

# **Trilogy™ Manual Electrostatic Air Spray/HVLP Solventborne Spray Gun**

Customer Product Manual  
Part 1093591-02

Issued 6/19

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

This document is subject to change without notice.  
Check <http://emanuals.nordson.com> for the latest version.



NORDSON CORPORATION • AMHERST, OHIO • USA

---

**Contact Us**

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

Address all correspondence to:

Nordson Corporation  
Attn: Customer Service  
555 Jackson Street  
Amherst, OH 44001

**Notice**

This is a Nordson Corporation publication which is protected by copyright. Original copyright date 2009. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Nordson Corporation. The information contained in this publication is subject to change without notice.

**Trademarks**

Trilogy, Nordson and the Nordson logo are registered trademarks of Nordson Corporation.

Loctite is a registered trademark of Loctite Corporation.

MagnaLube is a registered trademark of General Magnaplate Corporation.

Viton is a registered trademark of DuPont Performance Elastomers. L.L.C.

All other trademarks are the property of their respective owners.

# Table of Contents

<b>Safety</b> .....	<b>1-1</b>
Introduction .....	1-1
Qualified Personnel .....	1-1
Intended Use .....	1-1
Regulations and Approvals .....	1-1
Personal Safety .....	1-2
High-Pressure Fluids .....	1-3
Fire Safety .....	1-4
Halogenated Hydrocarbon Solvent Hazards .....	1-4
Action in the Event of a Malfunction .....	1-5
Disposal .....	1-5
Safety Label .....	1-5
 <b>Description</b> .....	 <b>2-1</b>
Introduction .....	2-1
Spray Gun Features .....	2-2
Spray Technology .....	2-2
Options .....	2-2
Coating Materials .....	2-2
Theory of Operation .....	2-3
Trigger Lock .....	2-3
Electrostatic Charge .....	2-3
Fluid Flow .....	2-3
Air Flow .....	2-5
Specifications .....	2-5
Dimensions .....	2-5
Weight .....	2-5
Operating Pressures .....	2-5
Electrostatics .....	2-6
Spray Gun Fitting Sizes .....	2-6
Optional Air Hoses .....	2-6
Approvals .....	2-6
 <b>Installation</b> .....	 <b>3-1</b>
Preparation .....	3-1
Typical Air Spray and HVLP System .....	3-2
Air and Fluid Hose Connections .....	3-3
Air Hose Selection and Connection .....	3-3
Fluid Hose Selection and Connection .....	3-3
Fluid Hose Connection .....	3-3
Gun Cable Connection .....	3-4
Securing Hoses and Cables .....	3-5
Fluid Tip and Air Cap Installation .....	3-5

<b>Operation</b>	<b>4-1</b>
Introduction	4-1
System Startup	4-2
Spray Adjustments	4-3
Fluid Pressure and Flow Rate Adjustments	4-3
Spray Pattern and Atomization Adjustments	4-3
Fluid Tips and Air Caps	4-4
Shutdown	4-5
Short-Term Shutdown	4-5
Long-Term Shutdown	4-5
Multi-Component Coatings	4-5
Needle Travel Adjustment	4-6
HVLP Performance Testing	4-6
HVLP Compliance Test	4-6
 <b>Maintenance</b>	 <b>5-1</b>
Introduction	5-1
Daily	5-1
Periodically	5-2
System Flushing	5-3
Spray Gun Cleaning	5-3
Routine Cleaning	5-3
Extensive Cleaning	5-4
Electrostatic System Checks	5-4
 <b>Troubleshooting</b>	 <b>6-1</b>
Introduction	6-1
Common Problems	6-2
Spray Pattern/Film Build Troubleshooting	6-4
Electrostatic Troubleshooting	6-6
Multiplier and Needle Continuity and Resistance Check	6-7
Gun Cable Continuity Check	6-8
 <b>Repair</b>	 <b>7-1</b>
Tools/Supplies Required	7-2
Air Cap, Fluid Tip, and Needle Replacement	7-3
Trigger Lock Replacement	7-4
Repair Preparation	7-4
Packing Cartridge Replacement	7-5
Removing the Extension	7-5
Removing the Packing Cartridge	7-6
Packing Cartridge Installation	7-7
Needle Travel Adjustment	7-8
Extension Installation	7-9
Cable and Air Inlet Fitting Replacement	7-10
Handle Cover Removal	7-10
Cable and Fitting Replacement	7-10
Cable and Handle Cover Installation	7-10
Air Valve Repair	7-12
Horn Air Valve Repair	7-14
Multiplier Replacement	7-14
Multiplier Removal	7-14
Fluid Tube Replacement	7-16
Service Notes	7-18

---

<b>Parts</b> .....	<b>8-1</b>
Introduction .....	8-1
Spray Gun Parts .....	8-1
Repair Kits .....	8-4
Air Seal .....	8-4
Air Valve .....	8-4
Trigger Lock .....	8-4
Needle Kit .....	8-4
Ferrule Kit .....	8-4
Recommended Spare Parts .....	8-5
Options .....	8-5
Air Caps and Fluid Tips .....	8-5
Adhesives, Sealants, and Lubricants .....	8-5
Cable Extension .....	8-6
Fluid and Air Hoses and Fittings .....	8-6
HVLP Compliance Kit .....	8-6



# *Section 1*

## **Safety**

### **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 persons operating or servicing equipment.

### **Qualified Personnel**

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

### **Intended Use**

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

Some examples of unintended use of equipment include

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

### **Regulations and Approvals**

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

## Personal Safety

To prevent injury follow these instructions.

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



## High-Pressure Fluids

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

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

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



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

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

### MEDICAL ALERT—AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

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

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

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

## Fire Safety

To avoid a fire or explosion, follow these instructions.

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

### ***Halogenated Hydrocarbon Solvent Hazards***

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

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

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

## Action in the Event of a Malfunction

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

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





## Disposal

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

## Safety Label

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

Symbol	Description
	<b>WARNING:</b> Allow only qualified personnel to use this equipment. Observe and follow all safety instructions for this equipment.
	<b>WARNING:</b> Risk of explosion or fire. Fire, open flames, and smoking prohibited.
	<b>WARNING:</b> Do not point the spray gun at any part of your body or at anyone else. Do not operate the fluid delivery system if any component is leaking. Failure to observe this warning could result in an injection injury.
	<b>WARNING:</b> Risk of electrical shock. Disconnect and lockout input power to equipment before servicing. Failure to observe this warning may result in personal injury or death.



## Section 2

# Description

## Introduction

See Figure 2-1.

The Trilogy manual electrostatic air spray/HVLP solventborne spray gun is designed for use with solventborne coating materials. It has an internal user-replaceable voltage multiplier that generates the high voltage used to electrostatically charge the coating materials as they are sprayed from the gun. Electrostatic output voltage and air pressure are controlled by an IPS-20 manual control unit.

The spray gun is non-circulating and can be used with heated and unheated non-circulating spray systems. For systems that require circulation, a circulation fitting can be coupled to the fluid inlet fitting. Refer to the *Parts* section for ordering information.

HVLP and air spray systems use low-pressure fluid sources, such as pressure pots, diaphragm pumps, or low-ratio piston pumps. They are commonly used to apply low to medium viscosity fluids to products requiring a high-quality finish.

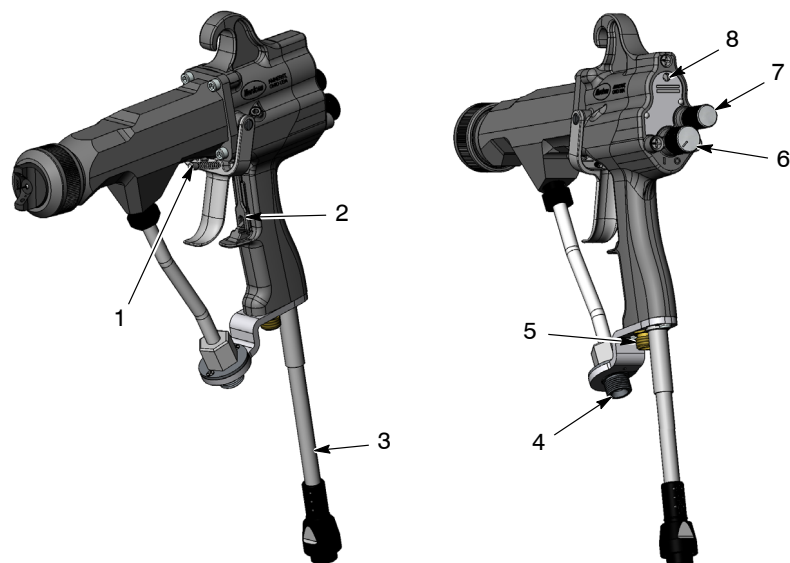


Figure 2-1 Trilogy Air Spray/HVLP Manual Electrostatic Spray Gun

- |                               |                            |
|-------------------------------|----------------------------|
| 1. Fluid flow adjust knob     | 5. Air fitting 1/4 in. NPS |
| 2. Trigger lock               | 6. kV switch               |
| 3. Gun cable                  | 7. Horn air adjust knob    |
| 4. Fluid fitting 3/8 in. NPSM | 8. kV LED                  |

## ***Spray Gun Features***

The Trilogy spray gun features:

- adjustable horn air pressure and fluid flow rate
- large air passages for higher air energy
- user-replaceable voltage multiplier
- bellows-type packing cartridge

## ***Spray Technology***

The fluid tip and air cap you choose to use determines the spray gun technology: air spray or HVLP.

**HVLP technology** creates a soft spray with high transfer efficiency, reducing emissions of volatile organic compounds (VOCs). HVLP spray guns use high volumes of very low pressure pattern control (horn) and atomizing air (less than 0.69 bar (10 psi)). The high volume of pattern control air provides sufficient energy to shape the pattern of sprayed fluids. The low atomizing air pressure reduces fluid bounceback and overspray, which improves transfer efficiency.

HVLP atomization is typically coarser than air spray when used with high-viscosity fluids and high flow rates.

**Air spray technology** atomizes material at higher air pressures and lower air flows than HVLP spray guns. Air spray guns produce a very fine, atomized mist. This makes them useful for extremely fine finishing work.

## ***Options***

Options include a variety of fluid tips and air caps, air and fluid hoses, fittings, and a cable extension. HVLP compliance kits are available for each HVLP air cap.

## ***Coating Materials***

The spray gun is compatible with a wide variety of solventborne coating materials including

- general solvent-based
- metallics
- high-solids
- multi-component
- ultra-violet coating

**NOTE:** The seals installed in the spray gun are compatible with most coatings. If the coating material you use damages the seals, contact your Nordson Corporation representative for compatible replacements.

# Theory of Operation

See Figure 2-2.

## ***Trigger Lock***

The gun includes a trigger lock (11) to prevent accidental triggering of the spray gun and possible injection injuries.

## ***Electrostatic Charge***

When the spray gun trigger is pulled, air flows through the control unit airflow switch and gun. The airflow switch closes a circuit and allows the gun control unit to deliver 0–21 Vdc through a cable (8) to the voltage multiplier (3) housed in the extension (4) of the spray gun. The voltage multiplier generates high voltage which creates a corona discharge around the gun electrode (1) and an electrostatic field from the electrode to the grounded parts. The voltage LED (5) at the back of the gun lights when the voltage multiplier is turned on.

The kV switch (6) at the back of the gun turns the voltage multiplier off and on at the gun. This allows the operator to turn off the high voltage and eliminate the Faraday cage effect when coating parts with deep recesses.

Resistors within the multiplier limit the output current of the voltage multiplier to safe levels. The high voltage electrostatically charges the coating material as it is sprayed. The charged coating material is attracted to the grounded parts.

## ***Fluid Flow***

Fluid enters the spray gun through a fluid supply hose (10) attached to the extension and flows past the packing cartridge to the fluid tip (2). When the trigger (12) is pulled it pulls the needle (15) off its seat in the fluid tip, allowing fluid to flow out of the gun. The fluid control knob (13) controls how far the needle is pulled off the seat, which determines fluid flow through the fluid tip.

**NOTE:** If you are regulating fluid flow and pressure with an external fluid regulator, the fluid control knob should be adjusted to allow full trigger travel and fluid flow.

The packing cartridge (14) prevents fluid from flowing past it into the handle. The fluid flow is dead-ended at the spray gun when the trigger is released.

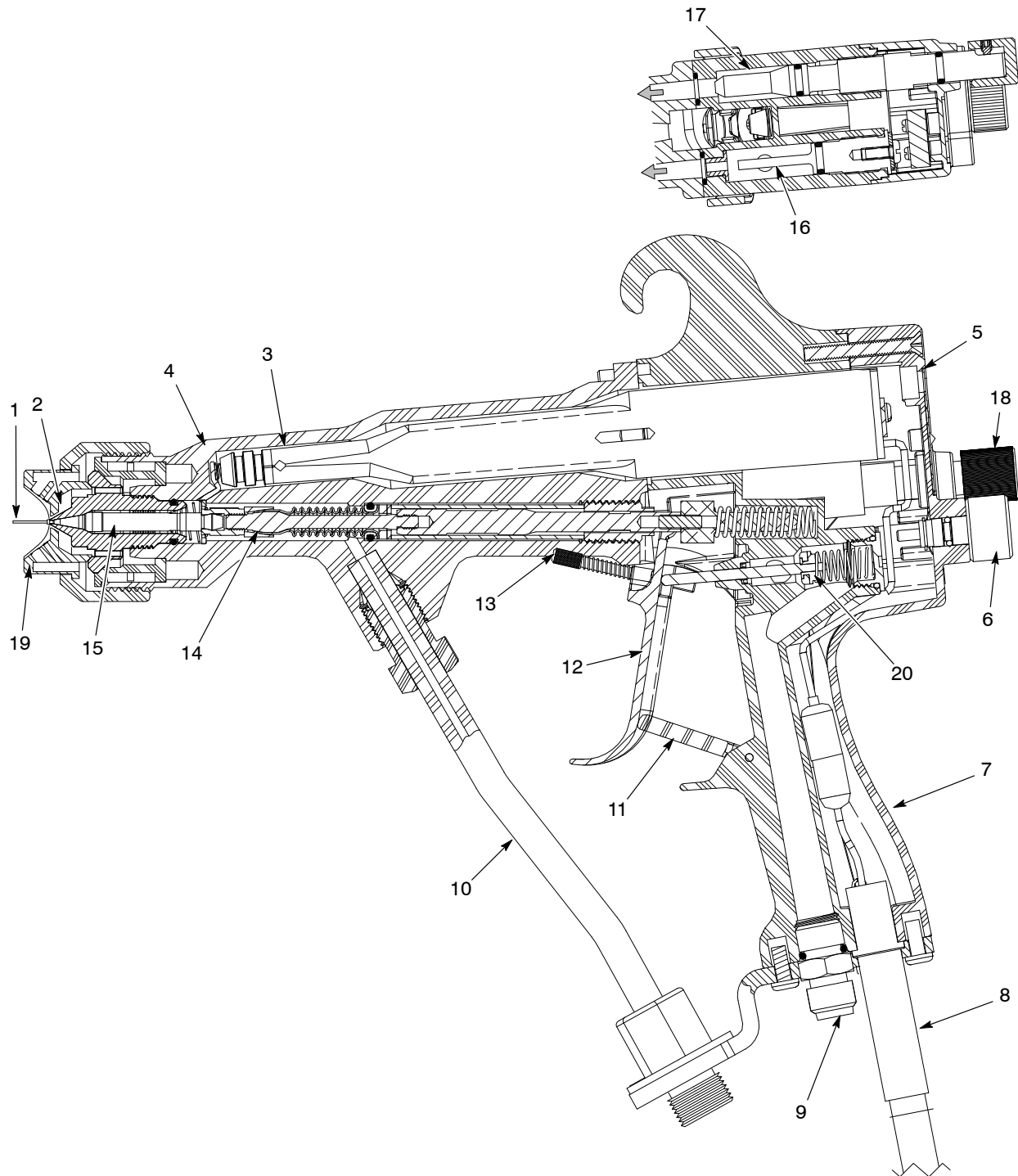


Figure 2-2 Spray Gun Components and Operation

- |                |                                   |                          |
|----------------|-----------------------------------|--------------------------|
| 1. Electrode   | 8. Gun cable                      | 15. Needle               |
| 2. Fluid tip   | 9. Atomization and horn air inlet | 16. Heat sink            |
| 3. Multiplier  | 10. Fluid tube                    | 17. Horn air valve       |
| 4. Extension   | 11. Trigger lock                  | 18. Horn air adjust knob |
| 5. Voltage LED | 12. Trigger                       | 19. Air cap              |
| 6. kV switch   | 13. Fluid control knob            | 20. Air valve            |
| 7. Handle      | 14. Packing cartridge             |                          |



## Air Flow

The atomization and horn air enter through the inlet fitting (9) in the spray gun handle (7).

Pulling the trigger opens the air valve (20), allowing air to flow through the atomization and horn air passages to the air cap. The air flow triggers a pressure switch attached to the control unit, which turns on power to the voltage multiplier in the spray gun.

Atomization air flows past the heat sink (16) and through the handle and extension to the air cap when the spray gun is triggered. The atomization air atomizes the coating material as it exits the nozzle. To control atomization, adjust the air pressure regulator that supplies the control unit and gun.

Horn air flows past the horn air valve (17) to the air cap (19) and shapes the spray pattern. The horn air flow is controlled by adjusting the valve with the adjust knob (18).

## Specifications

### Dimensions

Dimensions	Metric (cm)	English (in.)
Height	22.28	8.77
Length	30.48	12.00
Width	5.58	2.20
<b>NOTE:</b> The spray gun dimensions include the fluid and air fittings.		

### Weight

Weight	Metric (g)	English (oz)
Airspray/HVLP spray gun	887	31.3
<b>NOTE:</b> The spray gun weight includes the fluid and air fittings.		

### Operating Pressures

Operating Pressures	Metric	English
Maximum air input pressure	6.9 bar	100 psi
Maximum fluid input pressure	6.9 bar	100 psi
Maximum fluid temperature	82 °C	180 °F
<b>NOTE:</b> Supply air must be particulate free (5 microns maximum) and oil free. Use coalescing-type air filters.		

## ***Electrostatics***

Maximum voltage: 93 kV  
Maximum output rating current: 122 microamps

**NOTE:** Current draw greater than 50  $\mu$ A may affect spray pattern, transfer efficiency and finish. If the conductivity of your material causes excessive current draw, changing to a longer hose may be necessary.

Refer to *Fluid Hose Selection* in the *Installation* section.

## ***Spray Gun Fitting Sizes***

Spray Gun Standard Fitting Sizes	
Air fitting	1/4-in. NPS, Male
Fluid fitting	3/8-in. NPS, Male

## ***Optional Air Hoses***

Length	ID	Fittings
9.14, 15.24, 30.48 meter (30, 50, 100 ft.)	9.25 mm (3/8 in.)	1/4 in. NPS female fittings

## ***Approvals***

This spray gun has met the requirements for FM approval.

## 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.

## Preparation



**CAUTION:** Do not overtighten parts. Failure to observe this caution will result in equipment damage.

Fluid tips, air caps, and fluid and air hoses are not shipped with the spray gun. You must order them separately, based on your application. If you order a HVLP air cap, order the appropriate compliance kit also. You will need one compliance kit for each air cap size you use.

Compliance caps are used to verify compliance of non-electrostatic HVLP systems. Electrostatic guns are by themselves compliant spray technologies so it is not necessary to verify air cap compliance. Instead, you may want to use a compliance kit to make sure the air cap pressure is at optimum level.

Before installation,

- remove the spray gun, brushes, and tool kit from the box.
- make sure you have the appropriate fluid tip and air cap for your application.
- make sure you have air and fluid hoses of the correct length, ID, and materials.



**WARNING:** Risk of fire and/or electrical shock if the spray gun and system components are not properly grounded.

- make sure the system is properly grounded.

**NOTE:** Inadequately grounded parts will adversely affect transfer efficiency and coating quality.

## Typical Air Spray and HVLP System

Figure 3-1 shows the components of a typical air spray and HVLP system.

**NOTE:** Some components shown are optional. Make sure your system contains self-relieving shutoff valves for both air and fluid supply.

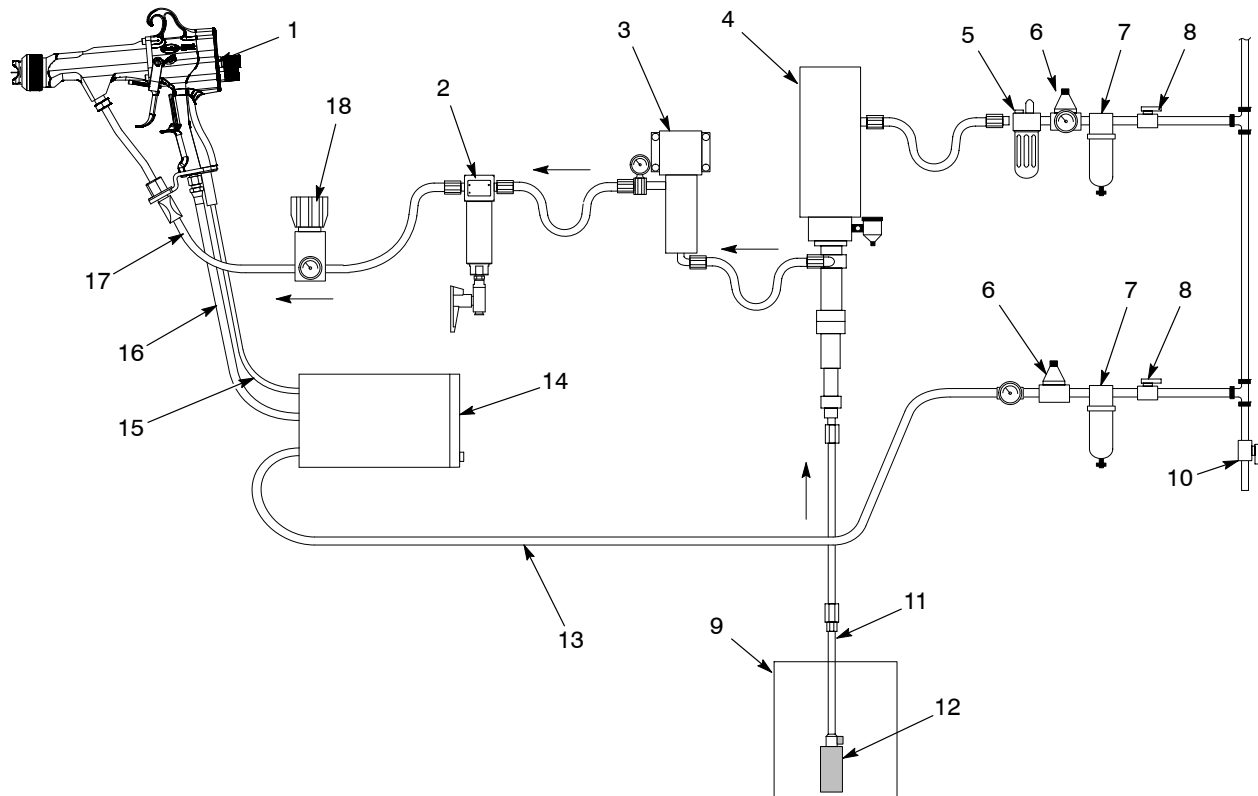


Figure 3-1 Typical Air Spray and HVLP System

- |                   |                                 |                              |
|-------------------|---------------------------------|------------------------------|
| 1. Spray gun      | 7. Air filter                   | 13. Air supply hose          |
| 2. Fluid filter   | 8. Self-relieving shutoff valve | 14. Control unit             |
| 3. Fluid heater   | 9. Fluid supply                 | 15. Gun cable                |
| 4. Pump           | 10. Drain valve                 | 16. Air hose                 |
| 5. Air lubricator | 11. Siphon rod                  | 17. Fluid hose               |
| 6. Air regulator  | 12. Siphon screen               | 18. Fluid pressure regulator |

## Air and Fluid Hose Connections

Spray gun fittings have the following thread sizes:

Air hose fitting:  $\frac{1}{4}$ -in. NPSM

Fluid fitting:  $\frac{3}{8}$ -in. NPSM

Refer to *Section 8, Parts*, for air and fluid hoses.

### Air Hose Selection and Connection

The air hoses supplying air to the spray gun should be a grounding type hose. Limit the number of restrictions in the air supply lines and hose to provide maximum air flow.

For optimum HVLP performance,  $\frac{3}{8}$ -in. ID hose is recommended, no longer than 9.14 m (30 ft).

1. Clean the air hose fittings with a clean, dry cloth.
2. See Figure 3-3. Connect the air hose from the air OUT fitting on the gun control unit to the  $\frac{1}{4}$ -in. NPSM fitting in the spray gun handle.

### Fluid Hose Selection and Connection



**WARNING:** The fluid hose must be a grounding-type hose, with continuity between fittings. Without a ground, a static charge could build up in the spray gun, resulting in shocks to the operator or sparking that could cause a fire. Resistance checks, from hose fitting to hose fitting, should be a part of your regular maintenance procedures.

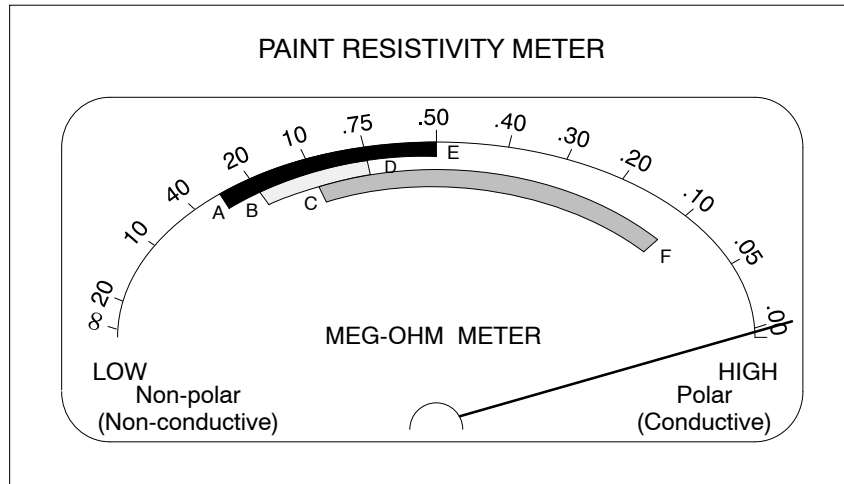
Current draw is an important consideration when selecting the fluid hose. The longer the hose and the smaller the ID, the lower the current draw. However, the longer the hose and the smaller the ID, the greater the pressure drop. There is a tradeoff between effective fluid isolation to reduce current draw and minimizing pressure drop to maintain adequate fluid flow rates.

Current draw through the fluid hose or fluid tube of 20  $\mu$ A or less should provide adequate charging of the coating material. Higher current draws may be acceptable if transfer efficiency and wrap are acceptable.

Figure 3-2 shows a paint resistivity meter and the optimum resistivity ranges of coatings for different types of electrostatic applications.

### Fluid Hose Connection

1. Clean the fluid hose or fluid tube fittings with a clean, dry cloth.
2. Connect the fluid hose(s) between the fluid-delivery system outlet and the  $\frac{3}{8}$ -in. NPSM straight fitting at the spray gun handle.



Legend:

- Best range for airspray electrostatic 0.5–3.0 range — A to E scale.
- Best range for airless and air-assisted airless electrostatic 0.75–2.0 range — B to D scale.
- Best range for rotary 0.10–1.0 range — C to F scale.

**NOTE:** Readings outside these ranges are often acceptable.

Figure 3-2 Resistivity Range for Coatings

## Gun Cable Connection

See Figure 3-3. Connect the gun cable plug (3) to the GUN OUTPUT receptacle (1) on the rear panel of the control unit. Refer to the gun control unit manual for installation and operation information.

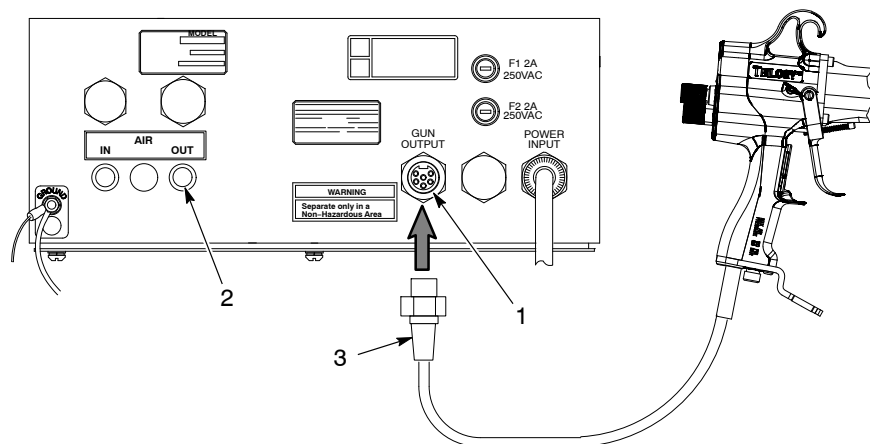


Figure 3-3 Gun Cable Connection

1. GUN OUTPUT receptacle
2. Air OUT fitting ( $\frac{1}{4}$  in. NPT)
3. Gun cable plug

## Securing Hoses and Cables

Bundle together the fluid and air hoses and gun cable where practical. Do the following to prevent wear and damage:

- Bundle the cable and hoses together with hook and loop tape, spiral-cut tubing, or similar devices.
- If you secure the cable and hoses to a stationary object at any point, make sure they can flex without strain.
- Keep the cable plugs and sockets clean and protected from contamination.
- Do not tie the cable or hoses to machine members in areas where the cable must move or stretch.
- Do not bend the cable around a radius of less than 15.24 cm (6 in.) at stationary points and 20.3 cm (8 in.) at flexing points.
- Do not allow the cable or hoses to become abraded by sharp corners such as booth edges.
- Do not walk on the cable and hoses or run over them with heavy objects.
- If desired, cover the spray gun body, hoses, and other equipment in the spray area with a grounded, conductive wrapping to keep them clean.

## Fluid Tip and Air Cap Installation



**WARNING:** Before removing and installing fluid tips and air caps, shut off the fluid delivery system and relieve the system pressure. Trigger the gun to ensure all pressure is relieved. Shut off the gun control unit and ground the spray gun electrode. Failure to observe this warning could result in personal injury.

See Figure 3-4.

1. Unscrew the retaining ring (6).
2. Lubricate the fluid tip O-ring (4) with MagnaLube-G or equivalent.



**CAUTION:** To prevent damage to the needle or fluid tip seat, pull and hold the trigger while removing or installing the fluid tip.

3. Pull the trigger to retract the needle (1).
4. Install the fluid tip over the needle and screw it into the extension with the combination tool. Tighten snugly but do not overtighten. Do not bend the electrode (2).



**CAUTION:** Tightening the fluid tip beyond snug does not prevent or eliminate fluid leaks. If coating material leaks around the fluid tip replace the O-ring.

5. Install the air cap (5) into the retaining ring and thread the retaining ring (6) onto the extension. Make sure the air cap is centered on the fluid tip. Hold the air cap in the desired position and tighten the retaining ring until it is snug. Do not overtighten the retaining ring.

**NOTE:** 991 and 992 air spray air caps are shipped permanently installed into retaining rings. These retaining rings cannot be used with the 985–988 air spray air caps, which use the standard retaining ring shipped with the spray gun.

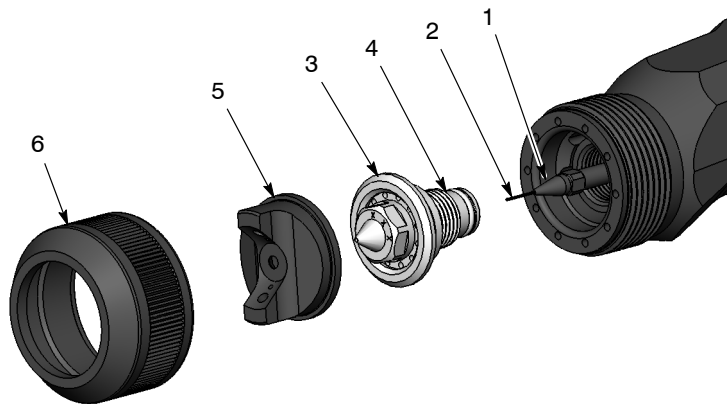


Figure 3-4 Fluid Tip and Air Cap Installation

- |              |                     |
|--------------|---------------------|
| 1. Needle    | 4. Fluid tip O-ring |
| 2. Electrode | 5. Air cap          |
| 3. Fluid tip | 6. Retaining ring   |



## 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.

## Introduction



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



**WARNING:** Do not exceed the maximum fluid pressure rating of 6.9 bar (100 psi). Failure to follow this warning may result in personal injury or death.



**WARNING:** Engage the trigger lock whenever you are not spraying to prevent accidental triggering of the spray gun and possible injection injuries. Failure to observe this warning may result in injury.



**WARNING:** Ground all electrically conductive equipment. Ungrounded conductive equipment can store a static charge, which could ignite a fire or cause an explosion if a hot spark is discharged. Wear shoes with conductive soles or use grounding straps to maintain a connection to ground when working with or around electrostatic equipment.

**NOTE:** Read this entire section before operating the spray gun.

Before operating the spray gun, make sure that

- the fluid tip is securely tightened and the air cap is correctly installed and secured with the retaining ring.
- all fluid and air connections are secure and leak-free. The fluid hose is grounded.
- all air supply and fluid-delivery components are correctly installed. All conductive system components and flammable material containers are securely connected to a true earth ground.
- the operator station and spray area are clean and free of debris.

## System Startup



**WARNING:** Never operate the spray gun with a worn or damaged trigger lock. Failure to observe this warning may result in injury.

**NOTE:** When starting a new spray system for the first time, flush the fluid delivery system, hose, and spray gun with a solvent compatible with the coating material to remove contaminants from the system. Remove the air cap from the spray gun before flushing the spray gun with solvent.

1. Turn on the spray booth exhaust fans.
2. Supply compressed air to the gun control unit. Do not exceed 6.9 bar (100 psi).
3. Start the fluid delivery system pump and pressurize the system. Do not exceed 6.9 bar (100 psi).
4. Turn on the fluid heater(s), if used. Do not exceed 82 °C (180 °F).
5. Check the fluid-delivery system for leaks. Do not operate the system if any leaks are present.
6. Adjust the fluid and air pressures to achieve optimum atomization and desired pattern width. Refer to *Spray Pattern and Atomization Adjustments* on page 4-3.
7. Turn the kV switch on the back of the gun to ON (I). Turn ON the gun control unit.
8. Unlock the trigger, point the spray gun into the booth, and trigger the spray gun. Make sure the red kV LED on the back of the gun turns on to indicate that kV is on.

If kV is off, make sure the control unit is turned on and the kV switch at the back of the gun is turned to the ON (I) position. If the kV voltage indicator is flickering or is off, the air pressure supplied to the control unit may be inadequate to hold the air flow or pressure switch open. Increase the air pressure to the control unit.

9. Adjust the fluid pressure to obtain the desired atomization and spray pattern. Refer to *Spray Pattern and Atomization Adjustments* on page 4-3.
10. Use a Nordson kV meter to read the maximum kV output of the voltage multiplier. Record the kV output for each new spray gun and use this information and the values from *Electrostatic Troubleshooting* in *Section 6, Troubleshooting*, as a baseline when troubleshooting.

# Spray Adjustments

## *Fluid Pressure and Flow Rate Adjustments*

Shut off the air supply to the spray gun or control unit and check the fluid flow rate.

For optimum atomization, an appropriate fluid supply pressure should provide an unatomized fluid stream that breaks at a distance of 25.4–35.6 cm (10–14 in.) from the fluid tip. If the desired flow rate does not provide an acceptable fluid stream, install a larger fluid tip and adjust the fluid pressure until a break of 25.4–35.6 cm (10–14 in.) is achieved at the required flow rate.

**NOTE:** If you are using an external fluid pressure regulator to control fluid flow and pressure, set the fluid adjuster to allow full flow when the gun is triggered.

Use the fluid adjuster to make **small changes in flow rate**. If the flow rate is too high, loosen the jam nut and turn the fluid flow adjuster clockwise in small increments. This decreases needle travel and fluid flow.

For **larger flow rate changes**, adjust the fluid pressure or use the next smallest or largest fluid tip.

**For best results**, leave the fluid flow adjusted to allow full fluid flow. If you have to limit the stroke to less than half the needle travel, you are using too large a fluid tip.

**Always tighten the jam nut** after making adjustments to the fluid flow. If you do not tighten the jam nut, the trigger action will cause the fluid adjuster to rotate in the housing, changing the needle travel and flow rate.

## *Spray Pattern and Atomization Adjustments*

Obtaining the correct spray pattern, coating material atomization, and transfer efficiency for your application requires a combination of operator experience and experimentation. To obtain the best results, perform the following steps:



**WARNING:** Shut off the gun control unit and ground the spray gun electrode to remove any residual charge. Failure to observe this warning could result in personal injury.

1. Set the supply air pressure to the control unit and spray gun. If using HVLP air caps and fluid tips, the air pressure should be set to 0.69 bar (10 psi) or less.

## ***Spray Pattern and Atomization Adjustments*** (contd)

The air pressure controls both the atomization of the sprayed fluid and the spray pattern. Use the lowest possible air pressure to obtain proper atomization of the coating material. Increasing the air pressure provides finer atomization. Decreasing the air pressure provides coarser atomization. If using an HVLP air cap and fluid tip refer to *HVLP Performance Testing* on page 4-6.

2. Point the spray gun into the booth and trigger the spray gun.
3. Adjust the horn air pressure to achieve the desired spray pattern.

A higher pressure generates a wider and flatter fan pattern. Lowering the pressure decreases the pattern width and creates a rounder pattern.

4. Adjust the supply air pressure and horn air pressure until you achieve the desired atomization and spray pattern.

Increasing the horn air pressure decreases atomization air pressure, decreasing the horn air pressure increases the atomization air pressure. If necessary, adjust the fluid pressure at the fluid delivery systems. Use the lowest atomization air pressure possible along with the appropriate fluid pressure and flow rate to ensure maximum transfer rates and highest quality finishes.

5. **If you are using a HVLP air cap and fluid tip:** Test for optimum HVLP performance. Both atomizing and horn air pressures should be 0.69 bar (10 psi) or less for optimum transfer efficiency. Refer to *HVLP Performance Testing* on page 4-6.

## ***Fluid Tips and Air Caps***



**CAUTION:** To prevent damage to the needle or fluid tip seat, pull and hold the trigger while removing or installing the fluid tip.

Different combinations of fluid tips and air caps can improve atomization and spray patterns with various coating materials and viscosities. If the fluid flow and air adjustments described previously do not produce the desired results, try a different combination of fluid tip and air cap.

A full range of airspray and HVLP fluid tips and air caps are available. Refer to the *Trilogy Air Spray* or *HVLP Air Caps and Fluid Tips* selection charts included with this manual.

Refer to *Section 3, Installation*, for air cap and fluid tip installation instructions.

# Shutdown



**WARNING:** Shut off the gun control unit and ground the spray gun electrode to remove any residual charge. Failure to observe this warning could result in personal injury.



**WARNING:** Shut off the fluid-delivery system and relieve the fluid pressure in the system before disconnecting any fluid connections or performing any maintenance and repair procedures. Failure to observe this warning could result in personal injury.

## Short-Term Shutdown

For short-term breaks in production, no shutdown procedures are necessary. Release and lock the trigger and wipe the air cap and fluid tip with a clean cloth dampened with a compatible solvent.

## Long-Term Shutdown

1. Shut off the gun control unit and ground the spray gun electrode.
2. Shut off the air supply to the control unit and gun.
3. Flush the fluid-delivery system, fluid hose(s), and spray gun with a compatible solvent.

**NOTE:** Refer to the *System Flushing* on page 5-3 for recommended flushing and cleaning procedures.

4. Relieve system fluid pressure.
5. Trigger the spray gun into a waste container to relieve fluid pressure.
6. Remove the air cap and fluid tip and clean them as described in *Section 5, Maintenance*.

## Multi-Component Coatings



**CAUTION:** Leaving the coating material in the spray gun longer than the indicated pot-life may clog the spray gun and require disassembly and replacement of major spray gun components.

Refer to the coating material pot-life information to determine the proper shutdown procedures.

## Needle Travel Adjustment

The needle travel is set at the factory. If for some reason the needle travel needs to be adjusted, refer to *Packing Cartridge Replacement* in the Repair section. You must remove the trigger and extension to check and adjust the needle travel. Slide calipers are required to check the adjustment.

## HVLP Performance Testing

To maintain optimum HVLP performance, both atomizing and horn air pressures should be 0.69 bar (10 psi) or less. Each HVLP air cap has a corresponding HVLP compliance kit that consists of a modified air cap, air tubing, and pressure gauges. Kits must be ordered separately for each type of air cap. Refer to the *Trilogy HVLP and Air Spray Fluid Tip and Aircap Selection Charts* included with this manual for part numbers.

**NOTE:** The 0.69 bar (10 psi) limit is for reference only. Many coating materials can be atomized using less pressure. Lower pressures will result in a softer pattern which, as long as the coating material is adequately atomized, provides better transfer efficiency.

After making an air pressure setting, perform a HVLP compliance test.

### *HVLP Compliance Test*



**WARNING:** Shut off the fluid-delivery system and relieve system fluid pressure before performing a compliance test. Failure to observe this warning could result in personal injury.

**NOTE:** Use this procedure to adjust air cap performance in order to achieve optimum transfer efficiencies. It is acceptable to exceed pressure limits. The lower the air pressure, the softer the spray.

See Figure 4-1.

1. Turn off the control unit and ground the spray gun electrode.
2. Shut off the fluid-delivery system and relieve the fluid pressure.
3. Remove the production air cap and retaining ring and replace them with the compliance kit air cap (4) and retaining ring (1).
4. Trigger the spray gun to fully open the air valve.
5. Check the air pressure gauges (2, 3). Both atomization and horn pressures should be 0.69 bar (10 psi) or less.

6. If the atomization pressure exceeds 0.69 bar (10 psi), reduce the regulated air supply pressure and check the atomization quality.
7. If the horn air pressure exceeds 0.69 bar (10 psi), do one of these:
  - turn the horn air valve clockwise to reduce the pressure. This will automatically increase the atomization air pressure.
  - reduce the supply air pressure. This will automatically lower both the atomization and horn air pressures.
8. Install the production air cap and check the fluid atomization.

**NOTE:** You can check the atomization quality with the compliance cap installed. Make sure the gauge tubing is not crimped or interfering with the spray pattern.

9. If atomization quality is unacceptable, install the next size larger air cap or increase the air pressure above the optimum level.

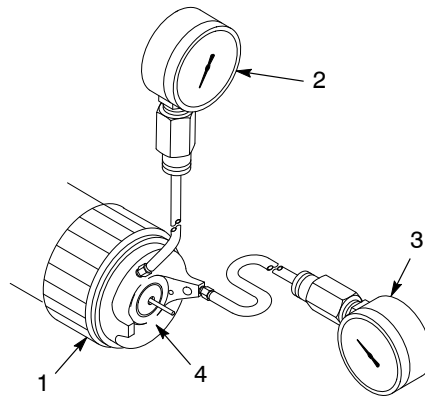


Figure 4-1 Using the HVLP Compliance Kit

- |                          |                       |
|--------------------------|-----------------------|
| 1. Retaining ring        | 3. Horn air gauge     |
| 2. Atomization air gauge | 4. Compliance air cap |





## Section 5

# Maintenance



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

## Introduction

The spray gun requires very little routine maintenance beyond cleaning. For best results, keep the spray gun as clean as practical.

## Daily

Perform the following procedure at the end of each work shift:



**WARNING:** Shut off the gun control unit and ground the spray gun electrode to remove any residual charge. Failure to observe this warning could result in personal injury.



**WARNING:** Shut down the fluid delivery system and relieve all fluid and air pressures before performing these procedures. Failure to observe this warning could result in injury.

1. Turn off the gun control unit and ground the spray gun electrode.
2. Shut off the air supply to the gun control unit.
3. Flush the fluid delivery system, fluid hose, and spray gun with a compatible solvent.
4. Shut down the fluid delivery system and relieve all fluid and air pressures.
5. Trigger the gun into the booth or a grounded waste container to relieve any residual pressure. Lock the trigger.



**CAUTION:** Trigger the spray gun to pull the needle out of the seat before removing the fluid tip. This will prevent damage to the needle and the seat.

6. Remove the air cap and fluid tip.

## Daily *(contd)*



**CAUTION:** Use a non-conductive solvent compatible with your coating material. Cleaning with conductive solvents can result in loss of kV, carbon tracking, and permanent damage to spray gun components.



**CAUTION:** Use only a Nordson cleaning brush to clean the fluid tip and air cap. Using metal tools will damage the fluid tip and air cap causing faulty spray patterns.



**CAUTION:** Avoid cleaning the spray gun with pressurized solvents. Pressurized solvents can penetrate into spray gun cavities, potentially damaging spray gun components.

7. Remove the O-ring from the fluid tip. Soak the fluid tip and air cap in a suitable non-conductive solvent to dissolve any accumulated coatings, then use the brush included with the spray gun to clean them.
8. Clean the spray gun with a clean cloth dampened with non-conductive solvent. Do not soak the spray gun in solvent.
9. Blow the fluid tip, air cap, and spray gun dry with an OSHA-approved blowgun.
10. Replace the O-ring on the fluid tip. Lubricate the O-ring with O-ring grease.

## Periodically

Periodically perform the following maintenance procedures on the spray gun. The frequency of these procedures will vary depending on the application and coating material being used.



**WARNING:** Shut off the gun control unit and ground the spray gun electrode to remove any residual charge. Failure to observe this warning could result in personal injury.



**WARNING:** Shut down the air supply and fluid delivery system and relieve all fluid and air pressures before performing these procedures. Failure to observe this warning could result in injury.



**CAUTION:** Use a non-conductive solvent compatible with your coating material. Cleaning with conductive solvents can result in carbon tracking and loss of kV.



**CAUTION:** Avoid cleaning the spray gun with pressurized solvents. Pressurized solvents can penetrate into spray gun cavities, potentially damaging spray gun components.

## System Flushing

1. Turn off the coating material delivery system and relieve the fluid pressure.
2. Turn off the gun control unit and ground the spray gun electrode to remove any residual charge.
3. Point the spray gun down into a grounded waste container. Trigger the spray gun to drain the spray gun and hose(s). Lock the trigger.
4. Remove the retaining ring and air cap.
5. Turn on the solvent supply and adjust it to the lowest possible pressure.
6. Unlock the trigger and trigger the gun into a suitably grounded container. Allow solvent to flow until it runs clear.
7. Turn off the solvent supply and relieve the pressure. Disconnect the fluid hose(s).

## Spray Gun Cleaning



**CAUTION:** Use a non-conductive solvent compatible with your coating material. Cleaning with conductive solvents can result in carbon tracking and loss of kV.



**CAUTION:** Do not clean the multiplier or gun cable with solvent. Failure to observe this caution could result in equipment damage.



**CAUTION:** Use only a Nordson cleaning brush to clean the fluid tip and air cap. Using metal tools will damage the fluid tip and air cap causing faulty spray patterns.

## Routine Cleaning

**NOTE:** Trigger the spray gun to pull the needle out of the seat before removing the fluid tip. This will prevent damage to the needle and the seat.

1. Remove the air cap and fluid tip.
2. Disconnect the air and fluid hoses.
3. Point the spray gun down and clean the front of the spray gun with a soft-bristled brush dampened with a compatible cleaning solvent.

**NOTE:** Pointing the spray gun down at a slight angle will prevent solvents from entering the air passages and possibly damaging the air seals. The air seals are not universally compatible with all solvents and can be damaged by them.

## **Spray Gun Cleaning** (contd)

4. Dampen a soft cloth with a compatible cleaning solvent. Point the spray gun downward and clean the exterior.

**NOTE:** Take special care when cleaning the spray gun handle with solvents. Using excessive amounts of solvent can allow solvent to leak into the spray gun and damage the multiplier. If the handle requires extensive cleaning, remove the multiplier. Refer to *Multiplier Replacement* in *Section 6, Repair* to remove the multiplier.

5. Clean the fluid tip, air cap, and retaining ring with a soft-bristled brush and a compatible solvent. Remove the O-ring and soak the fluid tip in solvent if necessary.
6. Trigger the gun to retract the needle, then install the fluid tip on the gun. Install the air cap and retaining ring.
7. Connect the air and fluid hoses.

### **Extensive Cleaning**



**CAUTION:** Never soak or vigorously clean the spray gun with the multiplier installed.

For more extensive cleaning, disassemble the spray gun and clean each part. Once disassembled, the extension and handle can be soaked in solvent and scrubbed. Remove all seals before soaking any parts in solvent.

**NOTE:** Allow parts that have been soaked or heavily washed in solvent to dry thoroughly (overnight) before assembling and reusing the spray gun.

## **Electrostatic System Checks**

Use a Nordson non-loading kV meter to check the voltage multiplier output and a megohmmeter to check the spray gun resistances. The checks ensure that the operator, spray gun, and all conductive material within the spray area are connected to a true earth ground. Proper grounding is essential for efficient operation and prevention of a buildup of an electrostatic charge that could discharge and ignite combustible material within the spray area.

Make sure the spray gun has and maintains the proper resistance values. Proper resistance values are important to keeping the system within the designed current outputs. The resistance values may vary over a period of time due to conditions such as a buildup of residue in the spray area or the degradation of components that have been exposed to high voltages.

## Section 6

# Troubleshooting



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

## Introduction



**WARNING:** Shut off the gun control unit and ground the spray gun electrode to remove any residual charge. Failure to observe this warning could result in personal injury.

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.

This section contains troubleshooting procedures for

- common spray gun problems;
- spray pattern and film-build faults; and
- electrostatics.

When multiple causes exist for a problem, they are listed in order of importance.

## Common Problems

Problem	Possible Cause	Corrective Action
<b>1. Spray gun spitting</b>	Clogged or damaged needle or fluid tip	Clean or replace the needle and/or fluid tip.
	Partially plugged or dirty air cap	Clean the air cap.
	Air bubbles in fluid stream	Bleed air from the fluid delivery system; check for leaks in the fluid delivery system or excessive agitation in the fluid reservoir.
	Fluid pressure too low	Increase the fluid pressure.
<b>2. Air leaks</b>	Foreign matter on air valve or worn air valve	Remove and clean the air valve and its seals. Replace the air valve if it is worn or damaged.
	Worn or damaged air seal O-rings or other air seals	Replace the air seal O-rings or other seals.
<b>3. Fluid leaking from front of spray gun</b>	Worn or damaged fluid tip O-ring	Replace the fluid tip O-ring.
	Worn or damaged needle or seat	Replace the fluid tip if the seat is damaged. Replace the needle if it is damaged.
<b>4. Fluid leaking from rear of extension</b>	Worn or damaged packing cartridge O-ring	Replace the O-ring.
	Worn or damaged packing cartridge	Replace the packing cartridge (packing cartridge cannot be repaired).
<b>5. Spray pattern not affected by horn air adjustments</b>	No air to spray gun	Supply air to the spray gun. Check for blockage in the air spray line. Adjust the supply air regulator.
	Atomization air pressure too high	Decrease the atomization air pressure.
	Plugged holes in air cap	Clean the air cap.
<b>6. Low or erratic fluid flow</b>	Fluid delivery system malfunction	Check the fluid delivery system (air and fluid).
	Blockage within spray gun, fluid hose, or fluid system	Flush the system. If necessary, repair or replace clogged or damaged components.
	Low fluid pressure	<b>WARNING:</b> Do not exceed the maximum fluid pressure rating of 6.9 bar (100 psi). Slowly increase the fluid pressure until the desired fluid flow is obtained.
	Fluid too viscous	Lower the viscosity by adding solvent or increasing the fluid temperature.
	Damaged fluid tip or air cap	Inspect the fluid tip and air cap; replace them if they are damaged.
Continued...		

Problem	Possible Cause	Corrective Action
<b>6. Low or erratic fluid flow</b> ( <i>contd</i> )	Needle has popped out of the packing cartridge	Remove the fluid tip and push the the needle into the packing cartridge. If the problem persists, make sure the operators are pulling the trigger before removing the fluid tip.
<b>7. Coarse spray</b>	Air pressure too low for fluid flow rate	Decrease the fluid flow rate or increase air pressure. Change the air cap and fluid tip.
	Fluid viscosity too high for atomizing air pressure	Increase the atomizing air pressure, use a larger air cap, or reduce fluid viscosity by either adding solvent or increasing fluid temperature.
	Damaged fluid tip or air cap	Inspect the fluid tip and air cap; replace them if they are damaged.
	Obstructed atomizing air orifice	Clean the air cap and exterior surface of fluid tip.
	Solvent evaporates too quickly	Use slower evaporating solvent. Contact your material supplier.
<b>8. Excessive overspray</b>	Atomization air pressure too high	Decrease the atomization air pressure.
	Fluid pressure too high	Use a larger fluid tip and reduce the fluid pressure.
<b>9. Excessive bounce back</b>	Air and fluid pressures too high	Decrease the pressures.
	Horn air pressure too high	Decrease the horn air pressure.
<b>10. Coating material is wrapping back onto gun</b>	Spray gun needs to be cleaned	Clean the spray gun. Refer to <i>Spray Gun Cleaning</i> on page 5-3. Use a gun cover.

## Spray Pattern/Film Build Troubleshooting

Figure 6-1 illustrates common spray pattern and film-build faults.

Problem	Possible Cause	Corrective Action
<b>1. Blown pattern (1)</b>	Horn air pressure too high	Decrease the horn air pressure.
	Fluid pressure too low	Increase the fluid pressure.
<b>2. Heavy top (3), bottom (2), left (4) or right (5) pattern</b>	Partially clogged air cap or fluid tip	Rotate the air cap and activate spray gun. If the problem persists, clean the air cap. If the problem still persists, clean the fluid tip or inspect the air cap and fluid tip for damage. Replace if necessary.
	Fluid viscosity incorrect	Change the fluid viscosity.
<b>3. Heavy center (6)</b>	Atomization or horn air pressure too low	Increase the atomization and horn air pressure.
	Fluid pressure too high	Decrease the fluid pressure.
	Fluid too viscous	Decrease the fluid viscosity.
<b>4. Spitting (7)</b>	Air in fluid line	Purge the air from the fluid delivery system.
	Atomization or horn pressure too low	Increase the atomization air and fluid pressure and/or increase the horn air pressure.
	Fluid too viscous	Decrease the fluid viscosity.
<b>5. Runs and sags</b>	Air in fluid line	Purge the air from the fluid-delivery system.
	Atomization air pressure too low	Increase the atomization air pressure and decrease fluid pressure.
	Fluid pressure too high	Increase the atomization air pressure and decrease fluid pressure.
	Spray gun too close to substrate	Move the spray gun farther from the substrate.
	Horn air pressure too low	Increase the horn air pressure.
	Fluid too viscous	Decrease the fluid viscosity.
<i>Continued...</i>		



Problem	Possible Cause	Corrective Action
<b>6. Dry spray</b>	Atomization or horn air pressure too high	Decrease the air supply pressure.
	Spray gun too far from the substrate	Move the spray gun closer to the substrate.
	Solvent evaporates too fast	Use a slower evaporating solvent. Contact your material supplier.
	Fluid viscosity incorrect	Change the fluid viscosity.
<b>7. Poor coverage in recesses</b>	Atomization air pressure too high	Decrease the atomization air pressure.
	Fluid pressure too high	Decrease the fluid pressure.
	Spray gun too far from the substrate	Move the spray gun closer to the substrate.

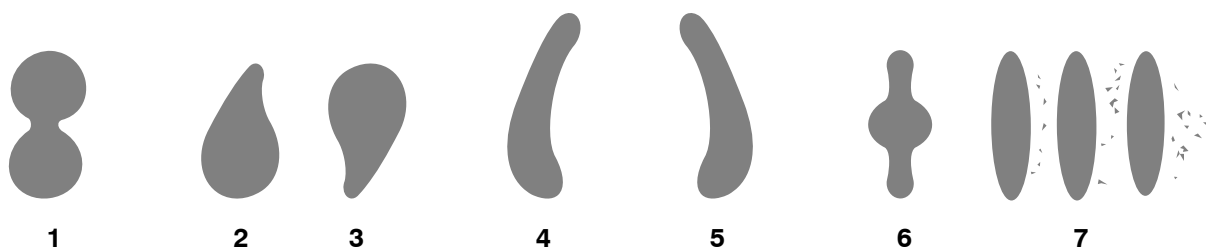


Figure 6-1 Common Spray Pattern Faults

- |                  |                     |                 |
|------------------|---------------------|-----------------|
| 1. Blown pattern | 4. Heavy left side  | 6. Heavy center |
| 2. Heavy bottom  | 5. Heavy right side | 7. Spitting     |
| 3. Heavy top     |                     |                 |

## Electrostatic Troubleshooting

Problem	Possible Cause	Corrective Action
<b>1. Loss of wrap, poor transfer efficiency</b>	Low electrostatic voltage	Increase the voltage.
	Resistor or multiplier failure	Check the multiplier and needle with a megohmmeter at 500 volts. The multiplier should measure 277–340 megohms. The needle should measure 18.8–22.8 megohms. If either is out of range replace the failed component. Refer to <i>Multiplier and Needle Continuity and Resistance Check</i> on page 6-7.
	Poorly grounded parts	Check conveyor chain, rollers, and part hangers for paint buildup. The resistance between the parts and the ground must be 1 megohm or less. 500 ohms or less is recommended for best results.
	Leaking packing cartridge	Check packing cartridge for leaks. Clean packing cartridge bore and install new packing cartridge and dielectric grease.
<b>2. No kV output from gun</b>	Damaged gun cable	Check the continuity of the cable from pin to pin. Replace the cable if any opens or shorts are found. Refer to <i>Gun Cable Continuity Check</i> on page 6-8.
	Malfunctioning voltage multiplier	Check the continuity and resistance of the multiplier/resistor assembly with a megohmmeter for 277–340 megohms at 500 volts. No burn throughs or arc tracks should be visible on any gun parts. Refer to <i>Multiplier Continuity and Resistance Check</i> on page 6-7.
	Failed needle resistor	Check the resistor with a megohmmeter for 18.8–22.8 megohms at 500 volts.
	Malfunctioning gun control unit or air pressure switch	Check gun control unit and pressure switch.
	Leaking packing cartridge	Check packing cartridge for leaks. Clean packing cartridge bore and install new packing cartridge.
<b>3. Electrostatics will not shut off when trigger is released</b>	Air leak in air hose	Check the air hose and fittings for leaks. Tighten the fittings or replace the hose.
	Air valve seat worn or damaged	Remove the air valve and inspect the sealing surface. Replace the air valve if worn or damaged.

## Multiplier and Needle Continuity and Resistance Check

See Figure 6-2.

The multiplier should measure 277–340 megohms at 500 volts.  
The needle should measure 18.8–22.8 megohms at 500 volts.

**NOTE:** Multiplier diodes require proper polarity for reading resistance.

1. Connect the earth ground probe (common) of the megohmmeter to the contact spring.
2. Connect the other probe on the megohmmeter to one of the three pins (1) on the end of the multiplier.

If the multiplier does not measure correctly, replace the multiplier. Refer to *Multiplier Replacement* in Section 6, *Repair*.

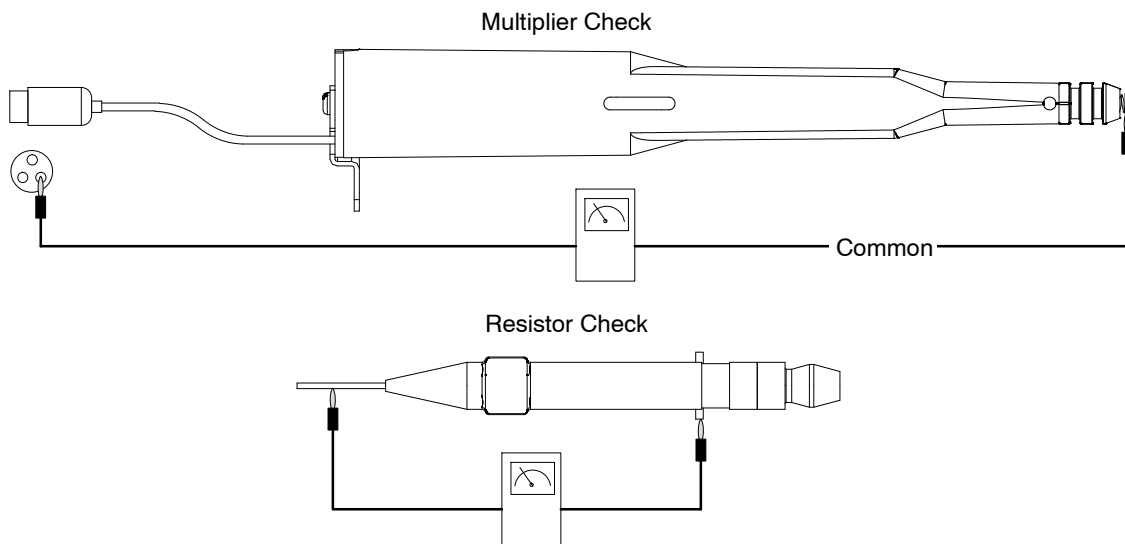


Figure 6-2 Multiplier and Needle Continuity and Resistance Check

## Gun Cable Continuity Check

See Figure 6-3.

Use an ohmmeter to check the continuity between the gun cable pins as listed in Table 6-1.

**NOTE:** If the continuity check fails make sure the cable switch is in the on position.

Table 6-1 Gun Cable Continuity Check

Control Unit Plug (J1)	Multiplier Plug (J2)	Position
1	—	Open
2	3	Closed
3	1	Closed
4	2	Closed
5	—	Open
6	Bracket	Closed

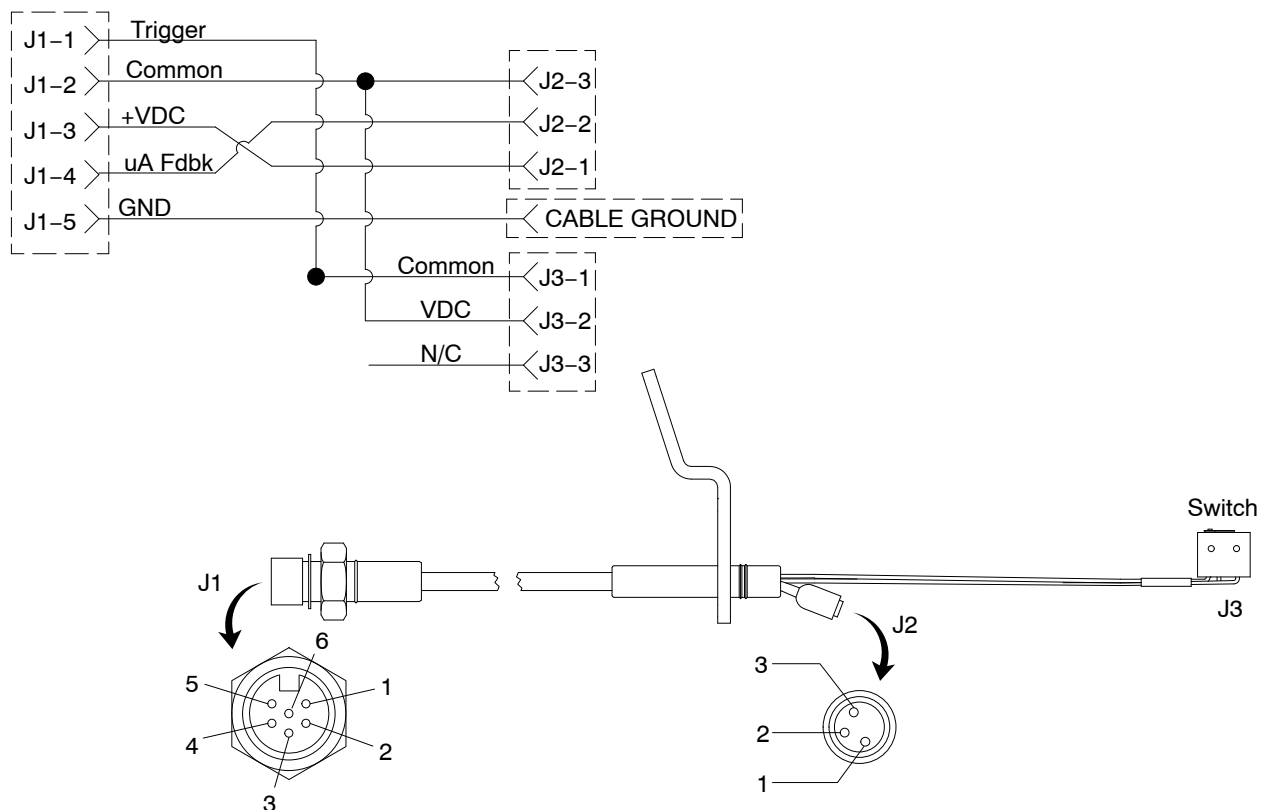


Figure 6-3 Gun Cable Continuity Check

## Section 7

# Repair



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



**WARNING:** Shut off the gun control unit and ground the spray gun electrode to remove any residual charge. Failure to observe this warning could result in personal injury.



**WARNING:** Shut down the system and relieve all fluid and air pressures before performing these procedures. Failure to observe this warning could result in injection injury.



**WARNING:** Use only Nordson replacement parts to repair the spray gun. Deviating from the repair instructions, using unauthorized parts, or making unauthorized modifications can result in personal injury or death and/or the loss of approvals by agencies such as Factory Mutual Research Corporation (FM).



**CAUTION:** Do not overtighten threaded parts. Failure to observe this caution could result in equipment damage.

**NOTE:** Tighten all fittings until snug or to the specified torques. Because the spray gun uses O-ring seals, further tightening provides no benefit and could damage plastic threads.

**NOTE:** The numeric callouts in this section match the item numbers in the spray gun parts list. Refer to the *Parts* section for complete part descriptions and ordering information. Items in the repair section that are not called out in the spray gun parts list are identified with alphabetic callouts.

## Tools/Supplies Required

Before beginning any of the repair tasks described in this section, make sure you have the following tools and supplies:

- See Figure 7-1: Combination tool (provided with spray gun)
- small channel-lock and needle-nosed pliers
- Needle nose pliers (provided with spray gun)
- $\frac{5}{32}$ -in. hex wrench
- $\frac{5}{16}$ -in. deep socket wrench
- Small flat-blade screwdriver
- Small Phillips-head screwdriver
- Service kits and replacement parts
- Removeable threadlocking adhesive (Loctite 242 or equivalent)
- Dielectric grease
- PTFE-based O-ring grease (MagnaLube-G or equivalent)
- Pipe/thread/hydraulic sealant/adhesive

**NOTE:** Refer to the *Parts* section for service kits and individual part numbers.

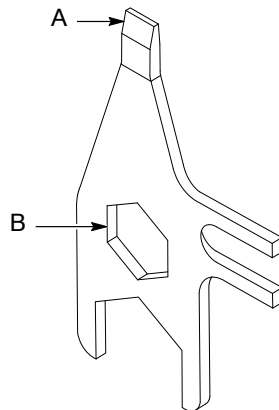


Figure 7-1 Combination Tool

A. Screwdriver

B. Fluid tip tool

## Air Cap, Fluid Tip, and Needle Replacement

1. Turn off the gun control unit and ground the spray gun electrode.
2. Turn off the fluid delivery system and relieve the fluid pressure. Point the spray gun into the booth or a grounded waste container and trigger the gun to relieve any residual pressure.
3. See Figure 7-2. Unscrew the retaining ring (1) and remove it and the air cap (A) from the extension (5).



**CAUTION:** To prevent damage to the needle or fluid tip seat, pull and hold the trigger while removing or installing the fluid tip.

4. Pull the trigger and unscrew the fluid tip (B) from the extension.
5. Grasp the needle (2) with your fingers and pull it and the contact spring (3) out of the packing cartridge (6). If necessary, hook the bent needle-nose plier jaws under the corners of the needle flats to remove it. Do not scratch the needle.
6. The needle kit includes a new contact spring. Install the contact spring on the needle, then push the new needle into the end of the packing cartridge until it snaps into place. Do not bend the electrode.
7. Make sure the O-ring is installed in the groove in the fluid tip. Lubricate the O-ring with MagnaLube-G grease or an equivalent.



**CAUTION:** Tightening the fluid tip beyond snug does not prevent or eliminate fluid leaks. If coating material leaks around the fluid tip replace the O-ring.

8. Pull and hold the spray gun trigger while screwing the new fluid tip in the extension. Tighten the fluid tip snugly without overtightening it.
9. Install the air cap (A) into the retaining ring and thread the retaining ring (1) onto the extension. Make sure the air cap is centered on the fluid tip. Hold the air cap in the desired position and tighten the retaining ring until it is snug. Do not overtighten the retaining ring.

**NOTE:** 991 and 992 air spray air caps are shipped permanently installed into retaining rings.

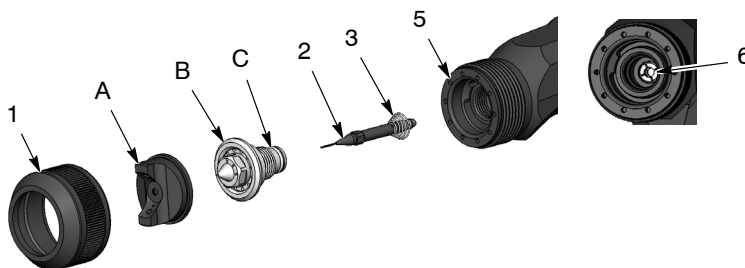


Figure 7-2 Air Cap, Fluid Tip, and Needle Replacement

- |                   |                      |              |
|-------------------|----------------------|--------------|
| 1. Retaining ring | 5. Extension         | A. Air cap   |
| 2. Needle         | 6. Packing cartridge | B. Fluid tip |
| 3. Contact spring |                      | C. O-ring    |

## Trigger Lock Replacement



**WARNING:** Never operate the spray gun with a worn or damaged trigger lock. Failure to observe this warning could result in injury.

1. See Figure 7-3. Drive the pin (45) out of the trigger lock (44) and handle with a small dowel pin.
2. Hold the new trigger lock in place and drive the new pin through the trigger lock and handle hole so that the pin is approximately flush with the outside edges of the trigger lock.

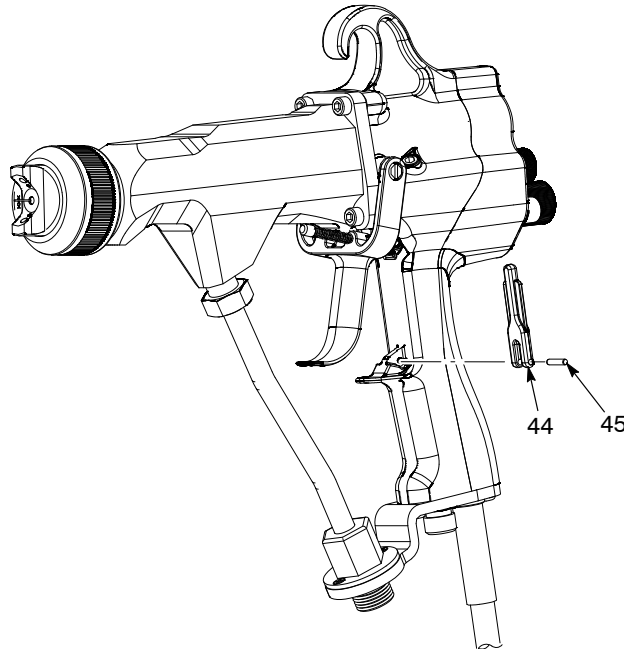


Figure 7-3 Trigger Lock Replacement

44. Trigger lock

45. Pin

## Repair Preparation

Use these procedures before performing any repair procedures that require disconnecting hoses and cables and taking the spray gun apart.

1. Turn off the gun control unit and ground the spray gun electrode. Disconnect the cable from the gun control unit.
2. Flush the fluid delivery system, fluid hoses, and spray gun with a compatible solvent.
3. Turn off the fluid delivery system. Relieve system fluid pressures. Point the spray gun into the booth or grounded waste container and trigger it to relieve any residual pressure.
4. Disconnect the fluid and air hoses from the spray gun. Move the spray gun to a clean, dry, flat surface.



## Packing Cartridge Replacement



**CAUTION:** If the packing cartridge leaks, it is important to thoroughly clean the extension with a compatible non-conductive solvent to remove any residual coating material. Failure to do so may result in loss of kV and affect atomizing and horn air flow.



**CAUTION:** Do not overtighten threaded parts. Failure to observe this caution may result in equipment damage.

The only serviceable part of the packing cartridge is the external O-ring. Typically, if you must replace the O-ring, you should also replace the packing cartridge. An O-ring is included with each new cartridge.

See Figure 7-4.

### ***Removing the Extension***

1. Prepare the spray gun as described in *Repair Preparation* on page 7-4.
2. Remove the air cap, fluid tip, needle, and contact spring as described in *Air Cap, Fluid Tip, and Needle Replacement* on page 7-3.
3. Remove the two screws (51) and straight fitting (50) from the cable bracket (40A).
4. Remove the two pivot screws (47) and the trigger (46).
5. Using a  $\frac{5}{32}$ -in. hex wrench, remove the four socket-head screws (4) securing the extension (5) to the handle (18). Pull the extension straight away from the handle(18) and off the multiplier (10). Do not lose the one large and two small O-rings (16, 17, not shown) installed in the handle.
6. Remove the trigger spring (15) from the trigger puller (14) if it came out of the handle.

## Removing the Extension (contd)

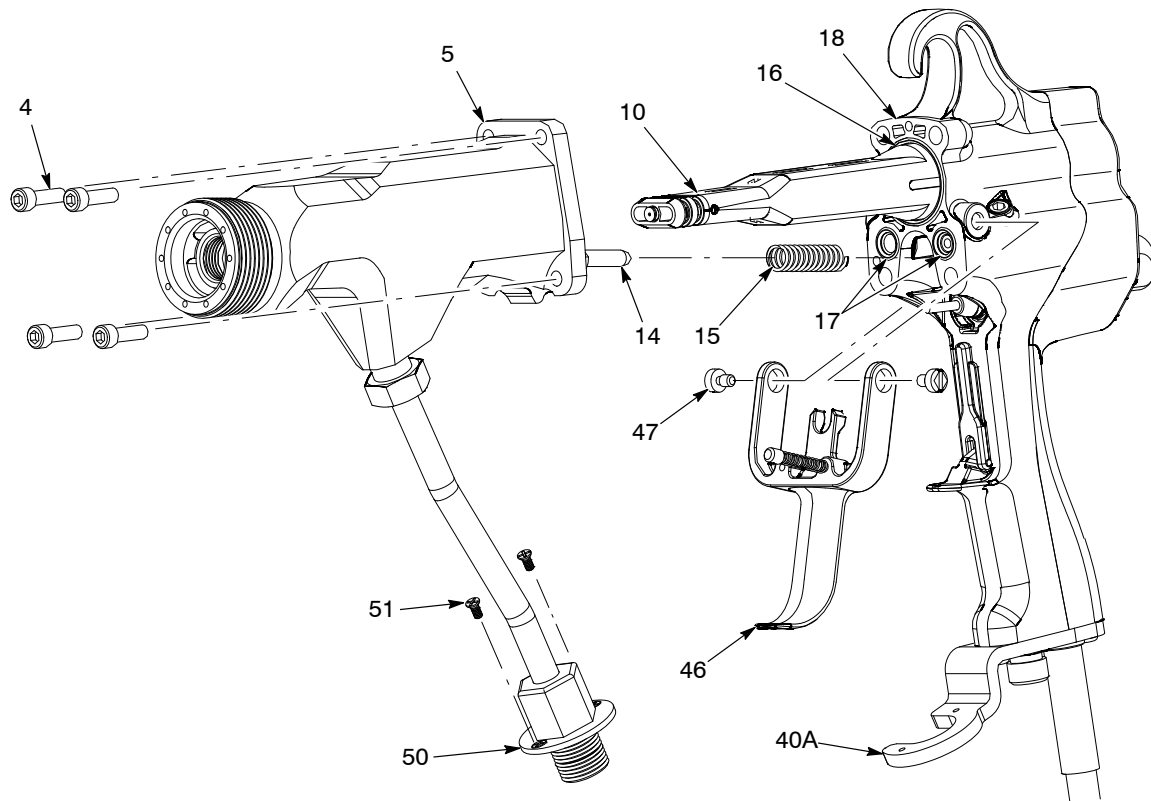


Figure 7-4 Packing Cartridge Replacement – Removing the Extension

- |                    |                       |                      |
|--------------------|-----------------------|----------------------|
| 4. Screws (4)      | 16. Large O-ring      | 46. Trigger          |
| 5. Extension       | 17. Small O-rings (2) | 47. Pivot screws (2) |
| 10. Multiplier     | 18. Handle            | 50. Straight fitting |
| 14. Trigger puller | 40A. Cable bracket    | 51. Screws (2)       |
| 15. Trigger spring |                       |                      |

## Removing the Packing Cartridge

1. See Figure 7-5. Hold the pull shaft (7) with pliers while unscrewing the trigger puller (14).

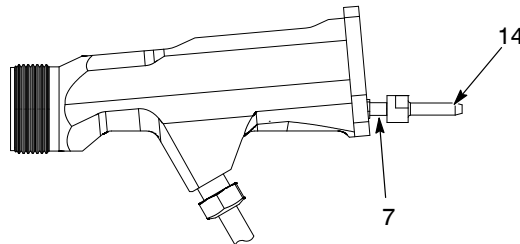


Figure 7-5 Packing Cartridge Replacement – Removing Trigger Puller

- |               |                    |
|---------------|--------------------|
| 7. Pull shaft | 14. Trigger puller |
|---------------|--------------------|

2. See Figure 7-6. Unscrew the packing cartridge retainer (9) from the extension.

**NOTE:** To avoid damaging the contact spring, remove the needle and contact spring before removing the packing cartridge/pull shaft/sleeve assembly (6, 7, 8) from the extension. Refer to page 7-3.

3. Pull the packing cartridge/pull shaft/sleeve assembly (6, 7, 8) out of the extension.
4. Unscrew the pull shaft from the packing cartridge.
5. Clean the extension fluid bore with a round, soft-bristled brush and a compatible non-conductive solvent. For thorough cleaning, remove the fluid tube from the extension.

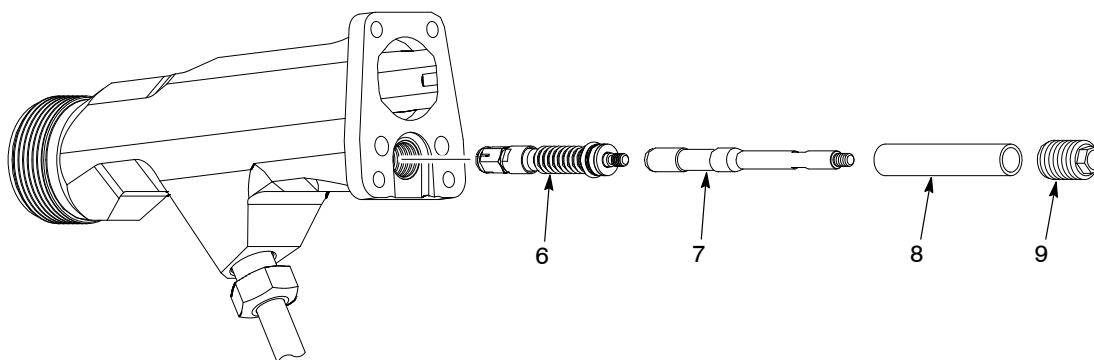


Figure 7-6 Packing Cartridge Replacement – Removing Cartridge From Extension and Pull Shaft

6. Packing cartridge
7. Pull shaft

8. Sleeve

9. Packing cartridge retainer

## Packing Cartridge Installation

**NOTE:** Make sure all residual coating material has been removed from all parts before installing them.

1. See Figure 7-6. Apply a removeable threadlocking adhesive (Loctite 242 or equivalent) to the threads of the new packing cartridge (6).
2. Screw the pull shaft (7) onto the packing cartridge.
3. Lubricate the packing cartridge bellows and seals with MagnaLube-G grease or an equivalent.



**CAUTION:** Apply dielectric grease as instructed in steps 4 and 5. If it is not applied as instructed, damage to the spray gun is likely and spray gun performance and safety may be compromised.

4. Coat the pull shaft, except for the threaded end, with a liberal amount of dielectric grease, then install the sleeve (8) over the pull shaft and up against the packing cartridge.
5. Apply a thin coating of dielectric grease to the outside of the sleeve.

## Packing Cartridge Installation *(contd)*

6. Install the packing cartridge/pull shaft/sleeve assembly into the extension.
7. Coat the inside diameter of the packing cartridge retainer (9) and the end of the pull shaft (8) with MagnaLube-G or equivalent lubricant.
8. Slide the packing cartridge retainer over the pull shaft and then screw the retainer into the extension. Tighten the packing cartridge retainer hand-tight (0.56 N•m (5-in-lb) maximum). **Do not overtighten.**
9. Wipe any dielectric grease off the threads of the pull shaft.
10. See Figure 7-5. Apply a removeable threadlocking adhesive (Loctite 242 or equivalent) to the threads of the pull shaft and screw the trigger puller (14) onto the pull shaft.

## Needle Travel Adjustment

Before re-installing the extension on the handle, use this procedure to adjust the needle travel and reduce operator fatigue.

1. Complete all steps in *Packing Cartridge Installation* first.
2. Install the needle, contact spring, and fluid tip as described in *Air Cap and Fluid Tip Replacement* on page 7-3.
3. Push on the trigger puller (14) to make sure the needle is fully seated in the fluid tip.
4. With inside calipers, measure the distance from the recessed counterbore in the extension to the face of the trigger puller. If the distance is less than 13.665 mm (0.538 in.), unscrew the trigger puller from the pull shaft until you obtain a distance of  $13.665 \pm 0.127$  mm ( $0.538 \pm 0.005$  in.).

**NOTE:** If the distance is greater than 13.792 mm (0.543 in.) and all threaded connections from the packing cartridge to the trigger puller are tight, the needle is installed correctly into the packing cartridge, and the needle is tight against the fluid tip seat, then no further adjustment is possible.

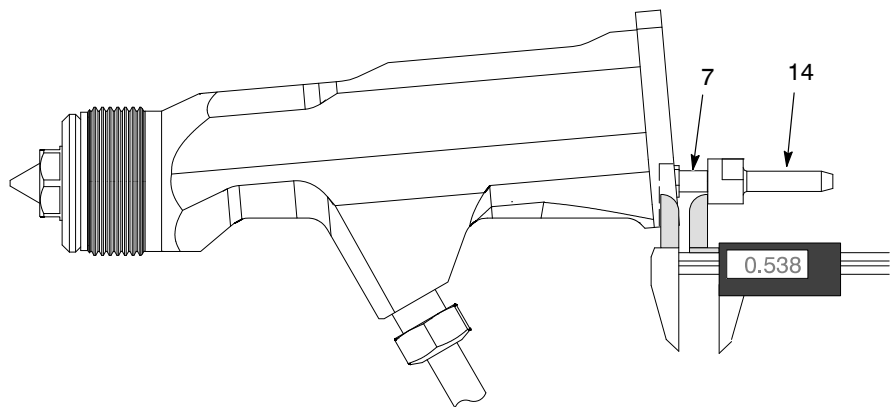


Figure 7-7 Packing Cartridge Replacement – Removing Trigger Puller

5. Install the extension as described in the following procedure.

## ***Extension Installation***

See Figure 7-4.

1. Make sure that the multiplier (5) is clean. Coat the front  $\frac{1}{3}$  of the multiplier and contact spring with dielectric grease.
2. Lubricate the trigger puller shaft (14) and trigger spring (15) with MagnaLube-G or equivalent lubricant.
3. Lubricate the spring bore in the handle with MagnaLube-G or equivalent lubricant.
4. Insert the trigger spring into the spring bore, then insert the trigger puller shaft into the spring while mating together the handle (18) and the extension (5).
5. Secure the extension to the handle with the four socket-head screws (4). Tighten the screws to 2.27–2.83 N•m (20–25 in.-lb).
6. Install the trigger (46) on the handle, making sure the trigger fork engages the trigger puller. Install the pivot screws (47) and tighten them to 0.90–1.13 N•m (8–10 in.-lb).

**NOTE:** Pull the trigger and make sure it presses the air valve stem into the handle and pulls the packing cartridge into the spray gun.

7. Install the straight fitting (50) into the cable bracket (40A) and secure it with the two screws (51).
8. Install the air cap as described in *Air Cap and Fluid Tip Replacement* on page 7-3.
9. Connect the air and fluid hoses to the gun.
10. Turn on the gun control unit and fluid delivery system and make sure the spray gun is working correctly. Adjust fluid flow rate and atomization as desired. Refer to *Fluid Pressure and Flow Rate Adjustments* on page 4-3 and *Spray Pattern and Atomization Adjustments* on page 4-3.

## Cable and Air Inlet Fitting Replacement

See Figure 7-8. The air inlet fitting will only need to be replaced if the fitting threads are damaged.

### ***Handle Cover Removal***

1. Loosen the set screw (26) in the horn air adjust knob (27) with a  $\frac{1}{16}$ -in. hex wrench, then remove the knob.
2. Remove the two screws (51) securing the straight fitting (50) to the cable bracket (40A), then remove the fitting from the bracket.
3. Remove the screws (25, 43) from the cover (31) and cable bracket.
4. Slowly pull the cover away from the handle (18) so you do not damage the cable connectors or the kV actuator switch wires.

### ***Cable and Fitting Replacement***

1. Remove the cover as described above.
2. Disconnect the cable connector (40B) from the multiplier connector (10B).
3. Remove the two screws and lockwashers (37, 38) securing the kV switch to the cover. Remove the switch actuator (39) from the switch.
4. To replace the air fitting (41), unscrew it from the handle. Replace the O-ring (42) and lubricate the new O-ring with MagnaLube-G or an equivalent lubricant before re-installing the fitting.
5. Install the switch actuator (39) on the cable switch, then secure the switch to the cover as shown, making sure the actuator rests on top of the knob pin (30).
6. Connect the cable connector (40B) to the multiplier cable connector (10B).

### ***Cable and Handle Cover Installation***

1. Push the multiplier cable into the ribbed slots in the back of the handle.
2. Install the cable bracket (40A) over the air fitting hex. Tighten or loosen the fitting slightly to align the fitting hex and bracket.
3. Install the cover (31) onto the handle (18), making sure the cable and switch leads are not pinched between the cover and the handle.
4. Secure the cable bracket to the handle and cover with the two screws (43). Tighten the screws to 1.36–1.69 N•m (12–15 in.-lb).
5. Secure the cover to the handle with the three screws (25). Tighten the screws to 0.9–1.13 N•m (8–10 in.-lb).
6. Secure the fitting (50) to the cable bracket with the two screws (51).
7. Install the horn air adjust knob (27) on the valve shaft, align the set screw (26) with the shaft flat, then tighten the set screw snugly.

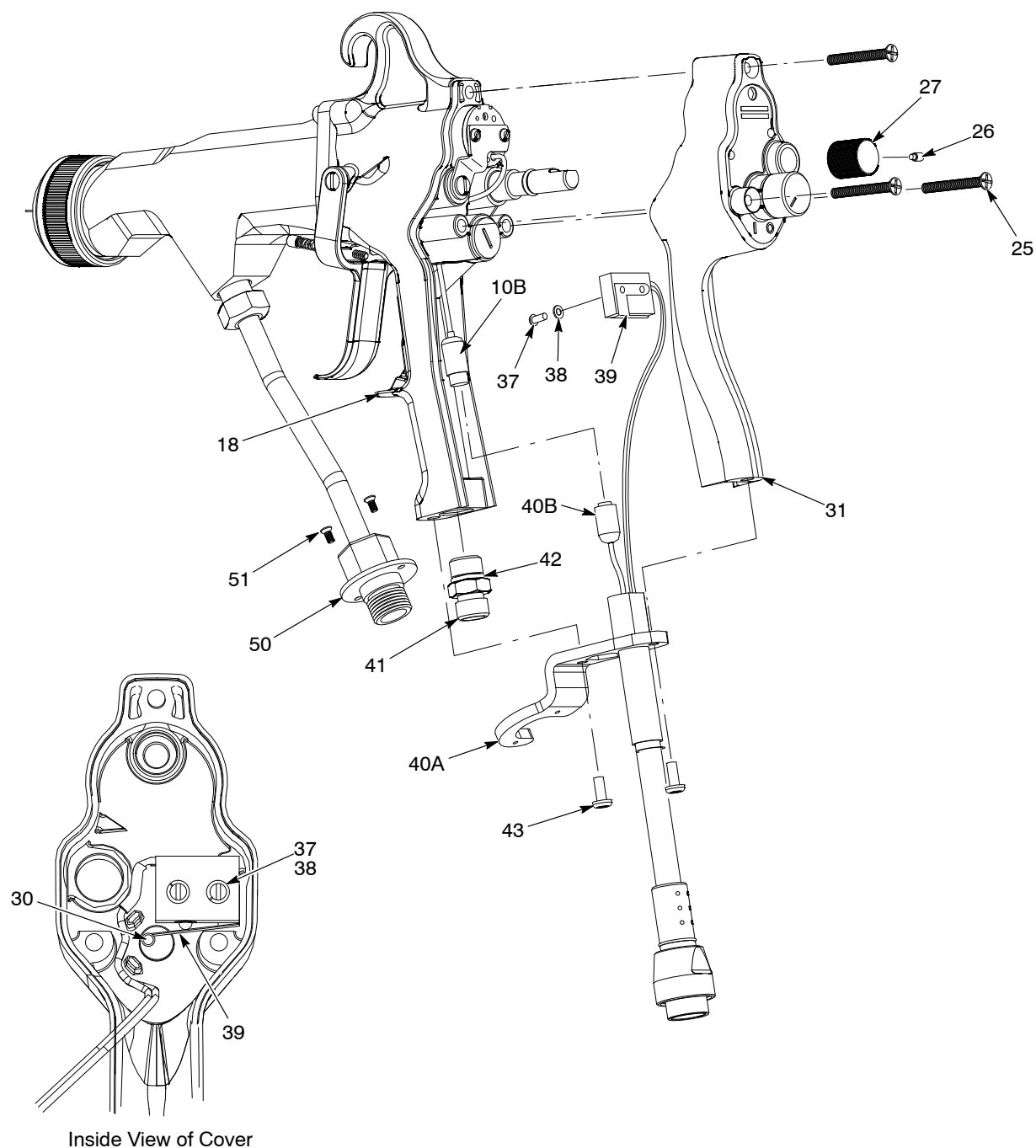


Figure 7-8 Cable and Air Inlet Fitting Replacement

- |                           |                     |                      |
|---------------------------|---------------------|----------------------|
| 10B. Multiplier connector | 31. Cover           | 41. Air fitting      |
| 18. Handle                | 37. Screws (2)      | 42. O-ring           |
| 25. Screws (3)            | 38. Lockwashers (2) | 43. Screws (2)       |
| 26. Set screw             | 39. Switch actuator | 50. Straight fitting |
| 27. Horn air adjust knob  | 40A. Cable bracket  | 51. Screws (2)       |

## Air Valve Repair



**CAUTION:** A worn or damaged air valve could result in an air leak which triggers on the electrostatics. Replace a worn or damaged air valve immediately.

1. Remove the cover as described on page 7-10.
2. See Figure 7-9. Unscrew the air valve plug (32). Inspect the O-ring (33) and replace it if it is damaged.
3. Remove the air valve spring (34) and air valve stem (35) from the handle. Do not lose the spring. If the air valve stem does not come out with the spring, push it out from the trigger side of the handle. Do not use any tools to force the stem; you may damage the U-cup seal (36) or stem bore.
4. Inspect the air valve stem. Replace the valve stem if the elastomeric seat is damaged or the stem is worn or damaged.

**NOTE:** If there is no damage to the air valve stem, and air does not leak from the stem bore when the trigger is pulled, you should not have to replace the U-cup seal.

5. If necessary, remove and replace the U-cup seal:
  - a. Use a small dowel or the air valve stem to push the U-cup seal out of the handle.
  - b. Install a new U-cup seal on the air valve stem with the U facing toward the stem seat. Carefully insert the stem into the stem bore in the handle and seat the U-cup into the recess at the bottom of the bore.
  - c. Remove the air valve stem. Use the blunt end of a dowel with a larger diameter than the inside diameter of the U-cup seal to press the seal into the recess. Make sure the end of the dowel does not have sharp edges.
6. If the air valve spring (34) came off the air valve stem (35), snap it back on. The air valve spring must be attached to the air valve stem or the gun will not work properly.
7. Lubricate the U-cup seal (36) with MagnaLube-G or an equivalent lubricant. Insert the air valve stem through the U-cup seal and into the stem bore.
8. Lubricate the air valve plug O-ring (33) with MagnaLube-G or an equivalent lubricant and screw the air valve plug (32) into the handle until it is snug.
9. Install the cover as described on page 7-10.



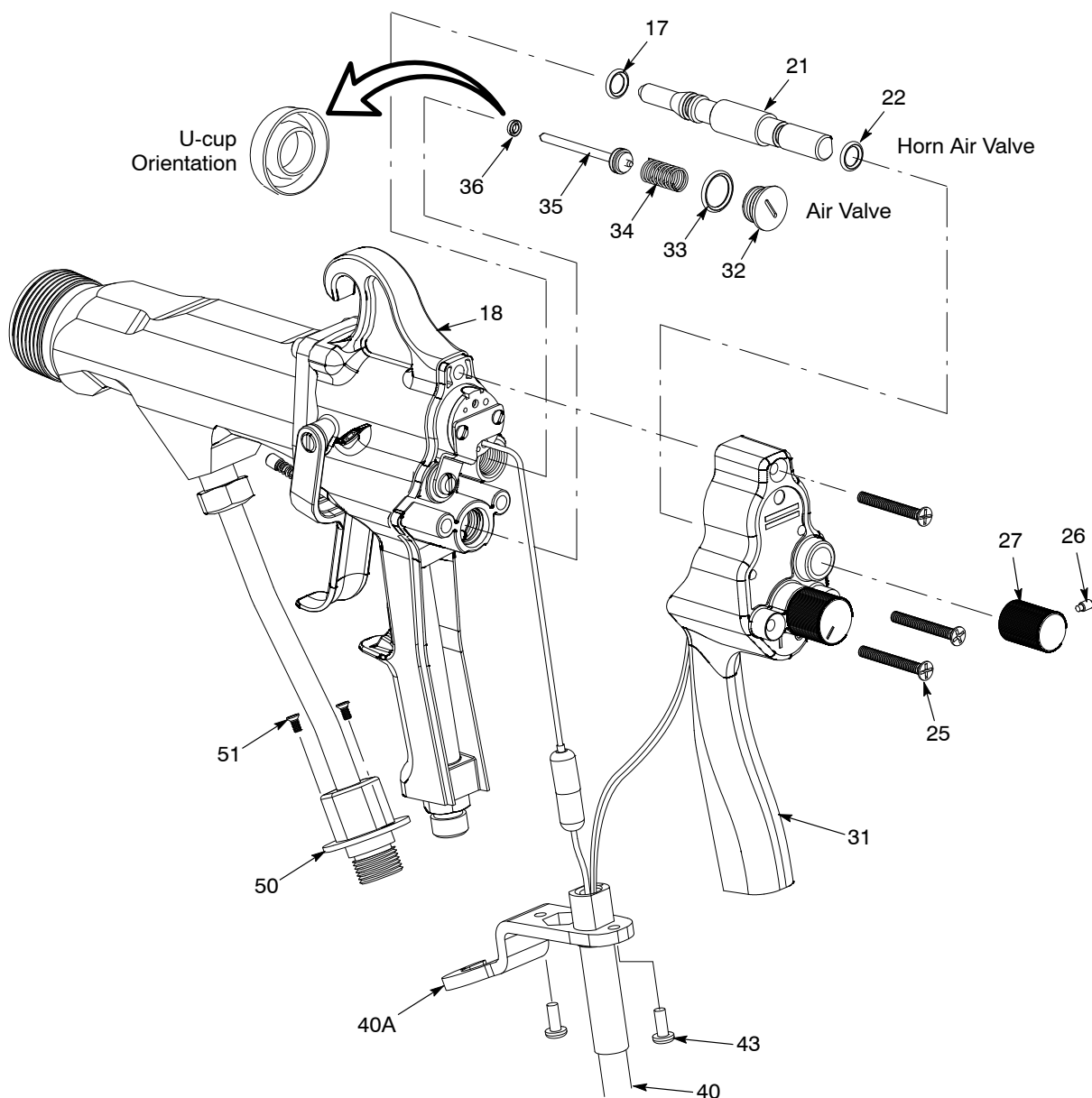


Figure 7-9 Air Valve Repair

- |                    |                          |                      |
|--------------------|--------------------------|----------------------|
| 18. Handle         | 27. Horn air adjust knob | 36. U-cup seal       |
| 20. O-ring         | 31. Cover                | 40. Cable            |
| 21. Horn air valve | 32. Plug                 | 40A. Cable bracket   |
| 22. O-ring         | 33. O-ring               | 43. Screws (2)       |
| 25. Screws (3)     | 34. Spring               | 50. Straight fitting |
| 26. Set screw      | 35. Air valve stem       | 51. Screws (2)       |

## Horn Air Valve Repair

1. Remove the cover as described on page 7-10.
2. See Figure 7-9. Install the horn air adjust knob (27) on the horn air adjust valve (21) and tighten the set screw (26). Unscrew the valve from the handle.
3. Inspect the horn air adjust valve and its O-rings (17, 22). Replace any damaged parts. Lubricate the O-rings with MagnaLube-G grease or equivalent before re-installing the horn air adjust valve.
4. Screw the horn air adjust valve into the handle, then remove the knob.
5. Install the cover as described on page 7-10.

## Multiplier Replacement

See Figure 7-10.

### *Multiplier Removal*

1. Remove the cover as described on page 7-10.
2. Remove the screw (13) securing the heat sink bracket (11) to the handle.



**CAUTION:** Do not pull the multiplier out of the spray gun by its cable.

3. Pull the multiplier (10) out of the spray gun handle (18).
4. Remove the screws (12) and heat sink bracket (11) from the old multiplier and install them on the new multiplier.



**CAUTION:** Apply dielectric grease as instructed. If dielectric grease is not applied correctly damage to the spray gun is likely and spray gun performance and safety may be compromised.

5. Make sure that the contact spring (10A) is in place in the front of the multiplier. Apply a liberal amount of dielectric grease to the front  $\frac{1}{3}$  of the new multiplier and the contact spring.
6. Push the new multiplier through the handle (18) and into the extension.
7. Attach the heat sink bracket (11) to the gun handle with the screw (13).
8. Connect the cable connector (40B) to the multiplier connector (10B).
9. Snap the multiplier cable into the ribbed slots in the back of the handle.
10. Install the cover as described on page 7-10.
11. Connect the fluid and air hoses, then turn on the gun control unit and fluid delivery system and test gun operation.

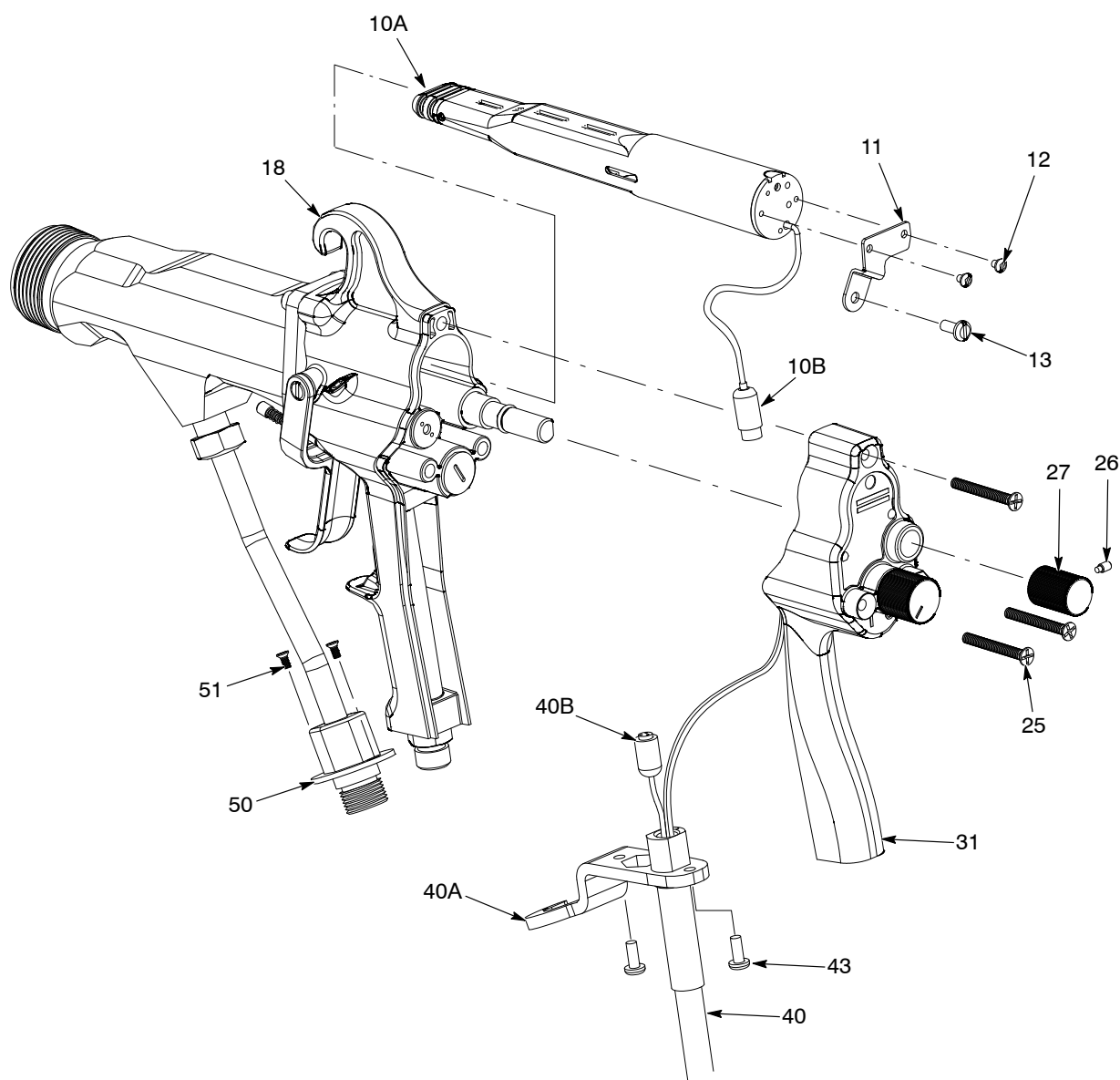


Figure 7-10 Multiplier Replacement

- |                           |                          |                      |
|---------------------------|--------------------------|----------------------|
| 10. Multiplier            | 18. Handle               | 40A. Cable bracket   |
| 10A. Contact spring       | 25. Screws (3)           | 40B. Cable connector |
| 10B. Multiplier connector | 26. Set Screw            | 43. Screws (2)       |
| 11. Heat sink bracket     | 27. Horn air adjust knob | 50. Straight fitting |
| 12. Screws (2)            | 31. Cover                | 51. Screws (2)       |
| 13. Screw                 | 40. Cable                |                      |

## Fluid Tube Replacement

See Figure 7-11. Follow these steps to replace the fluid tube and ferrule set.

**NOTE:** Replace the ferrule set along with the fluid tube. When the hose nut is tightened it permanently swages the ferrule set to the tube so that it cannot be removed and re-used.

1. Turn off the gun control unit and ground the spray gun electrode.
2. Turn off the fluid delivery system and relieve the fluid pressure.
3. Remove the two screws (51) and remove the straight fitting (50) from the cable bracket (40A).
4. Unscrew the ferrule nut (52) from the fitting and pull the fluid tube (53) out the fitting.
5. Unscrew the hose nut (54) and pull the fluid tube out of the extension (5).
6. Remove the hose nut from the fluid tube. Discard the old fluid tube and ferrule set.
7. Install the hose nut and new ferrule set on the new fluid tube as shown.
8. Push the end of the fluid tube into the extension until it bottoms out, then screw the hose nut into the extension. Tighten the hose nut 1- $\frac{1}{4}$  turns past hand-tight.

**NOTE:** If you are just removing and re-connecting the fluid tube to the extension without replacing the tube and ferrule set, tighten the hose nut  $\frac{1}{4}$  turn past hand-tight.

9. Install the ferrule nut on the opposite end of the tube, then push the tube end into the straight fitting and screw the ferrule nut onto the fitting. Do not tighten the nut.
10. Attach the straight fitting to the cable bracket with the two screws.
11. Now tighten the ferrule nut  $\frac{1}{2}$  turn past hand-tight.
12. Turn on the fluid-delivery system at a low pressure and slowly increase the fluid pressure to 6.89 bar (100 psi). If the hose fittings leak, retighten the fittings. Do not operate the system with leaking fittings.

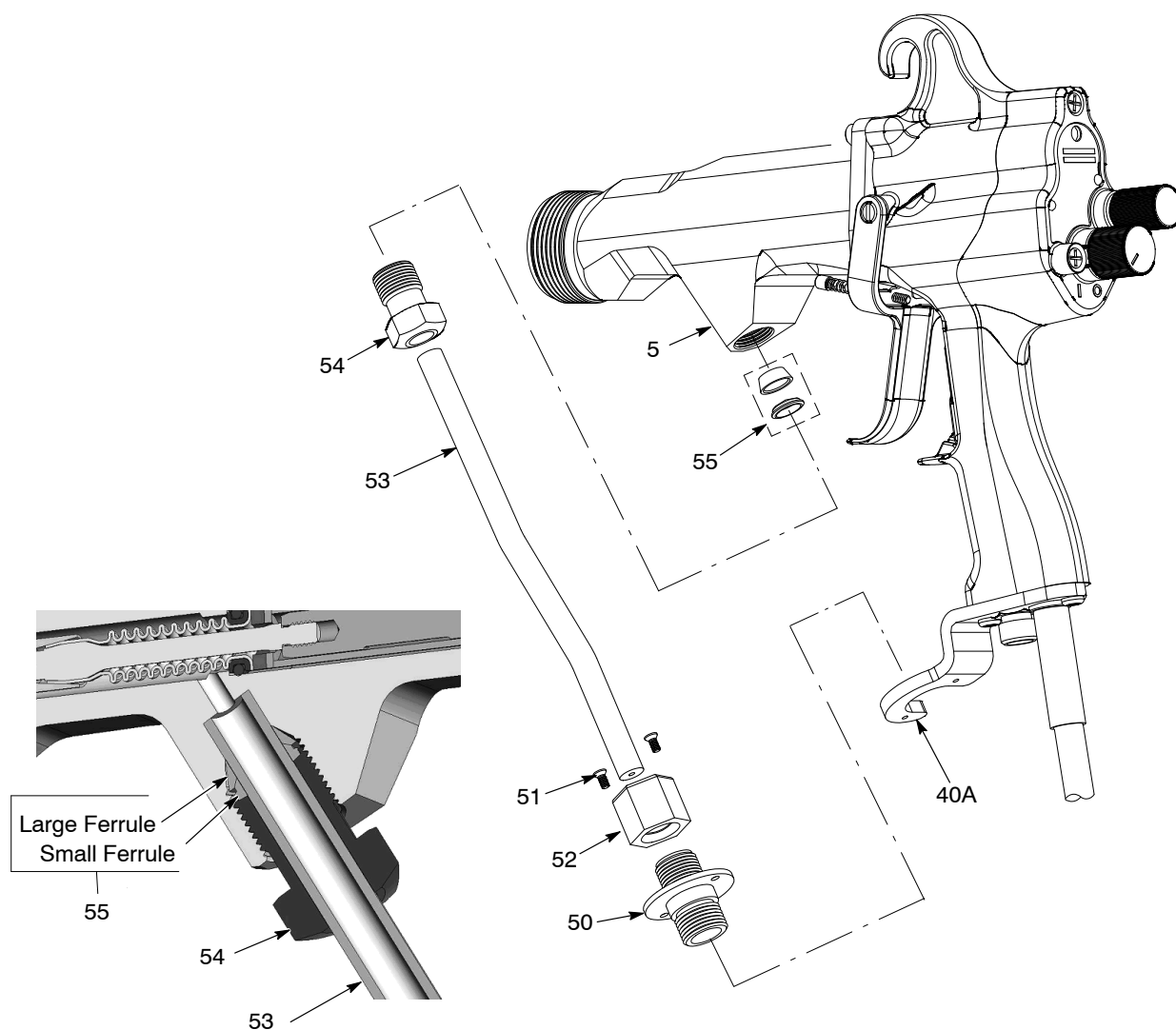


Figure 7-11 Multiplier Replacement

5. Extension  
40A. Cable bracket  
50. Straight fitting

51. Screws (2)  
52. Ferrule nut  
53. Fluid Tube

54. Hose nut  
55. Ferrule set

## Service Notes

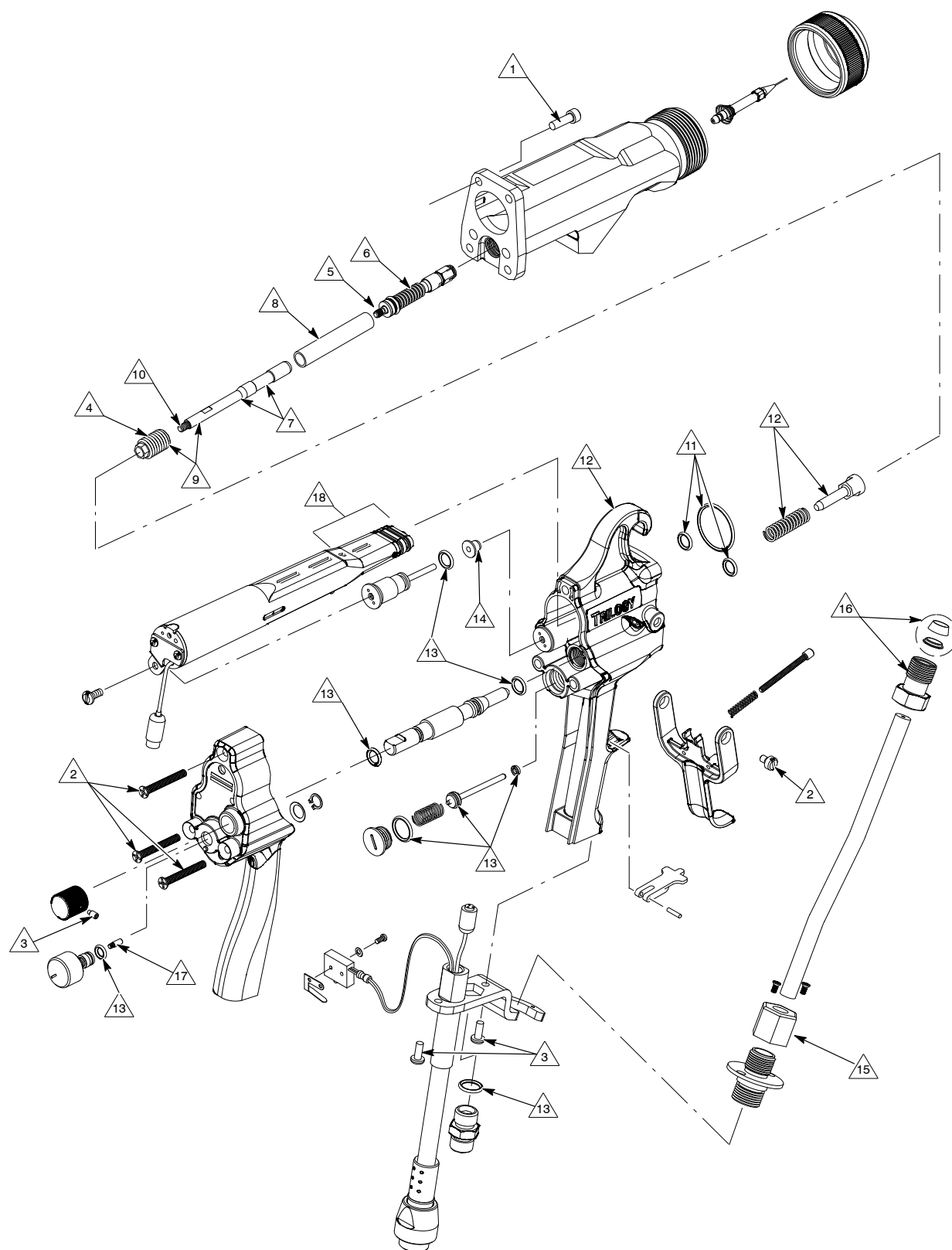




















Figure 7-12 Spray Gun Service Notes

Table 7-2 Service Notes

Note	Description
	Tighten to 2.27–2.83 N•m (20–25 in.-lb)
	Tighten to 0.9–1.13 N•m (8–10 in.-lb)
	Tighten to 1.36–1.69 N•m (12–15 in.-lb)
	Tighten hand-tight (0.56 N•m (5 in.-lb) maximum)
	Apply removeable threadlocking adhesive (Loctite 242) to the threads of the packing cartridge before screwing it into the pull shaft.
	Apply MagnaLube-G to the packing cartridge bellows and O-ring before installation.
	Apply a liberal coat of dielectric grease to these areas of the pull shaft before installing it in the extension.
	Apply a thin coat of dielectric grease to the outside diameter of the sleeve before installing it over the pull shaft and into the extension.
	Apply MagnaLube-G to the inside diameter of the packing cartridge retainer and the end of the pull shaft before installing the retainer over the puller shaft.
	Apply removeable threadlocking adhesive (Loctite 242) to the threads of the pull shaft before screwing it into the trigger puller.
	Apply dielectric grease to these O-rings.
	Generously apply MagnaLube-G or an equivalent PTFE-filled grease to: <ul style="list-style-type: none"> <li>• spring</li> <li>• small diameter of the trigger puller</li> <li>• handle spring bore</li> </ul> before installing the extension on the handle.
	Apply MagnaLube-G to these O-rings and lip seal before installation.
	Apply Loctite Prism 406 instant adhesive to outside small diameter of air plug before installing.
	Tighten $\frac{1}{2}$ turn past hand-tight.
	When installing a new ferrule set, tighten the hose nut $1\frac{1}{4}$ turns past hand-tight. If ferrule set has already been swaged, tighten the hose nut $\frac{1}{4}$ turn past hand-tight.
	If replacing the switch pin, apply removeable threadlocking adhesive (Loctite 242) to the threads of the pin before installing.
	Apply a liberal amount of dielectric grease to the front $\frac{1}{3}$ of the multiplier and contact spring before installing the multiplier into the handle and extension.





## Section 8

# Parts

## Introduction

To order parts, call the Nordson Finishing Customer Support Center at (800) 433-9319 or contact your local Nordson representative. Use the illustrations and parts lists to locate and describe parts correctly.

## Spray Gun Parts

**NOTE:** Before ordering parts for your spray gun, review the procedures in the *Repair* section to make sure you have the correct parts and service items to complete the procedure.

See Figure 8-1.

Item	Part	Description	Quantity	Note
—	1090697	GUN, Trilogy, manual, low pressure	1	
1	1089398	• RING, retaining, air cap, Trilogy	1	
2	1094722	• KIT, needle, Trilogy	1	
3	1090179	• • SPRING, compression, contact, Trilogy	1	
4	325752	• SCREW, socket, #10-24 x 0.625 in., SS	4	
5	1094723	• KIT, extension, Trilogy, low pressure	1	
6	1094777	• KIT, cartridge, Trilogy	1	
6A	940118	• • O RING, hot paint, 0.313 x 0.438 x 0.063 in.	1	
7	1095878	• RETAINER, sleeve, bellows cartridge	1	
8	1093963	• SHAFT, puller, w/stud, Trilogy	1	
9	325749	• RETAINER, packing cartridge, electrostatic	1	
10	336505	• KIT, multiplier, 93 kV, Kinetix	1	
10A	336383	• • SPRING ASSEMBLY, contact	1	
11	336375	• BRACKET, heat sink, manual, electrostatic	1	
12	981522	• SCREW, pan, #4-40 x 0.125 in., steel, zinc	2	
13	982763	• SCREW, pan, #8-32 x 0.375 in., steel, zinc	1	
14	325751	• PULLER, shaft, trigger, electrostatic	1	
15	325534	• SPRING, fluid return, low pressure	1	
16	336499	• O-RING, PTFE, 1.051 x 0.07 in.	1	A
17	940110	• O-RING, hotpaint, 0.313 x 0.438 x 0.063 in.	4	A
18	1092040	• HANDLE, machined, Trilogy	1	
19	336427	• PLUG, air adjust, HVLP, electrostatic	1	
20	336376	• HEAT SINK, electrostatic	1	
Continued...				

Item	Part	Description	Quantity	Note
21	336334	• VALVE, air adjust, electrostatic	1	
22	336512	• O-RING, PTFE, 0.313 x 0.438 x 0.06 in.	1	A
23	986030	• RETAINING, ring, external, 31, basic	1	
24	325755	• WASHER, curved spring, 0.49 x 0.331 in.	1	
25	325760	• SCREW, flat, #8-32 x 1.375 in., 18-8 SS	3	
26	981030	• SCREW, socket, 6-32 x 0.187 in., dog, zinc	1	
27	1095740	• KNOB, valve, adjustment	1	
28	1095741	• KNOB, on/off, switch, electrostatic	1	
29	940090	• O-RING, Viton, 0.208 ID x 0.07 wide, brown	1	A
30	336378	• PIN, knob, on/off, electrostatic	1	
31	336411	• COVER, electrostatic, molded	1	
32	1090742	• PLUG, valve, air trigger, 0.688 in. dia. head	1	
33	940140	• O-RING, hotpaint, 0.50 x 0.625 x 0.063 in.	1	A
34	325499	• SPRING, air valve	1	C
35	325523	• STEM, air valve, trigger assembly	1	C
36	955076	• SEAL, 1/8 x 1/4 x 1/16 in., PTFE	1	C
37	981915	• SCREW, pan, #2-56 x 0.375 in., steel, zinc	2	
38	983113	• LOCK WASHER, split, 2, steel, zinc	2	
39	132336	• ACTUATOR, switch	1	
40	1095680	• CABLE, Trilogy, manual, 50 ft, 5 conductor	1	
41	973505	• COUPLING, 1/4 x 1/4 in., brass	1	
42	940130	• O-RING, hotpaint, 0.438 x 0.563 x 0.063 in.	1	A
43	325754	• SCREW, pan, #8-32 x 0.406 in., stainless steel	2	
44	336631	• KIT, trigger lock, electrostatic	1	
45	985438	• • PIN, dowel, 0.094 x 0.438 in., alloy steel	1	
46	336365	• TRIGGER, Kinetix	1	
47	246526	• SCREW, pivot, trigger/handle	2	
48	336353	• SPRING, compression, fluid adjustment	1	
49	1093570	• SCREW, adjustment, #6-32, Trilogy	1	
50	1095735	• FITTING, straight, 3/8-in. NPSM x 5/8-20 UN-2A	1	
51	346725	• MACH SCREW, flat, #4-40, 0.25 in. SS	2	
52	971456	• NUT, ferrule, 3/8-in. tube, nylon, plastic grip	1	
53	1090743	• TUBE, PTFE, 3/8-in. x 3/32-in. ID, manual	1	
54	1089413	• NUT, hose, 3/8-in.	1	B
55	1090625	• FERRULE, set, 0.375 ID	1	B
NS	1094480	• KIT, tools, low pressure, Trilogy	1	
NS	901905	• • BRUSH (wooden toothbrush type)	1	
NS	247066	• • BRUSH	1	
NS	336642	• • WRENCH, Kinetix, combination tool	1	
NS	1028630	• • PLIERS, needle nose, bent	1	
NOTE A: Parts included in 336634 Kit, Air Seal, Hotpaint, Electrostatic. B: Parts included in 1094775 Kit, Ferrule, 3/8 in., Low Pressure. C: Parts included in 325657 Air Valve Service Kit.				

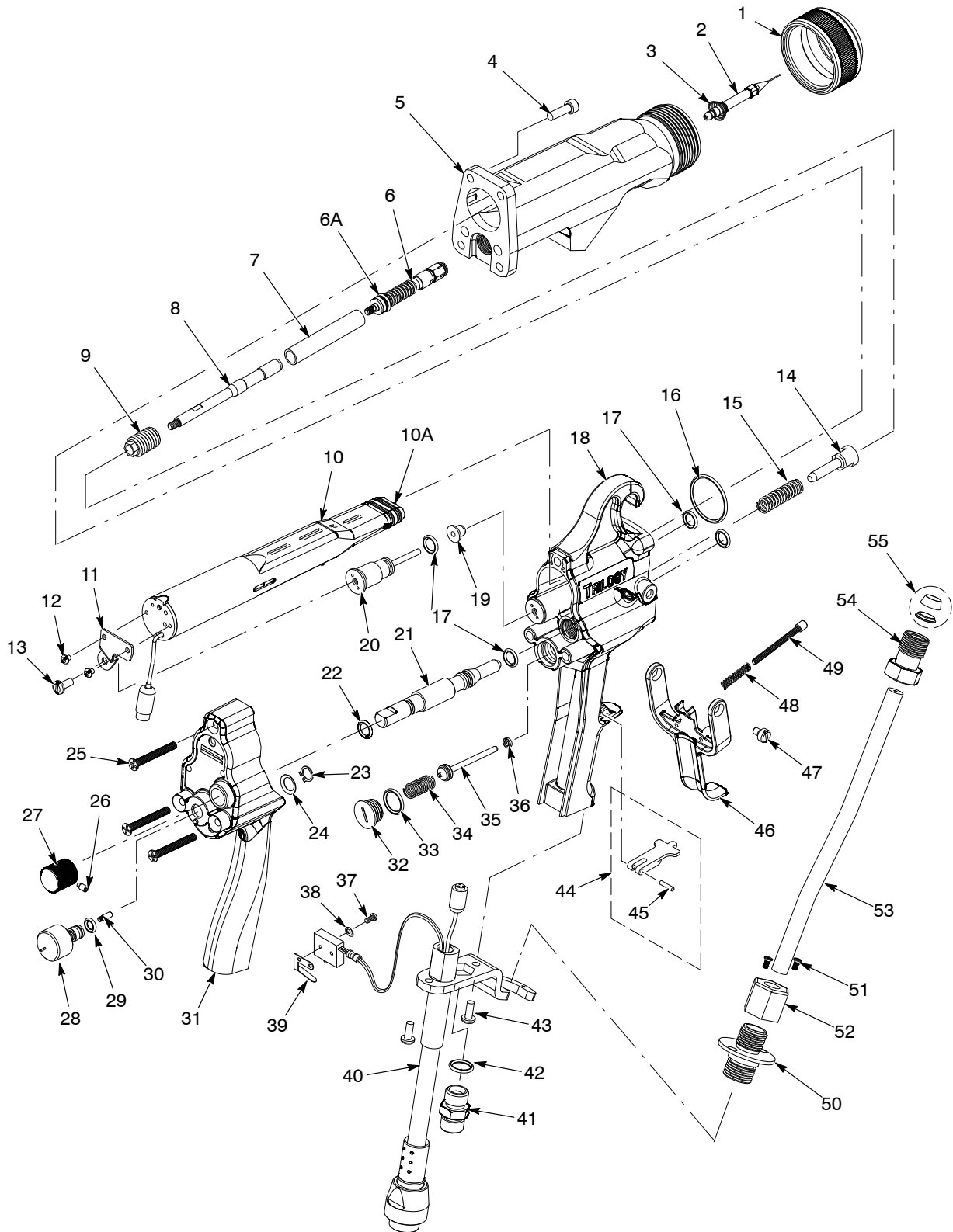


Figure 8-1 Spray Gun Parts

## Repair Kits

See Figure 8-1.

### Air Seal

Item	Part	Description	Quantity	Note
—	336634	AIR SEAL KIT, hotpaint, electrostatic	1	
16	336499	• O-RING, PTFE, 1.051 x 0.07 in.	1	A
17	940110	• O-RING, hotpaint, 0.313 x 0.438 x 0.063 in.	4	A
22	336512	• O-RING, PTFE, 0.313 x 0.438 x 0.06 in.	1	A
29	940090	• O-RING, Viton, 0.208 ID x 0.07 wide, brown	1	A
33	940140	• O-RING, hotpaint, 0.50 x 0.625 x 0.063 in.	1	A
42	940130	• O-RING, hotpaint, 0.438 x 0.563 x 0.063 in.	1	A

### Air Valve

Item	Part	Description	Quantity	Note
—	325657	AIR VALVE KIT	1	
34	325499	• SPRING, air valve	1	C
35	325523	• STEM, air valve, trigger assembly	1	C
36	955076	• SEAL, $\frac{1}{8}$ x $\frac{1}{4}$ x $\frac{1}{16}$ in., PTFE	1	C

### Trigger Lock

Item	Part	Description	Quantity	Note
44	336631	KIT, trigger lock, electrostatic	1	
—	-----	• LOCK, trigger, Kinetix	1	
45	985438	• PIN, dowel, 0.094 x 0.438 in., alloy steel, hardened and ground	1	

### Needle Kit

Item	Part	Description	Quantity	Note
2	1094722	KIT, needle, Trilogy	1	
—	1090577	• NEEDLE, potted, solvent	1	
3	1090179	• SPRING, compression, contact, Trilogy	1	

### Ferrule Kit

Item	Part	Description	Quantity	Note
—	1094775	KIT, ferrule, $\frac{3}{8}$ in., low pressure	1	
54	1089413	• NUT, hose, $\frac{3}{8}$ -in.	1	B
55	1090625	• FERRULE, set, 0.375 ID	1	B

## Recommended Spare Parts

Keep the following parts in inventory to avoid unplanned downtime. Quantities listed support a single spray gun. Adjust order quantities based on the number of spray guns in service.

Part	Description	Quantity	Note
336634	KIT, air seal, hotpaint, electrostatic	1	
325657	KIT, air valve	1	
1094777	KIT, cartridge, Trilogy	1	
336631	KIT, trigger lock	1	
1095680	CABLE, 50 ft, Trilogy, manual, 5 conductor	1	
1094722	KIT, needle, Trilogy	1	
336505	KIT, multiplier, 93 kV, Kinetix	1	
336642	WRENCH, Kinetix, combination tool	1	
900349	LUBRICANT, O-ring, (MagnaLube) , 0.75-oz tube	1	
247658	DIELECTRIC GREASE, applicator, 10 cc, 12 count	1	
-----	FLUID TIP	1	A
-----	AIR CAP	1	A
1090743	TUBE, PTFE, $\frac{3}{8}$ in. OD x $\frac{3}{32}$ -in. ID x 0.141-in. wall	1	
1094775	KIT, ferrule, $\frac{3}{8}$ in., low pressure	1	
1094025	POSTER, parts, manual, solventborne, Trilogy	1	
NOTE A: Refer to the <i>Trilogy Airspray Fluid Tip and Air Cap Selection Chart</i> and the <i>Trilogy HVLP Fluid Tip and Air Spray Selection Chart</i> included with this manual for available part numbers and descriptions.			

## Options

### *Air Caps and Fluid Tips*

Refer to the air cap and fluid tip guides included with this manual to select and order air caps and fluid tips for your spray gun:

**TC-09-01 Air Spray Fluid Tips and Air Caps**

**TC-09-02 HVLP Fluid Tips and Air Caps**

### *Adhesives, Sealants, and Lubricants*

Use these adhesives, sealants, and lubricants when repairing your spray gun. Refer to the *Repair or Installation* sections for application instructions.

Part	Description	Quantity
900464	ADHESIVE, threadlocking (Loctite Removable 242)	1
900349	LUBRICANT, PTFE grease, O-ring, (MagnaLube) , 0.75-oz tube	1
247658	DIELECTRIC GREASE, applicator, 10 cc, 12 count	1

## Cable Extension

Part	Description	Quantity	Note
336531	CABLE, 50 ft, electrostatic, extension	1	

## Fluid and Air Hoses and Fittings

Part	Description	Quantity	Note
1092093	HOSE, manual, Trilogy, low pressure, 25 ft, standard	1	
1092092	HOSE, manual, Trilogy, low pressure, 25 ft, solvent resistant	1	
1074130	HOSE, air, w/1/4 in. NPSF fittings, 30 ft, packaged	1	
1074131	HOSE, air, w/1/4 in. NPSF fittings, 50 ft, packaged	1	
1074132	HOSE, air, w/1/4 in. NPSF fittings, 100 ft, packaged	1	
336470	COUPLING, 3/8 in. NPMSM, brass	1	
972637	COUPLING, 3/8 in. NPMSM, brass, nickel plate	1	
336497	STEM, swivel, 3/8 in. NPS, Hosco	1	
336495	CONNECTOR, quick disconnect, 3/8 in. NPS, Hosco	1	
336496	CONNECTOR, circulation, 3/8 in. NPS, PLH-RY-6, stainless steel	1	A

NOTE A: Use to circulate fluid at the gun handle.

## HVLP Compliance Kit

Item	Part	Description	Quantity	Note
—	-----	COMPLIANCE KIT	1	A
1	325643	• GAUGE, air, 1.5-in. diameter, 0–30 psi	2	
2	972937	• CONNECTOR, female, 1/8-in. tube x 1/8-in. NPT	2	
3	-----	• TUBING, 1/8-in. diameter, gray (18 in.)	3	
4	-----	• CAP, compliance, HVLP	1	A
5	971620	• • CONNECTOR, barbed, #3-56 x 1/8 in., brass	2	

NOTE A: Refer to the *Trilogy HVLP Fluid Tip and Air Cap Selection Chart* included with this manual for kit and air cap part numbers.

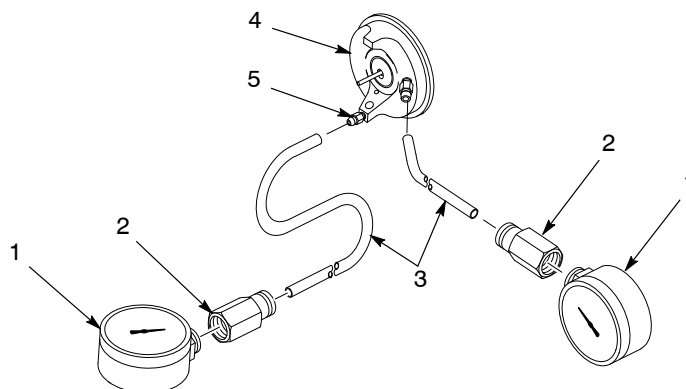
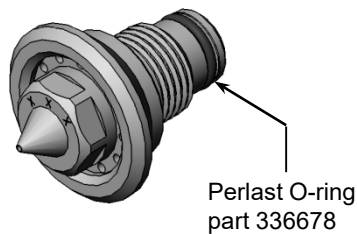


Figure 8-3 HVLP Compliance Kit Parts

FLUID TIPS

- Understand the flow rate required for your application. Flow rate is a function of film build, pattern width, line speed, coating material solids, and gun travel speed.
- After making your initial choice, have the next lower and higher size fluid tip on hand as well.
- Flow-rate the nozzle with the coating material.
- Make sure that the un-atomized fluid stream breaks between 10 and 14 inches. Change the fluid tip to obtain the correct flow rate and fluid stream break instead of increasing or decreasing the fluid pressure.
- All fluid tips include a Perlast O-ring 336678. Optional O-rings are: Kalrez 709774, Hotpaint 940120.

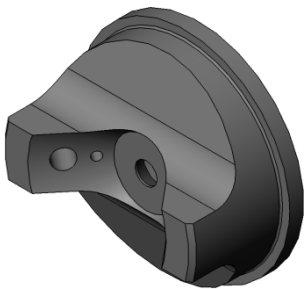


Air Spray Fluid Tip

Part	Orifice Diameter
1089619*	0.012
1089631*	0.020
1089632	0.030
1089634	0.040
1089635	0.046
1089636	0.059
1089637	0.070
1089638	0.080
1089639	0.090
1089641	0.100

\* These fluid tips are intended for use with Trilogy waterborne guns only.

AIR CAPS

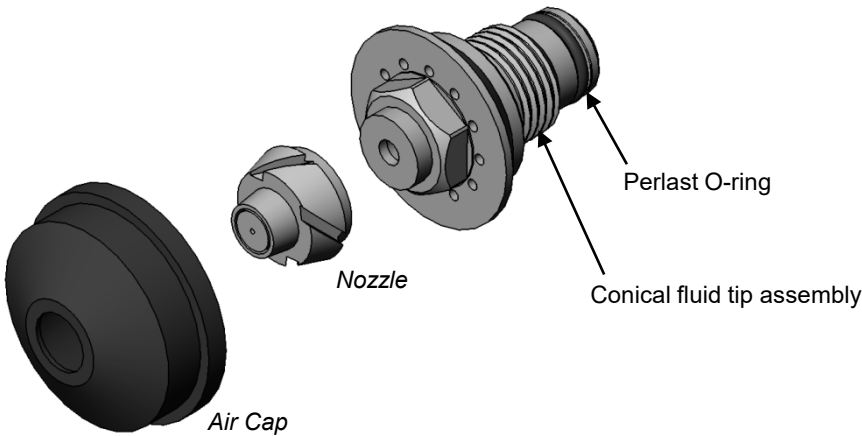


Air Spray Air Cap

AIR CAP	AIR CAP MARKING	ATOMIZATION AIR PRESSURE	SCFM	FLOW RATE	FAN WIDTH PATTERN	USAGE
245985	985	Less than 2.41 bar (35 psi)	8.2 @ 20 psi	0.059–0.295 l/min (2–10 oz/min)	15.24–30.48 cm (6–12 in.)	Universal air cap; low flow rates
245986	986	2.07–4.14 bar (30–60 psi)	12 @ 40 psi	0.236–0.355 l/min (8–12 oz/min)	30.48–45.72 cm (12–18 in.)	Medium flow rates
245987	987	1.38–4.14 bar (20–60 psi)	16 @ 40 psi	0.296–0.592 l/min (10–20 oz/min)	30.48–45.72 cm (12–18 in.)	High flow rates, must use for fluid tips 0.80 in. and larger
245988	988	Less than 2.41 bar (35 psi)	12 @ 40 psi	0.059–0.326 l/min (2–11 oz/min)	30.48–45.72 cm (12–18 in.)	Low flow rates, high solids or metallics
1092156	991	Less than 2.76 bar (40 psi)	8 @ 15 psi	0.059–0.326 l/min (2–11 oz/min)	Less than or equal to 40.64 cm (16 in.)	Low flow rates, high viscosities
1092157	992	Less than 2.76 bar (40 psi)	8 @ 15 psi	0.059–0.326 l/min (2–11 oz/min)	Less than or equal to 40.64 cm (16 in.)	Low flow rates, high solids or metallics

Conical Nozzle Kits

	10-in. Nozzle Kit 1103490	13-in. Nozzle Kit 1610748
Air Cap	1089649	1089692
Nozzle	247777	247778
Fluid Tip	1103511	1103511
Nozzle Insert	247779	247780
O-Ring	336678	336678



## **Trilogy™ Air Spray Fluid Tip and Air Cap Selection Chart**

---

Refer to the appropriate Trilogy Spray Gun manual for other parts.

---



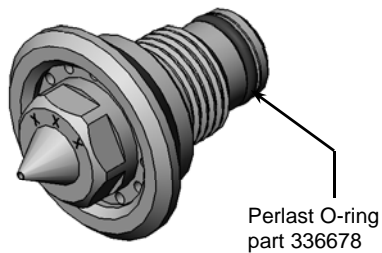


Trilogy™ HVLP Fluid Tip and Air Cap Selection Chart



FLUID TIPS

- Understand the flow rate required for your application. Flow rate is a function of film build, pattern width, line speed, coating material solids, and gun travel speed.
- After making your initial choice, have the next lower and higher size fluid tip on hand as well.
- Flow-rate the nozzle with the coating material.
- Make sure that the un-atomized fluid stream breaks between 10 and 14 inches. Change the fluid tip to obtain the correct flow rate and fluid stream break instead of increasing or decreasing the fluid pressure.
- All fluid tips include a Perlast O-ring 336678. Optional O-rings are: Kalrez 709774, Hotpaint 940120.

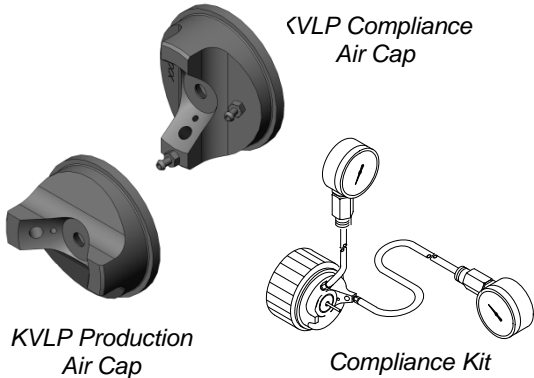


HVLP Fluid Tip

Part	Orifice Diameter
1089574	0.030
1089575	0.035
1089576	0.040
1089577	0.050
1089578	0.060
1089579	0.070
1089580	0.080
1089581	0.100

AIR CAPS

- A larger air cap will provide lower cap pressures and higher air flow, but may yield coarser atomization.
- Lower air cap pressures produce a softer spray and theoretically, improved transfer efficiency.
- Smaller air caps will produce finer atomization.
- Smaller air caps will require higher air cap pressures to atomize.
- Smaller fluid tips will work best with smaller air caps.
- Larger fluid tips will work best with larger air caps.
- As the fluid tip ID increases, the airflow through the atomizing section of the air cap decreases, as a result, there is less air available for atomization.
- Higher viscosity coatings and higher flow rates require more airflow for atomization.
- Atomizing air and horn air are completely independent in automatic spray guns.



DESCRIPTION	PART
General purpose air caps	1092132
	1092133
	1092134
Very light viscosity, low solids air caps	1092119
	1092130
	1092131
Heavy viscosity, high solids, high flow	1092135
	1092137
	1092138

AIR CAP LOCATER	COATING CHARACTERISTICS	MAXIMUM AIRFLOW (SCFM)	TYPICAL COATINGS
A	Very light viscosity, very low solids, (<25%) Low flow (<5 oz/min)	10–12	Stains, wash primers, bleaches, fine finish
B	Light viscosity, low solids (25–30%) Low flow (<5 oz/min) to medium flow (5–10 oz/min)	13–15	Stains, wash primers, ADPRO, lacquer clear coat, fine finish
C	Light viscosity, low solids (25–30%) Medium flow (5–10 oz/min)	17–20	Primers, ADPRO, lacquer clear coat, metallics, solid colors, enamels, urethanes, waterbornes
	Medium viscosity, medium solids (30–50%) Low flow (<5 oz/min)		
D	Medium viscosity, medium solids (30–50%) Medium flow (5–10 oz/min) to high flow (10–20 oz/min)	22–25	Metallics, solid colors, enamels, urethanes, waterbornes, plural component, corrosion protection
	Heavy viscosity, high solids (>75%) Low flow (<5 oz/min)		
E	Medium viscosity, medium solids (30–50%) High flow (10–20 oz/min) to very high flow (>20 oz/min)	28–34	High solids enamels and urethanes, high solids waterbornes, plural component, corrosion protection
	Heavy viscosity, high solids (>75%) Medium flow (5–10 oz/min) to high flow (10–20 oz/min)		
X	Not recommended		

AIR CAP PART NUMBER (Atomizing Air Hole Diameter in inches)									
Tip Orifice (inches)	1092119 (0.140)	1092130 (0.150)	1092131 (0.160)	1092132 (0.170)	1092133 (0.190)	1092134 (0.210)	1092135 (0.230)	1092137 (0.250)	1092138 (0.270)
0.030	A	A	B	B	C	D	E	X	X
0.035	A	A	B	B	C	D	E	E	X
0.040	A	A	B	B	C	D	E	E	E
0.050	A	A	A	B	C	C	D	E	E
0.060	X	A	A	A	B	C	D	E	E
0.070	X	X	A	A	B	C	D	E	E
0.080	X	X	X	A	B	C	D	E	E
0.100	X	X	X	X	X	B	C	D	E
Compliance Air Cap	1094642	1094643	1094644	1094645	1094646	1094647	1094648	1094649	1094650
NOTE: Compliance air caps are modified caps for testing air pressure ONLY.									
Compliance Kits	1094668	1094669	1094680	1094681	1094682	1094683	1094684	1094685	1094686
NOTE: Compliance kits include caps, gauges, and air tubing. Compliance kits are modified for testing ONLY.									

## Trilogy™ HVLP Fluid Tip and Air Cap Selection Chart

---

Refer to the appropriate Trilogy Spray Gun manual for other parts.

---

