INSTRUCTIONS–PARTS LIST

307–978

This manual contains IMPORTANT WARNINGS AND INSTRUCTIONS
READ AND RETAIN FOR REFERENCE

Rev. L
Supersedes J
Includes K

ELECTROSTATIC AIR SPRAY
WATER-BASE SYSTEM

Model PRO 3500WB™ Air Spray Gun
U.S. PATENT NO. D313,064; 4,978,075

Model WB3500™ Voltage Control

For use with Electrostatic Air Spray Systems when spraying conductive, water-based fluids having flash points above 140° F (60° C) and a maximum 20%, by weight, organic solvent concentration.

COMPONENTS OF THE PRO 3500WB SYSTEM
ISOLATION STAND **Part No. 223–445;** 15 gallon (57 liters) **Part No. 727–212;** 55 gallon (209 liters)
WB3500 VOLTAGE CONTROL **Part No. 223–477**
PRO 3500WB SPRAY GUN WITH AIR & FLUID HOSES **Part No. 223–518;** 25 ft (7.6 m) hose length **Part No. 223–519;** 36 ft (11.0 m) hose length **Part No. 223–520;** 50 ft (15.3 m) hose length
SAFETY FENCE **Part No. 110–614**
CONVERSION KIT **Part No. 223–114**
GUN HOLSTER **Part No. 236–090**

Factory Mutual System Approved

NOTE: See the **PARTS DRAWINGS** and **LISTS** for a complete list of part numbers.

CONTENTS

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

WARNINGS

SERIOUS BODILY INJURY, EXPLOSION, FIRE, OR ELECTRIC SHOCK CAN OCCUR IF THE PRECAUTIONS BELOW ARE NOT FOLLOWED.

READ AND UNDERSTAND ALL INSTRUCTION MANUALS, TAGS, AND WARNING LABELS BEFORE OPERATING EQUIPMENT.

ELECTROSTATIC EQUIPMENT SHALL ONLY BE USED BY TRAINED, QUALIFIED PERSONNEL WHO SHALL BE FULLY CONVERSANT WITH THE REQUIREMENTS STATED WITHIN THIS INSTRUCTION MANUAL.

FIRE, EXPLOSION, OR ELECTRIC SHOCK HAZARD

This system is designed to be used ONLY to dispense water-base fluids, with flashpoints above 140° F (60° C) and less than 20%, by weight, organic solvent concentration. When spraying water-base fluid electrostatically, the entire fluid supply is isolated from ground to maintain voltage at the tip of the gun. To reduce the risk of fire, explosion, or electric shock, which may result from electrical discharge:

- Ground the electrostatic system.
- Ground all personnel in or close to the spray area.
- Ground all electrically conductive objects or devices in the spray area, including paint containers, wash cans and tools.
- Electrically connect a metal part of the fluid supply unit to the voltage control.
- Enclose the fluid supply in a safety fence that prohibits personnel from approaching the fluid supply before discharging the system.
- Do not touch the gun nozzle or come within 4 in. (101.6 mm) of the nozzle during gun operation or for 30 seconds after operation stops to allow the voltage to discharge through the voltage control. It is recommended that the operator hold the gun in hand or hang it in the gun holster during this 30 second period. See **ACCESSORIES** to order the gun holster.

When operating the electrostatic gun, any ungrounded objects in the spray area (such as people, containers, tools, etc.) can become electrically charged. Arcing may occur if these objects then come in contact or close to ground.

Static electricity can also be generated by flow of fluid through the fluid supply unit, hose, gun, and nozzle, but it is dissipated through proper grounding as described in **Grounding**, below.

If you experience any arcing or feel even a slight shock, **STOP SPRAYING IMMEDIATELY**. Check for proper grounding of the entire system. Be sure you have corrected the problem before starting to spray again.

Grounding

The following are minimum requirements for grounding a basic electrostatic system. Your system may include other equipment or objects which must also be grounded. Always check your local electrical code for detailed grounding instructions. Be sure your system is connected to a true earth ground.

1. *Air compressors and hydraulic power supplies:* ground according to the manufacturer's recommendations.
2. *Gun Air Supply Hose:* use ONLY Graco Electrically Conductive Air Supply Hose as specified in this manual; see the **ACCESSORIES** section to order. Connect the air hose ground cable to a true earth ground.
3. *Electrostatic Air Spray Gun:* obtain grounding through connection to a properly grounded Graco Electrically Conductive Air Supply Hose.
4. *Voltage Control:* electrically connect to a true earth ground.
5. *Safety Fence:* electrically connect to a true earth ground.
6. *Grounding Rod:* electrically connect to a true earth ground.
7. *Object being sprayed:* keep the work piece hangers clean and grounded at all times. Contact points must be sharp points or knife edges.
8. *All persons entering the spray area:* shoes must have conductive soles, such as leather, and personal grounding straps must be worn. Rubber or plastic soles are not conductive. The operator must not wear gloves which insulate the hand from the spray gun. The gloves must be conductive or modified as shown on page 12.
9. *The floor of the spray area* must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.
10. *All electrically conductive objects or devices* in the spray area, including paint containers and wash cans, must be properly grounded.
11. *All solvent pails:* use only grounded metal pails, which are conductive. Do not place the pail on any non-conductive surface, such as cardboard or paper, which would interrupt grounding continuity.

Isolate High Voltage Equipment

The fluid supply MUST be isolated from all personnel. Place a safety fence around the fluid supply to ensure it is safely isolated. A *safety fence air line interlock* MUST be installed to shut off the high voltage anytime the gate is opened. See the **TYPICAL INSTALLATION** drawing and read and follow the **INSTALLATION** instructions.

FIRE, EXPLOSION, OR ELECTRIC SHOCK HAZARD

Voltage Discharge Procedure

To reduce the risk of electric shock, which could cause serious injury, ALWAYS follow this procedure when entering the safety fence.

1. Disengage the air line interlock. This will turn off the air to the gun and trigger the dump switch to discharge the electrical charge.
2. Enter the safety fence area and remove the grounding rod from the fence. Grasp the grounding rod by the hook end of the handle. Touch the exposed wire of the grounding rod to a metal surface of the fluid source; see Fig 10, page 13. If an arc is detected, correct the problem before doing anything further with the system. See **TROUBLESHOOTING** on page 21.
3. Before leaving the safety fence, ALWAYS make sure that the paint source is connected to the voltage control.

Flushing and Cleaning Safety

To reduce the risk of static sparking or splashing, always follow the ***Pressure Relief Procedure***, below, before flushing.

Be sure the spray gun ES valve lever is OFF and the equipment has been properly grounded before flushing or cleaning any part of the spray system.

Use the lowest possible pressure to flush. Trigger the gun into a *grounded* metal waste container.

ALWAYS use solvents with a flash point above 140° F (60° C) to flush, purge, or clean the gun or spray system.

ALWAYS remove all solvent from the system before reactivating the spray gun.

Use only non-sparking tools to clean residue from the booth and hangers.

Ventilate the Spray Booth

To prevent hazardous concentrations of toxic and/or flammable vapors, spray only in a properly ventilated spray booth.

Check and follow all National, State and Local codes regarding air exhaust velocity requirements. Check and follow all local safety and fire codes and OSHA standard 1910.107.

NEVER operate the spray gun unless the ventilating fans are operating.

EQUIPMENT MISUSE HAZARD

General Safety

Any misuse of the spray equipment or accessories, such as over pressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in serious bodily injury, fire, explosion or property damage.

NEVER point the spray gun at anyone or at any part of the body.

NEVER put hand or fingers over the spray nozzle.

ALWAYS follow the ***Voltage Discharge Procedure*** and ***Pressure Relief Procedure***, at right, before cleaning or removing the fluid nozzle or servicing any system equipment.

NEVER try to stop or deflect leaks with your hand or body.

NEVER alter or modify any part of this equipment; doing so could cause it to malfunction.

NEVER enter a high voltage or hazardous area until after all high voltage equipment has been discharged. A *safety fence air line interlock* MUST be installed to shut off the high voltage anytime the gate is opened.

CHECK all spray equipment regularly and repair or replace worn or damaged parts immediately.

System Pressure

This system has a *MAXIMUM WORKING PRESSURE* of 100 psi (7 bar). Never exceed the maximum working pressure of any component or accessory used in the system.

Fluid Compatibility

Only use fluids having flashpoints above 140° F (60° C) and less than 20%, by weight, organic solvent concentration. BE SURE all fluids and solvents used are chemically compatible with wetted parts in your system. (The gun wetted parts are listed on the back page.) Always read the fluid and solvent manufacturer's literature before using the fluid or solvent in the system.

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including splashing in the eyes or on the skin, injury from moving parts or electric shock, ALWAYS follow this procedure when shutting off the system, when checking or servicing any part of the spray system, when installing, cleaning or changing fluid nozzles, and whenever you stop spraying.

1. **Turn the spray gun ES On-Off valve lever to OFF.**
2. Follow the ***Voltage Discharge Procedure***, above.
3. Turn off the fluid supply to the gun.
4. Trigger the gun into a *grounded* metal waste container to relieve air and fluid pressure.
5. Relieve fluid pressure in the fluid supply unit as instructed in your fluid supply unit manual.

HOSE SAFETY

TIGHTEN all fluid connections securely before each use.

HANDLE AND ROUTE HOSES CAREFULLY. The fluid hose MUST be routed over head from the safety fence to the spray area. Do not pull on hoses to move equipment.

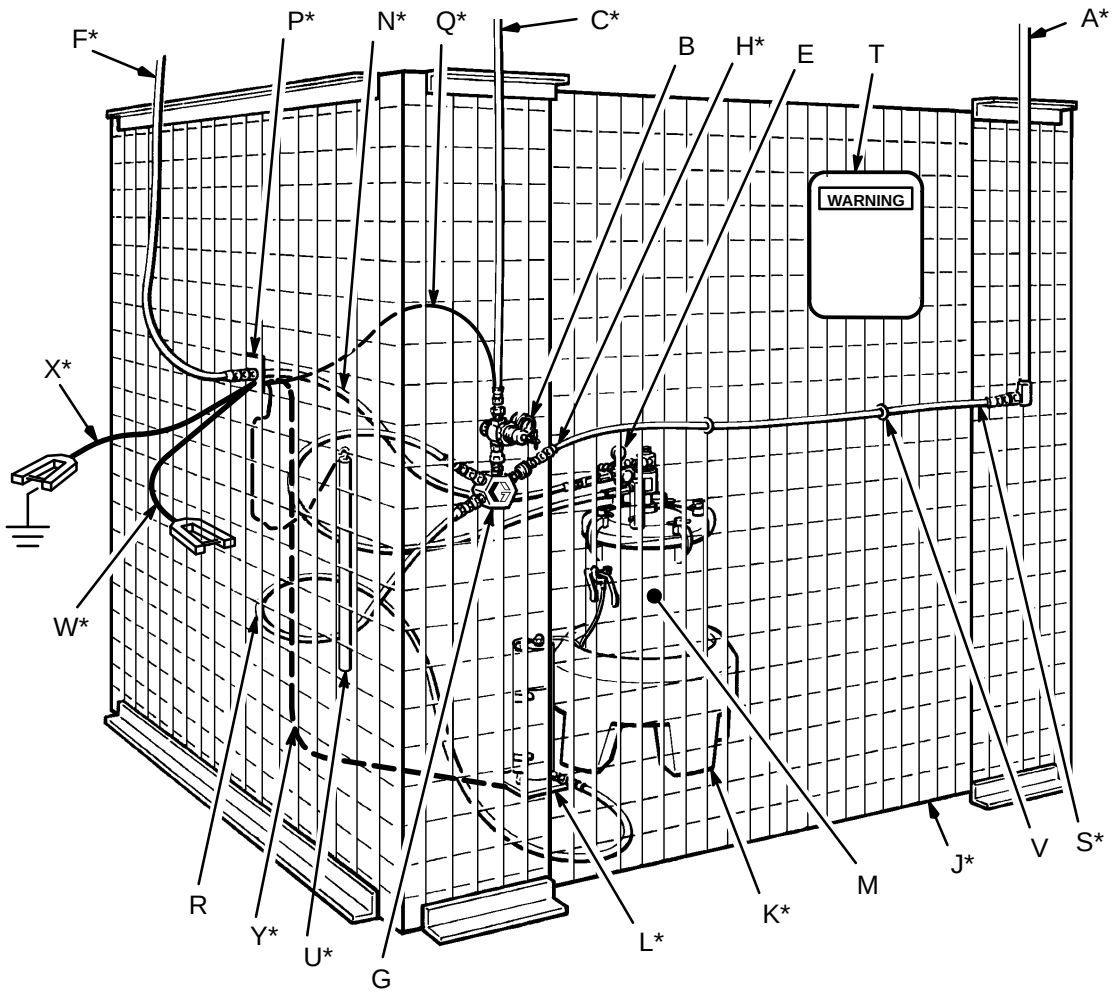
DO NOT use fluids or solvents that are not compatible with the inner tube and cover of the hose. Read ***Fluid Compatibility***, above, and refer to the hose description in **ACCESSORIES** on page 42.

NEVER use a damaged hose. Before each use, check the entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately.

IMPORTANT

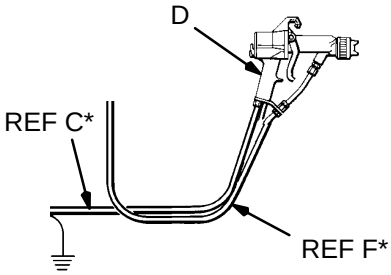
United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards—particularly the General Standards, Part 1910.107 and any other appropriate regulations—should be consulted in connection with the installation, operation, and maintenance of electrostatic spray painting equipment.

TYPICAL INSTALLATION

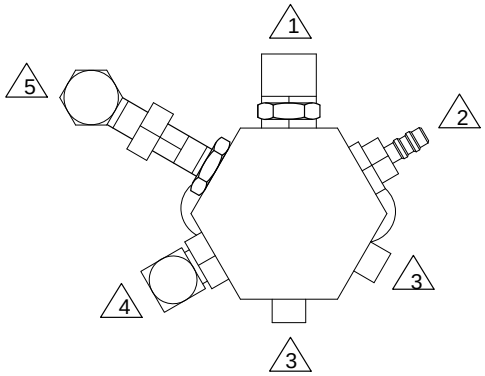


**Equipment that must be installed for safe operation of a water-base system*

SPRAY GUN



AIR MANIFOLD ASSEMBLY



INTRODUCTION

This system is designed to be used ONLY with water-base fluids, with flashpoints above 140° F (60° C) and less than 20%, by weight, organic solvent concentration. When you use conductive, water-base fluids in an electrostatic system, the fluids in the spray gun (D), fluid line (F), and fluid supply unit (M) are charged to high voltage. The entire fluid supply is isolated from ground to maintain voltage at the tip of the gun.

For proper operation and safety, this high voltage MUST be isolated both from ground and from contact with people. The high voltage is isolated from ground by the insulated fluid line (F), isolation stand (K), and voltage control (L). Safety protection is provided by the safety fence (J), air-line interlock (H), and voltage control (L).

1. Gun Grounded Air Supply Hose Connector
2. Safety Fence Air Line Interlock Connector
3. Plug
4. Voltage Control Air Hose Connector
5. Pressure Pot Connector; includes check valve to minimize the volume of air discharged when air line interlock is disconnected

KEY TO TYPICAL INSTALLATION DRAWING

Ref Letter	Part No.	Description	Assembly Included With	See Page
A*	–	Grounded Main Air Supply Line	–	–
B	206–199	Gun Air Pressure Regulator	–	43
C*	235–070 (25') 235–071 (36') 235–072 (50')	Gun Grounded Air Supply Hose	223–518 (25') 223–519 (36') 223–520 (50') See front cover	42
D	222–700	Water-base Electrostatic Spray Gun	223–518 (25') 223–519 (36') 223–520 (50') See front cover	37
E	–	Fluid Supply Air Pressure Regulator	SST Pressure Tanks	42
F*	185–918 (25') 185–919 (36') 185–920 (50')	Gun Insulated Fluid Supply Hose	223–192 (25') 223–193 (36') 223–194 (50')	40
G	223–640	Air Manifold Assembly	223–477	39
H*	–	Safety Fence Air Line Interlock	223–640 See page 39	–
J*	110–614	Safety Fence	–	42
K*	223–445 or 727–212	Isolation Stand	–	41 or 42
L*	223–639	Voltage Control	223–477	39
M	–	Fluid Supply Unit	–	42
N*	208–591	Fluid Supply Unit Non-conductive Air Supply Hose	223–477	39
P*	185–972 & 185–971	Strain Relief/Ground Terminal	223–192 (25') 223–193 (36') 223–194 (50')	40
Q*	–	Gun Air Hose Ground Wire	218–663 (25') 218–664 (36') 218–665 (50')	42
R	223–446	Voltage Control Air Hose	223–477	39
S*	223–447	Safety Fence Interlock Air Hose	223–477	39
T	186–119	Safety Fence Warning Sign	223–477	39
U*	210–084	Grounding Rod	223–477	39
V*	110–790	U-Bolts and Plate	223–477	39
W*	223–685	Fence Ground Wire	223–477	39
X*	223–547	Main Ground Wire	223–477	39
Y*	223–548	Voltage Control Ground Wire	223–639	39

WARNING

A safety fence (J), non-conductive hoses, isolation stand (K), and voltage control (L) **MUST** be installed to isolate the fluid in the fluid line (F), and fluid supply unit (M) from ground and to prevent people from contacting portions of the system that are charged to high voltage. This helps reduce the risk of electric shock, which could cause serious injury.

The Typical Installation shown on page 4 is only a guide for selecting and installing a water-base electrostatic air spray system. It is not an actual system design. The particular type and size system for your operation must be custom designed for your needs. For assistance in designing a system, contact your Graco representative.

WARNING

Installing and servicing this equipment requires access to parts which may cause electrostatic shock or other serious bodily injury if work is not performed properly. **Do not install or service this equipment unless you are trained and qualified.**

Check and follow all local safety and fire codes, NFPA 33, NEC 504 and 516, and OSHA standard 1910.107.

Warning Signs

Mount warning sign 186–118 (included with the spray gun) in the spray area where it can easily be seen and read by all operators. Mount warning sign 186–119 (included with the voltage control) on the safety fence gate, as designated on the bottom of the sign. Additional warning signs are available at no charge. See the spray gun and voltage control **PARTS LISTS** or the **ACCESSORIES** section to order them.

Ventilate the Spray Booth

WARNING

To prevent hazardous concentrations of toxic and/or flammable vapors, spray only in a properly ventilated spray booth. **Never operate the spray gun unless ventilation fans are operating.** The air supply to the gun must be electrically interlocked with the ventilators to prevent operation of the power supply unless ventilating fans are running.

Check and follow all National, State and Local codes regarding air exhaust velocity requirements.

NOTE: High velocity air exhaust will decrease the operating efficiency of the electrostatic system. Air exhaust velocity of 100 ft/min (31 linear meters/minute) should be sufficient.

Install the Safety Fence

Install the safety fence as shown in Fig 1 or an equivalent safety fence as specified below. Anchor the fence to the floor as specified in Fig 2.

Safety Fence Specifications

1. The fence MUST provide at least a 6 x 6 x 6 ft. (1.83 x 1.83 x 1.83 m) protective area. See Fig 1.

2. This area MUST ONLY be accessible through a single gate. This gate MUST be hinged and latched so it only opens outwards.

3. The fence MUST be constructed so it can be bolted to the floor and and can withstand any forces induced by vehicles, equipment, or personnel in the area, without reducing the protection provided. See Fig 2.

4. The fence MUST be constructed so there is no more than 6 inches (152 mm) of clearance between the bottom of any portion of the fence and the building floor.

5. The shape of the mesh pattern in the fence sides and gate is optional, but it MUST restrict a 2.5 inch (64 mm) diameter spherical object from passing through it.

6. The fence MUST be painted a high visibility yellow.

7. A means MUST be provided to connect the fence to true earth ground. There must be electrical continuity between all sides of the fence and the gate.

Install the Isolation Stand

1. Position the isolation stand inside the safety fence. The isolation stand ***MUST*** be placed in the center of the fence so it is a minimum of 20 inches (508 mm) from any side of the fence.

2. To help keep the stand from moving, install one 1/2 inch (13 mm) bolt in the floor in the position of the one hole in the bottom of the isolation stand. Refer to Fig 2 and 3.

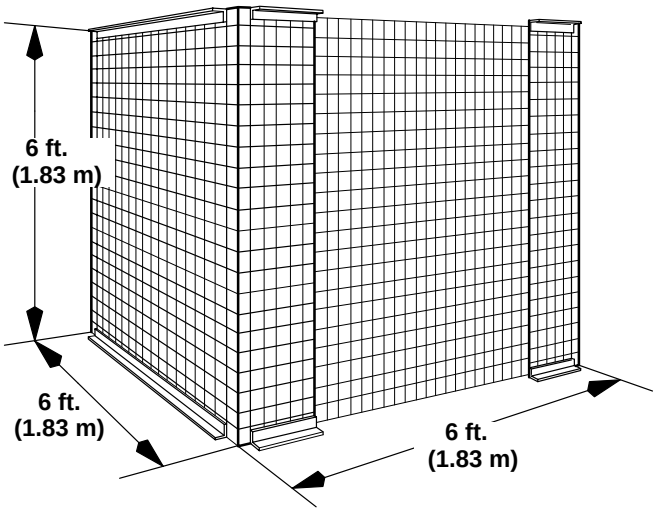


Fig 1

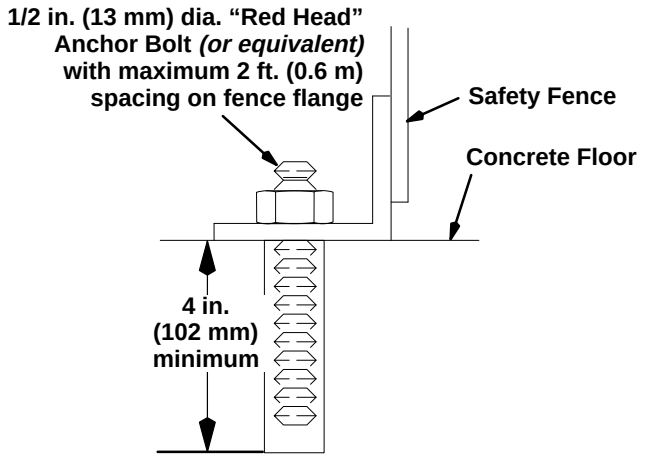
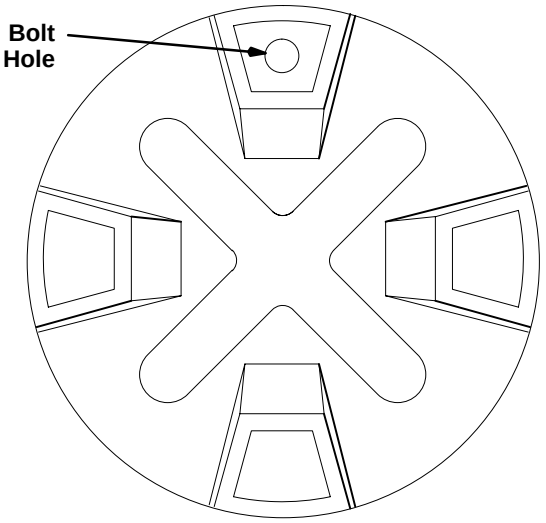


Fig 2



ISOLATION STAND: BOTTOM VIEW

Fig 3

3. Place the isolation stand's bolt hole over the bolt in the floor.

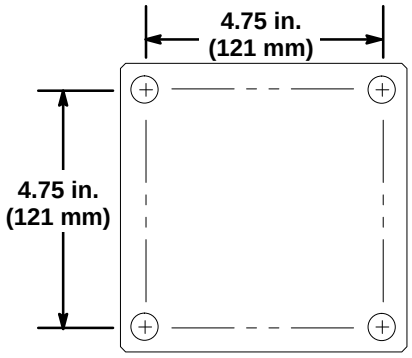
Install the Voltage Control

The voltage control (L) contains a bleed resistor, which continually bleeds current to ground, and a quick-dump switch, which dumps the charge to ground whenever the safety fence air-line interlock (G) is disconnected to open the gate. Refer to the Typical Installation Drawing.

1. Place the voltage control 4 inches (102 mm) from the edge of the isolation stand.

2. Measure the resistance between the isolation stand grounding grate and the voltage control ground. The resistance should be less than 20 ohms.

3. Secure the voltage control to the floor with four 1/2 inch (13 mm) anchor bolts. See Fig 4.



VOLTAGE CONTROL: BOTTOM VIEW

Fig 4

Install the Strain Relief/Ground Terminal and Fluid Hose Assembly

Two plates (311 & 312) are provided to relieve strain and ground the fluid hose conductive hose layer. They also function as a grounding terminal as shown in Fig 6, page 8. Mount the plates, with the fluid hose, to the side of the fence as shown in Fig 5.

Connect the Fluid Hose to the Spray Gun

1. Remove the exhaust tube clamp (67) and air fitting (17) from the spray gun. See Fig 5.

2. Using petroleum jelly, lubricate o-ring (304) on hose barbed insert (301). Then push the hose barbed insert into the gun barrel until the gun barrel is pressed against shoulder of the barbed insert (301).

3. Tighten the fitting (302) until the o-ring on the fitting is compressed to about half its original thickness.

4. Tighten the nut (305) against the fitting (302).

5. Align the bracket (309) holes with the air inlet and exhaust outlet, and secure the bracket with the air fitting (17) and exhaust tube clamp (67).

NOTE: The fluid hose (306) consists of an insulated layer, a conductive layer, and an abrasion-resistant outer layer. The conductive layer is connected to ground at the strain relief/ground terminal (311 & 312) and gun fitting bracket (309).

KEY

17 Air Fitting
67 Exhaust Tube Clamp
301 Barbed Insert
302 Fitting
304 O–Ring
305 Nut
306 Fluid Hose
307 Ferrule
308 Ferrule Housing
309 Gun Fitting Bracket
311/312 Strain Relief/ Ground Terminal Plates

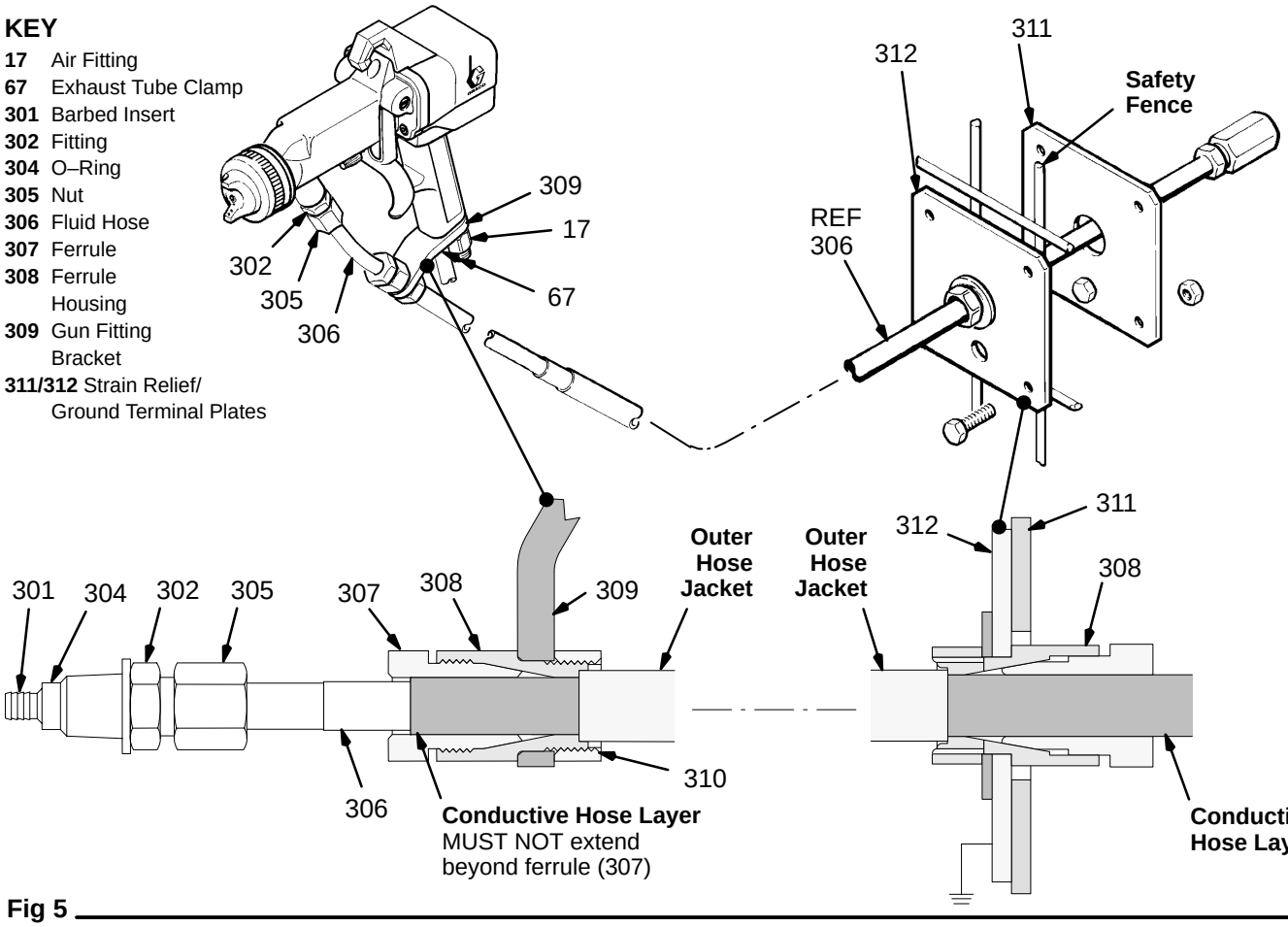


Fig 5

Install the Interconnect Cables

1. Connect the interconnect cable (406) between the terminal block and voltage control. See Fig 6. Fasten the cable in cable clamp to provide strain relief.
2. Connect the voltage control ground cable (127) to the strain relief/ground terminal.
3. Connect the strain relief/ground terminal cable (X) to a true earth ground.
4. Connect the strain relief/ground terminal cable (W) to the safety fence.

Install the Grounding Rod

Connect the grounding rod to the strain relief/ground terminal. See Fig 6. Hook the grounding rod onto the fence near the gate, as shown in Typical Installation.

Install the Fluid Supply Unit

1. Place the fluid supply unit on the isolation stand. See Fig 6.
2. Connect the cable's (405) c-clamp from the isolation stand terminal block to a metal part of the fluid supply unit.

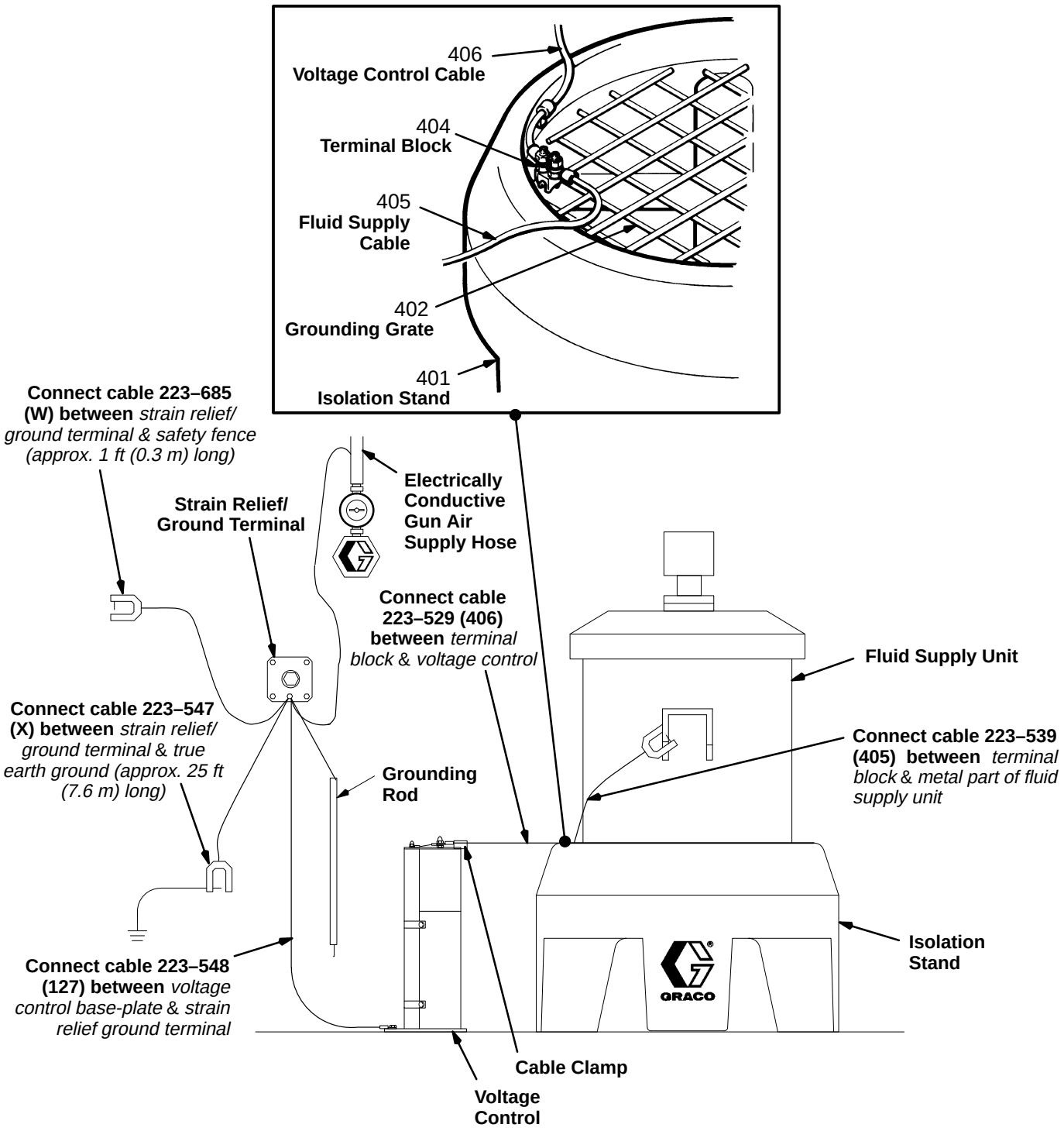


Fig 6

Install the Air Line Interlock

Install the air line interlock. Use the u-bolts and brackets to secure the air line in place. Mount the air manifold to the safety fence. See Typical Installation.

WARNING

Never tamper with or bypass the air-line interlock as this could cause electric shock and result in serious injury.

Connect the Air Lines

1. Connect the 1/4 in. ID nylon *non-conductive* air hose (N) between the air manifold and the fluid supply. Refer to the **TYPICAL INSTALLATION** drawing on page 4.

2. Connect the 3/8 in. ID air hose (S) between the main air supply line and the air manifold air line interlock fitting.

3. Connect the 5/16 in. ID air hose (R) between the air manifold and the voltage control air inlet.

4. Install a bleed-type air regulator on the fluid supply unit and gun air supply lines to control air pressure to the fluid supply unit and gun.

5. Connect the gun's *electrically conductive* air supply hose (C) between the air regulator and the gun's air inlet. (The gun air inlet fitting has a left hand thread.) Connect the air supply hose ground cable (Q) to the strain relief/ground terminal.

WARNING

To reduce the risk of electric shock or other serious bodily injury, the gun air supply hose must be electrically connected to a true earth ground. **Use Only Graco Electrically Conductive Air Supply Hose**, as specified in the **ACCESSORIES** section of this manual. This hose, and the gun, have special threads which prevent using any other type of hose with the gun.

6. Install an air line filter and an air and water separator on the air line to ensure a dry, clean air supply to the gun. Dirt and moisture can ruin the appearance of your finished workpiece and can cause the gun to malfunction. A combination air filter/moisture separator is shown in the **ACCESSORIES** section.

7. Install a bleed-type air shutoff valve on the main air line and the fluid supply unit line to shut off air to the fluid supply unit and/or gun(s). Install an additional bleed-type valve on each fluid supply unit's air supply line to relieve air trapped between this valve and the fluid supply unit after the air regulator is shut off.

WARNING

The *bleed-type air shutoff valve* is required in your system to relieve air trapped between this valve and the fluid supply unit after the air regulator is closed. Trapped air can cause the gun to spray unexpectedly, which could result in serious bodily injury, including splashing in the eyes or on the skin and injury from moving parts.

8. Install an air shutoff valve on each gun air supply line to shut off air to the gun(s).

Connect the Fluid Line

1. Install a fluid regulator (E) on the fluid line to control fluid pressure to the gun.

2. Install a fluid filter at the fluid supply unit outlet.

3. Connect the fluid line to the fluid supply unit.

Check the Electrical Grounding

WARNING

Proper electrical grounding of your system is essential. For your safety, read the warning section, **FIRE, EXPLOSION, OR ELECTRIC SHOCK HAZARD**, on page 2. Ground the system as explained there. Then check your system as explained below.

1. Turn the gun ES On–Off Valve Lever to OFF *(O)*. See Fig 11, page 14, for the location of the ES On–Off lever.

2. Turn off the air and fluid supply to the gun.

3. Have a qualified electrician check the electrical grounding continuity of the spray gun and air hose.

   a. With the electrically conductive *air hose* connected and properly grounded, use an ohmmeter to measure the resistance between the *gun handle* and a *true earth ground*. See Fig 8.

   b. If the resistance is greater than 100 ohms, check the tightness of the ground connections, and be sure the air supply hose ground cable is connected to a true earth ground. If the resistance is still greater than 100 ohms, replace the air supply hose.

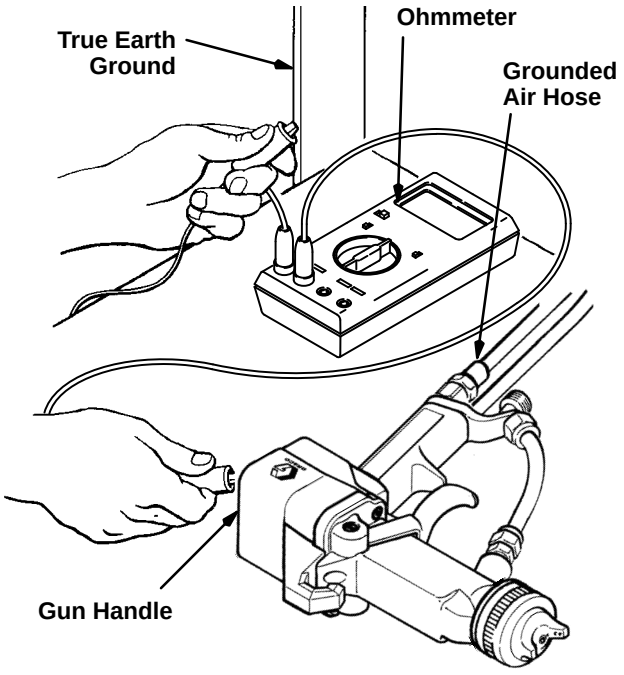


Fig 8

NOTES

Operating Checklist

Check the following list daily, before starting to operate the system, to help ensure safe, efficient operation.

____ 1. Be sure all operators are properly trained to safely operate a water-base electrostatic air spray system.

____ 2. Be sure all operators are trained how to properly and completely relieve system pressure according to the ***Pressure Relief Procedure***, at right.

____ 3. Be sure the system is thoroughly grounded. See **FIRE, EXPLOSION, OR ELECTRIC SHOCK HAZARD**, page 2 and 3, and **Check the Electrical Grounding**, page 10.

____ 4. Be sure the electrostatics are turned off and grounded according to the ***Voltage Discharge Procedure***, at right, when any person enters the safety fence, before cleaning, and before performing any maintenance.

____ 5. Be sure the operator and all persons entering the spray area are properly grounded by wearing shoes with conductive soles and personal grounding straps.

____ 6. Operator must not wear gloves which insulate the hand from the spray gun. If worn, gloves must be conductive or modified as shown in Fig 9 so as not to interfere with operator grounding through the gun.

____ 7. Be sure ventilation fans are operating properly.

____ 8. Be sure the workpiece hangers are clean and grounded. Contact points must be sharp points or knife edges.

____ 9. Be sure all refuse is removed from spray booth.

____ 10. Only fluids having flashpoints above 140° F (60° C) and less than 20%, by weight, organic solvent concentration may be in the spray area.

____ 11. Be sure all conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.

WARNING

To reduce the risk of serious bodily injury, including splashing in the eyes or on the skin, injury from moving parts or electric shock, ALWAYS follow the ***Pressure Relief Procedure***, at right, when shutting off system, when checking or servicing any part of the spray system, when installing, cleaning or changing fluid nozzles, and whenever you stop spraying.

WARNING

To reduce risk of electric shock, which could cause serious injury, ALWAYS follow the ***Voltage Discharge Procedure***, below, when entering the safety fence.

Do not touch the gun nozzle or come within 4 in. (101.6 mm) of the nozzle during gun operation or for 30 seconds after operation stops to allow the voltage to discharge through the voltage control. It is recommended that the operator hold the gun in hand or hang it in the gun holster during this 30 second period. See **ACCESSORIES** to order the gun holster.

Voltage Discharge Procedure

1. **Turn the spray gun ES On-Off valve lever to OFF *(0).*** See Fig 11, page 14.
2. Disengage the air line interlock. This will turn off the air to the gun and trigger the dump switch to discharge the electrical charge.
3. Enter the safety fence area and remove the grounding rod from the fence. Grasp the grounding rod by the hook end of the handle. Touch the exposed wire of the grounding rod to a metal surface of the fluid source; See Fig 10, page 13. If an arc is detected, correct the problem before doing anything further with the system. See **TROUBLESHOOTING** on page 21.
4. Before leaving the safety fence, ALWAYS make sure that the fluid source is connected to the voltage control.

Pressure Relief Procedure

1. **Turn the spray gun ES On-Off valve lever to OFF *(0).*** See Fig 11, page 14.
2. Follow the ***Voltage Discharge Procedure***, above.
3. Turn off the fluid supply to the gun.
4. Trigger the gun into a *grounded* metal waste container to relieve air and fluid pressure.
5. Relieve fluid pressure in the fluid supply unit as instructed in your fluid supply unit manual.

3 in. (76 mm) Square Cut Out and Finger of Glove Cut Off

NOTE: If gloves are worn, they must be conductive or modified as shown so as not to interfere with operator grounding through the gun.

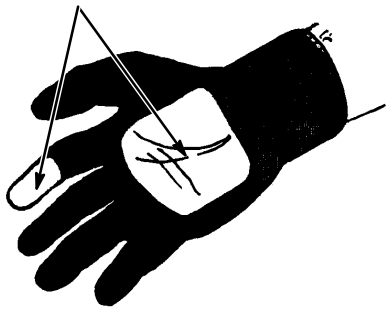


Fig 9

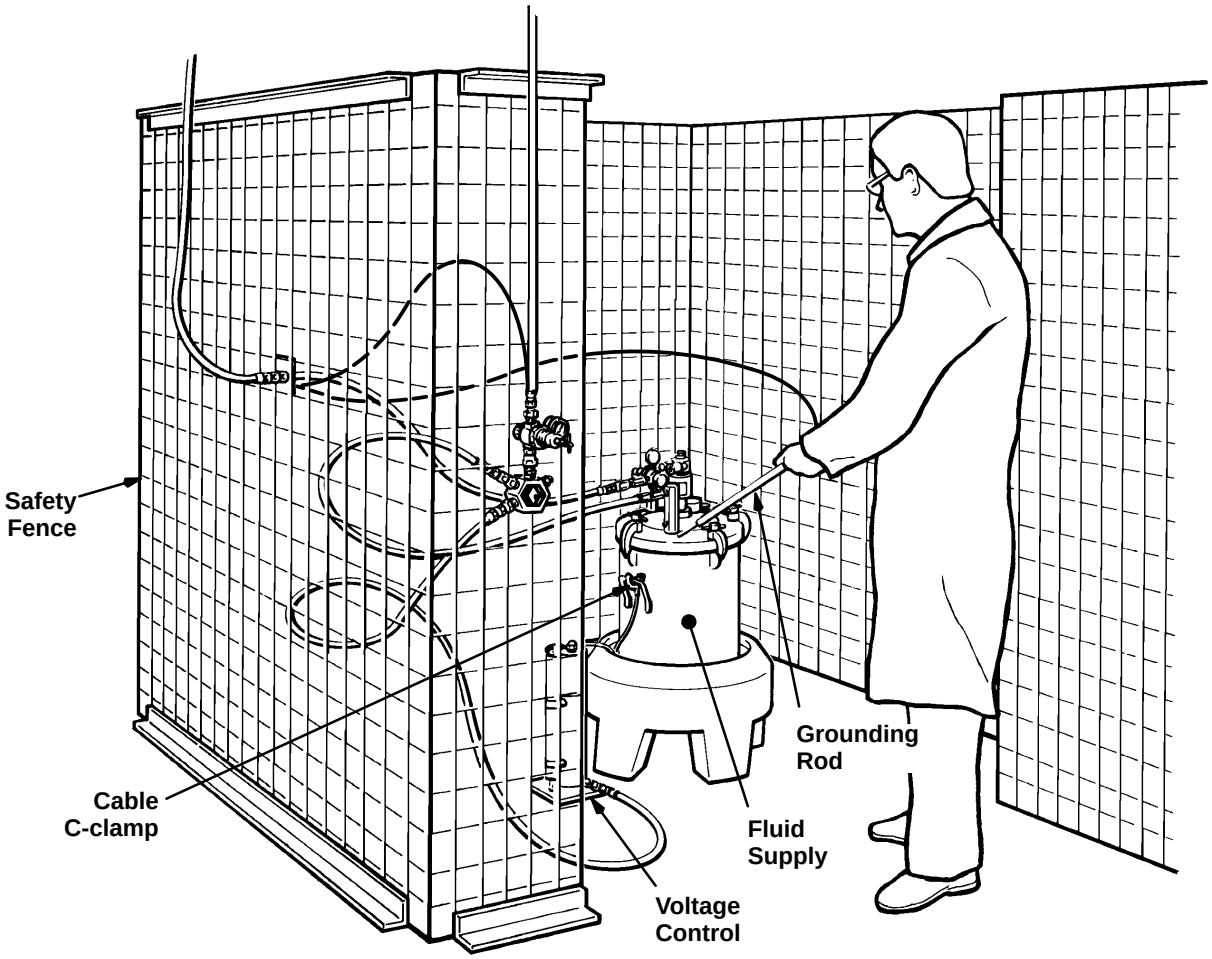


Fig 10

Removing Fluid Supply from Isolated Area

1. Follow the ***Voltage Discharge Procedure*** and ***Pressure Relief Procedure***, on page 12.
2. Disconnect the cable c-clamp from the fluid supply. Refer to Fig 10.
3. Remove the fluid supply.

Placing Fluid Supply in Isolated Area

1. Place the fluid supply on the isolation stand. Refer to Fig 10.
2. Connect the cable c-clamp from the isolation stand terminal to a metal part of the fluid supply.
3. Exit the fenced area.
4. Connect the safety fence gate interlock.

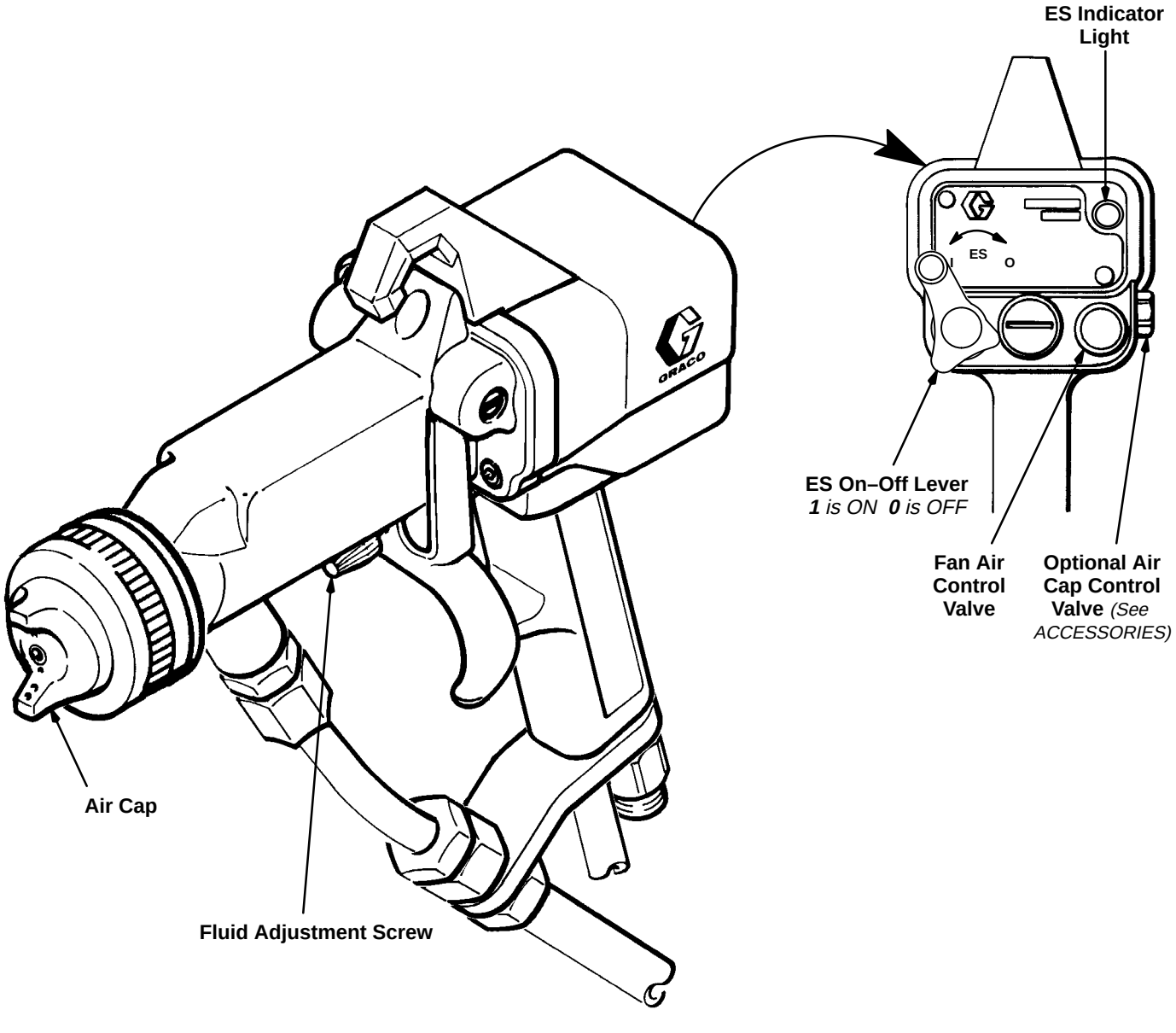

ES Indicator Light
ES
I
O
ES On–Off Lever
1 is ON *0* is OFF
Fan Air Control Valve
Optional Air Cap Control Valve *(See ACCESSORIES)*
Air Cap
Fluid Adjustment Screw

Fig 11

Filter the Fluid

Filter the fluid to remove coarse particles and sediment which could clog the spray nozzle.

Install the Fluid Nozzle and Air Cap

WARNING

To reduce the risk of serious bodily injury, including splashing in the eyes or on the skin or electric shock, always follow the ***Pressure Relief Procedure*** on page 12 before installing, or removing the fluid nozzle/air cap assembly.

Do not touch the gun nozzle or come within 4 in. (101.6 mm) of the nozzle during gun operation or for 30 seconds after operation stops to allow the voltage to discharge through the voltage control. It is recommended that the operator hold the gun in hand or hang it in the gun holster during this 30 second period. See **ACCESSORIES** to order the gun holster.

1. Choose the correct fluid nozzle and air cap combination for your application. See Manual 307–803 to select a fluid nozzle and air cap.

2. **Be sure the spray gun ES On-Off Lever is OFF *(0).*** See Fig 11.

3. Install the air cap and fluid nozzle into the gun barrel as described in ***Air Cap/Nozzle/Resistor Stud Replacement*** on page 24.

Adjust the Spray Pattern

Follow these steps to establish the correct fluid flow and air flow. **DO NOT** turn the ES On-Off lever to ON *(1)* yet:

1. Adjust the fluid flow by using the fluid pressure regulator installed in the fluid line at the pressure source.

NOTE: If the fluid supply is a pump, the fluid regulator **MUST** be installed at the pump outlet, not remote from the pump.

2. First, complete all the checks under the ***Operating Checklist*** on page 12. Then turn the ES On-Off lever to ON *(1)*. When spraying, the *ES indicator light* should glow, indicating the electrostatic charge.

3. Use an air pressure regulator to adjust the degree of atomization. Always use the lowest air pressure possible for the most efficiency.

4. A *minimum* of 2.8 bar (40 psi) air supply is required to ensure full voltage from the power supply. The gun may be operated at a lower air pressure/voltage if required, but may lose some electrostatic wrap.

5. If the flow to the air cap is still excessive after lowering the inlet pressure below 40 psi, the optional *air cap control valve* (see Fig 11) can be installed and used to limit air to the air cap. See **ACCESSORIES.**

6. Use the *fan air control valve* to change the shape of the spray pattern. When increasing to a wide, flat pattern, it may be necessary to increase the supply of fluid to the gun to maintain the same amount of coverage over a large area.

NOTE: See **SPRAY PATTERN TROUBLESHOOTING CHART** on page 18 to correct spray pattern problems.

CAUTION

ALWAYS hang the gun with its nozzle pointing down to avoid having solvent run into the gun air passages. Solvent in the gun air passages can cause poor atomization and excessive current demands and damage the gun.

Daily Care and Cleaning

WARNING

Before checking, adjusting, cleaning, or servicing any part of the spray system, and whenever entering the safety fence, ALWAYS follow the ***Pressure Relief Procedure*** and the ***Voltage Discharge Procedure*** on page 12. This will help reduce the risk of serious bodily injury, including splashing in the eyes or on the skin and injury from moving parts or electric shock.

WARNING

To reduce the risk of fire or explosion, which could cause serious injury and property damage, ONLY use solvents with flashpoints over 140° F (60° C) and with less than 20%, by weight, organic solvent content.

CAUTION

Methylene chloride is not recommended as a flushing or cleaning solvent with this gun as it will damage nylon components.

Immersing the gun in solvent is not recommended as a cleaning method. Solvent left in gun passages could result in a poor quality paint finish and may draw current and reduce the electrostatic effect. Solvent in the power supply cavity can reduce the alternator life.

1. Clean the fluid and air line filters daily.
2. Clean the outside of the gun daily with a soft cloth dampened in a compatible solvent.
3. Clean the air cap and fluid nozzle daily, minimum. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See ***Clean the Air Cap and Fluid Nozzle***.
4. Check all of the work hangers for build-up of material; clean them, if necessary.

Cleaning the Isolation Stand

WARNING

The grounding grate MUST be kept clean to ensure a good ground connection.This helps reduce the risk of electric shock, which could result in serious injury.

Make sure that all the surfaces of the stand are free of paint, including the grounding grate. Refer to Fig 6. Clean with a soft cloth dampened in a solvent that's suitable for use in an electrostatic water-base system.

Cleaning the Voltage Control

Thoroughly clean the outer surfaces of the voltage control with a soft cloth dampened in a solvent that's suitable for use in an electrostatic water-base system.

Clean the Air Cap and Fluid Nozzle

CAUTION

Do not use metal tools to clean the air cap holes as this may scratch them. Scratches in the air cap holes can distort the spray pattern.

Do not use any cleaning method which may allow solvent into the gun air passages. Clogged air passages cause poor atomization and excessive current demands. Point the gun down while cleaning to prevent dirty solvent from running back into the air passages.

WARNING

Do not touch the gun nozzle or come within 4 in. (101.6 mm) of the nozzle during gun operation or for 30 seconds after operation stops to allow the voltage to discharge through the voltage control. It is recommended that the operator hold the gun in hand or hang it in the gun holster during this 30 second period. See **ACCESSORIES** to order the gun holster.

Equipment needed:

Soft bristle brush (supplied).

Solvent compatible with fluid being sprayed.

Procedure:

1. Follow the ***Voltage Discharge Procedure*** and ***Pressure Relief Procedure*** on page 12.
2. Remove the air cap assembly.
3. With the front of the gun pointed down, clean the air cap, fluid nozzle, and front of the gun, using the soft bristle brush and solvent. See Fig 12.
4. Reinstall air cap assembly. Tighten the retaining nut until it is snug, allowing the air cap to turn with resistance.

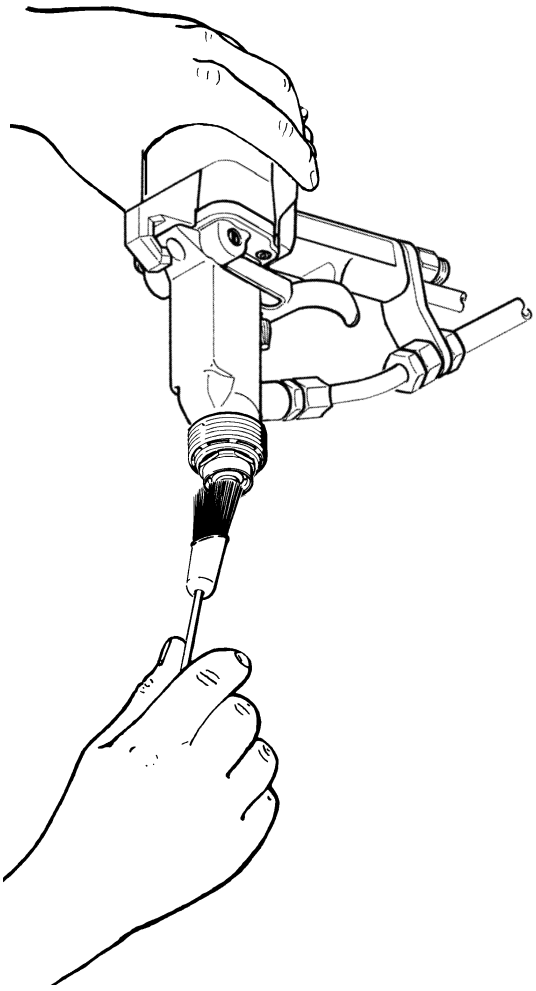


Fig 12

Flush the Spray Gun

WARNING

To reduce the risk of electric shock, which could result in serious injury, the ES On-Off lever must be OFF *(0)* before flushing.

WARNING

To reduce the risk of serious injury and property damage, ONLY use solvents with flashpoints over 140° F (60° C) and with less than 20%, by weight, organic solvent content.

CAUTION

Methylene chloride is not recommended as a flushing or cleaning solvent with this gun as it will damage nylon components.

1. Follow the ***Voltage Discharge Procedure*** and ***Pressure Relief Procedure*** on page 12.
2. Connect the fluid line to the solvent supply unit.
4. Flush the gun with solvent until it is clean.
5. Follow the ***Pressure Relief Procedure***, then disconnect the fluid line from the solvent supply unit.
6. Reconnect the fluid line to the paint/fluid supply unit.
7. Turn on the fluid and air supplies.
8. Trigger the gun until it is clear of solvent.

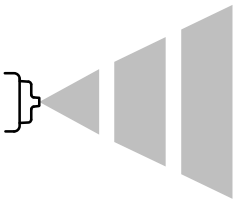
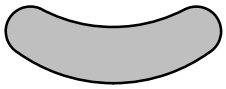
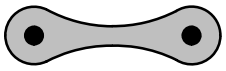
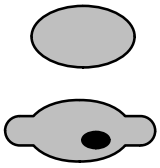
SPRAY PATTERN TROUBLESHOOTING CHART

WARNING

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious bodily injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.

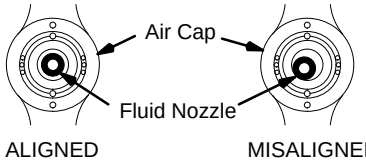
Before checking, adjusting, cleaning, or servicing any part of the spray system, and whenever entering the safety fence, ALWAYS follow the ***Pressure Relief Procedure*** and the ***Voltage Discharge Procedure*** on page 12. This will help reduce the risk of serious bodily injury, including splashing in the eyes or on the skin and injury from moving parts or electric shock.

NOTE: Check all possible remedies in the Troubleshooting Charts before disassembling the gun.

PROBLEM: IMPROPER SPRAY PATTERN	CAUSE	SOLUTION
Fluttering or spitting spray 	Insufficient fluid supply.	Adjust fluid regulator or fill fluid tank.
	Loose fluid nozzle or damaged fluid nozzle taper seat.	Tighten or replace fluid nozzle. See page 24.
	Dirt between fluid nozzle, taper seat and body.	Clean. See page 16.
	Loose or cracked coupler at fluid inlet.	Tighten or repair.
	Loose fluid tube in tank.	Tighten.
	Fluid build-up on air cap; partially clogged horn holes. Full air pressure from clean horn hole forces fan pattern toward clogged end.	Clean with soft implement or submerge in suitable solvent and wipe clean. See page 16.
	Damaged fluid nozzle or air cap holes.	Replace damaged part. See page 24.
	Fluid build-up on the perimeter of fluid nozzle orifice, or partially clogged fluid nozzle orifice	Remove obstruction. Never use wire or hard instruments. See page 16.
	Too high fan air pressure.	Adjust fan air adjusting valve.
	Fluid too thin.	Regulate fluid viscosity.
	Not enough fluid pressure	Increase fluid pressure.
	Low air pressure	Increase air pressure.
	Fluid too thick	Regulate fluid viscosity.
	Too much fluid.	Reduce fluid flow. Reduce fluid pressure on pressure feed guns and/or adjust fluid adjusting screw until proper pattern is obtained.
Streaks 	Last coat of fluid applied too wet.	Apply drier finish with multiple strokes.
	Too much air pressure.	Use least air pressure necessary.
	Insufficient air pressure.	Increase air pressure.
	Non-uniform spray pattern.	Clean or replace air cap. See page 16.

NOTE: Some improper patterns are caused by the improper balance between air and fluid.

GUN OPERATION TROUBLESHOOTING CHART

PROBLEM	CAUSE	SOLUTION
Leakage from fluid packing area.	Loose packing nut.	Tighten. See page 27.
	Worn needle packings or shaft.	Replace needle packings or shaft. See page 27.
Air leakage from front of gun.	Air valve not seating properly.	Clean, service. See page 29.
	Air valve o-ring sticking.	Lubricate o-ring. See page 29.
Fluid leakage from front of gun.	Needle worn or damaged.	Replace needle. See page 27.
	Worn fluid seat.	Replace fluid nozzle and/or electrode. See page 25 and 27.
	Fluid packing too tight.	Lubricate and adjust packing nut. See page 27.
	Loose resistor stud.	Tighten resistor stud. See page 24.
	Loose fluid nozzle.	Tighten fluid nozzle. See page 10.
	Damaged resistor stud o-ring.	Replace o-ring. See page 24.
“Orange Peel” finish.	Insufficient air pressure.	Increase, use least air pressure needed for good results.
	Fluid poorly mixed or filtered.	Remix or refilter fluid.
	Improper thinner being used.	Use proper thinner.
Excessive spray fog.	Too much air pressure.	Reduce,use least air pressure needed for good results.
	Fluid thinned too much.	Properly thin fluid.
No fluid sprays from gun.	Fluid low.	Check, add fluid if necessary.
	Damaged air cap.	Replace air cap. See page 24.
	Dirty or clogged fluid nozzle.	Clean fluid nozzle. See page 16.
	Damaged fluid nozzle.	Check, replace fluid nozzle. See page 24.
Equipment covered with fluid.	Exhaust air flow insufficient or not directed properly.	Check for proper CFM, check baffles and direction of air flow.
	Improper distance between gun and work piece.	Adjust distance to 8 to 12 in. (203 to 305 mm).
Dirty air cap.	Misalignment between air cap and fluid nozzle. 	Remove and clean air cap and fluid nozzle. See page 16. Then reinstall them. Or replace fluid nozzle and air cap. See page 24.

ELECTRICAL TROUBLESHOOTING CHART

PROBLEM	CAUSE	SOLUTION
Low or no electrostatic wrap.	*ES On–Off lever in OFF *(0)* position.	Turn lever to ON *(1)*.
	Improper distance between gun and workpiece.	Adjust spraying distance to 8–12 in. (203–305 mm).
	Parts poorly grounded.	Clean hangers, check for proper ground on conveyer or track.
	High booth exhaust velocity.	Reduce within code limits.
	Atomizing air pressure too high.	Reduce air pressure.
	Fluid pressure too high.	Reduce fluid pressure.
	Improper fluid viscosity.	Check supplier for proper fluid for water-base electrostatic spray.
	*Turbine alternator not operating	Check if ES On-Off lever is ON *(1)*. Check air supply to gun. Check for dirt or moisture in turbine. See page 28.
	Faulty gun resistance.	Check gun resistance. See page 22.
	Faulty resistor stud resistance.	Check resistor stud resistance. See page 23.
	Fluid leaks from needle packing and causes short.	Clean needle cavity, tighten or replace packing. See page 27.
	*Faulty turbine alternator.	Be sure plug is in place on back of turbine alternator housing. Remove and test turbine alternator. See page 28.
	Isolation stand voltage control not actuating to isolate fluid supply when gun is triggered or actuated.	Check operation of voltage control quick dump switch. Replace if defective.
	Fluid hose breakdown.	Replace fluid hose, if damaged.
	Fluid hose shorting to ground.	Support fluid hose away from ground.
	Conductive air hose used from fluid supply unit to grounded air supply.	Must use non-conductive air hose.
	Air supply for gun taken from isolated fluid supply using conductive air hose.	Must use non-conductive air hose.
	Excess moisture in air lines.	Use air filter-moisture separator.
	Voltage control dump switch closed.	Air pressure below 30 psi (bar). Adjust the inlet air pressure.
	Bleed resistor shorted.	Voltage control seals damaged. Replace seals. See page 31.
	Isolation stand too close to fence.	Replace voltage control bleed resistor.
	Voltage control too close to fence.	Center isolation stand in safety fence. See page 6.
		Locate voltage control in safety fence as described on page 7.

**ES indicator light not on when gun is triggered.*

ELECTRICAL TROUBLESHOOTING CHART

PROBLEM	CAUSE	SOLUTION
Arc detected with grounding rod.	Voltage control not connected to isolation stand.	Connect voltage control to isolation stand terminal as shown on page 8.
	Fluid supply not electrically connected to isolation stand terminal.	Connect fluid supply to isolation stand terminal as shown on page 8.
	Isolation stand making poor electrical contact with fluid container.	Clean grate and/or fluid container. Check connection between terminal block and fluid supply. See page 8.
	Air interlock by-passed.	NEVER by-pass air line interlock. See page 4.
	Dump switch open.	Voltage control seals damaged. Replace seals. See page 31.
Operator gets mild shock.	Operator not properly grounded or is in contact with ungrounded object.	Be sure floor is properly grounded. Wear shoes with conductive soles or wear personal grounding straps. Be sure operator is not in contact with or carrying any metallic items which could build up electrical charge. If worn, a glove must be conductive or modified as shown on page 12.
	Gun not properly grounded.	See **Check the Electrical Grounding**.
Operator gets mild shock when touching workpiece.	Workpiece not properly grounded.	Clean workpiece hangers. Check for proper ground on conveyor or track.

SPRAY GUN ELECTRICAL TESTS

The performance of the spray gun is directly affected by the condition of the electrical components contained inside the gun. The electrical tests below can be used to determine the condition of the power supply (18) and the resistor stud (22) as well as the continuity of the electrical path between the components.

Use megohmmeter 218–979 (see **ACCESSORIES**) and an applied voltage of 500 volts to complete these electrical tests. Connect the leads as shown.

WARNING

To reduce the risk of sparking, which could cause fire, explosion, or electric shock and result in serious bodily injury, **DO NOT** use the megohmmeter in the hazardous area. Remove the gun from the hazardous area before testing it.

Test Gun Resistance

Remove the air cap, nozzle, and resistor stud. See ***Air Cap/Nozzle/Resistor Stud Replacement***. Measure the resistance between the metal contact pin (C) and the gun air inlet fitting (17). See Fig 13.

The resistance should be between 157.5 to 192.5 megohms. If the resistance is outside the specified range, go to the next test. If the resistance is correct, test the resistor stud resistance as shown on page 23.

Test Power Supply Resistance

Remove the power cartridge from the gun handle (7). See ***Power Cartridge Replacement***.

Remove the turbine alternator (37) from the power cartridge. See ***Turbine Alternator Removal***.

Measure the resistance from the power supply's ground contact point (EE) to the contact spring (18c) on the other end of the power supply. See Fig 14.

The resistance should be 157.5 to 192.5 megohms. If the resistance is outside the specified range, the power supply is defective and must be replaced. If the resistance of the power supply is correct, proceed to the next test.

If you still have problems, refer to the **ELECTRICAL TROUBLESHOOTING CHART** for other possible causes of poor performance, or contact the nearest authorized service agency.

KEY

A Megohmmeter
C Metal Contact
17 Air Fitting

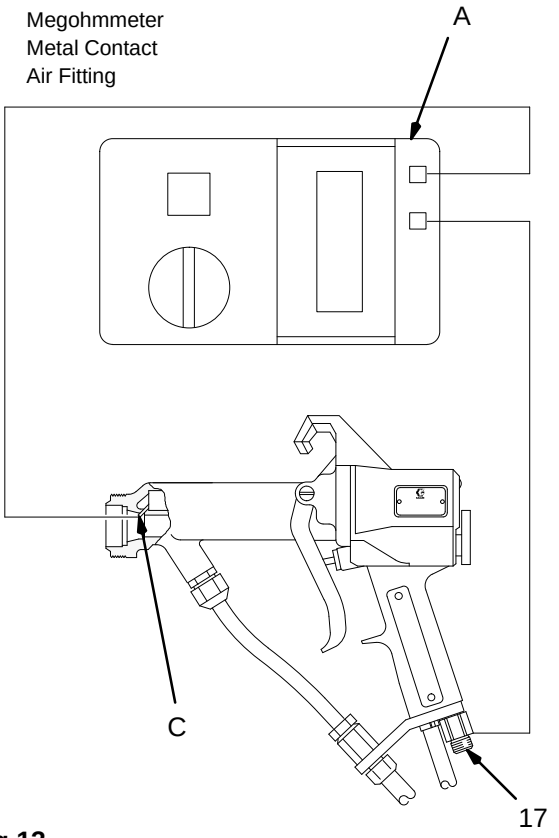


Fig 13

KEY

A Megohmmeter
18 Power Supply
18c Contact Spring
EE Ground Contact Point

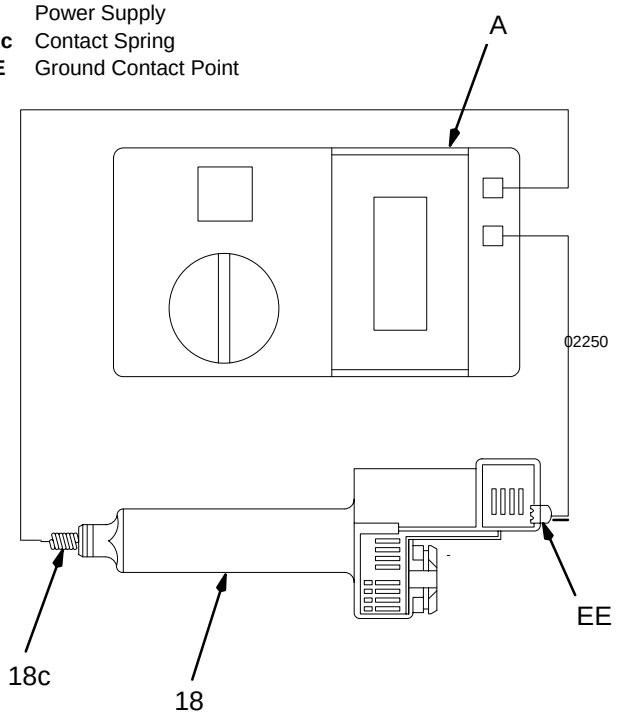


Fig 14

Test Resistor Stud Resistance

Remove the resistor stud. See ***Air Cap/Nozzle/Resistor Stud Replacement***. Check the resistance between the black resistor stud contact ring (D) and the needle contact ring (E). Refer to Fig 15. You may have to press down on the contact ring (D) in several places to get a good reading.

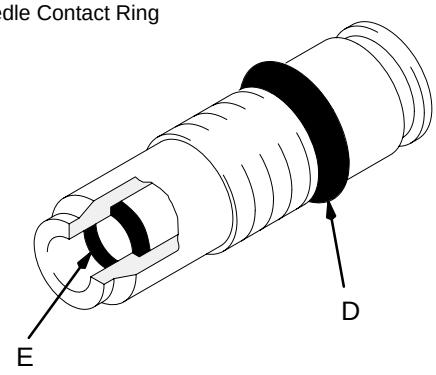
The resistance should be 22.5 to 27.5 megohms. If the resistance is correct, make sure the metal contact (C) in the barrel and the needle contact wire (E) are clean. If the resistance is outside the specified range, the resistor is defective and the resistor stud (22) must be replaced. See ***Air Cap/Nozzle/Resistor Stud Replacement***.

WARNING

The resistor stud contact ring (D) is a conductive contact ring, NOT a sealing o-ring. To reduce the risk of sparking, which could cause fire, explosion, or electrostatic shock and result in serious injury, **DO NOT** remove the resistor stud contact ring (D) from the resistor stud or operate the gun without the contact ring in place. **DO NOT** replace the resistor stud with anything but a genuine Graco part.

KEY

D Resistor Stud Contact Ring
E Needle Contact Ring



0442

Fig 15

Gun Disassembly

WARNING

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious bodily injury if the work is not performed properly.

1. Do not install or service this equipment unless you are trained and qualified.
2. Follow the ***Voltage Discharge Procedure*** and ***Pressure Relief Procedure***, page 12, before servicing the gun or any part of the system.
3. Do not touch the gun nozzle or come within 4 in. (101.6 mm) of the nozzle during gun operation or for 30 seconds after operation stops to allow the voltage to discharge through the voltage control. It is recommended that the operator hold the gun in hand or hang it in the gun holster during this 30 second period. See **ACCESSORIES** to order the gun holster.

Service Notes:

- Check all possible remedies in the **TROUBLESHOOTING CHARTS** before disassembling the gun.
- If the plastic parts of the gun must be held in a vise, *ONLY* use padded vise jaws to avoid damaging parts.
- Always remove the gun from the worksite for service or repair. The service or repair area must be clean.
- Before servicing the gun, flush it as described under ***Flush the Spray Gun*** in **OPERATION**.

Disconnecting the Air and Fluid Hoses

Disconnect the air hose fitting and remove the air hose from the gun. Disconnect the fluid hose fitting (111) and nut (112) and remove the fluid hose assembly from the gun. Refer to the **PARTS DRAWING** on page 33.

Air Cap/Nozzle/Resistor Stud Replacement

CAUTION

BE SURE to hold front end of the gun up and trigger the gun while removing nozzle and resistor stud. This helps drain the gun and prevent any paint or solvent left in the gun from entering air passages.

1. Remove the air cap assembly. Point the front end of the gun up and squeeze the trigger while removing the fluid nozzle/resistor stud (21, 22) assembly with the nozzle wrench (70). Refer to Fig 17.

   If the resistor stud remains in the gun when the fluid nozzle is removed, start the nozzle thread onto the stud and pull the stud out.

2. Using the 8 mm hex key (62) supplied, unscrew and remove the resistor stud (22). See Fig 18.

WARNING

The contact ring (D) is a conductive, contact ring, NOT a sealing o-ring. To reduce the risk of sparking, which could cause fire, explosion, or electrostatic shock and result in serious injury, **DO NOT** remove the contact ring from the resistor stud or operate the gun without the contact ring in place. **DO NOT** replace the resistor stud with anything but a genuine Graco part.

To install the resistor stud:

3. Lubricate the o–ring (25) with petroleum jelly and install it on the resistor stud (22).

4. Using 8 mm hex key (62), install resistor stud (22) in the fluid nozzle (21). Tighten to 10 in-lb (1.12 N•m).

NOTE: Make sure the electrode (20) is tightened properly, as shown in Fig 19, page 25

5. Trigger the gun while installing the fluid nozzle (21) and resistor stud (22) assembly with the nozzle wrench (70). Tighten until the fluid nozzle seats in the gun barrel.

6. Install the air cap assembly (1, 2, 8). Test the gun resistance as instructed on page 22.

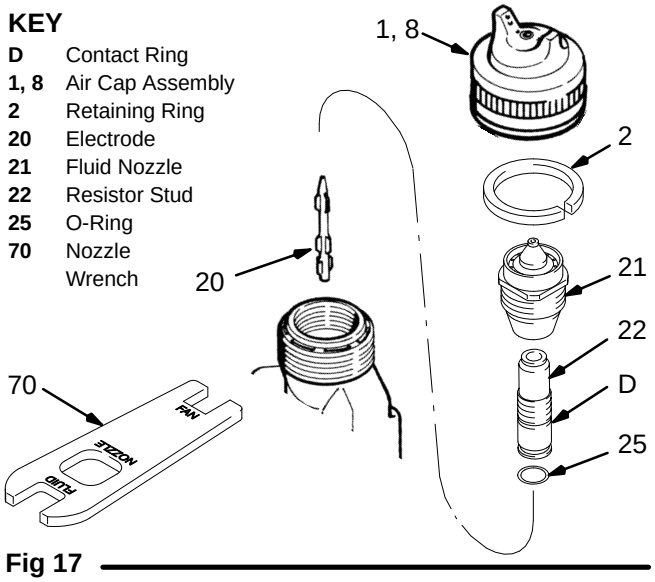


Fig 17

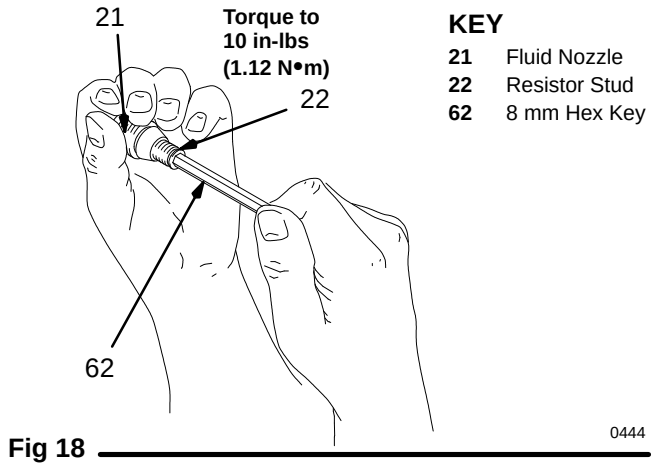


Fig 18

Electrode Replacement

1. Remove the air cap, nozzle and resistor stud as described in ***Air Cap/Nozzle/Resistor Stud Replacement***.

2. Unscrew and remove the fluid needle/electrode (20) with the electrode tool (64) provided. See Fig 19. If the needle shaft turns, hold the needle shaft assembly by placing a screw driver blade into the slot on the shaft, near the trigger.

CAUTION

Be careful not to damage the contact wire when removing the electrode from the gun.

3. Apply low-strength *(purple)* Loctite® or equivalent thread sealant to the electrode and needle shaft threads. Refer to **SERVICE NOTES**, page 34. Install the new electrode finger tight. DO NOT over tighten.

CAUTION

To avoid damaging the plastic threads or contact wire, be very careful when installing the electrode.

4. Trigger the gun while installing the fluid nozzle and resistor stud assembly. Install the air cap assembly. Test the gun resistance as instructed on page 22.

KEY

20 Electrode
64 Electrode Tool

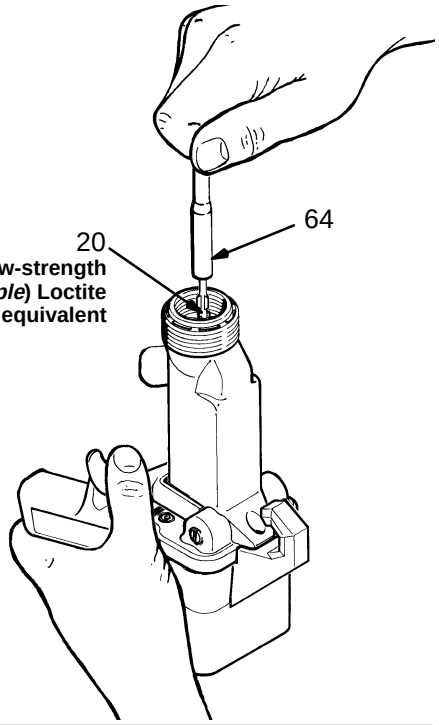


Fig 19

Barrel Removal

1. Using the wrench (63) supplied, loosen the three socket head cap screws (5).

2. Hold the gun handle (7) with one hand and pull the barrel (3) straight away from the handle to remove it. See Fig 21.

KEY

5 Cap Screws
63 Wrench

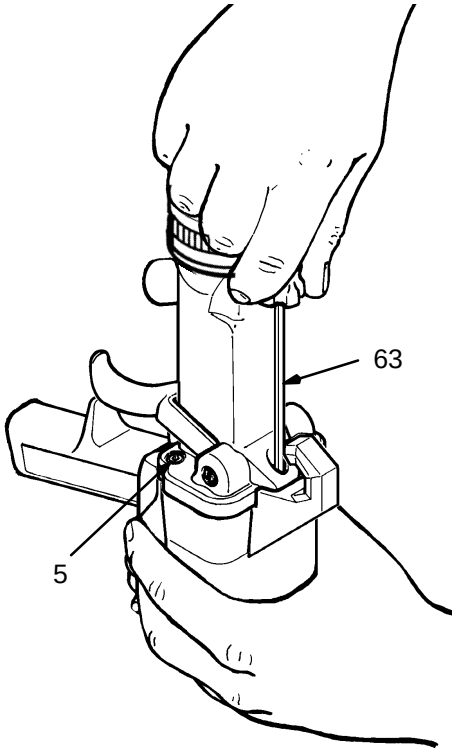


Fig 20

KEY

3 Gun Barrel
7 Gun Handle
18 Power Cartridge

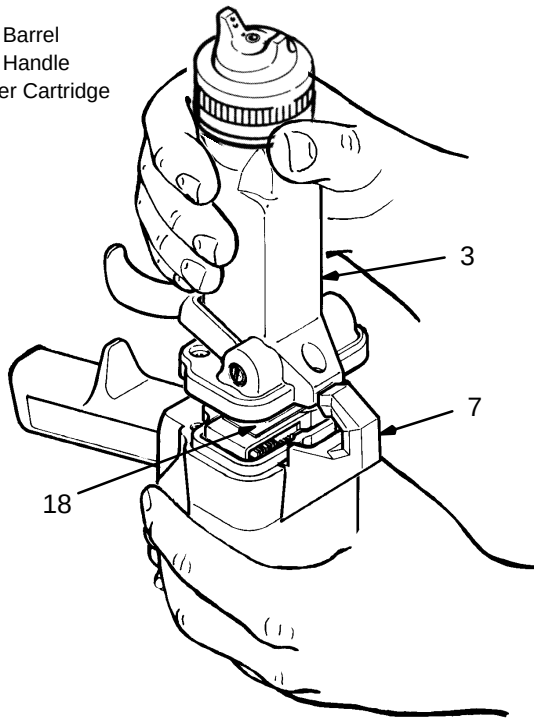


Fig 21

CAUTION

To avoid damaging the power cartridge (18), always pull the gun barrel straight away. If necessary, gently move the gun barrel from side to side to free it from the gun handle.

Barrel Installation

1. Be sure the gaskets (34 & 18a) and spring (30) are in place. See Fig 22. Replace if damaged.
2. Place the barrel (3) over the power cartridge (18) and onto the gun handle (7). Make sure the fluid needle spring (30) is seated properly.
3. Tighten the three socket head cap screws (5) oppositely and evenly with the wrench (63) supplied. Tighten the cap screws to 18 in-lbs (2 N•m) *MAXIMUM* (about a half turn past snug). *DO NOT* over tighten.
4. Assemble the fluid and air hose assemblies back into the gun. Test the gun resistance as instructed on page 22.

KEY

3	Gun Barrel	**18a**	Gasket
5	Cap Screws	**30**	Spring
7	Gun Handle	**34**	Gasket
18	Power Cartridge		

CAUTION

To avoid damaging the gun, DO NOT overtighten the cap screws (5). Tighten the screws to 18 in-lbs (2 N•m) *MAXIMUM* (about a half turn past snug), using the wrench (63) supplied only.

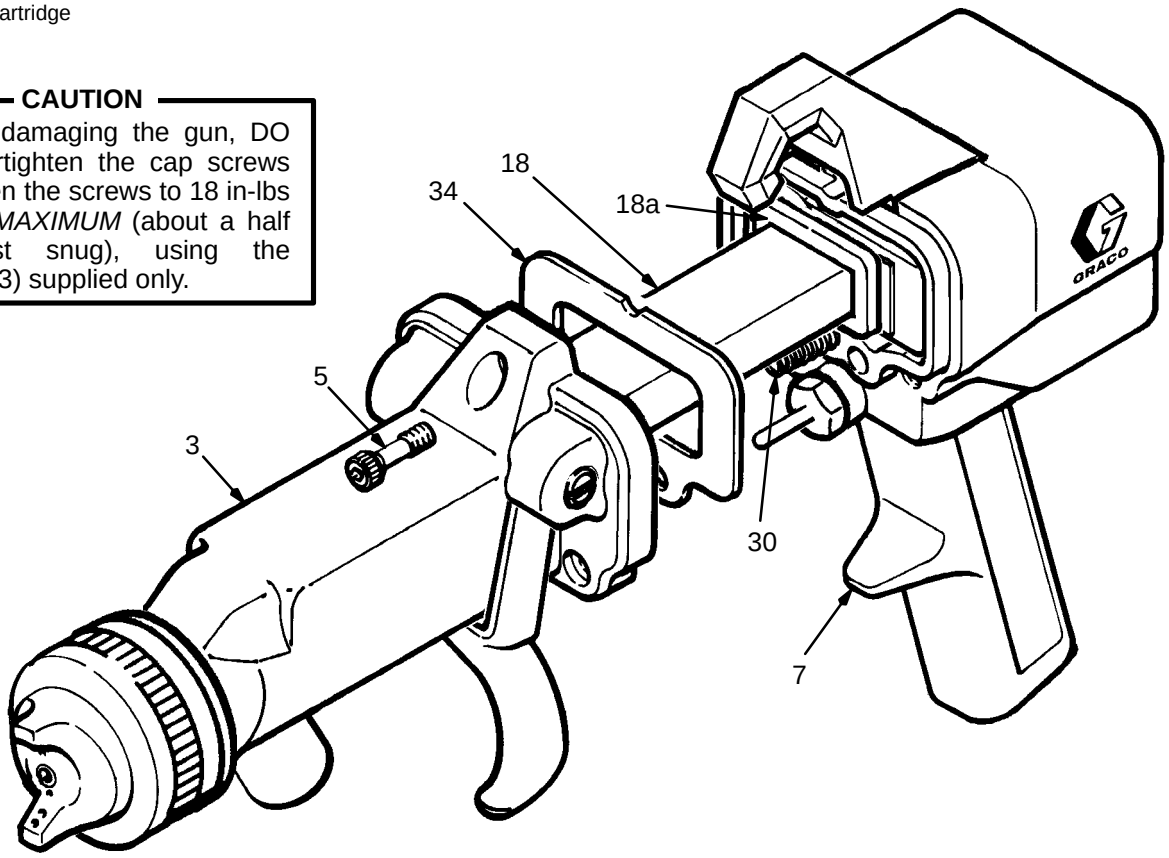


Fig 22

Fluid Packing Removal

1. Remove the air cap assembly, fluid nozzle and resistor stud, and electrode as described under ***Electrode Replacement***.

2. Loosen the trigger screws (4) far enough to remove the trigger (13).

3. Use the 9 mm hex nut driver (61) to remove the packing cartridge and needle assembly (28). See Fig 23.

CAUTION

Clean all parts in non-conductive solvent compatible with the fluid being used, such as xylol or mineral spirits. Use of conductive solvents can cause the gun to malfunction.

4. Check all the parts for wear or damage and replace if necessary.

Fluid Packing and Needle Repair

The fluid packings and needle can be replaced as individual parts or as assemblies. The overall assembly is preadjusted at the factory.

NOTE: Before installing the packing and needle assembly into the gun barrel, make sure the internal surfaces of the barrel are clean. Remove any residue with a soft brush or cloth. Check the inside of the barrel for marks from high voltage arcing. If the marks are present, replace the barrel.

If parts are purchased separately, assemble them as instructed below and shown in Fig 24.

1. Place the packing nut (28c) and o-ring (28f) on the fluid needle (28a). Flats on the packing nut must be facing toward the back of the fluid needle.

2. Fill the entire inner cavity of the spacer (28h) with petroleum jelly. Place the spacer on the fluid needle (28a) in the direction shown in Fig 24 . Generously apply petroleum jelly to the outside of the spacer.

3. Place the fluid packing (28e), needle packing (28d), and housing (28b) on the fluid needle (28a) as shown in Fig 24.

KEY

4 Trigger Screws
13 Trigger
28 Fluid Packing/Needle Assembly
61 Driver

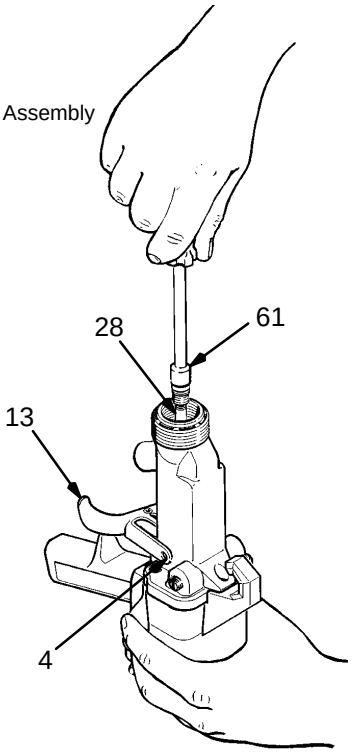


Fig 23

4. Lubricate the o-ring (28g) on the outside of the packing housing (28b).

5. Make sure the spring (30) is installed on the nut as shown in Fig 24.

6. Install the packing and needle assembly into the gun barrel. Using the 9 mm hex nut driver (61), tighten the assembly until just snug, then check the drag on the needle.

7. Tighten the packing nut to 2 lbs. (9 N) of drag force when sliding the needle through the packing cartridge.

8. Install the trigger (13) and tighten the trigger screws (4).

9. Install the electrode, nozzle and resistor stud assembly and the air cap assembly as described under ***Electrode Replacement***.

KEY

28 Fluid Packing/Needle Assembly
28a Fluid Needle
28b Packing Housing
28c Packing Nut
28d Needle Packing
28e Fluid Packing
28f O-Ring
28g O-Ring
28h Spacer
30 Spring

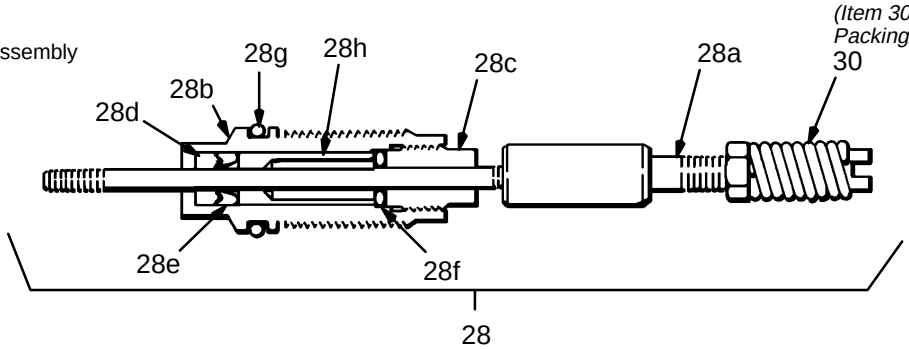


Fig 24

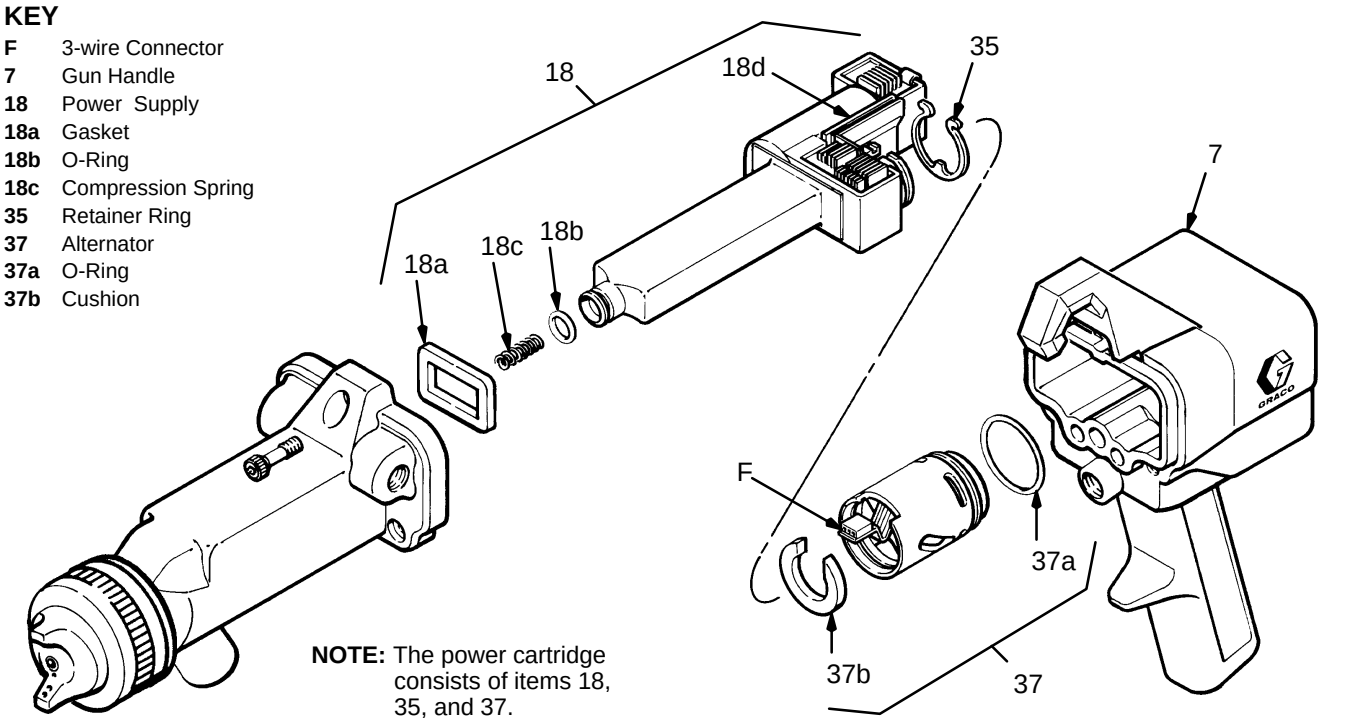


Fig 25

Power Cartridge Replacement

NOTE: The power cartridge consists of the alternator (37), power supply (18) and retaining ring (35). See Fig 25.

1. Remove the barrel as described in ***Barrel Removal***.

CAUTION

Be careful when handling the power cartridge to avoid damaging it.

2. Grasp the power cartridge with your hand. With a gentle side to side motion, pull it free from the gun handle (7). Then pull the power cartridge straight out of the handle.

CAUTION

To avoid a loss in electrostatic performance, inspect the power cartridge cavity in the handle for dirt or moisture. Clean out the cavity with a clean, dry rag if necessary.

Lightly lubricate the o-rings (18b, 37a) on the new power cartridge with petroleum jelly. All the o-rings and the compression spring (18c) must be in place or the gun will malfunction.

3. Insert the new power cartridge in the gun handle. Be sure the gasket (18a) is in place.

4. Install the barrel on the handle as described under ***Barrel Removal***.

Turbine Alternator Replacement

NOTE: Replace turbine bearings after 2,000 hours of operation. See your authorized Graco representative.

1. Remove the power cartridge from the gun handle as described in ***Power Cartridge Replacement***.

2. Squeeze the two ends of the retaining ring (35) together and carefully pull the alternator (37) away from the power supply until the connector (F) disengages. See Fig 25.

3. Using an ohmmeter, test the coil in the turbine alternator. Measure the resistance between the two outer terminals of the 3-wire connector (F). The resistance should be 3 to 5 ohms. If the reading varies from this value, replace the alternator.

4. Measure the resistance between each outer terminal of the 3-wire connector and the turbine alternator housing. The resistance should be infinite. If the resistance is not infinite, replace the alternator.

5. Connect the 3-wire connector to the 3 prongs in the power supply. Push the alternator onto the power supply until the retaining ring engages with the alternator.

6. Install the power cartridge in the gun handle as described under ***Power Cartridge Replacement***.

Fan Air Adjustment Valve Repair

1. Place a wrench on the flats of the valve housing and remove it from the handle. See Fig 26.

NOTE: The fan air valve (43) can be replaced as an assembly or as individual parts.

To disassemble the fan valve,

2. Remove the retaining ring (43b). Rotate the air adjusting screw (43c) *counterclockwise* until it is disengaged from the valve housing threads (43d). Pull the adjusting screw out of the valve housing.

3. Clean all the parts and inspect them for wear or damage. If replacing the seal (43a), unscrew it *clockwise* and remove it from the adjusting screw (43c).

4. Apply medium grade thread sealant to the small threads on the end of the adjusting screw (43c) and install a new seal (43a) *(left hand thread).*

5. When reassembling the fan air valve (43), lubricate the o-rings (43e) and the adjusting screw threads (43c) with petroleum jelly.

6. After the retaining ring (43b) is installed on the adjusting screw (43c), back the adjusting screw out of the valve housing (43d) until it bottoms out against the retaining ring.

7. Apply Teflon paste to the threads of the valve housing (43d) and install it in the handle. Torque the housing to 10 to 12 in-lb (1.1 to 1.4 N•m).

Air Trigger Valve Repair

1. Using a screwdriver, remove the cap (45), o-ring (23) and spring (44). See Fig 27.

CAUTION

Clean all parts in non-conductive solvent compatible with the fluid being used, such as xylol or mineral spirits. Use of conductive solvents can cause the gun to malfunction.

2. Loosen the air valve packing nut (40) one full turn. Remove the air valve shaft (39) with a pliers.

CAUTION

When removing the air valve shaft (39) be careful not to damage the seat area.

3. Check the o-rings (41, 23) for damage and replace if necessary. Apply petroleum jelly to the o-rings.

CAUTION

DO NOT over lubricate parts. Excessive lubricant on the o-ring (41) and air valve shaft (39) can be pushed into the gun air passage and blemish the finish on the workpiece.

4. Unscrew the packing nut (40) to check the u-cup (42). Do not remove the u-cup unless it is damaged.

5. Install the air valve shaft, with the o-ring (41), and spring (44) into the back of the gun handle (7). *If the u-cup (42) was removed,* install the air valve shaft (39) before installing the u-cup. Install the u-cup with its lips facing into the gun handle.

6. Install the cap (45), with the o-ring (23). Tighten the cap with a screw driver. Tighten the air valve packing nut (40) until it bottoms.

KEY

43	Fan Air Valve Assy
43a	Valve Seal
43b	Retaining Ring
43c	Adjusting Screw
43d	Valve Housing
43e	O-Ring

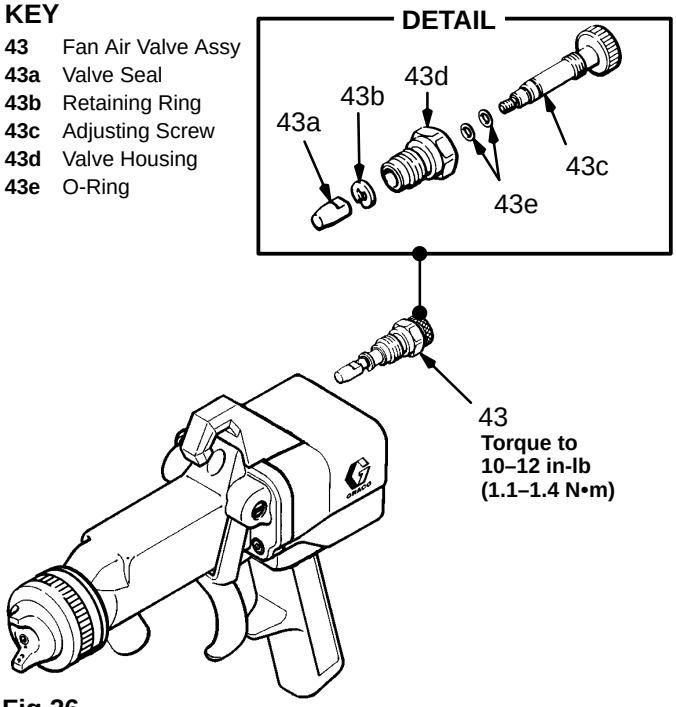


Fig 26

KEY

23	O-Ring
39	Air Valve Shaft
40	Packing Nut
41	O-Ring
42	U-Cup
44	Spring
45	Cap

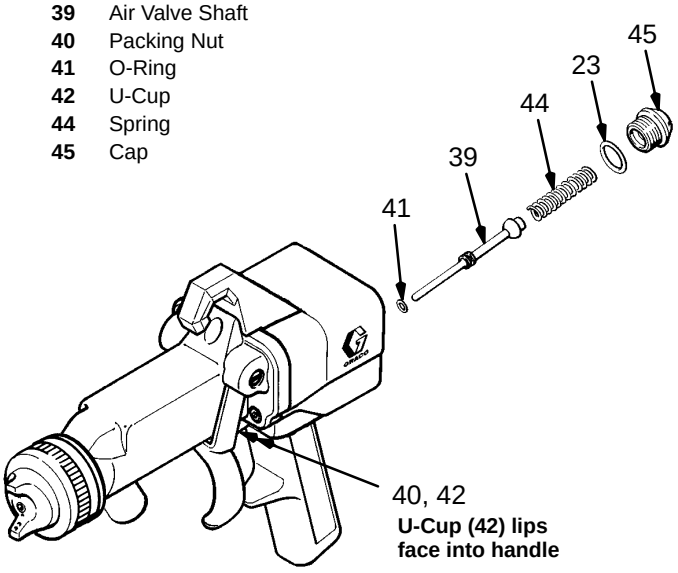


Fig 27

ES On–Off Valve Repair

1. Loosen the set screw (24) with the 2 mm hex key (69) provided. Remove the lever (26) from the valve. See Fig 28.

WARNING

To reduce the risk of eye injury, *BE SURE* to wear safety glasses when removing or installing the retaining ring (47) as the retaining ring could slip off the tool when compressed.

2. Use internal snap ring pliers (see **ACCESSORIES**) to remove the retaining ring (47) from the handle. Align the holes in the retaining ring with the flat on the spacer (32) to ease assembly and disassembly.

3. Remove the valve body (38) from the handle; be careful not to drop the regulator disk (46) and spacer (32).

4. Clean and inspect the parts for damage. Replace if necessary. Lubricate the o-ring (36) with petroleum jelly.

CAUTION

DO NOT over lubricate parts. Excessive lubricant on the o-ring (36) can be pushed into the gun air passage and blemish the finish on the workpiece.

5. Install the regulator disk (46) in the valve (38) with its bevelled side facing in toward the valve.

CAUTION

BE SURE the regulator disk (46) is installed correctly. A missing or incorrectly installed regulator disc can cause severe damage to the turbine alternator.

6. Install the valve (38) with the regulator disc (46) and o–ring (36) into the gun handle. Install the spacer (32) on the valve.

7. Install the retaining ring (47) into the groove in the handle. Install the lever (26) and tighten the set screw (24).

WARNING

Always make sure that the retaining ring (47) is engaged in the groove in the gun handle when installing the ES ON-OFF Valve. If the retaining ring is missing or improperly installed, the valve assembly can be propelled out of the gun when air pressure is applied and cause serious injury.

KEY

24	Set Screw
26	Lever
32	Spacer
36	O-Ring
38	Valve Body
46	Regulator Disk
47	Retaining Ring

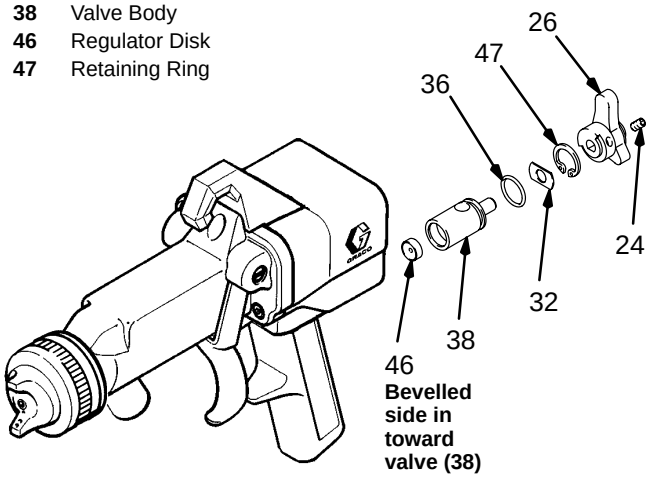


Fig 28

Replacing the Voltage Control Rod Seal

1. Disconnect the cable (117) connected between the dump switch and bleed resistor.
2. Disconnect the cable (A) connected between the dump switch and isolation stand.
3. Remove straps (103) from the bleed resistor (102).
4. Disconnect the ground connection (220) connected to the voltage control base.
5. Remove the four screws (104).
6. Disconnect the air line from the fitting (110).
7. Remove the oil cup (208) from the dump switch housing (205).
8. Remove the five screws (215) from the top cover.
9. Empty the oil from the oil cup (208) into a clean container. If the oil is clean, it can be reused. If there is a black carbon residue, replace the oil with electrical insulating oil, such as Diala® Ax Oil (Shell Oil Company) or an equivalent oil that meets ANSI/ASTM D3487 and NEMA TR–P8–1975 specifications.
10. Remove the electrode (209) from the cylinder rod (B).
11. Remove the seal flange (217) from the oil cup (208).
12. Remove the two seals (206). Replace them with two new seals, part no. 110–612. Orientate the seals as shown in Fig 29.
13. Refill the oil cup (208) and reassemble the voltage control in the reverse order of disassembly. Use a semi-permanent thread sealant to fasten the electrode (209) to the cylinder (B).

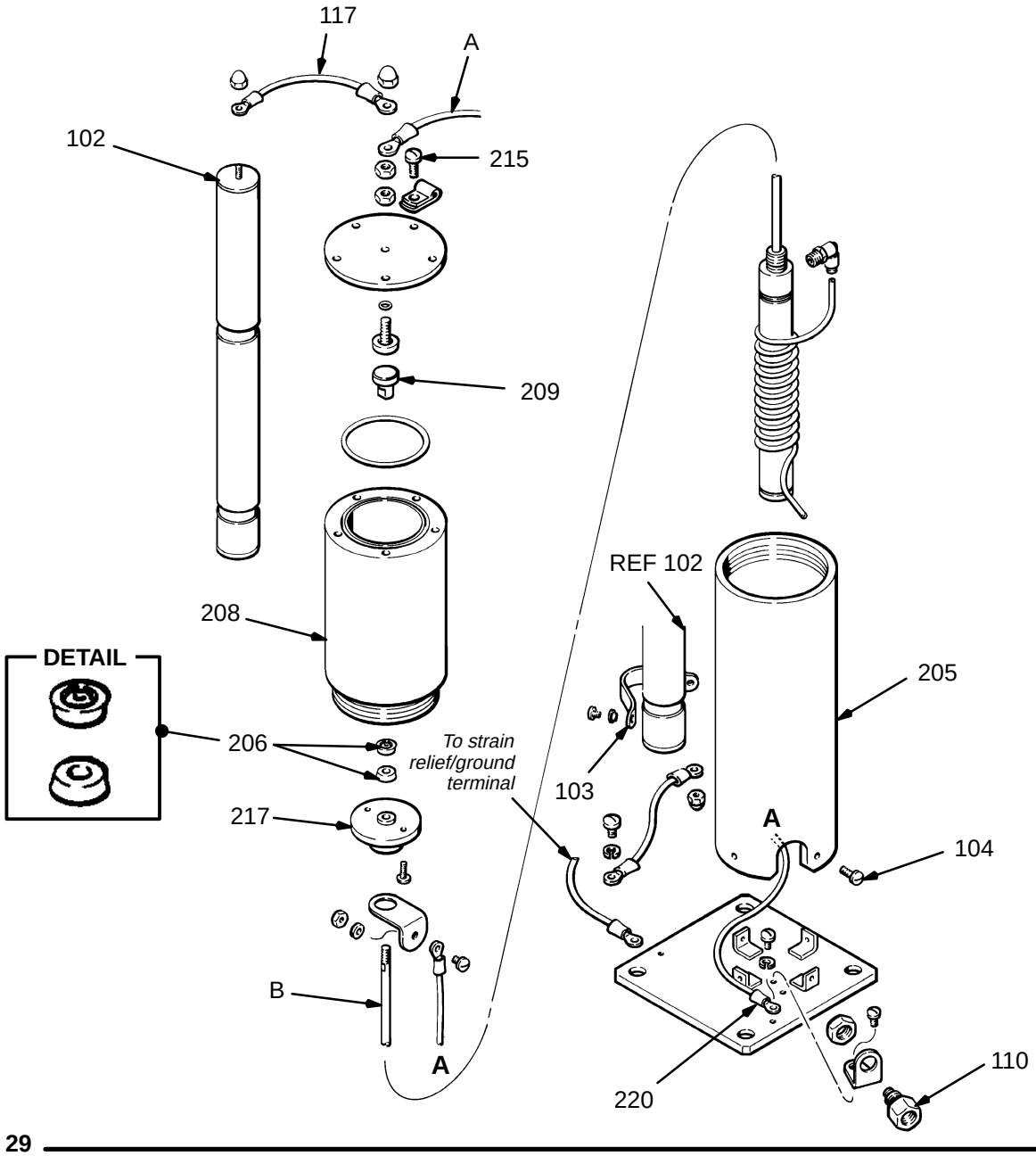


Fig 29

CONVERTING PRO 3500SC GUN TO PRO 3500WB GUN

NOTE: See page 41 to order Conversion Kit 223–114. The fluid hose and air hose are not included with this kit. See pages 40 and 42 to order hoses. Use ONLY the electrically conductive air supply hose specified in this manual. A larger fluid nozzle may be required for some water-base paints. See Manual 307–803 for available fluid nozzles.

KEY

A	Fluid Seal	**J**	Needle/Electrode
B	Fluid Tube Fitting	**K**	Fluid Needle Assembly
C	Gun Fitting Bracket	**L**	Trigger Screws
D	Air Fitting	**M**	Trigger
E	Exhaust Tube	**P**	Air Cap
F	Exhaust Tube Clamp	**Q**	Ferrules
G	Retaining Nut	**R**	Nut
H	Nozzle/Resistor Stud Assembly		

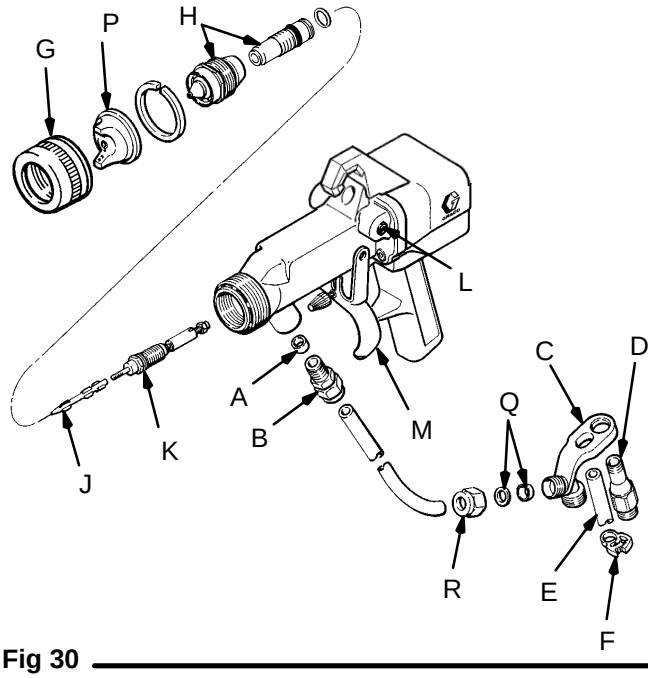


Fig 30

PRO 3500SC Gun Disassembly

1. Remove the fluid tube fitting (B) and fluid seal (A) from the gun. See Fig 30.
2. Remove the air fitting (D), exhaust tube clamp (F), and the exhaust tube (E). *Keep these parts and the nut (R) and ferrules (Q) for reassembly.*
3. Remove the gun fitting bracket (C) with the hose assembly.
4. Remove the retaining nut (G).

NOTE: *Keep all the following parts for reassembly.*

5. Remove the air cap (P). Point the front end of the gun up and squeeze the trigger while removing the fluid nozzle/resistor stud assembly (H).

CAUTION

BE SURE to hold the front end of the gun up while removing the nozzle and resistor stud to prevent any paint or solvent left in the gun from entering the air passages.

NOTE: If the resistor stud remains in the gun when the fluid nozzle is removed, start the nozzle thread onto the stud and pull the stud out.

6. Unscrew and remove the fluid needle/electrode (J) with the electrode tool supplied with the gun. If the needle shaft turns, hold the needle shaft assembly by placing a screw driver blade into the slot on the shaft, near the trigger.

CAUTION

Be careful not to damage the contact wire when removing electrode from the gun.

7. Loosen the trigger screws (L) far enough to remove the trigger (M).
8. Remove the packing cartridge and needle assembly (K) with the 9 mm hex nut driver supplied with the gun.

Installing the Fluid Needle Assembly

1. Before installing the new fluid needle assembly (28*) into the gun barrel, make sure the internal surfaces of the barrel are clean. Remove any residue with a soft brush or cloth.
2. Lubricate the o-ring on the outside of the fluid needle packing housing.
3. Install the fluid needle assembly (28) into the gun barrel. See Fig 7. Using the 9 mm hex nut driver, tighten the assembly until just snug, then check the drag on the needle. (Make sure the spring is installed on the fluid needle nut.)
4. Install the trigger (L) and tighten the trigger screws (K).
5. Install the electrode (20) finger tight. DO NOT over tighten.

CAUTION

To avoid damaging the plastic threads or contact wire, be very careful when installing the electrode.

KEY

- **H** Nozzle/Resistor Stud Assembly
- **20** Needle/Electrode
- **L** Trigger Screws
- **M** Trigger
- **N** Fluid Hose Assembly *(not included with kit)*
- **P** Air Cap
- **8*** Retaining Nut
- **28*** Fluid Needle Assembly
- **71*** Warning Sign *(not shown)*

**Parts included with Conversion Kit 223–114.*

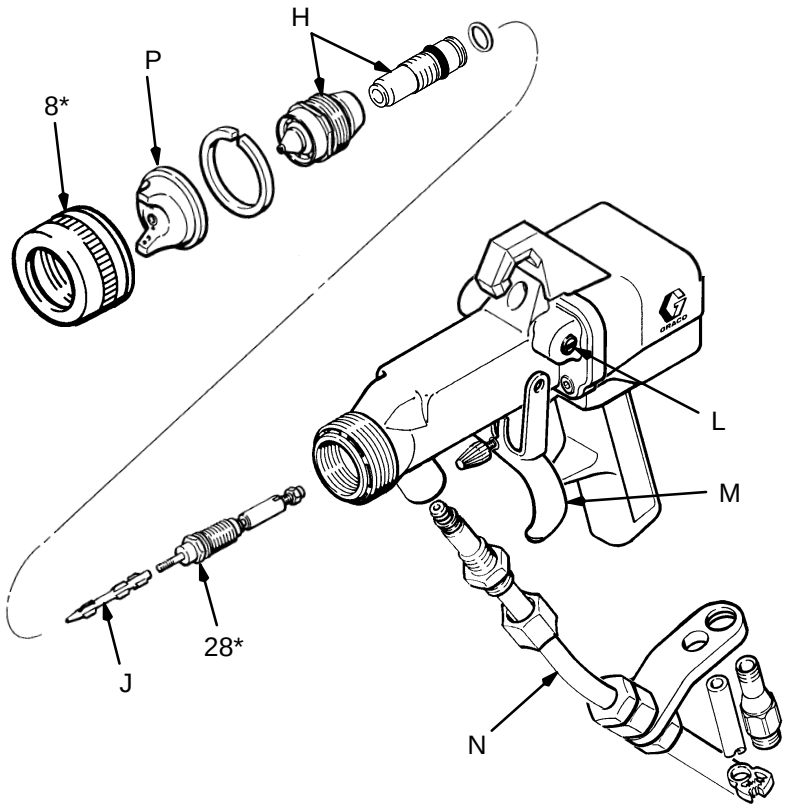


Fig 31

6. Trigger the gun while installing the fluid nozzle and resistor stud (H) assembly. Tighten until the fluid nozzle seats in the gun barrel.

7. Install the air cap (P). Screw on the retaining nut (8*) finger tight.

8. Mount the warning sign (71*) in the spray area where it can easily be seen and read by all operators.

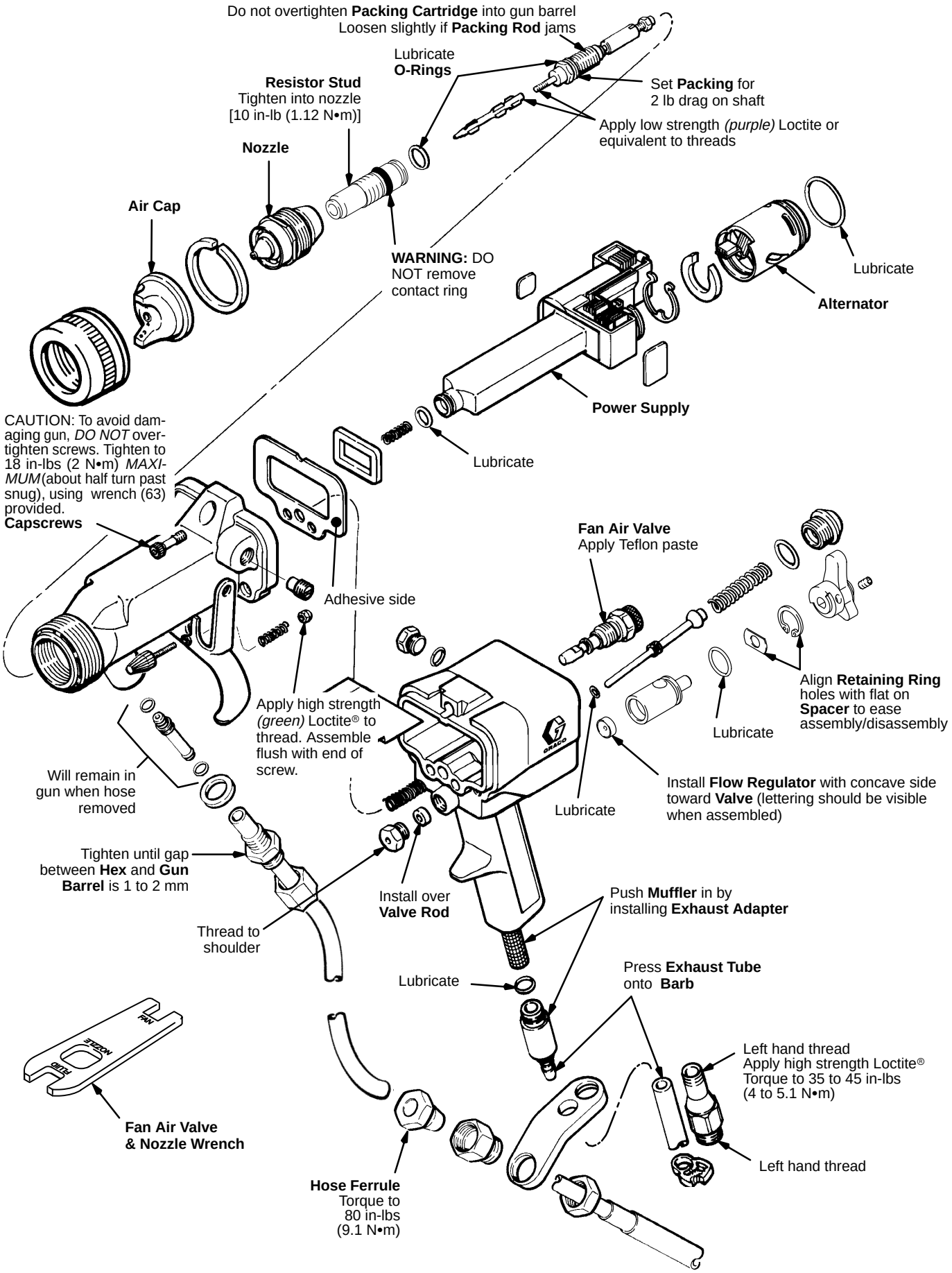
9. Follow the additional warnings, installation, operation, service, and other instructions given in this manual for a water-base system. Order replacement parts for the gun from the parts list on page 37.

NOTE: BE SURE to test the gun resistance as instructed on page 22.

WARNING

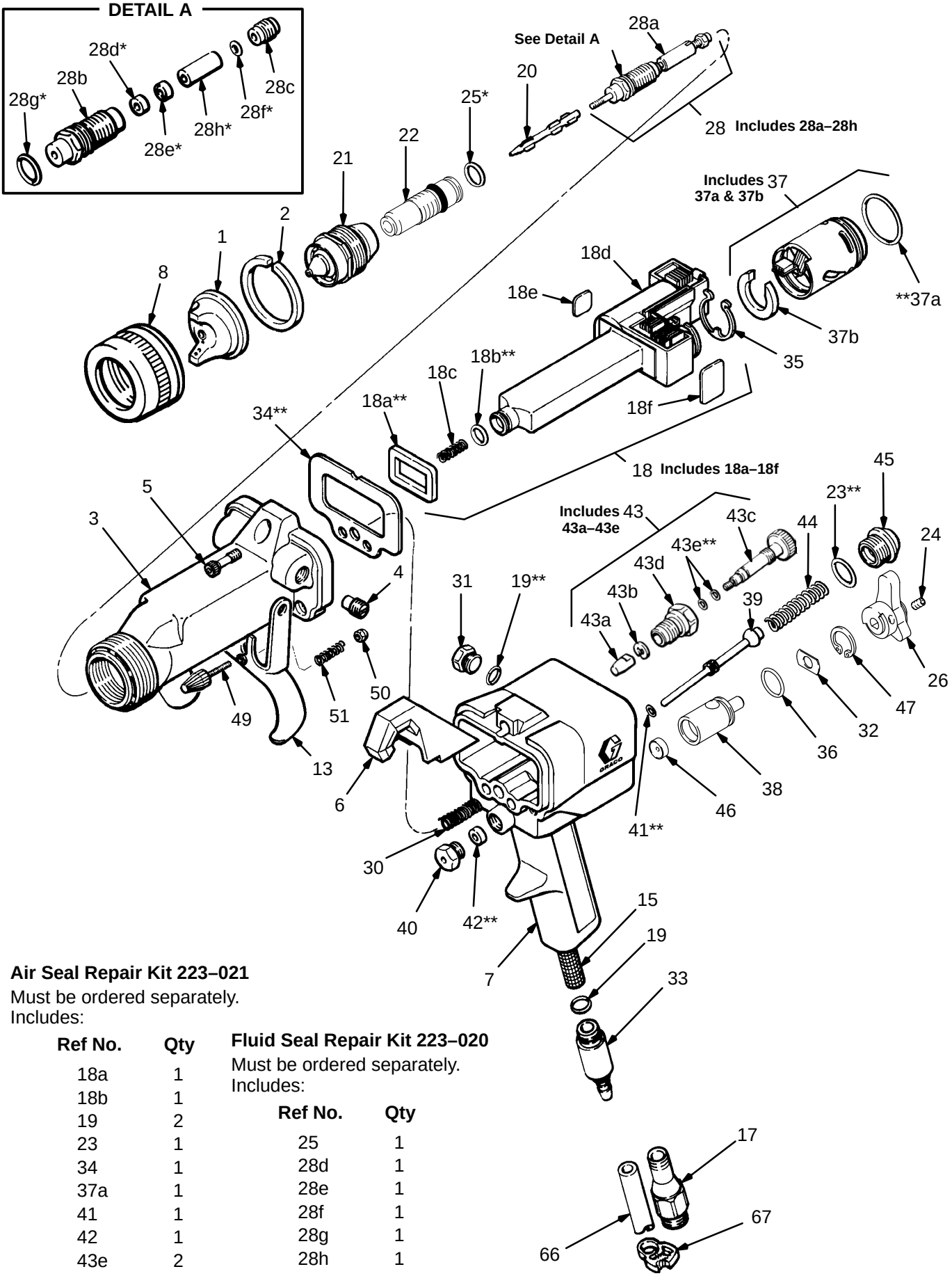
To help avoid electric shock, which could cause serious injury, *ONLY* use the air hoses listed in the **ACCESSORIES** section.

SPRAY GUN SERVICE NOTES



NOTES

SPRAY GUN PARTS DRAWING



Air Seal Repair Kit 223–021
Must be ordered separately.
Includes:

Ref No.	Qty
18a	1
18b	1
19	2
23	1
34	1
37a	1
41	1
42	1
43e	2

Fluid Seal Repair Kit 223–020
Must be ordered separately.
Includes:

Ref No.	Qty
25	1
28d	1
28e	1
28f	1
28g	1
28h	1

Part No. 222–700
Electrostatic Air Spray Gun

REF NO.	PART NO.	DESCRIPTION	QTY
1	177–033	AIR CAP; See Manual 307–803 for available air caps	1
2	176–930	RING, retaining	1
3	222–314	BARREL, gun	1
4	185–095	SCREW, trigger	2
5	185–096	SCREW, cap, relieved; M5 x 0.8	3
6	185–097	HOOK	1
7	222–666	HANDLE, gun	1
8	223–653	RETAINER, air cap	1
11	179–791	TAG, warning *(not shown)*	1
	222–670	TRIGGER, 2 finger	
15	185–122	MUFFLER	1
17	185–105	FITTING, air	1
18	222–333	POWER CARTRIDGE Includes items 18a–18f	1
18a**	185–134	•GASKET, power supply	1
18b**	106–555	•O–RING, Viton®	1
18c	178–504	•SPRING, compression	1
18d	185–141	•CUSHION, power supply	1
18e	185–099	•PAD	1
18f	185–145	•PAD	1
19**	106–555	O–RING; Viton	2
20	186–615	NEEDLE, electrode	1
21	185–158	NOZZLE, fluid, See Manual 307–803 for available nozzles	1
22	223–977	STUD, resistor	1
23**	110–099	O–RING, Teflon®	1
24	110–083	SET SCREW, lever; sch; M4 x 0.7	1
25*	111–507	O–RING; fluoroelastomer	1
26	186–839	LEVER, ES valve	1
27		PLATE, identification	1
28	223–444	FLUID PACKING & NEEDLE ASSY Includes items 28a–28h	1
28a	223–024	•NEEDLE, fluid	1
28b	185–495	•HOUSING, packing	1
28c	185–488	•NUT, packing	1
28d*	178–763	•PACKING, needle	1
28e*	178–409	•PACKING, fluid	1
28f*	111–504	•O–RING, fluoroelastomer	1
28g*	111–316	•O–RING, fluoroelastomer	1
28h*	186–069	•SPACER	1
30	185–111	SPRING, compression	1
31†	185–079	PLUG	1
32	185–119	SPACER, lever	1
33	185–112	ADAPTER, exhaust hose	1
34**	185–113	GASKET, manifold; polyethylene	1
35	185–114	RING, retainer, alternator	1
36	110–084	O–RING, Kalrez or Chemraz	1
37	222–319	ALTERNATOR, turbine Includes items 37a & 37b	1
37a**	110–073	•O–RING, Viton	1
37b	185–124	•CUSHION	1
38	185–118	VALVE, electrostatic	1
39	222–320	SHAFT ASSY., air valve	1
40	185–115	NUT, packing	1
41**	111–508	O–RING, trigger valve; fluoroelastomer	1
42**	105–452	U–CUP, Teflon	1
43	222–321	VALVE ASSY, fan air Includes items 43a–43e	1
43a	181–383	•SEAL, valve	1
43b	105–681	•RING, retaining	1
43c	185–089	•SCREW, adjusting	1
43d	185–090	•HOUSING, valve	1
43e**	103–557	•O–RING, Viton	2
44	185–116	SPRING, compression, air valve	1
45	188–486	CAP, air valve	1
46	107–107	REGULATOR, disc	1
47	110–082	RING, retaining	1
49	223–334	SCREW, fluid adjustment	1
50	189–020	NUT, fluid adjustment	1
51	112–305	SPRING	1
61	110–087	DRIVER, hex nut; 9 mm *(not shown)*	1
62	110–088	WRENCH, allen; 8 mm *(not shown)*	1
63	107–460	WRENCH, barrel *(not shown)*	1
64	185–123	WRENCH, electrode *(not shown)*	1
65	105–749	BRUSH, cleaning *(not shown)*	1
66	185–103	TUBE, exhaust; polyurethane	1
67	110–231	CLAMP, exhaust tube	1
68	110–089	WRAP, spiral	5
69	110–086	WRENCH, allen, hex key; 2 mm *(not shown)*	1
70	187–421	WRENCH, nozzle *(not shown)*	1
71	186–118	SIGN, warning, English *(not shown)* See Accessories for additional signs, available at no charge	1
72	180–209	COVER, gun *(not shown)*	1

**Included in Fluid Seal Repair Kit 223–020.*

***Included in Air Seal Repair Kit 223–021*

†*See Accessories for Optional Air Restrictor Valve 222–322.*

HOW TO ORDER REPLACEMENT PARTS

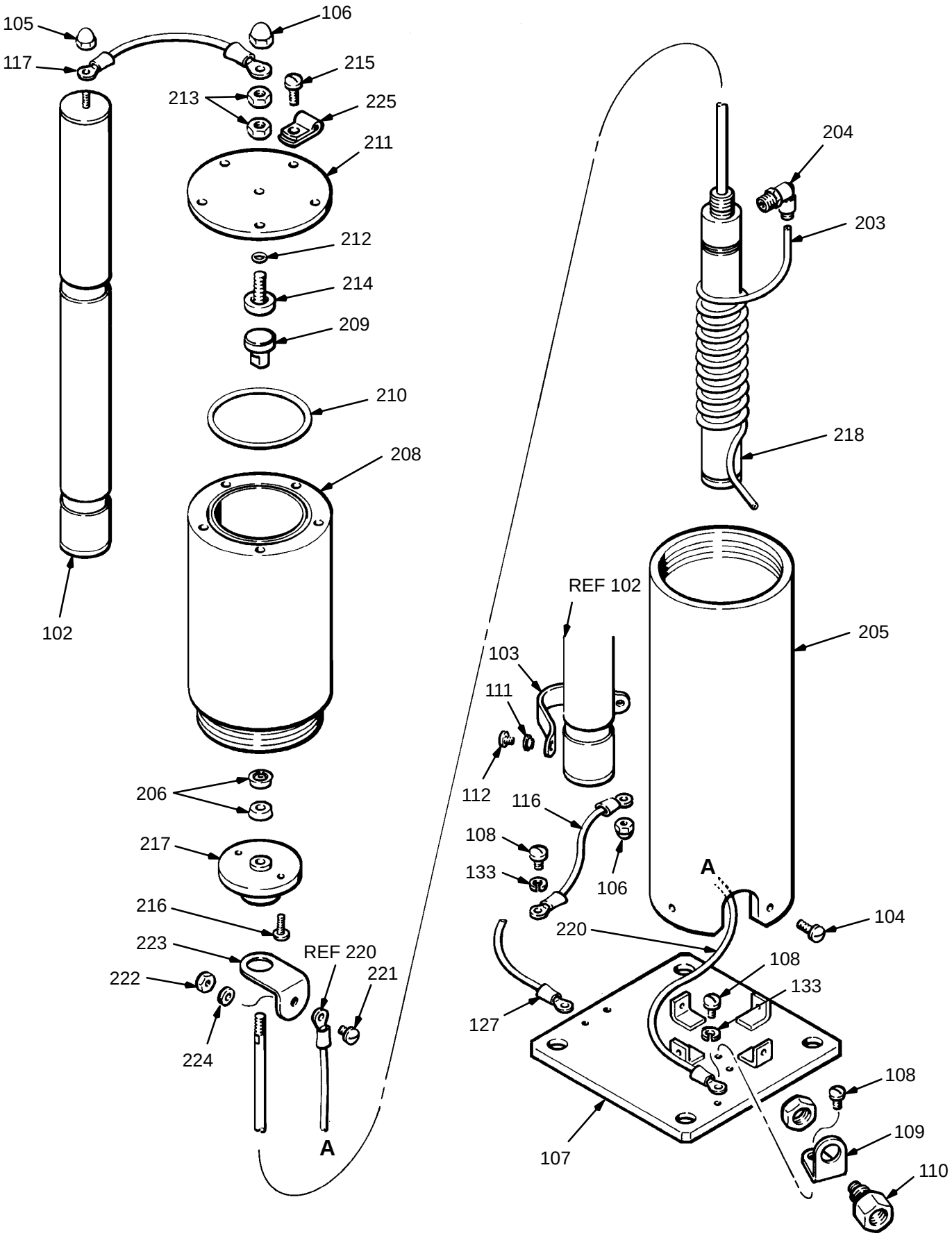
1. To be sure you receive the correct replacement parts, kits or accessories, always give all of the information requested in the chart below.
2. Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
3. Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

WARNING

When servicing use only genuine Graco replacement parts. Use of other parts or any modification of the gun could alter the grounding continuity of the gun or cause parts to rupture and result in serious injury, fire, explosion or property damage.

VOLTAGE CONTROL PARTS DRAWING



Part No. 223–477
Water-base Voltage Control Assembly

REF NO.	PART NO.	DESCRIPTION	QTY
G*	223–640	AIR MANIFOLD ASSEMBLY	1
L	223–639	WATER-BASE VOLTAGE CONTROL See separate Parts List, below	1
N*	208–591	HOSE, air, fluid supply unit; 6 ft. (1.83 m); 3/8 npsm(f) swivel; non-conductive	1
R*	223–446	HOSE, air, voltage control; 10 ft. (3.05 m); 1/4-18 npsm x 1/4-18 npt	1
S*	223–447	HOSE, air, air line interlock; 5 ft. (1.53 m); 3/8–18 npsm x 3/8–18 nptf	1
T*	186–119	SIGN, warning *(for safety fence gate)*	1
U*	210–084	ROD, grounding	1
V*	110–790	U-BOLT & PLATE	2
W*	223–685	CABLE ASSEMBLY, 1 ft. (0.3 m); *(strain relief/ground to safety fence)*	1
X*	223–547	CABLE ASSEMBLY, 25 ft. (7.6 m); *(strain relief/ground to true earth ground)*	1

These parts are not shown in the Parts Drawing. See pages 4 and 8 for illustration of these parts.

Ref Letter L, Part No. 223–639
Water-base Voltage Control

REF NO.	PART NO.	DESCRIPTION	QTY
101	223–141	WATER-BASE SWITCH See separate Parts List, at right	1
102	223–318	BLEED RESISTOR	1
103	186–081	STRAP, resistor	2
104	103–374	SCREW, mach., pnh; 10–32 UNF-2A x 5/8 in.	4
105	104–336	NUT, crown; 10–32 UNF-2B	2
106	100–029	NUT, hex cap; 1/4 x 20 UNC	2
107	223–428	PLATE, base	1
108	103–832	SCREW, mach., pnh; 10–32 UNF-2B x 1/4 in.	5
109	186–057	BRACKET, fitting	1
110	110–737	FITTING, air	1
111	110–745	BUSHING, strap	4
112	110–620	SCREW, nylon; 10–24 UNC-2A x 1/2 in.	4
116	223–609	CABLE ASSEMBLY, 3 in. (76.2 mm) *(bleed resistor to plate)*	1
117	223–528	CABLE ASSEMBLY, 4 in. (102 mm); *(switch to bleed resistor)*	1
127	223–548	CABLE ASSEMBLY, 6.5 ft. (1.98 m); *(base plate to strain relief/ground)*	1
133	100–718	WASHER	3

Ref No. 101, Part No. 223–141
Water-base Switch

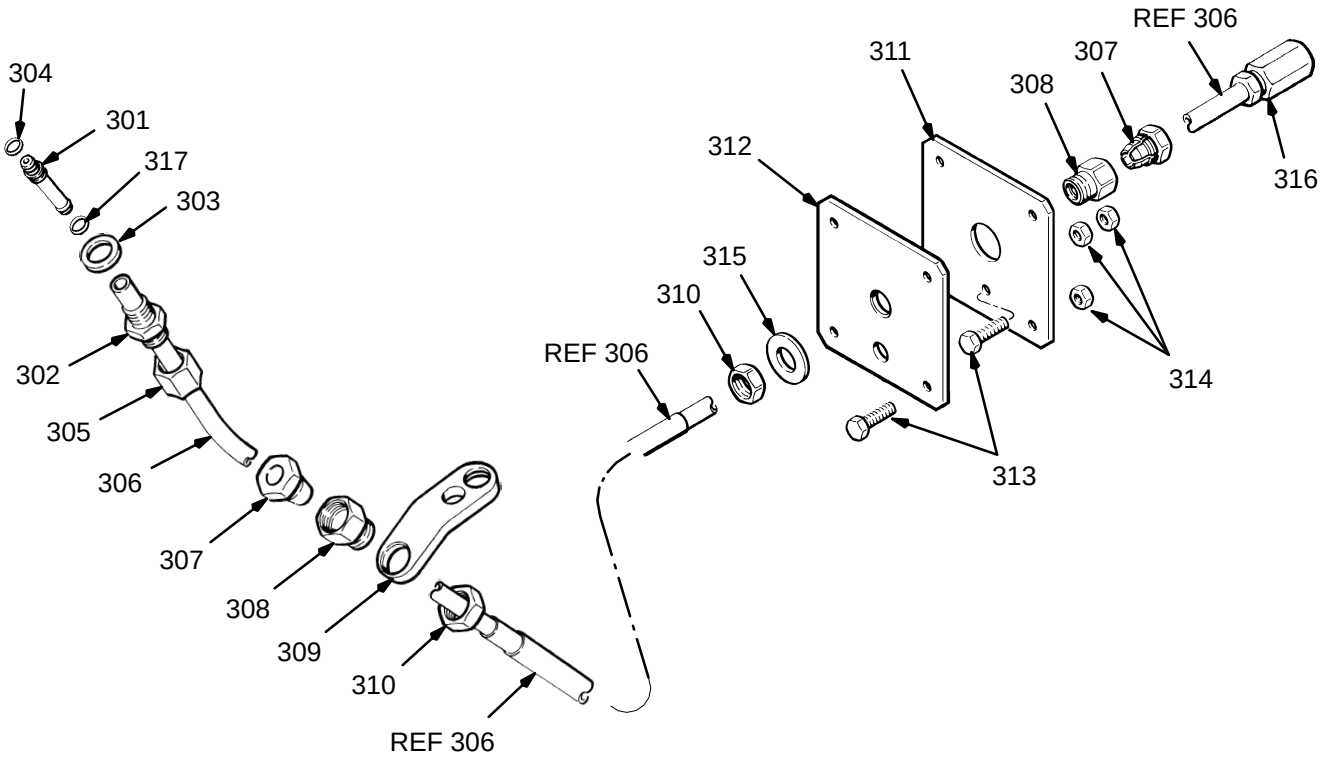
REF NO.	PART NO.	DESCRIPTION	QTY
203	110–609	TUBING, nylon	1
204	110–610	FITTING, tube elbow; 1/8-27 npt	1
205	185–575	HOUSING, cylinder	1
206	110–612	SEAL, rod	2
208	185–584	CUP, oil	1
209	185–573	CONTACT, cylinder	1
210	103–209	O-RING; Viton®	1
211	185–576	PLATE, cover	1
212	103–337	O-RING; Viton	1
213	102–025	NUT, hex; 1/4-20	2
214	185–574	CONTACT, cover	1
215	110–620	SCREW, pan hd. mach.; 10–24 UNC-2A x 1/2 in.	5
216	100–903	SCREW, pan hd. mach; 8–32 UNC-2A x 1/2 in.	2
217	185–583	FLANGE, cylinder	1
218	110–608	CYLINDER, air piston	1
220	223–324	WIRE, ground; 12 in. (305 mm)	1
221	103–832	SCREW, pan hd. mach.; 10–32 UNF-2A x 1/2 in.	1
222	100–166	NUT, hex; 10-32 UNF-2B	1
223	185–915	STRAP, ground	1
224	100–718	WASHER, lock	1
225	110–629	CLAMP, cable	1

HOW TO ORDER REPLACEMENT PARTS

1. To be sure you receive the correct replacement parts, kits or accessories, always give all of the information requested in the chart below.
2. Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
3. Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

FLUID HOSE ASSEMBLY PARTS DRAWING



FLUID HOSE ASSEMBLY PARTS LIST

Fluid Hose Assemblies

100 psi (7 bar) MAXIMUM WORKING PRESSURE
0.25 in. (6.35 mm) ID; 3/8–18 nptf; Teflon®

Fluid Hose Assy. Part No.	Hose Length
223–192	25 ft (7.6 m)
223–193	36 ft. (11 m)
223–194	50 ft (15.3 m)

HOW TO ORDER REPLACEMENT PARTS

1. To be sure you receive the correct replacement parts, kits or accessories, always give all of the information requested in the chart below.
2. Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
3. Order all parts from your nearest Graco distributor.

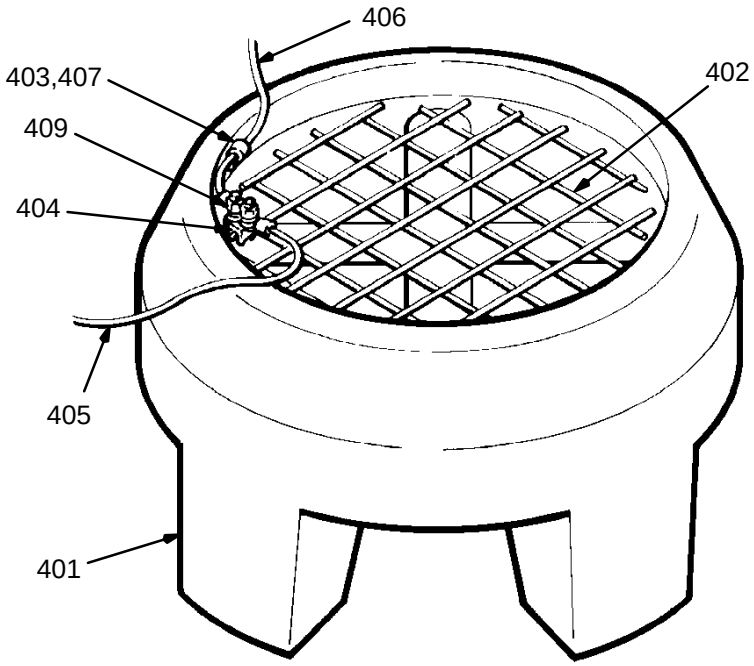
6 digit Part Number	Qty	Part Description

REF NO.	PART NO.	DESCRIPTION	QTY
301	186–052	INSERT, barbed	1
302	180–553	FITTING, male	1
303	107–305	O-RING; Viton®	1
304	110–736	O-RING; Viton	1
305	107–208	NUT, ferrule	1
306	185–918	HOSE, fluid; 25 ft (7.6 m)	
		Part No. 223–192 ONLY	1
	185–919	HOSE, fluid; 36 ft (1 m)	
		Part No. 223–193 ONLY	1
	185–920	HOSE, fluid; 50 ft (15.3 m)	
		Part No. 223–194 ONLY	1
307	185–549	FERRULE, hose	2
308	185–547	HOUSING, ferrule	2
309	185–566	BRACKET, fitting	1
310	185–548	NUT; 5/8–24 UNEF-2B	2
311	185–972	PLATE, fitting	1
312	185–971	PLATE, fitting	1
313	100–021	SCREW, hex; 1/4-20 UNC-2A x 1”	5
314	102–025	NUT, hex; 1/4-20	6
315	154–636	WASHER	1
316	107–048	CONNECTOR; 3/8-18 npt(f)	1
317	103–337	O-RING; Viton	1

ISOLATION STAND PARTS DRAWING AND LIST

Part No. 223–445
Isolation Stand Assembly
For 15 gallon (57 liter) fluid container

REF NO.	PART NO.	DESCRIPTION	QTY
401	185–468	STAND, bare	1
402	185–946	GRATE. grounding	1
403	110–629	CLAMP, cable	1
404	110–757	U-BOLT, clip	1
405	223–539	CABLE ASSEMBLY, 36” (914 mm) *(from terminal block to fluid supply unit)*	1
406	223–529	CABLE ASSEMBLY, 12” (305 mm) *(from terminal block to voltage control)*	1
407	105–967	SCREW, thread forming, pnh; 10–16 x 0.5 in.	1
409	100–077	NUT, hex; 5/16–18	2

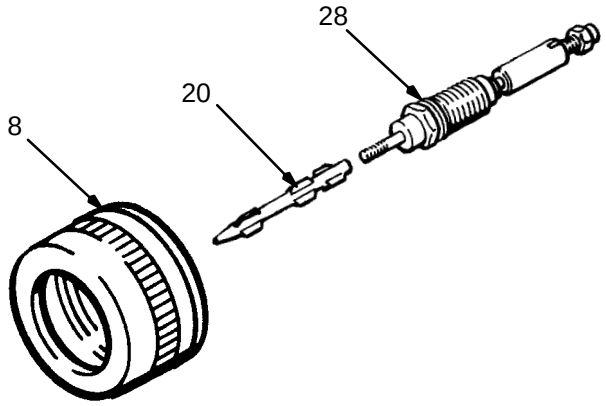


GUN CONVERSION KIT PARTS DRAWING AND LIST

Part No. 223–114
Gun Conversion Kit

REF NO.	PART NO.	DESCRIPTION	QTY
8	223–653	NUT, air cap retaining	1
20	186–615	ELECTRODE	1
28	223–444	ROD, packing assembly	1
71	186–118	SIGN, warning *(not shown)*	1

The Kit Ref Nos. correspond with the Gun Ref Nos. on page 37.



Manual Change Summary

The following parts have been changed in this revison.

Assembly Changed	Part Status	Ref No.	Part No.	Name
222–700 Spray Gun	Old New	45 45	185–117 188–486	Cap, air valve Cap, air valve
Air Line Accessories	Old New	– –	110–805 112–534	Disconnect Disconnect/ Swivel

Other changes were made on the following pages.

Page 28: A **NOTE** was added under **Turbine Alternator Replacement** to replace turbine bearings after 2,000 hours of operation.

Page 44: Under **WARRANTY**, the barrel, handle, trigger, and hook were added as parts that will be repaired or replaced for thirty-six months or six thousand hours of operation from time of sale.

ACCESSORIES

Accessories must be purchased separately.
Use only **GENUINE GRACO PARTS AND ACCESSORIES.**

WARNING

NEVER operate your equipment at a working pressure rating that is higher than the lowest rated component in your system. Lower rated components may not be able to withstand the pressure developed by the pump and may rupture, causing serious bodily injury or property damage.

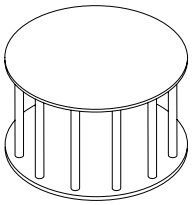
The accessories in this box are approved by Factory Mutual

GUN FLUID HOSE ASSEMBLIES
See page 40 to order.

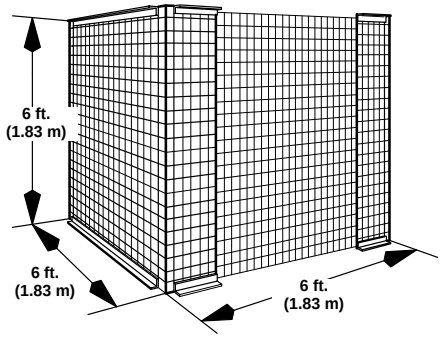
SAFETY WARNING SIGN
Available at no charge from Graco.
Must be ordered separately.

186–118 Warning Sign, for spray area
186–119 Warning Sign, for safety fence gate

ISOLATION STAND 727–212
For 55 gallon (209 liter) fluid container.

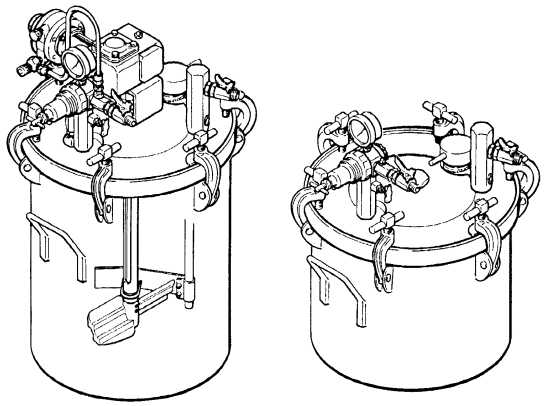


SAFETY FENCE 110–614
To isolate personnel from high voltage equipment.



STAINLESS STEEL PRESSURE TANKS
100 psi (7 bar) MAXIMUM WORKING PRESSURE

Size	Models with Agitator	Models without Agitator
5 gallon (19 liter)	222–179	222–183
10 gallon (38 liter)	222–180	222–184
15 gallon (57 liter)	222–181	222–185



The accessories below and on page 43 have not been tested by Factory Mutual.

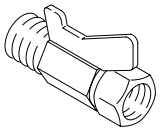
AIR LINE ACCESSORIES

GROUNDED GUN AIR SUPPLY HOSE
100 psi (7 bar) MAXIMUM WORKING PRESSURE
0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) LH
Color coded red; Stainless steel braid ground path
(Meets CENELEC EN 50 050 requirement for metallic ground path.)

235–070 25 ft (8 m)
235–071 36 ft (11 m)
235–072 50 ft (15 m)

GUN AIR LINE QUICK DISCONNECT/SWIVEL 112–534
Includes a quick disconnect coupling insert, which replaces air inlet fitting 185–105, and a swivel shut-off coupling body (left-hand thread), which connects to the grounded air hose.

AIR SHUTOFF VALVE 224–754
500 psi (35 bar) MAXIMUM WORKING PRESSURE
For turning air to gun off or on.
1/4 npsm(m) LH x 1/4 npsm(f) LH

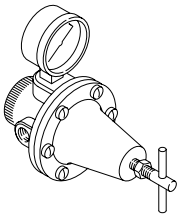


ACCESSORIES

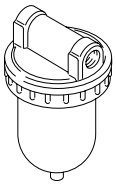
Accessories must be purchased separately.
Use only **GENUINE GRACO PARTS AND ACCESSORIES.**

AIR ADAPTER NIPPLE 185–493
For connecting two or more grounded gun air supply hoses. 1/4 npt x 1/4 npsm LH

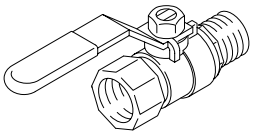
HIGH VOLUME AIR REGULATOR 206–199
0–125 psi (0–9 bar) Regulated Pressure
200 psi (14 bar) Steel Pressure Gauge
1/2 npt(f) inlet and outlet



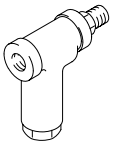
AIR FILTER/MOISTURE SEPARATOR 106–148
250 psi (17.5 bar) MAXIMUM WORKING PRESSURE
For cleaning and drying air in air spray system. 20 micron element, 5 oz. bowl capacity, 3/8 npt(f) inlet and outlet



BLEED-TYPE MASTER AIR VALVE 107–141
300 psi (21 bar) MAXIMUM WORKING PRESSURE
Relieves air trapped in the air line between the paint pump air motor and this valve when closed. 3/4 npt



FILTER (AIR OR PAINT) 202–271
750 psi (52 bar) MAXIMUM WORKING PRESSURE
With 60 mesh (250 micron) element, 3/8 npt(f) inlet, 3/8 npt(m) outlet



MISCELLANEOUS ACCESSORIES

GUN HOLSTER 236–090
Mount the gun holster to the side of the spray booth. Hang gun in holster for voltage to discharge.

AIR CAP AIR CONTROL VALVE 222–322
Allows air cap air to be restricted without losing alternator power.

SNAP RING PLIERS 110–090
For removing the ES ON-OFF Valve Retaining Ring (item 47 in Parts List).

GUN COVER 180–209
Order Part No. 218–374 for package of 10.

ES ON/OFF CONVERSION KIT 223–976
Converts the ES ON/OFF Valve to a constant on setting. A ball valve is included for complete air shut-off at gun.

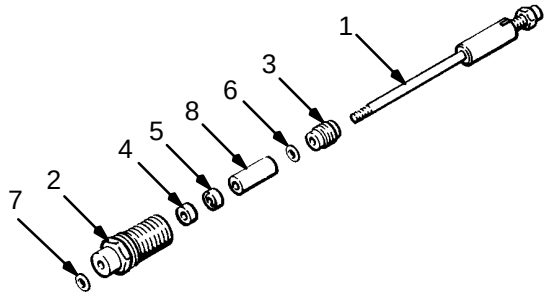
PUSH-PULL PATTERN ADJUSTMENT VALVE 224–883
Pattern adjustment valve that allows quick adjustment of the pattern width between two adjustable settings.

FLUID DRAIN VALVE
500 psi (35 bar) MAXIMUM WORKING PRESSURE
For relieving fluid line pressure

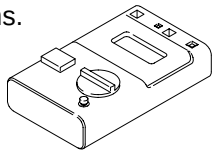
208–630 1/2 npt(m) x 3/8 npt(f); carbon steel and Teflon; *for non-corrosive fluids*
210–071 3/8 npt(m) x 3/8 npt(f); stainless steel and Teflon; *for corrosive fluids*

FLUID NEEDLE ASSEMBLY 223–444
Includes items 1 to 8

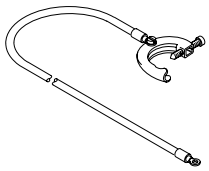
1	223–024	.NEEDLE, fluid	1
2	185–495	.HOUSING, packing	1
3	185–488	.NUT, packing	1
4	178–763	.PACKING, needle	1
5	178–409	.PACKING, fluid	1
6	110–072	.O–RING, Kalrez or Chemraz	1
7	110–071	.O–RING, Kalrez or Chemraz	1
8	186–069	.SPACER, packing	1



MEGOHMMETER 218–979
500 Volt output; 0.01–2000 megohms.
Not for use in Hazardous areas.



GROUNDING CLAMP AND WIRE 222–011
12 ga, 25 ft (7.6 m) wire



SPRAY GUN TECHNICAL DATA

Weight	1.87 lb (0.85 Kg)
Gun Length	9.5 in. (240 mm)
Maximum Working Pressure	100 psi (7 bar)
Air Pressure Operating Range:	0–100 psi (0–7 bar)
Fluid Pressure Operating Range:	0–100 psi (0–7 bar)
Voltage Output	0–65 KV
Air Inlet	1/4 npsm(m) L.H.
Fluid Inlet	3/8 npsm(m)
Fluid Specifications:	Use only with fluids having flash-points above 140° F (60° C) and a maximum 20%, by weight, organic solvent concentration
Wetted Parts	Stainless Steel, Brass, Nylon, Acetal, Teflon®, Fluoroelastomer, Ultra High Molecular Weight Polyethylene, Ceramic

Teflon®, Viton®, and Kalrez® are registered trademarks of the DuPont Co.

Loctite® is a registered trademark of the Loctite Corporation.

Chemraz® is a registered trademark of the Green, Tweed and Company.

THE GRACO WARRANTY AND DISCLAIMERS

WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months or two thousand hours of operation from time of sale, repair or replace any part of the equipment proven defective. However, any deficiency in the barrel, handle, trigger, hook, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months or six thousand hours of operation from time of sale. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non–Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claim. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor and transportation.

DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose,** and of any non–contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. in no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

EQUIPMENT NOT COVERED BY GRACO WARRANTY

Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose,** with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

Sales Offices: Atlanta, Chicago, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)
Foreign Offices: Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea
GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441
PRINTED IN U.S.A. 307–978 12/89 Revised 3/94

Parts Change Notice

Some parts in Rev. L of manual 307–978 have changed but have not yet been changed in the instruction manual. Please note the changes below and mark them in your manual or keep this sheet with your manual.

Use the following information in place of the front cover system description:

ELECTROSTATIC AIR SPRAY
PRO 3500wb ™ Waterbase System

For use when electrostatically spraying conductive, waterbase fluids that have a flash point above 140° F (60° C) and a maximum 20%, by weight, organic solvent concentration.

For Applications with a 15 Gallons (57 Liters) or Less Fluid Supply

Waterbase Systems

These systems include a PRO 3500WB electrostatic spray gun, fluid hose, air hose, voltage control switch, isolation stand, gun holster, and isolation fence.

Part No.	Hose Length
236–909	25 feet (7.6 meters)
236–910	36 feet (11 meters)
236–911	50 feet (15.3 meters)

Waterbase Conversion Systems

For converting an existing PRO 3500SC system to a PRO 3500WB system. These systems include a spray gun conversion kit, fluid hose, air hose, voltage control switch, isolation stand, gun holster, and isolation fence.

Part No.	Hose Length
236–912	25 feet (7.6 meters)
236–913	36 feet (11 meters)
236–914	50 feet (15.3 meters)

For Applications with a 55 Gallons (209 Liters) Fluid Supply

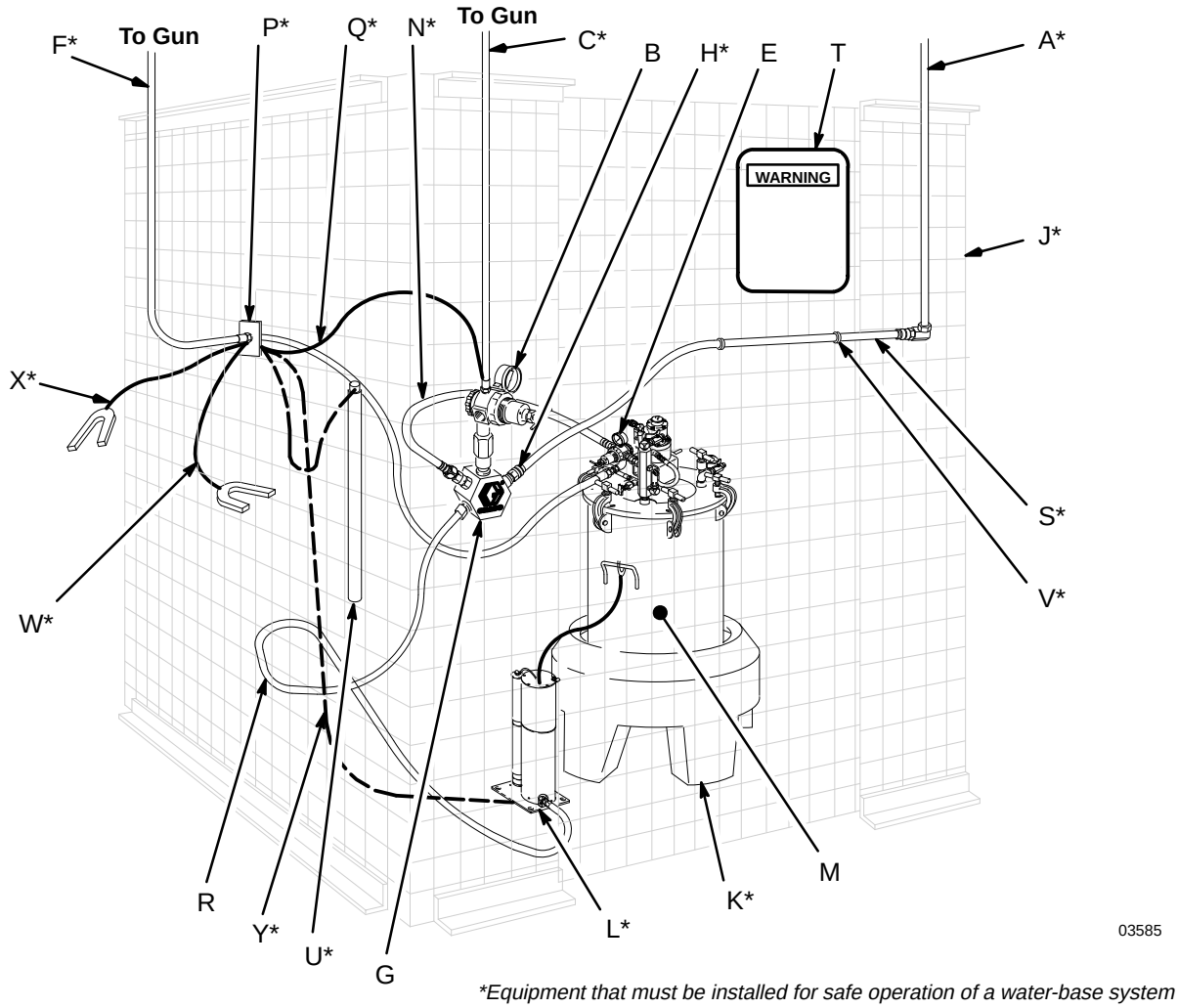
The fluid hose, air hose, voltage control switch, isolation stand, gun holster, and isolation fence must be ordered separately for these applications.

NOTE: See the **Parts Drawings and Lists** and **Accessories** sections for a complete list of part numbers, or contact your authorized Graco representative.

GRACO

January 27, 1995

Refer to this drawing in place of the typical installation drawing on page 4:



**Equipment that must be installed for safe operation of a water-base system*

On page 22:

Test Gun Resistance

Change the procedure to the following:

Measure the resistance between the electrode (20) and the gun air fitting (17). See Fig. 13. The resistance should be between 180 to 220 megohms. If the resistance is outside the specified range, go to the next test. If the resistance is correct, test the resistor stud resistance as shown on page 23.

On page 23:

Test Resistor Stud Resistance

The resistance should be 21 to 29 megohms instead of 22.5 to 27.5 megohms.

KEY

A Megohmmeter
17 Air Fitting
20 Electrode

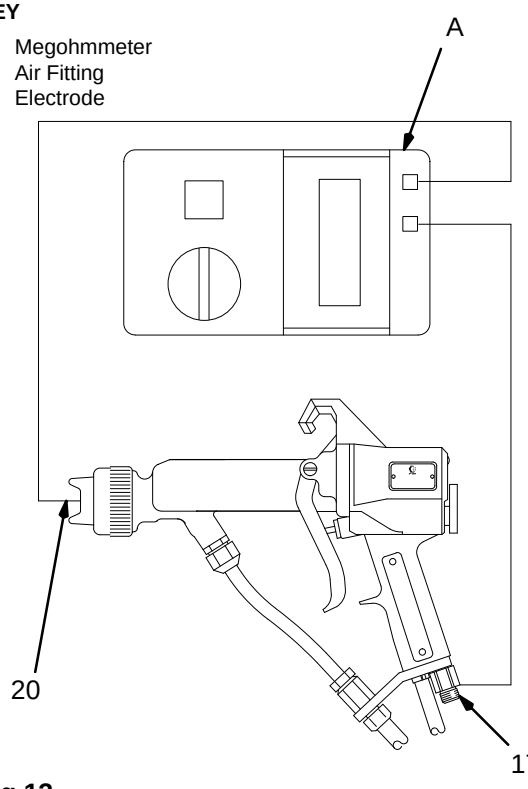


Fig 13

Use this chart in place of the chart on page 5:

KEY TO TYPICAL INSTALLATION DRAWING

Ref Letter	Part No.	Description	Assembly Included With	See Page
A*	–	Grounded Main Air Supply Line	–	–
B	206–199	Gun Air Pressure Regulator	–	43
C*	235–070 (25') 235–071 (36') 235–072 (50')	Gun Grounded Air Supply Hose	See front cover	42
D	222–700	Water-base Electrostatic Spray Gun	See front cover	37
E	–	Fluid Supply Air Pressure Regulator	SST Pressure Tanks	42
F*	185–918 (25') 185–919 (36') 185–920 (50')	Gun Insulated Fluid Supply Hose	223–192 (25') 223–193 (36') 223–194 (50')	40
G	223–640	Air Manifold Assembly	223–477	39
H*	Part of 223–447 (item S)	Safety Fence Air Line Interlock	223–477	–
J*	110–614	Safety Fence	See front cover	42
K*	223–445 or 727–212	Isolation Stand	See front cover	41 or 42
L*	223–639	Voltage Control	223–477	39
M	–	Fluid Supply Unit	–	42
N*	208–591	Fluid Supply Unit Non-conductive Air Supply Hose	223–477	39
P*	185–972 & 185–971	Strain Relief/Ground Terminal	223–192 (25') 223–193 (36') 223–194 (50')	40
Q*	–	Gun Air Hose Ground Wire	235–070 (25') 235–071 (36') 235–072 (50')	42
R	223–446	Voltage Control Non-conductive Air Hose	223–477	39
S*	223–447	Safety Fence Interlock Air Hose	223–477	39
T	186–119	Safety Fence Warning Sign	223–477	39
U*	210–084	Grounding Rod	223–477	39
V*	110–790	U-Bolts and Plate	223–477	39
W*	223–685	Fence Ground Wire	223–477	39
X*	223–547	Main Ground Wire	223–477	39
Y*	223–548	Voltage Control Ground Wire	223–639	39

Refer to this drawing in place of the drawing on page 13:

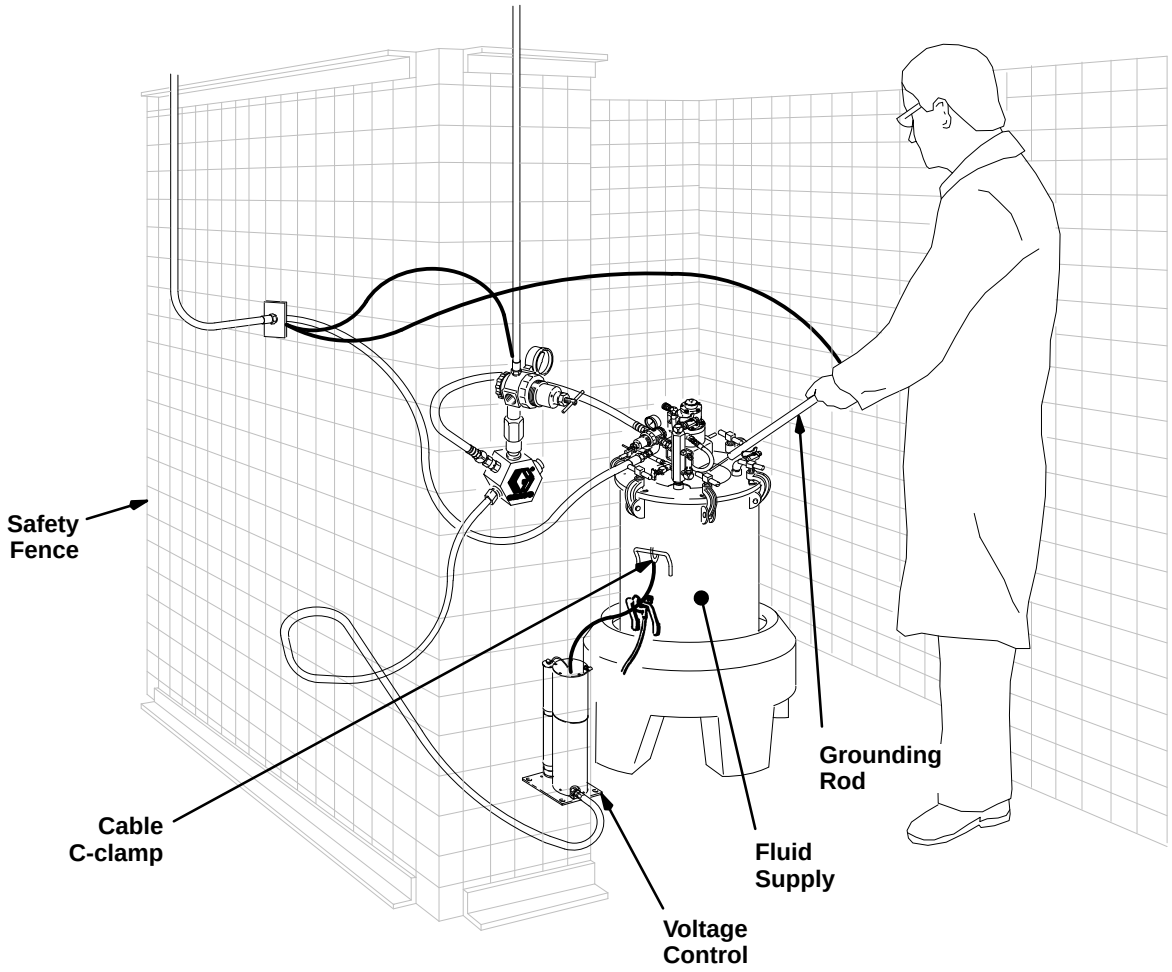


Fig. 10

On page 40:

Change the part number for Ref. No. 316 from 107–048 to 112–480.

On page 39:

Change the quantity for Ref. No. 213 from 2 to 1; the hex nut has been replaced by a star washer, part number 100–985.

Use the following pressure tank part numbers in place of those listed on page 42:

Stainless Steel Pressure Tanks

100 psi (7 bar) Maximum Working Pressure

Size	Models with Agitator	Models without Agitator
5 gallon (19 liter)	236–149	236–152
10 gallon (38 liter)	236–150	236–153
15 gallon (57 liter)	235–151	236–154