

Tribomatic® II Two-Gauge Control Unit

Customer Product Manual
Part 106569B
Issued 5/03



NORDSON CORPORATION • AMHERST, OHIO • USA

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Section 1

Safety

Introduction

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

Qualified Personnel

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

Intended Use

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

Some examples of unintended use of equipment include

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

Regulations and Approvals

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

All phases of equipment installation must comply with all federal, state, and local codes.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Grounding



WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program. If you receive even a slight electrical shock or notice static sparking or arcing, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

All work conducted inside the spray booth or within 1 m (3 ft) of booth openings is considered within a Class 2, Division 1 or 2 Hazardous location and must comply with NFPA 33, NFPA 70 (NEC articles 500, 502, and 516), and NFPA 77, latest conditions.

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.
- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator platforms, hoppers, photoeye supports, and blow-off nozzles. Personnel working in the spray area must be grounded.
- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as an operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.
- Operators must maintain skin-to-handle contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.
- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

Action in the Event of a Malfunction

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

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

Disposal

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

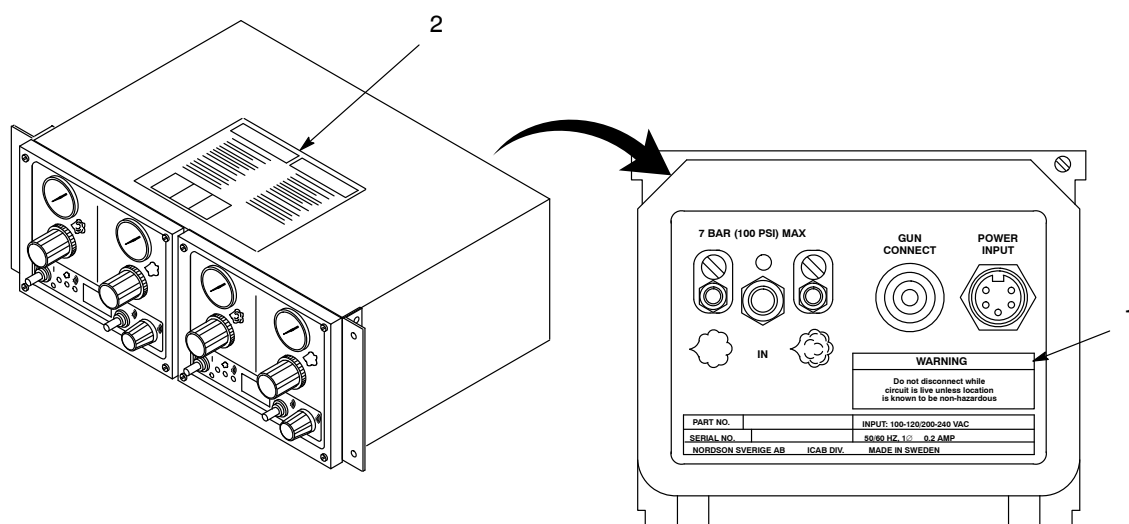
Safety Labels

Table 1-1 contains the text of the safety label on this equipment. The safety label is provided to help you operate and maintain your equipment safely. See Figure 1-1 for the location of the safety label.

Table 1-1 Safety Labels

Item	Part	Description
1.	—	 WARNING: Do not disconnect while circuit is live unless location is known to be non-hazardous.
2.	129597	SAFETY INSTRUCTIONS 1. To be installed in accordance with all local codes and ordinances, all pertinent statutes and regulations, and the safety provisions of the Nordson manual. 2. Ground all equipment and other metal objects within 10 ft (3 m) of spray area. Keep spray area clean. 3. Work pieces must be grounded. Keep conveyor and hangers clean. 4. Hold gun in bare hand. Wear shoes with conductive soles such as leather. (Rubber soles are not conductive.) 5. Turn off power and ground nozzle before doing any cleaning or other work on gun. 6. Do not store flammable materials in spraying area. 7. Caution: Shut off electrical power before breaking connections or opening enclosure.
	244644	 WARNING: Disconnect main power before servicing.  WARNING: The following procedures MUST be followed when working with this electrostatic spray equipment. Failure to follow these instructions may result in a fire and/or serious personal injury. Display this warning on the spray booth.  1. NO SMOKING. Keep open flames, hot surfaces, and sparks from torches or grinding away from booth. 2. Turn the electrostatic power unit <u>off</u> when the spray gun is not in use. 3. Shut down immediately in event of fire. 4. Maintain ground circuit on all conductive objects below 1 megohm to prevent sparking. (ANSI/NFPA 33, Chapter 9, or local codes). 5. Shut down operation and correct grounds if sparking occurs. 6. Install fixed fire suppression system in accordance with ANSI/NFPA 33, Chapter 7 (or local codes), before operating with combustible powder.

Item	Part	Description
		7. Install automatic flame detectors in accordance with ANSI/NFPA 33, Chapter 7 (or local codes), before operating automatic guns 8. Examine all equipment at the beginning of each work period and repair or replace any damaged, loose, or missing parts. 9. Before cleaning or performing any maintenance on the electrostatic spray gun, turn off the power unit and ground the nozzle. Maintain electrostatic spray equipment in accordance with instruction manual. Do not deviate. Do not substitute parts from other manufacturers. 10. Operator must be grounded to prevent shocks from static electricity. Floor surface must be conductive. Footwear and gloves must be static dissipative in accordance with ANSI Z41-1991 (or local codes). 11. Air velocity through all booth openings must meet local requirements and contain powder within the booth. If powder escapes from the booth, shut down operation and correct the malfunction. 12. Powder may be toxic or be a nuisance dust hazard. Refer to supplier's MSDS. If exposed to dust during operation, maintenance, or clean up, operators must use appropriate personal protective equipment. 13. Do not use compressed air or organic solvents for removal of powder from skin or clothing. Do use soap and water. Wash hands before eating or smoking. 14. Guns, feeders, booths, etc., may be cleaned with clean dry air at 1.7 bar (25 psig). If you have any questions concerning this electrostatic spray equipment, call (440) 988-9411, and ask to speak with the Powder Systems Group Technical Service Department.



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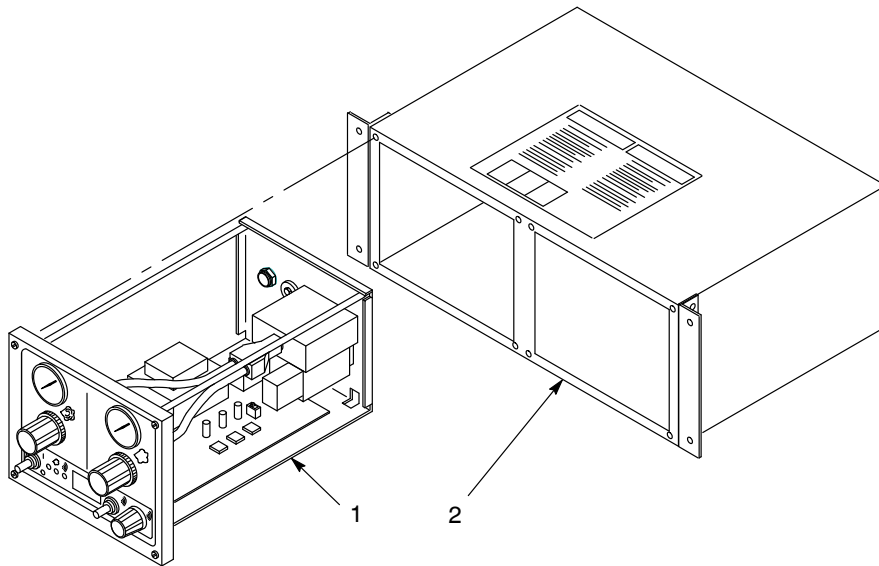
Figure 1-1 Safety Labels

Section 2

Description

Introduction

The Nordson Tribomatic II two-gauge control units provide pneumatic and electrical controls for Tribomatic II automatic powder spray guns. The control units consist of one or two control modules installed in a dual-module cabinet. The cabinets are normally installed in a standard 19-inch equipment rack. The modules are controlled by a Nordson MC-3, Smart Spray, or Tribomatic master control unit installed in the same rack.



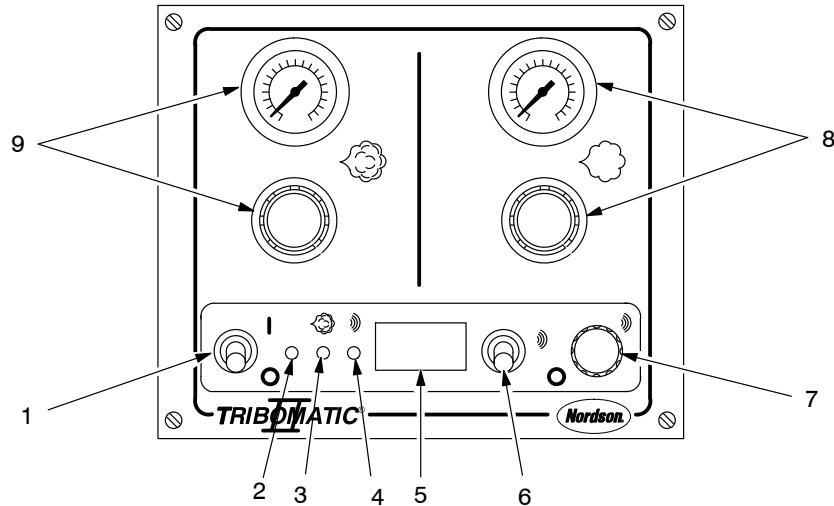
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Figure 2-1 Tribomatic II Control Unit (Dual-Module Cabinet Shown)

1. Control module

2. Cabinet

Front Panel Controls



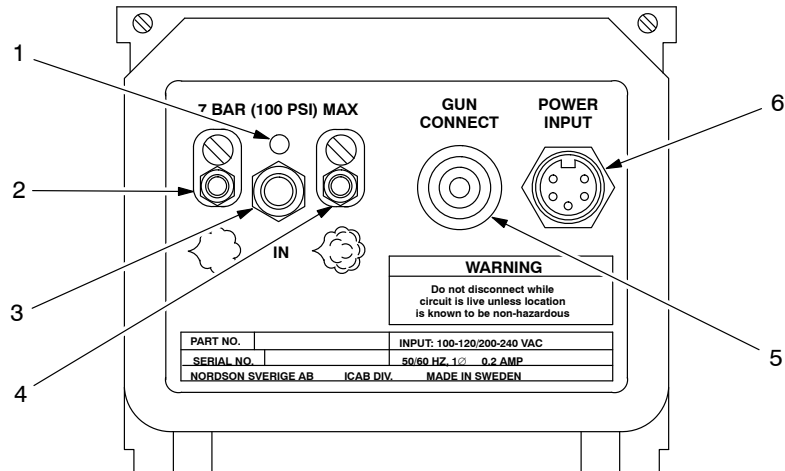
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Figure 2-2 Front Panel Controls

Table 2-2 Front Panel Controls

Item	Description	Function
1	Power switch	Activates the control module and energizes the flow rate and diffuser air solenoid valves.
2	Power LED (Green)	Lights when the control module is turned on.
3	Powder LED (Green)	Lights when the control module is turned on and the solenoid valves are energized, allowing air to flow to the pump and diffuser.
4	Low-charge alarm LED (Red)	Flashes when the powder is charging below the alarm setting.
5	Digital display	Displays the flow of current from the gun to ground, measured in microamperes (μA). This μA reading is affected by powder flow rate and velocity. The plus (+) or minus (-) indicates whether the powder is charging positively or negatively. When the display function switch is held in the up position, the display shows the low-charge alarm setting.
6	Display function switch (non-latching toggle switch)	Changes the digital display function. The display normally shows the μA output. When the switch is held in the up position, the display shows the low-charge alarm setting.
7	Low-charge alarm potentiometer	Controls the low-charge alarm. Rotate to turn the alarm on and off and to change the alarm setting.
8	Diffuser air regulator and gauge	Controls and indicates diffuser air pressure. Pull the regulator knob out to change the air pressure, push it in to lock the setting.
9	Flow rate air regulator and gauge	Controls and indicates powder pump flow rate (ejector) air pressure. Pull the regulator knob out to change the air pressure, push it in to lock the setting.

Rear Panel Connections



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Figure 2-3 Rear Panel Connections

Table 2-3 Rear Panel Controls

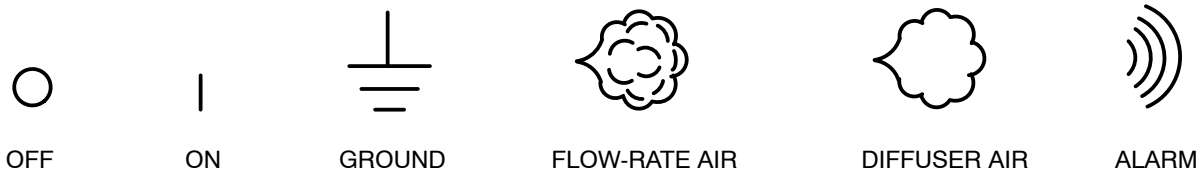
Item	Description	Function
1	Exhaust air port	Solenoid valve exhaust. Do not block.
2	6-mm straight tubing connector	Diffuser air output. Pressure at regulator setting.
3	10-mm straight tubing connector	Supply air input. 7 bar (100 psi) maximum air pressure.
4	6-mm straight tubing connector	Flow-rate air output. Pressure at regulator setting.
5	Gun ground	Isolated gun ground wire connection.
6	5-pin receptacle	Power/control cord connection.
–	Module ground (not shown)	Grounds module to cabinet. Cabinet has a ground stud that must be connected to a true earth ground.

Specifications

Electrical	
Input	100–120/200–240 Vac ($\pm 10\%$), 50/60 Hz 1 $\emptyset$, 0.2 amps
Power Consumption	20 VA
Pneumatic	
Input minimum	4 bar (60 psi)
Input maximum	7 bar (100 psi)
Nominal Operating Pressures	
Flow rate Air	1.8 bar (26 psi)
Diffuser Air	2.5 bar (36 psi)
Air Supply Quality	Air must be clean and dry. Use a regenerative desiccant or refrigerated air dryer capable of producing a 38 °F (3.4 °C) or lower dewpoint at 7 bar (100 psi). A filter system with pre-filters and coalescent filters capable of removing oil, water, and dirt in the submicron range should also be used

Symbols

Symbols used on this equipment are described in Figure 2-4.



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Figure 2-4 Symbols Used on Control Unit

Section 3

Installation

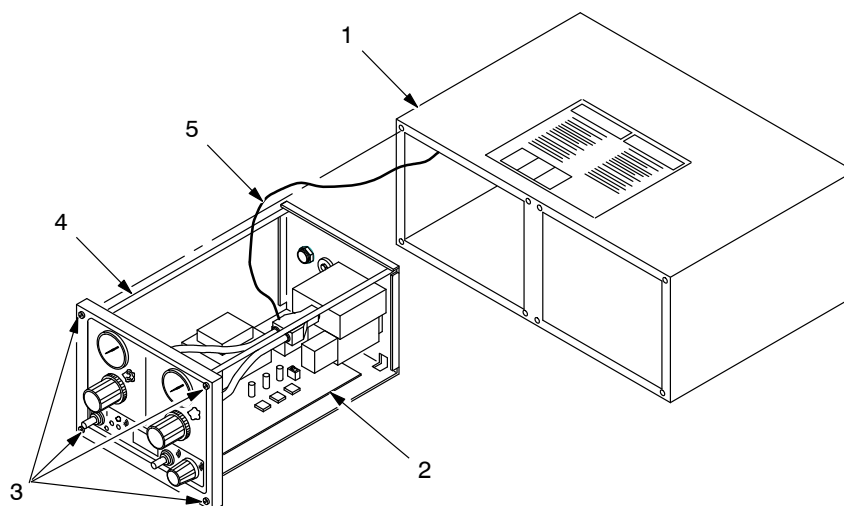


WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Circuit Board Setup

Before putting the control unit into service, switches on the circuit board must be set for the correct input voltage, triggering method, and solenoid activation timing, depending on your system configuration and the Tribomatic spray gun used with the unit. It is easier to set these switches before connecting power and air to the control unit.

1. Loosen the captive screws (3) securing the control module (4) to the cabinet (1). Slide the control module out of the cabinet and disconnect the ground wire (5) from the module, if necessary.



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Figure 3-1 Removing the Control Module from the Cabinet

- | | | |
|------------------|-------------------|----------------|
| 1. Cabinet | 3. Captive screws | 5. Ground wire |
| 2. Circuit board | 4. Control module | |

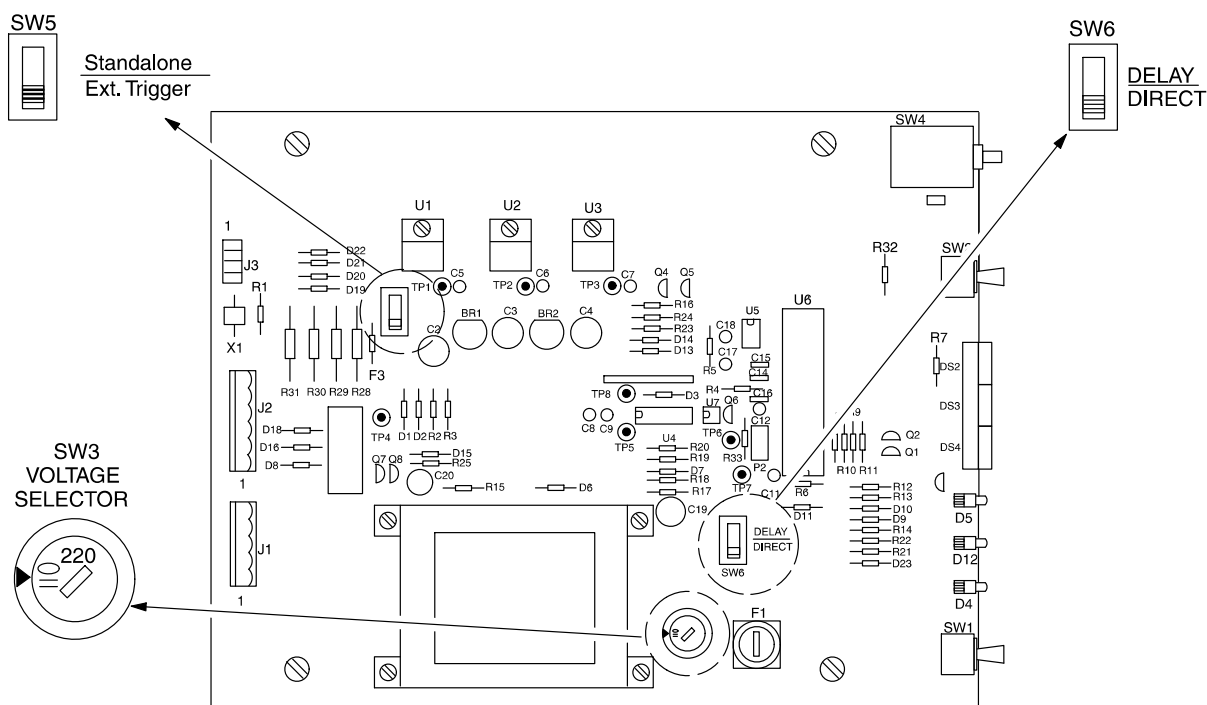
Circuit Board Setup *(contd)*

- See Figure 3-2. and refer to Table 3-1 to set the switches.
- Slide the electronic control module back into the cabinet and tighten the captive screws at the four corners of the front panel.

NOTE: To maintain a dust-free environment inside the cabinet, make sure the front- and rear-panel gaskets are undamaged and in place before installing the control module in the cabinet.

Table 3-1 Jumper Block and Switch Settings

Switch SW3 — Set the switch to input voltage as follows:	
110	100–120 Vac nominal input power. Units are shipped set for 110 Vac or local voltage.
220	200–240 Vac nominal input power.
NOTE: Input voltage must be 100–120 or 200–240 Vac ($\pm 10\%$), 50/60 Hz, 1 ϕ $\geq$	
Switch SW5 — Set the switch to the correct position for your application:	
Stand Alone	The power switch will activate the unit and start air flowing to the pump and diffuser.
Ext. Trigger	The control unit will be controlled by a master control unit or other device.
Switch SW6 — This switch is not present on revision A or B circuit boards.	
DELAY	If using Tribomatic I automatic spray guns. The delay setting turns on flow rate air before diffuser air.
DIRECT	If using Tribomatic II spray guns.



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Figure 3-2 Circuit Board Setup

Mechanical Installation

Install the cabinet into an empty slot in a standard 19-inch equipment rack. Rails will be needed to support the weight of the cabinet. Secure the cabinet to the rack by installing properly sized screws through the brackets on the sides of the cabinet.

Electrical Connections



WARNING: Install a locking disconnect switch or breaker in the service line ahead of the equipment so power can be shut off during installation or repair.

NOTE: Units are shipped set for 110 Vac or local voltage. Make sure switch SW3 is set correctly before connecting electrical power to the control unit.



CAUTION: Equipment damage may occur if the control unit is connected to any line voltage other than that stated on the ID plate.



WARNING: If the control unit is within the spray area or any area defined as hazardous, disconnect electrical power at a breaker or disconnect in the service line ahead of the control unit before disconnecting the power cord from an outlet.

1. See Figure 3-3. Connect the unit's power cord according to the following table.

Externally Triggered Units		Standalone Units
a. Plug the power cord into the POWER INPUT receptacle on the rear panel.		a. Plug the power cord into the POWER INPUT receptacle on the rear panel.
b. Route the power cord through a dust-tight strain-relief connector in the rear panel of the master control unit.		b. Cut the black and white leads off at the cord insulation.
c. Connect the leads to one of the plug connectors on the master control unit's distribution board exactly as described below.		c. Connect the brown, blue, and green/yellow wires to a three-pronged power plug. Wire functions as described below.
		d. Plug the cord into a socket. Make sure the voltage supplied is correct.
M/C Connection	Function	Wire Color
L (L1)	Line (Hot)	Brown
N (L2)	Neutral	Blue
PE (GND)	Ground	Green/Yellow
A/P	Alarm	Black
TRIG	External Trigger	White

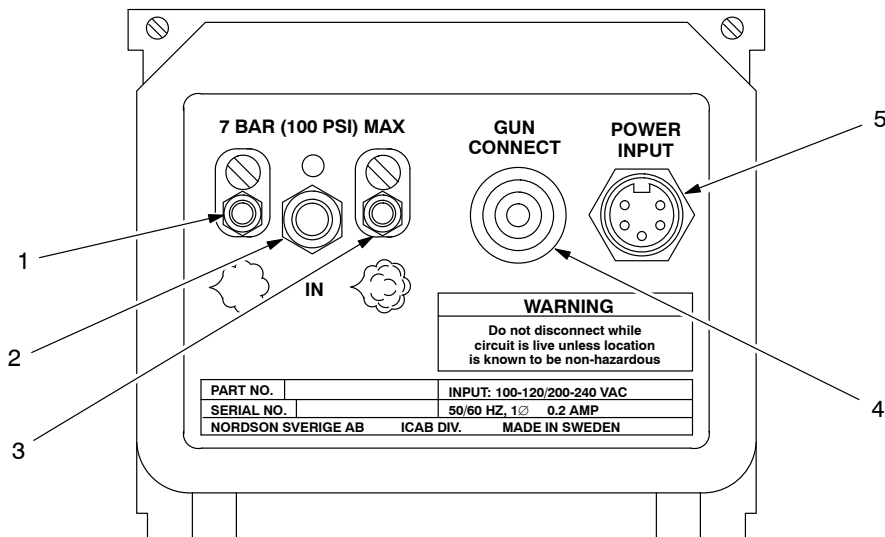
2. Connect the gun ground wire to the GUN CONNECT stud on the rear panel.

Electrical Connections *(contd)*



WARNING: The gun must always be connected to ground through the gun cable and control unit when spraying powder or cleaning the gun with compressed air. Without a ground connection the gun will become electrostatically charged. Personnel touching the gun could receive a shock.

3. Connect the ground strap furnished with the control unit to the ground stud located on the rear of the cabinet. Secure the clamp to an earth ground or to the ground studs in the equipment rack. Make sure the rack is grounded.



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Figure 3-3 Electrical and Pneumatic Connections

- | | | |
|------------------------|--------------------------|--------------------------|
| 1. Diffuser air output | 3. Flow rate air output | 5. Power cord receptacle |
| 2. Air input | 4. Gun ground connection | |

Pneumatic Connections

The maximum input air pressure is 7 bar (100 psi). Air must be clean and dry. Refer to the *Description* section for recommendations on air filtering and conditioning equipment.

Air Type	Tubing size	From	To
Input	10-mm	IN connector (2) on the rear pane	air supply or rack manifold
Flow rate	6-mm	 Flow rate connection (1) on rear panel	"F" connection on powder pump
Diffuser	6-mm	 Diffuser connection (3) on rear panel	Diffuser connection on spray gun
NOTE: Install a shut-off valve in the supply line in front of the manifold or control unit.			

Section 4

Operation



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

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

The system must be connected to safety interlocks which will shut it down if a fire is detected or the booth fan shuts down.

Flow Rate and Diffuser Air Pressure Settings

Flow rate and diffuser air pressures are two variables that affect system performance and coating quality. You will use powder more economically and obtain better quality coatings as you gain experience setting air pressures.

Table 4-1 Flow Rate and Diffuser Air Pressure Settings

Air Type	Symbol	Initial Setting	Function	Adjusting the Pressure
Flow Rate		1.8 bar (26 psi)	Controls the volume of the powder delivered to the spray gun.	Increasing will increase the amount of powder sprayed and the film build on the parts. If the pressure is too high: • powder will not wrap around part edges • too much powder will be sprayed • pump and spray gun parts will wear faster
Diffuser		2.5 bar (36 psi)	Controls the density (powder-to-air ratio) and velocity of the powder through the spray gun.	Increasing will decrease the density of the powder and increase the powder charge. If the pressure is too high the spray gun parts may wear faster. Decreasing will increase the density of the powder-and provide better coverage. If the pressure is too low the powder may clog the spray gun passages.

Startup

Before spraying powder, make sure the booth vent fans are on, the powder recovery system is operating, and the powder in the feed hopper is thoroughly fluidized.

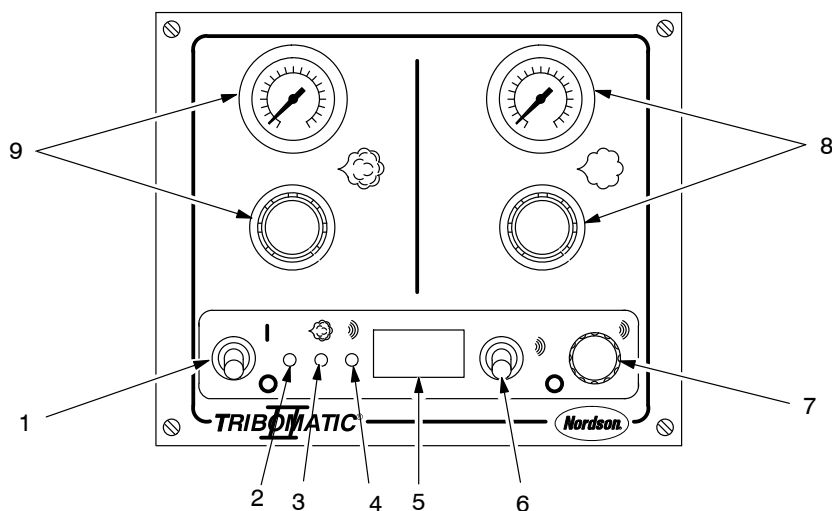


WARNING: All electrically conductive equipment in the spray area must be grounded. Ungrounded or poorly grounded equipment can store an electrostatic charge which can give personnel a severe shock, or arc and cause a fire or explosion.

1. Turn on the system electrical power and air supply.
2. Turn on the master control unit. If the control unit is set up to operate independently (standalone), disregard this step.
3. See Figure 4-1. Turn on the control unit power switch (1). The power (2) and powder (3) LEDs will light.
4. Set the flow-rate and diffuser air pressures as described in Table 4-1. Adjust these pressures for economical powder use, desired film build, type of powder used, spray room humidity, and other operating variables.

NOTE: High air pressures will cause powder contact surfaces to wear faster. Operate the powder spray system at the lowest possible air pressures.

5. Spray powder on a part and observe the spray pattern and film build. Adjust the flow rate and diffuser air pressures until you obtain the spray pattern and film build desired.
6. Note the μA output shown on the digital display (5). Press up on the switch (6) to display the low-charge alarm setting.
7. Turn the low-charge alarm potentiometer (7) to set the low-charge alarm to $0.5 \mu\text{A}$ below the μA output. Release the switch to return to the μA output display.
8. Record the flow rate and diffuser air pressures, the powder type, and the μA output on the chart furnished at the end of this section. Use these values to set air pressures the next time the same powder is used and to monitor the powder charge.



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Figure 4-1 Front Panel Controls

- | | | |
|-----------------|----------------------------|--------------------------------------|
| 1. Power switch | 4. Low-charge alarm LED | 7. Low-charge alarm potentiometer |
| 2. Power LED | 5. Digital display | 8. Diffuser air regulator and gauge |
| 3. Powder LED | 6. Display function switch | 9. Flow-rate air regulator and gauge |

Shutdown

Master Control Unit: Turn it off. This will shut off all the control units connected to it.

Control unit is set up as a standalone unit: Turn off the control unit power switch.

Maintenance

Exercise good housekeeping practices with all components of a powder spray system. Dust and powder accumulating on electrostatic equipment can cause malfunctions and fire and shock hazards. Clean the entire system and surrounding area periodically. Make the following procedures part of a scheduled maintenance program.



WARNING: Do not disconnect the power cord from the control unit while power is on if the unit is in a hazardous location.

Daily	• Open the supply line drain valve to check for water and oil in the air supply. • Drain the air filters. Refer to the air dryer manual for maintenance procedures. • Make sure all system safety interlocks and fire detection systems are connected and functioning properly.
Weekly	• Check the module-to-cabinet and cabinet-to-ground connections. Losing the ground connection will affect transfer efficiency and create a safety hazard. • Clean powder and dust off the control unit cabinet with a clean cloth or brush.

Control Unit Settings

Use this chart to record your control unit settings and μA output for different powders and parts. This chart can be copied and posted next to the control unit. Significant deviations from the recorded μA output could indicate problems with the powder, air pressures, or gun.

[illegible]

Section 5

Troubleshooting



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

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.

Designations such as SW1 and U3 given in the troubleshooting procedures refer to components on the circuit board. Refer to the following illustrations for help in troubleshooting.

Figure	Description
Figure 5-1	Circuit board test points, switches, and fuses
Figure 5-2	Control unit wiring diagram



WARNING: Electrical power must be on to check voltages. Touching energized electrical components could be fatal. The troubleshooting procedures in this section must be performed only by qualified personnel.

Problem	Possible Cause	Corrective Action
1. All LED's off, no display	No input power SW1 (power switch) off or open Blown fuse F1 SW3 (voltage selector switch) not set properly	Check for appropriate input power on J1-1 and J1-2. Check SW1 for proper operation. Correct overload problem and replace fuse F1. Make sure SW3 is set for input voltage.
2. Power LED off, powder LED on	LED D4 or regulator U3 failed	Replace the circuit board.
3. Powder LED off, display on	LED D12, U7, or Q6 failed	Replace the circuit board.
4. Display off, powder LED on	Q3 or U6 failed	Replace the circuit board.
5. No air output, green powder LED on	Bad solenoid connection Solenoid coil open	Check for loose connection at J2 or broken solenoid leads. Replace the solenoid valve.
Continued...		

Problem	Possible Cause	Corrective Action
6. No air output, green powder LED off, all other LEDs on	D8 or Q7 failed	Replace the circuit board.
7. Powder LED off, display off, all other LEDs on	SW5 (trigger switch) in wrong position TP1 is less than -11.5 volts DC TP2 is less than +11.5 volts DC U4 or Q6 failed	Place SW5 in proper position. Replace the circuit board. Replace the circuit board. Replace the circuit board.
8. No alarm function	SW4, U4, or Q4 failed	Replace the circuit board.
9. Display reads zero μA, powder charging normally	Gun ground wire shorted or open, or poor connection	Check ground wire continuity and connection at rear panel and at J3; repair or replace as necessary.
10. Display reads zero μA, loss of wrap, transfer efficiency	U6 failed Gun ground wire shorted or open, or poor connection Powder not suitable for tribo-charging	Replace the circuit board. Check ground wire continuity and connections; repair or replace as necessary. Consult your powder manufacturer.
11. Loss of wrap, poor transfer efficiency	Poorly grounded parts Powder not suitable for tribo-charging	Measure resistance between the parts and ground with a megohmmeter. Resistance should not be greater than one megohm. Clean the hangers and conveyor if necessary. Consult your powder manufacturer.
12. Powder continues to flow when power is turned off	Solenoid valve exhaust vent plugged Solenoid valve(s) dirty, stuck open Solenoid valve spring broken	Make sure the exhaust vent is not blocked. Remove the manifold and clean passageways. Replace the valve, check air filters and dryer. Make sure the air is clean and dry. Replace the solenoid valve.

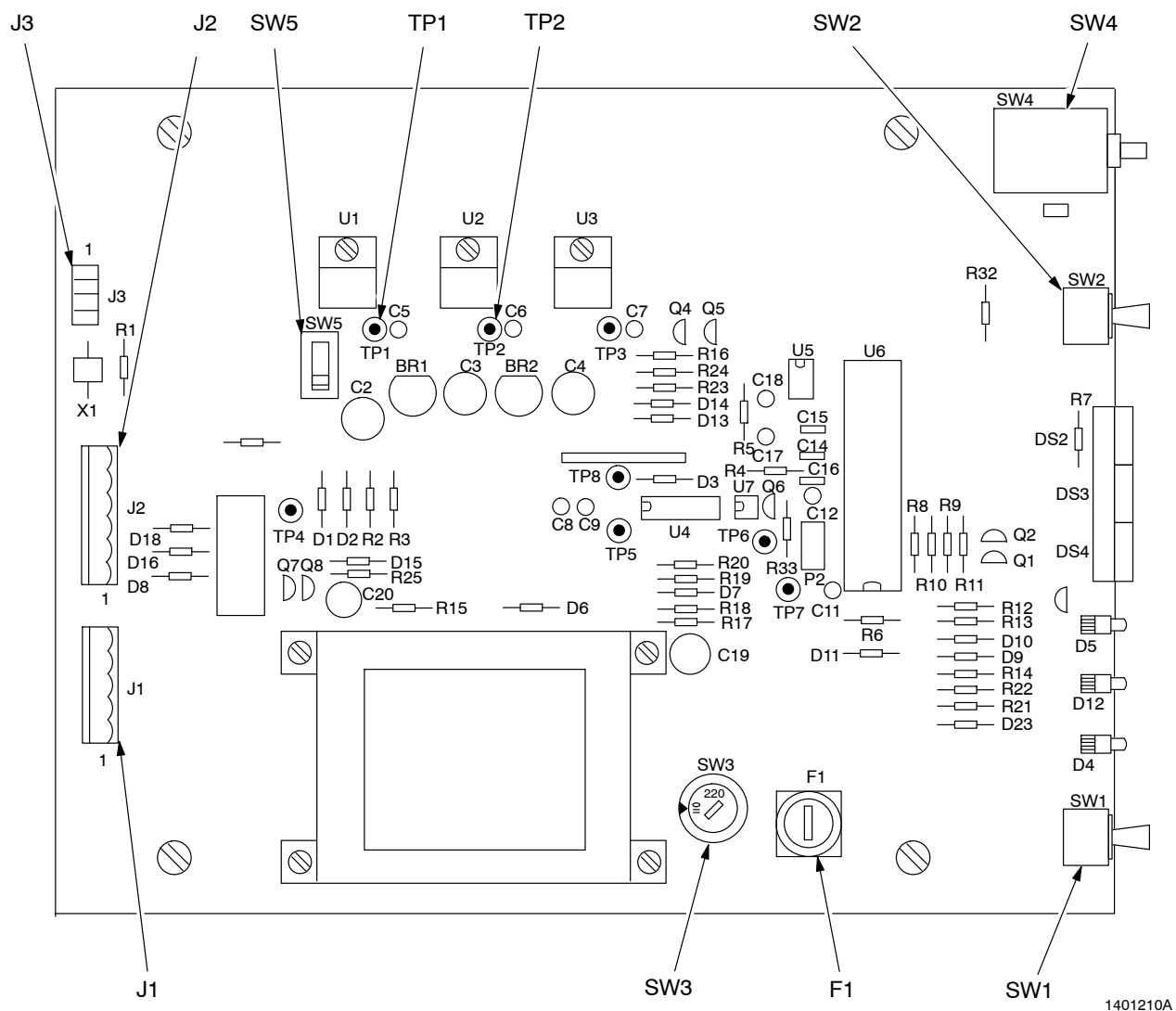
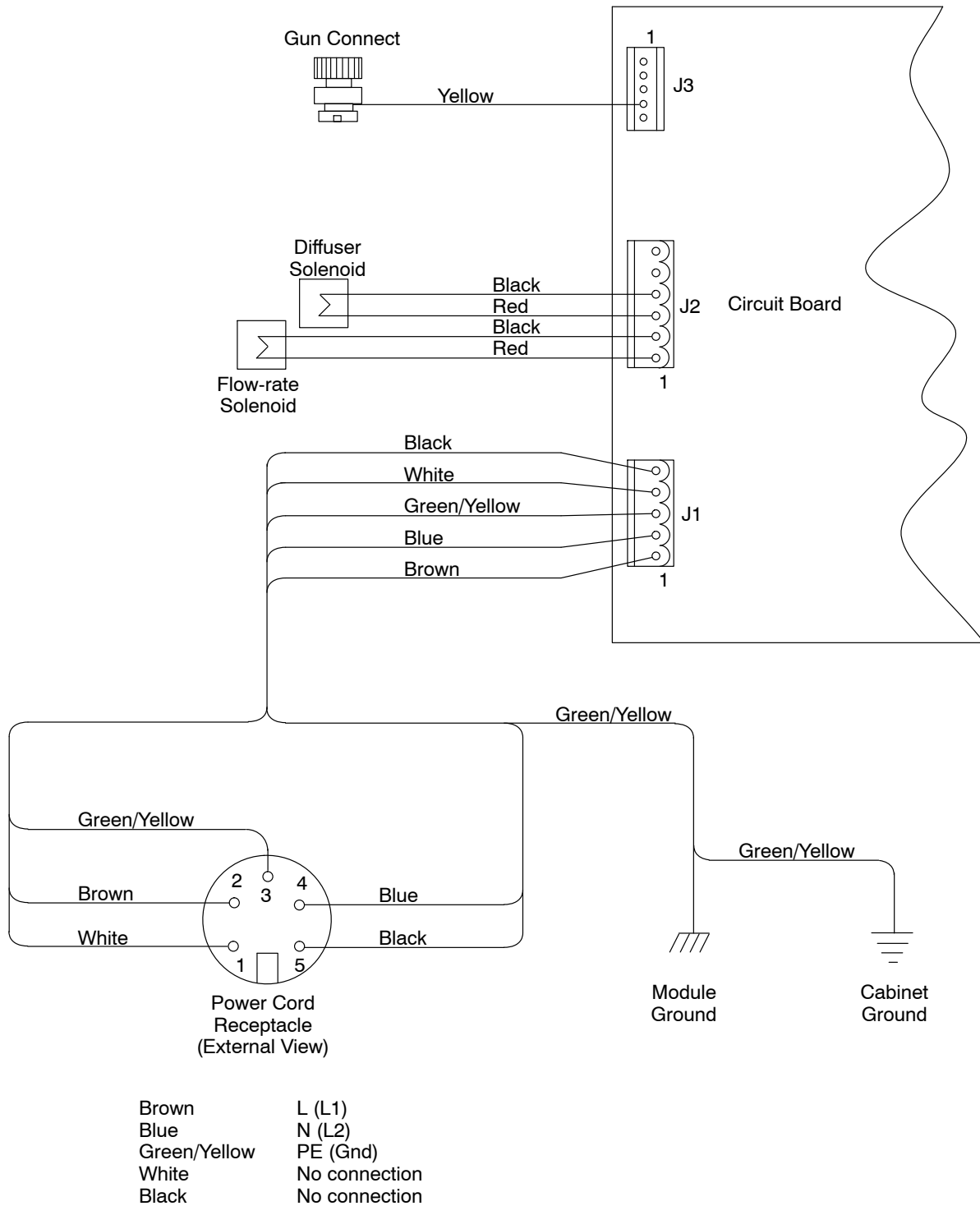


Figure 5-1 Circuit Board Test Points, Switches, and Fuses



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Figure 5-2 Control Unit Wiring Diagram

Section 6

Repair

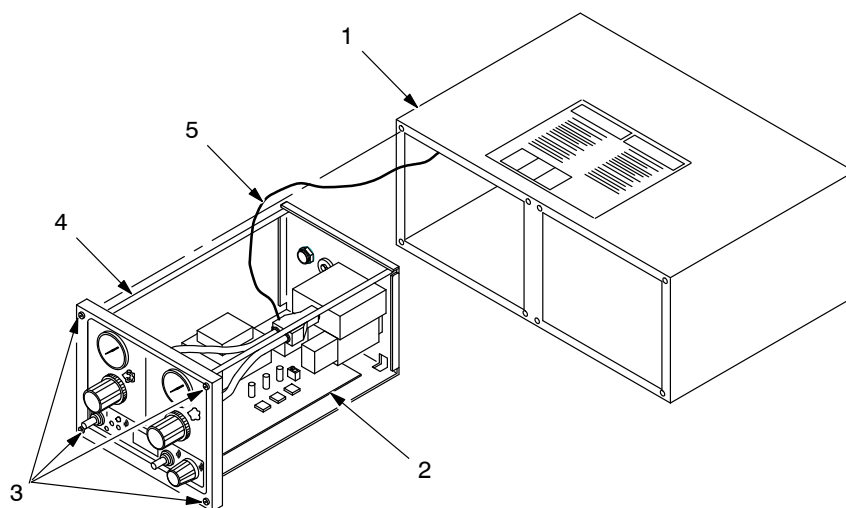


WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

NOTE: A dust-free environment must be maintained inside the control unit cabinet. Always make sure all gaskets (front and rear panels, gauges, regulators, switches, and manifold) are in good condition.

Control Module Removal

1. Disconnect the power cables, gun ground wires, and all air tubing from the control unit. Disconnect the cabinet ground from the equipment rack. Remove the cabinet from the rack.
2. See Figure 6-1. Loosen the four captive screws (3) securing the control module (4) to the cabinet (1).
3. Slide the control module out of the cabinet. Disconnect the cabinet ground wire (5) from the module.



1401207A

Figure 6-1 Removing Control Module from Cabinet

- | | | |
|------------------|-------------------|----------------|
| 1. Cabinet | 3. Captive screws | 5. Ground wire |
| 2. Circuit board | 4. Control module | |

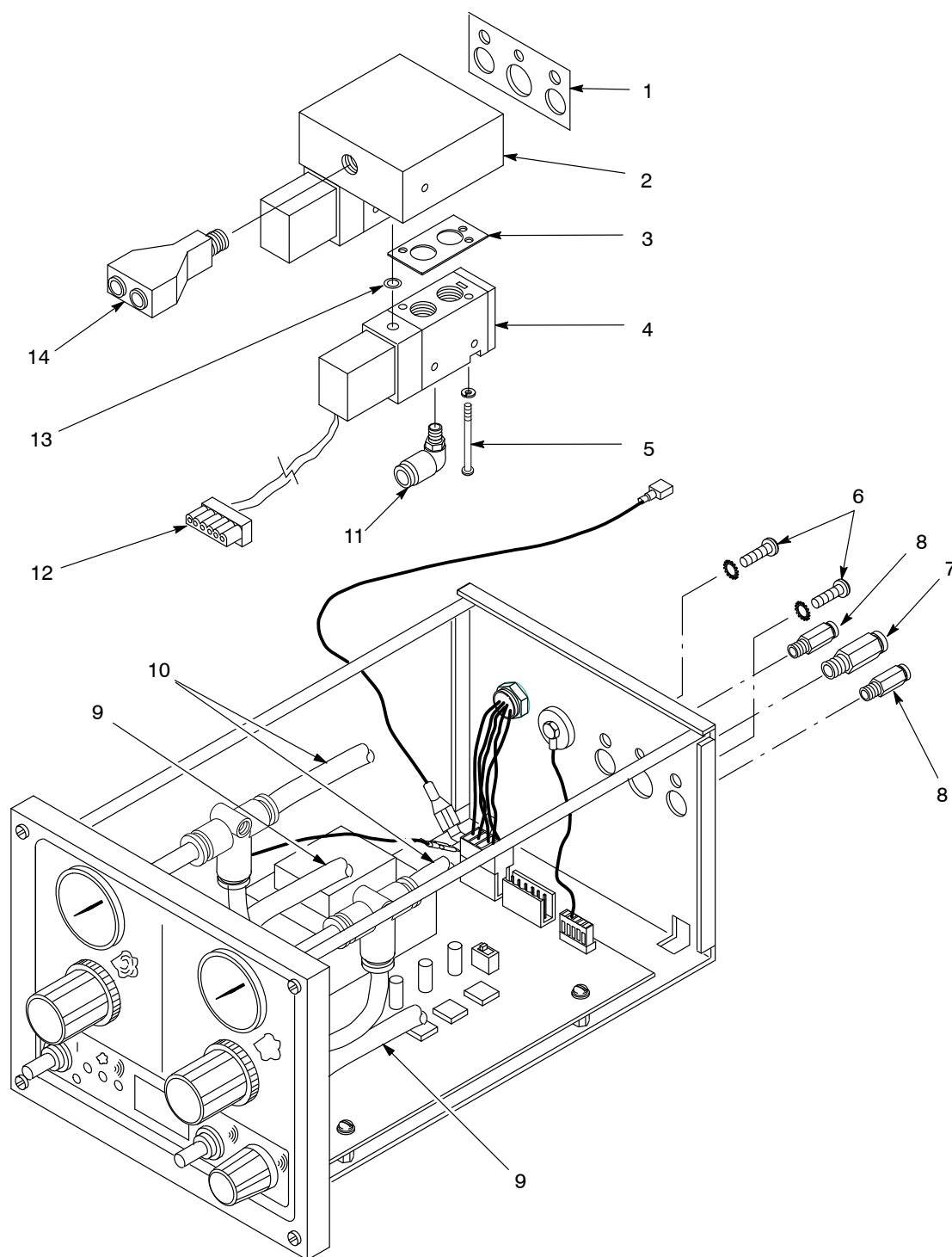
Solenoid Valve Replacement

Remove the Solenoid Valve

1. Remove the control module from the cabinet as described in *Control Module Removal* on page 6-1.
2. See Figure 6-2. Disconnect the air tubing (9) from the Y-connector (14) in the manifold (2) and the tubing (10) from the elbows (11).
3. Remove the 10- and 6-mm straight tube fittings (7, 8) from the rear panel. Save the fittings for reuse.
4. Disconnect the plug connector (12) from the J2 connector on the circuit board.
5. Remove the two screws and washers (6) securing the manifold to the rear panel. Remove the manifold and panel gasket (1). Save the screws and washers for reuse.
6. Remove the screws and washers (5) securing the solenoid valves to the manifold. Save the screws and washers for reuse.
7. Remove the solenoid valves, gaskets (3), and O-rings (13) from the manifold. Save the gaskets and O-rings for reuse, if they are undamaged.
8. Disconnect the solenoid valve leads from the plug connector (12).
9. Remove the elbow fittings (11) from the solenoid valves.

Install the Solenoid Valve

1. Wrap the elbow fitting threads with PTFE tape and screw them into the new solenoid valves. Tighten the fittings securely.
2. Connect the new solenoid valve leads to the plug connector (12) as shown in Figure 6-2.
3. Install the O-rings (13) into the grooves in the manifold. Install the gaskets (3) on the solenoid valves. Make sure the gaskets are oriented so the square holes in the valves are not blocked. Insert the screws and washers (5) through the solenoid valves and gaskets to hold the gaskets in place.
4. Install the solenoid valves and gaskets on the manifold (2). Thread the screws into the manifold and tighten them securely.
5. Hold the panel gasket (1) and manifold up against the rear panel. Thread the screws and washers (6) into the manifold.
6. Wrap the straight tube fitting threads (7, 8) with PTFE tape, and thread them into the manifold.
7. Tighten the screws and fittings (6, 7, 8) securely.
8. Connect the plug connector to the J2 connector on the circuit board.
9. Connect the air tubing to the Y connector and elbow fittings.
10. Install the control module in the cabinet.



1401212B

Figure 6-2 Solenoid Valve Replacement

- | | | |
|---------------------------|------------------------------|--------------------|
| 1. Panel gasket | 6. Screws and lock washers | 11. Elbow fittings |
| 2. Manifold | 7. 10-mm straight fitting | 12. Plug connector |
| 3. Gasket | 8. 6-mm straight fittings | 13. O-ring |
| 4. Solenoid valve | 9. Tubing to Y-connector | 14. Y-connector |
| 5. Screws and lockwashers | 10. Tubing to elbow fittings | |

Air Gauge Replacement

NOTE: Replace the gauges one at a time to avoid crossing air tubing.

See Figure 6-3. Two types of air gauges are available for the control unit.

Air Gauge Part 631123 (Barbed Fitting)

Remove the Air Gauge

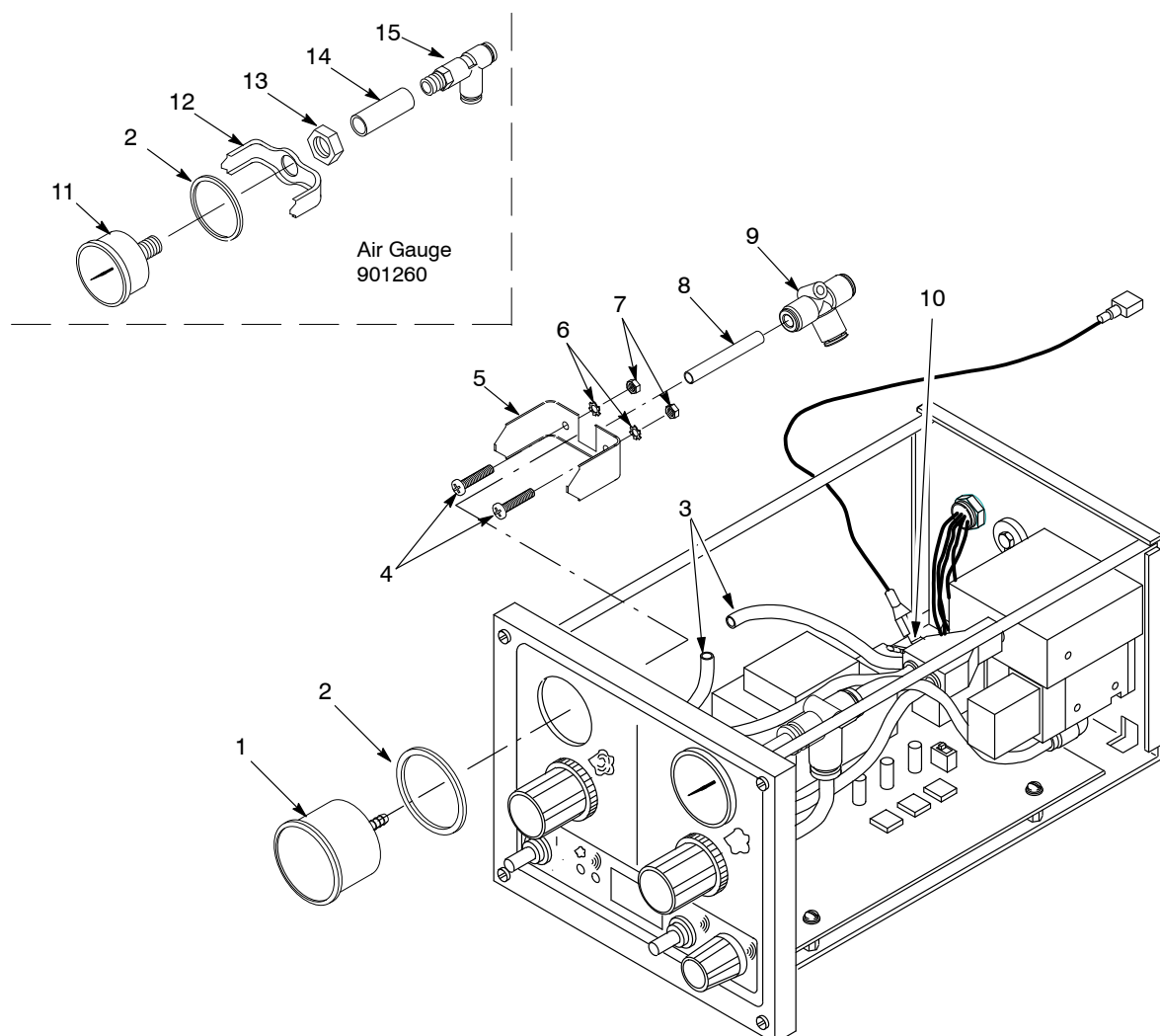
1. Remove the control module from the cabinet as described in *Control Module Removal* on page 6-1.
2. Disconnect the air tubing (3) from the tee (9).
3. Pull the 6-mm tubing (8) and tee from the air gauge (1).
4. Separate the 6-mm tubing and tee.
5. Remove the screws (4), lock washers (6), and nuts (7) from the gauge bracket (5).

NOTE: The bracket, screws, lock washers and nuts hold the gauge against the front panel so hold onto the air gauge as these parts are removed.

6. Remove the gauge and gasket (2) from the front panel. Save the gasket for reuse, if it is undamaged.

Install the Air Gauge

1. Install the gasket (2) behind the gauge bezel. Install the gauge (1) through the front panel.
2. Install the screws (4), lock washers (6), and nuts (7) onto the gauge bracket (5) then set this assembly in place onto the air gauge. Tighten the nuts to hold the gauge against the front panel. Use a wrench on the flats on the back side of the gauge to prevent it from turning while tightening the nuts.
3. Push the 6-mm tubing (8) onto the barbed fitting of the air gauge.
4. Push the opposite end of the 6-mm tubing into the tee (9).
5. Connect the air tubing (3) to the tee.
6. Check the resistance between the gauge body and the module ground stud (10) with an ohmmeter. The resistance should not exceed one ohm.



1401213B

Figure 6-3 Air Gauge Replacement

- | | | |
|---------------------------|------------------------|----------------------------|
| 1. Air gauge, part 631123 | 6. Lock washers | 11. Air gauge, part 901260 |
| 2. Gasket | 7. Nuts | 12. Gauge bracket |
| 3. Air tubing | 8. 6-mm tubing | 13. Nut |
| 4. Screws | 9. Tee | 14. Coupling |
| 5. Gauge bracket | 10. Module ground stud | 15. Tee |

Air Gauge Part 901260 (Threaded Fitting)

NOTE: Older models of the control unit use this air gauge with a threaded fitting.

Remove the Air Gauge

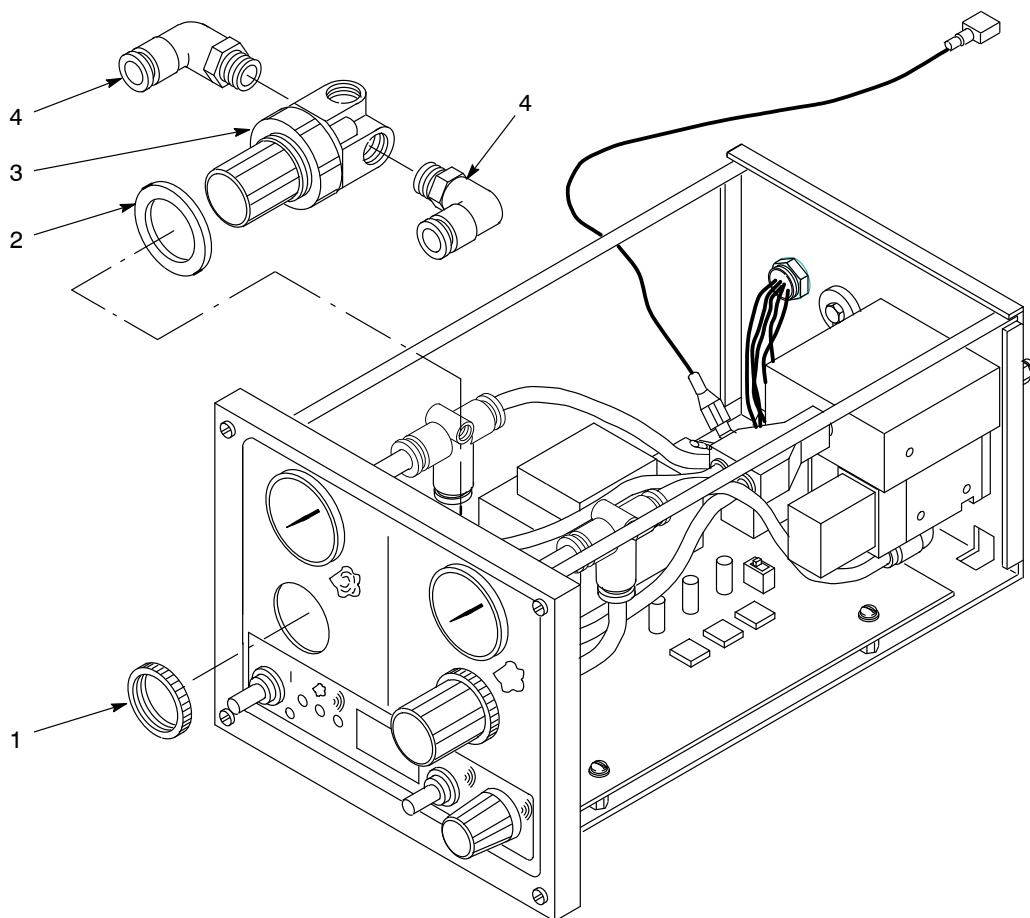
1. Remove the control module from the cabinet as described in *Control Module Removal* on page 6-1.
2. Disconnect the air tubing (3) from the tee (15).
3. Remove the tee and coupling (14) from the air gauge (11).
4. Remove the nut (13) and bracket (12) from the gauge.
5. Remove the gauge and gasket (2) from the front panel. Save the gasket for reuse, if it is undamaged.
6. Remove the nut and bracket from the new air gauge. Wrap the gauge threads with PTFE tape.

Install the Air Gauge

1. Install the gasket (2) behind the gauge bezel. Install the gauge (11) through the front panel.
2. Install the gauge bracket (12) and nut (13) on the gauge. Tighten the nut to hold the gauge against the front panel. Use a wrench on the flats on the back side of the gauge to prevent it from turning while tightening the nut.
3. Thread the coupling (14) onto the gauge and tighten securely.
4. Wrap the tee (15) threads with PTFE tape. Thread the tee into the end of the coupling and tighten securely.
5. Connect the air tubing (3) to the tee.
6. Check the resistance between the gauge body and the module ground stud (10) with an ohmmeter. The resistance should not exceed one ohm.

Air Regulator Replacement

1. Remove the control module from the cabinet as described in *Control Module Removal* on page 6-1.
2. See Figure 6-4. Disconnect the air tubing from the regulator elbow fitting (4).
3. Unscrew the knurled locking nut (1) from the regulator.
4. Remove the regulator (3) and gasket (2) from the front panel. Save the gasket for reuse, if undamaged.
5. Remove the elbow fitting from the regulator.
6. Wrap the elbow fitting threads with PTFE tape and install them in the new regulator.
7. Install the gasket on the new regulator.
8. Install the regulator in the front panel and secure them with the knurled locking nut.
9. Connect the air tubing to the elbows.



1401214B

Figure 6-4 Air Regulator Replacement

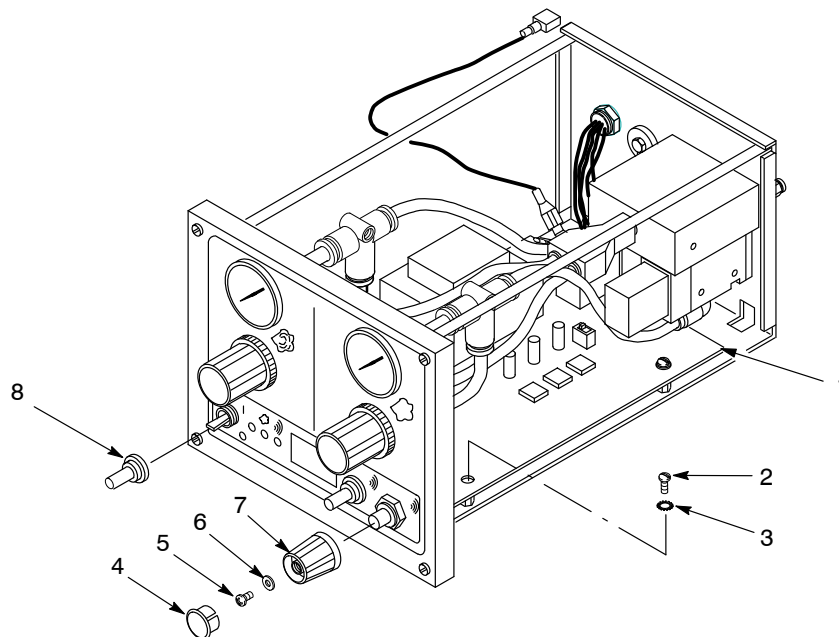
1. Knurled locking nut
2. Gasket

3. Regulator

4. Elbow fitting

Circuit Board Replacement

1. Remove the control module from the cabinet as described in *Control Module Removal* on page 6-1.
2. Disconnect the plug connectors from the J1, J2, and J3 connectors on the circuit board (1).
3. See Figure 6-5. Remove the dust-cover nuts (8) from the two toggle switches. Save the nuts for reuse.
4. Remove the cap, screw, washer, and knob (4, 5, 6, 7) from the low-charge alarm potentiometer. Save them for reuse.
5. Remove the four screws and toothed washers (2, 3), then carefully remove the circuit board from the module. Save the screws and washers for reuse.
6. Position the new circuit board on the module standoffs and secure it with the screws and washers removed in step 5. Do not over-tighten the screws or you will damage the circuit board.
7. Connect the plug connectors to the J1, J2, and J3 connectors on the circuit board.
8. Install the dust-cover nuts on the toggle switches.
9. Secure the knob to the low-charge alarm potentiometer with the screw and washer. Install the cap on the knob.
10. Install the control module in the cabinet.



1401215B

Figure 6-5 Circuit Board Replacement

- | | | |
|--------------------|-----------|--------------------|
| 1. Circuit board | 4. Cap | 7. Knob |
| 2. Screws | 5. Screw | 8. Dust-cover nuts |
| 3. Toothed washers | 6. Washer | |

Section 7

Parts

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 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.

- 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.

Item	Part	Description	Quantity	Note
—	0000000	Assembly	1	
1	000000	• Subassembly	2	A
2	000000	• • Part	1	

Tribomatic II Single and Dual Control Units

See Figure 7-1.

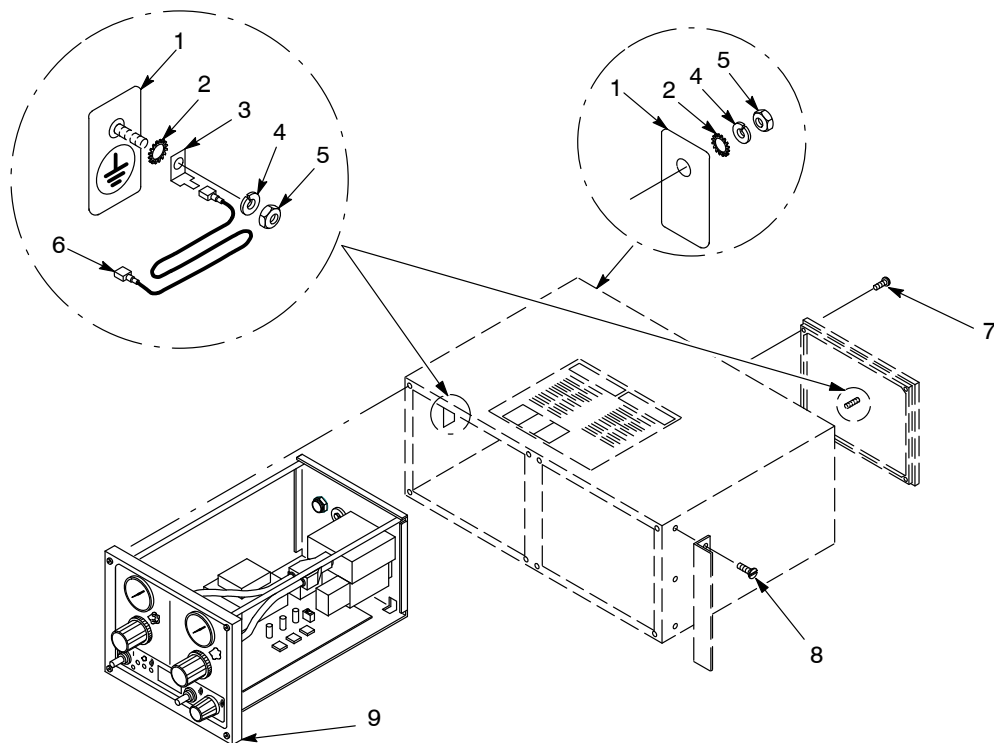
Item	Part	Description	Quantity	Note
—	631152	CONTROL UNIT, 1 module, Tribomatic II	1	
—	631153	CONTROL UNIT, 2 module, Tribomatic II	1	
1	240674	• TAG, ground	AR	
2	983021	• WASHER, flat, external, 0.203 x 0.406 in.	AR	
3	933469	• LUG, terminal, 90°, tab	AR	
4	983401	• LOCK WASHER, split, M5	AR	
5	984702	• NUT, hex, M5, brass	AR	
6	163443	• JUMPER, ground, cabinet	AR	
7	982284	• SCREW, captive, M5	AR	
8	982286	• SCREW, flat head, M5 x 10	6	
9	631100	• MODULE, control, T2, auto	AR	A
NS	130629	• CABLE, power, 5 wire, 6.5 ft, female	AR	B
NS	129541	• JUMPER, ground	AR	B
NS	971177	• CONNECTOR, straight, 1/4-in. NPT x 3/8-in. tube	AR	B

NOTE A: For parts breakdown, see Figure 7-2 and its parts list.

B: Noted parts are shipped loose. Use for rack installation.

AR: As Required

NS: Not Shown



1401216A

Figure 7-1 Tribomatic II Control Unit (Dual Module Cabinet Shown)

Control Module

See Figure 7-2.

Item	Part	Description	Quantity	Note
—	631100	MODULE, control, electronic, Tribomatic II, auto	1	
1	631142	• GASKET, manifold	1	
2	972837	• ELBOW, male, 6-mm tube x 1/8-in. BSPT	2	
3	630836	• CONNECTOR, main, chassis	1	
4	631149	• NUT, hex	1	
5	945063	• O-RING, 17 x 2 mm	1	
6	982245	• SCREW, M5 x 25	1	
7	983422	• WASHER, lock, internal, M5	5	
8	984706	• NUT, hex, M5	1	
9	631114	• INSULATOR, gun connector	2	
10	630073	• KNOB, gun connector	1	
11	982200	• SCREW, pan head, M5 x 10	2	
12	971196	• CONNECTOR, male, 10-mm tube x 1/4-in. BSPT	1	
13	971230	• CONNECTOR, male, 6-mm tube x 1/8-in. BSPT	2	
14	129600	• GASKET, rear panel	1	
15	933343	• CONNECTOR, plug, 5 pin	1	
16	631113	• WIRE, gun connect, auto	1	
17	631111	• CIRCUIT BOARD	1	
NS	939915	• • FUSE, 200 mA, slow-blow	1	
18	982164	• SCREW, pan head, M4 x 6	4	
19	983416	• LOCK WASHER, M4	4	
20	248741	• SEAL, shaft, rotary	1	
21	129593	• KNOB, collet, 21 mm, 1/4-in. shaft	1	
22	129585	• CAP, flat, 21 mm, with curved arrow	1	
23	631146	• COVER, dust, switch	2	
24	981387	• SCREW, captive, M5 x 21	4	
25	940073	• O-RING, Viton, 0.156 x 0.281 in.	4	
26	129583	• GASKET, bezel	1	
27	129591	• ROD, support	2	
28	630597	• TUBING, blue, 6-mm	AR	
29	130630	• JUMPER, ground, cabinet	1	
AR: As Required				
NS: Not Shown				
Continued...				

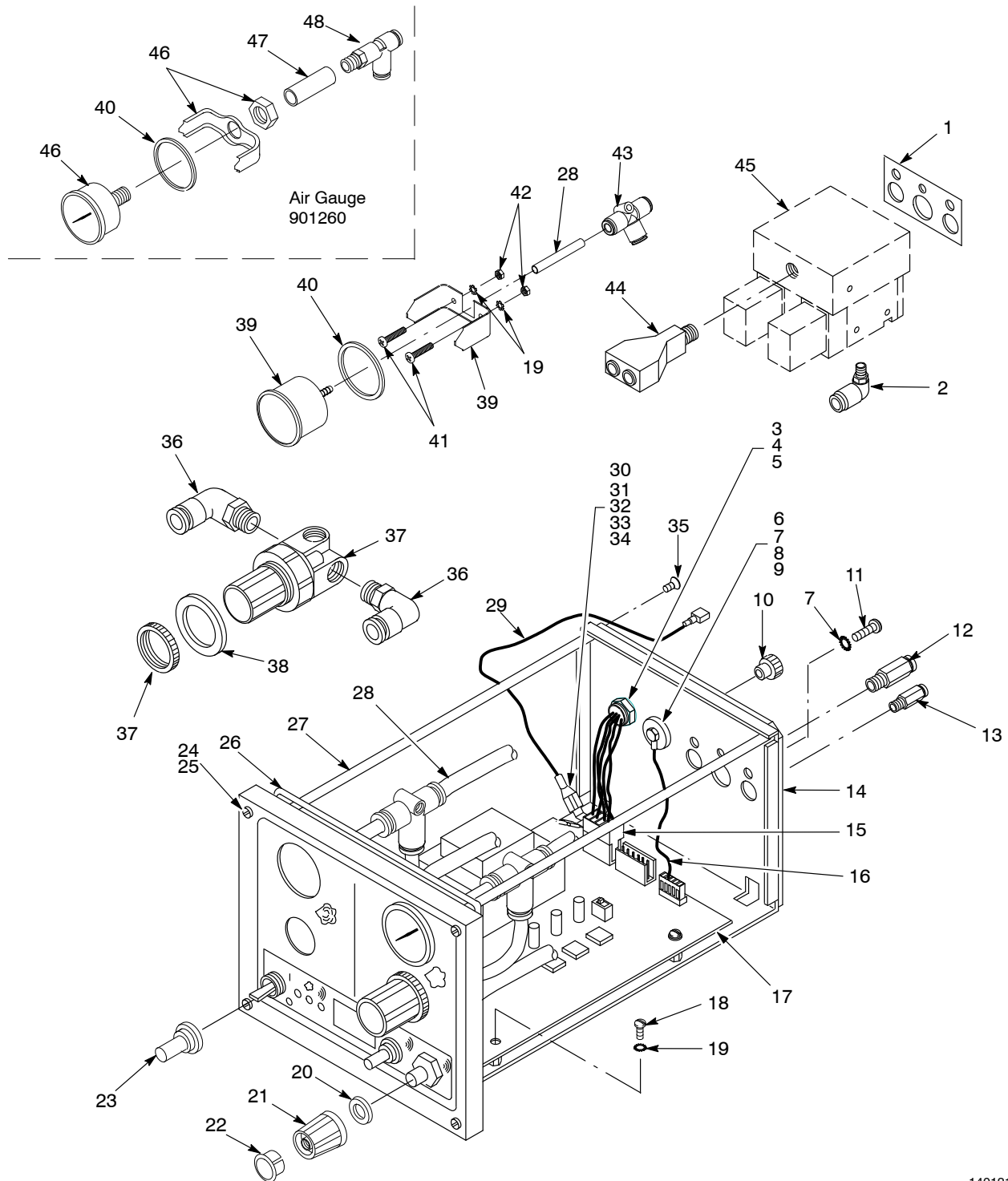
Control Module *(contd)*

Item	Part	Description	Quantity	Note
30	240674	• TAG, ground	1	
31	983021	• WASHER, flat, .203 x .406 in., brass	1	
32	983401	• LOCK WASHER, M5	1	
33	984702	• NUT, hex, M5, brass	1	
34	933156	• LUG, terminal	2	
35	982127	• SCREW, flat head, M4 x 8	2	
36	972838	• ELBOW, male, 6-mm tube x 1/4-in. BSPT	4	
37	630082	• VALVE, air regulator	2	
38	631139	• GASKET, regulator	2	
39	631123	• GAUGE, 0-7 bar	2	A
40	631138	• GASKET, gauge	2	
41	982069	• SCREW, pan head, M4 x 16	4	
42	984715	• NUT, hex, M4	4	
43	971114	• UNION TEE, 6-mm tube x 6-mm tube	2	
44	972839	• CONNECTOR, Y-branch, 6-mm tube x 1/4-in. BSPT	1	
45	631121	• SOLENOID ASSEMBLY, Tribomatic II	1	B
NOTE A: Older models of the control unit use air gauge, part 901260, with a threaded fitting. Refer to <i>Alternate Air Gauge</i> for part numbers and quantities for this air gauge. B: See Figure 7-3 and accompanying parts list. AR: As Required				

Alternate Air Gauge

See Figure 7-2.

Item	Part	Description	Quantity	Note
40	631138	• GASKET, gauge	2	
46	901260	• GAUGE, 0-7 bar	2	
47	973572	• COUPLING, pipe, hydraulic, 1/8-in.	2	
48	972840	• TEE, male run, 6-mm tube x 1/8-in. BSPT	2	



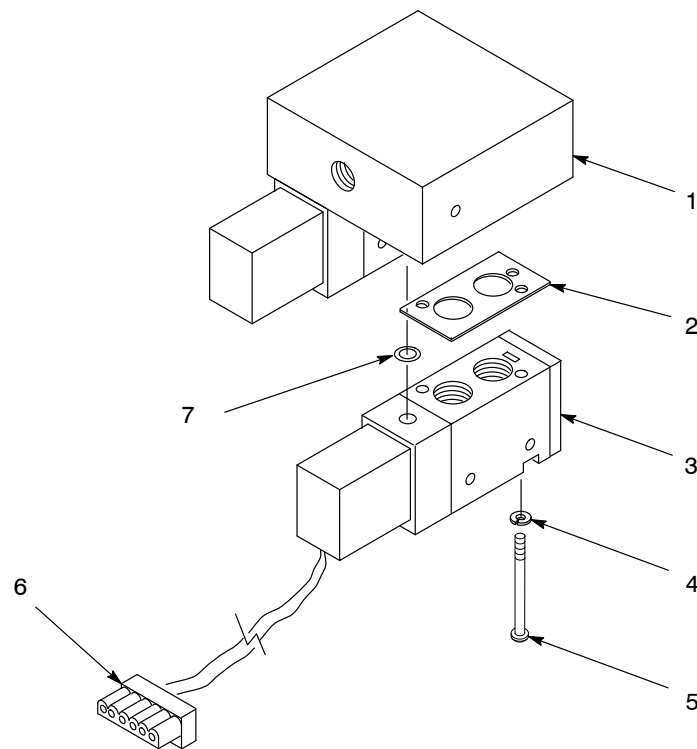
1401217B

Figure 7-2 Control Module

Solenoid Assembly

See Figure 7-3.

Item	Part	Description	Quantity	Note
—	631121	SOLENOID ASSEMBLY, T2	1	
1	631143	• MANIFOLD, T2	2	
2	630853	• GASKET, valve/base	2	
3	631144	• VALVE, solenoid	2	
4	983400	• LOCK WASHER, M3	4	
5	982192	• SCREW, pan head, M3 x 30	4	
6	933334	• CONNECTOR, plug, 6 pole	1	
7	945062	• O-RING, Viton, 7.1 x 1.6 mm	2	



1401218A

Figure 7-3 Solenoid Assembly