

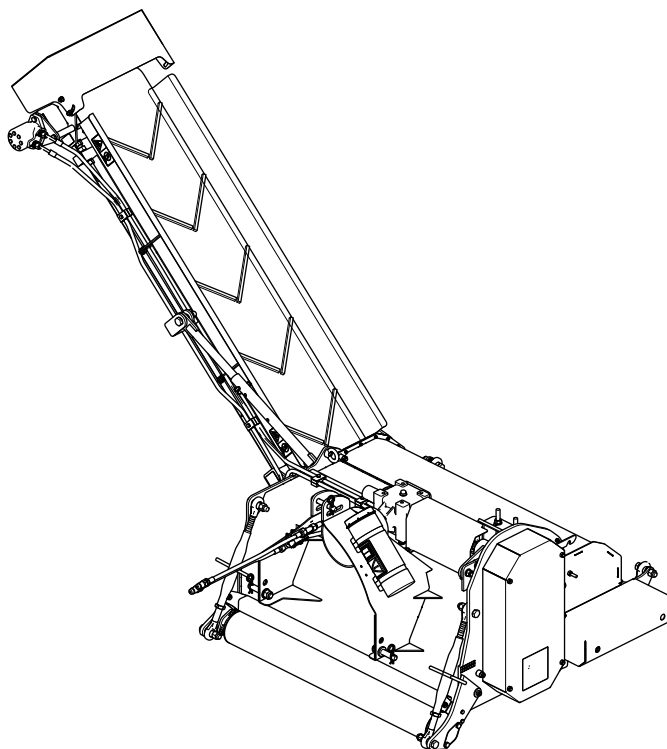


Form No. 3443-926 Rev B

Operator's Manual

NuSurface 470

Model No. 46450—Serial No. 321000001 and Up



⚠ WARNING

CALIFORNIA Proposition 65 Warning

Use of this product may cause exposure to chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Introduction

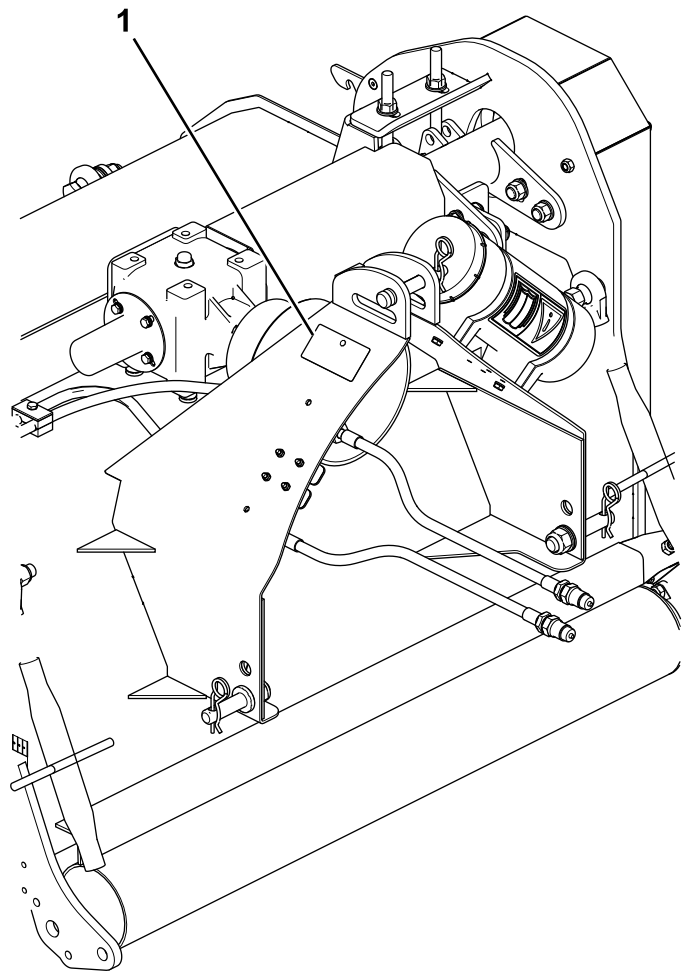
This machine is a tow-behind attachment intended to be used by professional, hired operators in commercial applications. It is a renovation machine used for cutting, scarifying or removing large areas of grass and leaving behind a clean surface. Using this product for purposes other than its intended use could prove dangerous to you and bystanders.

Read this information carefully to learn how to operate and maintain your product properly and to avoid injury and product damage. You are responsible for operating the product properly and safely.

Visit www.Toro.com/Bullseye for product safety and operation training materials, accessory information, help finding a dealer, or to register your product.

Whenever you need service, genuine Bullseye parts, or additional information, contact an Authorized Service Dealer or Bullseye Customer Service and have the model and serial numbers of your product ready. [Figure 1](#) identifies the location of the model and serial numbers on the product. Write the numbers in the space provided.

Important: With your mobile device, you can scan the QR code on the serial-number decal (if equipped) to access warranty, parts, and other product information.



g347733

Figure 1

1. Model and serial number location

Model No. _____

Serial No. _____

This manual identifies potential hazards and has safety messages identified by the safety-alert symbol ([Figure 2](#)), which signals a hazard that may cause serious injury or death if you do not follow the recommended precautions.



g000502

Figure 2

1. Safety-alert symbol

This manual uses 2 words to highlight information. **Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

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Safety

General Safety

This product is capable of causing personal injury. Always follow all safety instructions to avoid serious personal injury.

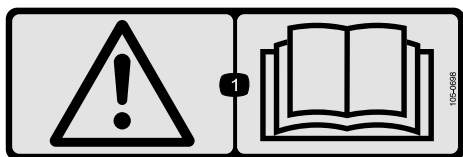
- Read and understand the contents of both this *Operator's Manual* and the operator's manual of the traction unit before using this machine. Ensure that everyone using this product knows how to use this machine and the traction unit and understands the warnings.
- Use your full attention while operating the machine. Do not engage in any activity that causes distractions; otherwise, injury or property damage may occur.
- Do not put your hands or feet near moving components of the machine.
- Do not operate the machine without all guards and other safety protective devices in place and working on the machine.
- Keep the machine away from bystanders while it is moving.
- Keep children out of the operating area. Never allow children to operate the machine.
- Stop the machine, shut off the engine, engage the parking brake of the traction unit, remove the key, and wait for all moving parts to stop before servicing, fueling, or unclogging the machine.

Improperly using or maintaining this machine can result in injury. To reduce the potential for injury, comply with these safety instructions and always pay attention to the safety-alert symbol , which means Caution, Warning, or Danger—personal safety instruction. Failure to comply with these instructions may result in personal injury or death.

Safety and Instructional Decals



Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or missing.



105-0698

decal105-0698

1. Warning—read the *Operator's Manual*.

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.
For more information, please visit www.ttoCAProp65.com

133-8061

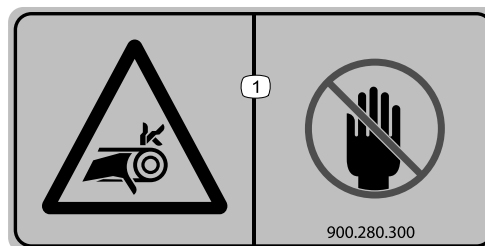
decal133-8061



144-7905

decal144-7905

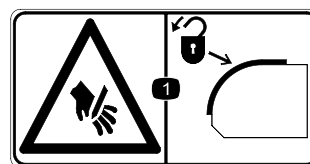
1. Thrown object hazard—keep bystanders away.
2. Warning—remove the key, secure the machine from movement, and read the *Operator's Manual* before performing maintenance.



144-7910

decal144-7910

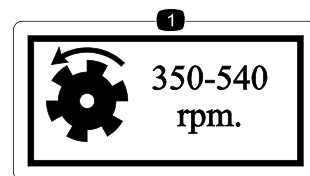
1. Warning—entanglement hazard; keep hands away from moving parts.



144-7911

decal144-7911

1. Cutting hazard of hand—close and lock the cover.



144-8256

decal144-8256

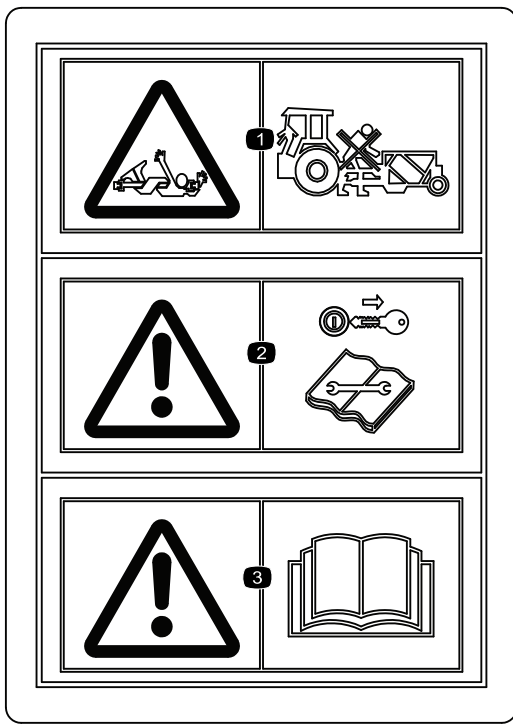
1. PTO—350 to 540 rpm



144-7906

decal144-7906

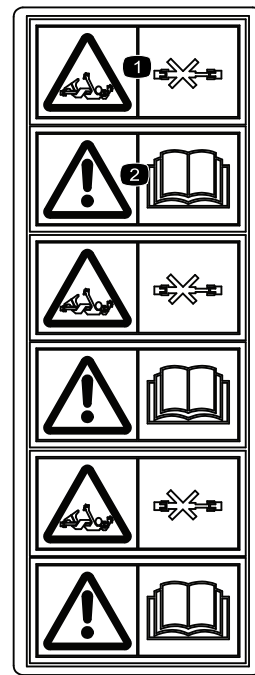
1. Cutting/dismemberment hazard of the fingers



144-8338

decal144-8338

1. Entanglement hazard—keep away from moving parts..
2. Warning—remove the key before performing maintenance; read the *Operator's Manual*.
3. Warning—read the *Operator's Manual*.



144-8339

decal144-8339

1. Entanglement hazard—keep away from moving parts.
2. Warning—read the *Operator's Manual*.

Setup

Inspecting the Machine

Checking the Grease and Gearbox

Check and ensure that the gearbox has fluid; refer to [Checking the Gearbox Lubrication \(page 21\)](#).

Ensure that the machine is greased before use; refer to [Greasing the Attachment \(page 21\)](#).

Checking the Traction Unit Requirements

Use the following list and figure as a reference:

- Refer to the specifications section for the minimum horse power, maximum horse power, and the minimum lifting capacity; [Specifications \(page 7\)](#).
- The traction unit must have a category I or II 3-point hitch.
- The traction unit must have a PTO output-shaft speed of 540 rpm.
- Adequate front-end weight (ballast) to offset the weight of the machine.
- Check the tire air pressure of the traction unit.

Adjust the tire air pressure as needed.

Important: Do not exceed the maximum or minimum tire inflation pressures as recommended by tire manufacturer.

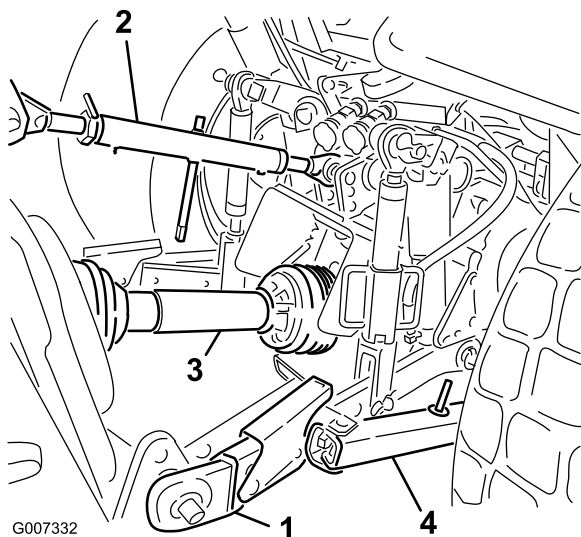


Figure 3

3-Point Hitch and PTO Components

- | | |
|-------------------|-------------------|
| 1. Lower link arm | 3. PTO driveshaft |
| 2. Upper link arm | 4. Sway link |

Checking the Ballast Requirements

⚠ WARNING

Mounting the machine to the rear of the traction unit decreases the weight on its front axle.

Failure to add required ballast may result in an accident and severe injury or death.

- To ensure adequate steering control and stability you may need to add ballast to the front of the traction unit.
- Refer to the traction unit operator's manual for ballast requirements.

Product Overview

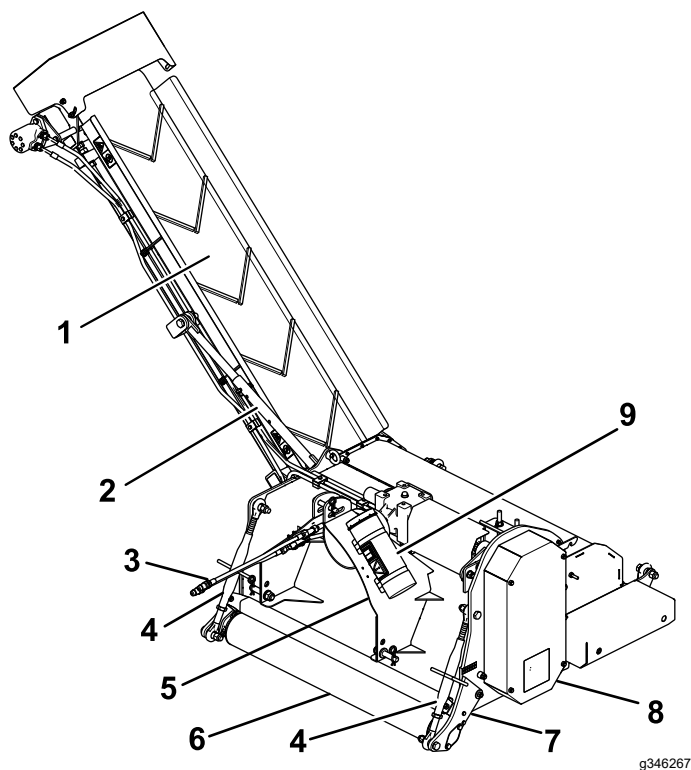


Figure 4

- | | |
|-----------------------------|---------------------|
| 1. Lift conveyor | 6. Front roller |
| 2. Adjustment arm | 7. Roller indicator |
| 3. Hydraulic hoses | 8. Belt cover |
| 4. Front link | 9. Toolbox |
| 5. 3-point hitch connection | |

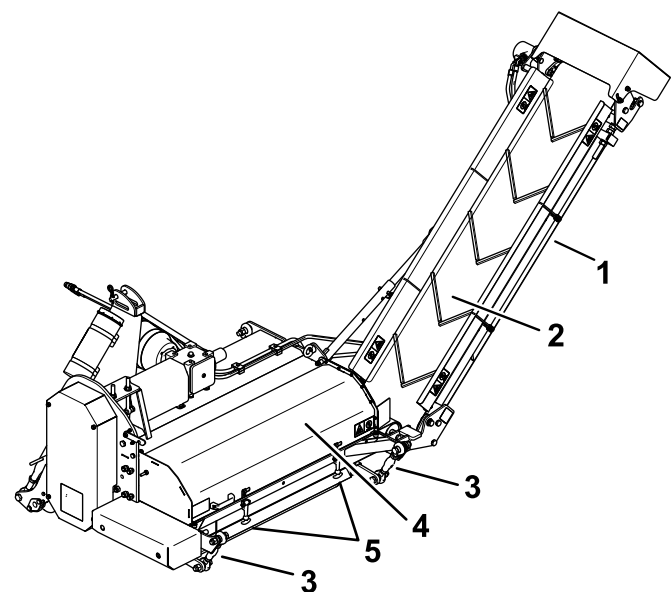


Figure 5

- | | |
|--------------------------|----------|
| 1. Lift conveyor | 4. Cover |
| 2. Debris transport belt | 5. Latch |
| 3. Rear link | |

Specifications

Note: Specifications and design are subject to change without notice.

Traction Unit Requirements

Tractor horse power	30 hp minimum
Minimum lifting capacity (61 cm (24 inches) from lower link pins)	775 kg (1,709 lb)
3-point hitch	Category 1 or higher
Hydraulic connections	1 double-operating valve

Attachment Specifications

Weight	620 kg (1,367 lb)
Width	185.4 cm (73 inches)
Length	157.4 cm (62 inches)
Height	221 cm (87 inches)
Conveyor height	Up to 150 cm (59-1/16 inches)
Working width	120 cm (47-1/4 inches)
Working depth	0 to 50 mm (0 to 2 inches)
Maximum working speed	3 km/h (1.8 mph)
PTO output-shaft speed	540 rpm

Attachments/Accessories

A selection of Bullseye approved attachments and accessories may be available for use with the machine to enhance and expand its capabilities. Contact your Authorized Service Dealer or authorized Bullseye distributor or go to www.Toro.com/Bullseye for a list of all approved attachments and accessories.

To ensure optimum performance and continued safety certification of the machine, use only genuine Bullseye replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous, and such use could void the product warranty.

Operation

Note: Determine the left and right sides of the machine from the normal operating position.

Before Operation

Before Operation Safety

- Never allow children or untrained people to operate or service the machine. Local regulations may restrict the age of the operator. The owner is responsible for training all operators and mechanics.
- Keep your hands clear of the joint pivot areas when handling the PTO driveshaft.
- Do not step on, over, or under the PTO or driveshafts.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- Know how to stop the machine and shut off the engine of the traction unit quickly.
- Do not use PTO spline adapters or extensions.
- Ensure that the guards and shields are properly installed and maintained. Replace missing, damaged, or worn guards and shields before using the machine.
- Ensure that the PTO driveshaft does not contact the drawbar.
- Inspect the area where you will use the machine and remove all objects that the machine could strike.
- Ensure that your traction unit is suitable for use with an implement of this weight by checking with your traction unit supplier or manufacturer.
- Shut off the machine, shut off the engine and remove the key of the traction unit, and wait for all moving parts to stop before making any adjustments to the machine.

Understanding the Traction Unit Controls

Familiarize yourself with the operation of the following traction unit controls before operating the machine:

- PTO engagement
- 3 point hitch (raise/lower)
- Clutch
- Throttle
- Gear selection
- Parking brake

Important: Refer to the traction unit operator's manual for operating instructions.

Practicing the Operating Procedures

Before using the machine, find a clear area and practice operating the traction unit with the machine installed.

Important: If there are sprinkler heads, electrical or communication lines, or other obstructions in the area being scarified or renovated, mark these locations to ensure that these items are not damaged during operation.

- Operate the traction unit using the recommended gear settings and PTO drive speeds and become thoroughly familiar with the traction unit handling with the attached machine.
- Practice stopping and starting, raising the machine, and lowering the machine, disengaging the PTO drive, and aligning the machine with previous passes.

Practice sessions helps you gain confidence in the performance of the machine and helps ensure that you are using it properly.

⚠ WARNING

Adjusting or maintaining the machine while the traction unit is running may result in an accident and severe injury or death.

- **Lower the machine onto the ground or jacks stands while repairing the machine.**
- **Before leaving the operator's seat, disengage the PTO drive, engage the parking brake, shut off the engine, remove the key, and wait for all moving parts to stop.**
- **Ensure that all safety devices are secured and in proper position before resuming operation.**

Connecting to a 3-Point Hitch

Connecting the Lower Link Arms

1. Ensure that the attachment is positioned on a level surface.
2. Remove the hairpin cotters from the hitch pins (Figure 6).

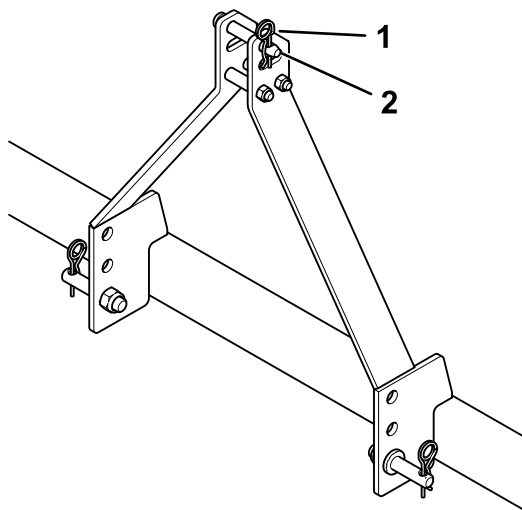


Figure 6

g345540

1. Hairpin cotter (3)
2. Hitch pin (3)

3. Back the traction unit squarely up to the attachment so that you can attach the lower connecting arms to the frame.
4. Engage the parking brake, shut off the engine, and remove the key from the ignition. Wait for the engine and all moving parts to stop before leaving the operator's seat.

Note: For maximum ground clearance, install the hitch pins in the lower mounting holes of the hitch plate for the attachment.

5. Insert the right and left lower link arms onto the hitch pins (Figure 7).

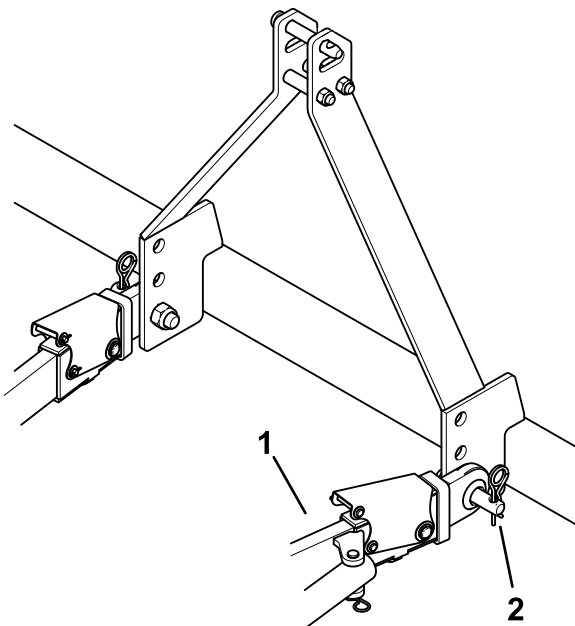


Figure 7

g345538

1. Lower link arm (2)
2. Hitch pin and hairpin cotter (2)

6. Secure the lower link arms to the hitch pins using the hairpin cotters.

Connecting the Upper Link Arm

1. Connect the upper link arm to the bracket and secure it with the link pin and the hairpin cotter (Figure 8).

Note: Use the slotted hole if you want the attachment to follow the terrain during operation.

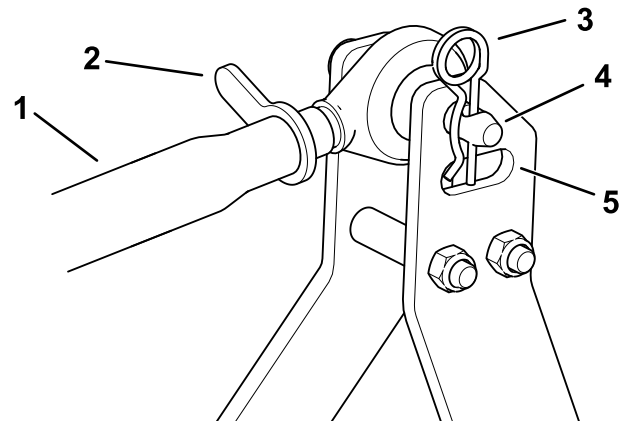


Figure 8

g345539

1. Upper link arm
2. Jam nut
3. Hairpin cotter
4. Link pin
5. Slotted hole

2. Grease the threaded steel upper link arm tubes.
3. Rotate the upper link arm to shorten the link. Adjust it until the attachment is flat on the ground.
4. Tighten the jam nut to secure the upper link arm into position.
5. Start the traction unit and lift the attachment off the ground.

Connecting the PTO Driveshaft

Adjusting the PTO Driveshaft Length

Adjust the length of the PTO driveshaft whenever you install the attachment to a different traction unit.

Important: If the length of PTO is not adjusted properly, using the attachment can damage the traction unit or the attachment. The overlapping length of the cylinders must be at least 150 mm (6 inches). The length changes when you lift or install the attachment on a different traction unit.

1. Park the machine on a level surface, engage the parking brake, and lower the attachment to the ground.
2. Shut off the engine and remove the key.
3. Pull the PTO driveshaft sections apart (Figure 9).

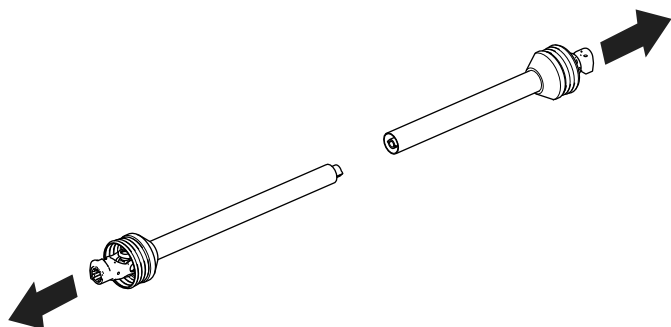


Figure 9

g347461

4. Assemble the outer PTO driveshaft section to the traction-unit PTO output shaft (Figure 10).

Note: Pull on the driveshaft to ensure that the locking pin engages the PTO output shaft.

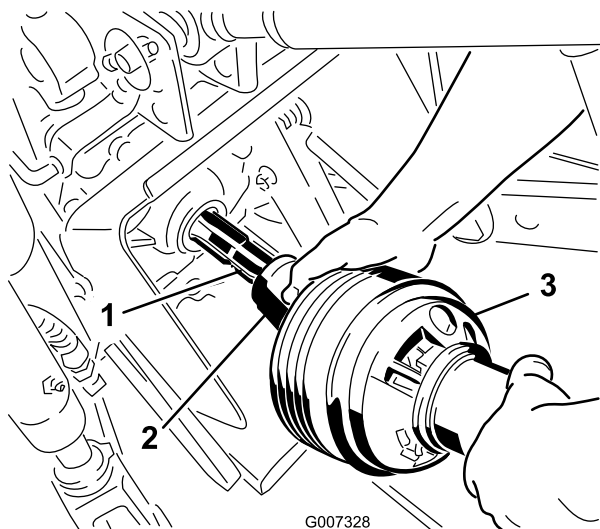


Figure 10

G007328

g007328

1. PTO output shaft (traction unit)
2. PTO shaft coupler
3. PTO driveshaft

5. Hold the driveshaft sections parallel to each other to determine if they are too long (Figure 11).

Note: Each driveshaft section must be 76 mm (3 inches) from the U-joint (Figure 11).

6. If the driveshaft sections are too long, mark 76 mm (3 inches) back from U-joint on each section (Figure 11).

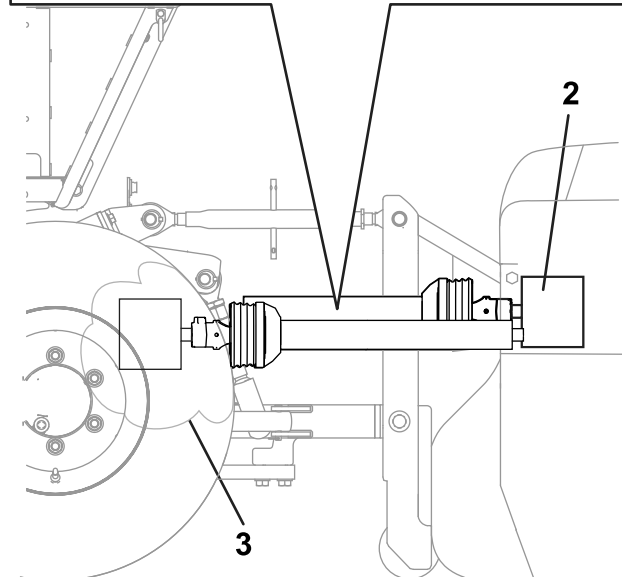
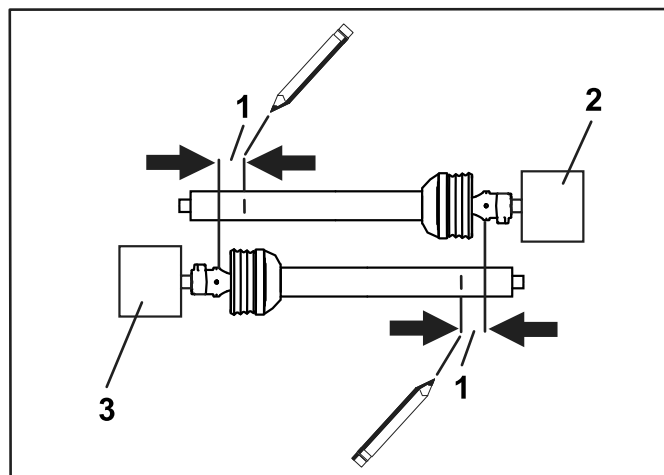


Figure 11

g347524

1. 76 mm (3 inches)
2. Attachment gearbox
3. Traction-unit PTO output shaft

7. Remove and cut each section at the mark (Figure 12).

Note: Ensure the same amount is removed from each section.

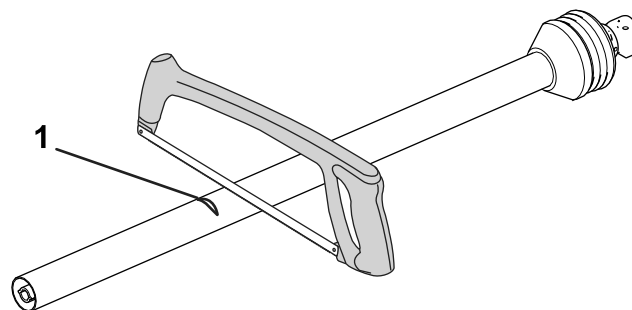


Figure 12

g347473

1. Cut the driveshaft section.

8. Deburr the ends of the sections (Figure 13).

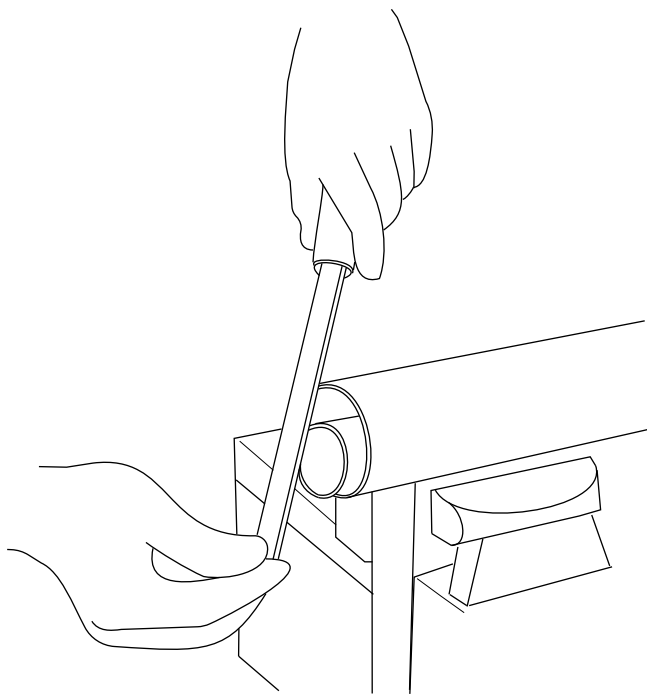
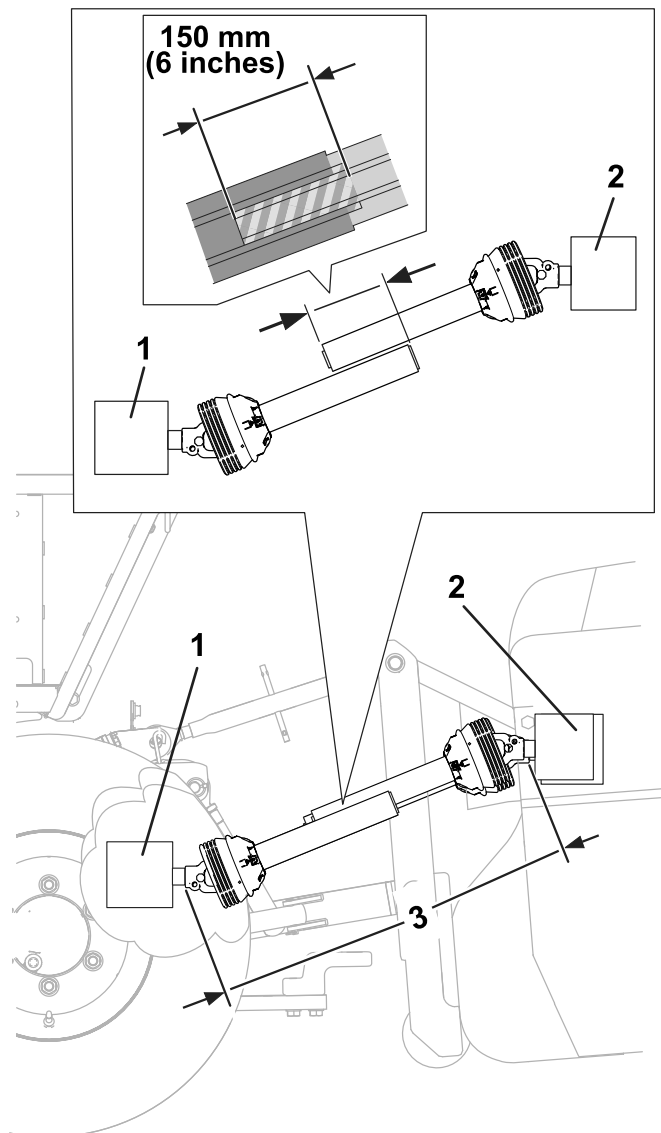


Figure 13

g347459

9. Assemble the outer PTO driveshaft section to the PTO shaft of the traction unit ([Figure 10](#)).
10. Raise the attachment to the position where the traction-unit PTO output shaft and gearbox input shaft are furthest apart ([Figure 14](#)).
11. Hold the driveshaft sections parallel to each other and check to ensure that they overlap 150 mm (6 inches) or more ([Figure 14](#)).

Note: If the sections do not overlap 150 mm (6 inches), contact your authorized distributor.



g347621

Figure 14

- | | |
|-----------------------------------|--------------------------|
| 1. Attachment gearbox | 3. Shafts furthest apart |
| 2. Traction-unit PTO output shaft | |

12. Grease and assemble the sections.

Important: Do not use the attachment if the PTO driveshaft is damaged; replace the damaged driveshaft before operation.

Installing the PTO Driveshaft

Important: Refer to the PTO driveshaft owner's manual for additional operating and safety information.

⚠ CAUTION

Operating the machine without the PTO guards and shields may cause injury or death.

Keep all PTO guards and shields in place.

Important: When connecting the PTO, ensure that the attachment is not lifted higher than necessary. Lifting the attachment too high causes the PTO driveshaft knuckles to break (**Figure 15**). The PTO can operate up to an angle of 25°, but operating it beyond 30° angle may severely damage the shaft.

Note: Ensure the cross bearings are aligned as shown in **Figure 15**.

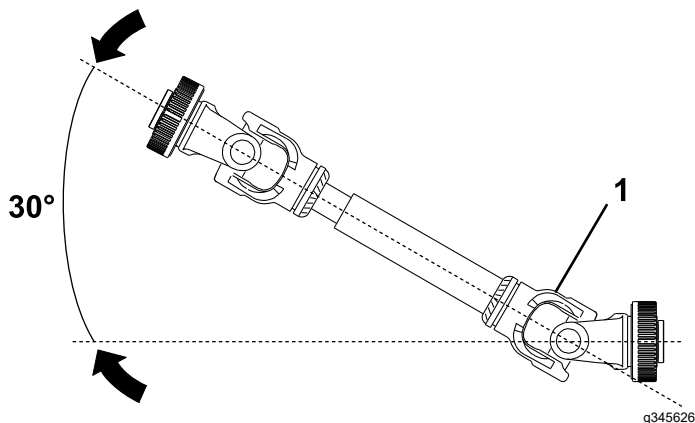


Figure 15

1. Breakage occurs here.

1. Assemble the PTO driveshaft to the gearbox input shaft of the attachment.

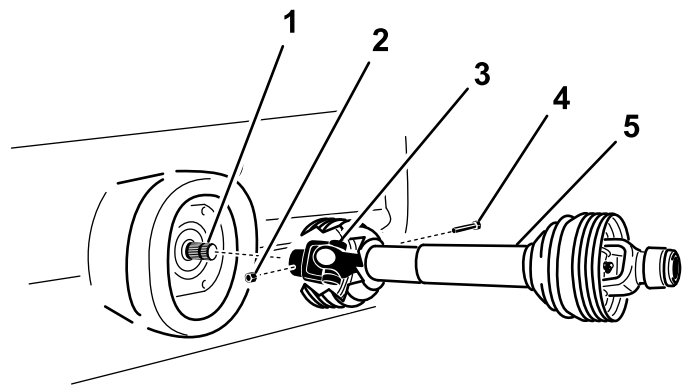


Figure 16

1. Gearbox input shaft
2. Nut
3. PTO shaft coupler
4. Bolt
5. PTO driveshaft

2. Assemble the PTO driveshaft to the PTO output shaft of the traction unit.

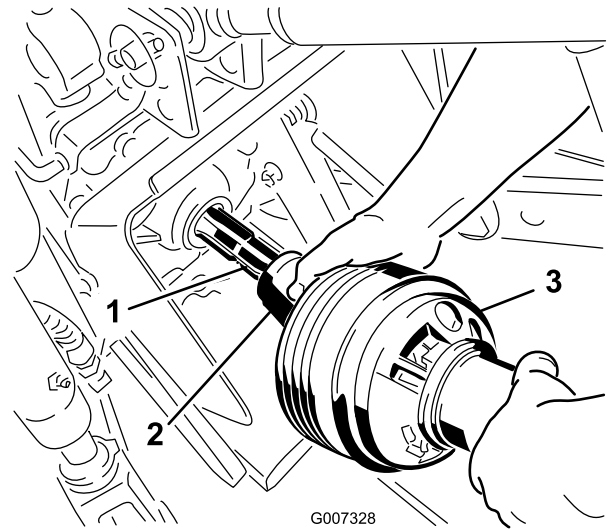


Figure 17

1. PTO output shaft (traction unit)
2. PTO shaft coupler
3. PTO driveshaft

3. Slide the PTO driveshaft forward as far as the PTO output shaft allows.
4. Pull back on the locking collar of the PTO shaft coupler to secure the PTO driveshaft. Slide the PTO driveshaft back and forth to ensure that it is locked securely.

- Verify that the telescoping tube has a minimum of 150 mm (6 inches) overlap when the attachment is raised to the maximum height.

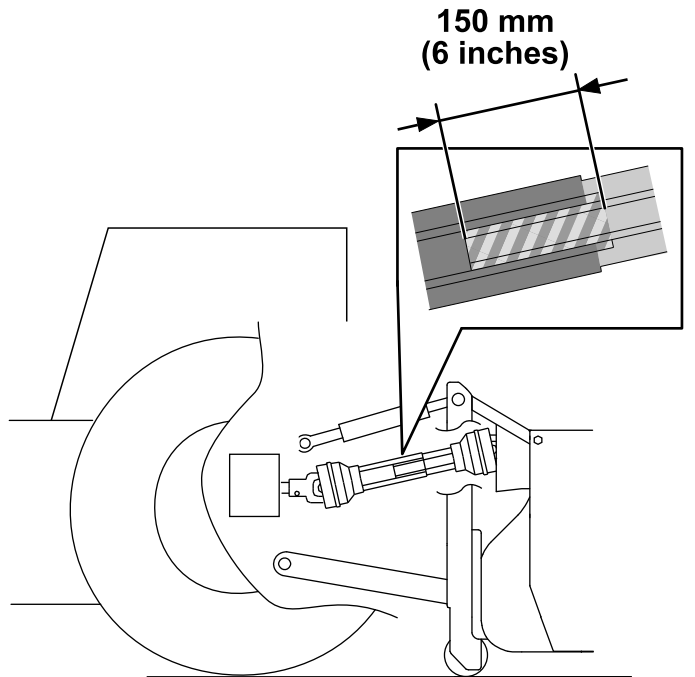


Figure 18

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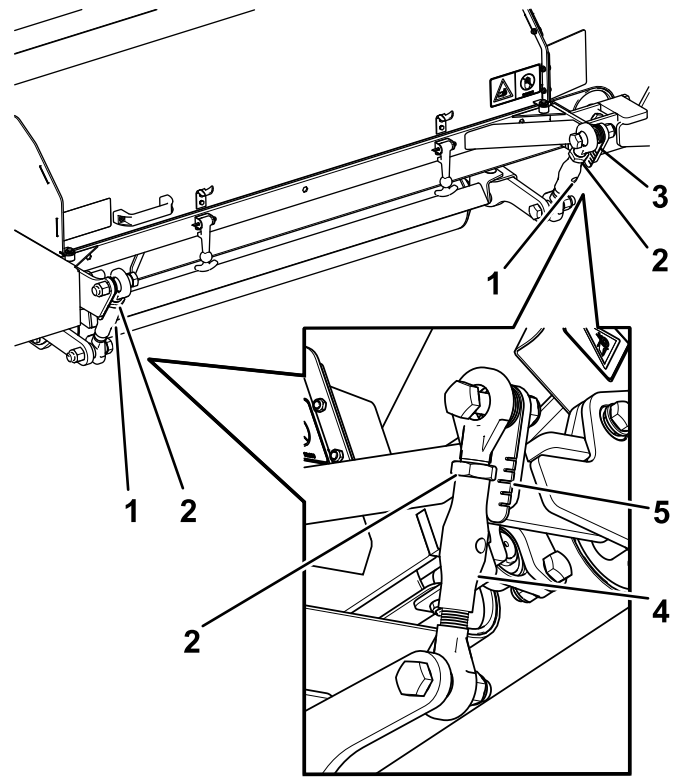


Figure 19

g346323

- | | |
|--------------|-----------------------|
| 1. Rear link | 4. Rear link |
| 2. Jam nut | 5. Long slot in gauge |
| 3. Gauge | |

Connecting the Hydraulic Hoses

- Connect the hydraulic hoses from the attachment to the traction unit. Ensure the hydraulic hoses are engaged in the ports.
- Confirm that the traction unit levers operate the attachment hydraulics.

Adjusting the Working Depth

The working depth is set by adjusting the front roller.

Ensure the rear roller is set to the long slot for cutting and scarifying (Figure 19).

Important: Adjust the working depth only when the traction unit is parked, the parking brake is engaged, the PTO is disengaged, and the engine is shut off.

- Loosen the jam nut on the top of each rear link.
- Adjust the rear links until they align with the long slot in the gauge (Figure 19).
- Tighten the jam nut on the top of each rear link (Figure 19).

- Loosen the jam nut on each front link.
- Adjust the front links to your desired depth by using the indicators on the sides.
- Tighten the jam nut on each front link.
- Check the working depth by running the machine a few meters (yards). Refer to [Operating the Attachment \(page 15\)](#).
- If needed, adjust the front links until you reach your desired depth.

Note: When the lift conveyor is folded out, the machine weight shifts to this side. Due to the extra weight, you can remove more material on this side. To compensate for this extra weight, adjust the front and back links on the right side (lift conveyor side).

During Operation

During Operation Safety

- The owner/operator can prevent and is responsible for accidents that may cause personal injury or property damage.
- Wear appropriate clothing, including eye protection; long pants; substantial, slip-resistant footwear; and hearing protection. Tie back long hair and do not wear loose clothing or loose jewelry.
- Use your full attention while operating the machine. Do not engage in any activity that causes distractions; otherwise, injury or property damage may occur.
- Do not operate the machine when tired, ill, or under the influence of alcohol or drugs.
- Never carry passengers on the machine and keep bystanders and pets away from the machine during operation.
- Operate the machine only in good visibility to avoid holes or hidden hazards.
- Before you start the engine, ensure that all drives are in neutral, the PTO is disengaged, the parking brake is engaged, and you are in the operating position.
- Keep your hands and feet away from moving parts.
- Look behind and down before backing up to be sure of a clear path.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure your vision.
- Do not run the PTO with the attachment raised.
- Stop the attachment whenever you are not using it.
- Stop the machine, shut off the engine, remove the key, wait for all moving parts to stop, and inspect the machine after striking an object or if there is an abnormal vibration in the machine. Make all necessary repairs before resuming operation.
- Slow down and use caution when making turns and crossing roads and sidewalks with the machine. Always yield the right-of-way.
- Reduce speed on rough roads and surfaces.
- When attached to a traction unit, and in the raised position, the weight of the attachment affects stability, braking and steering. Exercise caution when transporting between working areas.
- Never leave a running machine unattended.
- Before leaving the operating position, do the following:
 - Ensure that the PTO is disengaged.
 - Park the machine on a level surface.

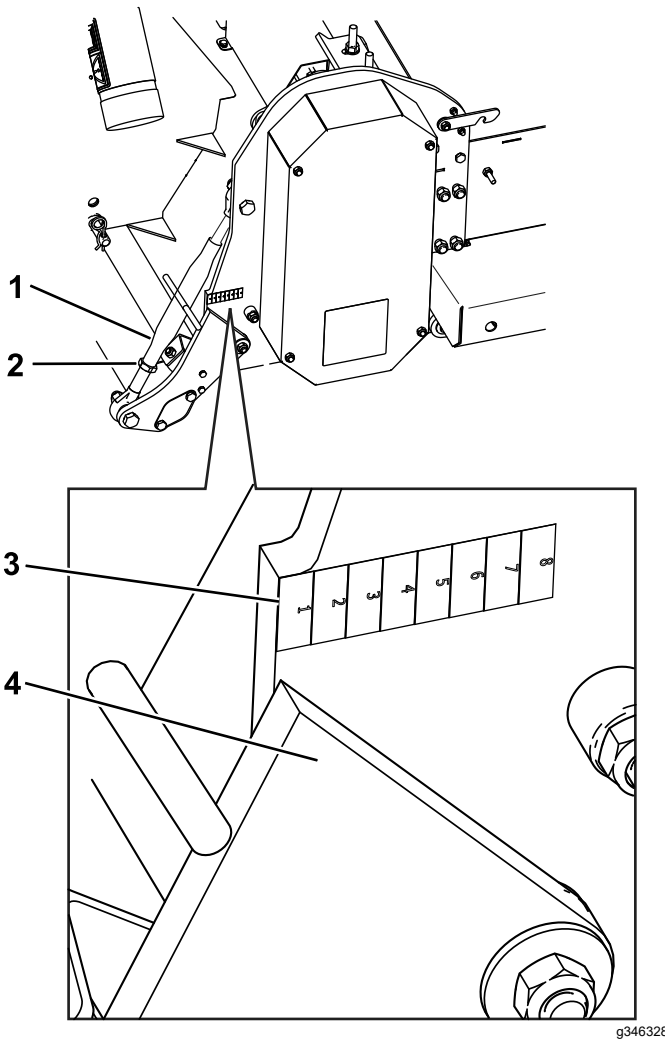


Figure 20

- | | |
|---------------|-------------------------|
| 1. Front link | 3. Adjustment positions |
| 2. Jam nut | 4. Front indicator |

Transporting the Machine

To prevent losing control of the machine, move slowly across steep inclines and approach rough, undulating areas slowly and carefully.

Important: Do not exceed 12 km/h (7.5 mph) while transporting the attachment.

1. Park the traction unit and machine on a level surface, disengage the PTO, engage the parking brake, shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operator's seat.
2. Move the lift conveyor to the transport position.
3. Raise the attachment and drive the traction unit, not exceeding 12 km/h (7.5 mph).

- Engage the parking brake.
- Lower the attachment.
- Shut off the engine and remove the key.
- Wait for all moving parts to stop before leaving the machine.
- Do not operate the machine when there is the risk of lightning.
- Use Bullseye accessories, attachments, and replacement parts only.
- For disassembly or repair of all steel PTO driveshaft parts (tubes, bearings, joints, etc.), contact your authorized distributor. Removing components for repairs and assembly may damage some parts if not performed with special tools by trained technicians.
- Do not operate the attachment if the PTO or driveshaft guards are missing.
- Be careful when turning the machine so that the traction unit tires do not contact the PTO driveshaft.
- Secure hydraulic hoses, electrical wiring, ropes, and other items to keep them from contacting the PTO driveshaft guard.

Slope Safety

- Review the traction unit specifications to ensure that you do not exceed its slope capabilities.
- Slopes are a major factor related to loss of control and rollover accidents, which can result in severe injury or death. You are responsible for safe slope operation. Operating the machine on any slope requires extra caution.
- Review and understand the slope instructions in the manual and on the traction unit.
- Evaluate the site conditions to determine if the slope is safe for machine operation, including surveying the site. Always use common sense and good judgment when performing this survey.
- Review the slope instructions listed below for operating the machine on slopes and to determine whether you can operate the machine in the conditions on that day and at that site. Changes in the terrain can result in a change in slope operation for the machine.
- Avoid starting, stopping, or turning the machine on slopes. Avoid making sudden changes in speed or direction. Make turns slowly and gradually.
- Do not operate a machine under any conditions where traction, steering, or stability are in question.
- Remove or mark obstructions such as ditches, holes, ruts, bumps, rocks, or other hidden hazards.

Tall grass can hide obstructions. Uneven terrain could overturn the machine.

- Be aware that operating the machine on wet grass, across slopes, or downhill may cause the machine to lose traction. Loss of traction to the drive wheels may result in sliding and a loss of braking and steering.
- Use extreme caution when operating the machine near drop-offs, ditches, embankments, water hazards, or other hazards. The machine could suddenly roll over if a wheel goes over the edge or the edge caves in. Establish a safety area between the machine and any hazard.
- Identify hazards at the base of the slope. If there are hazards, mow the slope with a power walk-behind mower.
- If possible, keep the attachment lowered to the ground while operating on slopes. Raising the attachment while operating on slopes can cause the machine to become unstable.
- Use extreme caution with other attachments. These can change the stability of the machine and cause a loss of control. Always keep the machine in gear when going down slopes. Do not coast downhill (applicable only to gear-drive units).

Operating the Attachment

Using the PTO

Before engaging the PTO, verify the following:

- The angle of the pivot pins are 25° or less and never exceeding 30°.
- The pivot pins are aligned.
- The overlap of the PTO cylinders is at least 150 mm (6 inches).
- The PTO protection guard is not damaged.

Starting the Attachment

⚠ WARNING

Lifting the attachment too high causes the PTO driveshaft knuckles to break.

Ensure that the attachment is not lifted higher than is necessary.

Important:

The PTO can operate up to an angle of 25°, but operating it beyond 30° angle may severely damage the shaft (Figure 21).

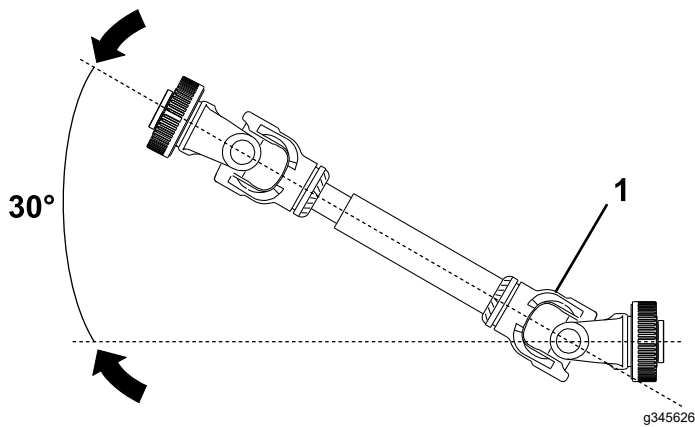


Figure 21

1. Breakage occurs here.

1. Drive to the location where you will use the attachment
2. Inspect the area where you will use the machine and remove all objects that the machine could strike.
3. Locate and mark all electrical or communication lines, irrigation components, and other obstructions in the area.
4. Park the machine on a level surface and lower the attachment.
5. Engage the parking brake, shut off the engine, and remove the key from the traction unit.
6. Adjust the lift conveyor and secure the arm in the desired position ([Figure 22](#)).

Note: Ensure there is enough clearance around the machine where you unfold the conveyor.

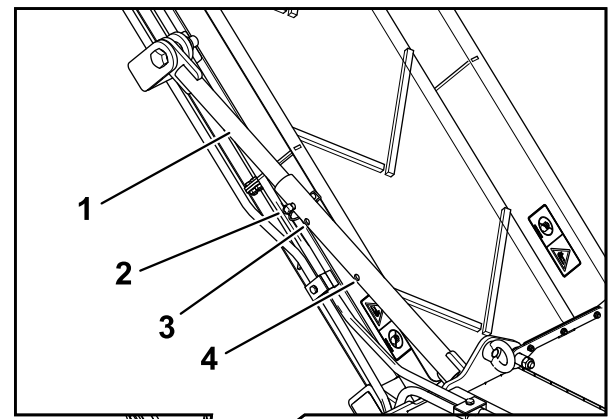


Figure 22

- | | |
|----------------------|-----------------------|
| 1. Conveyor arm | 3. Middle position |
| 2. Extended position | 4. Transport position |

7. Adjust the working depth of the attachment; refer to [Adjusting the Working Depth \(page 13\)](#).
8. Mount the upper link arm in the slotted hole so that the attachment follows the terrain; refer to [Connecting the Upper Link Arm \(page 9\)](#).
9. Start the traction unit and raise the attachment so that the knives do not touch the ground.

⚠ WARNING

The conveyor belts are rotating when removing debris and could cause serious injury.

- **Keep away from moving parts.**
- **Keep clear of the discharge opening.**
- **Ensure there is clearance for the second machine collecting the debris.**

10. Allow a second machine for collecting the debris to drive under the conveyor.
11. Engage the traction unit into the proper gear.
12. Activate the hydraulic valve on the traction unit to engage the horizontal belt and the transport belt.
13. Lower the attachment until it is approximately 50 mm (2 inches) above the ground.

14. Engage the traction unit PTO at a low engine speed.
15. Increase the traction unit PTO speed to approximately 300 rpm.
16. Drive the traction unit forward slowly and allow the attachment to smoothly lower onto the rollers.
Note: Ensure the second machine is following to collect the debris.
17. Slowly lower the attachment until it reaches the working depth.
18. Drive forward and increase the rotational speed until the PTO driveshaft speed reaches 540 rpm.
19. Increase the traction unit speed to a maximum of 3 km/h (1.8 mph).

Important: Ensure the speed of the traction unit does not exceed 3km/h (1.8 mph).

20. Drive the traction unit and attachment a few meters (yards) and check the working depth. If necessary, adjust the working depth as described in [Adjusting the Working Depth \(page 13\)](#).
21. After operating the attachment, close the hydraulic valve on the traction unit to stop the belts and turn around by raising it to approximately 50 mm (2 inches) above the ground.
Note: Ensure there is enough clearance around the machine where you turn around.
22. After turning around, allow the second machine to drive under the conveyor, open the hydraulic valve on the traction unit to start the belts, lower the attachment, and continue operation.

Stopping the Attachment

1. Decrease the PTO driveshaft speed to approximately 300 rpm by decreasing the engine speed.
2. Lift the machine slightly off the ground.
3. Switch the PTO off as soon as the knives no longer touch the soil.
4. Close the hydraulic valve on the traction unit to stop the belts.
5. Lift the attachment.
6. Allow the second machine to move away from the conveyor.
7. Go to the next work area.

Operating Tips

- Engage the PTO at low engine speed. Lower the machine and increase engine speed to achieve a PTO speed of 540 rpm (maximum). Operate the engine at a speed that the machine runs most smoothly.
- Make very gradual turns. Never make sharp turns with the machine lowered. Plan your path before lowering the machine.
- Do not use the attachment if the ground is too wet.
- Raise the working depth if the ground is hard packed.
- Always check/adjust the top link whenever you change the depth. The front of the attachment should be vertical.
- Look backward frequently to ensure that the machine is operating properly, the second machine for collecting the debris is following, and the alignment is maintained with previous passes.
- Replace broken knives, and inspect and correct damage to those still usable. Repair any other machine damage before resuming operation.

3. Lower the attachment onto the rollers.
4. Shut off the engine and remove the key from the traction unit.
5. Remove the hydraulic hoses from the traction unit.
6. Remove the top link from the attachment.

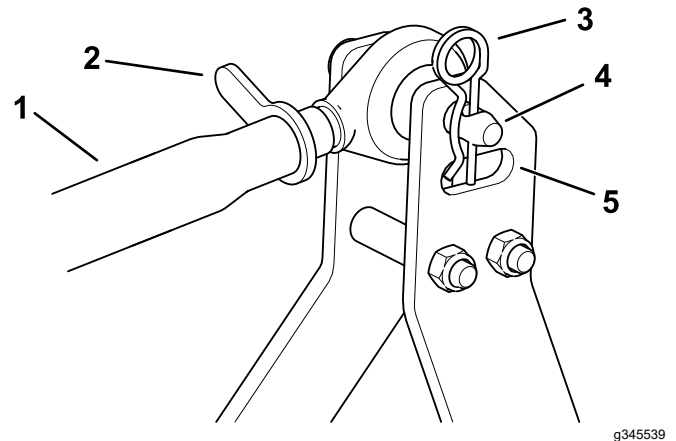


Figure 23

- | | |
|-------------------|-----------------|
| 1. Upper link arm | 4. Link pin |
| 2. Jam nut | 5. Slotted hole |
| 3. Hairpin cotter | |

After Operation

After Operation Safety

- Park the machine on a level surface; engage the parking brake; shut off the engine; remove the key; and wait for all movement to stop before leaving the machine.
- Do not step on, over, or under the driveshaft.
- Do not use the restrain chain of the PTO-shaft guard to support the shaft when transporting or storing the mower.
- Do not rest the PTO shaft on the ground.
- Do not allow the PTO-shaft guards to pull apart.
- Keep all parts of the machine in good working condition and all hardware tightened.
- Replace all worn, damaged, or missing decals.

7. Remove the PTO shaft from the traction unit.

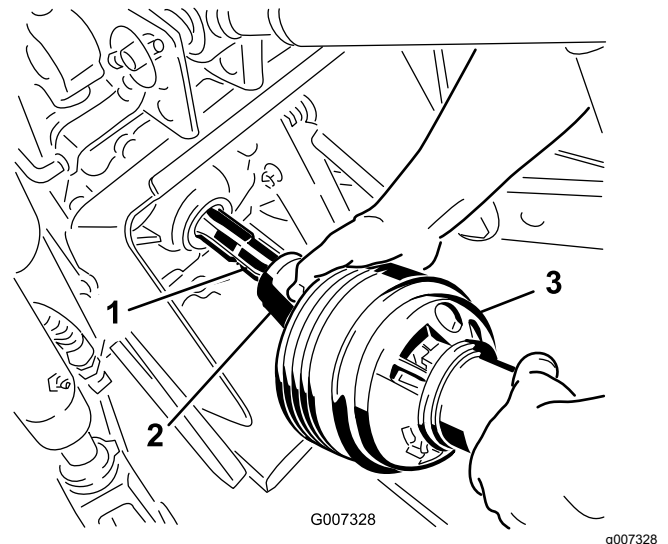


Figure 24

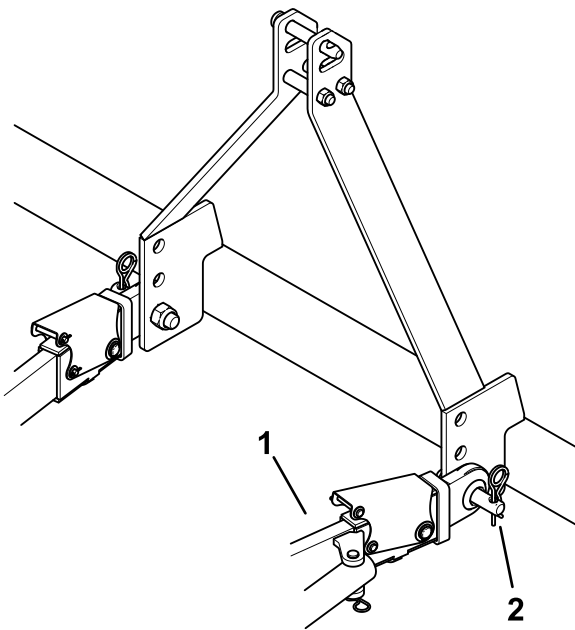
- | | |
|-------------------------------------|-------------------|
| 1. PTO output shaft (traction unit) | 3. PTO driveshaft |
| 2. PTO shaft coupler | |

Removing the Attachment

1. Park the machine on a level surface and engage the parking brake.
2. Lower the front and rear rollers enough to allow the attachment to rest on the rollers without the knives touching the ground. Refer to [Adjusting the Working Depth \(page 13\)](#).

8. Remove the lower links from the attachment.

Important: Ensure that the attachment does not roll when off the traction unit.

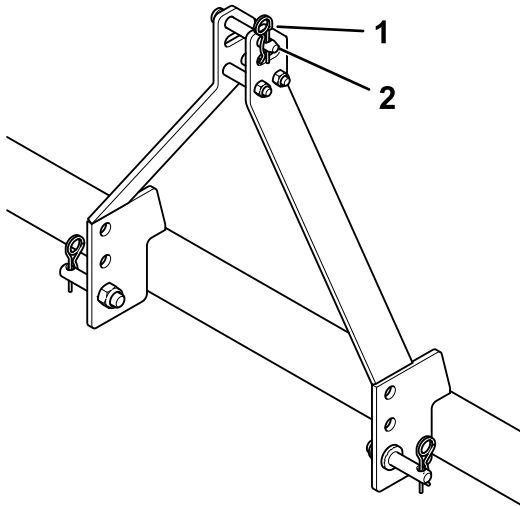


g345538

Figure 25

1. Lower link arm (2)
2. Hitch pin and hairpin cotter (2)

-
9. Start the traction unit and drive it away from the attachment.
 10. Install the hairpin cotters into the hitch pins.



g345540

Figure 26

1. Hairpin cotter (3)
2. Hitch pin (3)

Maintenance

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 20 hours	<ul style="list-style-type: none">• Grease the PTO shaft and roller bearings.• Check the gearbox oil level.• Check the gearbox for leaks.• Check the V-belt tension.• Check for loose nuts and bolts.
Before each use or daily	<ul style="list-style-type: none">• Check the gearbox oil level.• Check for loose nuts and bolts.• Check the PTO shaft.• Check the hydraulics.• Check the conveyor belts.
After each use	<ul style="list-style-type: none">• Grease the bearings with 1 shot.• Clean the machine.
Every 50 hours	<ul style="list-style-type: none">• Grease the bearings and bushings.• Check the gearbox oil level.• Check the gearbox for leaks.• Check the V-belt tension.• Check for loose nuts and bolts.
Every 500 hours	<ul style="list-style-type: none">• Change the gearbox oil.
Before storage	<ul style="list-style-type: none">• Perform all 50-hour maintenance procedures.• Paint areas that are scratched, chipped, or rusted.• Remove all debris.

⚠ CAUTION

If you leave the key in the switch, someone could accidentally start the engine and seriously injure you or other bystanders.

Remove the key from the switch before you perform any maintenance.

Maintenance Safety

- Before adjusting, cleaning, servicing, or leaving the machine, do the following:
 - Position the machine on a level surface.
 - Move the throttle switch to the low-idle position.
 - Disengage the PTO (if applicable).
 - Ensure that the traction is in neutral.
 - Engage the parking brake.
 - Shut off the engine of the traction unit and remove the key.
 - Wait for all moving parts to stop.
 - Allow machine components to cool before performing maintenance.
- Perform only those maintenance instructions described in this manual. If major repairs are ever needed or assistance is desired, contact an authorized Bullseye distributor.
- Ensure that the machine is in safe operating condition by keeping nuts, bolts, and screws tight.
- If possible, do not perform maintenance while the engine is running. Keep away from moving parts.
- Carefully release pressure from components with stored energy.
- Support the machine with blocks or storage stands when working beneath it. Never rely on the hydraulic system to support the machine.
- Never crawl under the attachment. If necessary, tilt the attachment.
- Ensure that all guards are installed and secured after maintaining or adjusting the machine.
- To ensure safe, optimal performance of the machine, use only genuine Bullseye replacement parts. Replacement parts made by other manufacturers could be dangerous, and such use could void the product warranty.

Greasing the Attachment

Service Interval: After the first 20 hours

After each use

Every 50 hours Grease the bearings and bushings after cleaning the machine.

The attachment has grease fittings that you must lubricate regularly with No. 2 lithium grease. Also, lubricate the attachment immediately after every washing and after long periods without use.

Grease the machine at the following bearing locations (Figure 27).

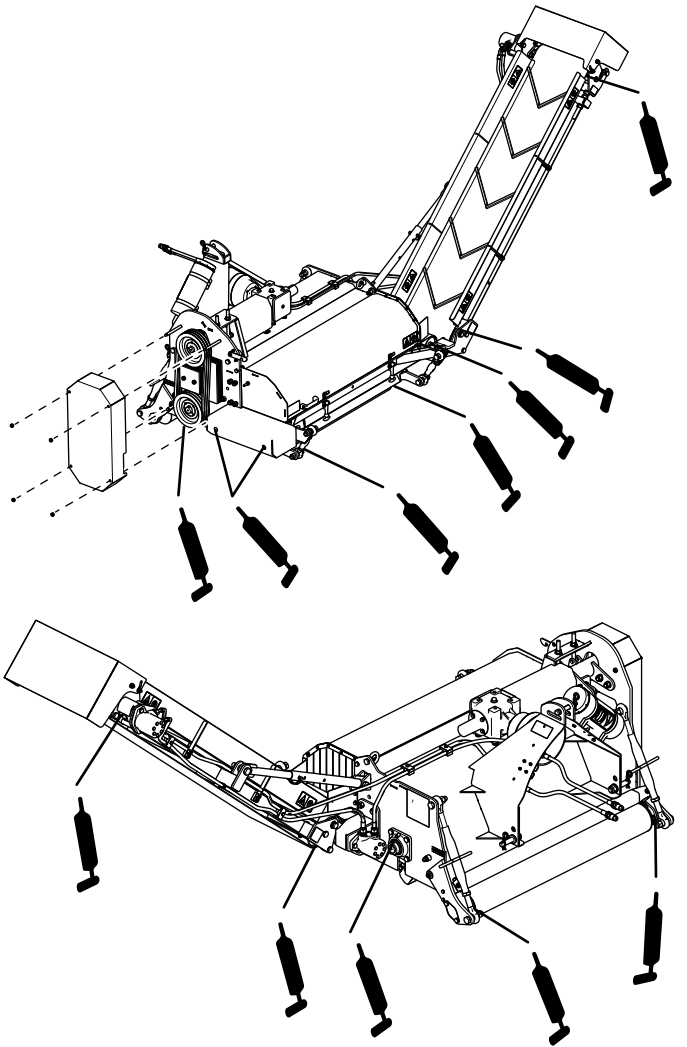


Figure 27

Grease the PTO driveshaft at the following locations (Figure 28).

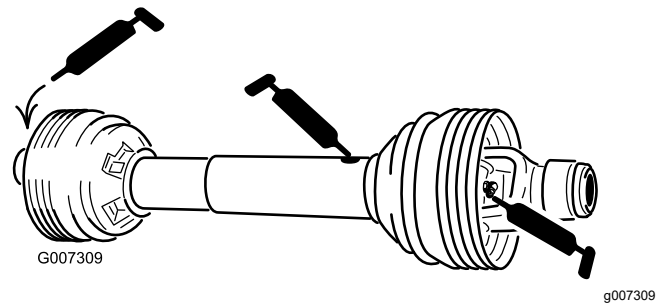


Figure 28

Checking the Gearbox Lubrication

Service Interval: Before each use or daily—Check the gearbox oil level.

After the first 20 hours—Check the gearbox oil level.

After the first 20 hours—Check the gearbox for leaks.

Every 50 hours—Check the gearbox oil level.

Every 50 hours—Check the gearbox for leaks.

Allow the gearbox to cool before checking the lubrication.

1. Clean debris from the fill plug to avoid contamination (Figure 29).
2. Remove the fill plug to relieve trapped air.
3. Remove the socket-head bolt on the rear of the gearbox.
4. If no fluid spills out, add more fluid until it comes out.
5. Install the socket-head bolt on the rear of the gearbox (Figure 29).
6. Install the fill plug.

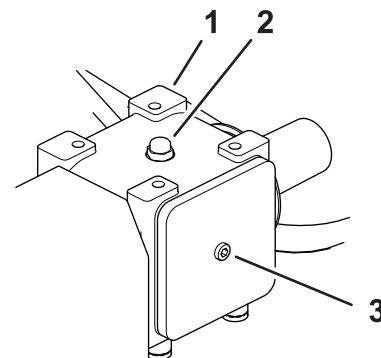


Figure 29

- | | |
|--------------|---------------------|
| 1. Gearbox | 3. Socket-head bolt |
| 2. Fill plug | |

Changing the Gearbox Lubrication

Service Interval: Every 500 hours

The gearbox is filled with SAE140 gear oil or equivalent.

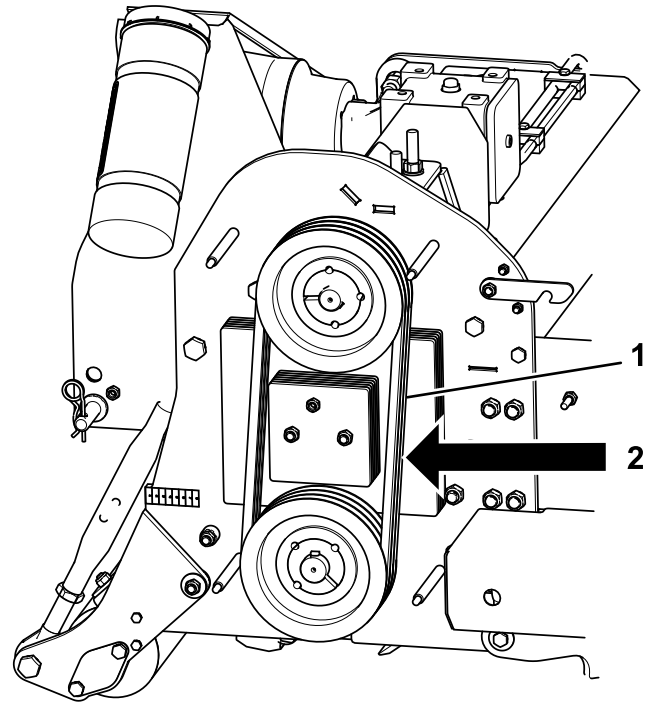
1. Clean debris from the fill plug and the drain plug to avoid contamination (Figure 29).
2. Remove the fill plug to relieve trapped air.
3. Position a short drain pan under the drain plug and remove the drain plug.

Note: The high viscosity of cool oil extends the drain time (approximately 30 minutes).

4. After oil is completely drained, install the drain plug.
5. Remove the socket-head bolt on the back of the gearbox.
6. Fill the gearbox until fluid comes out the back hole.
7. Install the socket-head bolt on the rear of the gearbox (Figure 29).
8. Install the fill plug.

2. Check the tension of the V-belts by pushing point A with a pressure of 7.5 kg (16-1/2 lb). Proper tension of the belts allows 12.4 mm (1/2 inch) of deflection on each belt (Figure 30).

Note: If the tension is correct, install the belt cover (Figure 31).



g347805

Figure 30

1. Belts
2. Check for 12.4 mm (1/2 inch) of deflection.

Inspecting the Belts

The drive belt(s) on the machine are durable. However, the normal exposure to UV radiation, ozone or incidental exposure to chemicals can deteriorate the rubber compounding over time and lead to premature wear or material loss (i.e. chunking).

Annual belt inspection is highly recommended for signs of wear, excessive cushion cracks, or large embedded debris with replacement when needed.

Adjusting the V-Belt Tension

Service Interval: After the first 20 hours

Every 50 hours

Make sure that the belts are properly tensioned to ensure that the machine is operating correctly and to prevent unnecessary wear.

This machine is equipped with adjustable tension pulleys that keep the V-belts tight. Depending on the intensity of using the machine, the driveline could be affected by the wear of the belts.

1. Remove the belt cover.

3. If the tension is not correct, loosen the locknuts under the plate (Figure 31).
4. Loosen the bolts in the slots (Figure 31).
5. Adjust the locknuts on top to adjust the tension of the belts.
6. Check the belt tension and if needed, continue to adjust the top locknuts.
7. Tighten the lower locknuts under the plate (Figure 31).
8. Tighten the top locknuts.
9. Tighten the bolts in the slots.
10. Install the belt cover.

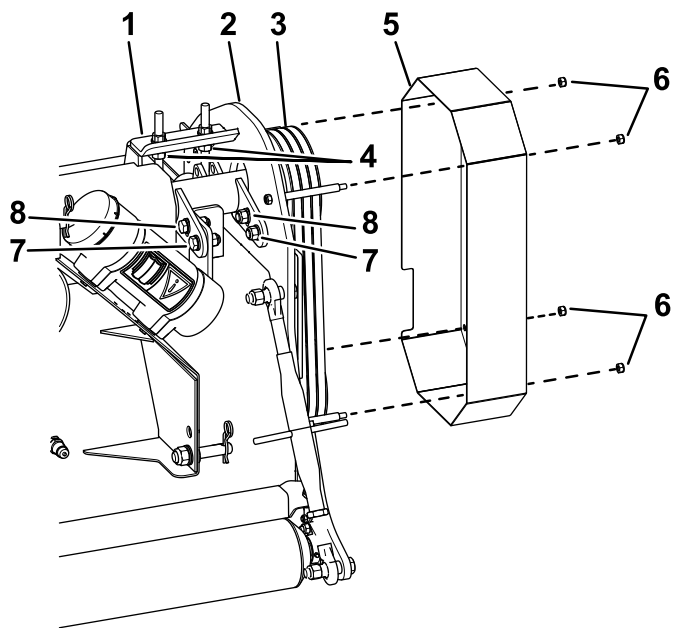


Figure 31

g346321

- | | |
|----------------------------|-----------------|
| 1. Top locknut | 5. Belt cover |
| 2. Left side | 6. Nuts |
| 3. V-belts | 7. Pivot bolt |
| 4. Locknut under the plate | 8. Bolt in slot |

Adjusting the Conveyor Belt Alignment

If the conveyor belt starts slipping or moving sideways after use or after new installation, adjust the conveyor belt tension.

1. Check if the rollers and the inside of the conveyor belt are clean. If necessary clean the rollers and remove any dirt inside.
2. Release the tension of the conveyor belt by loosening the left and right screws.
3. Mark both sides of the belt with 2 measurement marks a distance of 1000 mm (39-13/32 inch) apart; refer to [Figure 32](#).

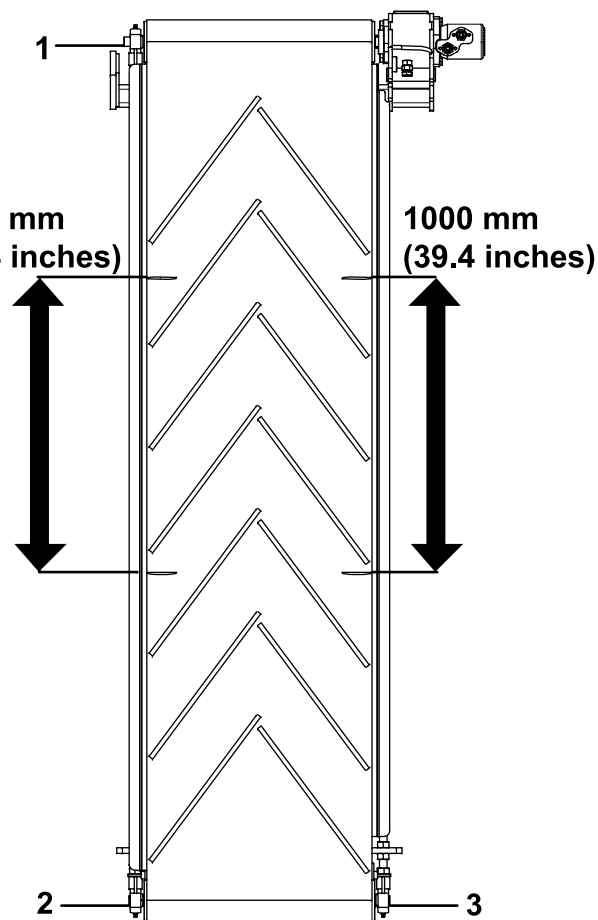


Figure 32

g346659

- | | |
|----------------------|---------------------|
| 1. Lower screw | 3. Upper left screw |
| 2. Upper right screw | |

4. Adjust the screws on both sides evenly till the distance between the marks has increased to an initial dimension of 1004 mm (39-1/2 inch).

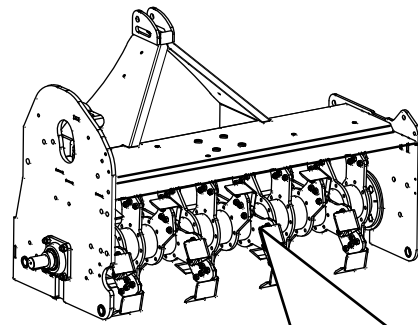
Note: Make the adjustments evenly on both sides in small steps.

5. Run the conveyor belt only slowly to detect any belt movement and before any damage occurs.
6. If the belt keeps slipping, adjust the screws evenly till a maximum of 1010 mm (39-13/16 inch).
7. If the conveyor belt tends to move to the left, give a little more tension on the lower left adjustment. If the conveyor belt moves to the right, give a little more tension to the lower right adjustment.

Note: Carry out the adjustments in small steps.

Belt Tensioning		
Belt movement	The belt moves to the left.	The belt moves to the right.
Adjustment	Tighten the lower left screw.	Tighten the lower right screw.

8. After each adjustment, allow the conveyor belt to rotate for at least 10 rotations to position itself to the new alignment before making any further corrections.
9. If the belt is working properly again, securely lock the screws in place.



Cleaning the Machine

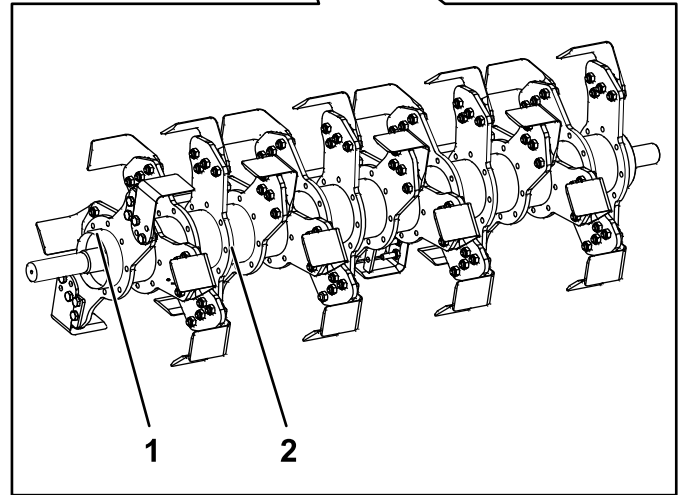
Service Interval: After each use

Important: Do not use brackish or reclaimed water to clean the machine.

- After daily use, thoroughly wash the machine with a garden hose (**without** a nozzle) to avoid contamination and seal and bearing damage due to excessive water pressure.

Note: Use a brush to help remove thick layered, dried, or compacted dirt and debris.

- Use a mild detergent to clean the covers.
- Inspect the machine for damage, leaking oil, and component wear.
- After cleaning the machine, grease all drive lines and roller bearings; refer to [Greasing the Attachment \(page 21\)](#).



g346660

Figure 33

1. Knives pointing to the right 2. Knives pointing to the left

Installing the Cutter Knives

1. Install the far left knives with the L pointing to the right.
2. Install all remaining knives with the L pointing to the left.

Installing Scarifying Knives

This machine is equipped with cutting knives, but you can also equip it with scarifying knives (if required) for scarifying the subsoil.

You can set the distance between the scarifying knives at the following 4 positions:

- 20 mm (0.79 inches)
- 40 mm (1.6 inches)
- 60 mm (2.36 inches)
- 80 mm (3.15 inches)

There are 8 rows on the rotor (Figure 34). Each row has 4 plates. When you stand behind the attachment, plate section 1 is the extreme left plate and plate section 4 is the extreme right plate (Figure 35).

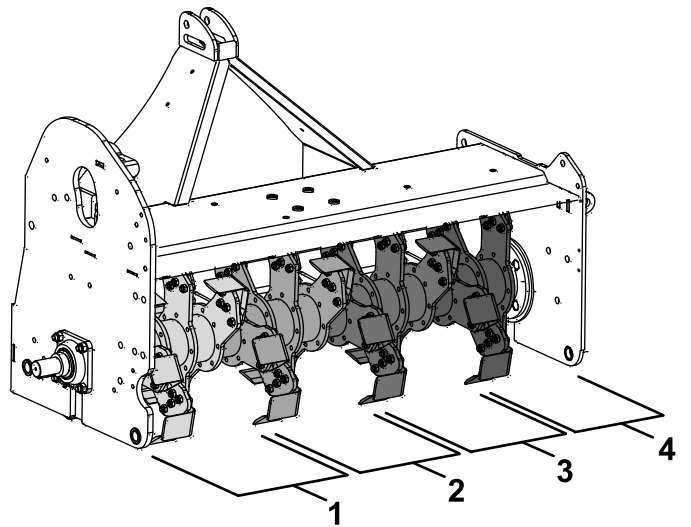


Figure 35

1. Plate section 1
3. Plate section 3
2. Plate section 2
4. Plate section 4

Note: Do not forget the weights. Without the weights, the machine could become unbalanced and that could cause damage to the field and the machine. The following tables show the distribution.

Use the tables below to select the spacing. The letters in the tables and Figure 37 show what parts to assemble in each row.

Note: There are different parts used in the row at the different plate sections.

20 mm (0.79 inches) Between Knives

	Plate Section			
Row	1	2	3	4
1	A	B	B	B
2	B	B	B	B
3	B	B	B	B
4	B	B	B	C
5	D	E	E	E
6	E	E	E	E
7	E	E	E	E
8	E	E	E	F

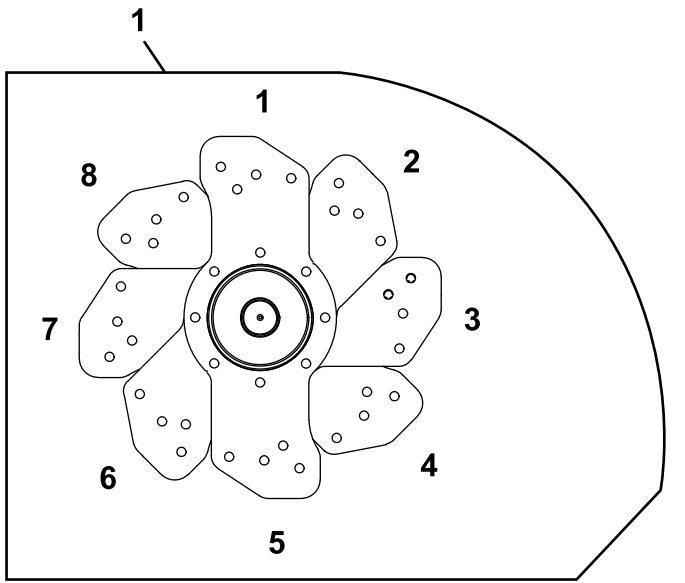


Figure 34

1. Left side view showing the knife rows

Parts needed for 20 mm Spacing (Figure 37)

Part	Quantity
Knife	62
Bushing	60
Bolt (M10 x 30)	4
Bolt (M10 x 55)	60
Nut (M10)	64
Large paddle	60
Small paddle	4

40 mm (1.57 inches) Between Knives

	Plate Section			
Row	1	2	3	4
1	G	H	H	H
2	H	H	H	H
3	H	H	H	H
4	H	H	H	I
5	D	E	E	E
6	E	E	E	E
7	E	E	E	E
8	E	E	E	Q

Parts needed for 40 mm Spacing (Figure 37)

Part	Quantity
Knife	31
Counterweight	31
Bushing	60
Bolt (M10 x 35)	2
Bolt (M10 x 55)	32
Bolt (M10 x 60)	30
Nut (M10)	64
Large paddle	60
Small paddle	4

60 mm (2.36 inches) Between Knives

	Plate Section			
Row	1	2	3	4
1	G	N	J	L
2	N	J	L	N
3	J	L	N	J
4	L	N	J	R
5	P	M	M	M
6	M	M	M	M
7	M	M	M	M
8	M	M	M	Q

Parts needed for 60 mm Spacing (Figure 37)

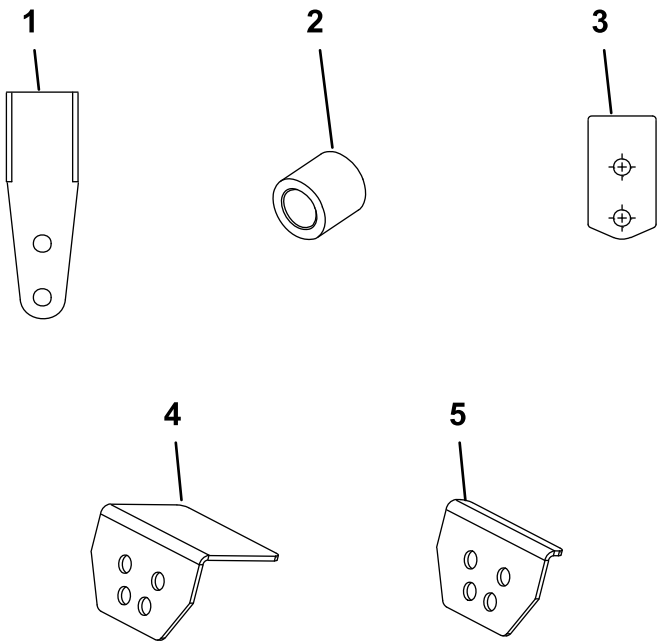
Part	Quantity
Knife	21
Counterweight	11
Bushing	60
Bolt (M10 x 35)	2
Bolt (M10 x 55)	62
Nut (M10)	64
Large paddle	60
Small paddle	4

80 mm (3.15 inches) Between Knives

	Plate Section			
Row	1	2	3	4
1	G	L	L	L
2	L	L	L	L
3	L	L	L	L
4	L	L	L	R
5	P	E	E	E
6	E	E	E	E
7	E	E	E	E
8	E	E	E	Q

Parts needed for 80 mm Spacing (Figure 37)

Part	Quantity
Knife	16
Counterweight	16
Bushing	60
Bolt (M10 x 35)	2
Bolt (M10 x 55)	62
Nut (M10)	64
Large paddle	60
Small paddle	4



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Figure 36

1. Knife
2. Bushing
3. Counter weight
4. Large paddle
5. Small paddle

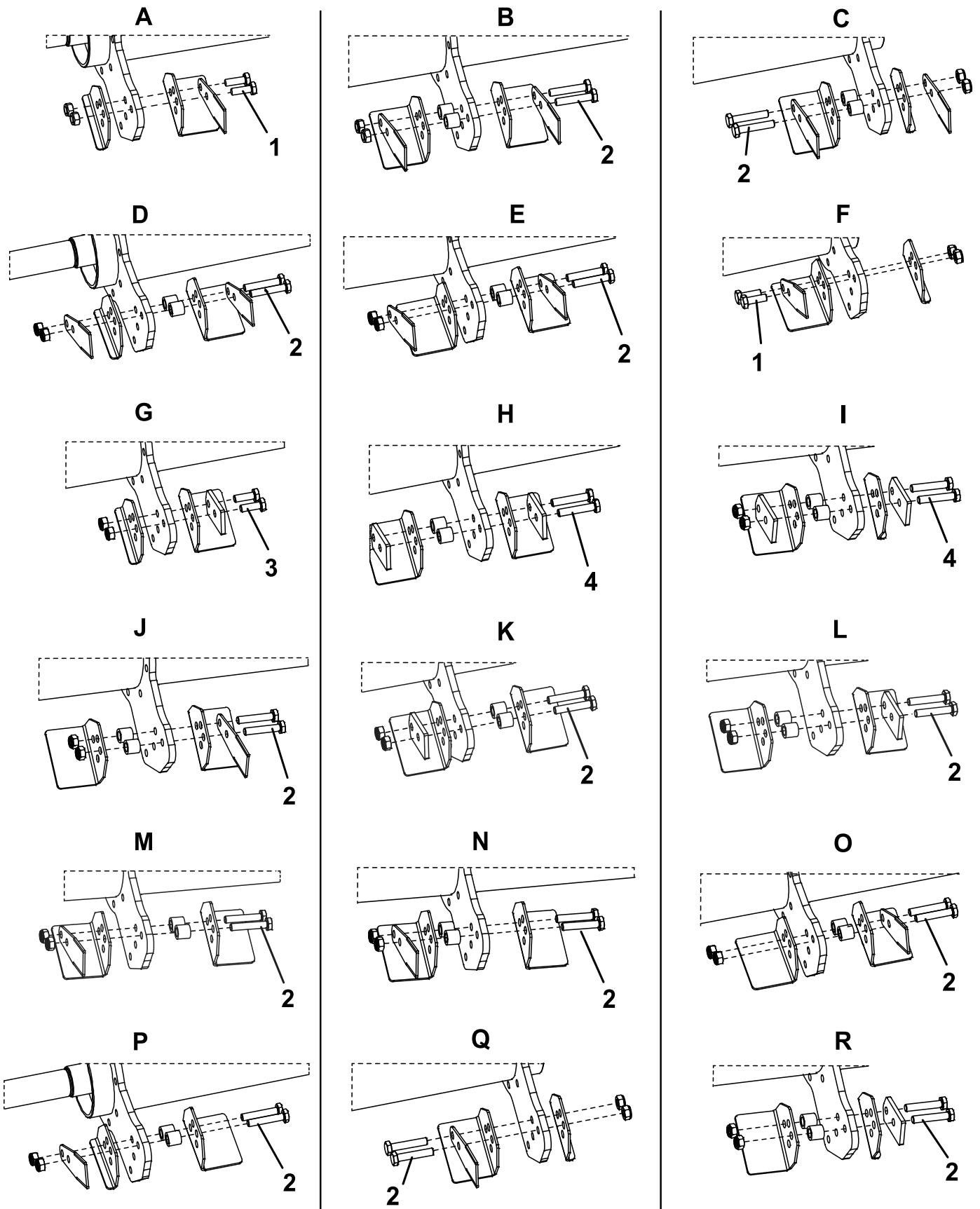


Figure 37

- 1. Bolt (M10 x 30)
- 2. Bolt (M10 x 55)

- 3. Bolt (M10 x 35)
- 4. Bolt (M10 x 60)

g346662

Storage

Storage Safety

- Before adjusting, cleaning, storing, or repairing the machine, park the it on a level surface; engage the parking brake of the traction unit; shut off the engine; remove the key; and wait for all movement to stop before leaving the traction unit.
- Store the machine on the front and rear rollers positioned on a firm, level surface so that it does not sink or roll away.
- Store the machine away from areas of human activity.
- Do not allow children to play on or around the stored machine.

Preparing the Machine for Storage

Important: Do not use brackish or reclaimed water to clean the machine.

When the machine is stored for a long period, perform the following procedure:

1. Clean off any dirt or grease that may have accumulated on the machine or any of the moving parts.
2. Clean accumulated soil from the knives.
3. Open the hood and clean out the inside of the machine.
4. Lubricate all grease fittings.
5. Support the PTO driveshaft in the stored position with the tether to prevent damage, or remove the PTO and store it under the hood to minimize corrosion.
6. Touch up any scratches on the painted surfaces.
7. Replace any missing or damaged decals.
8. Store the machine inside a dry, secure building. Inside storage reduces maintenance, gives a longer working life, and increases the residual value of the machine. If inside storage is not available, cover the machine with a heavy sheet or tarpaulin and secure it tightly.

Troubleshooting

Problem	Possible Cause	Corrective Action
The machine vibrates.	<ol style="list-style-type: none"> 1. There is an obstacle(s) between the knives 2. The knives are worn or broken. 3. The rotor is unbalanced. 	<ol style="list-style-type: none"> 1. Remove the obstacle(s). 2. Replace with new knives. 3. Balance the rotor.
The working depth is not achieved.	<ol style="list-style-type: none"> 1. The working depth is not correct. 2. The subsoil is too hard. 3. The driving speed is too high. 	<ol style="list-style-type: none"> 1. Adjust the working depth properly. 2. Lower the driving speed or pass over the soil more than once. 3. Lower the driving speed.
The soil is too coarse while processing.	<ol style="list-style-type: none"> 1. The driving speed is too high. 2. The soil is too wet. 	<ol style="list-style-type: none"> 1. Lower the driving speed. 2. Wait for better conditions.
The rotor is jammed.	<ol style="list-style-type: none"> 1. The soil is too wet. 2. There is an obstacle(s) between the knives 3. The driving speed is too high. 4. There is too much overgrowth. 	<ol style="list-style-type: none"> 1. Wait for better conditions. 2. Remove the obstacle(s). 3. Lower the driving speed. 4. Cut the overgrowth.
The rotor does not turn.	<ol style="list-style-type: none"> 1. The V-belts that drive the rotor slip. 2. The machine is adjusted too deep. 	<ol style="list-style-type: none"> 1. Tighten the V-belts. 2. Adjust the machine depth.
The transport belt cannot handle the quantity of material.	<ol style="list-style-type: none"> 1. The driving speed is too high. 2. Transport belt turns too slowly. 	<ol style="list-style-type: none"> 1. Lower the driving speed. 2. Increase the oil flow of the tractor.
The transport belt moves slowly or does not move.	<ol style="list-style-type: none"> 1. There is no hydraulic flow. 2. The transport belt slips. 	<ol style="list-style-type: none"> 1. Check the hydraulic connections. 2. Tighten the transport belt.

California Proposition 65 Warning Information

What is this warning?

You may see a product for sale that has a warning label like the following:



WARNING: Cancer and Reproductive Harm—www.p65Warnings.ca.gov.

What is Prop 65?

Prop 65 applies to any company operating in California, selling products in California, or manufacturing products that may be sold in or brought into California. It mandates that the Governor of California maintain and publish a list of chemicals known to cause cancer, birth defects, and/or other reproductive harm. The list, which is updated annually, includes hundreds of chemicals found in many everyday items. The purpose of Prop 65 is to inform the public about exposure to these chemicals.

Prop 65 does not ban the sale of products containing these chemicals but instead requires warnings on any product, product packaging, or literature with the product. Moreover, a Prop 65 warning does not mean that a product is in violation of any product safety standards or requirements. In fact, the California government has clarified that a Prop 65 warning "is not the same as a regulatory decision that a product is 'safe' or 'unsafe.'" Many of these chemicals have been used in everyday products for years without documented harm. For more information, go to <https://oag.ca.gov/prop65/faqs-view-all>.

A Prop 65 warning means that a company has either (1) evaluated the exposure and has concluded that it exceeds the "no significant risk level"; or (2) has chosen to provide a warning based on its understanding about the presence of a listed chemical without attempting to evaluate the exposure.

Does this law apply everywhere?

Prop 65 warnings are required under California law only. These warnings are seen throughout California in a wide range of settings, including but not limited to restaurants, grocery stores, hotels, schools, and hospitals, and on a wide variety of products. Additionally, some online and mail order retailers provide Prop 65 warnings on their websites or in catalogs.

How do the California warnings compare to federal limits?

Prop 65 standards are often more stringent than federal and international standards. There are various substances that require a Prop 65 warning at levels that are far lower than federal action limits. For example, the Prop 65 standard for warnings for lead is 0.5 µg/day, which is well below the federal and international standards.

Why don't all similar products carry the warning?

- Products sold in California require Prop 65 labelling while similar products sold elsewhere do not.
- A company involved in a Prop 65 lawsuit reaching a settlement may be required to use Prop 65 warnings for its products, but other companies making similar products may have no such requirement.
- The enforcement of Prop 65 is inconsistent.
- Companies may elect not to provide warnings because they conclude that they are not required to do so under Prop 65; a lack of warnings for a product does not mean that the product is free of listed chemicals at similar levels.

Why do we include this warning?

Our company has chosen to provide consumers with as much information as possible so that they can make informed decisions about the products they buy and use. We provide warnings in certain cases based on its knowledge of the presence of one or more listed chemicals without evaluating the level of exposure, as not all the listed chemicals provide exposure limit requirements. While the exposure from our products may be negligible or well within the "no significant risk" range, out of an abundance of caution, we have elected to provide the Prop 65 warnings. Moreover, if we do not provide these warnings, it could be sued by the State of California or by private parties seeking to enforce Prop 65 and subject to substantial penalties.



Warranty Statement

One-Year Limited Warranty

Conditions and Products Covered

Your Bullseye product ("Product") is warranted to be free from defects in materials or workmanship for 1 year. Where a warrantable condition exists, we will repair the Product at no cost to you including diagnostics, labor, parts, and transportation. This warranty begins on the date the Product is delivered to the original retail purchaser.

Instructions for Obtaining Warranty Service

You are responsible for notifying the distributor or authorized dealer from whom you purchased the Product as soon as you believe a warrantable condition exists. If you need help locating a distributor or authorized dealer, or if you have questions regarding your warranty rights or responsibilities, you may contact us at:

Bullseye Commercial Products Service Department
8111 Lyndale Avenue South
Bloomington, MN 55420-1196

952-888-8801 or 800-952-2740

Items and Conditions Not Covered

Not all product failures or malfunctions that occur during the warranty period are defects in materials or workmanship. This warranty does not cover the following:

- Product failures which result from the use of non-Bullseye replacement parts, or from installation and use of non-Bullseye branded accessories and products, or unapproved modifications to the Product, accessory, or replacement part.
- Product failures which result from failure to perform recommended maintenance and/or adjustments.
- Product failures which result from misusing the Product or using it in an abusive, negligent, or reckless manner.
- Parts consumed through use that are not defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to, blades, reels, rollers and bearings (sealed or greasable), bed knives, spark plugs, castor wheels and bearings, tires, filters, belts, and discs, seed element castings, rotors, brushes, scrapers, fraze blades, rake tines, PTO's, and draw bars.
- Failures caused by outside influence, including, but not limited to, weather, natural disaster, storage practices, contamination, use of unapproved fuels, coolants, lubricants, additives, fertilizers, water, or chemicals.
- Failure or performance issues due to the use of fuels (e.g. gasoline, diesel, or biodiesel) that do not conform to their respective industry standards.
- Normal noise, vibration, wear and tear, and deterioration. Normal "wear and tear" includes, but is not limited to, damage to seats due to wear or abrasion, worn painted surfaces, scratched decals or windows.

Parts

Parts scheduled for replacement, as required maintenance, are covered for the same warranty period as the product warranty. Parts replaced under this warranty are covered for the duration of the original product warranty. Bullseye may retain all parts being replaced. Bullseye will make the final decision whether to repair any existing part or assembly or replace it. Bullseye may use remanufactured parts for warranty repairs.

Maintenance is at Owner's Expense

Engine tune-up, lubrication, cleaning and polishing, replacement of filters, coolant, and completing recommended maintenance are some of the normal services Bullseye products require that are at the owner's expense.

General Conditions

Repair by an Authorized Distributor or Dealer is your sole remedy under this warranty.

Neither Bullseye, nor any company involved in the manufacture, distribution, or sale of a Bullseye product shall be liable for indirect, incidental or consequential damages arising out of or related to the sale or use of the Product, including any cost or expense of providing substitute equipment or service during reasonable periods of malfunction or non-use pending completion of repairs under this warranty. Except for the emissions warranty referenced below, if applicable, there is no other express or implied warranty.

Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Note Regarding Emissions Warranty

The emissions control system on your Product may be covered by a separate warranty from the engine manufacturer, meeting requirements established by the U.S. Environmental Protection Agency (EPA) and/or the California Air Resources Board (CARB). The hour limitations set forth above do not apply to the emissions control system warranty. Refer to the engine emission control warranty statement supplied with your product or contained in the engine manufacturer's documentation.