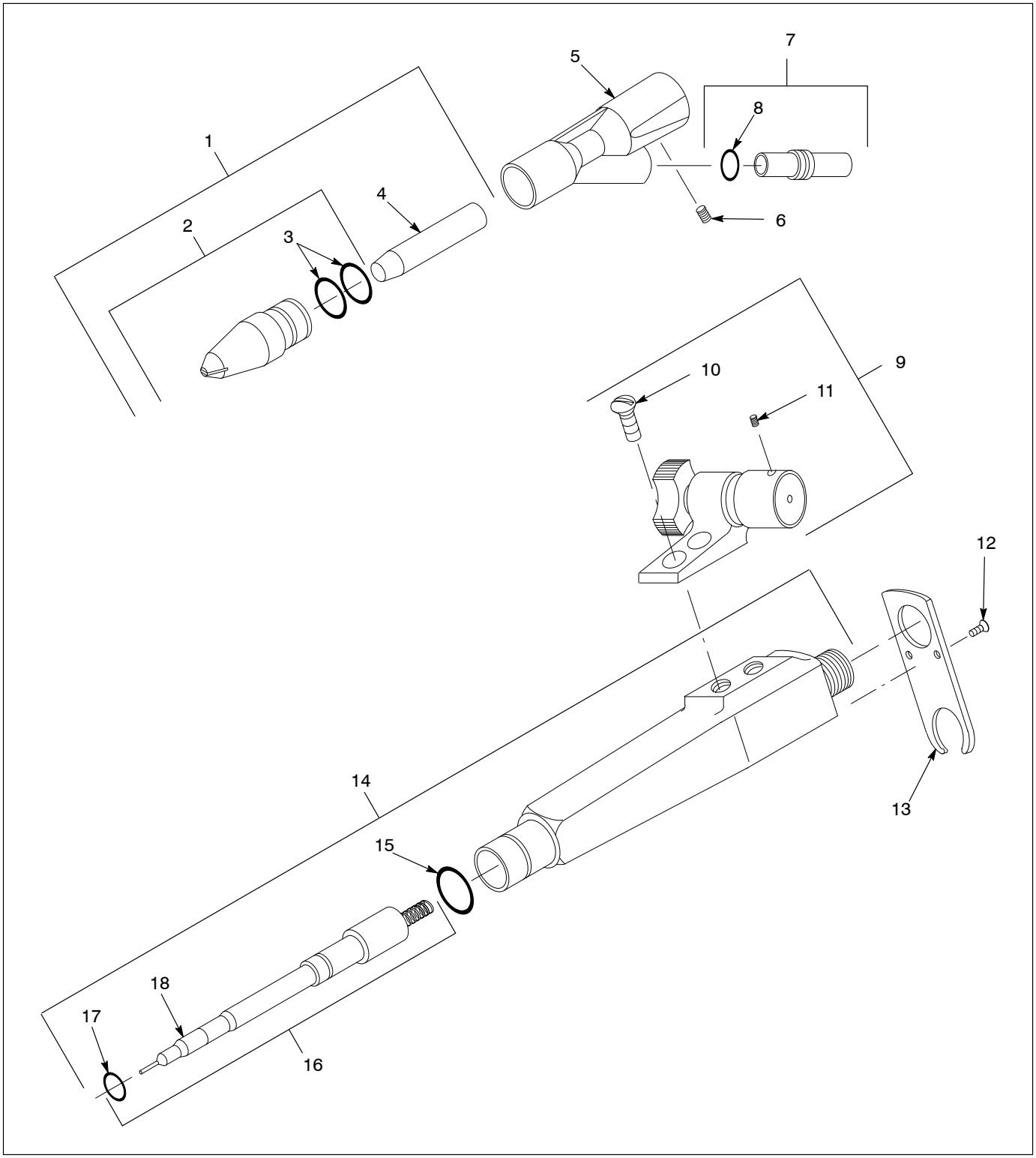

Fig. 7-1 Versa-Spray IPS Automatic Powder Spray Gun

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)	

3. Options

Tivar Flat-Spray Nozzles

Figure 7-2 applies to the 2.5-, 3-, 4-, and 6-mm Tivar and GFT flat spray nozzles.

Item	Part	Description	Quantity	Note
—	134 380	Service kit, nozzle, flat spray, 2.5 mm	1	
1	134 384	• Nozzle, flat spray, 2.5 mm, with O-rings, Tivar	1	A
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

NOTE A: Nozzles without identification groove use O-ring, part 940 212. Nozzles with groove use O-ring, part 941 181.

NS: Not Shown

Item	Part	Description	Quantity	Note
—	139 935	Service kit, nozzle, flat spray, 3 mm	1	
1	139 902	• Nozzle, flat spray, 3 mm, with O-rings, Tivar	1	A
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	A
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

NOTE A: Nozzles without identification groove use O-ring, part 940 212. Nozzles with groove use O-ring, part 941 181.

NS: Not Shown

Item	Part	Description	Quantity	Note
—	141 044	Service kit, nozzle, flat spray, 4 mm	1	
1	141 045	• Nozzle, flat spray, 4 mm, with O-rings, Tivar	1	A
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

NOTE A: Nozzles without identification groove use O-ring, part 940 212. Nozzles with groove use O-ring, part 941 181.

NS: Not Shown

Item	Part	Description	Quantity	Note
—	139 937	Service kit, nozzle, flat spray, 6 mm	1	
1	139 903	• Nozzle, flat spray, 6 mm, with O-rings, Tivar	1	A
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

NOTE A: Nozzles without identification groove use O-ring, part 940 212. Nozzles with groove use O-ring, part 941 181.

NS: Not Shown

Glass-Filled PTFE Flat-Spray Nozzles

See Figure 7-2. These nozzles are available with 2.5-, 3-, 4-, and 6-mm slot widths. They do not include a wear sleeve.

Item	Part	Description	Quantity	Note
1	174 223	Nozzle, flat spray, with O-rings, G-F PTFE, 2.5 mm	1	
2	941 181	• O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
1	174 225	Nozzle, flat spray, with O-rings, G-F PTFE, 3 mm	1	
2	941 181	• O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
1	174 227	Nozzle, flat spray, with O-rings, G-F PTFE, 4 mm	1	
2	941 181	• O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
1	174 229	Nozzle, flat spray, with O-rings, G-F PTFE, 6 mm	1	
2	941 181	• O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	

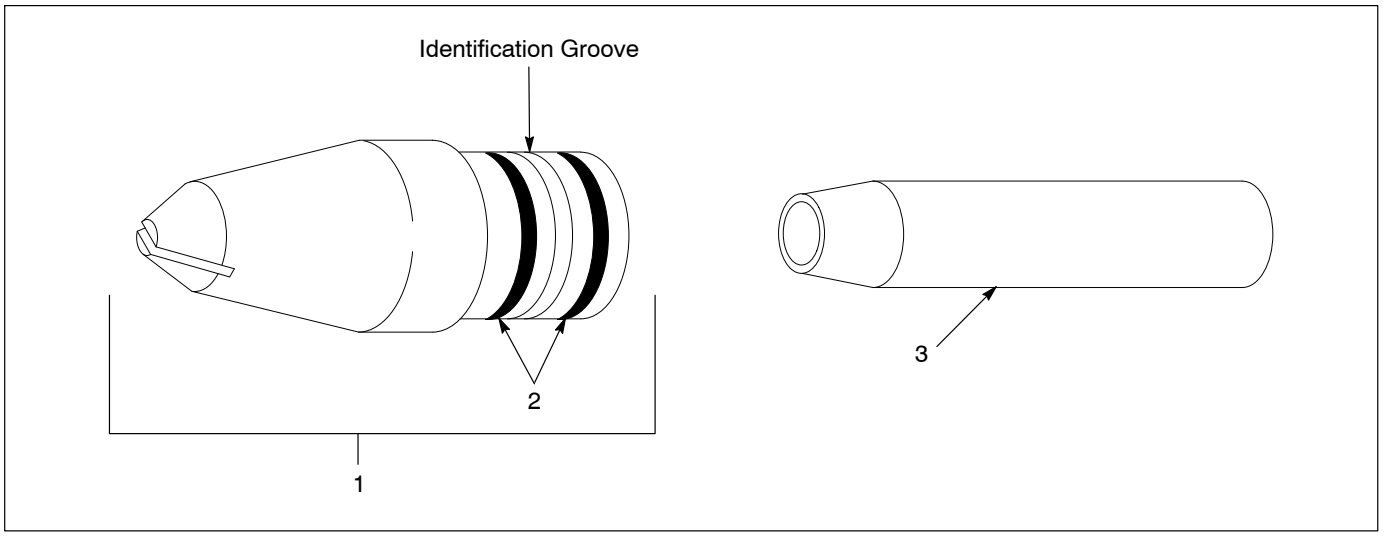

Fig. 7-2 Flat Spray Nozzles

Cross-Cut Nozzles

Figure 7-3 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, 2.5 mm, 60°, with O-rings	1	A
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

NOTE A: Nozzles without identification groove use O-ring, part 940 212. Nozzles with groove use O-ring, part 941 181.

NS: Not Shown

Item	Part	Description	Quantity	Note
—	141 014	Service kit, nozzle, Cross-cut, 90°	1	
1	141 015	• Nozzle, Cross-cut, 2.5 mm, 90°, with O-rings	1	A
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

NOTE A: Nozzles without identification groove use O-ring, part 940 212. Nozzles with groove use O-ring, part 941 181.

NS: Not Shown

Cross-Cut Nozzles *(contd)*

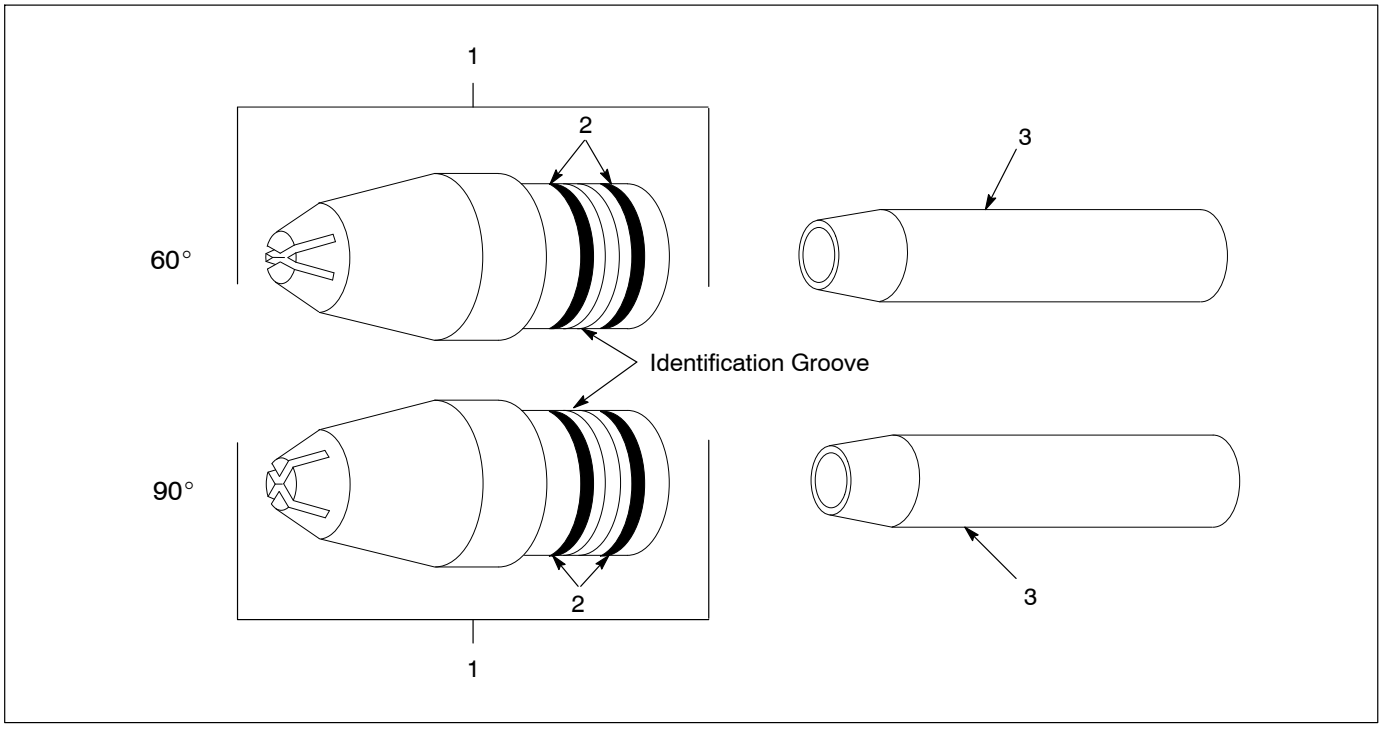

Fig. 7-3 Cross-Cut Nozzles

Castle Nozzle

See Figure 7-4.

Item	Part	Description	Quantity	Note
—	147 495	Service kit, nozzle, castle, .375	1	
1	147 877	• Nozzle, castle, 0.375, with O-rings	1	
2	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
3	134 385	• Sleeve, wear, flat spray, with O-ring	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	
NS: Not Shown				

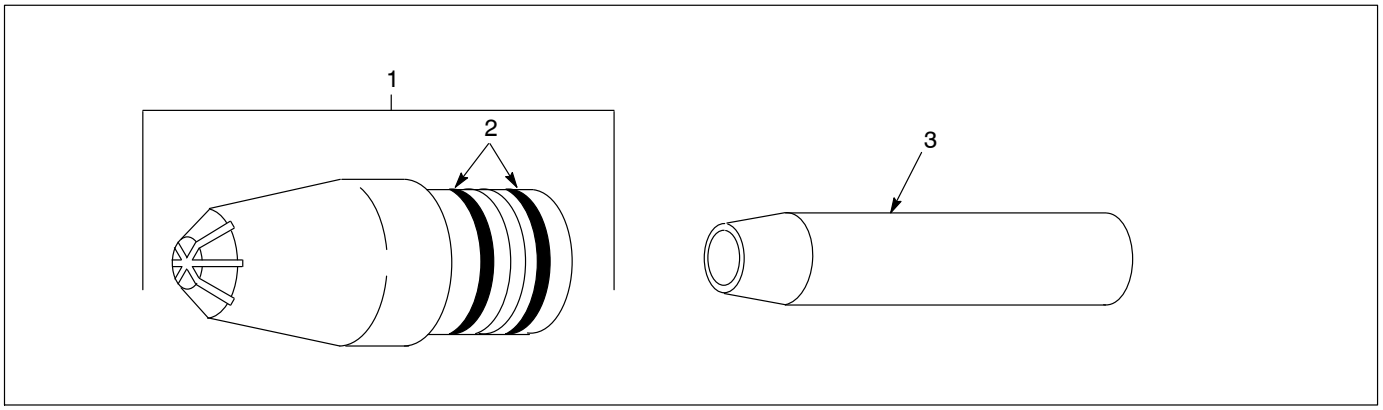

Fig. 7-4 Castle Nozzle

32-mm Conical Nozzle

See Figure 7-5.

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 1.063 x 0.094 in.	2	
4	941 205	• • O-ring, silicone, 1.000 x 1.188 x .094 in.	1	
5	144 759	• Adjuster, pattern, 32 mm	1	
6	133 734	• Deflector, 26 mm dia., with O-ring, Tivar	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	
NS: Not Shown				

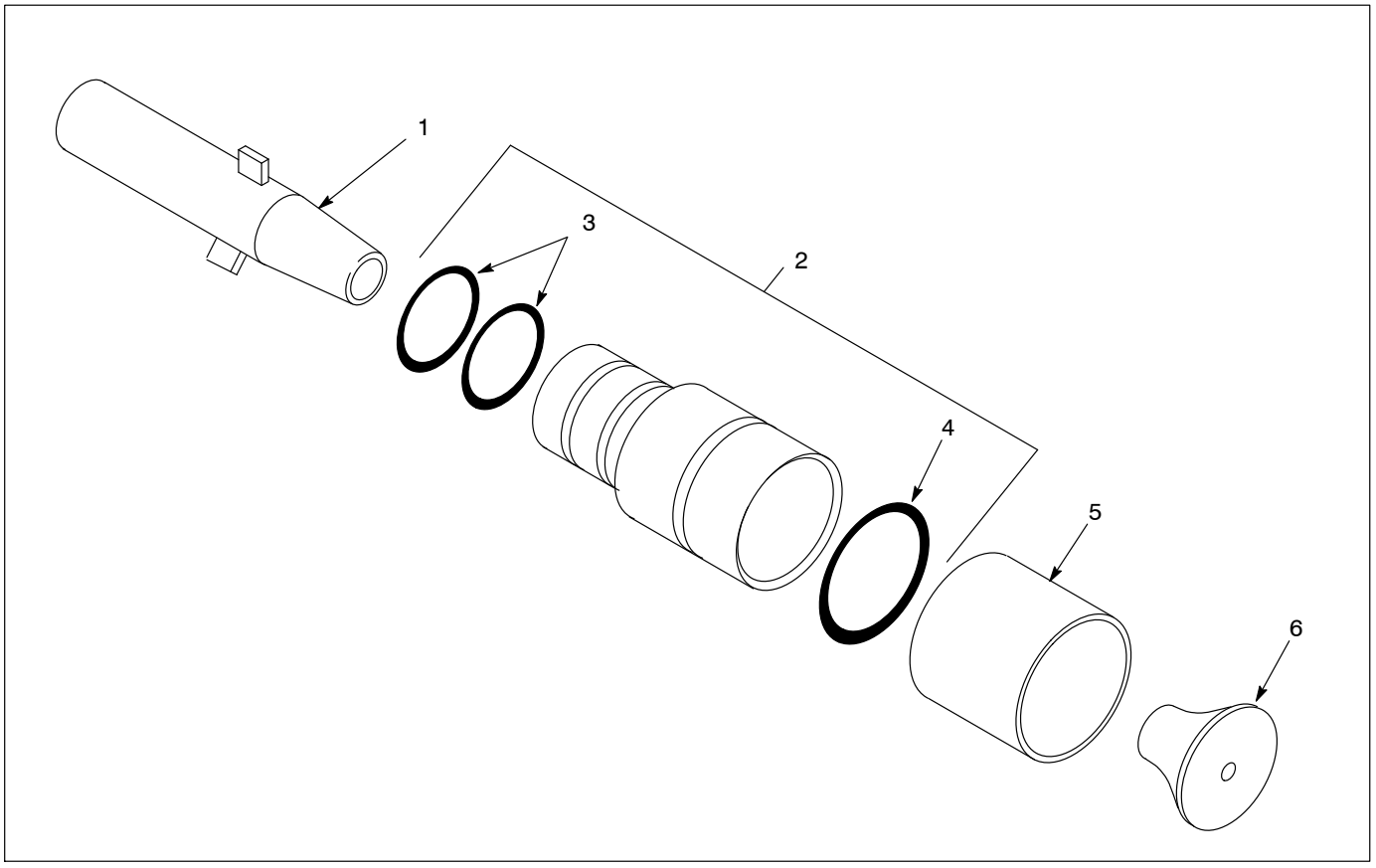

Fig. 7-5 32-mm Conical Nozzle

45-mm Conical Nozzle

See Figure 7-6.

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 1.063 x 0.094 in.	2	
4	249 233	• Deflector, with O-ring, Tivar	1	
NS	940 084	• • O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	
NS: Not Shown				

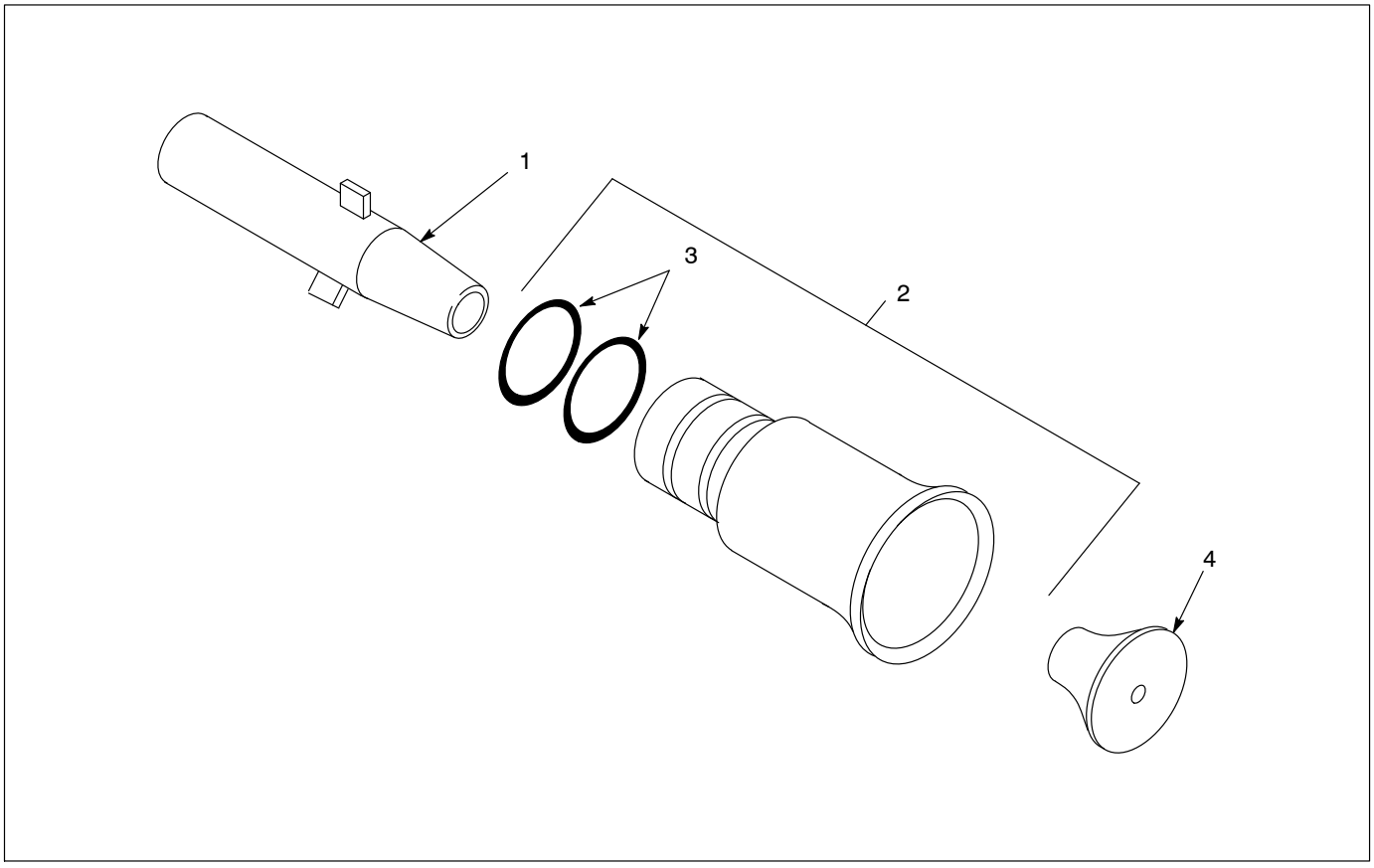

Fig. 7-6 45-mm Conical Nozzle

150- and 300-mm Lance Extensions

See Figure 7-7.

Item	Part	Part	Description	Quantity	Note
—	133 730		Extension, lance, 150 mm	1	A
—		133 731	Extension, lance, 300 mm	1	B
1	940 212	940 212	• O-ring, silicone, 0.938 x 1.063 x 0.063 in.	1	
2	133 728	133 728	• Tube, extension, 150 mm	1	
2	133 729	133 729	• Tube, extension, 300 mm	1	
3	940 224	940 224	• O-ring, silicone, 1.00 x 1.125 x 0.063 in.	1	
4	160 066	160 066	• Electrode, lance, 150 mm	1	C
5	160 020	160 020	• Sleeving, contact	1	C
4	160 068	160 068	• Electrode, lance, 300 mm	1	C
5	160 020	160 020	• Sleeving, contact	1	C
6	160 021	160 021	• Link, adapter, 300 mm	1	
7	133 719	133 719	• Support, lance	1	
8	133 721	133 721	• Connector, nozzle	1	
9	249 194	249 194	• Support, cable well	1	
—	- - - - - -	- - - - - -	• Nozzle, 32 mm, with O-rings	1	D
—	940 212	940 212	• • O-ring, silicone, 0.938 x 1.063 x 0.063 in.	1	D
—	- - - - - -	- - - - - -	• Adjuster, pattern, with O-ring	1	E
—	940 262	940 262	• • O-ring, silicone, 1.250 x 1.375 x 0.063 in.	1	E
10	145 558	145 558	• Nozzle, with O-rings	1	
11	941 181	941 181	• • O-ring, silicone, 0.875 x 1.063 x 0.094 in.	2	
12	941 205	941 205	• • O-ring, silicone, 1.000 x 1.188 x 0.094 in.	1	
13	144 759	144 759	• Adjuster, pattern, 32 mm	1	
14	133 734	133 734	• Deflector, 26 mm dia., with O-ring	1	

NOTE A: Obsolete; replaced by lightweight lance extension, part 233 469. Selected service parts are still available; contact your Nordson Corporation representative.

B: Obsolete; replaced by lightweight lance extension, part 233 468. Selected service parts are still available; contact your Nordson Corporation representative.

C: Replaces electrode (150 mm), part 133 732, and electrode (300 mm), part 133 733. Use contact sleeve, part 133 727 with old-style electrodes.

D: Obsolete; replaced by nozzle, part145 558.

E: Obsolete; replaced by adjuster, part 144 759.

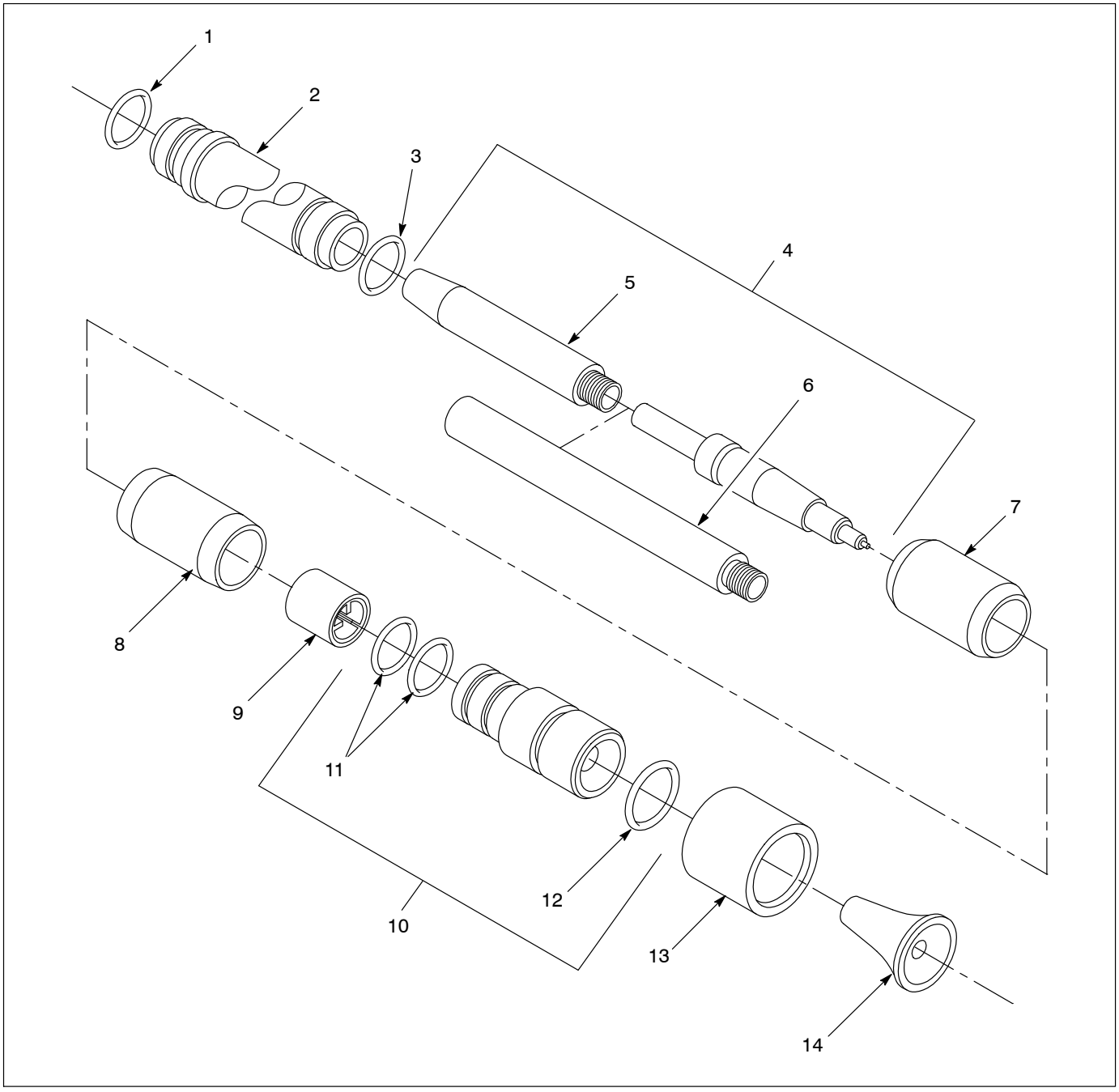

Fig. 7-7 150- and 300-mm Lance Extensions

14-, 16-, and 19-mm Deflectors and Low-Flow Hose Adapter

See Figure 7-8.

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 0.063 in.	1	
3	147 880	Deflector, 16 mm dia., Tivar, with O-ring	1	
4	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	
5	133 714	Deflector, 19 mm dia., Tivar, with O-ring	1	
6	940 084	• O-ring, silicone, 0.188 x 0.312 x 0.063 in.	1	

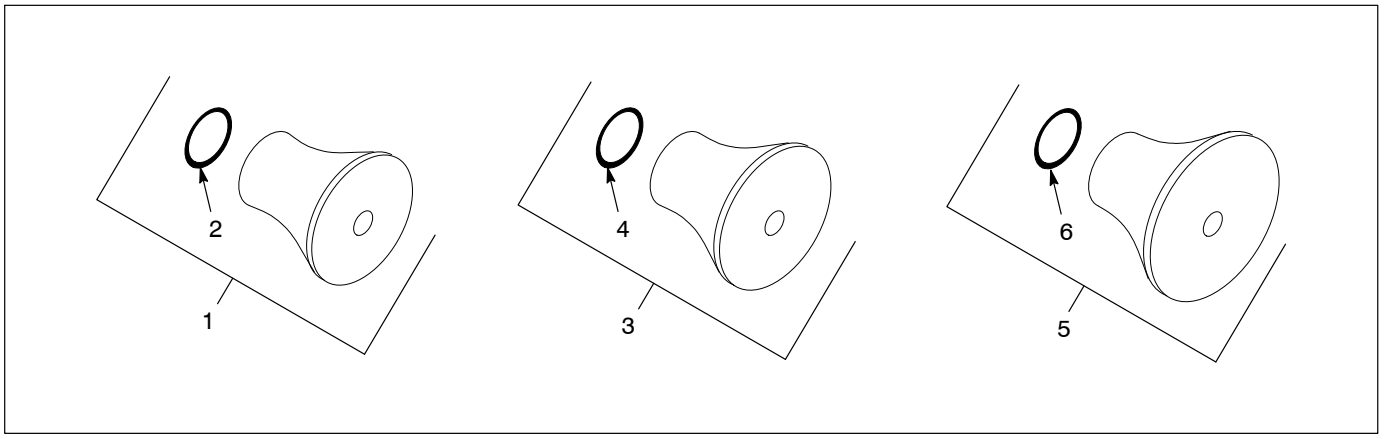

Fig. 7-8 Deflectors and Low-flow Hose Adapters

Gun Mounting Bar

See Figure 7-9.

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

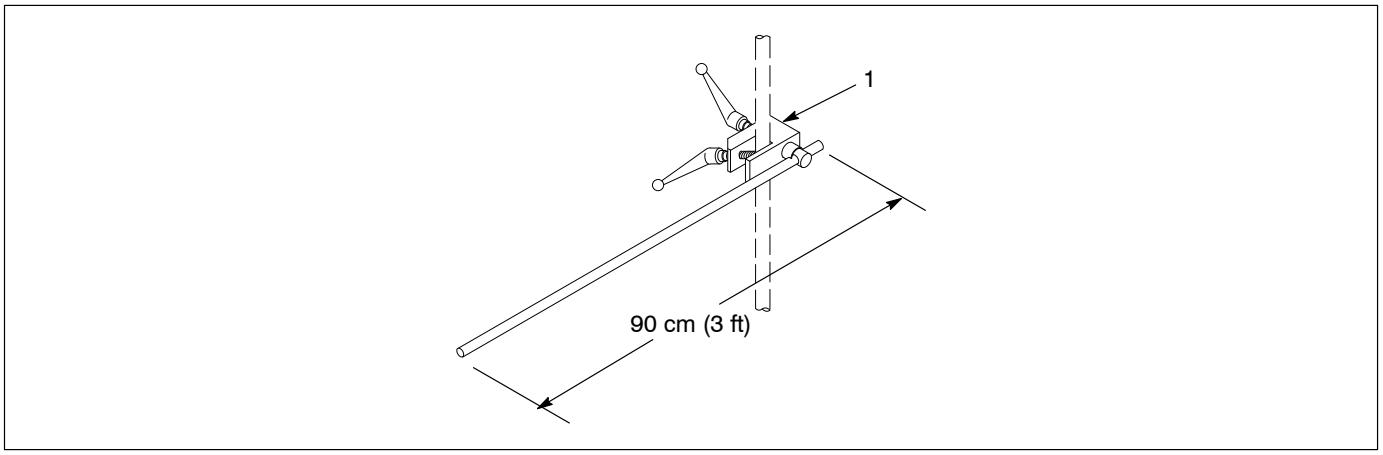

Fig. 7-9 Gun Mounting Bar

Shorting Plug

See Figure 7-10.

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

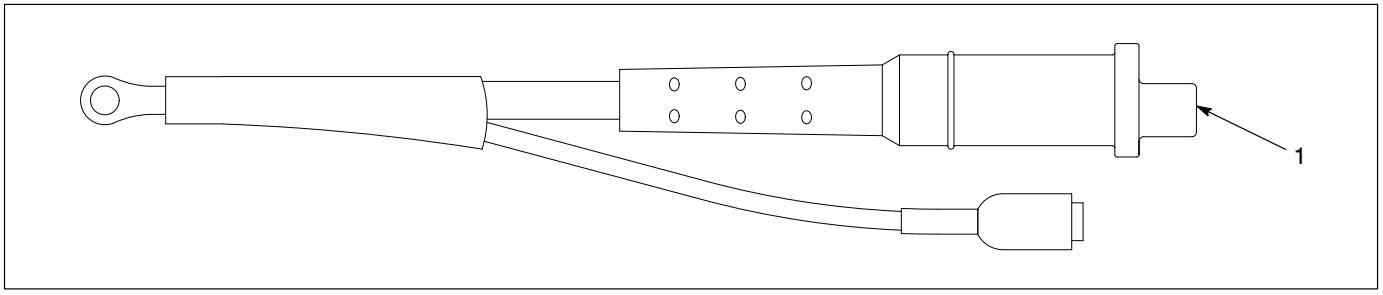

Fig. 7-10 Shorting Plug

Powder Feed Tubing

Part	Description	Note
900 549	Tubing, powder, 0.375 in. ID, black	A, B
900 550	Tubing, powder, 0.500 in. ID, black	A, B
900 649	Tubing, powder, 0.375 in. ID, blue	A, C
900 648	Tubing, powder, 0.440 in. ID, blue	A, C
900 650	Tubing, powder, 0.500 in. ID, blue	A,C

NOTE A: Bulk part numbers. Order in one-foot increments.
B: For organic powders.
C: For metallic and most organic powders.

Purge Adapter Kit

See Figure 7-11. 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 $^1/_4$-in. air tubing are not included. Refer to the *Versa-Spray Purge Adapter Kits* manual, shipped with the purge adapter, for installation and operation instructions.

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

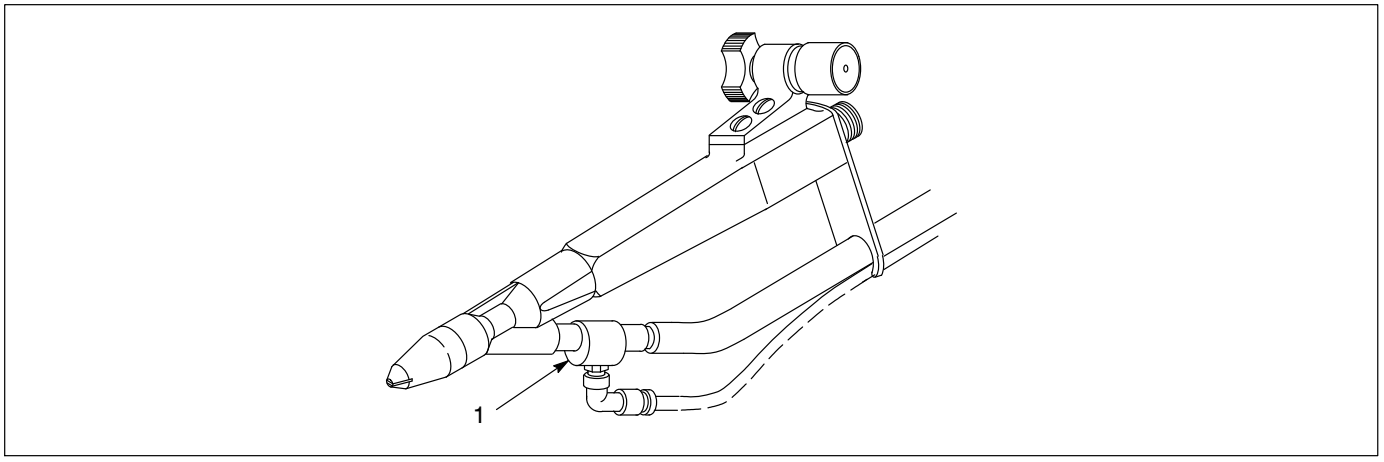

Fig. 7-11 Purge Adapter

Low-Flow Hose Adapter for Purge Adapter

See Figure 7-12. 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, low-flow	1	

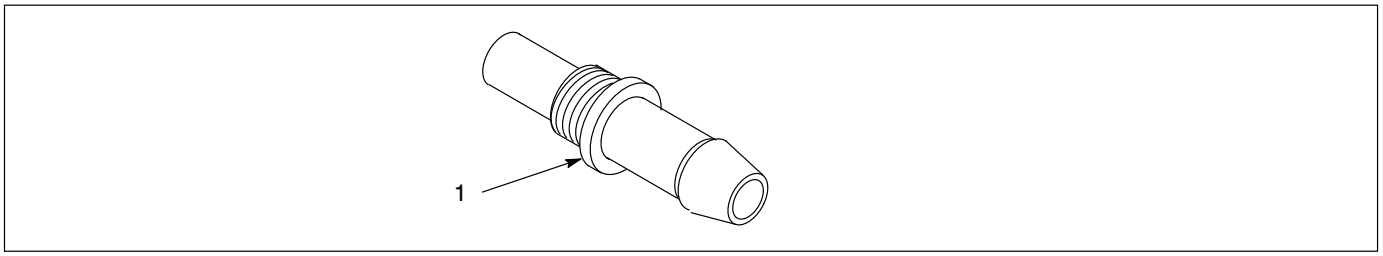

Fig. 7-12 Low-Flow Hose Adapter for Purge Adapters