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**100 PLUS[®]
ELECTROSTATIC
POWER UNIT**

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NORDSON CORPORATION

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100 PLUS ELECTROSTATIC POWER UNIT

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Safety

Powder Spray Systems

1. Introduction

This section contains general safety instructions for using your Nordson equipment. Task- and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this equipment safely,

- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.
- follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies. Refer to the National Fire Protection Association (NFPA) standard 33 and to federal, state, regulatory agency, and local codes for rules and regulations covering installation and operation of powder spray systems.
- obtain and read Material Safety Data Sheets (MSDS) for all materials used.

2. Safety Symbols

Become familiar with the safety symbols presented in this section. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.



WARNING: Failure to observe this warning may result in personal injury, death, or equipment damage.

2. Safety Symbols (contd.)



WARNING: Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Risk of explosion or fire. Fire, open flames, and smoking prohibited.



WARNING: Wear protective clothing, safety goggles, and approved respiratory protection. Failure to observe may result in serious injury.



WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.



CAUTION: Failure to observe may result in equipment damage.

3. Qualified Personnel

“Qualified personnel” is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

4. *Intended Use*



WARNING: Use of this equipment in ways other than described in this manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in this manual.

Nordson Corporation cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death, or property damage. Unintended uses may result from taking the following actions:

- making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine Nordson replacement parts.
- failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards
- using materials or auxiliary equipment that are inappropriate or incompatible with your Nordson equipment
- allowing unqualified personnel to perform any task

5. *Installation*

Read the installation section of all system component manuals before installing your equipment. A thorough understanding of system components and their requirements will help you install the system safely and efficiently.

- Allow only qualified personnel to install Nordson and auxiliary equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install all electrical, pneumatic, gas, and hydraulic connections to local code.

5. Installation (contd.)

- Install locking, manual, shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Ground all electrically conductive equipment within 10 feet (3 meters) of the spray area. Ungrounded conductive equipment can store a static charge which could ignite a fire or cause an explosion if a hot spark is discharged.
- Route electrical wiring, electrostatic cables, and air hoses and tubing along a protected path. Make sure they will not be damaged by moving equipment. Do not bend electrostatic cables around a radius of less than 6 in. (152 mm).
- Install safety interlocks and approved, fast-acting fire detection systems. These shut down the spray system if the booth exhaust fan fails, a fire is detected, or other emergency situation develops.
- Make sure the spray area floor is conductive to ground and that the operator's platform is grounded.
- Use only designated lifting points or lugs to lift and move heavy equipment. Always balance and block loads when lifting to prevent shifting. Lifting devices must be inspected, certified, and rated for a greater weight than the equipment being lifted.
- Protect components from damage, wear, and harsh environmental conditions.
- Allow ample room for maintenance, material supply container drop-off and loading, panel accessibility, and cover removal.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

6. Operation

Only qualified personnel, physically capable of operating the equipment and with no impairments to their judgement or reaction times, should operate this equipment.

Read all component manuals before operating a powder spray system. A thorough understanding of all components and their operation will help you operate the system safely and efficiently.

- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
- Know where EMERGENCY STOP buttons, shutoff valves, and fire extinguishers are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.
- Before operating, make sure all conductive equipment in the spray area is connected to a true earth ground.
- Never operate equipment with a known malfunction or leak.
- Do not attempt to operate electrical equipment if standing water is present.
- Never touch exposed electrical connections on equipment while the power is ON.
- Do not operate the equipment at pressures higher than the rated maximum working pressure of any component in the system.
- Know the pinch points, temperatures, and pressures for all equipment that you are working with. Recognize potential hazards associated with these and exercise appropriate caution.
- Wear shoes with conductive soles, such as leather, or use grounding straps to maintain a connection to ground when working with or around electrostatic equipment.

6. Operation (contd.)

- Do not wear or carry metallic objects (jewelry or tools) while working with or around electrostatic equipment. Ungrounded metal can store a static charge and cause harmful shocks.
- Maintain skin-to-metal contact between your hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If wearing gloves, cut away the palm or fingers.
- Keep parts of the body or loose clothing away from moving equipment or parts. Remove personal jewelry and cover or tie back long hair.
- Wear National Institute of Occupational Safety and Health (NIOSH) approved respirators, safety glasses or goggles, and gloves, and while handling powder containers, filling hoppers, operating spray equipment, and performing maintenance or cleaning tasks. Avoid getting powder coatings on your skin.
- Never point manual guns at yourself or other persons.
- Do not smoke in the spray area. A lit cigarette could ignite a fire or cause an explosion.
- If you notice electrical arcing in a spray area, shut down the system immediately. An arc can cause a fire or explosion.
- Shut off electrostatic power supplies and ground gun electrodes before making adjustments to powder spray guns.
- Shut off moving equipment before taking measurements or inspecting workpieces.
- Wash exposed skin frequently with soap and water, especially before eating or drinking. Do not use solvents to remove coating materials from your skin.
- Do not use high-pressure compressed air to blow powder off your skin or clothes. High-pressure compressed air can be injected under the skin and cause serious injury or death. Treat all high-pressure fittings and hoses as if they could leak and cause injury.

7. Less-obvious Dangers

Operators should also be aware of less-obvious dangers in the workplace that often cannot be completely eliminated:

- exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded
- electrical equipment which may remain energized for a period of time after the equipment has been shut off
- vapors and materials which may cause allergic reactions or other health problems
- automatic hydraulic, pneumatic, or mechanical equipment or parts that may move without warning
- unguarded, moving mechanical assemblies

8. Action in the Event of a System or Component Malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component.

9. Maintenance and Repair

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Always wear appropriate protective devices and use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Use only genuine Nordson replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.

9. Maintenance and Repair
(contd.)

- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.
- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.
- Do not attempt to service a moving piece of equipment. Shut off the equipment and lock out power. Secure equipment to prevent uncontrolled movement.
- Relieve air pressures before servicing equipment. Follow the specific instructions in this manual.
- Make sure that the room where you are working is sufficiently ventilated.
- If a “power on” test is required, perform the test carefully and then shut off and lock out power as soon as the test is over.
- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground all conductive equipment.
- Service lines connected to panel disconnect switches may still be energized unless they are disconnected. Make sure the power is off before servicing. Wait 5 minutes for capacitors to discharge after shutting off the electrical power.
- Turn off the electrostatic power supply and ground the gun electrode before adjusting or cleaning.
- Keep high-voltage connection points clean and insulated with dielectric grease or oil.
- Check all ground connections periodically with a megohm meter. Resistance to ground must not exceed one megohm. If arcing occurs, shut down the system immediately.

9. Maintenance and Repair

(contd.)

- Check interlock systems periodically to ensure their effectiveness.



WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program.

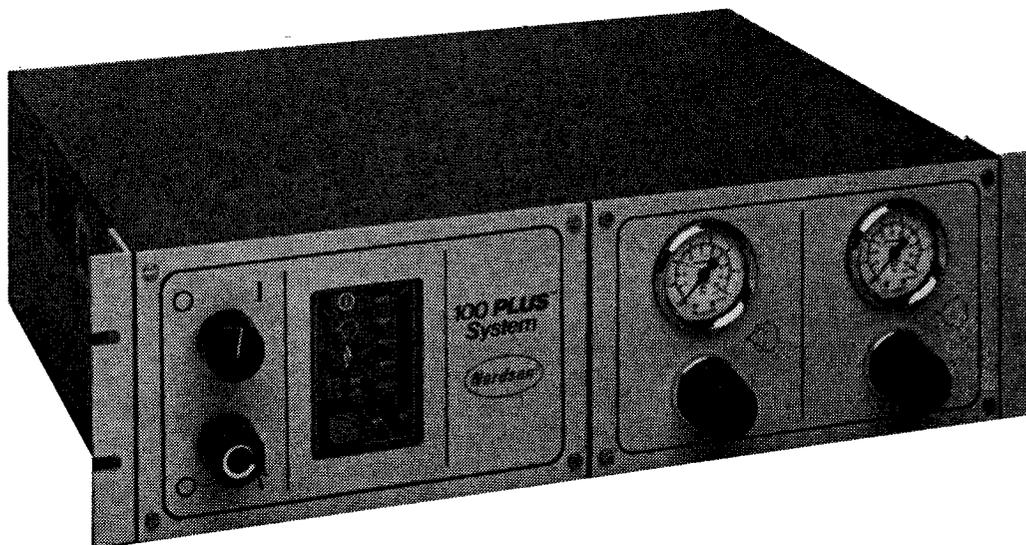
- Do not store flammable materials in the spray area or room. Keep containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.
- Practice good housekeeping procedures. Do not allow dust or powder coatings to accumulate in the spray area or booth or on electrical equipment. Read this information carefully and follow instructions.

10. Disposal

Dispose of equipment and materials used in operation and cleaning according to your local regulations.

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SECTION 2 EQUIPMENT FAMILIARIZATION



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Figure 1 - 100 Plus Power Unit

GENERAL DESCRIPTION

Note: This manual provides information for rack mounted and wall mounted NORDSON 100 Plus Power Units. For simplicity, the rack mounted power unit is illustrated throughout this manual. When data or information differs, it will be noted in the affected Section.

Refer to Figure 1. The NORDSON 100 Plus Power Unit houses the air and electrical controls for a single automatic electrostatic powder spray gun. It can be used as a stand-alone unit or, with a master control console, in multiple gun systems.

The individual power units are designed to be mounted in standard 19 in. (483mm) equipment racks or wall mounted, and are modular in design. Modules on the front and rear of the cabinet house separate air and electrical controls and are easily removed for servicing. The power unit's voltage multiplier is adjustable between 30 and 100 KVDC (30,000-100,000 volts D.C.) for efficient electrostatic charging of the powder spray.

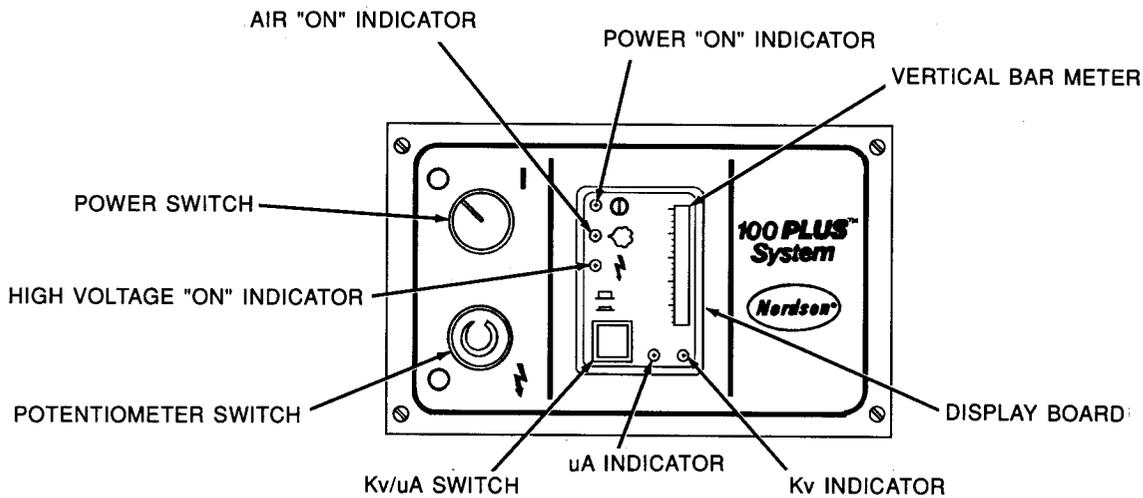


Figure 2 - Electronic Control Module

ELECTRONIC CONTROL MODULE

Refer to Figure 2. The electronic control module contains switches, indicators and a vertical bar meter. Attached to the module are a regulator circuit board, power supply circuit board, universal display circuit board and a module ground stud.

Cable Power Switch - Activates power to the unit and energizes the display board.

KV Potentiometer Switch - Activates the voltage multiplier which produces the high voltages necessary for electrostatic charging; rotating the switch clockwise increases the high voltage output.

Display Board - Houses the indicator LED's, vertical bar meter and KV/ μ A switch.

Power Indicator (Green) - Lights when the power supply is ON.

Air Indicator (Green) - When power supply is turned ON, LED is lit and solenoid is energized, opening valves to allow outlet air to flow.

KV Indicator (Green) - Lights when the KV Potentiometer Switch is ON.

Vertical Bar Meter - Displays both KV and microampere (μA) output; function is controlled by the KV/ μA switch. KV is indicated in 5KV increments, ie., 40 plus or minus 5 KV when the scale is lit up to 40 KV.

NOTE - Bar meter displays true KV output only when cable is not connected to multiplier well (no load). When cable and gun are attached actual KV output is somewhat less than bar meter reading due to resistance of cable and gun resistor.

NOTE - When bar meter is displaying μA , reading will fluctuate as workpieces go by gun tip. The closer a workpiece is to the electrode, the greater the μA reading. μA readings are affected by gun tip-to-workpiece distance, geometry of workpiece and powder flow rates.

NOTE - When unit is first put into service, μA output shown on bar meter should be noted and then monitored periodically thereafter. A significant increase in μA output indicates a probable short in the gun resistor, electrostatic cable or multiplier. A significant decrease in μA output indicates that multiplier is failing.

Microampere (μA) Indicator - When lit, indicates that the meter is displaying μA Output.

KV/ μA Switch - A momentary non-latching switch which when depressed changes the function of the bar meter so that it displays μA output.

NOTE - Red LED on regulator board lights when KV switch is turned ON and indicates that circuits controlling the multiplier are functioning properly.

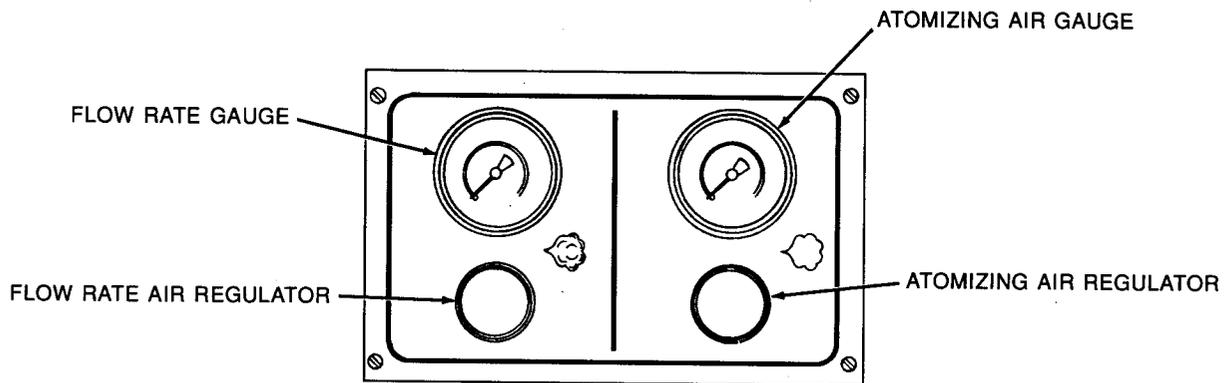


Figure 3 - Pneumatic Control Module

PNEUMATIC CONTROL MODULE

Refer to Figure 3. The pneumatic control module contains air gauges and regulators.

Atomizing Air Gauge - Shows atomizing (diffuser) air pressure as adjusted by regulator.

Atomizing Air Regulator - Controls atomizing air pressure. Rotating knob clockwise increases pressure. Pull knob out to lock in position, pull off to prevent tampering.

Flow Rate Air Gauge - Shows flow rate (ejector) air pressure as adjusted by regulator.

Flow Rate Air Regulator - Controls flow rate air pressure. Rotating the knob clockwise increases pressure. Pull knob out to lock in position, pull off to prevent tampering.

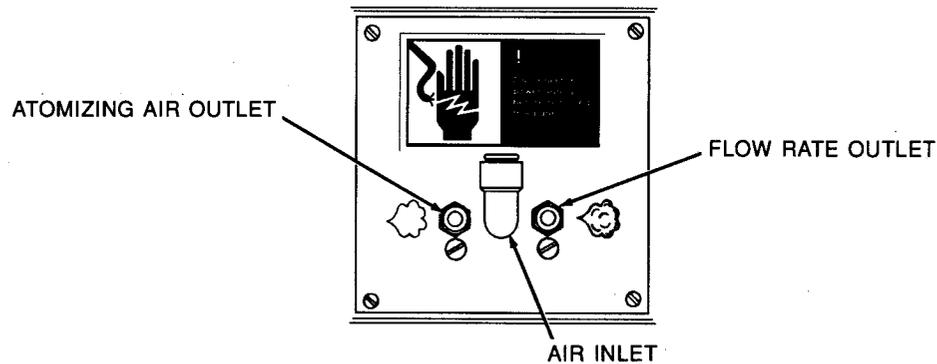


Figure 4 - Pneumatic Output Module

PNEUMATIC OUTPUT MODULE

Refer to Figure 4. The pneumatic output module contains an air manifold and a 24VDC air-electronic solenoid valve (normally closed).

Air Inlet - 3/8 inch (9.5mm) elbow tubing connector for air supply. Inlet air pressure must be no more than 100 PSI (689.5 kPa, 7.0 kg/sq. cm).

Atomizing Air Outlet - 1/4 inch (6.35mm) tubing connector for atomizing air supply to powder pump.

Flow Rate Outlet - 1/4 inch (6.35mm) tubing connector for flow rate air supply to powder pump.

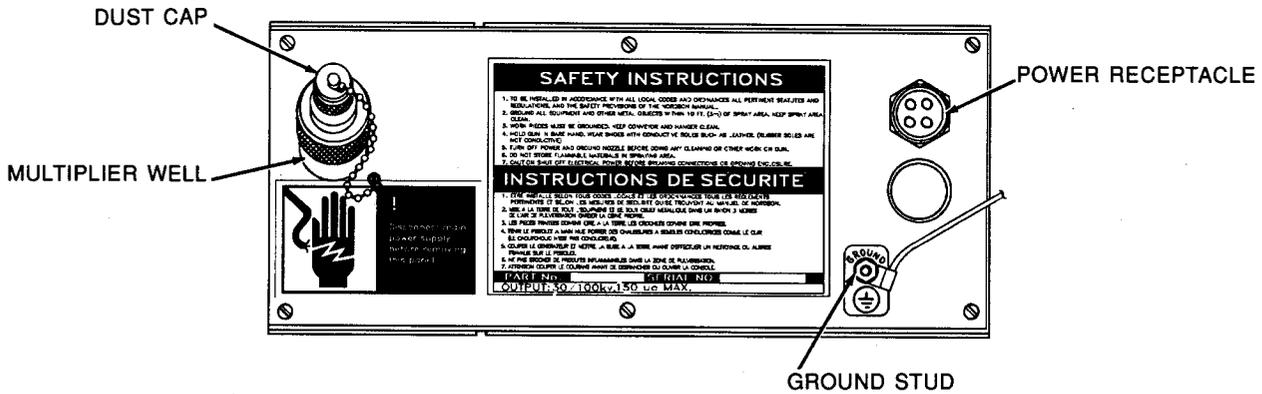


Figure 5 - Multiplier Module

MULTIPLIER MODULE

Refer to Figure 5. The multiplier module contains a high voltage multiplier, power supply receptacle and ground stud.

Multiplier Well - Receptacle for high voltage electrostatic cable. Well should always be filled with clean H.V. insulating oil. Cover well with dust cap any time cable is removed. Dirt, water and other contaminants can cause arcing and failure of the multiplier.

Power Receptacle - 4 pin connector for power supply. Designed for use with Nordson power cable and master control console.

Ground Stud - Connection for cabinet ground. Ground strap with terminal and clamp is furnished with power unit.



WARNING-To prevent serious injury to personnel and damage to equipment, ground strap must be connected to stud and earth ground before unit is put into operation.

SECTION 3 INSTALLATION

MOUNTING

Install the power unit in accordance with all local codes. The unit is designed to be mounted in a standard 19 inch (483mm) equipment rack or wall mounted. Refer to section 9, Technical Data, for dimensions. Various size blank panels are available to cover unused areas of rack. Refer to Master Control Unit Manual No. 33-5 for system installation instructions.



WARNING: Power unit should be connected to service line by a qualified electrician.



WARNING: To prevent electrical shock during installation or servicing, a power isolation device such as a disconnect switch or breaker should be installed in the service line ahead of the power unit or master control console.

POWER SUPPLY CIRCUIT BOARD SETUP



WARNING: Ensure no electrical power is present at the power unit before removing any components.

1. Remove electronic control module from cabinet to gain access to power supply circuit board. Refer to Section 7 for removal procedures.

NOTE: Input voltage must be nominally 120 or 240 VAC, 50/60 Hz. Connecting any other voltage supply to the power unit will result in improper operation and may result in component damage. Power units are shipped with power supply circuit board configured for 120 VAC operation.

2. Refer to Figure 6. Input voltage is selected by installing voltage selector plug in the 120V or 240V position. To change input voltage selection, remove voltage selector plug from J3 and install on power supply circuit board so voltage designation can be seen when proper input voltage has been selected.

NOTE: Power units are shipped with power supply circuit board configured for automatic use with a master control (W/MC) unit.

3. If power unit is to be used as a stand-alone unit, remove shorting plug from W/MC on J8 and install in W/O (without master control unit) position.
5. If power unit is used in Japan, remove shorting plug from J4 and insert into designated JAPAN socket.
4. Install electronic control module in cabinet. Refer to section 7 for installation procedures.

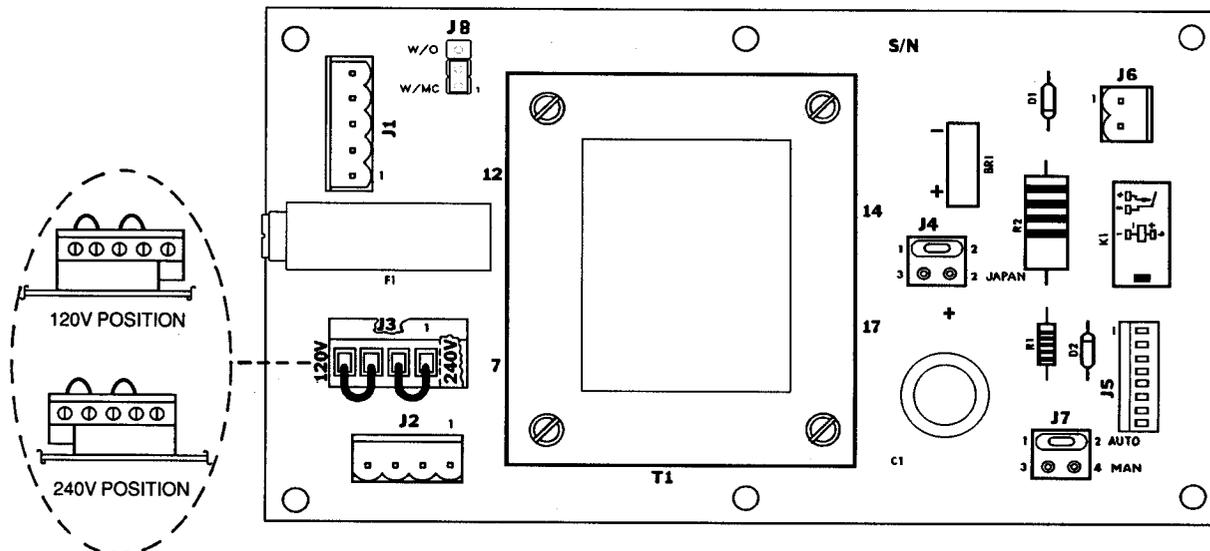


Figure 6 - Power Supply Circuit Board

INPUT POWER CONNECTIONS

1. With master control console: Plug power cable into receptacle and connect terminals to master control console terminal block per instructions in master control console.

2. Refer to Figure 7. As stand-alone unit:
 - a. Remove multiplier module from power unit. Refer to Section 7 for removal procedures.
 - b. Loosen screws and remove wires from input connector.
 - c. Remove input receptacle from multiplier module.
 - d. Install a watertight conduit connector (to maintain dust-free internal environment) conforming to local codes in place of receptacle. Panel hole is 7/8 in. (22.2mm) in diameter.



WARNING: Ensure service line leads are the same size (AWG) as input receptacle leads.



WARNING: If power unit is to be used as a stand-alone unit a disconnect device must be installed in service line ahead of power unit.

- e. Strip insulation from service line voltage, neutral and ground leads.
- f. Insert service line leads into input connector and tighten screws.
- g. Install multiplier module to power unit. Refer to Section 7 for installation procedures.

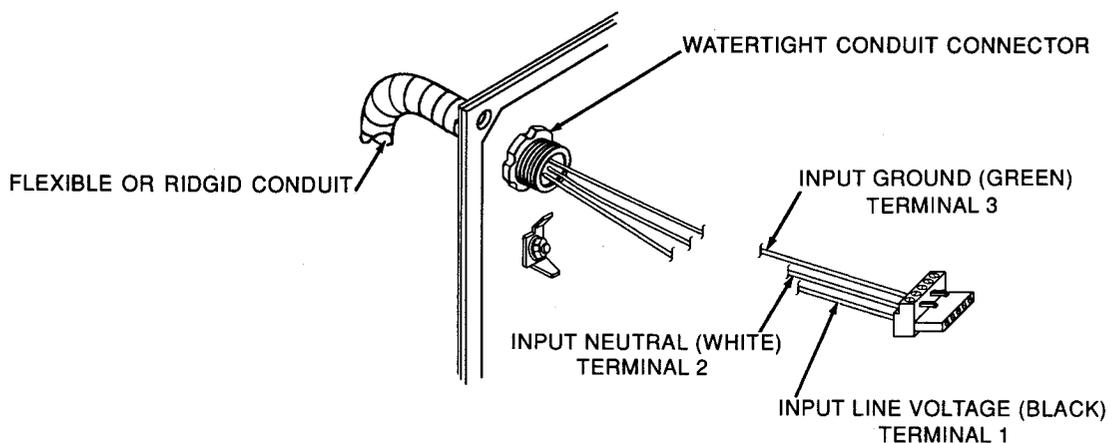


Figure 7 - Input Wiring For Stand-Alone Units

3. Refer to Section 2, Figure 5. Connect ground strap furnished with power unit to ground stud on multiplier module. Secure the clamp to an earth ground. Ensure electrically conductive components of the system and all other equipment within 10 ft. (3m) of the spray area are properly grounded.

AIR INPUT

NOTE- Air tubing must be cut squarely and inserted fully into air fitting to ensure leak-free operation

Refer to Section 2, Figure 4. Connect 3/8 in. (9.5mm) tubing to center elbow fitting marked "IN" on manifold module to supply air to atomizing and flow rate pressure regulators. Connect tubing to master control console or, if used as a stand-alone unit, to a shut-off valve so air may be turned off for servicing.



CAUTION - Maximum input air pressure must be no more than 100 PSI (689 kPa, 7.0 kg/sq.cm).

Supply air must be clean and dry. Moist or contaminated air can cause powder caking and sticking to tubing walls, clogging of pump venturi throat and metering orifices and gun passages, as well as grounding or arcing of the high voltage circuit in the gun.

Nordson recommends the use of both prefilters and coalescent filters, with automatic drains. A refrigerated or regenerative desiccant air dryer capable of producing 38° F (3.4°C) or lower dewpoint at 100 PSI (689 kPa) is also recommended.

AIR OUTPUT

NOTE- Air tubing must be cut squarely and inserted fully into air fitting to ensure leak-free operation

Connect 1/4 inch (6.35mm) tubing between the atomizing and flow rate air outlets on the manifold module (refer to Figure 4) and their respective connectors on the feed hopper powder pump.

HIGH VOLTAGE CABLE ATTACHMENT

1. Refer to Section 2, Figure 5. Remove dustcap from multiplier well. Fill well with H.V. insulating oil (supplied with unit in two 7.5 ml tubes). Refer to Kit List in Section 8 for H.V. insulating oil part number.

2. Ensure end of electrostatic cable is clean and dry.
3. Slowly insert electrostatic cable into the well, wiping up any oil overflow. Secure cable to well with retaining nut on cable end.

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SECTION 4 OPERATING INSTRUCTIONS

INTRODUCTION

This section covers safety precautions, startup and shutdown procedures and routine operating instructions for an electrostatic powder spray system using the NORDSON 100 PLUS Power unit.

Before operating a Nordson powder spray system, the operator should read all the related component manuals and be familiar with the operating characteristics of each component. A thorough understanding of the system operation will help obtain desired results and aid in troubleshooting.

SAFETY PRECAUTIONS

Observe the following safety precautions when operating an electrostatic powder spray system.



WARNING- Ensure all equipment in spray area is properly grounded. Periodically inspect grounds. Sparks which can result from poor grounds can cause fires or explosions.



WARNING- Inspect and maintain fire detection systems and safety interlocks daily.



WARNING- Maintain a grounded area for operator. Operator must not wear or carry metallic objects that can store a charge, in order to avoid potentially dangerous shocks.



WARNING- Power packs contain energized components that carry potentially fatal charges. Only qualified maintenance personnel should service this equipment.

Refer to Section 1, Powder Spray System Safety, for additional warnings.

SYSTEM COMPONENTS

Along with the power unit(s), master control unit and electrostatic cable and gun, other components used in a typical powder spray system include a spray booth, exhaust filters, transfer pumps, distribution hopper, sieve, feed hopper and powder pumps.

The system should be electrically connected to a safety interlock or interlocks which will shut it down if a fire is detected, the booth fans shut down, or a gun comes too close to a ground.

STARTUP

Before activating the power unit, ensure the booth vent fans are on, the powder recovery system is operating, and fluidizing air (fed to the feed hopper by a separate regulator) is flowing into the powder feed hopper. Refer to the appropriate component manuals for startup procedures for these components.



WARNING- Breathing certain airborne dusts (including finishing powders) may be hazardous to your health. Ask the manufacturer of the powder being used for a Material Safety Data Sheet (MSDS) for specific guidance. Use appropriate respiratory protection.

OPERATION

1. Refer to Figure 8. Turn cable power switch (1) ON. Power (2) and air (3) indicators will light. Solenoid will be energized, allowing atomizing and flow rate air to flow to feed hopper powder.
2. Adjust atomizing air (4,gauge; 5,regulator) to approximately 40 PSI (2.8 kg/sq. cm, 276 kPa) and flow rate air (6,gauge; 7,regulator) to approximately 40 PSI (2.8 kg/sq. cm, 276 kPa). Flow rate air pressure controls the volume and velocity of the powder-air mixture delivered to the gun and atomizing air pressure controls the density (powder-to-air ratio) of the mixture.

NOTE- The pressures given are an average starting point. Adjust for economical powder use and deposition requirements, type of powder, humidity, and other operating variables.

3. Test spray and adjust gun pattern sleeve, if used, to desired spray pattern.



WARNING: Electrical sparks discharged from ungrounded conductive objects may start fires or cause explosions. Before turning on high voltage, ensure power unit and all conductive objects in spray area are grounded.

4. Turn KV potentiometer switch (8) ON and adjust to 100 KV. The high voltage indicator LED (9) will light and the bar meter (10) will display KV output of the voltage multiplier plus or minus 5 KV. The KV indicator (11) will light, indicating that the bar meter is displaying KV output. Pressing the KV/ μ A switch (12) will change the function of the bar meter so that it displays μ A output. The μ A indicator (13) will light.

NOTE: On initial startup of power unit, note μ A reading on bar meter. Monitor μ A reading periodically thereafter. If there is a significant increase in the μ A reading, check the gun resistor, electrostatic cable, and multiplier well. Shorting in one of these components will increase current draw and present a serious safety hazard. A significant decrease in μ A reading could signal a failure in the multiplier or regulator board.

5. Test spray items to be coated. Adjust KV output to achieve desired results. KV output can be adjusted from 30 to 100 KV.

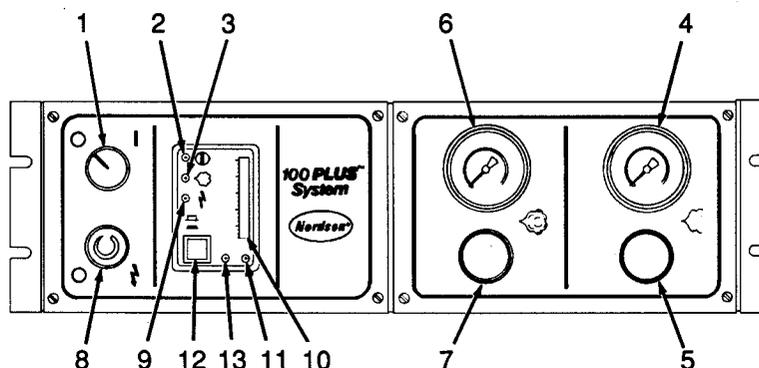


Figure 8 - Operating Controls And Indicators

ADJUSTMENTS

Obtaining a quality powder coating while maintaining powder economy is achieved through experimentation and experience. Variables affecting results are:

1. As the voltage is lowered the deposition rate decreases but the ability to coat recessed areas is generally improved. Increasing voltage will increase deposition rates to a point after which the electrostatic charge on the powder already de-positied will tend to repel any additional powder (like charges repel).
2. High flow rate air pressure increases deposition rate and velocity imparted to the powder assists in coating recessed areas by defeating some of the electrostatic attraction of the powder to projecting areas around the recess. However, high flow rate air pressure can cause a loss of wrap, a decrease in powder economy, and increased wear on the internal parts of the spray gun and powder pump.
3. Increasing the atomizing air pressure will decrease the density of the cloud emitted from the gun and result in lowered deposition rates. Decreasing the pressure will increase powder-to-air ratio providing better coverage. Too low a pressure can result in powder clogging the pump venturie throat or gun passages. Too high a pressure can cause rapid wear of powder contact parts.

SHUTDOWN

1. Turn KV potentiometer and power switches OFF.
2. If using a master control console, turn off power at the master control to disable all power units in the system.

SECTION 5

PREVENTIVE MAINTENANCE

It is important to exercise good housekeeping practices with all components of a powder spray system. Dust and powder accumulating on electrostatic equipment can cause malfunctions resulting in fire and shock hazards. The entire system should be cleaned periodically along with the surrounding area.

1. Check air filter system on a regular basis. Drain filters as often as necessary and replace when necessary.
2. Check operation of air dryer at least once a week.



WARNING - DO NOT use high pressure air to blow powder from skin or clothes. Air can be injected under skin, causing personal injury or death.

3. Clean guns and pumps daily. Used compressed air to blow powder from guns, pumps, and hoses. Never blow powder backwards from gun to pump. Wipe power unit cabinet down with clean cloth or brush.
4. Periodically check powder contact parts for wear. If the parts indicate excessive wear, replace them. Failure to do so will result in more time spent in cleaning the part to remove impact fusion, and will affect the operation of the system. Never use sharp objects to clean parts. Maintain a supply of replacement parts.
5. Check all ground connections on a regular basis. The loss of a ground could affect transfer efficiency and create a safety hazard. Strip workpiece hangers regularly.
6. Check for pressure drops across booth filters. Restricted filters could result in poor powder containment within the booth and create a safety hazard if airborne powder concentration exceeds safe limits. No powder should be present in exhaust plenum. Clean or change filter cartridges when necessary.
7. Clean booth daily with a rubber squeegee or other grounded non-sparking device. Extensive cleaning should be done weekly or bi-weekly. Exhaust fans should be on while booth is being cleaned.

8. Clean optical fire detector lenses every four hours or, as often as necessary, to maintain operation. **DO NOT** operate optical fire detector in the bypass mode.
9. Clean out in-line powder sieves daily.
10. Blow out feed hopper exhaust vent and tubing weekly.

SECTION 6 TROUBLESHOOTING



WARNING- Before attempting to do any maintenance on the power unit (or any other component of the system), turn power OFF at switch or circuit breaker ahead of the power unit or component. Only qualified personnel should be allowed to work on electrical components.

TROUBLESHOOTING-PNEUMATIC

PROBLEM:

Powder puffing from gun.

Probable Cause:

1. Low air pressure.

Suggested Correction:

1. Increase atomizing and/or flow rate air pressure.

PROBLEM:

Powder surging from gun.

Probable Cause:

1. Poor fluidization of powder in hopper.
2. Wet powder.

Suggested Correction:

1. Increase fluidization pressure.
2. Inspect powder in hopper, replace if damp. Check air supply and filtration/dryer system.

PROBLEM:

Powder drooling from gun.

Probable Cause:

1. Poor atomization of powder.
2. Low voltage.

Suggested Correction:

1. Increase atomizing pressure.
2. Increase voltage. Check uA meter reading, if higher than normal, check gun resistor, cable with megohm meter. If lower than normal, check multiplier output at well with KV meter.
3. Increase flow rate pressure.

3. Low flow rate pressure.

PROBLEM:

Uneven pattern.

Probable Cause:

1. Worn nozzle or deflector.
2. Impact fusion on nozzle or deflector.
3. Flow rate pressure low.

Suggested Correction:

1. Disassemble gun and check parts for wear, replace if necessary.
2. Disassemble gun and clean or replace parts as necessary.
3. Increase flow rate pressure.

PROBLEM:

Voids in powder pattern.

Probable Cause:

1. Worn nozzle or deflector.
2. Plugged orifices in gun.

Suggested Correction:

1. Disassemble gun and inspect parts, replace if necessary.
2. Disassemble gun and clean.

PROBLEM:

Inadequate or no powder flow.

Probable Cause:

1. Plugged hose, pump, or gun.
2. Worn pump venturi nozzle or throat.
3. Sticking manifold valve cartridges.
4. Malfunctioning solenoid.
5. No or poor fluidization.

Suggested Correction:

1. Disassemble gun and clean. Disconnect hose from pump and blow out with compressed air. Disassemble pump and clean. Inspect powder supply for dampness and replace if necessary.
2. Disassemble pump, inspect parts and replace if necessary.
3. Remove panel from power unit, remove solenoid, pilot manifold and gasket and check cartridge movement in manifold bore. Replace if necessary. **DO NOT LUBRICATE.**
4. Check solenoid and replace if necessary. See electrical portion of troubleshooting guide for test specifications.
5. Increase fluidization pressure; inspect fluidization plate for plugging

TROUBLESHOOTING-ELECTRICAL

PROBLEM:

No Power (ALL LEDS OFF).

Probable Cause:

1. Input power failure.
2. Loose connection or shorted wiring
3. Fuse failure.

Suggested Correction:

1. Check input power supply, interlock system.
2. Ensure that internal cable connections are secure, check for signs of shorts.
3. Check fuse visually or with continuity tester. If failed, correct reason for failure before replacing. Shorted capacitor can cause fuse to blow.

PROBLEM:

No Power (ALL LEDS OFF).

4. Switch failure.
5. Power supply circuit board failure
6. Regulator board failure.

Suggested Correction:

4. Check continuity across switch connector leads 11 and 12, 8 and 10 with switch ON and cable disconnected. Remove switch connector from J2. With switch on and cable disconnected, check continuity across switch terminals C1 and 2, C2 and 4.
5. With power OFF, check for 7.8 to 11.7 ohms at J5, pins 4 and 5 on power supply circuit board.
6. Replace regulator board.

PROBLEM:

Power pack functions normally, but LED for one or more functions OFF.

Probable Cause:

1. Loose connection or short.
2. Display board faulty.

Suggested Correction:

1. Ensure that cable connections are secure, check for signs of short.
2. Replace multiplier/regulator board.

PROBLEM:

No output air, LED ON.

Probable Cause:

1. Loose connection or short.
2. Solenoid failure.
3. Valve cartridges sticking.

Suggested Correction:

1. Ensure that cable connections are secure, check for signs of short.
2. Disconnect solenoid leads, VOM reading across leads should be 550 ohms. Replace if not obtained.
3. Check cartridge movement in bore. Replace if not moving freely. **DO NOT LUBRICATE.**

PROBLEM:

No KV output, GREEN LED ON, RED LED on circuit board ON.

Probable Cause:

1. Loose connection or short.
2. KV switch failure.
3. Regulator board failure.

Suggested Correction:

1. Ensure that cable connections are secure, check for signs of short.
2. Check continuity across terminals No. 3 and 4 on switch cable connector with switch ON (leads No.s 22 and 23).
3. Replace regulator board.

PROBLEM:

No KV output, GREEN LED ON, RED LED OFF.

Probable Cause:

1. Regulator board failure.

Suggested Correction:

1. Replace regulator board.

PROBLEM:

No KV output, GREEN LED ON, RED LED ON.

Probable Cause:

1. Gun resistor failure.
2. Electrostatic cable failure.
3. Multiplier or regulator board shorted.

Suggested Correction:

1. Check resistor with megohm meter. Resistance should be 175 megohms.
2. Check cable with megohm meter. Resistance should be between 332 - 456 megohms.
3. Adjust KV up and down. Whine produced by multiplier should increase and decrease in pitch. If whine is not heard, replace multiplier.

PROBLEM:

Low KV output.

Probable Cause:

1. Regulator board failed open, multiplier diodes failing.

Suggested Correction:

1. Voltage at board connector P3-5 or contact on back of the KV switch should be approximately 13.9VDC at maximum KV output. If not able to obtain, replace regulator board.

PROBLEM:

Loss of wrap, poor transfer efficiency.

Probable Cause:

1. Poorly grounded workpiece.
2. Power pack not grounded.
3. Electrostatic cable or gun resistor failure
4. Moisture in air causing KV to leak to ground.
5. Dirt or powder contamination of connections causing arcing.

Suggested Correction:

1. Inspect and clean conveyor and hangers.
2. Check ground connection.
3. Check cable/gun resistance with megohm meter. Multiplier end of cable to gun resistor resistance should be 370 megohms plus or minus 20%.
4. Check air dryers.
5. Check cable and resistor connections, clean or replace components.

SECTION 7 DISASSEMBLY AND REPAIR



WARNING - The power unit contains energized electrical components with potentials which could be fatal. Disconnect and lock out input electrical power to the power unit before removing any panels or performing any repairs.

NOTE - It is important to maintain a dust-free environment inside the power unit cabinet. Ensure that panel gaskets are in good condition and that O-rings are in place behind gauge faces whenever installing panels or gauge in cabinet.

INTRODUCTION

The following paragraphs provide procedures for disassembly, repair and installation of the power unit subassemblies. Refer to exploded figures and parts lists in Section 8 or to electrical schematic in Section 6 when performing repairs.

PNEUMATIC CONTROL MODULE DISASSEMBLY

Refer to Figure 13. Removal of the pneumatic control module is provided in the following steps:



WARNING - Ensure air pressure is relieved from power unit before performing any maintenance. Failure to observe this warning may result in personal injury and/or damage to equipment.

1. Loosen captive screws (5) on gauge panel (1) and gain access to air regulators (13).
2. Tag and disconnect tubing (11) from male run tee (8) on air gauges (3).
3. Tag and disconnect tubing (12) from elbows (9) on air regulators (13).
4. Disconnect multiplier harness terminal (wire 31C) from air gauge (3) terminal (wires 31E, 31F).

Pneumatic Control Module Repair

Procedures for replacement of defective components in the pneumatic control module are provided in the following paragraphs. Refer to Figure 13.

Air Gauge - Replacement of air gauge is provided in the following steps:

Removal:

1. Remove nut and lockwasher securing terminal to air gauge (3).
2. Remove coupling pipe (7) from air gauge (3).
3. Remove nut securing bracket to air gauge (3).
4. Remove air gauge (3) and O-ring (4) from gauge panel (1).
5. Using a cloth, remove teflon paste residue from air gauge (3) threads.

Installation:

1. Remove nut securing bracket to replacement air gauge (3).
2. Install O-ring (4) and air gauge (3) to gauge panel (1).
3. Install bracket to air gauge (3) using nut.
4. Apply teflon paste to air gauge (3) threads.
5. Install coupling pipe (7) to air gauge (3) and tighten.
6. Install terminal to air gauge (3) using lockwasher and nut.

Air Regulator - Replacement of air regulator is provided in the following steps:

Removal:

1. Disconnect tubing (10) from regulator (13).
2. Remove knurled locking nut securing air regulator (13) to gauge panel (1).
3. Remove air regulator (13) from gauge panel (1).
4. Remove elbows (9) from air regulator (13).

5. Using a cloth, remove teflon paste residue from threaded end of elbows (9).

Installation:

1. Apply teflon paste to threaded end of elbows (9).
2. Install elbows (9) to air regulator (13).
3. Install air regulator (13) to gauge panel (1) using knurled locking nut.
4. Connect tubing (10) to regulator (13).

Pneumatic Control Module Installation

Refer to Figure 13. Installation of the pneumatic control module is provided in the following steps:

1. Connect terminal (wires 31E, 31F) from air gauges (3) to multiplier harness terminal (wire 31C).
2. Connect tubing (12) to elbows (9) on air regulators (13). Remove tags.
3. Connect tubing (11) to tees (8) on air gauges (3).
4. Install pneumatic control module to cabinet and tighten captive screws (5).

ELECTRONIC CONTROL MODULE DISASSEMBLY

Refer to Figure 14. Disassembly of the electronic control module is provided in the following steps:

1. Loosen captive screws (5) on control panel (7) and gain access to power supply circuit board (19).
2. Disconnect power supply connector from J1 on power supply circuit board (19).
3. Disconnect multiplier module connector from P5 on regulator board (26).
4. Disconnect solenoid connector from J6 on power supply circuit board (19).

5. Disconnect multiplier harness ground wires from terminal lugs (23,25).

Electronic Control Module Repair

Procedures for replacement of defective components in the electronic control module are provided in the following paragraphs. Refer to Figure 14.

Power Supply Circuit Board - Replacement of power supply circuit board is provided in the following steps:

Removal:

1. Disconnect connectors from J1, J2, J3, J5, and J6 on power supply circuit board (19).
2. Remove screws (17) and lockwashers (18) securing power supply circuit board (19) to electronic control module.

Installation:

1. Install power supply circuit board (19) to electronic control module using lockwashers (18) and screws (17).
2. Connect connectors to J1, J2, J3, J5, and J6 on power supply circuit board (19).
3. Ensure power supply circuit board (19) is configured for desired operation. Refer to Section 3.

Regulator Circuit Board - Replacement of regulator circuit board is provided in the following steps:

Removal:

1. Disconnect ribbon cable RB2 from P1 on regulator circuit board (26).
2. Disconnect KV/wired potentiometer connector (12) from P2 on regulator circuit board (26)
3. Disconnect ribbon cable RB1 from P3 on regulator circuit board (26).
4. Disconnect multiplier harness connector from P5 on regulator circuit board (26).

5. Remove screws (29) and lockwashers (30) securing regulator circuit board (26) to electronics control module.

Installation:

1. Install regulator circuit board (26) to electronic control module using lockwashers (30) and screws (29).
2. Connect multiplier harness connector to P5 on regulator circuit board (26).
3. Connect ribbon cable RB1 to P3 on regulator circuit board (26).
4. Connect kv/wired potentiometer (12) connector to P2 on regulator circuit board (26).
5. Connect ribbon cable RB2 to P1 on regulator circuit board (26).

Regulator Circuit Board Calibration- Replacement regulator circuit board must be calibrated for accurate KV and μ A display. Refer to Figure 10. Calibration is provided in the following steps:



WARNING - Power is applied to the power unit during calibration procedure. Exercise extreme caution while calibrating regulator board. Contact with energized components may cause severe shock or death.

1. Ensure connectors are connected to electronic control module. Refer to electronic control module installation.
2. Disconnect electrostatic cable from multiplier well.
3. Install dust cap to multiplier well.
4. Loosen captive screws securing multiplier module. Without putting any stress on wires, gain access to negative multiplier.
5. Turn KV potentiometer on

NOTE-There are two types of negative multipliers. If the negative multiplier installed in power unit DOES NOT have pin 5 omit steps 6 and 7.

6. Using a voltmeter set for DC volts, measure DC voltage from pin 5 (located on center finger) on foil side of finger board to multiplier ground stud.
7. Adjust potentiometer R20 on regulator circuit board to voltage marked on top cap of negative multiplier.

NOTE- If the negative multiplier installed in power unit DOES have pin 5 omit step 8.

NOTE- If the negative multiplier installed in power unit DOES NOT have pin 5 do not adjust potentiometer R20 (it is factory set) unless locking compound has been broken.

8. If locking compound on potentiometer R20 adjustment screw has been broken and negative multiplier DOES NOT have pin 5:
 - a. Using a voltmeter set for DC volts, measure DC voltage from either contact on KV potentiometer and ground.
 - b. Adjust potentiometer R20 on regulator circuit board to 13.5vdc ($\pm .05$ vdc).
9. Apply locking compound to potentiometer R20 adjustment screw.
10. Turn KV potentiometer off.
11. Install multiplier module to cabinet and tighten captive screws.
12. Turn KV potentiometer on and set to maximum KV output.
13. Adjust potentiometer R40 on regulator circuit board until bar meter reads 100KV.
14. Turn KV potentiometer off.
15. Remove dust cap from multiplier well.
16. Connect electrostatic cable to multiplier well.

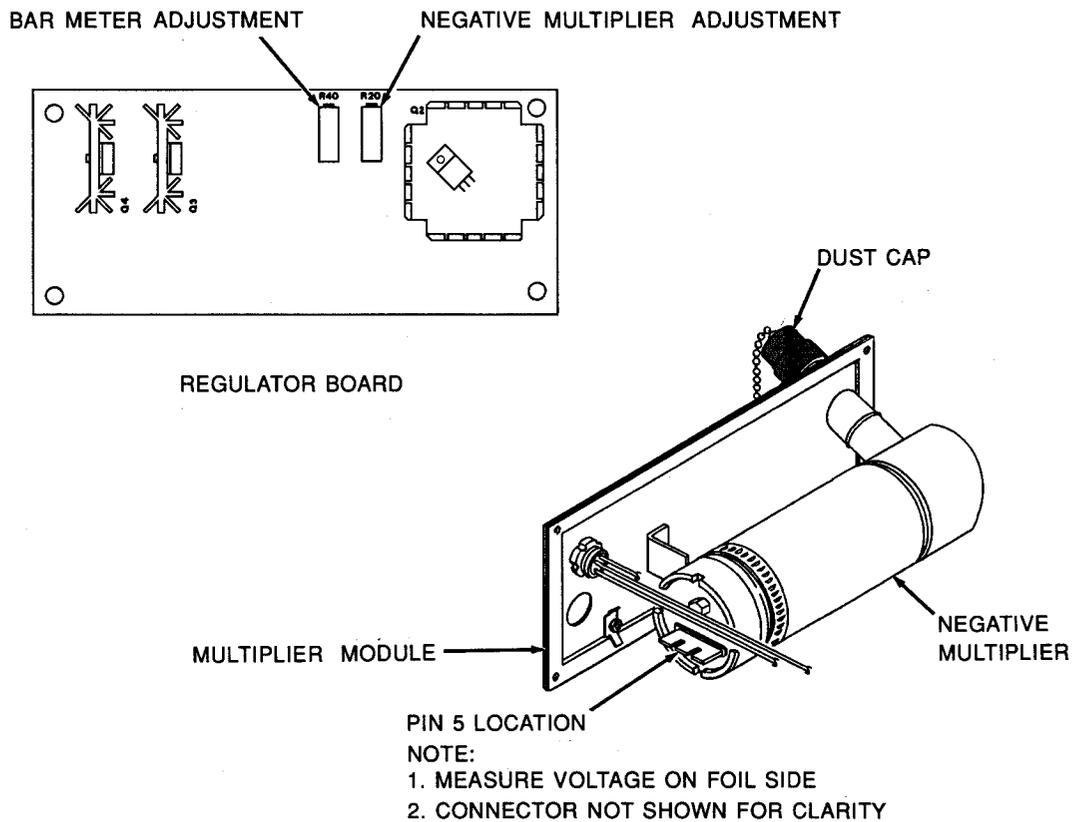


Figure 10 - Regulator Board Calibration

Universal Display Circuit Board - Replacement of universal display circuit board is provided in the following steps:

Removal:

1. Disconnect ribbon cable RB1 from P1 on universal display circuit board (14).
2. Disconnect KV/microamp switch connector (16) from P3 on universal display circuit board (14).
3. Remove nuts (27), lockwashers (18) and washers (31) securing universal display circuit board (14) to electronic control module.

Installation:

1. Install universal display circuit board (14) to electronic control module using washers (31), lockwashers (18) and nuts (27).

2. Connect KV/microamp switch connector to P3 on universal display circuit board (14).
3. Connect ribbon cable RB1 to P1 on universal display circuit board (14).

Power Switch-Replacement of the power switch is provided in the following steps:

Removal:

1. Disconnect power switch connector from J2 on power supply circuit board (19).
2. Remove cap (2) and knob (3) from power switch (11).
3. Remove rotary shaft seal (4) from cable power switch (11).

Installation:

1. Install power switch (11) to electronic control module using rotary shaft seal (4).
2. Install knob (3) and cap (2) to cable power switch (11).
3. Connect power switch connector to J2 on power supply circuit board (19).

KV Potentiometer - Replacement of the KV potentiometer switch is provided in the following steps:

Removal:

1. Disconnect KV potentiometer connector (15) from P2 on regulator circuit board (26).
2. Remove cap (1) and knob (3) from KV potentiometer (13).
3. Remove rotary shaft seal (4) from KV potentiometer (13).

Installation:

1. Install KV potentiometer (13) to electronics control module using rotary shaft seal (4).
2. Install knob (3) and cap (1) to KV potentiometer (13).

3. Connect KV potentiometer connector (13) to P3 on regulator circuit board (26).

KV/Microamp Switch - Replacement of the KV/microamp switch is provided in the following steps:

Removal:

1. Remove universal display circuit board (14) from electronic control module. Refer to universal display circuit board replacement procedure.
2. Remove screw and bar securing KV/microamp switch (16) to panel display overlay.

Installation:

1. Install KV/microamp switch (16) using bar and screw.
2. Install universal display circuit board (14). Refer to universal display circuit board replacement procedure.

Electronic Control Module Installation

Refer to Figure 14. Installation of the electronic control module is provided in the following steps:

1. Connect multiplier harness ground wires to terminal lugs (23,25).
2. Connect solenoid connector to J6 on power supply circuit board (19).
3. Connect multiplier module connector to J1 on power supply circuit board (19).
4. Tighten captive screws (5) on control panel (7).

MULTIPLIER MODULE DISASSEMBLY

Refer to Figure 15. Removal of multiplier module is provided in the following steps:

1. Loosen captive screws (24) securing multiplier module to cabinet.
2. Disconnect connector (17) from J1 on power supply circuit board.
3. Disconnect connector from negative multiplier (3).

Multiplier Module Repair

Procedures for repair or replacement of defective components in the multiplier module are provided in the following paragraphs.

Multiplier Well - Replacement of multiplier well is provided in the following steps:

Removal:

1. Remove dust cap (12).
2. Drain insulating oil from multiplier well (4).
3. Remove retainer nut (11).
4. Loosen hose clamp (23) and remove multiplier (3) from multiplier panel.
5. Remove multiplier well (4) from multiplier (3).
6. Remove O-Rings (7,8) from multiplier well (4).

Installation:

1. Install O-Rings (7,8) to multiplier well (4).
2. Install multiplier well (4) to multiplier (3).
3. Install negative multiplier (3) to multiplier panel and tighten hose clamp (23).
3. Install retainer nut (11).
4. Fill multiplier well (4) to the top with H.V. insulating oil. Refer to Kit List for proper H.V. insulating oil.
5. Install dustcap (12).

Multiplier Module Installation

Installation of multiplier module is provided in the following steps:

1. Connect multiplier connector to negative multiplier (3).
2. Connect connector (17) to J1 on power supply circuit board.
3. Install multiplier module to cabinet and tighten captive screws (24).

PNEUMATIC OUTPUT MODULE DISASSEMBLY

Refer to Figure 16. Removal of pneumatic output module is provided in the following steps:

1. Loosen captive screws (20) on manifold silkscreen panel (15) and gain access to manifold body (7).
2. Disconnect manifold solenoid connector from J6 on power supply circuit board.
3. Tag and disconnect tubing from male connectors (6).

Pneumatic Output Module Repair

Procedures for repair or replacement of defective components in the pneumatic output module are provided in the following paragraphs. Refer to Figure 16.

Solenoid - Replacement of manifold mounted solenoid is provided in the following steps:

Removal:

1. Disconnect solenoid connector from J6 on power supply circuit board.
2. Remove screws (1) and lockwashers (2) securing solenoid (3) to pilot manifold (10).

Installation:

1. Install solenoid (3) to pilot manifold (10) using lockwashers (2) and screws (1).
2. Connect solenoid connector to J6 on power supply circuit board.

Three-way Valve Cartridge - Replacement of three-way valve cartridge is provided in the following steps:

Removal:

1. Remove solenoid (3). Refer to solenoid replacement procedure.
2. Remove screws (4) and lockwashers (2) securing pilot manifold (10) and gasket (9) to body manifold (7).

3. Remove male connectors (6) 1 and 4 from body manifold (7).
4. Using a wood dowel, push three-way valve cartridge (5) up and out of body manifold (7).
5. Remove valve spring from body manifold (7).

Installation:

1. Install valve spring in three-way valve cartridge (5).
2. Turn body manifold (7) upside down and insert three-way valve cartridge (5) in bore of manifold body (7).
3. Ensure valve spring is properly seated between three-way cartridge (5) and bottom of bore in body manifold (7).
4. Install connectors (5) 1 and 4 to manifold body (7).
5. Install gasket (9) and pilot manifold (10) to body manifold (7) using screws and lockwashers.
6. Install solenoid (3). Refer to solenoid replacement procedure.

Pneumatic Output Module Installation

Installation of pneumatic output module is provided in the following steps:

1. Connect tubing to male connectors (6). Remove tags.
2. Install manifold solenoid connector to J6 on power supply circuit board.
3. Install pneumatic output module to cabinet and tighten captive screws (20).

SECTION 8 ILLUSTRATED PARTS LIST

INTRODUCTION

The Rack Mount 100 Plus Power Unit is illustrated in Figure 11. Figure 12 illustrates the Wall Mount 100 Plus Power Unit. Figure 13 illustrates the 3 Gauge Wall Mount 100 Plus Power Unit. Figures 14 through 19 illustrate components and parts common to some or all Power Units.

The number in the **REF.** column indicates the number assigned to the part in the associated figure. The code **NS** (Not Shown) is used for parts that are not illustrated.

The letter in the **NOTE** column is a reference to an unusual circumstance for this particular part, and it is explained further at the end of the list.

The number in the **PART NO.** column indicates the Nordson part number for the part. When a part number is not listed in the column it indicates that the item is a nonsaleable part or a non-saleable subassembly of a saleable assembly.

The **DESCRIPTION** column gives the name of the part together with its dimensions and other physical properties, where appropriate. Indented parts are subgroups of a major assembly or sub-assembly. For example:

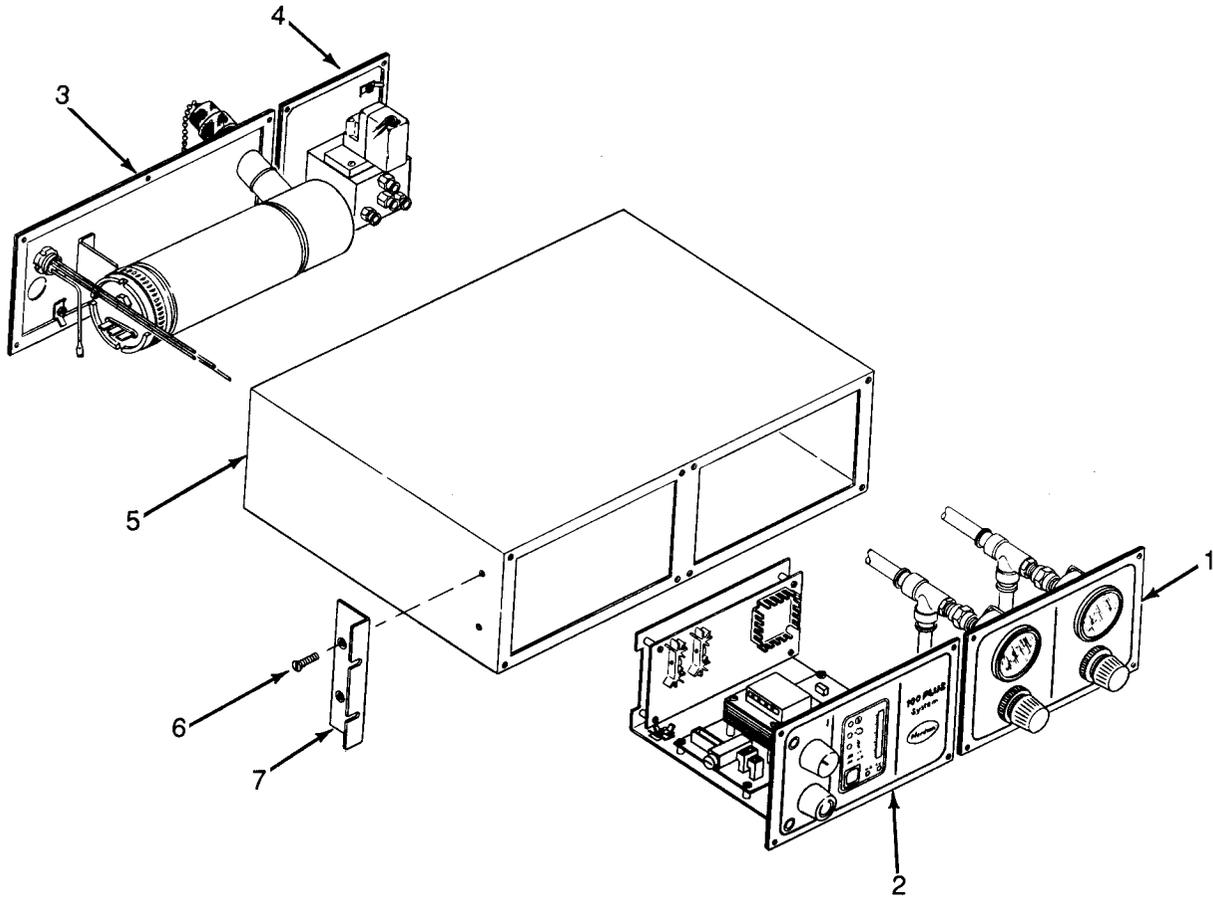
Ref.	Note	Part No.	Description	Qty.
1		249 100	Power Unit	1
2		- - - - -	• Multiplier Module	1
3		940 090	• • O-Ring, Viton	1

If you order number 1, items 2 and 3 will be included.

If you order number 2, item 3 will be included.

If you order number 3, you will receive only number 3.

The number in the **QTY.** column indicates the quantity required per unit or assembly. When the quantity is not applicable it is not listed.



PS-204

Figure 11 - Rack Mount 100 PLUS Power Unit

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
-		105 108	Negative Power Unit, 100 PLUS (Rack Mount)	1
-		124 516	Positive Power Unit, 100 PLUS (Rack Mount)	1
-		134 268	Negative Power Unit, 100 PLUS, Rack Mount, w/ Trigger Receptacle	1
-		134 267	Positive Power Unit, 100 PLUS, Rack Mount, w/ Trigger	1
1	AB	-----	• Module, Pneumatic Control	1
2	A	-----	• Module, Electronic Control	1
3	A	-----	• Module, Multiplier, Negative	1
3	A	-----	• Module, Multiplier, Positive	1
3		-----	• Module, Multiplier, Negative, w/ Trigger Receptacle	1
3		-----	• Module, Multiplier, Positive, w/ Trigger Receptacle	1
4	A	-----	• Module, Pneumatic Output	1
5	B	-----	• Cabinet, 19 Inch Rack	1
NS		107 257	• Kit, Rack Mount, 100 PLUS	1
NS		247 512	• • Oil, 7.5 mL, H.V., Insulating	2
NS		101 285	• • Cable, Power, 6.5 ft., w/o Terminals	1
NS		933 326	• • Connector, Conduit, ½ NPT	1
NS		939 122	• • Gasket, Nut	1
NS		983 121	• • Washer, Lock, Ext., #10	1
NS		981 159	• • Screw, Pan Hd., #10-32 x .500	1
6		982 286	• Screw, Flathd, Slotted, M5 x 10	4
7		248 709	• Bracket, Rack Mount	2
NS		240 674	• Tag, Ground	1
NS		271 221	• Lug, Terminal, Gnd	1
NS		983 021	• Washer, Flat	1
NS		983 401	• Washer, Lock, Split, M5	1
NS		984 702	• Nut, Hex, M5, Brass	1
NS		939 110	• Strap, Cable	1
NS		105 989	• Jumper, Gnd., 20"	1
NS		129 541	• Jumper, Gnd., 9"	1

Note (A) - See parts lists following for module components.

Note (B) - Not serviced separately.

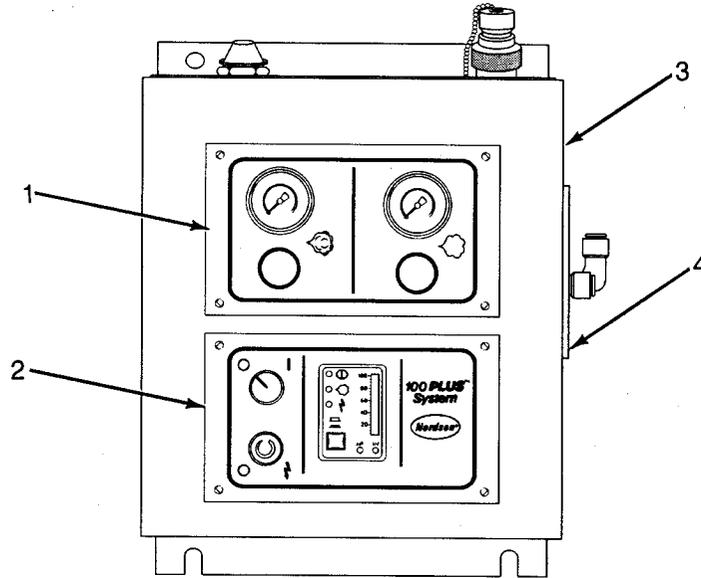
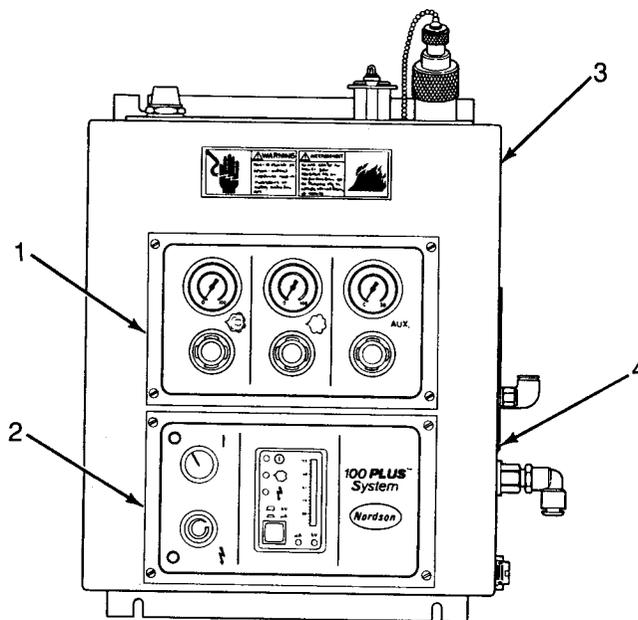


Figure 12 - Wall Mount 100 PLUS Power Unit

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
-		113 744	Negative Power Unit, 100 PLUS, Wall Mount	1
-		124 517	Positive Power Unit, 100 PLUS, Wall Mount	1
1	AB	-----	• Module, Pneumatic Control	1
2	A	105 849	• Module, Electronic Control	1
3	A	105 846	• Module, Multiplier, Negative	1
3	A	121 349	• Module, Multiplier, Positive	1
4	A	105 837	• Module, Pneumatic Output	1
NS		240 976	• Clamp, Ground W/Wire	1
NS		240 674	• Tag, Ground	1
NS		933 469	• Lug, Terminal, 90° Tab	1
NS		983 021	• Washer, Flat	1
NS		983 401	• Washer, Lock, Split, M5	1
NS		984 702	• Nut, Hex, Brass	1
NS		105 989	• Jumper, Gnd., 20"	1
NS		939 110	• Strap, Cable	1
NS		247 512	• Oil, 7.5 mL, Insulating	2
NS		115 569	• Clamp, Adj., Adh. Backed	1
NS		982 182	• Screw, Flt. Hd., M4 x 10	1

Note (A) - See parts lists following for module components.
Note (B) - Not serviced separately.



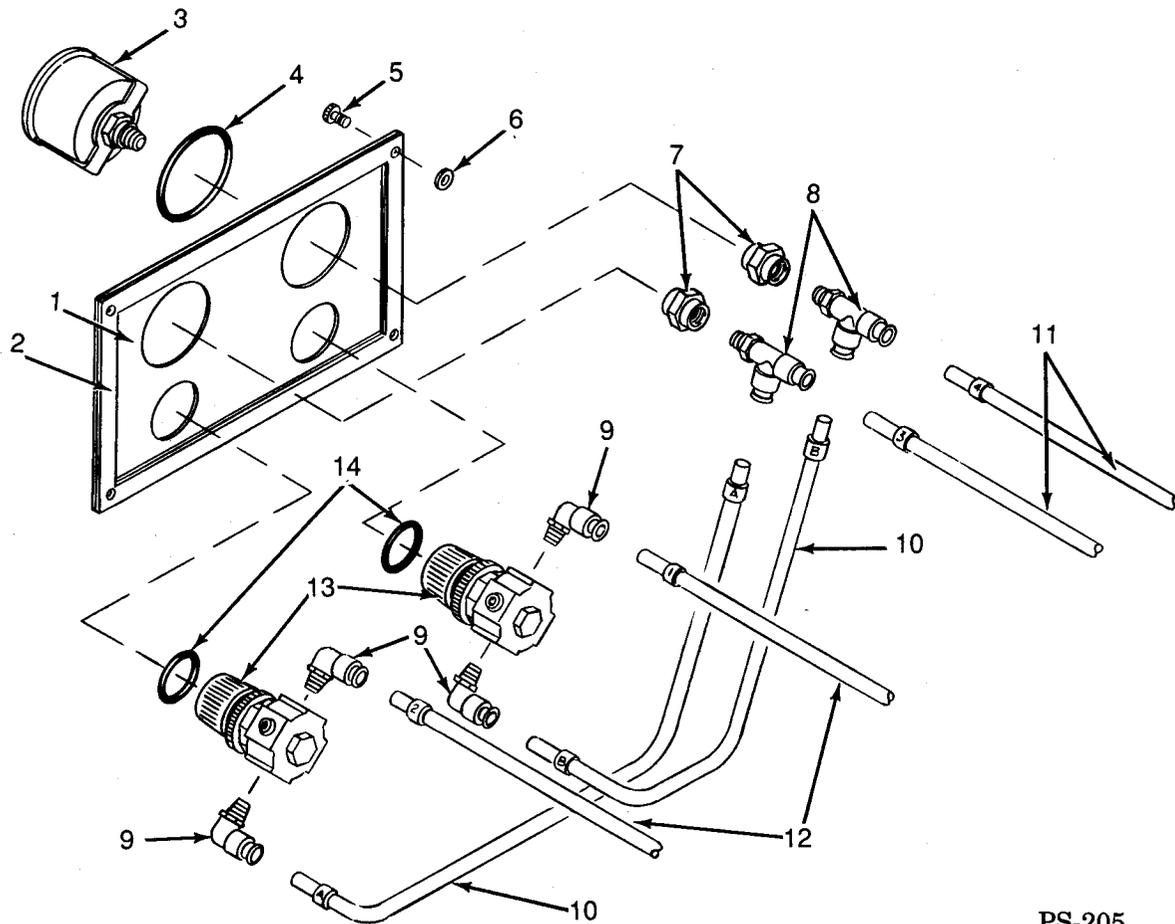
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Figure 13 - Wall Mount 100 PLUS Power Unit (3 Gauge)

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
-		134 270	Power Unit, Wall, 3 Gauge, Neg.	1
-		134 269	Power Unit, Wall, 3 Gauge, Pos.	1
1	A	117 056	• Module, Pneumatic Control, 3 Gauge	1
2	A	105 849	• Module, Electronic Control	1
3	A	134 266	• Module, Multiplier, w/ Trigger, Neg.	1
3	A	134 265	• Module, Multiplier, w/ Trigger, Pos.	1
4	A	105 837	• Module, Pneumatic Output	1
NS		240 976	• Clamp, Ground, w/ Wire	1
NS		933 469	• Lug, Terminal, 90°, Tag	1
NS		983 021	• Washer, Flat, .203 x .406	1
NS		983 401	• Washer, Lock, Split, M5, ZN	1
NS		984 702	• Nut, Hex, M5, Brass	1
NS		105 989	• Jumper, GND, 20"	1
NS		939 110	• Strap, Cable	1
NS		900 297	• Oil, H.V., Insulating	ASR
NS		115 569	• Clamp, Adjustable, Adhesive-Backed	1
NS		982 182	• Screw, Flat Hd., SLT, M4 x 10, ZN	1

NOTE (A)- See parts list following for module components.



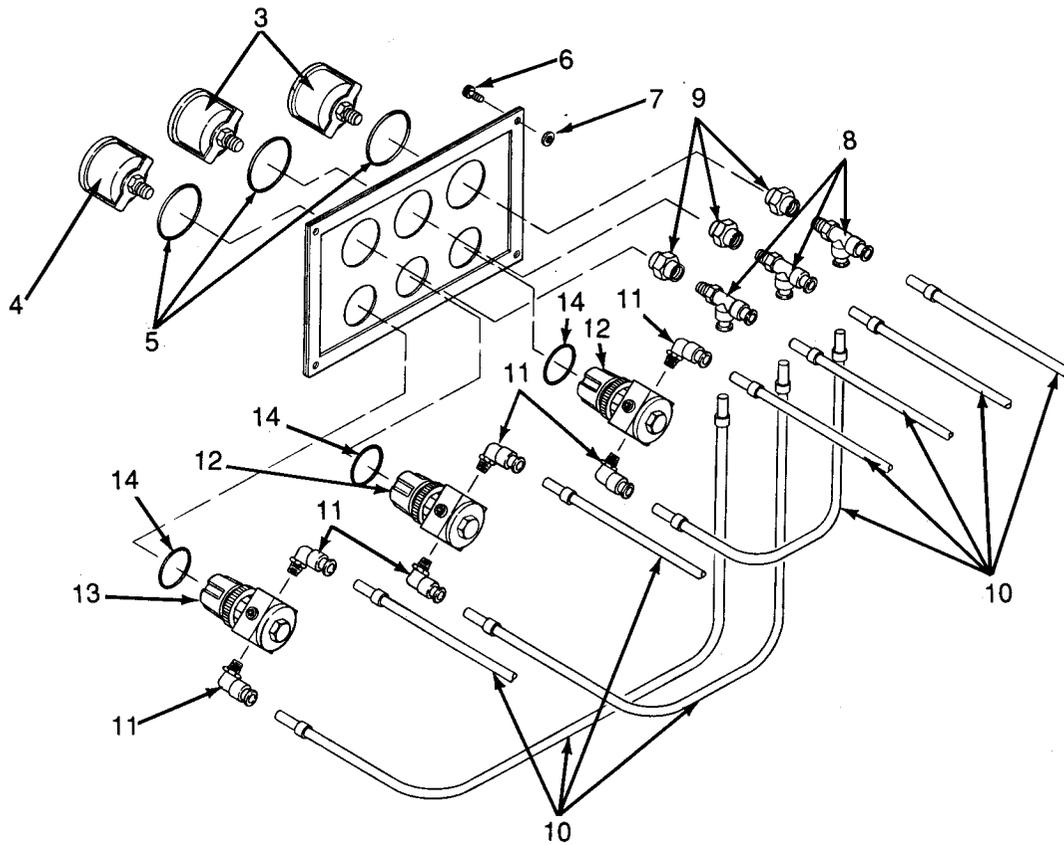
PS-205

Figure 14 - Pneumatic Control Module

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
		-----	Module, Pneumatic Control	1
1		248 712	• Panel, Silkscreen, Gauge	1
2		248 711	• Gasket, Panel, Front	1
3		901 228	• Gauge, Air, 0-100 PSI	2
4		941 300	• O-Ring, Buna-N, 1.625 x 1.813 x .094	2
5		982 284	• Screw, Captive, M5	4
6		940 073	• O-ring, Viton, .156 x .281 x .063	4
7		973 572	• Coupling, Pipe, Hyd, Sae, 1/8 NPT	2
8		973 278	• Tee, Male Run, 1/4 Tube x 1/8 NPT	2
9		972 119	• Elbow, 1/4 Tube x 1/8 NPT	4
10	A	900 730	• Tubing, Poly, 1/4 x 4.75 In. (121mm)	ASR
11	A	900 730	• Tubing, Poly, 1/4 x 14 In. (356mm)	ASR
12	A	900 730	• Tubing, Poly, 1/4 x 16 In. (466mm)	ASR
13		901 478	• Regulator, Air 1/8 NPT	2
14		941 230	• O-ring, Viton, 1.188 x 1.375 x .093	2

Note (A) - Part number is for bulk tubing. Order quantity listed in **Description** column.



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Figure 15 - Pneumatic Control Module (3 Gauge)

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
-		-----	Module, Pneumatic Control, 3-Gauge	1
1		117 057	• Panel, Silkscreen, 3-Gauge	1
2		248 711	• Gasket, Panel, Front	3
3		901 260	• Gauge, Air, 0-100 psi	2
4		901 259	• Gauge, Air, 0-30 psi	1
5		940 065	• O-ring, 1.5 I.D. x 1.62 O.D.	3
6		982 284	• Screw, Captive, M5	4
7		940 073	• O-ring, Viton®, .156 x .281 x .063	4
8		973 278	• Tee, Male Run, ¼ x ⅛ NPT	3
9		973 572	• Coupling, Pipe, Hyd., SAE, ⅛	3
10	A	900 730	• Tubing, Polyurethane, ¼	ASR
11		971 266	• Elbow, Male, ¼ x ¼ NPT	4
12		901 444	• Regulator, Air, 5 - 125 psi, ¼ NPT	2
13		901 446	• Regulator, Air, 0 - 30 psi	1
14		941 230	• O-ring, Viton, 1.188 x 1.375 x .093	3

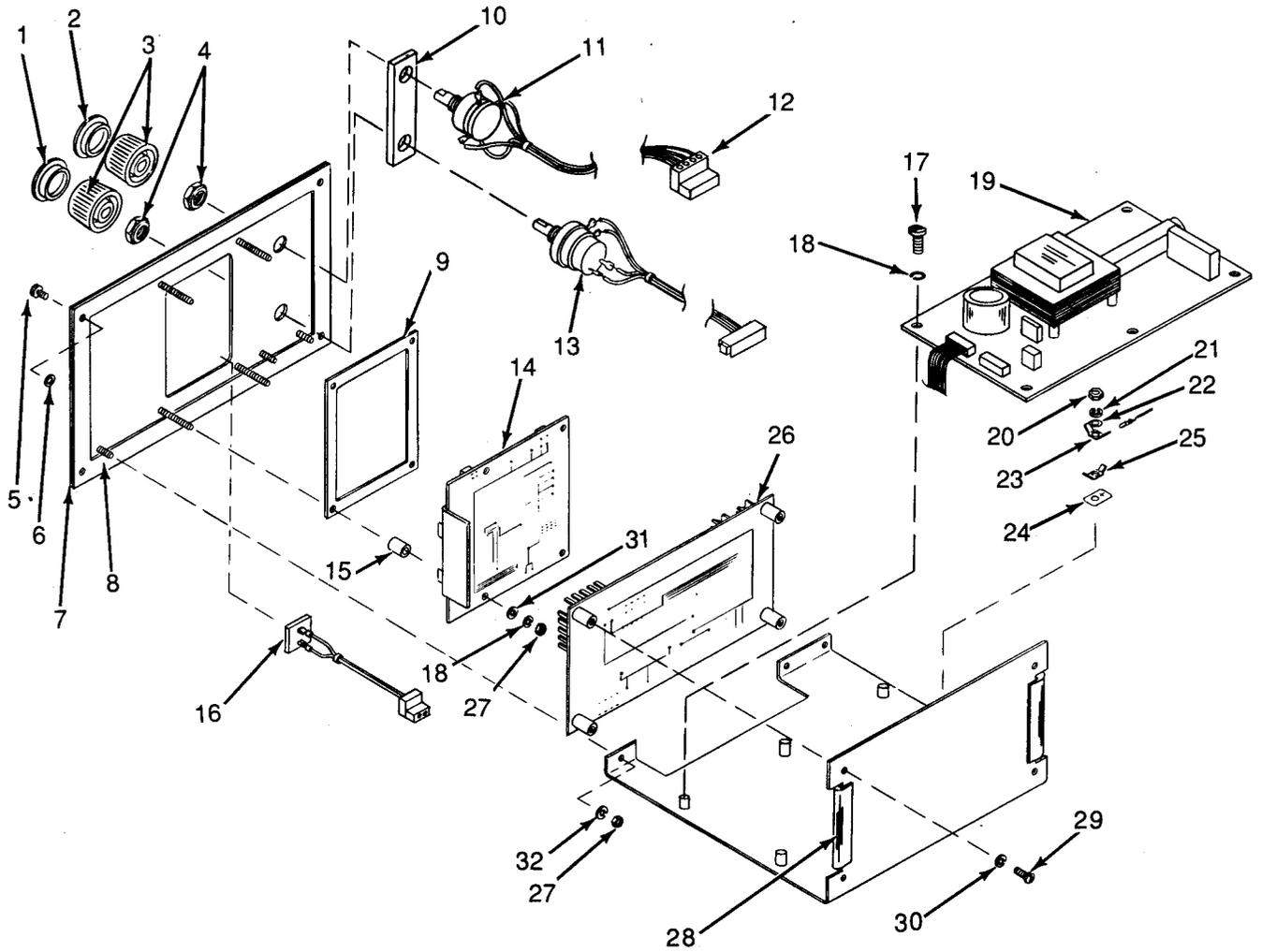
Note (A) - Part number is for bulk tubing. Order quantity listed in **Description** column.

Parts List For Electronic Control Module - Refer to Figure 16

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
		105 849	Module, Electronic Control	1
1		248 696	• Cap, Flat, W/Arrow	1
2		248 695	• Cap, Flat, W/Line	1
3		248 694	• Knob, Collet, 28mm, 1/4 Shaft	2
4		248 741	• Seal, Shaft, Rotary	2
5		982 284	• Screw, Captive, M5 x 0.8	4
6		940 073	• O-Ring, Viton, .156 x .281	4
7		248 726	• Panel, Silkscreen, Control	1
8		248 711	• Gasket, Panel, Front	1
9		248 802	• Gasket, Panel, Display	1
10		248 684	• Spacer	1
11		249 254	• Cable, Switch, Power	1
12		933 342	• • Connector, Plug, 4 Pin	1
13		248 808	• Potentiometer, kV, Wired	1
14		248 968	• Board, Circuit Universal Display	1
15		248 705	• Spacer, Nylon, #8 Nom. x .500	4
16		248 811	• Switch, μ A/kV, Wired	1
17		982 092	• Screw, Panhead, M4 x 10	6
18		983 416	• Lockwasher, Int, M4, Zn	10
19		105 844	• Circuit Board, Power Supply	1
20		984 702	• Nut, Hex, M5 x 0.8, Brass	1
21		983 401	• Lockwasher, Split, M5	1
22		983 021	• Washer, Flat, Brass	1
23		271 221	• Lug, Terminal, Gnd	1
24		240 674	• Tag, Ground	1
25		933 469	• Lug, Terminal, 90 Deg	1
26		248 969	• Board, Circuit Regulator	1
27		984 715	• Nut, Hex, M4 x 0.7 Steel, Zn	7
28	A	246 470	• Trim, .062 Thk Panel, PVC	ASR
29		981 014	• Screw, Panhd, #4-40 x .25 Lg.	4
30		983 526	• Lockwasher, Split, #4	4
31		248 706	• Washer, Nylon, .188 x .375 x .062	4
32		983 403	• Lockwasher, Split, M4	3

Note (A) - Part number is for bulk tubing. Order quantity listed in **Description** column.



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Figure 16 - Electronic Control Module

Parts Lists For Multiplier Module - Refer To Figure 17

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

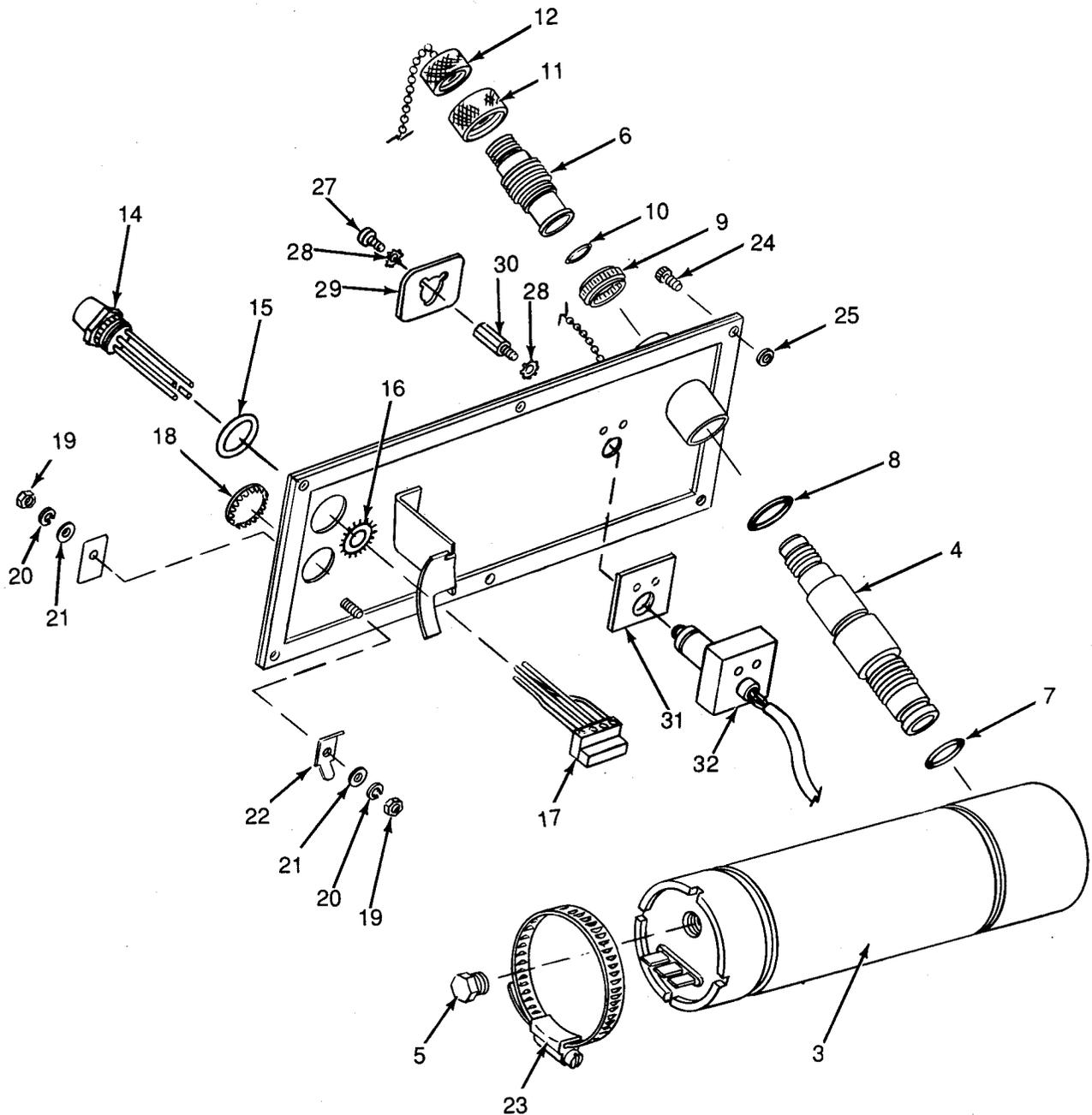
Ref.	Note	Part No.	Description	Qty.
		105 846	Module, Negative Multiplier	1
		121 349	Module, Positive Multiplier	1
		134 265	Module, Multiplier, w/ Trigger, Positive	1
		134 266	Module, Multiplier, w/ Trigger, Negative	1
1	A	-----	• Panel, Multiplier	1
2		248 714	• Gasket, Multiplier Panel	1
3	B	-----	• Multiplier, Negative	1
3	D	-----	• Multiplier, Positive	1
4		248 717	• • Well, Multiplier	1
5		244 607	• • Plug, W/O-Ring	1
NS		945 014	• • • O-Ring, Buna-N, 5/16 O.D.	1
6		248 736	• • Adapter, Cable	1
7		940 181	• • O-Ring, Viton, .75 x .875 x .062	4
8		941 172	• • O-Ring, Viton, .813 x 1.00 x .063	1
9		248 847	• • Ring, Tolerance, 1.00 Dia	1
10		940 141	• • O-Ring, Viton, .050 x .625 x .063	1
11		248 729	• Nut Retainer	1
12		248 699	• Cap, Dust, W/Chain	1
13		981 012	• Screw, Rd. Hd, Self-tap, #2-32 x .187	1
14		933 285	• Receptacle, 4 Wire	1
15		939 122	• Gasket, Nut	1
16		984 526	• Nut, Lock, Conduit	1
17		933 343	• Connector, Plug, 5 Pin	1
18		900 809	• Cap, Flush, 7/8 Dia.	1
19		984 702	• Nut, Hex, M5, Brass	2
20		983 401	• Washer, Lock, Split, M5, Zn Pl	2
21		983 021	• Washer, Flat, .203 x .406 x .040	2
22		271 221	• Lug, Terminal, Gnd	1
23		970 970	• Clamp, Hose, No. 52	1
24		982 284	• Screw, Captive, M5	6
25		940 073	• O-Ring, Viton, .156 x .281 x .063	6
26		240 674	• Tag, Ground	2
27	C	982 000	• Scew, Pan Hd., Slit, M5 x 10, ZN	2
28	C	983 422	• Washer, Lock, Ext, M5, ZN	4
29	C	246 843	• Bracket, Jumper	1
30	C	246 842	• Standoff, Bracket	2
NS	C	245 857	• Jumper	1
31	C	245 695	• Gasket	1
32	C	134 263	• Trigger Receptacle	1

Note (A) - Not serviced separately.

Note (B) - Order 106 430 Kit, Multiplier Replacement.

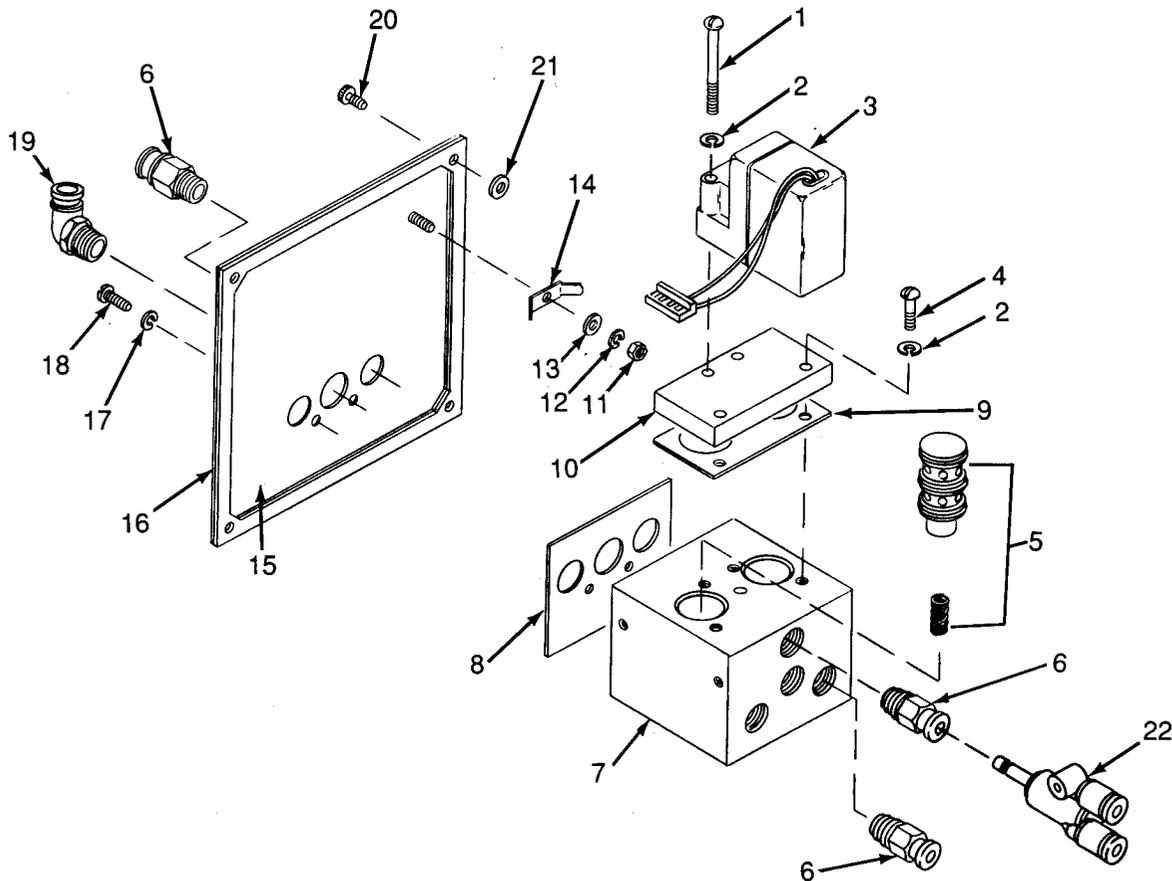
Note (C) - Used on Three-gauge Power Supply (w/ Trigger) only.

Note (D) - Order 124 452 Kit, Positive Multiplier Replacement.



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Figure 17 - Multiplier Module



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Figure 18 - Pneumatic Output Module

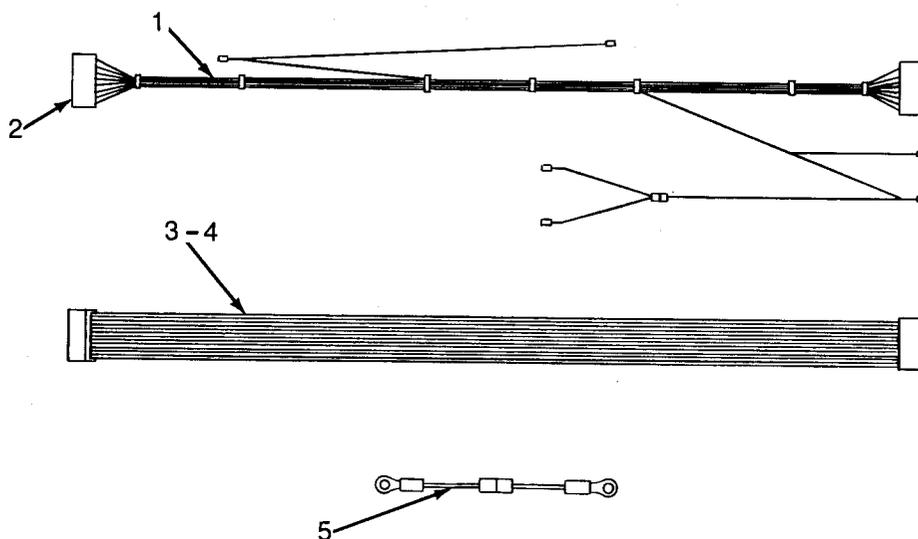
Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
-	-	-----	Module, Pneumatic Output	1
1		982 285	• Screw, Ph, Slt, M4 x 40 Zn	2
2		983 403	• Lockwasher, Split, M4, Zn	4
3		105 839	• Solenoid, w/2 Pin Connector	1
4		982 069	• Screw, Ph, Slt, M4 x 16	2
5		248 716	• Valve, 3-way Cartridge	2
6		972 716	• Connector, Male, 1/4 x 1/8 NPT	6
7		248 728	• Manifold, Body	1
8		248 700	• Gasket, Manifold	1
9		248 701	• Gasket, Pilot Manifold	1
10		248 715	• Manifold, Pilot	1
11		984 702	• Nut, Hex, M5, Brass	1
12		983 401	• Washer, Lock, Split, M5, Zn Pl	1
13		983 021	• Washer, Flat, .203 x .406 x .040	1
14		933 469	• Lug, Terminal, 90, Tab	1

Parts List Continued On Following Page

Ref.	Note	Part No.	Description	Qty.
15		248 719	• Panel, Silkscreen, Manifold	1
16		248 713	• Gasket, Panel, Manifold	1
17		983 422	• Lockwasher, Ext, M5, Zn	2
18		982 000	• Screw, Pan Hd. Slit, M5 x 10	2
19		972 183	• Elbow, 3/8 x 1/4 NPT	1
20		982 284	• Screw, Captive, M5	4
21		940 073	• O-Ring, Viton, .156 x .281 x .063	4
22	A	972 707	• Connector, Plug-in, Y	1
NS		240 674	• Tag, Ground	1

Note (A) - Three-gauge power supply only.



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Figure 19 - Internal Cables And Harnesses

Note: Names of parts included in an assembly are indented after each assembly or sub-assembly.

Ref.	Note	Part No.	Description	Qty.
1		248 805	Harness, Multiplier	1
2		248 815	• Connector, 10 Ckt, Single-Sided	4
3		248 804	Cable, Ribbon, 7 Ckt	1
4		105 835	Cable, Ribbon, 8 Ckt	1
5	A	118 193	Jumper, Wire, GND, Gauge	1

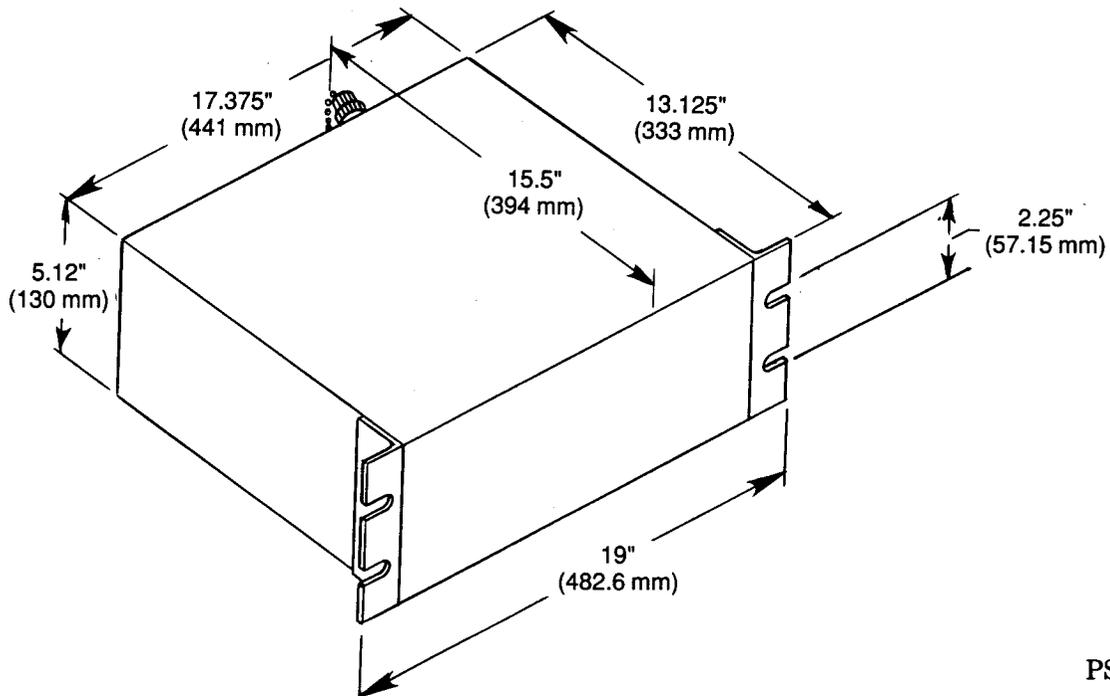
Note (A) - Three-gauge power supply only.

KIT LIST

Ref.	Note	Part No.	Description	Qty.
-		106 430	Kit, Multiplier, Replacement	1
-		247 512	Oil, Insulating, 7.5 mL	2
-		124 452	Service Kit, 100 PLUS Multiplier, Positive	1

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SECTION 9 TECHNICAL DATA



PS-210

Figure 20 - Rack Mount Cabinet Dimensions

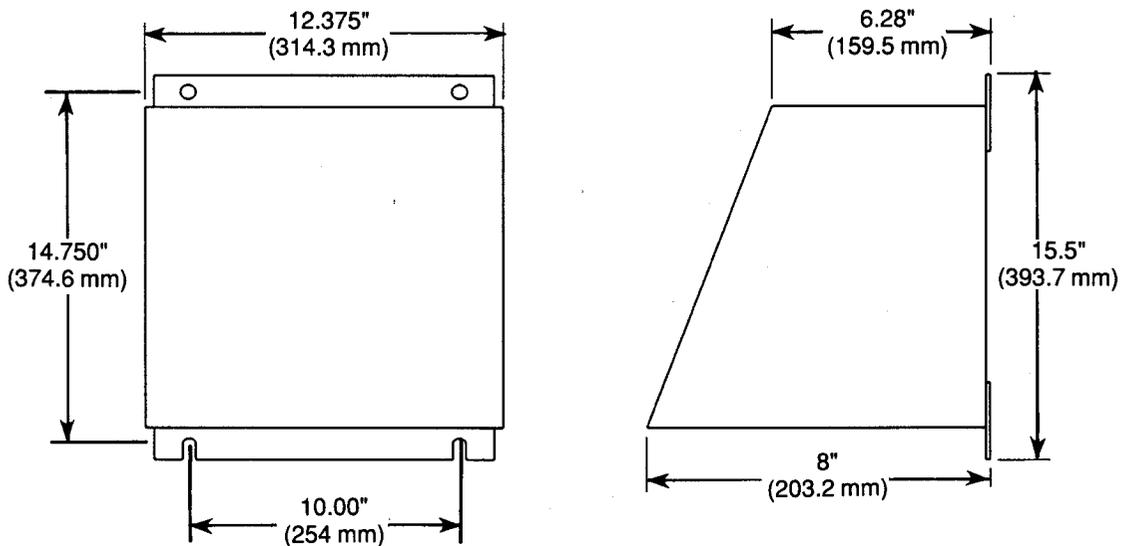


Figure 21 - Wall Mount Cabinet Dimensions

ELECTRICAL

Input:

120 or 240VAC
+/-10% @ 50/60 HZ.

Output:

30-100KV DC

Short Circuit

Output Current:

125 Microamperes (125 μ A)

AIR INPUT

Minimum:

60 PSI (4.2kg/sq.cm) (414kPa)

Maximum:

100 PSI (7.0kg/sq.cm) (689 kPa)

AVERAGE OPERATING RATES

100 PLUS POWER UNIT-

Flow Rate:

40 PSI (2.8kg/sq.cm) (276 kPa)

Atomizing Rate:

40 PSI (2.8kg/sq.cm) (276kPa)

100 PLUS POWDER PUMP

Flow Rate:

30 PSI (1.4 bar)

Atomizing Rate:

20 PSI (2.1 bar)

FILTRATION

Air must be clean and dry. Use of a regenerative dessicant or refrigerated air dryer capable of producing a 38° F (3.4° C) or lower dewpoint at 100 PSI (689kPa), and a filter system with prefilters and coalescent type filters capable of removing oil, water and dirt in the sub-micron range is recommended.

