Spectrum Powder Coating System

Customer Product Manual
Part 331 231A

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.

All phases of equipment installation must comply with all Federal, State, and Local codes.

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.
- 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.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.

- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.

- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.

- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

7. Grounding

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

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.

- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator's platform, hoppers, photoeye supports, and metal blow-off nozzles. Personnel working in the spray area must be grounded.

- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as the operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.

- Operators must maintain skin-to-metal contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.

7. Grounding (contd)

- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

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

8. 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.

9. Disposal

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

Section 2

Description

Section 2
Description

1. Introduction

This manual covers typical standard Spectrum Powder Coating Systems. It includes booth operation, maintenance, troubleshooting, repair procedures, and serviceable parts.

NOTE: Because powder coating systems are customized to meet customer requirements, your system may have controls and equipment not described in this manual or located in different positions. Your Nordson representative can provide you with additional information and training to supplement this manual.

2. System Overview

Spectrum powder coating systems are designed for quick color change and maximum transfer efficiency. A basic system consists of the following subsystems:

- Recovery System
- Floor Sweeper (Optional)
- Cyclone System
- Powder Feed Center(s)
- Roll-On/Roll-Off System (Optional)

Spectrum powder coating system capacity can be 8,000 CFM or 12,000 CFM.

8K CFM systems have two 4,000 CFM collector units in the afterfilter, one cyclone assembly, and one powder feed center.

12K CFM systems have three 4,000 CFM collector units in the afterfilter, two cyclone assemblies, and two powder feed centers.

3. Recovery System

See Figure 2-1.

The recovery system consists of the booth canopy and base, an exhaust fan, a final filter unit, two or three collector units, and the ducts that connect all components of the system together.

Recovery System Components

Recovery system components and their functions are described in Table 2-1.

Table 2-1 Recovery System Components

Component	Description
Canopy	The canopy helps contain the sprayed powder within the system. The canopy is mounted on the booth base, which houses the floor sweeper drive, electrical wiring, and pneumatic plumbing. The canopy has inlet duct openings at each end; a slot in the roof for the part conveyor; entrance and exit vestibules and doors; slots in the sides for automatic guns; and doorways for manual spray gun operators. Air flow through the canopy openings carries unused powder into the inlet ducts.
Ducts	Inlet ducts connect the canopy to the cyclone, and ducts connect the cyclone to the afterfilter. The duct layout varies depending on system configuration and customer requirements.
Afterfilters	The afterfilter consists of several collector units and a final filter unit. The afterfilter generates the air flow through the system and removes the fine powder particles (fines) left in the airflow after the cyclones reclaim the usable powder. The final filters in the final filter unit scrub the air before it is returned to the spray room to prevent contamination.

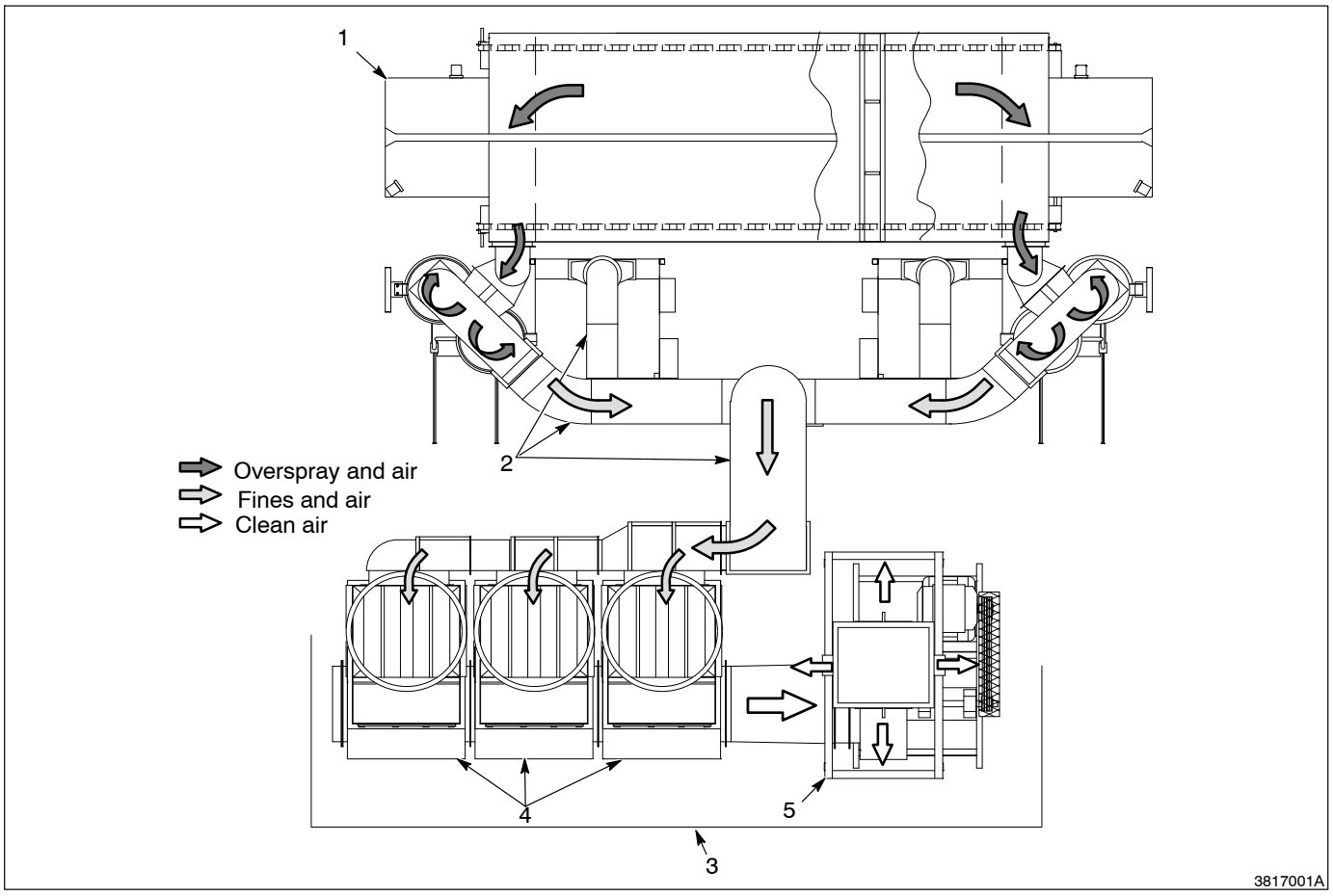

Fig. 2-1 Powder Recovery System—Top View

1. Canopy
2. Ducts
3. Afterfilter
4. Collector units
5. Final filter unit

Afterfilter Components

Afterfilter components and their function are described in Table 2-2.

Table 2-2 Afterfilter Components

Component	Description
Collector units	Each collector unit houses • eight Powder Grid cartridge filters • eight pulse valves • one pulse air manifold • one hopper with 4 fluidizing valves • one pulse valve timer panel Powder conveyed by the air flow collects on the external surfaces of the cartridge filters. The pulse valves blow the powder off the cartridge filters. The powder collects in the hopper. The fluidizing valves diffuse air into the powder in the hopper so it will flow easily when it is removed. One pulse valve timer panel controls the pulsing of all collector units. Each collector unit is equipped with an explosion vent ducted to the building exterior. A collector unit has an air flow capacity of 4,000 CFM. 8K CFM systems have two collector units; 12K CFM systems have three.
Final filter/fan unit	Houses the exhaust fan (exhauster) that generates the air flow through the system, and the final filters that remove any remaining powder from the air before it is returned to the spray room. 8K CFM systems have six final filters; 12K CFM systems have eight final filters.
Controls	**Exhauster Start and Stop buttons**—Start and stop the exhaust fan. Located in the motor starter panel. **Exhauster Stop button**—Stops the exhaust fan. Located in the exhauster panel. **Pulse On-Demand switch**—Allows operator to select Continuous or On-Demand pulsing modes. In Continuous mode, pulsing is on all the time. In On-Demand mode, pulsing starts when the pressure drop across the cartridge filters reaches 6.5-in. w.c. (water column). Located in the exhauster panel. **Pulse timer board**—Controls pulsing delay and duration. Located in a separate panel on the afterfilter. **Differential pressure gauges and switches**—Detect pressure drop across cartridge and final filters and indicate condition of filter media. The final filter differential pressure switch is set to light a warning light in the motor starter panel at 2.5-in. w.c. and shut down the entire system at 3-in. w.c. Located in the exhauster panel.

Afterfilter Operation

See Figure 2-2. The airflow carries the unusable powder through the intake ducts (1) into the collector units, where it collects on the external surfaces of the cartridge filters (3). The air passes through the filters and flows through ducts to the final filter unit, through the fan (6), and through the final filters (5) back into the spray room.

The pulse valves (4) release large volumes of compressed air into the centers of the cartridge filters, blowing the accumulated powder off the filters. Pulsing is controlled by a timer board, which allows you to set both the time between pulses (delay) and the pulse (duration) time. Pulsing can be set to continuous or on-demand mode. In on-demand mode, pulsing starts when the cartridge filter differential pressure switch detects a pressure drop across the cartridge filters above 6.5-in. w.c.

The powder falls into the hoppers (8) in the bottom of the collector units. The hoppers are equipped with fluidizing valves. The valves diffuse air into the powder so that it will flow easily when the hoppers are emptied. The ball valves (9) are used to empty the hoppers.

The final filter differential pressure switch monitors the pressure drop across the final filters. At 2.5-in. w.c., a red warning light on the motor starter panel lights. At 3-in. w.c., the entire system is shut down.

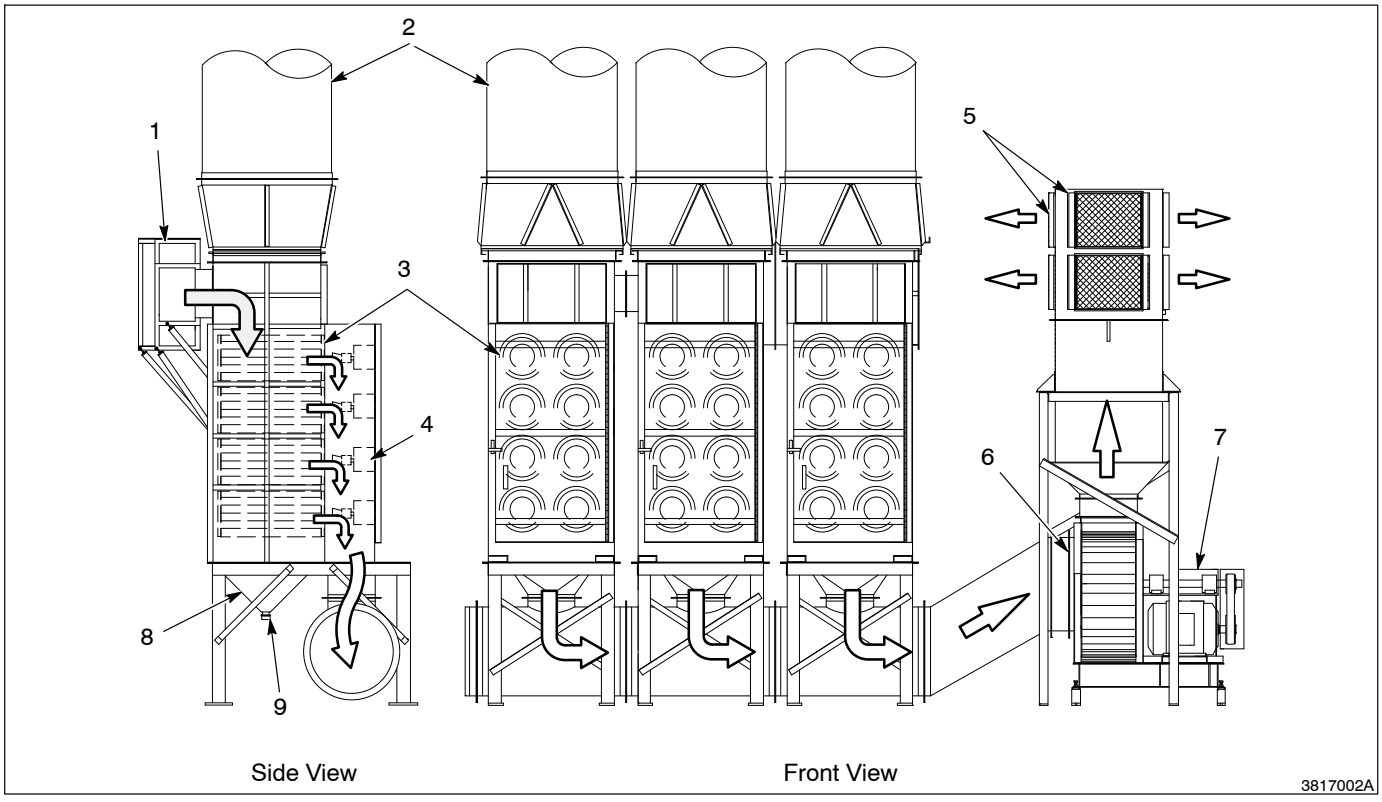

Fig. 2-2 Afterfilter Operation—Side and Front Views

1. Intake ducts
2. Explosion vents
3. Cartridge filters
4. Pulse valves and manifolds
5. Final filters
6. Exhaust fan
7. Motor and belt drive
8. Hopper
9. Ball valves

4. Floor Sweeper (Optional)

See Figure 2-3.

The floor sweeper moves the powder that accumulates on the booth floor during spray operations into the inlet duct openings at each end of the booth. The sweeper moves at a fixed speed of 2.3-m (7.5-ft) per minute. The floor sweeper is optional, and must be installed at the factory.

Floor Sweeper Components

Table 2-3 describes the floor sweeper components and their function.

Table 2-3 Floor Sweeper Components

Component	Description
Sweeper	Two-bladed squeegee-type powder sweeper, riding on four wheels, magnetically coupled to the propulsion mechanism.
Propulsion mechanism	Consists of • three-phase gearmotor • drive and idle sprockets and chains • chain tensioners • magnetic carriage assemblies The gearmotor and sprockets drive the chains. The chains run the length of the booth, under the floor. Each chain carries a magnetic carriage assembly that magnetically couples with the sweeper and pulls it along the booth floor. Gearmotor operation is controlled by limit switches and a reversing motor starter in the motor starter panel.
Controls	**Sweeper switch**—Three position switch: Auto, On, and Off. When Auto is selected, the sweeper runs according the Feed Center switch position. When On, is selected, the sweeper runs continuously. Located on the motor starter panel. **Limit switches**—Control floor sweeper motion. The forward limit switch is located at the Exit end of the booth; the reverse limit switch is located at the Entrance end of the booth. The switches are normally closed. **Feed Center switch**—Sweeper can only be turned on when this switch is in the AUTO position. If this switch is set to OFF or CLCH (Color Change) while the sweeper is running, motion will continue until the sweeper opens a limit switch. Located on the feed center panel. **Feed Center PLC**—Programmable Logic Controller, located in the feed center panel. Controls floor sweeper operation.

Floor Sweeper Components

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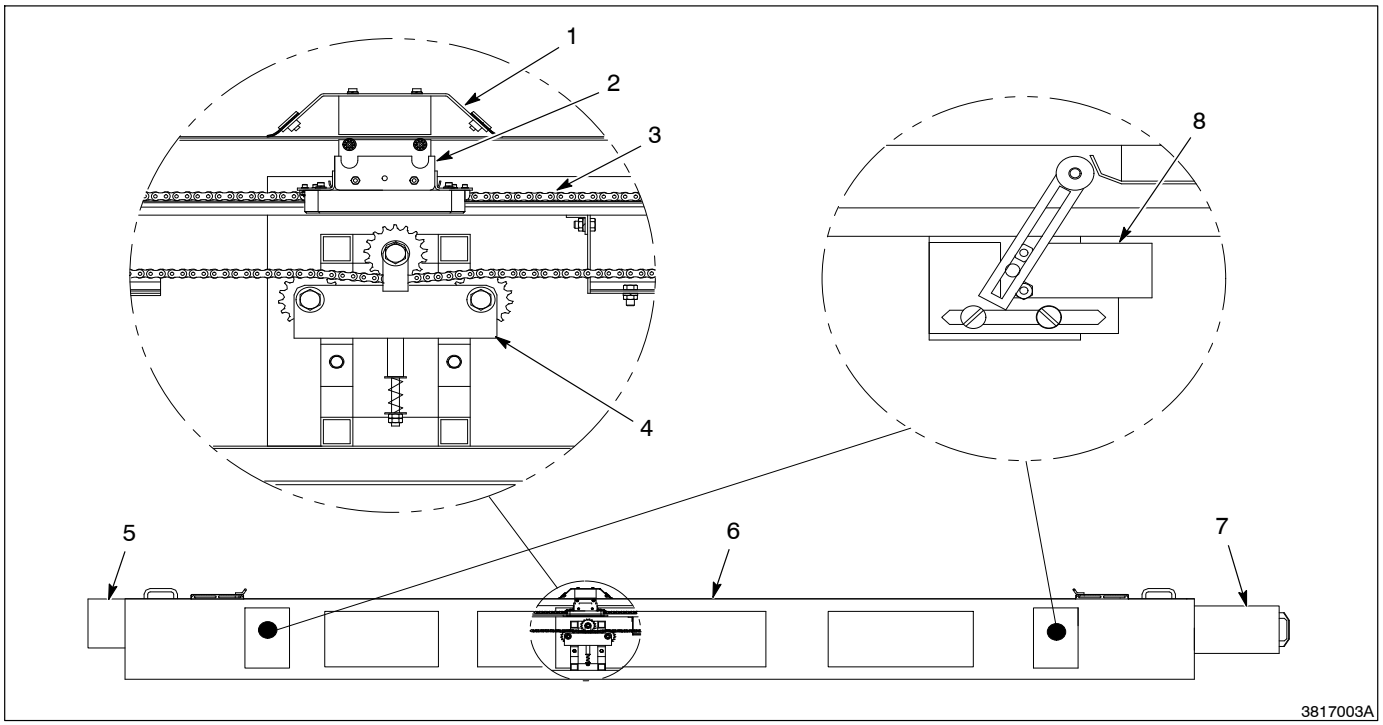

Fig. 2-3 Floor Sweeper

1. Floor sweeper
2. Magnetic carriage assembly
3. Chains
4. Chain tensioners
5. Sprockets
6. Booth base
7. Gearmotor and drive sprockets
8. Limit switches

Floor Sweeper Operation

See Figure 2-3.

Floor sweeper operation is enabled when the

- spray booth exhauster motor is running,
- floor sweeper and feed center switch are set to AUTO, or the
- floor sweeper switch is set to ON (continuously running).

The following is a description of sweeper operation when the Feed Center switch and Floor Sweeper switches are set to Auto.

CAUTION: The sweeper must always move forward, toward the exit end of the booth, when first started and not already at the forward limit switch position. If the direction is not forward, mechanical damage may occur. If this happens, STOP THE SWEEPER IMMEDIATELY and refer to *Troubleshooting*.

When started, the sweeper should always move first in the forward direction, toward the exit end of the spray booth. An electrical signal is sent to the Programmable Logic Controller (PLC) in the feed center panel while the sweeper is moving forward.

When the magnetic carriage assembly contacts the forward limit switch, the limit switch opens, stopping forward motion and initiating a reverse direction delay timer. After a 3 second delay, voltage to the gear motor is reversed and the sweeper starts moving in the reverse direction, toward the entrance end of the booth.

When the magnetic carriage assembly contacts the reverse limit switch, the limit switch opens, stopping reverse motion and initiating a forward direction delay timer. After a 2 second delay, voltage to the gear motor is reversed and the sweeper again moves in the forward direction. The forward and reverse motion cycling repeats continuously.

When the sweeper stops at either end of the booth, the electrical signal to the PLC is shut off. A 30 second timer is started. The timer delays and then initiates a sieve hopper discharge cycle. The delay allows time for the powder dumped into the recovery system by the sweeper to be processed through the cyclone. The discharge cycle moves powder from the sieve hopper into the feed center hopper.

If the system has only a single feed center and cyclone, then

- both forward and reverse direction stops initiate a sieve hopper discharge cycle.

If the system has two feed centers and cyclones, then

- the forward direction stop initiates a discharge cycle in the sieve hopper located at the exit end of the booth, and
- the reverse direction stop initiates a discharge cycle in the sieve hopper located at the entrance end of the booth.

If the Feed Center switch is moved to the OFF or CLCH position while the sweeper is running (with the Floor Sweeper switch set to Auto), it will continue to run until it reaches the end of travel and opens a limit switch. This positions the sweeper near one of the inlet duct openings so it can be easily cleaned.

5. Cyclone System

See Figures 2-4, 2-5, and 2-6.

The cyclone system reclaims usable powder from the airflow, screens the reclaimed powder, and delivers it to the feed hoppers for reuse.

Cyclone System Components

Cyclone system components and their functions are described in Table 2-4.

Table 2-4 Cyclone System Components

Component	Description
Cyclones	Single or twin tapered cylinders, connected to the ducts at the top and the cyclone valve at the bottom. The cyclones separate the usable powder from the air flow.
Cyclone valve	Consists of a • manually-operated butterfly valve type damper • damper-closed proximity switch • inflatable seal Controls the flow of powder into the sieve from the cyclones and isolates the sieve and hopper from the air flow through the cyclone during the discharge cycle. During powder spray operations, the damper is closed. During sieve cleaning, the damper is opened.
Sieve	Consists of a • pan screen • ultrasonic transducer • electric vibrator motor (not shown) Screens the reclaimed powder, using vibration produced by the ultrasonic transducer and vibrator motor. Contaminants and particles too large to pass through the screen are retained on top of the screen and discarded when the sieve is cleaned.
Sieve hopper	Consists of a • fluidizing membrane • discharge valve • pneumatic cylinder Stores screened powder. When a discharge cycle is initiated, air diffused through the fluidizing membrane fluidizes the powder. The pneumatic cylinder opens the discharge valve to allow the fluidized powder to flow through the discharge tube into the feed center hopper.

Component	Description
Discharge tube	Consists of a • tube • clamps • purge air amplifier Connects the sieve hopper to the feed hopper in the feed center. The purge air amplifier assists powder flow through the tube when a discharge cycle is initiated.
Controls	**PLC**—Controls discharge cycle timing and functions. Mounted in the feed center panel. **Damper-closed proximity switch**—Senses the position of the cyclone valve damper handle. Interlocks with the discharge cycle controls. **Solenoid valves**—Control pneumatic functions. Located in either the feed center panel or the ultrasonic transducer panel. **Cyclone Seal switch**—Inflates and deflates the cyclone seal. Located on the feed center panel. **Cyclone Discharge pushbutton**—Initiates a discharge cycle. Used to remove the powder from the sieve hopper before cleaning the sieve.

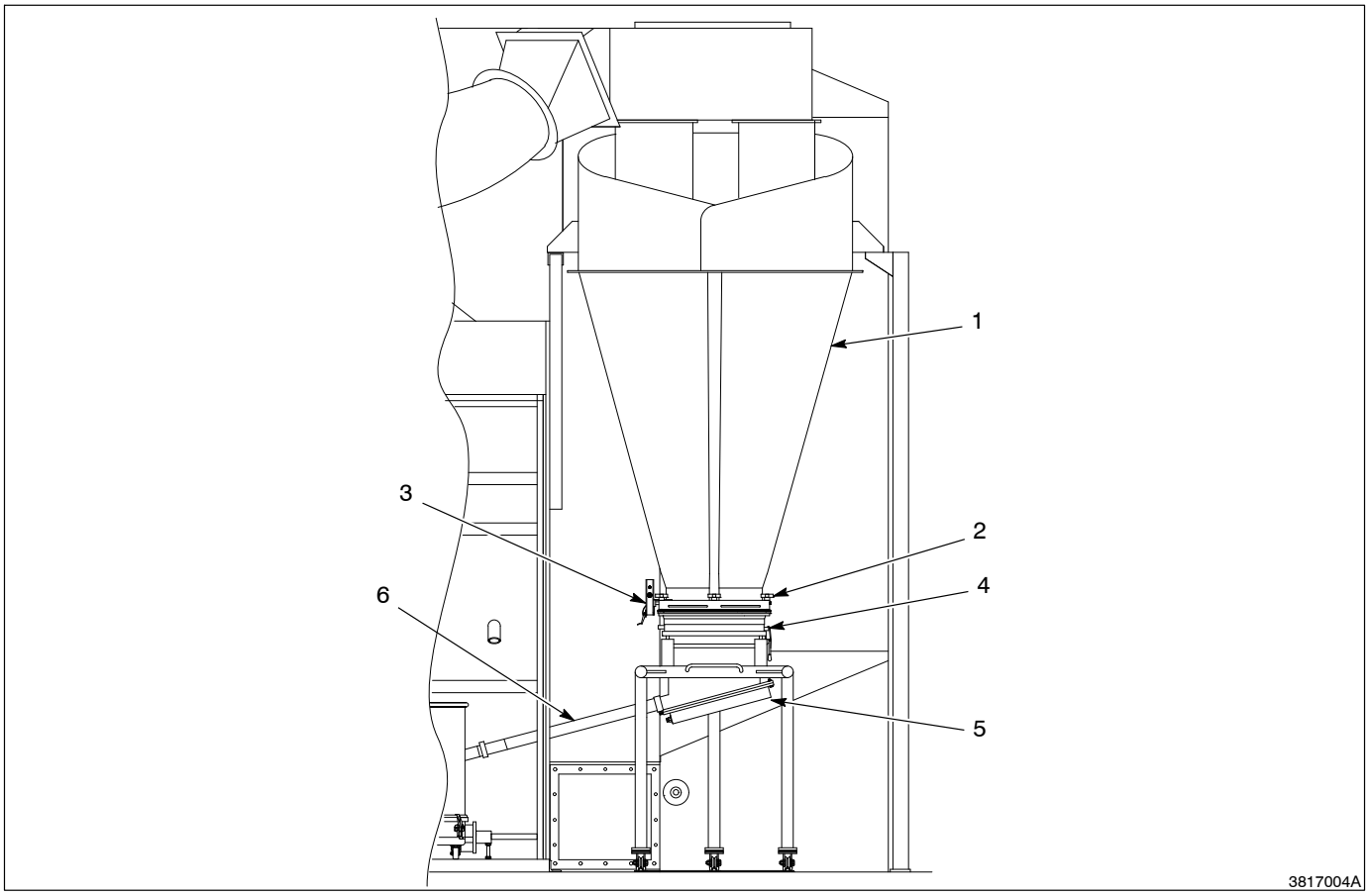

Fig. 2-4 Cyclone System—Front View

1. Cyclones
2. Cyclone valve
3. Cyclone valve damper handle
4. Sieve
5. Sieve hopper
6. Discharge tube

Cyclone System Components

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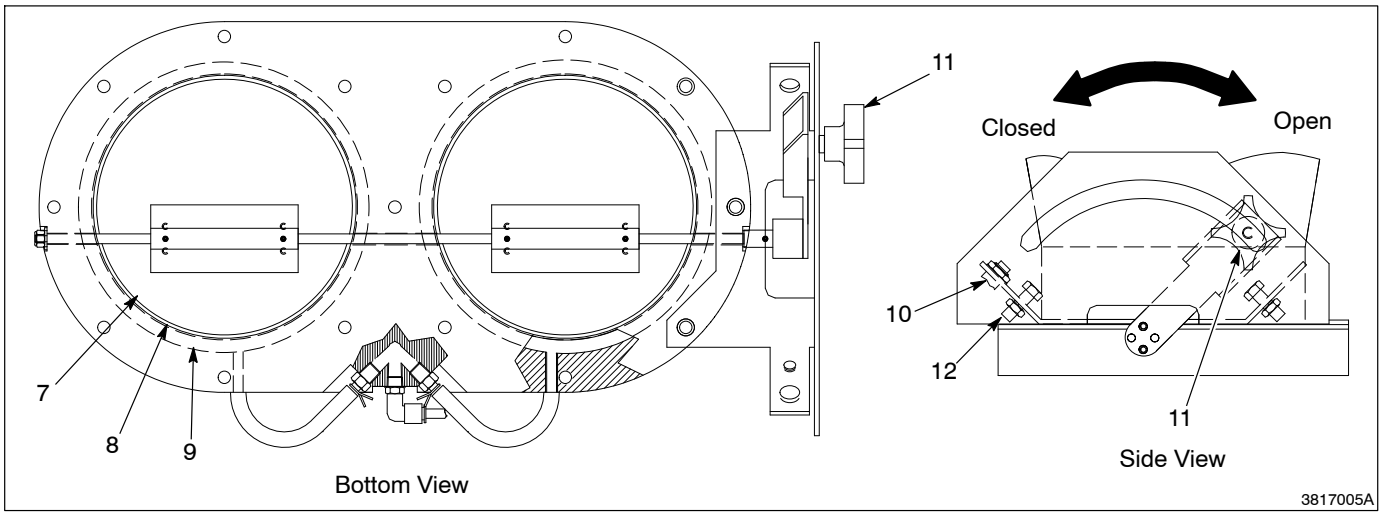

Fig. 2-5 Cyclone Valve

7. Cyclone valve damper
8. Gap
9. Cyclone valve seal
10. Proximity switch
11. Damper control handle and knob
12. Stops

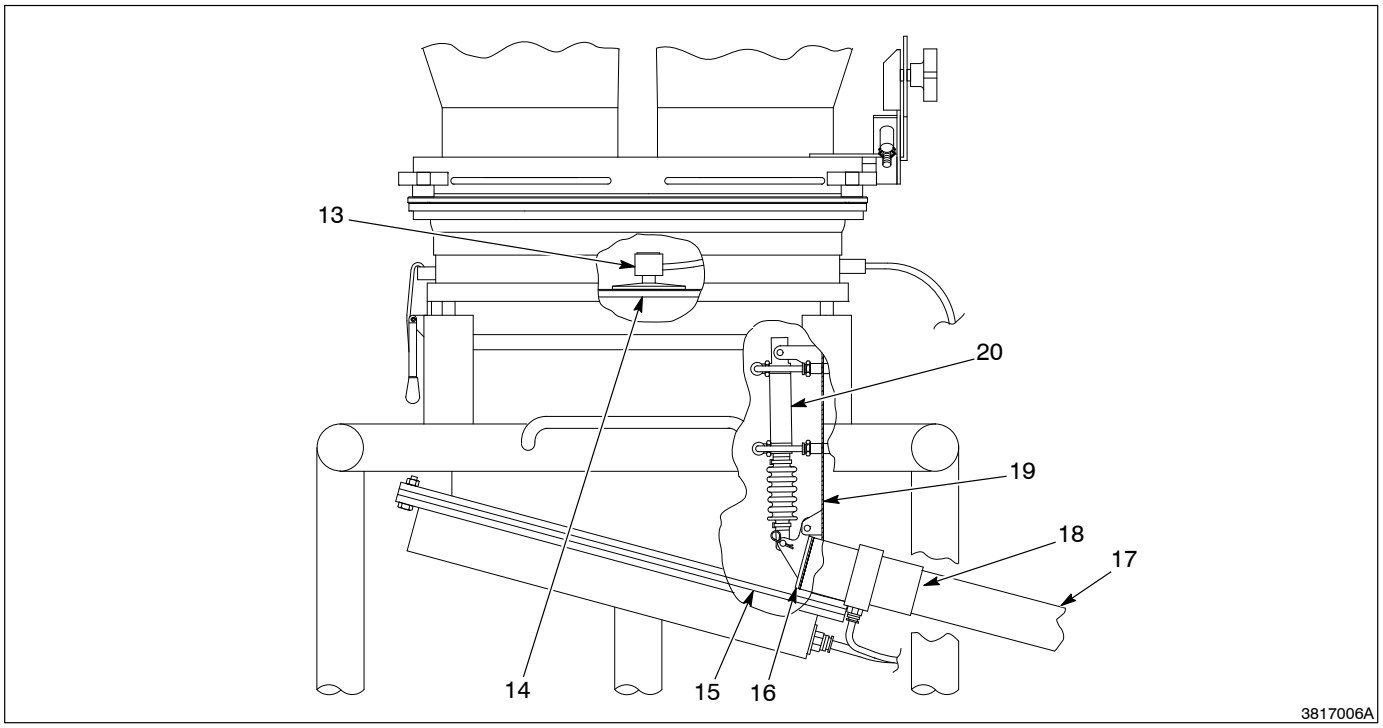

Fig. 2-6 Sieve and Discharge Tube

13. Ultrasonic transducer
14. Screen
15. Fluidizing membrane
16. Discharge valve
17. Discharge tube
18. Purge air amplifier
19. Sieve hopper
20. Pneumatic cylinder

Cyclone System Operation

See Figures 2-4, 2-5, and 2-6.

System air flow moves unused powder into the cyclone system. In the cyclones (1), the usable powder is separated from the air flow. The unusable powder, which is too fine to be reused, remains in the air flow and is carried through the ducts to the afterfilter.

During powder spray operations, the cylcone valve damper control handle (11) is moved to the closed position and the cyclone valve seal (9) is deflated. The narrow gap (8) between the edge of the damper and the seal allows the usable powder to flow into the sieve and onto the screen (14).

The vibrations generated by the continuously running ultrasonic transducer (13) and vibrator motor screen the powder. The usable powder falls through the screen into the sieve hopper (19), where it is stored until a discharge cycle is initiated. Contaminants and powder clumps too large to pass through the screen remain on the screen surface.

Discharge Cycle Process

The discharge cycle moves the powder in the sieve hopper to the feed hopper in the feed center. Discharge cycles are initiated by the operation of the floor sweeper, or by a timed cycle if the sweeper is not included in the system. The operator can also initiate a discharge cycle manually, from the feed center panel. The discharge cycle process is controlled by a PLC in the feed center panel. A total discharge cycle takes approximately 20 seconds.

NOTE: If the damper control handle is not in the closed position, the proximity switch (10) will not allow a discharge cycle to start.

The following is a description of the discharge cycle sequence.

1. The cyclone seal is inflated, closing off the gap between the damper and the seal.

2. After a short delay that allows the cyclone seal to fully inflate, the sieve hopper fluidizing air is turned on. The powder in the hopper is fluidized.

3. At the same time the fluidizing air is turned on, the discharge valve is opened. The air pressure inside the hopper starts moving the powder into the discharge tube.

4. After a short delay that allows the powder in the hopper to be completely fluidized, air to the purge amplifier is turned on. The air is pulsed on and off for a few cycles, then turned on continuously. The purge air helps the powder flow through the discharge tube into the feed hopper.

Discharge Cycle Process (contd)

5. When the continuous air timer runs out, purge air and fluidizing air are turned off, the discharge valve is closed, and the cyclone seal is deflated.

6. The powder that accumulated on top of the damper during the discharge cycle flows into the sieve after the discharge cycle is completed.

6. Powder Feed Centers

See Figures 2-7 and 2-8.

The powder feed centers condition reclaimed and virgin powder and deliver it to the spray guns. They also provide pneumatic and mechanical systems to aid in quick color changes.

Powder Feed Center Components

Powder feed center components and their functions are described in Table 2-5.

Table 2-5 Powder Feed Center Components

Component	Description
Enclosure	Contains powder within the feed center. Airflow through the canopy is controlled by a pneumatically operated exhaust damper in the duct connecting the canopy to the recovery system.
Lance Assembly	Consists of a vertical slide assembly and one or two pump assemblies. Each pump assembly consists of up to nine powder pumps and pickup tubes. A pneumatic cylinder raises and lowers the pump assemblies in and out of the feed hopper or onto the purge manifold. Lance position is detected by two limit switches, while movement is controlled by the operator. Pump operation is controlled by the powder application system.
Purge Manifold	Pulses compressed air through the pickup tubes, pumps, powder feed hoses, and spray guns to blow out all loose powder. Consists of two manifold blocks, each equipped with nine nozzles. Air is supplied by a purge valve manifold. The manifold blocks are mounted on a pivot assembly moved by a pneumatic cylinder. Manifold position is detected by two limit switches. Movement and purge cycle initiation are controlled by the operator. Pulsing is controlled by the PLC.
Feed Hopper	Stores and fluidizes the powder supply for the spray guns.

Component	Description
Controls	**Feed center panel**—Houses a PLC and the operator switches, buttons, and indicator lights that control feed center and cyclone functions. Refer to *System Controls and Devices* for a description of feed center controls. **Limit switches**—Detect the position and interlock the operation of the lance assembly and purge manifold motion. **Level sensor**—Detects the powder level in the feed hopper. The sensor is a normally closed capacitive proximity switch, held open by the presence of powder. **Solenoid valves**—Control pneumatic functions. Located in either the feed center panel or transducer/pneumatic panel. **Transducer/pneumatic panel**—Provides high frequency output to the sieve screen transducer. Typically houses the regulators and gauges used to control air pressure for the cyclone seal, feed hopper fluidizing, sieve hopper fluidizing, and purge air amplifier. **Purge valves**—Control air flow to the purge manifold.

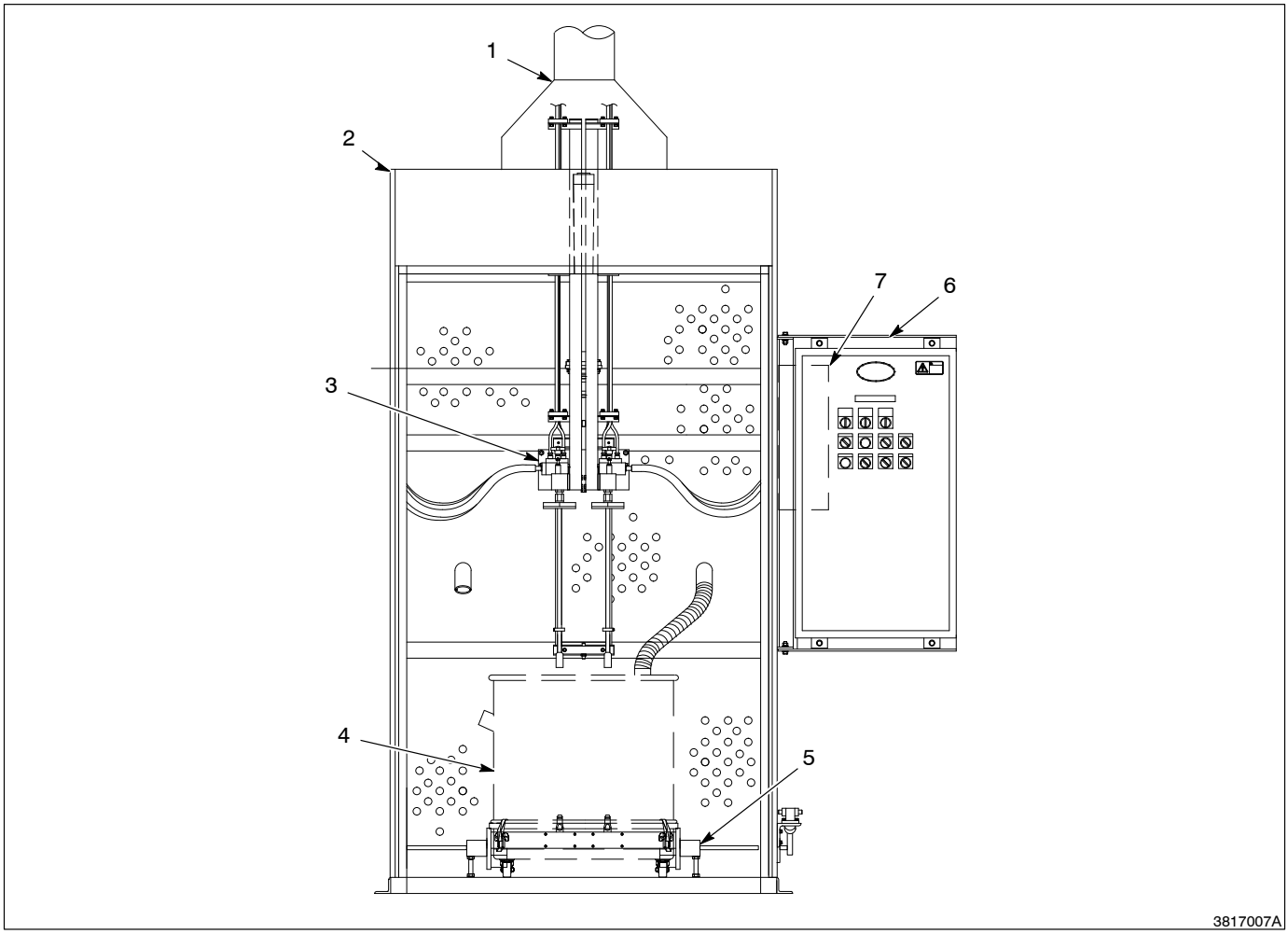

Fig. 2-7 Powder Feed Center—Front View

1. Exhaust damper
2. Enclosure
3. Lance assembly
4. Feed hopper
5. Purge manifold
6. Control panel
7. Transducer/pneumatic panel

Powder Feed Center Components *(contd)*

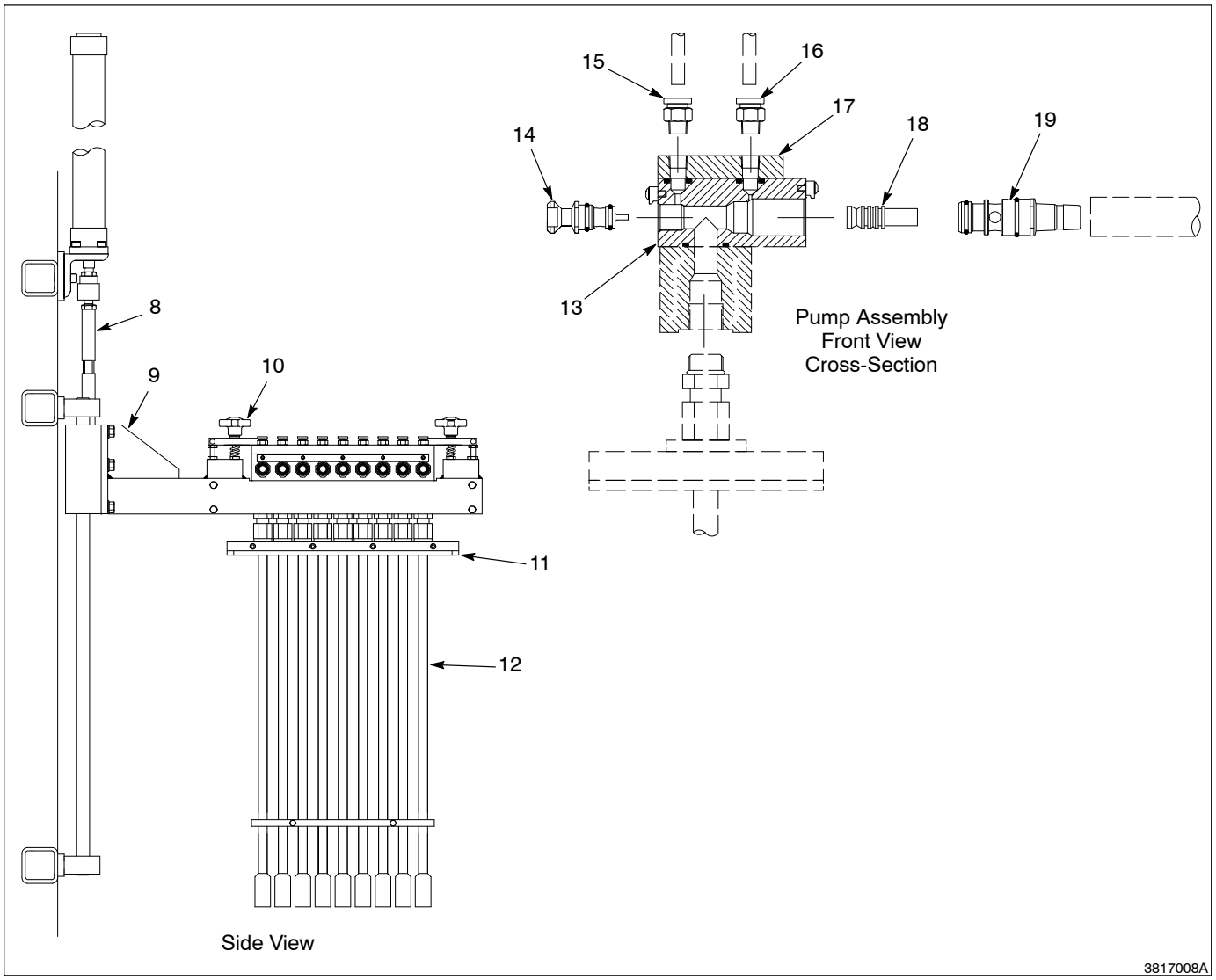

Fig. 2-8 Lance Assembly—Side and Front Views

8. Vertical slide assembly
9. Mounting arm
10. Clamps
11. Seal plate
12. Pickup tubes
13. Pump block
14. Venturi nozzle
15. Flow-rate air fitting
16. Atomizing air fitting
17. Air inlet plate
18. Venturi throat
19. Throat holder

Powder Feed Center Operation

See Figures 2-7 and 2-8.

Powder feed center operation has two stages: a spray cycle and a purge cycle.

Spray Cycle

The feed center exhaust damper (1) is closed and the feed hopper (4) is moved under the lance assembly (3). The level sensor, vent hose, fluidizing air tubing, and discharge tube are connected to the hopper. Feed hopper fluidizing air is turned on to fluidize the powder prior to lowering the lance assembly into the powder.

The lance assembly is lowered into the feed hopper, through the slots in the hopper lid, until the ends of the pickup tubes are approximately three inches above the fluidizing membrane and the seal plate contacts the hopper lid. When the spray guns are turned on, the pumps pull the fluidized powder up the pickup tubes (12) and force it through the feed hoses to the spray guns.

The cyclone discharge cycles replenish the feed hopper powder supply with reclaimed powder from the sieve hopper. If the powder level falls too low for too long, the level sensor initiates an operator alarm. The powder supply can also be replenished from a optional bulk transfer system.

Purge Cycle

The floor sweeper and spray guns are shut off. The operator manually initiates a discharge cycle to dump the remaining powder in the sieve hopper into the feed hopper. The feed center exhaust damper is opened, and fluidizing air is turned off. The lance assembly is raised out of the feed hopper, then the feed hopper is disconnected and moved out of the feed center.

The purge manifold (5) is lowered, then the lance assembly is lowered until the ends of the pickup tubes mate with the purge manifold nozzles. The operator manually starts the lance purge. The purge valves directs large volumes of air at system pressure through the purge manifold nozzles, pickup tubes, pumps, feed hoses, and spray guns.

The following is a description of the the purge sequence.

1. The Lance Purge button is pressed, activating the cycle. The Lance Purge indicator lights and the cycle timer starts and sets the duration for the purge.

2. Purge valve 1 is pulsed on and off until the cycle timer stops.

3. Purge cycling is set to purge valve 2, and the timer is reset to zero.

Purge Cycle *(contd)*

4. Purge valve 2 is pulsed on and off until the cycle timer stops.

5. The process continues until all purge valves have been cycled. The Lance Purge indicator light is turned off when the cycle is finished.

Typically, one purge valve is used for every three sets of pickup tubes, pumps, hoses, and spray guns. Purge valve configuration may vary depending on system configuration and available compressed air volume and pressure.

While the purge cycle is running, the operator cleans the lance assembly and feed center with compressed air, then cleans the sieve and booth. When all cleaning is complete, the purge manifold is raised and a new feed hopper is moved into the feed center.

Normally, two sets of pump blocks and powder feed hoses are used in each feed center. One set is used with light-colored powders, the other with dark-colored powders.

During a color change from light to dark or dark to light powders, the lance assembly is purged, then the air inlet plate is unclamped from the pump block. The pump block, along with the attached powder feed hoses, is removed from the lance assembly and stored for future use with powders of the same color or shade. The alternate-color pump block, along with its attached powder feed hoses, is then installed on the lance assembly.

If the color change is between similar colors or shades of color, the air inlet plate and pump block do not have to be disassembled. The purge cycle will effectively clean the pump block, hoses, and guns.

Interlocks

The lance assembly and purge manifold limit switches provide the following interlocks:

- Lance assembly motion downward is not allowed unless the purge manifold is in either the full up or full down positions.

- Purge manifold motion in either direction is not allowed unless the lance assembly is in the full up position.

- The purge cycle will not start unless the purge manifold and lance assembly are in their full down positions.

7. Roll-On/Roll-Off System (Optional)

Roll-on/Roll-Off systems move the booth off-line for color change, cleaning, and maintenance. A roll-on/roll-off system consists of a booth mover system and a duct disconnect system that disconnects the stationary afterfilter from the booth before it is moved.

Booth Mover System

The booth mover system consists of a platform equipped with casters and motor drives. The platform supports the booth and all related equipment. The casters ride on rails installed in the spray room floor. The motor drives move the platform online and offline. The afterfilter and ductwork connecting the afterfilter to the booth remains stationary.

Booth movement is controlled by online and offline end-of-travel limit switches. Operator controls consist of a Booth Mover Enable button and pendant buttons.

Duct Disconnect System

The duct disconnect system disconnects the stationary afterfilter from the booth before it is moved. The configuration of the disconnect system varies depending on spray room dimensions and system configuration. Typical disconnect system configurations are:

Slide Gate/Duct Extension System

See Figure 2-9.

This system uses two slide gate/duct extension assemblies on the afterfilter duct. The duct extensions connect the afterfilter duct to the booth duct. The slide gates seal the afterfilter duct while it is disconnected from the booth duct.

Slide Gate/Duct Seal System

See Figure 2-10.

This system uses two slide gate assemblies on the afterfilter duct and a duct seal assembly on the booth duct. The duct seal assembly connects the booth duct to the afterfilter duct. The slide gates seal the afterfilter duct while it is disconnected from the booth duct.

Duct Disconnect System Components

Table 2-6 Duct Disconnect System Components

Component	Description
Slide Gates	Consists of a housing and a sliding plate operated by a pneumatic cylinder, a pneumatic valve, and two limit switches. The pneumatic cylinder moves the slide gate to block and unblock the ductwork to the afterfilter. The limit switches detect the gate position.
Duct Extension(s) (Option)	Consists of a stationary duct, telescoping duct, pneumatic cylinders, pneumatic valve, and limit switches. The cylinders extend the telescoping duct to connect the booth to the afterfilter and retract the telescoping duct to allow booth movement. The limit switches detect the telescoping duct position.
Duct Seal Assembly	Consists of an inflatable rubber sealing ring, and a duct seal control panel. The sealing ring inflates to seal the gap between ducts.
Controls	**Gate/Duct Control switch**—Three position selector switch. Positions are Off, Online, and Offline. Located on the exhauster panel. **Status lights**—Three indicating lights showing Booth Mover Ready, Online Ready, and Offline Ready status. Located on exhauster panel. **Booth Mover Enable button**—Enables the pendant buttons and starts a 3-minute timer. When the timer runs out, the pendant buttons are disabled, preventing accidental movement of booth. Located on the motor starter panel. **Pendant buttons**—Allow the operator to move the booth to the online or offline positions. Located on the pendant. **Duct seal panel**—Consists of an inflation valve, pressure regulator and gauge, and an inflation pressure sensor. The inflation valve and regulator control duct seal inflation and pressure. The pressure sensor provides an interlock to prevent booth movement if the seal is inflated.

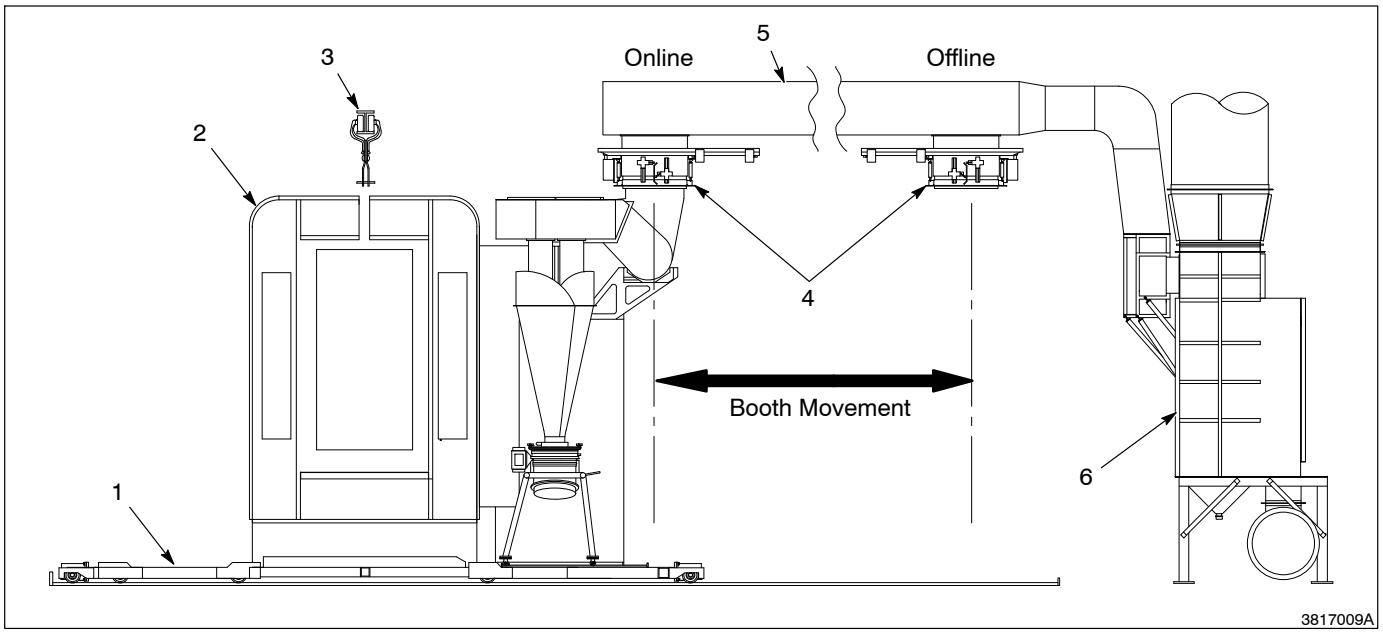

Fig. 2-9 Slide Gate/Duct Extension System (Side View)

1. Platform, casters, and motors
2. Booth
3. Conveyor
4. Slide gate/duct extension assembly
5. Overhead duct
6. Afterfilter

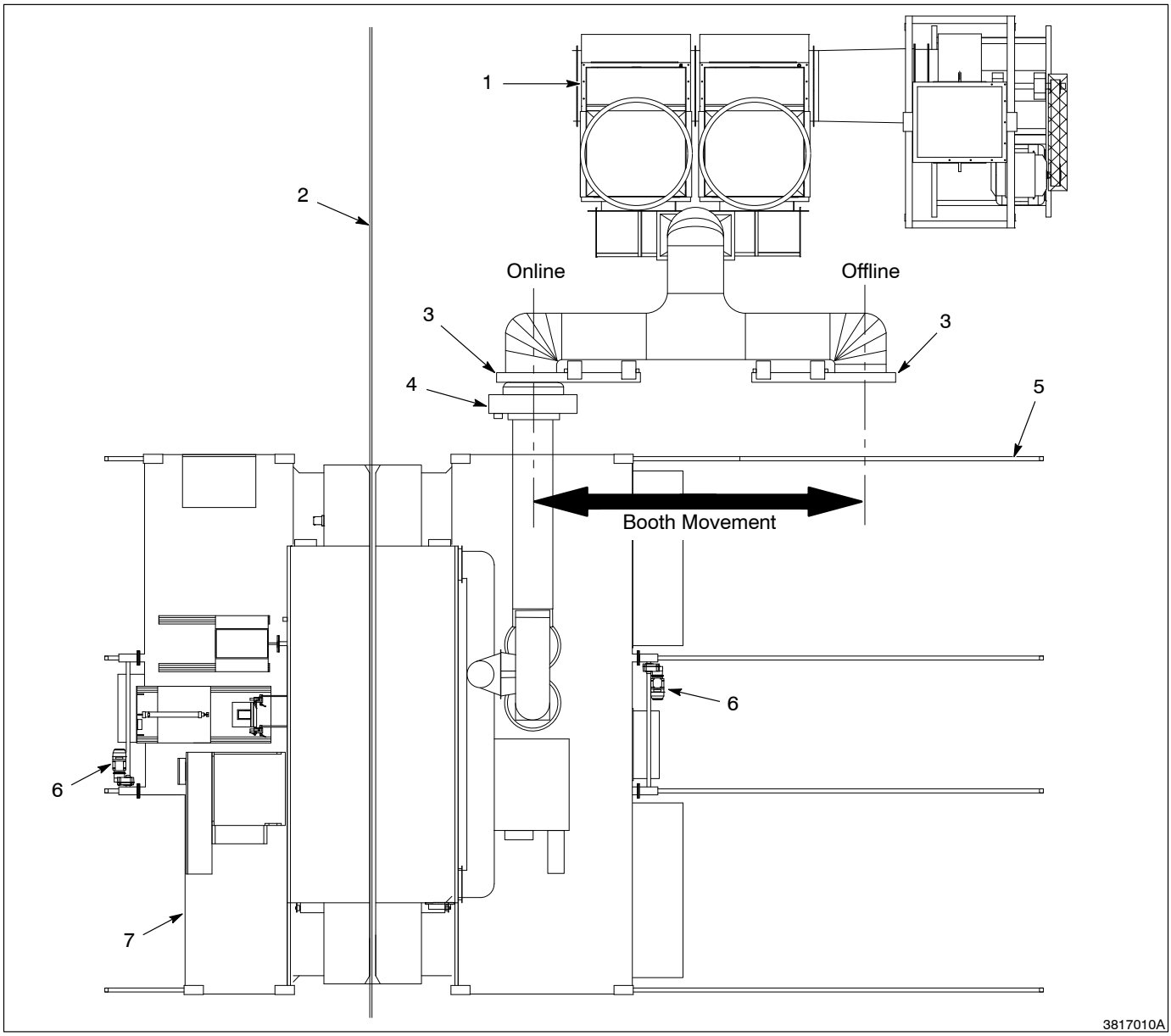

Fig. 2-10 Slide Gate/Duct Seal System (Top View)

1. Afterfilter
2. Conveyor
3. Slide gates
4. Duct seal
5. Rails
6. Drive motors
7. Platform

Disconnect System Operation

1. The exhaust fan is turned off.
2. The Gate/Duct Control selector is turned OFF.
3. The slide gates close and the closed-position limit switches close.
4. The duct extensions retract, or the duct seal deflates, creating a gap between the booth duct and the slide gates to allow booth movement.
5. The duct extension open limit switches close, or the seal pressure switch senses the loss of air pressure and closes.
6. The Booth Mover Ready indicator lights.
7. The Booth Mover Enable button is pressed. A buzzer sounds to warn people in the area that the booth is about to be moved. A timer is started. The timer allows booth movement for up to three minutes.
8. The pendant buttons are used to move the booth to the online or offline position. At either position, a limit switch will stop the booth.
9. The Gate/Duct Control Selector switch is moved to the appropriate position, Online or Offline.

   If Online is selected the

   - online slide gate opens and the offline slide gate stays closed
   - online slide gate-open limit switch and offline slide gate-closed limit switch both close
   - online duct extension extends, or the duct seal inflates, to seal the gap between the extensions or seals and the slide gates
   - online duct extension-closed limit switch closes or seal pressure switch opens
   - Online Ready indicator lights

   If Offline is selected the

   - offline slide gate opens and the online slide gate stays closed
   - offline slide gate-open limit switch and online slide gate-closed limit switch both close
   - offline duct extension extends, or the duct seal inflates, to seal the gap between the extensions or seals and the slide gates
   - offline duct extension-closed limit switch closes or seal pressure switch opens
   - Offline Ready indicator lights

The exhaust fan can now be started and production or cleaning can begin.

8. System Controls and Devices

System control panel and device locations vary depending on the system configuration and options installed.

Table 2-7 System Controls

Controls	Description
Exhauster Panel	Located on the afterfilter. **Operator Controls:** • **Disconnect switch**—Turns on and off the main system and exhauster motor power. • **Exhauster Stop pushbutton**—Stops the exhauster motor. • **Gate/Duct Control switch**—Three position switch, Online/Off/Offline, controls the position of the slide gates, retracts or extends the duct extensions or deflates and inflates the duct seal (roll-on/roll-off systems). • **Pulse On-Demand switch**—Two position switch, Demand/Continuous, controls the pulsing mode. • **Online Ready indicator**—Green, lights when the system is ready for operation in the online position (roll-on/roll-off systems). • **Offline Ready indicator**—Green, lights when the system is ready for operation in the offline position (roll-on/roll-off systems). • **Booth Mover Ready indicator**—Amber, lights when the ducts are disconnected and the booth is ready to be moved. **Other Components:** • Three phase circuit breaker for electrical supply • Exhaust motor circuit breaker, starter, and overload protector (motor not equipped with VFD control) • Online and offline slide gate and duct extension control relays, terminators for the slide gate and duct extension limit switches (roll-on/roll-off systems) • Terminators for the pulse valve timer panel • Differential pressure gauges • Slide gate and duct extension or duct seal interlock relays (roll-on/roll-off systems)
	The following devices are supplied with power and are terminated or controlled from the exhauster panel: • Pulse valve timer panel • Main system control panel • Slide gate assemblies and duct extension or duct seal assemblies (roll-on/roll-off systems only) • Exhaust fan motor
Slide Gate and Duct Extension Control Devices (Roll-on/Roll-off Systems Only)	Each slide gate and duct extension assembly has the following control components: • Four-way valve, three position, center blocked, dual solenoid, 120 Vac, open and closed position designation • Open position limit switch • Closed position limit switch

8. System Controls and Devices (contd)

Controls	Description
Duct Seal Panel (Roll-on/Roll-off Systems Only)	This panel is included only if a duct seal assembly is used. Each panel contains a: • Inflation valve • Pressure regulator and gauge (set for 20 psi) • Pressure sensor (set to trip at 3 psi)
Motor Starter Panel	Located at the booth, usually on the opposite side of the booth from the feed center. **Operator Controls:** • **Disconnect switch**—Turns booth power on and off (does not disconnect power to exhaust fan motor). • **System Ready indicator**—Green, lights when the system is ready for operation. • **Final Filter Warning indicator**—Red, lights when the pressure drop across the final filters rises above 2.5 in. w.c., indicating filters are clogging. • **Sieve 1 On indicator**—Amber, lights when sieve 1 vibrator is on. • **Exhauster Start button/indicator**—Amber, starts the exhaust fan, lit while fan is running. • **Booth Lights switch**—Two position switch, ON/OFF, controls the booth lights. • **Sieve 2 On indicator**—Amber, lights when sieve 2 vibrator is on. • **Exhauster Stop pushbutton**—Shuts off the exhaust fan. • **Oscillator #1 Start pushbutton/indicator**—Amber, starts oscillator 1, lit while oscillator is running. • **Oscillator #2 Start pushbutton/indicator**—Amber, starts oscillator 2, lit while oscillator is running. • **Sweeper switch**—Three position switch, AUTO/ON/OFF, starts and stops the floor sweeper. • **Oscillator #1 Stop pushbutton**—Stops oscillator 1. • **Oscillator #2 Stop pushbutton**—Stops oscillator 2. • **Booth Mover Enable pushbutton**—Enables the pendant buttons, sounds the alarm, and starts the three minute timer. The booth can only be moved while the timer is running. **Other Components:** • Motor starters and overload protectors • Floor sweeper motor reversing starter and overload protector • System control transformer • Air dryer and conveyor interlock relays • Booth mover enable and floor sweeper timer relays

Controls	Description
Feed Center Panel	Mounted on the side of the feed center, opposite the cyclone. **Operator Controls:** • **Feed Center switch**—Three position switch, CLCH/OFF/AUTO. In CLCH position, enables switches for manual control during color change. In Off position, disables all functions. In Auto mode, enables all automatic functions. • **Lance switch**—Three position switch, UP/OFF/DOWN. Raises and lowers the lance assembly. Only active when the Feed Center selector switch is in the CLCH position. • **Purge Manifold switch**—Three position switch, UP/OFF/DOWN. Raises and lowers the purge manifold. Only active when the Feed Center selector switch is in the CLCH position. • **Fault Silence pushbutton/light**—Red, flashes or lights continuously when fault condition occurs. Pressing button turns off fault buzzer. Refer to the *Troubleshooting* section of this manual for more information. • **Lance Purge pushbutton/indicator**—Amber, starts lance purge. Lit while purge cycle is running. Only active when the Feed Center selector switch is in the CLCH position. • **Cyclone Discharge pushbutton/indicator**—Amber, starts sieve hopper discharge cycle. Lit while discharge cycle is running. • **FC Fluidize switch**—Two position switch, ON/OFF. Turns on and off fluidizing air to feed hopper. • **Bulk Transfer switch**—Two position switch, AUTO/OFF. Turns on or off bulk transfer system. • **Cyclone Seal switch**—Two position switch, ON/OFF. Inflates or deflates cyclone seal. In the ON position, the seal is inflated, isolating the sieve from the cyclone. In the OFF position, the seal is deflated, allowing powder to flow into sieve. Only active when the Feed Center selector switch is in the CLCH position. • **FC Light switch**—Two position switch, ON/OFF. Turns the feed center light on or off. • **Discharge Valve switch**—Two position switch, CLOSE/OPEN. Opens and closes the sieve hopper discharge valve. Only active when the Feed Center switch is in the CLCH position. **NOTE:** If the discharge valve is opened with the exhaust fan on, the feed hopper connected to the sieve hopper, and the cyclone seal deflated, the recovery system will draw all the powder out of the sieve, sieve hopper, and feed hopper. • **Exhaust Damper switch**—Two position switch, CLOSE/OPEN. Opens and closes the feed center damper, controlling air flow through the feed center. Only active when the Feed Center selector switch is in the CLCH position. **Other Components:** • PLC with handheld operator display • ultrasonic transducer and purge manifold position relays • terminals for all feed-center related devices

8. System Controls and Devices (contd)

Controls	Description
Feed Center Panel *(contd)*	The following devices are supplied with power, terminated, or controlled from the feed center control panel: • Lance up limit switch • Lance down limit switch • Purge manifold up limit switch • Purge manifold down limit switch • Cyclone valve damper proximity switch, detects damper handle in closed position • Feed hopper level sensor, detects high powder level • Ultrasonic transducer/solenoid valves • Feed center light fixture
Ultrasonic Transducer/Solenoid Panel	The ultrasonic transducer/solenoid panel typically houses the following devices: • Transducer controller • Terminals for all feed center pneumatic functions • Regulators and gauges controlling air pressure for feed center pneumatic functions (refer to Feed Center Pneumatic Panel) • Solenoid valves for - cyclone seal - discharge valve, exhaust damper, lance, and purge manifold cylinders - bulk transfer (pilot) - feed hopper and sieve hopper fluidizing air - discharge air amplifier **NOTE:** The regulators, gauges, and solenoid valves may be installed in the feed center panel or in a separate pneumatic panel instead of this panel.
	The following devices are supplied with power, are terminated, or are controlled from the ultrasonic transducer/solenoid panel: • Ultrasonic transducer • Purge valves **NOTE:** Purge valve arrangement is configurable, depending on quantity of pumps and guns. Typically, one valve is used for every three pumps.

Controls	Description
Feed Center Pneumatic Panel	Houses air-pressure regulators and gauges controlling air pressure for: • Cyclone seal • Lance purge • Feed center hopper fluidizing • Sieve hopper fluidizing • Discharge air amplifier • Spare **NOTE:** The regulators and gauges may be installed in the transducer/solenoid panel instead of this panel.
Flame Detector Indicator/Relay Panel	Provides visible and audible fault and fire alarms and interlock relays. If a detector senses a flame, the interlock relays shut down the conveyor, booth exhaust fan, compressed air and electrical power to the guns. ANSI/NFPA-33 standards require flame detectors in all systems equipped with automatic guns.

9. Typical System Options

Typical options include those described below. Contact your Nordson representative for information on these and other options.

Table 2-8 Typical System Options

Equipment	Description
Air dryer	Removes moisture from the system air supply. Most systems use regenerative-desiccant or refrigerated air dryers.
Gun movers (oscillators and reciprocators)	Move the spray guns in repetitive patterns for better powder coverage. May also be equipped to move the guns in closer to the parts to spray recesses.
Powder drum unloaders	Transfer powder from shipping drums to the feed hoppers.
Feed hoppers	Additional feed hoppers for differently colored powders.
Part identification and spray gun triggering systems	Identify and track parts on the conveyor line; control automatic-gun movement, triggering, air pressure, and voltage. Also gather data on system operation and generate reports.

Section 3

Operation

Section 3
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

Operation procedures consist of

- initial system setup
- daily startup
- color change
- daily shutdown

Use the initial system setup procedure for new systems.

NOTE: System function tests detailed in the *Troubleshooting* section are part of the initial startup procedure. Your Nordson application engineer usually performs these tests after the system is installed.

2. Initial System Startup

Use these procedures to prepare your Spectrum powder booth for production. The feed center PLC controls most of the automatic processes in a typical system. The PLC can be be programmed to meet your system requirements. Setup and operation of powder application equipment, gun movers, and advanced control systems, such as the Smart-Coat system, are covered in separate manuals.

Turning on Power

1. Turn on the exhauster panel disconnect switch. This switch supplies power to the afterfilters and the motor starter panel. The exhauster panel is typically located near the afterfilter.

2. Turn on the motor starter panel disconnect switch. This switch supplies power to the floor sweeper and powder application equipment, as well as the feed center panel. The motor starter panel is typically located on the side of the booth opposite the feed centers.

Initial Startup Procedure

Use the charts at the end of this section to record your booth and spray system settings. Make extra copies of the charts as needed.

NOTE: Step 1 can be performed now or anytime before beginning spraying.

1. Move the booth to the on-line position. (Skip this step if the booth is a fixed booth system and not a roll-on/roll-off system.) Refer to *Booth Moving* in this section.

2. Set up the feed center PLC. Refer to *Feed Center PLC Settings* in this section.

3. Set up the afterfilter pulse valve timers. Set the OFF timer to 90 seconds and the ON timer to 0.07 seconds. The timers are labeled.

4. Set the compressed air pressure to the booth and afterfilter to 90 psi.

5. At the afterfilter, set the pulse valve air pressure to 60–65 psi. Set the collector unit hopper fluidizer air pressure to 15 psi.

6. Prepare the feed center(s) (if applicable) and load powder into the feed hoppers. Refer to *Feed Center Preparation* in this section.

7. At the feed center pneumatic panel, set air pressures for the cyclone seal, discharge valve, discharge purge air amplifier, feed center (hopper) fluidize, and cyclone hopper fluidize. Refer to *Typical Operating Air Pressures* in this section for pressure settings.

8. Install the feed hopper level sensor switch and calibrate it. Refer to *Level Sensor Switch Installation and Calibration* in this section.

9. Set the duct seal pressure to 20 psi maximum (if your system is a roll-on/roll-off system).

10. Season the cartridge filters according to the instructions in *Cartridge Filter Seasoning* in this section. All new cartridge filters should be seasoned for proper operation.

11. Condition the interior of the booth canopy. Refer to *Booth Canopy Conditioning* in this section.

12. Your booth is now ready for production. Refer to *Daily System Startup* for startup instructions.

13. Set the conveyor interlock switch to NORM.

14. Start spraying powder. Adjust your application settings to obtain the coverage and film thickness desired. Refer to the manuals for the application equipment, gun movers, and advanced control systems for setup and operation instructions.

Feed Center PLC Settings

One handheld interface is provided with your system. The interface allows you to enter and change setup data into the feed center PLC. It also allows you to view system faults.

Included with the interface is a special cable that connects the interface to the PLC.

Connecting the Handheld Interface to the PLC

1. Open the feed center control panel door.

2. Plug the interface cable into the interface. The connector is keyed so it can only be plugged in one way. Do not force the cable connector into the interface.

3. Plug the other end of the interface cable into the PLC. The connector is keyed so it can only be plugged in one way. Do not force the cable connector into the PLC.

4. Allow the interface to perform its self-test. When complete, it displays
   `Nordson Feed Center,,,,,Press 1`
   This is the Introduction display.

5. Press **1** to proceed.

   Two choices are displayed:
   `Faults,, Press 1`
   `Setup,, Press 2`

These choices allow you to view fault messages or make system settings. Refer to *Troubleshooting* for information on fault messages.

Viewing and Changing Setup Parameters

1. Press **2** to setup your system. A `LIMITED ACCESS` screen appears, prompting you for a code number.

2. Press **9889411**, then the **RETURN** key to enter setup.

After a short delay, the first setup parameter will be displayed. Typical parameter displays will present a very brief description of the parameter, the current value with engineering units and decimal, and a new data entry area.

3. Press the **NEXT** or **PREV** key to step through the setup parameters. Press the **MENU** key to return to the Introduction menu.

Viewing and Changing Setup Parameters *(contd)*

4. To enter a new value:

   a. Press the number keys representing the new value, including the decimal point.

   b. If you enter a wrong value, press the **CE** key.

   c. Press the **RETURN** key to enter the new number into the PLC memory.

   d. The next setup parameter will automatically be displayed. To view the new value you just entered, press the **PREV** key.

Initial PLC Settings

These parameters must configured prior to system startup. Refer to Table 3-1.

1. Lance Purge Solenoids—Enter the number of solenoids supplied with the individual feed center(s).

2. Sweep Length—Enter the distance, in inches, that the floor sweeper will travel in one direction.

NOTE: If this value is not changed from the default of 0, feed center automatic operation will not be allowed. The fault silence light and fault buzzer will be activated.

Disconnecting the Interface from the PLC

Grasp the interface cable connector and pull it straight out of the PLC receptacle. Do not pull on the cable.

PLC Setup Values

Table 3-1 lists typical PLC setup values.

NOTE: These settings will typically be made during initial system installation and setup by your Nordson application engineer. Default values marked with an asterisk (*****) should not be changed without consulting your Nordson application engineer.

Table 3-1 PLC Setup Parameters

Parameter	Description	Interface ID	Default
Low Powder Level Alarm	Time delay, in minutes, for the Low Powder alarm. The delay starts when the feed hopper level sensor no longer detects powder.	Lo Pwdr Alrm Dly	5
Bulk Powder Delay	Time delay, in seconds, for the transfer of bulk powder to the system. The delay starts when the feed hopper level sensor no longer detects powder.	Bulk Pwdr Xfr Dly	30
Bulk Powder Duration	Duration, in seconds, that the bulk powder solenoid will be enabled.	Bulk Pwdr Dura	20
Lance Purge Solenoids	Number of valves on the lance purge valve assembly.	Lance Prg Sol's	1
Lance Purge Duration	Duration, in seconds, of the pulsing cycle for each purge valve. When the duration timer runs out, it is reset for the next valve, until all valves have been cycled.	Lance Prg Dura	10*
Lance Purge On Duration	Duration, in hundredths of a second, for the valve pulse on time.	Lance Prg On	.15*
Lance Purge Off Duration	Duration, in hundredths of a second, for the valve pulse off time.	Lance Prg Off	.15*
Purge Frequency Delay	Number of seconds between automatic discharge cycles. Used if a floor sweeper is not part of the system.	Cyc NoSwp PrgDly	90
Air Amplifier Delay On	Number of seconds to delay amplifier air after sieve hopper fluidizing air is turned on. Allows time for powder to fluidize.	Cyc Air Prg Dly	5*
Air Amplifier Pulse On Duration	Duration, in hundredths of a second, for the air amplifier pulse on time during a discharge cycle.	Cyc Air Puls On	1.00*
Air Amplifier Pulse Off Duration	Duration, in hundredths of a second, for the air amplifier pulse off time during a discharge cycle.	Cyc Air Puls Off	3.00*
Air Amplifier Pulse Cycles	Number of air amplifier pulses to occur during a discharge cycle.	Cyc Air Pulse Cycles	2*
Air Amplifier On Continuous	Time duration, in seconds, of continuous flow output of the air amplifier during a discharge cycle. Continuous output occurs after pulsing, and the end of this duration signals the end of the discharge cycle.	Cyc Air Cont On	4.00*
Sweep Length	Length of floor sweeper travel, in inches, in one direction. This value allows the PLC to calculate the expected running time in one direction.	Floor Swpr Len	0
* Do not change without first consulting your Nordson Application Engineer.			

Level Sensor Switch Installation and Calibration

See Figure 3-1.

The feed hopper level sensor is a capacitive proximity switch. For the switch to function properly, you must calibrate it. Perform this procedure when you start up a new system and also when you replace a sensor.

1. Insert the level sensor into the plastic mounting well (1) in the side of the feed hopper until it bottoms out. Tighten the plastic screws on the side of the well to hold the sensor securely.

2. Make sure system power is on and the exhaust fan is running.

3. Open the feed hopper lid and fill the hopper $^2/_3$ full of powder.

4. Increase the hopper fluidizing air pressure to 0.6–0.7 bar (8–10 psi). The powder level should rise above the top of the mounting well as the powder fluidizes. Add powder to the hopper if it does not.

5. Shut off the fluidizing air. The mounting well should now be coated with a film of powder.

6. If the sensor LED (3) is on, slowly turn the sensor potentiometer (2) clockwise until it goes off. If the LED is off, slowly turn the potentiometer counterclockwise until it lights, then clockwise until it goes off.

7. Increase the fluidizing pressure until the powder level rises above the mounting well. The LED should be off.

8. Turn the potentiometer counterclockwise, counting the number of turns you make, until the LED lights.

9. Turn the potentiometer clockwise for $^1/_2$ the number of turns you counted in step 8. The LED will go off. The sensor is now set in the midpoint of its sensitivity range.

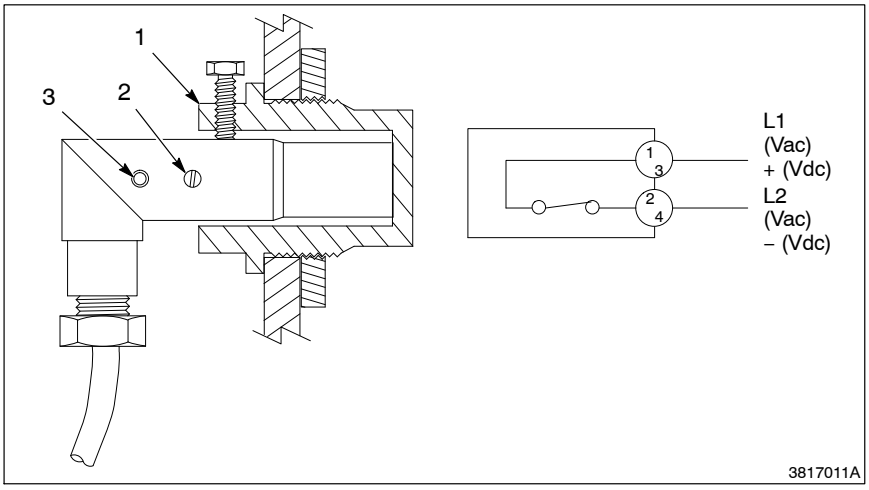

Fig. 3-1 Level Sensor Installation and Configuration

1. Mounting well
2. Potentiometer
3. LED

Cartridge Filter Seasoning

Perform this procedure for all new cartridge filters.

NOTE: The cartridge filters in the afterfilter must be properly seasoned at initial system installation and when all cartridge filters are replaced. If new cartridges filters are not properly seasoned, their performance and life can be dramatically reduced, and can also adversely affect the performance of the final filters.

Cartridge filter seasoning is accomplished by introducing VIRGIN POWDER ONLY to the collector units through the cyclone banjo. If there is more than one cyclone banjo, powder can be introduced into either banjo. Seasoning requires a minimum of ten pounds of powder for each cartridge filter in the afterfilter.

For example, for a 12,000 CFM system, 24 cartridge filters are used requiring a minimum of 240 pounds of virgin powder to ensure proper seasoning. The powder can either be slowly dumped manually into the top of the cyclone banjo or fed into the banjo using a transfer pump and powder hose from a box feeder or other bulk feeder.

WARNING: Wear protective clothing, safety goggles, and approved respiratory protection whenever handling powder or performing maintenance or cleaning operations. Follow the personal protection recommendations included in the Material Safety Data Sheets for each powder used.

1. Turn on the exhauster. Turn off cartridge filter pulsing or make sure pulse-on-demand is set at a minimum of 5-in. w.c. for the seasoning procedure.

2. Measure the initial average air velocity across the booth part openings using a hand-held velometer.

3. Record the static pressure across the cartridge and final filters shown on the pressure gauges located on the afterfilter panel.

4. Disconnect the sieves from the cyclones. Move the sieves out from under the cyclones.

5. Open the cyclone valve dampers to draw air up through the bottom of the cyclones.

6. Open one of the pressure relief panels at the top of the cyclone banjo. Load the seasoning powder into the cyclone through the opened panel.

Cartridge Filter Seasoning
(contd)

7. Note the static pressure across the cartridge filters shown on the gauges at the afterfilter panel. The pressure should be no less than 3-in. w.c. If it is less, add more powder until the static pressure reaches 3 in.

8. Move the sieves under the cyclones and reconnect them.

9. Close the cyclone valve dampers.

10. Record the average air velocity at the booth part openings with a hand-held velometer.

11. Record the static pressure across the cartridge and final filters shown on the gauges located on the afterfilter panel.

Booth Canopy Conditioning

Perform this procedure during initial system setup of a new system and also as part of a weekly maintenance program. Conditioning will keep the canopy easy to clean and reduce the potential for contamination of reclaimed powder.

The conditioning process requires two wash cycles and three rinse cycles. The canopy must be completely dry before spraying powder.

1. Fill two clean buckets with water.

2. Put a couple drops of mild dishwashing detergent into one of the buckets. This will be the soap bucket.

3. Soak and wring out a hand sponge or sponge mop in the soap bucket. Wipe down the entire inside of the canopy, frequently wringing out the sponge in the rinse bucket and then resoaping the sponge in the soap bucket.

4. Empty the buckets, rinse them out, then refill them and add a few drops of mild detergent to one of the buckets.

5. Repeat step 3 again, for a total of two wash cycles.

6. Empty the buckets and rinse them out. Fill the buckets with clean water and rinse the entire inside of the canopy, frequently wringing out the sponges in the rinse buckets.

7. Repeat step 6 two times, for a total of three rinse cycles.

Booth Moving

Refer to Table 3-2 for Exhaust Fan and Booth Mover Interlocks.

1. Shut off the exhaust fan.

2. Move the Gate/Duct Control switch to OFF. The duct extension(s) retract, or the duct seal deflates. Both slide gates close. The Booth Mover Ready indicator lights.

NOTE: The exhaust fan is interlocked with the slide gate position limit switches, and the duct extensions position limit switches or duct seal pressure switch. If the fan is on when the Gate/Duct Control switch is moved to the OFF position, the fan will automatically shut off.

3. When the Booth Mover Ready indicator lights, press the Booth Mover Enable button. The booth mover buzzer sounds. The pendant buttons are enabled for three minutes.

NOTE: If the buzzer does not turn on, the duct extensions or duct seals, or the slide gates, are not in the correct position.

4. Visually check the direction the booth will be moved for obstructions and personnel. Clear the area.

5. Visually check the duct seal (if used) to make sure it has fully collapsed.

6. Press and hold the pendant buttons to move the booth to the desired position. The booth stops when an end-of-travel limit switch is actuated, at the online or offline positions.

7. Check the alignment of the duct extension or seal and the slide gates. Move the booth to correct the alignment if necessary.

8. Move the Gate/Duct Control switch to ONLINE or OFFLINE. The system automatically opens the slide gate in the chosen position and extends the duct extension or inflates the duct seal.

9. When the Online or Offline Ready indicator lights, press the Exhauster Start button to turn on the exhaust fan.

Booth Moving (contd)

NOTE: If the Online or Offline Ready indicator does not light, then either the correct slide gate or duct extension limit switches are not actuated, or the duct seal pressure sensor does not detect pressure in the seal.

Table 3-2 Exhaust Fan and Booth Mover Interlocks

	Online Slide Gate Position and Limit Switch	Online Duct Extension Position and Limit Switch	Duct Seal	Duct Seal Pressure Switch (pneumatic)	Duct Seal Pressure Switch (electrical)	Offline Slide Gate Position and Limit Switch	Offline Duct Extension Position and Limit Switch
Online Ready	Open	Closed	Inflated	Pressure Detected	Open	Closed	Open
Booth Mover Ready	Closed	Open	Deflated	Pressure Not Detected	Closed	Closed	Open
Offline Ready	Closed	Open	Deflated	Pressure Detected	Open	Open	Closed

Feed Center Preparation

1. Move the Feed Center switch to the CLCH position.
2. Move the Purge Manifold switch to UP and hold it until the purge manifold stops in the full up position. The lance must be in the full up position before the manifold will move.
3. See Figure 3-2. Move a feed hopper (2) containing enough powder for the production run into the powder feed center.

NOTE: Do not fill the feed hopper more than two-thirds full. When fluidizing air is turned on the powder level will rise.

4. Secure the feed hopper with the two locking pins (5), one on each side of the hopper base.
5. Connect the vent hose (8) to the vent stub on the hopper lid.
6. Connect the discharge tube (3) to the feed hopper and the cyclone hopper.
7. Connect the fluidizing air tubing (6) to the hopper plenum.
8. Install the level sensor (7) in the well in the side of the hopper and secure it with the thumbscrew.
9. Press the Exhauster Start button to start the exhaust fan.
10. Move the FC Fluidizing switch to the ON position and allow time for the powder in the feed hopper to fluidize.
11. Move the Lance switch to DOWN and hold it until the lance (1) stops in the full down position.

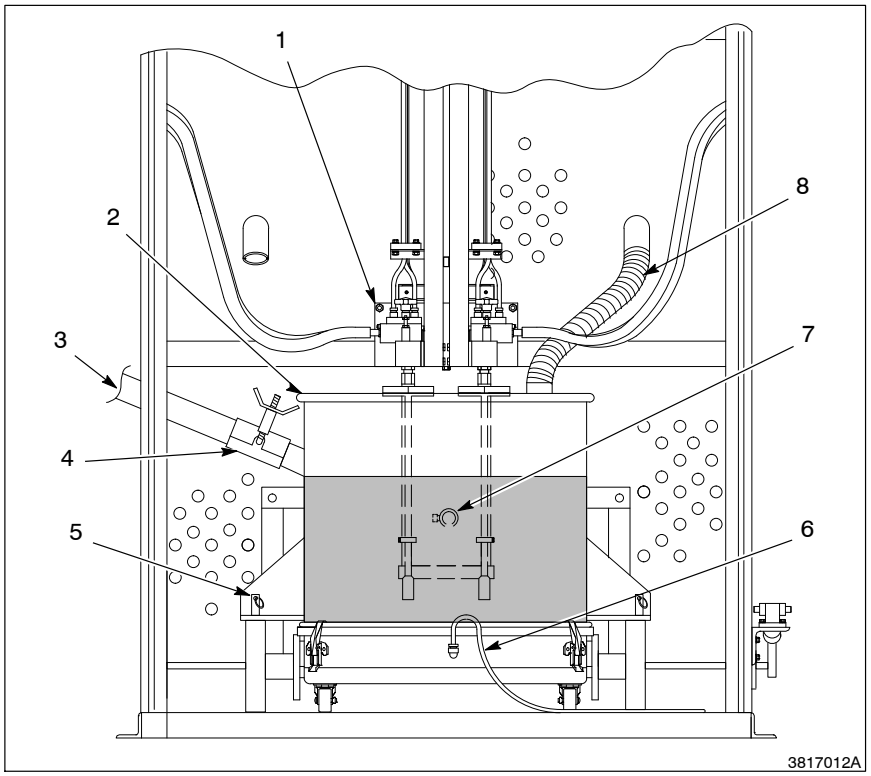

Fig. 3-2 Feed Center Preparation

1. Lance assembly
2. Feed hopper
3. Discharge tube
4. Discharge tube clamp
5. Locking pins
6. Fluidizing air tubing
7. Level sensor
8. Vent hose

12. See Figure 3-3.

    Make sure the cyclone valve damper control handle (1) is in the closed position. Tighten the knob (2) to prevent handle movement. The handle must be detected by the proximity sensor (3) before normal operation can begin. A light in the sensor turns on when the handle is detected.

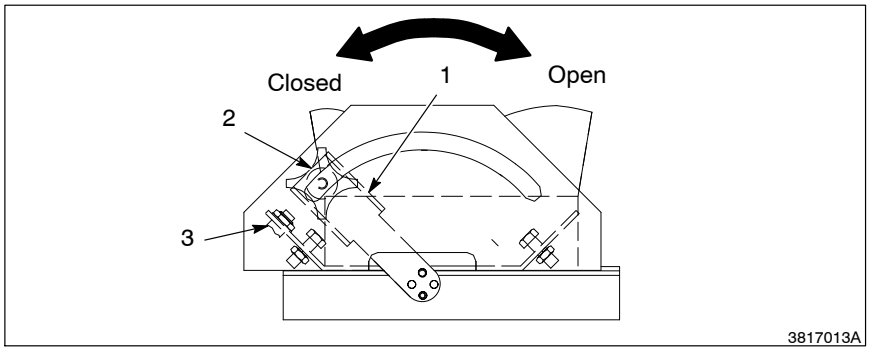

Fig. 3-3 Cyclone Valve Control Handle Positions

1. Handle
2. Knob
3. Proximity sensor

Feed Center Preparation (contd)

13. Set the feed center controls as follows:

    - Feed Center: Auto
    - Bulk Transfer: Auto
    - FC Fluidizing: On
    - Cyclone Seal: Off
    - Discharge Valve: Closed
    - Exhaust Damper: Closed

The feed center is ready for production.

3. Startup

Use this procedure for routine booth startup.

1. Turn on the system electrical power and compressed air supply.

2. Walk around the booth and verify that:

    - system equipment is connected to ground
    - fire detection system is on
    - transfer and feed hoses are connected to the pumps and guns
    - feed hopper has an adequate supply of powder for production (no more than $^2/_3$ full)
    - booth system is in online position.

3. Turn on the exhauster panel disconnect switch. This switch supplies power to the afterfilter and the motor starter panel. The exhauster panel is typically located near the afterfilter.

4. Turn on the motor starter panel disconnect switch. This switch supplies power to the floor sweeper and powder application equipment, as well as the feed center panel. The motor starter panel is typically located at the side of the booth.

5. Press the Exhauster Start button to start the exhaust fan.

6. Move the Floor Sweeper switch to AUTO or ON to start the floor sweeper. The switch is typically set to AUTO when running the booth in reclaim mode, and set to ON when running the booth in spray-to-waste mode. When set to ON, the sweeper will run continuously.

NOTE: The Floor Sweeper switch is set to AUTO, the sweeper will not start unless the Feed Center switch is in the AUTO position and the exhaust fan is running. If set to ON, the sweeper will run continuously as long as the exhaust fan is running.

CAUTION: The sweeper must always move forward, toward the exit end of the booth, when first started and not already at the forward limit switch position. If the direction is not forward, mechanical damage may occur. If this happens, STOP THE SWEEPER IMMEDIATELY and refer to *Troubleshooting*.

7. Adjust the spray gun kV settings and powder pump air pressures, if necessary. Refer to your gun control unit manuals.

8. Start the conveyor and start spraying powder.

9. Check airflow through the canopy. Make sure the sprayed powder is not being pulled from the guns and work pieces, or escaping from the canopy openings. Airflow through each opening must be maintained at an average 120 ft/min minimum.

Fault Silence

The Feed Center PLC monitors several conditions and devices and indicates problems by turning on the Fault Silence light and buzzer. Depending on the fault, the light either flashes or remains on continuously. Pressing the Fault Silence button turns off the buzzer. The light will remain on until the fault is corrected.

A label located next to the Fault Silence button describes the possible fault conditions and light indications. Refer to *Troubleshooting* for more information.

Typical Operating Air Pressures

The pressures listed here are approximate. You may need to increase or decrease pressures to obtain best results.

Feed Center Pneumatic Panel Pressures

Table 3-3 Feed Center Air Pressures

Regulator	Pressure
Cyclone Seal	40 psi
Discharge Purge Air Amplifier	30 psi
Feed Center Hopper Fluidize	5 psi
Sieve Hopper Fluidize	20 psi

Other System Pressures

Regulator	Pressure
Duct Seal	20 psi maximum

NOTE: Refer to your powder spray equipment manuals for information on spray gun setup and operation and pump operating pressures.

4. Color Change Procedures

This section provides a description of the overall color change process and detailed color change procedures for two possible booth system configurations:

- one powder feed center
- two powder feed centers

The procedures describe a color change when changing a booth system from dark- to light-colored powders or from light- to dark-colored powders. Both procedures assume the booth is running in reclaim mode.

Refer to two *Color Change Flowcharts* at the end of this section. The first is for a two operator, one powder feed center color change procedure and the second for a three operator, two powder feed center procedure.

Color Change Guidelines

In order to minimize the overall time required for a color change and to ensure that the booth is contamination-free, follow these guidelines for all color change processes.

- Use only compressed air to clean equipment. Do not use vacuums or solvents. The only exception is the booth floor, which must be cleaned with a squeegee.

- Have spare sieve screens and feed hoppers ready for each feed center. This allows quick on-line replacement and thorough off-line cleaning.

- Have spare gun nozzles and wear sleeves ready for each spray gun. This allows quick on-line replacement and thorough off-line cleaning.

- Keep the operator platform and area around it clean to minimize the possibility of color contamination. The entire booth area should be kept as clean as possible. Operators should wear shoe covers to avoid tracking in contaminants when cleaning the booth.

- The booth canopy interior should be routinely cleaned and conditioned at least once a week as specified in *Weekly Maintenance* in the *Maintenance* section. This will maintain the ability to quickly and easily blow off powder during a color change.

WARNING: Wear protective clothing, safety goggles, and approved respiratory protection whenever handling powder or performing maintenance or cleaning operations. Follow the personal protection recommendations included in the Material Safety Data Sheets for each powder used.

Color Change Preparation

1. Close the booth doors.
2. Turn the floor sweeper and exhaust fan off.
3. If desired, move the booth offline, if it is roll-on/roll-off equipped. Refer to *Booth Moving* in this section.
4. Turn the exhaust fan on. All cleaning is done with the exhaust fan on.
5. Move the floor sweeper switch to AUTO.
6. Perform the following procedures in order:

Procedure	Page
Feed Center Cleaning	3-15
Sieve Cleaning	3-20
Booth Cleaning	3-21
Sieve Re-Assembly	3-23
Feed Center Re-Assembly	3-23
Restart After Color Change	3-24

Feed Center Cleaning

1. Make sure the Floor Sweeper switch is set to AUTO. Move the Feed Center switch to CLCH. The floor sweeper will continue to run until it reaches the end of travel and actuates the limit switch.
2. Move the FC Fluidizing switch to OFF.
3. Press the Cyclone Discharge button to initiate a discharge cycle and move any powder in the cyclone hopper into the feed hopper.
4. Move the feed center Exhaust Damper switch to OPEN.

Removing the Feed Hopper

See Figure 3-4.

1. Move the Lance switch to UP and hold it until the lance assembly (1) stops in the full up position.

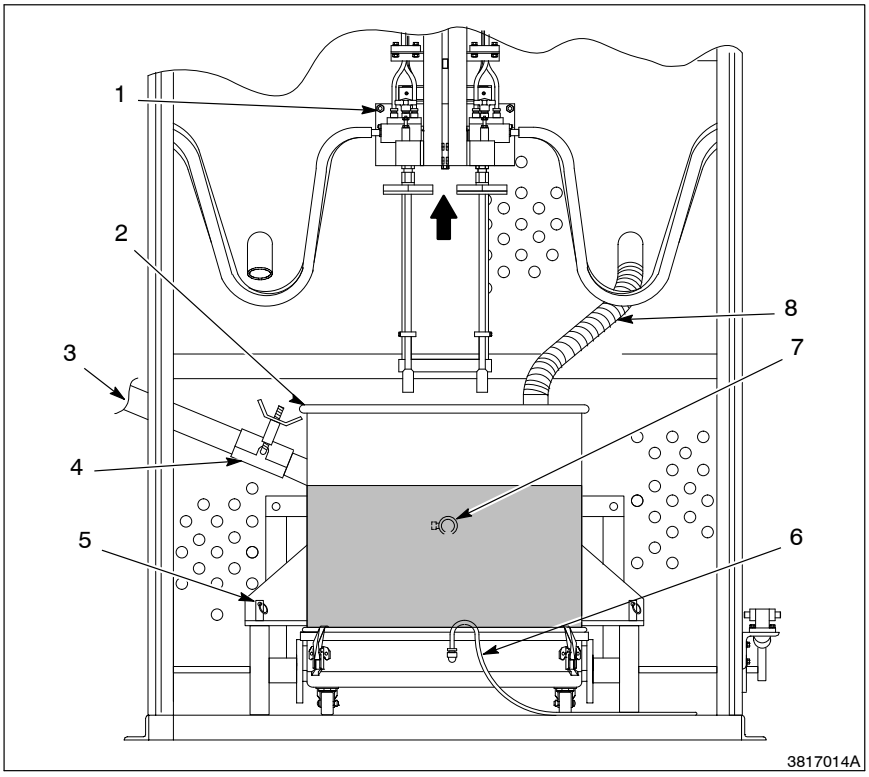

Fig. 3-4 Feed Center Cleaning

1. Lance assembly
2. Feed hopper lid
3. Discharge tube
4. Discharge tube clamp
5. Locking pins
6. Fluidizing air tubing
7. Level sensor
8. Vent hose

2. Blow off the lance assembly and feed hopper.

3. Disconnect the vent hose (8) from the feed hopper (2) lid. Leave the hose connected to the vent stub on the back wall of the enclosure. Blow out the vent hose.

4. Disconnect the fluidizing air tubing (6) from the feed hopper plenum.

CAUTION: Use care when handling the level sensor to prevent damaging it.

5. Remove the level sensor (7) from the feed hopper. Stow the level sensor in a secure location to prevent damaging it.

6. Loosen the discharge tube clamps (4) and disconnect the discharge tube (3) from the feed hopper and the cyclone hopper.

7. Remove the hopper locking pins (5).

8. Roll the feed hopper out of the feed center. If the remaining powder in the feed hopper will be reused, cover the lid with a plastic cover and install a plug in the discharge tube inlet.

Lance Purge and Feed Center Cleaning

See Figure 3-5.

1. Move the Purge Manifold switch to DOWN and hold it until the purge manifold (2) stops in the full down position.

NOTE: Purge manifold motion is not allowed unless the lance is in the full up position.

2. Move the Lance switch to DOWN and hold it until the lance (1) stops in the full down position. The pickup tubes should be coupled to the purge manifold nozzles (3).

WARNING: No personnel should be in the booth during a lance purge. Failure to observe this warning may result in personal injury.

3. Press the Lance Purge button. The purge cycle will begin and purge the pickup tubes, pumps, hoses, and guns.

NOTE: The purge cycle will not start unless both the lance and purge manifold are in their full down positions.

4. When the Lance Purge is complete, operators can start cleaning the booth while feed center cleaning continues.

5. Blow off the lance assembly and the interior of the feed center.

Lance Purge and Feed Center Cleaning *(contd)*

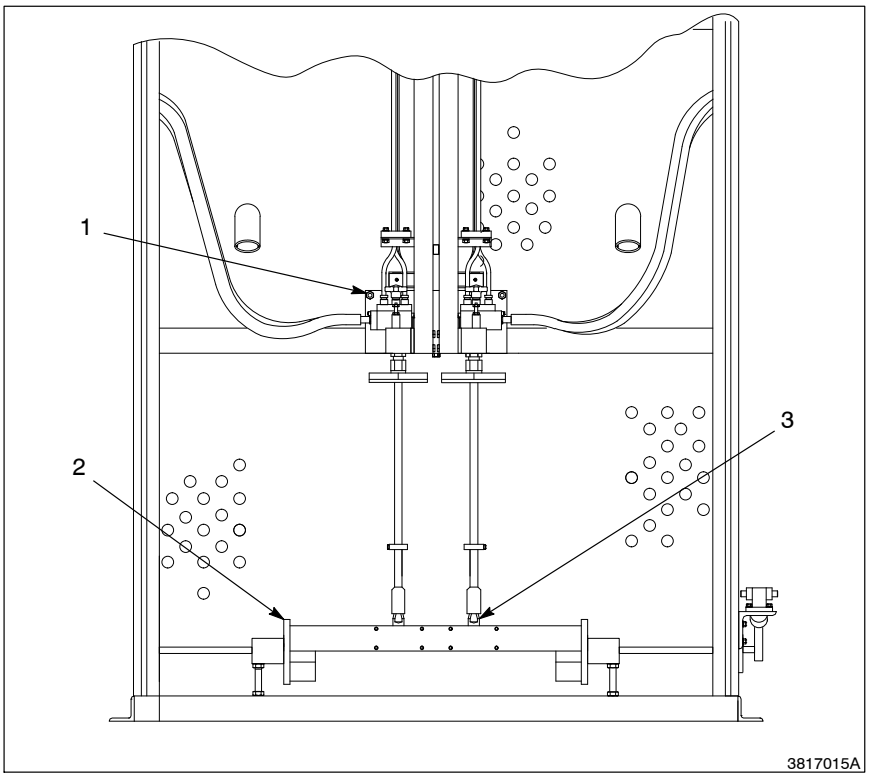

Fig. 3-5 Lance Purge

1. Lance assembly
2. Purge manifold
3. Nozzles

6. When the purge cycle is complete, turn the Lance switch to UP and hold it until the lance stops in the full up position.

7. Blow off the lance assembly, purge manifold, and the interior of the enclosure.

8. Move the Purge Manifold switch to UP and hold it until the purge manifold stops in the full up position.

9. See Figure 3-6. Loosen the knobs on the clamps (3). Pull the locking tabs away from the air inlet plate (1).

10. Remove the air inlet plate from the pump block (2).

11. Remove the pump block and attached hoses from the mounting arm.

12. Blow off the pump block. Place the pump block onto the storage shelf on the back wall of the enclosure.

13. Blow off the mounting arm (4).

14. Blow out each lance, from the bottom.

15. Install the alternate-color pump block and attached hoses on the mounting arm.

16. Install the air inlet plate on top of the pump block. Secure the plate with the clamps.

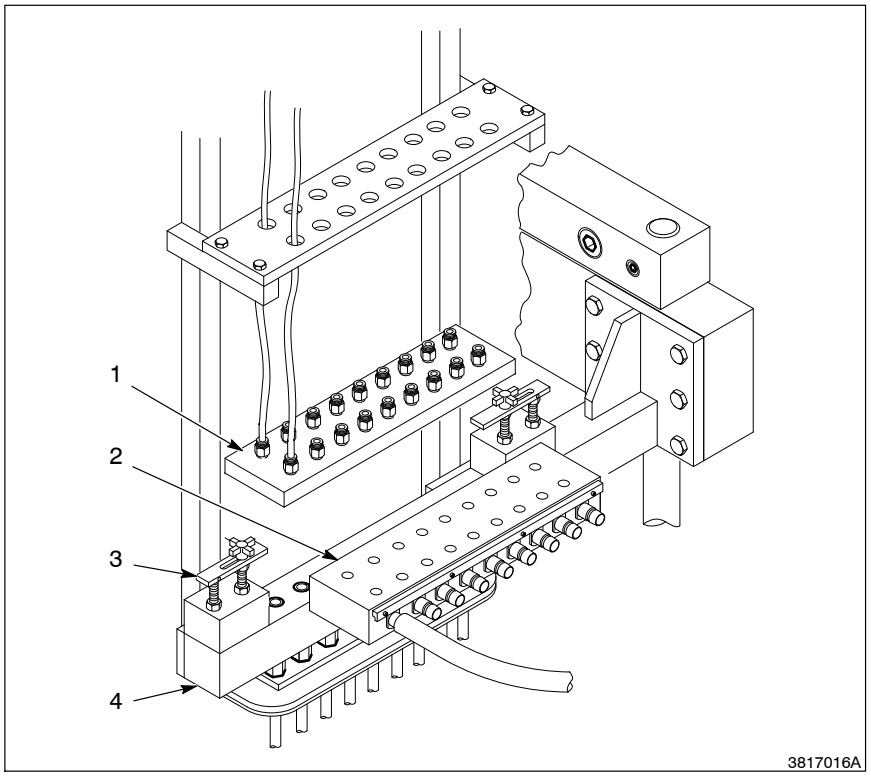

Fig. 3-6 Changing the Pump Block

1. Air inlet plate
2. Pump block
3. Clamps
4. Mounting arm

17. Aim the discharge tube toward the rear plenum of the feed center and away from the lance assembly. Blow out the discharge tube and clean the tube exterior and tube clamps.

18. Blow out the vent hose from the feed hopper end.

19. Move the Exhaust Damper switch to CLOSED.

Sieve Cleaning

Perform the *Feed Center Cleaning* procedure before starting this procedure.

1. Move the Cyclone Seal switch to OFF.
2. See Figure 3-7. Disconnect the ultrasonic transducer cable (8) from the receptacle on the side of the screen (9).
3. Unscrew the black plastic knobs (1) on top of the cyclone flange.
4. Roll the sieve halfway out from under the cyclone.
5. Loosen the cyclone valve damper handle knob (10) and move the handle to the OPEN position (to the right) to create suction under the cyclone. Tighten the knob to secure the handle.

CAUTION: Use care when handling and blowing off sieve screen to prevent damage to screen and transducer. The screen is easily damaged.

6. Blow off the screen and sleeve (3).
7. Release the clamps (5) and carefully remove the screen and sleeve (3) from the sieve. Inspect the screen for tears and other damage. Set the screen aside for more thorough cleaning offline.

NOTE: To minimize the time required for a color change, replace the screen with a pre-cleaned spare sieve screen.

8. If changing the screen, loosen the clamp (4), remove the sleeve (3), blow it clean, and install it on the alternate-color screen. Alternately, set the screen and sleeve aside and use a clean sleeve and screen for the next color.
9. Move the Discharge Valve switch to OPEN.
10. Blow out the sieve hopper (6) and discharge valve (7).
11. Roll the sieve out from under the cyclone.
12. Blow off the underside of the cyclone valve and flange.
13. Move the Discharge Valve switch to CLOSED.
14. Loosen the cyclone valve damper control handle knob and move the handle to the closed position (left). Tighten the knob.

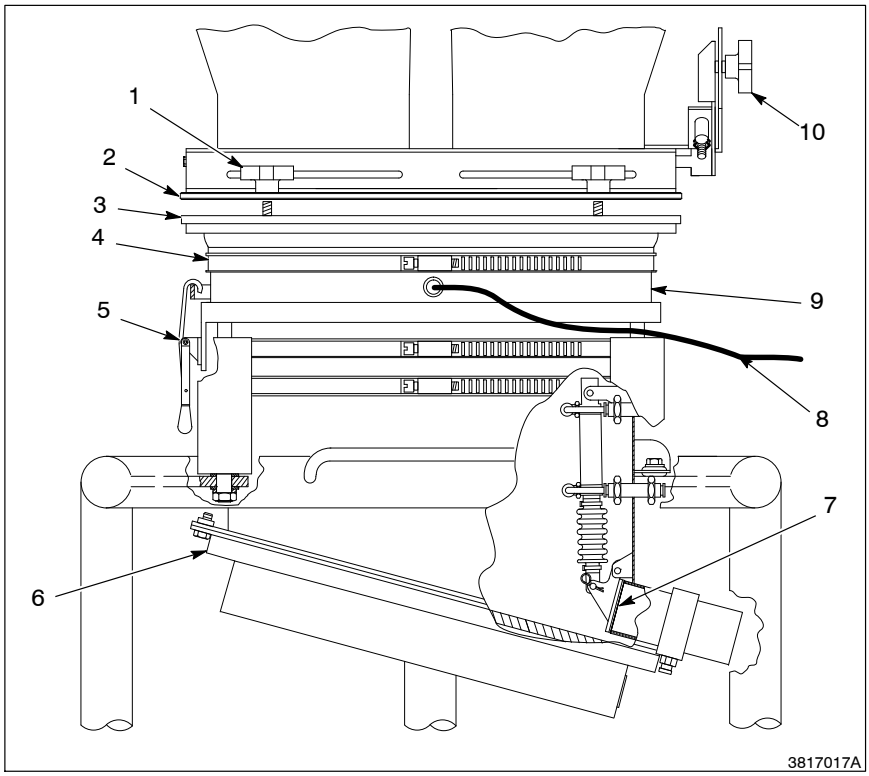

Fig. 3-7 Cleaning the Sieve

1. Knobs
2. Cyclone flange
3. Sleeve
4. Clamp
5. Clamps
6. Sieve hopper
7. Discharge valve
8. Transducer cable
9. Screen
10. Cyclone valve damper handle and knob

Booth Cleaning

This procedure can be performed immediately after the lance purge is performed as described in the *Feed Center Cleaning* procedure.

WARNING: No personnel should be in the booth during a lance purge. Failure to observe this warning may result in personal injury.

WARNING: Use only non-conductive tools to clean the booth interior. Do not use any tools that could create friction sparks. A hot spark could be pulled into the recovery system and ignite an explosion or fire.

Booth Cleaning *(contd)*

NOTE: Operators should use shoe covers to prevent carrying contaminants into the booth on their shoes.

1. After the feed center lance purge is complete, enter the booth and squeegee the floor.

2. Remove the nozzles and wear sleeves from the spray guns, if necessary.

3. Starting with the first group of guns on one side of the booth, disconnect the powder feed hoses and blow off the inside end and the exterior of the guns, then move them completely out of the booth, Repeat this procedure for guns on the both sides of the booth.

4. Lift the floor sweeper off the floor and blow it off until clean. Set the sweeper in the closest vestibule.

5. With a plastic scraper, remove from the floor any compacted powder tracks left by the sweeper wheels.

6. Starting from one end of the booth, blow off the ceiling, walls, and floor, working toward the opposite end of the booth.

7. At the end of the booth, blow off the vestibule. Then lift up the inlet grate and end panels (if equipped) and blow out the horizontal duct opening.

8. Open the vertical duct doors and blow off the duct and doors. When cleaning is complete, close the inlet grate, end panels, and vertical duct doors.

9. Starting from the current end of the booth, blow off the ceiling, walls, and floor, working toward the opposite end of the booth.

10. At the end of the booth, blow off the vestibule. Then lift up the inlet grate and end panels (if equipped) and blow out the horizontal duct opening.

11. Open the vertical duct doors and blow off the duct and doors. When cleaning is complete, close the inlet grate, end panels, and vertical duct doors.

12. Install clean wear sleeves and nozzles on the spray guns.

13. Connect the alternate-color powder feed hoses to the spray guns.

14. Place the sweeper on the floor in approximately the same position it was previously. Move the sweeper until it magnetically couples with the floor sweeper drive under the floor.

15. Exit the booth.

Sieve Re-Assembly

See Figure 3-7.

Perform this procedure after cleaning the feed center, sieve, and booth.

1. Install a clean screen on the sieve hopper. Clamp the screen to the hopper.
2. Move the sieve under the cyclone.
3. Lift up on the sleeve and insert the threaded studs into the slots in the cyclone flange.
4. Thread the knobs onto the studs and tighten them.
5. Connect the ultrasonic transducer cable to the receptacle on the side of the sieve.
6. Connect the discharge tube to the cyclone hopper. Tighten the clamp to secure the tube to the stub.

Feed Center Re-Assembly

Perform this procedure after cleaning the feed center, sieve, and booth, and re-assembling the sieve.

1. Move the Purge Manifold switch to UP and hold it until the purge manifold stops at the full up position.
2. See Figure 3-2. Move the feed hopper (2) containing the new powder color into position in the feed center and secure it in place with the locking pins (5).
3. Connect the discharge tube (3) to the feed hopper.
4. Connect the vent hose (8) to the vent stub on the hopper lid.
5. Connect the fluidizing air tubing (6) to the hopper plenum.
6. Install the level sensor (7) in the well in the side of the feed hopper.
7. Move the FC Fluidizing switch to the ON position and allow time for the powder in the feed hopper to fluidize.
8. Turn the Lance switch to DOWN and hold it until the lance stops at the full down position. The seal plate on the pickup tubes should seal the slots in the hopper lid.

Restart After Color Change

Perform this procedure after cleaning the booth, sieve, and feed center and re-assembling the sieve and feed center.

1. Move the booth online, if necessary. Refer to *Booth Moving* in this section.

2. Set the feed center controls as follows:

   - Feed Center: Auto
   - Bulk Transfer: Auto
   - FC Fluidizing: On
   - Cyclone Seal: Off
   - Discharge Valve: Closed
   - Feed Center Exhaust Damper: Closed

3. Start the floor sweeper. If the Floor Sweeper switch is set to AUTO, the sweeper will start automatically.

You are now ready to start production.

5. Daily System Shutdown

Perform this procedure when shutting down the system.

1. Move the booth offline, if it is a roll-on/roll-off booth. Refer to *Booth Moving* in this section.

2. Shut off the floor sweeper unless you are changing colors and the Floor Sweeper switch is set to AUTO.

3. Turn off the automatic gun master control unit(s) and the manual control unit(s).

4. Perform the *Daily Maintenance* procedures described in *Maintenance*.

5. Turn off the exhaust fan. Turn off the disconnect switch at the exhauster panel.

6. Color Change Chart — Booths with One Powder Feed Center

Use this procedure chart for Spectrum booths with one powder feed center. This chart coordinates the activities of two operators, changing from dark to light or light to dark colors. Refer to *Color Change Procedures* in this section for *Color Change Guidelines* and detailed instructions and illustrations.

Color Change Chart—Booths with One Powder Feed Center					
Task	**Operator #1**		**Operator #2**		**Notes**
1	PFC—At powder feed center controls (PFCC), set powder feed center to AUTO, turn feed hopper fluidizing air to OFF, and press discharge purge cycle CYC DISCHARGE button. This conveys any remaining powder in sieve hopper to feed center hopper.		Booth—Close booth vestibule doors and move booth offline (if applicable).		
2	PFC—At PFCC, set powder feed center to color change CLCH and open feed center damper by setting EXHAUST DAMPER or FEED CENTER DAMPER to OPEN.		Booth—Blow off gun slots from outside of booth.		
3	PFC—At PFCC, raise lance assembly fully out of feed center hopper using LANCE UP switch. Blow off lance assembly and hopper exterior.				
4	PFC—Remove level sensor and stow securely. CAUTION: USE CARE WHEN HANDLING LEVEL SENSOR TO PREVENT DAMAGING IT.				
5	PFC—Disconnect vent hose from hopper lid and blow out into feed center exhaust.				
6	PFC—Disconnect discharge tube from side of feed hopper and sieve.				
7	PFC—Disconnect fluidizing air tubing from fitting on base of feed hopper.				
8	PFC—Roll feed hopper out of feed center. Cover hopper lid with plastic cover and install plug into discharge tube inlet on side of hopper.				
9	PFC—Blow off lance assembly.				
10	PFC—At PFCC, lower purge manifold by turning and holding PURGE MANIFOLD switch to DOWN position.				
11	PFC—At PFCC, lower lance assembly onto purge manifold by turning LANCE switch to DOWN position.				
12	PFC—At PFCC, Press LANCE PURGE button to purge lance assembly, pumps, hoses and guns.		Booth—AFTER lance purge is completed, enter booth and squeegee floor starting from part EXIT end to part ENTRY end. (Refer to Note)		WARNING: DO NOT enter booth while lance purge is in progress. IMPORTANT: Operators are REQUIRED to wear shoe booties or covers when entering booth.
13	Sieve—Disconnect ultrasonic transducer cable from side of sieve screen.		Booth—Lift floor sweeper off floor and place sweeper on floor grate.		
14	Sieve—Unscrew four black plastic knobs on top of cyclone flange.		Guns—Remove nozzles and wear sleeves from ALL automatic guns and place nozzles and wear sleeves in container. Place container outside booth.		

6. Color Change Chart — Booths with One Powder Feed Center (contd)

Color Change Chart—Booths with One Powder Feed Center					
Task	**Operator #1**		**Operator #2**		**Notes**
15	Sieve—Roll sieve half way out from under cyclone and check amount of powder left on screen. There should be very little powder on screen. Quickly inspect for screen tears. Unclamp screen and remove from sieve. CAUTION: USE CARE WHEN HANDLING AND BLOWING OFF SIEVE SCREEN TO PREVENT DAMAGE TO SCREEN AND ULTRASONIC TRANSDUCER.		Guns – Starting with group of guns on ONE side of booth, disconnect powder feed hoses and blow off inside end and exterior of guns. When complete, back gun mover out of booth. Repeat for all guns on side of booth. (Refer to Note)		Always blow toward booth end to avoid blowing powder out of booth through gun slots.
16	Sieve—Roll sieve (without a screen) halfway under the cyclone. At PFCC, turn CYC DISCHARGE switch to OPEN. Do not open cyclone valve damper. (Refer to Note)		Guns—Move to opposite side of booth, disconnect the powder feed hoses and blow off inside end and exterior of guns. When complete, back gun mover out of booth. Repeat for each group on side of booth.		During interior booth blow off, powder feed center damper and cyclone valve damper must NOT be open at same time. Opening both will deplete booth of airflow necessary to contain powder during booth blow off and cleaning.
17	PFC—Blow off lance assembly and interior of feed center.		Booth—Lift floor sweeper, blow it off and set it in closest vestibule.		
18	PFC—At PFCC, raise lance assembly off purge manifold by turning LANCE switch to UP. Raise purge manifold by turning PURGE MANIFOLD switch to UP position.		Booth – With a plastic scraper, remove any powder tracks from the floor left by sweeper wheels.		
19	PFC—Pump assemblies: Loosen two knobs on locking tabs and pull locking tabs away from air inlet plate(s).		Booth—Starting from part EXIT end blow down the ceiling, walls, and floor, working toward ENTRY end.		
20	PFC—Pump assemblies: Lift air inlet plate(s) off pump block(s) and remove pump block(s).		Booth—At part ENTRY end, blow out vestibule. Lift up inlet grate and end panels and blow out horizontal duct. Open vertical duct doors and blow out ductwork. When complete, close inlet grate, end panels and vertical duct doors.		
21	PFC—Blow off pump block(s).		Booth—Starting from part ENTRY end, blow down the ceiling, walls, and floor, working toward the EXIT end.		
22	PFC—Blow out each lance from bottom.		Booth – At EXIT end, blow out vestibule. Lift up inlet grate and end panels and blow out horizontal duct. Open vertical duct doors and blow out ductwork. When complete, close inlet grate, end panels and vertical duct doors.		
23	PFC—Blow out discharge tubes and clean tube clamps. (Refer to Note)		Guns—Install clean wear sleeves and nozzles on guns. Connect powder feed hoses to guns.		When blowing off discharge tube, direct air flow toward rear plenum of feed center and away from lance assembly.

Color Change Chart—Booths with One Powder Feed Center					
Task	**Operator #1**		**Operator #2**		**Notes**
24	PFC—Blow out vent hose into feed center exhaust. Blow off feed center interior and all parts inside.		Booth—Place sweeper on the floor in same position it was previously. Move the sweeper until it magnetically engages with the sweeper drive under the booth floor.		
25	PFC—Install alternate color pump block on lance.		Exit Booth. **Operator #2 should assist Operator #1 to complete external booth cleaning activities, if needed.**		
26	PFC—Install air inlet plate on pump block and secure by pushing locking tabs over plate and tightening knobs.				
27	PFC—At PFCC, close feed center damper by turning EXHAUST DAMPER or FEED CENTER DAMPER to CLOSE position. (Refer to Note)				During interior booth blow off, powder feed center damper and cyclone valve damper must NOT be open at same time. Opening both will deplete booth of airflow necessary to contain powder during booth blow off and cleaning.
28	PFC—Roll in alternate color hopper, connect vent hoses to hopper lid, connect fluidize air tubing to fitting on the plenum and level sensor to hopper body. CAUTION: USE CARE WHEN HANDLING LEVEL SENSOR TO PREVENT DAMAGE TO IT. (Refer to Note)				DO NOT connect vent hoses to feed hopper lid when feed center damper is open. Powder in hopper will be sucked out of hopper and conveyed to scrap powder hopper in afterfilter collector unit.
29	PFC—At PFCC, turn FC FLUIDIZE switch to ON. After powder in feed hopper is fluidized, lower lance assembly into hopper by turning LANCE switch to DOWN until lance is fully down. Turn FC FLUIDIZE switch to OFF position.				
30	Sieve—At PFCC, turn CYC DISCHARGE switch to CLOSE. Manually loosen cyclone valve damper knob, move handle to OPEN position, then tighten knob. Blow out inside of sieve, aiming air gun tangentially to keep powder air entrained so that powder will be drawn into the cyclone. Blow off all internal surfaces including inside surface of flexible connection around perimeter, to make sure no powder is trapped behind the lip.				
31	Sieve—At PFCCs, turn CYC DISCHARGE to OPEN. Clean discharge valve by blowing into it from outside. Close valve and quickly blow out sieve hopper.				
32	Cyclones and Sieves—Roll sieve completely out from under cyclone and blow off underside of cyclone flange (including plugs in flange), cyclone valve and inside lower cone section of cyclone. Blow out sieve final time to remove any powder blown onto sieve from cyclone cleaning. Manually loosen cyclone valve damper knob, move handle to CLOSED position, then tighten knob.				

6. Color Change Chart — Booths with One Powder Feed Center (contd)

Color Change Chart—Booths with One Powder Feed Center					
Task	**Operator #1**		**Operator #2**		**Notes**
33	Cyclones and Sieve—After booth blow down is complete, open cyclone valve damper for 30 seconds to flush out any powder remaining in cyclone. Blow off inside lower cone section of cyclone. Close cyclone valve damper. (Refer to Note)				A clean sieve assembly can be re-installed anytime after booth cleaning is completed and cyclone has been flushed of powder. Wait 30 seconds after last booth cleaning task for cyclone to flush out powder.
34	Sieve—Install clean sieve screen. After booth cleaning is complete and cyclone is flushed, roll sieve under the cyclone making sure the threaded studs on the sieve boot fit into slots in the cyclone flange. (Refer to Note)				A clean sieve assembly can be re-installed anytime after booth cleaning is completed and cyclone has been flushed of powder. Wait 30 seconds after last booth cleaning task for cyclone to flush out powder.
35	Sieve—Thread knob onto studs.				
36	Sieve—Connect ultrasonic transducer to receptacle on side of sieve screen.				
37	Sieve and PFC—Connect discharge tube to sieve hopper and feed hopper. Tighten clamps to secure tube to sieve and feed center hopper stubs.				
System is ready to spray next color					

7. Color Change Chart — Booths with Two Powder Feed Centers

Use this procedure chart for Spectrum booths with two powder feed center. This chart coordinates the activities of three operators, changing from dark to light or light to dark colors. Refer to *Color Change Procedures* in this section for *Color Change Guidelines* and detailed instructions and illustrations.

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
1	PFC#1—At powder feed center controls (PFCC), set powder feed center to AUTO, turn feed hopper fluidizing air to OFF, and press discharge purge cycle CYC DISCHARGE button. This conveys any remaining powder in sieve hopper to feed center hopper.		PFC#2—At powder feed center controls (PFCC), set powder feed center to AUTO, turn feed hopper fluidizing air to OFF, and press discharge purge cycle CYC DISCHARGE button. This conveys any remaining powder in sieve hopper to feed center hopper.		Booth—Close booth vestibule doors and move booth offline (if applicable).		
2	PFC #1—At PFCC, set powder feed center to color change CLCH and open feed center damper by setting EXHAUST DAMPER or FEED CENTER DAMPER to OPEN.		PFC #2—At PFCC, set powder feed center to color change CLCH and open feed center damper by setting EXHAUST DAMPER or FEED CENTER DAMPER to OPEN.		Sieve #1—After discharge is complete, disconnect discharge tube from bottom of sieve hopper. Give tube to operator in feed center through access hole in side of feed center for cleaning.		
3	PFC #1—At PFCC, raise lance assembly fully out of feed center hopper using LANCE UP switch. Blow off lance assembly and hopper exterior.		PFC #2—At PFCC, raise lance assembly fully out of feed center hopper using LANCE UP switch. Blow off lance assembly and hopper exterior.		Sieve #1—Disconnect ultrasonic transducer cable from side of sieve screen.		
4	PFC #1—Remove level sensor and stow securely. (Refer to Note)		PFC #2—Remove level sensor and stow securely. (Refer to Note)		Sieve #1—Unscrew four black plastic knobs on top of cyclone flange.		CAUTION: USE CARE WHEN HANDLING LEVEL SENSOR TO PREVENT DAMAGING IT.
5	PFC #1—Disconnect vent hose from hopper lid and blow out into feed center exhaust.		PFC #2—Disconnect vent hose from hopper lid and blow out into feed center exhaust.		Sieve #1—Roll sieve half way out from under cyclone and check amount of powder left on screen. There should be very little powder on screen. Quickly inspect for screen tears. Unclamp screen and remove from sieve. (Refer to Note)		CAUTION: USE CARE WHEN HANDLING AND BLOWING OFF SIEVE SCREEN TO PREVENT DAMAGE TO SCREEN AND ULTRASONIC TRANSDUCER.
6	PFC #1—Disconnect discharge tube from side of feed hopper and sieve #1. (If discharge tube is still connected).		PFC #2—Disconnect discharge tube from side of feed hopper and sieve #2.		Sieve #1—Roll sieve (without a screen) halfway under the cyclone. At PFCC, turn CYC DISCHARGE switch to OPEN. Manually loosen cyclone valve damper knob, move handle to OPEN position, then tighten knob.		

7. Color Change Chart — Booths with Two Powder Feed Centers (contd)

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
7	PFC #1—Disconnect fluidizing air tubing from fitting on base of feed hopper.		PFC #2—Disconnect fluidizing air tubing from fitting on base of feed hopper.		Sieve #1—Blow out inside of sieve, aiming air gun tangentially to keep powder air entrainied so that powder will be drawn into the cyclone. Blow off all internal surfaces including inside surface of flexible connection around perimeter, to make sure no powder is trapped behind the lip. Cycle the discharge valve to make sure no powder is trapped in the valve cylinder bellows.		
8	PFC #1—Roll feed hopper out of feed center. Cover hopper lid with plastic cover and install plug into discharge tube inlet on side of hopper.		PFC #2—Roll feed hopper out of feed center. Cover hopper lid with plastic cover and install plug into discharge tube inlet on side of hopper.		Sieve #1—Roll sieve completely out from under cyclone and blow off underside of cyclone flange (including plugs in flange), cyclone valve and inside lower cone section of cyclone. Blow out sieve final time to remove any powder blown onto sieve from cyclone cleaning. Manually loosen cyclone valve damper knob, move handle to CLOSED position, then tighten knob.		
9	PFC #1—At PFCC, lower purge manifold by turning and holding PURGE MANIFOLD switch to DOWN position.		PFC #2—At PFCC, lower purge manifold by turning and holding PURGE MANIFOLD switch to DOWN position.				
10	PFC #1—At PFCC, lower lance assembly onto purge manifold by turning LANCE switch to DOWN position.		PFC #2—At PFCC, lower lance assembly onto purge manifold by turning LANCE switch to DOWN position.				
11	PFC #1—At PFCC, press LANCE PURGE button to purge lance assembly, pumps, hoses, and guns.		PFC #2—At PFCC, press LANCE PURGE button to purge lance assembly, pumps, hoses, and guns.		PFC #1—At PFCC, turn CYC DISCHARGE switch to CLOSE. Do not roll sieve under cyclone until booth cleaning is complete.		Booth cleaning can begin immediately after lance purge is complete for both feed centers. A clean sieve assembly can be re-installed anytime after booth cleaning is completed and cyclone has been flushed of powder. Wait 30 seconds after last booth cleaning task for cyclone to flush out powder.

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
12	PFC #1—At PFCC, turn EXHAUST DAMPER or FEED CENTER DAMPER switch to CLOSE. (Refer to Note)(This task will likely be performed before Operator #3 moves to PFC #1)		PFC #2—At PFCC, turn EXHAUST DAMPER or FEED CENTER DAMPER switch to CLOSE. (Refer to Note)		PFC #1—At PFCC, turn EXHAUST DAMPER or FEED CENTER DAMPER switch to OPEN. (Refer to Note)		During interior booth blow off, powder feed center damper and cyclone valve damper must NOT be open at same time. Opening both will deplete booth of airflow necessary to contain powder during booth blow off and cleaning.
13	Booth—Enter booth and squeegee floor, starting from the part ENTRY end to the part EXIT end. (Refer to Note)		Booth—Enter booth and squeegee floor, starting from the part ENTRY end to the part EXIT end. (Refer to Note)		PFC #1—Blow off the lance assembly and interior of feed center.		IMPORTANT: Operators are REQUIRED to wear shoe booties or covers when entering booth to minimize color contamination. Operators 1 and 2 work together by completing same tasks on opposite sides of booth.
14	Booth—Lift floor sweeper off floor and set sweeper on nearest inlet grate.		Booth—Move squeegees out of booth and bring in ladder (if necessary) and container.		PFC #1—At PFCC, turn LANCE switch to UP and raise lance to full up position. Turn PURGE MANIFOLD switch to UP and raise purge manifold to full up position.		
15	Guns—On one side of booth, remove nozzles and wear sleeves from guns and disconnect powder feed tubing (if necessary). Place nozzles and wear sleeves in container.		Guns—On one side of booth, remove nozzles and wear sleeves from guns and disconnect powder feed tubing (if necessary). Place nozzles and wear sleeves in container. (Refer to Note)		PFC #1—Pump assemblies: Loosen two knobs on locking tabs and pull locking tabs away from air inlet plate(s).		If system is equipped with additional center or horizontal guns, operator #2 performs same procedure as with other guns.
16	Guns—Starting with same group of guns, blow off inside end and one side of exterior. (Refer to Note)		Guns—Starting with same group of guns, blow off inside end and one side of exterior. (Refer to Note)		PFC #1—Pump assemblies: Lift air inlet plate(s) off pump block(s) and remove pump block(s).		When blowing off guns, direct air flow toward end of booth to avoid blowing powder out of booth. If system is equipped with additional center or horizontal guns, operator #2 performs same procedure as with other guns.
17	Booth—Blow off floor sweeper and set it in the nearest vestibule.		Guns—At same group of guns, blow off other side of exterior. Move center or horizontal gun mover out of booth, if equipped. (Refer to Note)		PFC #1—Blow off the pump block.		When blowing off guns, direct air flow toward end of booth to avoid blowing powder out of booth. If system is equipped with additional center of horizontal guns, operator #2 performs same procedure as with other guns.

7. Color Change Chart — Booths with Two Powder Feed Centers (contd)

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
18	Guns—At same group of guns, blow off other side of gun exteriors. Move ALL guns out of booth, using the gun mover control panel.		Booth—Starting from part ENTRY end, begin blowing down inlet grate. Lift up inlet grate and end panels and blow off horizontal duct.		PFC #1—Blow out each lance from bottom.		
19	Booth—At part ENTRY end, blow out vestibule. Open vertical duct doors and blow out ductwork. Complete blow off of inlet grate and end panels and blow out the horizontal duct. Open vertical duct doors and blow out the ductwork. When complete, close inlet grate, end panels, and vertical duct doors.		Booth—With a plastic scraper, remove any powder tracks from floor left by sweeper wheels.		PFC #1—Blow out the discharge tube and clean the tube clamps. (Refer to Note)		When blowing off discharge tube, direct air flow toward rear plenum of feed center and away from lance assembly.
20	Booth—Starting from part ENTRY end, blow down the ceiling, walls, and floor, working toward the EXIT end.		Booth—Starting from part ENTRY, blow down the ceiling, walls, and floor, working toward the EXIT end.		PFC #1—Blow out vent hoses into feed center exhaust. Blow off the feed center and all parts inside.		
21	Booth—At part EXIT end, blow out vestibule. Open vertical duct doors and blow out ductwork. Complete blow off of inlet grate and end panels and blow out the horizontal duct. Open vertical duct doors and blow out the ductwork. When complete, close inlet grate, end panels, and vertical duct doors.		Booth—At part EXIT end, begin blowing down the inlet grate. Lift up the inlet grate and end panels and blow off horizontal duct.		PFC #1—At PFCC, turn EXHAUST DAMPER or FEED CENTER DAMPER switch to CLOSE.		
22	Booth—Starting from the part EXIT end, blow down the ceiling, walls, and floor, working toward the ENTRY end.		Guns—Bring in ladder (if necessary) and install clean wear sleeves and nozzles on ALL guns. Connect powder feed hoses to ALL guns.		PFC #1—Install the alternate color pump block(s) on the lance.		
23	Booth—Place sweeper on the floor in same position it was previously. Move the sweeper until it magnetically engages with the sweeper drive under the floor.		Exit Booth. **Operator #2 should assist Operator #3 to complete external booth cleaning activities, if needed.**		PFC #1—Install air inlet plate on pump block and secure by pushing locking tabs over plate and tightening knobs.		

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
24	Exit Booth. **Operator #1 should assist Operator #3 to complete external booth cleaning activities, if needed.**				PFC #1—Roll in alternate color hopper, connect vent hoses to hopper lid, connect fluidize air tubing to fitting on the plenum and level sensor to hopper body. CAUTION: USE CARE WHEN HANDLING LEVEL SENSOR TO PREVENT DAMAGE TO IT. (Refer to Note)		DO NOT connect vent hoses to feed hopper lid when feed center damper is open. Powder in hopper will be sucked out of hopper and conveyed to scrap powder hopper in afterfilter collector unit.
25					PFC #1—At PFCC, turn FC FLUIDIZE switch to ON. After powder in feed hopper is fluidized, lower lance assembly into hopper by turning LANCE switch to DOWN until lance is fully down. Turn FC FLUIDIZE switch to OFF position.		
26					Sieve #2—Disconnect ultrasonic transducer cable from side of sieve screen.		
27					Sieve #2—Unscrew four black plastic knobs on top of cyclone flange.		
28					Sieve #2—Roll sieve half way out from under cyclone and check amount of powder left on screen. There should be very little powder on screen. Quickly inspect for screen tears. Unclamp screen and remove from sieve. (Refer to Note)		CAUTION: USE CARE WHEN HANDLING AND BLOWING OFF SIEVE SCREEN TO PREVENT DAMAGE TO SCREEN AND ULTRASONIC TRANSDUCER.
29					Sieve #2—Roll sieve (without a screen) halfway under the cyclone. At PFCC, turn CYC DISCHARGE switch to OPEN. Manually loosen cyclone valve damper knob, move handle to OPEN position, then tighten knob. (Refer to Note)		During interior booth blow off, powder feed center damper and cyclone valve damper must NOT be open at same time. Opening both will deplete booth of airflow necessary to contain powder during booth blow off and cleaning.

7. Color Change Chart — Booths with Two Powder Feed Centers (contd)

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
30					Sieve #2—Blow out inside of sieve, aiming air gun tangentially to keep powder air entrained so that powder will be drawn into the cyclone. Blow off all internal surfaces including inside surface of flexible connection around perimeter, to make sure no powder is trapped behind the lip. Cycle the discharge valve to make sure no powder is trapped in the valve cylinder bellows.		
31					Sieve #2—Roll sieve completely out from under cyclone and blow off underside of cyclone flange (including plugs in flange), cyclone valve and inside lower cone section of cyclone. Blow out sieve final time to remove any powder blown onto sieve from cyclone cleaning. Manually loosen cyclone valve damper knob, move handle to CLOSED position, then tighten knob.		
32					PFC #2—At PFCC, turn CYC DISCHARGE switch to CLOSE. DO NOT roll sieve under cyclone until booth cleaning is complete.		A clean sieve assembly can be re-installed anytime after booth cleaning is completed and cyclone has been flushed of powder. Wait 30 seconds after last booth cleaning task for cyclone to flush out powder.
33					PFC #2—At PFCC, turn EXHAUST DAMPER or FEED CENTER DAMPER switch to OPEN position. (Refer to Note)		During interior booth blow off, powder feed center damper and cyclone valve damper must NOT be open at same time. Opening both will deplete booth of airflow necessary to contain powder during booth blow off and cleaning.

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
34					PFC #2—Blow off the lance assembly and interior of feed center.		
35					PFC #2—At PFCC, turn LANCE switch to UP and raise lance to full up position. Turn PURGE MANIFOLD switch to UP and raise purge manifold to full up position.		
36					PFC #2—Pump assemblies: Loosen two knobs on locking tabs and pull locking tabs away from air inlet plate(s).		
37					PFC #2—Pump assemblies: Lift air inlet plate(s) off pump block(s) and remove pump block(s).		
38					PFC #2—Blow off the pump block.		
39					PFC #2—Blow out each lance from bottom.		
40					PFC #2—Blow out the discharge tube and clean the tube clamps. (Refer to Note)		When blowing off discharge tube, direct air flow toward rear plenum of feed center and away from lance assembly.
41					PFC #2—Blow out vent hoses into feed center exhaust. Blow off the feed center and all parts inside.		
42					PFC #2—At PFCC, turn EXHAUST DAMPER or FEED CENTER DAMPER switch to CLOSE.		
43					PFC #1—Install the alternate color pump block(s) on the lance.		
44					PFC #1—Install air inlet plate on pump block and secure by pushing locking tabs over plate and tightening knobs.		

7. Color Change Chart — Booths with Two Powder Feed Centers (contd)

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
45					PFC #1—Roll in alternate color hopper, connect vent hoses to hopper lid, connect fluidize air tubing to fitting on the plenum and level sensor to hopper body. CAUTION: USE CARE WHEN HANDLING LEVEL SENSOR TO PREVENT DAMAGE TO IT. (Refer to Note)		DO NOT connect vent hoses to feed hopper lid when feed center damper is open. Powder in hopper will be sucked out of hopper and conveyed to scrap powder hopper in afterfilter collector unit.
46					PFC #1—At PFCC, turn FC FLUIDIZE switch to ON. After powder in feed hopper is fluidized, lower lance assembly into hopper by turning LANCE switch to DOWN until lance is fully down. Turn FC FLUIDIZE switch to OFF position.		
47					Sieve #1—After booth blow down is complete, open cyclone valve damper for 30 seconds to flush out any powder remaining in cyclone. Blow off inside lower cone section of cyclone. Manually loosen cyclone valve damper knob, move handle to CLOSED position, then tighten knob.		
48					Sieve #1—Install clean sieve screen. After booth cleaning is complete and cyclone is flushed, roll sieve under the cyclone making sure the threaded studs on the sieve boot fit into slots in the cyclone flange. (Refer to Note)		A clean sieve assembly can be re-installed anytime after booth cleaning is completed and cyclone has been flushed of powder. Wait 30 seconds after last booth cleaning task for cyclone to flush out powder.
49					Sieve #1—Thread knob onto studs.		
50					Sieve #1—Connect ultrasonic transducer to receptacle on side of sieve screen.		
51					Sieve #1 and PFC #1—Connect discharge tube to sieve hopper and feed hopper. Tighten clamps to secure tube to sieve and feed center hopper stubs.		

Color Change Chart—Booths with Two Powder Feed Centers							
Task	**Operator #1**		**Operator #2**		**Operator #3**		**Notes**
52					Sieve #2—After booth blow down is complete, open cyclone valve damper for 30 seconds to flush out any powder remaining in cyclone. Blow off inside lower cone section of cyclone. Manually loosen cyclone valve damper knob, move handle to CLOSED position, then tighten knob.		
53					Sieve #2—Install clean sieve screen. After booth cleaning is complete and cyclone is flushed, roll sieve under the cyclone making sure the threaded studs on the sieve boot fit into slots in the cyclone flange. (Refer to Note)		A clean sieve assembly can be re-installed anytime after booth cleaning is completed and cyclone has been flushed of powder. Wait 30 seconds after last booth cleaning task for cyclone to flush out powder.
54					Sieve #2—Thread knob onto studs.		
55					Sieve #2—Connect ultrasonic transducer to receptacle on side of sieve screen.		
56					Sieve #2 and PFC #1—Connect discharge tube to sieve hopper and feed hopper. Tighten clamps to secure tube to sieve and feed center hopper stubs.		
System is ready to spray next color							

Section 4

Maintenance

Section 4
Maintenance

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

1. Daily Maintenance

Perform these procedures daily to keep your system clean and functioning properly.

Cleaning

Perform this procedure daily and when changing powder color or type.

WARNING: Wear an approved respirator and safety glasses or goggles when performing maintenance or cleaning operations. Follow the personal protection recommendations included in the Material Safety Data Sheets for each powder used.

1. Turn off the automatic gun master control unit(s) and manual gun control unit(s).
2. Shut off the floor sweeper unless you are changing colors and the Floor Sweeper switch is set to AUTO.
3. Turn the exhaust fan on. All cleaning must be done with the exhaust fan on.

WARNING: Use only non-conductive tools to clean the booth interior. Do not use any tools that could create friction sparks. A hot spark could be pulled into the recovery system and ignite an explosion or fire.

NOTE: Use only compressed air to clean equipment. Do not use vacuums or solvents. The only exception is the booth floor, which must be cleaned with a squeegee.

Cleaning (contd)

4. Perform the following tasks of the *Color Change Procedures* in *Operation:*
   - *Feed Center Cleaning*
   - *Sieve Cleaning*
   - *Booth Cleaning*
   - *Sieve Re-Assembly*
5. Ground the spray gun electrodes and clean the spray guns according to the instructions in the gun manuals.
6. Turn off the exhaust fan.
7. Turn off the system's electrical power and compressed air supply.
8. Clean the operator platforms and floor around the booth.

NOTE: To speed color changes and minimize color contamination, operators should keep operator platforms and areas around booth clean and free of clutter.

Daily Equipment Maintenance

Use the guidelines listed in Table 4-1 to establish a daily maintenance schedule for your Spectrum powder coating system.

Table 4-1 Daily Maintenance

Equipment	Daily Maintenance Procedures
Vent Hoses	Blow the powder out of the vent hoses with compressed air.
Air Dryers	Perform any required maintenance as described in your air dryer manual.
Air Velocity	Measure the air velocity at all booth openings with a velometer. Minimum average velocity is 36 m/min (120 fpm).
Compressed Air Supply	Check for contaminants by holding a clean, white cloth under the supply line drop leg and open the drop-leg drain valve. Water, oil, or other contaminants will stain the cloth. Eliminate any source of contamination. Drain the filters and separators and check the filter elements. Check all air pressure regulator settings. **NOTE:** The air dryer should remain on at all times to prevent moisture from accumulating in the compressed air system.
Filters	With the exhaust fan running, check the final filter differential pressure gauge. It should read between 1- and 2.5-in. of water (w.c.). Check the cartridge-filter differential pressure gauge. It should read between 4- and 6-in. w.c. Check the pulse valve timing to make sure cartridge filters are being pulsed often enough to prevent clogging.
Flame Detector System	Check the detector sensors every four hours and clean the lenses, if necessary. Make sure air is being supplied to the sensors. Make sure the detector system is operating properly.

Equipment	Daily Maintenance Procedures
Gun Movers (Oscillators and Reciprocators)	Each shift, make sure the gun movers are stroking smoothly and at the proper speed. Make repairs and adjustments if necessary. Lubricate the gun movers as described in their manuals.
Powder Guns	Disassemble and clean the guns according to the instructions in their manuals.
Powder Pumps	Disassemble and clean the pump blocks, venturi nozzles and throats, and the throat holders. Replace worn parts.
Sieves	Remove and clean the screens. Replace the screen if it is damaged, or if the transducer is not functioning. Check the rubber boots and seals on the screen assembly and sieve discharge valve assembly. Replace any damaged or worn parts.
Bulk Feed Transfer Pumps	Disconnect the transfer hoses from the pumps. Blow the powder out of the hoses with compressed air. Remove the transfer pumps from the adapters. Blow out the adapters and pickup tubes. Disassemble the pumps. Clean the parts with a low-pressure air gun and a clean cloth. Replace any worn or damaged parts.
Workpiece and Conveyor Grounds	 **WARNING:** An ungrounded or poorly grounded workpiece, hanger, or conveyor can cause electrical arcing. If arcing is observed, shut down the system immediately. Correct the cause before resuming operations. Failure to observe this warning could result in a fire or explosion, causing property damage and possible personal injury or death. Make sure all workpieces are grounded through the hangers and conveyor. The resistance between the workpieces and the hangers, and the hangers and ground, must be less than 1 megohm. Use a megohm meter to check resistances. You will get better transfer efficiency and workpiece coverage at 500 ohms or less. Clean the hangers regularly.
Cyclones	With compressed air, blow off cyclone valve and seal, and inside cyclone cone section. Visually inspect cyclone interior walls. A smooth thin layer of impact fusion will not affect cyclone performance. If impact fusion on inside of cyclone is rough or heavily textured in appearance, the cyclones should be removed and cleaned.

2. Weekly Maintenance

Use the guidelines listed in Table 4-2 to establish a weekly maintenance schedule for your Spectrum powder coating system.

Table 4-2 Weekly Maintenance

Equipment	Weekly Maintenance Procedures
Booth Canopy	Turn on the exhaust fan and vacuum the canopy roof, walls, and floor with a soft brush attachment. Perform the *Booth Canopy Conditioning* procedure in the *Initial Startup* section of *Operation*. **NOTE:** Weekly conditioning of the booth canopy interior will keep the canopy easy to clean. Check the canopy for cracks, damage, and dirt. Seal any cracks or replace the panels. Clean the booth exterior, all attached equipment, and the spray room.
Cartridge Filters and Housing	Pulse the cartridge filters. Turn on fluidizing air to the collector unit hopper and wait a few minutes for the powder in the hopper to become adequately fluidized. Move a waste drum under the hopper. Slowly open the ball valve to control the flow of powder into the drum. Close the ball valve and turn off the fluidizing air when the hopper is emptied.
Final Filter Unit	Inspect the final filter unit interior. If significant amount of powder has accumulated in the housing, the cartridge filters may be leaking. Refer to *Troubleshooting* for instructions.
Feed Hoppers and Cyclone Hoppers	Remove the powder from the hoppers. Vacuum the interiors. Remove the fluidizing plates and check the undersides for stains. If the plate is stained, the air supply could be contaminated by oil or moisture. Check the air dryer and air filters. Replace the fluidizing plate if it is contaminated.
Powder Guns and Cables	Clean the spray guns. Perform electrostatic resistance checks as described in the gun and gun control unit manuals.
Powder Pumps and Feed Hoses	Purge the lance assemblies. Disassemble the pump blocks and clean the venturi throats and nozzles. Replace any worn or damaged parts. Blow out the feed hoses with compressed air. Replace damaged or clogged hoses.

3. Periodic Maintenance

Use the guidelines listed in Table 4-3 to establish a periodic maintenance schedule for your Spectrum powder coating system.

Table 4-3 Periodic Maintenance

Equipment	Procedure
Air Dryer	Check the air dryer operation. Refer to your air dryer manual for maintenance procedures and schedules.
Booth Mover Bearings	Every six months, lubricate the motor bearings with two shots of No. 2 lithium grease from a grease gun. Refer to the booth mover manual for maintenance procedures and schedules.
Roll-On/Roll-Off Wheels	Lubricate the flanged wheel bearings with two shots of white lithium grease every six months.
Floor Sweeper Chain Drive	**WARNING**: Before performing any maintenance on the floor sweeper, shut off system electrical power. Lock and tag the disconnect switch. Lubricate the pillow block bearings with two shots of white lithium grease every six months. Check the chain tension every three months. The chain should be taut, with no sag or looseness in chain or tensioning idler. If chain is slack, tighten nut on tensioning idler. If tensioning idler does not take up slack, loosen nut on chain idler and adjust pillow blocks at non-drive end of chain drive. Refer to *Floor Sweeper Chain Tensioning* in *Repair*.
Differential Pressure Gauges	Observe and record the differential pressure gauge readings. Pressure drop across cartridge filters: 4–6.5-in. w.c. Pressure drop across final filters: 1–2.5-in. w.c. If the pressure drop across the cartridge filters exceeds 6.5-in. w.c., the filters are clogged. If the pressure drop across the final filters exceeds 2.5-in. w.c., the Final Filter Warning light on the motor starter panel will light. At 3-in. w.c. the system will shut down.
Electrical Connections	Check all terminal blocks and junction boxes for loose wires. Tighten any loose connections and inspect the system wiring. Replace any wires with damaged insulation.
Exhaust Fan V-belts	Every six months, adjust the tension of the exhaust fan V-belts. You should not be able to deflect the belts more than 13–19 mm (0.5–0.75 in.) (one belt diameter).
Gaskets	Inspect all gaskets and seals for damage. Replace them if they are damaged.
Guns and Cables	Perform electrostatic resistance checks as described in the gun, and gun control unit or electrostatic power unit manuals.
Powder Feed and Transfer Hoses	Purge the lance assemblies. This will blow the powder out of the feed hoses. Disconnect the transfer hoses at the pumps and blow out the hoses with compressed air. Never blow air through the hoses toward the pumps. Replace the hoses if they are clogged with impact-fused powder.
Exhaust Fan	Every six months, check and lubricate all bearings and couplings as described in the fan manual. Refer to the fan manual for maintenance procedures and schedules.

4. Maintenance Check List

Activity	Each Shift	Daily	Weekly	Monthly	Color Change
Cleaning					
Booth canopy (clean)	✓	✓			✓
Booth canopy (condition)			✓		
Collector unit hoppers (empty)			✓		
Final filter compartment			✓		✓
Feed and sieve hoppers			✓		
Feed and bulk transfer hoses	✓				✓
Fire detector head lenses*	✓				
Pump assemblies	✓	✓	✓		✓
Spray guns	✓		✓		✓
Sieves	✓	✓			✓
Bulk transfer pumps	✓	✓			✓
Vent hoses		✓			✓
Cyclones	✓	✓			✓
Resistance Checks — Guns and Cables			✓		
Visual Checks					
Air supply drop leg		✓			
Air dryer drain		✓			
Cartridge filter differential-pressure gauge	✓				
Electrical connections			✓		
Exhaust fan V-belts				✓	
Final filter differential-pressure gauge	✓				
Fire detector sensors	✓				✓
Gaskets			✓		✓
Gun movers	✓				
Workpiece clearance**	✓				
Workpiece grounding	✓				✓
Powder levels	✓				

* Every 4 hours.

** Clearance should be monitored continuously.

Lubrication	Every 6 months
Roll-on/roll-off wheel bearings (refer to booth mover manual)	✓
Fan and motor bearings (refer to fan manual)	✓
Floor sweeper pillow block bearings	✓

Section 5

Troubleshooting

Section 5
Troubleshooting

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

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.

Obvious causes of problems, such as broken or disconnected wires, damaged or disconnected tubing, are not covered here. You should always check for these causes before doing any more extensive troubleshooting.

If you are having a problem with your powder application equipment (guns, gun control units, or powder pumps), refer to their manuals for troubleshooting information.

If you are having a problem that is not covered in any of your equipment manuals, please contact your Nordson representative for help. If the problem is with non-Nordson equipment, please contact the manufacturer.

This section covers:

- General Troubleshooting
- Fault Troubleshooting
- Equipment Tests
- Correcting Fan Rotation Direction

2. General Troubleshooting

General troubleshooting covers problems with devices and processes not monitored by system controls.

Problem	Possible Cause	Corrective Action
1. Spray guns are surging or spitting; powder flow is inadequate or intermittent	Insufficient air volume in feed hose, powder is settling out	Increase the atomizing air pressure, decrease the flow-rate air pressure. Refer to the gun and control unit manuals for recommended air pressures and ratios.
	Powder in feed hopper inadequately fluidized, cavities forming in powder below pickup tube ends	Adjust the fluidizing air pressure. The powder should be gently boiling. Refer to problem 6.
	Low powder level in feed hopper	Add powder to the feed hopper. Refer to problem 3.
	Powder pump venturi nozzles or throats worn; pickup tube sucking air at connection to pump mounting arm, pump or pickup tube clogged	Clean the pump and pickup tube. Replace any worn parts. Replace any damaged O-rings.
	Obstruction in powder feed hose	Disconnect the feed hose from the pump. Blow the powder out of the hose with compressed air. Make sure the hose is clear. Eliminate kinks or severe bends in hose. Hose should be no longer than 7.6-m (25-ft) with a maximum 2.7-m (9-ft) vertical rise.
	Severe tribo-charging in powder feed hose	Contact your Nordson Corporation representative for a suitable hose material. Contact your powder supplier.
	Obstruction in spray gun	Clean the spray gun. If you are using conical nozzles, make sure there is a 3-mm (0.125-in.) or larger gap between the deflector and the nozzle.

2. General Troubleshooting
(contd)

Problem	Possible Cause	Corrective Action
2. Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses	Poor workpiece grounding	Resistance from the workpiece to the ground must be less than 1 megohm. For best results, resistance should not be more than 500 ohms. Clean the workpiece hangers, fixtures, and hooks if necessary. Check the conveyor ground.
	Spray gun placement incorrect	Position the spray guns 254–355 mm (10–14 in.) from the workpieces. Stagger the guns 304-mm (12-in.) apart vertically and 381-mm (15-in.) apart horizontally to avoid fan pattern and electrostatic field overlap. Contact your Nordson Corporation representative for advice.
	Powder pump flow-rate and atomizing air pressure incorrect	Refer to the gun and control unit manuals for the recommended air pressures and ratios.
	Electrostatic voltage (kV) or AFC setting incorrect for workpieces being coated	Adjust the voltage to 90–100 kV for large flat surfaces and 60–75 kV for recesses. Never set the voltage below 60 kV. Refer to the gun and control unit manuals for the recommended voltage, AFC, and air pressure settings and ratios.
	Wrong nozzles being used	Use flat spray nozzles for large, regular-shaped workpieces. Use conical nozzles for deep recesses and most manual touch-ups.
	Powder feed problems	Refer to problem 1.

Problem	Possible Cause	Corrective Action
3. Powder not transferring from sieve hopper to feed hopper	Discharge cycle disabled	Move the Feed Center switch to AUTO.
	Floor sweeper not running	Start the floor sweeper.
	Discharge cycle timing (no floor sweeper) incorrect	Connection handheld interface to feed center PLC. Check Purge Frequency Delay (Cyc NoSwp PrgDly). Default is 90 seconds. Refer to *Operation* for instructions.
	Fault in wiring from panel to solenoid valve in transducer panel	Check for the signal to solenoid valve. Check the solenoid valve function. Replace wiring or components as necessary.
	No air supply to discharge valve solenoid or cylinder	Check air supply to solenoid valve. Make sure air is getting to discharge valve cylinder.
	Discharge valve cylinder malfunction	Apply air to cylinder. If cylinder does not function correctly, replace it.
	Sieve screen clogged, powder not being screened	Clean the sieve screen. Make sure vibrator motor and ultrasonic transducer are functioning properly. Refer to *Sieve Vibrator and Transducer Test*.
	Powder in sieve hopper not fluidized	Increase the fluidizing pressure. Check air supply to hopper fluidizing port.
	Air amplifier not operating	Check air supply to air amplifier. Check pressure setting. Remove discharge tube and air tubing and blow out amplifier.
	Feed hopper overfilled	Check powder level in feed hopper. Level should not exceed 2/3 full with fluidizing air off. If hopper is overfilled, sieve hopper cannot discharge reclaimed powder. Remove excess powder from feed hopper.
4. Powder in sieve hopper contaminated	Screen torn	Replace the screen.

2. General Troubleshooting
(contd)

Problem	Possible Cause	Corrective Action
5. Excessive noise from sieve while operating, powder leaking from sieve	Knobs or clamps not tightened, isolators loose or damaged, rubber sleeves damaged	Tighten knobs on cyclone flanges. Make sure screen clamps are tight. Check isolators for looseness or damage. Tighten isolator mounting screws. Check rubber sleeves for damage, replace if necessary.
6. Powder in feed hopper not fluidizing, or clouds of powder erupting from surface	Fluidizing pressure too low or too high	Check the powder in the hoppers. Increase the fluidizing air pressure until the powder is gently boiling. Decrease the pressure if clouds of powder are erupting from the surface.
	Moist or oil-contaminated powder	Open the drain valve at the air-supply drop leg and check the air supply for water or oil. Check the filters, separators, and air dryer. Replace the powder in the hoppers. Refer to the next cause.
	Fluidizing plate gasket leaking, or plate plugged, cracked, or installed incorrectly	Check for air leaks around the fluidizing plate gaskets. If leaks are found, remove the plate and replace the gasket. Remove the fluidizing plate from the hopper. Inspect it for stains, discoloration, polished surfaces, or cracks. Replace the fluidizing plate if it is contaminated, plugged, or damaged. Plate should be installed with smooth surface up (in contact with powder).
	Incorrect ratio of reclaimed-to-new powder	Change the transfer-pump air pressure to increase or decrease the transfer rate. Add new powder to hopper. The powder supply should be no more than 3 parts reclaim-to-1 part new powder.
	Uneven distribution of powder in hopper	Increase the fluidizing pressure. Check the powder and the fluidizing plate for contamination as previously described.

Problem	Possible Cause	Corrective Action
7. Final filters clogged, powder in fan or final filter housing	Leaking cartridge filter gaskets, or damaged filter media	Make sure the gaskets are sealing correctly. Refer to *Repair* for proper gasket installation and compression. If the gaskets continue to leak, remove the cartridges and gaskets. Clean and inspect the gaskets, sealing surfaces, and filter media. Replace the cartridges if the gaskets or filter media are damaged. Replace clogged final filters. Refer to *Repair*.
	Leaks in collector housing allowing powder to bypass filters	Locate and seal any leaks with RTV sealant.
8. Cartridge filters clogged	Pulse air pressure inadequate	Increase the pulse air pressure or volume. Decrease the pulse timer delay (off time).
	Powder contaminated	Replace contaminated powder and fix the source of contamination.
	Timer board settings incorrect	Adjust the timer board settings as described in *Operation*.
	Pulse valve or solenoid valves clogged or malfunctioning	Open the pulse-valve timer panel. If you do not hear a pulse each time a LED lights, the solenoid valve or the pulse valve connected to that LED may be clogged or failed. Check the wiring to the solenoid valve before opening the solenoid box and replacing the solenoid valve.
	Powder level in collector hopper too high	Remove powder from hopper. Refer to *Weekly Maintenance* in *Maintenance*.

2. General Troubleshooting
(contd)

Problem	Possible Cause	Corrective Action
9. System shuts down or will not start	Flame detector system sees a flame or spark, or is malfunctioning	Check the inside of the canopy, the detector head aim, and the workpiece and conveyor grounds. Follow the troubleshooting procedures in the flame detector system manual.
	Final filters clogged	Locate the source of powder leakage and correct the problem. Refer to problems 7 and 8.
	Final filter pressure switch failed	Replace the switch.
	Air dryer not operating, or interlock not activated	Start the air dryer. Follow the troubleshooting procedures in the dryer manual. Check the interlock circuit.
	Fuse(s) blown	Check the fuses in the system electrical panel. Replace the blown fuse(s). If the fuses continue to blow, fix the electrical problem.
	Electrical failure	Trace the circuits and correct the problem.
10. Powder escaping from enclosure openings	Cartridge filters clogged, exhaust fan draw insufficient to retain powder within enclosure	If the differential pressure gauge shows more than 6-in. w.c., refer to problem 8.
	Cross drafts interfering with exhaust fan draw	Check for cross drafts at all enclosure openings. Eliminate or divert drafts.
	Workpieces entering booth are too hot	Cool the workpieces before moving them into the booth. The workpiece temperature should not exceed 49 °C (120 °F).
	Powder gun output exceeds booth containment capability	Reduce the powder flow and/or the number of the guns.
	Booth openings too large	Close or decrease the size of the openings.
	Workpieces too large for booth	Contact your Nordson Corporation representative.

Problem	Possible Cause	Corrective Action
10. Powder escaping from booth openings *(contd.)*	Spray guns too close to entrance and exit vestibules or openings	Move the spray guns farther away from the vestibules or openings.
	Fan rotation backward	Reverse the rotation of the motor. Refer to the *Reversing Motor Direction* procedure.
	Air leaks in ducts, slide gates, or duct extensions or duct seals	Inspect duct joints, slide gates, and duct extensions or seals for air leaks. Repair and seal all leaks.
11. Floor sweeper does not move forward when started **WARNING:** Sweeper must always move forward, toward exit end of booth, when first started and not already at the forward limit switch position. If movement is not correct, IMMEDIATELY STOP SWEEPER.	Delay timer settings incorrect	Open main system control panel. Make sure the reverse delay timer is set to a longer time than the forward delay timer.
	Forward limit switch (at exit end of booth) is actuated or electrical wiring is open	Check switch operation and wiring and correct.
	Sweeper motor leads connected wrong	Turn off system electrical power. Change direction of motor by reversing motor leads.
	Floor sweeper motor fuses or motor overload are open	Open main system control panel. Check fuses and overload. If open, check mechanical system operation.
	Floor sweeper mechanical system failure	Inspect chains, sprockets, and associated mechanical components of sweeper drive.
12. Floor sweeper does not move in reverse after reaching exit end of booth	Reverse limit switch (at entrance end of booth) is actuated or electrical wiring is open	Check switch operation and wiring and correct.
13. Discharge cycle does not start at correct time	Sweep length value not entered into feed center PLC, or value entered is incorrect	Connect handheld interface to feed center PLC. Check sweep length value (Floor Swpr Len). Enter correct value if necessary. Refer to *Operation* for instructions.

3. Fault Troubleshooting

The feed center PLC monitors several conditions and devices and indicates faults by sounding a buzzer and lighting the Fault Silence button/light. The light will flash or remain on continuously, depending on the fault detected.

NOTE: Faults are only enabled when the Feed Center switch is in the AUTO position.

Pressing the Fault Silence button will turn off the buzzer. The light will stay on until the fault is corrected.

A fault that turns on the flashing light could be caused by one of five different components. Check the equipment visually to locate the specific fault. The handheld interface will display the specific fault, if connected.

Fault Troubleshooting

Problem	Possible Cause	Corrective Action
1. Hopper Powder Level Low (continuous light)	Not enough powder in the recovery system to maintain powder level in hopper	Make sure the Feed Center switch is in AUTO position. Check rest of possible causes. Add powder to feed hopper from bulk transfer system.
	Feed center exhaust damper opened while feed hopper vent hose connected to feed center exhaust plenum, powder in hopper drawn into recovery system	Make sure the feed center exhaust damper switch is in CLOSED position when hopper vent hose is connected. Exhaust damper should only be opened during color change, as described in *Operation*.
	Powder in feed hopper not fluidized	Make sure FC Fluidizing switch is in ON position. Check air supply to feed hopper plenum and solenoid valve. Check solenoid valve function. Check electrical connections to solenoid valve.
	Cyclone seal not inflating during discharge cycle while discharge valve is open, causing powder in feed hopper to be drawn into recovery system.	Make sure Feed Center switch is in AUTO position and Cyclone Seal switch is in OFF position. Check air supply to seal. If air is being supplied to seal, check seal for leaks or damage. If no air is being supplied to seal, check air supply to solenoid valve. Check solenoid function. Check electrical connections to solenoid valve.

Problem	Possible Cause	Corrective Action
1. Hopper Powder Level Low (continuous light) *(contd.)*	Ultrasonic transducer failed, screen blinding	Check transducer cable connections. Check transducer panel output. Replace screen if panel and cable are functioning properly.
	Vibrator motor not operating, screen blinding	Check electrical connections to motor. Replace motor if voltage is present and connections are tight.
	Discharge valve not opening	Check air supply to discharge valve and solenoid valve. Check solenoid valve function. Check electrical connections to solenoid valve.
	Air amplifier not operating	Check air supply to air amplifier. Check pressure setting. Remove discharge tube and air tubing and blow out amplifier.
	Powder in sieve hopper not fluidizing	Check air supply to hopper fluidizing port. Increase fluidizing pressure.
2. Sieve vibrator stopped, (flashing light)	Vibrator motor overload	Vibrator motor is controlled by a motor starter/overload protector in the system control panel. Check for blown fuses or open overload. Replace fuses if blown, reset overload if open. If overload opens again, check circuits. If circuits are good, replace motor.
	Sieve control electrical system failure	Signal from motor starter to PLC indicates motor is on. If signal fails fault is enabled. Check electrical circuits and motor starter.
3. Lance position not down limit (flashing light)	Lance down limit switch not actuated	Turn the Feed Center switch to CLCH. Turn Lance switch to DOWN. Turn the Feed Center switch to AUTO. If fault persists, check limit switch. Switch should be actuated in full down position. Adjust limit switch position or lance travel.
4. Cyclone damper not closed (flashing light)	Damper handle not in closed position (red indicator light on sensor will flash if handle detected)	Check handle position. If handle is in closed position, up against stop, make sure proximity sensor is no more than 3 mm from handle. Adjust sensor position if necessary. If fault persists, check wiring to sensor. Fix or replace wiring or sensor.

Fault Troubleshooting *(contd)*

Problem	Possible Cause	Corrective Action
5. Floor sweeper not cycling (flashing light)	Floor Sweeper switch on system control panel in OFF position	Turn switch to AUTO or ON position.
	Mechanical failure	Check chains, motor, gears and bearings.
	Sweeper motor overload	Open system control panel and check motor starter and electrical circuits. Check chains, gears, and bearings.
	Motor fuse failure	Open system control panel and check fuses, motor starter, and electrical circuits.
	Sweeper control system electrical failure	Open system control panel and check fuses, motor starter, and electrical circuits. Check circuits to motor, limit switches, and feed center control panel.
6. No value entered for sweep length (flashing light)	No value entered into feed center PLC for sweep length	Connect handheld interface to PLC, go to Floor Swpr Len, and enter value (in inches) for length of travel in one direction of floor sweeper.

Viewing Fault Messages

All possible fault conditions can be viewed on the handheld interface. Refer to Feed Center PLC Settings in the Operation section for instructions on connecting the interface to the PLC and accessing the fault display.

Fault Condition	No Fault Message	Fault Message
Hopper Powder	Level Okay	Low Level
Sieve Vibrator	Running/Okay	Stopped
Lance Position	Okay	Not Down Limit
Cyclone Damper	Closed & Okay	Not Closed
Floor Sweeper	Okay	Not Cycling
Sweep Length	Value Entered	No Value Entered

4. Feed Center and Cyclone Tests

These procedures are used at system startup to test electrical and pneumatic equipment. You can also use these procedures to troubleshoot problems.

Preparation

1. Turn on system electrical power and compressed air.
2. Turn the Feed Center switch to OFF.
3. Check the pneumatic system for leaks.
4. Turn the Feed Center switch to CLCH.

Lance Assembly Motion Test

Releasing the lance switch will stop lance assembly motion. Full stroke motion should take approximately 5 seconds.

1. Move the Lance switch to UP and hold it until the lance assembly stops at the full up position. Observe the lance assembly motion.

NOTE: Upward motion of the lance assembly is always allowed, regardless of the purge manifold position.

   a. If the lance assembly moves too fast or slow adjust the cylinder airflow control to reduce the speed. Airflow control adjusters are fittings at the cylinder ports.

   b. If the lance assembly moves down instead of up, or does not move, check the solenoid valve for proper electrical or pneumatic operation.

   c. Make sure the up limit switch stops the lance assembly at the proper location.

2. Release the Lance switch, allowing it to return to OFF. The lance assembly should hold position at the up position limit switch.

NOTE: If the lance assembly is left in the up position for a long period of time (overnight or over a weekend), and the system compressed air is shut down, the lance will eventually drift to the down position as compressed air slowly bleeds out of the system. This is normal and does not indicate a problem with the lance actuator pneumatic system.

3. Remove the feed hopper from the feed center, if present.

Lance Assembly Motion Test
(contd)

4. Move the Lance switch to DOWN and hold it until the lance assembly stops at the down position limit switch. Observe the lance assembly motion.

NOTE: Downward motion is only allowed when the purge manifold is in the full up or full down position, actuating the purge manifold up position or down position limit switches. It may be necessary to test the purge manifold motion before testing lance down motion.

   a. If the lance assembly moves too fast or slow adjust the cylinder airflow control to reduce the speed. Airflow control adjusters are fittings at the cylinder ports.

   b. If the lance assembly moves up instead of down, or does not move, check the solenoid valve for proper electrical or pneumatic operation.

   c. Make sure the down limit switch stops the lance assembly at the proper location.

Purge Manifold Motion Test

Releasing the Purge Manifold switch will stop purge manifold motion. Full stroke motion should take approximately 5 seconds.

NOTE: Purge manifold motion is only allowed when the lance assembly is in the full up position and the lance up position limit switch is actuated.

1. Move the Lance switch to UP and hold it until the lance assembly stops at the up position limit switch.

2. Move the Purge Manifold switch to DOWN and hold it until the manifold stops at the down position limit switch.

   a. If the purge manifold moves too fast or slow adjust the cylinder airflow control to reduce the speed. Airflow control adjusters are fittings at the cylinder ports.

   b. If the purge manifold moves up instead of down, or does not move, check the solenoid valve for proper electrical or pneumatic operation.

   c. Make sure the down limit switch stops the purge manifold at the proper location.

3. Move the Purge Manifold switch to UP and hold it until the lance assembly stops at the up position limit switch. Observe the purge manifold motion.

   a. If the purge manifold moves too fast or slow, adjust the cylinder airflow control to reduce the speed. Airflow control adjusters are fittings at the cylinder ports.

   b. If the purge manifold moves down instead of up, or does not move, check the solenoid valve for proper electrical or pneumatic operation.

   c. Make sure the up limit switch stops the purge manifold at the proper location.

Pickup Tube to Purge Nozzle Engagement Test

1. Move the Purge Manifold switch to DOWN and hold it until the purge manifold stops at the down position limit switch.

2. Visually check the alignment of the purge manifold nozzles and lance assembly pickup tubes. Correct any obvious alignment problems.

3. Move the Lance switch to DOWN and hold it until the lance assembly stops at the down position limit switch. Observe the motion and alignment while the lance assembly is moving. Release the switch if it appears that the pickup tubes will not align properly with the nozzles and correct the alignment.

4. Make sure the pickup tubes mate properly with the purge manifold nozzles. Correct alignment, if necessary.

Lance Purge Test

Before performing this test complete the *Lance Assembly Motion Test*, the *Purge Manifold Motion Test* and the *Pickup Tube to Purge Nozzle Engagement Test*.

1. Start the exhaust fan.

2. Move the Feed Center switch to CLCH.

3. Move the FC Damper switch to OPEN.

4. Move the Lance switch to UP and hold it until the lance assembly stops at the up position limit switch.

5. Remove the feed hopper from the feed center.

Lance Purge Test (contd)

6. Move the Purge Manifold switch to DOWN and hold it until the manifold stops at the down position limit switch.

7. Move the Lance switch to DOWN and hold it until the lance assembly stops at the down position limit switch.

8. Check the pickup tube-to-purge nozzle engagement. Make sure the purge manifold air supply hoses are connected to the purge manifold and purge valve assembly.

9. Make sure the powder feed hoses are connected to the pumps and that any unused pump ports are plugged.

10. Make sure no one is in the booth, and that any manual spray guns are secured with the nozzles pointing into the booth.

11. Press the Lance Purge button to activate the purge cycle. The button will light and stay lit until the purge cycle is complete.

NOTE: To stop the purge cycle before it is complete, move the Feed Center switch to OFF.

12. Observe the spray guns and feed hoses. At each stage of the purge cycle, three spray guns are purged. Make sure all spray guns connected to the pumps are purged.

13. When the test is complete, move the Feed Center switch to OFF.

Cyclone Damper and Discharge Valve Test

CAUTION: Shut off exhaust fan while performing these tests. Failure to observe this warning could result in equipment damage or personal injury.

1. Unscrew the four black knobs from the top of the cyclone flange. Disconnect the rubber boot from the cyclone flange.

2. Close the cyclone valve, if not already closed.

3. Roll the sieve out from under the cyclone, so that the sieve vibrator motor is clear.

4. Look up into the bottom of the cyclone valve. The damper must be exactly parallel to the horizontal surface of the valve housing. If it is not, adjust the damper stop.

5. Check the damper control proximity sensor. In the closed position, the red LED on the sensor should be lit. If the LED is not lit, adjust the sensor position.

6. Open the cyclone valve. The sensor LED should go off and the damper should be in the full open position.
7. Close the damper. The sensor LED should light.
8. Unplug the ultrasonic transducer cable from the the sieve.
9. Unclamp the screen and remove it from the sieve hopper.
10. Check the position of the discharge valve in the hopper. The valve is normally closed. Check the cylinder boot. Replace the boot if it is damaged.
11. Move the Feed Center switch to CLCH.
12. Move the Discharge Valve switch to OPEN. The valve should be open. Check the valve gasket. Replace the gasket if it is damaged.
13. Move the Discharge Valve switch to CLOSED. The valve should be closed.

Exhaust Damper, Sieve Vibrator, Transducer, and Cyclone Seal Tests

Before performing these tests, do the following:

1. Complete the *Cyclone Damper and Discharge Valve Test*.
2. Move the Feed Center switch to OFF.
3. Move the FC Fluidizing switch to OFF.
4. Start the exhaust fan.
5. Move the FC Damper switch to CLOSED.
6. Move the Cyclone Seal switch to OFF.
7. Move the Discharge Valve switch to CLOSED.
8. Move the Feed Center switch to CLCH.

Exhaust Damper Test

1. With the damper closed, listen to the noise generated by air moving through the feed center.
2. Move the the Exhaust Damper switch to OPEN.

Exhaust Damper Test (contd)

3. Listen to the noise generated by air moving through the feed center. The noise level and airflow should increase significantly.

4. Move the Exhaust Damper switch to CLOSED.

Sieve Vibrator and Transducer Test

1. Roll the sieve out from under the cyclone, and unclamp the screen. Make sure the transducer cable is connected to the screen. Do not remove the screen from the sieve hopper.

2. Move the Feed Center switch to AUTO. This should start the vibrator motor and power the transducer.

3. Touch the vibrator motor and sieve hopper. When operating properly, a very noticeable vibration can be felt.

4. Lift the screen off the hopper. Gently touch the transducer attached to the center of the screen. When working properly, a noticeable high-frequency vibration can be felt.

5. Move the Feed Center switch to OFF.

Cyclone Seal Test

1. Assemble the sieve, roll the sieve under the cyclone, and attach the sieve to the cyclone.

2. Close the cyclone damper. Make sure the proximity sensor LED is lit.

3. Remove the 2-in. access plug from the cyclone flange.

4. Place your hand over the access hole. You should feel the suction caused by the vacuum generated by the air movement through the cyclone.

5. Move the Cyclone Seal switch to ON.

6. Place your hand over the access hole. If the cyclone seal is functioning properly, you should not feel any suction.

7. Move the Cyclone Seal switch to OFF.

Sieve Hopper and Discharge Cycle Tests

Before performing this test complete the *Lance Assembly Motion Test*, the *Purge Manifold Motion Test* and the *Cyclone Seal Test.*

Preparation

1. Move the Feed Center switch to OFF.
2. Move the FC Fluidizing switch to OFF.
3. Move the FC Damper switch to CLOSED.
4. Start the exhaust fan.
5. Move the Feed Center switch to CLCH.
6. Move the Lance switch to UP and hold it until the lance assembly stops at the up position limit switch.
7. Install the feed hopper in the feed center.
8. Make sure the sieve is connected to the cyclone and ready for operation.
9. Make sure the cyclone damper is closed and the proximity sensor light is on.

Discharge Cycle Test

1. Move the Feed Center switch to AUTO.
2. Press the Discharge Purge button to activate a discharge cycle. The button will light and stay lit until the discharge cycle is complete.

NOTE: To stop the discharge cycle before it is complete, move the Feed Center switch to OFF.

Sieve Hopper Fluidizing Test

1. Disconnect the fluidizing air tubing from the sieve hopper.
2. Press the Discharge Purge button to activate a discharge cycle.
3. Check for air flow from the fluidizing air tubing.
4. Reconnect the air tubing.

Discharge Air Amplifier Test

1. Disconnect the air tubing from the air amplifier on the discharge tube.
2. Press the Discharge Purge button to activate a discharge cycle.
3. Check for air flow from the tubing. Air should pulse from the tubing, then change into a steady flow.
4. Reconnect the air tubing.

5. Reversing Motor Direction

Improperly connecting the exhaust fan motor starter will cause it to rotate in the wrong direction. If the exhaust fan is rotating in the wrong direction, air will not be drawn through the recovery system and the sprayed powder will not be contained within the enclosure. Use the following procedure to check and correct fan rotation.

1. Turn on power at the exhauster panel and motor starter panel.
2. Start the exhaust fan motor.
3. Observe the direction of fan rotation. The fan should rotate in the direction indicated by the yellow arrow on the fan drive housing. If the rotation is backward, go to the next step.

WARNING: Even with the disconnect switch in the off position, the terminals at the top of the switch are still live. Do not touch them. Failure to observe this warning could result in serious injury or death.

4. Shut off power at the disconnect switch on the exhauster panel. Open the panel door and reverse any two wires (L1, L2, or L3) connected to the fan motor starter (M218). Close the panel door.
5. Turn on the disconnect switch. Start the fan and check the rotation direction.

Section 6

Repair

Section 6
Repair

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

1. Cartridge Filter Replacement

See Figure 6-1.

Cartridge filters are located in the collector units. Each collector unit has eight cartridge filters.

WARNING: Wear protective clothing, safety goggles, and approved respiratory protection whenever handling powder or performing maintenance or cleaning operations. Follow the personal protection recommendations included in the Material Safety Data Sheets for each powder used.

Removal

1. Pulse the cartridge filters to remove as much powder as possible from the filter media.
2. Shut off the exhaust fan and system power. Lock and tag the disconnect switch.
3. Open the collector unit door (2).
4. Remove the three nuts (4) from the mounting studs (5). See View A.
5. Pull the cartridge filter assembly (1) out of the collector unit.

Disassembly

1. See View B. Remove the nut (13), lock washer (14), and flat washer (15) from the filter mounting rod (12).
2. Remove the filter mount cover (3) from the rod.
3. Unscrew the filter mounting rod from the threaded stud (9) in the bottom of the cartridge filter.
4. Remove the cover gasket (7).

1. Cartridge Filter Replacement (contd)

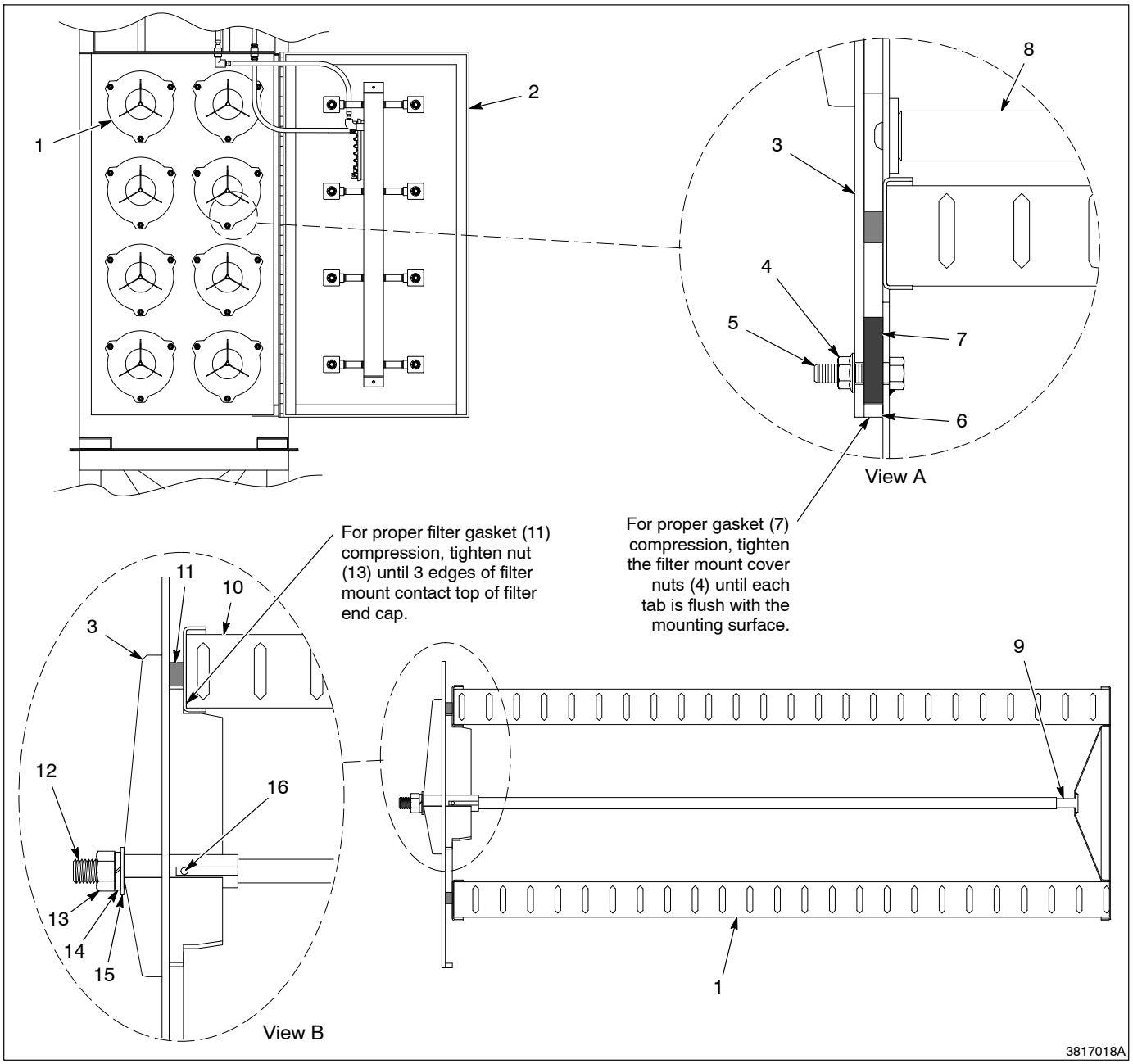

Fig. 6-1 Cartridge Filter Replacement

1. Cartridge filter assemblies
2. Door
3. Filter mount cover
4. Nuts
5. Studs
6. Tabs
7. Gasket
8. Support rods
9. Stud
10. Cartridge filters
11. Filter gasket
12. Filter mount rod
13. Nuts
14. Lock washers
15. Flat washers
16. Handle

Filter Cartridge Assembly

1. Remove the new cartridge filter from its packaging. Inspect the filter and gasket for damage. Do not use damaged filters.

NOTE: Do not use any cartridge filters other than those specified for your system. Using unapproved cartridge filters could seriously affect the operation and performance of your system.

2. See View B. Screw the filter mounting rod (12) onto the threaded stud (9) at the bottom of the new cartridge filter.

3. Install the filter mount cover (3) on the filter mounting rod, so that the rod handle (16) slips into the slot in the cover.

4. Install the flat washer (15), lock washer (14), and nut (13) on the rod. Tighten the nut until the three edges of the cover are tight against the metal end of the cartridge filter (10). This will properly compress the filter gasket (11) and ensure a powder-tight seal.

CAUTION: Do not overtighten the filter mounting nut. Overtightening the nut could damage the filter cartridge.

Filter Cartridge Assembly Installation

NOTE: When replacing a filter cartridge, the filter mount cover gasket (7) should also be replaced.

1. Install the filter mount cover gasket (7) onto the three mounting studs (5) located around the filter opening.

NOTE: When installing the filter cartridge assembly, make sure the filter mount cover gasket is positioned evenly around the filter opening and flush against the collector.

2. See View A. Install the pre-assembled filter cartridge assembly into the collector unit so that the mounting studs (5) go through the holes in the filter mount cover (3). The two support rods (8) support the cartridge filter assembly.

3. Install the three nuts (4) on the mounting studs and tighten the nuts until the tabs (6) on the filter mount cover contact the collector unit face plate (see View A). This will compress the filter mount cover gasket (7) and ensure a powder-tight seal.

4. When done, close and bolt the collector unit door tightly.

5. Season the new cartridge filters. Refer to the *Operation* section for seasoning instructions.

2. Final Filter Replacement

See Figure 6-2.

1. Shut off the exhaust fan and system electrical power. Lock and tag the disconnect switch.
2. Unscrew and remove the nuts (2) and brackets (3) securing the final filters (1) to the final filter unit housing.
3. Remove the old filters and discard them.
4. Check the interior of the final filter unit housing. If you see large amounts of powder inside the housing, powder is leaking through the cartridge filter gaskets or media. Clean the housing and fix the leak(s) before starting the system.
5. Remove the new filters from their cartons. Inspect the filter assembly, gaskets, and media for damage. Do not use damaged filters.
6. Install a new filter into each opening in the housing.
7. Install the brackets over the threaded studs. Thread the mounting nuts on the studs.
8. Tighten the nuts to compress the filter gaskets slightly. Do not overtighten the nuts.
9. Restore system electrical power. Start the exhaust fan and check for leaks around the filter gaskets.

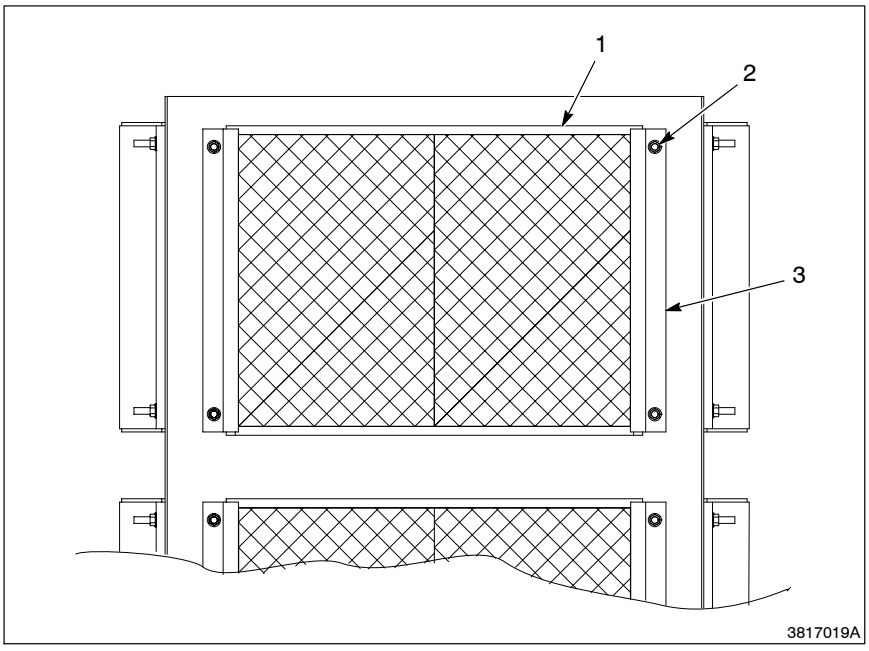

Fig. 6-2 Final Filter Replacement

1. Final filters
2. Nuts
3. Brackets

3. Pulse Valve Replacement

See Figure 6-3.

The pulse valves connect directly to the air manifold. To avoid connecting the valves to the wrong solenoids, remove and replace one valve at a time. Incorrect connections will cause the valves to open in the wrong order.

WARNING: Before performing the following procedure shut off the system compressed air supply and relieve the system air pressure. Shut off system electrical power. Lock and tag the disconnect switch.

1. Open the collector unit door.
2. Disconnect the air tubing from the tube fitting (1) in the pulse valve.
3. Unscrew the pulse valve (2) from the manifold nipple (4).
4. Remove the tube fitting and nozzle (3) from the old valve. Wrap PTFE tape around the threads of the tube fitting and nozzle. Install the fitting and nozzle into the new valve.

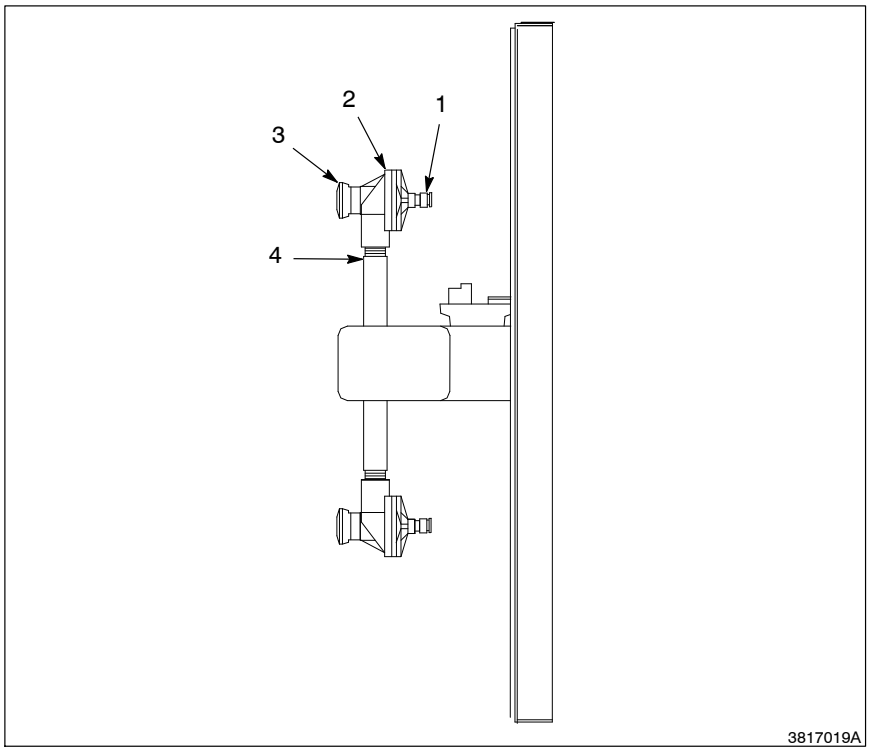

Fig. 6-3 Pulse Valve Replacement

1. Tube fitting
2. Pulse valve
3. Nozzle
4. Nipple

3. Pulse Valve Replacement (contd)

5. Wrap PTFE tape around the threads of the manifold nipple. Screw the new valve onto the nipple. Position the valve so the final adjustment will tighten the threads and form an airtight seal.

6. Align the valve so the centerline through the nozzle and valve is perpendicular (90°) to the manifold centerline.

7. Connect the air tubing to the tube fitting.

8. When pulse valve replacement is complete, make certain the gasket on the collector unit door is undamaged. If the gasket is damaged, replace it.

9. Close and bolt the collector unit door.

4. Floor Sweeper Chain Drive Tensioning

See Figure 6-4.

Drive chains should be taut and there should be no sag or looseness in the chains or chain tensioning idlers. Follow this procedure to tension chain.

1. Remove booth base cover and tighten nut (6) on chain tensioner (5). If this does not take up the slack in the chain, proceed to following steps.

2. Loosen the nut on the chain idler until the spring is not compressed.

3. Remove the cover (1) at the non-drive end of the booth base.

4. Loosen the mounting bolts (4) on the pillow blocks (3).

NOTE: It is important to keep the sprocket and chain (2) aligned with the chain guide. If not aligned properly, the chain may jump out of the chain guide during operation, which may damage the chain drive.

5. Apply even force to the pillow blocks to take up the chain slack while keeping the sprockets aligned with the chain guides.

6. Retighten the pillow block mounting bolts.

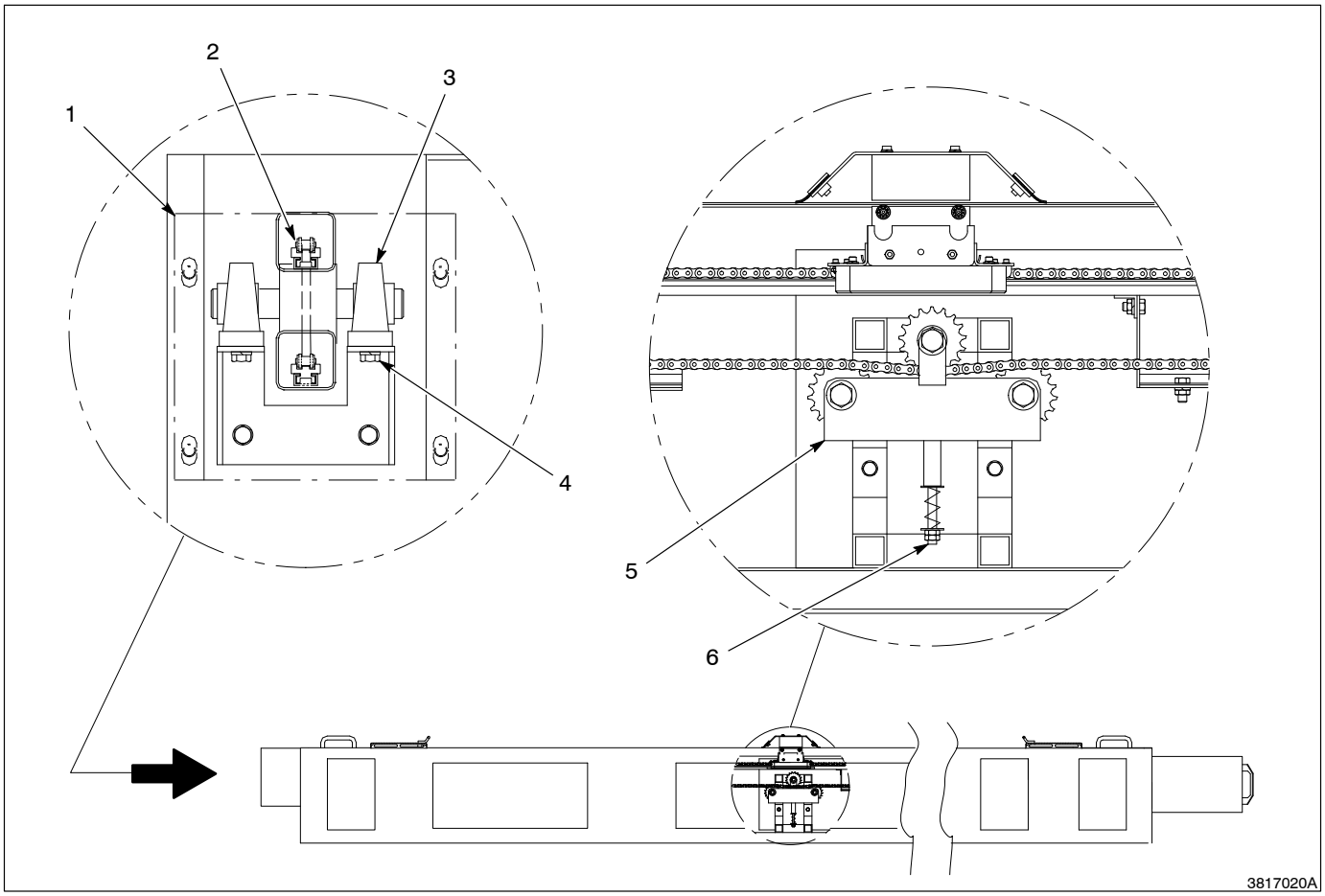

Fig. 6-4 Floor Sweeper Chain Drive Tensioning

1. Cover
2. Sprocket and chain
3. Pillow block
4. Mounting bolts
5. Chain tensioner
6. Nut

5. Exhaust Fan Repair

Refer to the fan manual included with your system.

Section 7

Parts

Section 7
Parts

1. Introduction

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

Using the Illustrated Parts List

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

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

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

Item	Part	Description	Quantity	Note
—	000 0000	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. Sieve Parts

See Figure 7-1. Quantities shown are for one sieve assembly.

Item	Part	Description	Quantity	Note
1	339 596	Knob, 4 arm, 2 in. diameter, $^{5}/_{16}$–18, female	4	
2	326 275	Sieve, pan, sanitary, main rim	1	
3	326 278	Motor, vibratory, 3450 rpm, 460 volt, 3 phase, Branford	1	A
3	326 279	Motor, vibratory, 3450 rpm, 230/460 volt, 3 phase, Martin	1	B
4	326 256	Cord, extension, 11.5 ft, male, Amphenol	1	
5	326 255	Ultrasonic panel assembly, SK20070	1	
6	339 615	Cylinder, double acting, sieve	1	
7	339 613	Bellows, air cylinder	1	
8	337 861	Plug, reservoir	1	
9	1002 150	Cord, panel, 2 ft, bulkhead jack, male, Amphenol	1	
10	337 854	Plate, fluidizing	1	
11	1005 607	Gasket, polyethylene foam, $^{3}/_{16}$ x $^{3}/_{8}$ in.	AR	C
12	1004 847	Clamp, discharge tube	2	
13	337 859	Sleeve, pan seal (upper)	1	
14	339 663	Clamp, hose, $^{9}/_{16}$ wide, 1.9 to 17 in. diameter	3	
15	337 860	Sleeve, pan seal, lower	1	
16	339 661	Isolator, sieve stand	4	
NS	326 241	Plug, test, 1.8 to 1.9 in. diameter	2	

NOTE A: Used on current sieve models.
B: Used on early sieve models.
C: Apply to bottom of sieve and top of fluidizing pan. 4.6 ft for each. Sold in bulk, order length needed.
AR: As Required
NS: Not Shown

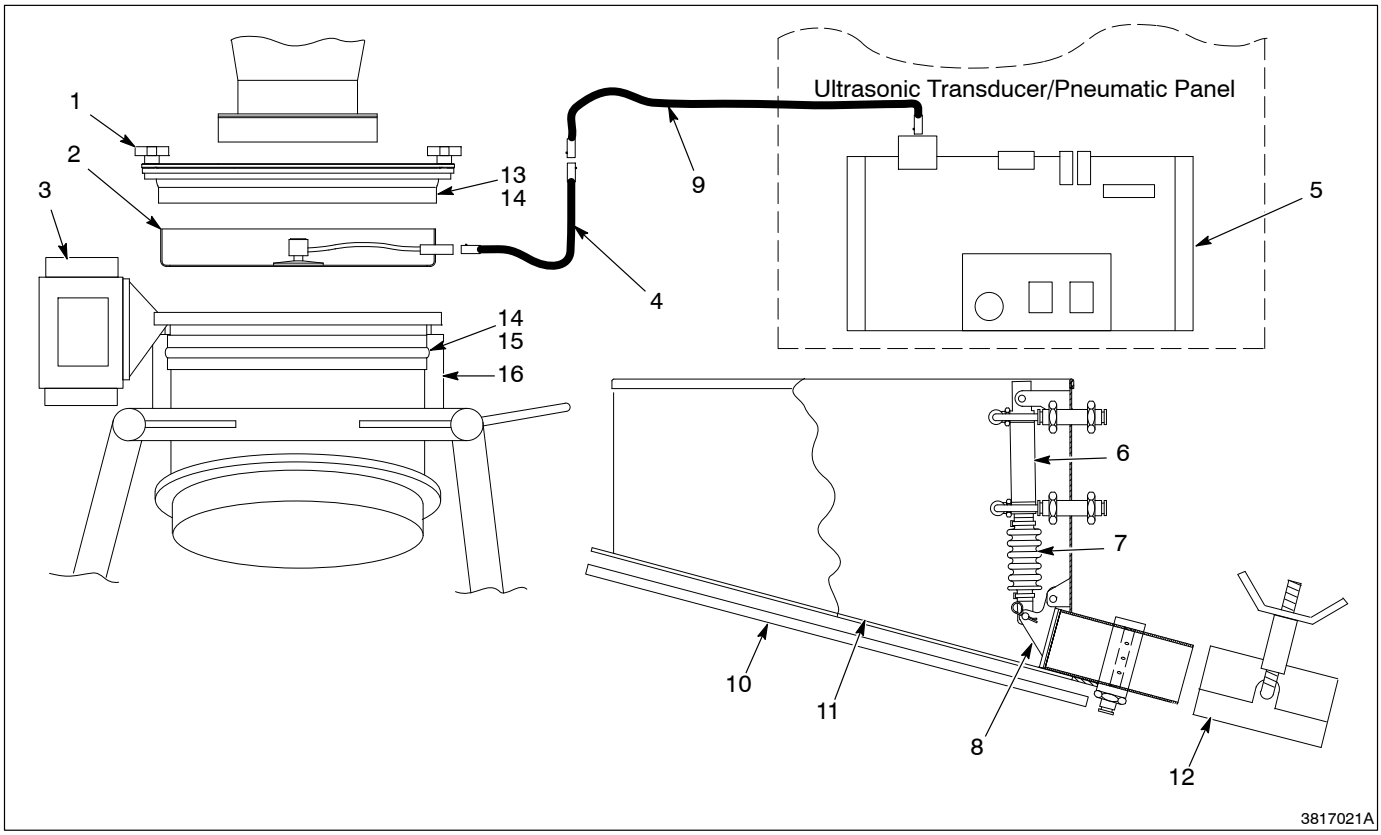

Fig. 7-1 Sieve Parts

3. Cyclone Valve Parts

See Figure 7-2.

Item	Part	Description	Quantity	Note
1	337 843	Seal, valve, air lock	2	A
NOTE A: Use pipe thread sealant on connector threads.				

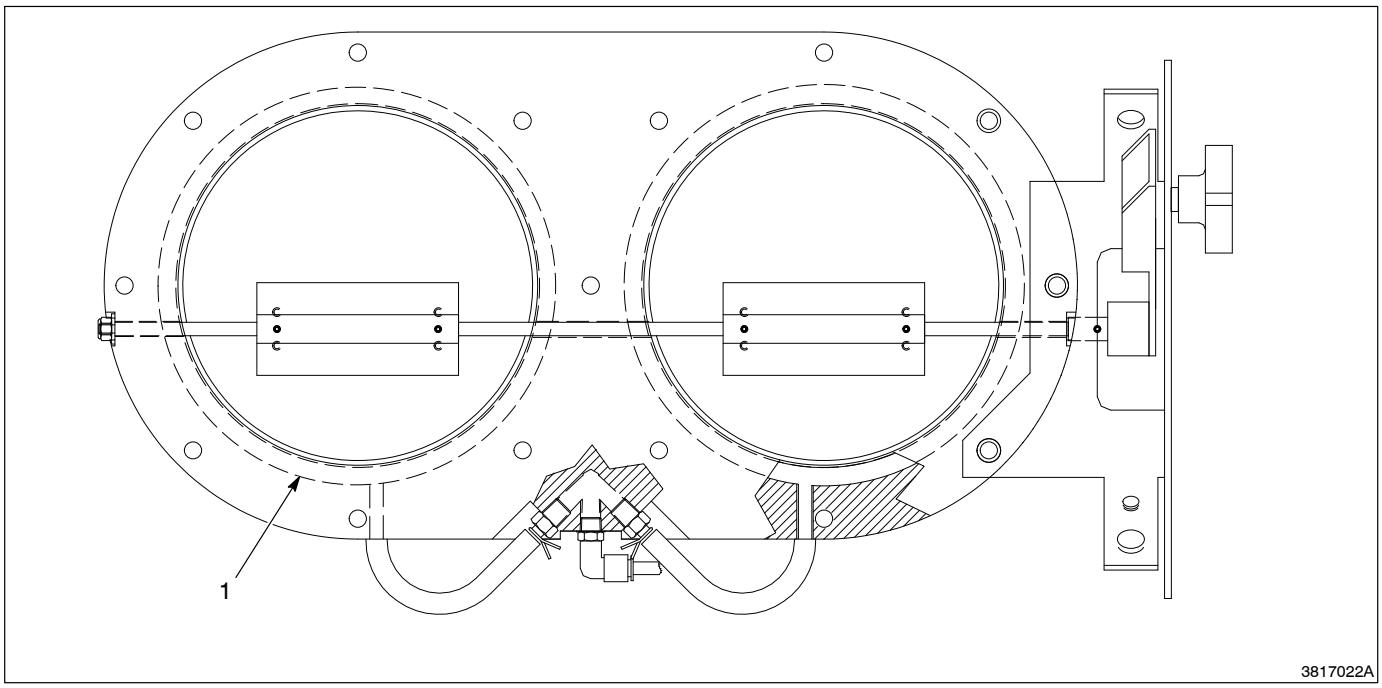

Fig. 7-2 Cyclone Valve Parts

4. Pump Assembly Parts

See Figure 7-3. Quantities shown are for one pump assembly.

Item	Part	Description	Quantity	Note
–	337 864	Pump manifold assembly		
1	345 995	• Nozzle, air	9	
2	940 207	• O-ring, Parker, #2-013-S604–70	9	
3	940 129	• O-ring, Parker, #2-012-S604–70	9	
4	941 113	• O-ring, Parker, #2-111-S604–70	18	
5	337 866	• Plate, air inlet	1	
6	337 867	• Plate, side, throat holder	1	
7	337 868	• Retainer	2	
8	225 542	• Throat, pump	9	
9	940 015	• O-ring, Parker, #2-015-S674–70	9	
10	337 869	• Holder, throat, corona	9	
11	940 177	• O-ring, Parker, #2-017-S674–70	9	
12	337 865	• Block, pump	1	
13	1009 997	O-ring, Parker, #2-117-S604-70	9	
14	337 881	Lance, stainless steel	9	
NS	1009 994	Knob, hand	4	A
NS	1009 995	Stud, hand knob	4	A
NS	1009 996	Spring, hand knob	4	A

NOTE A: Used to retain air inlet and throat holder plates.
NS: Not Shown

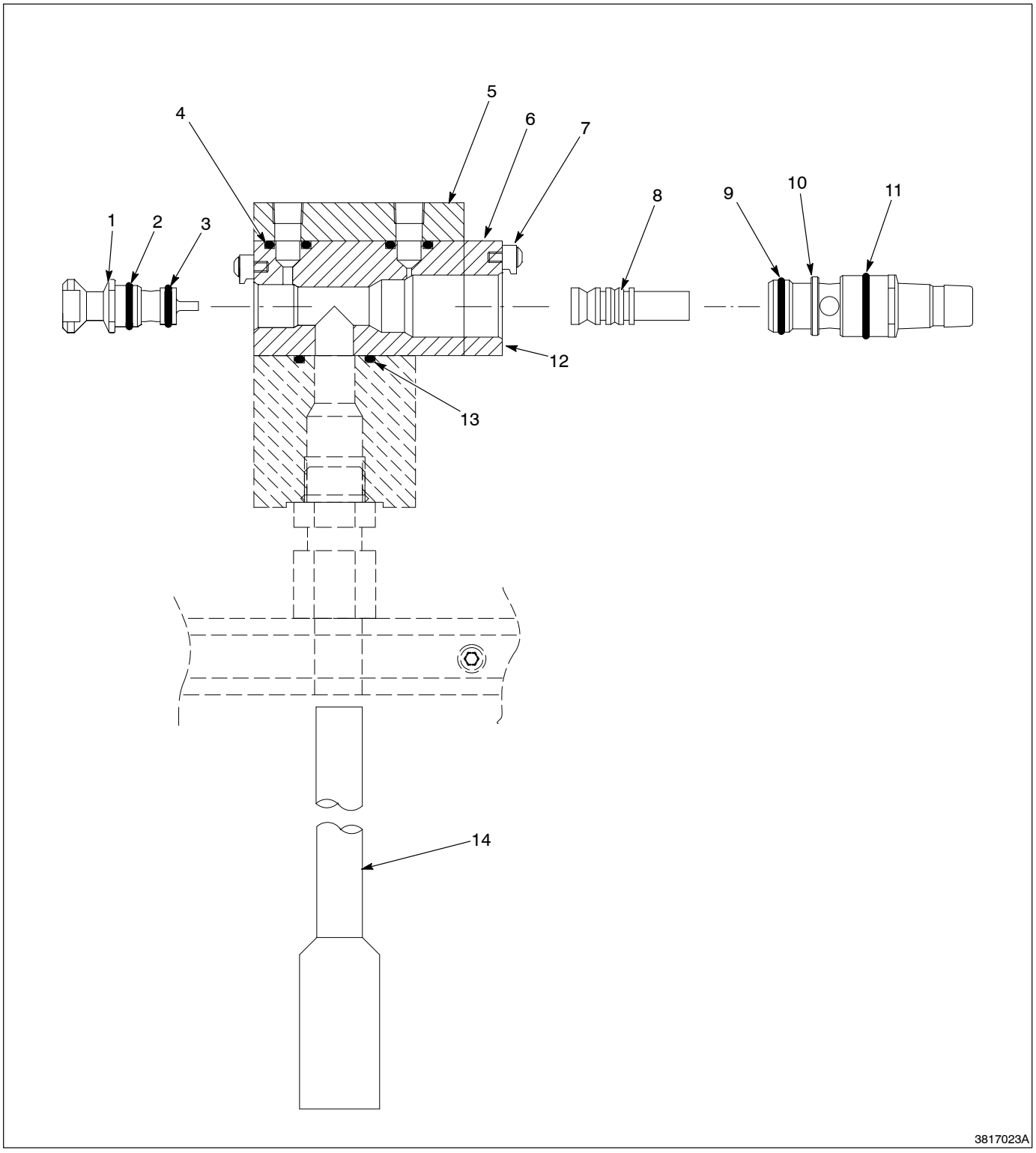

Fig. 7-3 Pump Assembly Parts

5. Floor Sweeper Parts

See Figure 7-4. Quantities shown are for one sweeper.

Item	Part	Description	Quantity	Note
1	981 679	Screw, socket head, cap, $^1/_4$–20 x 0.750 in.	AR	
2	714 241	Washer, lock, E, split, 0.250 in., stainless steel	AR	
3	983 042	Washer, flat, E, 0.250 x 0.500 in., stainless steel	AR	A
4	341 579	Wheel, assembly, QCB scraper	4	A
5	343 717	Screw, socket, flat head, $^1/_4$–20 x 0.625 in., stainless steel	AR	
6	314 572	Blade, rubber, QCB scraper, 7 ft base	2	B

NOTE A: Install two flat washers between the wheel and the mounting bracket. Install the wheel with the stepped portion of the bore against the mounting bracket.

B: Replacement blades are 7 ft long. Cut for 6 ft base.

AR: As Required

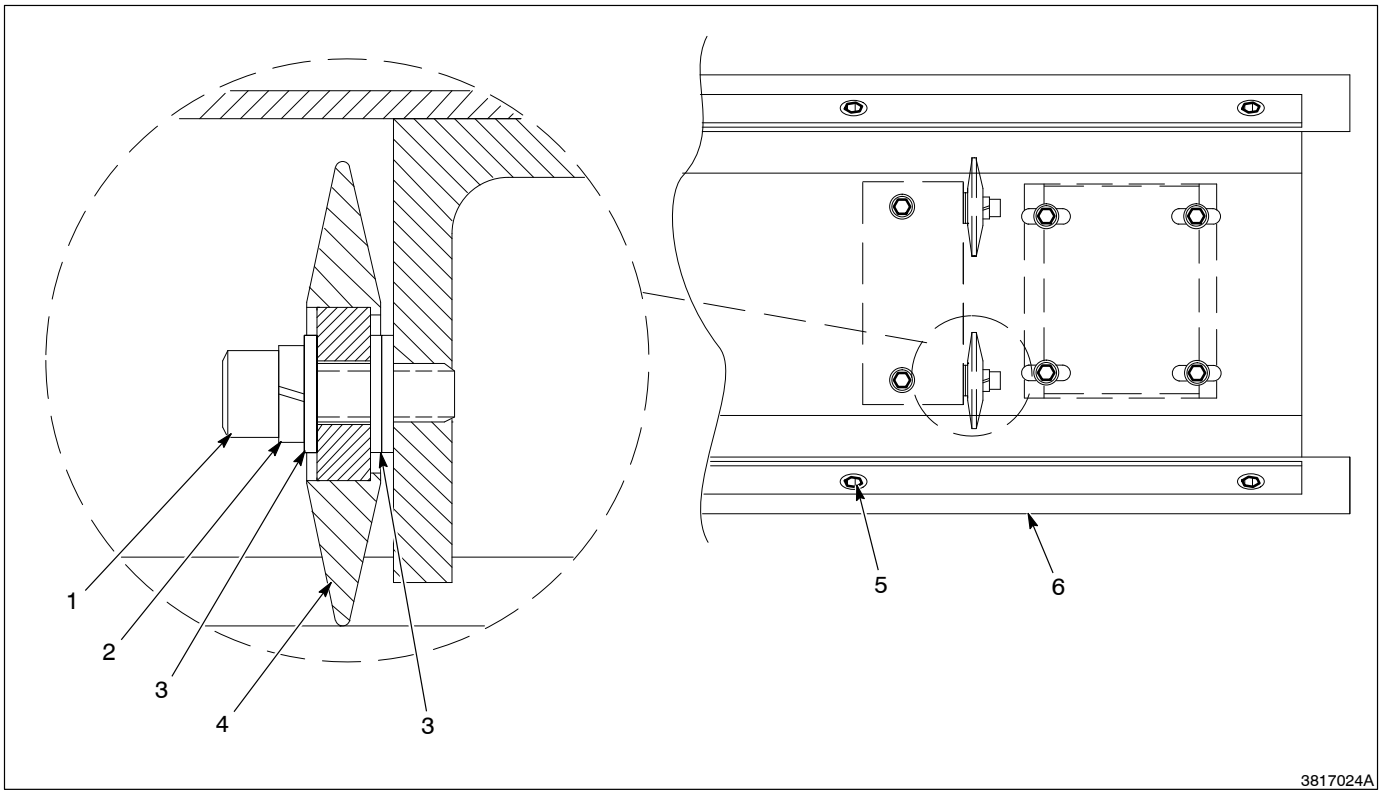

Fig. 7-4 Floor Sweeper Parts

6. Magnetic Carriage Parts

See Figure 7-5. Quantities listed are for one carriage.

Item	Part	Description	Quantity	Note
1	982 860	Screw, socket head cap, 10–32 x 0.500 in. stainless steel	4	
2	702 106	Washer, lock, E, split, 10, stainless steel	4	
3	339 787	Bearing, lower magnet carriage, QCB scraper	4	
4	339 788	Spring, lower magnet carriage, QCB scraper	4	
5	341 577	Block, magnet carriage guide, QCB scraper	2	
6	1001907	Connecting link, single strand, flange mount, 40 pitch	2	
7	981 289	Screw, socket head cap, 6–32, x 0.500 in. stainless steel	8	
8	983 253	Washer, flat, E, 0.156 x 0.312 x 0.032, stainless steel	8	
9	343 716	Nut, lock, #6–32, with nylon insert	8	

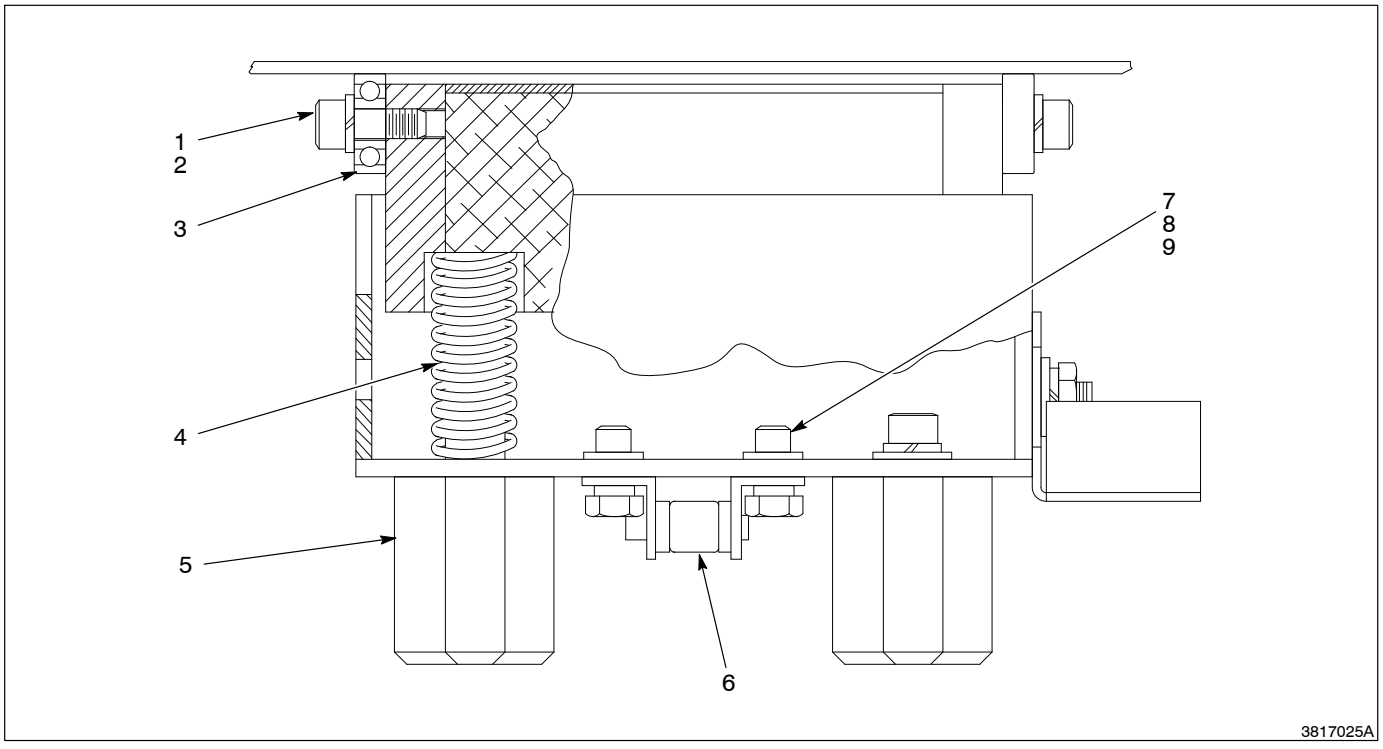

Fig. 7-5 Magnetic Carriage Parts

7. Chain Drive Parts

See Figure 7-6. Quantities listed are for one booth base.

Item	Part	Description	Quantity	Note
1	100 1867	Clevis, tensioning, idler, chain	2	
2	100 1868	Spring, tensioner	2	
3	100 1911	Sprocket, idler, ball bearing, 17 teeth	6	
4	100 1864	Chain, magnet cart drive	2	
5	100 1912	Sprocket, drive, 25 teeth, hardened	5	
6	100 1914	Bushing, sprocket, Q.D. type	5	
7	100 1906	Bearing, pillow block	8	
8	100 1862	Chain, motor drive	1	
9	100 1905	Sprocket, motor, 10 teeth, hardened	1	
10	100 1920	Motor, floor sweeper drive, 1/3 HP 3 PH, 230/460V	1	
NS	100 1908	Link, connecting, single strand, 40 SC pitch	4	A

NOTE A: See Figure 7-5 for flanged connecting link part number.
NS: Not Shown

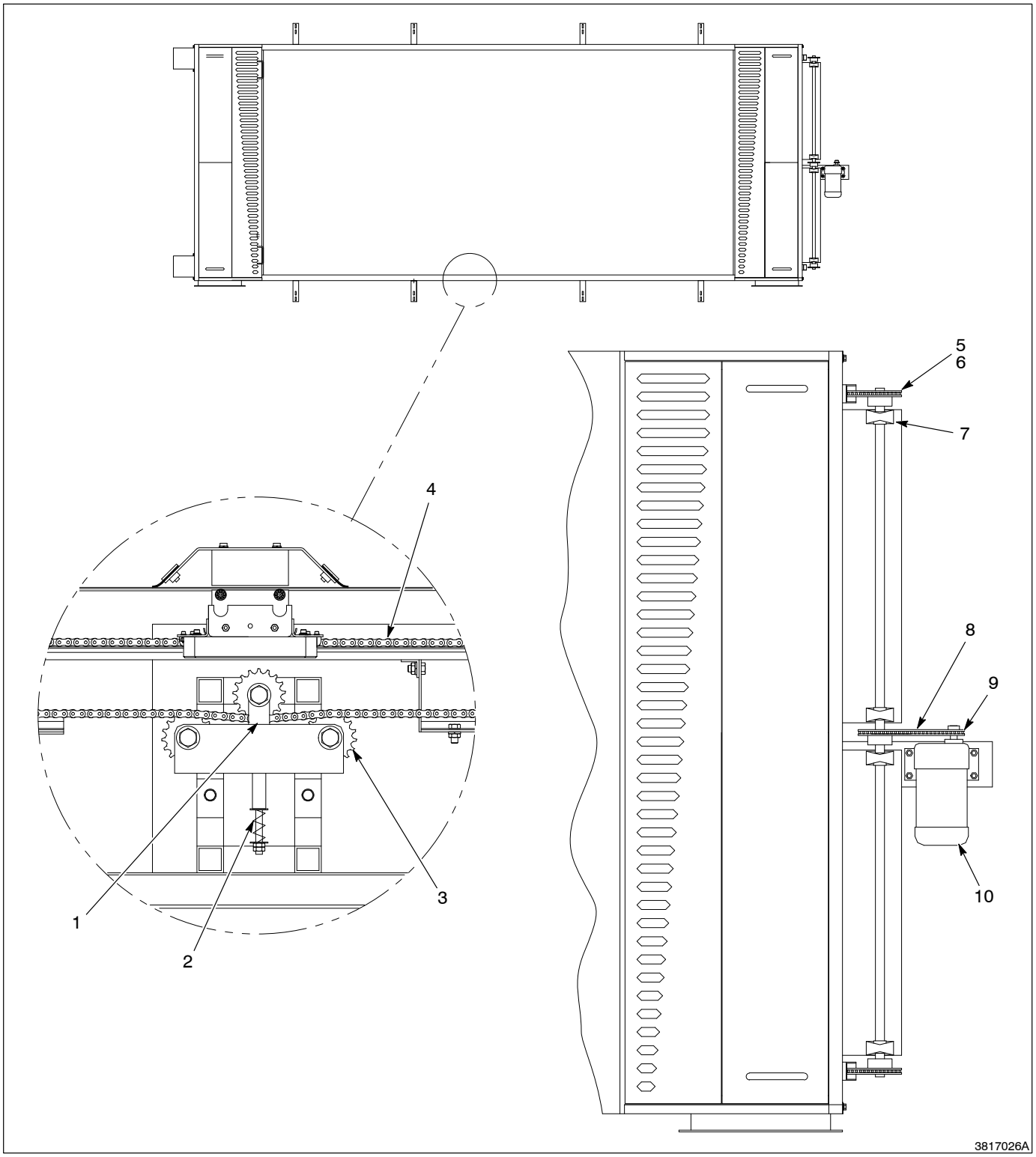

Fig. 7-6 Chain Drive Parts

8. Feed Hopper Parts

See Figure 7-7.

Item	Part	Description	Quantity	Note
—	339 575	Hopper, gravity feed	1	
1	339 582	• Lid, assembly, gravity feed	1	
2	339 581	• • Plug, expandable, 4 in. pipe	1	
NS	100 2160	• • Gasket, hole plug, hopper	1	
3	339 610	• Plug assembly, cover, feed center	1	
4	174 233	• Latch, lever, closing ring, 22.5 in.	1	
5	326 241	• Plug, test, 1.8 in. to 1.9 in.	2	
6	174 607	• Kit, well, level sensor	1	
NS	237 303	• • Gasket, sensor well	1	
NS	144 705	• • Nut, conduit, 1.5 in.	1	
NS	184 150	• • Nut/bolt, hex head, $^3/_8$-16 x 1.25 in.	1	
7	174 495	• Gasket, U-channel, 150 lb hopper	1	
8	174 235	• Plate, fluidizing, 150 lb hopper	1	
9	175 040	• Drum, fluidizing, assembly, 150 lb hopper	1	A
NS	970 966	• Clamp, hose	4	
NS	326 235	• Hose, flexible, 2 in. ID	AR	B
NS	134 575	• Wire, ground	1	
NS	972 184	• Elbow, male, $^1/_2$ in. tube x $^1/_2$ in. NPT	1	
NS	972 171	• Elbow, male, barb, HDPE, $^3/_4$ x $^3/_4$ in.	2	
NS	983 554	• Washer, sealing, $^3/_4$ in. pipe	2	
NS	984 085	• Nut, hex, nylon, $^3/_4$ in. NPT	2	

NOTE A: Refer to following pages for parts breakdowns.
B: Order length needed in increments of one foot.
AR: As Required
NS: Not Shown

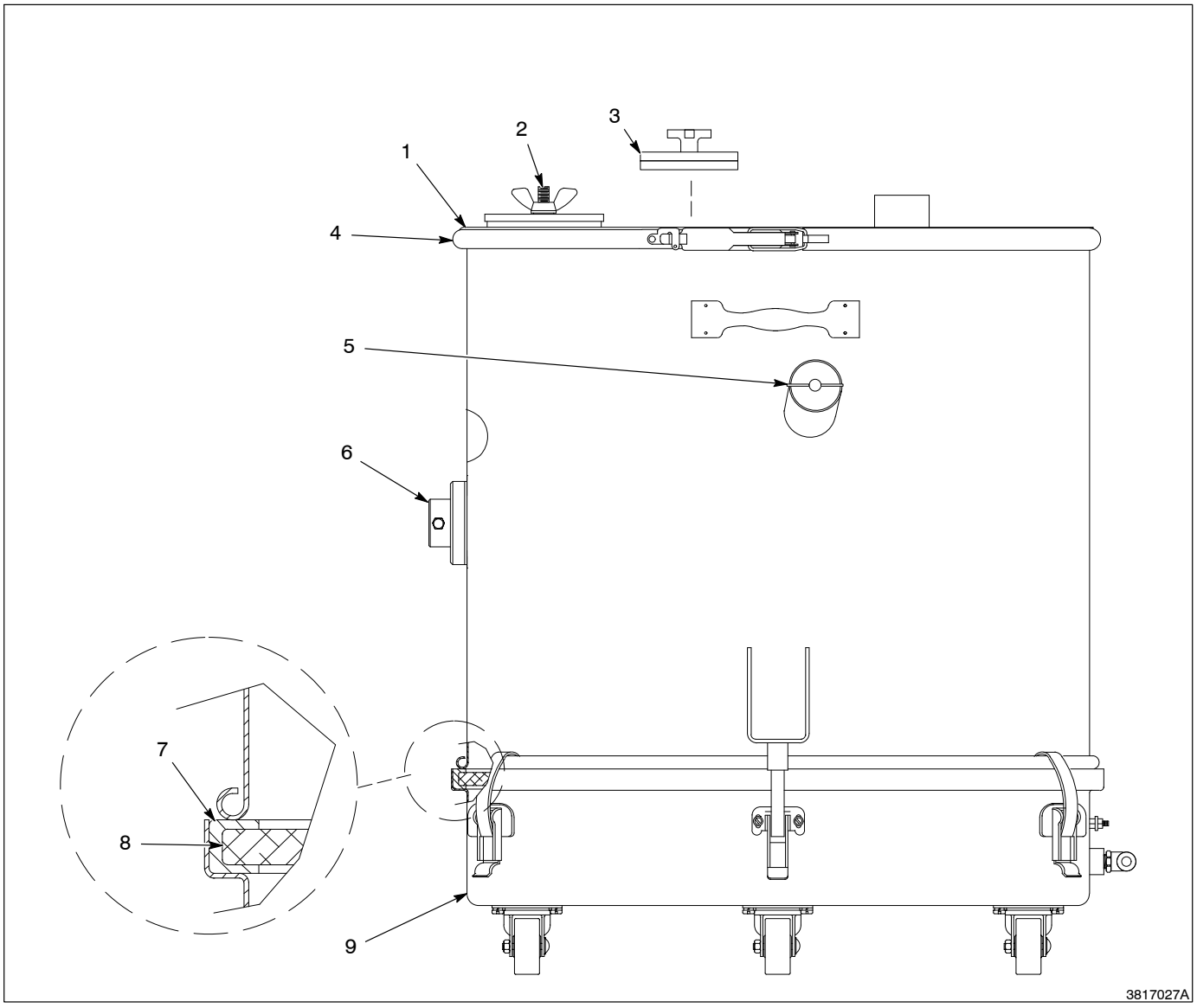

Fig. 7-7 Feed Hopper Parts

Fluidizing Drum Assembly

See Figure 7-8. The fluidizing drum is part of the feed hopper.

Item	Part	Description	Quantity	Note
—	175040	Drum, fluidizing, assembly, 150 lb hopper	1	
1	981 105	• Screw, pan head, #10-24 x 0.375 in., slotted, zinc	3	
2	984 518	• Nut, spring, type U, #10-24	3	
3	174 234	• Disc, baffle, 150 lb hopper	1	
4	981 064	• Screw, pan head, #8-32 x 0.375 in., slotted, zinc	1	
5	983 111	• Washer, lock, split, #8, steel, zinc	1	
6	------	• Spacer, 0.75 x 0.38 in., threaded, #8-32	1	
7	124 851	• Muffler, $^3/_4$ in. NPT, 40 micron	1	
8	973 328	• Coupling, pipe, hydraulic, $^3/_4$ x $^1/_2$ in., steel	1	
9	973 329	• Nipple, steel, sched 40, $^1/_2$ in. NPT x 7.00 in.	1	
10	972 240	• Elbow, male, 12 mm tube x $^1/_2$ in. uni	1	
11	152 233	• Jumper, ground, box feeder, vib	1	
12	984 702	• Nut, hex, M5, brass	4	
13	983 401	• Washer, lock, split, M5, steel, zinc	32	
14	983 021	• Washer, flat, 0.203 x 0.406 x 0.040 in., brass	3	
15	982 126	• Screw, pan head, slotted, M5 x 25, brass	2	
16	240 674	• Tag, ground	1	
17	174 496	• Clamp, drawlatch, large	6	
18	982 000	• Screw, pan head, slotted, M5 x 10, zinc	27	
19	983 123	• Washer, flat, 0.219 x 0.500 x 0.049 in., zinc	11	
20	984 706	• Nut, hex, M5, steel, zinc	11	
21	174 493	• Caster, general duty, 2 in.	4	

Fluidizing Drum Parts *(contd)*

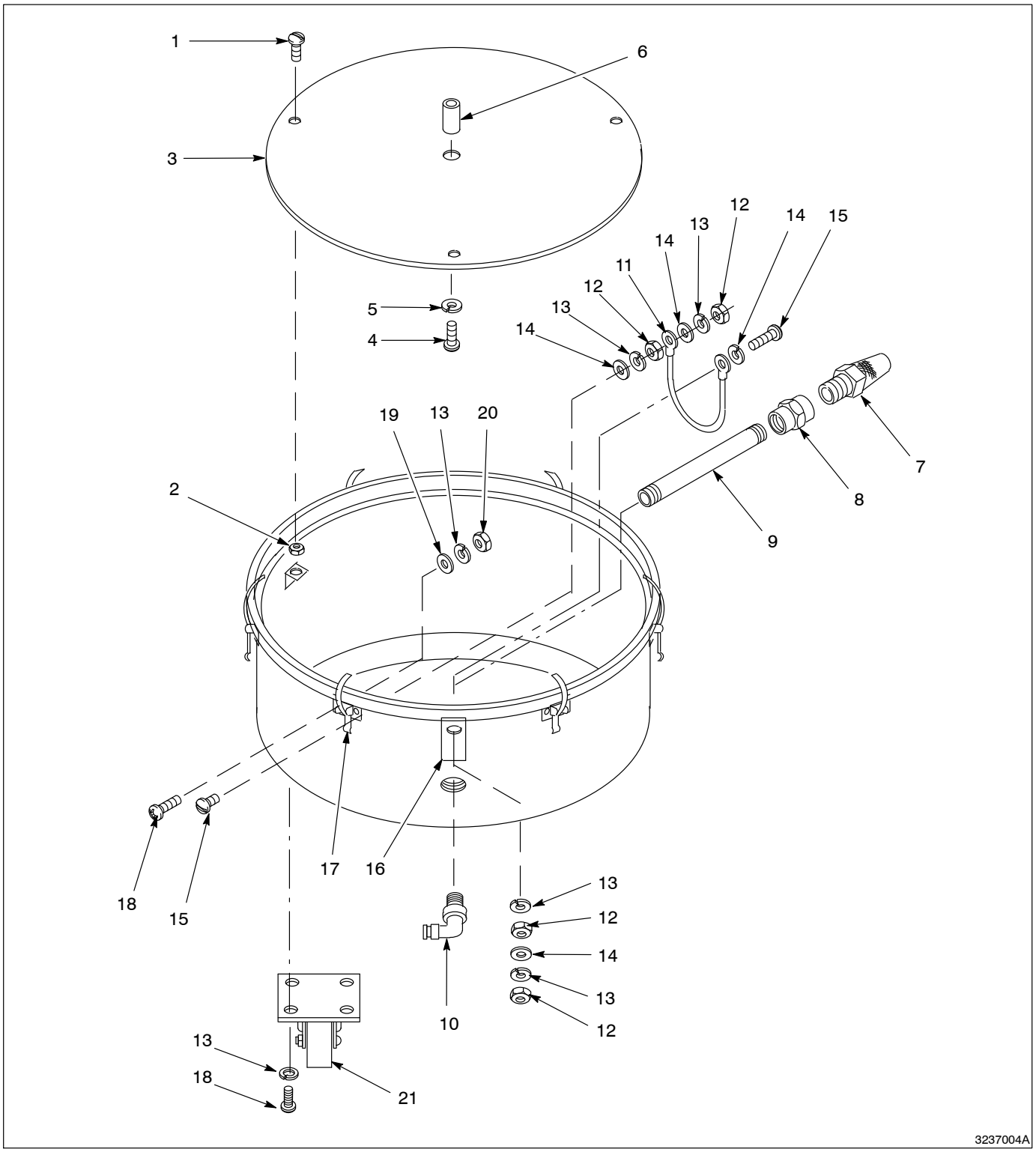

Fig. 7-8 Feed Hopper Fluidizing Drum Parts

9. Nordson Afterfilter Parts

Part	Description	Quantity	Note
156 996	Filter, cartridge, primary, with 3-lobed gasket	8	A
322 239	Gasket, filter mount	8	A
341 848	Fluidizer, valve	4	A
174 710	Valve, pulse	8	A
101 432	Filter, final	8	B
100 1863	Wheel, fan	1	B
100 1865	Shaft, fan	1	B
100 1866	Belt, fan	4	B
100 1869	Sheave, fan	1	B
100 1910	Bushing, fan	1	B
100 1913	Sheave, motor	1	B
100 1915	Bushing, motor	1	B
100 1916	Bearing, fan, pillow block	2	B

NOTE A: Quantities listed are for one collector unit.
B: Quantities listed are for one final filter unit.
AR: As Required

10. Herding Afterfilter Parts

Part	Description	Quantity	Note
100 1982	Element, filter, delta 1500/9 3K	48	
100 1981	Solenoid, pulse, valve, 2 in. 24 vdc	12	
100 1983	Gasket, filter element, profile	48	
100 1986	Valve, pressure relieve, accumulator	2	
100 1988	Belt, fan drive, type 5VX1120	4	
100 1925	Sheave, fan	1	
100 1924	Sheave, motor	1	
100 1926	Bearing, fan, pillow block	2	
341 848	Fluidizer, valve	8	
100 1927	D-seal, slide gate, 12K	1	

11. Controls

Contact your Nordson representative for parts not listed here.

Item	Part	Description	Quantity	Note
–	341 632	Gun driver board	AR	
–	341 626	Device net interface board	AR	
–	333 685	Servo pneumatic valve, gun movers	AR	
–	333 508	Blocking valve, gun movers	AR	
AR: As Required				