



This manual contains important
warnings and information.
READ AND KEEP FOR REFERENCE.

INSTRUCTIONS

First choice when
quality counts.™

Rev. E
Supersedes Rev. D
and PCN E

120 VAC, 15A

Asbestos Encapsulator I Sprayer

2750 psi (19.5 MPa, 195 bar) MAXIMUM WORKING PRESSURE

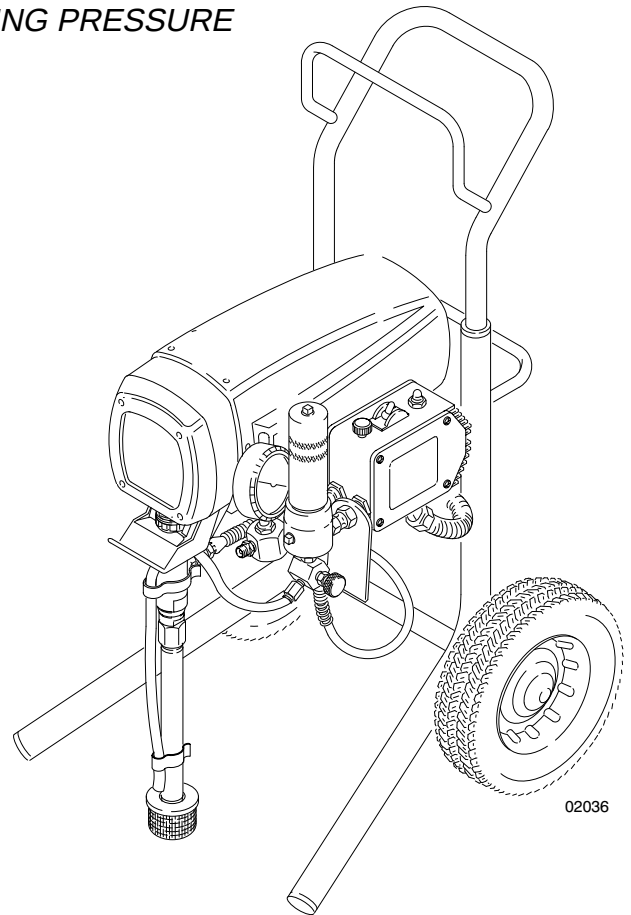
Model 222-685, Series F

Basic sprayer on Upright cart without hose or gun

U.S. Patent No. 4,323,741, 4,397,610

Patented 1983, Canada

And Other Patents Pending



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Basic Components

This sprayer functions and operates differently than other airless paint sprayers. This section will help you become familiar with the sprayer before operating it.

Pressure Control

The pressure control includes an ON/OFF switch for the sprayer, the pressure adjusting control knob, a pressure sensing device and a current overload circuit breaker with a manual reset button. The function of the pressure control is to control the motor speed so that the sprayer maintains constant fluid pressure at the pump outlet.

Motor

The DC motor has sealed bearings and replaceable motor brushes. It drives the displacement pump at the rate needed to supply sufficient paint volume at the selected pressure. Working together, the pressure control and motor cause the pump to cycle whenever there is fluid or pressure demand. When the pump is cycling, the motor sounds like an automobile starter cranking. When the pump is not cycling, the motor may hum intermittently until the fluid pressure stabilizes, then the motor will shut itself off. However, there will still be power to the sprayer and it will stay pressurized and ready to use until you manually shut it off and relieve pressure.

Because the motor is DC, it is less sensitive to low voltage or voltage fluctuations than an AC motor, and a heavy gauge extension cord of up to 150 ft (45 m) can be used.

Drive Assembly

The sealed drive assembly transfers power from the DC motor to the displacement pump.

Displacement Pump

The positive displacement, volume-balanced pump provides equal fluid delivery on both the up and down pump strokes. The pump has a wet-cup which, when filled with Graco Throat Seal Liquid, helps prevent damage to the throat packings and piston rod.

Fluid Filter

The fluid filter strains the paint to help avoid clogs in the hose and spray tip. The filter includes a reusable element and has a pressure drain valve for manually relieving fluid pressure.

OPTIONAL Hoses

Graco hoses are made of nylon, are grounded and have spring guards on both ends. The 50 ft (15.2 m) hose has a 1/4 in. ID. Use a 3 ft (0.9 m), 3/16 in. ID between the main hose and gun for more flexible gun movement. The nylon hose material acts as a pulsation dampener to absorb pressure fluctuations.

Spray Gun & RAC IV DripLess Tip Guard

Graco high pressure spray guns have a safety latch which prevents accidental triggering when it is engaged. See the Detail in Fig 1. The gun shown with the sprayer also has a filter for final paint straining. The Reverse-A-Clean IV SwitchTip uses high pressure fluid to remove clogs from the spray tip without removing it from the gun. The Reverse-A-Clean IV DripLess tip guard is a safety feature which helps reduce the risk of fluid injection injury.

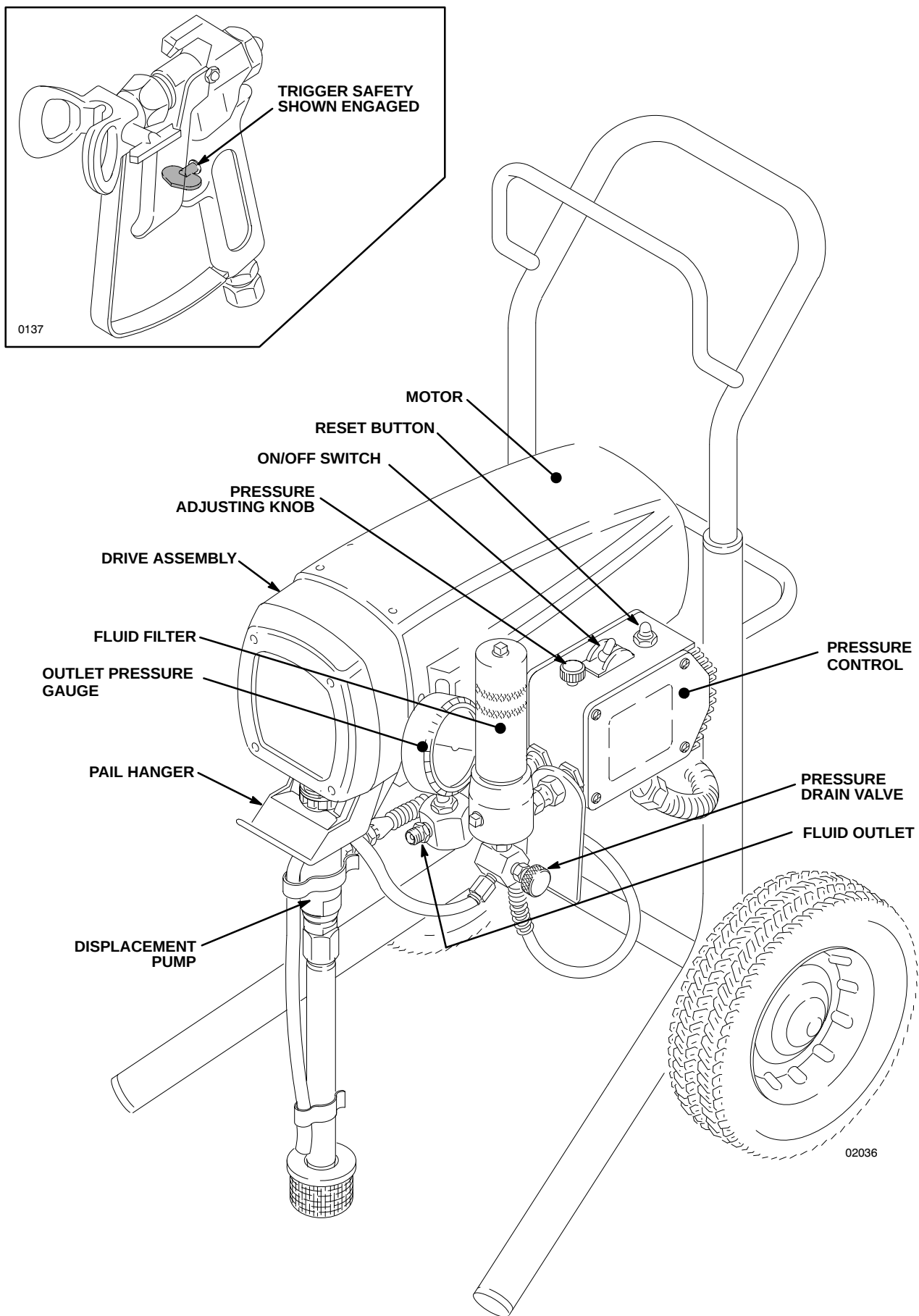


Fig 1

Symbols

Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol



This symbol alerts you to the possibility of damage to equipment if you do not follow the instructions.

WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your distributor.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. Refer to the **Technical Data** on page 43 for the maximum working pressure of this equipment.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.
- Wear hearing protection when operating this equipment.
- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in pressurized aluminum equipment. Such use could result in a chemical reaction, with the possibility of explosion.

WARNING



INJECTION HAZARD

Spray from the gun, leaks or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin may look like just a cut, but it is a serious injury. **Get immediate medical attention.**
- Do not point the gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun trigger safety operates before spraying.
- Lock the gun trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedure** on page 7 if the spray tip clogs and before cleaning, checking or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Fluid hoses must have spring guards on both ends, to help protect them from rupture caused by kinks or bends near the couplings.



TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

⚠ WARNING



FIRE AND EXPLOSION HAZARD

Improper grounding, poor ventilation, open flames or sparks can cause a hazardous condition and result in a fire or explosion and serious injury.



- If there is any static sparking or you feel an electric shock while using this equipment, **stop spraying immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Disconnect all electrical equipment in the spray area.
- Extinguish all open flames or pilot lights in the spray area.
- Do not smoke in the spray area.
- Do not turn on or off any light switch in the spray area while operating or if fumes are present.
- Do not operate a gasoline engine in the spray area.
- Ground the sprayer to a true earth ground with the ground wire and clamp (supplied).
- Use only electrically conductive hoses.



MOVING PARTS HAZARD

Moving parts can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the sprayer.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 7 to prevent the equipment from starting unexpectedly.



DANGER



FIRE AND EXPLOSION HAZARD

Spray painting, flushing or cleaning equipment with flammable liquids in confined areas can result in fire or explosion.
Use outdoors or in extremely well ventilated areas. Ground equipment, hoses, containers and objects being sprayed.
Avoid all ignition sources such as static electricity from plastic drop cloths, open flames such as pilot lights, hot objects such as cigarettes, arcs from connecting or disconnecting power cords or turning light switches on and off.
Failure to follow this warning can result in death or serious injury.



SKIN INJECTION HAZARD

Liquids can be injected into the body by high pressure airless spray or leaks – especially hose leaks.
Keep body clear of the nozzle. Never stop leaks with any part of the body. Drain all pressure before removing parts. Avoid accidental triggering of gun by always setting safety latch when not spraying. Never spray without a tip guard.
In case of accidental skin injection, seek immediate “Surgical Treatment”.
Failure to follow this warning can result in amputation or serious injury.

READ AND UNDERSTAND ALL LABELS AND INSTRUCTION MANUALS BEFORE USE

Setup

General Information

NOTE: Reference numbers and letters in parentheses in the text refer to the callouts in the figures and the parts drawing.

NOTE: Always use Genuine Graco Parts and Accessories, available from your Graco distributor.

**WARNING**

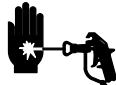
**FIRE AND EXPLOSION HAZARD**
Before operating the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 6.

Grounding

1. *Sprayer:* connect a ground wire and clamp (supplied) to a true earth ground.
2. *Fluid hoses:* use only grounded hoses with a maximum of 500 ft (150 m) combined hose length to ensure grounding continuity.
3. *Spray gun:* obtain grounding through connection to a properly grounded fluid hose and sprayer.
4. *Object being sprayed:* according to local code.
5. *Fluid supply container:* according to local code.
6. *All solvent pails used when flushing,* according to local code. Use only metal pails, which are conductive. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.
7. *To maintain grounding continuity when flushing or relieving pressure,* always hold a metal part of the gun firmly to the side of a grounded metal pail, then trigger the gun.

Pressure Relief Procedure

**WARNING**

**INJECTION HAZARD**
Fluid under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure,
- stop spraying,
- check or service any of the system equipment,
- or install or clean the spray tips.

1. Engage the gun safety latch.
2. Turn the ON/OFF switch to OFF.
3. Unplug the power supply cord.
4. Disengage the gun safety latch. Hold a metal part of the gun firmly to the side of a grounded metal pail, and trigger the gun to relieve pressure.
5. Engage the gun safety latch.
6. Open the pressure drain valve, having a container ready to catch the drainage. Leave the valve open until you are ready to spray again.

If you suspect that the spray tip or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, wrap a rag around the tip guard retaining nut or hose end coupling and very slowly loosen the part to relieve pressure gradually. Now clear the tip or hose.

Setup

WARNING

To reduce the risk of serious injury from static sparking, fluid injection, or overpressurization and rupture of the hose or gun, all hoses must be electrically conductive, the gun must have a tip guard, and each part must be rated for at least 2750 psi (19.5 MPa, 195 bar) Maximum Working Pressure.

CAUTION

To avoid damaging the pressure control, which may result in poor equipment performance and component damage, follow these precautions:

1. Always use grounded, flexible spray hose at least 50 ft (15 m) long.
2. Never use a wire braid hose as it is too rigid to act as a pulsation dampener.
3. Never install any shutoff device between the filter and the main hose. See Fig 2.
4. Always use the main filter outlet. Never plug this outlet.

WARNING

Proper electrical grounding is essential to reduce the risk of fire or explosion which can result in serious injury and property damage. Read the **Grounding** section on page 7 for more detailed grounding instructions.

NOTE: See Fig 2 while doing the setup.

1. Fill the packing nut/wet-cup 1/3 full with Graco Throat Seal Liquid (TSL), supplied.
2. Connect the gun and 50 ft hose. Screw the assembly onto the outlet nipple. Don't use thread sealant and don't install the spray tip yet!
3. Check the electrical service.
 - a. Electrical requirements: 120 VAC, 60 Hz, 15A (minimum).
 - b. Use a grounded electrical outlet located at least 20 ft (6 m) from the spray area.
 - c. Do not remove the grounding prong of the power supply cord and do not use an adapter.
 - d. Extension cord specifications: 15A, 3 wires, grounding type. (Long lengths reduce sprayer performance.)
4. Plug in the sprayer. Turn the ON/OFF switch OFF. Plug the cord into a grounded electrical.
5. Flush the pump to remove the oil left in to protect pump parts after factory testing. See the FLUSHING on page 14.
6. Prepare the material according to the manufacturer's recommendations.

Setup

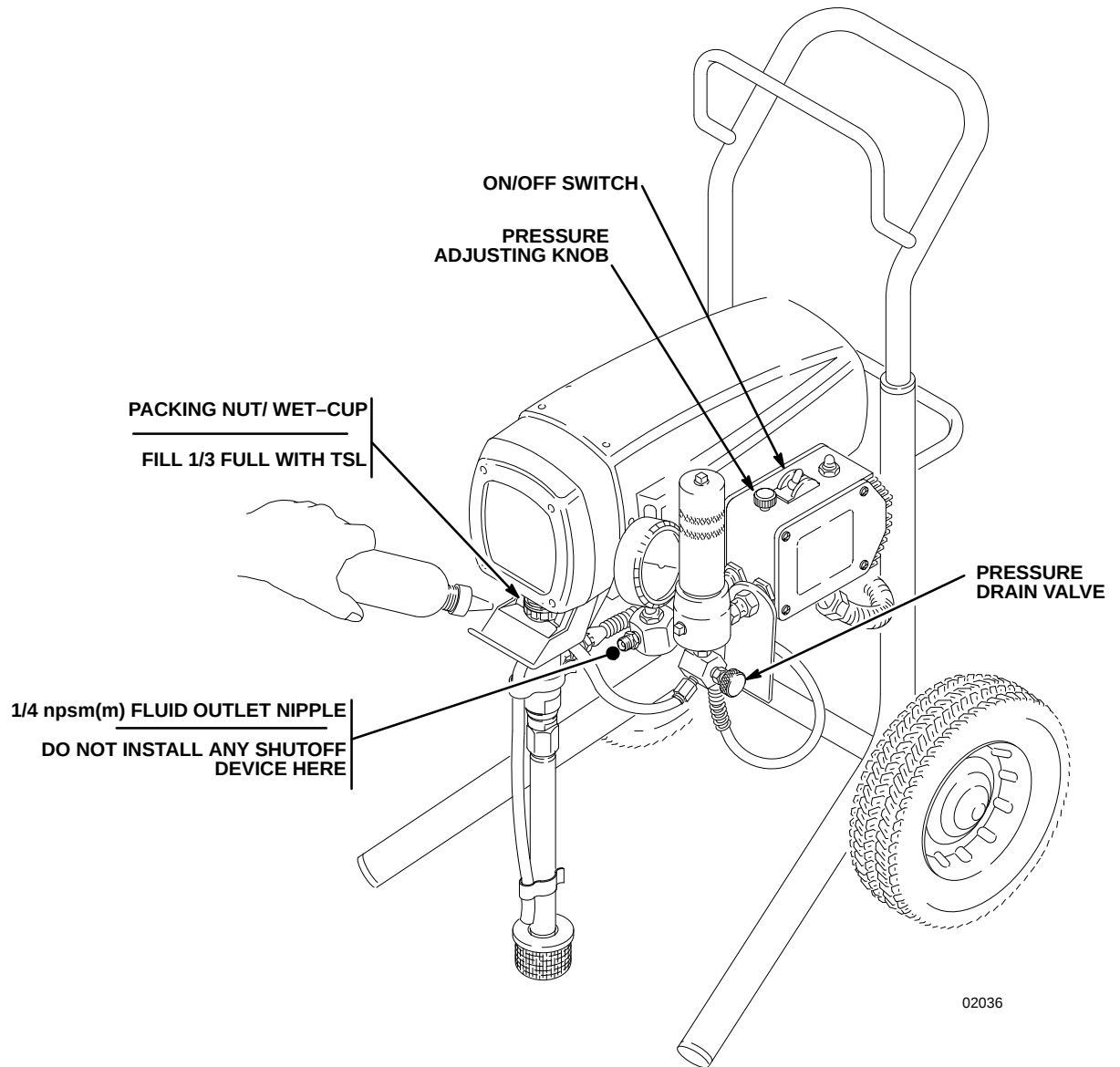


Fig 2

Operation

Use this procedure each time you start the sprayer to help ensure the sprayer is ready to operate and that you start it safely.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: Flush the sprayer if this is a first-time startup. See page 14.

NOTE: See Fig 4 except where noted.

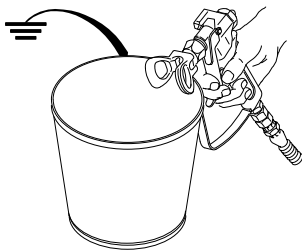
1. **Plug in the sprayer.**
2. **Close the pressure drain valve.**
3. **Put the suction tube into the material container.**
4. **Turn the pressure adjusting knob fully counterclockwise to minimum pressure.**

⚠ CAUTION

Do not run the pump without fluid in it for more than 30 seconds to avoid damage to the displacement pump packings.

⚠ WARNING

To reduce the risk of static sparking and splashing when flushing, always remove the spray tip from the gun and hold a metal part of the gun firmly to the side of a grounded metal pail.



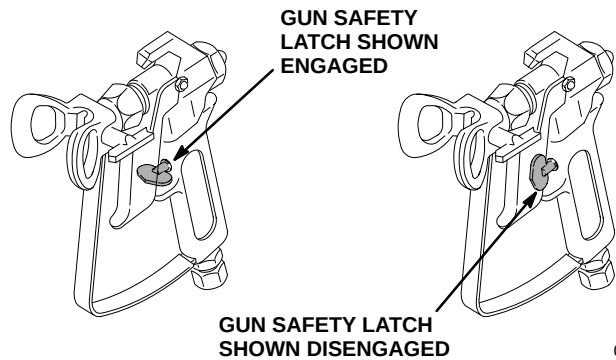
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5. **Prime the pump.**
 - a. Open the pressure drain valve. Turn on the sprayer. Slowly turn the pressure adjusting knob clockwise until the sprayer starts. When fluid comes from the drain hose, close the valve.

- b. Disengage the gun safety latch. See Fig 3. Following the warning, above, trigger the gun until all air is forced out of the system and the material flows freely from the gun.

- c. Release the trigger. Engage the gun safety latch.

6. **Check all fluid connections for leaks. Relieve the fluid pressure** before tightening connections.



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Fig 3

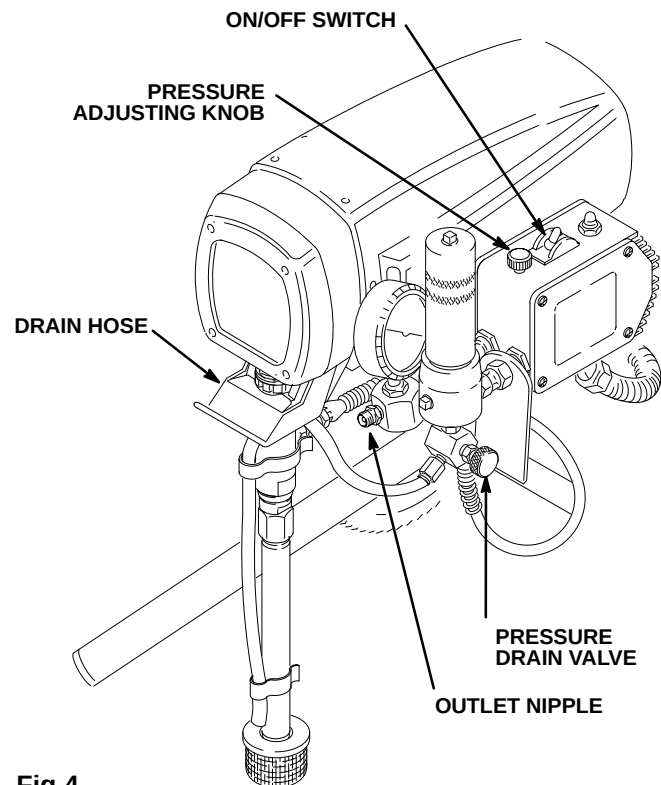


Fig 4

Operation

7. Adjust the spray pattern

- a. Increase the pressure just until spray from the gun is completely atomized. Use the lowest pressure needed to get the desired results. This reduces over spray and fogging, decreases tip wear and extends the life of the sprayer.
- b. Check your material manufacturer's spray pressure recommendations. With the gun triggered, adjust the pressure until the pressure gauge indicates you are within the recommended pressure range.
- c. If more coverage is needed, use a larger tip rather than increasing the pressure.
- d. Test the spray pattern. To adjust the pattern, engage the gun safety latch, loosen the retaining nut. Position the tip guard horizontally for a horizontal pattern or vertically for a vertical pattern. Then tighten the retaining nut.

8. **Install the spray tip and tip guard.** Engage the gun safety latch. See Fig 5. Install the spray tip according to the instructions supplied with it.

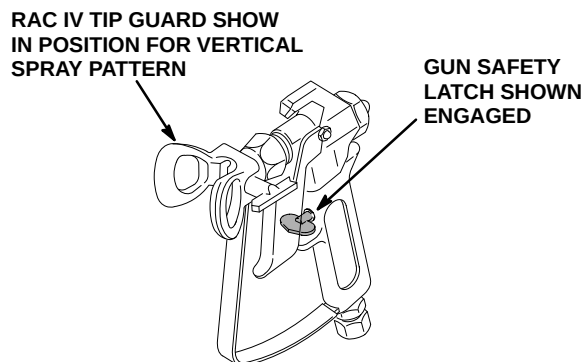


Fig 5

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Maintenance

Cleaning a Clogged Tip

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

WARNING

To reduce the risk of serious injury from fluid injection:

Never operate the spray gun with the tip guard removed.

Do not hold your hand, body, or a rag in front of the spray tip when cleaning or checking a clogged tip. Always point the gun toward the ground or into a pail when checking to see if the tip is clear.

Do not try to “blow back” fluid; this is not an air spray sprayer.

1. Clean the front of the tip frequently during the day's operation. First, **relieve the pressure**.

NOTE: If you are using a RAC IV self-clearing tip, follow Steps 2 through 5. If you are using any other kind of tip guard and spray tip, follow the instructions supplied with it for clearing a clog.

2. If the spray tip does clog, release the gun trigger, engage the gun safety latch, and rotate the RAC IV handle 180°. See Fig 6.
3. Disengage the gun safety latch and trigger the gun into a waste container. Engage the gun safety latch again.
4. Return the handle to the original position, disengage the gun safety latch, and resume spraying.
5. If the tip is still clogged, engage the gun safety latch, shut off and unplug the sprayer, and open the pressure drain valve to **relieve the pressure**. Clean the spray tip as shown in manual 307–848, supplied with the RAC IV.

TIP GUARD HANDLE
SHOWN IN SPRAYING
POSITION

TURN HANDLE 180°,
DISENGAGE SAFETY
LATCH AND TRIGGER
GUN TO CLEAR CLOG

GUN SAFETY
LATCH
SHOWN
ENGAGED

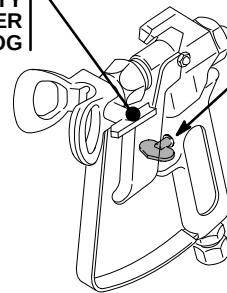


Fig 6

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Maintenance



WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

1. **Check the packing nut/wet-cup daily.** First **relieve the pressure**. Keep the wet-cup 1/3 full of TSL at all times to help prevent fluid buildup on the piston rod and premature wear of packings.
2. **Tighten the packing nut just enough to stop leakage.** Over tightening causes binding and excessive packing wear. Use a round punch or brass rod and light hammer to adjust the nut. Refer to Fig 7.
3. **Clean the fluid filter often** and whenever the sprayer is stored. Follow the Flushing Guidelines on page 14 or refer to manual 307–273, supplied, for the cleaning procedure.
4. **Lubricate the bearing housing** after every 100 hours of operation. First **relieve the pressure**. Remove the front cover. Fill the bearing housing cavity with SAE 10 non-detergent oil. See Fig 8.
5. **For very short shutoff periods**, leave the suction tube in the material, **relieve the pressure**, and clean the spray tip.
6. **Flush the sprayer at the end of each work day** and fill it with mineral spirits to help prevent pump corrosion and freezing. See page 14.



CAUTION

To prevent pump corrosion, and to reduce the chance of fluid freezing in the pump or pressure control in cold weather, never leave water or any type of material in the sprayer when it is not in use. Freezing can seriously damage the sprayer or result in a loss of pressure or stalling.

7. **Coil the hose and hang it on the hose rack** when storing it, even for overnight, to help protect the hose from kinking, abrasion, coupling damage, etc.

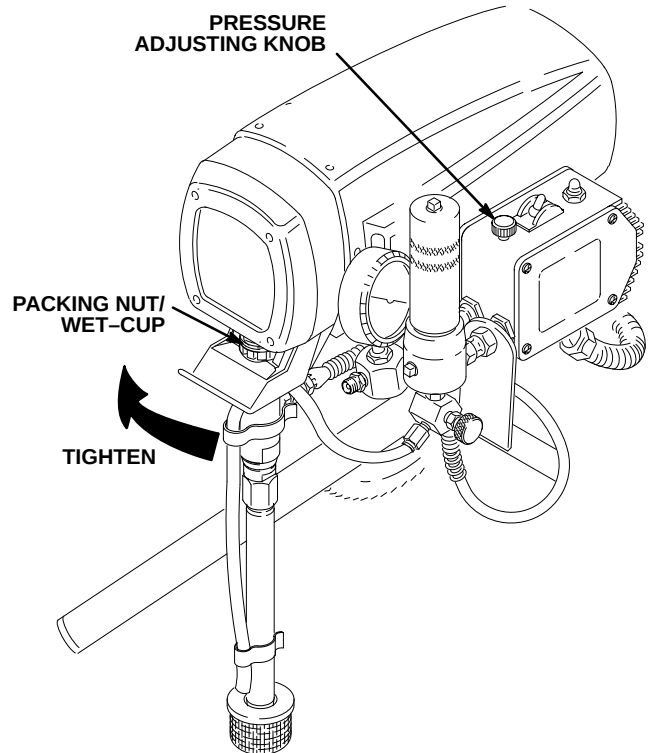


Fig 7

FILL BEARING HOUSING CAVITY WITH SAE NON-DETERGENT OIL AFTER EVERY 100 HOURS OF OPERATION

FRONT COVER

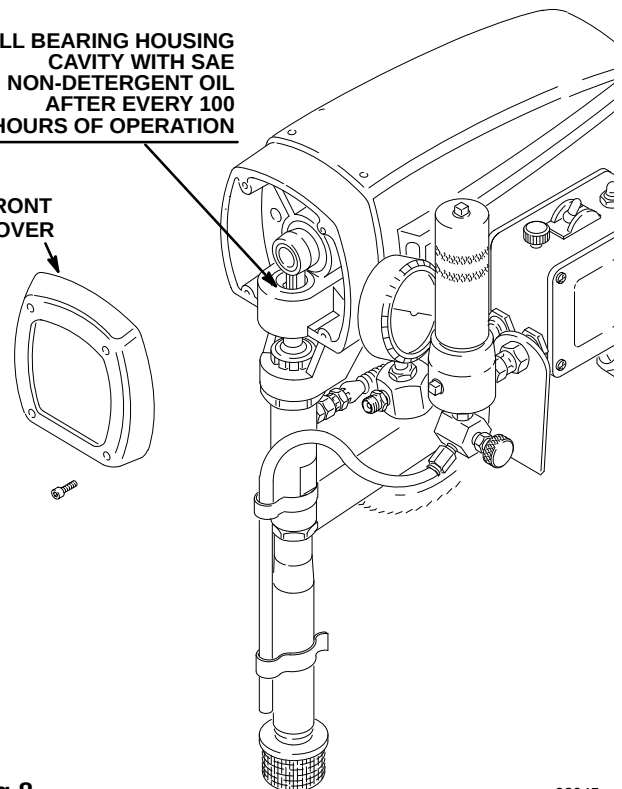


Fig 8

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Flushing

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: Several flushes may be needed to thoroughly clean the system. Use this chart to determine the required flushing order for the fluid you are using, and then follow the procedure below for flushing.

*Use this category for flushing a brand new sprayer and flushing after storage.

System has this fluid in it:	Next fluid to be sprayed.	Flushing order:			Before you spray or store sprayer:
		Flush 1	Flush 2	Flush 3	
*Oil-based solvent or fluid	Oil-based fluid – new color	Mineral spirits	none	none	Prime with oil-based fluid
Oil-based solvent or fluid	Water-based fluid	Mineral spirits	Warm soapy water	Clean water	Prime with water-based fluid
Oil-based solvent or fluid	Prepare for storage	Mineral spirits	none	none	Relieve the pressure, Leave drain valve open
Water or water-based fluid	Water-based fluid – new color	Warm soapy water	Clean water	none	Prime with water
Water or water-based fluid	Oil-based fluid	Warm soapy water	Clean water	Mineral spirits	Prime with oil
Water or water-based fluid	Prepare for storage	Warm soapy water	Clean water	Mineral spirits	Relieve the pressure, Leave drain valve open

⚠ CAUTION

Never allow water to freeze in the pressure control. Doing so prevents the sprayer from being started and causes serious damage to the pressure control. Pump the water out with mineral spirits.

⚠ WARNING

To reduce the risk of static sparking and splashing when flushing, always remove the spray tip from the gun and hold a metal part of the gun firmly to the side of a grounded metal pail.

- Start the sprayer. See page 10. To save the fluid still in the sprayer, trigger the gun into another container until the next fluid appears, then trigger the gun back into the fluid you are pumping. Circulate the flushing fluid a couple of minutes to thoroughly clean the system.
- Do not run the pump dry for more than 30 seconds to avoid damaging the pump packings!
- Relieve the pressure.** Engage the gun safety latch.
- Unscrew the filter bowl and reinstall the clean screen. Install the bowl and hand tighten.

- Follow the illustrated **Pressure Relief Procedure** on page 4. Engage the gun safety latch.
- Turn the pressure adjusting knob fully counter-clockwise to the minimum pressure.
- Remove the spray tip from the gun. Remove the filter bowl and screen; see manual 307–273. Clean the screen separately and install the bowl without the screen to flush it. See Fig 9.
- Put the suction tube into a grounded metal pail with 1/2 gallon of compatible solvent.

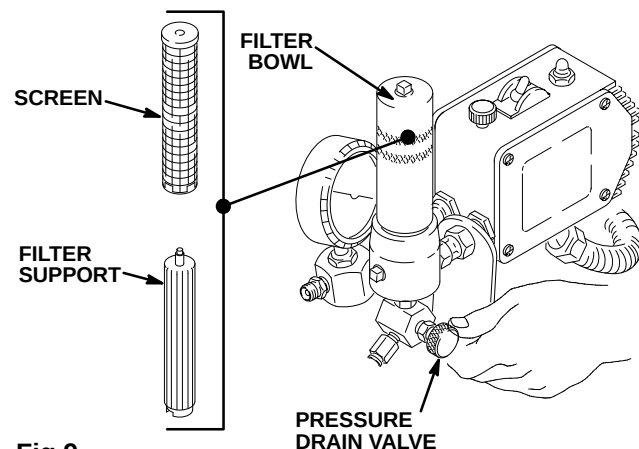


Fig 9

Troubleshooting



WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

Check everything in the chart before disassembling the sprayer.

Motor Won't Operate

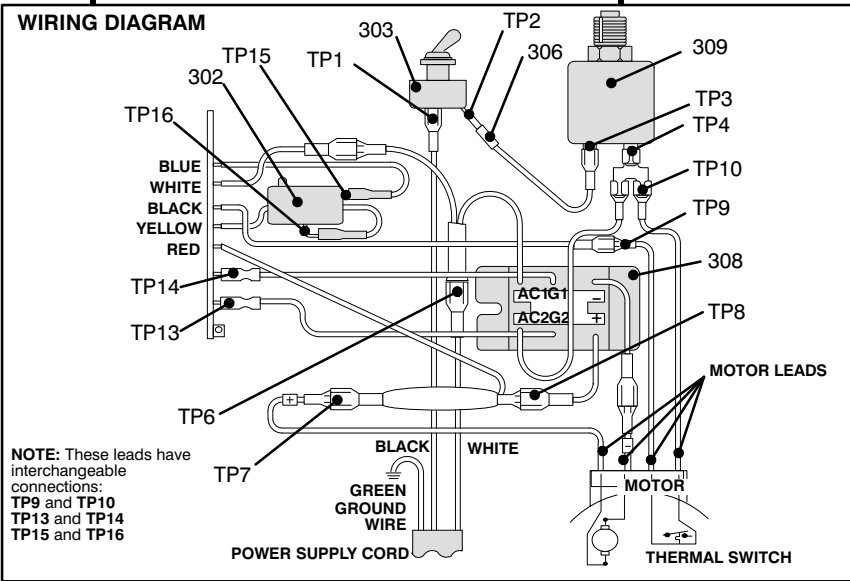
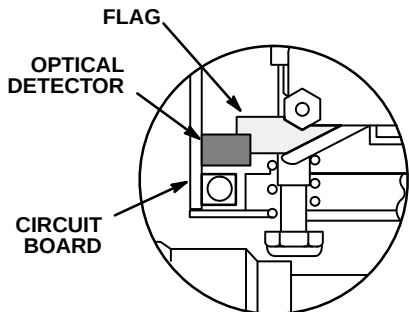
TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Basic Fluid Pressure Problems	1. Check the pressure control knob setting. The motor will not run if it is at the minimum setting (fully counterclockwise).	1. Slowly increase the pressure setting to see if the motor starts.
	2. Check for a clogged spray tip. Refer to the separate gun or tip instruction manual.	2. Relieve the pressure , refer to the separate gun or tip instruction manual for tip cleaning.
Basic Mechanical Problems	1. Check for frozen or hardened paint in the pump (39) and/or pressure control tube. Using a screwdriver, carefully try to rotate fan at back of motor by hand. See page 21.	1. Thaw. Plug in sprayer and turn on. Slowly increase pressure setting to see if motor starts. If it doesn't, see NOTE 1, below.
	2. Check displacement pump connecting rod pin (20). It must be completely pushed into connecting rod (29) and retaining spring (35) must be firmly in groove of connecting rod. See Fig 31, page 35.	2. Push pin into place and secure with the spring retainer.
	3. Check for motor damage. Remove drive housing assembly (18). See page 31. Try to rotate fan by hand.	3. Replace motor (1) if fan won't turn. See page 33.
Basic Electrical Problems	1. Check sprayer circuit breaker (309) button to be sure it has not popped up.	1. Depress button to reset. If circuit breaker continues to open, see 'Electrical Short' on page 20.
	2. Check electrical supply with volt meter. Meter should read 105–125 VAC.	2. Reset building circuit breaker; replace building fuse. Try another outlet.
	3. Check extension cord for visible damage. Use a volt meter or test lamp at extension cord outlet to check.	3. Replace extension cord.
	4. Check sprayer power supply cord (311) for visible damage such as broken insulation or wires.	4. Replace power supply cord. See page 25.
	5. Check motor brush leads, terminals and brush length. Brush length should be 1/2" minimum. See page 24.	5. Tighten terminal screws; replace brushes. See page 24.

NOTE 1: Thaw the sprayer if water or water-based paint has frozen in it, due to exposure to low temperatures, by placing it in a warm area. Do not try to start the sprayer until it has thawed completely. If the bourdon tube was not damaged by the freezing, the pump should operate. If paint hardened (dried) in the sprayer, the pump packings and/or bare pressure control must be replaced. See page 36 (pump) or 28 (pressure control).

Motor Won't Operate (continued)

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Diagnosing circuit board indicator lamps. The normal condition is red lamp on, clear lamp on when board is telling pump to run. Follow Pressure Relief Procedure Warning, page 7. Remove gun from hose. Remove pressure control cover. Check for faulty condition of circuit board lamps. Condition A Both lamps on; pump won't operate and motor is not running	1. Check leads from bridge (308) to motor to be sure they are securely fastened and properly mated.	1. Replace loose terminals; crimp to leads. Be sure male terminal blades are straight and firmly connected to mating part.
	2. Check G1 and G2 connections between circuit board (28) and bridge (308) for damage or loose terminals.	2. Clean circuit board male terminals. Replace loose or damaged terminals. Securely reconnect leads.
	3. Check for loose motor brush lead connections and terminals. See page 24.	3. Tighten terminal screws. Replace brushes if leads are damaged. See page 24.
	4. Check brush length which should be 0.40" minimum. See page 24. NOTE: The brushes do not wear at the same rate on both sides of the motor. Check both brushes.	4. Replace brushes. See page 24.
	5. Check for broken or misaligned motor brush springs. Rolled portion of spring must rest squarely on top of brush. See page 24.	5. Replace spring if broken. Realign spring with brush. See page 24.
	6. Check motor brushes for binding in brush holders. See page 24.	6. Clean brush holders. Remove carbon with small cleaning brush. Align brush leads with slot in brush holder to assure free vertical brush movement.
	7. Check motor armature commutator for burn spots, gouges and extreme roughness. Remove motor cover and brush inspection plates to check. See page 24.	7. Remove motor and have motor shop resurface commutator if possible. See page 34.
	8. Check motor armature for shorts using armature tester (growler) or perform spin test. See page 21.	8. Replace motor. See page 33.
	9. Check bridge (308) by substituting with a good bridge or performing bridge test. See page 22. CAUTION: Do not perform this check until motor armature is determined to be good. A bad motor armature will immediately burn out a good bridge.	9. Replace bridge. See page 26.
Condition B (continued) Both lamps off REFER TO THE WIRING DIAGRAM ON PAGE 18 TO IDENTIFY TEST POINTS (TP). NOTE: Connect the volt meter to the <u>terminal</u> not the wire which you disconnect from the terminal.	1. Check circuit breaker (309) button to be sure it has not popped up.	1. Depress button to reset. If circuit breaker or fuse continues to open, see "Electrical Short", page 20.
	2. Check power supply cord (311). Disconnect TP6 female (neutral) and TP1 female and connect volt meter to these leads. Plug in sprayer. Meter should read 105 to 125 VAC. Unplug sprayer. Reconnect TP1.	2. Replace power supply cord. See page 25.
	3. Check ON/OFF switch (303). Disconnect TP2 and connect volt meter to TP6 female and TP2 male. Plug in sprayer and turn ON . Meter should read 105 to 125 VAC. Turn off and unplug sprayer. Reconnect TP2.	3. Replace ON/OFF switch. See page 25.
	4. Check jumper wire (306). Disconnect TP3 and connect volt meter to TP6 female and TP3 female. Plug in sprayer and turn on. Meter should read 105 to 125 VAC. Turn off and unplug sprayer. Reconnect TP3.	4. Replace jumper wire. See page 25.
	5. Check circuit breaker (309). Connect volt meter to TP6 female and TP4. Plug in sprayer and turn ON . Meter should read 105 to 125 VAC. Turn off and unplug sprayer.	5. Replace circuit breaker. See page 26.

Motor Won't Operate (continued)

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Condition B (continued) Both lamps off REFER TO THE WIRING DIAGRAM BELOW TO IDENTIFY TEST POINTS (TP).	6. Check motor thermal cutout switch. Connect volt meter to TP6 female and TP9 female. Plug in sprayer and turn on. Meter should read 105 to 125 VAC. Turn off and unplug sprayer.	6. Allow motor to cool. Correct cause of over-heating. If switch remains open after motor cools, check continuity between TP9 female and TP10 with ohmmeter. If open, replace motor.
	7. Check microswitch (302). Reconnect TP6 connectors. Connect volt meter to TP15 male and TP4. Meter should read 50–125 VAC.	7. Clean microswitch male terminals. Replace loose or damaged terminals. Securely reconnect leads.
	8. Visually inspect microswitch (302) button. Adjustment stud should not depress button when fluid pressure is zero. Depress button with small screwdriver; audible click indicates microswitch is in normal position.	8. Microswitch is faulty. Return sprayer for repair.
	9. Check microswitch (302) continuity with ohm meter. <i>Be sure sprayer is unplugged!</i> Meter should read zero ohms with no fluid pressure in the sprayer.	9. Microswitch is faulty. Return sprayer for repair.
	10. Check all terminals for damage or loose fit. Reconnect TP6 connectors.	10. Replace damaged terminals and reconnect securely.
	11. Check circuit board (28) by substituting with a good board. See page 27.	11. Replace circuit board. See page 27.
WIRING DIAGRAM  NOTE: These leads have interchangeable connections: TP9 and TP10 TP13 and TP14 TP15 and TP16		
Condition C Red lamps on, Clear lamp off <i>Unplug sprayer!</i>	1. Check circuit board (28) by removing from box <i>without</i> disconnecting wires; see page 27 for removal procedure. WARNING: Removing circuit board while still wired over-rides optical detector which may cause sprayer to over-pressurize, if microswitch does not function properly. Turn sprayer on <i>ONLY</i> long enough to check lamp condition, then shut off immediately. WARNING: To reduce risk of electric shock, handle board by edges only! Do not allow any metal objects to come in contact with board! Plug in and turn on sprayer. Clear lamp should be on now. Turn off and unplug sprayer.	1. Replace circuit board. See page 27. 
	2. Check bourdon tube flag and detector position. Reinstall circuit board (see page 27). Turn pressure setting to maximum; flag should extend less than half way into optical detector slot from the bottom.	2. Perform pressure control adjustment to see if that corrects problem. See page 29. If not, replace bare pressure control. See page 29.

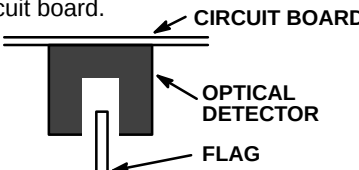
Low Output

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Low Output	1. Check for worn spray tip.	1. Follow Pressure Relief Procedure Warning then replace tip. See your separate gun or tip manual.
	2. Check to see that pump does not continue to stroke when gun trigger is released. Plug in and turn on sprayer. Prime with paint. Trigger gun momentarily, then release and engage safety latch. Relieve the pressure , turn off and unplug sprayer.	2. Service pump. See pages 36.
	3. Check electrical supply with volt meter. Meter should read 105–125 VAC.	3. Reset building circuit breaker; replace building fuse. Repair electrical outlet or try another outlet.
	4. Check extension cord size and length.	4. Replace with a larger wire size cord.
	5. Check G1 and G2 leads from bridge (308) to circuit board (28) for damaged or loose wires or connectors. Refer to the WIRING DIAGRAM on Fig 19, page 26.	5. Clean circuit board male terminals. Replace loose or defective lead terminals. Securely reconnect lead terminals to board.
	6. Check stall pressure. Refer to Pressure Control Adjustment on page 29.	6. Perform Pressure Control Adjustment. See page 29.
	7. Check bridge (308) + and – leads and terminals to motor. Inspect wiring insulation and terminals for signs of overheating. See page 27.	7. Be sure male terminal blades are centered and firmly connected to female terminals. Replace any loose terminal or damaged wiring. Securely reconnect wires to bridge.
	8. Check for loose motor brush leads and terminals. See page 24.	8. Tighten terminal screws. Replace brushes if leads are damaged. See page 24.
	9. Check for worn motor brushes which should be 1/2" minimum. See page 24.	9. Replace brushes. See page 24.
	10. Check for broken and misaligned motor brush springs. Rolled portion of spring must rest squarely on top of brush.	10. Replace spring if broken. Realign spring with brush. See page 24.
	11. Check motor brushes for binding in brush holders. See page 24.	11. Clean brush holders, remove carbon dust with small cleaning brush. Align brush lead with slot in brush holder to assure free vertical brush movement.
	12. Check circuit board (28) by substituting with a good circuit board. See page 27.	12. Replace circuit board. See page 27.
	13. Check motor armature for shorts by using an armature tester (growler) or perform spin test. See page 21.	13. Replace motor. See page 33.
	14. Check bridge (308) by substituting with a good bridge or by performing the bridge test. See page 22. CAUTION: Do not perform this check until armature is determined to be good. A bad armature will immediately burn out a good bridge.	14. Replace bridge. See page 26.

No Output

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Motor runs and pump strokes	1. Check paint supply.	1. Refill and reprime pump.
	2. Check for clogged intake strainer.	2. Remove and clean, then reinstall.
	3. Check for loose suction tube or fittings.	3. Tighten; use thread sealant or sealing tape on threads if necessary.
	4. Check to see if intake valve ball and piston ball are seating properly. See page 36.	4. Remove intake valve and clean. Check balls and seats for nicks; replace if necessary. See page 36. Strain paint before using to remove particles that could clog the pump.
	5. Check for leaking around throat packing nut which may indicate worn or damaged packings. See page 36.	5. Replace packings. See page 36. Also check piston valve seat for hardened paint or nicks and replace if necessary. Tighten the packing nut/wet-cup.
Motor runs but pump does not stroke	1. Check displacement pump connecting rod pin (20). See page 35.	1. Replace pin if missing. Be sure retainer spring (35) is fully in groove all around connecting rod. See page 35.
	2. Check connecting rod assembly (29) for damage. See page 31.	2. Replace connecting rod assembly. See page 31.
	3. Be sure crank in drive housing rotates; plug in sprayer and turn on briefly to check. Turn off and unplug sprayer. See page 31.	3. Check drive housing assembly for damage and replace if necessary. See page 31.

Excessive Pressure Fluctuations

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Spray pattern variations.	1. Be sure both G1 and G2 leads from bridge (308) to circuit board (28) are firmly connected. See Fig 19, page 26.	1. Reconnect securely. See page 27.
	2. Check maximum working pressure adjustment. Refer to Pressure Control Adjustment on page 29.	2. Perform Pressure Control Adjustment. See page 29.
	3. Check bourdon tube flag and detector position. Turn pressure setting to maximum; flag should not drag or bind in optical detector slot of circuit board. 	3. Carefully bend flag into alignment with detector slot to see if that corrects problem. If not, replace bare pressure control assembly (301). Perform pressure control adjustment after reassembly.
	4. Check circuit board (28) by substituting with a good board. See page 27.	4. Replace circuit board. See page 27.
	5. Check LOW OUTPUT section, page 18.	

Motor is Hot and Runs Intermittently

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
	1. Determine if sprayer was operated at high pressure with small tips, which causes low motor RPM and excessive heat build up.	1. Decrease pressure setting or increase tip size.
	2. Be sure ambient temperature where sprayer is located is no more than 90°F and sprayer is not located in direct sun.	2. Move sprayer to shaded, cooler area, if possible.
	3. Determine if was sprayer turned on, pressurized, but not operating for long periods of time.	3. Turn off sprayer whenever you stop spraying for a while and relieve the pressure .

Electrical Short

TYPE OF PROBLEM	WHAT TO CHECK <i>If check is OK, go to next check</i>	WHAT TO DO <i>When check is not OK refer to this column</i>
Building circuit breaker opens as soon as sprayer switch is turned on. CAUTION Any short in any part of the motor power circuit, which is connected to the output side of the bridge, will cause the bridge to burn out immediately. Correctly diagnose and repair all shorts before checking and replacing bridge.	1. Check all electrical wiring for damaged insulation, and all terminals for loose fit or damage. Also check wires between pressure control and motor which are encased in conduit (1). See page 33.	1. Repair or replace any damaged wiring or terminals. Securely reconnect all wires.
	2. Check for missing inspection plate gasket (see page 24), bent terminal forks or other metal to metal contact points which could cause a short.	2. Correct faulty conditions.
	3. Check motor armature for shorts. Use an armature tester (growler) or perform spin test. See page 21. Inspect windings for burns.	3. Replace motor. See page 33.
	4. Check bridge (308) by substituting with a good bridge or by performing bridge test. See pages 22 or 26. CAUTION: Do not check bridge until armature is determined to be good. A bad armature will immediately burn out a good bridge.	4. Replace bridge. See page 26.
Building circuit breaker opens as soon as sprayer is plugged into outlet and sprayer is NOT turned on.	1. Check 'Basic Electrical Problems' on page 15.	
	2. Check ON/OFF switch (303) See page 25. <i>Be sure the sprayer is unplugged!</i> Disconnect wires from switch. Check switch with ohmmeter. The reading should be infinity with the ON/OFF switch OFF, and zero with the switch ON. CAUTION: A short in the motor circuit burns the bridge out immediately, which usually causes the ON/OFF switch to fail in the closed mode.	2. Replace ON/OFF switch. See page 25.
Sprayer circuit breaker opens after sprayer operates for 5 to 10 minutes.	1. Check electrical supply with volt meter. Meter should read 105 to 125 VAC.	1. If voltage is too high, do not operate sprayer until corrected.
	2. Check tightness of pump packing nut. Over-tightening tightens packings on rod, restricts pump action, and damages packings.	2. Loosen packing nut. Check for leaking around throat. Replace pump packings, if necessary. See page 35.
	3. Check maximum working pressure adjustment.	3. Perform Pressure Control Adjustment. See page 29.
	4. After determining that there is no short in system, reset circuit breaker button.	4. If circuit breaker continues to open (button pops up), replace the circuit breaker. See page 26.

Spin Test



WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

For checking armature, motor winding and brush electrical continuity.

Setup

Relieve the pressure. Remove the drive housing. See page 31.

Remove the pressure control cover, the motor shield (14), the fan cover (F) and the inspection covers (J). See Fig 10.

Disconnect the two leads (E) from the motor to the bridge (308). See Fig 11.

Armature Short Circuit Test

Relieve the pressure. Quickly turn the motor fan by hand. If there are no shorts, the motor will coast two or three revolutions before coming to a complete stop. If the motor does not spin freely, the armature is shorted and the motor must be replaced. See page 33.

Armature, Brushes, and Motor Wiring Open Circuit Test (Continuity)

Relieve the pressure. Connect the two black motor leads together with a test lead. Turn the motor fan by hand at about two revolutions per second.

If there is uneven or no turning resistance, check the following: broken brush springs, brush leads, motor leads; loose brush terminal screws, motor lead terminals; worn brushes. Repair parts as needed. See page 24.

If there is still uneven or no turning resistance, replace the motor. See page 33.

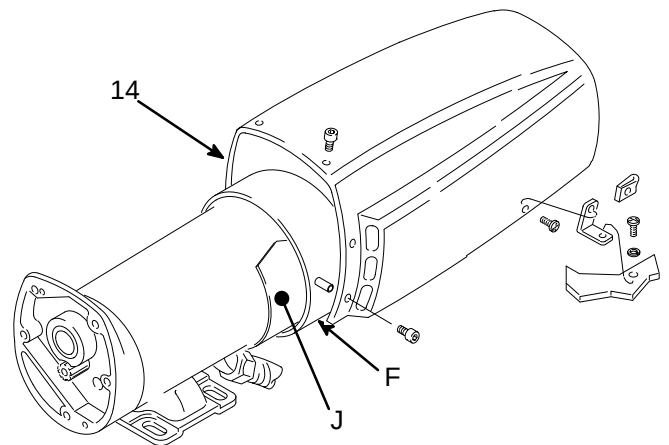


Fig 10

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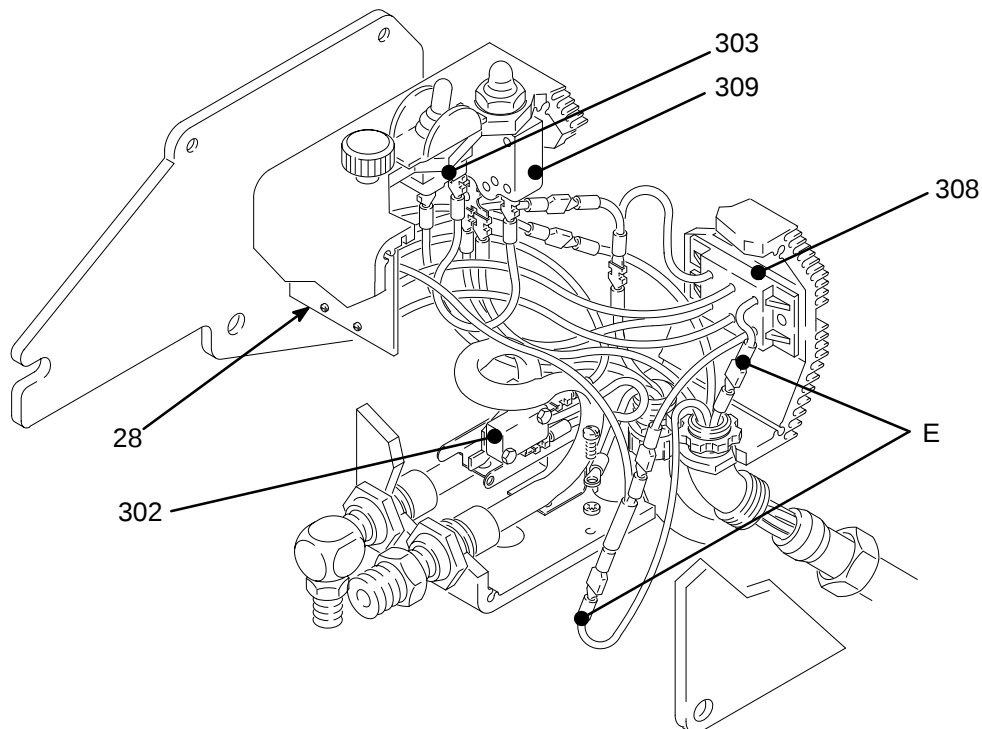


Fig 11

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Bridge Test

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

Remove the bridge from the pressure control box and perform this test to determine if the bridge is functional. See **BRIDGE RECTIFIER REPLACEMENT**, page 26. Use a continuity tester, such as multi-meter set on the X1 ohms scale.

Perform all tests in the chart. If the bridge fails even one test, it must be replaced.

Fig 12 shows the position of the wires on the bridge. Using the chart at the right, connect the meter wires as indicated by the black dots for each test, and then check the continuity.

In Tests 1, 2 and 3, there should be NO continuity.

In Tests 4, 5 and 6, connect the + and – meter wires as indicated, check continuity, then switch the meter wire connections and check continuity again. You should get NO continuity one way and YES continuity the other way.

In Tests 7 and 8, connect the meter wires as indicated by the black dots. Touch the indicated “G” wire to one meter wire, and then to the other. You should get NO continuity one way and YES continuity the other way.

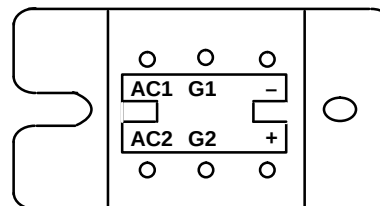


Fig 12

BRIDGE WIRES

CONTINUITY	G2	G1	-	+	AC1	AC2	
NO					•	•	TEST 1
NO				•		•	TEST 2
NO				•	•		TEST 3
YES NO			•	•	•	•	TEST 4
YES NO			•	•	•	•	TEST 5
YES NO			•	•	•	•	TEST 6
YES NO		○	OR	•	•	•	TEST 7
YES NO	○		OR	•	•	•	TEST 8

General Repair Information

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

CAUTION

To reduce the risk of a pressure control malfunction:

- Always use needle nose pliers to disconnect a wire.
- Mate wire connectors properly. Be sure the flat blade of the insulated male connector is centered in the wrap-around blade of the female connector.
- Route wires carefully through the center of the U-shaped bourdon tube to avoid interference with the movement of the bourdon tube. Also avoid interference from the circuit board and between the pressure control and cover.

Tool List

Phillips screwdriver	1/4 in. hex key wrench
Small flat blade screwdriver	3/16 in. hex key wrench
Needle nose pliers	5/8 in. socket wrench
Plastic mallet	3/8 in. open end wrench
Adjustable wrench	1/2 in. open end wrench
Adjustable, open-end wrench	3/4 in. open end wrench
Torque wrench	7/8 in. open end wrench
	High quality motor oil
	Bearing grease

1. Keep all screws, nuts, washers, gaskets, and electrical fittings removed during repair procedures. These parts are not normally provided with replacement assemblies.
2. Test your repair before regular operation of the sprayer to be sure the problem is corrected.

WARNING

To reduce the risk of serious injury, including electric shock, do not touch any moving parts or electrical parts with your fingers or a tool while inspecting the repair.

Shut off the sprayer and unplug it as soon as you complete the inspection.

Reinstall all covers, gaskets, screws, and washers before operating the sprayer.

3. If the sprayer does not operate properly, review the repair procedure again to verify that everything was done correctly. If necessary, see the Troubleshooting Guide, pages 16–21, to help identify other possible problems and solutions.

CAUTION

Do not run the sprayer dry for more than 30 seconds to avoid damaging the pump packings.

4. Reinstall the motor shield before regular operation of the sprayer and replace it if it is damaged. The cover directs cooling air around the motor to help prevent overheating. It can also help reduce the risk of burns, fire or explosion; see the **WARNING**, below.

WARNING

During operation, the motor and drive housing become very hot and could burn your skin if touched. Flammable materials spilled on the hot, bare motor could cause a fire or explosion. Always have the motor shield in place during regular operation to reduce the risk of burns, fire, or explosion.

Motor Brush Replacement

NOTE: Replace brushes when they have worn to about 0.4 in. (10 mm). Always check both brushes. Brush Repair Kit 220–853 is available. A new spring clip, P/N 110–816 may be purchased separately.

NOTE: Replacement brushes may last only half as long as the original ones. To maximize brush life, break in new brushes by operating the sprayer with no load (remove the pump connecting rod pin) for at least 1 hour.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

1. **Relieve the pressure.**
2. Remove the motor shield (14). Remove both inspection covers and gaskets (L). See Fig 13.
3. Push in the spring clip (D) to release its hooks (B) from the brush holder, and pull it out. See Fig 14.
4. Loosen the screw (F). Pull the brush lead (E) away, but leave the motor lead terminal (G) in place. Remove the brush and spring. See Fig 15.
5. Inspect the commutator for excessive pitting, burning or gouging. A black color on the commutator is normal. Have the commutator resurfaced by a qualified motor repair shop if the brushes seem to wear too fast.
6. Install a new brush (C) so the lead is in the long slot of the holder. See Fig 16.
7. Slide the terminal under the screw (F) washer and tighten the screw. Be sure the motor lead is still connected at the screw. See Fig 15.
8. Place the spring (A) on the brush (C). See Fig 16.
9. Install the spring clip (D) and push it down to hook the short slots (H) in the brush holder. See Fig 16.
10. Repeat for the other side of the motor.

⚠ WARNING

Do not touch brushes, leads, springs, or brush holders while the sprayer is plugged in to reduce the risk of electric shock and serious injury.

⚠ CAUTION

Do not run the sprayer dry for more than 30 seconds while checking the brushes to avoid damaging the displacement pump packings.

11. **Test the brushes.** Turn the pressure control knob to minimum. Plug in and turn on the sprayer. Slowly increase the pressure until the motor comes up to full speed. Inspect the brush and commutator contact area for excessive arcing. Arcs should not “trail” or circle around the commutator surface.
12. Install the remaining parts.

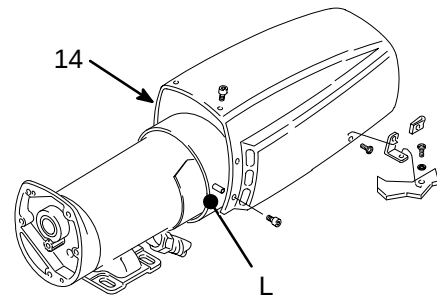


Fig 13

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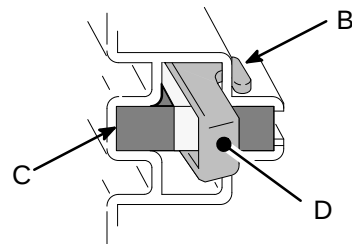


Fig 14

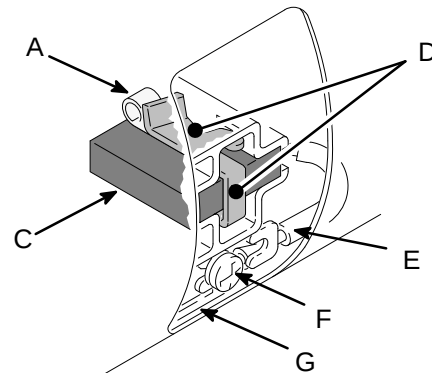


Fig 15

⚠ Note: spring must coil in this direction

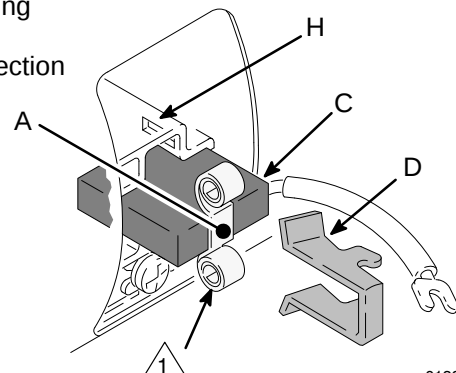


Fig 16

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Power Supply Cord Replacement

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

1. Relieve the pressure.
2. Remove the pressure control cover (62).

3. Disconnect the power supply cord lead from the ON/OFF switch (303), the white wire going to the bridge (308), and the green wire to the grounding screw (343).
4. Loosen the strain relief bushing (328). Remove the power supply cord (311).
5. Install the new cord (311) in the reverse order.

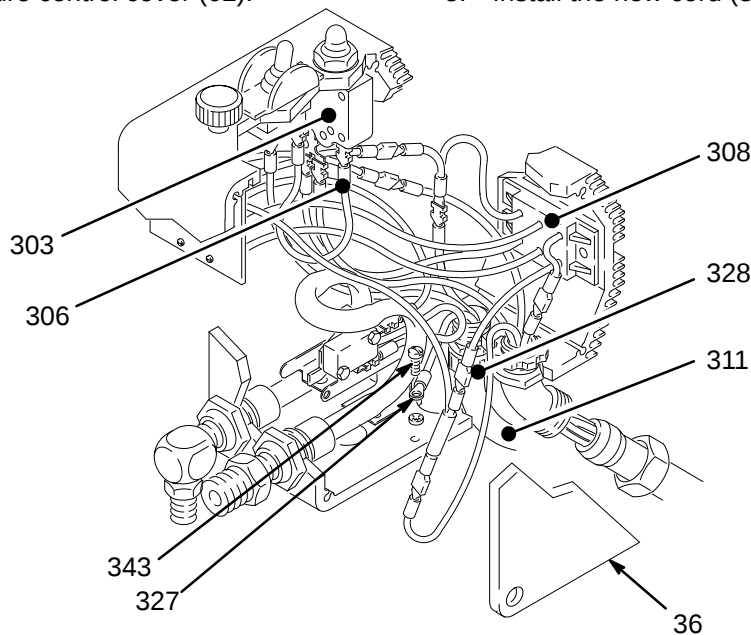


Fig 17

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On/Off Switch Replacement

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

1. Relieve the pressure.
2. Remove the pressure control cover (36).
3. Disconnect the upper terminal wire from the micro-switch (302) and the two black wires from the ON/OFF switch (303). See Fig 17.
4. Using a 5/8 in. socket wrench, remove the nut and rubber boot (304). Remove the switch guard (305).
5. Remove the ON/OFF switch (303)
6. Install the new switch so the internal tab of the anti-rotation ring (W) engages with the vertical groove in the threads of the switch, and the external tab engages with the blind hole (D) of the pressure control box.

7. Install the switch guard (305), aligning the internal tab with the groove in the threads.
8. Powder the inside of the rubber boot (304) with talcum powder, then shake the excess out of the boot.
9. Install the nut and rubber boot and tighten.
10. Reconnect all wires.

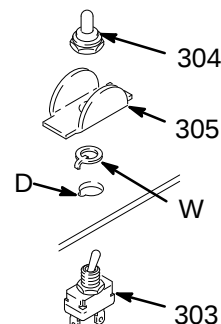


Fig 18

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Bridge Rectifier Replacement

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: *The most common cause of bridge failure is a faulty motor.* Check the motor before replacing the bridge to prevent damaging the new bridge.

1. **Relieve the pressure.**
2. Remove the pressure control cover (36).
3. Disconnect all wires from the bridge (308).

4. Loosen but don't remove the screw (331A). Remove the screw (331B). Slide the bridge out.
5. Slide in the new bridge (308). Be sure the lockwashers (333) are **IN FRONT** of the bridge. Tighten the screws (331) securely.

⚠ CAUTION

The lockwashers (333) must be in front of the bridge to avoid overheating which will result in bridge failure. See the DETAIL, below.

6. Connect all wires properly and route them carefully.

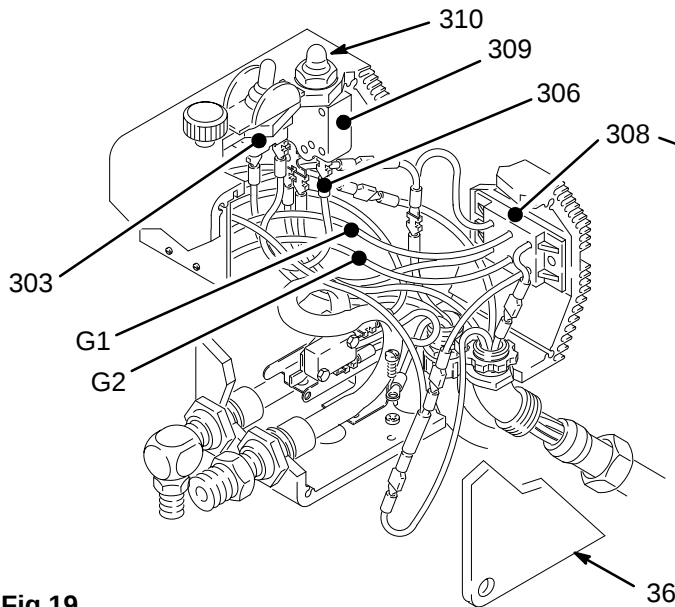
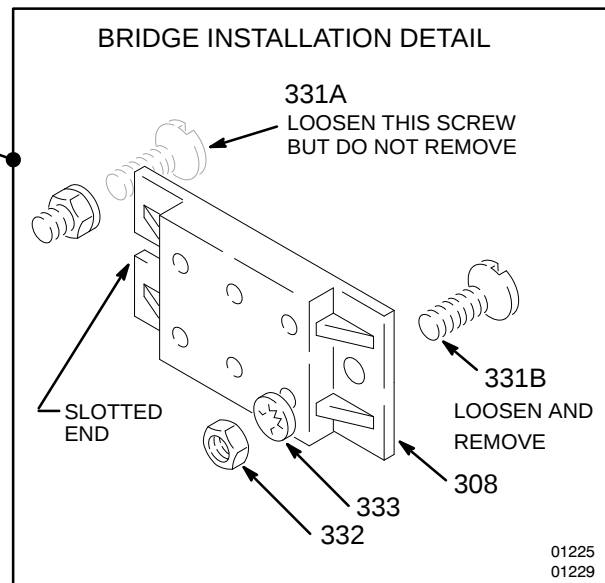


Fig 19



Circuit Breaker Replacement

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: Refer to Fig 19 for this procedure.

1. Remove the pressure control cover (36).
2. Use a small screwdriver to slide the terminal adapter off the circuit breaker terminal.
3. Disconnect the single black wire (306) between the circuit breaker (309) to the ON/OFF switch (303).

4. Use a 5/8 in. socket wrench to loosen the nut and boot (310) on the circuit breaker button.
5. Push down on the top of the circuit breaker (309) and pull it out of the box.
6. Install the new circuit breaker in the reverse order.

⚠ CAUTION

Do not allow the circuit breaker contacts to touch the bourdon tube, which will cause a short. Tighten the circuit breaker nut firmly to prevent the circuit breaker from turning.

Circuit Board Replacement



WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: Refer to Fig 20 and 21 for this procedure.

1. **Relieve the pressure.**
2. Remove the pressure control cover.
3. Turn the pressure control knob (A) to the minimum setting to release spring tension on the board. Check to be sure only three or four threads of the pressure control knob shaft are exposed below the pressure adjustment nut (S). Loosen the nut, if necessary.
4. Disconnect all seven wires from the board. Pay close attention to where connections are made.
5. Pull out the plastic-tipped pin (330). Push the bottom of the circuit board (28) toward the wall of the pressure control and carefully slide the board out.

6. Reinstall the new board in the pressure control at the same angle as it was removed.
7. Reconnect all wires. Ease the pin (330) into the retainer.
8. Perform the **PRESSURE CONTROL ADJUSTMENT**, page 30, if you installed a new board.

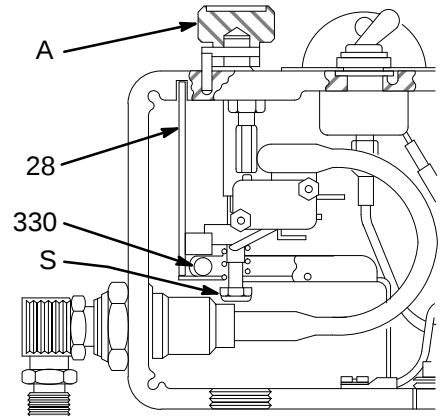


Fig 20

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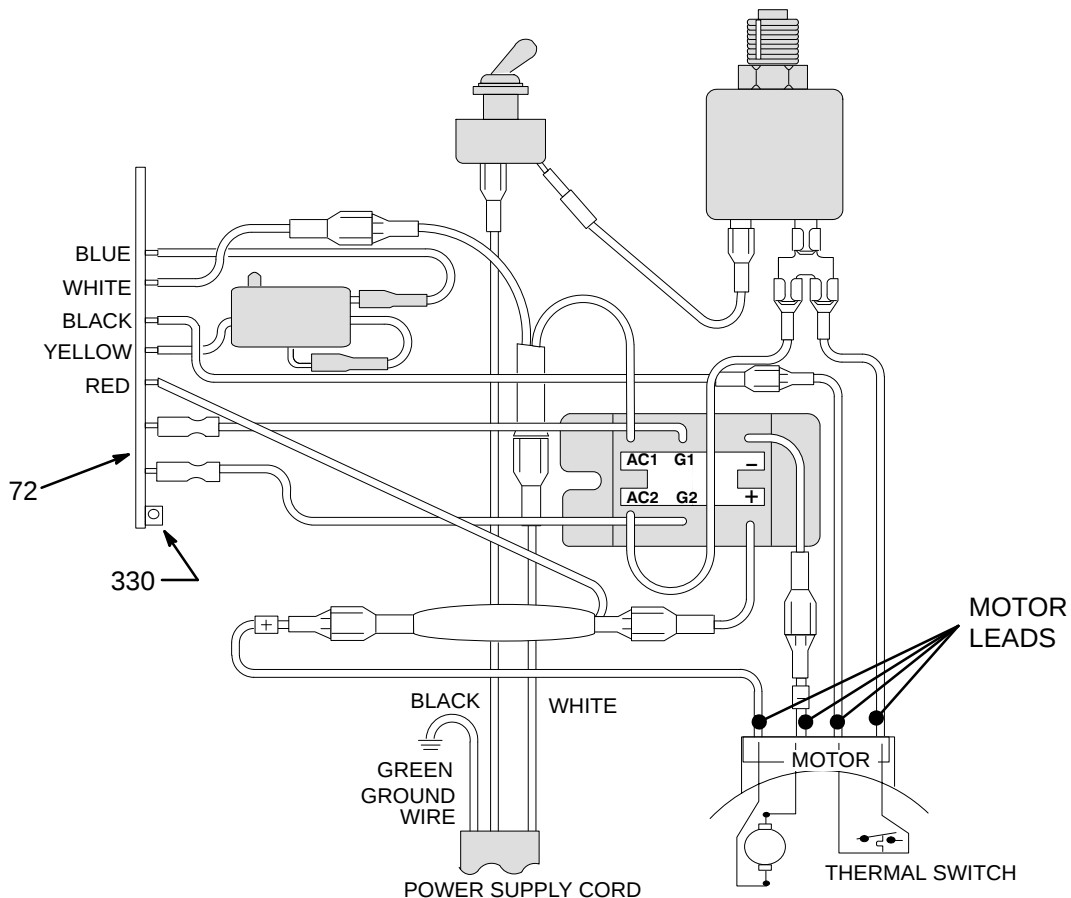


Fig 21

Pressure Control Replacement

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: Refer to Fig 22 for this procedure.

1. **Relieve the pressure.**
2. Disconnect the fluid outlet hoses. Disconnect the hose (68) between the pump and pressure control.
3. Loosen the filter bracket nut (21).
4. Hold the hex of the pressure control adapter (341) firmly with a 3/4" open end wrench. Use an adjustable wrench to unscrew the swivel union (23), and then remove the fluid filter (48).
5. Remove the pressure control cover (36). Disconnect the four motor leads. See Fig 28–2.
6. Remove the circuit board and retain it. See page 27.

7. Remove the conduit (22).
8. Remove the three pressure control mounting screws (7), lockwashers (40) and nuts (74). Remove the pressure control.
9. Remove the screws (59) and back mounting bracket (62).

⚠ CAUTION

Do not allow the adapter (341) to turn while installing the new pressure control assembly. Turning it can damage the sensitive bourdon tube. Hold the adapter firmly with a 3/4" open end wrench while screwing in the swivel union (23).

10. Install the new pressure control assembly in the reverse order of disassembly. Reinstall the conduit seal (19) around the wires in the conduit connector (345) to prevent motor contamination from entering the control. See the DETAIL below.
11. Perform the Pressure Control Adjustment, page 29, before regular operation of the sprayer.

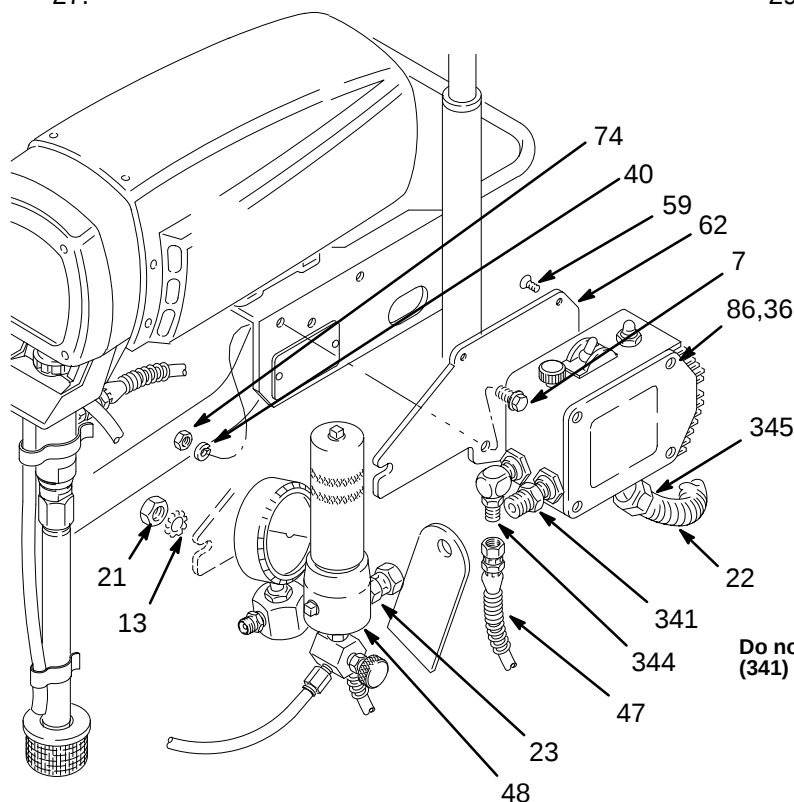
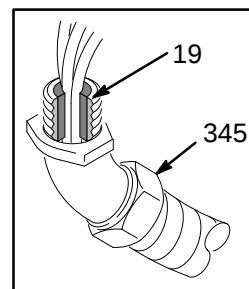


Fig 22



01232

CAUTION

Do not allow the adapter (341) to turn at any time.

Pressure Control Adjustment

WARNING

Use extreme caution when performing this calibration procedure to reduce the risk of a fluid injection injury or other serious bodily injury, which can result from component rupture, electric shock, fire, explosion or moving parts.

This procedure sets the sprayer to 2750 psi (19.5 MPa, 195 bar) **MAXIMUM WORKING PRESSURE** and sets the overpressurization switch (microswitch) to approximately 3600 psi (24.2 MPa, 242 bar).

Perform this procedure whenever the pressure control assembly is removed and reinstalled or replaced, or a new circuit board is installed.

Improper adjustment can cause the sprayer to over-pressurize and result in component rupture, fire, or explosion. It may also prevent the sprayer from obtaining the maximum working pressure, resulting in poor sprayer performance.

Never try to increase the sprayer's maximum working pressure of 2750 psi (19.5 MPa, 195 bar) by performing these adjustments in any other way. Normal operation of the sprayer at higher pressures may result in component rupture, fire, or explosion. To perform this adjustment, however, the sprayer pressure must be temporarily increased above the normal working pressure.

Use a new 50 ft (15.2 m) spray hose rated for at least 2750 psi (19.5 MPa, 195 bar) **MAXIMUM WORKING PRESSURE**. A use, under-rated hose could develop a high pressure leak or rupture.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

4. Place the pump suction tube in a pail of clean water.
5. Be sure the gun safety latch is engaged.
6. Plug in the sprayer.

Required tools for adjustment procedure

- 3/8 in. nut driver or 3/8 in. socket wrench
 - 1/4 in. open end wrench
 - 7/16 in. open end wrench
 - 0 – 5000 psi, oil-filled test gauge, Part No. 102–814
 - Pail of clean water
 - Mineral spirits
 - NEW 3000 psi (21.0 MPa, 210 bar) high pressure spray hose, Part No. 223–541
1. **Relieve the pressure.**
 2. See the above list of tools and equipment needed. Remove the plug (48a) from the top of the fluid filter and install the fluid-filled pressure gauge. See Fig 23. Connect the gun to the **new** test hose and connect the hose to the sprayer outlet.
 3. Remove the pressure control cover (36).

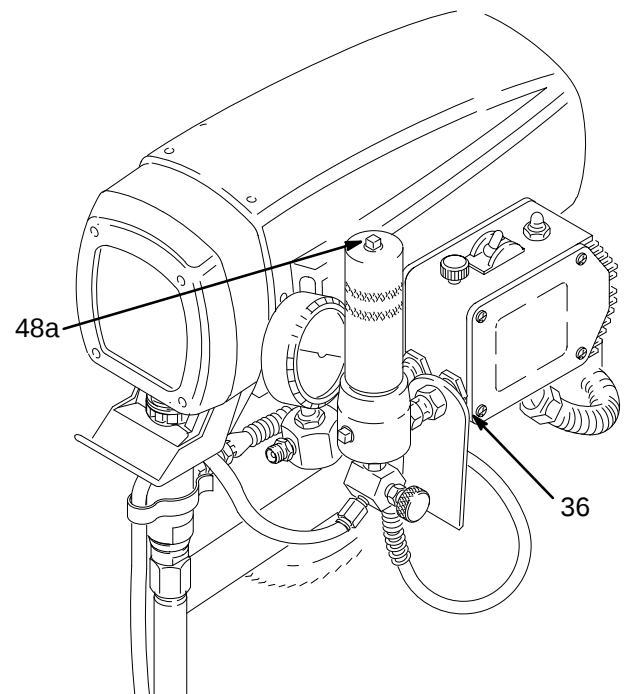


Fig 23

01566

Pressure Control Adjustment

- Turn the pressure control knob (B) to the *minimum* setting (fully counterclockwise), and turn the sprayer ON. **THE DISPLACEMENT PUMP SHOULD NOT CYCLE**

If it does cycle, remove the plug (15) from the bottom of the pressure control. Insert a 3/8 in. nut driver through the opening, and unscrew the pressure adjustment nut (T) just until the sprayer stops running.

Adjust the Overpressurization Switch

- With the spray gun triggered, **slowly** turn the pressure control knob clockwise just until the sprayer starts. Prime the pump and hose.
- Slowly turn the pressure control knob to the maximum setting. While watching the red light on the circuit board and the pressure gauge, turn the nut (T) **slowly** to increase pressure until the red light goes out **and** the gauge reads between 3400 – 3800 psi (23.8–26.6 MPa, 238 – 266 bar).

If the red light does not go out by 3800 psi (26.6 MPa, 266 bar), loosen the nut (P) and adjust the stud (Q) until the light goes out.

If the red light goes out before 3400 psi (23.8 MPa, 238 bar), loosen the nut (P) and adjust the stud (Q) until the light goes out between 3400 – 3800 psi (23.8–26.6 MPa, 238 – 266 bar).

- Tighten the nut (P) if it was loosened in Step 9.
- Trigger the gun to **relieve the pressure**. Release the trigger and engage the safety latch. Repeat Step 9 to verify your results.
- Install the pressure control cover.

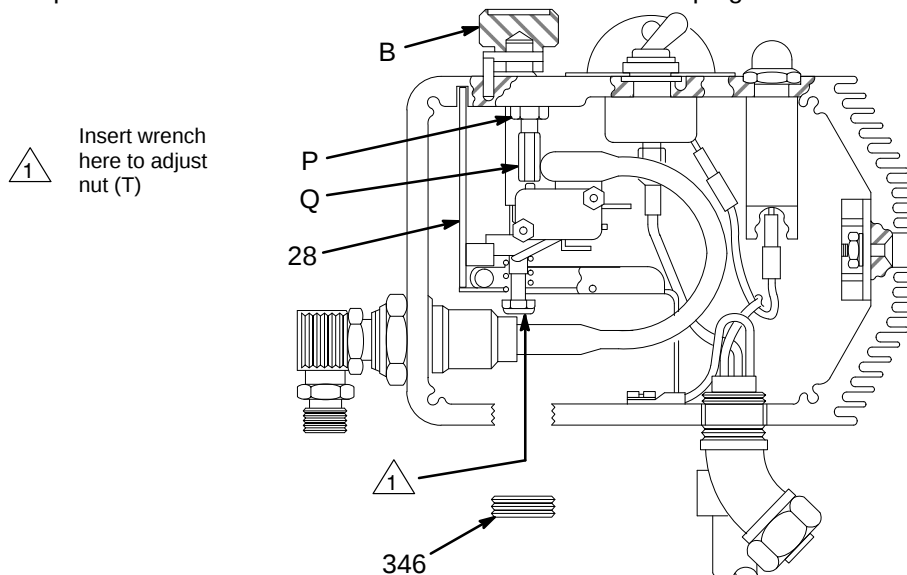
Maximum Working Pressure Adjustment

- Turn the sprayer OFF. Disengage the gun safety latch. Trigger the gun into a grounded waste container until pressure is relieved. Engage the gun safety latch.
- Use the 3/8 in. nut driver to turn the pressure adjustment nut (T) counterclockwise one full turn.
- With the pressure control knob at the *minimum* setting, turn the sprayer ON.
- Slowly** turn the pressure control knob (B) clockwise to the maximum setting and hold it there. Use a 3/8 in. nut driver or socket wrench to slowly turn the pressure adjustment nut (T) clockwise until the gauge reads **EXACTLY** 2750 psi (19.5 MPa, 195 bar).
- Turn the pressure control knob to the minimum setting. Release the gun safety latch and trigger the gun into a grounded waste container until pressure is relieved. Engage the gun safety latch. Slowly increase the pressure to verify that the maximum working pressure is set at 2750 psi (19.5 MPa, 195 bar).

⚠ CAUTION

To prevent pump corrosion, flush the water out of the pump, hose, and gun with mineral spirits. Be sure to close the drain valve, first. Use the lowest pressure necessary to flush. **Relieve the pressure**. Leave the mineral spirits in the pump to protect it until you are ready to spray again.

- Install the plug (15) in the bottom of the pressure control. Remove the gauge assembly and reinstall the plug. Flush out the water with mineral spirits.



Drive Housing, Conn Rod, Crankshaft

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: Stop the sprayer at the bottom of its stroke to get the crankshaft (29) in its lowest position. To lower the crankshaft manually, carefully rotate the blades of the motor fan with a screwdriver.

NOTE: Refer to Fig 26 unless otherwise noted.

1. Remove the front cover (31), the motor shield (58) and the short hose (47).
2. Hold a wrench on the pump intake valve and unscrew the suction tube.
3. Use a screwdriver to push up the retaining spring (35). Push the pin (20) out the rear. See Fig 25.

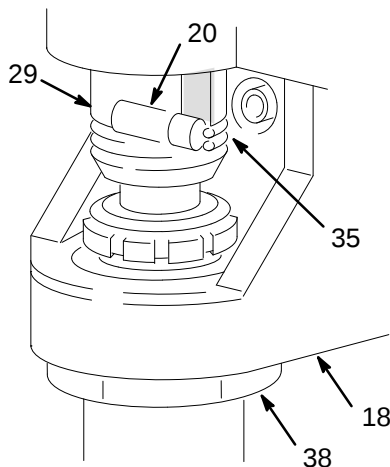


Fig 25

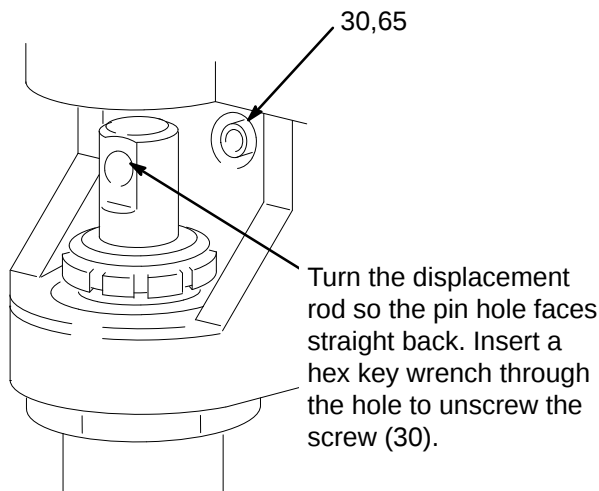


Fig 26

01579

4. Loosen the jam nut (38) with an adjustable wrench. Unscrew and remove the pump.
5. See Fig 26 to remove one screw (30) which is hidden. Remove the other two screws (30) from the recess of the drive housing. See Fig 28.
6. Remove the two screws (7) holding the motor (1) to the drive housing (18).
7. Lightly tap the lower rear of the drive housing (18) with a plastic mallet to loosen it from the front of the motor. Then pull the drive housing straight off.

CAUTION

Do not allow the gear (9) to fall. It may stay attached to the drive housing or to the motor.

Do not lose the thrust balls (10) located at each end of the gear (9). The balls are heavily covered with grease and usually stay in the shaft recesses, but they could be dislodged. If caught between the gears and not removed, the balls will damage the drive housing. If the balls are not in place, the bearings will wear prematurely.

8. Inspect the drive housing (18) for excessive wear and replace parts as needed.
9. Pull the crankshaft (29) out. Inspect it for wear or damage and replace it, if necessary. Be sure the thrust bearings (8a and 8b) are in the proper place on crankshaft.
10. Remove the connecting rod (29). Inspect it for wear or damage. Replace the rod, if necessary.
11. Evenly lubricate the inside of the bronze bearing in the drive housing with high quality motor oil. Liberally pack the roller bearing and gears with bearing grease.
12. Carefully align the drive housing and front of the motor with the locating pins. Push the drive housing onto the motor, or tap it into place with a plastic mallet.

CAUTION

Do not use the drive housing screws (30) to try to align or seat the housing to the motor; doing so will not ensure proper alignment, but will cause premature bearing wear.

13. Install the screws (30) and lockwashers (65) on the drive housing and tighten evenly.
14. Reinstall the motor shield (58).

Drive Housing, Conn Rod, Crankshaft

15. Screw the displacement pump about 3/4 of the way into the drive housing (18). Hold the pin (20) up to the pin hole in the connecting rod assembly (29) and continue screwing in the pump until the pin slides easily into the hole. Back off the pump until the top threads of the pump cylinder are flush with the face of the drive housing and the outlet nipple (46) is facing back. Push the retaining spring (35) into the groove all the way around the connecting rod. Tighten the locknut (38) very tight – about 70 ft-lb (95 N.m) – with a 1-3/4 in. open end wrench and a light hammer. See Fig 27 and 28.

⚠ WARNING

Be sure the retaining spring (35) is firmly in the groove all the way around, to prevent the pin (20) from working loose due to vibration. See Fig 27.

If the pin works loose, it or other parts could break off due to the force of the pump action. These parts could be projected through the air and result in serious injury or property damage, including damage to the pump connecting rod or bearing housing.

16. Reinstall the remaining parts.

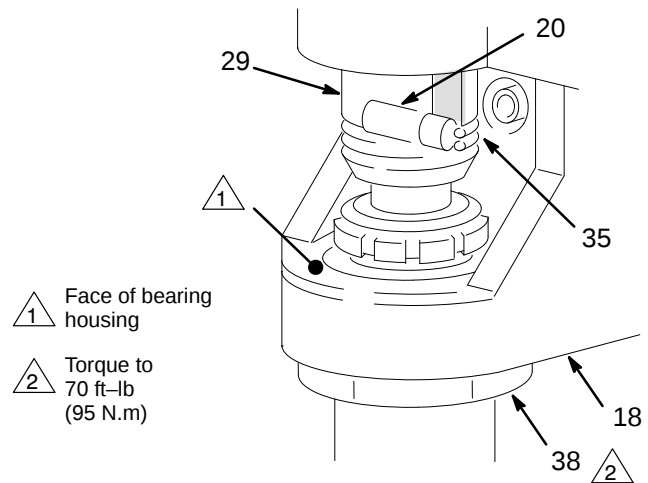


Fig 27

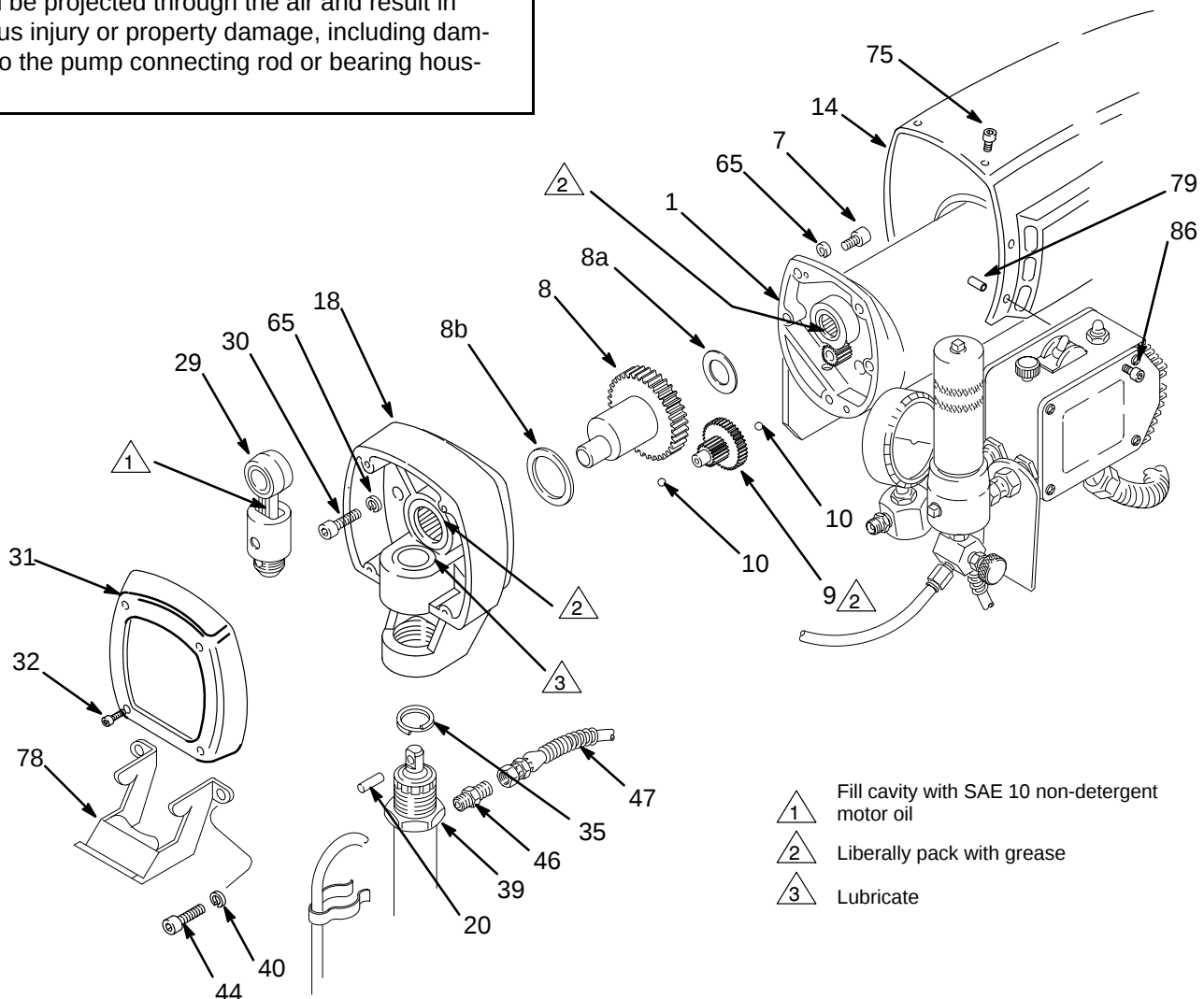


Fig 28

02040

Motor Replacement

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

NOTE: See Fig 29 except where noted.

1. Remove the pressure control cover. Disconnect the four motor leads. See the **WIRING DIAGRAM** in Fig 29. Remove the conduit seal (19) from the conduit elbow (345) coming into the control.
2. Use an adjustable wrench to loosen the conduit connector nut (345) at the pressure control (43).
3. Swing the conduit (22) away from the pressure control.
4. Pull the motor leads through the connector, one at a time.

CAUTION

Always pull the motor leads one at a time to avoid loosening the terminals.

5. Loosen the nut of the connector (51) at the motor and pull the conduit (22) away from the motor, then pull the leads through the conduit, one at a time.
6. Unscrew the connector (51) from the motor.
7. Pull the motor leads through the connector, one at a time.
8. Remove the front cover (31).
9. Unscrew the suction tube from the pump, holding a wrench on the pump intake valve to keep the pump from loosening.
10. Disconnect the short hose (47) from the pump.
11. Use a screwdriver to push up the retaining spring (35). Push the pin (20) out the rear. See Fig 25, page 31.
12. Loosen the jam nut (38) with an adjustable wrench. Unscrew the displacement pump.

13. Turn the displacement rod so the pin hole faces straight back. Insert a hex key wrench through the hole to unscrew the screw (30). See Fig 26, page 31. Remove the other two screws from the recess of the drive housing.

14. Remove the motor shield (14).

15. Remove the two screws (7) from the top of the motor.

16. Use a plastic mallet to gently tap the displacement pump (39) from the rear to loosen the drive housing from the front of the motor. Then pull the drive housing away from the of the motor.

CAUTION

Do not allow the gear (9) to fall. It may stay attached to the drive housing or to the motor.

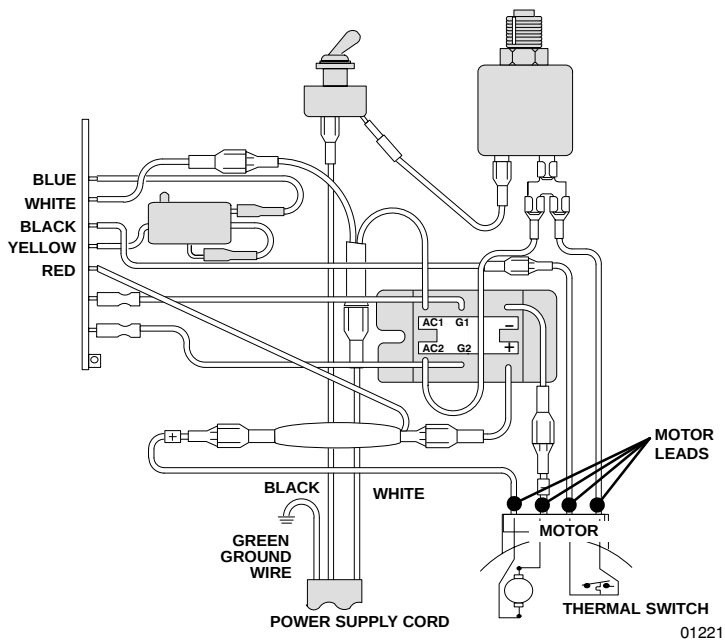
Do not lose the thrust balls (10) located at each end of the gear (9). The balls are heavily covered with grease and usually stay in the shaft recesses, but they could be dislodged. If caught between the gears and not removed, the balls will damage the drive housing. If the balls are not in place, the bearings will wear prematurely.

17. Remove the four motor mounting screws (7) and related hardware.
18. Lift the motor (1) off the frame.
19. Align the new motor with the frame mounting holes. Install the screws (7) and related hardware.
20. Liberally grease the gear cluster (9) and pinion gear (A) and pack all bearings in the motor front end bell. Check to be sure the thrust balls (10) are in place.
21. Place the bronze-colored washer (8a) and THEN the silver-colored washer (8b) on the crankshaft (8).
22. Align the gears and push the drive housing (18) straight onto the front of the motor and the locating pins.
23. Starting at Step 15 and working backwards, continue to reassemble the sprayer.

NOTE: Use a turning motion on the conduit (22) when feeding wires through it.

Motor Replacement

WIRING DIAGRAM



DETAIL

Shows position of conduit seal (19) in conduit connector (345)

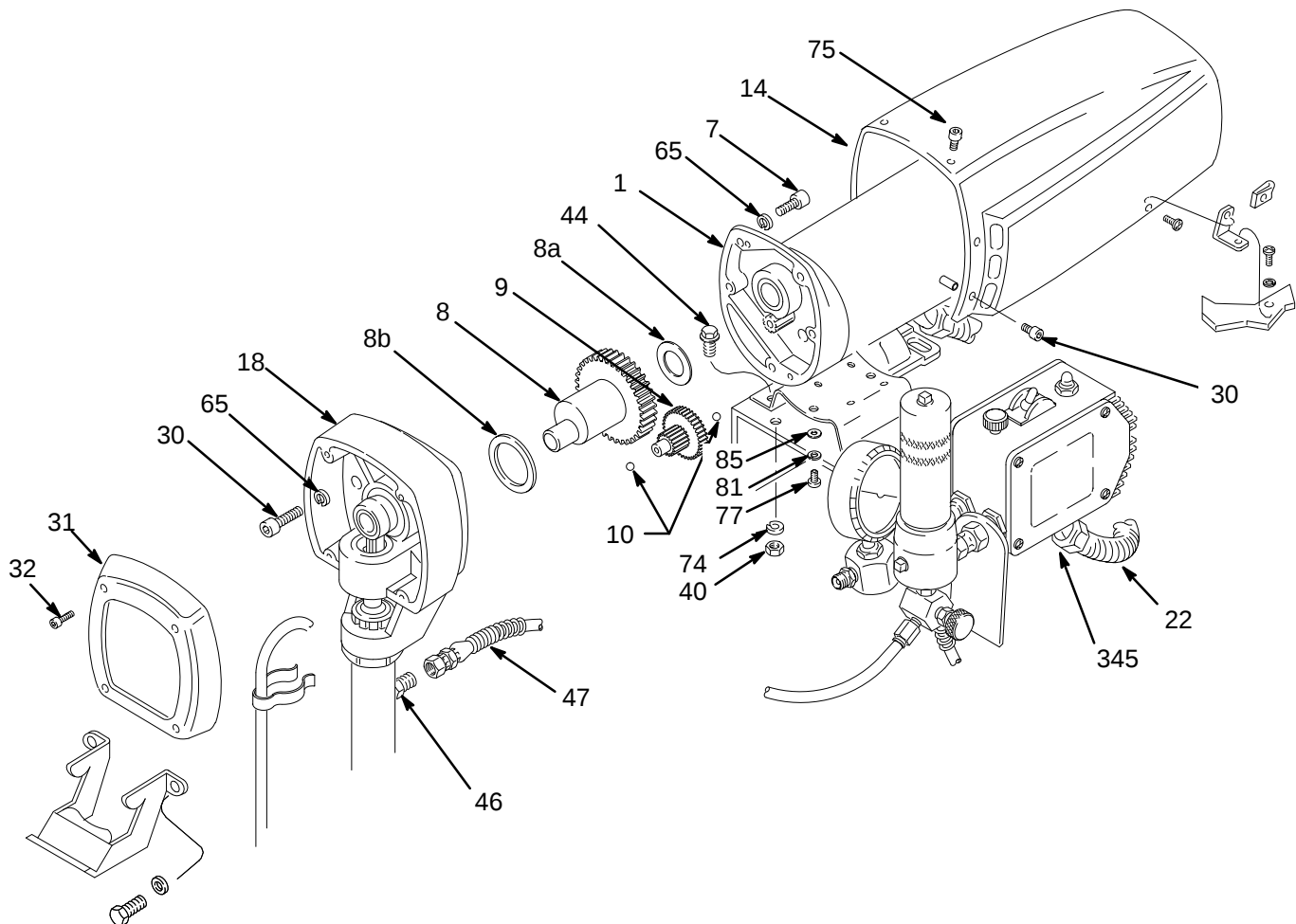
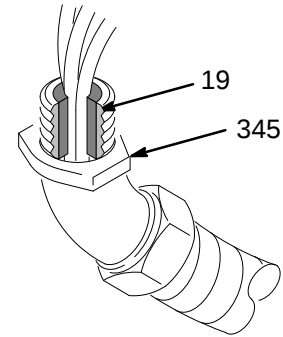


Fig 29

02041

Removing and Installing a Pump

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 7.

Remove the pump See Fig 30.

1. Flush the pump. **Relieve the pressure.** Stop the pump with the piston rod (223) in its lowest position or carefully rotate the blades of the fan with a screwdriver to lower the rod.
2. While holding the pump intake valve (224) steady with a wrench, unscrew the suction tube (42).
3. Disconnect the hose (47).
4. Push the retaining spring (35) up. Push out the pin (20).
5. Loosen the locknut (38) and unscrew the pump from the bearing housing (18).

Install the pump See Fig 31.

1. Screw the displacement pump 3/4 of the way into the bearing housing (18).
2. Hold the pin (20) up to the pin hole in the connecting rod assembly (29) and continue screwing in the pump until the pin slides easily into the hole. Back off the pump until the top threads of the pump cylinder are flush with the face of the bearing housing and the outlet nipple (46) is straight back.
3. Push the retaining spring (35) into the groove all the way around the connecting rod.
4. Tighten the locknut (38) very tight—about 70 ft-lb (97 N.m)—with a 2 in. open-end wrench and a light hammer.

⚠ WARNING

Be sure the retaining spring (52) is firmly in the groove of the connecting rod, all the way around, to prevent the pin (20) from working loose due to vibration. Refer to Fig 31.

If the pin works loose, parts could break off due to the force of the pumping action. These parts could be projected through the air and result in serious injury, sprayer damage, or property damage.

⚠ CAUTION

If the locknut (38) loosens during operation, the threads of the bearing housing (18) will be damaged. Be sure to tighten the locknut firmly.

5. Tighten the packing nut (221) just enough to stop leakage, but no tighter. Fill the wet-cup/packing nut 1/3 full with Graco TSL.

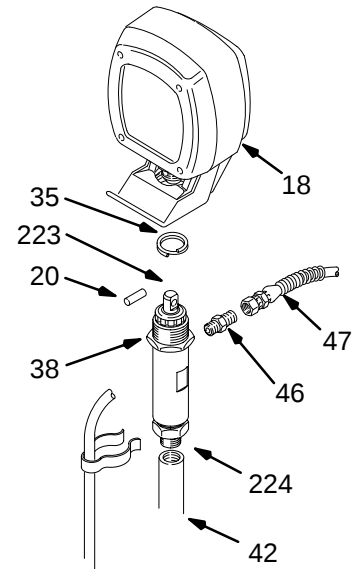


Fig 30

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- 1 Face of bearing housing
- 2 Torque to 70 ft-lb (95 N.m)

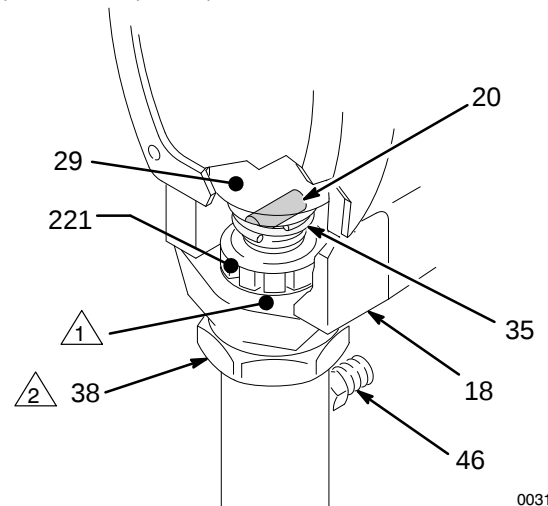


Fig 31

0031

Displacement Pump Repair

Disassembly. See Fig 33, except where noted.

1. Remove and disassemble the intake valve (222). If no further service is needed, reassemble the valve, using a new gasket (206*). Torque the intake valve to 80 ft-lb (107 N.m). See Fig 32.
2. Remove the packing nut (221) and plug (201).
3. Tap the piston rod (223) down with a plastic mallet. Pull the rod out the bottom of the cylinder (216).
4. Remove the packings and glands from the throat of the cylinder (216).
5. Clamp the flats of the piston rod (223) in a vise. Unscrew the retaining nut (214). Unscrew the piston valve (224) from the rod. Remove all parts from the piston.

Reassembly Notes

- a. Packing Repair Kit 222-687 is available. Parts included in the kit are marked with an asterisk (*) in the text and drawings.
- b. Clean all parts thoroughly. Check the outside of the piston rod (223) and the inside of the cylinder (216) for scoring or scratches, which prevent the packings from sealing properly. Replace all worn parts.
- c. Note the direction the packings must face:
the lips of the throat v-packings face down;
the lips of the piston V-packings face up;
the lips of the U-cup seal (205) face down.
- d. Coat the piston rod and the inside of the cylinder with lightweight oil, and soak the packings in oil before reassembling.

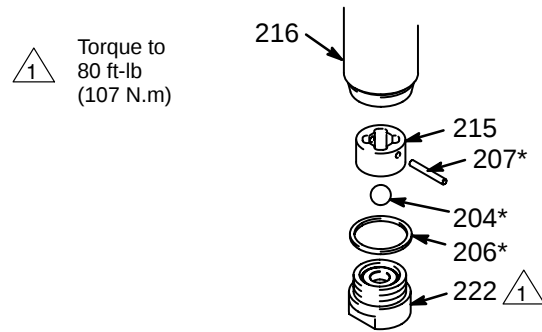


Fig 32

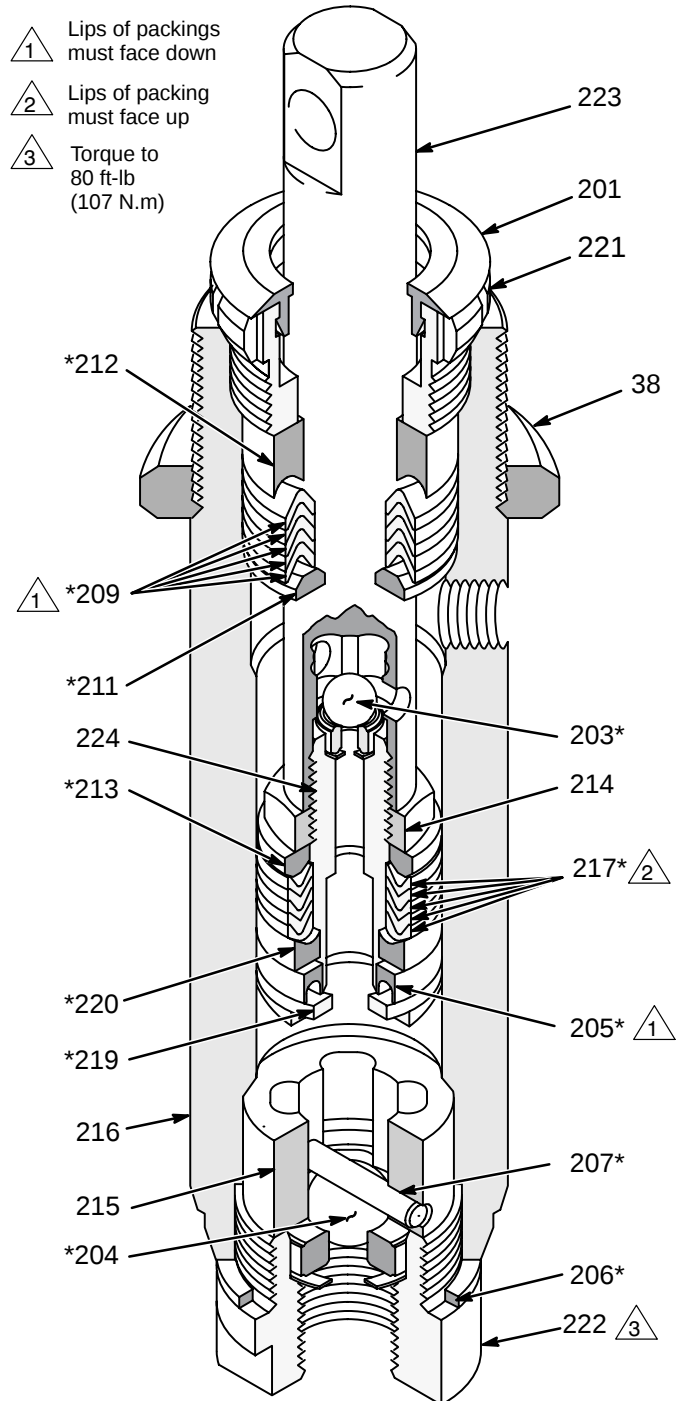


Fig 33

Displacement Pump Repair

Reassembly Procedure

1. Stack these parts one at a time onto the piston valve (224): backup washer (219*), U-cup seal (205*) *lips down*, and female gland (220*), v-packings (217*) *lips up*, and then the male gland (213*). See Fig 36.

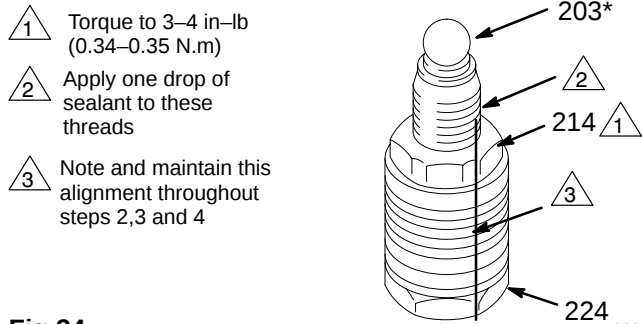


Fig 34

2. Tighten the packing retaining nut (214) against the gland (213) and torque to 3–4 in-lb (0.34 – 0.35 N.m). See Fig 34.

NOTE THE ALIGNMENT of the piston (224) to the nut (214). Maintain this alignment throughout Steps 2, 3 and 4.

3. Apply *1 drop only* of sealant, supplied with the repair kit, to the piston valve threads. Place the small ball (203*) on the valve. See Fig 34. Hand tighten the valve into the rod (223) just until the nut contacts the rod. Place the flats of the displacement rod in a vise.

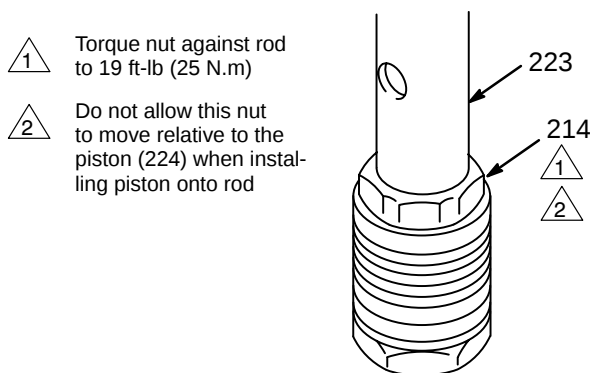


Fig 35

4. Torque the nut (214) against the rod (223) to 19 ft-lb (25 N.m). Use two wrenches to maintain the alignment as mentioned in the **NOTE** above. See Fig 35.
5. Stack these parts one at a time into the top of the cylinder (216): male gland (211*), v-packings (209*) *lips down*, and then the female gland (212*). See Fig 36.

6. Loosely install the packing nut (221) and plug (201).
7. Insert the oiled piston rod (223) through the bottom of the cylinder.
8. Assemble the intake valve. Use a new gasket (206*). Screw the intake valve into the cylinder and tighten to 80 ft-lb (107 N.m). See Fig 36.
9. Screw down the cylinder locknut (38) until it is finger tight at the bottom of the external cylinder threads. See Fig 36.
10. Install the displacement pump on the sprayer. See page 35.

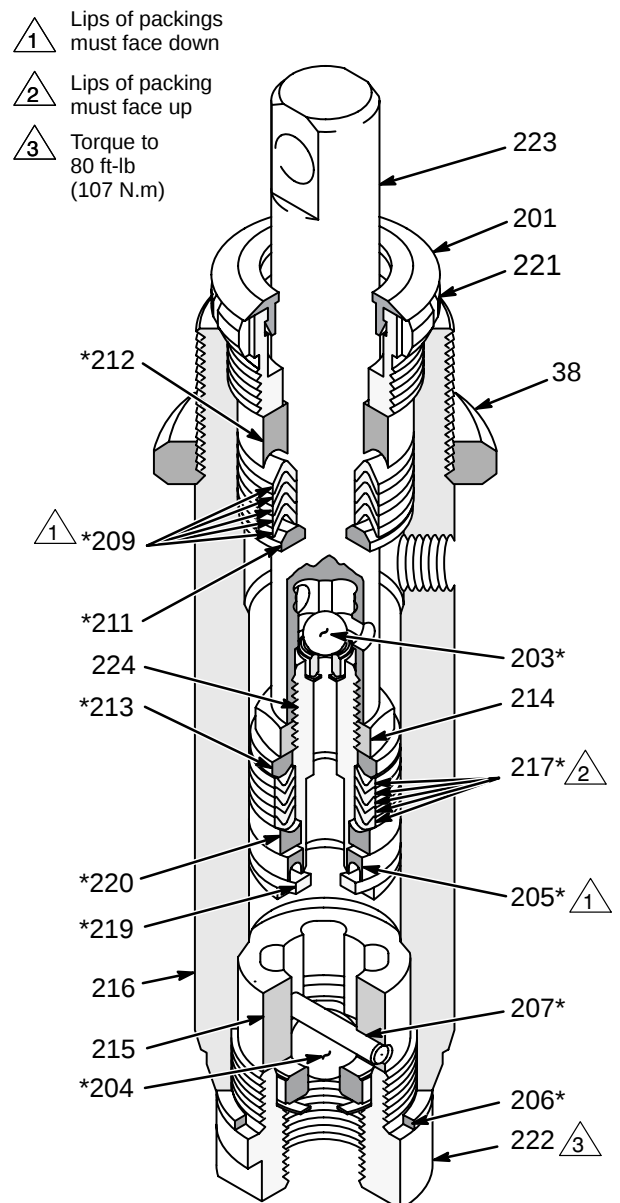


Fig 36

Parts – Displacement Pump

Model 222–688, Series A

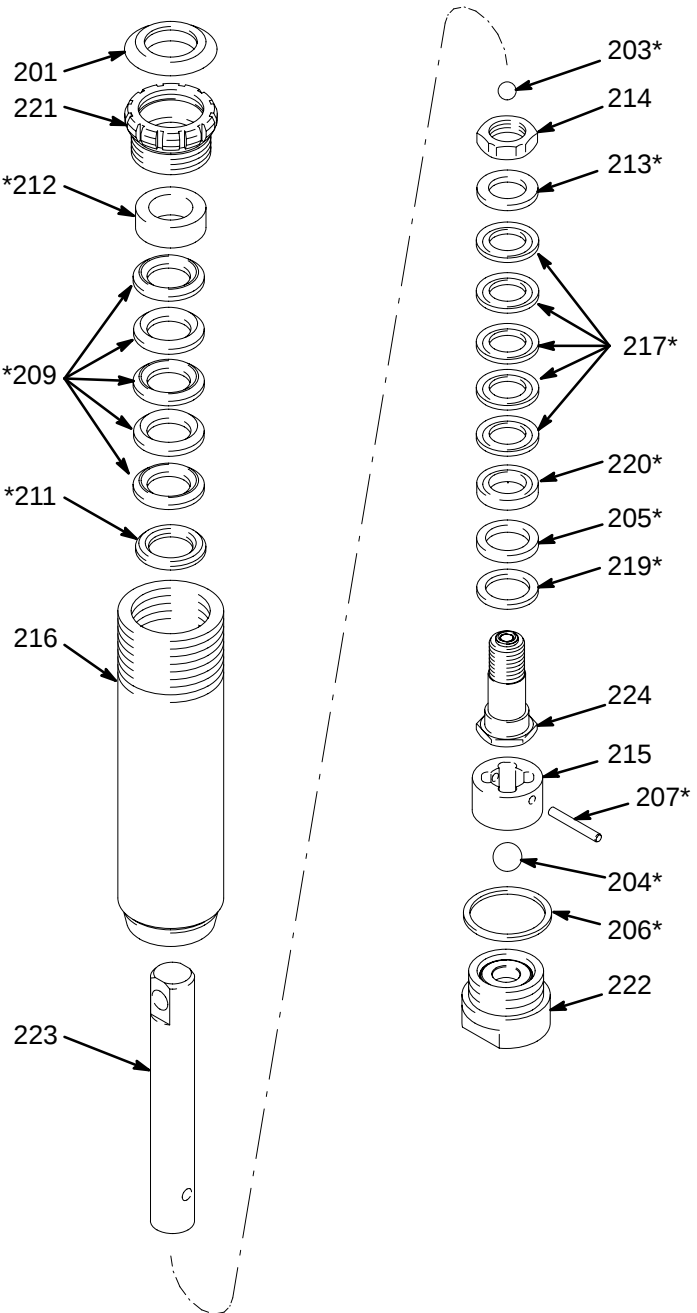
Carbon Steel Displacement Pump

Includes items 201 to 224

Ref No.	Part No.	Description	Qty
201	180–656	PLUG	1
203*	105–444	BALL, sst, 0.3125" dia.	1
204*	105–445	BALL, sst, 0.5" dia.	1
205*	108–995	SEAL, u-cup, polyurethane	1
206*	176–761	GASKET, brass	1
207*	176–759	PIN, ball stop	1
211*	183–556	GLAND, male	1
212*	183–237	GLAND, female, brass	1
213*	182–236	GLAND, male, brass	1
214	176–751	NUT, hex, 1/2–20, sst	1
215	176–760	GUIDE, ball, sst	1
216	183–238	CYLINDER, stainless steel	1
217*	176–882	V-PACKING	5
218*	176–997	V-PACKING	5
219*	183–557	WASHER, backup, aluminum	1
220*	183–558	GLAND, female, plated steel	1
221	176–758	NUT, packing/wet-cup	1
222	215–455	VALVE, intake	1
223	181–239	ROD, piston, alloy steel	1
224	218–197	VALVE, piston	1

NOTE: See the repair instructions for important torque values and procedures

*Also included in **Repair Kit 222–687**, sold separately.
Keep a kit on hand to reduce down time.

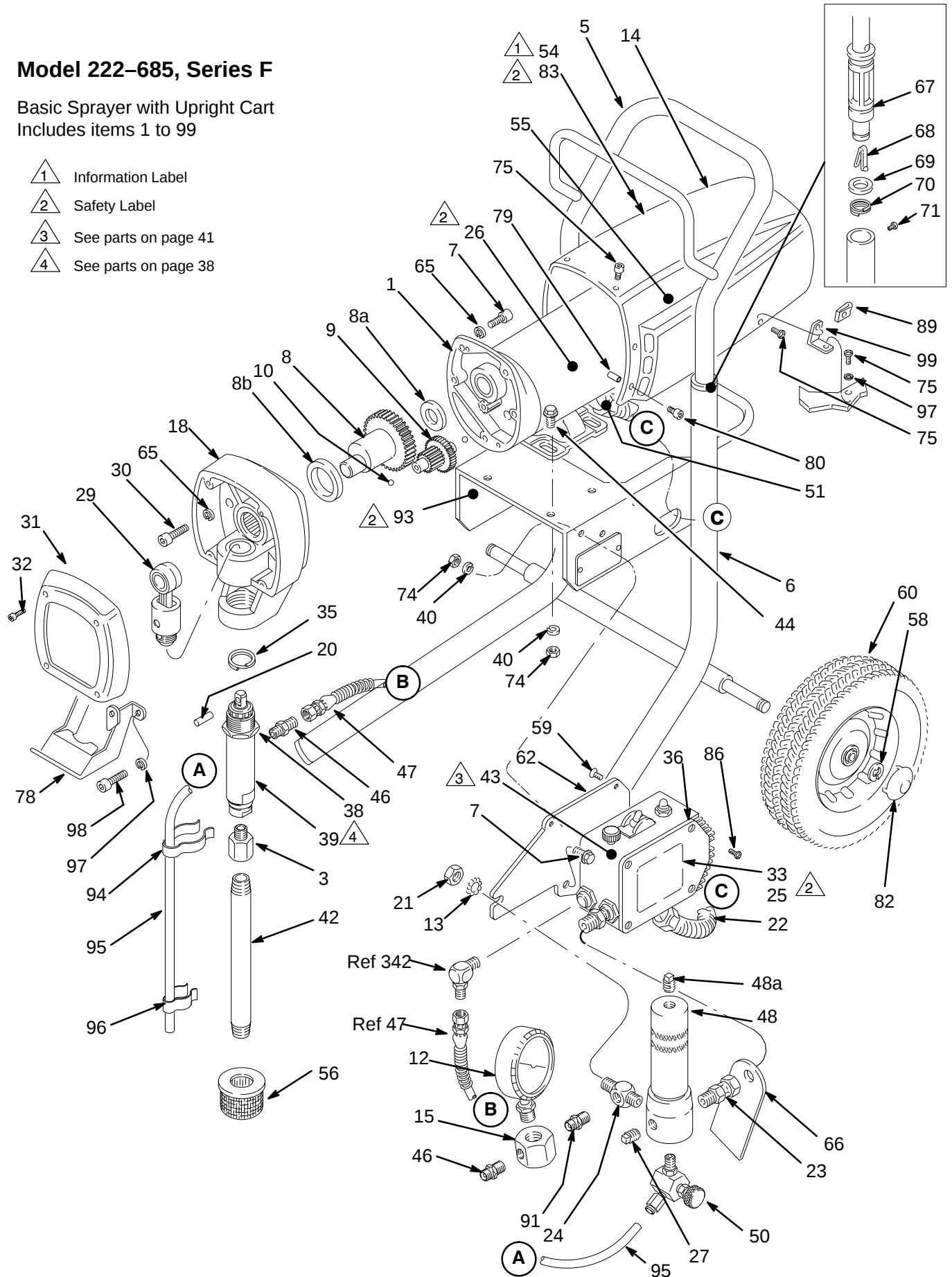


Parts – Sprayer

Model 222–685, Series F

Basic Sprayer with Upright Cart
Includes items 1 to 99

-  Information Label
-  Safety Label
-  See parts on page 41
-  See parts on page 38



Parts

Model 222–685, Series F

Includes items 1 to 99

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
1**	222–678	MOTOR, <i>includes items 1a to 1c, and one each of items 10 and 83</i>	1	44	110–963	SCREW, serrated flange, 5/16–18 x 3/4"	7
1a	107–267	.TERMINAL, 0.187, 16–14 AWG	2	46	162–453	NIPPLE, hex, 1/4 npsm x 1/4 npt	1
1b	107–504	.TERMINAL, 0.187, 22–18 AWG	1	47	235–574	HOSE, grounded, nylon, 1/4" ID, 29" (736 m) long, spring guard both ends	1
1c	103–885	.TERMINAL, 0.250, 16–14 AWG	1	48	218–029	FLUID FILTER	
3	178–460	ADAPTER, 3/8 npt(m) x 1/2 npt(f)	1			Includes items 48a and 48b	
5	222–554	HANDLE, cart	1			<i>see manual 307–273 for additional parts</i>	1
6	222–555	CART	1	48a	100–040	.PLUG	1
7	101–682	SCREW, socket head, 1/4–20 x 0.62 "	2	48b	162–453	.NIPPLE, 1/4 npsm x 1/4 npt	1
8	235–558	CRANKSHAFT ASSEMBLY, <i>includes items 69a and 69b</i>	1	50	221–077	PRESSURE DRAIN VALVE	1
8a	180–131	.BEARING	1	51	108–460	CONNECTOR, conduit, 45°	1
8b	107–434	.BEARING	1	54	185–451	LABEL, identification	1
9	235–561	GEAR REDUCER	1	55	185–452	LABEL, identification	1
10	100–069	BALL, stainless steel, 1/4" dia.	2	56	187–146	STRAINER	1
12	110–338	GAUGE, pressure	1	58	101–242	RING, retaining	2
13	100–322	LOCKWASHER, 7/16"	1	59	106–078	SCREW, no 6–24 x 1/2"	4
14	185–431	SHIELD, MOTOR	1	60	106–062	WHEEL, semi-pneumatic	2
15	185–598	MANIFOLD, 1/4 x 3/4–18 npt	1	62	186–365	BRACKET, mounting	1
18	222–676	DRIVE HOUSING		63	206–994	THROAT SEAL LIQUID, 8 oz. (0.27 liter)	1
		Includes item 73a		65	105–510	LOCKWASHER, 1/4"	5
18a	110–293	.GREASE <i>not shown</i>	1	66	178–034	TAG, WARNING	1
19	107–447	SEAL, conduit <i>see page 41</i>	2	67	187–603	SLEEVE	2
20	176–818	PIN, 3/8" dia. x 1"	1	68	111–590	BUTTON, snap	2
21	150–513	NUT, jam, 7/16"	1	69	183–350	WASHER	2
22	065–099	CONDUIT, specify length when ordering	0.8 ft	70	110–243	RING, retaining	2
23	155–665	UNION, adapter, 3/8" npsm swivel x 3/8 npt(m)	1	71	109–032	SCREW, 10–24 x 1/4"	4
24	179–945	ADAPTER, elbow, special, 1/4–18 npt (m x f)	1	72	108–691	PLUG, tubing, frame	2
				74	100–188	NUT, 5/16–18	7
25*	177–762	LABEL, WARNING	1	75	108–865	SCREW, No. 8 x 3/8"	8
26*	185–954	LABEL, DANGER, English	1	78	185–365	HANGER, pail	1
27	100–509	PLUG, square head, 1/4 npt(m)	1	79	108–663	SPACER	2
28	218–405	CIRCUIT BOARD <i>see page 42</i>	1	80	108–709	SCREW, 8–32 x 1"	2
29	235–560	CONNECTING ROD	1	82	104–811	HUBCAP	2
30	107–445	CAPSCREW, 1/4–20 x 1.5"	3	83*	185–952	LABEL, DANGER, English	1
31	181–611	COVER, housing	1	86	110–037	SCREW, 10–24 x 5/8"	4
32	107–209	SCREW, filh, no. 8–32 x 1"	4	88	180–041	PIN, straight <i>see page 42</i>	1
33	185–449*	LABEL, Warning	1	89	110–240	SPEED NUT	2
34	107–258	TIP, grip <i>see page 44</i>	1	93*	185–955	LABEL, DANGER, French	1
35	176–817	SPRING, retaining	1	94	178–341	CLIP, spring	1
36	188–333	COVER, pressure control	1	95	186–495	DRAIN TUBE	1
37	185–450	LABEL, identification	1	96	178–342	CLIP, spring	1
38	176–762	NUT, 1–1/2–18	1	97	100–020	LOCKWASHER, 3/16"	4
39	222–688	DISPLACEMENT PUMP		98	103–846	CAPSCREW,	2
		<i>see page 38 for parts</i>	1	99	185–384	BRACKET, support, shield	2
40	100–214	LOCKWASHER, 5/16"	7				
42	178–597	TUBE, suction	1				
43	220–455	PRESSURE CONTROL					
		<i>see parts list on page 44</i>	1				

*Extra warning labels available free.

**Motor brush kit 220–853 is available. Purchase separately.

Parts – Pressure Control

Pressure Control Assembly 220–455

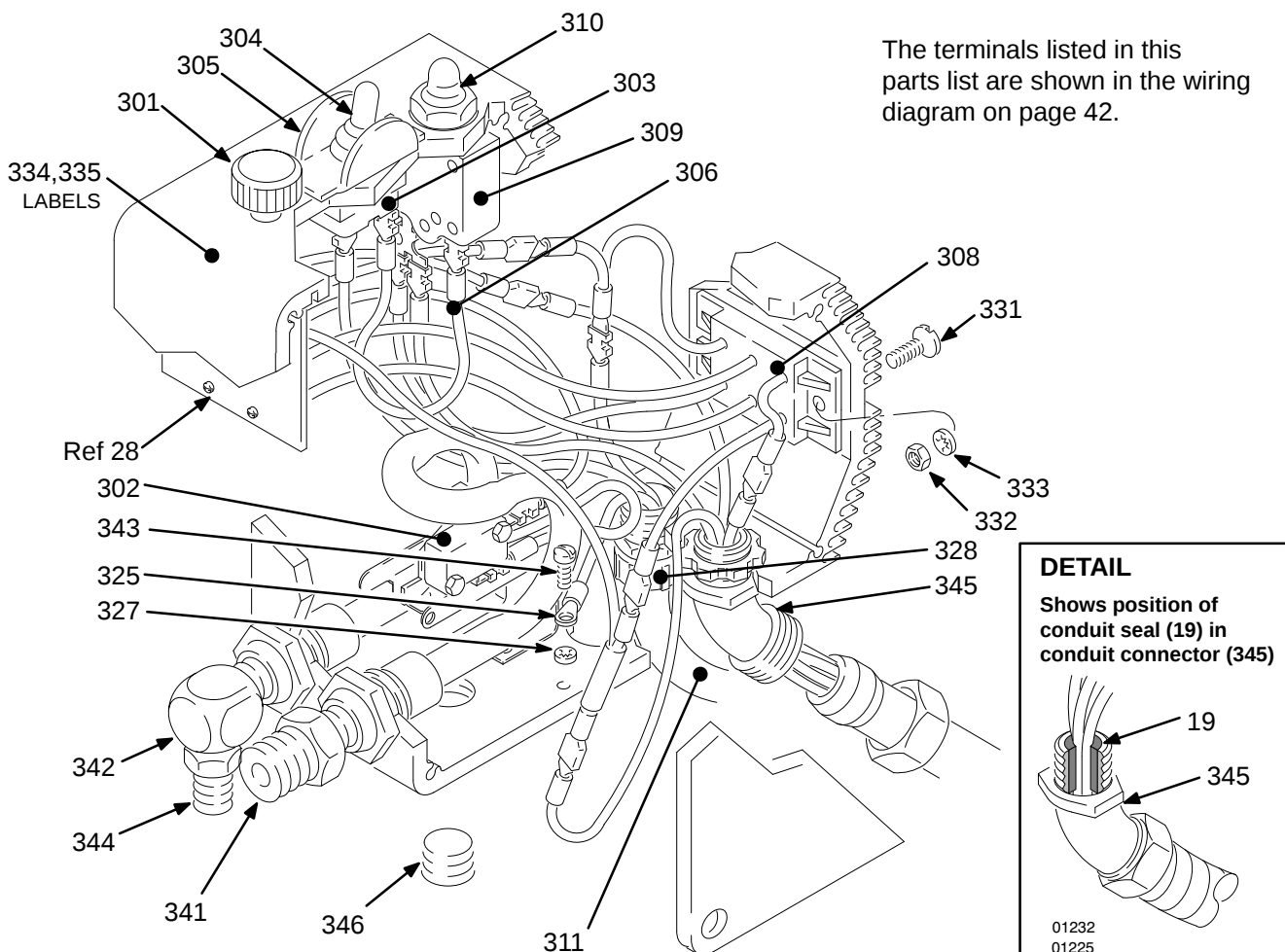
Includes all items listed below, except the terminals.

The terminals are included with the circuit board (item 28). The terminals listed in this parts list are shown on the wiring diagram on page 42.

Part numbers for items 19, 28, 34, 88, 1a, 1b, and 1c shown in the drawings below are given on page 39.

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
302	180–043	,MICROSWITCH	1	324	107–263	TERMINAL, female	1
303	105–679	.ON/OFF switch	1	325	102–799	TERMINAL, ring	1
304	105–659	.BOOT, switch	1	327	157–021	LOCKWASHER, No. 8, internal	1
305	107–255	.GUARD, locking	1	328	108–295	BUSHING, strain relief	1
306	218–168	JUMPER WIRE	1	331	101–273	SCREW, No. 10–24 x 5/8"	2
308	218–170	RECTIFIER, bridge	1	332	100–179	NUT, hex, No. 10–24 thd	2
309	107–256	CIRCUIT BREAKER	1	333	100–718	LOCKWASHER, No. 10	2
310	107–254	BOOT, circuit breaker	1	334	178–797*	LABEL, WARNING	1
311	218–169	CORD, power supply	1	335	178–035*	LABEL, WARNING	1
312	107–268	ADAPTER, terminal	1	336	107–261	TERMINAL, male	2
314	107–267	TERMINAL, female	1	337	107–503	TERMINAL, female	1
315	107–293	TERMINAL, female	2	338	107–504	TERMINAL, male	1
316	107–264	TERMINAL, male	1	341	157–350	ADAPTER, 3/8 npt(m) x 1/4 npt (m)	1
317	107–396	TERMINAL, male	1	342	100–840	ELBOW, street, 1/4 npt(m x f)	1
318	107–262	TERMINAL, female	1	343	100–035	SCREW, No. 8 x 5/16"	1
319	107–260	TERMINAL, female	1	344	162–453	NIPPLE, 1/4 npt(m) x 1/4 npsm	1
320	107–266	TERMINAL, female	1	345	108–460	CONNECTOR, conduit	1
321	103–885	TERMINAL, male	1	346	101–754	PLUG	1
322	103–886	TERMINAL, female	3				
323	107–265	TERMINAL, female	1				

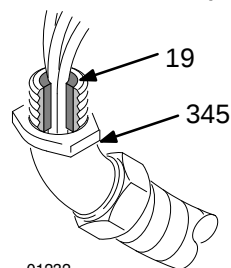
*Extra warning labels available free.



The terminals listed in this parts list are shown in the wiring diagram on page 42.

DETAIL

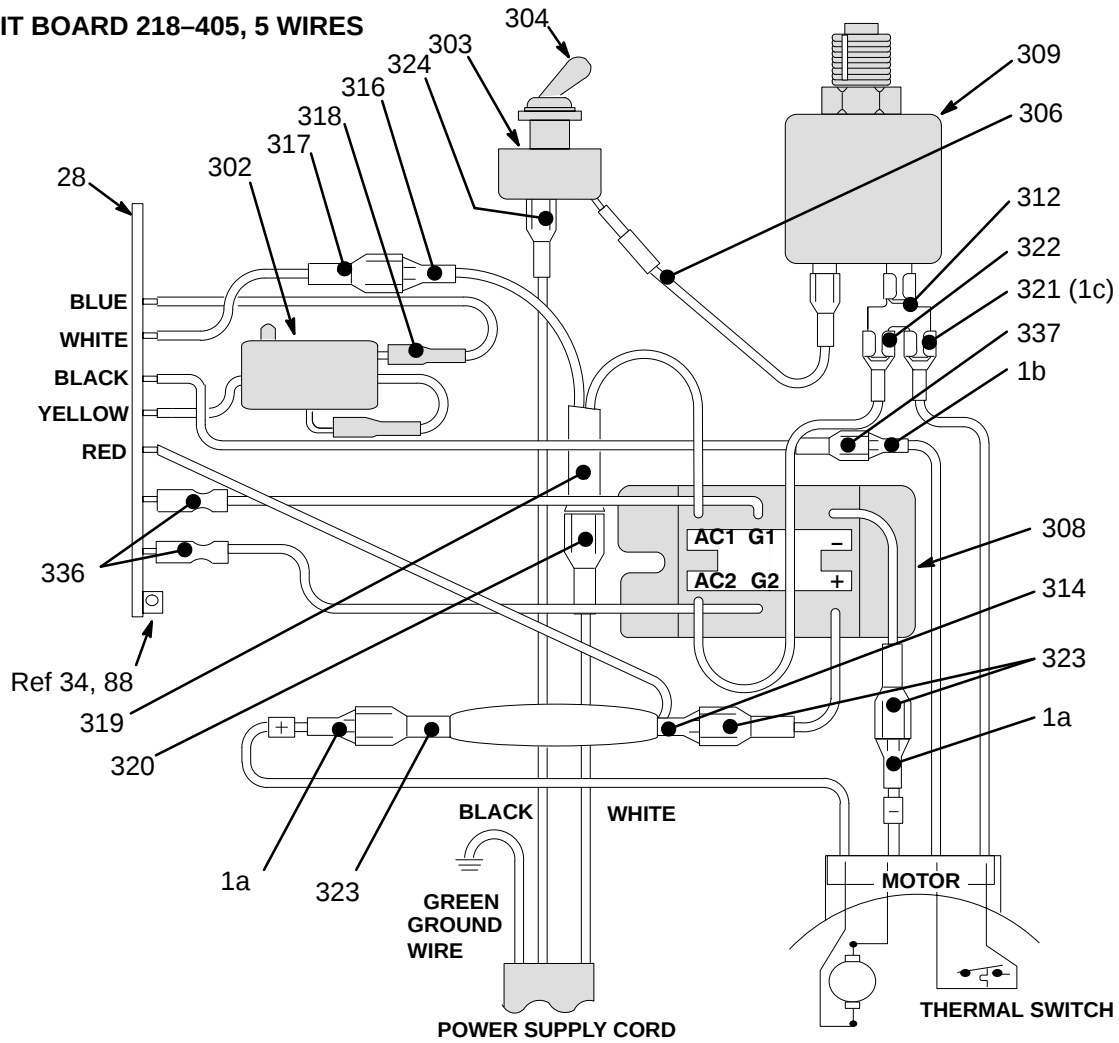
Shows position of conduit seal (19) in conduit connector (345)



01232
01225

Parts – Wiring Diagram

CIRCUIT BOARD 218-405, 5 WIRES



01221

Technical Data

Power Requirements	120 vac, 60Hz, 1 phase, 15A minimum or 2500 Watt generator
Motor	1/2 hp, dc
Working Pressure Range	0–2750 psi (0–19.5 MPa, 0–195 bar)
Cycles/Gallon (liter)	470 (124)
Maximum Delivery	0.45 gpm (1.8 liter/min)
Power Cord	No. 14 Awg, 3 wire, 8'6" (2.6 m)
Inlet Paint Strainer	16 mesh (1190 micron) Stainless Steel Screen, reusable
Outlet Paint Filter	60 mesh (250 micron) Stainless Steel Screen, reusable
Pump Inlet Size	3/8 npt(f)
Fluid Outlet Size	1/4 npsm from fluid filter
Wetted Parts:	
<i>Displacement Pump</i>	Stainless steel, Polyethylene, Brass, Copper, Zinc-plated steel
<i>Filter</i>	Aluminum, Carbon steel, Stainless Steel 60 mesh (250 micron reusable SST screen)

Manual Change Summary

This manual was revised to include the changes from PCN E.

Dimensions

Weight	75 lb (35 kg)
Height	28 in. (711 mm)
Length	26 in. (660 mm)
Width	22.5 in. (572 mm)

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Graco warrants all equipment listed in this manual which is manufactured by Graco 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. With the exception of any special extended or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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