

**100 PLUS™ Master  
Control Unit**

Part 104 360B

# Previous Generation



NORDSON CORPORATION • AMHERST, OHIO • USA

# Previous Generation

Nordson Corporation welcomes requests for information, comments and inquiries about its products.

Address all correspondence to

Nordson Corporation  
555 Jackson Street  
Amherst, OH 44001

## Notice

This is a Nordson Corporation publication which is protected by copyright. Original copyright date 1990. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Nordson Corporation. The information contained in this publication is subject to change without notice.

## Trademarks

Blue Box, ChromaFlex, CleanSleeve, CleanSpray, Control Coat, Cross-Cut, Easy Coat, Econo-Coat, Excel 2000, Flow Sentry, Isocoil, Isocore, Iso-Flo, Nordson, the Nordson logo, PRX, Pro-Flo, RBX, Ready-Coat, Rhino, Select Coat, Select Cure, Shur-Lok, Smart Spray, System Sentry, Thread Coat, Tribomatic, and Versa-Spray are registered trademarks of Nordson Corporation.

100 PLUS, CPX, CanWorks, Excel 2000, PowderGrid, Pulse Spray, SCF, Versa-Coat, Versa Screen, Package of Values, and Swirl Coat are trademarks of Nordson Corporation.

Viton is a registered trademark of E.I. DuPont de Nemours & Co.

# Table of Contents

<b><i>Safety</i></b>	1. Introduction . . . . .	1-1
	2. Safety Symbols . . . . .	1-1
	3. Qualified Personnel . . . . .	1-2
	4. Intended Use . . . . .	1-3
	5. Installation . . . . .	1-3
	6. Operation . . . . .	1-5
	7. Less-Obvious Dangers . . . . .	1-7
	8. Action in the Event of a System or Component Malfunction . . . . .	1-7
	9. Maintenance and Repair . . . . .	1-7
	10. Disposal . . . . .	1-9
<b><i>Description</i></b>	1. Introduction . . . . .	2-1
	2. Theory of Operation . . . . .	2-3
<b><i>Installation</i></b>	1. Introduction . . . . .	3-1
	2. Installation . . . . .	3-4
	Power Unit Cables . . . . .	3-4
	Wiring Input Power to Master Control . . . . .	3-6
	Pneumatics . . . . .	3-8
	Electrostatic Cable . . . . .	3-8
	Cabinet Grounds and Optional Interlocks . . . . .	3-8
	3. Options . . . . .	3-9
	Installing Multiple Master Control Units . . . . .	3-9
	Auxiliary 12–24 Vdc Power Supply . . . . .	3-10

## **Operation**

1. Introduction .....	4-1
Initial System Startup .....	4-1
2. Daily Startup .....	4-2
Before Startup .....	4-2
Startup .....	4-2
During Operation .....	4-2
Shutdown .....	4-2
3. Maintenance .....	4-3

## **Troubleshooting**

1. Introduction .....	5-1
2. Troubleshooting Chart .....	5-2
3. Electrical Schematic .....	5-5

## **Repair**

1. Removing Modules .....	6-1
2. Repair .....	6-2
Distribution Module .....	6-2
Disassembly .....	6-2
Assembly .....	6-2
Power/Logic Module .....	6-3
Disassembly .....	6-3
Assembly .....	6-3
3. Installing the Modules .....	6-3

## **Parts**

1. Introduction .....	7-1
Using the Illustrated Parts List .....	7-1
2. Master Control Unit .....	7-2
3. Power/Logic Module .....	7-4
4. Power Distribution Module .....	7-6
5. Pipe Rack I/O Module .....	7-8
6. Optional Parts .....	7-10
100 PLUS Mounting Kit .....	7-10
Cabinet Parts .....	7-10

**Specifications**

Dimensions ..... 8-1

Inputs ..... 8-1

    Electrical ..... 8-1

    Air ..... 8-1

Outputs ..... 8-1

    Line Voltage ..... 8-1

    Air ..... 8-1

Auxiliary Power ..... 8-1

Master Control Dimensions ..... 8-2

Previous  
Generation

# Previous Generation

# Previous Generation

# Previous Generation



# Section 1

## Safety

---

### 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.

Previous Generation

---

## 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.

Previous  
Generation

---

**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.

Previous  
Generation

---

**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 standard ohmmeter. 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.

Previous  
Generation

# Previous Generation

***Description***

---

# Previous Generation

# Previous Generation

## Section 2

### Description

#### 1. Introduction

See Figure 2-1. The 100 PLUS master control unit is designed for fusion-bond coating applications in the pipe and re-bar industries. One 100 PLUS master control unit can control up to 16 electrostatic power units.

The master control unit has these features:

- switched terminal connectors for 12 or 24 Vdc auxiliary power
- unswitched connectors for 120 or 240 Vdc single-phase power
- auxiliary-free contacts to connect a secondary master control unit to the primary master control unit — for systems that require more than 16 power units
- internal power distribution circuit board DIP switches for triggering electrostatic power units with an external relay

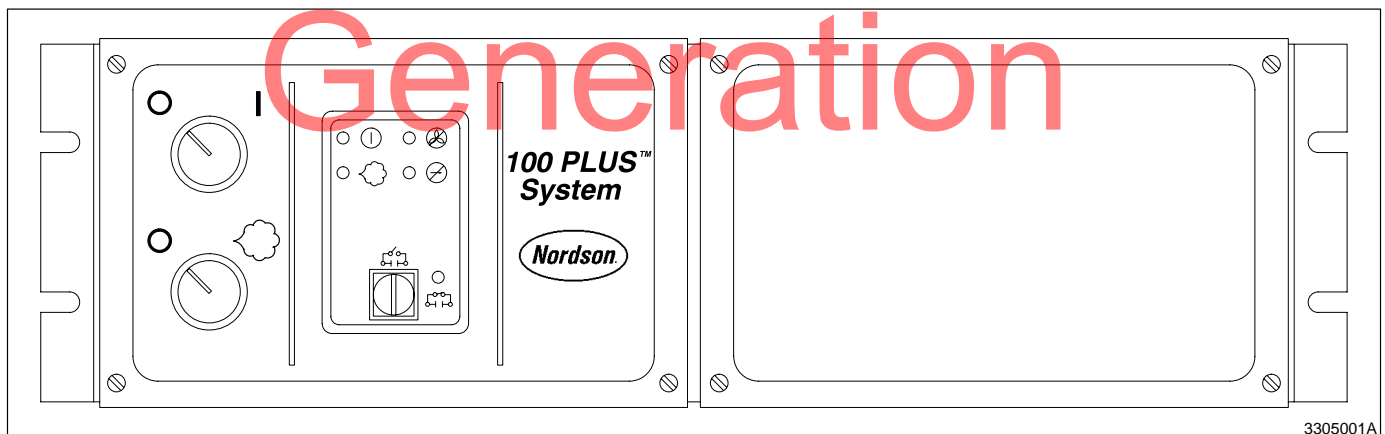


Fig. 2-1 100 PLUS master control unit

## 1. Introduction (contd.)

See Figure 2-2. The control panel has LED indicators for

- Air On (1)
- Power On (2)
- Booth Fan Off (3)
- Conveyor Off (4)
- Conveyor Interlock bypass (5)

You can connect external booth fan and conveyor electrical interlocks to the master control unit.

You can install one master control unit and up to 10 electrostatic power units into a standard 19-inch equipment cabinet.

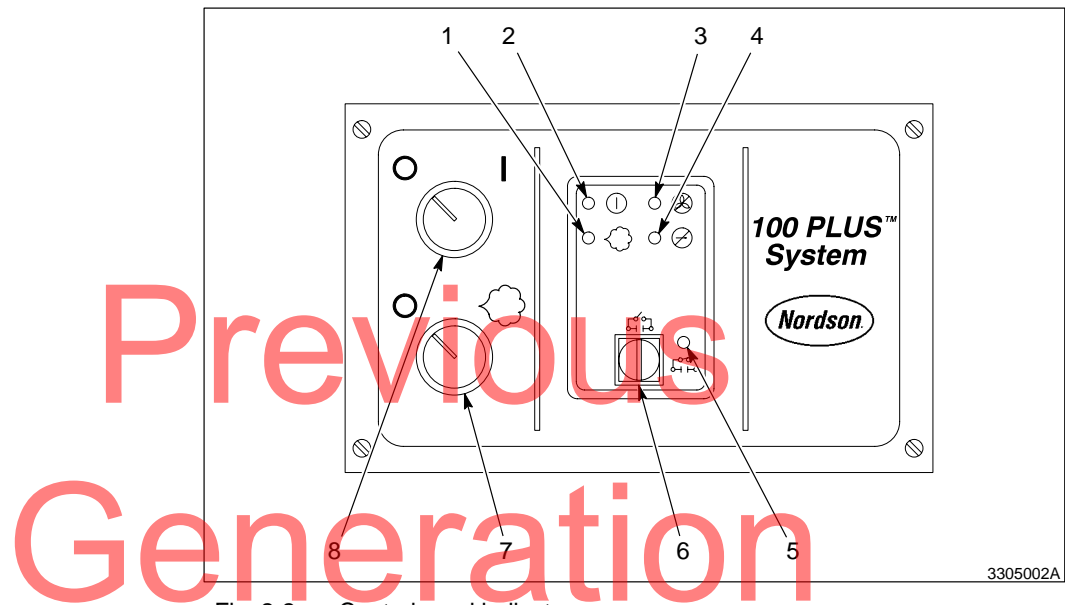


Fig. 2-2 Controls and indicators

- |                      |                                  |
|----------------------|----------------------------------|
| 1. Air on LED        | 5. Conveyor interlock bypass LED |
| 2. Power on LED      | 6. Bypass keyswitch              |
| 3. Booth fan off LED | 7. Air switch                    |
| 4. Conveyor off LED  | 8. Power Switch                  |

---

## 2. Theory of Operation

---

See Figure 2-2. The master control unit operates on

- 120 or 240 Vac, single-phase power at 50–60 Hz
- air pressure of 4.14–7 bar (60–100 psi).

Before power is sent to the electrostatic power units, the fan and conveyor interlock circuits must be complete. When the power switch (8) is on, the green power on indicator (2) lights. The booth fan off (3) and conveyor off (4) indicator lights stay off.

When the air switch (7) is on, the green air on indicator (1) lights. A solenoid valve energizes and allows air pressure to activate an external pilot operated air valve. The air valve opens and allows system air to flow to the power units through a manifold. The electrostatic power units and any external components controlled by the master control unit(s) are now activated.

If the fan or conveyor shuts down or fails,

- the interlock circuitry opens and the internal relays shut off power to the primary and secondary master control units and all equipment controlled by the primary master control unit
- the red warning indicator (3 or 4) for that interlock lights

The conveyor bypass key switch (6) can be used to bypass the conveyor interlock and operate the system with the conveyor shut down. When the bypass is activated, both the red CONVEYOR OFF indicator (4) and the red BYPASS indicator (5) will light.

Previous  
Generation

# Previous Generation



# Previous Generation

# Previous Generation

## Section 3 Installation



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

### 1. Introduction

Figure 3-1 illustrates a typical system. Figure 3-2 illustrates a typical double-cabinet air line and cable diagram. Read the following before you install the master control unit:

- You can install the master control unit in a standard 19-inch cabinet, along with power units and an air manifold module. The cabinet accepts 19-inch wide panels on a frame, tapped with #10-32 holes on EIA spacing.
- If you use 2 or more cabinets in a system, remove the side panels from the mating sides and bolt the cabinets together.
- Install at least one set of horizontal support brackets under the lowest power unit to support the weight of the units.
- Use 18 AWG or heavier wire for the input power.

Previous  
Generation

1. Introduction (contd.)

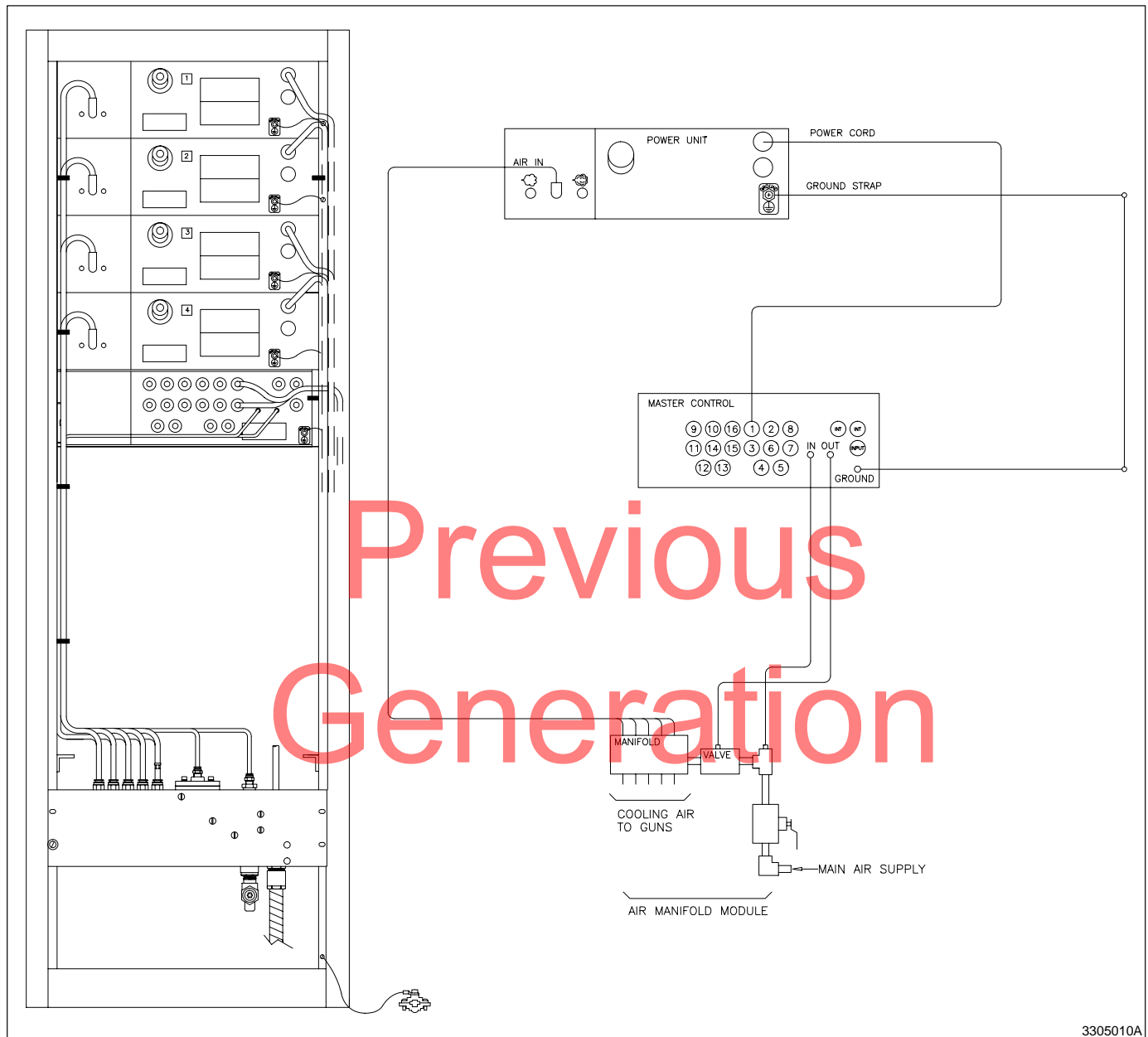
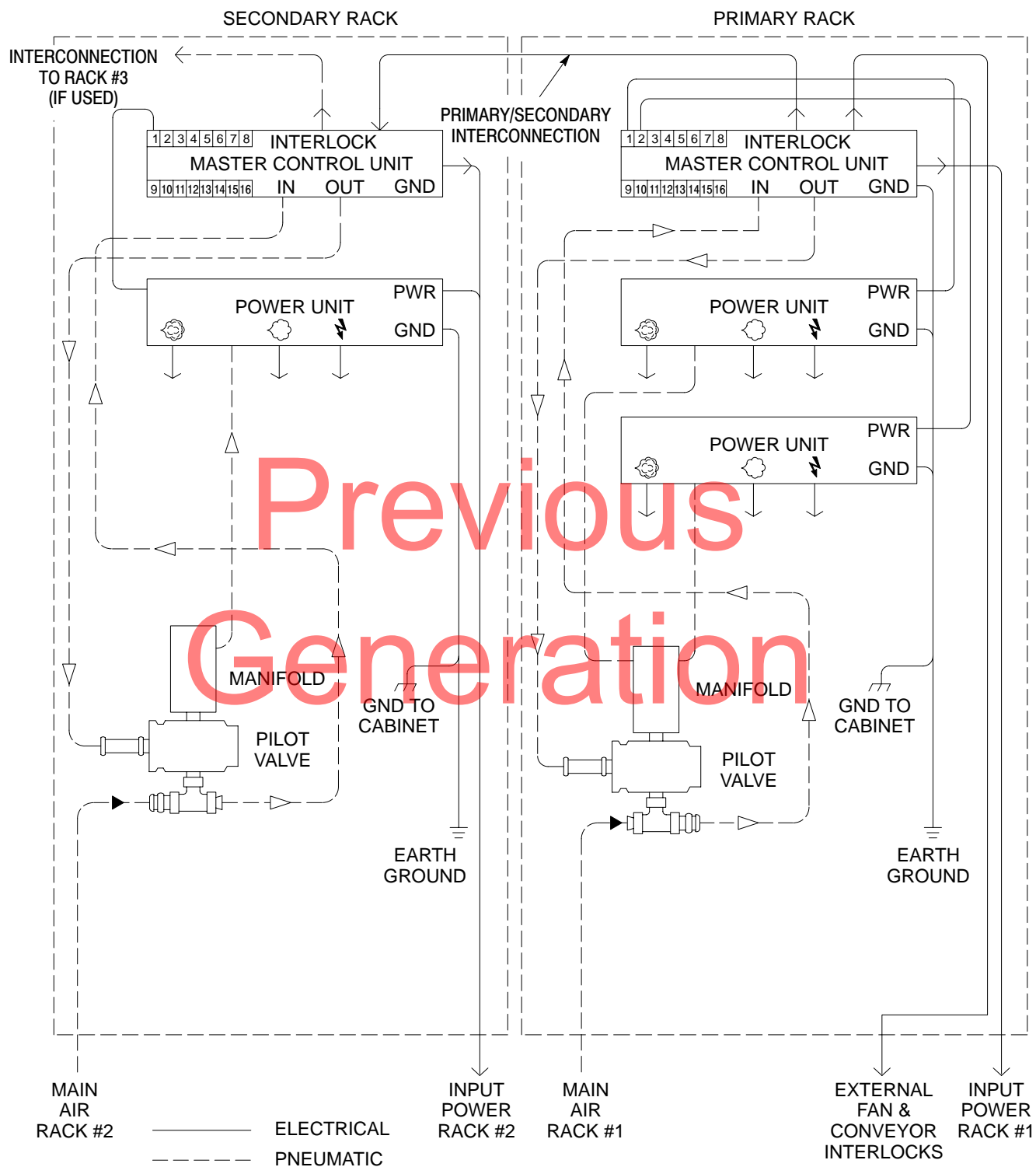


Fig. 3-1 Typical 19-inch equipment cabinet installation

# 1. Introduction (contd.)



3305012A

Fig. 3-2 Typical double-cabinet air line and cable diagram

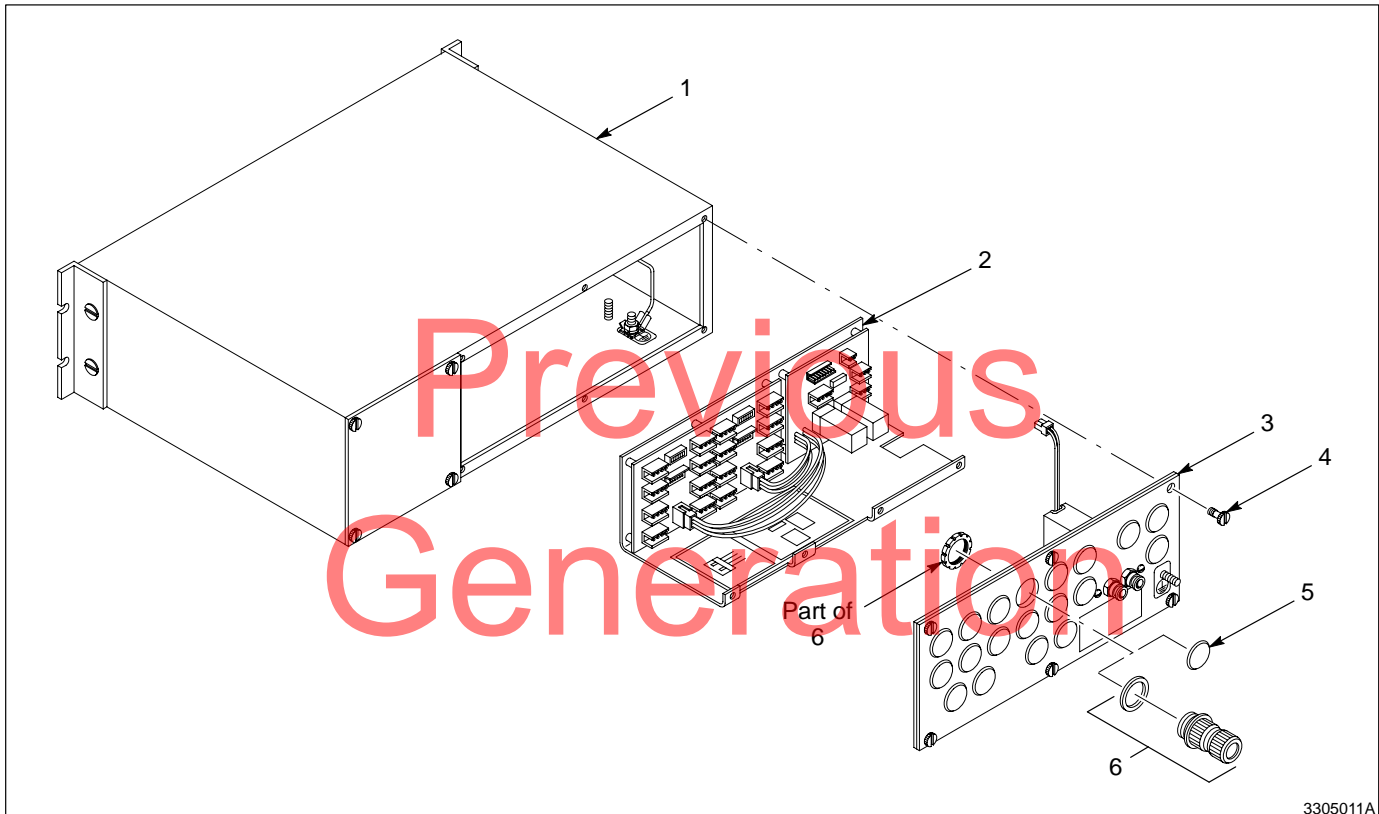
## 2. Installation

Master control unit installation is provided in the following paragraphs.

### Power Unit Cables

Before mounting the master control unit in the cabinet, connect the power unit cables to the power distribution module:

1. See Figure 3-3. Remove the screws (4) securing the panel (3) to the cabinet (1). Slide the power distribution module (2) out of the cabinet.
2. Starting with knockout 1, remove the plug (5). Install a straight watertight conduit connector (6) into each knockout that you use.



3305011A

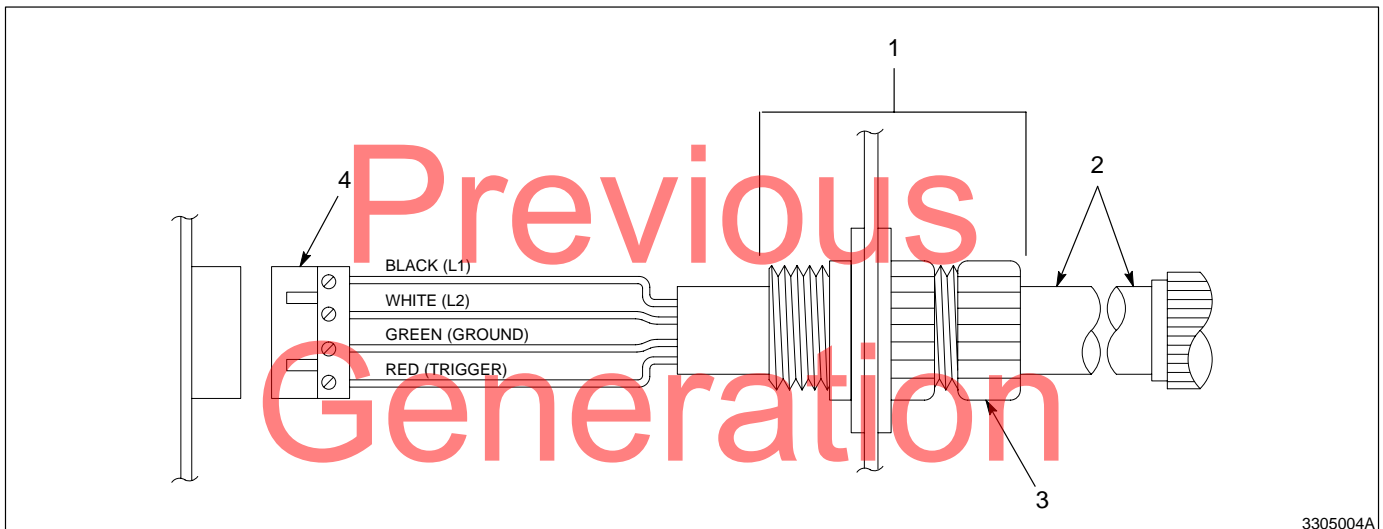
Fig. 3-3 Power distribution module

- |                              |          |                            |
|------------------------------|----------|----------------------------|
| 1. Cabinet                   | 3. Panel | 5. Plug (position 1 shown) |
| 2. Power distribution module | 4. Screw | 6. Conduit connector       |

**Power Unit Cables** (contd.)

**NOTE:** The cables are 2 m (6.5 ft) long. You can shorten the cables as necessary for ease of installation and routing.

3. See Figure 3-4. Loosen the packing gland nut (3). Insert each power unit cable through a conduit connector (1). Allow enough slack for cable connections. Tighten the packing gland nut.
4. Connect the cable leads to the connectors (4) as illustrated.
5. See Figure 3-5. Plug each connector into the power distribution circuit board in this manner:
  - Power unit 1 to connector P1, power unit 2 to connector P2, power unit 3 to connector P3, and so forth.
6. Write the knockout numbers on the receptacle end of power the cables.



3305004A

Fig. 3-4 Typical power unit cable connection

- |                      |                      |              |
|----------------------|----------------------|--------------|
| 1. Conduit connector | 3. Packing gland nut | 4. Connector |
| 2. Power unit cable  |                      |              |

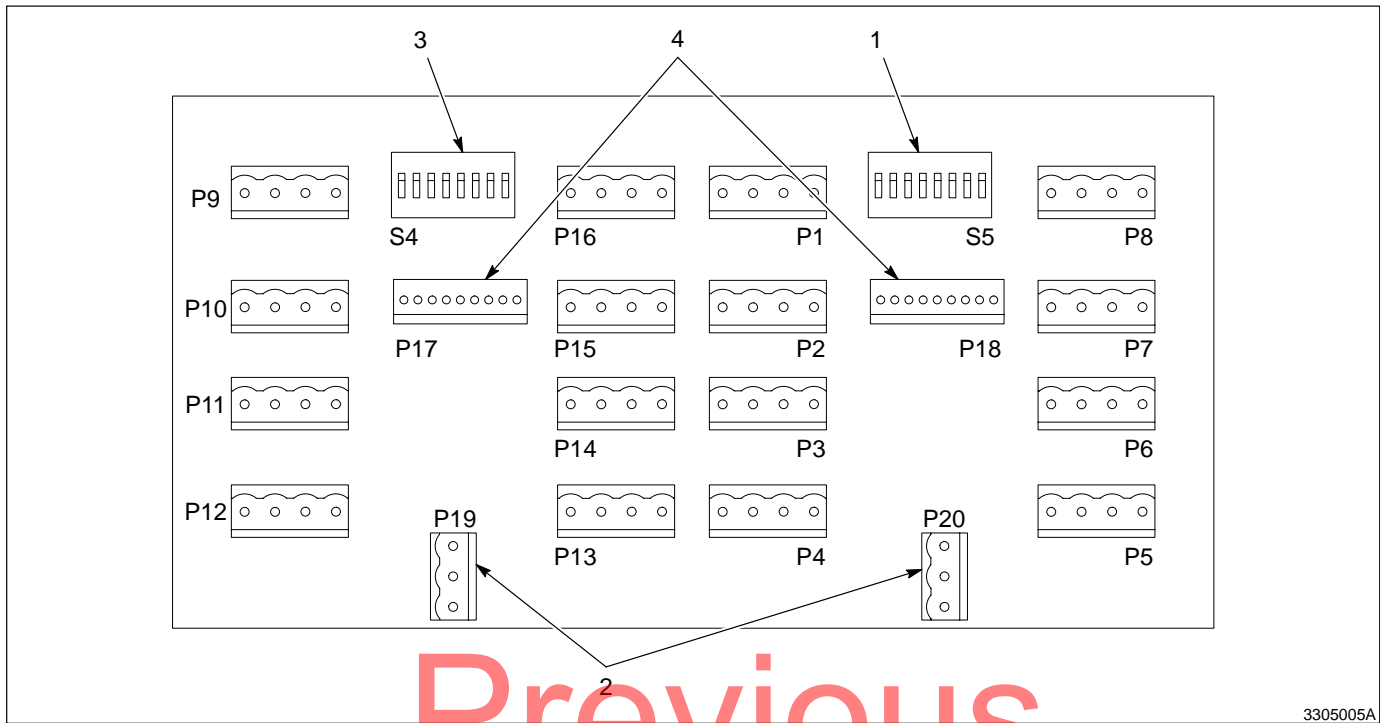
**Power Unit Cables** (contd.)

Fig. 3-5 Distribution board pin connector locations

1. Trigger DIP switch S5  
 2. Input Power  
 3. Trigger DIP switch S4  
 4. External trigger connections

**Wiring Input Power to Master Control**

Input power must be 115 Vac or 230 Vac nominal, single phase, at 50/60 Hz.

**NOTE:** Omit these procedures if you have a pre-wired rack system.

1. See Figure 3-3. Remove the screws securing the power distribution module to the master control cabinet. Slide the module out of the cabinet.
2. Route the input power leads through the straight watertight cable connector installed in the knockout above the cabinet ground stud.
3. Install the stripped ends of leads into the plug connector as shown in Figure 3-6. Connect the plug to pin connector P1.
4. See Figure 3-7. Position the jumper (1) on power/logic board P8 to the desired voltage. The input voltage etched on the board (2) is visible when you select the desired voltage.
5. Slide the power distribution module into the cabinet. Use the screws to secure the module to the master control cabinet.



### Wiring Input Power to Master Control *(contd.)*

6. Remove the rubber feet from the power units and master control unit. Install the master control unit into the fifth position in the cabinet using the mounting brackets.
7. Install the power units into the cabinet. Connect the power cables to the power units in sequence. Number the front and rear of the power units for easy identification.

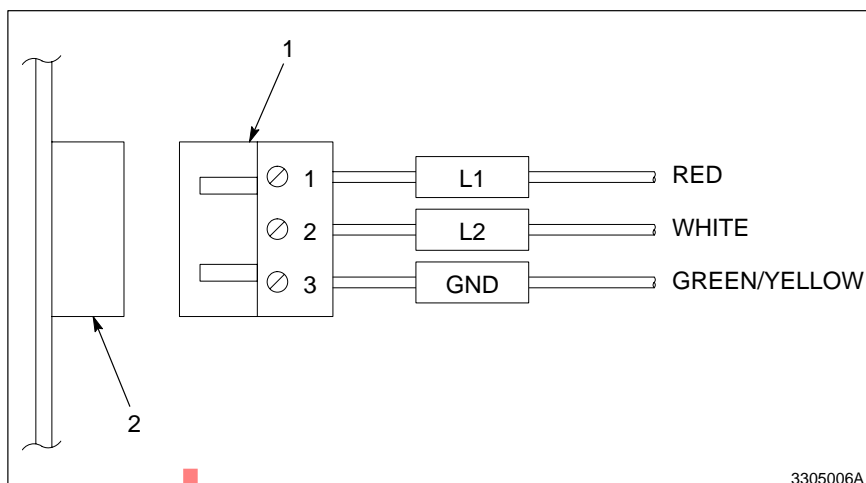


Fig. 3-6 Input power connections

1. Female connector

2. Relay board connector P1

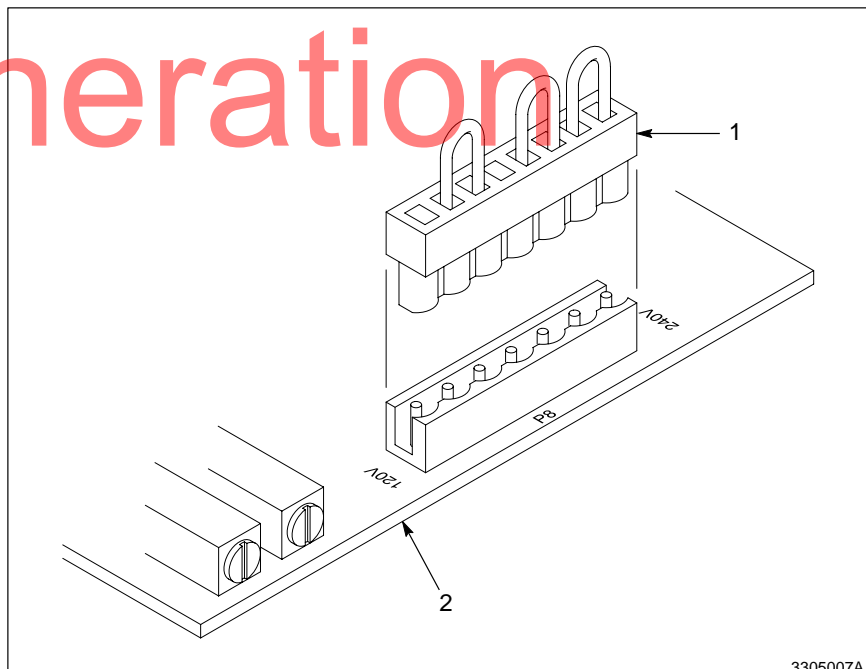


Fig. 3-7 Voltage-selector jumper

1. Jumper

2. Board

**Pneumatics**

1. Connect  $\frac{3}{8}$  in. OD polyurethane tubing from the air manifold outlets to the IN fittings on each power unit.
2. Connect  $\frac{1}{4}$  in. OD tubing between the master control unit IN fitting and the ball valve assembly fitting.
3. Connect  $\frac{1}{4}$  in. OD tubing from the power unit flow rate and atomizing air outlets to the powder pumps.

**Electrostatic Cable**

Refer to your power unit manual for electrostatic cable installation procedures.

**Cabinet Grounds and Optional Interlocks**

1. Connect the master control unit and the power unit ground straps to the cabinet. Ground the cabinet to a true earth ground.

**NOTE:** The external interlock relays are customer supplied and must be rated at 24 Vdc, 100 mA. Use 18-22 AWG wire.

2. See Figure 3-8. If you use the master control interlocks, connect the leads from the external N.O. (normally open) interlock relays to terminal P5 on the master control relay board.

**NOTE:** If the interlocks are not wired through the master control unit, the P5 terminals must be jumped before the unit will function. Jump P5-1 to P5-2 and P5-3 to P5-4.

Previous Generation

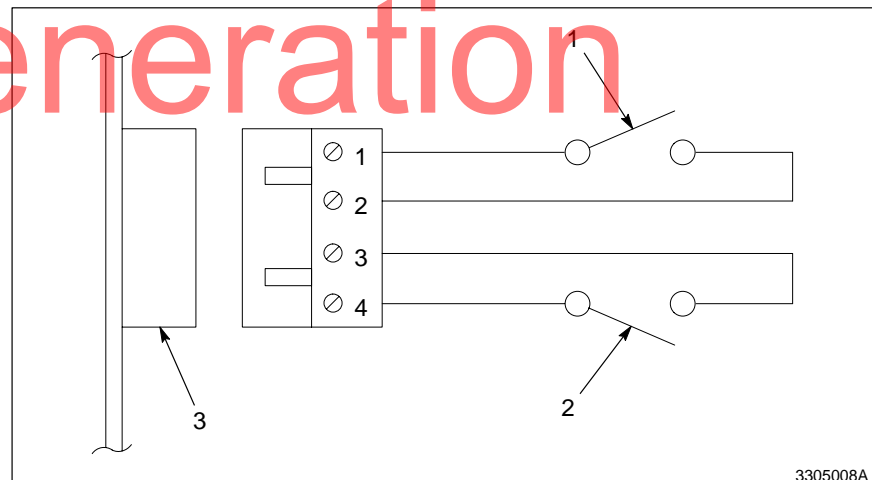


Fig. 3-8 Interlock connections

1. Booth vent fan relay
2. Conveyor interlock

3. P5 connector

### 3. Options

The following paragraphs provide optional installation configurations for the master control unit.

#### Installing Multiple Master Control Units

Read these guidelines before you connect the master control units together:

- The installation must meet all local, state, and federal codes.
  - Use 18 AWG wire to connect the master control units together.
  - Route the wires on the inside of the cabinet.
1. Remove the side panels on the mating sides of the cabinets. Bolt the cabinets together.
  2. Gain access to the relay board in each master control unit.
  3. See Figures 3-2 and 3-9. Make the wire connections listed in Table 3-1.

Table 3-1 Wire Connections for Multiple Control Units

From Primary Relay Board	To Secondary Relay Board
P6-1	P5-4
P6-2	P5-3

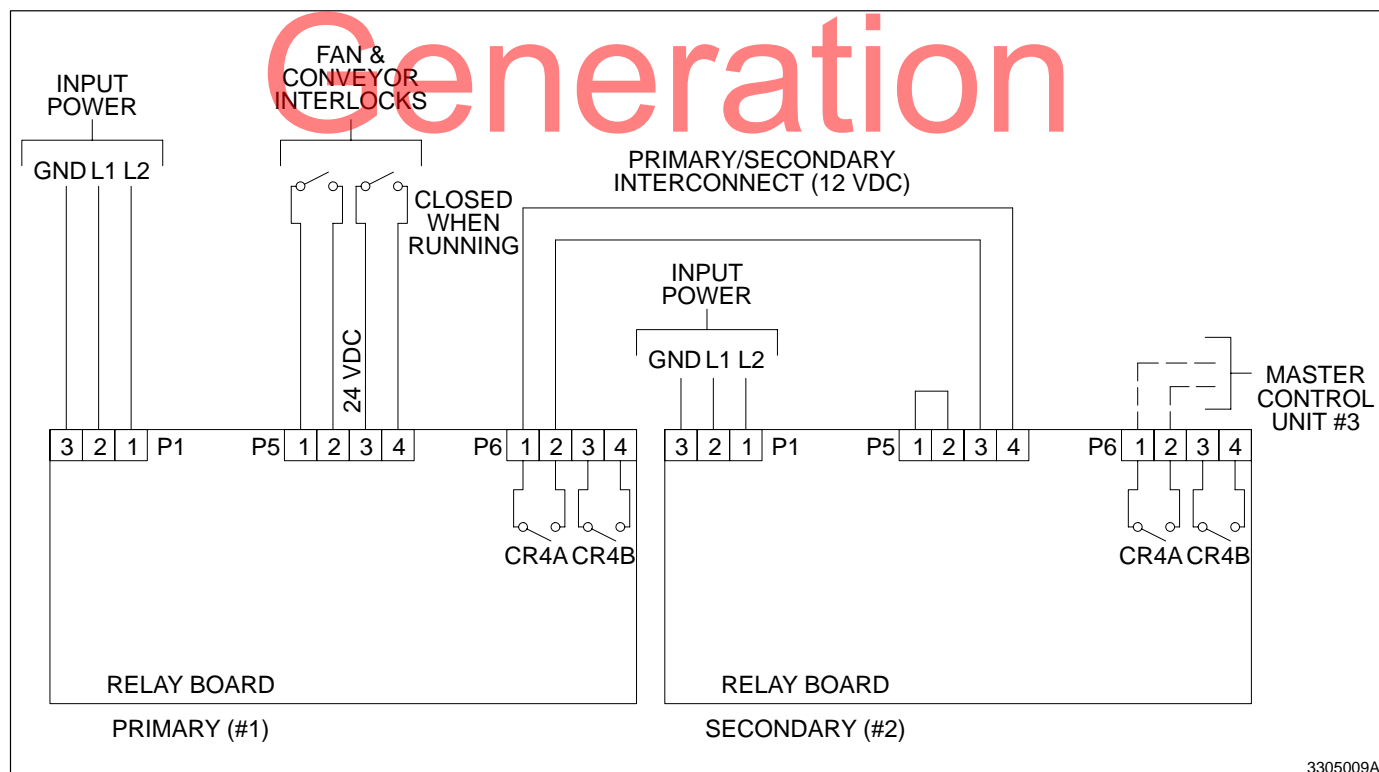
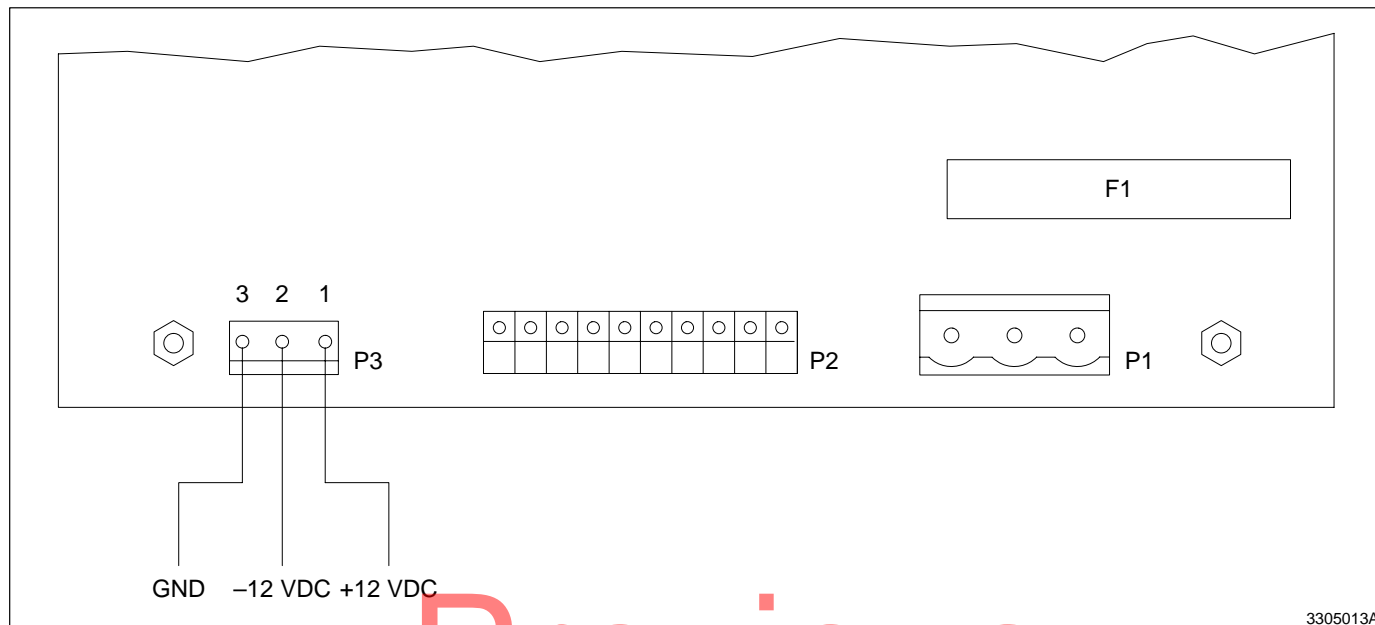


Fig. 3-9 Wiring multiple control units

# **Auxiliary 12–24 Vdc Power Supply**

See Figure 3-10. Auxiliary 12–24 Vdc, 1 amp switched power is available at P3 on the power/logic board. The master control unit power switch controls the output.



3305013A

Fig. 3-10 Auxiliary 12–24 Vdc power supply connections

Previous  
Generation

# Previous Generation

# Previous Generation

## Section 4 Operation



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

### 1. Introduction

The following paragraphs provide operating procedures for the master control unit.

Before activating the system, make sure that the

- booth vent fans are on
- powder recovery system is operating
- feed hopper fluidizing air is on
- powder supply is properly fluidized
- air and power is supplied to the powder spray system

### Initial System Startup

1. Turn off all power and air switches on the power units.
2. Turn on the conveyor bypass switch at the primary master control unit. Turn on the primary master control unit power and air switches.

**NOTE:** The bypass and the conveyor interlock indicator lights come on when you turn on the conveyor bypass switch.

3. Make sure that the ball valve on the pipe rack I/O module is opened.
4. Turn on the main power switches at the power units.
5. Watch the spray pattern at the gun and adjust the
  - atomizing air pressure to 1.4 bar (20 psi).
  - flow rate air pressure to 2 bar (30 psi).

**NOTE:** These pressures are an average starting point and may be adjusted to obtain the desired powder velocity at each gun.

6. Turn on the power unit high voltage switches. Adjust the kV to the desired output.
7. Turn off the master control unit conveyor bypass switch.
8. Start the conveyor and test spray workpieces. Adjust the kV output of the power units for best results.

---

## 2. Daily Startup

---

The following paragraphs provide daily startup procedures.

### **Before Startup**

Check all ground connections before starting operations. Make sure that the

- feed hopper is  $\frac{2}{3}$  full of clean, dry powder
- booth vent fans are on
- powder recovery system is on
- feed hopper fluidizing air is on
- ball valve on the pipe rack I/O module is opened

### **Startup**

1. Turn on the master control and power units.
2. Turn on the air switch.
3. Start the conveyor.

### **During Operation**



**WARNING:** Sparks from shorted components can cause a fire or explosion and may injure personnel.

Monitor the A meter on each power unit. A large deviation from the normal reading could signal a short in the

- gun
- electrostatic cable
- power unit voltage multiplier

If the external booth vent fan or conveyor interlock relays are tripped, the break in current flow causes an internal relay contact to open, which shuts off power and air to the power units. The master control unit interlock indicator lights.

### **Shutdown**

Turn off the master control unit power switch to shut down the powder spray system components controlled by the master control unit.

**NOTE:** You do not have to shut off the power units and air switches unless there is a malfunction or you have to perform service.



---

### 3. Maintenance

---



**WARNING:** Ungrounded equipment and parts may accumulate a charge that could arc and cause a fire or explosion.

Perform these procedures daily:

- Check all grounded connections, including ground parts. Ungrounded or poorly grounded parts will affect transfer efficiency, electrostatic wrap, and the quality of the finish.
- Check power and gun cable connections.
- Make sure supply air is clean and dry.
- Wipe powder and dust off the master control unit cabinet with a clean, dry cloth.

# Previous Generation

# Previous Generation

## ***Troubleshooting***

---

# Previous Generation

# Previous Generation

# Section 5

## Troubleshooting



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

### 1. Introduction

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

Problem		Page
1.	No power when master control unit is switched on; indicators do not light.	5-2
2.	Power units do not turn on when master control unit is switched on. External interlock circuits are complete (no indicators lit).	5-2
3.	Components switched through relay board connector P6 do not turn on when master control unit is turned on.	5-3
4.	Interlock circuitry shut off power and air to power units. Fan or conveyor indicator is on but fan and/or conveyor are running and external interlock relay contacts are closed.	5-3
5.	No output air to pilot-operated air valve.	5-4
6.	No air to power units, air pressure being delivered to air valve pilot port.	5-4

See Figure 5-1. An electrical schematic is provided to aid in troubleshooting the master control unit.

## 2. Troubleshooting Chart

Problem	Possible Cause	Corrective Action
1. No power when master control unit is switched on; indicators do not light.	Power/logic board fuses F2 or F3 blown	Check fuses and replace, if necessary. Correct condition causing fuse to blow before turning on power. Wrong voltage-selector jumper position or failed capacitor could cause fuse to blow.
	Loose or shorted connection at relay board connector P1 or power/logic board connector P1 or S1	Check connectors and replace connector or harness, if necessary.
	Power switch failure	Disconnect switch harness at connector S1 on power/logic board. Turn switch on and check for continuity across switch harness connector sockets 1 & 4 and 2 & 3. If either circuit is open, replace switch.
	Power supply failure	Perform these voltage checks: a. Check for 24 Vac output at transformer T1 pins 7 and 12 (pins 9 & 10 are ground). b. Check for +12 Vdc at power/logic board connector P3-1 and -12 Vdc at P3-2 (P3-3 is ground). Replace the power/logic board if voltage checks fail.
2. Power units do not turn on when master control unit is switched on. External interlock circuits are complete (no indicators lit).	Fuse F1 on relay board blown	Check fuse F1, replace if blown, correct condition causing fuse to blow before turning on power.
	Power distribution board connectors P19 or P20 loose or shorted	Check connectors. Replace connector or harness, if necessary.
	Distribution board connectors P1 through P16 wired incorrectly	Refer to <i>Electrical</i> in the <i>Installation</i> section for power unit cable connections.
	Bad relay CR1	Check relay CR1. Contacts should click when you turn on the master control unit. You can also check by unplugging relay and applying 24 Vdc to relay terminal A while grounding terminal B.

## 2. Troubleshooting Chart

(contd.)

Problem	Possible Cause	Corrective Action
3. Components switched through relay board connector P6 do not turn on when master control unit is turned on.	Poor connection at connector P6	Check connection at P6 connector.
	Bad relay CR4	There are two two ways to check relay CR4:  a. Turn on master control unit; contacts should click.  or  b. Unplug relay and apply 24 Vdc to relay terminal A while grounding terminal B.
	Bad ribbon cable connection at power/logic board or display board Display circuit board failure	Check cable connections, connector pins, and sockets. Replace display circuit board.
4. Interlock circuitry shut off power and air to power units. Fan or conveyor indicator is on but fan and/or conveyor are running and external interlock relay contacts are closed.	Relay CR3 failed	If conveyor indicator is on, turn conveyor by-pass switch on. If power units are activated, relay CR3 has failed. Replace power/logic board.
	Relay CR2 has failed or blown Fuse F1 on relay board	If fuse F1 is not blown and the <ul style="list-style-type: none"><li>fan is running</li><li>external interlock relay contacts are closed</li><li>fan interlock indicator is on, relay CR2 has failed.</li></ul> Replace power/logic board.

## 2. Troubleshooting Chart

(contd.)

Problem	Possible Cause	Corrective Action
<b>5. No output air to pilot-operated air valve.</b>	Bad electrical connections	Check connections of these components: <ul style="list-style-type: none"> <li>power/logic board connector P5</li> <li>air switch</li> <li>ribbon cable between power/logic board and relay board</li> <li>relay board connector P3</li> </ul>
	Air line connections	See <a href="#">Figures 3-1</a> and <a href="#">3-2</a> . Make sure that the air lines from the master control unit are properly connected.
	If air indicator is on, solenoid failed	Unplug solenoid harness at relay connector P4. Check for 24 Vdc across P3-1 and P3-2. If voltage is correct, replace solenoid.
	If air indicator is off, air switch failed	Disconnect switch wiring at power/logic board connector P5. Check continuity across harness sockets with switch on. If switch contacts are not closed, replace switch.
	Solenoid valve gasket orientation incorrect	Install gasket with side marked 3-NC facing upwards.
<b>6. No air to power units, air pressure being delivered to air valve pilot port.</b>	Pilot-operated air valve malfunction	Repair or replace valve.
	Blockage in valve or manifold	Clean valve or manifold, check air supply.



### 3. *Electrical Schematic*

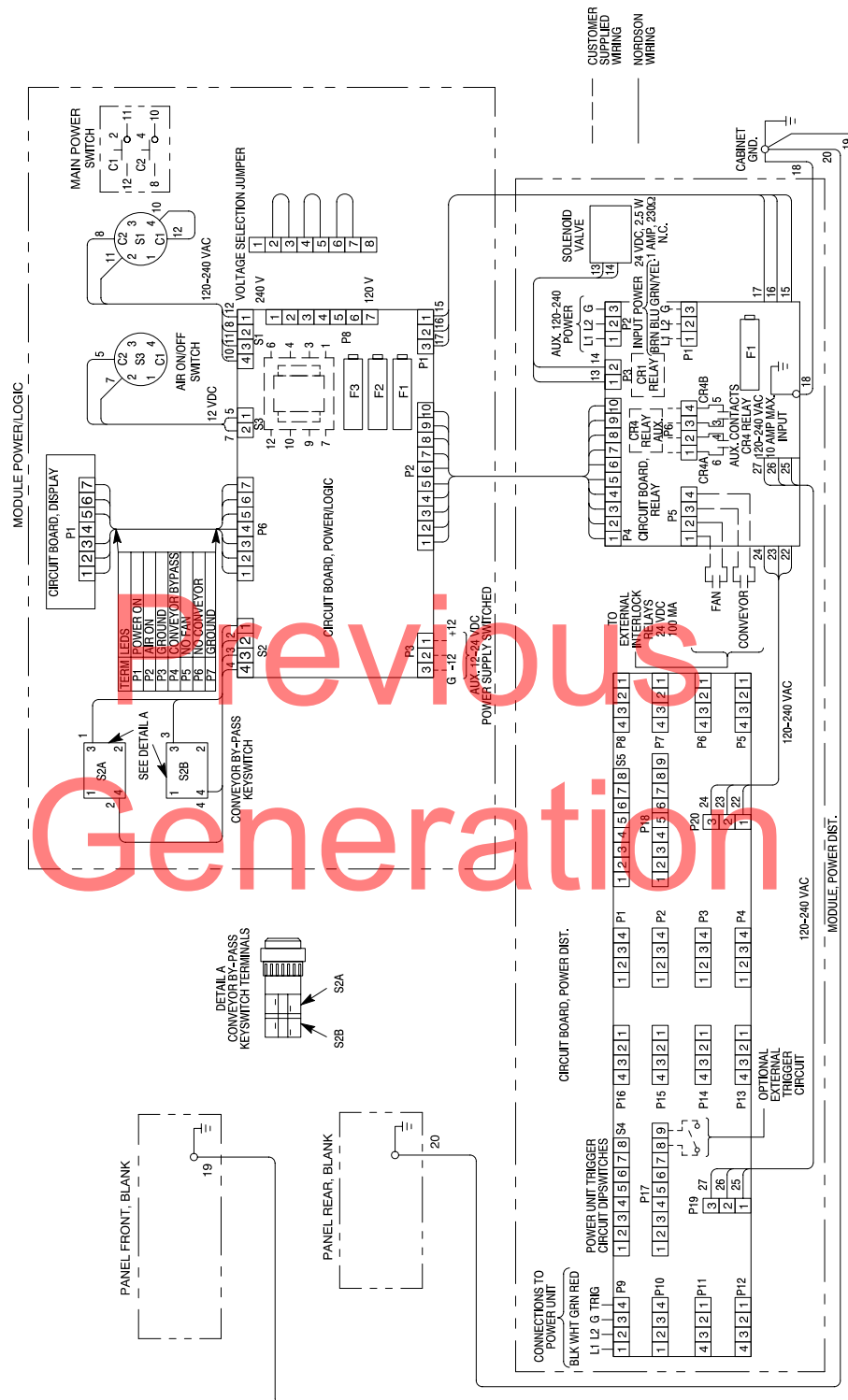


Fig. 5-1 Electrical schematic

3305014A

# Previous Generation

# Previous Generation

# Previous Generation

## Section 6

### Repair



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

#### 1. Removing Modules



**WARNING:** Disconnect and lock out electrical power before performing the following tasks. Failure to observe this warning could result in personal injury or death.

**NOTE:** Refer to the illustrations in the *Parts* section for component location.

Perform the following steps to remove the modules from the cabinet.

1. Turn off the main air supply.
2. Bleed the air out of input and output air tubing by turning on the master control unit air switches.
3. Turn off power to the master control unit at the external switch or breaker.
4. Disconnect the input and output air tubing.
5. Tag and disconnect the electrical cables at the power units. Disconnect the input power supply and the ground strap.
6. Remove the fasteners securing the master control unit to the cabinet. Pull the unit out of the cabinet and move to a clean workbench.
7. Remove the screws securing the distribution module to the cabinet. Pull the module out of the cabinet far enough to allow access to the cable and harness connections. The cabinet ground connections are underneath the module.
8. Disconnect the cables and harnesses connecting the distribution module and the power/logic module and to cabinet ground. Remove distribution module from cabinet.
9. Remove the screws securing the power/logic module to the cabinet. Pull the module out to disconnect the ground cable. Remove the module from the cabinet.

---

## **2. Repair**

---

The following paragraphs provide repair procedures for the distribution and power/logic modules. Refer to the illustrations in the *Parts* section for component location.

### ***Distribution Module***

#### ***Disassembly***

1. Remove the 4-pin plug connectors from the cables. Loosen the watertight seal connector gland nut and remove the cables from the module.
2. Disconnect the relay board harnesses from the distribution board connectors P19 and P20. Disconnect the solenoid harness from the relay board.
3. Remove the screws securing the boards to the module. Remove the boards.
4. Remove the screws securing the solenoid valve to the manifold. Remove the solenoid valve.
5. Unplug relays CR1 and CR4 from the relay board.

#### ***Assembly***

1. Plug relays CR1 and CR4 into the relay board.

**NOTE:** Make sure that the side marked 3-NC on the valve gasket faces upwards when you install the new solenoid valve on the manifold.

2. Use the screws to secure the solenoid valve to the manifold.
3. Use the screws to secure the new boards to the module.
4. Connect the relay board harnesses to the distribution board connectors P19 and P20. Connect the solenoid harness to the relay board.
5. Install the cables. Install the 4-pin plug connectors to the cables. Tighten the watertight seal connector gland nut.

## Power/Logic Module

### Disassembly

1. Remove the caps, knobs, and rotary shaft seals from the switches.
2. Disconnect the switches from the power/logic circuit board.
3. Remove the nuts and lock washers securing the circuit board.
4. Remove the nuts, lock washers, and washers securing the display circuit board.

### Assembly

1. Use the washers, lock washers, and nuts, to secure the display circuit board.
2. Use the lock washers and nuts to secure the circuit board.
3. Connect the switches to the power/logic circuit board.
4. Use the rotary shaft seals to secure the switches to the front panel. Install the knobs and caps on the switches.

## 3. Installing the Modules

**NOTE:** Maintain a dust-free environment inside the cabinet. Make sure that the panel gaskets are in good condition and correctly installed before putting the unit back into service.

1. Connect the ground cable. Insert the power/logic module into the cabinet. Use the screws to secure the power/logic module to the cabinet.
2. Connect the cables and harnesses that connect the distribution module to the power/logic module and to the cabinet ground.
3. Insert the distribution module into the cabinet. Use the screws to secure the distribution module to the cabinet.
4. Install the master control unit into the cabinet. Use the fasteners to secure the master control unit to the cabinet.
5. Connect the electrical cables to the power units. Connect the input power supply and the ground strap.
6. Connect the input and output air tubing.

# Previous Generation



# Previous Generation

# Previous Generation

## Section 7

### Parts

#### 1. Introduction

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

#### Using the Illustrated Parts List

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The six-digit number in the Part column is the Nordson Corporation part number. A series of dashes in this column (— — — — —) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

Item	Part	Description	Quantity	Note
—	000 000	Assembly	1	
1	000 000	• Subassembly	2	A
2	000 000	• • Part	1	

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

**2. Master Control Unit**

See Figure 7-1.

Item	Part	Description	Quantity	Note
—	249 246	Module, master control, 100 PLUS	1	
1	-----	• Cabinet, 19-inch rack	1	B
2	-----	• Module, power/logic	1	A, B
3	-----	• Module, power distribution	1	A, B
4	249 250	• Panel, front, blank	1	
5	248 711	• Gasket, panel, front	1	
6	982 284	• Screw, captive, M5 x 0.8	8	
7	940 073	• O-ring, Viton	8	
8	240 674	• Tag, ground	3	
9	271 221	• Lug, terminal, 45° tab	4	
10	983 021	• Washer, flat, .203 x .406 x .040 in., brass	3	
11	983 401	• Lockwasher, split, M5, st, zn pl	3	
12	984 702	• Nut, hex, M5, brass	3	
13	249 271	• Panel, rear, blank	1	
14	249 272	• Cable, ribbon, 10 ckt, w/conn.	1	
15	248 713	• Gasket, panel, manifold	1	
16	249 274	• Wire group, ground	1	C
17	982 286	• Screw, flat hd, slt, M5 x 10	4	
18	248 709	• Bracket, rack mount	2	
19	246 458	• Jumper, ground, 4 in.	1	
20	248 734	• Bumper, foot, rubber	4	
21	982 123	• Screw, pan hd, slt, M3 x 6 mm, bl	4	
22	933 326	Connector, conduit, 1/2 NPT	AR	D
23	939 122	Gasket, nut	AR	D
24	984 526	Nut, lock, conduit	AR	D

NOTE A: Refer to parts lists following.

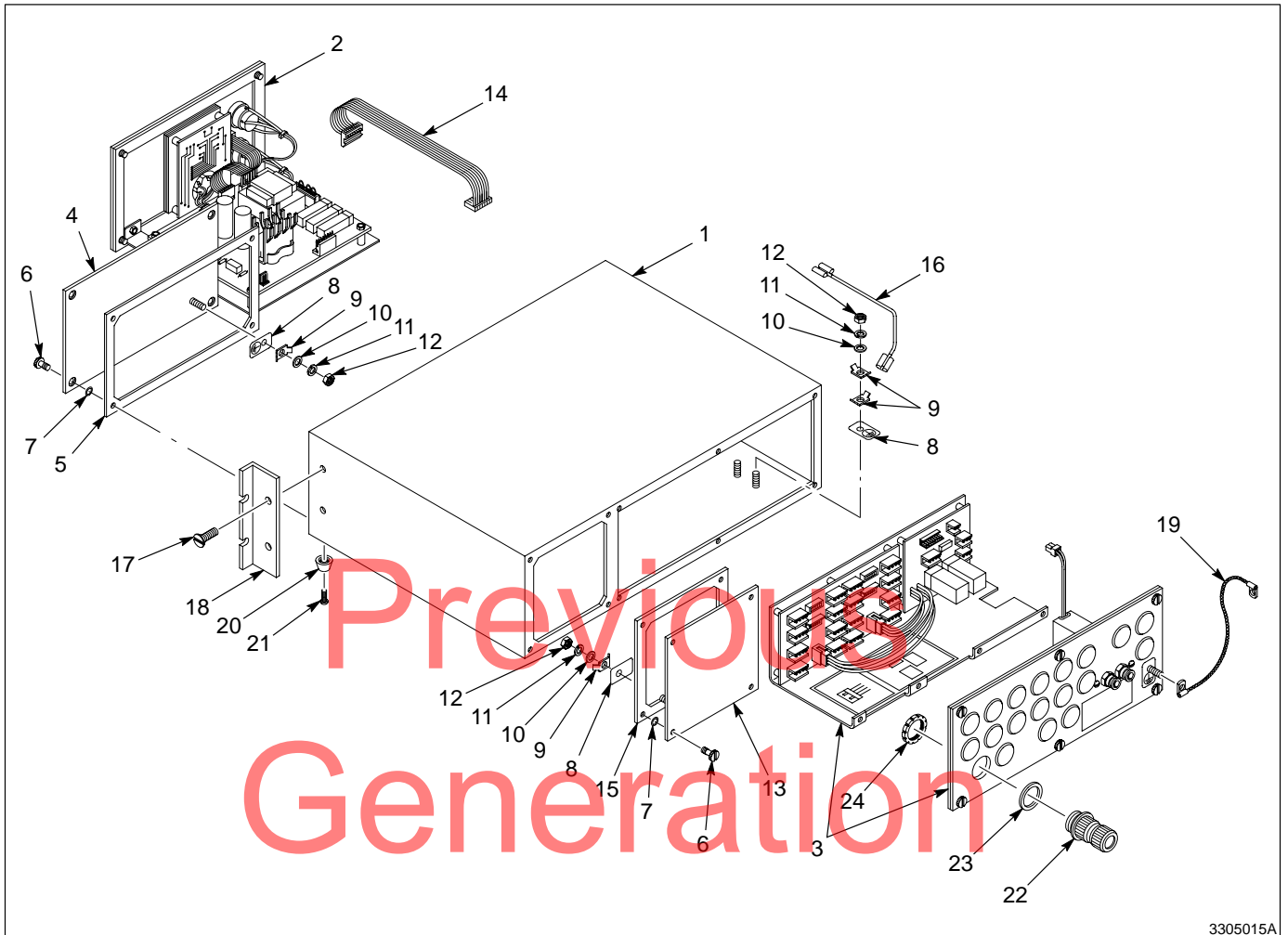
B: Not sold separately.

C: Consists of 3 ground cables with terminals.

D: Optional parts, included in power unit rack mount kit.

AR: As Required

## 2. Master Control Unit (contd.)



3305015A

Fig. 7-1 Master control unit

**3. Power/Logic Module**

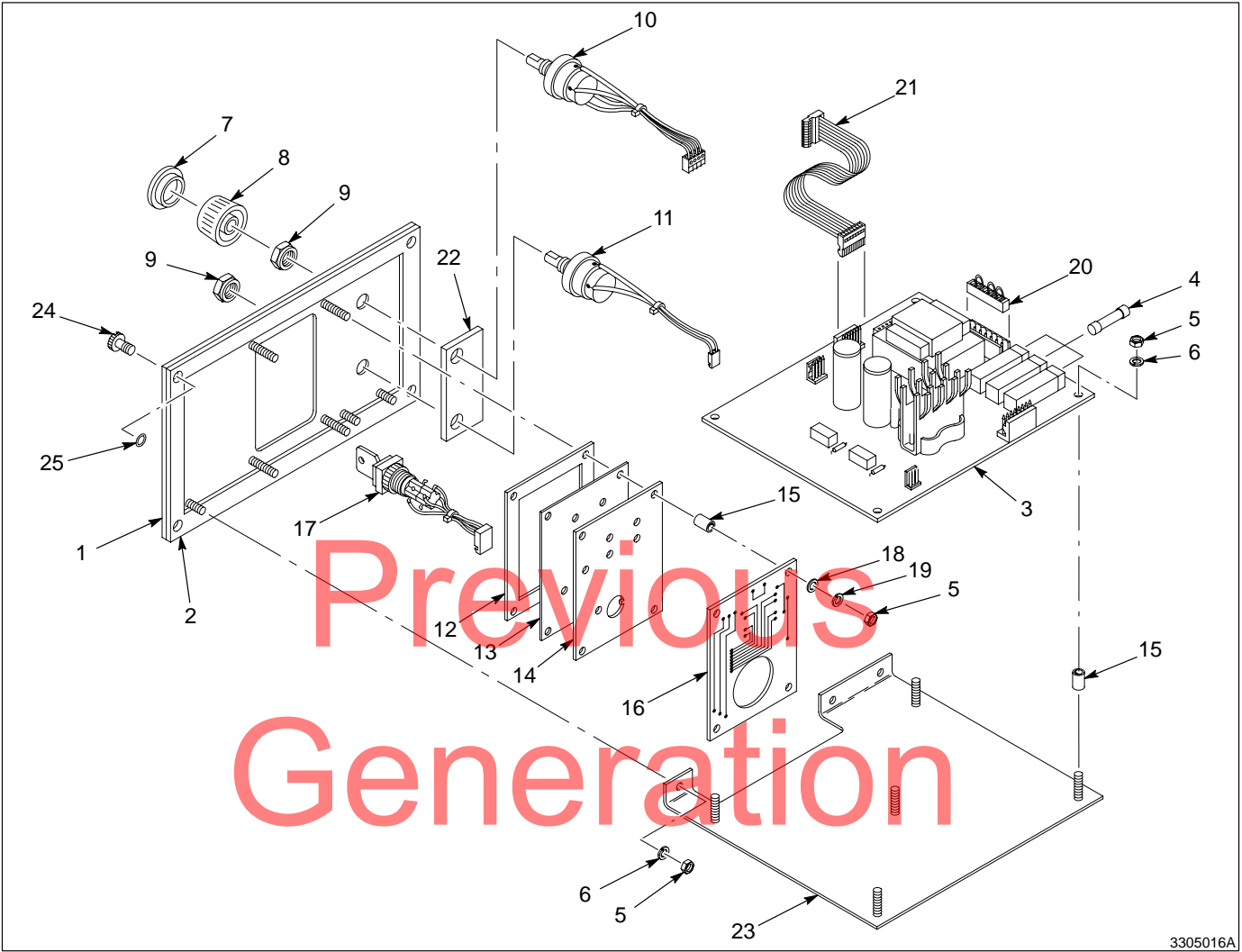
See Figure 7-2.

Item	Part	Description	Quantity	Note
—	-----	Module, power/logic, m/c	1	A
1	249 252	• Panel, silkscreen, control	1	
2	248 711	• Gasket, panel, front	1	
3	249 164	• Board, circuit, power/logic	1	
4	-----	• Fuse, 1 amp, 250V	3	B
5	984 715	• Nut, hex, M4 x 0.7, st, zn pl	12	
6	983 403	• Lockwasher, split, M4	3	
7	248 695	• Cap, flat, w/line	2	
8	248 694	• Knob, collet, 28 mm, 1/4-in. shaft	2	
9	248 741	• Seal, shaft, rotary	2	
10	249 254	• Switch, power, w/cable	1	
11	249 257	• Switch, air, w/cable	1	
12	248 802	• Gasket, panel, display	1	
13	-----	• Panel, overlay, display	1	A
14	-----	• Panel, display	1	A
15	248 705	• Spacer, nylon, no. 8 x .500 in.	9	
16	249 165	• Circuit board, display	1	
17	249 258	• Switch, key w/cable	1	
18	248 706	• Washer, nylon, .188 x .375 x .031 in.	4	
19	983 416	• Lockwasher, int, No. 4, st, zn pl	9	
20	249 260	• Jumper, voltage selection	1	
21	248 804	• Cable, ribbon, 7 ckt, w/conn	1	
22	248 684	• Spacer	1	
23	-----	• Panel, component, Lf	1	A
24	982 284	• Screw, captive, M5 x 0.8	4	
25	940 073	• O-ring, Viton	4	

NOTE A: Not sold separately.

B: Use 1 amp, 250V normal blow fuse.

**3. Power/Logic Module**  
(contd.)



3305016A

Fig. 7-2 Power/Logic module

#### 4. Power Distribution Module

See Figure 7-3.

Item	Part	Description	Quantity	Note
—	-----	Module, power distribution	1	A
1	249 262	• Panel, silkscreen, power dist.	1	
2	248 714	• Gasket, panel, multiplier	1	
3	982 284	• Screw, captive, M5	6	
4	940 073	• O-ring, Viton	6	
5	983 401	• Lockwasher, split, M5, stl, zn pl	2	
6	982 126	• Screw, pan hd, slt, M4 x 25, br	1	
7	240 674	• Tag, ground	1	
8	983 021	• Washer, flat, .203 x .406 x .040, brass	1	
9	984 702	• Nut, hex, M5, brass	1	
10	972 716	• Connector, male, 1/4 tube 1/8 NPT	2	
11	982 092	• Screw, pan hd, slt, M4 x 10	2	
12	983 403	• Lockwasher, split, m4, stl, zn pl	8	
13	900 809	• Cap, flush, 7/8	19	
14	249 276	• Gasket, manifold	1	
15	249 266	• Manifold	1	
16	249 264	• Solenoid, w/2 pin conn.	1	
17	982 300	• Screw, pan hd, slt, M4 x 30	2	
18	246 470	• Trim, .062 thk, panel, PVC	AR	
19	249 162	• Board, circuit, relay, m/c	1	
20	-----	• Fuse, 10 amp, 250V	1	B
21	249 414	• Relay, 24V, 10 amp	2	
22	249 163	• Board, circuit, power dist.	1	
23	983 400	• Lockwasher, split, M3, stl, zn pl	10	
24	982 086	• Screw, pan hd, M3 x 0.5 x 8mm lg.	10	
25	249 263	• Panel, component, lr	1	
26	984 715	• Nut, hex, m4, stl, zn pl	4	
27	249 269	• Tag, wiring diagram, m/c	1	

NOTE A: Not sold separately.

B: Use 10 amp, 250V normal blow fuse.

AR: As Required



4. Power Distribution  
Module (contd.)

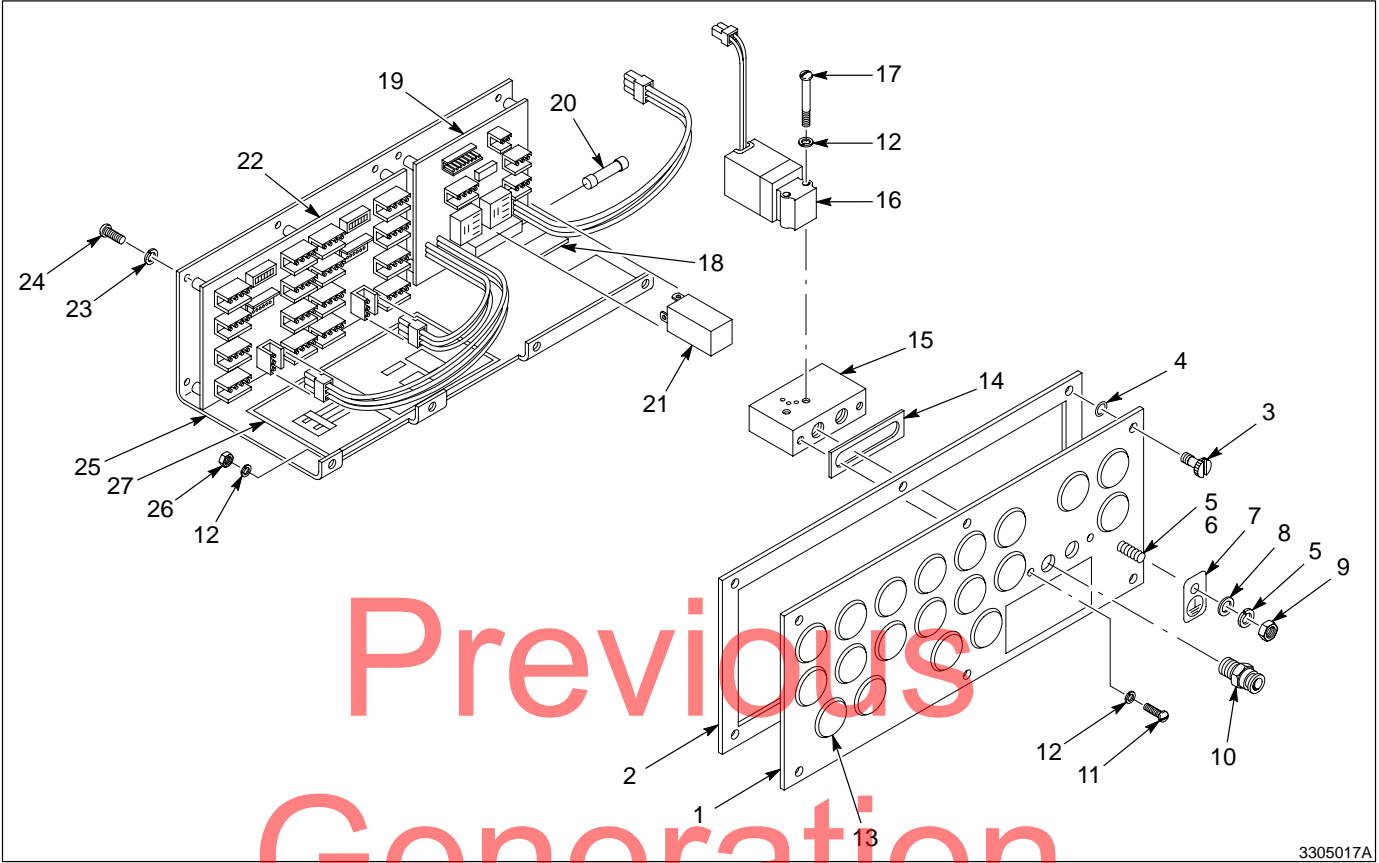


Fig. 7-3 Power distribution module

**5. Pipe Rack I/O Module**

See Figure 7-4.

Item	Part	Description	Quantity	Note
—	150 868	Module, I/O, pipe rack	1	
1	183 473	• Panel, manifold, I/O, pipe rack	1	
2	973 282	• Tee, pipe, hyd	1	
3	973 382	• Bushing, red, $\frac{1}{2}$ x $\frac{1}{4}$ in.	1	A
4	971 265	• Connector, male, $\frac{1}{4}$ tube x $\frac{1}{2}$ NPT	2	
5	973 089	• Nipple, steel, sched 40, $\frac{1}{2}$ , 1.75	2	A
6	982 112	• Screw, M6 x 16	4	
7	983 410	• Washer, flat, narrow, M6	4	
8	983 409	• Washer, lock, M6	4	
9	984 703	• Nut, hex, M6	4	
10	981 270	• Screw, hex, $\frac{1}{4}$ -20 x 3	2	
11	183 465	• Manifold, body, cooling air	1	
12	971 177	• Connector, male, $\frac{3}{8}$ tube x $\frac{1}{4}$ NPT	10	
13	183 467	• Bracket, L-shaped	1	
14	973 128	• Elbow, pipe, hyd, 90°, $\frac{1}{2}$	1	A
15	972 620	• Connector, male, 37°, $1\frac{1}{16}$ – 12 x $\frac{1}{2}$	1	A
16	972 716	• Connector, male, $\frac{1}{4}$ tube x $\frac{1}{8}$ NPT	10	
17	901 074	• Valve, air pilot, 2-way	1	
18	984 210	• Nut, hex, jam, $\frac{1}{4}$ -20	2	
19	983 141	• Washer, lock, internal, $\frac{1}{4}$	2	
20	901 151	• Valve, ball, $\frac{1}{2}$ NPT	1	
21	143 010	• Fitting, Carflex, liqtite, $\frac{1}{2}$	1	
22	163 436	• Clamp, 1.0 conduit, 1-hole	2	
23	973 524	• Coupling, pipe, hyd, $\frac{1}{2}$	1	
24	707 461	• Connector, cord, $\frac{1}{2}$ NPS	1	A
25	163 435	• Clamp, .75 conduit, 1-hole	1	
26	973 076	• Nipple, steel, sched, 40, $\frac{1}{2}$ , 1.12	1	A
27	248 336	• Plug, .250 tube	10	
NS	900 481	• Adhesive, pipe, 50 ml	1	

NOTE A: Use Loctite adhesive on threads during assembly.

NS: Not Shown

**5. Pipe Rack I/O Module**  
(contd.)

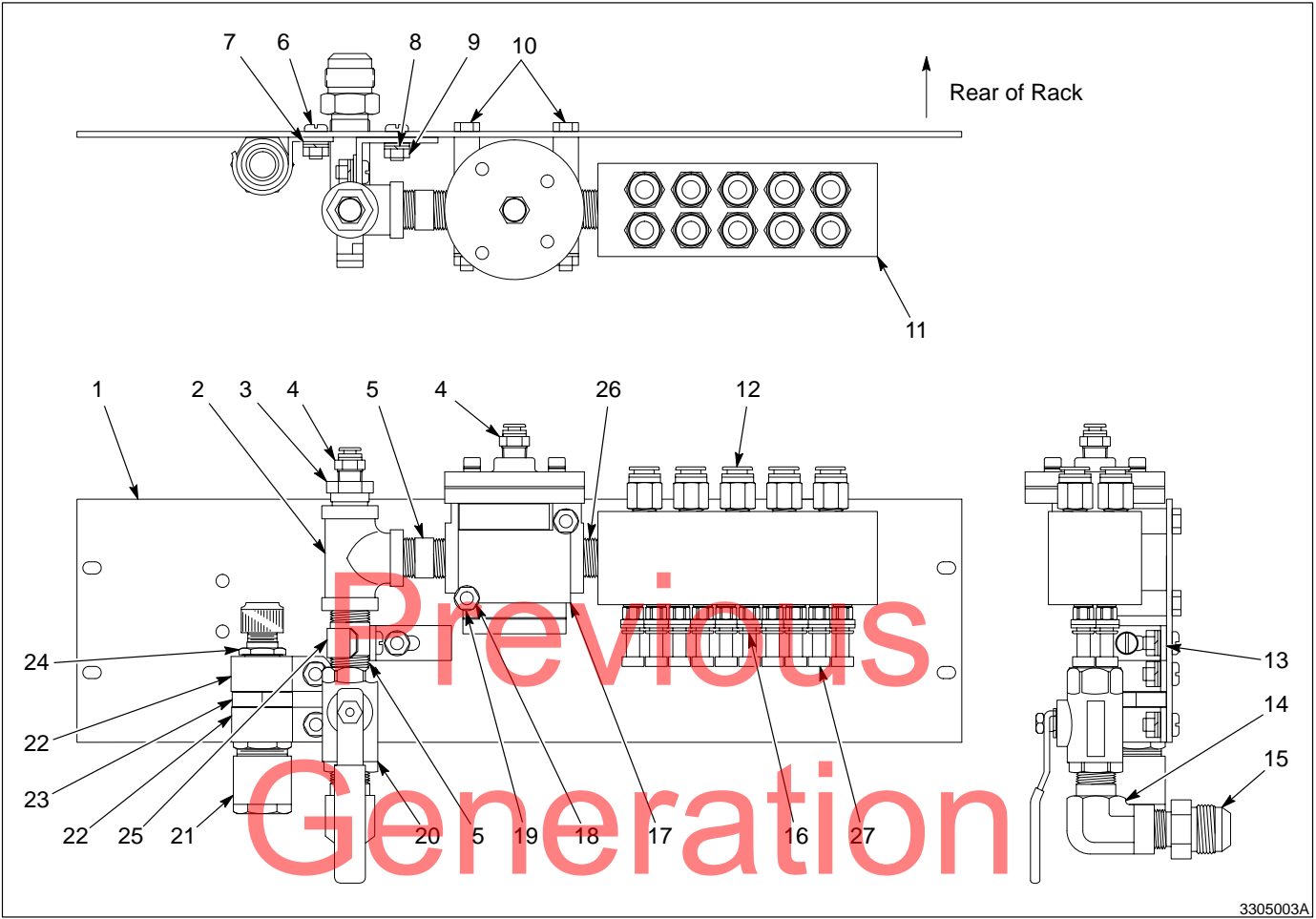


Fig. 7-4 Pipe rack I/O module

## 6. Optional Parts

### 100 PLUS Mounting Kit

Part	Description	Quantity	Note
107 257	Kit, rack mount, 100 PLUS	1	A
247 512	• Oil, 7.5 mL, H.V. insulating	2	
248 734	• Bumper, foot, rubber	4	
982 123	• Screw, pan hd., M3 x 6 mm	4	
101 285	• Cable, power, 6.5 ft	1	D
933 326	• Connector, conduit, 1/2 NPT	1	B
939 122	• Gasket, nut	1	B
984 526	• Nut, lock, conduit	1	B
983 121	• Washer, lock, ext, #10, stl, zn	1	C
981 159	• Screw, pan hd., #10-32 x .500, sl, br	1	C
NOTE A: Use this kit to install one power unit in a 19-inch cabinet. Mounting hardware is not included. B: Install in knockout on master control unit power distribution module rear panel. C: For securing ground cable to cabinet. D: Use only to connect power unit to master control. Refer to the <i>Installation</i> in this manual for wiring instructions.			

### Cabinet Parts

Part	Description	Quantity
101 289	Panel, blank, 10 <sup>1</sup> / <sub>2</sub> x 19 in.	1
101 288	Panel, blank, 5 <sup>1</sup> / <sub>4</sub> x 19 in.	1
101 287	Panel, blank, 3 <sup>1</sup> / <sub>2</sub> x 19 in.	1
101 286	Panel, blank, 1 <sup>3</sup> / <sub>4</sub> x 19 in.	1
900 534	Tubing, poly, 1/4 in. OD, natural	AR
900 509	Tubing, poly, 1/4 in. OD, black	AR
900 730	Tubing, poly, 1/4 in. OD, blue	AR
900 511	Tubing, poly, 3/8 in. OD, black	AR
AR: As Required		

***Specifications***

---

# Previous Generation

# Previous Generation

## Section 8 Specifications

### **Dimensions**

See Figure 8-1.

### **Inputs**

#### **Electrical**

90–130 Vac or 180–260 Vac, single phase at 50/60 Hz

#### **Air**

78 bar (100 psi) maximum

### **Outputs**

#### **Line Voltage**

1–16 power units

#### **Air**

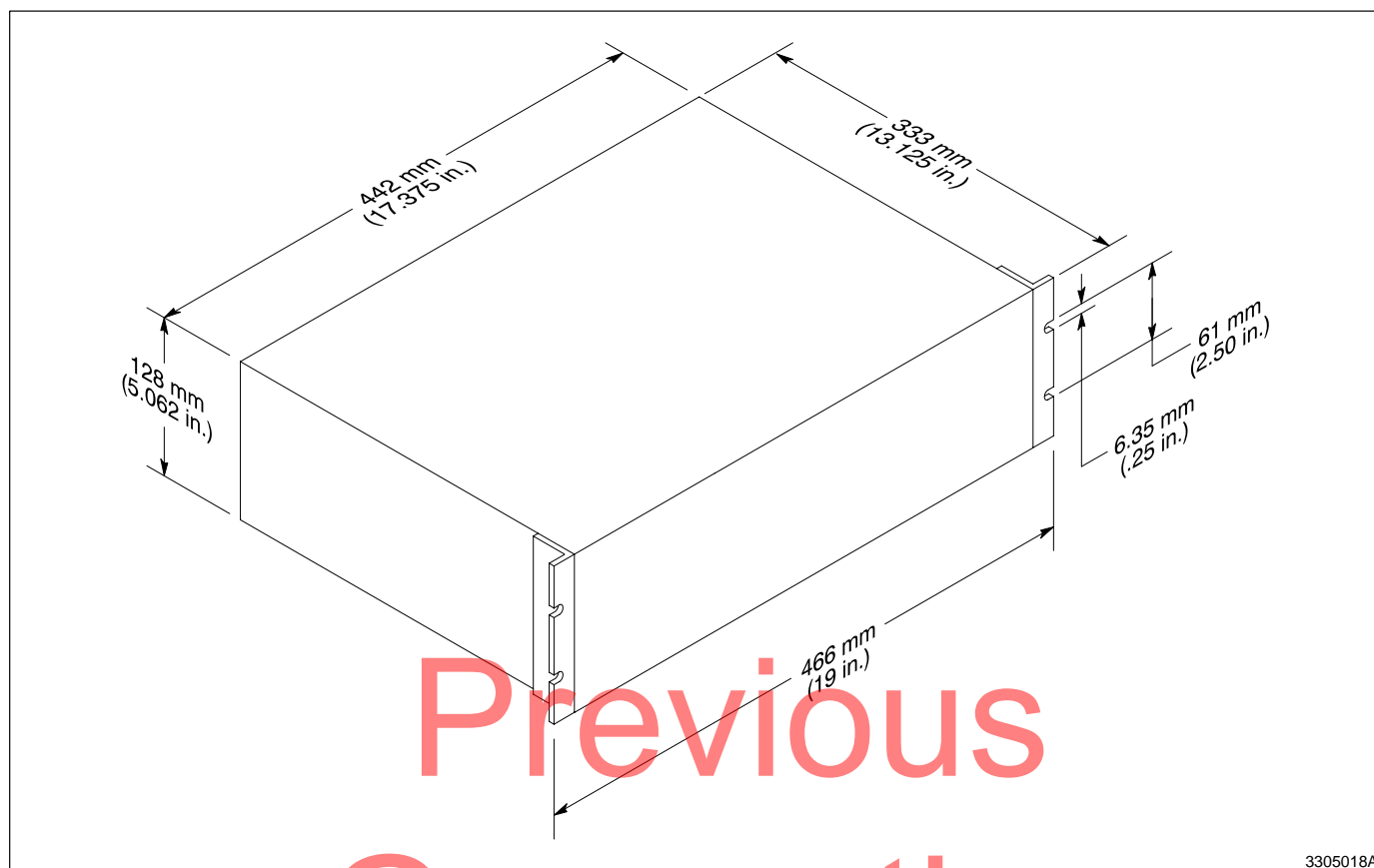
Input pressure to pilot valve

### **Auxiliary Power**

Line voltage, switched or unswitched 12–24 Vdc at 1 Amp, switched

Previous  
Generation

Master Control Dimensions



3305018A

Fig. 8-1 Master control dimensions