

# Vertical Oscillator

Customer Product Manual  
Part 334 602B



NORDSON CORPORATION • AMHERST, OHIO • USA

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# Vertical Oscillator

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## 1. Safety

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

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

### ***Qualified Personnel***

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

### ***Intended Use***

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

Some examples of unintended use of equipment include

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

### ***Regulations and Approvals***

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

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

**Personal Safety**

To prevent injury follow these instructions.

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

**Fire Safety**

To avoid a fire or explosion, follow these instructions.

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

- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

## Grounding

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.

### **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.

### **Action in the Event of a Malfunction**

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

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

### **Disposal**

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



## 2. Description

See Figure 1.

The Nordson vertical oscillator supports up to 12 automatic powder spray guns. The vertical oscillator moves the guns mounted to the gun carriage (6) up and down to allow more complete coverage of the parts inside the booth.

The oscillator has two handles (4), and mounts on a horizontal gun mover to move it on- and off-line. The guns are mounted to the gun carriage, which moves vertically along the lip splitter (1). The oscillator's internal components can be accessed through the access doors (3) on either side. The access doors are locked by latches (5).

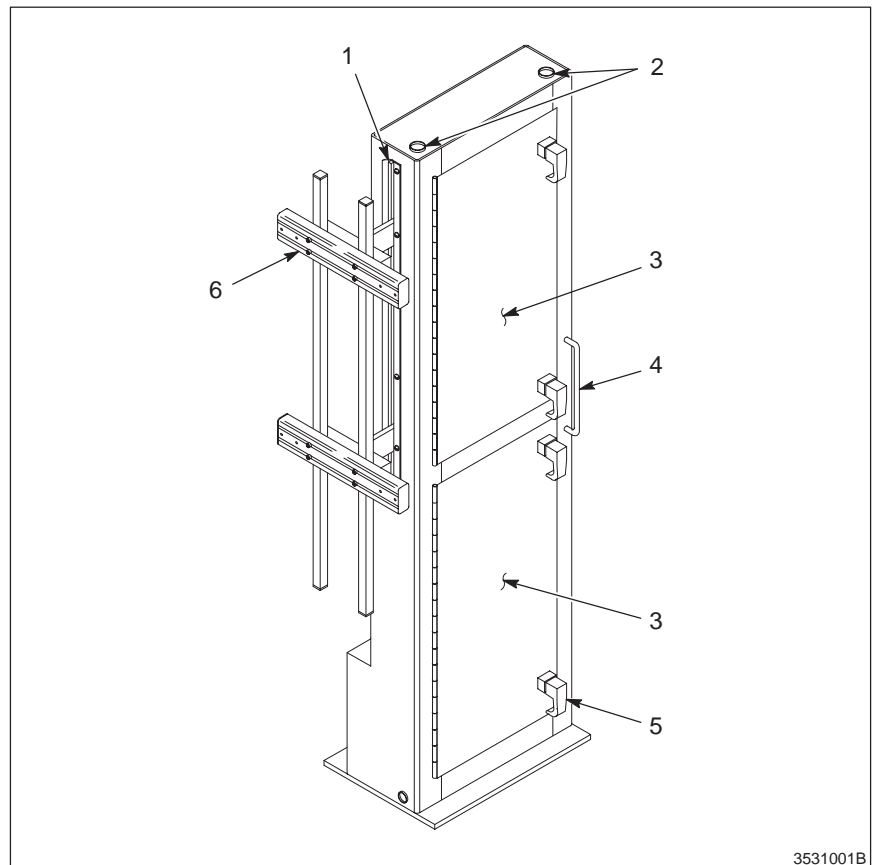


Fig. 1 Vertical Oscillator

- |                 |                 |
|-----------------|-----------------|
| 1. Lip splitter | 4. Handle       |
| 2. Tube cap     | 5. Door latch   |
| 3. Access doors | 6. Gun carriage |

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### **3. Installation**

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

This section explains receiving, unloading, and installation instructions. All Nordson vertical oscillators are inspected and attached to a pallet before shipping.

#### ***Reporting Damage***

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

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

After removing the oscillator, 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 about 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.

#### ***Ship-With Items***

The following items are shipped with the oscillator. Contact your Nordson representative if you did not receive any of these items.

- this manual (*Vertical Oscillator*, manual number 35-31)
- $\frac{5}{8}$ -11 bolts (quantity: 2)
- flat washers (quantity: 2)

## Unloading



**WARNING:** Use approved and tested lifting equipment capable of lifting 635 kg (1400 lb) or more. Failure to observe this warning could result in property damage, injury, or death.

**NOTE:** Save the screws and washers when you remove the lower shipping bracket. Use this hardware and the  $\frac{5}{8}$ -11 bolts and washers shipped with the oscillator to secure the oscillator to a horizontal gun mover.

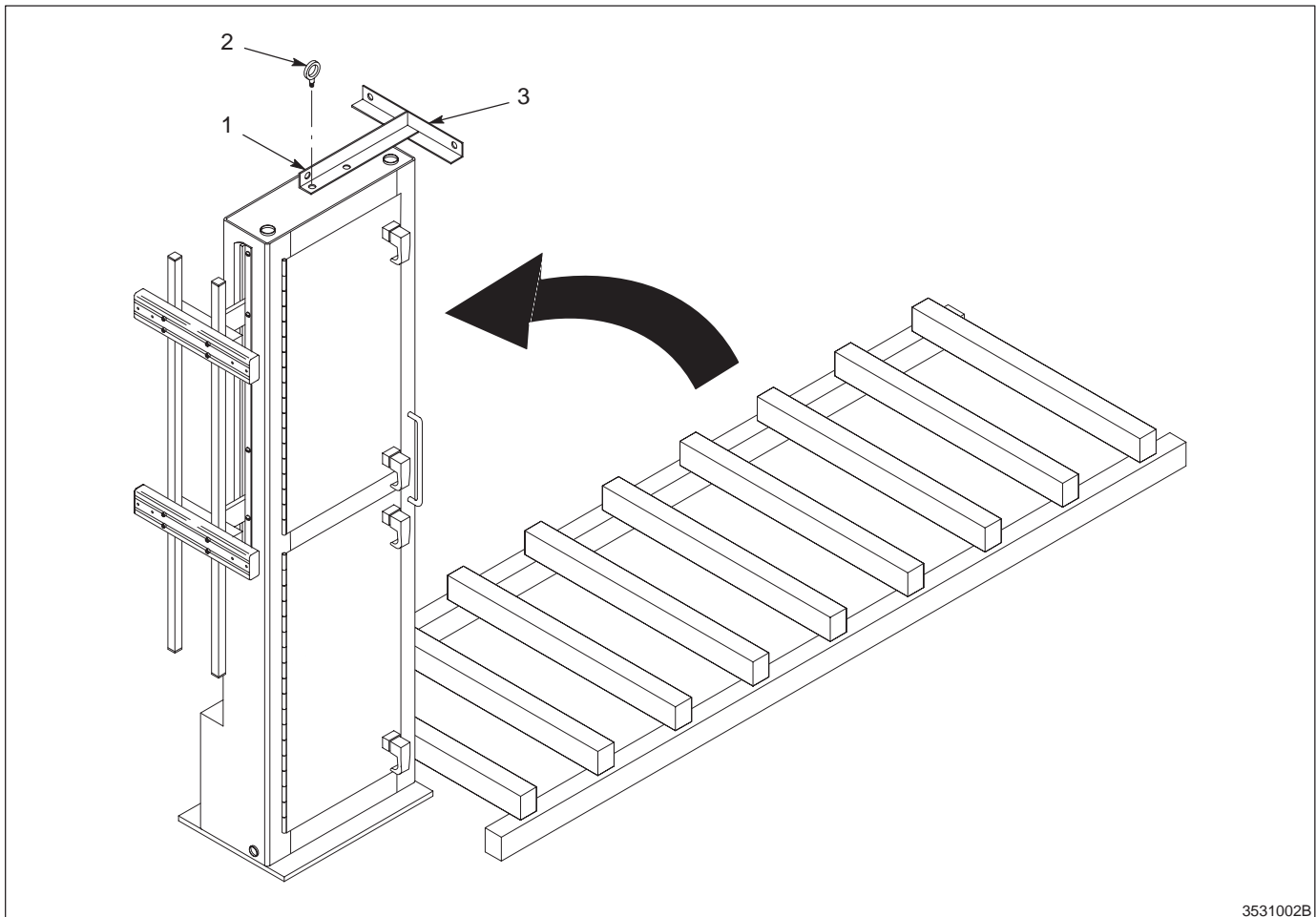
See Figure 2.

1. Remove the bottom shipping bracket from the oscillator.

**NOTE:** At this time, do not remove the upper shipping bracket from the oscillator.

2. Remove the hex head screws securing the upper shipping bracket to the pallet.
3. Secure lifting hardware to the oscillator using one of the following methods:
  - Install a shackle through the lifting hole in the upper shipping bracket (3).
  - Remove the upper shipping bracket from the oscillator and install a  $\frac{5}{8}$ -11 UNC eye bolt (2) into the weld nut (1) in the top plate.
4. Attach lifting equipment to the shackle or eye bolt and carefully lift the oscillator off the pallet. Stand the oscillator upright and place it on the floor or on a pre-installed horizontal gun mover.
5. Remove the upper shipping bracket or eye bolt. Plug the hole in the top with the bolt used to secure the shipping bracket.

**Unloading** (contd)



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Fig. 2 Unloading the Oscillator

1. Lifting hole

2. Eye bolt

3. Shipping bracket

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## 4. Operation

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



**WARNING:** Make sure that no loose clothing, jewelry, or long hair becomes entangled in the oscillator or its components. Failure to observe this warning could result in personal injury or death.

### Introduction

This section provides operating procedures for the Nordson vertical oscillator. The oscillator's only control is the speed adjusting knob on the lower rear end of the oscillator. The oscillator is powered up externally.

### Daily 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.



**WARNING:** Never open the access doors while the oscillator is operating. Do not operate the oscillator with the access doors open. Failure to observe this warning may result in equipment damage or personal injury.

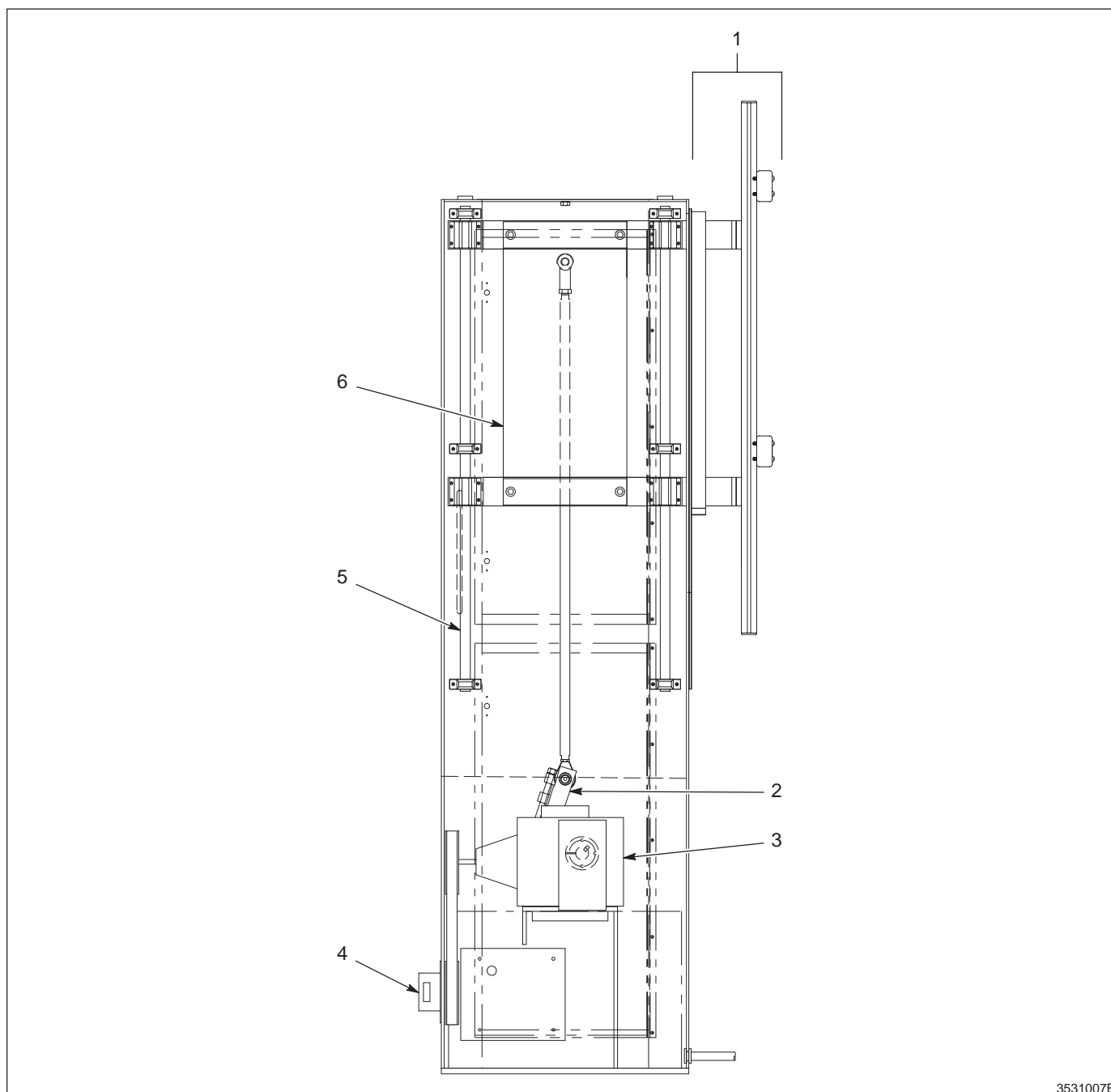
See Figure 1.

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

See Figure 3.

2. Inspect the areas around the carriage plate (6) and guide rods (5) for foreign objects.
3. Check the oil level in the gear reducer (3). Add oil if necessary.
4. Close upper and lower access doors and turn on the power to the oscillator.

**Startup** (contd)



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Fig. 3 Oscillator Operation

- |                       |                       |                   |
|-----------------------|-----------------------|-------------------|
| 1. Gun carriage       | 3. Gear reducer       | 5. Guide rods     |
| 2. Crank arm assembly | 4. Speed control knob | 6. Carriage plate |

## Stroke Adjustment



**WARNING:** Disconnect and lock out electrical power before performing the following tasks. Failure to observe this warning may result in property damage, personal injury, or death.



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



**CAUTION:** Contact your Nordson representative before making adjustments to the connecting linkage. Failure to observe this caution may result in equipment damage.

See Figure 3.

1. Disconnect and lock out electrical power to the oscillator.
2. Open the access doors.
3. Loosen the two  $\frac{3}{8}$ -16 in. hex head locking bolts on the crank arm (2) adjusting clamp.
4. Adjust the position of the roller stud bar by turning the  $\frac{1}{2}$ -13 hex head adjusting screw on the crank arm. Turn the adjusting screw clockwise for a shorter stroke and counterclockwise for a longer stroke.
5. Tighten the two  $\frac{3}{8}$ -16 in. hex head locking bolts on the crank arm adjusting clamp.
6. Check the gun carriage (1) for any possible interference resulting from the new stroke length.
7. Remove all tools from the oscillator.
8. Reconnect the power to the oscillator.
9. Test the new stroke adjustment to make sure that parts going through the booth will be covered by the gun stroke.

### Maximum Gun Arm Loading

See Figure 4.

The vertical oscillator is designed to carry a maximum gun arm load of 90 kg (200 lb) at stroke lengths of up to 25.5 cm (10 in.). At stroke lengths exceeding 23 cm (9 in.), the maximum gun arm loading is proportionately reduced. Figure 4 illustrates the maximum allowable load at varying stroke lengths.

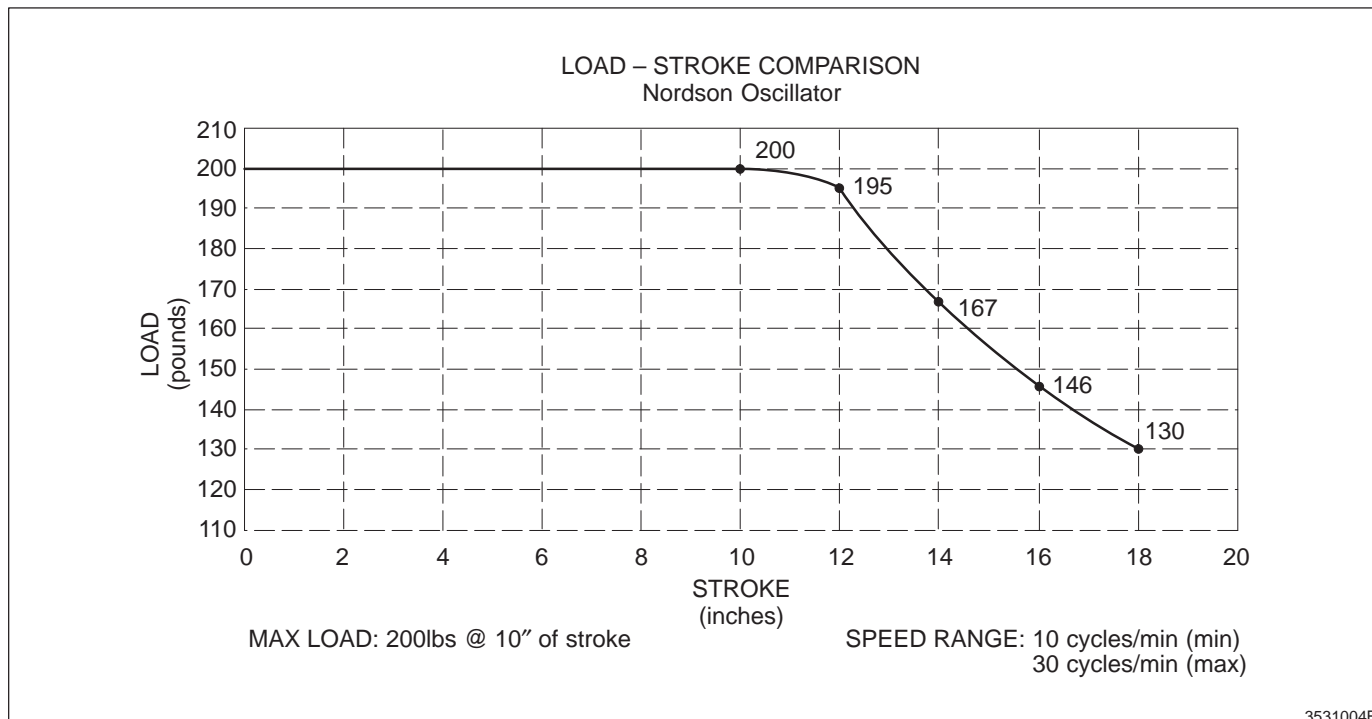


Fig. 4 Load-Stroke Comparison Chart



## Speed Adjustment

**NOTE:** The oscillator must be operating while you adjust the speed.

See Figure 3.

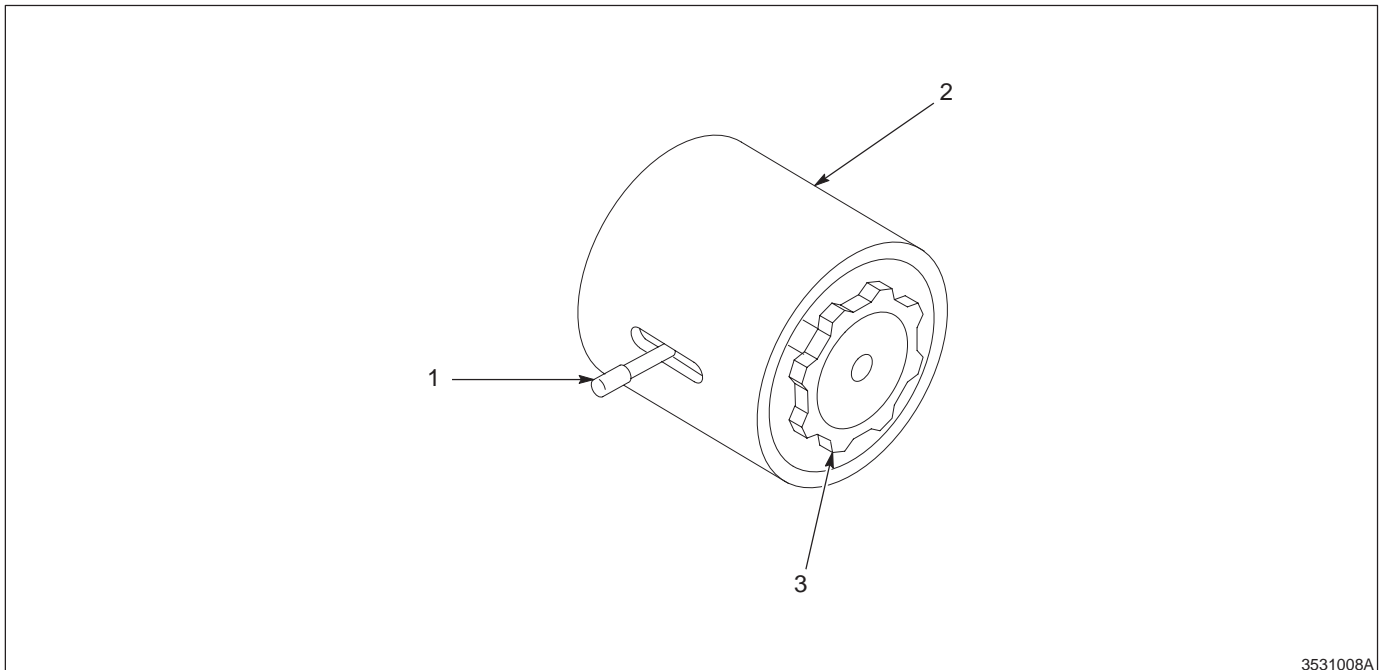
The speed control knob (4) for the variable speed pulley is located on the lower rear portion of the oscillator.

See Figure 5.

The torque arm (1) maintains the speed control knob (3) setting while the motor is operating. Turn the speed control knob to adjust the oscillator speed.

**NOTE:** Measure the speed by counting the stroke cycles. A stroke cycle equals both the up and down motion.

- Turn the knob counterclockwise to increase the oscillator speed.
- Turn the knob clockwise to decrease the oscillator speed.



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Fig. 5 Speed Control Knob

1. Torque arm

2. Control knob housing

3. Speed control knob

**Speed Adjustment** (contd)

See Figure 6.

The maximum allowable carriage speed is 110 fpm. The minimum allowable carriage speed is 6 fpm. The two shift operation speed limit is 100 fpm at full stroke.

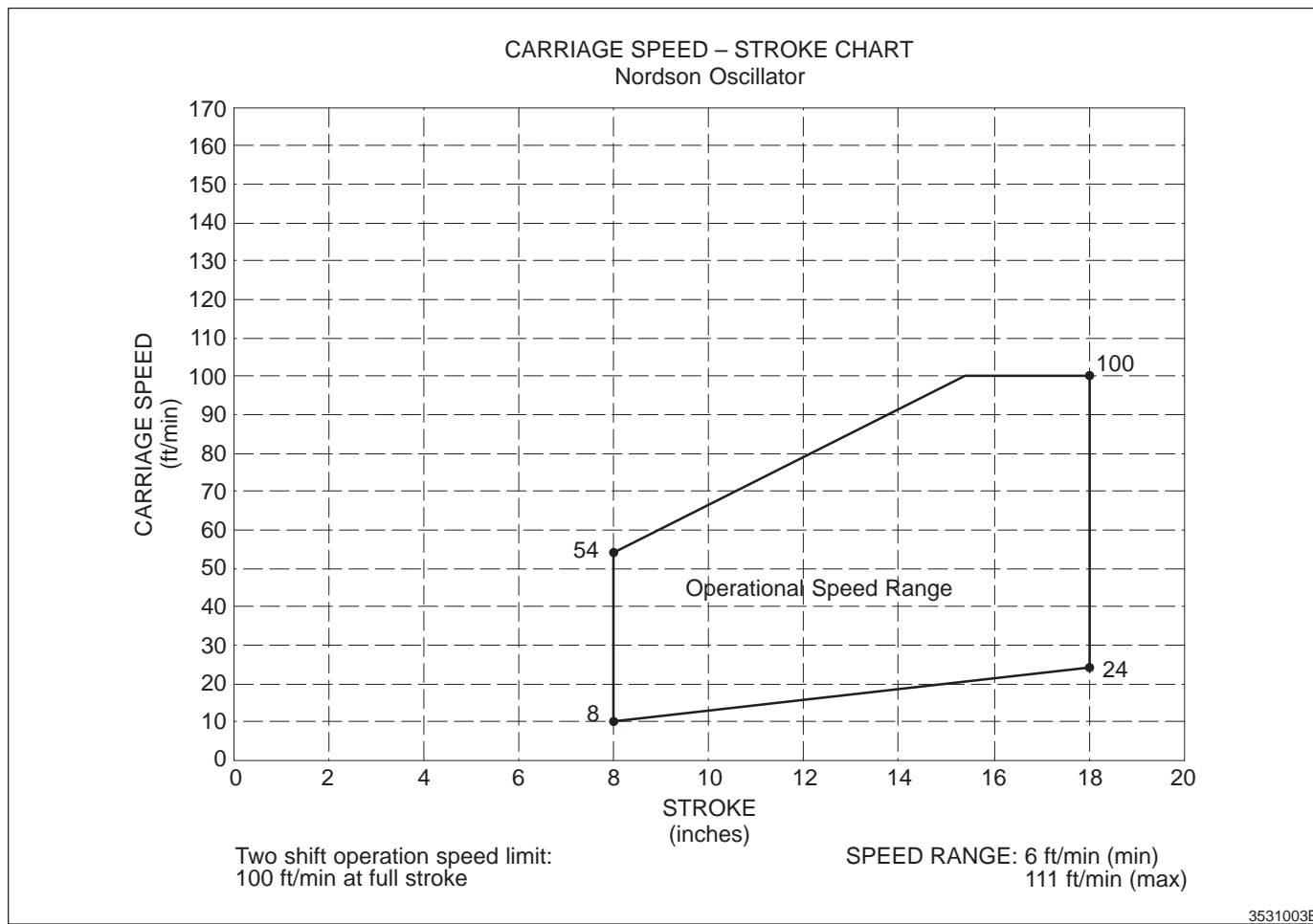


Fig. 6 Carriage Speed/Stroke Chart

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## 5. Maintenance

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



**WARNING:** Disconnect equipment from the line voltage before servicing the equipment. Failure to observe this warning may result in a severe shock.

### ***Introduction***

This section provides lubrication and maintenance instructions for the Nordson vertical oscillator. Perform maintenance and lubrication procedures according to the recommended intervals. Refer to the *Repair* section for disassembly and rebuilding instructions.

### ***General Cleaning***

Accumulation of dust, dirt or overspray may cause excessive wear and premature component failure. Inspect the interior of the oscillator periodically for cleanliness. Check for overspray build up and slack in the V-belt. Clean and adjust the belt as necessary. Lubricate all moving parts with the recommended lubricants after cleaning the oscillator.

If the oscillator is located in an inherently dirty environment or if the overspray build up is excessive, consider installing a pressurizing unit. Oscillators with built-in pressurizing units are available. Contact your Nordson representative for more information.

**Gear Reducer**

[See Figure 3.](#)

The gear reducer (3) is located behind the lower access door.

***Operating Temperature***

Normal operating temperature of the gear reducer is less than 80 °C (175 °F). During the initial break-in period, temperatures may rise above 80 °C (175 °F). If the temperature exceeds this temperature for more than 100 hours, contact your Nordson representative.

***Oil Changing Intervals***

**NOTE:** When you change the oil in the gear reducer, be sure to pack the bearings with new grease.

The gear reducer requires 0.838 l (0.885 qt) of polyglycol base synthetic oil. Pack the bearings  $\frac{1}{3}$  full with synthetic grease.

Change the oil in the gear reducer every 20000 service hours or four years, whichever comes first. If the oscillator is operating under extreme conditions (in high humidity, a dirty environment, or varying temperatures), change the oil every 10000 service hours.

**Motor**

[See Figure 7.](#)

The motor (12) is located inside, behind the lower access door.

Make sure that the grille over the fan on the rear of the motor is clear of dirt and powder.

**Gun Carriage**

[See Figure 7.](#)

Once each week, lubricate the carriage guide rods (5) with a light to medium film of either synthetic or mineral oil. Use a non-silicone, 20-weight oil, such as Citgo or Mobil One.

The carriage guide rods should be clean and free from any dirt or powder buildup when the carriage bearings are lubricated. Inspect the carriage guide rods periodically for excessive wear. Clean the guide rods. Evidence of deep grooves in the guide rods indicate that either the carriage bearings or the guide rods are out of alignment.

**Connecting Link Bearings**

[See Figure 7.](#)

The connecting link (16) connects the carriage plate (6) to the crank arm assembly (8) on the gear reducer (14). Lubricate the

- upper end (carriage plate) bearing every 200 hours with a high quality, lithium based multi-purpose grease.
- external rod end contact areas of both bearings to prevent noise and heat buildup.

**Crank Arm**

[See Figure 7.](#)

Check for loose nuts and bolts on the crank arm assembly (8). Tighten if necessary.

**V-Belt**

[See Figure 7.](#)

Inspect the V-belt (10) between the motor and the reducer periodically for cracks and fraying. If the belt is cracked or frayed, replace it. Refer to the *Parts* section for ordering information.

**6. Troubleshooting**

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

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

Problem	Possible Cause	Corrective Action
<b>1. Excessive vibration</b>	Defective carriage guide rods and support blocks	<p>Check for excessive guide rod wear. Replace the guide rods if necessary.</p> <p>Check the alignment of the support blocks. Adjust the support blocks if necessary.</p> <p>Lubricate the carriage guide rods.</p> <p>Check for missing ball bearings in the carriage bearings.</p>
	Low oil level in gear reducer	Check for proper oil level.
	Worn pulleys	<p>Check the condition of the V-belt. Replace the V-belt if necessary.</p> <p>Verify that the pulleys are securely fastened to the motor and gear reducer shafts.</p> <p>Check the pulleys for any wear or damage.</p> <p>Replace any worn and/or defective parts as necessary.</p>
	Loose crank arm	Check the lock down bolts on the crank arm.

Problem	Possible Cause	Corrective Action
<b>2. Oscillator will not start</b>	Motor does not start	<p>Check all electrical connections leading to the motor. Verify that the proper line voltage is supplied to the motor.</p> <p>Check all motor circuit breakers.</p> <p>Check motor rotation. The motor should be free from obstructions.</p>
	Excessive load	Check the load. Reduce the load if it exceeds the oscillator's limits.
	Blocked gear reducer	<p>Verify that the gear reducer is operating properly. Make sure that the output shaft moves freely and does not bind.</p> <p>Check the oil level in the gear reducer. Add oil as necessary.</p>
	Worn pulleys	<p>Make sure that the V-belt is in place and in good operating condition.</p> <p>Make sure that the pulleys are securely fastened to the motor and gear reducer. Check the pulleys for wear or damage. Replace defective and/or worn parts if necessary.</p>
	Speed control knob too tight	If the motor is humming but not turning, turn the speed control knob clockwise until the oscillator starts. Adjust the oscillator to the proper speed after it starts.
<b>3. Speed changes by itself</b>	Loose set screw on motor pulley	Contact your Nordson representative.

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## 7. Repair

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



**WARNING:** Disconnect equipment from the line voltage before servicing the equipment. Failure to observe this warning may result in a severe shock.

### ***V-Belt Replacement***



**WARNING:** Be sure that the gun carriage is secure before removing any parts. When the V-belt is removed, nothing will be supporting the carriage plate. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

Use the following procedures to replace the V-belt.

#### ***Removing the V-Belt***

[See Figure 7.](#)

1. Start the oscillator.
2. While the oscillator is operating, turn the speed control knob clockwise as far as possible. This will cause the V-belt to loosen.
3. Shut down the oscillator and disconnect and lockout system power.
4. Support the gun carriage by placing 5 x 10 cm (2 x 4 in.) pieces of wood between the bottom of the carriage plate (6) and the bottom of the upper door housing.
5. Remove the torque arm from the speed control knob.
6. Mark the location of the motor (12) mounting bolts on the motor mounting bracket. You will use this mark as a reference when installing the motor.
7. Remove the screws and nuts securing the motor to the motor bracket.
8. Carefully raise the motor to remove the V-belt (10), then remove the motor from the oscillator and set it aside.
9. Remove the V-belt from the pulleys (9, 11).

**NOTE:** It may be necessary to pry the V-belt off of the pulleys.



***Installing the V-Belt***

See Figure 7.

1. Install a new V-belt (10) on the gear reducer pulley (9).
2. Carefully lift the motor (12) into place and slide the V-belt onto the motor pulley (11).
3. Align the motor in its previous location on the motor bracket. Secure the motor using the screws and nuts.
4. Install the torque arm onto the speed control knob.
5. Remove the wood supporting the carriage plate.
6. Connect system electrical service and start the oscillator.
7. Turn the adjustment knob counterclockwise to tighten the V-belt.
8. Check the V-belt while the oscillator is operating.

**NOTE:** If the belt appears to be out of alignment, perform the *Pulley Alignment* procedure.

## ***Gun Carriage Bearing and Guide Rod Replacement***



**CAUTION:** Replacement and adjustments of the gun carriage bearings and guide rods is a procedure requiring great precision. It is best accomplished by a trained and authorized Nordson technician.

Use the following procedures to replace the gun carriage bearings and guide rods.

### ***Disassembly***

[See Figure 7.](#)

1. Open the oscillator access doors.



**WARNING:** Be sure that the gun carriage is secure before removing any parts. When the guide rods are removed, nothing will be supporting the carriage plate. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

2. Support the gun carriage (1) from the outside of the cabinet to take weight off the gun carriage bearings (3, 7).
3. Place a support that is 2.5 cm (1 in.) shorter than the distance from where the gun carriage is to be supported, and lower the carriage plate (6) on to the support. The 2.5 cm (1 in.) space facilitates assembly of the carriage drive components.

**NOTE:** Three guide rod support blocks (4) 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.

4. Loosen the socket head clamping screws located on the front of each guide rod support block.

5. Remove the plastic tube caps (2) on top of the oscillator and slide the carriage guide rods out through the top of the oscillator.

**NOTE:** Remove the carriage guide rods one at a time.

6. Inspect the gun carriage guide rods and bearings (3, 7). If the guide rods are worn, the bearings should be replaced. Changing the shafts and the bearings at the same time eliminates unnecessary down time.
7. If you are replacing the gun carriage bearing, remove each one by removing its four socket head cap screws. Install the new bearing but do not tighten the screws at this time.

### **Assembly**

See Figure 7.



**CAUTION:** Use caution when installing the guide rods. If not installed properly, the support blocks can scratch the guide rods.

1. Install the new guide rods (5) through the holes on top of the cabinet. Carefully insert the guide rods through the guide rod support blocks (4).
2. After the new guide rods are in place, tighten the clamping screws on each of the three support blocks. Replace the tube caps (2) on top of the oscillator and lubricate the gun carriage bearings.
3. Move the gun carriage (1) up and down manually to let the bearing float to its slot position on the gun carriage. Tighten the four bolts on each gun carriage bearing (3, 7), making sure that there is no binding on the bearings.
4. Remove all gun arm or carriage plate supports.

### ***Adjustments***

See Figure 7.

**NOTE:** The gun carriage can be moved manually by turning the V-belt (10) by hand.

1. Before starting the oscillator, move the gun carriage (1) through the entire stroke by hand, making sure that the proper adjustment is maintained throughout the entire stroke.
2. Inspect the adjustments again to make certain that there is no bind at any point in the stroke.

**NOTE:** The guide rods must be parallel to each other within 0.015 in. If this is not the case, shim under the shaft support blocks as necessary.

3. Check the bearings (3, 7) to make sure they do not apply any force to the guide rods. Shim or adjust the slots as necessary.
4. Check the gun carriage motion manually.

## Gear Reducer



**WARNING:** Do not make adjustments to the connecting link. Failure to observe this warning may cause the carriage plate to crash into the guide rod support blocks, causing property damage, personal injury, or death.

Use the following procedure to replace the gear reducer.

### Disassembly

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 (14).



**WARNING:** Be sure that the gun carriage is secure before removing any parts. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

2. Support the gun carriage (1) from the outside of the cabinet to take weight off the gun carriage bearings (3, 7).
3. Place a support that is 2.5 cm (1 in.) shorter than the distance from where the gun carriage is to be supported, and lower the carriage plate (6) on to the support. The 2.5 cm (1 in.) space facilitates assembly of the carriage drive components.
4. Secure the carriage plate by placing a two-piece 2.5-cm (1-in.) bore clamp collar on the carriage guide rod (5) below the lower gun carriage bearing (7) on each side. This measure prevents the carriage plate from falling and causing damage and injury.
5. Remove the connecting link (16) from the crank arm assembly (8).
6. Note the location of the crank arm on the gear reducer shaft for later installation. Remove the crank arm assembly by removing the three set screws in the crank arm hub (15). There are three other tapped holes without presently installed set screws. The holes and set screws are used to remove the crank arm.

**Disassembly** *(contd)*

7. Install the three set screws that you just removed into the three tapped holes that previously had no set screws in them. Tighten each set screw one turn at a time, alternating between the three set screws. Tightening the set screws will pry the crank arm off of the reducer shaft.
8. After installing the set screw as far as possible, pry off the crank arm.
9. Remove the V-belt (10) from the pulleys (9, 11). The pulleys are adjustable, which facilitates the removal of the V-belt.

**NOTE:** It may be necessary to pry the V-belt off of the pulleys.



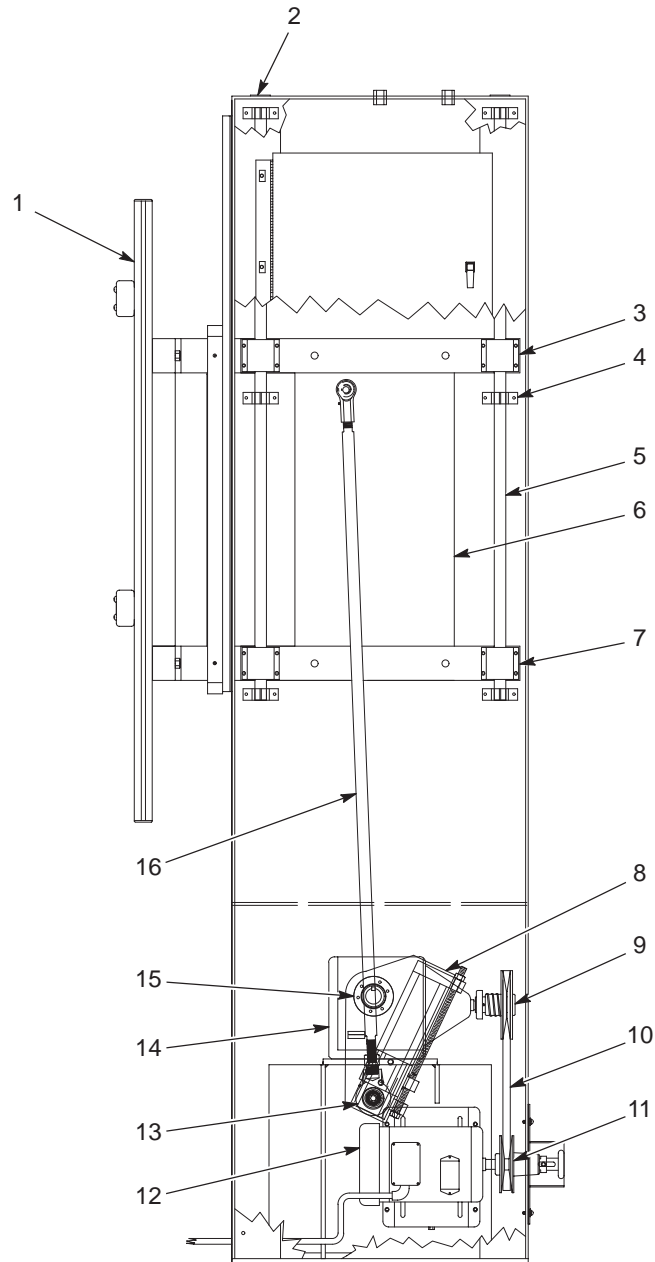
**WARNING:** The gear reducer weighs 23 kg (50 lb). Use caution when removing the gear reducer from the oscillator.

10. Loosen the four bolts and remove the gear reducer.

**Assembly**

See [Figure 7](#).

1. Install the new gear reducer (14) and secure it with the four bolts.
2. Align the motor pulley (11) so that it is parallel with the gear reducer pulley (9). Refer to *Pulley Alignment* for instructions.
3. Remove the set screws from the threaded holes in the crank arm hub (15). Install the set screws into the original holes in the crank arm hub. Tighten each set screw one turn at a time, alternating between the three set screws, until the crank arm hub is secure.
4. Install the crank arm assembly (8) on the gear reducer shaft.
5. Attach the connecting link (16) to the crank arm assembly, making sure that the connecting link is parallel to the carriage plate (6).
6. Remove the carriage plate supports.
7. Remove all tools from the oscillator.
8. Connect power to the oscillator.



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Fig. 7 Oscillator Repair

- |                               |                               |                     |
|-------------------------------|-------------------------------|---------------------|
| 1. Gun carriage               | 7. Lower gun carriage bearing | 12. Motor           |
| 2. Tube cap                   | 8. Crank arm assembly         | 13. Hanger bearing  |
| 3. Upper gun carriage bearing | 9. Gear reducer pulley        | 14. Gear reducer    |
| 4. Guide rod support block    | 10. V-belt                    | 15. Crank arm hub   |
| 5. Carriage guide rod         | 11. Motor pulley              | 16. Connecting link |
| 6. Carriage plate             |                               |                     |

## ***Pulley Alignment***

Use this procedure to align the motor pulley with the gear reducer pulley.



**CAUTION:** Do not hammer any of the pulley components during the alignment procedure. Hammering may damage the components and cause equipment failure.

### ***Preparation***



**CAUTION:** If you replace the gear reducer, a new pulley is already attached. Only adjust the gear reducer pulley if you are replacing the pulley on an existing gear reducer.

[See Figure 5.](#)

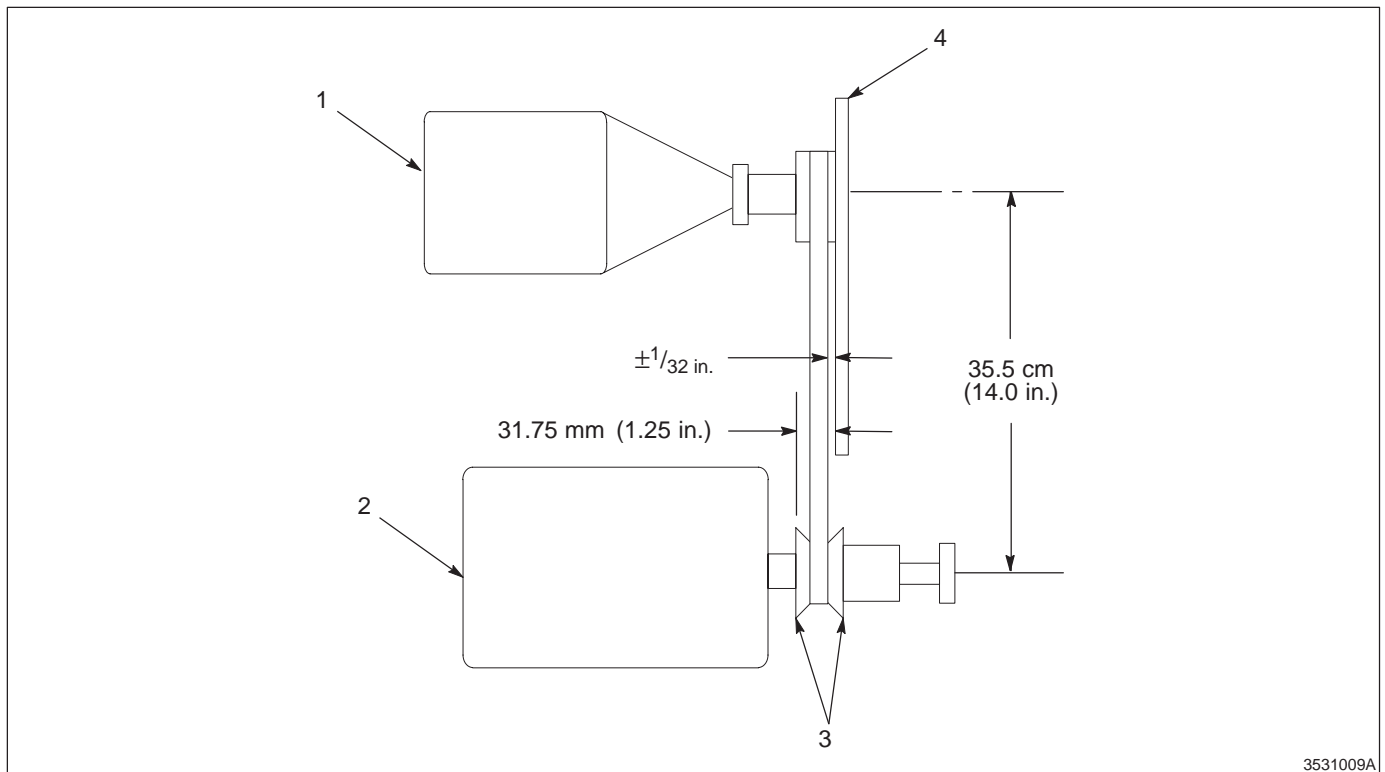
1. Make sure that the torque arm (1) is installed in the speed control knob (3).

2. [See Figure 8.](#)

Make sure that the motor (2) and gear reducer (1) shafts are parallel to each other with a center distance of 35.5 cm (14 in.) from each other.

3. Follow one of the following procedures, depending on what you are replacing:
  - If you are installing a motor, belt, or gear reducer assembly, follow the *Motor Pulley Alignment* procedure.
  - If you are replacing only the gear reducer pulley, follow the *Gear Reducer Pulley Alignment* procedure.





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Fig. 8 Pulley Alignment

1. Gear reducer
2. Motor

3. Motor pulley faces

4. Straight edge

### **Motor Pulley Alignment**

See Figure 8.

1. Turn the speed control knob until the motor pulley faces (3) are fully apart.
2. Loosen the motor pulley set screws and slide the pulley on the shaft to achieve the offset dimension. Make sure that the offset dimension is 31.75 mm (1.25 in.).
3. Install the belt onto the pulleys. Refer to *V-Belt Replacement* for instructions.
4. Turn the speed control knob until there is slight tension on the belt.

***Motor Pulley Alignment*** (contd)

5. Place a straight edge (4) against the outside face of the gear reducer pulley.

**NOTE:** Check the alignment at both the top and bottom of the belt.

6. Slide the motor pulley on the shaft as needed until the straight edge is parallel to the belt within  $\frac{1}{32}$  in.

**NOTE:** A difference in the distance between the belt and straight edge at the top versus the bottom indicates that the motor and gear reducer shafts are not parallel.

7. Tighten the motor pulley set screws.
8. After the set screws are securely tightened, recheck the belt alignment.
9. Start the oscillator and cycle through the speed range. Turn off the oscillator and recheck the alignment.

### ***Gear Reducer Pulley Alignment***



**CAUTION:** If you replace the gear reducer, a new pulley is already attached. Only adjust the gear reducer pulley if you are replacing the pulley on an existing gear reducer.

See Figure 8.

1. Slide the gear reducer (1) pulley onto the gear reducer shaft. Make sure that the offset dimension is 31.75 mm (1.25 in.).
2. Install the belt onto the pulleys. Refer to *V-Belt Replacement* for instructions.
3. Turn the speed control knob until there is slight tension on the belt.
4. Place a straight edge (4) against the outside face of the gear reducer pulley.

**NOTE:** Check the alignment at both the top and bottom of the belt.

5. Slide the gear reducer pulley on the shaft as needed until the straight edge is parallel to the belt within  $\frac{1}{32}$  in.

**NOTE:** A difference in the distance between the belt and straight edge at the top versus the bottom indicates that the motor and gear reducer shafts are not parallel.

6. Tighten the gear reducer pulley set screws.
7. After the set screws are securely tightened, recheck the belt alignment.
8. Start the oscillator and cycle through the speed range. Turn off the oscillator and recheck the alignment.

## **Connecting Link Replacement**

The connecting link connects the gun carriage to the crank arm assembly. Use the following procedure to replace the connecting link.



**WARNING:** Be sure that the gun carriage is secure before removing any parts. Failure to observe this warning may cause the carriage to slip, causing property damage, personal injury, or death.

See Figure 7.

1. Support the gun carriage (1) from the outside of the cabinet to take weight off the gun carriage bearings (3, 7).
2. Place a support that is 2.5 cm (1 in.) shorter than the distance from where the gun carriage is to be supported, and lower the carriage plate (6) on to the support. The 2.5 cm (1 in.) space facilitates assembly of the carriage drive components.
3. Secure the carriage plate by placing a two-piece 2.5 cm (1 in.) bore clamp collar on the carriage guide rod (5) below the lower gun carriage bearing (7) on each side. This measure prevents the carriage plate from falling and causing damage and injury.
4. Unbolt the connecting link (16) from the gun carriage plate and the crank arm assembly (8). Note the placement of the spacers used to install the connecting link.

**NOTE:** The center distance between the carriage plate bearing and hanger bearing (13) must be no more than 158.12 cm (62.25 in.).

5. Install the connecting link, remove the supports, and manually check the motion of the carriage.
6. Turn on power to the oscillator.

## 8. Parts

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

### Using the Illustrated Parts List

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

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

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

Item	Part	Description	Quantity	Note
—	000 0000	Assembly	1	A
1	000 000	• Subassembly	2	
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.

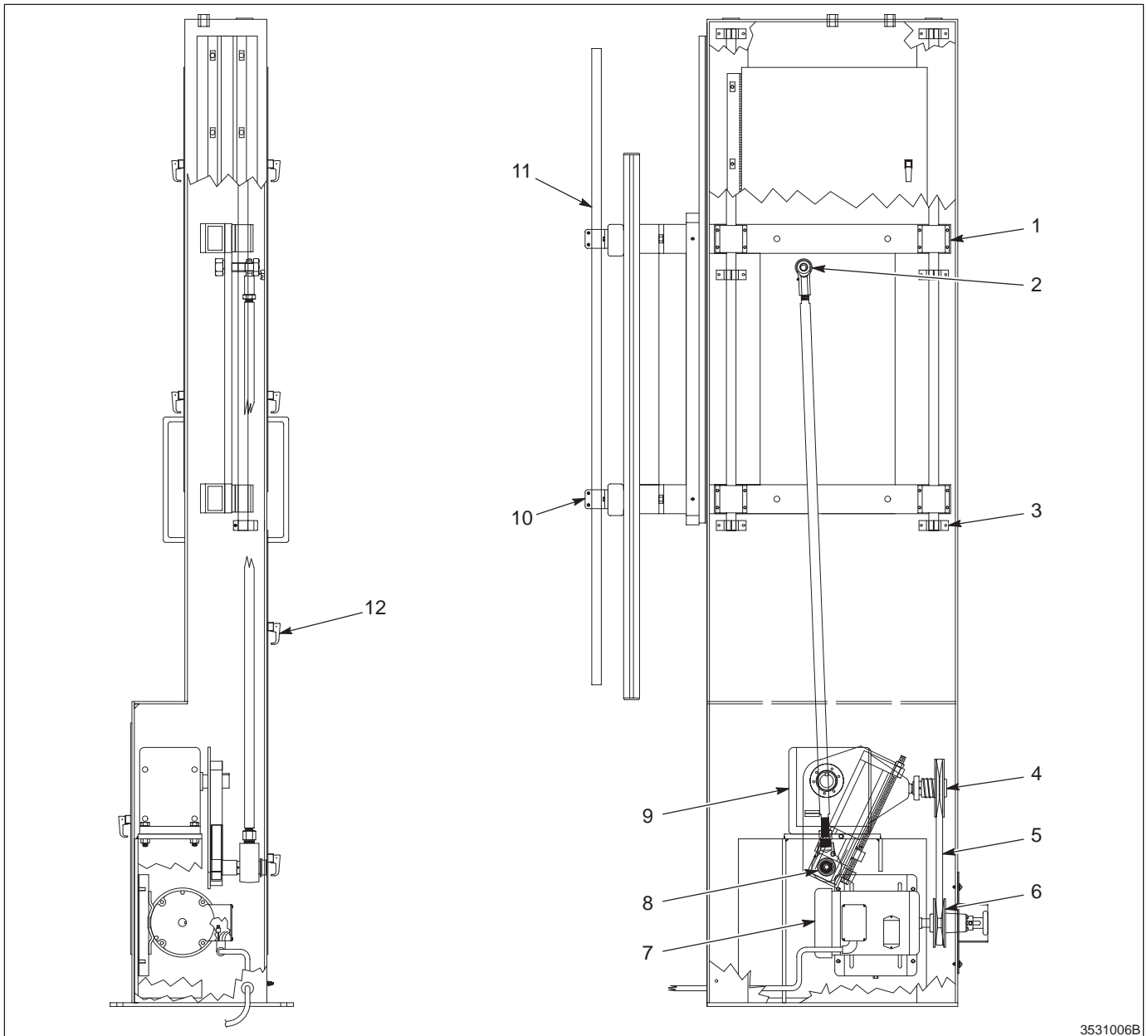
The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

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.

**Oscillator Parts**

See Figure 9.

Item	Part	Description	Quantity
—	333 513	Oscillator, vertical, Nordson	1
1	340 610	• Bearing, linear, with housing, 1 in. bore	4
2	340 616	• Bearing, rod, end, $\frac{3}{4}$ -in. bore	1
3	-----	• Shaft, support block, 1 in. dia	6
4	340 615	• Pulley, gear reducer, $\frac{3}{4}$ in. bore	1
5	100 0837	• Belt, V drive, B40, 41.8 in. pitch	1
6	340 613	• Pulley, motor, controllable, $\frac{7}{8}$ in.	1
7	340 612	• Motor, electric, 1800 rpm	1
8	100 5160	• Bearing, hanger, 1 in. bore	1
9	342 700	• Reducer, speed, helical-worm, with pulley	1
10	-----	• Clamp, flange, 1 in. bore block	4
11	-----	• Rod, 1 in. dia x 52 in. long	2
12	339 350	• Latch, small, $\frac{1}{4}$ turn, with 0.47 in. maximum grip	7



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Fig. 9 Oscillator Parts

## 9. Specifications

Refer to Table 1 for specifications of the vertical oscillator.

Table 1 Oscillator Specifications

<b>Oscillator</b>	
Power supply	Standard: 230/460 V, 3 phase, 60 Hz  Also Available: 120 V, 1 phase, 60 Hz 380 V, 3 phase, 50 Hz 380 V, 3 phase, 60 Hz 575 V, 3 phase, 60 Hz
Motor	1800 rpm, 1 <sup>1</sup> / <sub>2</sub> hp
Enclosure	TEFC
Frame	145T
Gun speed velocity range	Minimum: 10 cycles per minute (up and down)  Maximum: 30 cycles per minute (up and down)
<b>Dimensions</b>	
Height	277.4 cm (109.2 in.) on gun mover
Width	48.26 cm (19.0 in.) at base 216 mm (8.5 in.) at gun slot height
Depth	660 mm (26 in.)
<b>Working Dimensions</b>	
Stroke center line from floor	190.5 cm (75 in.) without gun mover 208.8 cm (82.2 in.) with gun mover
Stroke length adjustment	203.2–457 mm (8–18 in.)
Payload at maximum stroke and speed	6 guns and supports 31 kg (70 lb)
Payload at minimum stroke and speed	12 guns and supports 90 kg (200 lb)
Weight	635 kg (1400 lb) without guns