



**Count on it.**

Form No. 3477-812 Rev A

# Operator's Manual

## **Z Master® Professional 5000 Series Riding Mower with TURBO FORCE® Rear Discharge Mower**

Model No. 72922—Serial No. 420000000 and Up

Model No. 72923—Serial No. 420000000 and Up

Model No. 72924—Serial No. 420000000 and Up





information and **Note** emphasizes general information worthy of special attention.

The safety-alert symbol (Figure 2) appears both in this manual and on the machine to identify important safety messages that you must follow to avoid accidents. This symbol will appear with the word **Danger**, **Warning**, or **Caution**.

- **Danger** indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury.
- **Warning** indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.
- **Caution** indicates a potentially hazardous situation which, if not avoided, **may** result in minor or moderate injury.



**Figure 2**  
Safety-alert symbol

sa-black

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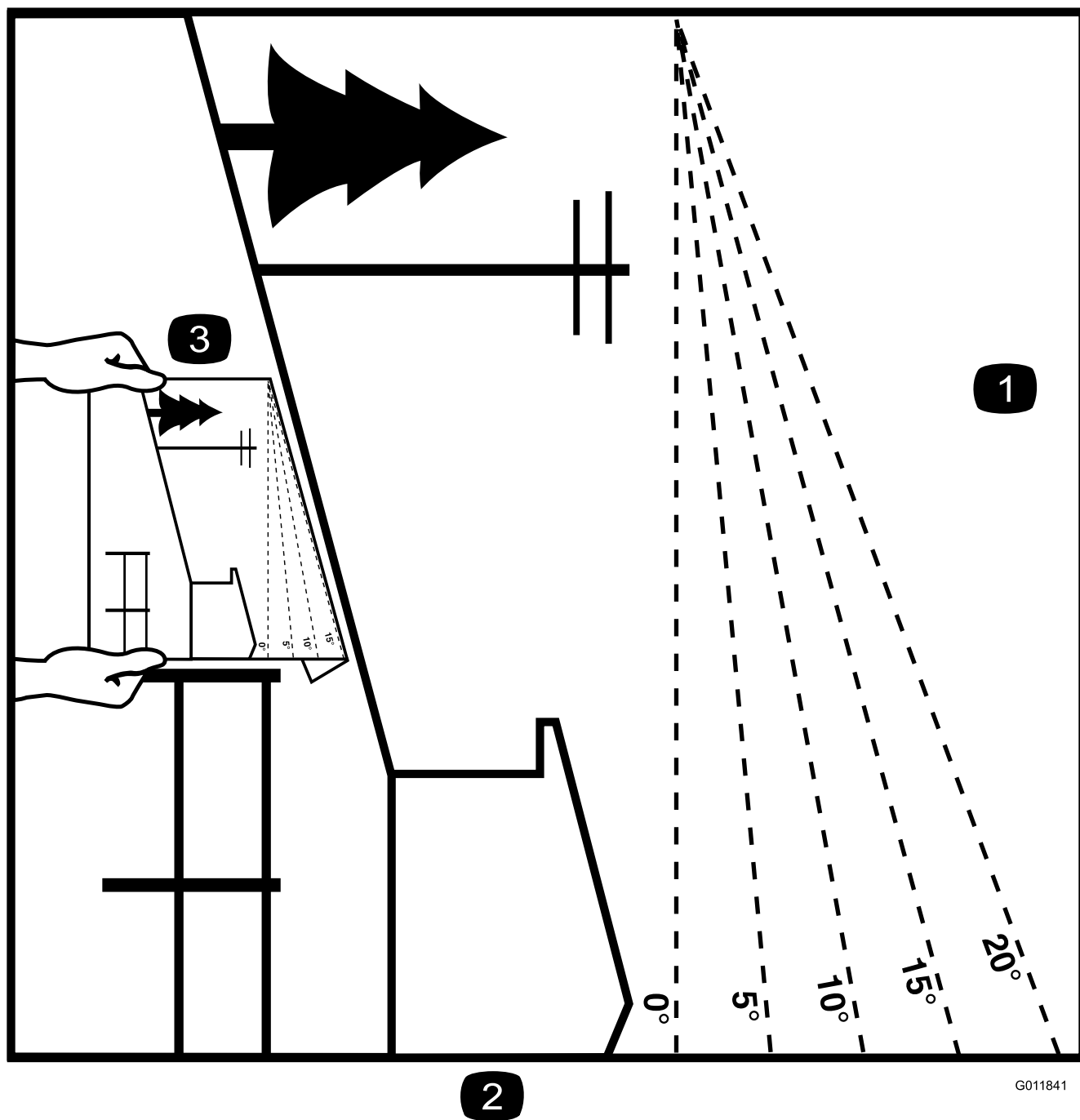
# Safety

## General Safety

This product is capable of amputating hands and feet and of throwing objects. Always follow all safety instructions to avoid serious personal injury.

- Read and understand the contents of this *Operator's Manual* before starting the engine.
- Keep bystanders and children away.
- Do not allow children or untrained people to operate or service the machine. Allow only people who are responsible, trained, familiar with the instructions, and physically capable to operate or service the machine.
- Always keep the roll bar in the fully raised and locked position and use the seat belt.
- Do not operate the machine near drop-offs, ditches, embankments, water, or other hazards, or on slopes greater than 15°.
- Do not put your hands or feet near moving components of the machine.
- Do not operate the machine without all guards, safety switches, and other safety protective devices in place and functioning properly.
- Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operator's position. Allow the machine to cool before servicing, adjusting, fueling, cleaning, or storing it.

# Slope Indicator



G011841

g011841

**Figure 3**

You may copy this page for personal use.

1. The maximum slope you can operate the machine on is **15 degrees**. Use the slope chart to determine the degree of slope of hills before operating. **Do not operate this machine on a slope greater than 15 degrees.** Fold along the appropriate line to match the recommended slope.
2. Align this edge with a vertical surface, a tree, building, fence pole, etc.
3. Example of how to compare slope with folded edge

# 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.



## Battery Symbols

Some or all of these symbols are on your battery.

- |  |   |
|--|---|
| 1. Explosion hazard                    | 6. Keep bystanders away from the battery.                                       |
| 2. No fire, open flame, or smoking     | 7. Wear eye protection; explosive gases can cause blindness and other injuries. |
| 3. Caustic liquid/chemical burn hazard | 8. Battery acid can cause blindness or severe burns.                            |
| 4. Wear eye protection.                | 9. Flush eyes immediately with water and get medical help fast.                 |
| 5. Read the <i>Operator's Manual</i> . | 10. Contains lead; do not discard   |



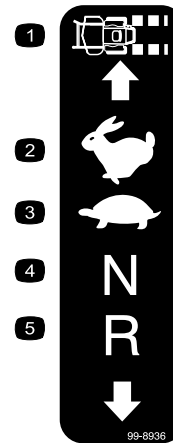
## Manufacturer's Mark

- This mark indicates that the blade is identified as a part from the original machine manufacturer.



58-6520

- Grease



99-8936

- |                  |            |
|------------------|------------|
| 1. Machine speed | 4. Neutral |
| 2. Fast          | 5. Reverse |
| 3. Slow          |            |



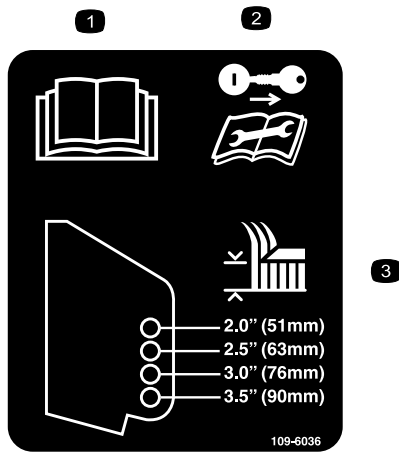
106-2655

- Warning—do not touch or approach moving belts; remove the key and read the instructions before servicing or performing maintenance.



106-5517

- Warning—do not touch the hot surface.

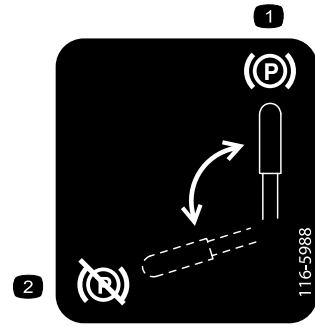


**109-6036**

Rear Discharge Machines Only

1. Read the *Operator's Manual*.
2. Remove the key and read the instructions before servicing or performing maintenance.
3. Height of cut

decal109-6036



**116-5988**

decal116-5988

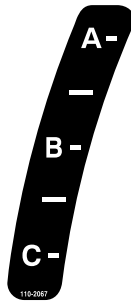
1. Parking brake—engaged
2. Parking brake—disengaged



**116-8726**

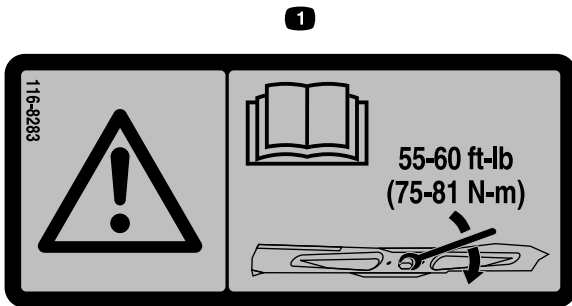
decal116-8726

1. Read the *Operator's Manual* for the recommended hydraulic fluid.



**110-2067**

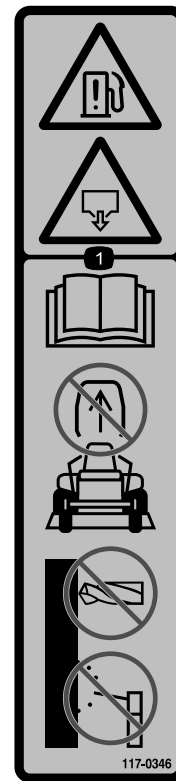
decal110-2067



**116-8283**

decal116-8283

1. Warning—read the *Operator's Manual* for instructions on torquing the blade bolt/nut to 75 to 81 N·m (55 to 60 ft-lb).



**117-0346**

decal117-0346

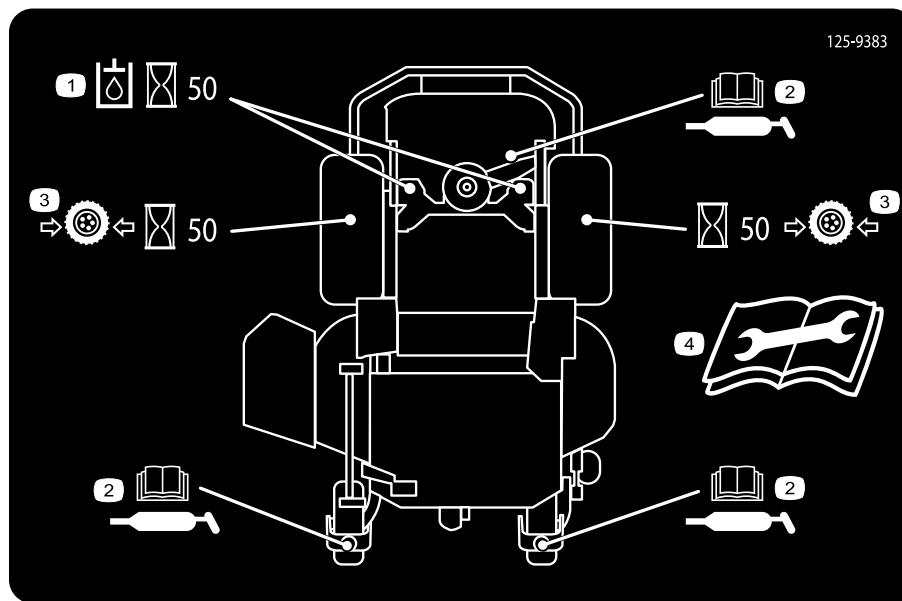
1. Fuel leak hazard—read the *Operator's Manual*; do not attempt to remove the roll bar; do not weld, drill or modify the roll bar in any way.



**133-8062**

decal133-8062





125-9383

### 125-9383

decal125-9383

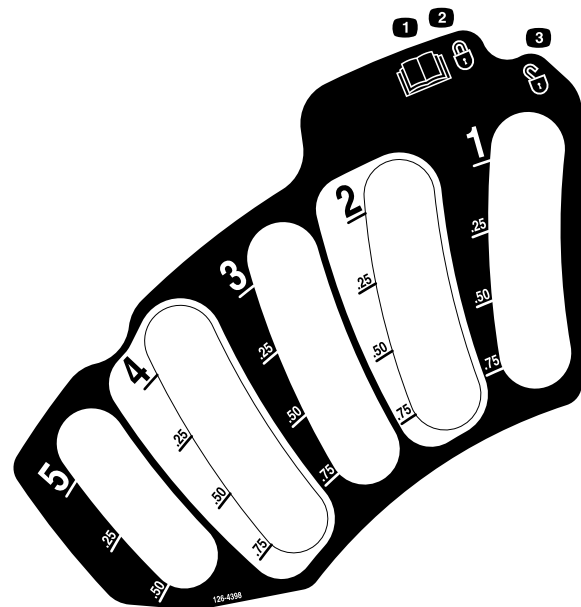
1. Check hydraulic fluid every 50 operating hours.
2. Read the *Operator's Manual* for information on lubricating the machine.
3. Check the tire pressure every 50 operating hours.
4. Read the *Operator's Manual* before servicing or performing maintenance.



decal126-2055

### 126-2055

1. Wheel lug nut—torque to 129 N·m (95 ft-lb).
2. Wheel hub nut—torque to 319 N·m (235 ft-lb).
3. Read the *Operator's Manual* before performing maintenance; check the torque after the first 100 hours and every 500 hours after.



decal126-4398

### 126-4398

1. Read the *Operator's Manual*.
2. Lock
3. Unlock

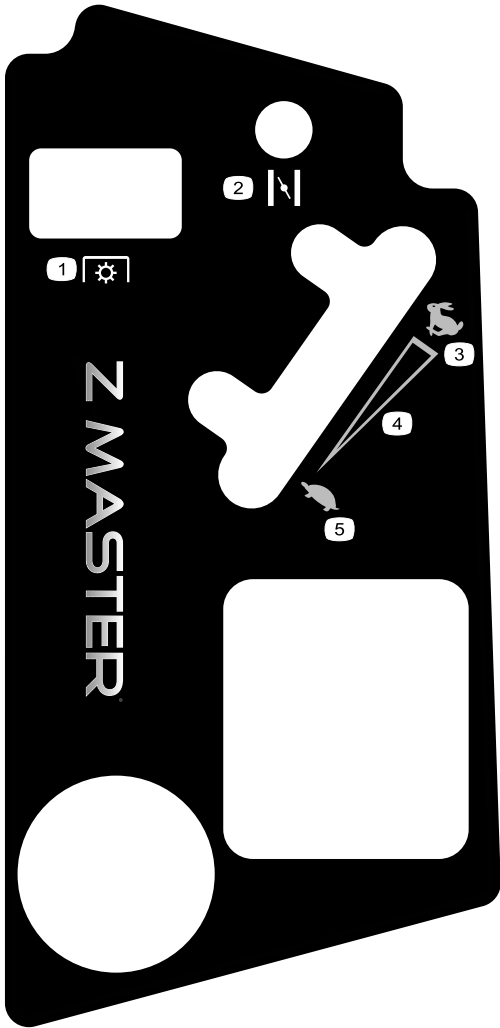


decal126-4659

### 126-4659

1. Warning—hot pulley; allow to cool.

Machines with a standard hour meter only

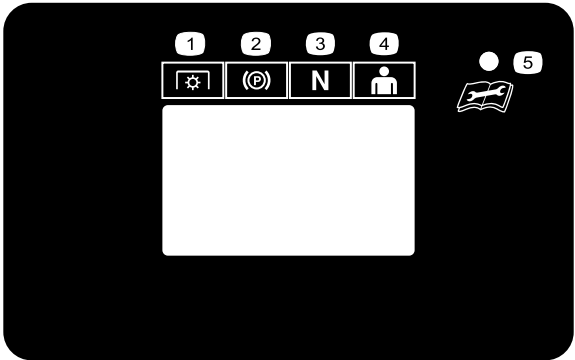


121-7551

decal121-7551

- |                        |                                |
|------------------------|--------------------------------|
| 1. Power takeoff (PTO) | 4. Continuous variable setting |
| 2. Choke               | 5. Slow                        |
| 3. Fast                |                                |

Machines with a smart hour meter only

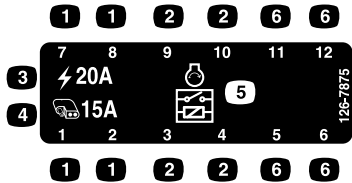


g224114

126-5641

- |                  |  |
|------------------|--|
| 1. PTO           | 4. Operator-presence switch                      |
| 2. Parking brake | 5. See user's guide for operating condition code |
| 3. Neutral       |  |

Machines with a Kohler Engine Only

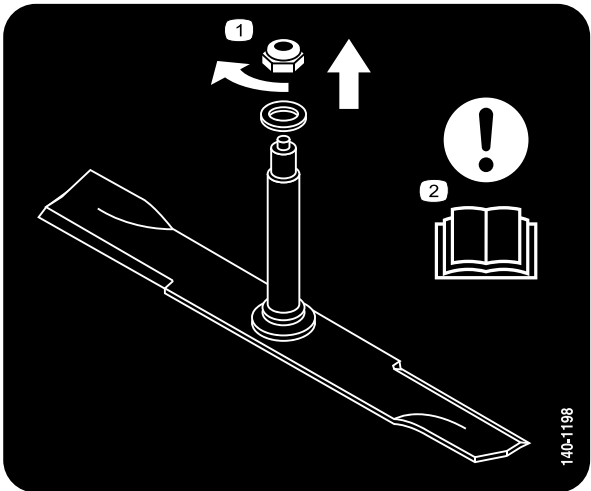


decal126-7875

126-7875

- |                   |                   |
|-------------------|-------------------|
| 1. Fuse location  | 4. Auxiliary, 15A |
| 2. Relay location | 5. Start relay    |
| 3. Main, 20A      | 6. Not used       |

Machines with Rear Discharge Only



decal140-1198

140-1198

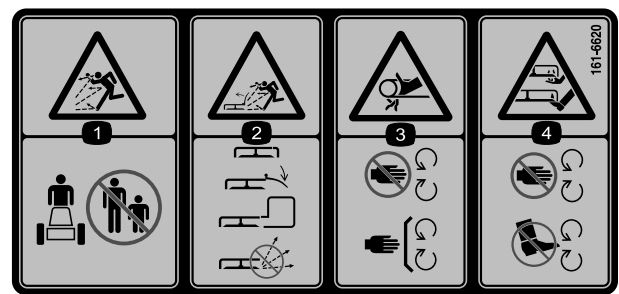
- |  |  |
|--|--|
| 1. Rotate the nut clockwise to remove. | 2. Attention—read the <i>Operator's Manual</i> . |
|--|--|



**127-6663**

decal127-6663

1. Warning—read the *Operator's Manual*.
2. Crushing hazard—engage the parking brake, shut off the engine, and remove the key; support the machine using jackstands.

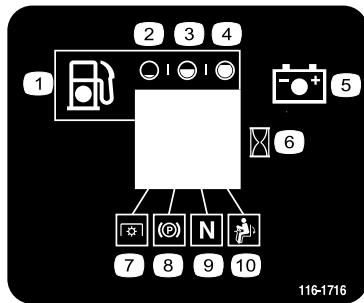


decal161-6620

**161-6620**

1. Thrown object hazard—keep bystanders away from the machine.
2. Thrown object hazard, raised deflector—lower the deflector before operating the machine; always operate the machine with the deflector, discharge cover, or grass collection system in place; do not operate the machine with the discharge opening uncovered.
3. Entanglement hazard—keep away from moving parts; keep all guards and shields in place.
4. Severing hazard of hand or foot—keep hands and feet away from moving parts.

### Machines with a standard hour meter only



decal116-1716

**116-1716**

1. Fuel
2. Empty
3. Half
4. Full
5. Battery
6. Hour meter
7. PTO
8. Parking brake
9. Neutral
10. Operator presence switch



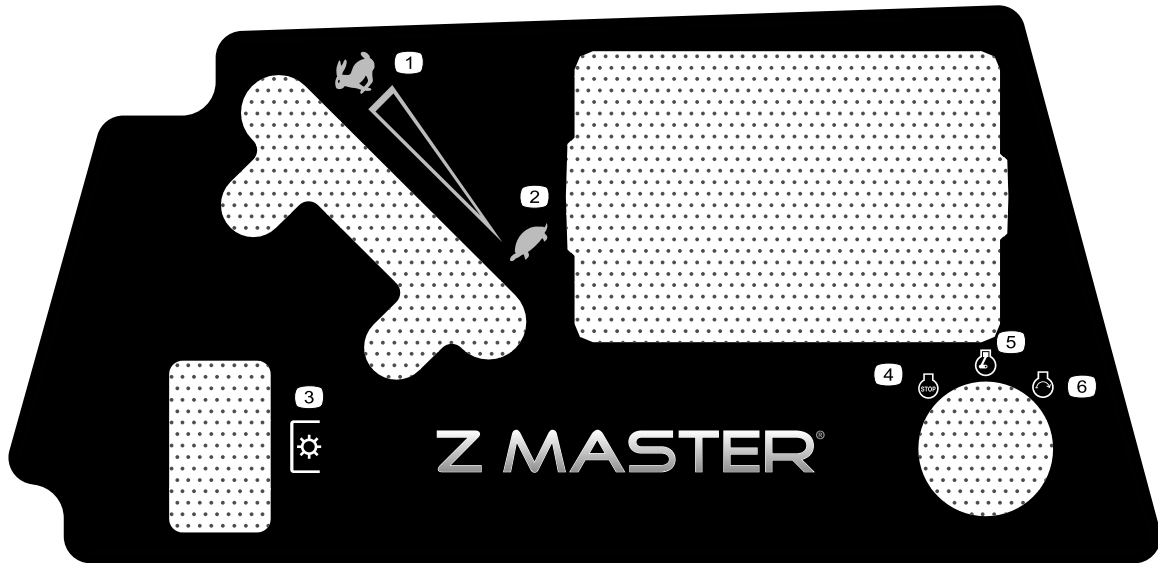
132-0871

decal132-0871

**Note:** This machine complies with the industry standard stability test in the static lateral and longitudinal tests with the maximum recommended slope indicated on the decal. Review the instructions for operating the machine on slopes in the *Operator's Manual* as well as the conditions in which you would operate the machine 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.

1. Warning—read the *Operator's Manual*; all operators should be trained before operating the machine; wear hearing protection.
2. Cutting/dismemberment hazard of hand—stay away from moving parts; keep all guards and shields in place.
3. Thrown object hazard—keep bystanders away.
4. Tipping hazard—do not use dual ramps when loading onto a trailer; use 1 ramp wide enough for the machine; use a ramp with a slope less than 15°; back up the ramp (in reverse) and drive forward off the ramp.
5. Runover hazard—do not carry passengers; look behind you when moving in reverse.
6. Tipping hazard—do not use the machine near drop-offs or on slopes greater than 15°; only operate across slopes less than 15°.

Machines with a smart hour meter only

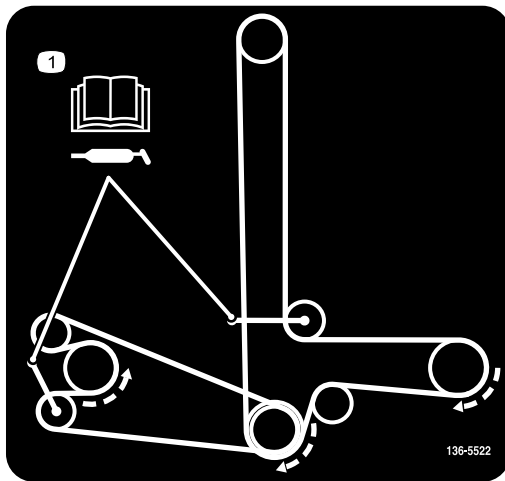


decal137-9208

**137-9208**

- |         |                 |
|---------|-----------------|
| 1. Fast | 4. Engine—stop  |
| 2. Slow | 5. Engine—run   |
| 3. PTO  | 6. Engine—start |

Machines with Rear Discharge Only



decal136-5522

**136-5522**

1. Belt routing; read the *Operator's Manual* for greasing information.

# Product Overview

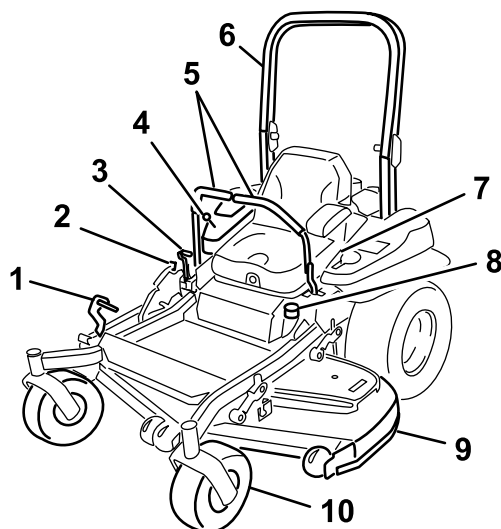


Figure 4

g570345

- |                          |                  |
|--------------------------|------------------|
| 1. Deck-lift pedal       | 6. Roll bar      |
| 2. Transport lock        | 7. Seat belt     |
| 3. Parking-brake lever   | 8. Fuel cap      |
| 4. Controls              | 9. Mower deck    |
| 5. Motion-control levers | 10. Caster wheel |

## Controls

Become familiar with all the controls before you start the engine and operate the machine.

### Control Panel

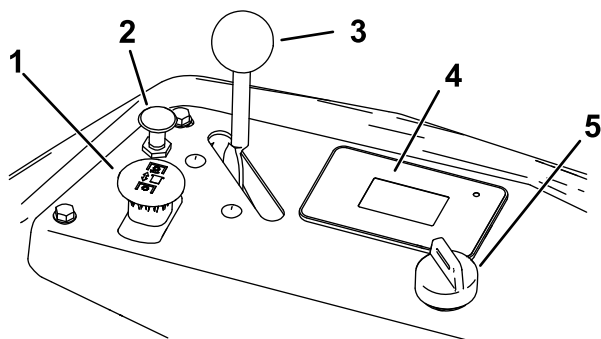


Figure 5

g233557

- |   |  |
|---|--|
| 1. Blade-control switch (power takeoff) | 4. Hour meter/Safety-interlock display |
| 2. Choke control                        | 5. Key switch                          |
| 3. Throttle control                     |  |

## Key Switch

The key switch, used to start and shut off the engine, has 3 positions: OFF, RUN, and START. Refer to [Starting the Engine \(page 25\)](#).

## Throttle Control

The throttle controls the engine speed, and it has a continuous-variable setting from the SLOW to FAST position ([Figure 5](#)).

## Choke Control

Use the choke control to start a cold engine.

## Hour Meter

### Machines with a Standard Hour Meter

The hour meter records the number of hours the engine has operated. It operates when the engine is running. Use these times for scheduling regular maintenance ([Figure 6](#)).

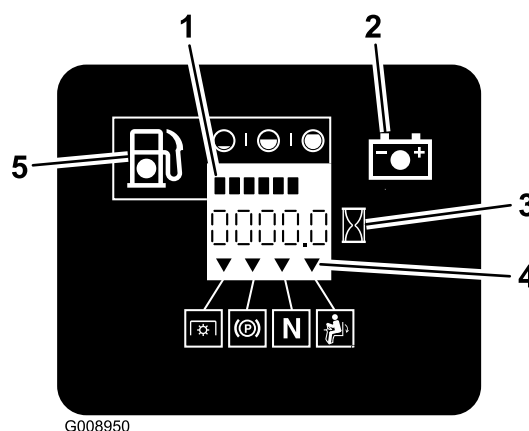


Figure 6

G008950

g008950

- |                      |                             |
|----------------------|-----------------------------|
| 1. Fuel gauge (bars) | 4. Safety-interlock symbols |
| 2. Battery light     | 5. Low fuel indicator light |
| 3. Hour meter        |                             |

### Fuel Gauge

The fuel gauge is located within the hour meter, and the bars light up when the key switch is in the ON position ([Figure 6](#)).

The indicator light appears when the fuel level is low (approximately 1 gallon remaining in the fuel tank).

### Safety-Interlock Indicators

There are symbols on the hour meter that indicate with a black triangle that the interlock component is positioned correctly ([Figure 7](#)).

## Battery-Indicator Light

If you turn the key switch to the ON position for a few seconds, the battery voltage displays in the area where the hours are normally displayed.

The battery light turns on when the key switch is turned on and when the charge is below the correct operating level ([Figure 6](#)).

## Electronic-Control Unit Malfunction-Indicator Light

The electronic-control unit (ECU) continuously monitors the operation of the EFI system.

If a problem or fault within the system is detected, the malfunction-indicator light (MIL) illuminates.

The MIL is the red light located in the right console panel.

Once the MIL illuminates, make initial troubleshooting checks; refer to the MIL section under [Troubleshooting \(page 73\)](#).

If these checks do not correct the problem, further diagnosis and servicing by an Authorized Service Dealer is necessary.

## Hour Meter

### For Machines with a Smart Hour Meter

The hour meter records the number of hours the engine has operated. It operates when the engine is running. Use these times for scheduling regular maintenance ([Figure 7](#)).

The hour meter displays when you are operating the machine and momentarily when you shut off the engine. The display turns off after 5 minutes.

Refer to the *Software Guide* for more information.

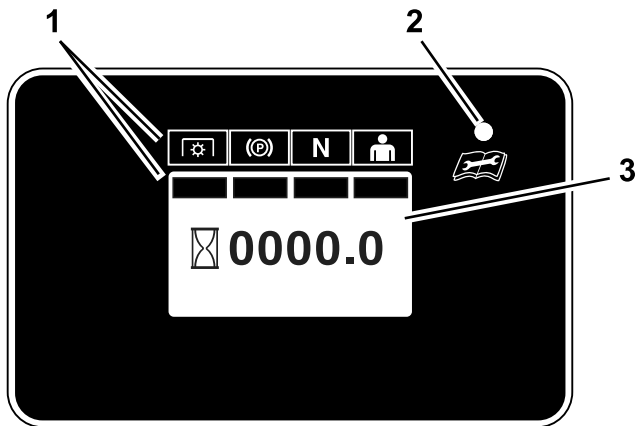


Figure 7

g231075

1. Safety-interlock indicators
2. LED status light
3. Information screen

## LED Status Light

The LED is multi-colored to indicate the system status and is located on the right side of the panel.

- **Solid Green**—indicates normal operating activity.
- **Blinking Red**—indicates a fault is active.
- **Blinking Green and Orange**—indicates a clutch reset is required.
- **Solid Red**—indicates maintenance is required.

Refer to the *Software Guide* for more information.

## Fuel Gauge

When the fuel-tank level is low, the LED status light flashes a red light and the fuel-level symbol on the screen flashes.

Refer to the *Software Guide* for more information.

## Safety-Interlock Indicators

There are symbols on the hour meter that indicate with a black bar that the interlock component is positioned correctly ([Figure 7](#)).

## Motion-Control Levers

Use the motion-control levers to drive the machine forward, reverse, and turn either direction ([Figure 4](#)).

## Neutral-Lock Position

Move the motion-control levers outward from the center to the NEUTRAL-LOCK position when exiting the machine ([Figure 24](#)). Always position the motion-control levers into the NEUTRAL-LOCK position when you stop the machine or leave it unattended.

## Parking-Brake Lever

Whenever you shut off the engine, engage the parking brake to prevent accidental movement of the machine.

## Fuel-Shutoff Valve

Close the fuel-shutoff valve when transporting or storing the machine; refer to [Using the Fuel-Shutoff Valve \(page 31\)](#).

# Specifications

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

## Machines with Rear Discharge

### Width:

	60-inch Mower Deck	72-inch Mower Deck
Without Mower Deck	134.6 cm (53.0 inches)	150.1 cm (59.1 inches)
With Mower Deck	168.4 cm (66.3 inches)	199.0 cm (78.3 inches)

### Length:

	60-inch Mower Deck	72-inch Mower Deck
Roll Bar - Up	221.6 cm (87.25 inches)	221.6 cm (87.25 inches)
Roll Bar - Down	226.0 cm (88.95 inches)	226.0 cm (88.95 inches)

### Height:

Roll Bar - Up	Roll Bar - Down
179.1 cm (70.5 inches)	118.9 cm (46.8 inches)

### Weight:

Model	Weight
60-inch Mower Deck	577 kg (1,271 lb)
72-inch Mower Deck	606 kg (1,335 lb)

## Attachments/Accessories

A selection of Toro approved attachments and accessories is available for use with the machine to enhance and expand its capabilities. Contact your Authorized Service Dealer or authorized Toro distributor or go to [www.Toro.com](http://www.Toro.com) for a list of all approved attachments and accessories.

To ensure optimum performance and continued safety certification of the machine, use only genuine Toro 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

### General Safety

- Do not 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.
  - Inspect the area where you will use the machine, and remove all objects that could interfere with the operation of the machine or that the machine could throw.
  - Become familiar with the safe operation of the equipment, operator controls, and safety signs.
  - Check that operator-presence controls, safety switches, and guards are attached and working properly. Do not operate the machine unless they are functioning properly.
  - Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operator's position. Allow the machine to cool before servicing, adjusting, fueling, cleaning, or storing it.
  - Before mowing, inspect the machine to ensure that the cutting assemblies are working properly.
  - Evaluate the terrain to determine the appropriate equipment and any attachments or accessories required to operate the machine properly and safely.
  - 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.
  - Do not carry passengers on the machine.
  - Keep bystanders and pets away from the machine during operation. Shut off the machine and attachment(s) if anyone enters the area.
  - Do not operate the machine unless all guards and safety devices, such as the deflectors and the entire grass catcher, are in place and functioning properly. Replace worn or deteriorated parts when necessary.
- ### Fuel Safety
- Fuel is extremely flammable and highly explosive. A fire or explosion from fuel can burn you and others and can damage property.
    - To prevent a static charge from igniting the fuel, place the container and/or machine directly on the ground before filling, not in a vehicle or on an object.
    - Fill the fuel tank outdoors on level ground, in an open area, and when the engine is cold. Wipe up any fuel that spills.
    - Do not handle fuel when smoking or around an open flame or sparks.
    - Do not remove the fuel cap or add fuel to the tank while the engine is running or hot.
    - If you spill fuel, do not attempt to start the engine. Avoid creating a source of ignition until the fuel vapors have dissipated.
    - Store fuel in an approved container and keep it out of the reach of children.
  - Fuel is harmful or fatal if swallowed. Long-term exposure to vapors can cause serious injury and illness.
    - Avoid prolonged breathing of vapors.
    - Keep your hands and face away from the nozzle and the fuel-tank opening.
    - Keep fuel away from your eyes and skin.
  - Do not store the machine or fuel container where there is an open flame, spark, or pilot light, such as on a water heater or on other appliances.
  - Do not fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground and away from your vehicle before filling.
  - Remove the equipment from the truck or trailer and refuel it while it is on the ground. If this is not possible, then refuel from a portable container rather than from a fuel-dispenser nozzle.
  - Do not operate the machine without the entire exhaust system in place and in proper working condition.
  - Keep the fuel-dispenser nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete. Do not use a nozzle lock-open device.
  - If you spill fuel on your clothing, change your clothing immediately.
  - Do not overfill the fuel tank. Replace the fuel cap and tighten it securely.
  - Clean grass and debris from the cutting unit, muffler, drives, grass catcher, and engine compartment to help prevent fires. Clean up oil or fuel spills.

# Adding Fuel

## Recommended Fuel

- For best results, use only clean, fresh (less than 30 days old), unleaded gasoline with an octane rating of 87 or higher ((R+M)/2 rating method).
- Ethanol:** Gasoline with up to 10% ethanol (gasohol) or 15% MTBE (methyl tertiary butyl ether) by volume is acceptable. Ethanol and MTBE are not the same. Gasoline with 15% ethanol (E15) by volume is not approved for use. **Never use gasoline that contains more than 10% ethanol by volume**, such as E15 (contains 15% ethanol), E20 (contains 20% ethanol), or E85 (contains up to 85% ethanol). Using unapproved gasoline may cause performance problems and/or engine damage which may not be covered under warranty.
- Do not** use gasoline containing methanol.
- Do not** store fuel either in the fuel tank or fuel containers over the winter unless you use a fuel stabilizer.
- Do not** add oil to gasoline.

## Using Stabilizer/Conditioner

Use a fuel stabilizer/conditioner in the machine to provide the following benefits:

- Keeps fuel fresh longer when used as directed by the fuel-stabilizer manufacturer
- Cleans the engine while it runs
- Eliminates gum-like varnish buildup in the fuel system, which causes hard starting

**Important:** Do not use fuel additives containing methanol or ethanol.

Add the correct amount of fuel stabilizer/conditioner to the fuel.

**Note:** A fuel stabilizer/conditioner is most effective when mixed with fresh fuel. To minimize the chance of varnish deposits in the fuel system, use fuel stabilizer at all times.

## Filling the Fuel Tank

1. Park the machine on a level surface.
2. Engage the parking brake.
3. Shut off the engine and remove the key.
4. Clean around the fuel-tank cap.
5. Fill the fuel tank to the bottom of the filler neck (Figure 8).

**Note:** Do not fill the fuel tank completely full. The empty space in the tank allows the fuel to expand.

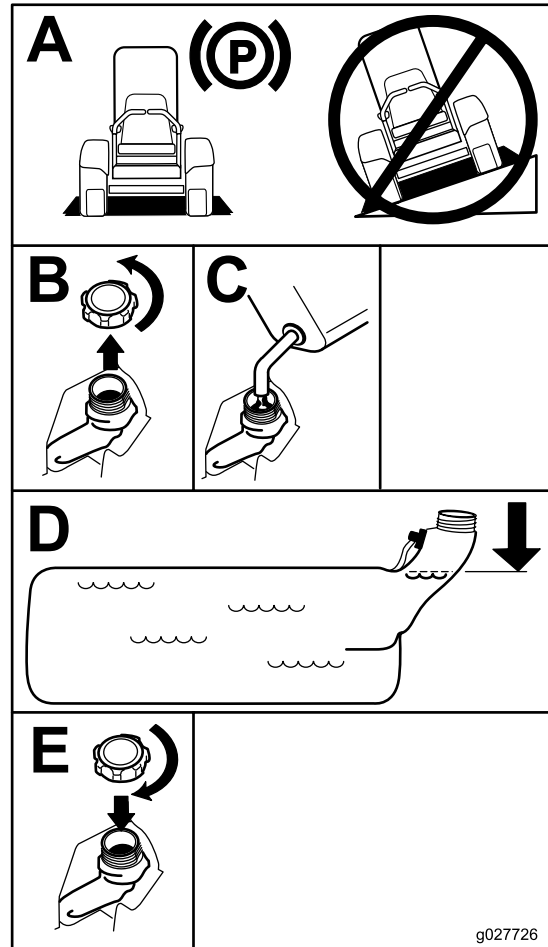


Figure 8

## Performing Daily Maintenance

Before starting the machine each day, perform the Each Use/Daily procedures listed in [Maintenance \(page 35\)](#).

## Breaking in a New Machine

New engines take time to develop full power. Mower decks and drive systems have higher friction when new, placing additional load on the engine. Allow 40 to 50 hours of break-in time for new machines to develop full power and best performance.

# Using the Rollover-Protection System (ROPS)

## ⚠ WARNING

To avoid injury or death from rollover, keep the roll bar in the fully raised, locked position and use the seat belt.

Ensure that the seat is secured to the machine.

## ⚠ WARNING

There is no rollover protection when the roll bar is in the down position.

- Lower the roll bar only when absolutely necessary.
- Do not wear the seat belt when the roll bar is in the down position.
- Drive slowly and carefully.
- Raise the roll bar as soon as clearance permits.
- Check carefully for overhead clearances (i.e., branches, doorways, electrical wires) before driving under any objects and do not contact them.

## Lowering the Roll Bar

**Important:** Lower the roll bar only when absolutely necessary.

1. To lower the roll bar, apply forward pressure to the upper part of the roll bar.
2. Pull both knobs out and rotate them 90 degrees so they are not engaged ([Figure 9](#)).
3. Lower the roll bar to the down position ([Figure 9](#)).

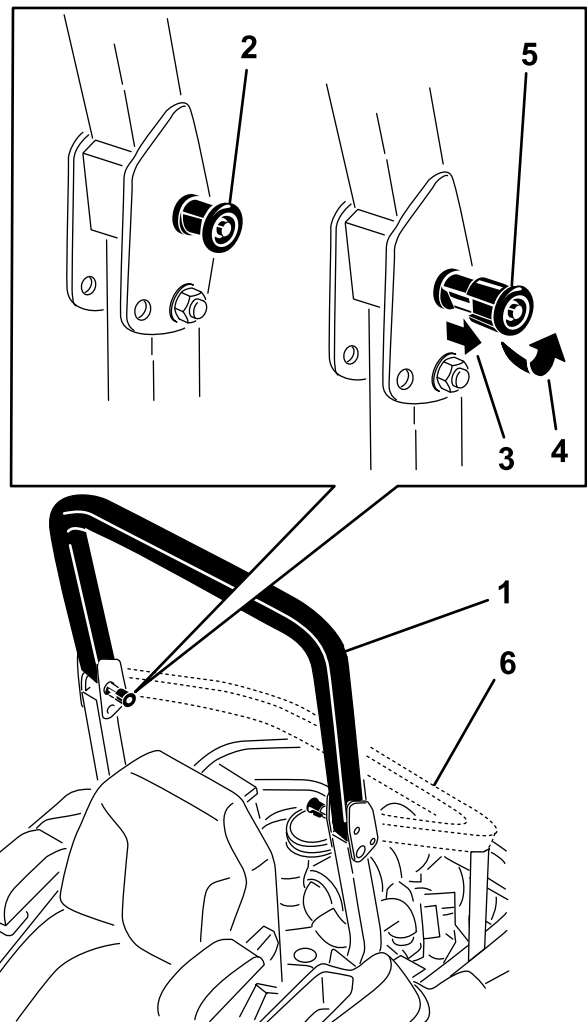


Figure 9

g228804

- |                                      |  |
|--------------------------------------|--|
| 1. Roll bar in the upright position  | 4. Rotate the ROPS knob 90 degrees.    |
| 2. ROPS knob in the latched position | 5. ROPS knob in the unlatched position |
| 3. Pull the ROPS knob out.           | 6. Roll bar in the folded position     |

## Raising the Roll Bar

**Important:** Always use the seat belt with the roll bar in the raised position.

1. Raise the roll bar to the operating position and rotate the knobs until they move partially into the grooves ([Figure 9](#)).
2. Raise the roll bar to the full upright position while pushing on the upper roll bar so that the pins snap into position when the holes align with the pins ([Figure 9](#)).
3. Push on the roll bar and ensure that both pins are engaged.

# Using the Safety-Interlock System

## ⚠ WARNING

If the safety-interlock switches are disconnected or damaged, the machine could operate unexpectedly, causing personal injury.

- Do not tamper with the interlock switches.
- Check the operation of the interlock switches daily and replace any damaged switches before operating the machine.

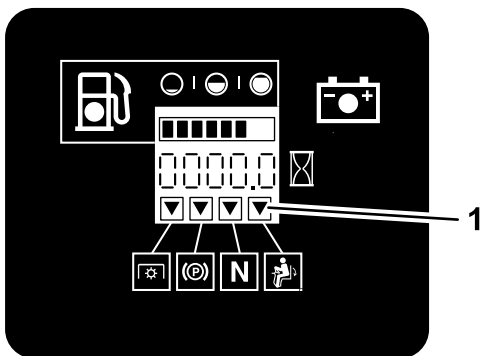
## Understanding the Safety-Interlock System

The safety-interlock system is designed to prevent the engine from starting unless the following occurs:

- The parking brake is engaged.
- The blade-control switch (PTO) is disengaged.
- The motion-control levers are in the NEUTRAL-LOCK position.

The safety-interlock system also is designed to shut off the engine when the motion-control levers are moved from the NEUTRAL-LOCK position with the parking brake engaged or if you rise from the seat when the PTO is engaged.

The hour meter has indicators to notify the user when the interlock component is in the correct position. When the component is in the correct position, an indicator displays on the screen.



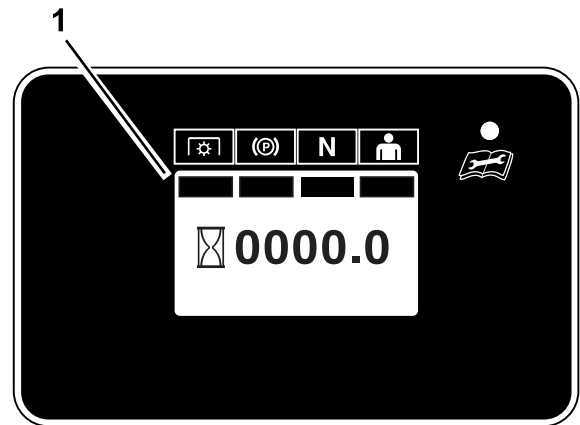
G009181

g009181

**Figure 10**

Standard hour meter shown

1. Indicators display when the interlock components are in the correct position.



g231781

**Figure 11**

Smart hour meter shown

1. Indicators display when the interlock components are in the correct position.

## Testing the Safety-Interlock System

**Service Interval:** Before each use or daily

Test the safety-interlock system before you use the machine each time. If the safety system does not operate as described below, have an Authorized Service Dealer repair the safety system immediately.

1. Sit on the seat, engage the parking brake, and move the blade-control switch (PTO) to the ON position. Try starting the engine; the engine should not start.
2. Sit on the seat, engage the parking brake, and move the blade-control switch (PTO) to the OFF position. Move either motion-control lever out of the NEUTRAL-LOCK position. Try starting the engine; the engine should not start. Repeat for the other control lever.
3. Sit on the seat, engage the parking brake, move the blade-control switch (PTO) to the OFF position, and move the motion-control levers to the NEUTRAL-LOCK position. Now start the engine. While the engine is running, disengage the parking brake, engage the blade-control switch (PTO), and rise slightly from the seat; the engine should shut off.
4. Sit on the seat, engage the parking brake, move the blade-control switch (PTO) to the OFF position, and move the motion-control levers to the NEUTRAL-LOCK position. Now start the engine. While the engine is running, center either motion control and move (forward or reverse); the engine should shut off. Repeat for other motion control.

5. Sit on the seat, disengage the parking brake, move the blade-control switch (PTO) to the OFF position, and move the motion-control levers to the NEUTRAL-LOCK position. Try starting the engine; the engine should not start.

## Positioning the Seat

The seat can move forward and backward. Position the seat where you have the best control of the machine and are most comfortable (Figure 12).

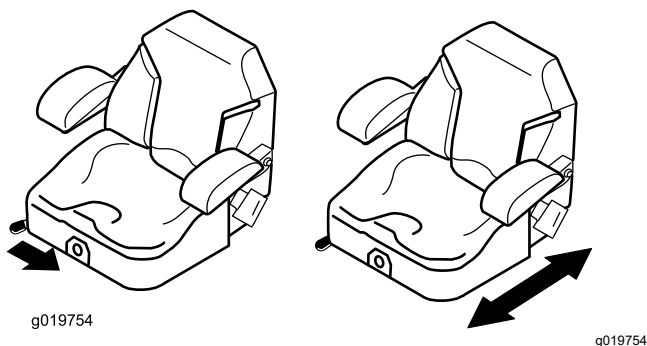


Figure 12

## Changing the Seat Suspension

The seat is adjustable to provide a smooth and comfortable ride. Position the seat where you are most comfortable.

To adjust it, turn the knob in front either direction to provide the best comfort (Figure 14).

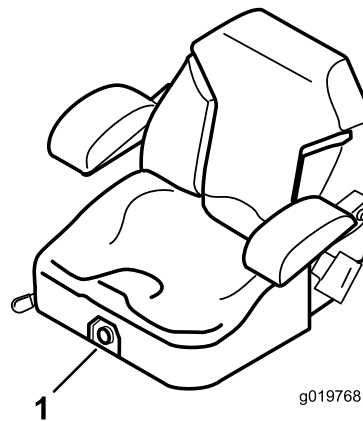


Figure 14

1. Seat-suspension knob

## Unlatching the Seat

To unlatch the seat, push the seat latch forward (Figure 13).

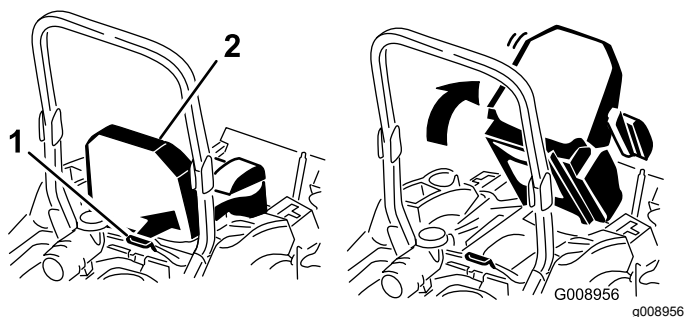


Figure 13

1. Seat latch

2. Seat

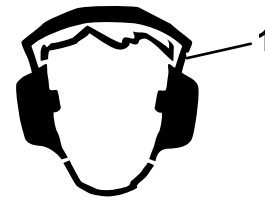
## During Operation

## During Operation Safety

### General Safety

- The owner/operator can prevent and is responsible for accidents that may cause personal injury or property damage.
- 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 while ill, tired, or under the influence of alcohol or drugs.
- Contacting the blade can result in serious personal injury. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position. When you turn the key to the OFF position, the engine should shut off and the blade should stop. If not, stop using your machine immediately and contact an Authorized Service Dealer.
- Operate the machine only in good visibility and appropriate weather conditions. Do not operate the machine when there is the risk of lightning.
- Keep your hands and feet away from the cutting units. Keep clear of the discharge opening.

- Do not mow with the discharge deflector raised, removed, or altered unless there is a grass-collection system or mulch kit in place and working properly.
- Do not mow in reverse unless it is absolutely necessary. Always look down and behind you before moving the machine in reverse.
- Use extreme care when approaching blind corners, shrubs, trees, or other objects that may block your view.
- Stop the blades whenever you are not mowing.
- If the machine strikes an object or starts to vibrate, immediately shut off the engine, remove the key (if equipped), and wait for all moving parts to stop before examining the machine for damage. 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.
- Before you leave the operating position, do the following:
  - Park the machine on a level surface.
  - Disengage the power takeoff and lower the attachments.
  - Engage the parking brake.
  - Shut off the engine and remove the key.
  - Wait for all moving parts to stop.
- Operate the engine only in well-ventilated areas. Exhaust gases contain carbon monoxide, which is lethal if inhaled.
- Never leave a running machine unattended.
- Attach towed equipment to the machine only at the hitch point.
- Do not operate the machine unless all guards and safety devices, such as the deflectors and the entire grass catcher, are in place and functioning properly. Replace worn or deteriorated parts when necessary.
- Use only accessories and attachments approved by Toro.
- This machine produces sound levels in excess of 85 dBA at the operator's ear and can cause hearing loss through extended periods of exposure.



**Figure 15**

g229846

1. Wear hearing protection.

- 
- Clean grass and debris from the cutting unit, drives, muffler, and engine to help prevent fires.
  - Start the engine with your feet well away from the blades.
  - Never raise the mower deck while the blades are moving.
  - Be aware of the mower discharge path and direct the discharge away from others. Avoid discharging material against a wall or obstruction because the material may ricochet back toward you.
  - Stop the blades, slow down the machine, and use caution when crossing surfaces other than grass or when transporting the machine to and from the operating area.
  - Do not change the engine governor speed or overspeed the engine.
  - Children are often attracted to the machine and the mowing activity. Never assume that children will remain where you last saw them.
  - Keep children out of the operating area and under the watchful care of a responsible adult other than the operator.
  - Be alert and shut off the machine if children enter the operating area.
  - Before backing up or turning the machine, look down and all around for small children.
  - Do not carry children on the machine, even when the blades are not moving. Children could fall off and be seriously injured or prevent you from safely operating the machine. Children who have been given rides in the past could appear in the operating area without warning and be run over or backed over by the machine.

## **Rollover Protection System (ROPS) Safety**

- The ROPS is an integral safety device. Do not remove any of the ROPS components from the machine.
- Ensure that the seat belt is attached and that you can release it quickly in an emergency.
- Keep the roll bar in the fully raised and locked position and always wear your seat belt whenever the roll bar is up.

- Check carefully for overhead objects before you drive under them, and do not contact them.
- Replace damaged ROPS components. Do not repair or alter them.
- There is no rollover protection when the roll bar is down.
- Wheels dropping over edges, over steep banks, or into water can cause a rollover, which may result in serious injury or death.
- Do not wear the seat belt when the roll bar is down.
- Lower the roll bar only when absolutely necessary; raise it as soon as clearance permits.
- In the event of a rollover, take the machine to an Authorized Service Dealer to inspect the ROPS.
- Use only Toro approved accessories and attachments for the ROPS.

## Slope Safety

- Slopes are a major factor related to loss of control and rollover accidents, which can result in severe injury or death. The operator is responsible for safe slope operation. Operating the machine on any slope requires extra caution. Before using the machine on a slope, do the following:
  - Review and understand the slope instructions in the manual and on the machine.
  - Use an angle indicator to determine the approximate slope angle of the area.
  - Never operate on slopes greater than 15°.
  - Evaluate the site conditions of the day to determine if the slope is safe for machine operation. Use common sense and good judgment when performing this evaluation. Changes in the terrain, such as moisture, can quickly affect the operation of the machine on a slope.
- Identify hazards at the base of the slope. Do not operate the machine near drop-offs, ditches, embankments, water, or other hazards. The machine could suddenly roll over if a wheel goes over the edge or the edge collapses. Keep a safe distance (twice the width of the machine) between the machine and any hazard. Use a walk-behind mower or a hand trimmer to mow the grass in these areas.
- Avoid starting, stopping, or turning the machine on slopes. Avoid making sudden changes in speed or direction; turn slowly and gradually.
- Do not operate a machine under any conditions where traction, steering, or stability is in question. 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. The machine can slide even if the drive wheels are stopped.

- Remove or mark obstacles such as ditches, holes, ruts, bumps, rocks, or other hidden hazards. Tall grass can hide obstacles. Uneven terrain could overturn the machine.
- Use extra care while operating with accessories or attachments, such as grass-collection systems. These can change the stability of the machine and cause a loss of control. Follow directions for counterweights.
- If possible, keep the deck lowered to the ground while operating on slopes. Raising the deck while operating on slopes can cause the machine to become unstable.

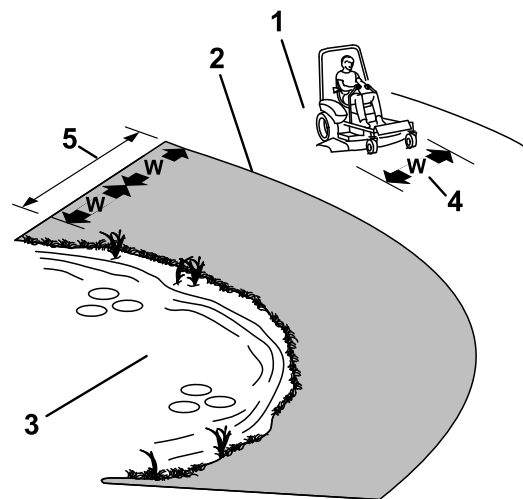


Figure 16

1. Safe Zone—use the machine here on slopes less than 15° or flat areas.
2. Danger Zone—use a walk-behind mower and/or a hand trimmer on slopes greater than 15° and near drop-offs or water.
3. Water
4. W = Width of the machine
5. Keep a safe distance (twice the width of the machine) between the machine and any hazard.

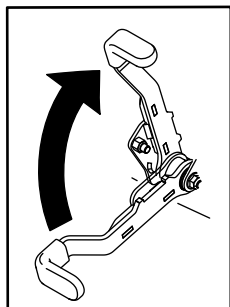
g221745

# Operating the Parking Brake

Always engage the parking brake when you stop the machine or leave it unattended.

## Engaging the Parking Brake

Park the machine on a level surface.



g027334

Figure 17

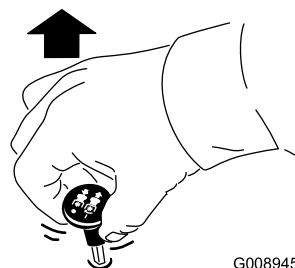
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# Operating the Mower Blade-Control Switch (PTO)

The blade-control switch (PTO) starts and stops the mower blades and any powered attachments.

## Engaging the Blade-Control Switch (PTO)

**Note:** Engaging the blade-control switch (PTO) with the throttle position at half or less causes excessive wear to the drive belts.

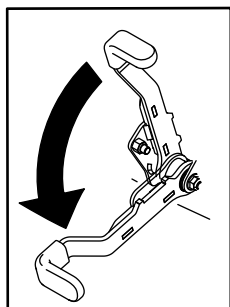


G008945

Figure 19

g008945

## Disengaging the Parking Brake

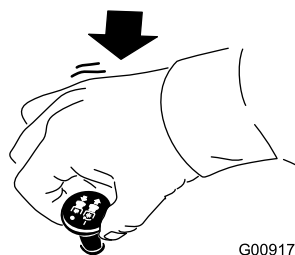


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Figure 18

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## Disengaging the Blade-Control Switch (PTO)



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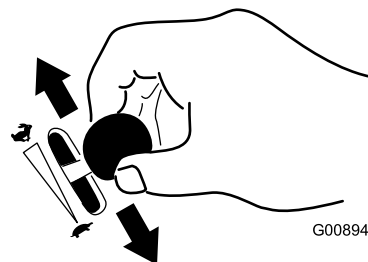
Figure 20

g009174

# Operating the Throttle

You can move the throttle control between FAST and SLOW positions ([Figure 21](#)).

Always use the FAST position when engaging the PTO.



G008946

Figure 21

g008946



## Starting the Engine

**Important:** Do not engage starter for more than 5 seconds at a time. If the engine fails to start, wait 15 seconds between attempts. Failure to follow these instructions can burn out the starter motor.

**Note:** You may need multiple attempts to start the engine the first time after adding fuel to an empty fuel system.

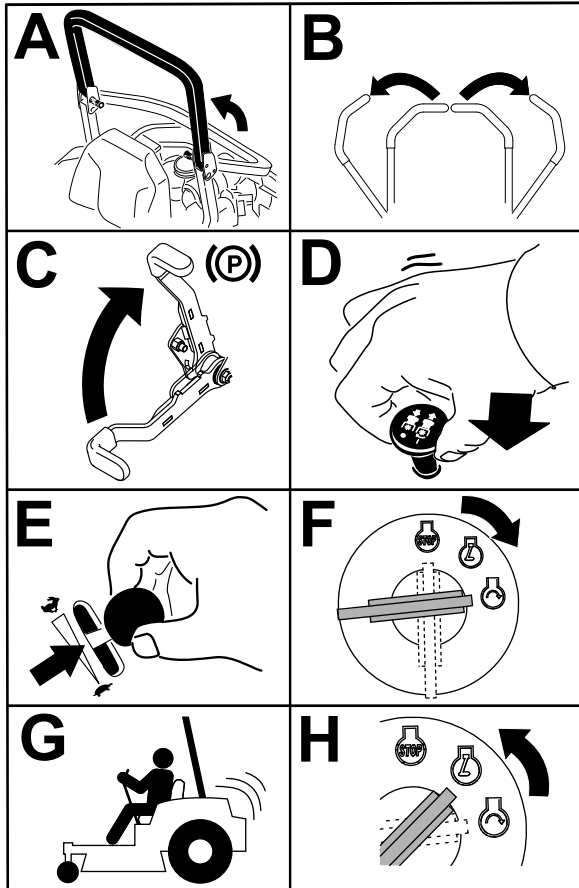


Figure 22

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g032328

## Shutting Off the Engine

### ⚠ CAUTION

Children or bystanders may be injured if they move or attempt to operate the machine while it is unattended.

Always remove the key and engage the parking brake when leaving the machine unattended.

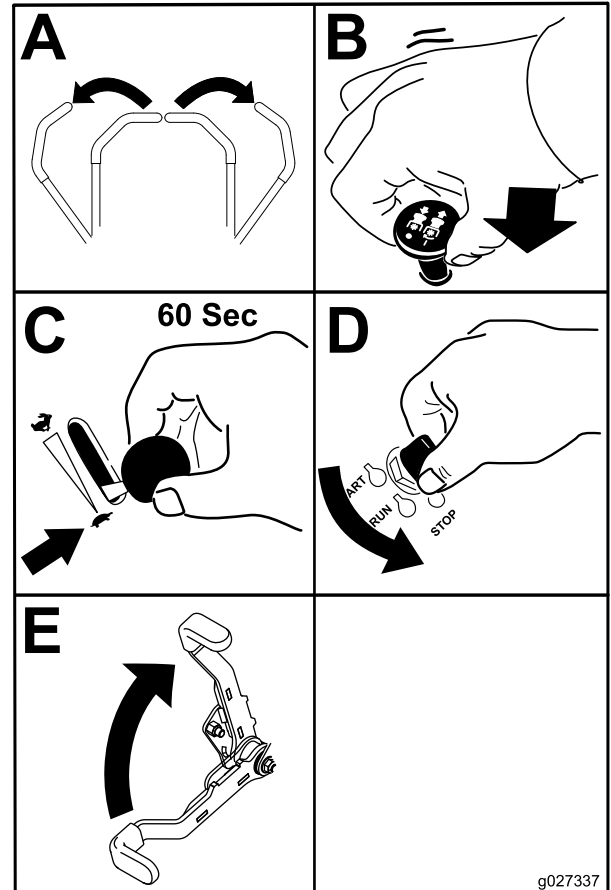


Figure 23

g027337

g027337

**Important:** Make sure that the fuel-shutoff valve is closed before transporting or storing the machine, as fuel leakage may occur. Engage the parking brake before transporting. Make sure that you remove the key as the fuel pump may run and cause the battery to lose charge.

# Using the Motion-Control Levers

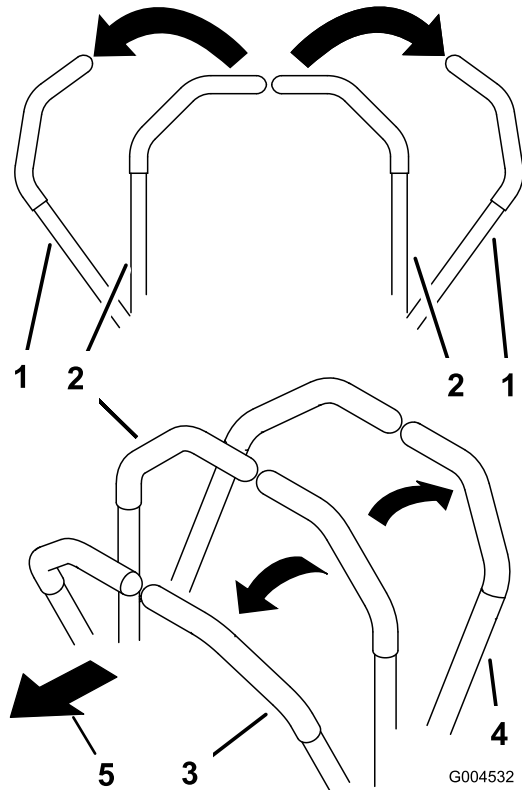


Figure 24

- |   |                     |
|---|---------------------|
| 1. Motion-control lever—NEUTRAL-LOCK position | 4. Backward         |
| 2. Center, unlocked position                  | 5. Front of machine |
| 3. Forward                                    |                     |

## Driving the Machine

The drive wheels turn independently, powered by hydraulic motors on each axle. You can turn 1 side in reverse while you turn the other forward, causing the machine to spin rather than turn. This greatly improves the machine maneuverability but may require some time for you to adapt to how it moves.

The throttle control regulates the engine speed as measured in rpm (revolutions per minute). Place the throttle control in the FAST position for best performance. Always operate in the full throttle position when mowing.

### ⚠ WARNING

The machine can spin very rapidly. You may lose control of the machine and cause personal injury or damage to the machine.

- Use caution when making turns.
- Slow the machine down before making sharp turns.

## Driving Forward

**Note:** The engine shuts off when you move the traction-control with the parking brake engaged.

To stop the machine, pull the motion-control levers to the NEUTRAL position.

1. Disengage the parking brake; refer to [Disengaging the Parking Brake \(page 24\)](#).
2. Move the levers to the center, unlocked position.
3. To go forward, slowly push the motion-control levers forward ([Figure 25](#)).

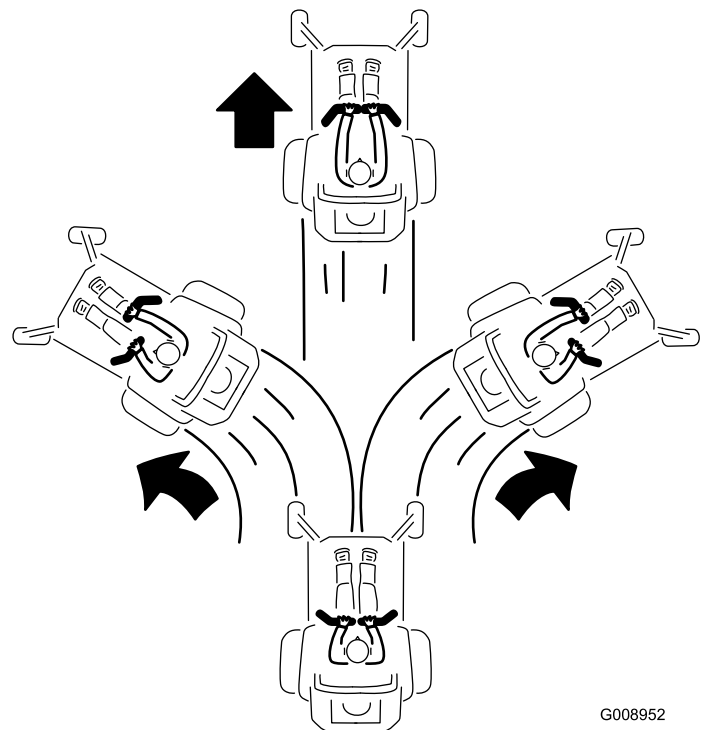
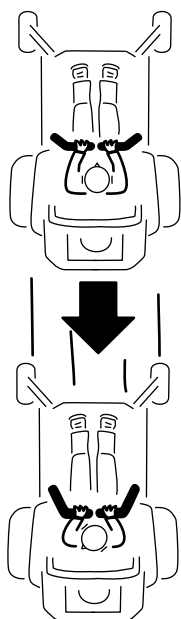


Figure 25

## Driving Backward

1. Move the levers to the center, unlocked position.
2. To go backward, slowly pull the motion-control levers rearward ([Figure 26](#)).



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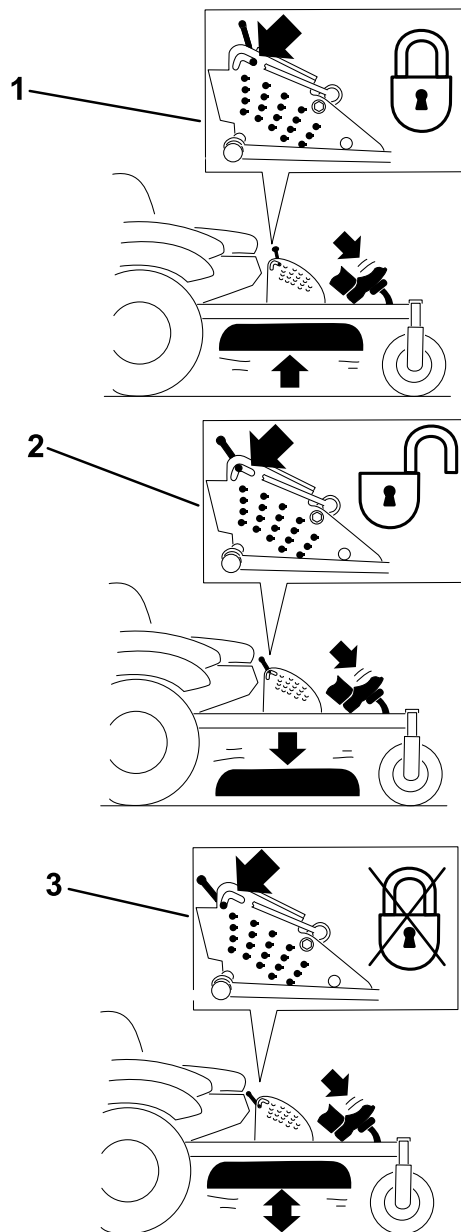
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**Figure 26**

# Adjusting the Height of Cut

## Using the Transport Lock

The transport lock has 2 positions, and is used with the deck-lift pedal. There is a LOCK position and an UNLOCK position for the transport position of the mower deck (Figure 27).



g229103

**Figure 27**

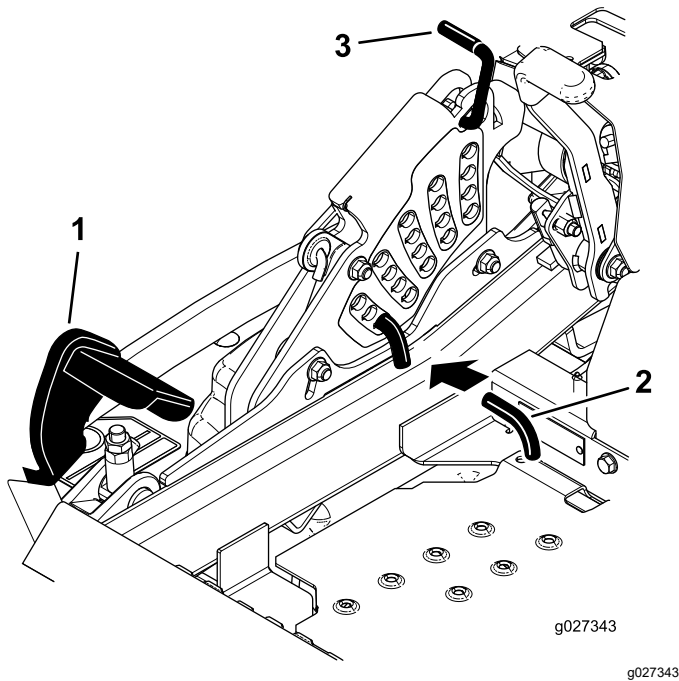
Transport-Lock Positions

1. Transport lock knob
2. LOCK position—The mower deck locks into the transport position.
3. UNLOCK position—The mower deck does not lock into the transport position.

## Adjusting the Height-of-Cut Pin

The height-of-cut is adjusted from 25 to 140 mm (1 to 5-1/2 inches) in 6 mm (1/4 inch) increments by relocating the clevis pin into different hole locations.

1. Move the transport lock to the lock position.
2. Push on the deck-lift pedal with your foot, and raise the mower deck to the transport position (also the 140 mm (5-1/2 inch) cutting height position) as shown in [Figure 28](#).
3. To adjust, rotate the pin 90 degrees and remove the pin from the height-of-cut bracket ([Figure 28](#)).
4. Select a hole in the height-of-cut bracket corresponding to the height-of-cut desired, and insert the pin ([Figure 28](#)).
5. Push on the deck lift, pull back on the transport lock, and slowly lower the mower deck.



**Figure 28**

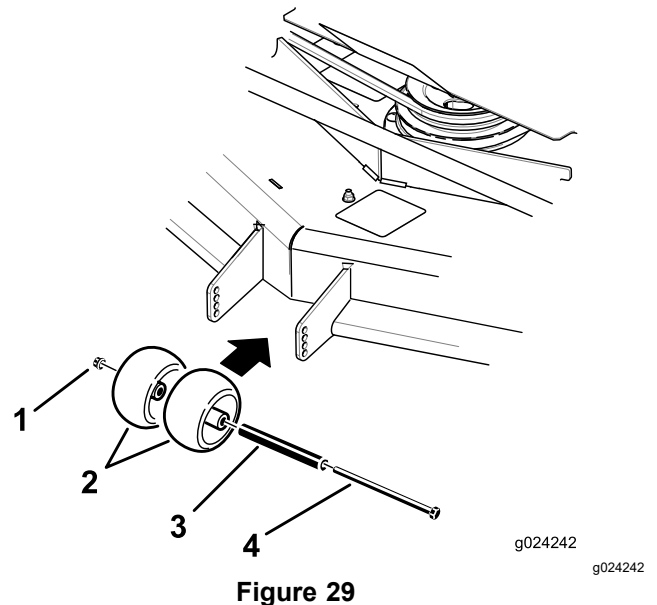
- |                      |                   |
|----------------------|-------------------|
| 1. Deck-lift pedal   | 3. Transport lock |
| 2. Cut-of-height pin |                   |

## Adjusting the Anti-Scalp Rollers

### Machines with Rear Discharge

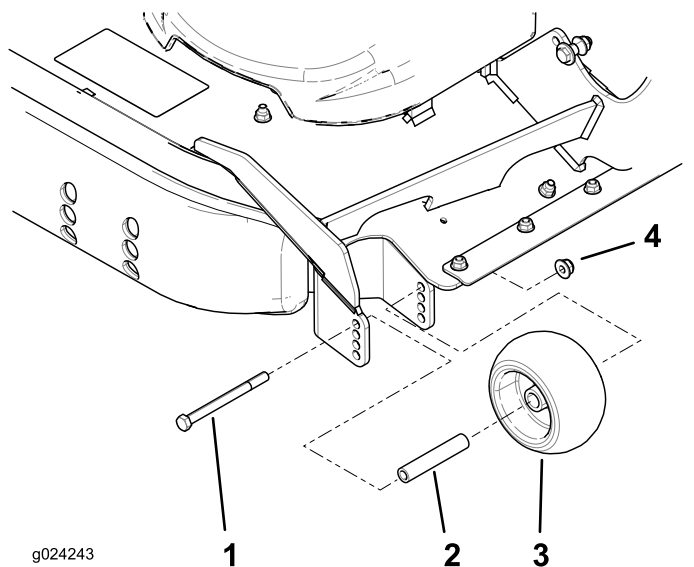
Whenever you change the height of cut, it is recommended to adjust the height of the anti-scalp rollers.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Adjust the anti-scalp rollers as shown in [Figure 29](#) and [Figure 30](#).



**Figure 29**

- |                      |            |
|----------------------|------------|
| 1. Flange nut        | 3. Bushing |
| 2. Anti-scalp roller | 4. Bolt    |



**Figure 30**

- |            |                      |
|------------|----------------------|
| 1. Bolt    | 3. Anti-scalp roller |
| 2. Bushing | 4. Flange nut        |

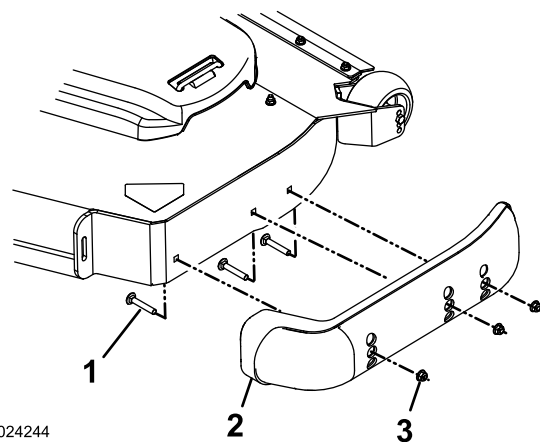
## Adjusting the Skid(s)

### For Machines with Rear Discharge

Mount the skids in the lower position when operating in height of cuts higher than 64 mm (2-1/2 inches) and in the higher position when operating in height of cuts lower than 64 mm (2-1/2 inches).

**Note:** When the skids become worn, switch the skid to the opposite sides of the mower, flipping them over. This allows you to use the skids longer before replacing them.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the carriage bolts and nuts from each skid (Figure 31).



**Figure 31**

- |                  |        |
|------------------|--------|
| 1. Carriage bolt | 3. Nut |
| 2. Skid          |        |

4. Move each skid to the desired position and secure them with the carriage bolts and nuts.

**Note:** Only use the top or center sets of holes to adjust the skids. The bottom holes are used when switching sides on the mower deck, at which time they become the top holes on the other side of the mower.

5. To prevent damaging the skid, torque the carriage bolts and nuts for each skid to 12.4 to 14.7 N·m (110 to 130 in-lb).

## Operating Tips

### Using the Fast Throttle Setting

For best mowing and maximum air circulation, operate the engine at the FAST position. Air is required to thoroughly cut grass clippings, so do not set the height-of-cut so low as to totally surround the mower deck in uncut grass. Always try to have 1 side of the mower deck free from uncut grass, which allows air to be drawn into the mower deck.

### Cutting a Lawn for the First Time

Cut grass slightly longer than normal to ensure that the cutting height of the mower deck does not scalp any uneven ground. However, the cutting height used in the past is generally the best one to use. When cutting grass longer than 15 cm (6 inches) tall, you may want to cut the lawn twice to ensure an acceptable quality of cut.

### Cutting a Third of the Grass Blade

It is best to cut only about a third of the grass blade. Cutting more than that is not recommended unless

grass is sparse, or it is late fall when grass grows more slowly.

## **Alternating the Mowing Direction**

Alternate the mowing direction to keep the grass standing straight. This also helps disperse clippings, which enhances decomposition and fertilization.

## **Mowing at Correct Intervals**

Grass grows at different rates at different times of the year. To maintain the same cutting height, mow more often in early spring. As the grass growth rate slows in mid summer, mow less frequently. If you cannot mow for an extended period, first mow at a high cutting height, then mow again 2 days later at a lower height setting.

## **Using a Slower Cutting Speed**

To improve cut quality, use a slower ground speed in certain conditions.

## **Avoiding Cutting Too Low**

When mowing uneven turf, raise the cutting height to avoid scalping the turf.

## **Stopping the Machine**

If you must stop the forward motion of the machine while mowing, a clump of grass clippings may drop onto your lawn. To avoid this, move onto a previously cut area with the blades engaged or you can disengage the mower deck while moving forward.

## **Keeping the Underside of the Mower Deck Clean**

Clean clippings and dirt from the underside of the mower deck after each use. If grass and dirt build up inside the mower deck, cutting quality will eventually become unsatisfactory.

## **Maintaining the Blade(s)**

Maintain a sharp blade throughout the cutting season because a sharp blade cuts cleanly without tearing or shredding the grass blades. Tearing and shredding turns grass brown at the edges, which slows growth and increases the chance of disease. Check the mower blades after each use for sharpness, and for any wear or damage. File down any nicks and sharpen the blades as necessary. If a blade is damaged or worn, replace it immediately with a genuine Toro replacement blade.

# After Operation

## After Operation Safety

### General Safety

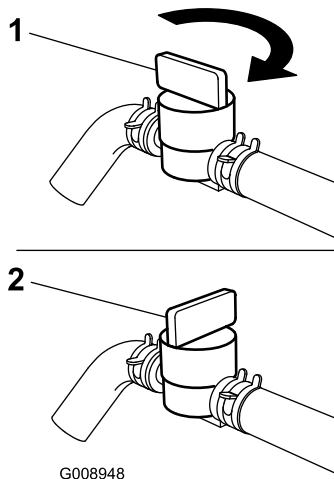
- Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operator's position. Allow the machine to cool before servicing, adjusting, fueling, cleaning, or storing it.
- Clean grass and debris from the cutting unit, muffler, drives, grass catcher, and engine compartment to help prevent fires. Clean up oil or fuel spills.
- Shut off the fuel and remove the key before storing or transporting the machine.

## Using the Fuel-Shutoff Valve

The fuel-shutoff valve is located under the seat. Move the seat forward to access it.

Close the fuel-shutoff valve for transport, maintenance, and storage.

Ensure that the fuel-shutoff valve is open when starting the engine.



**Figure 32**

1. ON position

2. OFF position

## Using the Drive-Wheel-Release Valves

### ⚠ WARNING

**Hands may become entangled in the rotating drive components below the engine deck, which could result in serious injury.**

**Shut off the engine, remove the key, and allow all moving parts to stop before accessing the drive-wheel-release valves.**

### ⚠ WARNING

**The engine and hydraulic-drive units can become very hot. Touching a hot engine or hydraulic-drive units can cause severe burns.**

**Allow the engine and hydraulic-drive units to cool completely before accessing the drive-wheel-release valves.**

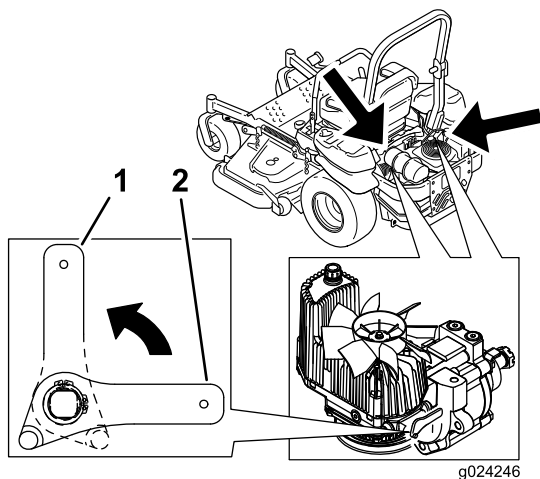
The drive-wheel-release valves are located in the back of each hydraulic-drive unit, under the seat.

**Note:** Make sure that the release valves are in the fully horizontal position when operating the machine; otherwise, severe damage to the hydraulic system can occur.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Rotate the release-valve levers vertically to push the machine ([Figure 33](#)).

**Note:** This allows hydraulic fluid to bypass the pump, enabling the wheels to turn.

4. Disengage the parking brake before pushing the machine.



**Figure 33**

1. Vertical to push the machine
2. Horizontal to run the machine

5. Rotate the release valve levers horizontally to run the machine (Figure 33).

## Transporting the Machine

Use a heavy-duty trailer or truck to transport the machine. Use a full-width ramp. Ensure that the trailer or truck has all the necessary brakes, lighting, and marking as required by law. Please carefully read all the safety instructions. Knowing this information could help you or bystanders avoid injury. Refer to your local ordinances for trailer and tie-down requirements.

### **⚠ WARNING**

Driving on the street or roadway without turn signals, lights, reflective markings, or a slow-moving-vehicle emblem is dangerous and can lead to accidents, causing personal injury.

**Do not drive the machine on a public street or roadway.**

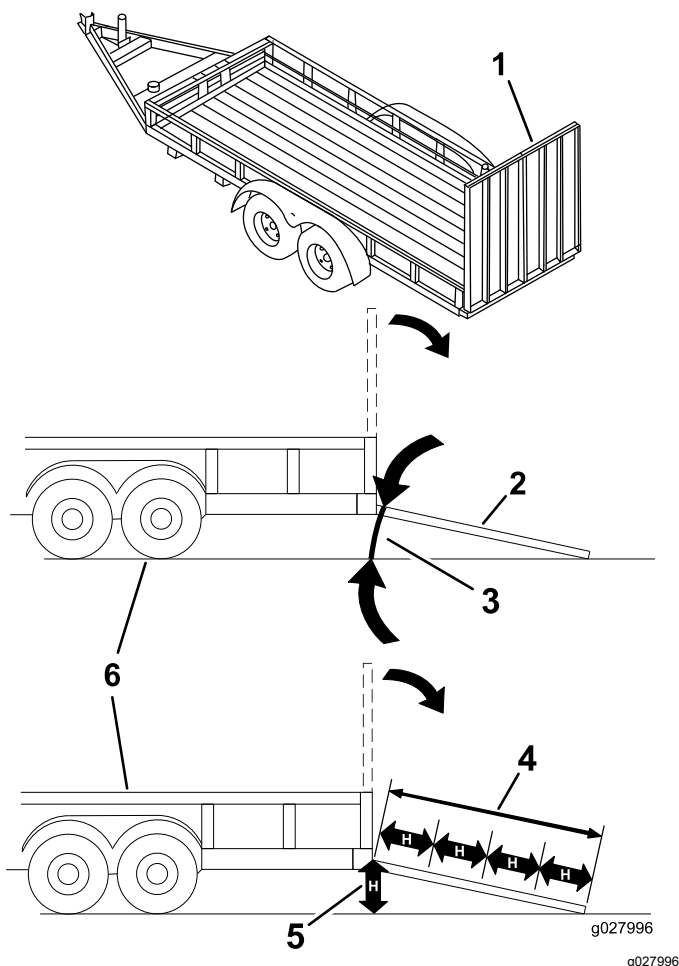
## Selecting a Trailer

### **⚠ WARNING**

Loading a machine onto a trailer or truck increases the possibility of tip-over and could cause serious injury or death (Figure 34).

- Use only a full-width ramp; do not use individual ramps for each side of the machine.
- Do not exceed a 15-degree angle between the ramp and the ground or between the ramp and the trailer or truck.
- Ensure that the length of the ramp is at least 4 times as long as the height of the trailer or truck bed to the ground. This ensures that the ramp angle does not exceed 15 degrees on flat ground.





**Figure 34**

- |   |   |
|---|---|
| 1. Full-width ramp in stowed position               | 4. Ramp is at least 4 times as long as the height of the trailer or truck bed to the ground |
| 2. Side view of full-width ramp in loading position | 5. H=height of the trailer or truck bed to the ground                                       |
| 3. Not greater than 15 degrees                      | 6. Trailer  |

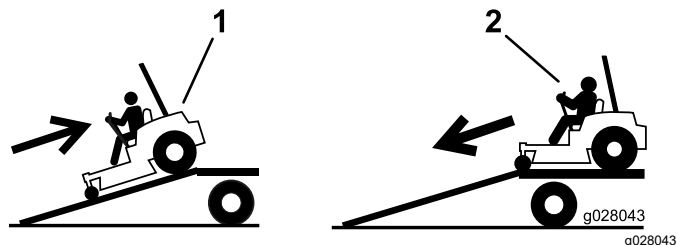
## Loading the Machine

### **⚠ WARNING**

Loading a machine onto a trailer or truck increases the possibility of tip-over and could cause serious injury or death.

- Use extreme caution when operating a machine on a ramp.
- Back the machine up the ramp and drive it forward down the ramp.
- Avoid sudden acceleration or deceleration while driving the machine on a ramp as this could cause a loss of control or a tip-over situation.

1. If using a trailer, connect it to the towing vehicle and connect the safety chains.
2. If applicable, connect the trailer brakes and lights.
3. Lower the ramp, ensuring that the angle between the ramp and the ground does not exceed 15 degrees (Figure 34).
4. Back the machine up the ramp (Figure 35).

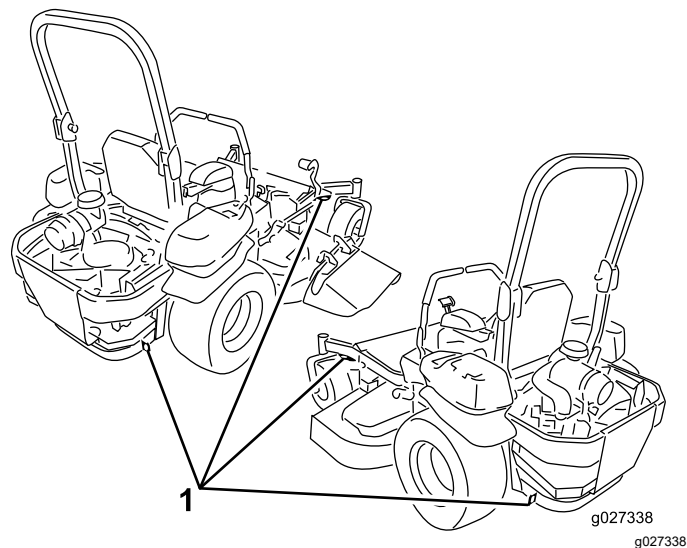


**Figure 35**

1. Back the machine up the ramp.
2. Drive the machine forward down the ramp.

5. Shut off the engine, remove the key, and engage the parking brake.
6. Tie down the machine near the front caster wheels and the rear frame with straps, chains, cable, or ropes (Figure 36). Refer to local regulations for tie-down requirements.

**Note:** Direct the straps down and away from the machine.



**Figure 36**

1. Tie-down points

## Unloading the Machine

1. Lower the ramp, ensuring that the angle between the ramp and the ground does not exceed 15 degrees (Figure 34).

2. Drive the machine forward down the ramp ([Figure 35](#)).

# Maintenance

## Maintenance Safety

- 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.
- Before you leave the operator's position, do the following:
  - Park the machine on a level surface.
  - Disengage the drives.
  - Engage the parking brake.
  - Shut off the engine and remove the key.
  - Allow machine components to cool before performing maintenance.
- Do not allow untrained personnel to service the machine.
- Keep your hands and feet away from moving parts or hot surfaces. If possible, do not make adjustments with the engine running.
- Carefully release pressure from components with stored energy.
- Check the parking brake operation frequently. Adjust and service it as required.
- Never tamper with safety devices. Check their proper operation regularly.
- Clean grass and debris from the cutting unit, muffler, drives, grass catcher, and engine compartment to prevent fires.
- Clean up oil or fuel spills and remove fuel-soaked debris.
- Do not rely on hydraulic or mechanical jacks to support the machine; support the machine with jack stands whenever you raise the machine.
- Keep all parts in good working condition and all hardware tightened, especially the blade-attachment hardware. Replace all worn or damaged decals.
- Disconnect the battery before repairing the machine. Disconnect the negative terminal first and the positive last. Connect the positive terminal first and the negative last.
- To ensure optimum performance, use only genuine Toro replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous, and such use could void the product warranty.

## Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 100 hours	<ul style="list-style-type: none"><li>• Check the wheel lug-nut torque.</li><li>• Check the wheel-hub slotted-nut torque.</li><li>• Adjust the parking brake.</li></ul>
After the first 250 hours	<ul style="list-style-type: none"><li>• Change the hydraulic filters and hydraulic fluid.</li></ul>
Before each use or daily	<ul style="list-style-type: none"><li>• Check the safety-interlock system.</li><li>• For Kohler engines—check the air cleaner for dirty, loose or damaged parts.</li><li>• For Kohler engines—check the engine-oil level.</li><li>• Check the seat belt.</li><li>• Check the roll bar knobs.</li><li>• Clean the engine screen and the oil cooler.</li><li>• Check and clean the hydraulic-unit shrouds.</li><li>• Inspect the blades.</li></ul>
After each use	<ul style="list-style-type: none"><li>• Clean the mower deck.</li></ul>
Every 50 hours	<ul style="list-style-type: none"><li>• Check the spark arrester (if equipped).</li><li>• Inspect the belts for cracks and wear.</li><li>• Check the hydraulic-fluid level.</li></ul>
Every 100 hours	<ul style="list-style-type: none"><li>• Lubricate the mower deck-lift pivots.</li><li>• For Kohler engines—change the engine oil (more often in dirty or dusty conditions).</li><li>• Check and clean engine-cooling fins and shrouds.</li></ul>

Maintenance Service Interval	Maintenance Procedure
Every 200 hours	<ul style="list-style-type: none"> <li>• For Kohler engines—change the engine-oil filter (more often in dirty or dusty conditions).</li> <li>• For Kohler engines—change the engine-oil filter (more often in dirty or dusty conditions).</li> <li>• For Kohler engines—check the spark plug(s).</li> <li>• Replace the fuel filter (more often in dirty or dusty conditions).</li> </ul>
Every 250 hours	<ul style="list-style-type: none"> <li>• For Kohler engines—service or replace the air-cleaner foam element (more often under dusty, dirty conditions).</li> <li>• After the initial change—change the hydraulic-system filters and fluid when using Mobil 1 15W50 fluid. (Change it more often under dirty or dusty conditions)</li> </ul>
Every 400 hours	<ul style="list-style-type: none"> <li>• Grease the caster pivots (more often in dirty or dusty conditions).</li> </ul>
Every 500 hours	<ul style="list-style-type: none"> <li>• For Kohler engines—replace the air-cleaner paper element (more often under dusty, dirty conditions).</li> <li>• For Kohler engines—replace the spark plug(s).</li> <li>• Check the wheel lug-nut torque.</li> <li>• Check the wheel-hub slotted-nut torque.</li> <li>• Adjust the caster-pivot bearing.</li> <li>• Adjust the parking brake.</li> <li>• After the initial change—change the hydraulic-system filters and fluid when using Toro® HYPR-OIL™ 500 fluid. (Change it more often under dirty or dusty conditions)</li> </ul>
Monthly	<ul style="list-style-type: none"> <li>• Check the battery charge.</li> </ul>
Yearly	<ul style="list-style-type: none"> <li>• Grease the pump-belt-idler arm.</li> <li>• Repack the caster-wheel bearings (more often in dirty or dusty conditions).</li> <li>• Greasing the caster-wheel hubs.</li> </ul>
Yearly or before storage	<ul style="list-style-type: none"> <li>• Paint chipped surfaces.</li> <li>• Check all maintenance procedures listed above before storage.</li> </ul>

**Important:** Refer to your engine owner's manual for additional maintenance procedures.

### **⚠ CAUTION**

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

Shut off the engine and remove the key from the switch before you perform any maintenance.

# Pre-Maintenance Procedures

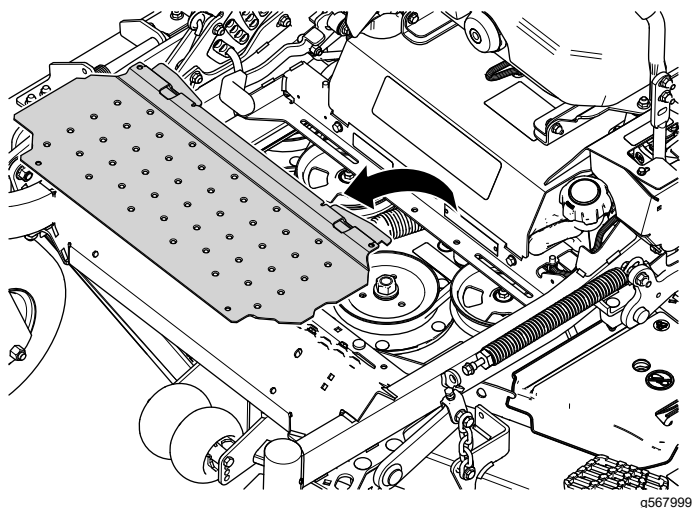
## Removing or Installing the Floor Pan

### **⚠ WARNING**

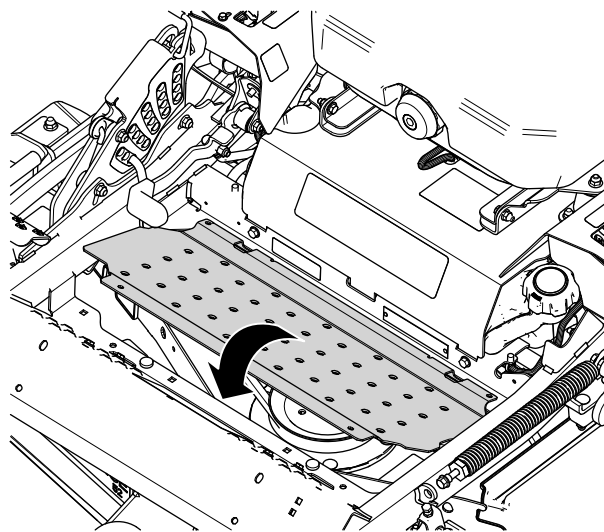
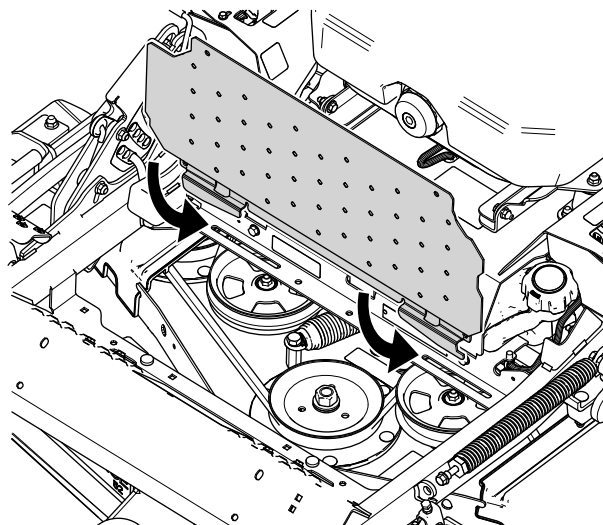
You can be seriously injured if you operate the machine with the floor pan removed, or if you do not completely remove the floor pan to perform maintenance on components beneath it.

Do not operate the machine with the floor pan removed. Completely remove the floor pan before you perform maintenance underneath it.

1. To remove the floor pan, lift the floor pan and pull it out of the openings in the frame.



**Figure 37**



**Figure 38**

2. To install the floor pan, place the floor pan in the openings in the frame and lower it into place.

# Lubrication

## Greasing the Machine

Grease the machine more often in dirty or dusty conditions.

**Grease Type:** No. 2 lithium or molybdenum grease

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Clean the grease fittings with a rag.

**Note:** Scrape any paint off the front of the fitting(s).

4. Connect a grease gun to the fitting.
5. Pump grease into the fittings until grease begins to ooze out of the bearings.
6. Wipe up any excess grease.

## Lubricating the Mower Deck-Lift Pivots

**Service Interval:** Every 100 hours

Use light oil or spray lubricant to lubricate the deck-lift pivots.

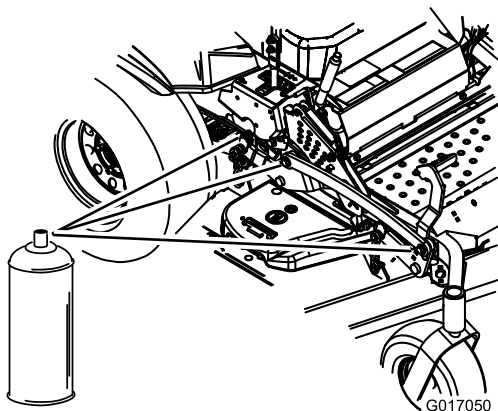


Figure 39

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## Greasing the Mower Deck

**Service Interval:** Yearly—Grease the pump-belt-idler arm.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.

2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the floor pan; refer to [Removing or Installing the Floor Pan \(page 37\)](#).
4. Grease the mower deck idler-pulley pivot until grease comes out the bottom ([Figure 40](#)).

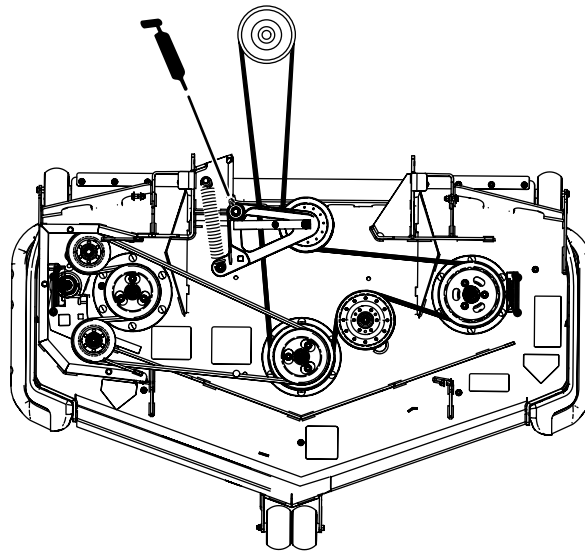


Figure 40

Machine with Rear Discharge Shown

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5. Grease the drive-belt idler arms ([Figure 41](#)).

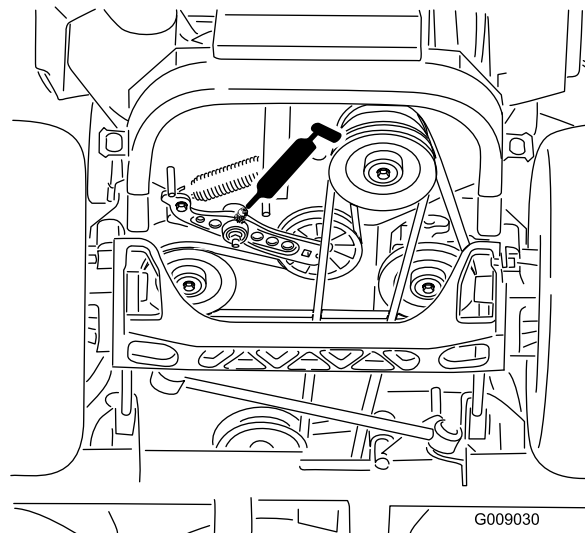
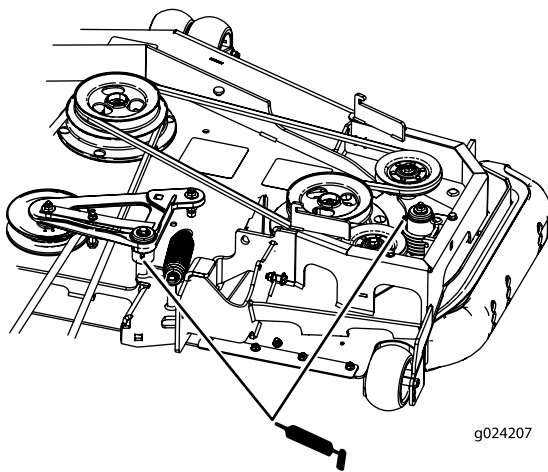


Figure 41

G009030

g009030

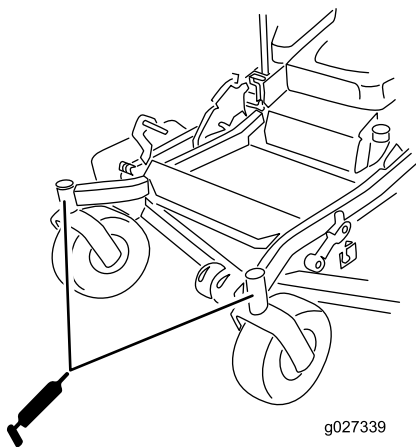
6. Grease the deck-belt idler arms (rear discharge machines only) as shown in [Figure 42](#).



**Figure 42**

Machines with Rear Discharge Only

7. Install the floor pan; refer to [Removing or Installing the Floor Pan \(page 37\)](#).
  8. Remove the dust cap and adjust the caster pivots.
- Note:** Keep the dust cap off until greasing is done.
9. Remove the hex plug.
  10. Thread a grease fitting into the hole.
  11. Pump grease into the fitting until it oozes out around the top bearing.
  12. Remove the grease fitting in the hole.
  13. Install the hex plug and dust cap ([Figure 43](#)).



**Figure 43**

14. Grease the caster-wheel bearings ([Figure 44](#)).

## Greasing the Caster Pivots

**Service Interval:** Every 400 hours/Yearly (whichever comes first) (more often in dirty or dusty conditions).

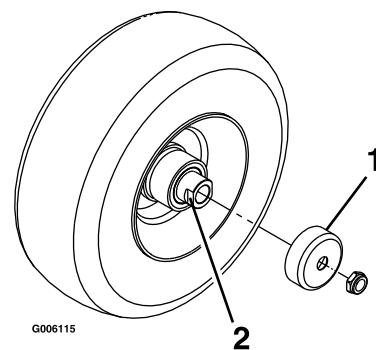
Yearly—Repack the caster-wheel bearings (more often in dirty or dusty conditions).

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the dust cap and adjust the caster pivots and keep the dust cap off until greasing is done; refer to [Greasing the Mower Deck \(page 38\)](#).
4. Remove the hex plug.
5. Thread a grease fitting into the hole.
6. Pump grease into the fitting until it oozes out around the top bearing.
7. Remove the grease fitting from the hole. Install the hex plug and cap.

## Greasing the Caster-Wheel Hubs

**Service Interval:** Yearly

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the mower for access.
4. Remove the caster wheel from the caster forks.
5. Remove the seal guards from the wheel hub.



**Figure 44**

1. Seal guard
2. Spacer nut with wrench flats

6. Remove a spacer nut from the axle assembly in the caster wheel.  
**Note:** Thread-locking compound has been applied to lock the spacer nuts to the axle.
7. Remove the axle (with the other spacer nut still assembled to it) from the wheel assembly.
8. Pry out seals and inspect bearings for wear or damage and replace if necessary.
9. Pack the bearings with a general-purpose grease.
10. Insert 1 bearing and 1 new seal into the wheel.
11. If the axle assembly is missing both spacer nuts, apply a thread-locking compound to 1 spacer nut and thread it onto the axle with the wrench flats facing outward.  
**Note:** Do not thread the spacer nut all of the way onto the end of the axle. Leave approximately 3 mm (1/8 inch) from the outer surface of the spacer nut to the end of the axle inside the nut.
12. Insert the assembled nut and axle into the wheel on the side with the new seal and bearing.
13. With the open end of the wheel facing up, fill the area inside the wheel around the axle full of general-purpose grease.
14. Insert the second bearing and new seal into the wheel.
15. Apply a thread-locking compound to the second spacer nut, and thread it onto the axle with the wrench flats facing outward.
16. Torque the nut to 8 to 9 N·m (75 to 80 in-lb), loosen the nut, then torque it to 2 to 3 N·m (20 to 25 in-lb).  
**Note:** Make sure that the axle does not extend beyond either nut.
17. Install the seal guards over the wheel hub, and insert the wheel into the caster fork.
18. Install the caster bolt and tighten the nut fully.

**Important:** To prevent seal and bearing damage, check the bearing adjustment often. Spin the caster tire. The tire should not spin freely (more than 1 or 2 revolutions) or have any side play. If the wheel spins freely, adjust the torque on the spacer nut until there is a slight amount of drag. Apply another layer of thread-locking compound.

## Engine Maintenance

### Engine Safety

- Keep your hands, feet, face, clothing, and other body parts away from the muffler and other hot surfaces. Allow engine components to cool before performing maintenance.
- Do not change the engine governor speed or overspeed the engine.

### Servicing a Kohler® Engine

This section is only for machines with Kohler engines. If your engine looks like the one shown in [Figure 45](#), you have a Kohler engine.

**Important:** Refer to your engine owner's manual for additional maintenance procedures.

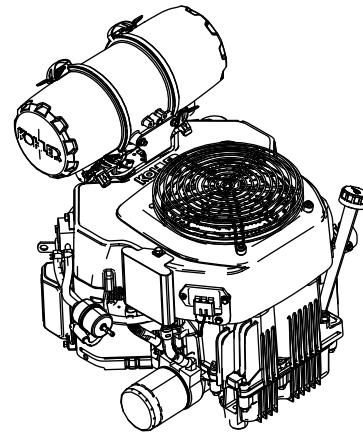


Figure 45

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### Servicing the Air Cleaner

**Service Interval:** Before each use or daily—For Kohler engines—check the air cleaner for dirty, loose or damaged parts.

Every 250 hours—For Kohler engines—service or replace the air-cleaner foam element (more often under dusty, dirty conditions).



Every 500 hours—For Kohler engines—replace the air-cleaner paper element (more often under dusty, dirty conditions).

**Note:** Service the air cleaner more frequently if operating conditions are extremely dusty or sandy.

## Removing the Filters

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Release the latches on the air cleaner and pull the air-inlet cover off the air-cleaner body (Figure 46).
4. Clean the air-inlet screen and cover.
5. Install the air-inlet cover and secure it with the latches (Figure 46).

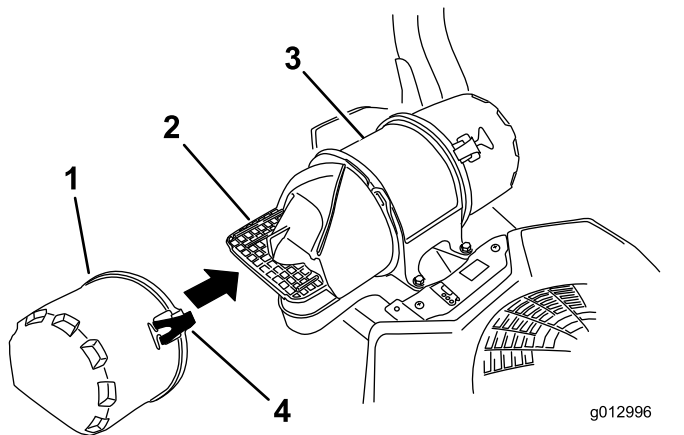


Figure 46

- |                     |                     |
|---------------------|---------------------|
| 1. Air-inlet cover  | 3. Air-cleaner body |
| 2. Air-inlet screen | 4. Latch            |

6. Release the latches on the air cleaner and pull the air-cleaner cover off the air-cleaner body (Figure 47).
  7. Clean the inside of the air-cleaner cover with compressed air.
  8. Gently slide the primary filter out of the air-cleaner body (Figure 47).
- Note:** Avoid knocking the filter into the side of the body.
9. Remove the inner filter only if you intend to replace it.

**Important:** Never attempt to clean the inner filter. If the safety filter is dirty, then the primary filter is damaged. Replace both filters.

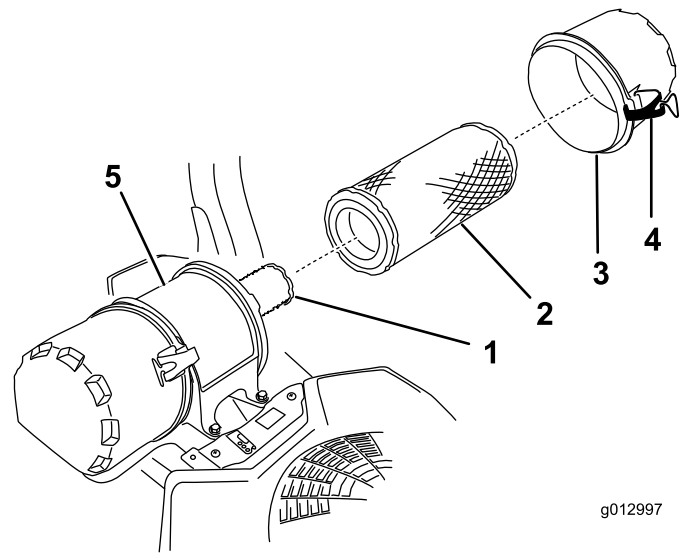


Figure 47

- |                      |                     |
|----------------------|---------------------|
| 1. Inner filter      | 4. Latch            |
| 2. Primary filter    | 5. Air-cleaner body |
| 3. Air-cleaner cover |                     |

10. Inspect the primary filter for damage by looking into the filter, while shining a bright light on the outside of the filter.

**Note:** Holes in the filter will appear as bright spots. If the filter is damaged, discard it.

## Servicing the Foam Element

1. Wash the foam element in liquid soap and warm water. When the element is clean, rinse it thoroughly.
2. Dry the element by squeezing it in a clean cloth.

**Important:** Replace the foam element if it is torn or worn.

## Servicing the Paper Element

1. Gently tap the paper element to dislodge dirt.

**Note:** Do not wash the paper element or use pressurized air, as this will damage the element.

**Note:** Replace a dirty, bent, or damaged element. Handle the new element carefully; do not use if the sealing surfaces are bent or damaged.

2. Clean the air-cleaner base as required, and check the condition.

## Installing the Filters

**Important:** To prevent engine damage, always operate the engine with both air filters and the cover installed.

1. If you are installing new filters, check each filter for shipping damage.

**Note:** Do not use a damaged filter.

2. If you are replacing the inner filter, carefully slide it into the filter body (Figure 47).
3. Carefully slide the primary filter over the safety filter (Figure 47).

**Note:** Ensure that the primary filter is fully seated by pushing on the outer rim while installing it.

**Important:** Do not press on the soft, inside area of the filter.

4. Install the air-cleaner cover and secure the latches (Figure 47).

## Servicing the Engine Oil

**Service Interval:** Before each use or daily

Every 100 hours (more often in dirty or dusty conditions).

Every 200 hours—For Kohler engines—change the engine-oil filter (more often in dirty or dusty conditions).

### Engine-Oil Specifications

**Oil Type:** Detergent oil (API service SJ or higher)

**Oil Capacity:** 1.8 L (61 fl oz) with a filter change; 1.6 L (54 fl oz) without a filter change

**Viscosity:** See the table below.

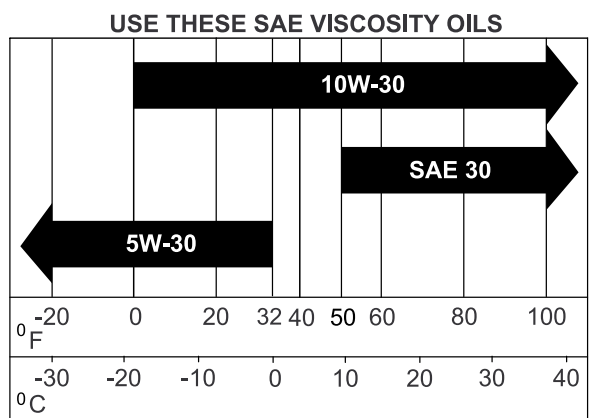


Figure 48

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## Checking the Engine-Oil Level

**Note:** Check the oil when the engine is cold.

**Important:** If you overfill or underfill the engine crankcase with oil and run the engine, you may damage the engine.

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

**Note:** Ensure that the engine is cool so that the oil has had time to drain into the sump.

3. To keep dirt, grass clippings, etc., out of the engine, clean the area around the oil-fill cap and dipstick before removing it (Figure 49).

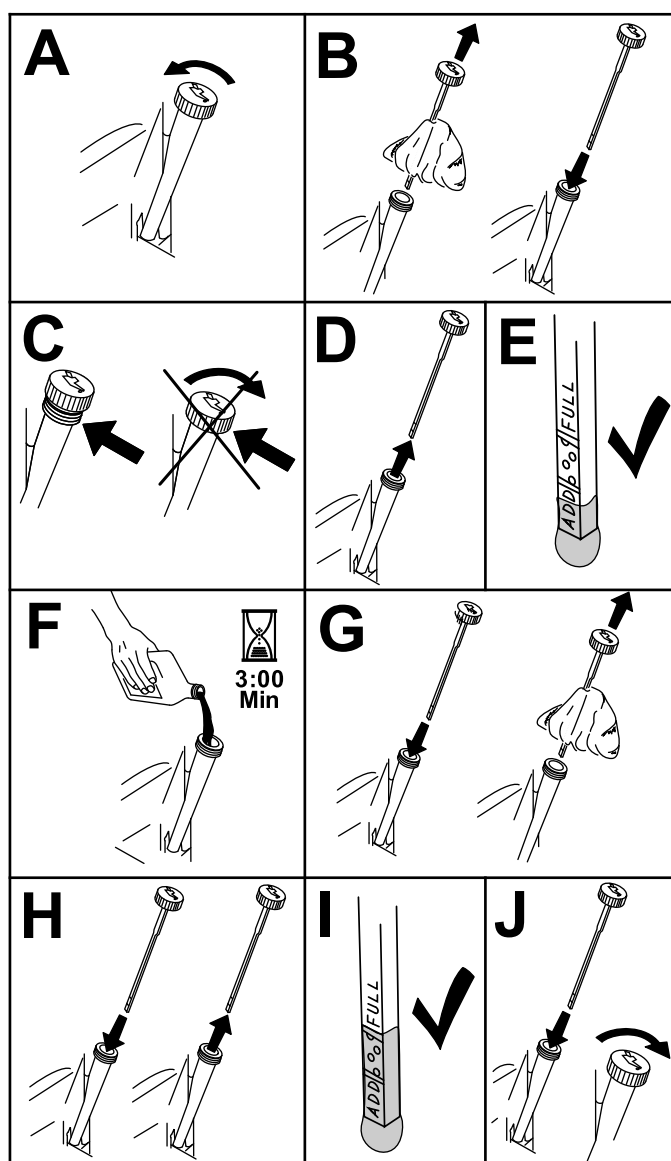


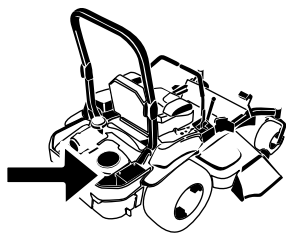
Figure 49

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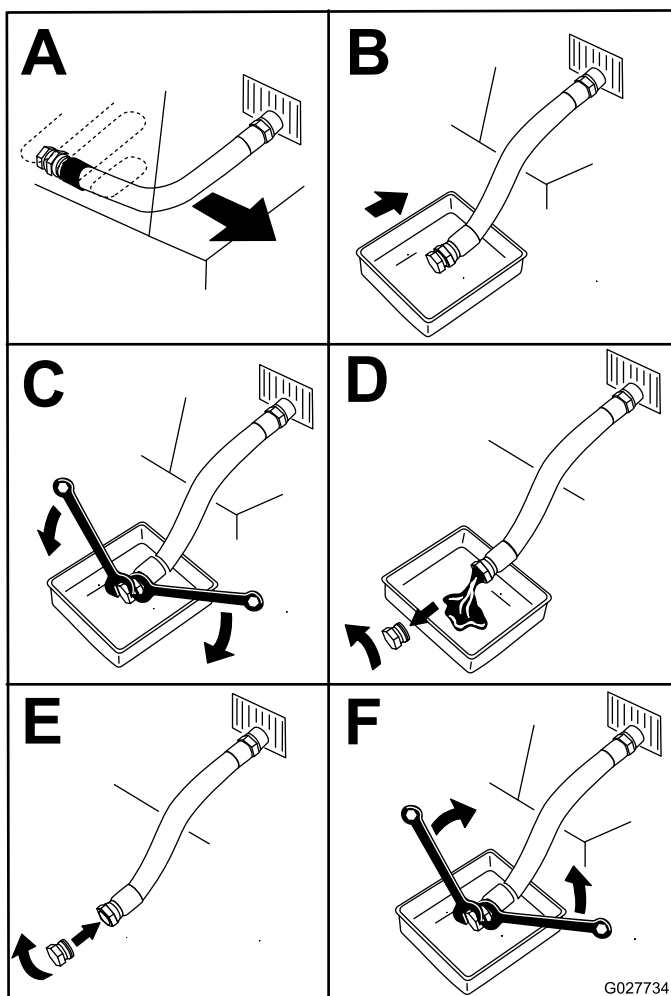
## Changing the Engine Oil

**Note:** Dispose of the used oil at a recycling center.

1. Start the engine and let it run for 5 minutes.  
**Note:** This warms the oil so that it drains better.
2. Park the machine so that the drain side is slightly lower than the opposite side to ensure that the oil drains completely.
3. Disengage the blade-control switch (PTO) and engage the parking brake.
4. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
5. Drain the oil from the engine (Figure 50).



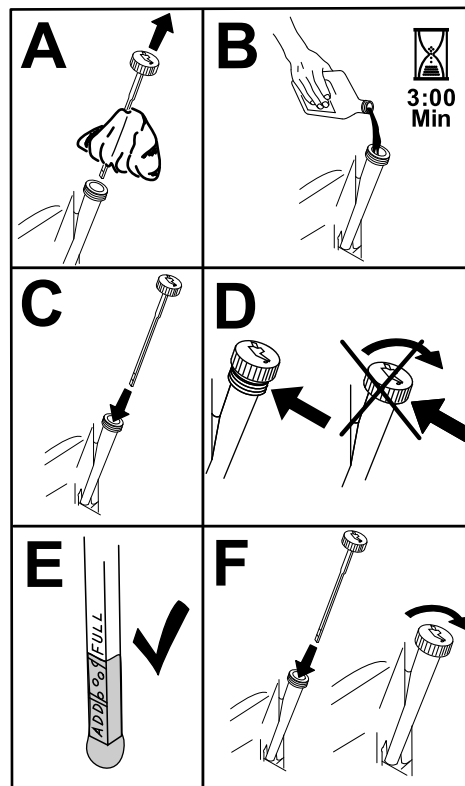
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Figure 50

6. Slowly pour approximately 80% of the specified oil into the filler tube and slowly add the additional oil to bring it to the Full mark (Figure 51).



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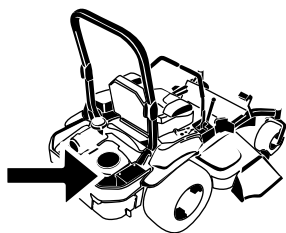
Figure 51

7. Start the engine and drive to a flat area.
8. Check the oil level again.

## Changing the Engine-Oil Filter

**Service Interval:** Every 200 hours—For Kohler engines—change the engine-oil filter (more often in dirty or dusty conditions).

1. Drain the oil from the engine; refer to [Changing the Engine Oil](#) (page 43).
2. Change the engine-oil filter (Figure 52).



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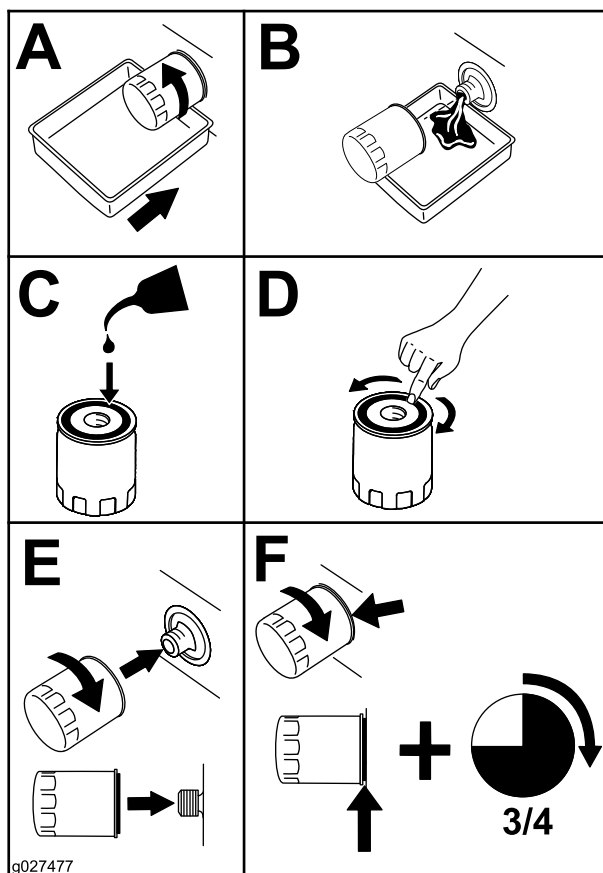


Figure 52

**Note:** Ensure that the oil-filter gasket touches the engine, and then turn the oil filter an extra 3/4 turn.

3. Fill the crankcase with the proper type of new oil; refer to [Changing the Engine Oil \(page 43\)](#).

## Servicing the Spark Plug

**Service Interval:** Every 200 hours—For Kohler engines—check the spark plug(s).

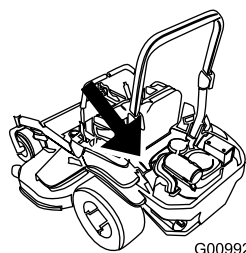
Every 500 hours—For Kohler engines—replace the spark plug(s).

**Type:** Champion XC12YC

**Air Gap:** 0.76 mm (0.03 inch)

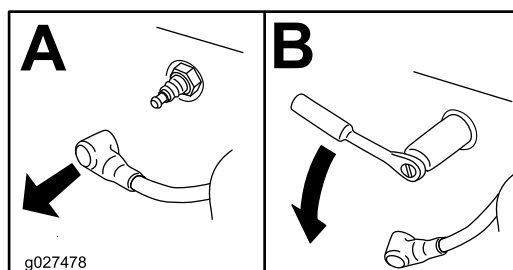
## Removing the Spark Plug

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Clean the area around the base of the plug(s) to keep dirt and debris out of the engine.
4. Locate and remove the spark plug(s) as shown in [Figure 53](#).



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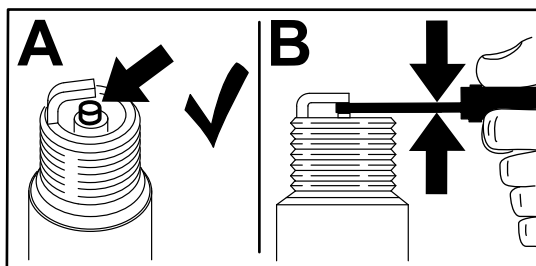
Figure 53

## Checking the Spark Plug

**Important:** Do not clean the spark plug(s). Always replace the spark plug(s) when it has a black coating, worn electrodes, an oily film, or cracks.

If you see light brown or gray on the insulator, the engine is operating properly. A black coating on the insulator usually means the air cleaner is dirty.

Set the gap to 0.76 mm (0.03 inch).



g206628

Figure 54

## Installing the Spark Plug

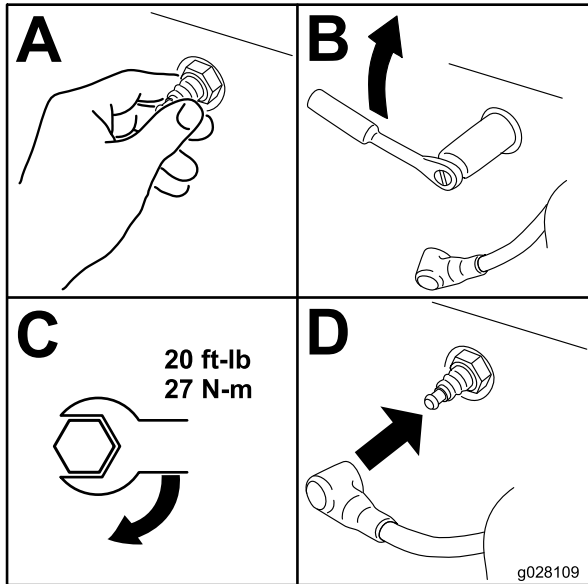


Figure 55

## Checking the Spark Arrester

### For Machines with a Spark Arrester

Service Interval: Every 50 hours

#### **⚠ WARNING**

Hot exhaust-system components may ignite fuel vapors even after you shut off the engine. Hot particles exhausted during engine operation may ignite flammable materials, resulting in personal injury or property damage.

Do not refuel or run the engine unless the spark arrester is installed.

1. Park the machine on a level surface, disengage the PTO, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Wait for the muffler to cool.
4. If you see any breaks in the screen or welds, replace the arrester.
5. If the screen is plugged, remove the arrester, shake loose particles out of the arrester, and clean the screen with a wire brush (soak the screen in solvent if necessary).
6. Install the arrester on the exhaust outlet.

# Fuel System Maintenance

## ⚠ WARNING

Fuel-system components are under high pressure. The use of improper components can result in system failure, fuel leakage, and possible explosion.

Use only approved fuel lines and fuel filters.

## Servicing the Electronic Fuel-Injection System

### Machines with EFI Engines Only

This machine contains an electronic fuel-injection system. It controls the fuel flow under different operating conditions.

The electronic-control unit (ECU) continuously monitors the operation of the EFI system.

If a problem or fault within the system is detected, the LED status light illuminates. The MIL is the red light located on the right side of the hour meter.

Once the light illuminates, make initial troubleshooting checks; refer to the LED status light section under [Troubleshooting \(page 73\)](#).

If these checks do not correct the problem, further diagnosis and servicing by an Authorized Service Dealer is necessary.

## Replacing the Low-Pressure Fuel Filter

**Service Interval:** Every 200 hours/Yearly (whichever comes first)

The fuel filter is located near the engine on the front or rear side of the engine.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Wait for the machine to cool down.
4. Close the fuel-shutoff valve under the seat ([Figure 56](#)).

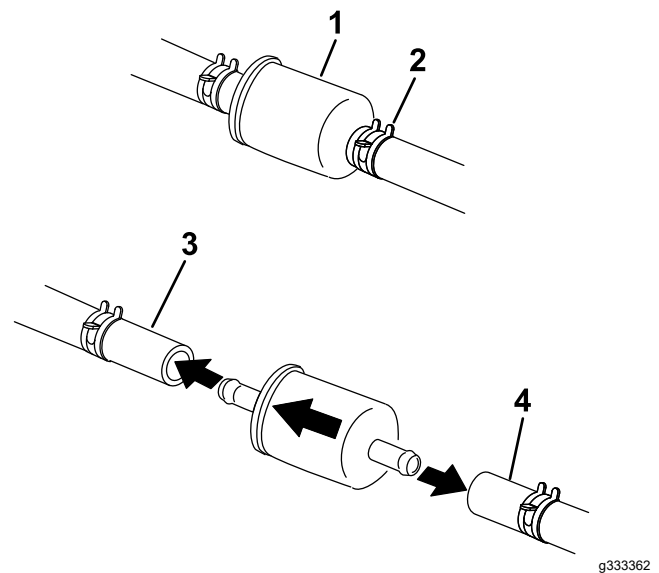


Figure 56

1. Fuel filter
  2. Hose clamp
  3. Fuel line to the engine
  4. Fuel line from the fuel tank
- 
5. Squeeze the ends of the hose clamps together and slide them away from the filter ([Figure 56](#)).
  6. Remove the filter from the fuel lines.
  7. Install a new filter and move the hose clamps close to the filter ([Figure 56](#)).
  8. Open the fuel-shutoff valve.

**Important:** Install the fuel line hoses and secure with plastic ties the same as they were originally installed at the factory to keep the fuel line away from components that can cause fuel line damage.

## Servicing the High-Pressure Fuel Filter

Do not attempt to service the high-pressure fuel filter. The high-pressure filter is integrated within the fuel-pump module. The fuel filter and other components inside the fuel-pump module are not serviceable.

**Important:** Do not attempt to open the fuel-pump module.

Ensure that an Authorized Service Dealer replaces the fuel-pump module with the high-pressure fuel filter.

## Servicing the Fuel Tank

Do not attempt to drain the fuel tank. Ensure that an Authorized Service Dealer drains the fuel tank and services any components of the fuel system.

# Electrical System Maintenance

## Electrical System Safety

- Disconnect the battery before repairing the machine. Disconnect the negative terminal first and the positive last. Connect the positive terminal first and the negative last.
- Charge the battery in an open, well-ventilated area, away from sparks and flames. Unplug the charger before connecting or disconnecting the battery. Wear protective clothing and use insulated tools.

## Servicing the Battery

Service Interval: Monthly

### Removing the Battery

#### ⚠ WARNING

Battery terminals or metal tools could short against metal machine components causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.

- When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine.
- Do not allow metal tools to short between the battery terminals and metal parts of the machine.

#### ⚠ WARNING

Incorrectly removing the cables from battery could damage the machine and cables, causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.

- Always disconnect the negative (black) battery cable before disconnecting the positive (red) cable.
- Always connect the positive (red) battery cable before connecting the negative (black) cable.

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.

2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the battery as shown in [Figure 57](#).

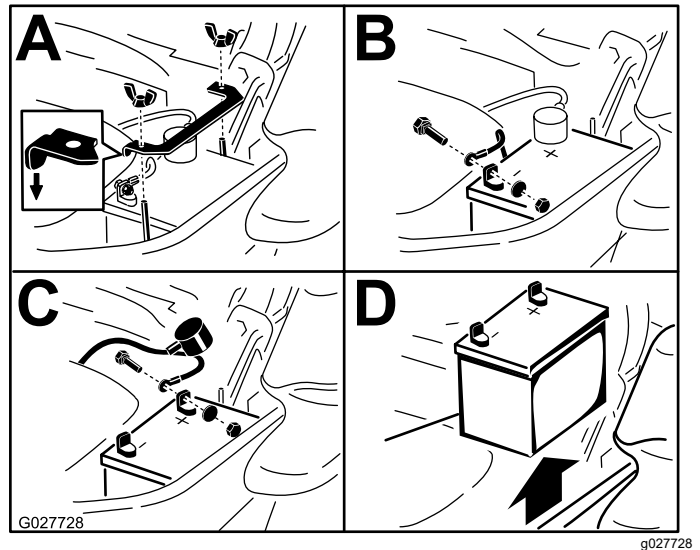


Figure 57



## Charging the Battery

### **⚠ WARNING**

Charging the battery produces gasses that can explode.

Never smoke near the battery and keep sparks and flames away from the battery.

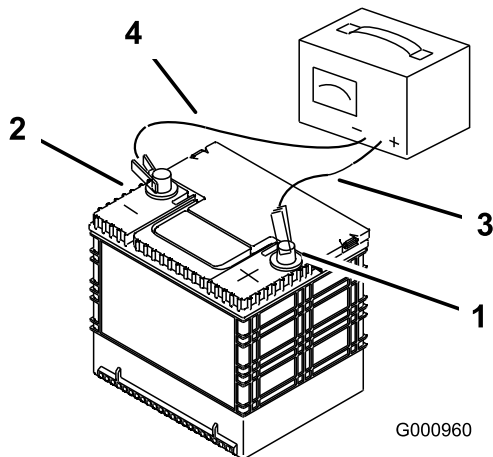
**Important:** Always keep the battery fully charged (1.265 specific gravity). This is especially important to prevent battery damage when the temperature is below 0°C (32°F).

1. Remove the battery from the chassis; refer to [Removing the Battery \(page 47\)](#).
2. Charge the battery for 10 to 15 minutes at 25 to 30 A or for 30 minutes at 10 A.

**Note:** Do not overcharge the battery.

3. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts ([Figure 58](#)).
4. Install the battery in the machine and connect the battery cables; refer to [Installing the Battery \(page 48\)](#).

**Note:** Do not run the machine with the battery disconnected; electrical damage may occur.

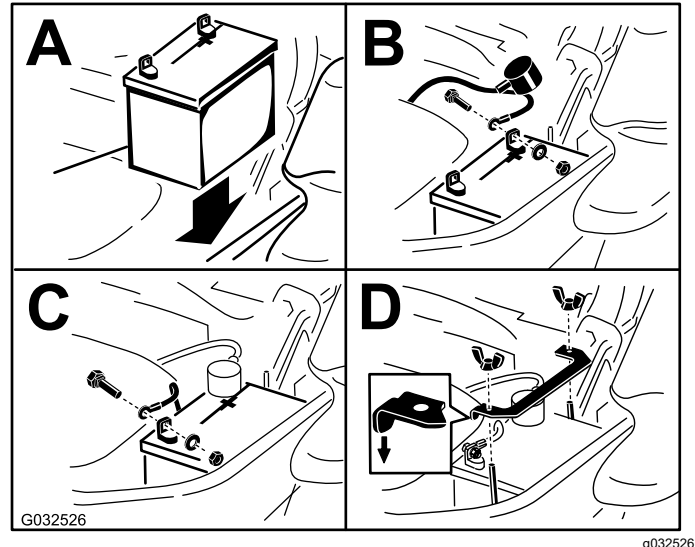


**Figure 58**

- |                              |                           |
|------------------------------|---------------------------|
| 1. Positive (+) battery post | 3. Red (+) charger lead   |
| 2. Negative (-) battery post | 4. Black (-) charger lead |

## Installing the Battery

**Note:** Position the battery in the tray with the terminal posts opposite from the hydraulic tank ([Figure 59](#)).



**Figure 59**



# Servicing the Fuses

## For Machines with a Standard Hour Meter

The electrical system is protected by fuses. It requires no maintenance, however, if a fuse blows check the component/circuit for a malfunction or short.

The fuses are located on the console to the right of the seat (Figure 60).

1. To replace the fuses, pull out on the fuse to remove it.
2. Install a new fuse (Figure 60).

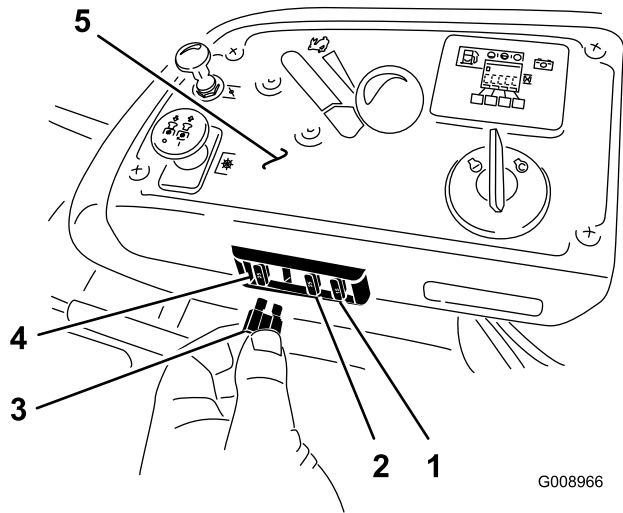


Figure 60

- |                              |                |
|------------------------------|----------------|
| 1. Optional accessory (15 A) | 4. Main (25 A) |
| 2. Charge (25 A)             | 5. Console     |
| 3. PTO (10 A)                |                |

# Servicing the Fuses

## For Machines with a Smart Hour Meter

The electrical system is protected by fuses. It requires no maintenance, however, if a fuse blows check the component/circuit for a malfunction or short. The fuses are located on the console to the right of the seat (Figure 61).

To replace the fuses, remove the cover, pull out on the fuse to remove it, and install a new fuse.

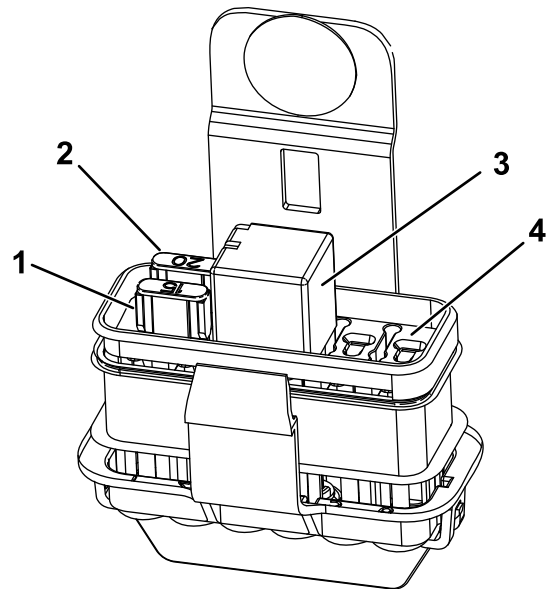


Figure 61

- |                    |                |
|--------------------|----------------|
| 1. Auxiliary, 15 A | 3. Start relay |
| 2. Main, 20 A      | 4. Open        |

## Jump-Starting the Machine

1. Check and clean corrosion from the battery terminals before jump-starting. Ensure that the connections are tight.

### ⚠ CAUTION

Corrosion or loose connections can cause unwanted electrical voltage spikes at any time during the jump-starting procedure.

Do not attempt to jump-start the machine with loose or corroded battery terminals, or damage to the engine or EFI may occur.

## ⚠ DANGER

Jump-starting a weak battery that is cracked or frozen or has a low electrolyte level or an open/shorted battery cell can cause an explosion, resulting in serious personal injury.

**Do not jump-start a weak battery if these conditions exist.**

2. Make sure that the booster battery is a good and fully charged lead-acid battery at 12.6 V or greater.

**Note:** Use properly sized jumper cables with short lengths to reduce voltage drop between systems. Make sure that the cables are color coded or labeled for the correct polarity.

## ⚠ CAUTION

Connecting the jumper cables incorrectly (wrong polarity) can immediately damage the EFI system.

**Be certain of battery-terminal polarity and jumper-cable polarity when hooking up the batteries.**

## ⚠ WARNING

Batteries contain acid and produce explosive gases.

- Shield your eyes and face from the batteries at all times.
- Do not lean over the batteries.

**Note:** Ensure that the vent caps are tight and level. Place a damp cloth, if available, over any vent caps on both batteries. Also ensure that the machines do not touch and that both electrical systems are off and at the same rated system voltage. These instructions are for negative ground systems only.

3. Connect the positive (+) cable to the positive (+) terminal of the discharged battery that is wired to the starter or solenoid as shown in [Figure 62](#).

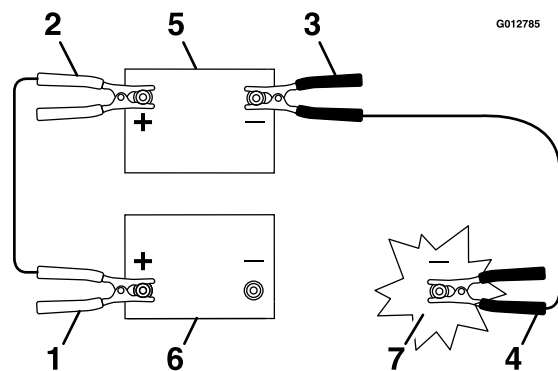


Figure 62

1. Positive (+) cable on discharged battery
2. Positive (+) cable on booster battery
3. Negative (-) cable on the booster battery
4. Negative (-) cable on the engine block
5. Booster battery
6. Discharged battery
7. Engine block

4. Connect the other end of the positive cable to the positive terminal of the booster battery.
5. Connect the black negative (-) cable to the other terminal (negative) of the booster battery.
6. Make the final connection on the engine block of the stalled machine (not to the negative battery post), away from the battery, and stand back ([Figure 63](#)).

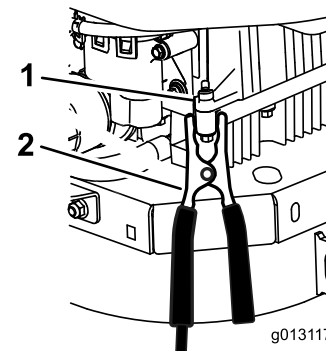
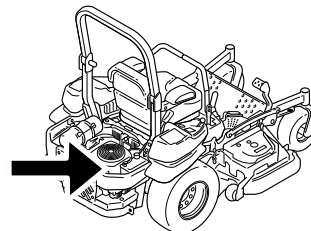


Figure 63

1. Engine block
2. Negative (-) cable

7. Start the machine and remove the cables in the reverse order of connection (disconnect the negative cable from the engine block first).

# Drive System Maintenance

## Checking the Seat Belt

**Service Interval:** Before each use or daily

Inspect the seat belt for wear, cuts, and proper operation of the retractor and buckle. Replace the seat belt if it is damaged.

## Checking the Roll-Bar Knobs

**Service Interval:** Before each use or daily

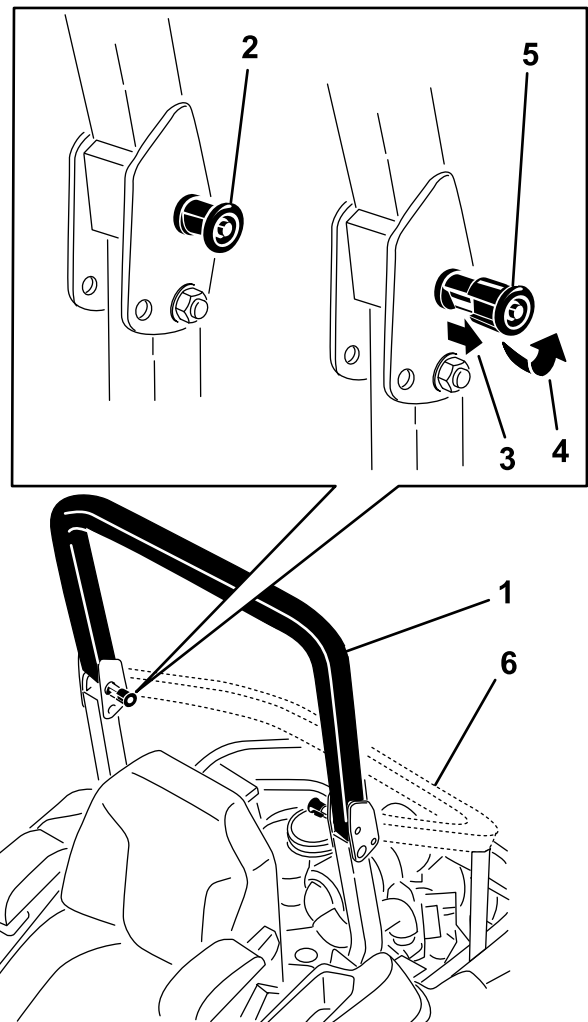
### ⚠ WARNING

To avoid injury or death from rollover, keep the roll bar in the fully raised, locked position and use the seat belt.

Ensure that the seat is secured to the machine.

- Check that both the mounting hardware and the knobs are in good working condition.
- Make sure that the knobs are fully engaged with the roll bar in the raised position.

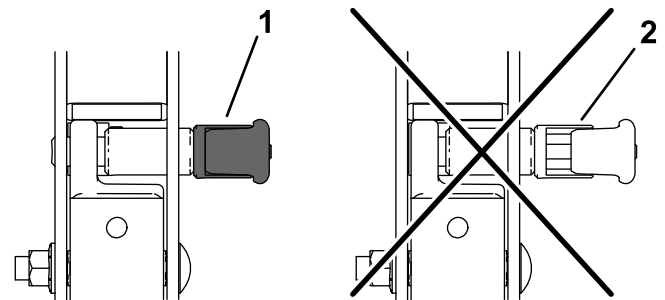
**Note:** The upper hoop of the roll bar may need to be pushed forward or pulled rearward to fully engage both knobs ([Figure 64](#) and [Figure 65](#)).



**Figure 64**

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- |   |  |
|---|--|
| 1. Roll bar in the upright position                     | 4. Rotate the roll-bar knob 90 degrees.    |
| 2. Roll-bar knob in the latched position                | 5. Roll-bar knob in the unlatched position |
| 3. Pull the roll-bar knob out and rotate it 90 degrees. | 6. Roll bar in the folded position         |



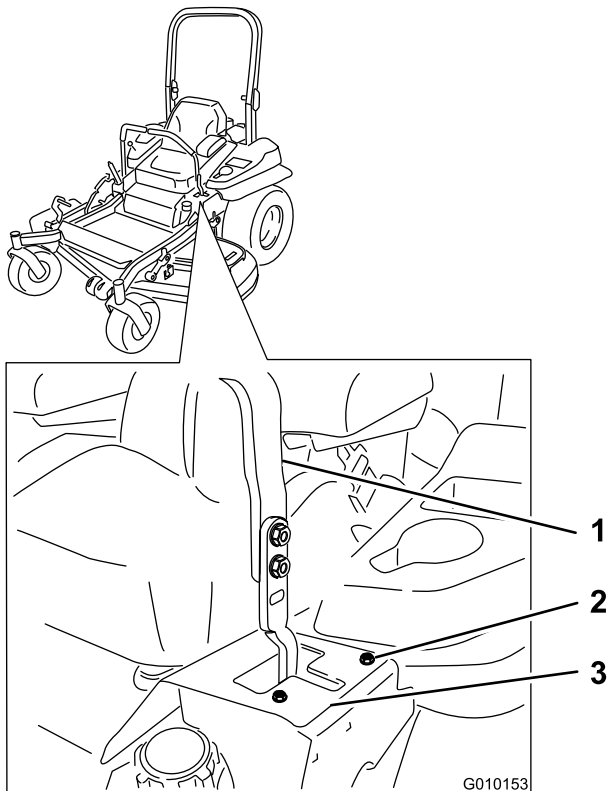
**Figure 65**

g228981

- |            |   |
|------------|---|
| 1. Engaged | 2. Partially engaged—do not operate with the roll bar in this position. |
|------------|---|

## Adjusting the Tracking

1. Disengage the blade-control switch (PTO).
2. Drive to an open flat area, move the motion-control levers to the NEUTRAL-LOCK position.
3. Move the throttle midway between the FAST and SLOW positions.
4. Move both motion-control levers all the way forward until they both hit the stops in the T-slot.
5. Check which way the machine tracks.
6. Engage the parking brake, shut off the engine, and remove the key.
7. Adjust the stop plates as needed.
  - If the machine tracks to the right, loosen the bolts and adjust the left stop plate rearward on the left T-slot until the machine tracks straight (Figure 66).
  - If the machine tracks to the left, loosen the bolts and adjust the right stop plate rearward on the right T-slot until the machine tracks straight (Figure 66).
8. Tighten the stop plate (Figure 66).



**Figure 66**

Left control lever shown

- |                  |               |
|------------------|---------------|
| 1. Control lever | 3. Stop plate |
| 2. Bolt          |               |

## Checking the Wheel Lug Nuts

Check and torque the wheel lug nuts to 122 to 129 N·m (90 to 95 ft-lb).

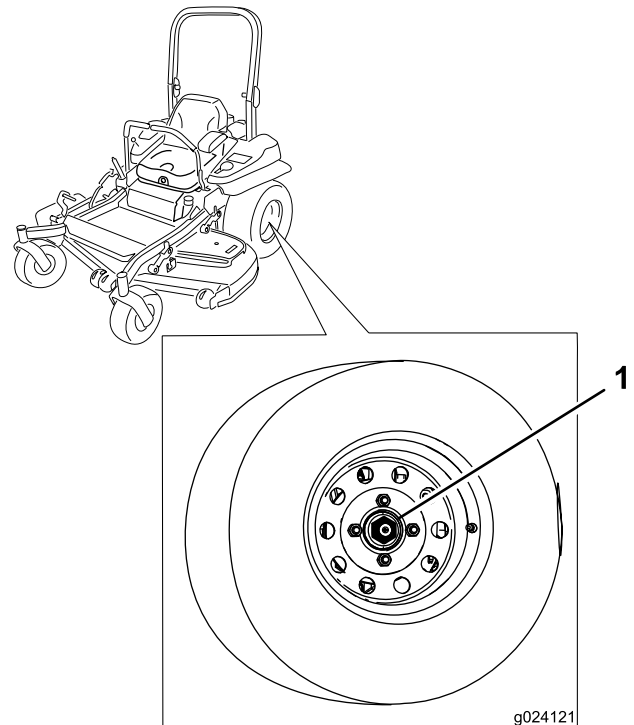
## Checking the Wheel-Hub Slotted Nut

**Service Interval:** After the first 100 hours

Every 500 hours

Check and ensure that the torque of the slotted nut is 286 to 352 N·m (211 to 260 ft-lb).

**Note:** Do not use anti-seize compound on wheel hub.



**Figure 67**

1. Slotted nut

## Adjusting the Caster-Pivot Bearing

**Service Interval:** Every 500 hours/Yearly (whichever comes first)

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Remove the dust cap from caster and tighten the locknut (Figure 68).
4. Tighten the locknut until the spring washers are flat, and then back off a 1/4 turn to properly set the preload on the bearings (Figure 68).

**Important:** Make sure that the spring washers are installed correctly as shown in Figure 68.

5. Install the dust cap (Figure 68).

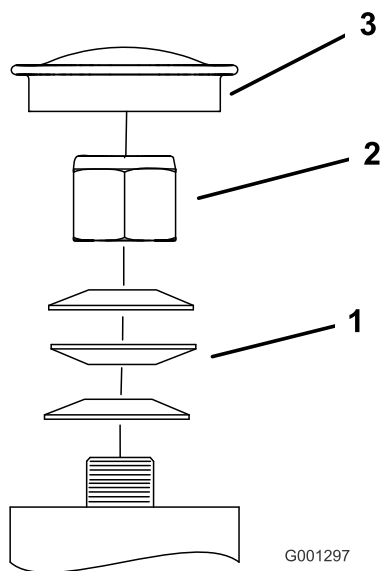


Figure 68

1. Spring washers
2. Locknut
3. Dust cap

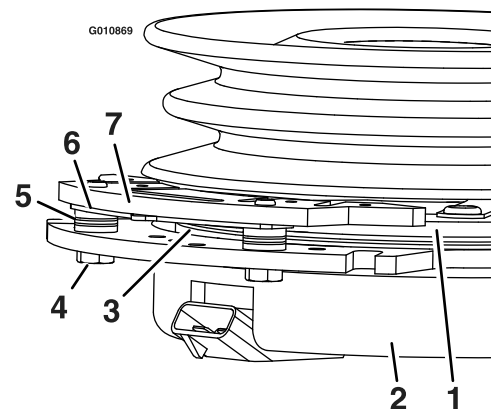


Figure 69

1. Armature
2. Field shell
3. Rotor
4. Brake-mounting bolt
5. Brake spacer
6. Re-gap shim
7. Brake pole

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Using an air compressor, blow out any debris from under the brake pole and around the brake spacers (Figure 70).

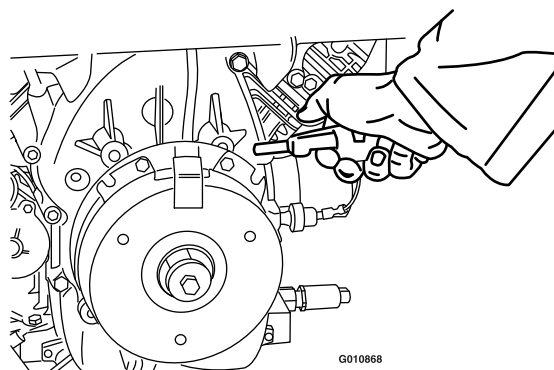


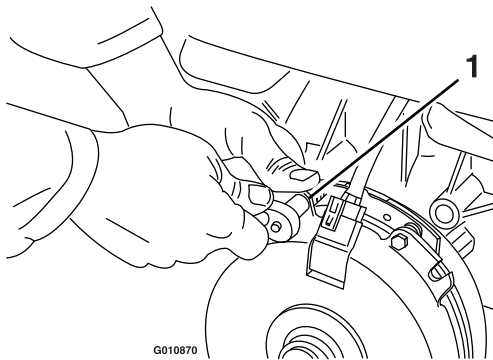
Figure 70

4. Check the condition of the wire-harness leads, connectors, and terminals.  
**Note:** Clean or repair as necessary.
5. Verify that 12 V is present at the clutch connector when the blade-control switch (PTO) switch is engaged.
6. Measure the gap between the rotor and armature. If the gap is greater than 1 mm (0.04 inch), do the following steps:
  - A. Loosen both brake-mounting bolts 1/2 to 1 full turn as shown in Figure 71.

## Removing the Clutch Shim

Some later model year units have been built with clutches that contain a brake shim. When the clutch brake has worn to the point where the clutch no longer engages consistently, you can remove the shim to extend the clutch life.

**Note:** Do not remove the brake pole from the field shell/armature. The brake pole has worn to match the armature and needs to continue to match after you remove the shim to ensure proper brake torque.

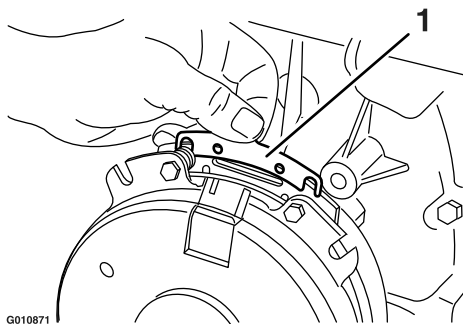


**Figure 71**

1. Brake-mounting bolt

- B. Using needle-nose pliers, or by hand, hold the tab and remove the shim (Figure 72).

**Note:** Do not discard the shim until the clutch is functioning properly.

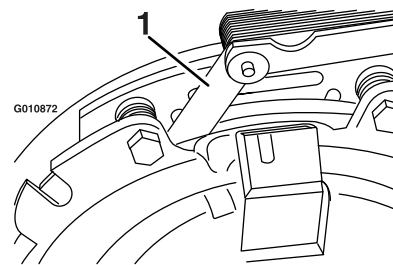


**Figure 72**

1. Shim

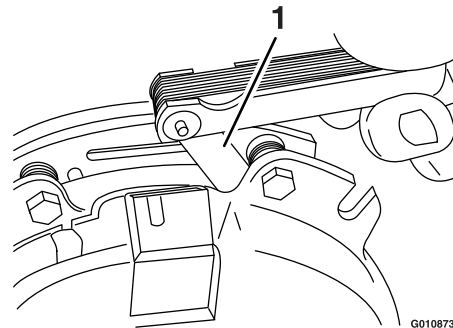
- C. Using a pneumatic line, blow out any debris from under the brake pole and around the brake spacers.
- D. Torque each bolt (M6 x 1) to 12.3 to 13.7 N·m (9.5 to 10.5 ft-lb).
- E. Using a 0.25 mm (0.01 inch) thick feeler gauge, verify that a gap is present between the rotor and the armature face on both sides of the brake pole as shown in Figure 73 and Figure 74.

**Note:** Due to the way the rotor and the armature faces wear (peaks and valleys) it is sometimes difficult to measure the gap accurately.



**Figure 73**

1. Feeler gauge



**Figure 74**

1. Feeler gauge

- If the gap is less than 0.25 mm (0.01 inch), then install the shim.
- If the gap is sufficient, proceed to the safety check in step F.

- F. Perform the following safety check:

- i. Sit on the seat and start the engine.
- ii. Make sure that the blades do not engage with the blade-control switch (PTO) in the OFF position, and that the clutch is disengaged.

If the clutch does not disengage, install the shim again.

- iii. Engage and disengage the blade-control switch (PTO) 10 consecutive times to ensure that the clutch is functioning properly.

# Cooling System Maintenance

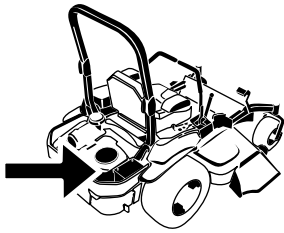
## Cooling System Safety

- Swallowing engine coolant can cause poisoning; keep out of reach from children and pets.
- Discharge of hot, pressurized coolant or touching a hot radiator and surrounding parts can cause severe burns.
  - Always allow the engine to cool at least 15 minutes before removing the radiator cap.
  - Use a rag when opening the radiator cap, and open the cap slowly to allow steam to escape.

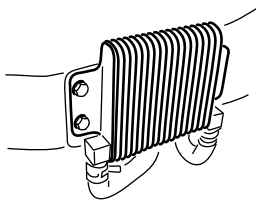
## Cleaning the Engine Screen and Engine-Oil Cooler

**Service Interval:** Before each use or daily

Remove any buildup of grass, dirt, or other debris from the oil cooler and the engine screen (Figure 75).



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g008804



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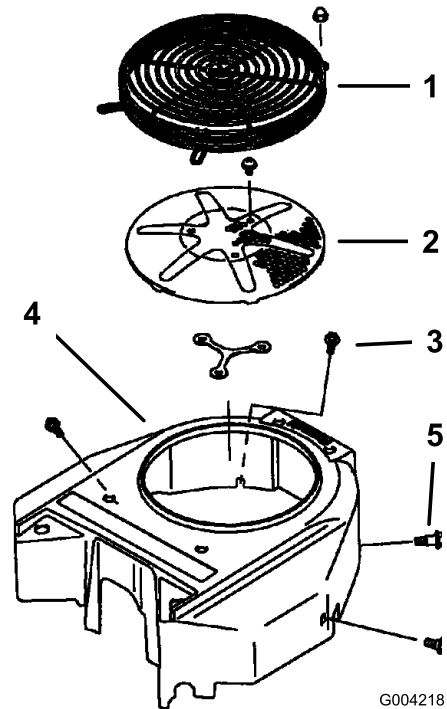
**Figure 75**

Remove any buildup of grass, dirt, or other debris from the engine screen. This helps ensure adequate cooling and correct engine speed and reduces the possibility of overheating and mechanical damage to the engine (Figure 72).

## Cleaning the Engine-Cooling Fins and Shrouds

**Service Interval:** Every 100 hours/Yearly (whichever comes first)

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the air-intake screen, the recoil starter, and the fan housing (Figure 76).
4. Clean the debris and grass from the engine parts.
5. Install the air-intake screen, the recoil starter, and the fan housing (Figure 76).



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**Figure 76**

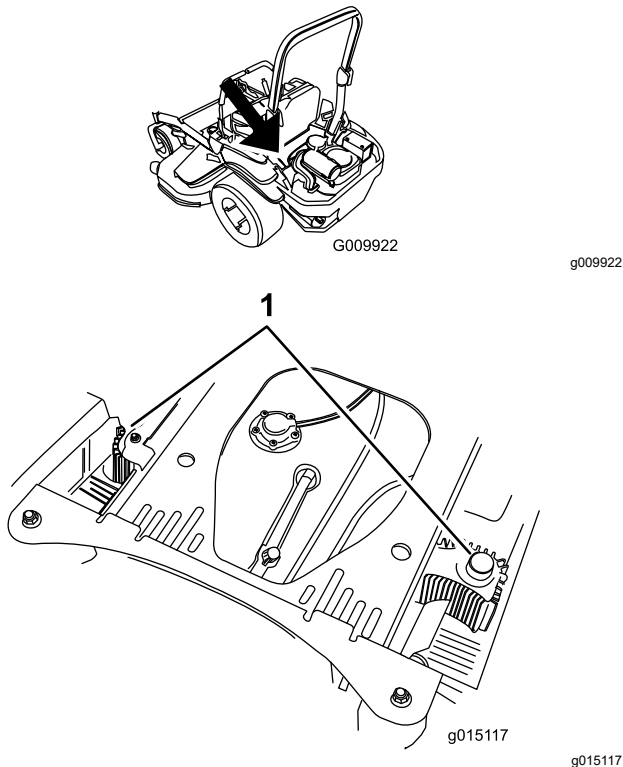
- |                             |                |
|-----------------------------|----------------|
| 1. Engine guard             | 4. Fan housing |
| 2. Engine air-intake screen | 5. Screw       |
| 3. Bolt                     |                |



# Checking and Cleaning the Hydraulic-Unit Shrouds

**Service Interval:** Before each use or daily

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Move the seat forward.
4. Clean the debris and grass from the hydraulic-unit shrouds ([Figure 77](#)).
5. Position the seat.



**Figure 77**

1. Hydraulic-unit shrouds

# Brake Maintenance

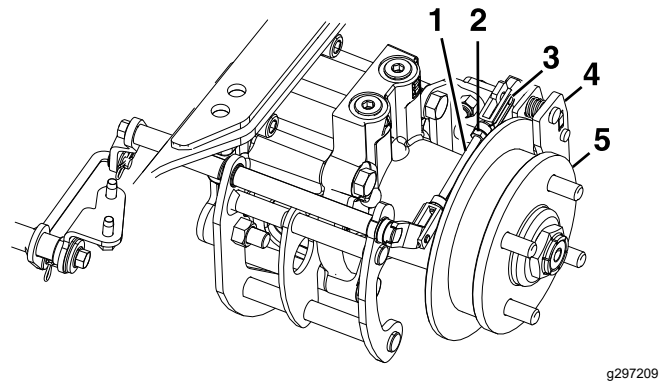
## Adjusting the Parking Brake

**Service Interval:** After the first 100 hours

Every 500 hours

Check to ensure that parking brake is adjusted properly. This procedure must be followed after the first 100 hours or when a brake component has been removed or replaced.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the rear of the machine up and support the machine with jack stands.
4. Remove the rear tires from the machine.
5. Remove any debris from the brake area.
6. Release the drive wheels; refer to [Using the Drive-Wheel-Release Valves](#) (page 31).
7. Disengage the parking brake.
8. Remove the spring clevis pin from the rear linkage and caliper ([Figure 78](#)).



**Figure 78**

- |                      |              |
|----------------------|--------------|
| 1. Rear linkage      | 4. Caliper   |
| 2. Jam nut           | 5. Wheel hub |
| 3. Spring clevis pin |              |

9. Loosen the jam nut on the rear linkage.
10. Push the caliper lever forward with finger pressure until the brake pad contacts the hub rotor.
11. Adjust the rear linkage until the spring clevis pin can be inserted in the hole in the caliper lever.

**Note:** To lengthen the linkage, rotate the clevis 1 turn outward.



12. Tighten the jam nut on the rear linkage ([Figure 78](#)).
13. Ensure that the wheel hub moves freely between the caliper brake pads.
14. Repeats steps [8](#) to [13](#) for the right side.
15. Rotate the drive wheel release handle to the operating position; refer to [Using the Drive-Wheel-Release Valves \(page 31\)](#).
16. Install the rear tires and torque the lug nuts to 129 N·m (95 ft-lb).
17. Remove the jack stands.

## ***Belt Maintenance***

### **Inspecting the Belts**

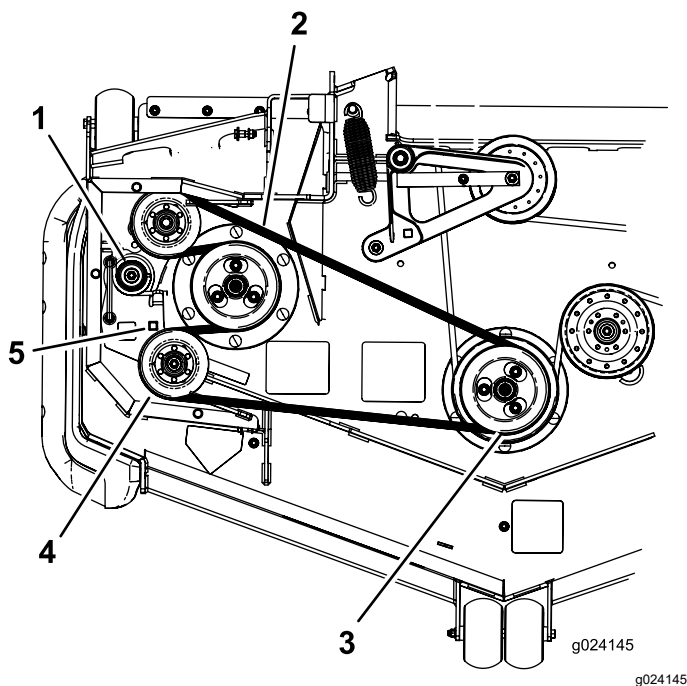
**Service Interval:** Every 50 hours

Replace the belt if it is worn. The signs of a worn belt include squealing while the belt is rotating; the blades slipping while cutting grass; and frayed edges, burn marks, and cracks on the belt.

### **Replacing the Mower Belt for Rear-Discharge Mower Decks**

#### **Replacing the Counter-Rotating Belt**

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Lower the mower to the 76 mm (3 inches) height of cut.
4. Remove the floor pan to gain access to the center pulley; refer to [Removing or Installing the Floor Pan \(page 37\)](#).
5. Remove the plastic belt cover ([Figure 80](#)).
6. Remove the 3 bolts holding the metal belt cover in place and remove the metal belt cover.



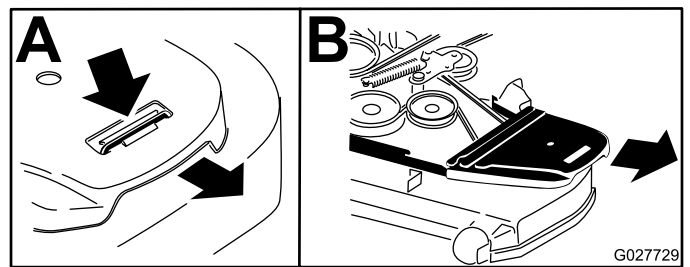
**Figure 79**

- |                          |   |
|--------------------------|---|
| 1. Idler spring          | 4. Idler pulley                                 |
| 2. Counter-rotating belt | 5. Square hole in the idler arm for the ratchet |
| 3. Double pulley         |   |

7. Use a ratchet in the square hole in the idler arm to remove tension on the idler spring (Figure 79).
8. Remove the belt from the mower deck pulley (Figure 79).
9. Remove the belt from the remaining pulleys (Figure 79).
10. Route the new belt around the mower pulleys.
11. Using the ratchet in the square hole, remove the tension on the spring, and guide the new belt around the idler pulley (Figure 79).
12. Install the floor pan; refer to [Removing or Installing the Floor Pan](#) (page 37).

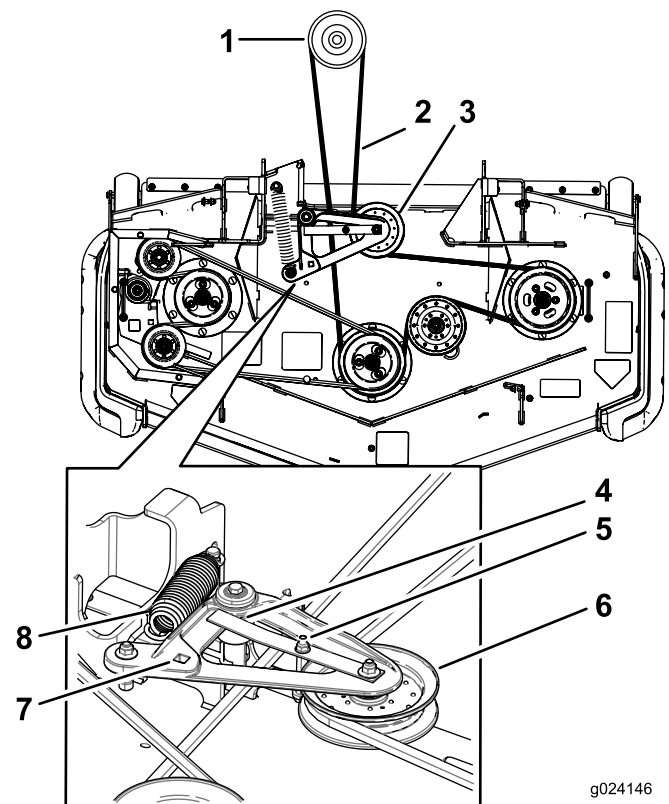
## Replacing the Mower Belt

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Lower the mower to the 76 mm (3 inches) height of cut.
4. Remove the belt covers (Figure 80).



**Figure 80**

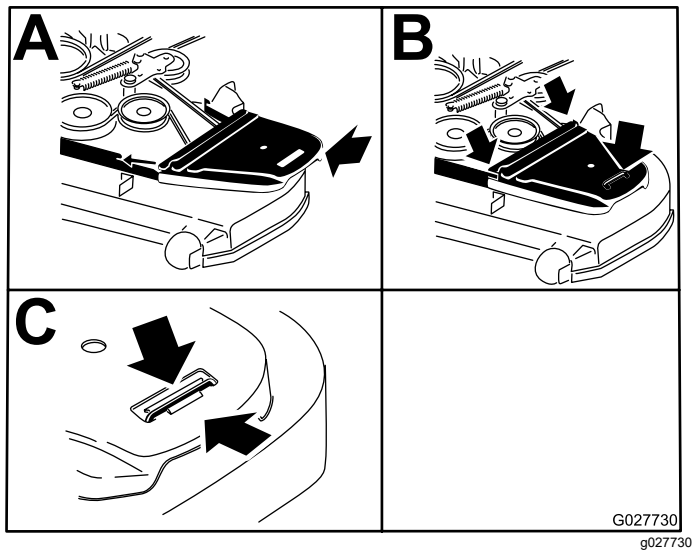
5. Remove the counter-rotating belt; refer to [Replacing the Counter-Rotating Belt](#) (page 57).
6. Use a ratchet in the square hole in the idler arm to remove tension on the idler spring (Figure 81).
7. Remove the belt from the mower-deck pulleys and the clutch pulley.
8. Install the new belt around the mower pulleys and the clutch pulley under the engine (Figure 81).



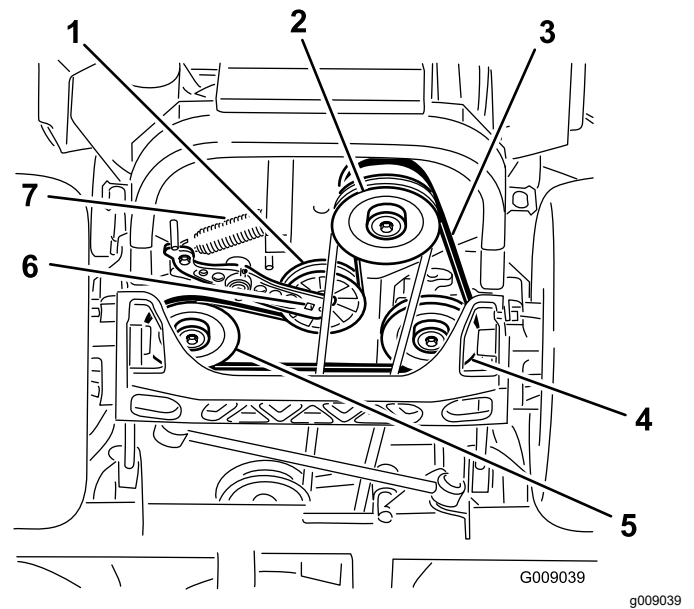
**Figure 81**

- |   |   |
|---|---|
| 1. Clutch pulley  | 5. Belt guide                                   |
| 2. Mower belt   | 6. Spring-loaded idler pulley                   |
| 3. Spring-loaded idler pulley                                 | 7. Square hole in the idler arm for the ratchet |
| 4. Ensure that the belt-guide tab hits against the pivot hub. | 8. Spring                                       |

9. Rotate and ensure the belt-guide tab hits against the pivot hub ([Figure 81](#)).
10. Using the ratchet in the square hole, install the belt around the spring-loaded idler pulley ([Figure 81](#)). Seat the spring ends in the anchor grooves.
11. Install the belt covers ([Figure 82](#)).



**Figure 82**



**Figure 83**

- |                                |                                 |
|--------------------------------|---------------------------------|
| 1. Idler pulley                | 5. Left hydraulic-pump pulley   |
| 2. Clutch pulley               | 6. Square hole in the idler arm |
| 3. Pump-drive belt             | 7. Idler spring                 |
| 4. Right hydraulic-pump pulley |                                 |

## Replacing the Hydraulic Pump-Drive Belt

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the mower belt; refer to [Replacing the Mower Belt for Rear-Discharge Mower Decks](#) (page 57).
4. Raise the machine and support it with jack stands ([Figure 83](#)).

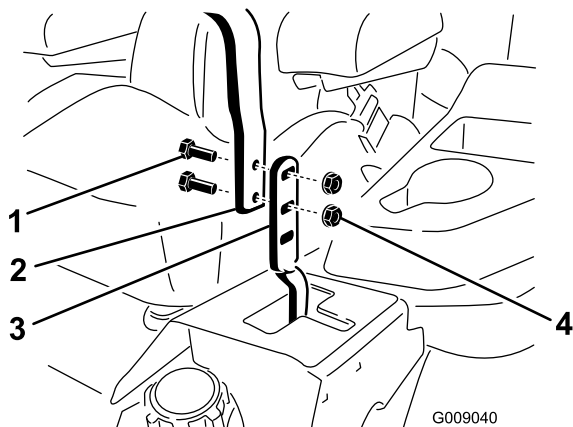
5. Use a ratchet in the square hole in the idler arm to remove the idler spring ([Figure 83](#)).
6. Unhook the idler spring from the frame ([Figure 83](#)).
7. Remove the belt from the hydraulic-unit-drive pulleys and the engine pulley.
8. Install the new belt around engine pulley and the 2 drive pulleys.
9. Using a ratchet in the square hole in the idler arm, install the idler spring to the frame ([Figure 83](#)).
10. Install the mower belt; refer to [Replacing the Mower Belt for Rear-Discharge Mower Decks](#) (page 57).

# Controls System Maintenance

## Adjusting the Control-Handle Position

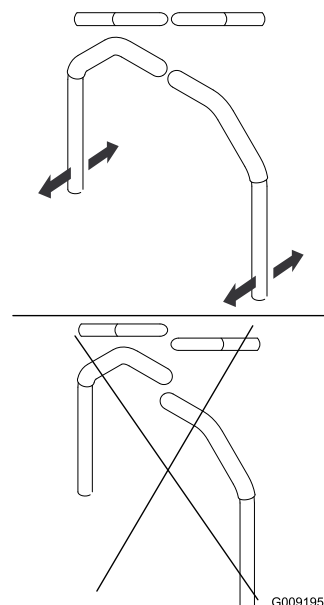
There are 2 height positions for the control levers—high and low. Remove the bolts to adjust the height for the operator.

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Loosen the bolts and flange nuts installed in the levers ([Figure 84](#)).
4. Align the levers in the front-to-rear position by bringing the levers together to the NEUTRAL position, and slide them until they are aligned, then tighten the bolts ([Figure 85](#)).



**Figure 84**

- |             |                  |
|-------------|------------------|
| 1. Bolt (2) | 3. Control lever |
| 2. Handle   | 4. Nut (2)       |



**Figure 85**

5. If the ends of the levers hit against each other, refer to [Adjusting the Motion-Control Neutral-Lock Pivot](#) ([page 62](#)).
6. Repeat to adjust the control levers.

## Adjusting the Motion-Control Linkage

Located on either side of the machine, below the seat, are the pump-control linkages. Rotating the end nut with a 1/2-inch deep socket wrench allows fine tuning adjustments so that the machine does not move in neutral. Any adjustments should be made for neutral positioning only.

### **⚠ WARNING**

**The engine must be running and the drive wheels turning so that you can perform the adjustments. Contact with moving parts or hot surfaces may cause personal injury.**

**Keep your fingers, hands, and clothing clear of rotating components and hot surfaces.**

1. Park the machine on a level surface, disengage the blade-control switch (PTO), move the motion-control levers to the NEUTRAL-LOCK position, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Push the deck-lift pedal, remove the height-of-cut pin, and lower the mower deck to the ground

4. Raise the rear of the machine up and support it with jack stands (or equivalent support) just high enough to allow the drive wheels to turn freely.
5. Remove the electrical connection from the seat safety switch, located under the bottom cushion of the seat.

**Note:** The switch is a part of the seat assembly.

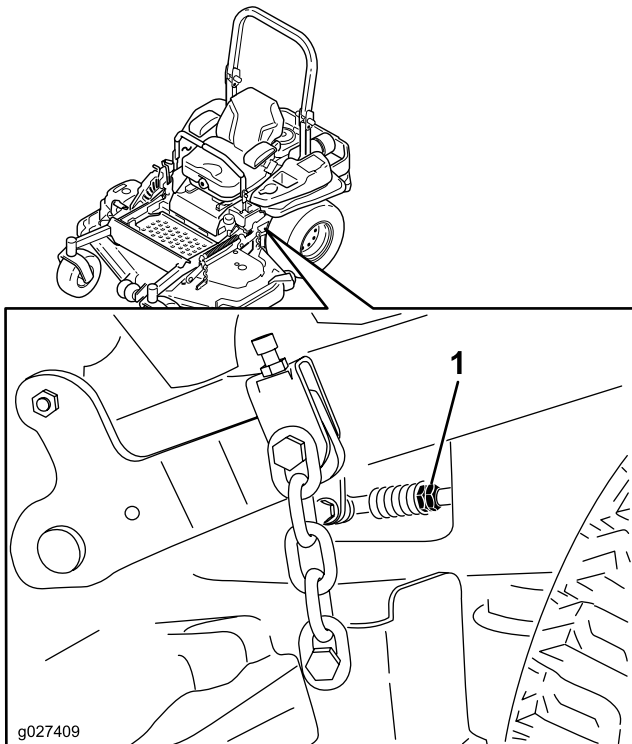
6. **Temporarily** install a jumper wire across the terminals in the connector of the main wire harness.
7. Start the engine, run it at full throttle, and disengage the parking brake.

**Note:** Before starting the engine, ensure that the parking brake is engaged and that the motion-control levers are out. You do not have to be in the seat.

8. Run the machine at least 5 minutes with the drive levers at full forward speed to bring the hydraulic fluid up to the operating temperature.

**Note:** The motion-control levers must be in neutral while you are making any adjustments.

9. Bring the motion-control levers into the NEUTRAL position.
10. Adjust the pump-control-rod lengths by rotating the double nuts on the rod in the appropriate direction until the wheels slightly creep in reverse ([Figure 86](#)).



**Figure 86**

1. Double nuts

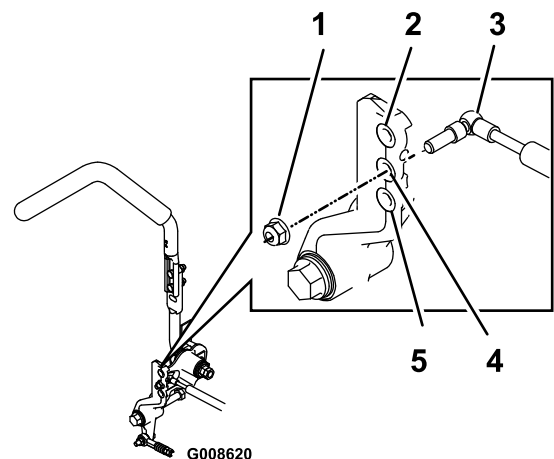
11. Move the motion-control levers to the REVERSE position and while applying slight pressure to the lever, allow the reverse-indicator springs to bring the levers back to neutral.

**Note:** The wheels should stop turning or slightly creep in reverse.

12. Shut off the machine.
13. Remove the jumper wire from the wire harness and plug the connector into the seat switch.
14. Remove the jack stands.
15. Raise the mower deck and install the height-of-cut pin.
16. Check and ensure that the machine does not creep in neutral with the parking brake disengaged.

## Adjusting the Motion-Control Damper

You can adjust the top damper-mounting bolt to obtain the desired motion-control lever resistance. Refer to [Figure 87](#) for mounting options.



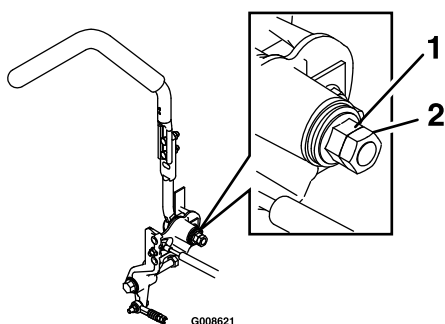
**Figure 87**  
Right Motion Control Shown

1. Torque the locknut to 23 N·m (17 ft-lb). The bolt must protrude past the end of the locknut after torquing.
2. Most resistance (firmest feel)
3. Damper
4. Medium resistance (medium feel)
5. Least resistance (softest feel)

# Adjusting the Motion-Control Neutral-Lock Pivot

You can adjust the flanged nut to obtain the desired motion-control lever resistance when moving it to the NEUTRAL-LOCK position. See [Figure 88](#) for adjustment options.

1. Loosen the jam nut.
2. Tighten or loosen the flanged nut to the desired feel.
  - For more resistance, tighten the flanged nut.
  - For less resistance, loosen the flanged nut
3. Tighten the jam nut.



**Figure 88**

1. Flanged nut

2. Jam nut

# Hydraulic System Maintenance

## Hydraulic System Safety

- Seek immediate medical attention if fluid is injected into skin. Injected fluid must be surgically removed within a few hours by a doctor.
- Ensure that all hydraulic-fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to the hydraulic system.
- Keep your body and hands away from pinhole leaks or nozzles that eject high-pressure hydraulic fluid.
- Use cardboard or paper to find hydraulic leaks.
- Safely relieve all pressure in the hydraulic system before performing any work on the hydraulic system.

## Hydraulic-Fluid Specifications

**Hydraulic-Fluid Type:** Toro® HYPR-OIL™ 500 hydraulic fluid or Mobil® 1 15W-50.

**Important:** Use the specified fluid. Other fluids could damage the hydraulic system.

**Each Hydraulic-System Fluid Capacity:** 1.5 L (52 fl oz) per side with filter change

## Checking the Hydraulic Fluid

**Service Interval:** Every 50 hours—Check the hydraulic-fluid level.

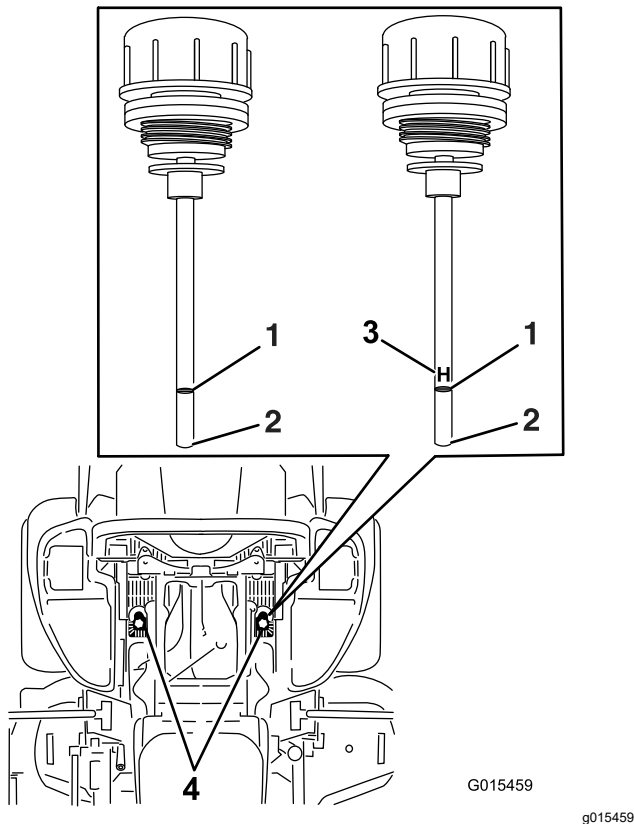
1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Allow the engine and the hydraulic system to cool for 10 minutes.

**Note:** The oil level on the dipstick is incorrect when the oil is checked and the machine is hot.

4. Move the seat forward.
5. Clean the area around the dipsticks of hydraulic-system reservoirs ([Figure 89](#)).
6. Remove 1 dipstick from the hydraulic reservoir ([Figure 89](#)).



7. Wipe the dipstick off and thread the dipstick into the reservoir.
  8. Remove the dipstick and look at the end ([Figure 89](#)).
- Important:** Do not overfill the hydraulic units with fluid, as damage may occur. Do not run the machine with fluid below the add mark.
9. If the fluid level is at the add mark, slowly pour only enough fluid into the hydraulic reservoir to raise the level to the full or H line.
  10. Install the dipstick.
  11. Repeat the procedure for the opposite dipstick.



**Figure 89**

Either dipstick is used in the machine

- |         |                                  |
|---------|----------------------------------|
| 1. Full | 3. H —means high level           |
| 2. Add  | 4. Dipstick locations under seat |

## Changing the Hydraulic Fluid and Filters

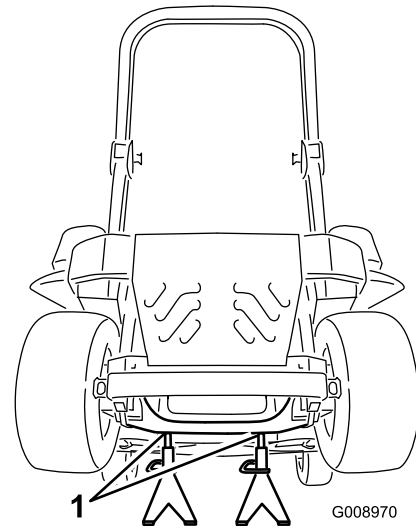
**Service Interval:** After the first 250 hours—Change the hydraulic filters and hydraulic fluid.

Every 250 hours—After the initial change—change the hydraulic-system filters and fluid when using Mobil 1 15W50 fluid. (Change it more often under dirty or dusty conditions)

Every 500 hours—After the initial change—change the hydraulic-system filters and fluid when using Toro® HYPR-OIL™ 500 fluid. (Change it more often under dirty or dusty conditions)

To replace the hydraulic fluid, the filters need to be removed. Replace both at the same time; refer to [Hydraulic-Fluid Specifications \(page 62\)](#) for fluid specifications.

1. Park the machine on a level surface, disengage the blade-control switch, and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the machine and support it with jack stands ([Figure 90](#)).



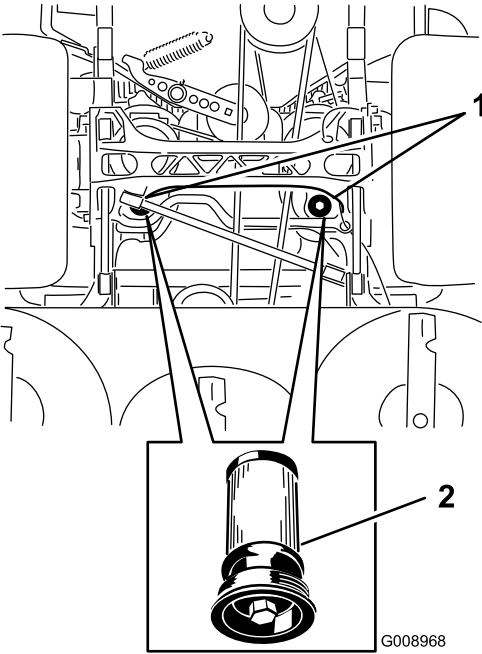
**Figure 90**

1. Jack stands

4. Remove both the mower belt and the pump-drive belt; refer to [Replacing the Mower Belt \(page 58\)](#) and [Replacing the Hydraulic Pump-Drive Belt \(page 59\)](#).

**Note:** This prevents fluid from getting on the belts.

5. Place a drain pan under the filter, remove the old filter, and wipe the surface clean ([Figure 91](#)).



**Figure 91**

Bottom view of the machine

1. Filter locations
2. Hydraulic filter

6. Apply a thin coat of hydraulic fluid to the rubber gasket on the replacement filter ([Figure 91](#)).
7. Install the replacement hydraulic filter.
8. Install the pump-drive belt and the mower belt.
9. Remove the jack stands and lower the machine ([Figure 90](#)).
10. Add fluid to the hydraulic reservoir and check for any leaks.
11. Clean up any spilled fluid.
12. Start the engine and let it run for about 2 minutes to purge air from the system.
13. Shut off the engine and check for leaks.
14. Check the fluid level while the fluid is cold.
15. If required, add fluid to the hydraulic reservoir.

**Note:** Do not overfill.

# Mower Deck Maintenance

## Blade Safety

- Inspect the blades periodically for wear or damage.
- Use care when checking the blades. Wrap the blades or wear gloves, and use caution when servicing the blades. Only replace or sharpen the blades; never straighten or weld them.
- On multi-bladed machines, take care as rotating one blade can cause other blades to rotate.
- Replace worn or damaged blades and bolts in sets to preserve balance.

## Servicing the Cutting Blades

To ensure a superior quality of cut, keep the blades sharp. For convenient sharpening and replacement, you may want to keep extra blades on hand.

## Before Inspecting or Servicing the Blades

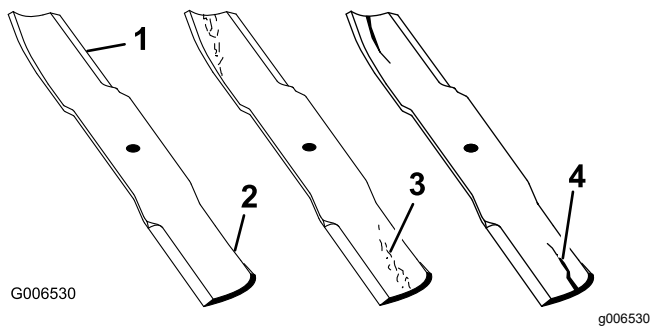
1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and disconnect the spark-plug wires from the spark plugs.

## Inspecting the Blades

**Service Interval:** Before each use or daily

1. Inspect the cutting edges ([Figure 92](#)).
2. If the edges are not sharp or have nicks, remove and sharpen the blade; refer to [Sharpening the Blades](#) (page 67).
3. Inspect the blades, especially in the curved area.
4. If you notice any cracks, wear, or a slot forming in this area, immediately install a new blade ([Figure 92](#)).





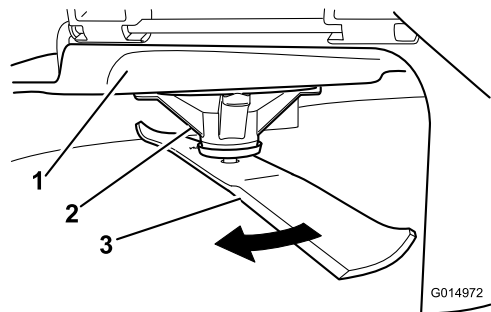
**Figure 92**

- |                 |                      |
|-----------------|----------------------|
| 1. Cutting edge | 3. Wear/slot forming |
| 2. Curved area  | 4. Crack             |

## Checking for Bent Blades

**Note:** The machine must be on a level surface for the following procedure.

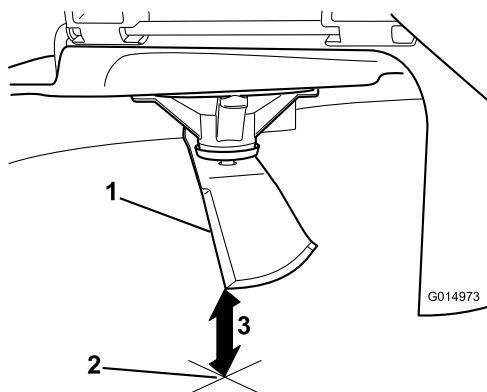
1. Raise the mower deck to the highest height-of-cut position.
2. While wearing thickly padded gloves, or other adequate hand protection, slowly rotate the blade into a position that allows you to measure the distance between the cutting edge and the level surface the machine is on ([Figure 93](#)).



**Figure 93**

- |                    |          |
|--------------------|----------|
| 1. Deck            | 3. Blade |
| 2. Spindle housing |          |

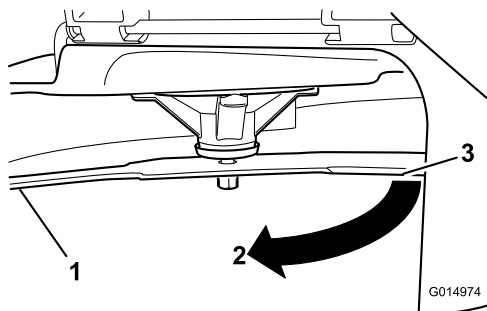
3. Measure from the tip of the blade to the flat surface ([Figure 94](#)).



**Figure 94**

1. Blade (in position for measuring)
2. Level surface
3. Measured distance between blade and the surface (A)

4. Rotate the same blade 180 degrees so that the opposing cutting edge is now in the same position (Figure 95).

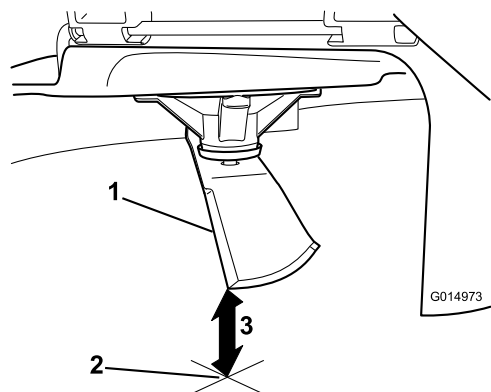


**Figure 95**

1. Blade (side previously measured)
2. Measurement (position used previously)
3. Opposing side of blade being moved into measurement position

5. Measure from the tip of the blade to the flat surface (Figure 96).

**Note:** The variance should be no more than 3 mm (1/8 inch).



**Figure 96**

1. Opposite blade edge (in position for measuring)
2. Level surface
3. Second measured distance between blade and surface (B)

- A. If the difference between A and B is greater than 3 mm (1/8 inch), replace the blade with a new blade; refer to [Removing the Blades \(page 66\)](#) and [Installing the Blades \(page 67\)](#).

**Note:** If a bent blade is replaced with a new blade, and the dimension obtained continues to exceed 3 mm (1/8 inch), the blade spindle could be bent. Contact an Authorized Service Dealer for service.

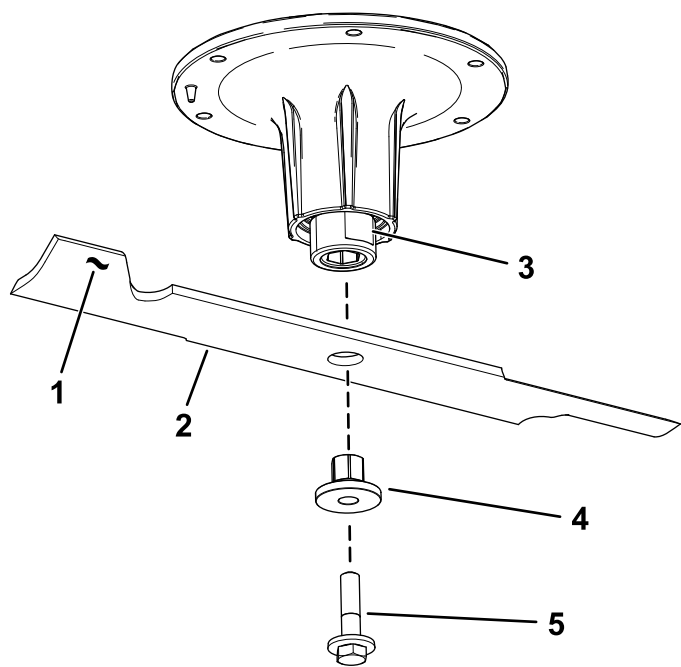
- B. If the variance is within constraints, move to the next blade.

6. Repeat this procedure on each blade.

## Removing the Blades

Replace the blades if they hit a solid object, or if the blade is out of balance or bent.

1. Place a wrench on the flat of the spindle shaft or hold the blade end using a rag or thickly padded glove.
2. Remove the blade bolt, bushing, and blade from the spindle shaft (Figure 97).



**Figure 97**

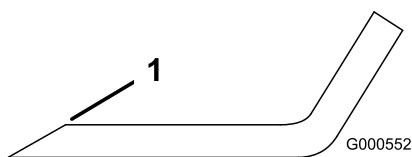
- |                              |               |
|------------------------------|---------------|
| 1. Sail area of the blade    | 4. Bushing    |
| 2. Blade                     | 5. Blade bolt |
| 3. Flat of the spindle shaft |               |

## Sharpening the Blades

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 98).

**Note:** Maintain the original angle.

**Note:** The blade retains its balance if the same amount of material is removed from both cutting edges.

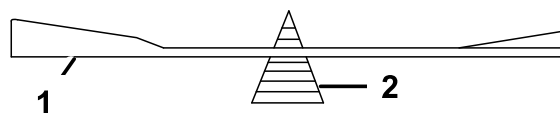


**Figure 98**

1. Sharpen at original angle.
2. Check the balance of the blade by putting it on a blade balancer (Figure 99).

**Note:** If the blade stays in a horizontal position, the blade is balanced and can be used.

**Note:** If the blade is not balanced, file some metal off the end of the sail area only (Figure 98).



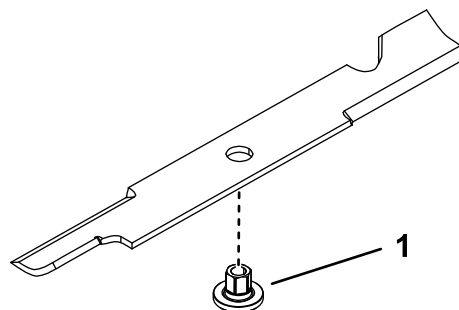
**Figure 99**

- |          |             |
|----------|-------------|
| 1. Blade | 2. Balancer |
|----------|-------------|

3. Repeat this procedure until the blade is balanced.

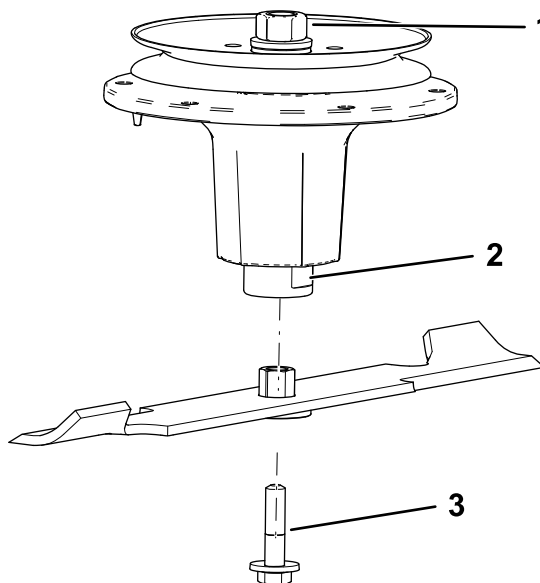
## Installing the Blades

1. Install the bushing through the blade with the bushing flange on the bottom (grass) side of the blade (Figure 100).



**Figure 100**

1. Bushing
2. Install the bushing/blade assembly into the spindle shaft (Figure 101).

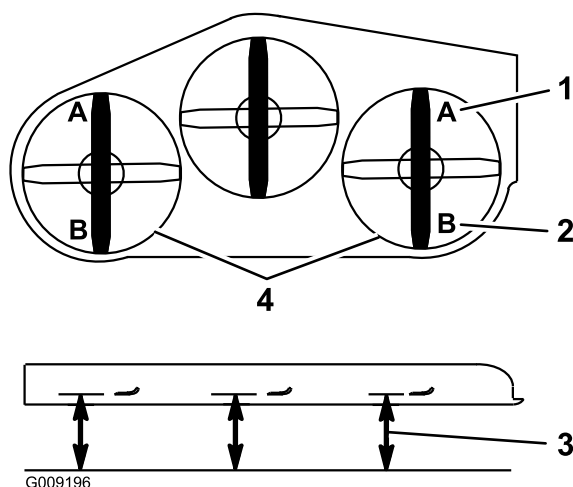


**Figure 101**

- |                              |               |
|------------------------------|---------------|
| 1. Top spindle nut           | 3. Blade bolt |
| 2. Flat of the spindle shaft |               |

3. Apply copper-based lubricant or grease to the threads of the blade bolt as needed to prevent seizing. Install the blade bolt finger-tight.
4. Place a wrench on the flat of the spindle shaft and torque the blade bolt to 75 to 81 N·m (55 to 60 ft-lb).

**Note:** The measurement should read 7.6 mm (3 inches)



**Figure 103**

1. 7.6 cm (3 inch) at position A is correct
2. 8.3 cm (3-1/4 inch) at position B is correct
3. Measure here from the blade tip to the hard surface
4. Measure at position A and B on both sides

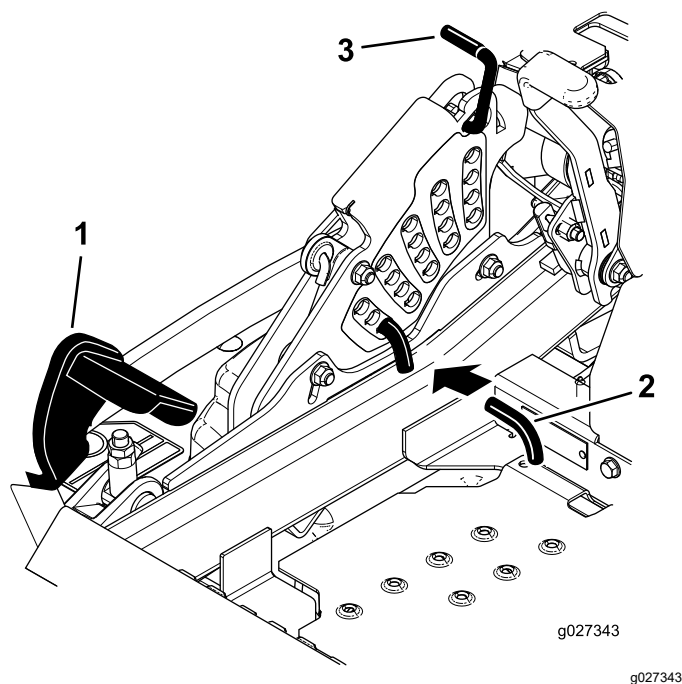
9. Fine-tune the adjustment nut on the front deck-lift assembly by turning it (Figure 104).

**Note:** To increase the height, turn the adjustment nut clockwise; to decrease the height, turn the nut counterclockwise.

**Note:** If the front deck links do not have enough adjustment to achieve accurate cut height, you can use the single-point adjustment to gain more adjustment.

## Leveling the Mower Deck

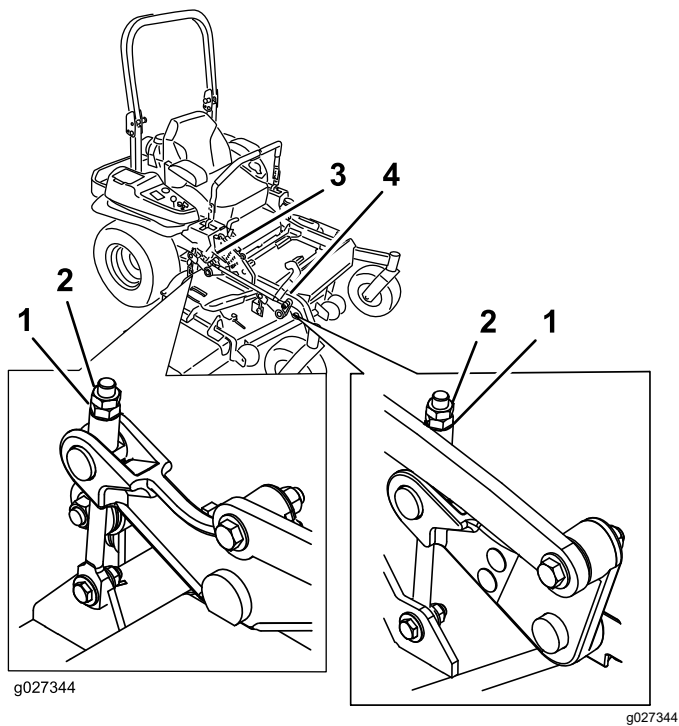
1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Position the transport lock in the latching position.
4. Push the deck-lift pedal all the way forward and the deck latches at the 140 mm (5-1/2 inches) transport position (Figure 102).



**Figure 102**

1. Deck-lift pedal
2. Height-of-cut pin
3. Transport lock

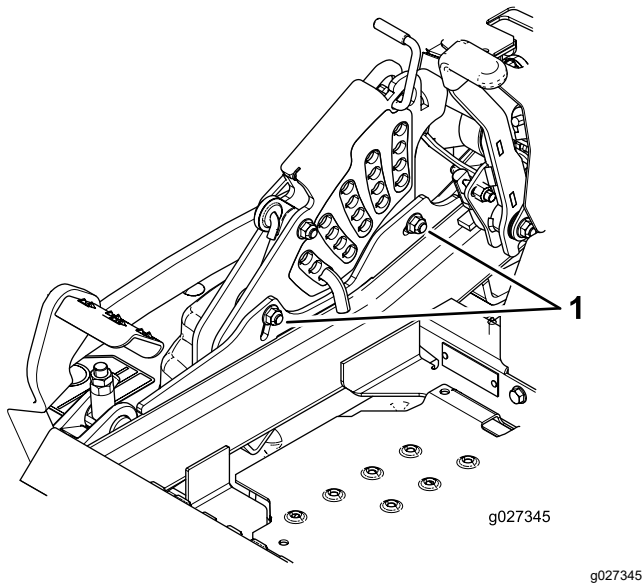
5. Insert the height-adjustment pin into the 7.6 cm (3 inches) cutting-height location.
6. Release the transport lock and allow the deck to lower to the cutting height.
7. Raise the discharge chute.
8. On both sides of the deck, measure from the level surface to the front tip of the blade (Position A) as shown in Figure 103.



**Figure 104**

- |                   |                          |
|-------------------|--------------------------|
| 1. Adjustment nut | 3. Rear deck adjustment  |
| 2. Jam nut        | 4. Front deck adjustment |

10. To adjust the single-point system, loosen the 2 bolts at the bottom of the height-of-cut plate (Figure 105).

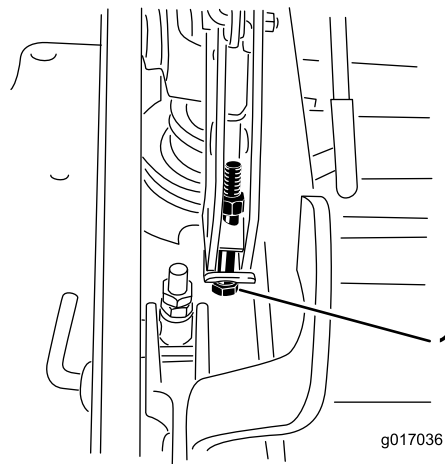


**Figure 105**

1. Bolts at the bottom of the height-of-cut plate

11. If the deck is too low, tighten the single-point-adjustment bolt by rotating it clockwise. If the deck is too high, loosen the single-point-adjustment bolt by rotating it counterclockwise (Figure 106).

**Note:** Loosen or tighten the single-point adjustment bolt enough to move the height-of-cut plate mounting bolts at least 1/3 the length of the available travel in their slots. This regains some up and down adjustment on each of the 4 deck links.



**Figure 106**

1. Single-point adjustment bolt

12. Tighten the 2 bolts at the bottom of the height-of-cut plate (Figure 105).

**Note:** In most conditions, the back blade tip should be adjusted 6.4 mm (1/4 inch) higher than the front.

13. Torque the 2 bolts to 37 to 45 N·m (27 to 33 ft-lb).  
14. On both sides of the deck, measure from the level surface to the back tip of the blade (position B) as shown in Figure 103.

**Note:** The measurement should read 8.3 cm (3-1/4 inches)

15. Fine tune the screw adjuster by turning it to get 8.3 mm (3-1/4 inches) height (Figure 104).

To increase the height, turn the adjustment nut clockwise; to decrease, turn counterclockwise.

16. Measure until all 4 sides are the correct height.  
17. Tighten all of the nuts on the deck-lift-arm assemblies.  
18. Lower the discharge chute.

# Removing the Mower Deck

Lock out the spring-loaded deck arms before servicing or removing the mower deck.

## ⚠ WARNING

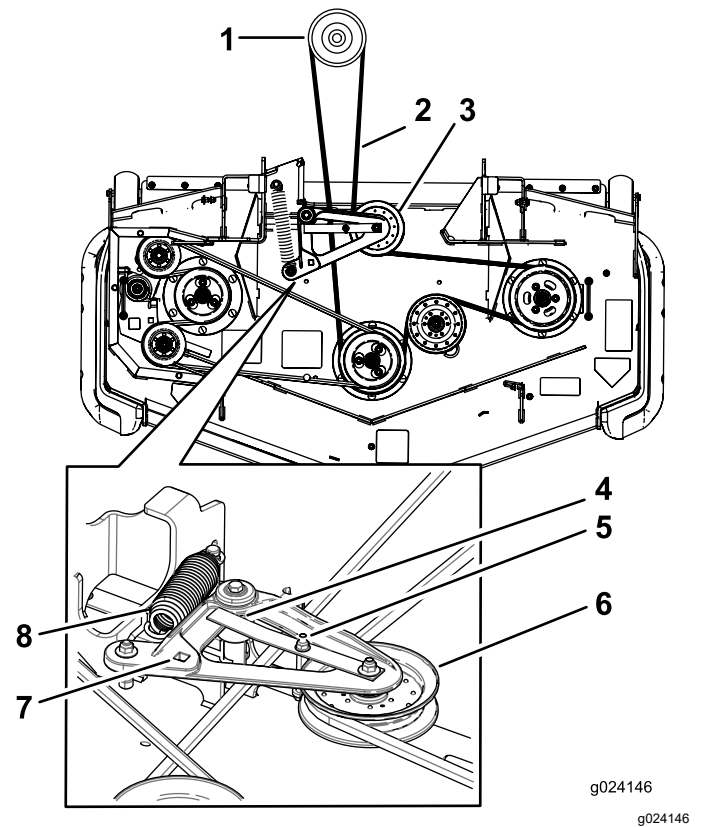
Deck-lift arm assemblies have stored energy. Removing the deck with out releasing the stored energy can cause serious injury or death.

Do not attempt to disassemble the deck from the front frame without locking out the stored energy.

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Place the height adjustment pin in the 7.6 cm (3 inch) cutting-height location.

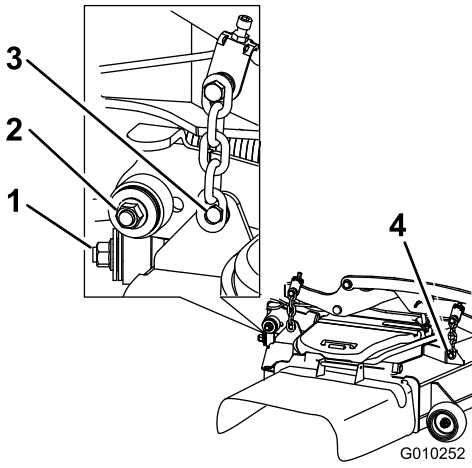
**Note:** This locks the deck-lift arms in the lowest position when the deck is removed and the stored energy in the deck spring is released.

4. Remove the belt covers.
5. Remove the floor pan and insert a ratchet into the square hole in the deck idler ([Figure 107](#)).
6. Rotate the deck idler clockwise, lift up on the belt-guide tab (rear-discharge machines only), and remove the mower belt ([Figure 107](#)).



**Figure 107**  
Rear-Discharge Machines

- |   |   |
|---|---|
| 1. Clutch pulley  | 5. Belt guide                                   |
| 2. Mower belt   | 6. Spring-loaded idler pulley                   |
| 3. Spring-loaded idler pulley                                 | 7. Square hole in the idler arm for the ratchet |
| 4. Ensure that the belt-guide tab hits against the pivot hub. | 8. Spring                                       |
- 
7. Remove and retain the hardware on both sides of the deck as shown in [Figure 108](#).



**Figure 108**

g010252

1. Right stabilizer
  2. Deck strut (right side shown)
  3. Remove the shoulder bolt and nut.
  4. Remove the shoulder bolt and nut.
- 
8. Raise the deck struts and secure them in the raised position.
  9. Slide the deck out to the right side of the machine.

## ***Cleaning***

### **Cleaning under the Mower Deck**

**Service Interval:** After each use

1. Park the machine on a level surface, disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the mower deck to the TRANSPORT position.

### **Disposing of Waste**

Engine oil, batteries, hydraulic fluid, and engine coolant are pollutants to the environment. Dispose of these according to your state and local regulations.

# Storage

## Storage Safety

- Shut off the engine, remove the key, and wait for all moving parts to stop before you leave the operator's position. Allow the machine to cool before adjusting, servicing, cleaning, or storing it.
- Do not store the machine or fuel near flames or drain the fuel indoors or inside an enclosed trailer.
- Do not store the machine or fuel container where there is an open flame, spark, or pilot light, such as on a water heater or on other appliances.

## Cleaning and Storage

1. Disengage the blade-control switch (PTO), and engage the parking brake.
2. Shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove grass clippings, dirt, and grime from the external parts of the entire machine, especially the engine and hydraulic system. Clean dirt and chaff from the outside of the engine cylinder head fins and blower housing.

**Important:** You can wash the machine with mild detergent and water. Do not pressure wash the machine. Avoid excessive use of water, especially near the control panel, engine, hydraulic pumps, and motors.

4. Check the parking brake operation; refer to [Adjusting the Parking Brake \(page 56\)](#).
5. Service the air cleaner; refer to [Servicing the Air Cleaner \(page 40\)](#).
6. Grease the machine; refer to [Lubrication \(page 38\)](#).
7. Change the crankcase oil; refer to [Servicing the Engine Oil \(page 42\)](#).
8. Change the hydraulic filters; refer to [Changing the Hydraulic Fluid and Filters \(page 63\)](#).
9. Charge the battery; refer to [Charging the Battery \(page 48\)](#).
10. Scrape any heavy buildup of grass and dirt from the underside of the mower, then wash the mower with a garden hose.

**Note:** Run the machine with the blade-control switch (PTO) engaged and the engine at high idle for 2 to 5 minutes after washing.

11. Check the condition of the blades; refer to [Servicing the Cutting Blades \(page 64\)](#).

12. Prepare the machine for storage when non-use occurs over 30 days. Prepare the machine for storage as follows:

- A. Add a petroleum-based stabilizer/conditioner to fuel in the tank. Follow mixing instructions from the stabilizer manufacturer. Do not use an alcohol-based stabilizer (ethanol or methanol).
- Note:** A fuel stabilizer/conditioner is most effective when mixed with fresh fuel and used at all times.
- B. Run the engine to distribute conditioned fuel through the fuel system for 5 minutes.
- C. Shut off the engine, allow it to cool, and drain the fuel tank.
- D. Start the engine and run it until it stops.
- E. Dispose of fuel properly. Recycle the fuel according to local codes.

**Important:** Do not store fuel containing stabilizer/conditioner longer than the duration recommended by the fuel-stabilizer manufacturer.

13. Remove and check the condition of the spark plug(s); refer to [Servicing the Spark Plug \(page 44\)](#). With the spark plug(s) removed from the engine, pour 30 ml (2 tablespoons) of engine oil into the spark plug hole. Use the starter to crank the engine and distribute the oil inside the cylinder. Install the spark plug(s). Do not install the wire on the spark plug(s).
14. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
15. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
16. Store the machine in a clean, dry garage or storage area. Remove the key from the switch and keep it out of reach of children or other unauthorized users. Cover the machine to protect it and keep it clean.



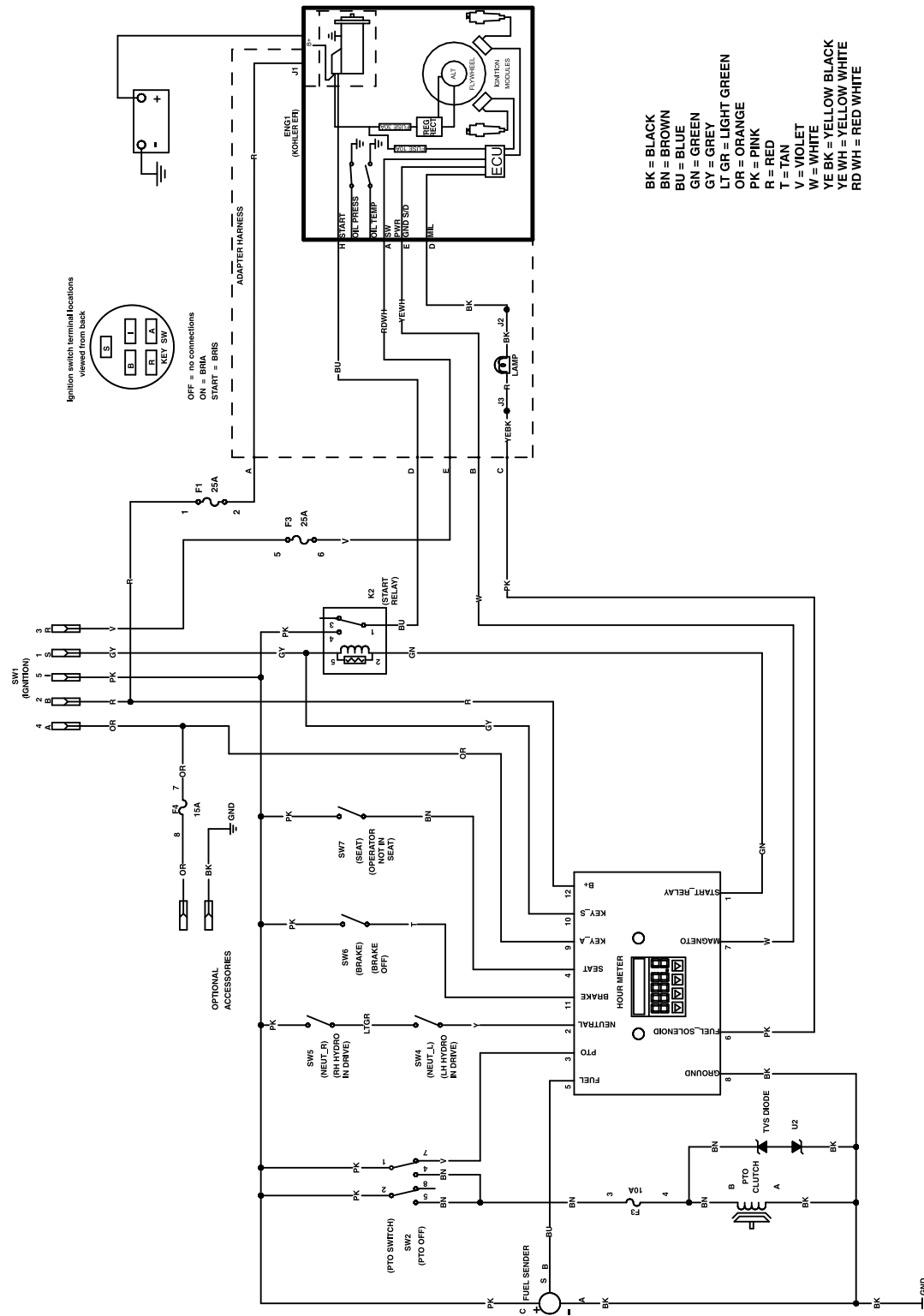
# Troubleshooting

Problem	Possible Cause	Corrective Action
The malfunction-indicator light (MIL) comes on.	<ol style="list-style-type: none"> <li>1. The engine is too hot.</li> <li>2. There is old fuel in the fuel tank.</li> <li>3. The fuel-shutoff valve is not open completely.</li> <li>4. The air cleaner is dirty.</li> <li>5. The battery is not charged.</li> <li>6. Incorrect fuel filters are being used or the fuel filters are dirty.</li> <li>7. The connections to the sensors electronic-control unit (ECU) and fuel injectors are not secured properly.</li> <li>8. There is low voltage from the battery.</li> <li>9. A fuse is blown.</li> </ol>	<ol style="list-style-type: none"> <li>1. Shut off the engine and let it cool.</li> <li>2. Use new fuel.</li> <li>3. Open the fuel-shutoff valve.</li> <li>4. Make sure that the air cleaner and precleaner are clean. Replace if necessary.</li> <li>5. Charge or replace the battery.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Contact an Authorized Service Dealer.</li> <li>8. Ensure that you are using a good 12 V battery and that it is fully charged.</li> <li>9. Check and replace any blown fuses.</li> </ol>
The starter does not crank.	<ol style="list-style-type: none"> <li>1. The blade-control switch is engaged.</li> <li>2. The parking brake is disengaged.</li> <li>3. The motion-control levers are not in the NEUTRAL-LOCK position.</li> <li>4. You are not sitting in the operator's seat.</li> <li>5. The battery is dead.</li> <li>6. The electrical connections are corroded or loose.</li> <li>7. A fuse is blown.</li> <li>8. A relay or switch is damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disengage the blade-control switch.</li> <li>2. Engage the parking brake.</li> <li>3. Move the motion-control levers outward to the NEUTRAL-LOCK position.</li> <li>4. Sit on the operator's seat.</li> <li>5. Charge the battery.</li> <li>6. Check the electrical connections for good contact.</li> <li>7. Replace the fuse.</li> <li>8. Contact an Authorized Service Dealer.</li> </ol>
The engine does not start, starts hard, or fails to keep running.	<ol style="list-style-type: none"> <li>1. The fuel tank is empty.</li> <li>2. The fuel-shutoff valve is closed.</li> <li>3. The oil level in the crankcase is low.</li> <li>4. The throttle is not in the correct position.</li> <li>5. There is dirt in the fuel filter.</li> <li>6. There is dirt, water, or stale fuel in the fuel system.</li> <li>7. The air cleaner is dirty.</li> <li>8. The seat switch is not functioning properly.</li> <li>9. The electrical connections are corroded, loose, or damaged.</li> <li>10. The relay or switch is worn or damaged.</li> <li>11. The spark plug is fouled or improperly gapped.</li> <li>12. The spark-plug wire is not connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill the fuel tank.</li> <li>2. Open the fuel-shutoff valve.</li> <li>3. Add oil to the crankcase.</li> <li>4. Be sure that the throttle control is midway between the SLOW and FAST positions.</li> <li>5. Replace the fuel filter.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Clean or replace the air-cleaner element.</li> <li>8. Check the seat-switch indicator. Replace the seat if necessary.</li> <li>9. Check the electrical connections for good contact. Clean the connector terminals thoroughly with electrical-contact cleaner, apply dielectric grease, and make the appropriate connections.</li> <li>10. Contact an Authorized Service Dealer.</li> <li>11. Adjust or replace the spark plug.</li> <li>12. Check the spark-plug wire connection.</li> </ol>

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
The engine loses power.	<ol style="list-style-type: none"> <li>1. The engine load is excessive.</li> <li>2. The air cleaner is dirty.</li> <li>3. The oil level in the crankcase is low.</li> <li>4. The cooling fins and the air passages above the engine are plugged.</li> <li>5. The vent hole in the fuel cap is plugged.</li> <li>6. There is dirt in the fuel filter.</li> <li>7. There is dirt, water, or stale fuel in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Clean the air-cleaner element.</li> <li>3. Add oil to the crankcase.</li> <li>4. Remove the obstruction from the cooling fins and the air passages.</li> <li>5. Clean or replace the fuel cap.</li> <li>6. Replace the fuel filter.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>
The engine overheats.	<ol style="list-style-type: none"> <li>1. The engine load is excessive.</li> <li>2. The oil level in the crankcase is low.</li> <li>3. The cooling fins and air passages under the engine-blower housing are plugged.</li> <li>4. The air cleaner is dirty.</li> <li>5. Dirt, water, or stale fuel is in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Add oil to the crankcase.</li> <li>3. Remove the obstruction from the cooling fins and air passages.</li> <li>4. Clean or replace the air-cleaner element.</li> <li>5. Contact an Authorized Service Dealer</li> </ol>
The machine pulls to the left or right (with the motion-control levers fully forward).	<ol style="list-style-type: none"> <li>1. The tracking needs adjustment</li> <li>2. The tire pressure in the drive tires is not correct.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the tracking.</li> <li>2. Adjust the tire pressure in the drive tires.</li> </ol>
The machine does not drive.	<ol style="list-style-type: none"> <li>1. The bypass valves are not closed tight.</li> <li>2. The pump belt is worn, loose, or broken.</li> <li>3. The pump belt is off a pulley.</li> <li>4. The idler spring is broken or missing.</li> <li>5. The hydraulic fluid level is low or too hot.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the bypass valves.</li> <li>2. Change the belt.</li> <li>3. Change the belt.</li> <li>4. Replace the spring.</li> <li>5. Add hydraulic fluid to the reservoirs or let it cool down.</li> </ol>
The machine vibrates abnormally.	<ol style="list-style-type: none"> <li>1. The cutting blade(s) is/are bent or unbalanced.</li> <li>2. The blade mounting bolt is loose.</li> <li>3. The engine mounting bolts are loose.</li> <li>4. The engine pulley, idler pulley, or blade pulley is loose.</li> <li>5. The engine pulley is damaged.</li> <li>6. The blade spindle is bent.</li> <li>7. The motor mount is loose or worn.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install new cutting blade(s).</li> <li>2. Tighten the blade mounting bolt.</li> <li>3. Tighten the engine mounting bolts.</li> <li>4. Tighten the appropriate pulley.</li> <li>5. Contact an Authorized Service Dealer.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>
The cutting height is uneven.	<ol style="list-style-type: none"> <li>1. The blade(s) is not sharp.</li> <li>2. A cutting blade(s) is/are bent.</li> <li>3. The mower is not level.</li> <li>4. An anti-scalp roller (if applicable) is not set correctly.</li> <li>5. The underside of the mower deck is dirty.</li> <li>6. The tire pressure is incorrect.</li> <li>7. A blade spindle is bent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen the blade(s).</li> <li>2. Install a new cutting blade(s).</li> <li>3. Level the mower from side-to-side and front-to-rear.</li> <li>4. Adjust the anti-scalp wheel height.</li> <li>5. Clean the underside of the mower deck.</li> <li>6. Adjust the tire pressure.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
The blades do not rotate.	<ol style="list-style-type: none"> <li>1. The mower deck belt is damaged, worn, loose, or broken.</li> <li>2. The mower deck belt is off the pulley.</li> <li>3. The pump drive belt is worn, loose, or broken.</li> <li>4. The idler spring is broken or missing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install a new deck belt.</li> <li>2. Install the mower belt on the deck pulley and check the idler pulley, idler arm, and spring for correct position and function.</li> <li>3. Check the belt tension or install a new belt.</li> <li>4. Replace the spring.</li> </ol>
The clutch does not engage.	<ol style="list-style-type: none"> <li>1. The fuse is blown.</li> <li>2. There is low voltage supply at the clutch.</li> <li>3. The coil is damaged.</li> <li>4. There is inadequate current supply.</li> <li>5. The rotor/armature air gap is too large.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the fuse. Check the coil resistance, battery charge, charging system, and wiring connections, and replace components if necessary.</li> <li>2. Check the coil resistance, battery charge, charging system, and wiring connections and replace parts if necessary.</li> <li>3. Replace the clutch.</li> <li>4. Repair or replace the clutch lead wire or electrical system. Clean the connector contacts.</li> <li>5. Remove the shim or replace the clutch.</li> </ol>

# Schematics



## Electrical Schematic—Kohler Engines (Rev. A)

**Notes:**

**Notes:**

# 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](http://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 does Toro include this warning?

Toro 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. Toro provides 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 Toro products may be negligible or well within the "no significant risk" range, out of an abundance of caution, Toro has elected to provide the Prop 65 warnings. Moreover, if Toro does 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.



**Count on it.**