Powder Mini Bell

Customer Product Manual
Part 303 849A

NORDSON CORPORATION ● AMHERST, OHIO ● USA

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Notice

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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 Nordson Powder Mini Bell is a motor-driven, rotating, electrostatic powder applicator. It is designed to apply decorative and protective finishes and is compatible with all commercially available organic powder coating materials.

The rotating nozzle provides uniform distribution of the powder pattern. Adjustable operating functions allow the powder bell to be tailored to specific situations.

Terms

Table 2-1 defines common terms used throughout this manual.

Table 2-1 Terms and Definitions

Term	Definition
Atomizing Air	Regulated air supplied to the powder pump. Dilutes and smoothes the delivery of the powder to the powder bell.
Bearing Air	Regulated air supplied to the internal chamber of the main body. Flows past the bearing seals reducing frictional drag on the spindle, prevents residual powder from entering the chamber, and prevents the powder supply from entering the chamber.
Charging Voltage or Electrostatic Voltage	Measured in kilovolts (kV). Imparts an electrostatic charge to the powder as it leaves the nozzle.
Diffuser Air	Regulated air supplied to the main body of the powder bell. Prevents powder build-up on the powder bell but can also be used with shaping air to provide additional control of the powder pattern.
Flow Rate Air	Regulated air supplied to the powder pump. Controls the delivery rate of powder to the powder mini bell.
Nozzle Air	Regulated air supplied to the recessed area behind the nozzle. Prevents powder build-up behind the nozzle.
Shaping Air	Regulated air supplied to the front of the powder bell. Controls the size of the powder pattern.

2. Specifications

Specifications for the powder mini bell system are as follows:

Dimensions

See Figure 2-1.

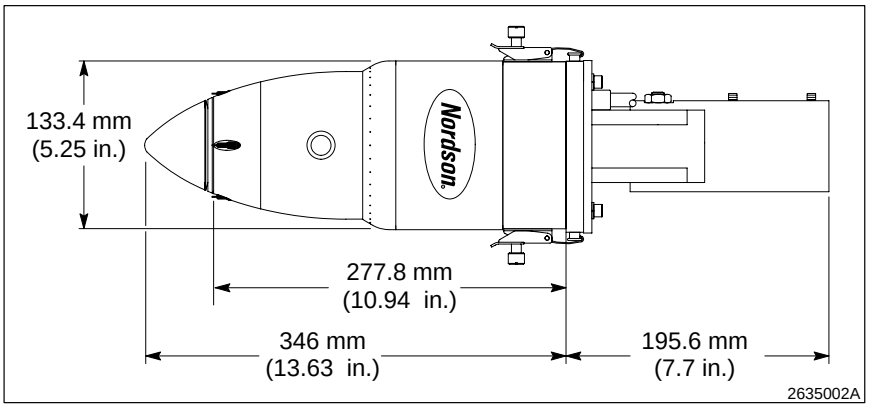

Fig. 2-1 Powder Mini Bell Dimensions

Weight	Powder mini bell	4.4 kg (9.6 lb)
	Mount assembly	2.1 kg (4.7 lb)
Pressure	Flow rate air	0.7–4.1 bar (10–60 psi)
	Atomizing air	0.3–1.0 bar (5–15 psi)
	Bearing air	1.0–1.4 bar (15–20 psi)
	Shaping air	0.1–1.4 bar (1–20 psi)
	Diffuser air	0.1–1.4 bar (1–20 psi)
	Nozzle air	0.1–1.4 bar (1–20 psi)
Powder Delivery	Operating range	1–7.5 gr/sec (8–60 lb/hr)
Rotating Speed	Operating range	750–2100 rpm
Charging Voltage	Operating range	30–95 kV

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

This section provides instructions for installation of the mounting assemblies, powder feed tube, pneumatic connections, and electronic connections.

2. Mounting Assemblies

See Figure 3-1. The system may be mounted to a tube or a bar mount assembly.

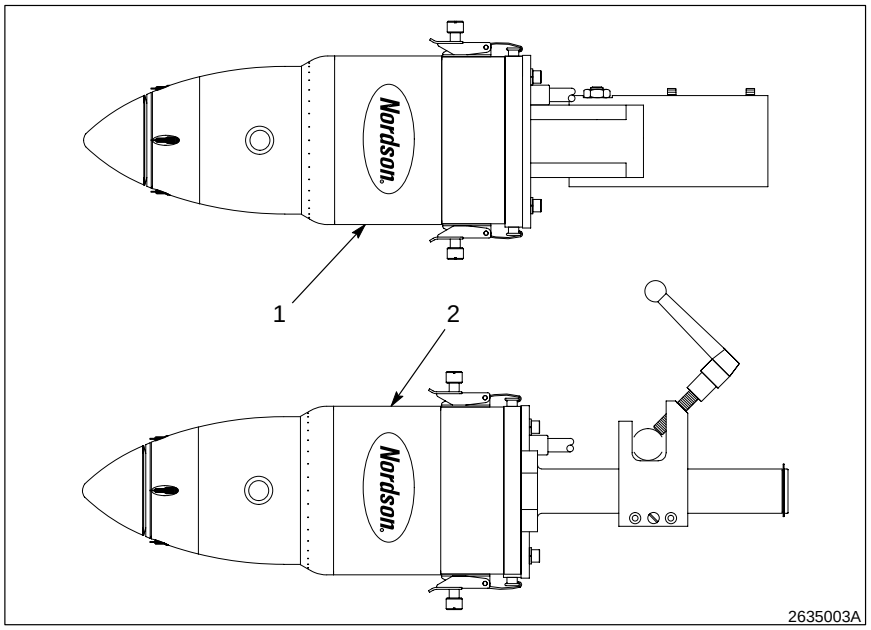

Fig. 3-1 Mounting Assemblies

1. Tube mount
2. Bar mount

Both mounting assemblies include pneumatic fittings for all powder bell air functions, the electrical cable, and the fitting for the powder feed tube.

Tube Mount Assembly

See Figure 3-1. The assembly fits over the end of a 48.5 mm (1.91 in.) outside diameter (OD) aluminum or steel tube. It is usually used for permanent installations because it is more rigid. The pneumatic, electronic, and powder lines can be routed directly through the tube, resulting in a less cluttered installation.

NOTE: Make sure that the tube is properly supported and has adequate strength to support the powder bell. Position the tube to allow for proper distance between the powder bell and the object to be coated (usually 203–305 mm (8–12 in.)).

1. Attach the assembly to the 48.5 mm (1.91 in.) OD tube by tightening the 2 set screws.

2. If desired, route the pneumatic, electrical, and powder lines through the tube.

Bar Mount Assembly

See Figure 3-2. This assembly has an adjustable clamping bolt for mounting to a round or square, 25.4 mm (1 in.) maximum, bar. It is usually used for temporary or lab installations, which may require frequent installation, removal, or repositioning. It can also be used for permanent installations.

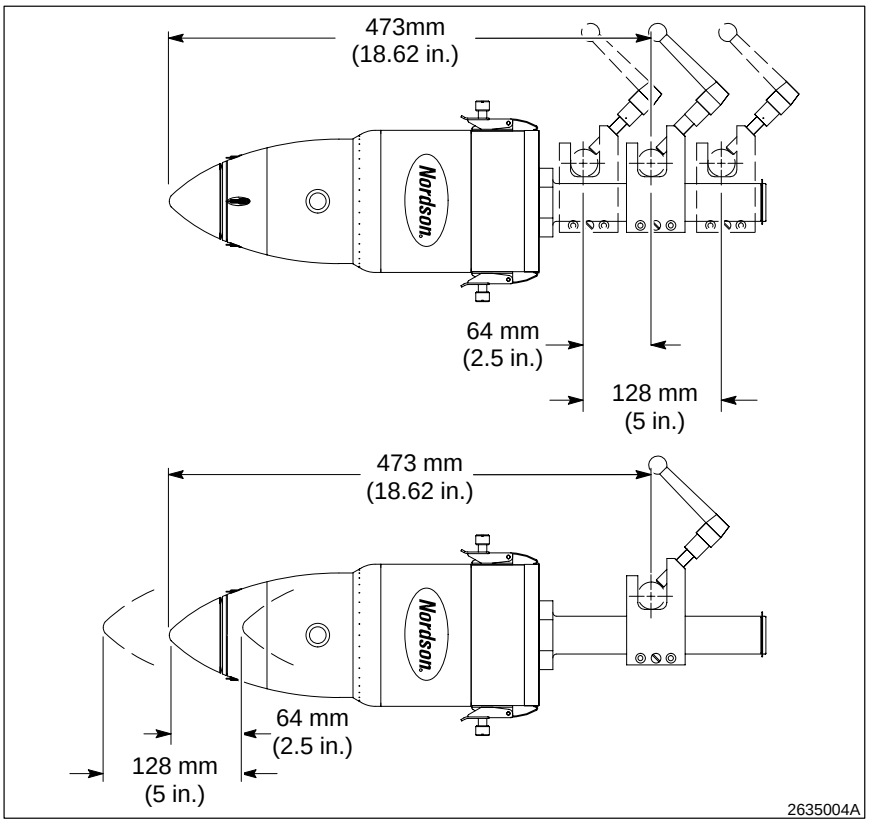

Fig. 3-2 Adjustment Range

Mount the assembly to the bar and tighten the handle attached to the threaded bolt.

NOTE: Make sure that the bar is properly supported and has adequate strength to support the powder bell. Position the bar to allow for proper distance between the powder bell and the object to be coated (usually 20–30 cm (8–12 in.)). The assembly can be adjusted 57 mm (2.25 in.) fore and aft, independent of the mounting bar.

3. Powder Feed Tube

See Figures 3-3. Attach the powder feed tube to the supplied connector (1). The connector accepts a feed tubing from 9.5–13 mm ($^3/_8$–$^1/_2$ in.) ID. Typical is 11 mm ($^7/_{16}$ in.) ID.

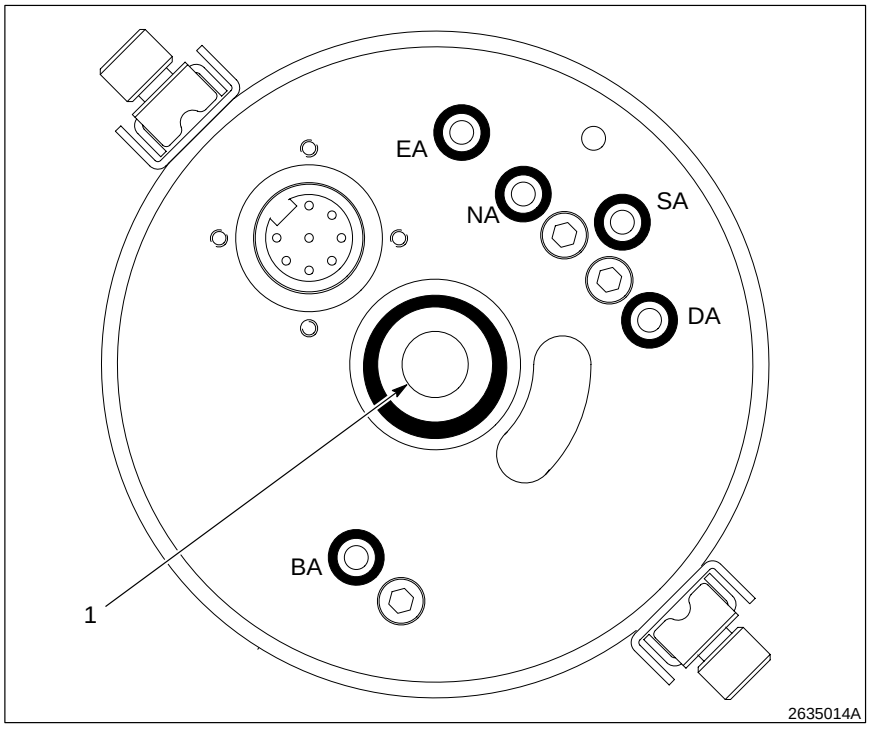

Fig. 3-3 Powder Feed Tube and Pneumatic Connections

1. Powder feed tube connection

4. Pneumatic Connections

NOTE: Make sure supply air is clean and dry, with 99.99% of 0.1 micron contaminants removed.

See Figure 3-3. Attach the 5 pneumatic tubes to the appropriate fittings on the rear of the mount:

Shaping (SA)	$^1/_4$ in.
Bearing (BA)	$^3/_8$ in.
Nozzle (NA)	$^1/_4$ in.
Diffuser (DA)	$^1/_4$ in.
Exhaust (EA)	$^3/_8$ in.

If a different type of tubing is desired, the supplied fittings can be removed and replaced with any fitting having a $^1/_8$ NPT thread.

Tubing Checks

Check the air functions and connections to the two manifolds as follows:

1. Adjust the shaping air regulator pressure until air is coming out from the bell electrode ring.
2. Adjust the diffuser air regulator until air is coming out from the diffuser ring.
3. Adjust the bearing air regulator pressure until air is coming from around the deflector cup.
4. If used, adjust the auxiliary air regulator pressure until air is coming from the deflector face (membrane).

5. Electronic Connections

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

WARNING: Do not skip step 1. Failure to install the locking disconnect switch or breaker may result in a severe shock during installation or repair.

1. 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.
2. Attach the free end of the external cable to the EXTERNAL I/O connector on the back panel of the controller.

NOTE: If a custom control panel is used, it may have a receptacle that is compatible with the external cable. If different terminations are required, refer to the *Troubleshooting* section.

RPM Check

Check the RPM of the bell cup:

1. Adjust the motor speed on the controller to 1500 rpm.
2. With an rpm meter, measure the bell cup rotational speed. It should be close to the same reading as the motor controller.
3. Check that rotation is counterclockwise when facing the powder bell.

Motor Feedback Check

Check the motor feedback:

1. Verify that the motor rpm is stable at approximately 1500 rpm.
2. Check the milliamp feedback. It should be less than 150 mA. If more than 150 mA, adjust (up or down) the bearing air pressure to lower the milliamp feedback signal.
3. Operate the powder bell for one hour before putting it into service.

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 contains general instructions for operating the powder bell. The air pressures given are initial settings. These settings may be adjusted for special applications.

NOTE: When operating the powder bell, make sure supply air is clean and dry, with 99.99% of 0.1 micron contaminants removed.

2. Daily or Shift Start-Up

For daily or shift start-up, perform the following steps:

1. Turn on the main air supply.
2. Make sure that the bearing air, shaping air, diffuser air, and nozzle air are properly adjusted:
   - Bearing air should be 1.0–1.4 bar (15–20 psi). If it falls below 0.7 bar (10 psi), an internal interlock switch stops the powder bell rotation.
   - Shaping air should be 0.1–1.4 bar (1–20 psi).
   - Diffuser air should be 0.1–1.4 bar (1–20 psi).
   - Nozzle air should be 0.1–1.4 bar (1–20 psi). Nozzle air is only used with a bell cup nozzle.
3. Make sure that motor power and kV power to the powder bell are both off, and that the powder bell motor is not rotating.

2. Daily or Shift Start-up (contd.)

4. See Figure 4-1. Press and hold the spindle lock button (2).
5. Thread the powder bell cup (1) onto the spindle, turning the powder bell cup clockwise while facing the front of the powder bell.
6. Tighten the powder bell cup finger tight. Do not over tighten.
7. Apply motor power to the powder bell and check that proper rotation speed is indicated (750–2100 rpm).

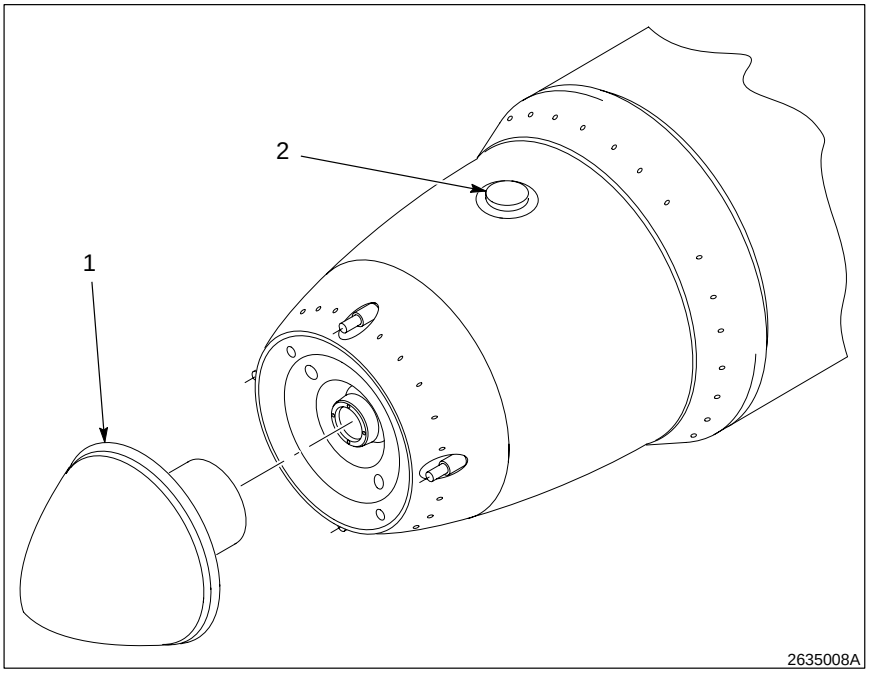

Fig. 4-1 Powder Bell

1. Bell cup
2. Spindle lock button

3. Daily or End of Shift Shutdown

For daily or end of shift shutdown, perform the following actions:

1. Turn off the motor power to the powder bell.
2. Turn off the kV power to the powder bell.
3. Leave on the air pressures to the powder bell to prevent powder infiltration while cleaning.
4. See Figure 4-1. Remove and clean the powder bell cup (1). Refer to the *Maintenance* section for procedures.

CAUTION: Do not use compressed air on the external surface of the powder bell. Only a vacuum or wiping cloth should be used. Internal damage can result if powder is forced into the powder bell from compressed air.

5. Clean the powder bell exterior of any powder build-up.

Section 5

Maintenance

Section 5
Maintenance

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 provides instructions for cleaning the powder bell. To keep the powder bell operating at maximum efficiency, follow these instructions carefully.

2. Cleaning

NOTE: Experience in operating the powder bell will determine how often cleaning is required for your application.

Nose Cone

Perform nose cone cleaning as follows:

1. Press and hold the spindle lock button.
2. See Figure 5-1. Remove the nose cone assembly by rotating it counterclockwise while facing the front of the powder bell.

CAUTION: To prevent damage, remove the nose cone before cleaning.

3. Remove the nose cone (1), stud (2), outer nozzle (3), wear tip (4), and inner nozzle (5). Check these items for damage. Replace if necessary.

Nose Cone *(contd)*

WARNING: Be sure to use an OSHA approved safety blow-off air gun. Failure to follow this warning may result in powder build-up, sparking, and injury to personnel.

4. If powder build-up is light and soft, remove the powder by carefully using a compressed air gun.

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

5. If powder build-up is impact fusion, soak the nose cone (1) in warm, de-ionized water.

6. Dry off the nose cone thoroughly. Use compressed air to fully remove any moisture from the interior holes and passages.

7. Assemble the nose cone, stud, outer nozzle, wear tip, and inner nozzle.

8. Install the nose cone assembly into the powder bell.

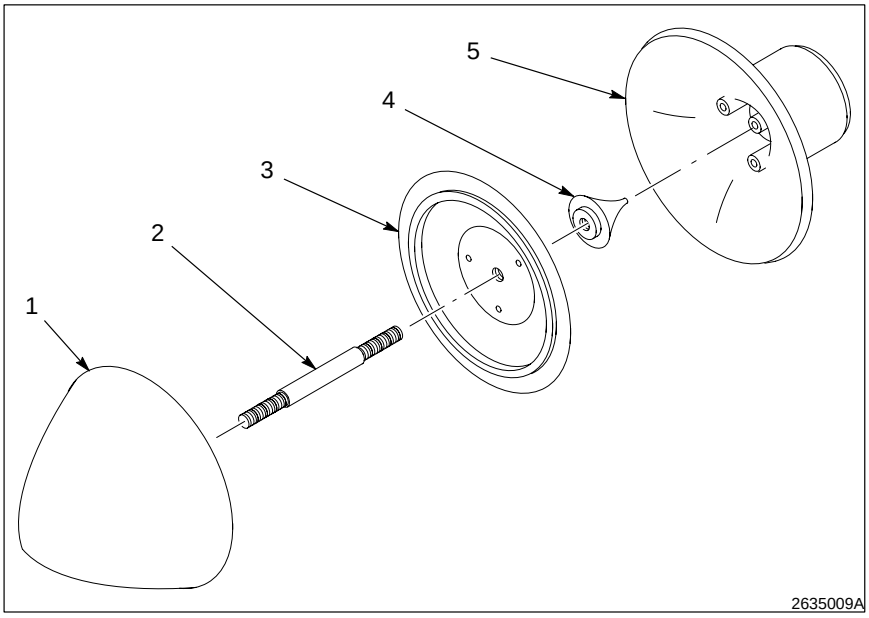

Fig. 5-1 Nose Cone Assembly

1. Nose cone
2. Stud
3. Outer nozzle
4. Wear tip
5. Inner nozzle

Powder Bell Deflector

Perform powder bell deflector cleaning as follows:

1. Press and hold the spindle lock button.

2. See Figure 5-2. Remove the powder bell deflector (2) by rotating the powder bell deflector counterclockwise while facing the front of the powder bell.

CAUTION: To prevent damage, remove the diffuser disk before cleaning the powder bell deflector.

3. Remove the diffuser disk (1) from the powder bell deflector (2). Check the diffuser disk for damage. Replace if necessary.

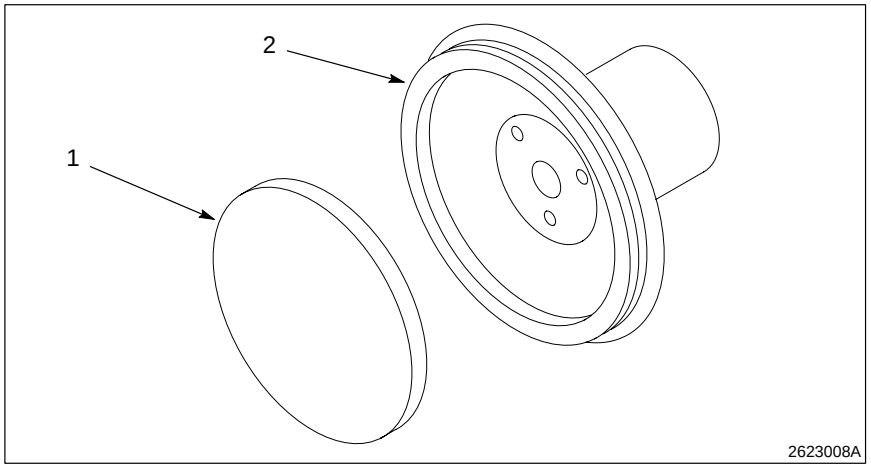

Fig. 5-2 Diffuser Disk Removal

1. Diffuser disk
2. Powder bell deflector

WARNING: Be sure to use an OSHA approved safety blow-off air gun. Failure to follow this warning may result in powder build-up, sparking, and injury to personnel.

4. If powder build-up is light and soft, remove the powder by carefully using a compressed air gun.

Powder Bell Deflector (contd)

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

CAUTION: Do not soak the diffuser disk. Damage to the powder bell can result.

5. If powder build-up is impact fusion, soak the powder bell deflector in warm, de-ionized water.
6. Dry off the powder bell deflector thoroughly. Use compressed air to fully remove any moisture from the interior holes and passages in the powder bell deflector.
7. Install the diffuser disk on the powder bell deflector.
8. Install the powder bell deflector to the powder bell.

Powder Bell

Perform powder bell cleaning as follows:

1. Remove the nose cone assembly or the powder bell deflector from the powder bell.

CAUTION: Do not use a compressed air gun to blow off the powder bell. This can force powder into the unit and cause damage.

2. Clean the main body of the powder bell by wiping with a clean, soft, dry, lint-free cloth, or by the use of a vacuum with a soft brush attachment.

Section 6

Troubleshooting

Section 6
Troubleshooting

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

Problem	Possible Cause	Corrective Action
1. Low transfer efficiency	Poor ground	Refer to *Procedures, Ground Check* in this section.
	kV set point too low	Check and adjust if necessary.
	Charging malfunction	Refer to *Procedures, Electrostatic Charging Diagnosis* in this section.
	Flow rate air too low	Check and adjust if necessary.
	Atomizing air too high	Check and adjust if necessary.

1. Introduction (contd.)

Problem	Possible Cause	Corrective Action
2. Low film build	Poor ground	Refer to *Procedures, Ground Check* in this section.
	kV set point too low	Check and adjust if necessary.
	Charging malfunction	Refer to *Procedures, Electrostatic Charging Diagnosis* in this section.
	Flow rate air too low	Check and adjust if necessary.
	Atomizing air too high	Check and adjust if necessary.
3. Powder bell cup speed low or irregular	RPM set point too low	Check and adjust if necessary. Refer to the *Motor Controller* manual.
	Bearing air pressure too low or too high	Check and adjust if necessary.
	Low output from motor controller	Refer to the *Motor Controller* manual.
	Bearings dirty or worn	Check and replace if necessary.
	Seals dirty or worn	Check and replace if necessary.
4. Powder bell cup does not rotate	Spindle lock pin not released	Check and correct if necessary.
	Bearing air pressure too low or too high	Check and adjust if necessary.
	Blown fuse on motor controller	Refer to the *Motor Controller* manual.
	Motor defective	Check and replace if necessary.
	Bearings dirty or worn	Check and replace if necessary.
	Seals dirty or worn	Check and replace if necessary.

2. Procedures

The following paragraphs provide ground check, electrostatic charging diagnosis, and motor power diagnosis procedures for the powder bell.

Ground Check

The object to be coated must be properly grounded to ensure safety and effective coating. To determine this, the electrical resistance between the part and ground must be measured. This can only be done by using a high voltage meg-ohmmeter. Do not use standard volt-ohmmeters because they do not reliably measure high resistance.

WARNING: Follow carefully the instructions supplied with the meg-ohmmeter. These units typically operate at 500–1000 Volts. Failure to adhere to this warning may result in electrical shock.

1. Attach the black (–) meter lead to a reliable ground point. Make sure that this ground attachment point is clean and free of paint or powder build up.

   Good grounds: conveyor rail; booth wall

   Poor grounds: booth grating

2. Attach the red (+) meter probe to the part being checked.

NOTE: The probe must touch bare metal on the part. If the part has been E-coated or previously painted, scratch a small spot where the probe can touch bare metal.

3. Check the resistance. The resistance between the part and the ground must be 1 meg-ohm or less.

4. If the resistance is higher than 1 meg-ohm, try to locate the problem area by first measuring the resistance from the part to the carrier, and then from the carrier to the ground point.

Electrostatic Charging Diagnostics

The powder bell has an internal high voltage multiplier which generates the electrostatic charging voltage, also known as E-stats or kV. The multiplier receives an input of 6–21 Vdc and multiplies it to an output of 30–95 kV. If a problem with the charging voltage is suspected, it can be isolated to the powder bell, the cable, or the power supply.

NOTE: To measure kilovolts, use the Nordson Electrostatic Analyzer kit. This is the only meter that properly measures kilovolts on Nordson equipment. Any other type or brand of kilovolt meter loads down the charging circuit excessively and gives a false reading.

1. Measure kV at the individual electrode tips one at a time. With the kV set point at maximum, each electrode tip should measure approximately ± 25 kV of the original set point.

   NOTE: The reading will be less than 95 kV due to corona discharge from the unmeasured electrode tip. If one tip was removed, the reading on the remaining tip would be approximately 95 kV.

2. If one electrode tip measures significantly lower than the other, it may be broken, loose, or not screwed completely into the electrode holder. Replace the tip if necessary.

3. If the electrode tips measure the same but do not measure ± 25 kV of the original set point, the problem may either be inside the powder bell or involve the voltage supply to the powder bell.

4. See Figures 6-1, 6-2, and 6-3 and refer to Table 6-1. Remove the powder bell from its mount and measure the voltage at the multiplier cable connector (1). With the kV set point at maximum, the voltage across pins 1 and 3 should measure approximately 21 Vdc.

   a. If the cable voltage measures 21 Vdc, the cable and power supply are correct and the problem is the powder bell.

   b. If the cable voltage does not measure 21 Vdc, the problem is either the cable or the power supply. Go to step 12b.

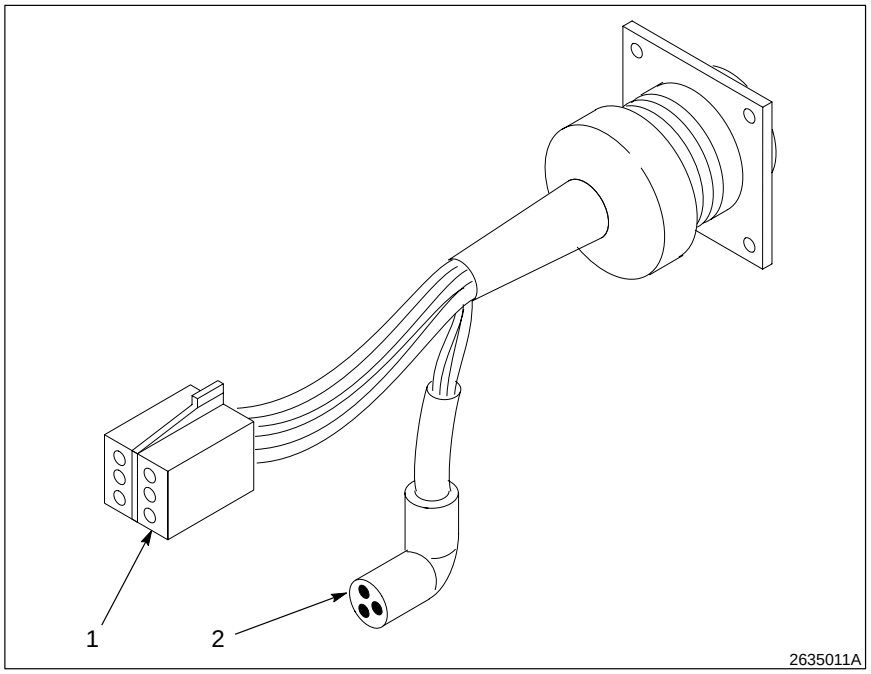

Fig. 6-1 Powder Bell Mount Internal View

1. Multiplier cable connector
2. Motor cable connector

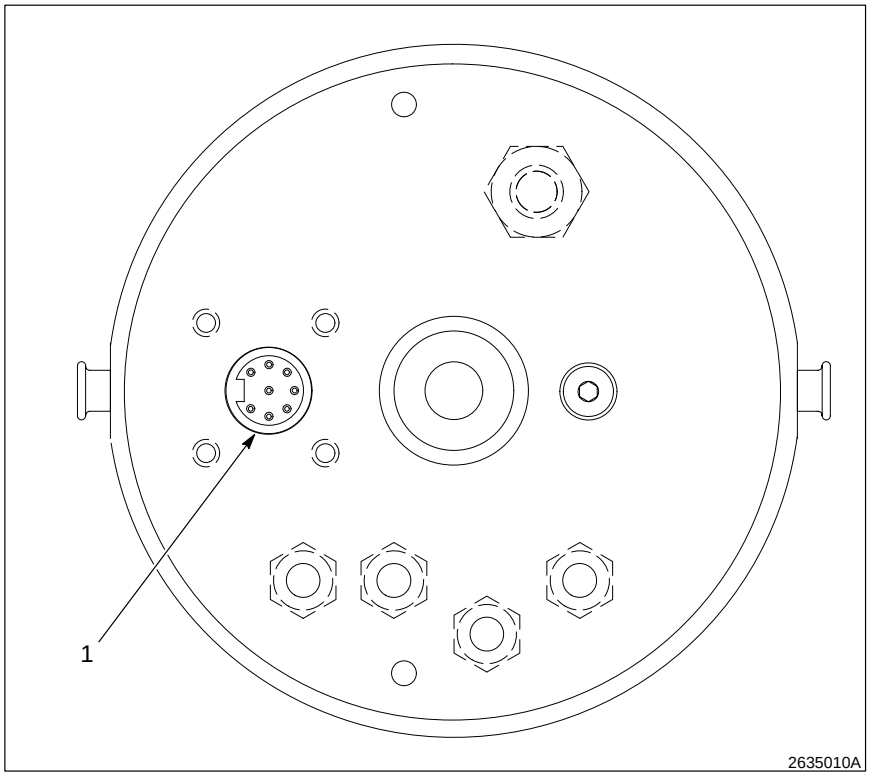

Fig. 6-2 Powder Bell Mount External End View

1. Rear body connector

Electrostatic Charging Diagnostics (contd)

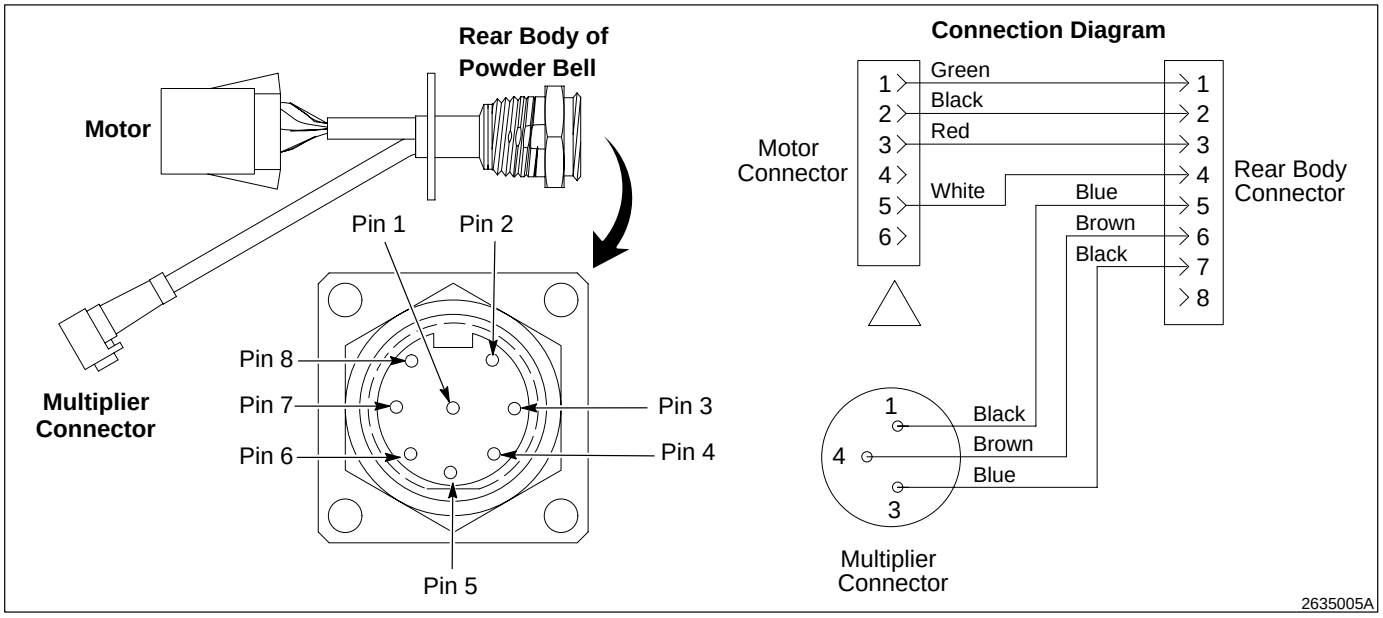

Fig. 6-3 Motor and Multiplier Connections

Table 6-1 Powder Bell Internal Connections

Cable	Pin	Type
Multiplier Connector	1	+21 Vdc (max)
	3	ground
	4	microamp feedback
Motor Power Connector	2	negative
	3	+27.5 Vdc
	5	motor feedback 2 ppr hall effect output (to pin 4 on the rear body connector)

5. See Figure 7-2. Remove the electrode ring from the powder bell.

6. Check that the conductive O-ring is in place and that the electrode tips are making contact with the O-ring. Replace if in doubt.

7. Set the kV set point at maximum. Measure kV at the end of the multiplier resistor where it protrudes from the front of the powder bell. The reading should be approximately 95 kV. If the voltage reading is not 95 ± 5 kV, remove the multiplier from the powder bell according *to Powder Bell Disassembly* in the *Repair* section.

8. Remove the multiplier resistor from the multiplier and measure the electrical resistance of the resistor using a high voltage meg-ohmmeter. The resistance should be 161–87 meg-ohms.

9. Replace the resistor if defective or damaged. Use sufficient dielectric grease where the resistor spring enters the multiplier well.

10. Retest the multiplier. Replace if necessary.

11. Check for proper voltage input to the multiplier cable. With the kV set point at maximum, voltage across pins 2 and 3 at the controller end of the cable should measure 21 Vdc.

12. If the connector has been removed from the controller end of the cable, check for 21 Vdc across the connection points for the black wire (multiplier negative) and the red wire (multiplier positive).

    a. If the voltage measures 21 Vdc at the controller end of the cable, but not at the powder bell end of the cable, the cable is defective. Replace the cable.

    b. If the voltage does not measure 21 Vdc at the controller end of the cable, the problem is in the kV card.

13. Check the wiring connector on the kV Control Circuit board. Make sure all wires are securely fastened.

14. Check the fuses on the kV Control Circuit board. Replace if necessary using a 1 amp fast-acting fuse. For part number verifications, refer to *Accessories* in the *Parts* section.

15. Check that the correct voltages are present at the kV Control Circuit board.

Electronic Connections

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

WARNING: Failure to install a locking disconnect switch or breaker may result in a severe shock during installation or repair.

Attach the free end of the external cable to the EXTERNAL I/O connector on the back panel of the controller.

NOTE: If a custom control panel is used, it may have a receptacle that is compatible with the external cable. If different terminations are required, refer to Table 6-2.

Table 6-2 Motor and KV Connections

Pin	Wire Color	Description
1	green	ground
2	black	motor (negative)
3	red	motor (positive)
4	white	motor rpm feedback
5	blue	kV Vdc common
6	brown	gun feedback
7	black	kV Vdc positive
8	—	shield drain

Section 7

Repair

Section 7
Repair

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

1. Powder Bell Disassembly

WARNING: Turn off the electrostatic voltage and ground the gun electrode before performing the following tasks. Failure to observe this warning could result in a shock.

NOTE: The powder bell tool kit is required for repairs.

Perform powder bell disassembly as follows:

1. See Figure 7-1. Remove the nose cone (1) by pressing in the spindle lock button (2) and turning the nose cone counterclockwise.

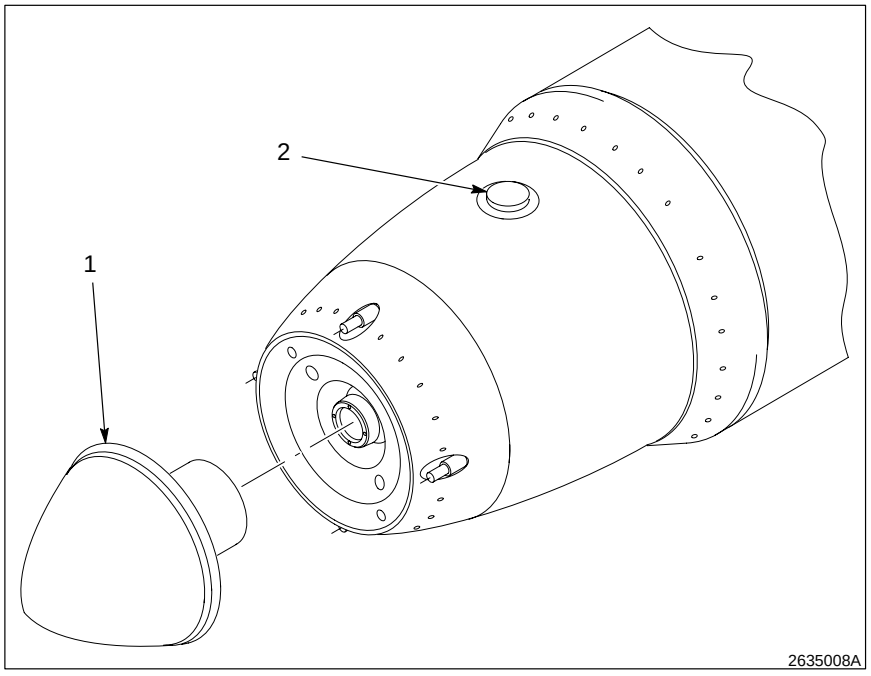

Fig. 7-1 Powder Bell

1. Nose cone
2. Spindle lock button

1. Powder Bell Disassembly (contd.)

2. See Figure 7-2. Insert the spanner wrench (1) into the alignment holes (2) on the electrode ring nut (3).

3. Turn the spanner wrench (1) counter-clockwise and remove the electrode ring nut (3).

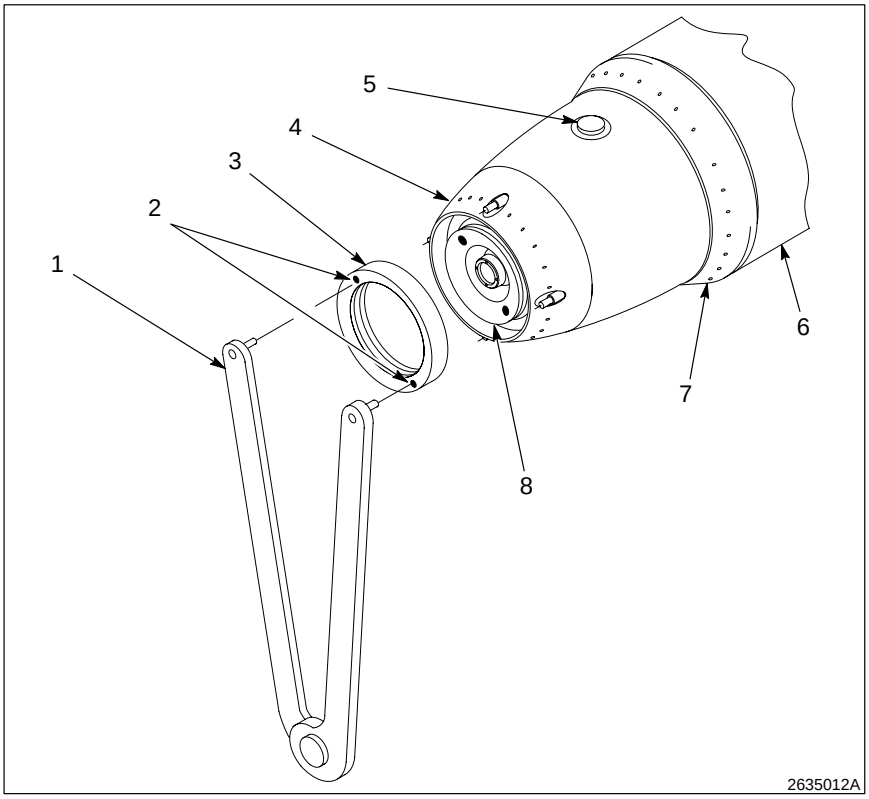

Fig. 7-2 Electrode Ring and Ring Nut Removal

1. Spanner wrench
2. Alignment holes
3. Electrode ring nut
4. Electrode ring
5. Spindle lock button
6. Outer shell
7. Diffuser ring
8. Front bearing retainer

4. Remove the electrode ring (4).

5. Use the grip pad from the powder bell tool kit to loosen and remove the diffuser ring (7). Turn counterclockwise.

6. Remove the outer shell. Press the spindle lock button (5) for clearance.

7. See Figure 7-3. Remove the screws (3) that secure the motor cable.
8. Disconnect and remove the motor cable (2) and manifold cable (6).
9. Remove the 3 screws (5) that secure the air hose manifold and multiplier.
10. Slide the powder hose (1) off the powder tube fitting (4) at the base end of the powder bell, leaving the opposite (nose) end connected.

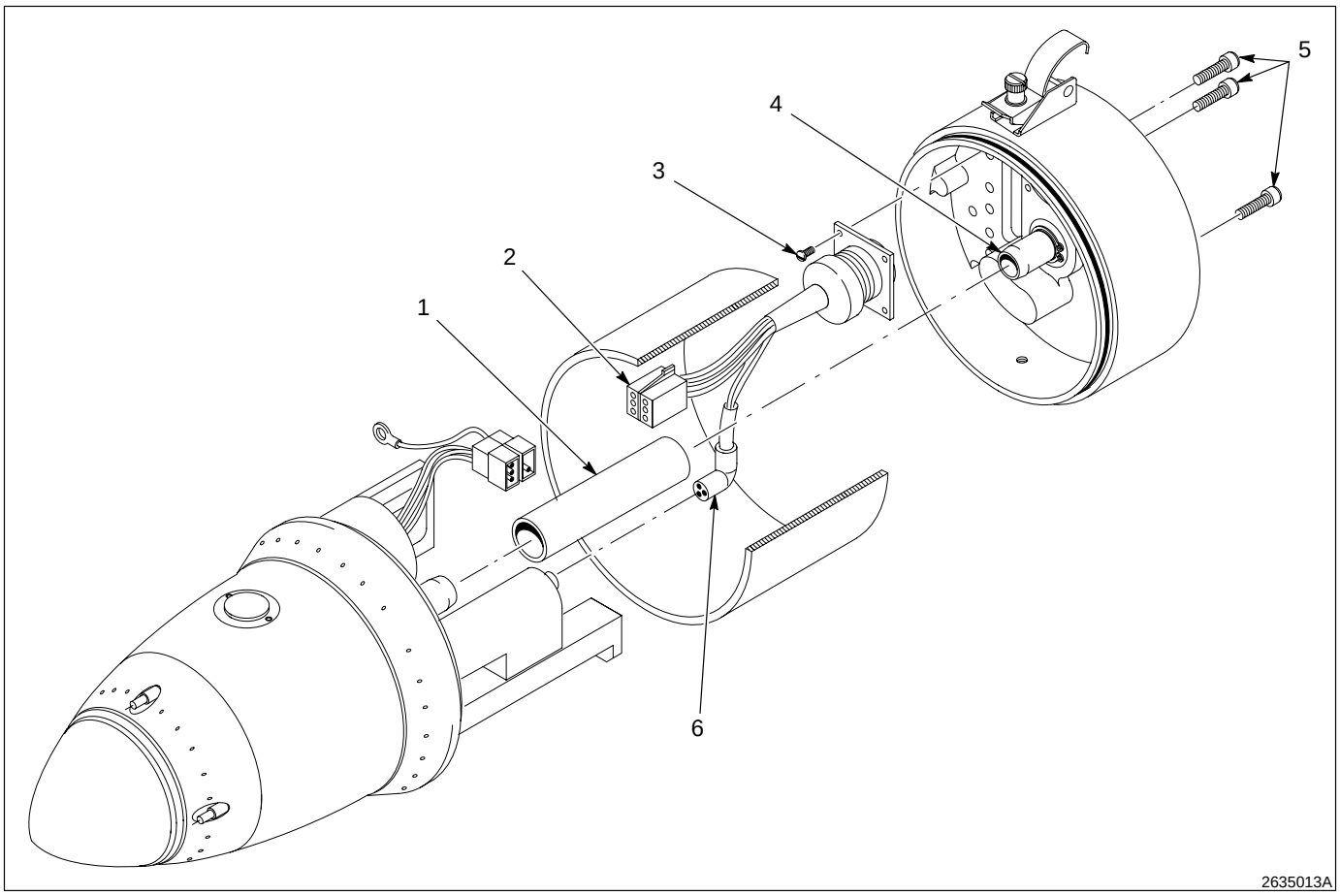

Fig. 7-3 Powder Bell Disassembly

1. Powder hose
2. Motor cable
3. Screw
4. Powder tube fitting
5. Screw
6. Manifold cable

1. Powder Bell Disassembly (contd.)

11. See Figure 7-4. Remove the screws (1) to the locking clips (2) that secure the rear body and remove the rear body.

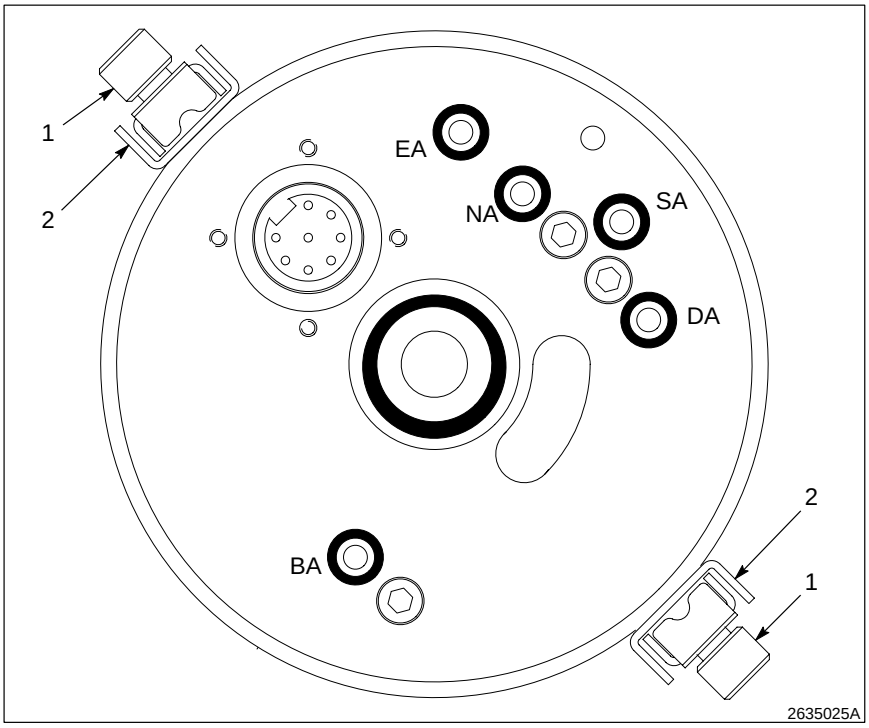

Fig. 7-4 Rear Body

1. Screws
2. Locking clip

12. See Figure 7-5. Remove the multiplier (8) with a twisting motion.

13. Remove the screw (2) to the air hose manifold (1).

14. Remove the screw (7) to the multiplier (8).

15. Remove the 2 motor retaining screws (4) and ground lug.

16. Remove the motor (3) with a twisting motion.

17. Use the spanner wrench (6) to loosen and remove the powder tube fitting (5).

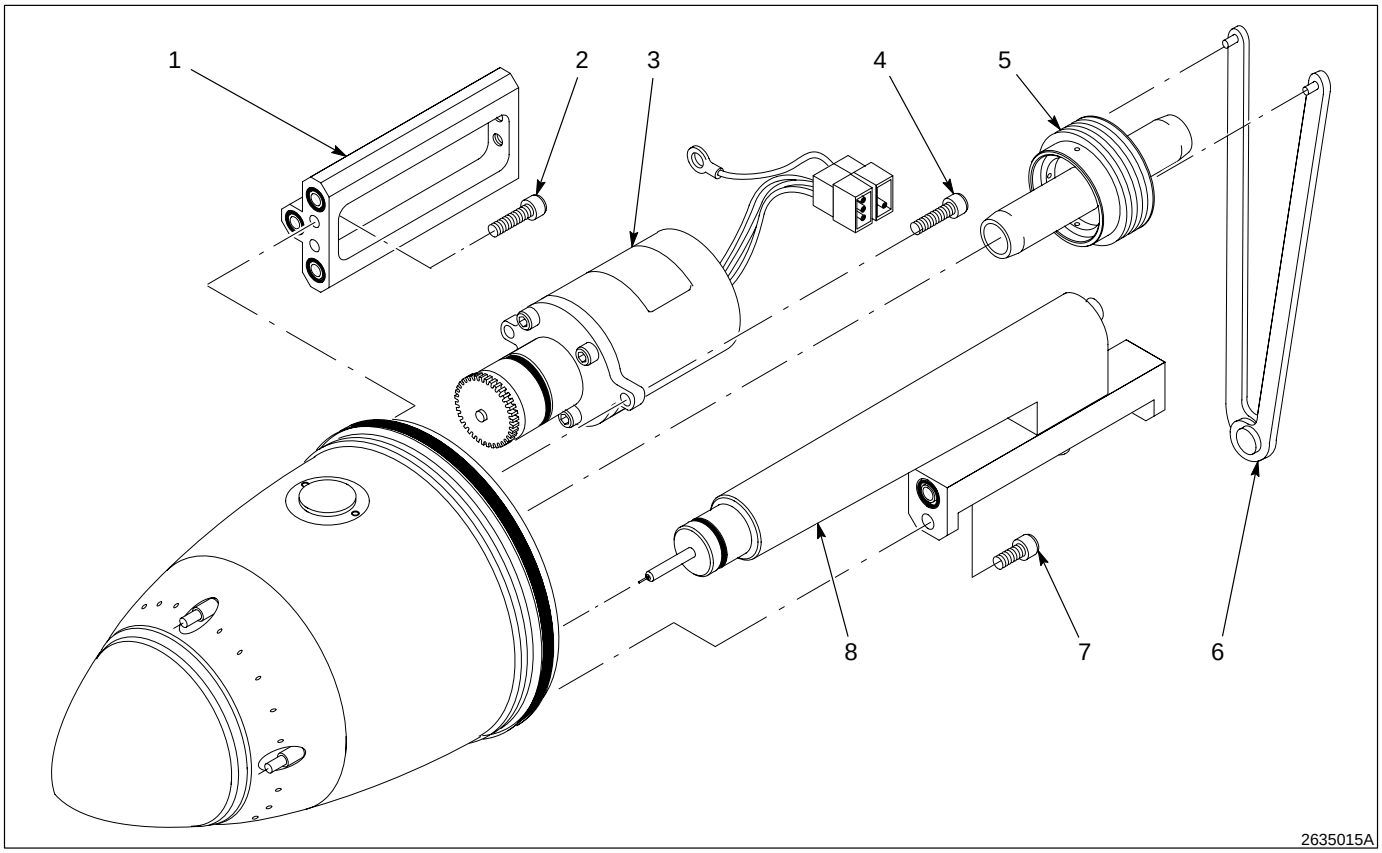

Fig. 7-5 Rear Body Disassembly

1. Air hose manifold
2. Screw
3. Motor
4. Motor retaining screw
5. Powder tube fitting
6. Spanner wrench
7. Screw
8. Multiplier

2. Rear Bearing Disassembly

Perform rear bearing disassembly as follows:

1. Complete *Powder Bell Disassembly*.

2. See Figures 7-6. Press down on the spindle lock button. Use the bearing nut wrench (5) to remove the rear bearing nut (4).

CAUTION: Do not force the bearing with tools. Use finger pressure only. Bearings are easily damaged.

3. Push, with finger pressure, the spindle (1) from the rear toward the front of the powder bell.

4. Move the rear bearing (3) from left to right to loosen and remove.

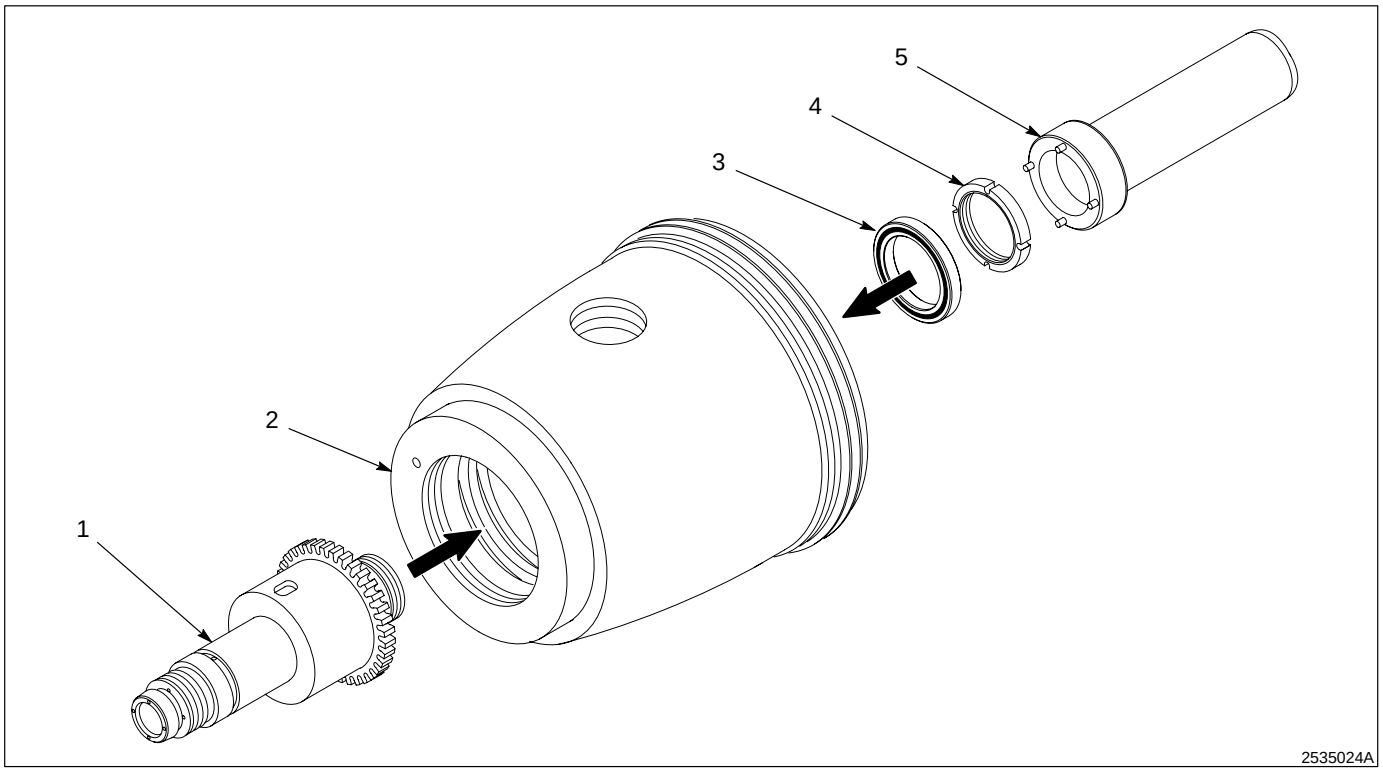

Fig. 7-6 Rear Bearing Disassembly

1. Spindle
2. Powder bell housing
3. Rear bearing
4. Rear bearing nut
5. Bearing nut wrench

3. Front Bearing Disassembly

Perform front bearing disassembly as follows:

1. Complete *Powder Bell Disassembly* and *Rear Bearing Disassembly*.

2. See Figure 7-2. Using the spanner wrench (1), remove the front bearing retainer (8) from the powder bell housing.

CAUTION: Make sure the rear bearing retainer nut has been removed or damage to the front bearing will result.

3. See Figure 7-7. Extend the puller tool (1) and align the heads of the 2 extended screws (2) with the 2 keyhole slots (3) in the front bearing holder.

4. Engage the screw heads into the keyhole slots with a clockwise turn.

5. Use a smooth continuous motion to pull or push the lever over the center, which will pull the front bearing holder out of the housing.

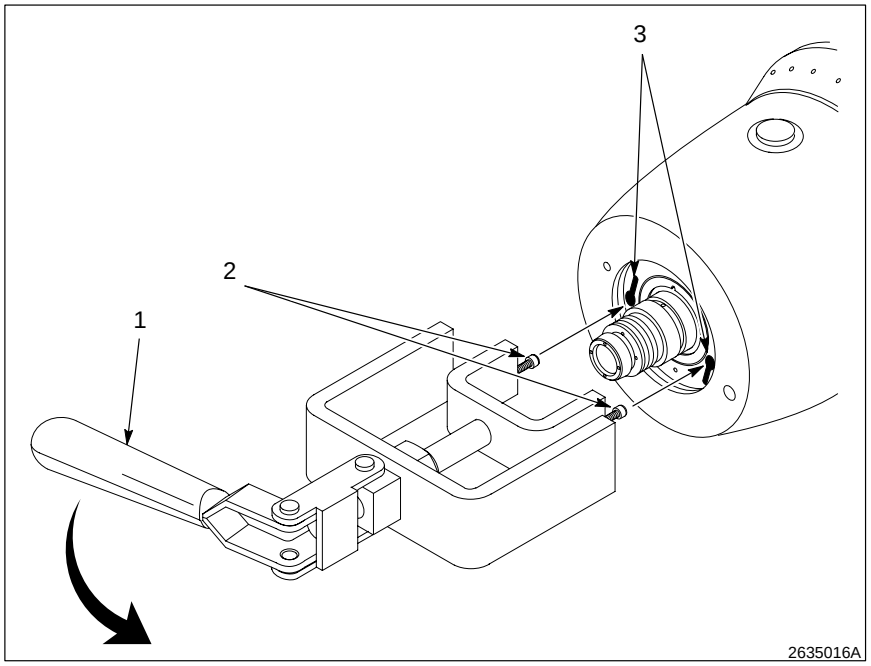

Fig. 7-7 Front Bearing Holder Removal

1. Puller tool
2. Screw head
3. Keyhole slot

3. *Front Bearing Disassembly (contd.)*

6. Make sure that the spindle lock button is not engaged.

CAUTION: Handle the spindle and gear with care. The gear teeth are plastic and are easily damaged.

7. See Figure 7-6. If the spindle (1) did not come out of the housing with the front bearing holder, carefully remove it.

8. Remove the rear bearing (3) and rear bearing nut (4).

9. See Figure 7-8. Use the bearing nut wrench (1) to remove the front seal (2) from the front bearing holder (4).

10. Remove the front bearing (3) from the front bearing holder (4). Push from the back side using fingers. Apply equal pressure to both sides. Do not force.

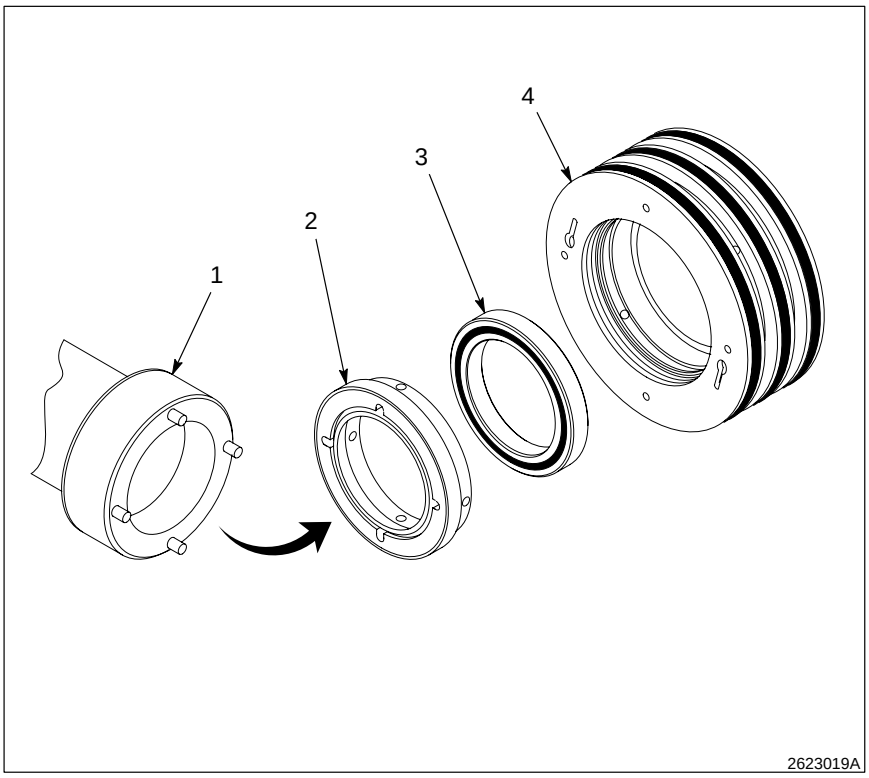

Fig. 7-8 Front Bearing Holder Disassembly

1. Bearing nut wrench
2. Front seal
3. Front bearing
4. Front bearing holder

4. Spindle Disassembly

CAUTION: Handle the spindle and gear with care. The gear teeth are plastic and are easily damaged.

1. See Figure 7-9. Remove the gear (1) from the spindle by removing the retaining screws (2).

2. Remove the rear seal (3) only if necessary. If the seal is removed, replace the seal with a new one.

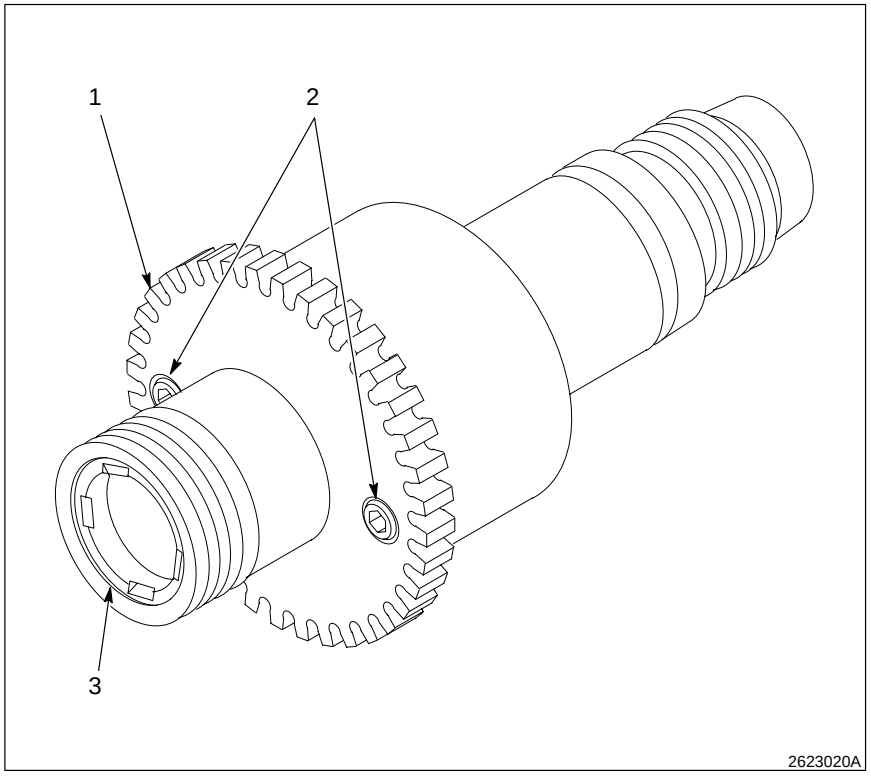

Fig. 7-9 Spindle Assembly

1. Gear
2. Retaining screw
3. Rear seal

5. Spindle Assembly

NOTE: Check all O-rings for damage and replace if necessary.

1. Make sure all surfaces are clean.
2. See Figure 7-9. Install a new rear seal (3) if necessary.
   a. Make sure the seal points forward, toward the inside of the spindle.
   b. Center the rear seal with the powder tube fitting to make sure the alignment is correct.

CAUTION: Do not over-tighten the gear retaining screws. The threads may become stripped or the spindle may crack.

3. Attach the gear (1) onto the spindle with the counter-sink facing out. Tighten the screws (2) in equal intervals.

6. Rear Bearing Assembly

Assemble the rear bearing as follows:

1. See Figure 7-6. Insert the rear bearing (3), finger pressure only, into the rear of the powder bell housing (2).
2. Make sure the rear bearing is level and properly seated.
3. Insert the spindle (1) into the nose end of the powder bell until several spindle threads are exposed.
4. Insert the rear bearing nut (4) with the raised shoulder against the bearing. If shoulders are present on both sides, the orientation does not matter.

CAUTION: Do not over-tighten the nut. The threads may become stripped or the spindle may crack.

5. Press the spindle lock button and use the bearing nut wrench (5) to tighten the nut.

7. Front Bearing Assembly

NOTE: Check all O-rings for damage and replace if necessary.

1. Make sure all surfaces are clean.
2. Turn the powder bell over.
3. See Figure 7-8. Install, using fingers, the front bearing (3) into the front bearing holder (4).
4. Install the front seal (2) into the bearing holder (4) using the bearing nut wrench (1). Make sure the seal points forward, facing outward from the bearing holder.

CAUTION: Do not over-tighten the bearing holder assembly. The threads may become stripped or the front seal may be damaged.

5. Carefully place the bearing holder assembly into the front of the powder bell. A few threads should be showing. Make sure the seal is facing outward, toward the front of the powder bell.
6. Install the bearing retainer nut, tightening by hand until the bearing holder is fully seated. Finish tightening with the spanner wrench.

8. Powder Bell Assembly

NOTE: Check all O-rings for damage and replace if necessary.

1. Make sure all surfaces are clean.
2. Insert the powder tube fitting and tighten using the spanner wrench until it bottoms out.
3. Check that the spindle turns freely and has 0.010–0.20 inches of end play.

CAUTION: Use care to avoid spindle gear damage.

4. Carefully insert the motor with its attached gear while turning the spindle so that the gears mesh. The spindle should turn freely when the motor is fully seated.

8. Powder Bell Assembly
(contd.)

5. See Figure 7-10. If the gear (1) was removed from the motor:

   a. Make sure the motor adapter (2) and O-ring are attached to the motor (3).

   b. Attach the gear (1) to the motor shaft at a distance of 38.1 mm (1.50 in.) from the edge of the motor adapter.

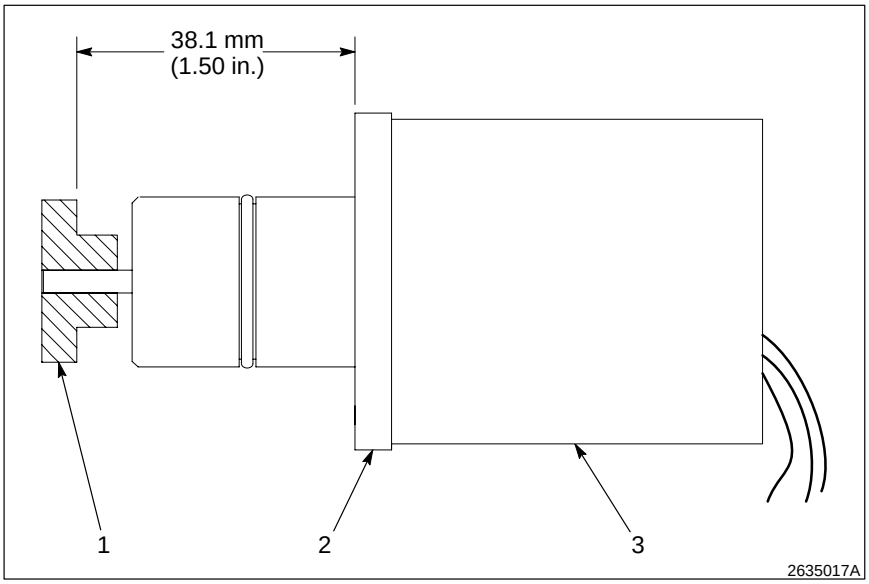

Fig. 7-10 Gear Alignment

1. Gear
2. Motor adapter
3. Motor

6. See Figure 7-5. Attach the ground lug and the motor retaining screws (4). After tightening the screws, make sure the spindle can turn freely.

7. Install the air hose manifold (1).

8. Install the multiplier (8). The square block of the multiplier should be parallel to the mounting rod.

9. Install the rear body with 2 screws to the locking clips. Align the multiplier hole and the air hose manifold holes.

10. See Figure 7-11. If the motor cable has been removed, install it with the key (1) pointing toward the outside of the powder bell.

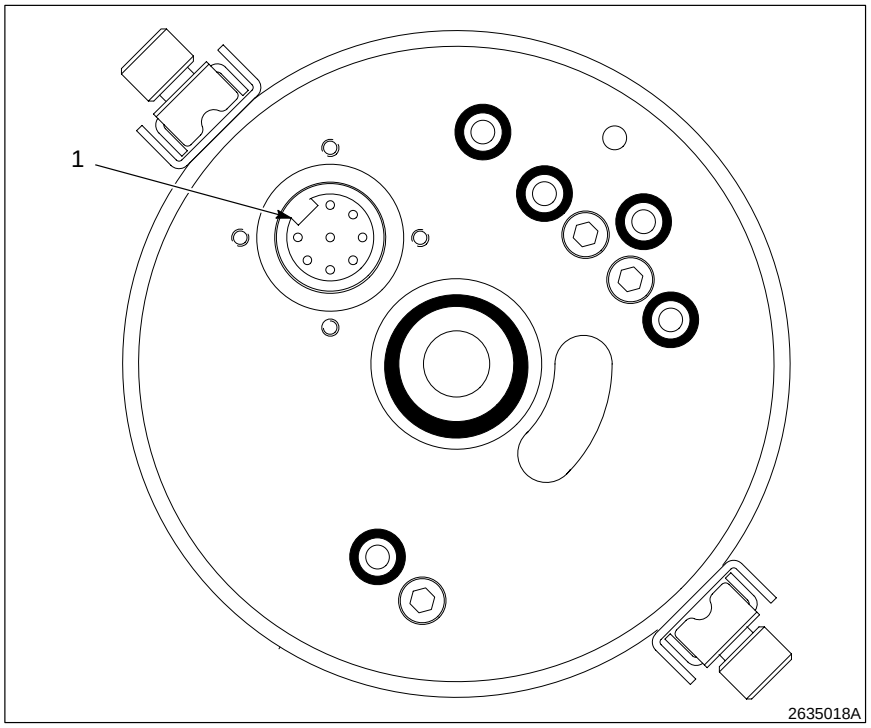

Fig. 7-11 Motor Cable Orientation

1. Key alignment

11. See Figure 7-3. Install the powder hose (1) to the powder tube fitting (4).

12. See Figure 7-2. Slide the outer shell onto the powder bell assembly. Press the spindle lock button (5) for clearance.

13. Screw the diffuser ring onto the powder bell assembly until snug. The outer shell should not move. Use the grip pad from the powder bell tool kit for a secure hand hold.

14. Before installing the electrode ring, make sure the electrode tip protrudes though the powder bell body.

15. Install, finger tight, the electrode ring (4) and electrode ring nut (3).

16. Rotate the electrode ring (4) so that the electrodes are in the proper orientation. Use the spanner wrench (1) to tighten the electrode ring nut (3).

17. Press the spindle lock button and install the nose cone or powder bell cup.

Section 8

Parts

Section 8
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. Powder Bell

See Figure 8-1.

Item	Part	Description	Quantity	Note
—	327 297	Powder bell assembly	1	
1	325 201	• Bell cup assembly with nose cone	1	A
NS	296 530	• Bell cup assembly	1	
2	235 983	• Nut, electrode ring	1	
3	327 299	• Ring, electrode	1	
4	132 748	• Contact, cable (electrode tip)	4	
5	236 762	• O-ring, 3 in. x $3\frac{3}{16}$ in. x $\frac{3}{32}$	1	
6	287 699	• O-ring, $2\frac{7}{16}$ ID x $2\frac{5}{8}$ OD	1	
7	327 300	• Ring, diffuser	1	
8	327 298	• Module, bell drive	1	B
9	942 461	• O-ring, 4.500 x 4.750 x 0.125	1	
10	235 925	• Tubing, isoprene, $\frac{7}{16}$ ID	1 ft	
11	327 301	• Shell, powder bell	1	
12	327 308	• Manifold, 3-port, powder bell	1	
13	940 140	• O-ring, $\frac{1}{2}$ x $\frac{5}{8}$ x $\frac{1}{16}$	13	
14	981 104	• Screw, socket, 10-24 x 0.500, zinc	6	
15	327 303	• Cable, motor, powder bell	1	
16	981 258	• Screw, fil, 6-32 x 0.312, steel, zinc	4	

NOTE A: See *Bell Cup Deflector Assembly* section.
B: See *Bell Drive Module* section.
NS: Not Shown

Continued on next page

Item	Part	Description	Quantity	Note
17	327 302	• Body, rear, powder bell	1	
18	327 305	• Standoff, latch	2	
19	327 304	• Latch, with safety lock	2	
20	981 066	• Screw, round, 8-32 x 0.250, steel, zinc	4	
21	236 751	• Fitting, powder tube, $^1/_2$ in.	1	
22	940 180	• O-ring, 0.75 x 0.875 x 0.063	1	
23	986 120	• Ring, retain, ext, 0.875, basic	1	
24	327 309	• Manifold, 1-port, powder bell	1	
25	983 004	• Washer, flat, e, 0.156 x 0.312 x 0.032, stainless steel	1	
26	983 070	• Washer, lock, split, #6, 316 stainles steel	1	
27	981 061	• Screw, cr round, 8-32 x 0.750, steel, zinc	1	
28	323 320	• Power supply, 95 kV, negative	1	
29	327 306	• Electrode, contact spring	1	
30	327 307	• Holder, electrode contact	1	
31	940 163	• O-ring, silicone, 0.625 x 0.750 x 0.063	1	

2. Powder Bell (contd.)

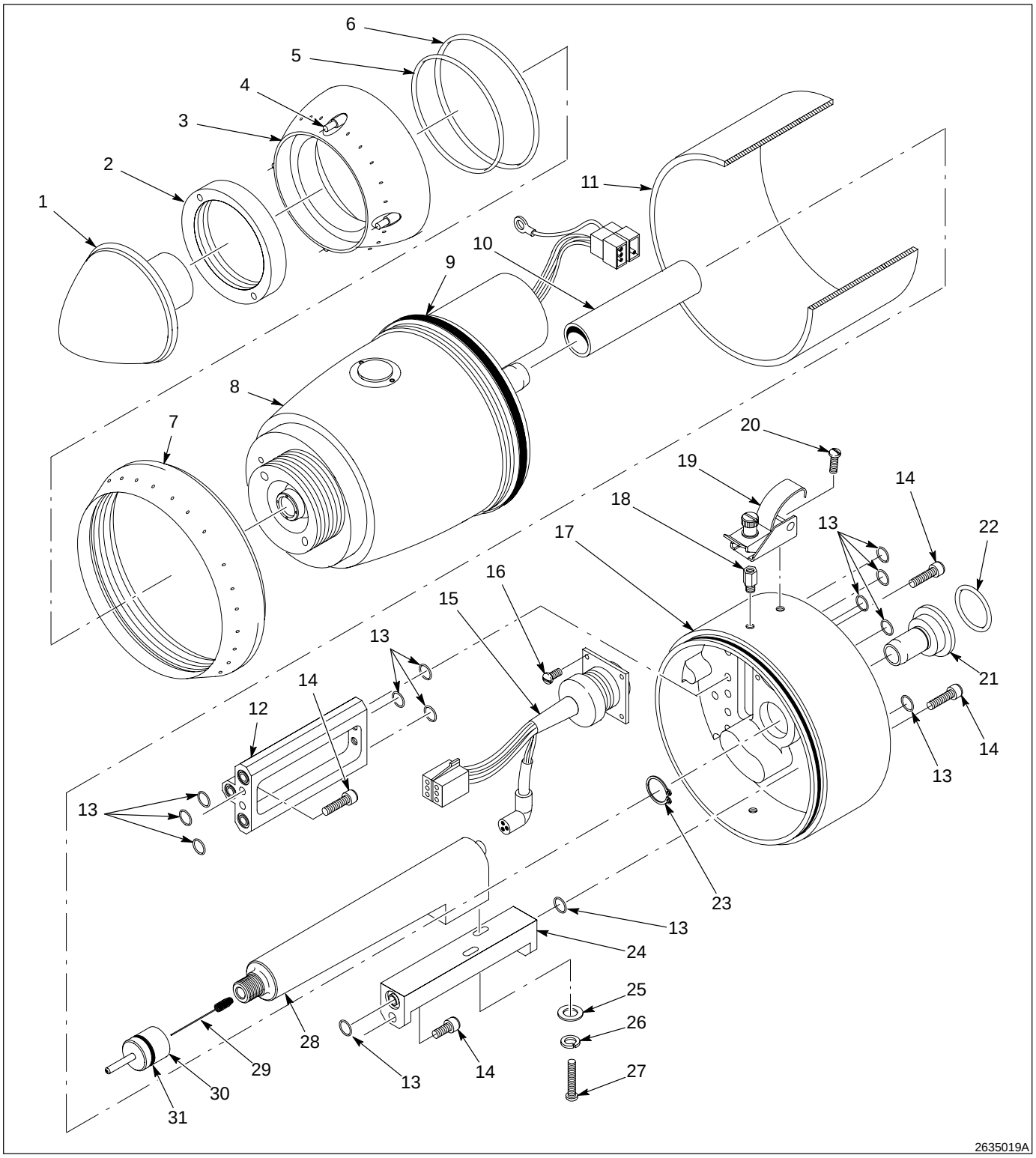

Fig. 8-1 Powder Bell

3. Bell Drive Module

See Figure 8-2.

Item	Part	Description	Quantity
—	327 298	Module, bell drive	1
1	327 311	• Retainer, button	1
2	940 163	• O-ring, silicone, 0.625 x 0.750 x 0.063	1
3	327 313	• Button assembly, powder bell	1
4	236 761	• Spring, compression, 0.36 in. x 0.041 in.	1
5	327 312	• Housing, powder bell	1
6	327 017	• Gear, 44 teeth, 48 pitch	1
7	327 019	• Drive assembly, 2000 rpm mini bell	1
8	327 174	• Bearing, ball, $^{3}/_{16}$ ID x $^{1}/_{2}$ OD	1
9	981 389	• Screw, socket, #4-40, x $^{1}/_{4}$ in. long, black	3
10	325 204	• Adapter, motor, 2000 rpm	1
11	236 802	• O-ring, $^{13}/_{16}$ ID x $^{15}/_{16}$ OD	1
12	236 752	• Motor, 28 Vdc brushless	1
13	981 880	• Screw, fillister, 8-32 x 0.625, steel, black	2
14	239 861	• Harness, ground	1
15	981 073	• Screw, fillister, 8-32 x 0.375, steel, zinc	1
16	239 766	• Retainer, rear bearing	1
17	239 770	• Nut, rear bearing	1
18	239 771	• Seal, rear	1
19	327 018	• Gear, 96 teeth, 48 pitch	1
20	296 380	• • Screw, #3-48 x $^{1}/_{4}$ in. socket head cap	2
21	239 763	• Spindle, powder bell	1
22	236 760	• O-ring, $2^{1}/_{8}$ ID x $2^{1}/_{4}$ OD	3
23	239 761	• Holder, front bearing	1
24	239 768	• Bearing, ball (1 in. shaft)	2
25	303 598	• Seal assembly, front	1
26	235 982	• Retainer, bearing, front	1

3. Bell Drive Module (contd.)

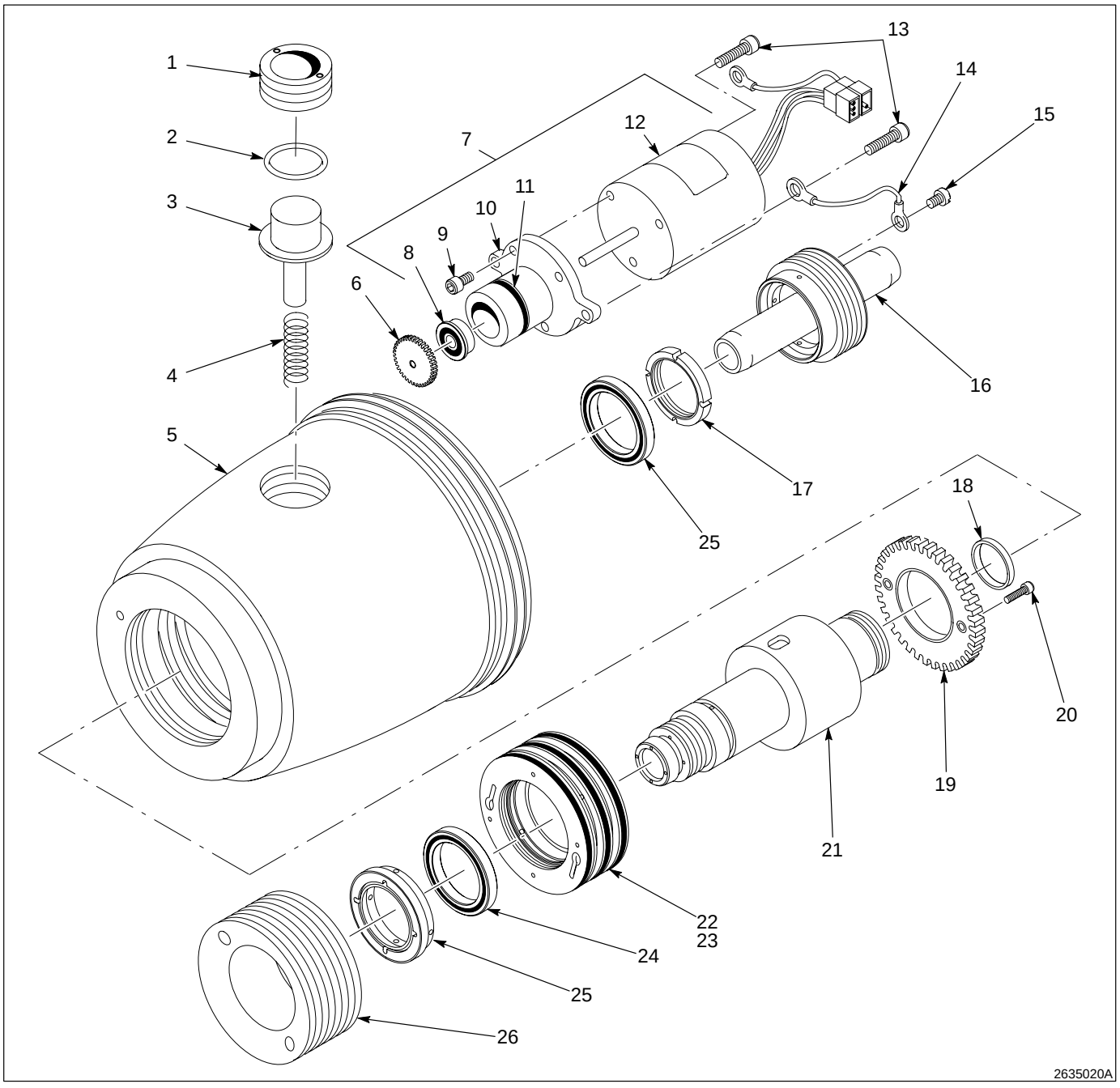

Fig. 8-2 Bell Drive Module

4. Mounting Assembly

See Figure 8-3.

Item	Part	Description	Quantity
—	327 314	Mounting assembly, powder bell	1
1	327 315	• Mounting, powder bell	1
2	981 834	• Screw,#8-32 x $^1/_2$ in. long, flat head socket	2
3	286 630	• Keeper, latch	2
4	327 333	• Adapter plate	1
5	327 329	• Cable, power, powder bell, 8 m	1
6	981 258	• Screw, fil, 6-32 x 0.312, steel, zinc	2
7	983 102	• Washer, lock, e, split, #6, steel, zinc	4
8	327 317	• Screw, shoulder $^5/_{16}$ x $^7/_8$	1
9	981 949	• Screw, socket, $^1/_4$-20 x 1.250, black	3
10	986 120	• Ring, retaining, external, $^7/_8$ in., basic	1
11	327 316	• Fitting, $^7/_{16}$ powder tube	1
12	972 716	• Connector, male, $^1/_4$ tube x $^1/_8$ NPT	4
13	971 177	• Connector, male, $^3/_8$ tube x $^1/_4$ NPT	1

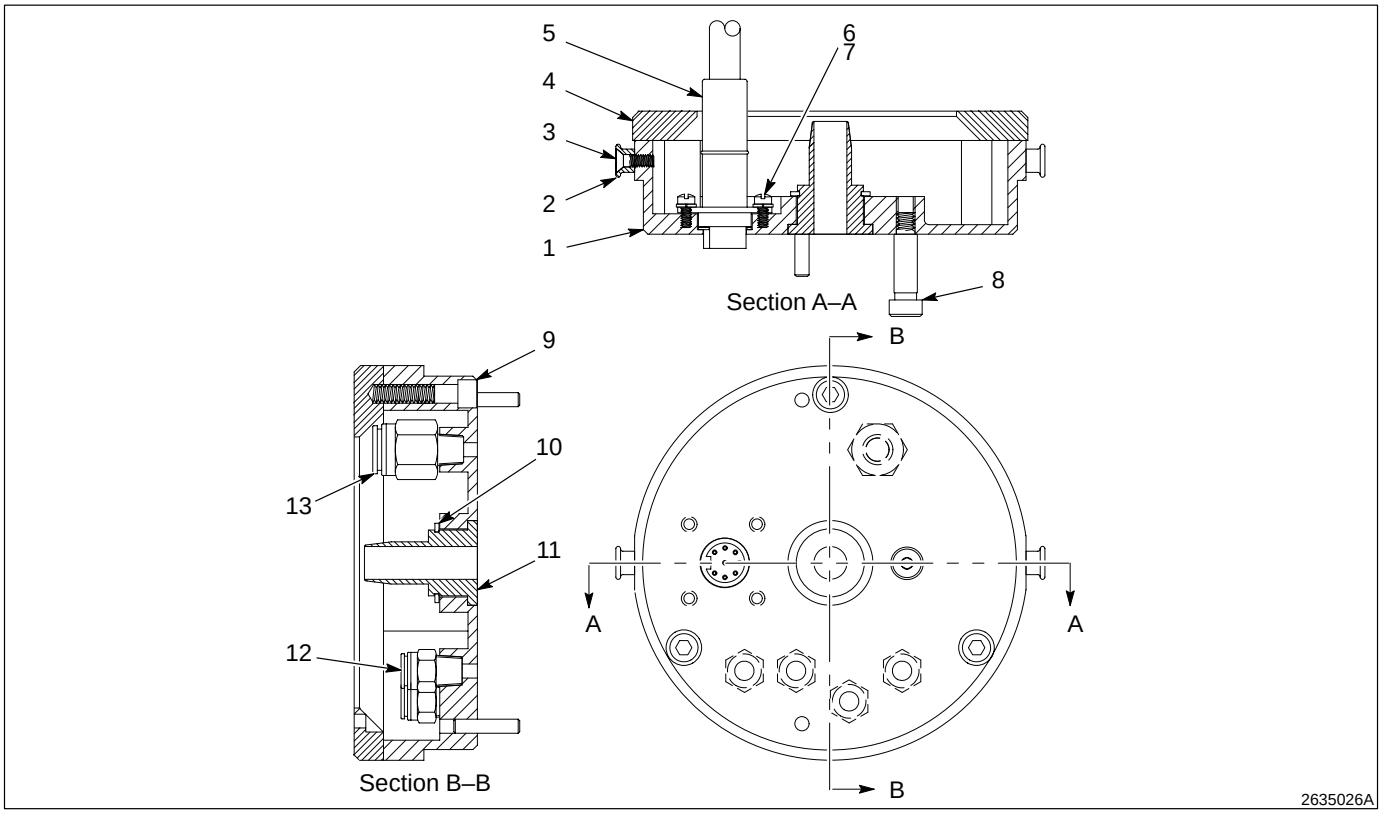

Fig. 8-3 Mounting Assembly

5. Tube Mount

See Figure 8-4.

Item	Part	Description	Quantity	Note
1	327 314	Mounting assembly, powder bell	1	A
2	236 900	Clevis, mounting	2	
3	981 563	Screw, flat, socket, $^3/_8$-16 x 1.000, black	2	
4	984 158	Nut, hex, jam, $^3/_8$-16, steel, zinc	2	
5	236 901	Mounting, tube	1	
6	981 228	Screw, socket set, $^1/_4$-20 x 0.250, cone	2	
7	327 333	Plate, mounting, powder bell	1	
8	981 679	Screw, socket, $^1/_4$-20 x 0.750, cap	2	
NOTE A: Refer to the *Mounting Assembly* section.				

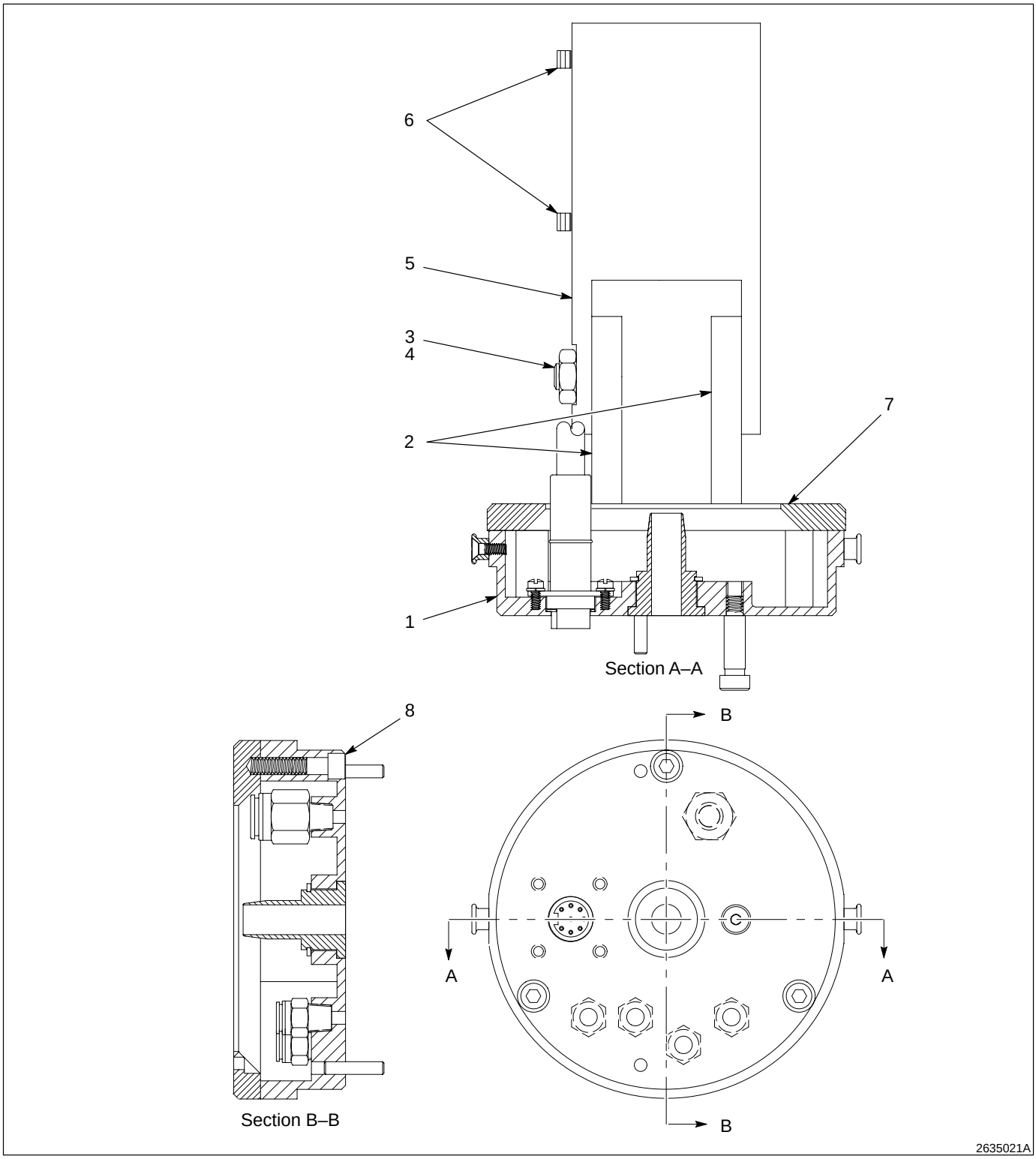

Fig. 8-4 Tube Mount Assembly

6. Bar Mount

See Figure 8-5.

Item	Part	Description	Quantity	Note
1	327 314	Mounting assembly, powder bell	1	A
2	287 970	Support, vertical	1	
3	287 969	Clamp, bar, powder bell	1	
4	249 074	Handle, adjustable, $^{3}/_{8}$-16 x 2.75	1	
5	237 856	Retaining ring, external, $1^{3}/_{8}$	1	
6	981 510	Screw, socket, 10-24 x 1.000, zinc	2	
7	981 679	Screw, socket, $^{1}/_{4}$-20 x 0.750, cap	3	
NOTE A: Refer to the *Mounting Assembly* section.				

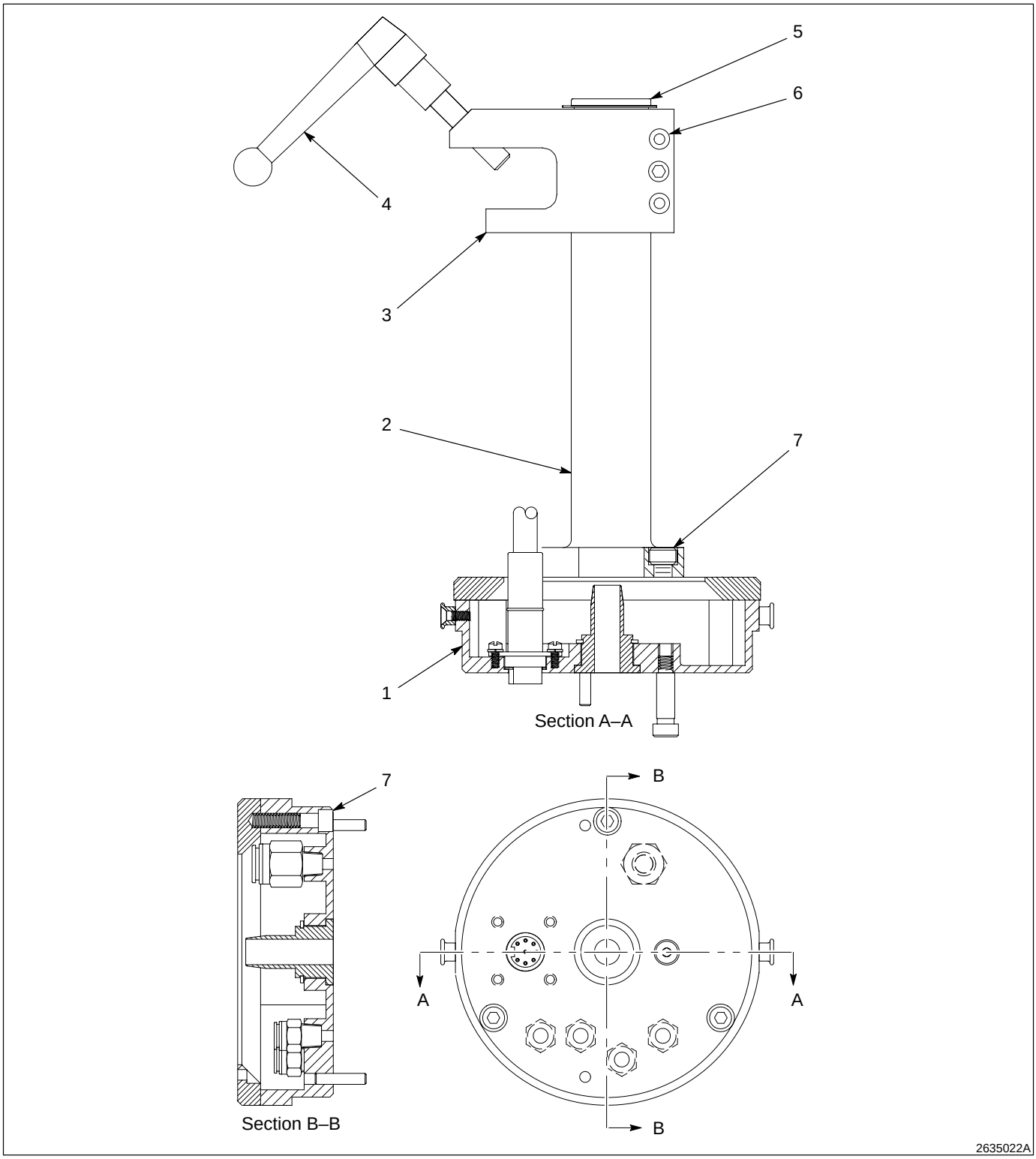

Fig. 8-5 Bar Mount Assembly

7. Bell Cup Nose Cone Assembly

See Figure 8-6.

Item	Part	Description	Quantity
—	325 201	Bell cup assembly with nose cone	1
1	325 296	• Nozzle, cone, outer, sub-assembly	1
2	325 198	• • Cone, nose, bell cup	1
3	325 200	• • Stud, 8-32 x 2.25 in.	1
4	325 197	• • Nozzle, outer cone	1
5	325 199	• • Tip, replaceable, bell cup	1
6	236 766	• Spacer, nozzle, bell	3
7	235 992	• Nozzle, inner	1

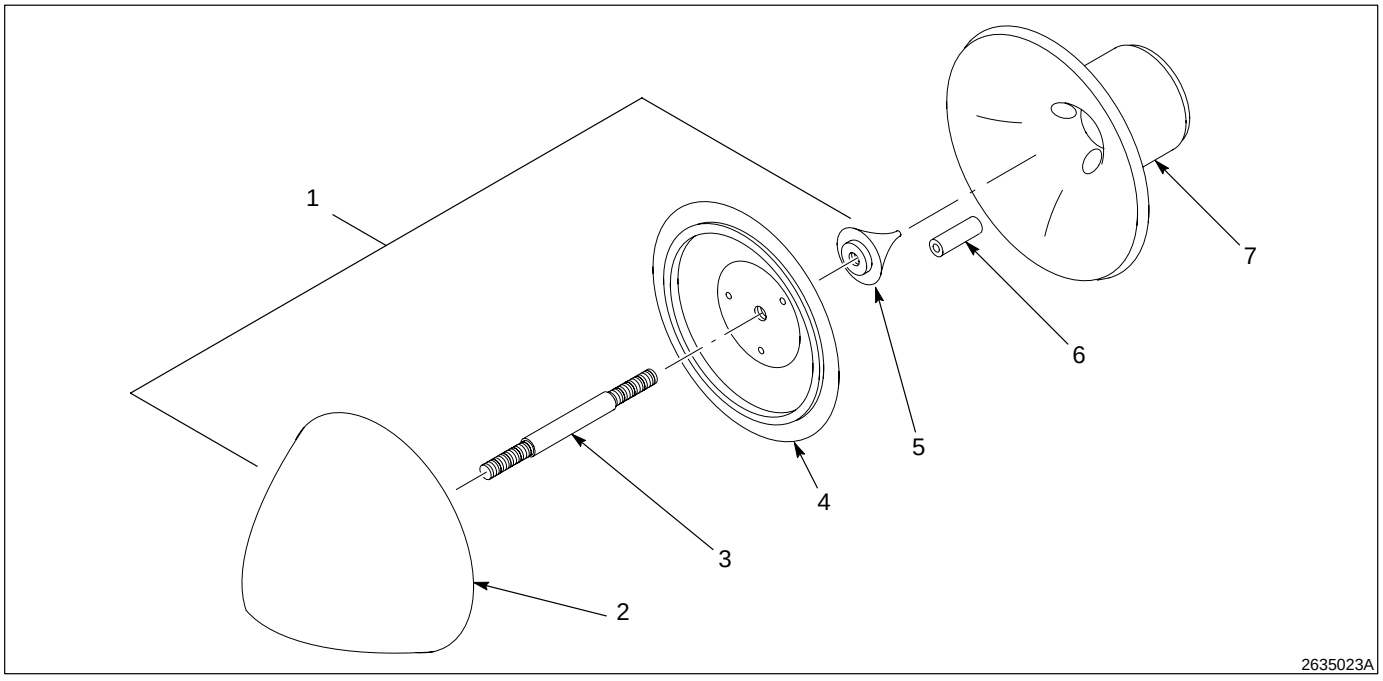

Fig. 8-6 Nose Cone Assembly

8. Bell Cup Deflector Assembly

See Figure 8-7.

Item	Part	Description	Quantity
—	327 020	Bell cup assembly, deflector	1
1	325 297	• Nozzle, outer, diffuser, sub-assembly	1
2	296 551	• • Diffuser, bell cup	1
3	236 924	• • Screw, #8-32 x $^1/_2$ nylon	1
4	325 305	• • Nozzle, outer	1
5	325 199	• • Tip, replaceable, bell cup	1
6	236 766	• Spacer, nozzle, bell	3
7	235 992	• Nozzle, inner	1

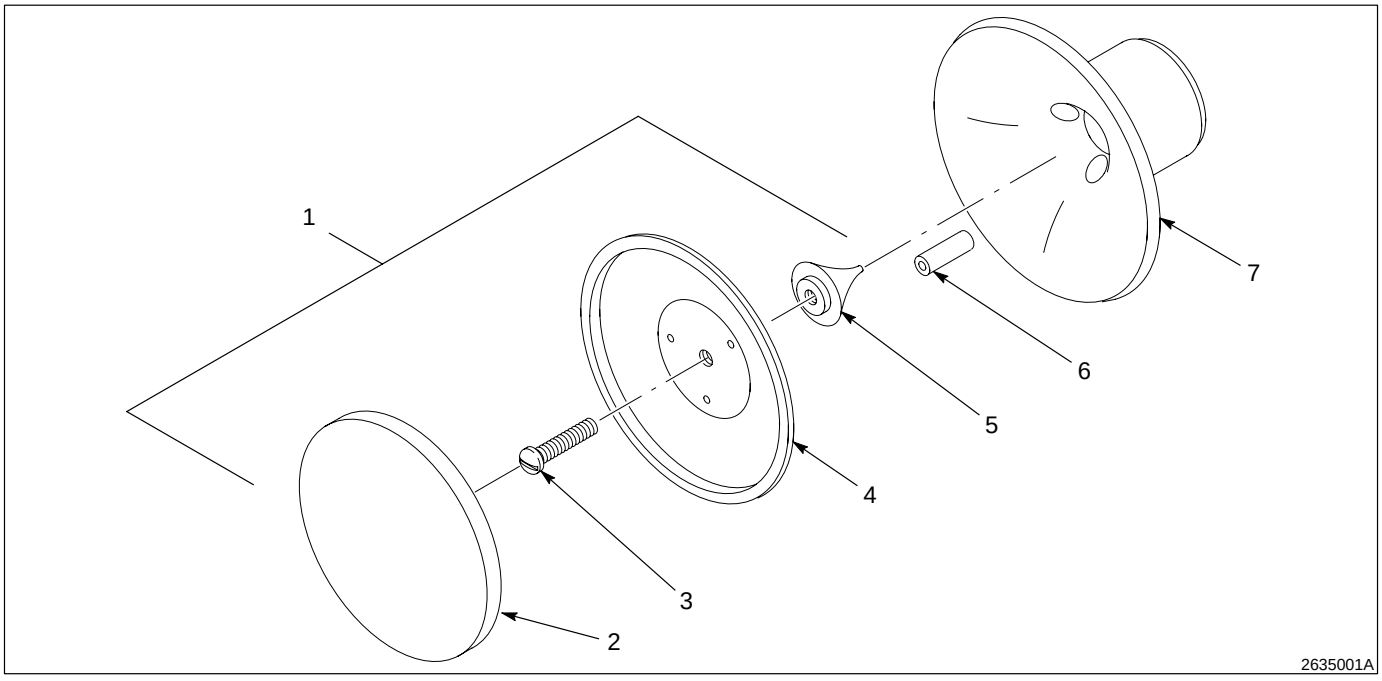

Fig. 8-7 Deflector Assembly

9. Powder Bell Tool Kit

See Figure 8-8.

Item	Part	Description	Quantity
—	303 594	Kit, powder bell repair tools	1
1	296 438	• Puller	1
2	239 804	• Tool, bearing nut	1
3	236 803	• Extension	1
4	303 595	• Spanner wrench	1
NS	303 596	• Grip cloth	1
NS	303 597	• Tool case	1
NS: Not Shown			

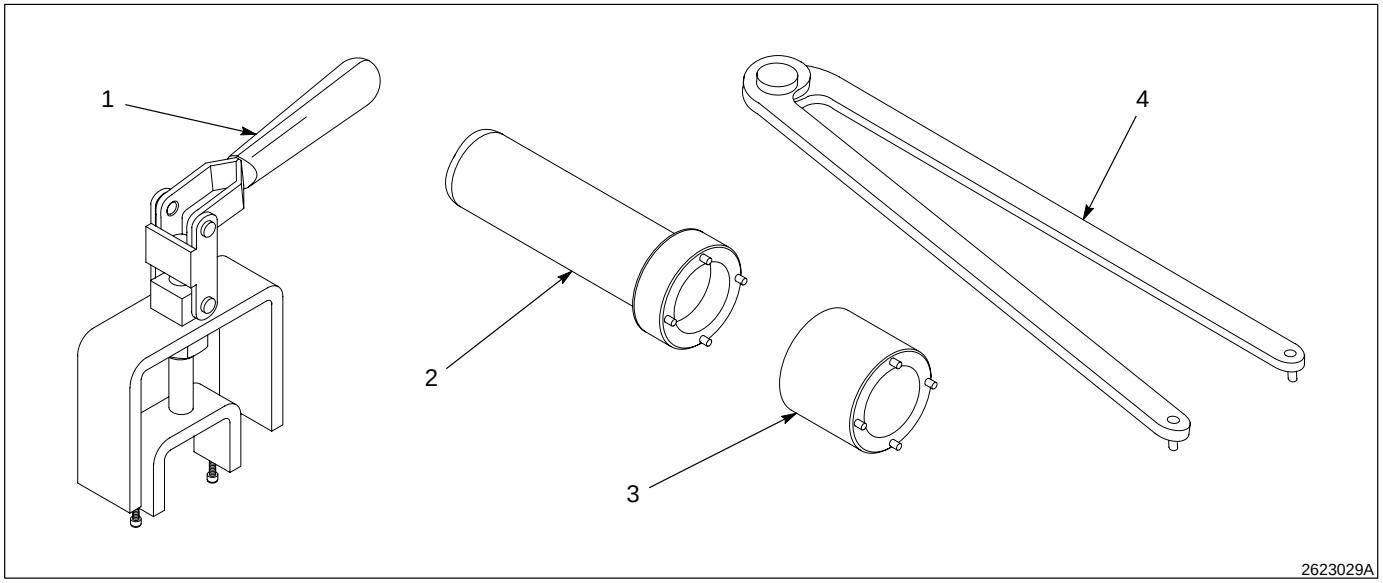

Fig. 8-8 Powder Bell Tools

10. Accessories

Refer to this chart for accessories.

Part	Description	Quantity
172 872	Nordson meg-ohm meter	1
185 807	Nordson electrostatic analyzer kit	1
327 604	KV circuit board (95 kV)	1
939 098	1 amp fast acting fuse	AR
327 325	Cable, power, 8 cond, 8 m	1
327 318	Receptacle, controller, bell	1
329 679	Controller, motor, powder bell	1
AR: As Required		