P311 Vertical Oscillator

Customer Product Manual
Part 229 753A

NORDSON CORPORATION ● AMHERST, OHIO ● USA

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Notice

Trademarks

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Section 1

Safety

Section 1
Safety

1. Introduction

This section contains general safety instructions for using your Nordson equipment. Task- and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this equipment safely,

- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.
- follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies. Refer to the National Fire Protection Association (NFPA) standard 33 and to federal, state, regulatory agency, and local codes for rules and regulations covering installation and operation of powder spray systems.
- obtain and read Material Safety Data Sheets (MSDS) for all materials used.

2. Safety Symbols

Become familiar with the safety symbols presented in this section. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.

WARNING: Failure to observe this warning may result in personal injury, death, or equipment damage.

2. Safety Symbols (contd.)

WARNING: Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: Risk of explosion or fire. Fire, open flames, and smoking prohibited.

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

WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

CAUTION: Failure to observe may result in equipment damage.

3. Qualified Personnel

"Qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

4. Intended Use

WARNING: Use of this equipment in ways other than described in this manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in this manual.

Nordson Corporation cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death, or property damage. Unintended uses may result from taking the following actions:

- making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine Nordson replacement parts
- failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards
- using materials or auxiliary equipment that are inappropriate or incompatible with your Nordson equipment
- allowing unqualified personnel to perform any task

5. Installation

Read the installation section of all system component manuals before installing your equipment. A thorough understanding of system components and their requirements will help you install the system safely and efficiently.

- Allow only qualified personnel to install Nordson and auxiliary equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install all electrical, pneumatic, gas, and hydraulic connections to local code.

5. Installation (contd.)

- Install locking, manual, shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Ground all electrically conductive equipment within 10 feet (3 meters) of the spray area. Ungrounded conductive equipment can store a static charge which could ignite a fire or cause an explosion if a hot spark is discharged.
- Route electrical wiring, electrostatic cables, and air hoses and tubing along a protected path. Make sure they will not be damaged by moving equipment. Do not bend electrostatic cables around a radius of less than 6 in. (152 mm).
- Install safety interlocks and approved, fast-acting fire detection systems. These shut down the spray system if the booth exhaust fan fails, a fire is detected, or other emergency situation develops.
- Make sure the spray area floor is conductive to ground and that the operator's platform is grounded.
- Use only designated lifting points or lugs to lift and move heavy equipment. Always balance and block loads when lifting to prevent shifting. Lifting devices must be inspected, certified, and rated for a greater weight than the equipment being lifted.
- Protect components from damage, wear, and harsh environmental conditions.
- Allow ample room for maintenance, material supply container drop-off and loading, panel accessibility, and cover removal.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

6. Operation

Only qualified personnel, physically capable of operating the equipment and with no impairments to their judgement or reaction times, should operate this equipment.

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

- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.

- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.

- Know where EMERGENCY STOP buttons, shutoff valves, and fire extinguishers are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.

- Before operating, make sure all conductive equipment in the spray area is connected to a true earth ground.

- Never operate equipment with a known malfunction or leak.

- Do not attempt to operate electrical equipment if standing water is present.

- Never touch exposed electrical connections on equipment while the power is ON.

- Do not operate the equipment at pressures higher than the rated maximum working pressure of any component in the system.

- Know the pinch points, temperatures, and pressures for all equipment that you are working with. Recognize potential hazards associated with these and exercise appropriate caution.

- Wear shoes with conductive soles, such as leather, or use grounding straps to maintain a connection to ground when working with or around electrostatic equipment.

6. Operation (contd.)

- Do not wear or carry metallic objects (jewelry or tools) while working with or around electrostatic equipment. Ungrounded metal can store a static charge and cause harmful shocks.

- Maintain skin-to-metal contact between your hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If wearing gloves, cut away the palm or fingers.

- Keep parts of the body or loose clothing away from moving equipment or parts. Remove personal jewelry and cover or tie back long hair.

- Wear National Institute of Occupational Safety and Health (NIOSH) approved respirators, safety glasses or goggles, and gloves, and while handling powder containers, filling hoppers, operating spray equipment, and performing maintenance or cleaning tasks. Avoid getting powder coatings on your skin.

- Never point manual guns at yourself or other persons.

- Do not smoke in the spray area. A lit cigarette could ignite a fire or cause an explosion.

- If you notice electrical arcing in a spray area, shut down the system immediately. An arc can cause a fire or explosion.

- Shut off electrostatic power supplies and ground gun electrodes before making adjustments to powder spray guns.

- Shut off moving equipment before taking measurements or inspecting workpieces.

- Wash exposed skin frequently with soap and water, especially before eating or drinking. Do not use solvents to remove coating materials from your skin.

- Do not use high-pressure compressed air to blow powder off your skin or clothes. High-pressure compressed air can be injected under the skin and cause serious injury or death. Treat all high-pressure fittings and hoses as if they could leak and cause injury.

7. Less-Obvious Dangers

Operators should also be aware of less-obvious dangers in the workplace that often cannot be completely eliminated:

- exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded
- electrical equipment which may remain energized for a period of time after the equipment has been shut off
- vapors and materials which may cause allergic reactions or other health problems
- automatic hydraulic, pneumatic, or mechanical equipment or parts that may move without warning
- unguarded, moving mechanical assemblies

8. Action in the Event of a System or Component Malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component.

9. Maintenance and Repair

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Always wear appropriate protective devices and use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Use only genuine Nordson replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.

9. Maintenance and Repair (contd.)

- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.
- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.
- Do not attempt to service a moving piece of equipment. Shut off the equipment and lock out power. Secure equipment to prevent uncontrolled movement.
- Relieve air pressures before servicing equipment. Follow the specific instructions in this manual.
- Make sure that the room where you are working is sufficiently ventilated.
- If a “power on” test is required, perform the test carefully and then shut off and lock out power as soon as the test is over.
- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground all conductive equipment.
- Service lines connected to panel disconnect switches may still be energized unless they are disconnected. Make sure the power is off before servicing. Wait 5 minutes for capacitors to discharge after shutting off the electrical power.
- Turn off the electrostatic power supply and ground the gun electrode before adjusting or cleaning.
- Keep high-voltage connection points clean and insulated with dielectric grease or oil.
- Check all ground connections periodically with a standard ohmmeter. Resistance to ground must not exceed one megohm. If arcing occurs, shut down the system immediately.

9. Maintenance and Repair (contd.)

- Check interlock systems periodically to ensure their effectiveness.

WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program.

- Do not store flammable materials in the spray area or room. Keep containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.

- Practice good housekeeping procedures. Do not allow dust or powder coatings to accumulate in the spray area or booth or on electrical equipment. Read this information carefully and follow instructions.

10. Disposal

Dispose of equipment and materials used in operation and cleaning according to your local regulations.

Section 2

Description

Section 2
Description

1. Introduction

See Figure 2-1. The P311 vertical oscillator supports one to six automatic powder finishing guns. The upright machine moves powder finishing guns, mounted to the gun carriage up and down to ensure complete coverage of the object inside the coating booth.

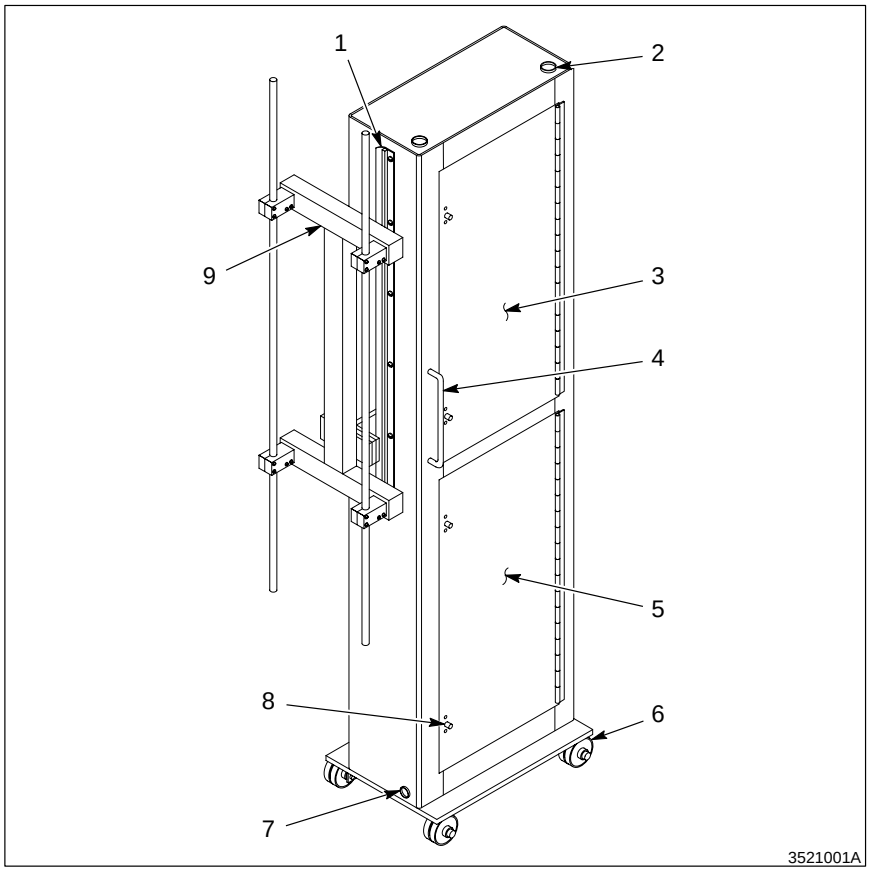

Fig. 2-1 P311 vertical oscillator

1. Lip splitter
2. Tube cap
3. Upper access door
4. Handle
5. Lower access door
6. Roller
7. Conduit
8. Latch
9. Gun carriage

1. Introduction (contd.)

To move the vertical oscillator on- and off-line, the machine is equipped with two handles (4), and stands on rollers (6). The powder finishing guns are mounted on a gun carriage (9), which moves vertically along a lip splitter (1). The interior of the oscillator can be inspected through access doors (3, 5) on both sides. The access doors are locked by latches (8).

Section 3

Installation

Section 3
Installation

1. Introduction

This section covers receiving, unloading and installation instructions. All Nordson vertical oscillators are inspected and crated before shipping.

Inspect the crate before removing it. Note any damage to the crate on the bill of lading and report it to the carrier.

If concealed damage is discovered while you are removing the crating, stop immediately and notify the carrier. Do not proceed until a carrier representative arrives to inspect the damage.

After removing the crating, make sure that all items listed on the packing slip are present. If an item listed on the packing slip is missing, note the missing item on the bill of lading and report the shortage to the carrier.

File a formal claim immediately with the carrier for any loss or damage. A notation on the bill of lading does not constitute notification of a claim. The following documents should be supplied to the carrier to support your claim:

- original freight bill
- original bill of lading
- copy of invoice or other evidence of value
- correspondence or photographs related to the claim
- concealed damage forms when necessary

NOTE: Contact your Nordson representative of any loss or damage. Nordson Corporation is willing to assist you in filing your claim and collecting for loss or damage. This willingness to assist you does not make Nordson Corporation responsible for collection of the claim or replacement of any loss.

2. Unloading

WARNING: Use approved and tested lifting equipment of adequate capacity. Failure to observe this note could result in property damage, injury, or death.

1. See Figure 3-1. Remove the lag screws securing the shipping brackets to the pallet.

2. Install a shackle through the lifting hole (1) in the shipping bracket (3), or remove the shipping bracket from the top and install a $^{1}/_{2}$ 13 UNC eye bolt (2) into the weld nut in the top plate.

3. Attach lifting equipment to the shackle or eye bolt (2) and lift the oscillator off the pallet. Stand the oscillator upright and place it on the floor or on a pre-installed V-track base.

4. Remove the shipping bracket or eye bolt (2). Plug the hole in the top with the bolt, used to secure the shipping bracket.

NOTE: The vertical oscillator is field wired and installed as an add-on to your existing system by a Nordson technician.

2. Unloading (contd.)

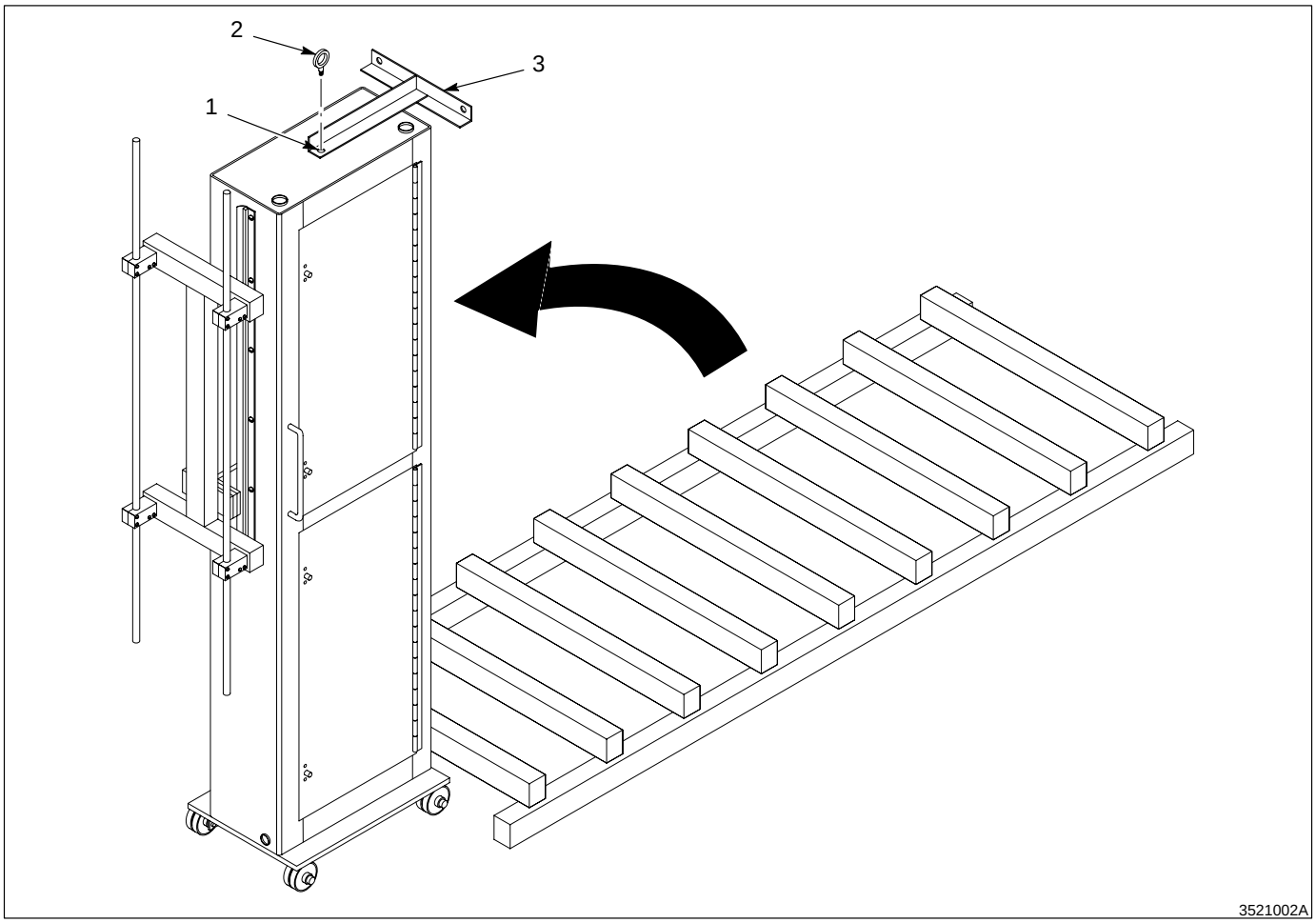

Fig. 3-1 Unloading the oscillator

1. Lifting hole
2. Eye bolt
3. Shipping bracket

Section 4

Operation

Section 4
Operation

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

1. Introduction

This section provides operating procedures for the P311 vertical oscillator. The unit is field wired by Nordson representatives and does not have any controls but the speed adjusting knob on the lower rear end of the oscillator. The vertical oscillator is powered up externally.

2. Startup

WARNING: Before starting the oscillator, make sure nothing interferes with the gun arm. Warn any personnel in the area to keep clear. Failure to observe this warning could result in property damage, injury, or death.

1. See Figure 2-1. Open the upper and lower access doors (3, 5) on both sides of the oscillator. Make sure the oscillator mechanism is free of any foreign objects that would interfere with its operation.

2. See Figure 7-1. Inspect the areas around the carriage plate assembly (22) and the shafts (18) for foreign objects.

3. See Figure 7-1. Check the gear reducer oil level. Install the provided breather vent plug (not shown), which screws into the top of the gear reducer (6).

4. See Figure 2-1. Close upper and lower access doors (3, 5) and turn on the power to the oscillator.

NOTE: The hold-down covers on the base must be in place and properly functioning.

Stroke Adjustment

WARNING: Never remove the access doors from the oscillator while it is operating. Do not operate the oscillator with the access doors removed.

1. Disconnect the power from the machine. Take all necessary precautions to prevent automatic or unintentional start up of the vertical oscillator.
2. Loosen the two 12.7 mm ($^1/_2$ in.) hex locking bolts on the crank arm adjusting clamp.
3. Adjust the position of the roller stud bar turning the 22.2 mm ($^7/_8$ in.) hex head of the crank arm adjusting screw. Turn the adjusting screw clockwise for a shorter stroke and counterclockwise for a longer stroke.
4. Tighten the two 12.7 mm ($^1/_2$ in.) hex head locking screws on the crank arm adjusting clamp.
5. Check the gun arm for any possible interference resulting from the new stroke length.
6. Remove all tools from the oscillator.
7. Reconnect the power to the unit.

Maximum Gun Arm Loading

The P311 vertical oscillator is designed to carry a maximum gun arm load of 90.72 kg (200 lb) at stroke lengths of up to 228 mm (9 in.). At stroke lengths exceeding 228 mm (9 in.), the maximum gun arm loading is proportionately reduced. Figure 4-2 describes the allowable loading conditions at varying stroke lengths.

Speed Adjustment

NOTE: Whenever the oscillator stroke is adjusted, the speed of the carriage must be adjusted proportionally to prevent an over speed condition.

See Figure 7-1 The adjusting knob for the variable speed pulley is located on the lower rear portion of the machine. Turning the knob counter-clockwise increases the speed of the machine, turning the knob clockwise decreases the speed of the machine.

NOTE: The maximum allowable carriage speed is 117 fpm. The minimum allowable carriage speed is 8 fpm. The two shift operation speed limit is 100 fpm at full stroke.

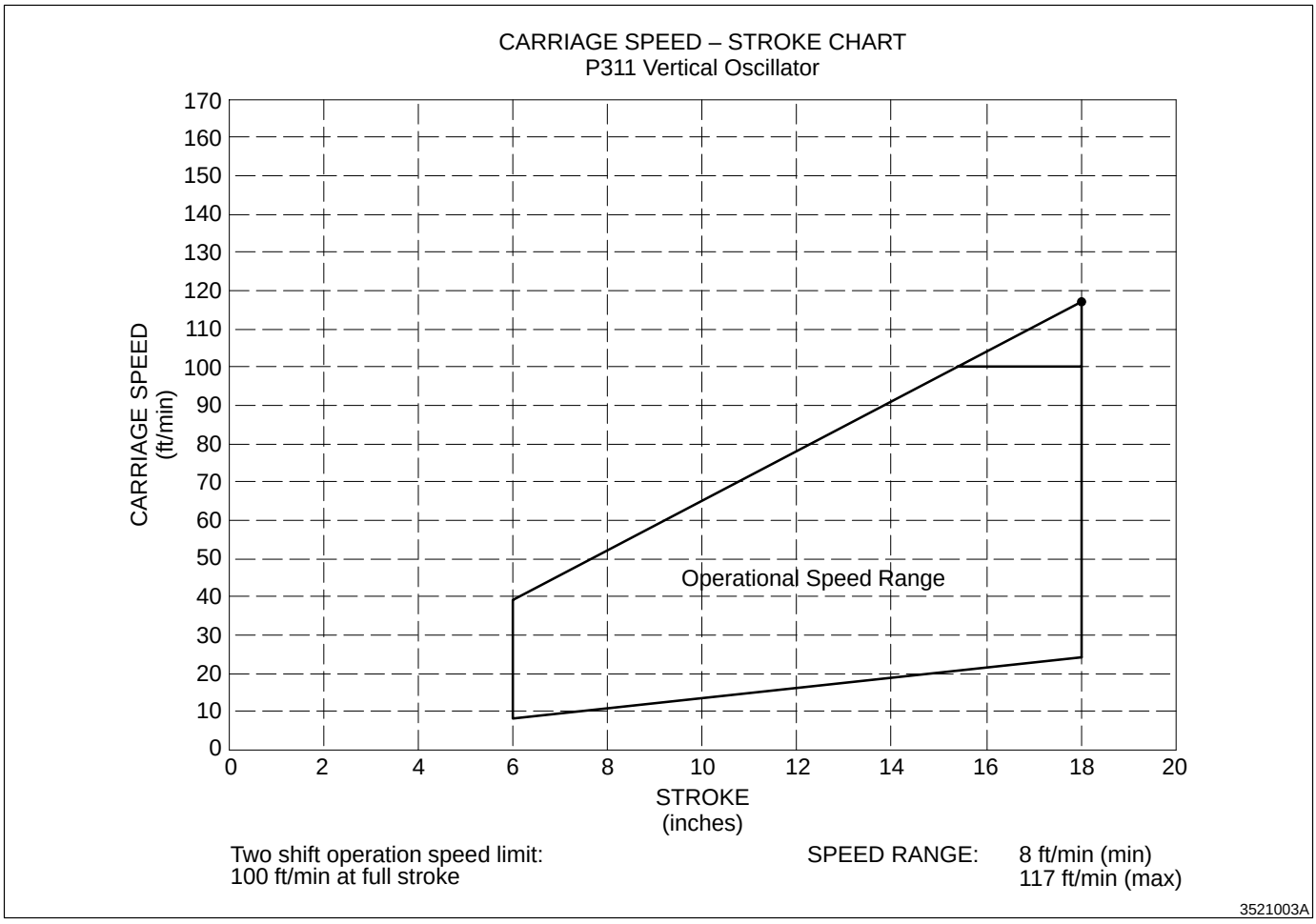

Fig. 4-1 Carriage speed/stroke chart

Speed Adjustment *(contd.)*

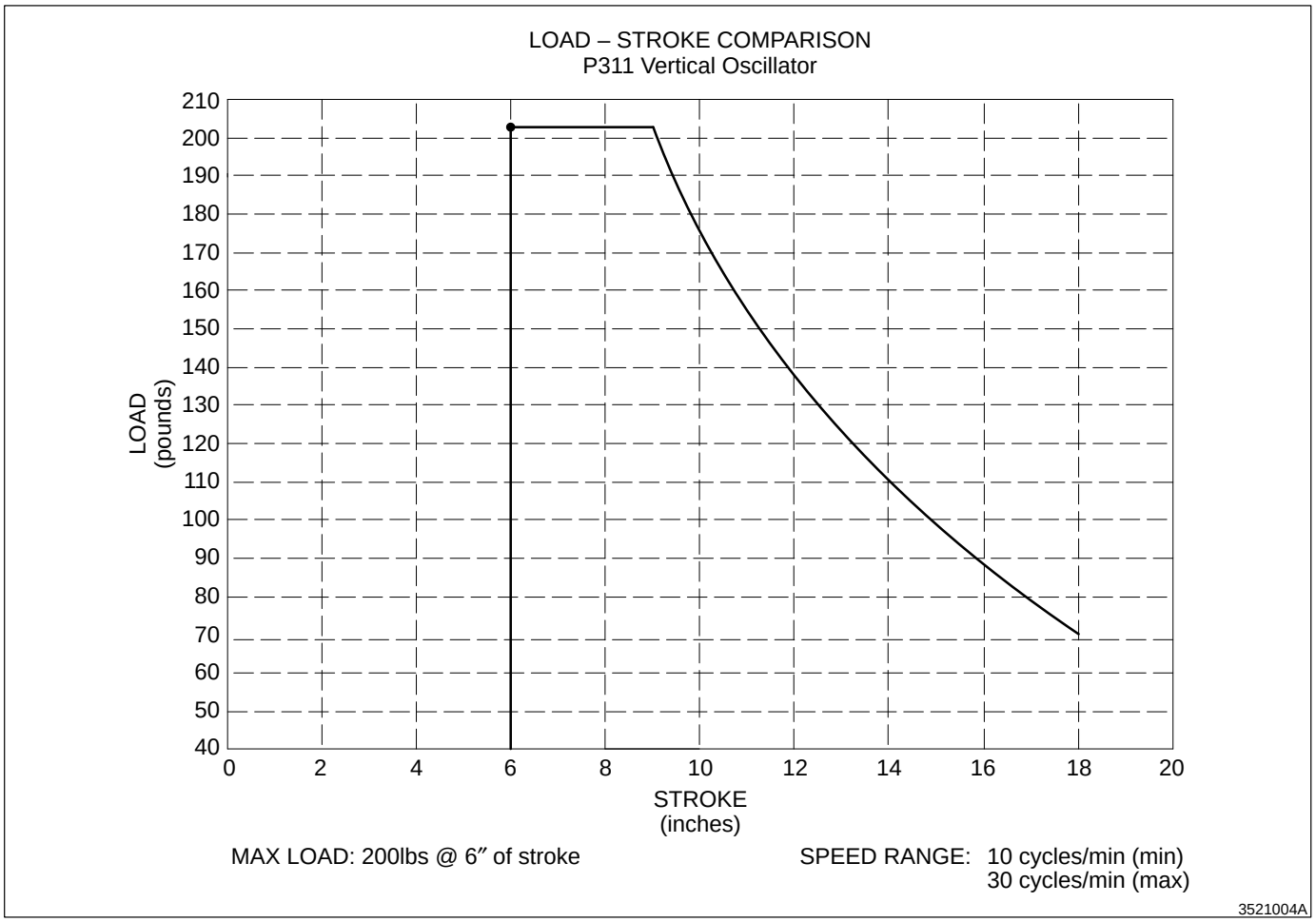

Fig. 4-2 Load-stroke comparison chart

Section 5

Maintenance

Section 5
Maintenance

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

1. Introduction

This section provides lubrication and maintenance instructions for the P311 vertical oscillator. Preventive maintenance and lubrication procedures should be performed according to the intervals listed. Refer to the *Repair* section for complete disassembly and rebuilding procedures.

Gear Reducer

The gear reducer is located behind the lower access door.

Operating Temperature

Normal operating temperature of the gear reducer is less than 93.3 °C (200 °F). During the initial break period, temperatures may rise above 93.3 °C (200 °F). If the temperature exceeds this temperature, for more than 100 hours, please contact your Nordson representative.

Oil Changing Intervals

The initial oil in the gear reducer should be changed after 500 hours or 5 weeks of service. After the 500 hours or 5 week oil change, the oil should be changed every 10,000 hours of service or every two years.

Check oil level, shaft seals and gear reducer for evidence of oil leaks. Change oil at specified time intervals. Use Worm Gear Oil (AGMA 7 or 8 is recommended).

Motor

The motor is located inside, behind the lower access door.

Machine Start

The machine must be properly connected to the load for proper direction of rotation. After starting quickly, the machine should run smooth. If this is not the case, shut motor off immediately. Possible cause for not running smooth could be low voltage, a misconnected motor or a load that is too heavy.

Check motor current after a short operating time and compare value with current value on the name plate. The motors ball bearings are factory lubricated.

Carriage

Lubricate the carriage bearings every 100 hours of operation or once a week, whichever comes first. A high quality lithium based multi-purpose grease should be used.

The carriage guide rods should be clean and free from any dirt or powder buildup when the carriage bearings are lubricated. Inspect carriage guide rods periodically for excessive wear. Clean rod and relubricate carriage bearings with MOBILUX EP2 grease. Evidence of deep grooves indicate that the carriage bearing or the guide rods are out of alignment.

Rod End Bearings

The rod end bearings connect the connecting link to the carriage plate. Lubricate the rod end bearings every 200 hours with a high quality, lithium based multi purpose grease. Lubricate grease fitting on connecting link with MOBILUX EP2 grease.

Crank Arm

Check for loose nuts and bolts on the crank arm assembly. Tighten if necessary.

Drive Belt

Inspect drive belt between the motor and the reducer periodically for cracks and fraying. In case of cracks or areas of frayed material, replace belt. Refer to the *Parts* section for belt part number information.

2. Cleaning

Accumulation of dust, dirt or overspray may cause excessive wear and premature component failure. Inspect the interior of the machine periodically for cleanliness. Check on overspray build up on the take up and the V-belt. Clean if necessary. Any build up should be removed immediately. Lubricate all moving parts with the recommended lubricants after cleaning the machine.

If the vertical oscillator is located in an inherently dirty environment or if the overspray build up is excessive, consider a pressurizing unit for the machine. Contact your Nordson representative for more information on pressurizing units.

Section 6

Troubleshooting

Section 6
Troubleshooting

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

1. Introduction

This section contains troubleshooting procedures for the P311 vertical oscillator. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Problem	Possible Cause	Corrective Action
1. Excessive vibration	Defective carriage support blocks and guide rods	Check for excessive guide rod wear, replace if necessary.
		Check support block adjustment, readjust if necessary.
		Lubricate support blocks.
		Check for missing ball bearings in support blocks.
	Low oil level in gear reducer	Check for proper oil level.
	Worn pulleys	Check condition of belt, replace if necessary.
		Verify that pulleys are securely fastened to motor and reducer shafts.
		Check if pulleys are worn or damaged.
		Replace worn and/or defective parts as required.
	Loose crank arm	Check lock down bolts on crank arm.

1. Introduction (contd.)

Problem	Possible Cause	Corrective Action
2. Oscillator will not start	Motor does not start	Check all electrical connections leading to the motor and verify that proper line voltage is supplied to the motor.
		Check all motor circuit breakers.
		Check if motor is freely turning over. Motor should be free from obstructions.
	Excessive load	Check that load does not exceed machine limits, reduce load if necessary.
	Blocked reducer	Verify that reducer is operating properly. Ensure that output shaft moves freely and does not bind.
		Check oil level in reducer and adjust if necessary.
	Worn pulleys	Check if belt is in place and in good operating condition.
		Check if pulleys are securely fastened to the motor and to the reducer. Check if pulleys are worn or damaged, replace defective and/or worn parts if necessary.

Section 7

Repair

Section 7
Repair

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

1. Introduction

This section provides repair instructions for the P311 vertical oscillator.

Shafts and Mounting Bearings

If the shafts and the bearings are replaced without the assistance of an authorized Nordson technician, the following instructions should be observed.

Disassembly

See Figure 7-1. If the shafts and the bearings are replaced without the assistance of an authorized Nordson technician, the following instructions should be observed.

NOTE: Replacement and adjustment of the shafts and mounting bearings are an exacting procedure. It is best accomplished by a trained and authorized Nordson technician.

1. Support the gun carriage (3) from the outside of the cabinet to take weight off the mounting bar bearings (21, 23).

2. Place a support that is 1 inch shorter than the distance from where the gun arm is to be supported, and lower the carriage plate (22) on to the support.

The one inch space facilitates reassembly of the carriage drive components.

NOTE: There is no support for the carriage plate, once the reducer is removed.

3. Secure the carriage plate (22) reliably by placing a two-piece one inch bore clamp collar on the shaft below the bearing pillow block on each side.

Disassembly *(contd.)*

This measure prevents the carriage plate from falling and causing damage and injury.

NOTE: Extreme care must be taken to insure that the support is secure, to prevent the carriage from slipping.

4. Remove shafts one at a time.

   NOTE: Do not remove both shafts simultaneously. Three shaft support blocks (17) are fastened to the inside of the frame on both sides. They retain the shafts. Do not remove the blocks from the frame. The blocks were shimmed to set the proper spacing of the shafts.

5. Loosen the socket head clamping screws on each block, located at the front of each shaft support block.

6. Remove the plastic tube cap (1) on top of the oscillator and slide the shafts out through the top of the oscillator.

7. Inspect the mounting bar bearings (21, 23).

If the shafts are worn, the bearings should be replaced. Changing the shafts and the bearings at the same time eliminates unnecessary down time.

8. Remove bearing by removing the four socket head cap screws from each bearing. Install the new bearing but do not tighten at this time.

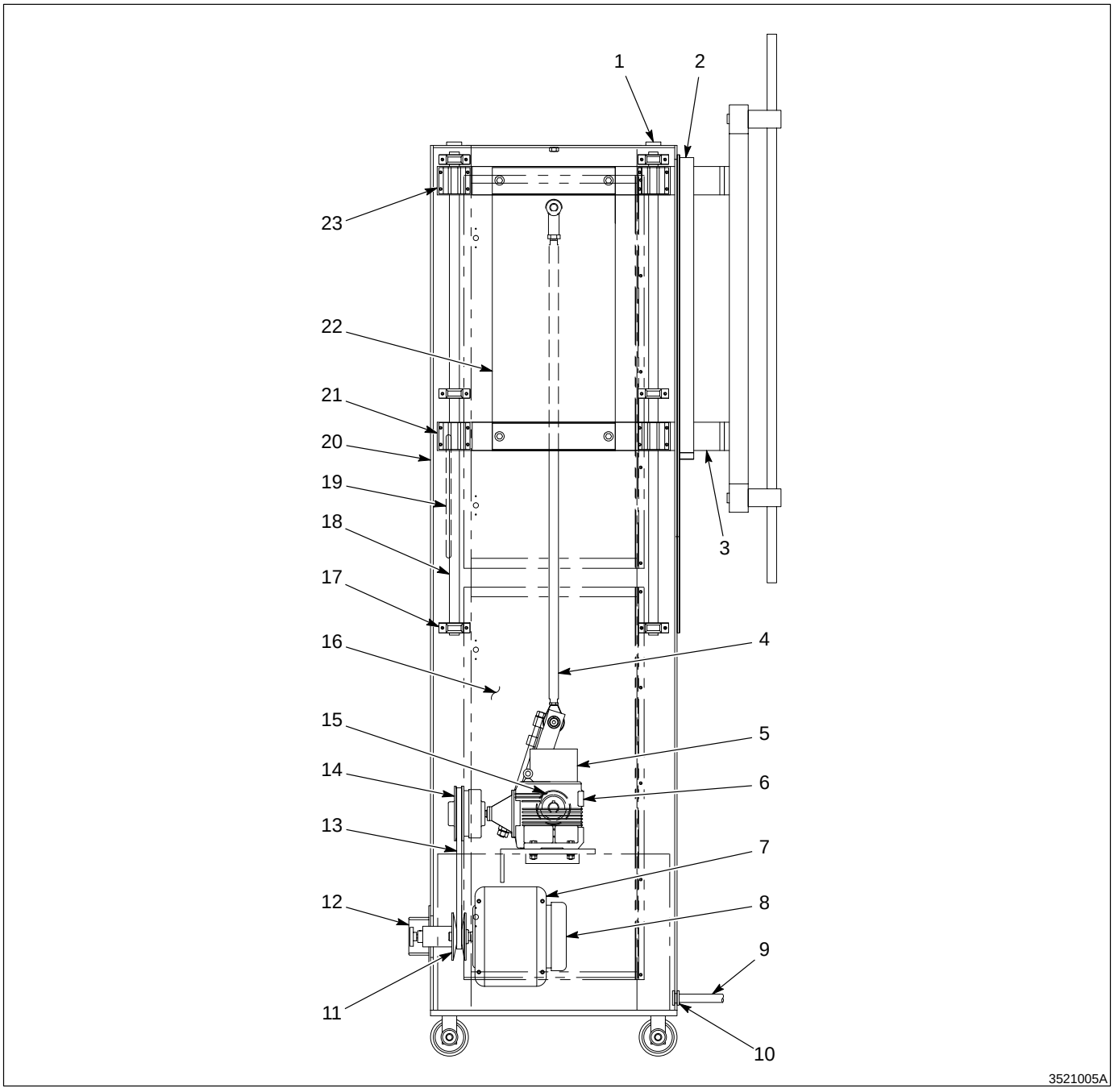

Fig. 7-1 Nordson vertical oscillator

1. Tube cap
2. Lip splitter
3. Gun carriage
4. Connecting link
5. Crank arm assembly
6. Gear reducer
7. Motor
8. Motor base
9. Conduit
10. Grommet
11. Motor pulley
12. Torque arm retainer
13. V-belt
14. Reducer pulley
15. Bushing
16. Lower door
17. Shaft support block
18. Shaft
19. Handle
20. Frame
21. Lower mounting bar bearing
22. Carriage plate
23. Upper mounting bar bearing

Assembly

1. See Figure 7-1. Install the new shafts (18) through the holes on top of the cabinet. Carefully insert the shafts through the shaft support blocks (17).

   NOTE: If not installed properly, the support blocks can scratch the shafts.

2. Re-tighten the clamping screws on each of the three support blocks, once the new shafts are in place. Replace tube caps (1) on top of the oscillator and lubricate the mounting bearings.

3. Run the gun carriage (3) up and down manually to let the bearing float to its slot position on the gun carriage. Tighten the four bolts on each mounting bar bearing (21, 23), ensuring that there is no binding on the bearings.

4. Remove all gun arm or carriage plate supports.

Adjustments

1. See Figure 7-1. Run the carriage plate (22) through the entire stroke by hand before starting the oscillator, ensuring that the proper adjustment is maintained throughout the entire stroke length.

   NOTE: The carriage can be moved manually by turning the V-belt (13) by hand.

2. Inspect the adjustments again to make certain that there is no bind at any point in the stroke.

   NOTE: The guide posts must be parallel to each other. If this is not the case, shim under the shaft support blocks as necessary.

3. Check the bearing pillow blocks to make certain they do not apply any force to the shafts.

4. Shim or adjust in the slots as necessary.

5. Control the carriage motion manually.

Gear Reducer

The gear reducer is located behind the lower access door.

Disassembly

1. See Figure 7-1. Stop the oscillator at the highest point of the stroke, providing maximum amount of room to work on the gear reducer (6).

2. Support the gun carriage (3) and the gun arm as described under *Shafts and Mounting Bearings, Disassembly* and *Assembly.*

3. Detach the connecting link (4) assembly from the crank arm assembly (5).

4. Remove the crank arm assembly, note the location of the crank arm on the reducer shaft for later installation.

5. Remove the crank arm assembly (5) by removing the two set screws in the crank arm hub. There is one other tapped hole without presently installed set screws. This set screw is used to remove the crank arm.

6. Install one of the just removed set screws into the one tapped hole that previously had no bolts in it.

   NOTE: The installation of this one set screw will start prying the crank arm off the reducer shaft.

7. After installing the one set screw as far as possible, remove the crank to pry off the crank arm all the way.

8. Remove the V-belt (13) from the pulleys (11, 14). The pulleys are adjustable, which facilitates the removal of the belt.

9. Loosen the four reducer bolts and remove the gear reducer (6).

Assembly

NOTE: The gear reducer weighs approximately 22.7 kg (50 lb). Use extreme care in removing the unit. The use of a portable crane is recommended.

1. Install the new gear reducer. Install the reducer bolts but do not tighten them at this point.
2. Install the reducer pulley on the new gear reducer and align the pulley parallel with the motor pulley and tighten the reducer bolts.
3. Install the V-belt on the pulleys.
4. Install the crank arm assembly (5) on the reducer shaft.
5. Re-attach the connecting link (4) to the crank arm assembly (5), ensuring that the connecting link parallels the carriage plate (22) assembly.
6. Remove the carriage plate supports prior to starting the machine.
7. Remove all tools from the machine prior to starting.

NOTE: Verify that the breather plug is installed in the new reducer in place of the Allen head pipe plug.

Connecting Link

The connecting link connects the carriage with the crank.

Disassembly

1. See Figure 7-1. Support the carriage and the gun arm as described under *Shafts and Mounting Bearings, Disassembly* and *Assembly*.
2. Unbolt the connecting link (4) from the carriage and the crank. Note the placement of the spacers used to install this link.

   NOTE: The proper center distance between bearings is 1.38 m ($54\frac{3}{8}$ in.).

Assembly

1. Reinstall the link, remove supports and manually check the motion of the carriage.
2. Supply power to the vertical oscillator.

Section 8

Parts

Section 8
Parts

1. Introduction

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

Using the Illustrated Parts List

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

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

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

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

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

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

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

2. Vertical Oscillator

See Figure 8-1.

Item	Part	Description	Quantity
- - - - - -	222 347	Oscillator, vertical P311	1
1	183 938	• Bearing, pillow block, 1 inch bore	4
2	183 933	• Reducer, helical wrm 76.36:1	1
3	183 934	• Motor, 1 HP, 1725 rpm, TEFC, 143T	1
4	183 935	• Pulley, motor, variable pitch, $^{7}/_{8}$ inch bore	1
5	183 937	• Belt, V, B section, B36	1
6	183 936	• Pulley, reducer, variable pitch, $^{5}/_{8}$ inch bore	1
7	183 939	• Bearing, rod, end, $^{3}/_{4}$	1
8	183 940	• Bearing, rod, end, $^{3}/_{4}$	1

2. Vertical Oscillator (contd.)

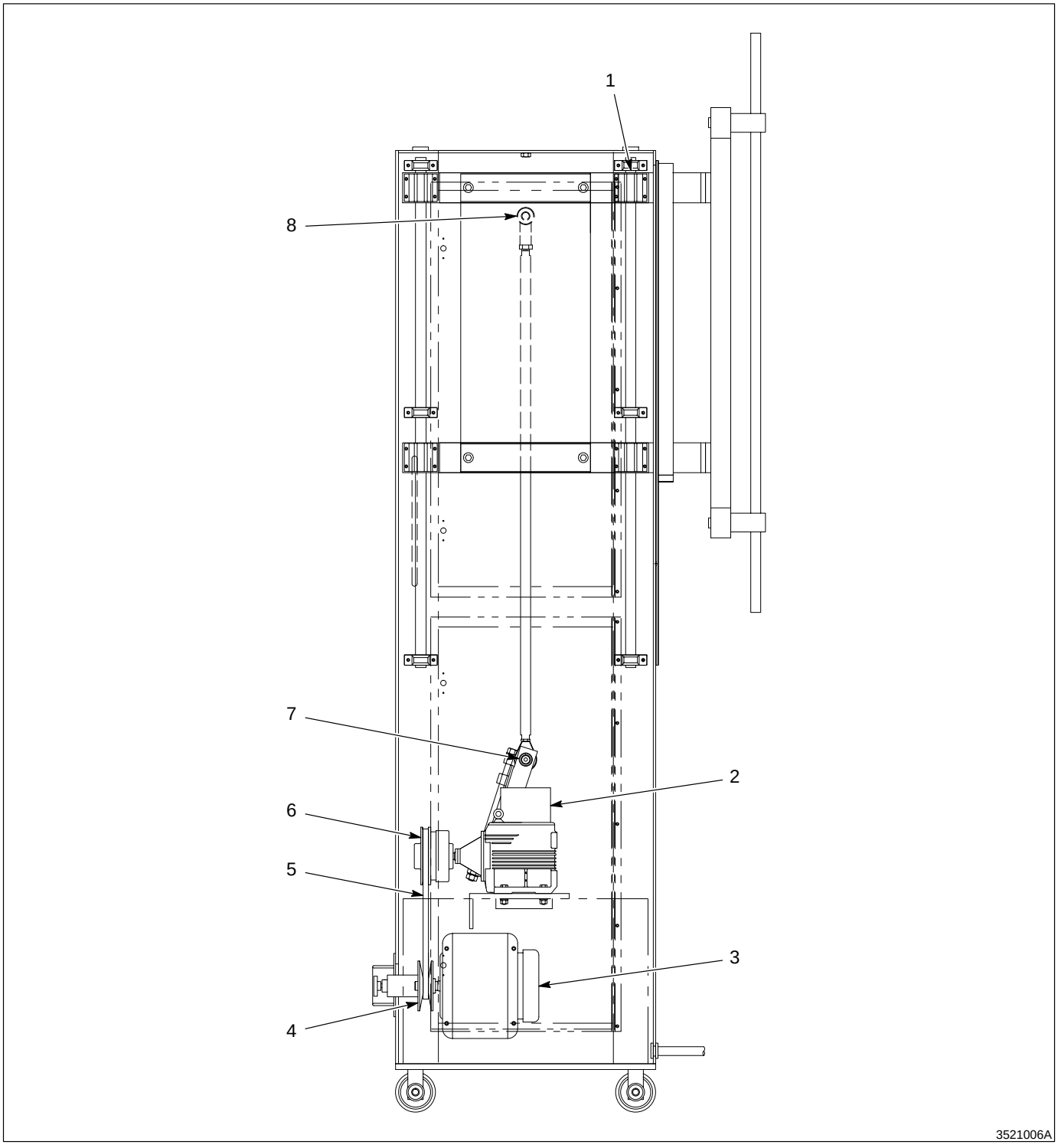

Fig. 8-1 Vertical oscillator illustrated parts

Section 9

Specifications

Section 9
Specifications

1. Technical Data

This section provides specification information for the P311 vertical oscillator.

Table 9-1 Machine Specifications

Oscillator	
Power supply	230/460/3 PH/60 Hz standard, (120 V, 240 V, 380 V, 575 V and 50 V also available)
Motor	1725 rpm, 1 HP
Enclosure	TEFC
Frame	143T
Gun speed velocity range	8 cycles per minute min. (up and down) 39 cycles per minute max. (up and down)
Dimensions	
Height	2.47 m ($97\frac{5}{16}$ in.) on V-track base
Width	492 mm ($19\frac{3}{8}$ in.) at base 304 mm (12 in.) at gun slot height
Depth	660 mm (26 in.)
Working dimensions	
Stroke centerline from floor	1.8 m (71 in.)
Stroke length adjustment	152 mm to 457 mm (6 in. to 18 in.)
Payload at maximum stroke and speed	6 guns and supports 31.7 kg (70 lb)
Payload at minimum stroke and speed	12 guns and supports 90.7 kg (200 lb)