EXP-100M (Metric)
Electrostatic Power Unit

Customer Product Manual
Part 106715B

For parts and technical support, call the Industrial Coating Systems Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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Section 1

Safety

Section 1
Safety

1. 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.

2. 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.

3. 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

4. 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.

5. 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.
- While operating manual electrostatic spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- 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.

6. Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment in the spray area. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- 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.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- 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.

7. 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.

8. Disposal

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

Section 2

Description

Section 2
Description

1. Introduction

The EXP-100M (Metric) electrostatic power unit houses the electrical and pneumatic controls and voltage multiplier for Versa-Spray cable-fed electrostatic powder spray handguns. It can be mounted on a wheeled dolly along with a hopper or vibratory box feeder and pump, or on a booth wall or bracket at a manual touch-up station.

Features

- 30 to 100 kV output
- Vertical bar meter, displaying kV or microamp (μA) output
- LED indicators: main power, air, kV, μA
- Atomizing air regulator and gauge
- Flow-rate air regulator and gauge
- Auxiliary air regulator and gauge

2. Description

See Figure 2-1. The power unit is modular in design, featuring easy-to-remove individual modules.

- Electronic control module (1): houses the controls and circuit boards.
- Pneumatic control module (2): houses air regulators and gauges.
- Multiplier module (3): houses the voltage multiplier and connections for electrical power input and triggering.
- Pneumatic output module (4): houses the manifold block, solenoid valve, and pneumatic input and output fittings.

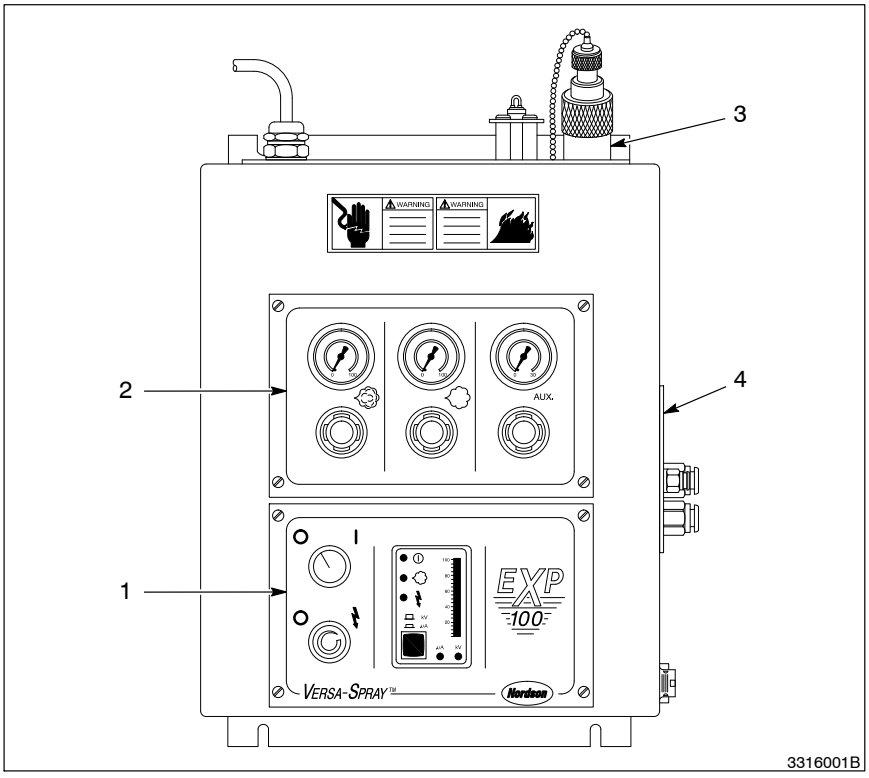

Fig. 2-1 Front View of EXP-100M Electrostatic Power Unit

1. Electronic control module
2. Pneumatic control module
3. Multiplier module
4. Pneumatic output module

Electrical Controls

The electronic control module houses the power supply and display circuit boards. On the front panel are the main power and high voltage (kV) controls and indicators used by the operator.

Depressing the kV/μA switch causes the vertical bar meter to display microamperes.

See Figure 2-2. The vertical bar meter (9) displays true kV output only when the cable is not connected to the multiplier well (no load). When the cable and gun are attached, the actual kV output is somewhat less than the vertical bar meter reading, due to the resistance of the cable and gun resistor.

NOTE: Record the μA reading when you first put a new gun and power unit into service. A significant increase in μA output means a probable short in the gun resistor, electrostatic cable, or multiplier. A significant decrease in μA output means that the multiplier or regulator board is failing.

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

Electrical Controls (contd)

A red LED on the internal regulator board lights when the kV switch (2) is turned on. It indicates that the circuits controlling the multiplier are functioning properly.

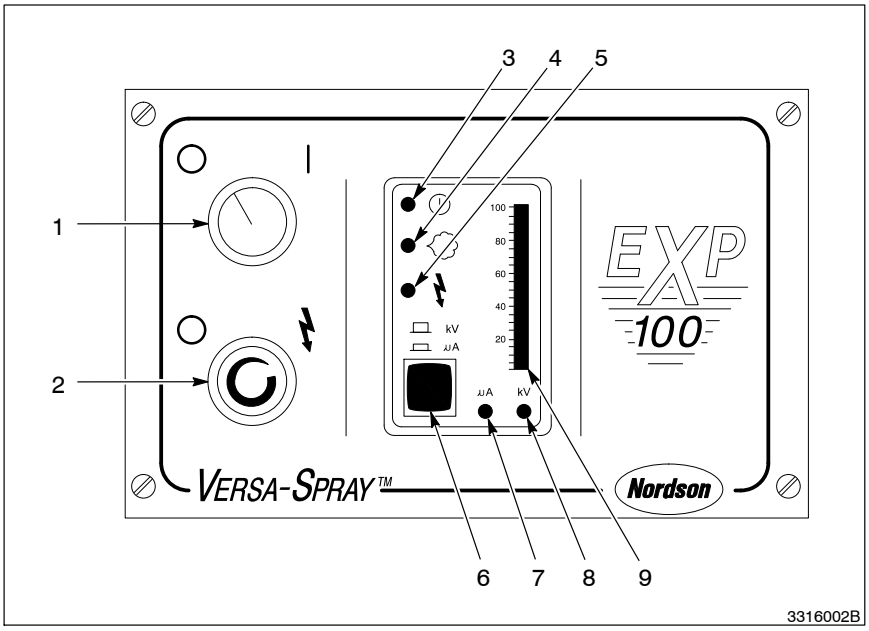

Fig. 2-2 Electronic Control Module Front Panel

1. Main power/switch
2. kV switch
3. Main power LED
4. Air on LED
5. kV on LED
6. kV µA switch
7. µA display LED
8. kV display LED
9. Vertical bar meter

Pneumatic Controls

See Figure 2-3. The flow of atomizing and flow-rate air are controlled by the solenoid valve inside the power unit cabinet. When the gun is triggered, this valve is energized, allowing air to flow to the powder pump.

NOTE: The regulators have locking knobs. Pull the knobs out to change the setting, push them back in to lock the setting in place.

The flow of auxiliary air is controlled by the operator. Turning the regulator knob clockwise will allow air to flow out the auxiliary air fitting on the side of the unit. This air is typically used for feed hopper fluidizing air, or to operate the vibrator motor on a Nordson vibratory box feeder.

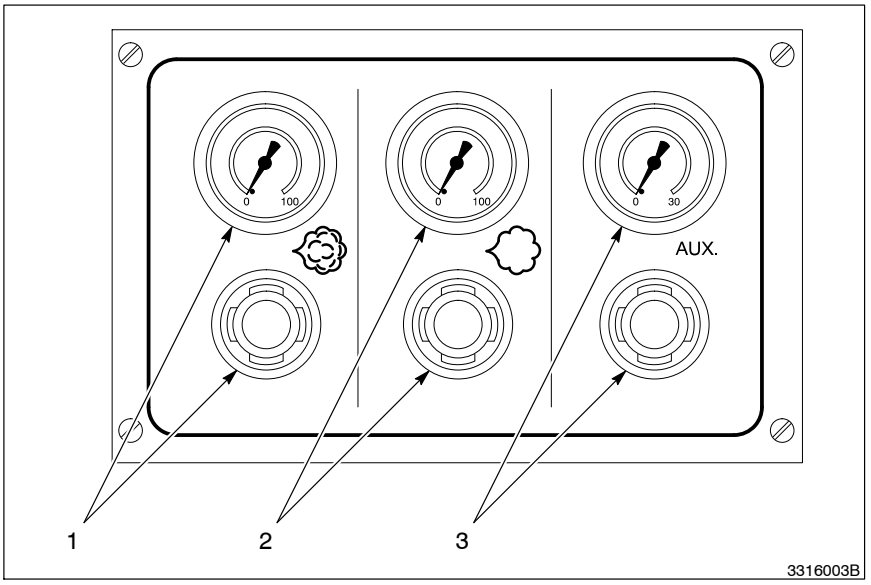

Fig. 2-3 Pneumatic Control Module Front Panel

1. Flow-rate air regulator and gauge
2. Atomizing air regulator and gauge
3. Auxiliary air regulator and gauge (fluidizing air)

Symbols

See Figure 2-4 for an explanation of the symbols used on the EXP-100M electrostatic power.

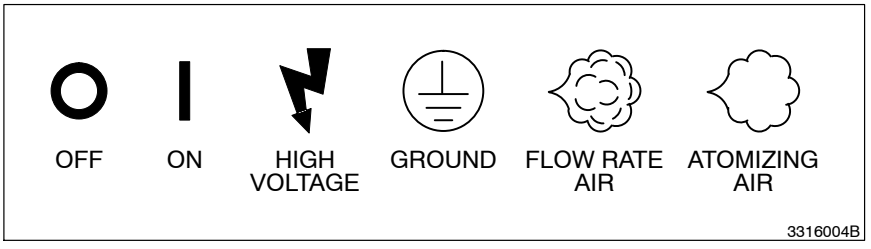

Fig. 2-4 Symbols Used on the EXP-100M Electrostatic Power Unit

3. Specifications

Electrical

Input:	100, 120, 220, 230, 240 Vac nominal, ± 10% at 50/60 Hz
Output:	30–100 kV dc
Short Circuit Output Current:	125 μA

Pneumatic

Minimum:	4.14 bar (60 psi)
Maximum:	6.89 bar (100 psi)

Air Quality Requirement

Air must be clean and dry. Use a regenerative dessicant or refrigerated air dryer capable of producing a 3.4 °C (38 °F) or lower dewpoint at 6.89 bar (100 psi), and a filter system with prefilters and coalescent type filters capable of removing oil, water, and dirt in the sub-micron range.

Moist or contaminated air can cause:

- the unit's solenoid valve to malfunction
- powder to cake and clog feed tubing, pump venturi throats and metering orifices, and gun passages
- grounding or arcing in the gun

Section 3

Installation

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.

1. Introduction

Included in this section are instructions and tips for:

- power supply board settings
- electrical connections
- electrostatic cable and trigger connections
- pneumatic connections

Before mounting your power unit make sure the power supply board jumpers are set for your input voltage and application. It is easier to do this before the unit is installed.

Install the unit on a wheeled dolly, spray booth wall, or operator's platform bracket, according to all applicable codes.

2. Circuit Board Setup

Factory Settings:

J3: 120 Vac
J4: Position 1–2
J8: W/MC

NOTE: Set J8 to the W/O position only when the power unit is used without a master control, and with an automatic gun. In this position, the unit's power switch will function as the trigger.

Setting Input Voltage

See Figure 3-1.

1. Loosen the captive screws at each corner of the electronic control module. Pull the module far enough out of the cabinet to reach the power supply circuit board.

2. Select the input voltage by installing the five-pin plug connector on J3 so the voltage is visible.

3. If your input voltage is lower than 120 or 240 Vac nominal, (such as 100 or 200 Vac), move the shorting plug on J4 to the 3–2 position.

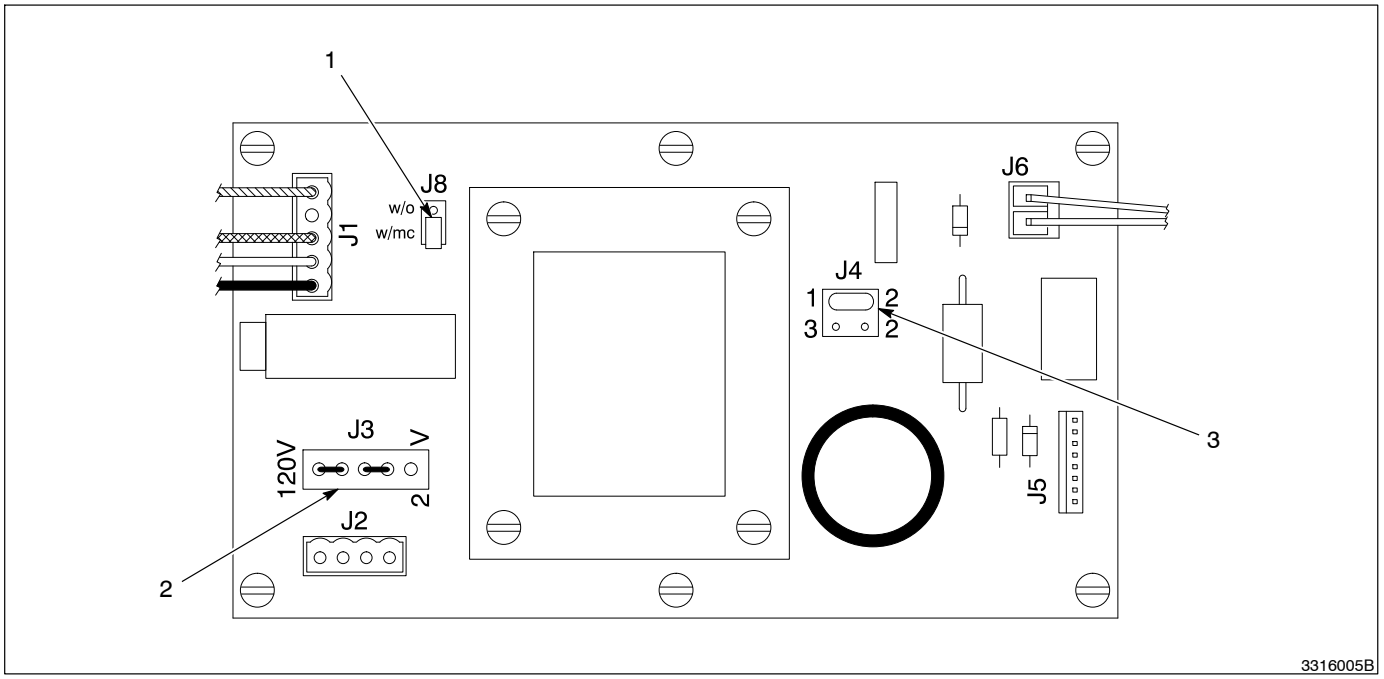

Fig. 3-1 Power Supply Circuit Board

1. Mode switch (set to W/MC)
2. Voltage selector switch (voltage showing is voltage selected)
3. Voltage adjust jumper
   Position 1–2: 120/240 Vac
   Position 3–2: 100/200 Vac

3. Electrical Connections

Electrical connections consist of the power cable, electrostatic cable, and ground strap.

Input Power Connections

WARNING: If hard wiring the unit, connections to the service line should be made only by a qualified electrician. Install an isolation device such as a disconnect switch or breaker in the service line ahead of any load.

See Figure 3-2.

1. Install a 3-pronged plug on the end of the power cord (1), and plug the power cord into a receptacle. Make sure the receptacle supplies the correct voltage. TIghten the dust-tight strain relief (2) to make sure the cord is secure.

Wire Color	Function
Brown	Line
Blue	Neutral
Green/yellow	Ground

WARNING: All electrically conductive equipment within 3 m (10 ft) of the spray area must be properly grounded. Ungrounded or poorly grounded equipment in the spray area can be electrically charged. This charge can deliver a severe shock, or create sparks hot enough to cause a fire or explosion.

2. Connect the ground strap ring-tong terminal to the ground stud (5). Secure the clamp to a true earth ground.

Input Power Connections

(contd)

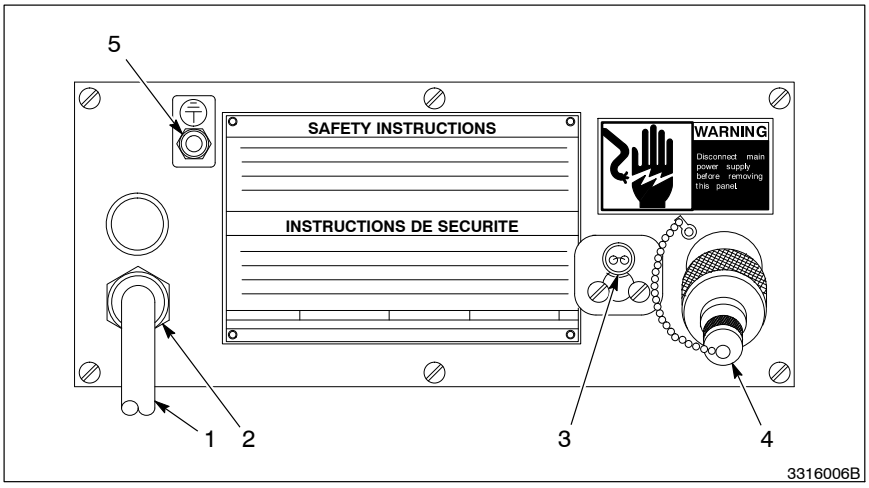

Fig. 3-2 Input Power, Electrostatic Cable, and Trigger Connections

1. Power cord
2. Dust-tight strain relief
3. Trigger receptacle
4. Cable well
5. Ground stud

Electrostatic Cable and Trigger Connection

See Figure 3-2.

1. Remove the dust cap from the multiplier well and fill the well with dielectric oil from the 7.5 ml pipettes shipped with the unit.

2. Make sure the cable ends are clean and dry. The power unit end of the cable has a small brass ball on the end. Insert the end into the cable well (4), and hand-tighten the cable nut onto the well. Wipe up any spilled oil.

NOTE: Do not run the cable across the floor where it can be stepped on, or run over by heavy equipment.

3. Route the cable to the gun. The cable can be run through the clamp on the side of the unit (see Figure 3-3). Provide slack for movement if the gun is on a reciprocator, and protect the cable from abrasion. Do not bend the cable in a radius of less than six inches.

4. Remove the jumper wire from the trigger receptacle (3) and plug the trigger cable into the receptacle. The trigger cable is an integral part of the electrostatic cable. The jumper wire must be installed in the receptacle if the power unit is used with an automatic gun.

4. Pneumatic Connections

See Figure 3-3 and refer to Table 3-1 to make air tubing connections.

Table 3-1 Pneumatic Connections

Item	Air Connections	Tubing
1	Supply	• 10 mm • From a source of clean, dry air
2	Atomizing	**CAUTION:** Maximum input air pressure must be no more than 6.89 bar (100 psi). • 6 mm • Blue • Fitting on powder pump marked “A” for atomizing
3	Flow-Rate	**CAUTION:** Maximum input air pressure must be no more than 6.89 bar (100 psi). • 6 mm • Black • Fitting on powder pump marked “F” for flow-rate
4	Auxiliary	• 10 mm • Attaches to either the fluidizing air fitting on the hopper plenum or to the vibrator air motor controls

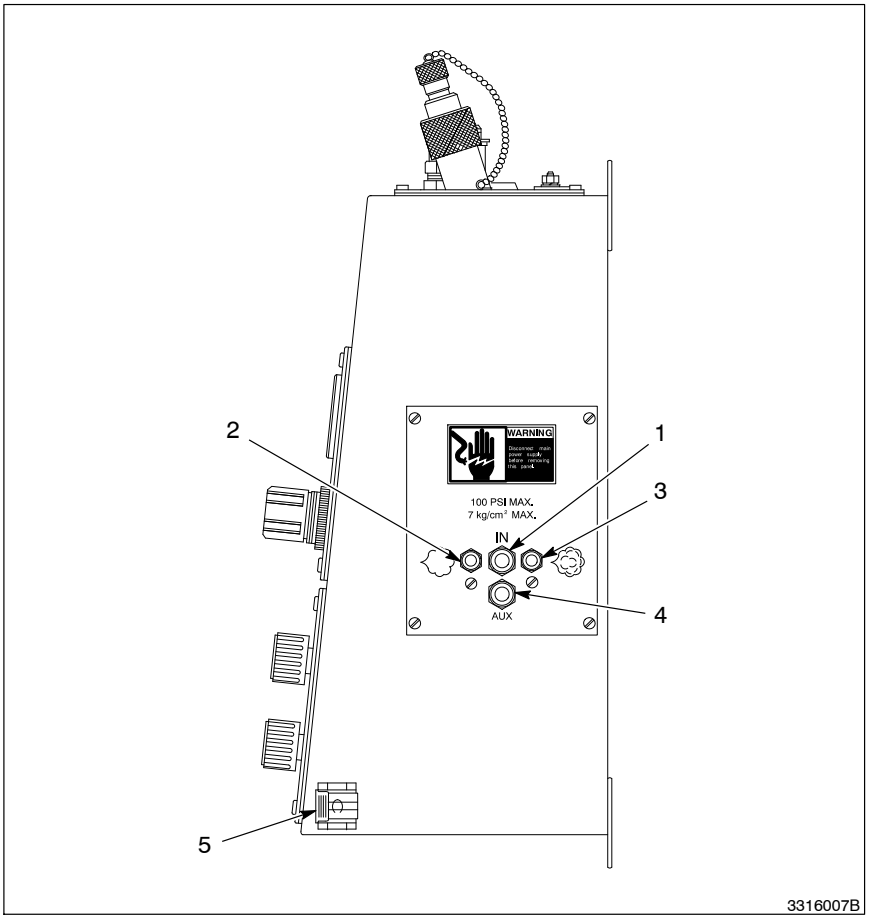

Fig. 3-3 Pneumatic Connections

1. Supply air
2. Atomizing air
3. Flow-rate air
4. Auxiliary air
5. Cable clamp

Section 4

Operation

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.

1. Introduction

This section covers startup, adjustment, and shutdown procedures for the EXP-100M electrostatic power unit, and basic preventive maintenance procedures for a typical powder coating system.

Before operating a Nordson powder spray system, read the system equipment manuals and be familiar with the operating characteristics of each piece of equipment. A thorough understanding of system operation will help you obtain desired results and aid in troubleshooting.

Read and observe the safety warnings given in the *Safety* section. Make sure the fire detection system and all other system safety interlocks are operating properly before spraying powder.

2. Startup

Before beginning production coating, set atomizing and flow-rate air pressures and electrostatic voltage, then adjust these while test coating a few parts.

Air Settings

NOTE: Air will not flow until the gun is triggered.

1. Turn on the main power switch.

NOTE: The pressures in step 2 are average starting points. Adjust for economical powder use and deposition requirements, type of powder, humidity, and other operating variables.

2. Adjust atomizing and flow-rate air pressure to 1.76–2.11 bar (25–30 psi). Flow-rate air pressure controls the volume and velocity of the powder and air mixture delivered to the gun, atomizing air pressure controls the density (powder-to-air ratio) of the mixture.

3. Coat a few parts and adjust the air pressures and gun pattern sleeve (if used) as needed.

Voltage Setting

NOTE: When putting a new or repaired power unit into service, record the μA reading. While spraying powder, periodically monitor the μA reading. If the reading increases significantly, check the gun resistor, electrostatic cable, and multiplier well. A short in one of these components will increase current draw and cause a serious safety hazard. A significant decrease in the μA reading could indicate a failure in the multiplier or regulator board.

1. Turn the kV potentiometer switch on and adjust it to 100 kV. Trigger the handgun to energize the voltage multiplier.

   The high voltage LED will light and the bar meter will display kV output ± 5 kV. The kV display LED will light. Pressing the kV/μA switch will display μA output. The μA display indicator will light.

2. Coat a few parts to test the spray pattern, wrap, and transfer efficiency. Adjust the kV output to achieve the desired results.

Production Variables

Obtaining a quality powder coating while maintaining powder economy is achieved through experimentation and experience. The following variables can affect the quality of your powder coating.

Electrostatic Voltage

- As the voltage is lowered, the deposition rate decreases, but the ability to coat recessed areas improves.

- Increasing the voltage will increase deposition rates to a point, after which the electrostatic charge on the powder already deposited will start to repel any additional powder (like charges repel).

Flow-Rate Air Pressure

- Increasing flow-rate air pressure increases the deposition rate.
- The velocity imparted to the powder will also help coat recessed areas, by partially defeating the Faraday Cage effect (the electrostatic attraction of the powder to projecting areas around the recess).
- However, increasing pressure too much can cause a loss of wrap (powder coating on the side of the part away from the gun), decrease powder economy, and increase gun and pump wear.

Atomizing Air Pressure

- Increasing the atomizing air pressure will decrease the density of the cloud emitted from the gun and result in lowered deposition rates.
- Increasing the pressure too much can cause rapid wear of powder contact parts.
- Decreasing the pressure will increase the powder-to-air ratio, providing better coverage.
- However, setting the pressure too low can cause an uneven spray pattern, and allow powder to clog the pump venturi throat or gun passages.

3. Shutdown

1. Turn the kV and main power switches off.
2. Perform the daily maintenance procedures given in this section.

4. Preventive Maintenance

The EXP-100M electrostatic power unit needs little maintenance. Refer to the manuals for the other components of your powder system for additional maintenance procedures.

- Check all ground connections. The loss of a ground could affect transfer efficiency and/or create a safety hazard.
- Visually inspect the power unit gauges and display. Make sure air pressures are properly set. Compare the μA reading against your recorded initial reading, for signs of significantly higher or lower current draw that could indicate a failing or shorted multiplier or gun resistor.

Periodically

- Check air supply filter/separators. Drain filters as often as necessary and replace filter elements when needed. Check the operation of the air dryer at least once a week. Make sure your compressed air supply is clean and dry. Refer to *Specifications* in *Description* for the recommended air quality.
- Clean dust and powder off the power unit cabinet. Dust and powder accumulating on electrical equipment can cause malfunctions resulting in fire and shock hazards.

Section 5

Troubleshooting

Section 5
Troubleshooting

1. Introduction

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

WARNING: Turn power off at switch or circuit breaker ahead of power unit, and ground gun electrode, before performing troubleshooting procedures. Only qualified personnel should be allowed to work on electrical components.

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.

Pneumatic Troubleshooting

Electrical Troubleshooting

2. Pneumatic Troubleshooting

Problem	Possible Cause	Corrective Action
1. P1—Powder puffing from gun	Low air pressure, incorrect ratio of atomizing to flow-rate air	Increase the atomizing or flow-rate air pressure.
2. P2—Powder surging from gun	Poor fluidization of powder in feed hopper	Increase the fluidization pressure.
	Wet powder	Inspect the powder in the feed hopper and replace the powder if it is damp. Check the air supply filters and dryer.
3. P3—Powder drooling from gun	Poor atomization of powder	Increase the atomizing pressure.
	Low voltage	Increase the voltage. Check the μA meter reading. If the reading is higher than normal, check the gun resistor and cable with a megohmmeter for the values given in gun manual. If the reading is lower than normal, check the multiplier output at the well with a kV meter.
4. P4—Uneven spray pattern	Worn nozzle or deflector	Disassemble the gun and check the parts for wear, Replace the parts if necessary.
	Impact fusion on nozzle or deflector	Disassemble the gun, and clean or replace the parts as necessary.
	Low flow rate and/or atomizing air pressure	Increase the flow rate and/or the atomizing air pressure.
5. P5—Voids in powder pattern	Worn nozzle or deflector	Disassemble the gun and inspect the parts. Replace the parts if necessary.
	Plugged gun powder path	Disassemble the gun and clean it.

Continued on next page

2. Pneumatic Troubleshooting (contd)

Problem	Possible Cause	Corrective Action
6. P6—Inadequate or no powder flow	Low or no flow-rate air pressure	Increase the flow-rate air pressure.
	Plugged hose, pump, or gun	Disassemble the gun and clean it. Disconnect the feed tubing from the pump and it blow out with compressed air. Disassemble the pump and clean it. Inspect the powder supply for dampness, and replace the powder if necessary.
	Worn pump venturi nozzle or throat	Disassemble the pump, inspect the parts, and replace the parts if necessary.
	Sticking manifold valve cartridges	Remove the pneumatic module from the power unit, remove the solenoid, pilot manifold, and gasket. Check the movement of the cartridges in the manifold bore. Do not lubricate the cartridges.
	Malfunctioning solenoid valve	Check the solenoid valve and replace it if necessary. Refer to *Electrical Troubleshooting,* problem E3, for test specifications and procedures.
	No or poor fluidization	Increase the fluidization pressure; inspect the fluidization plate for plugging.

3. Electrical Troubleshooting

Problem	Possible Cause	Corrective Action
1. E1—No power (all LEDs off)	Input power failure	Check the input power supply and the interlock system.
	Loose connection or shorted wiring	See Figure 5-1. Ensure that the internal cable connections are secure, and check the connections for signs of shorts.
	Fuse failure (power supply board)	Check the fuses visually or with a continuity tester. If a fuse has failed, correct the reason for the failure before replacing the fuse.
	Switch S2 failure	See Figure 5-1. Check the continuity across switch S2 connector leads 11 and 12 and leads 8 and 10 with the switch on and the cable disconnected. Remove the cable connector from J2. With the switch on and the cable disconnected, check the continuity across switch terminals C1 and 2 and terminals C2 and 4.
	Power supply circuit board failure	See Figure 5-1. Turn off the power and wait for a few seconds. Remove the J5 connector from the power supply board, and check for 10 kΩ across J5 pins 4 and 5.
	Regulator board failure	Replace the regulator board.
2. E2—Power pack functions normally, but LED for one or more functions off	Loose connection or short	See Figure 5-1. Ensure that cable connections are secure, and check for signs of short.
	Faulty display board	Replace the display board.

Continued on next page

3. Electrical Troubleshooting (contd)

Problem	Possible Cause	Corrective Action
3. E3—No output air, LED lit	Loose connection or short	See Figure 5-1. Ensure that the cable connections are secure, and check for signs of a short.
	Solenoid failure	See Figure 5-1. Disconnect the solenoid leads, and check the resistance across the leads. The Vom reading across leads should be 200–240 ohms. Replace the solenoid if you cannot obtain the appropriate reading.
	Power supply board output voltage low or failed	See Figure 5-1. Check the voltage across J6-1 and J6-2 on the power supply circuit board. The voltage should be 18 to 30 Vdc. If the voltage is less than 18 V, move jumper J4 to position 3-2. Recheck the voltage. If the voltage is still low, replace the power supply circuit board.
	12 V solenoid circuit board failure	See Figure 5-1. Check the voltage across P1 on the solenoid circuit board. The voltage should be 11–13 Vdc. If the voltage is less than 11 V, replace the solenoid circuit board.
	Valve cartridges sticking	Check the cartridge movement in the manifold bore. Replace the cartridge if it is not moving freely. Do not lubricate the cartridge.
4. E4—No kV output, green LED lit, red LED on regulator board lit	Loose connection or short	See Figure 5-1. Make sure the cable connections are secure. Check for signs of a short.
	Regulator board failure	Replace the regulator board.
	Multiplier failure	Replace the multiplier.

Continued on next page

Problem	Possible Cause	Corrective Action
5. E5—No kV output, green LED lit, red LED on regulator board off	kV switch failure	See Figure 5-1. Check the continuity across terminals No. 3 and 4 on the switch cable connector (P2) with the switch on (leads No. 22 and 23).
	Regulator board failure	Replace the regulator board.
6. E6—No kV output, green LED lit, red LED lit	Gun resistor failure	Check the gun resistor with a megohmmeter for the resistance value given in the gun manual.
	Electrostatic cable failure	Check the cable with a megohmmeter for the resistance value given in the gun manual.
	Multiplier or regulator board shorted	Adjust the kV up and down. The whining noise produced by the multiplier should increase and decrease in pitch. If you do not hear the whining noise, replace the multiplier.
7. E7—Low kV output	Regulator board failed open, multiplier diodes failing	The voltage at board connector P3-5 or the contact on back of the kV switch should be approximately 13.9 Vdc at maximum kV output. If you cannot obtain 13.9 Vdc, replace the regulator board.
8. E8—Loss of wrap, poor transfer efficiency	Poorly grounded part	Inspect and clean the conveyor and hangers.
	Power unit not grounded	Check the ground connection.
	Electrostatic cable or gun resistor failure	Check the cable and gun resistor with a megohmmeter for the values given in the gun manual.
	Moisture in air causing kV to leak to ground	Check the air dryers.
	Dirt or powder contamination of connections causing arcing	Check the cable and resistor connections. Clean or replace the components.

4. Wiring Diagram

Use this diagram to help troubleshoot electrical problems and correctly reconnect wiring after replacing components.

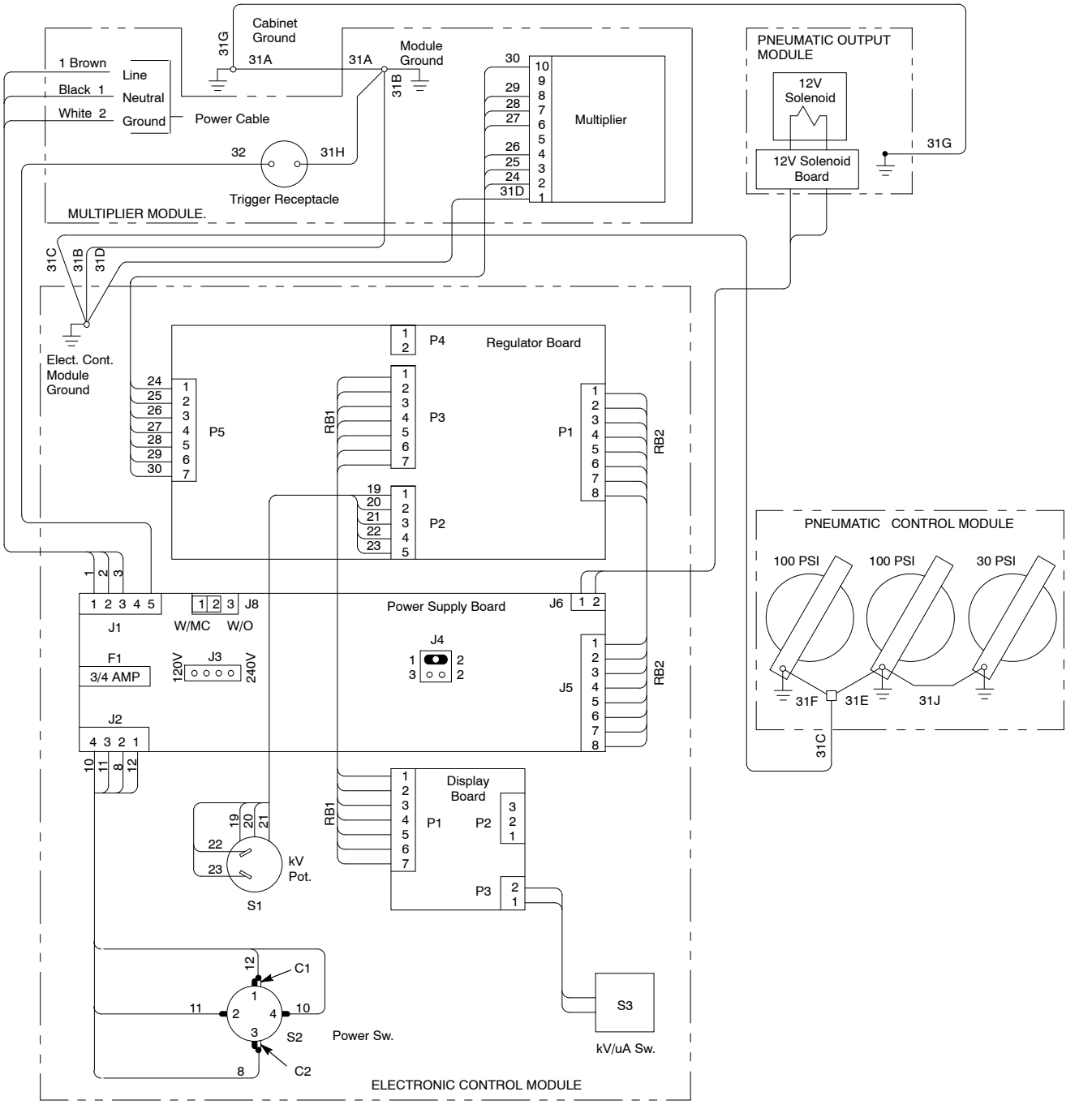

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Fig. 5-1 Wiring Diagram

Section 6

Repair

Section 6
Repair

1. Power Supply and Regulator Board Replacement

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

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

NOTE: Maintain a dust-free environment inside the power unit cabinet. Make sure that all gaskets, seals, and O-rings are in good condition when replacing components. Agency approvals require a dust-free cabinet. Unauthorized modifications can result in loss of approvals.

NOTE: Whenever the multiplier and/or regulator board are replaced, perform the regulator board calibration procedure.

1. See Figure 6-1. Loosen the four captive screws on the front of the electronic control module. Slide the module out of the cabinet far enough to reach the wiring harnesses and ribbon cables.

2. Disconnect the wiring harnesses and ribbon cables from power supply board connectors J1, J2, J6, and J5.

3. Disconnect the harnesses and ribbon cables from regulator board connectors P5, P3, P2, and P1.

1. Power Supply and Regulator Board Replacement (contd)

4. Disconnect the ground wires from the module ground terminals and pull the module out of the cabinet.

5. To remove the power supply board (1), unscrew the six screws and lockwashers holding the board to the module. To remove the regulator board (2), unscrew the four screws and lockwashers holding the board to the module backplate.

NOTE: If you replace the power supply board, make sure the jumper settings are correct for your input voltage and application. Refer to *Installation* for instructions. If you replace the regulator board, perform *Regulator Board Calibration*.

6. After replacing the boards, reconnect the module ground wires, wiring harnesses, and ribbon cables to their proper connectors.

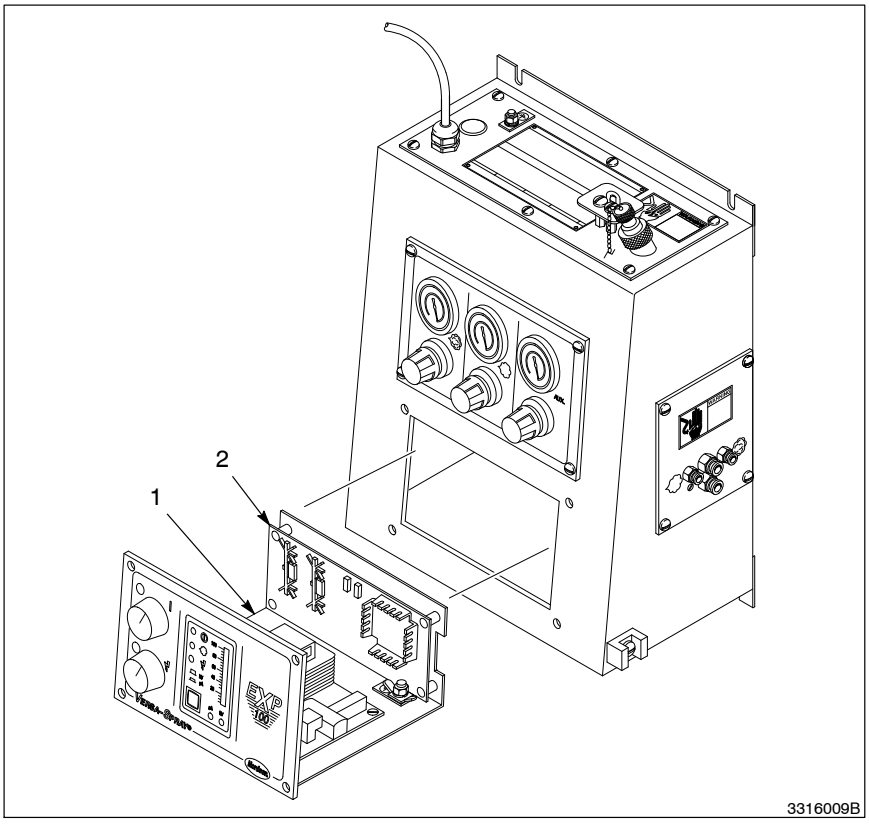

Fig. 6-1 Removing Electronic Control Module

1. Power supply board
2. Regulator board

Regulator Board Calibration

Calibrate the regulator board whenever you replace the regulator board or multiplier.

WARNING: Power is applied to the unit during the calibration procedure. Make sure the unit is grounded, and that modules removed from cabinet but still energized are also grounded. Exercise extreme caution because contact with energized components can cause severe shock or death.

1. Make sure all wiring harnesses, ribbon cables, and ground wires are connected properly.

2. If installed, disconnect the electrostatic cable from the multiplier well, fill the well with dielectric oil, and cap it with the dust cap.

3. Loosen the six screws securing the multiplier module to the cabinet and slide the module out of the cabinet. Set the module on a surface so that you can see the foil side of the finger board, without disconnecting the harness connector from the multiplier. Note the voltage rating inscribed on the multiplier end cap.

4. Restore electrical power to the power unit, and turn the main power switch on. The POWER ON, AIR ON, and kV LEDs should light. Turn the kV rotary switch on and rotate it to the maximum position. The kV ON LED should light.

5. Measure dc voltage from pin 5 on the foil side of the multiplier finger board to ground with a voltmeter.

6. With a small screwdriver, adjust the R20 potentiometer on the regulator board until the voltmeter reading is the same as that inscribed on the multiplier.

7. All LEDs on the bar meter should be lit, indicating maximum output. If they are not, adjust the R40 potentiometer on the regulator board until the bar meter reads 100 kV.

8. See Figure 6-2. Apply locking compound to potentiometer R20 (4) and R40 (3) adjustment screws.

9. Turn the kV potentiometer and power switch OFF.

10. Reinstall the multiplier and electronic control modules in the cabinet and tighten the captive screws. Remove the multiplier well dust cap and reinstall the electrostatic cable, first making sure the well is filled with dielectric oil and the cable end is clean and dry. Wipe up spilled oil.

Regulator Board Calibration

(contd)

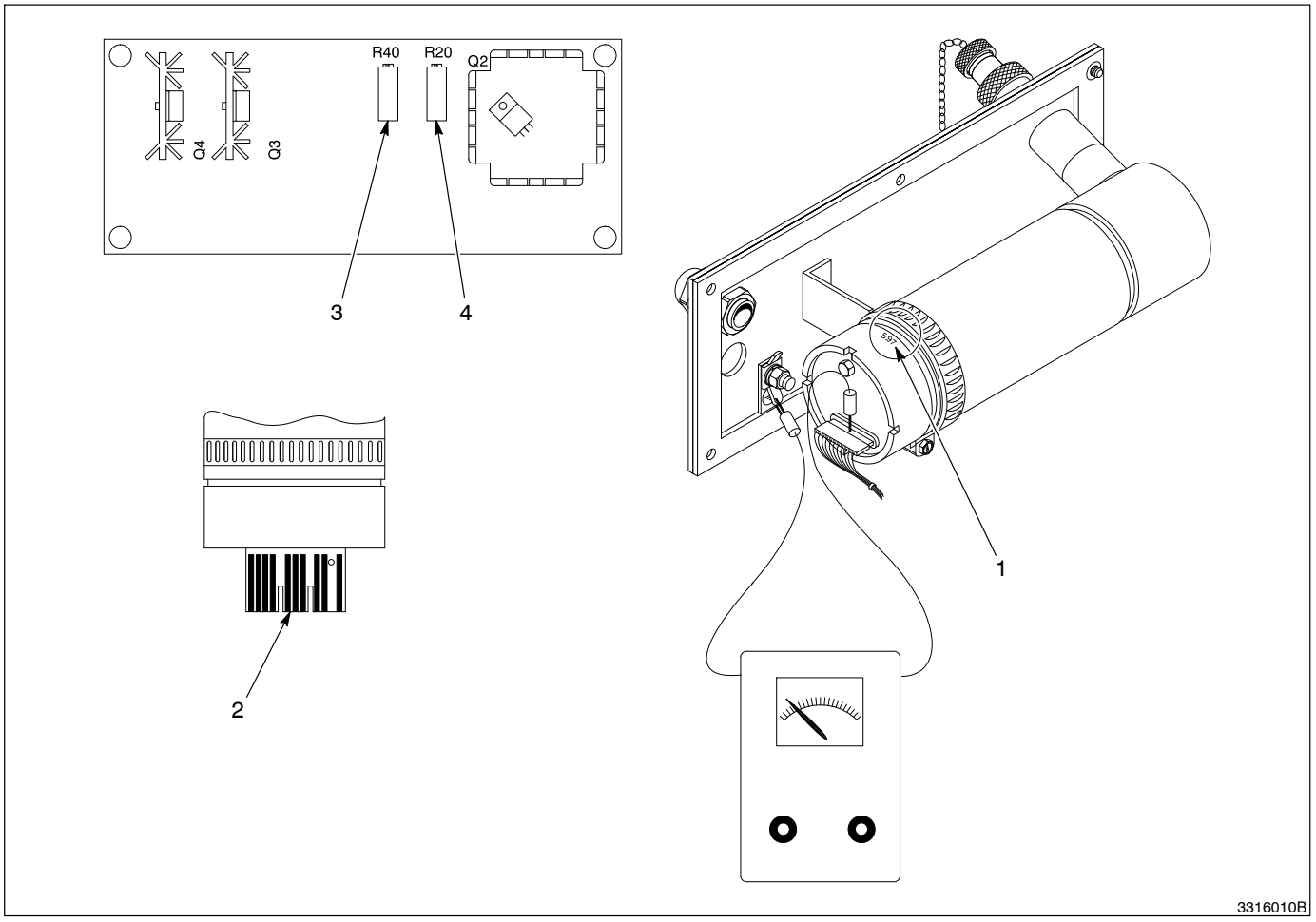

Fig. 6-2 Regulator Board Calibration

1. Adjustment voltage
2. Finger board pin #5
3. R40 potentiometer
4. R20 potentiometer

2. Multiplier and Multiplier Well Replacement

NOTE: All the parts shown in Figure 6-3 can be ordered separately. Refer to the *Parts* section for ordering information.

Multiplier Removal

1. See Figure 6-3. Shut off electrical power to the power unit and ground the gun electrode. Disconnect the electrostatic cable and handgun trigger connector. Cap the multiplier well.
2. Loosen the dust-tight strain relief connector so the power cord will pass through it freely.
3. Loosen the captive screws securing the multiplier module to the cabinet, slide the module out, and disconnect the module ground wire and multiplier harness.
4. Remove the cap from the multiplier well (10) and drain the oil.
5. Unscrew the retainer nut (1) from the module multiplier tube.
6. Loosen the hose clamp (9) and remove the multiplier (8) from the module.

If you are replacing the entire multiplier, proceed to *Multiplier Installation*.

Multiplier Well Removal and Disassembly

1. See Figure 6-3. Unscrew the multiplier well from the multiplier (8) and remove the upper and lower O-rings (5 and 7).
2. If replacing the entire well assembly, no further disassembly is required. If disassembling well assembly to reuse undamaged parts, proceed with step 3.
3. Remove the tolerance ring (4) and unscrew the cable adapter (2) from the well. Remove the O-ring (3) from inside the cable adapter.

Multiplier Well Removal and Disassembly *(contd)*

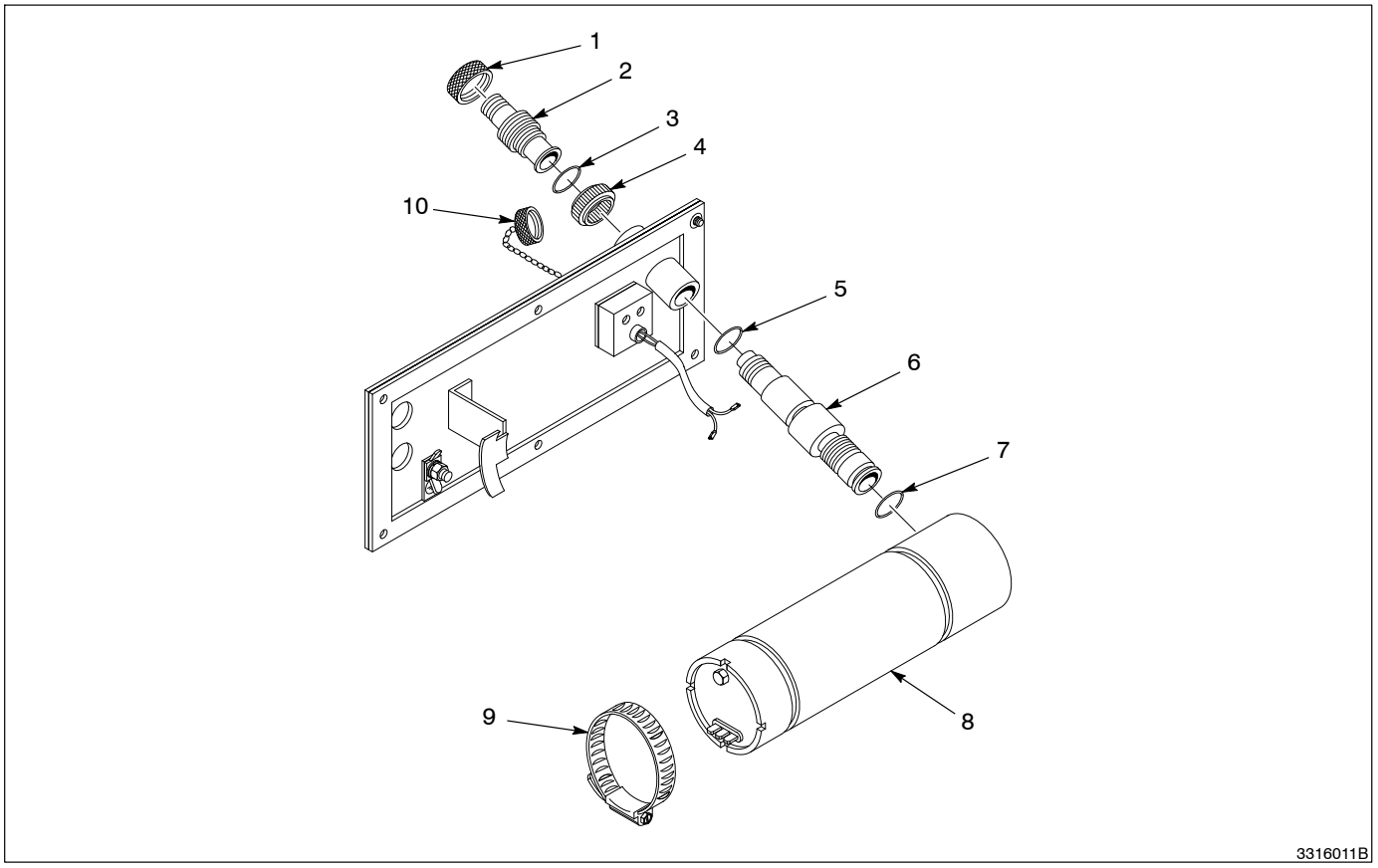

Fig. 6-3 Multiplier and Multiplier Well Removal and Replacement

1. Retainer nut
2. Cable adapter
3. O-ring
4. Tolerance ring
5. O-ring
6. Multiplier well
7. O-ring
8. Multiplier
9. Hose clamp
10. Dust cap

Multiplier Well Reassembly and Installation

NOTE: If you replace the multiplier, perform *Regulator Board Calibration.*

1. See Figure 6-3. Coat the O-ring (3) with dielectric grease and install it inside the cable adapter (2).
2. Screw the cable adapter onto the well, and install the tolerance ring (4) over the adapter.
3. Coat the O-ring (7) with dielectric grease. Install the O-rings (5 and 7) onto the multiplier well (6).
4. Insert the multiplier well into the multiplier end cap, making sure the spring-loaded contact at the bottom slides inside the well. Screw the well into the multiplier end cap and tighten it to 0.55–0.69 bar (8–10 in.-lb).

Multiplier Installation

1. See Figure 6-3. Install the multiplier (8) on the module and secure it with a hose clamp (9) and retainer nut (1).
2. Reconnect the multiplier harness and ground wire.

If the multiplier	Then
Has a pin 5 finger board trace (see Figure 6-2, item 2),	Perform *Regulator Board Calibration* before continuing.
Does not have a pin 5 finger board trace	Proceed to step 3.

3. Install the module into the cabinet and secure it in place with the captive screws.
4. Fill the multiplier well (6) with dielectric oil.
5. Make sure the end of the electrostatic cable is clean and dry. Reinstall the electrostatic cable into the multiplier well, and wipe up spilled oil.

3. Pneumatic Output Module Repair

See Figure 6-4. The following pneumatic output module components can be replaced:

- solenoid valve (1)
- solenoid valve circuit board (10)
- three-way valve cartridges (7)

To gain access to these components, loosen the four captive screws (12) at each corner of the module and pull the module from the cabinet. Disconnect the internal air tubing from the manifold fittings, the ground wire from the module ground, and the circuit board wiring from the power supply board, as needed.

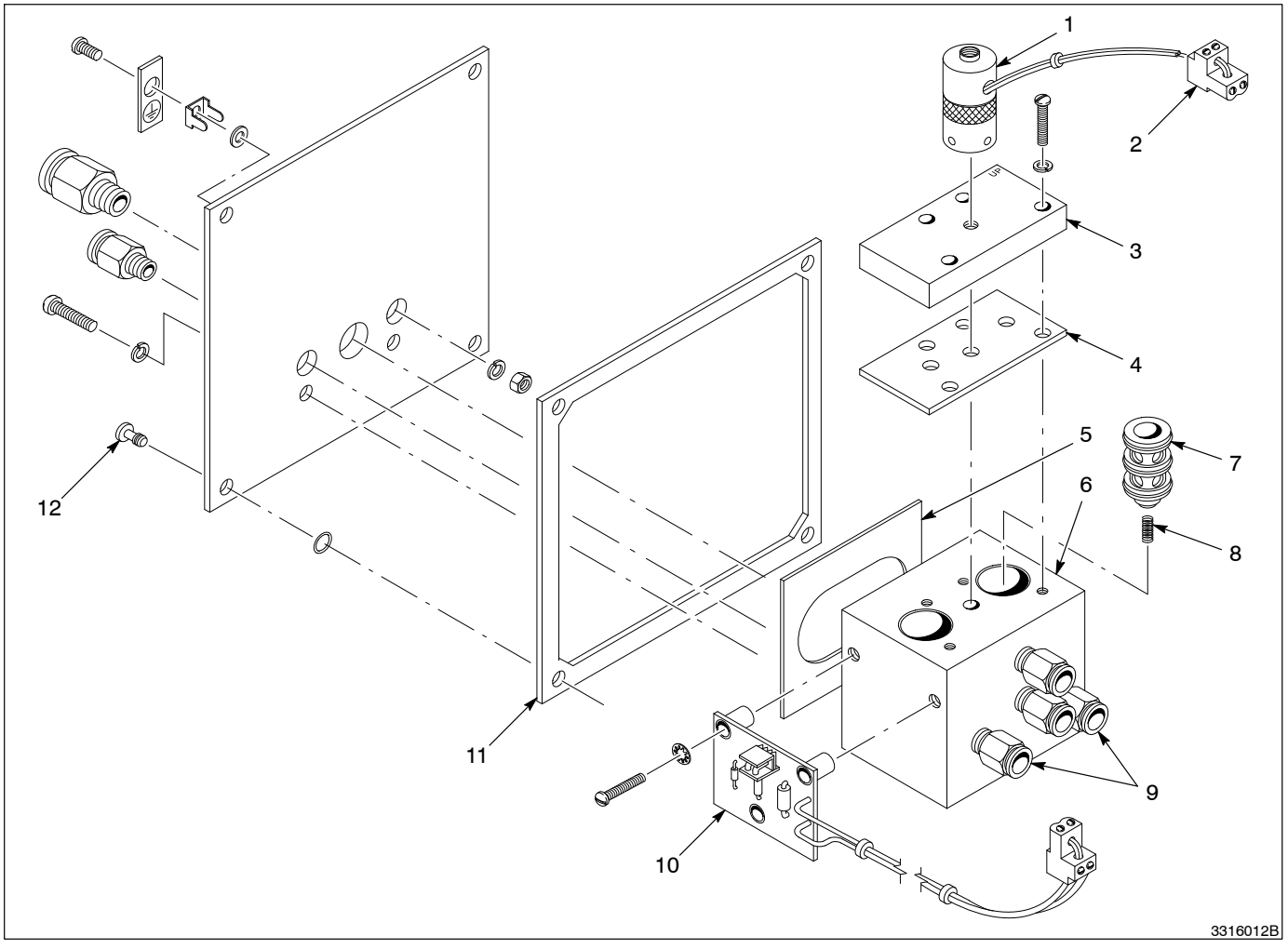

Fig. 6-4 Pneumatic Output Module Components

1. Solenoid valve
2. Two-position lead connector
3. Pilot manifold
4. Pilot manifold gasket
5. Manifold gasket
6. Manifold body
7. Valve cartridge
8. Cartridge spring
9. Fittings #1 and #4
10. Solenoid valve circuit board
11. Panel gasket
12. Captive screws

Solenoid Valve Replacement

1. See Figure 6-4. Disconnect the two-position lead connector (2) from the solenoid valve circuit board (10).
2. Unscrew the solenoid valve (1) from the pilot manifold (3).
3. Remove the two-position lead connector from the old solenoid valve leads and install it on the new solenoid valve leads.
4. Screw the new solenoid valve into the pilot manifold and tighten securely by hand.
5. Plug the two-position lead connector into the receptacle on the solenoid valve circuit board. Reconnect air lines and wiring removed before reinstalling the module in the cabinet.

Three-Way Valve Cartridge Replacement

1. See Figure 6-4. Disconnect the air tubing and ground wire. Disconnect the solenoid valve circuit board (10) wiring from the power supply board connector J6. Remove the pneumatic output module completely from the cabinet.
2. Remove the screws and lockwashers securing the pilot manifold (3) to the manifold body (6). Remove the pilot manifold, solenoid valve (1), and gasket (4) from the manifold body.
3. Unscrew fittings #1 and #4 (9) from the manifold body.
4. Push the valve cartridges (7) up and out of the manifold body with a wooden dowel or similar tool.
5. Remove the cartridge springs (8) from the manifold body.
6. Springs are included with new valve cartridges (7). Install the springs in the new valve cartridges.
7. Turn the manifold body upside down and insert the valve cartridges into the manifold body, springs first.

Three-Way Valve Cartridge Replacement *(contd)*

NOTE: Do not lubricate the cartridge O-rings.

8. Make sure that the cartridge springs are properly seated between the valve cartridges and the bottom of the bore and that the cartridges move freely.

9. Reinstall the manifold gasket (5), pilot manifold, and solenoid valve on top of the manifold and secure them in place with screws and lockwashers.

10. Wrap the threads of fittings #1 and #4 with PTFE tape and reinstall them in the manifold body.

11. Reconnect the wiring and air lines and reinstall the module in the cabinet.

Section 7

Parts

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. EXP-100M Electrostatic Power Unit

See Figure 7-1.

Item	Part	Part	Description	Quantity	Note
—	163 603		Power unit, EXP-100M, wall, 3-gauge, negative	1	
—		163 604	Power unit, EXP-100M, wall, 3-gauge, positive	1	A
1	164 567	164 567	• Module, control, pneumatic	1	B
2	143 985	143 985	• Module, control, electronic	1	C
3	- - - - - -	- - - - - -	• Module, multiplier	1	D
4	- - - - - -	- - - - - -	• Module, pneumatic output	1	E
5	240 674	240 674	• Tag, ground	1	
6	933 469	933 469	• Lug, terminal, 90°, tab	1	
7	983 021	983 021	• Washer, flat head, 0.203 x 0.406 in.	1	
8	983 401	983 401	• Washer, lock, M5	1	
9	984 702	984 702	• Nut, hex, M5, brass	1	
10	105 989	105 989	• Jumper, ground, 20 in.	1	
11	118 193	118 193	• Jumper, wire, ground, gauge	1	
12	115 569	115 569	• Clamp, adjustable, adhesive back	1	
13	982 182	982 182	• Screw, flat head, slotted, M4 x 10	1	
14	240 976	240 976	• Clamp, ground, w/wire	1	
15	144 662	144 662	• Cable, power, Versa-Spray, manual	1	
NS	247 512	247 512	• Oil, 7.5 ml, high volume, insulating	2	

NOTE A: Obsolete. This power unit and its associated “positive” multiplier module are no longer available. Refer to *Multiplier Module* for individual multiplier replacement kits.

B: Refer to *Pneumatic Control Module.*

C: Refer to *Electronic Control Module.*

D: Refer to *Multiplier Module.*

E: Refer to *Pneumatic Output Module.*

NS: Not Shown

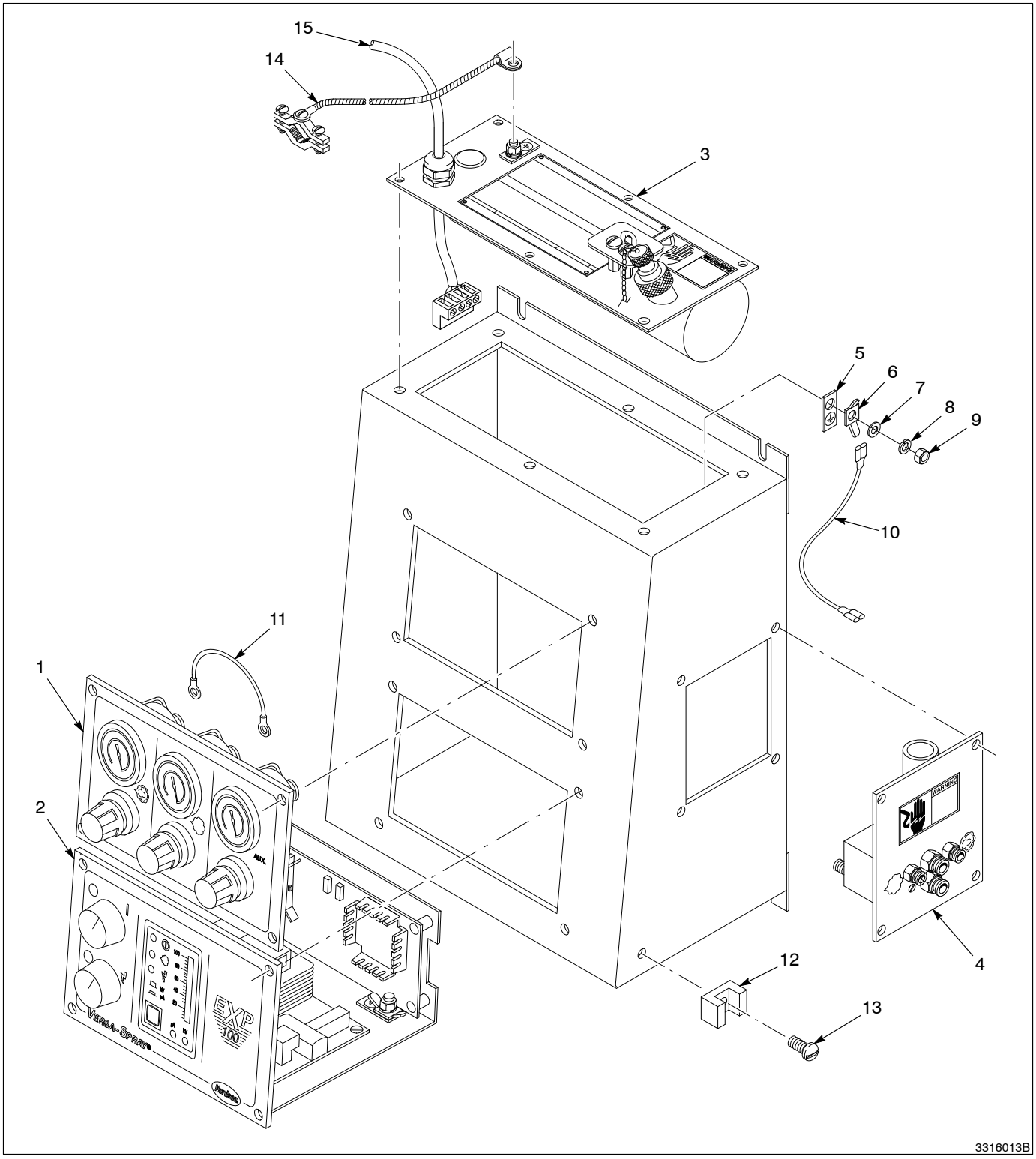

Fig. 7-1 EXP-100M Electrostatic Power Unit

3. Electronic Control Module

See Figure 7-2.

Item	Part	Description	Quantity	Note
—	143 985	Module, electronic control	1	
1	248 696	• Cap, flat, w/arrow	1	
2	248 695	• Cap, flat, w/line	1	
3	248 694	• Knob, collet, 28 mm, $^1/_4$ in. shaft	2	
4	248 741	• Seal, shaft, rotary	2	
5	982 284	• Screw, captive, M5 x 0.8	4	
6	940 073	• O-ring, Viton, 0.156 x 0.281 in.	4	
7	248 711	• Gasket, panel, front	1	
8	248 802	• Gasket, panel, display	1	
9	248 684	• Spacer	1	
10	249 254	• Cable, switch, power	1	
11	933 342	• Connector, plug, 4-pin	1	
12	248 808	• Potentiometer, kV, wired	1	
13	248 968	• Board, circuit universal display	1	
14	248 705	• Spacer, nylon, #8 x 0.500 in.	4	
15	248 811	• Switch, microamp/kV	1	
16	982 092	• Screw, pan head, M4 x 10	6	
17	983 416	• Washer, lock, internal, M4	10	
18	105 844	• Board, circuit, power supply	1	
19	984 702	• Nut, hex, M5 x 0.8, brass	1	

Item	Part	Description	Quantity	Note
20	983 401	• Washer, lock, split, M5	1	
21	983 021	• Washer, flat, brass	1	
22	271 221	• Lug, 45°, double, 0.250 in., 0.438 in.	1	
23	240 674	• Tag, ground	1	
24	933 469	• Lug, 90°, double, 0.250 in., 0.438 in.	1	
25	248 969	• Board, circuit, regulator	1	
26	984 715	• Nut, hex head, M4 x 0.7	7	
27	246 470	• Trim, 0.062 in. thick panel, pvc	AR	
28	981 014	• Screw, pan head, #4-40 x 0.25 in.	4	
29	983 526	• Washer, lock, split, #4	4	
30	248 706	• Washer, nylon, 0.188 x 0.375 x 0.062 in.	4	
31	983 403	• Washer, lock, split, M4	3	
NS	248 804	• Cable, ribbon, 7-circuit	1	
NS	248 805	• Harness, multiplier	1	
NS	105 835	• Cable, ribbon, 8-circuit	1	

AR: As Required
NS: Not Shown

3. Electronic Control Module (contd)

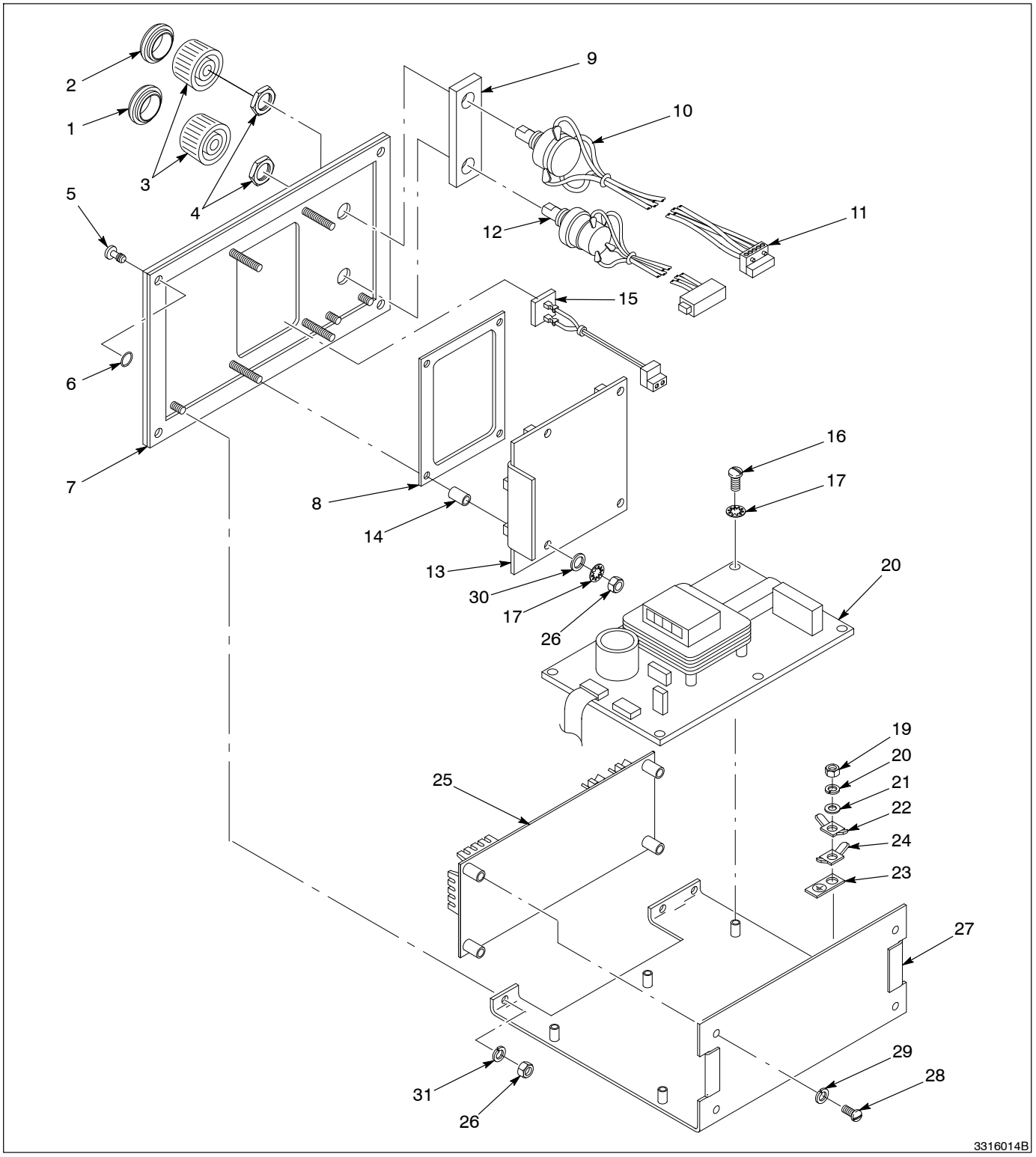

Fig. 7-2 Electronic Control Module

4. Multiplier Module

See Figure 7-3.

Item	Part	Part	Description	Quantity	Note
—	- - - - - -		Module, multiplier, w/trigger, negative	1	
—		- - - - - -	Module, multiplier, w/trigger, positive	1	
1	982 284	982 284	• Screw, captive, M5	6	
2	940 073	940 073	• O-ring, Viton, 0.156 x 0.281 x 0.063 in.	6	
3	248 714	248 714	• Gasket, multiplier panel	1	
4	245 857	245 857	• Jumper, auto gun	1	
5	982 000	982 000	• Screw, pan head, M5 x 10	2	
6	983 422	983 422	• Washer, lock, external, M5	4	
7	246 843	246 843	• Bracket, jumper	1	
8	246 842	246 842	• Standoff, bracket	2	
9	245 695	245 695	• Gasket	1	
10	134 263	134 263	• Receptacle, trigger	1	
11	984 702	984 702	• Nut, hex, M5, brass	2	
12	983 401	983 401	• Washer, lock, split, M5	2	
13	983 021	983 021	• Washer, flat head, external, 0.203 x 0.406 in., brass	2	
14	240 674	240 674	• Tag, ground	2	
15	271 221	271 221	• Lug, terminal, ground	1	
16	970 970	970 970	• Clamp, hose, #52	1	
17	900 809	900 809	• Cap, flush, $^{7}/_{8}$ in. diameter	1	
18	144 356	144 356	• Fitting, straight, $^{1}/_{2}$ in. NPT	1	
19	984 192	984 192	• Nut, lock, $^{1}/_{2}$ in. NPT, nylon	1	
20	248 729	248 729	• Nut, retainer, multiplier	1	
21	248 699	248 699	• Cap, dust, w/chain	1	

4. Multiplier Module (contd)

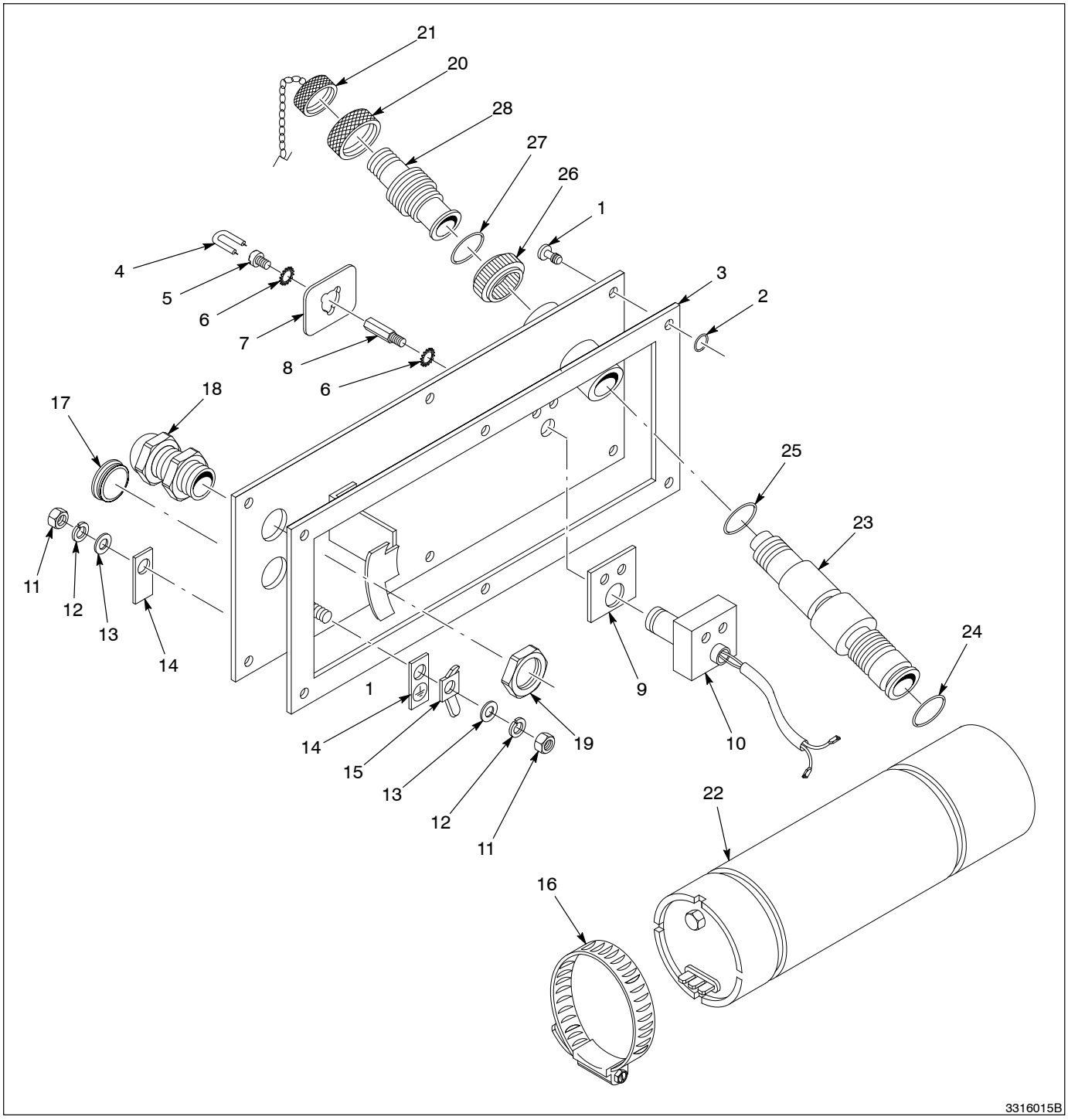

Fig. 7-3 Multiplier Module

Multiplier Replacement Kits

See Figure 7-3.

Item	Part	Part	Description	Quantity	Note
—	106 430		Kit, negative multiplier replacement	1	A
—		124 452	Kit, positive multiplier replacement	1	A
22	- - - - - -	- - - - - -	• Multiplier	1	B
23	248 717	248 717	• • Well, multiplier	1	
24	940 181	940 181	• • O-ring, Viton, 0.750 x 0.875 x 0.062 in.	1	
25	941 172	941 172	• • O-ring, Viton, 0.813 x 1.00 x 0.063 in.	1	
26	248 847	248 847	• • Ring, tolerance, 1.00 in. diameter	1	
27	940 141	940 141	• • O-ring, Viton, 0.500 x 0.625 x 0.063 in.	1	
28	248 736	248 736	• • Adapter, cable	1	

NOTE A: To replace the multiplier, order the appropriate kit.
B: Multiplier well parts may be ordered separately.

5. Pneumatic Output Module

See Figure 7-4.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, pneumatic output	1	
1	972 141	• Connector, male, 6 mm x $^1/_8$ in. unifit	7	
2	972 841	• Connector, male, 10 mm x $^1/_4$ in. unifit	2	
3	982 239	• Screw, fillet head, M5 x 10	2	
4	983 401	• Washer, lock, split, M5	3	
5	982 284	• Screw, captive, M5	4	
6	940 073	• O-ring, Viton, 0.156 x 0.281 x 0.063 in.	4	
7	248 713	• Gasket, panel, manifold	1	
8	982 069	• Screw, pan head, slotted, M4 x 16	6	
9	983 416	• Washer, lock, internal, M4	2	
10	143 027	• Board, circuit, 12 v, manifold	1	
11	248 716	• Valve, 3-way cartridge	2	
12	159 641	• Manifold, body	1	
13	163 442	• Gasket, manifold	1	
14	129 423	• Gasket, pilot manifold	1	
15	129 329	• Manifold, pilot	1	
16	335 241	• Connector, plug, 2-position	1	
17	983 403	• Washer, lock, split, M4	4	
18	129 503	• Valve, solenoid, 12 Vdc, n.o.	1	
19	240 674	• Tag, ground	1	
20	933 469	• Lug, terminal, 90°, tab	1	
21	983 021	• Washer, flat, external, 0.203 x 0.406 in., brass	1	
22	984 702	• Nut, hex, M5, brass	1	
23	972 126	• Elbow, 6 mm x $^1/_8$ in. unifit	1	

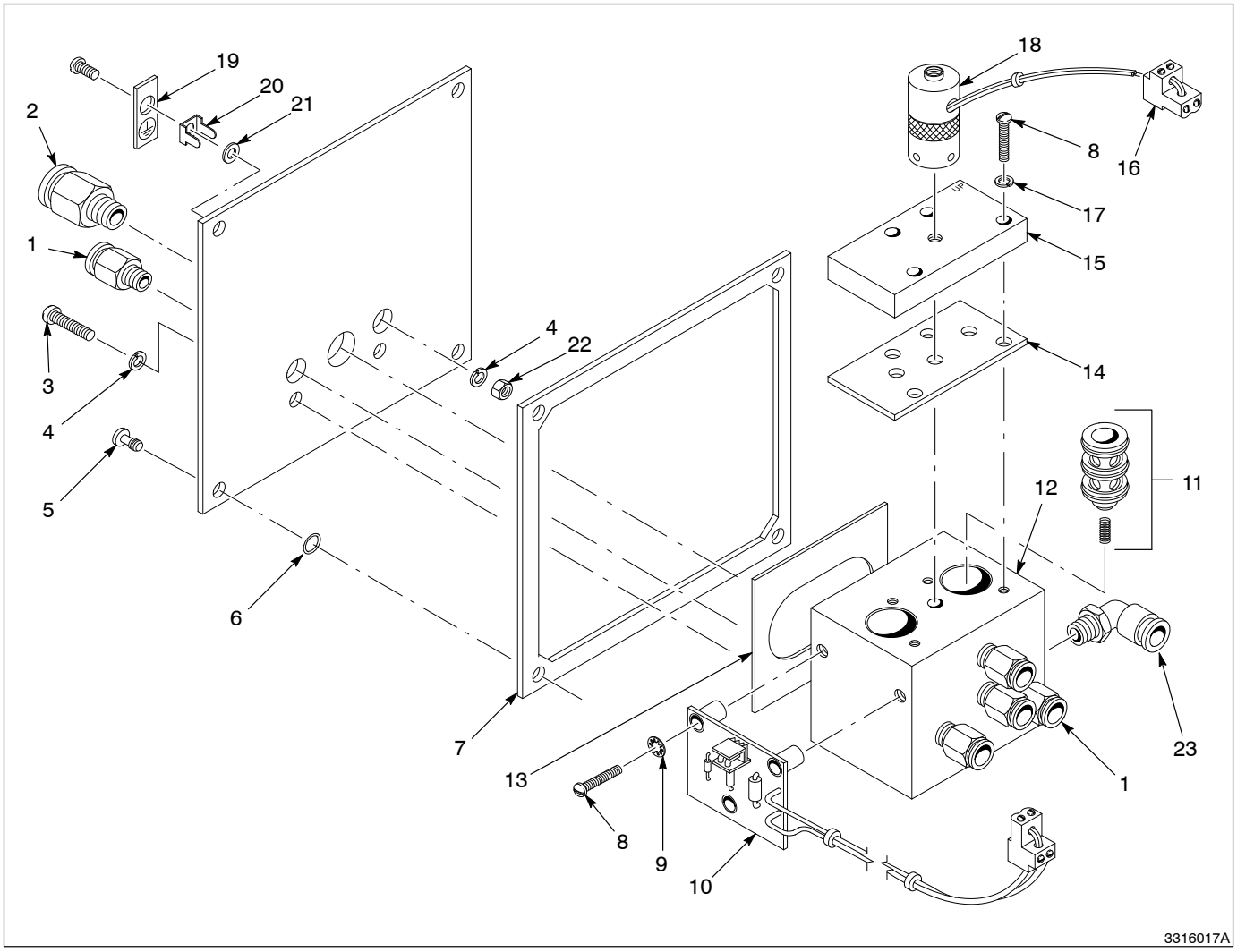

Fig. 7-4 Pneumatic Output Module

6. Pneumatic Control Module

See Figure 7-5.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, pneumatic control, 3-gauge	1	
1	901 260	• Gauge, air, 0–100 psi	3	
2	631 138	• Gasket, gauge, 40 mm diameter EPDM	3	
3	982 284	• Screw, captive, M5	4	
4	940 073	• O-ring, Viton, 0.156 x 0.281 x 0.063 in.	4	
5	248 711	• Gasket, panel, front	1	
6	973 572	• Coupling, pipe, hydraulic, sae, $^1/_8$ in. NPT	3	
7	972 840	• Tee, male run, M6 x $^1/_8$ in. unifit	3	
8	900 742	• Tubing, polyurethane, 6 mm	AR	
9	972 142	• Elbow, 6 mm x $^1/_4$ in. unifit	6	
10	901 446	• Regulator, Air, 5–125 psi, $^1/_4$ in. NPT	3	
11	141 603	• Seal, Panel, Regulator	3	

AR: As Required

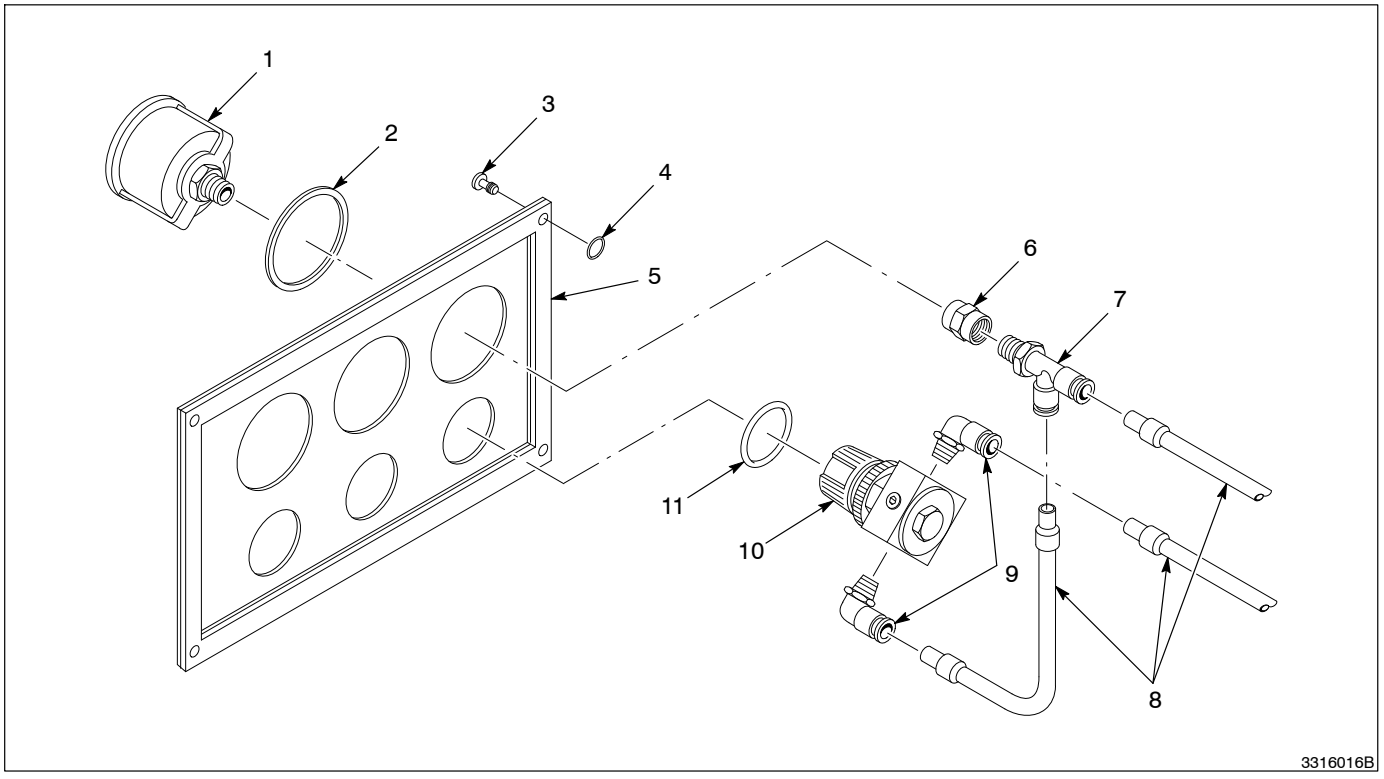

Fig. 7-5 Pneumatic Control Module