



**Count on it.**

# Operator's Manual

## **Z Master® Commercial 2000 Series Riding Mower**

**with 48in, 52in, or 60in TURBO FORCE® Side  
Discharge Mower**

**Model No. 74141—Serial No. 314000001 and Up**

**Model No. 74143—Serial No. 314000001 and Up**

**Model No. 74145—Serial No. 314000001 and Up**



G010244



## WARNING

### CALIFORNIA Proposition 65 Warning

**This product contains a chemical or chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

**The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

This spark ignition system complies with Canadian ICES-002

Because in some areas there are local, state, or federal regulations requiring that a spark arrester be used on the engine of this machine, a spark arrester is available as an option. If you require a spark arrester, contact your Authorized Toro Dealer.

Genuine Toro spark arresters are approved by the USDA Forestry Service.

**Note:** It is a violation of California Public Resource Code Section 4442 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land without a spark arrester muffler maintained in working order, or the engine constricted, equipped, and maintained for the prevention of fire. Other states or federal areas may have similar laws.

## ▲ WARNING

Removing standard original equipment parts and accessories may alter the warranty, traction, and safety of the machine. Failure to use original Toro parts could cause serious injury or death. Making unauthorized changes to the engine, fuel or venting system, may violate EPA and CARB regulations.

Replace all parts including, but not limited to, tires, belts, blades, and fuel system components with original Toro parts.

The enclosed *Engine Owner's Manual* is supplied for information regarding the US Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance, and warranty. Replacements may be ordered through the engine manufacturer.

# Introduction

This rotary-blade, riding lawn mower is intended to be used by residential homeowners or professional, hired operators. It is designed primarily for cutting grass on well-maintained lawns on residential or commercial properties. It is not designed for cutting brush or for agricultural uses.

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

You may contact Toro directly at [www.Toro.com](http://www.Toro.com) for product and accessory information, help finding a dealer, or to register your product.

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

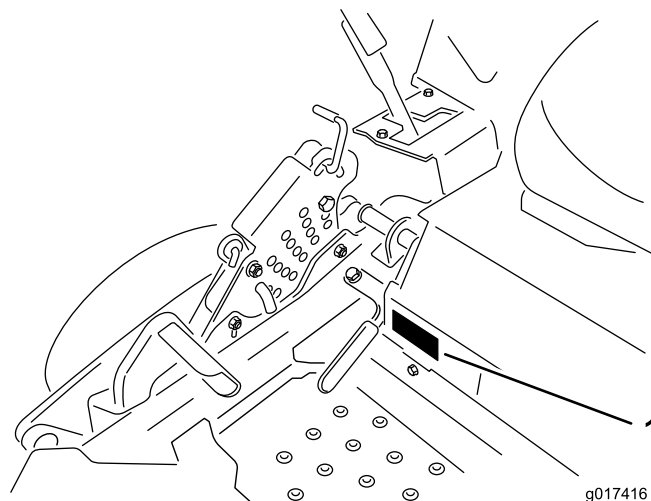


Figure 1

1. Model and serial number location

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

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



Figure 2

1. Safety alert symbol

This manual uses 2 words to highlight information.

**Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

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# Safety

**Improper use or maintenance by the operator or owner can result in injury.** To reduce the potential for injury, comply with these safety instructions, and pay attention to the safety alert symbol, which means **Caution, Warning, or Danger**—“personal safety instruction.” **Failure to comply with the instructions may result in personal injury or death.**

**Important:** This machine was manufactured according to the appropriate regulatory standards in effect at the time of manufacture. Modifying this machine in any way may cause it to be out of compliance with those standards and with the instructions in this Operator's Manual. Modifications to this machine should only be made by either the manufacturer or an Authorized Toro Dealer.

This product is capable of amputating hands and feet. Follow all safety instructions to avoid serious injury or death.

The owner/user can prevent and is responsible for accidents or injuries occurring to people, or damage to property.

**Important:** The addition of attachments made by other manufacturers that do not meet American National Standards Institute certification will cause noncompliance of this machine.

## Safe Operating Practices

The following instructions are adapted from ANSI standard B71.4-2012.

### Training

- Read the *Operator's Manual* and other training material.  
**Note:** If the operator(s) or mechanic(s) cannot read the manual language, it is the owner's responsibility to explain this material to them.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner is responsible for training the users.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries occurring to people, or damage to property.

### Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job.  
**Note:** Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including: a hard hat, safety glasses, and hearing protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is used, and remove all objects that can be thrown by the machine.
- Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

### Operation

- Lightning can cause severe injury or death. If lightning is seen, or thunder is heard in the area, do not operate the machine; seek shelter.
- Do not run an engine in an enclosed area.
- Only operate in well-lit areas, keeping away from holes and hidden hazards.
- Ensure that all drives are in neutral and that the parking brake is engaged before starting engine. Only start the engine from the operator's position.
- Make sure that you have good footing while using this machine, especially when backing up.  
**Note:** Reduced footing could cause slipping.
- Slow down and use extra care on hillsides. Be sure to travel side to side on hillsides. Turf conditions can affect the stability of the machine. Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes.
- Do not raise the mower deck with the blades running.
- Do not operate the machine without the PTO shield or other guards securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- Do not change the engine governor setting or overspeed the engine.
- Stop on level ground, disengage drives, engage the parking brake (if provided), shut off the engine before leaving the operator's position for any reason, including emptying the catchers or unclogging the chute.
- Stop equipment and inspect the blades after striking objects or if an abnormal vibration occurs. Make the necessary repairs before resuming operations.
- Keep your hands and feet away from the cutting unit.
- Look behind and down before backing up to ensure a clear path.

- Keep pets and bystanders away from an operating machine.
- Slow down and use caution when making turns and crossing roads and sidewalks. Stop the blades if you are not mowing.
- Be aware of the mower-discharge direction and do not point it at anyone.
- Do not operate the mower under the influence of alcohol or drugs.
- Use care when loading or unloading the machine into or from a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

## Safe handling of fuels

- To avoid personal injury or property damage, use extreme care in handling gasoline. Gasoline is extremely flammable and the vapors are explosive.
- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container.
- Do not remove the fuel cap or add fuel with the engine running.
- Allow the engine to cool before fueling.
- Do not refuel the machine indoors.
- 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, on a truck, or on a trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before filling.
- Remove equipment from the truck or trailer and fuel it on the ground. If this is not possible, then add fuel with such equipment as a portable container, rather than from a fuel dispenser nozzle.
- Keep the 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 fuel is spilled on clothing, change your clothing immediately.
- Do not overfill fuel tank. Replace fuel cap and tighten securely.

## Maintenance and Storage

- Disengage drives, set the parking brake, stop the engine, and remove the key or disconnect spark-plug wire. Wait for all movement to stop before adjusting, cleaning, or repairing.
- Park the machine on a level surface.
- Clean grass and debris from the cutting unit, drives, mufflers, and engine to help prevent fires.
- Clean up oil or fuel spillage.
- Let the engine cool before storing.
- Do not store fuel near flames or drain indoors.
- Do not allow untrained personnel to service machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect the battery or remove the spark-plug wire before making any repairs. Disconnect the negative terminal first and the positive terminal last. Reconnect the positive first and negative last.
- Use care when checking the blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace blades; do not straighten or weld them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.

## Hauling

- Use care when loading or unloading the machine into a trailer or a truck.
- Use full-width ramps for loading machine into a trailer or a truck.
- Tie the machine down securely using straps, chains, cable, or ropes. Both front and rear straps should be directed down and outward from the machine.

## Toro Mower Safety

The following list contains safety information specific to Toro products and other safety information you must know.

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

This product is designed for cutting and recycling grass, or, when equipped with a grass bagger, for catching cut grass. Any use for purposes other than these could prove dangerous to the user and bystanders.

## General Operation

- Be sure that the area is clear of bystanders before mowing. Stop the machine if anyone enters the area.
- Do not touch equipment or attachment parts which may be hot from operation. Allow all of the parts to cool before attempting to maintain, adjust, or service the machine.
- Use only Toro-approved attachments. Warranty may be voided if used with any unapproved attachments.
- Check carefully for overhead clearances (i.e. branches, doorways, electrical wires, etc.) before operating under any objects, and do not contact them.
- Slow down before making turns and use extra caution.
- Use caution when riding the platform over curbs, rocks, roots, or other obstructions.
- Look behind and down before backing up to ensure a clear path. Use extra care when operating in reverse.
- Do not jerk the controls; use a steady motion.
- When loading or unloading the machine, use one full-width ramp that is wide enough to extend beyond the width of the machine.
- Do not carry passengers.
- Do not carry equipment on the machine.

## Slope Operation

All slopes and ramps require extra caution. If you feel uneasy on a slope, do not mow it.

- Remove obstacles such as rocks, tree limbs, etc. from the mowing area.
- Watch for holes, ruts or bumps.

**Note:** Tall grass can hide obstacles.

- Use caution near drop-offs, ditches, or embankments.

**Note:** The machine could suddenly turn over if a wheel goes over the edge of a cliff or ditch, or if an edge caves in.

- Use extra care with grass catchers or other attachments.

**Note:** These can change the stability of the machine.

- Keep all movement on slopes slow and gradual.
- Do not make sudden changes in speed or direction.
- Mow slopes side to side.
- Do not mow slopes greater than 20 degrees.

## Using the Rollover Protection System (ROPS)

- The ROPS is an integral and effective safety device. Keep the ROPS in the raised and locked position and use the seat belt when operating the machine.
- Lower the ROPS temporarily only when absolutely necessary. Do not wear the seat belt when the ROPS is folded down.
- Be aware there is no rollover protection when the ROPS is in the down position.
- Be certain that the seat belt can be released quickly in the event of an emergency.
- Check the area to be mowed and never fold down the ROPS in areas where there are slopes, drop offs or water.
- Check carefully for overhead clearances (i.e. branches, doorways, electrical wires) before driving under any objects and do not contact them.
- Keep the ROPS in safe operating condition by periodically thoroughly inspecting for damage and keeping all mounting fasteners tight.
- Replace a damaged ROPS. Do not repair or revise.
- **Do not** remove the ROPS.
- Any alterations to a ROPS must be approved by the manufacturer.

## Service

- Do not store the machine or a fuel container inside where there is an open flame, such as near a water heater or furnace.
- Keep the nuts and bolts tight, especially the blade-attachment bolts.
- Never interfere with the intended function of a safety device or reduce the protection provided by a safety device. Check their proper operation regularly.
- To best protect your investment and maintain optimal performance of your Toro equipment, count on Toro genuine parts. When it comes to reliability, Toro delivers replacement parts designed to the exact engineering specifications of our equipment. For peace of mind, insist on Toro genuine parts.
- Check brake operation frequently. Adjust and service as required.

# Slope Indicator



G011841

**Figure 3**

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1. The maximum slope you can safely 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 lost.



1-403005



68-8340



54-9220



98-5954



103-2076



58-6520

1. Grease



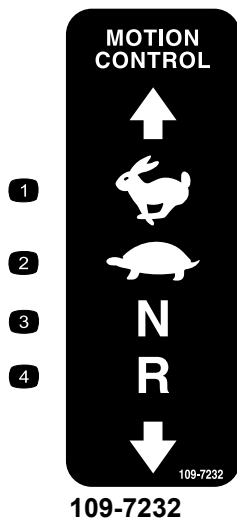
Manufacturer's Mark

1. Indicates the blade is identified as a part from the original machine manufacturer.

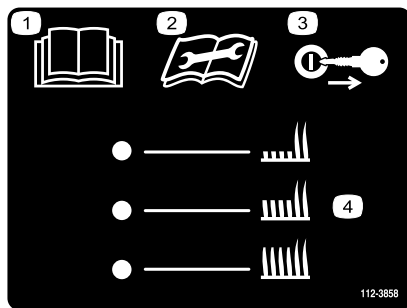


66-1340



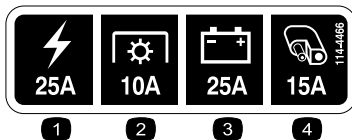


109-7232



112-3858

1. Read the *Operator's Manual*.
2. Read the instructions before servicing or performing maintenance.
3. Remove the ignition key before adjusting the height of cut.
4. Height of cut settings.



114-4466

1. Main, 25A
2. PTO, 10A
3. Charge, 25A
4. Auxiliary, 15A



116-0205



116-1654



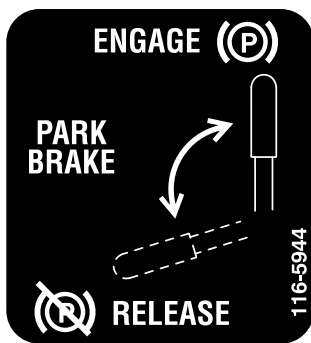
116-3303

### CALIFORNIA SPARK ARRESTER WARNING

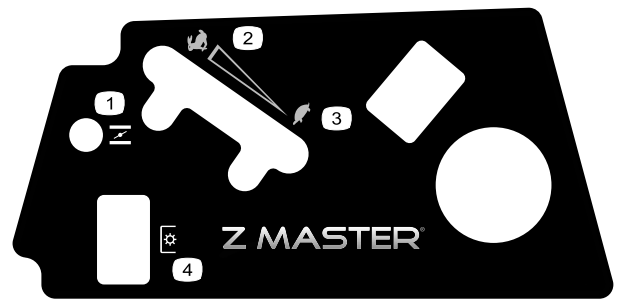
Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrester may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

116-4858

116-4858



116-5944



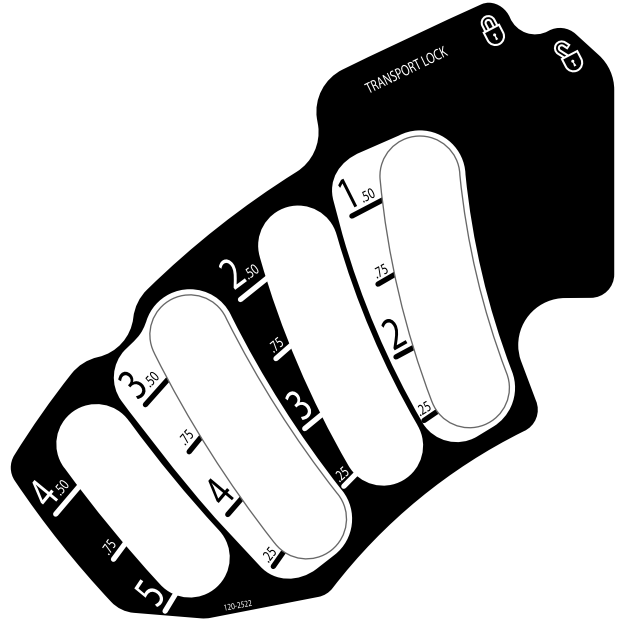
119-2501

1. Choke
2. Fast
3. Slow
4. PTO (Power Take-off)

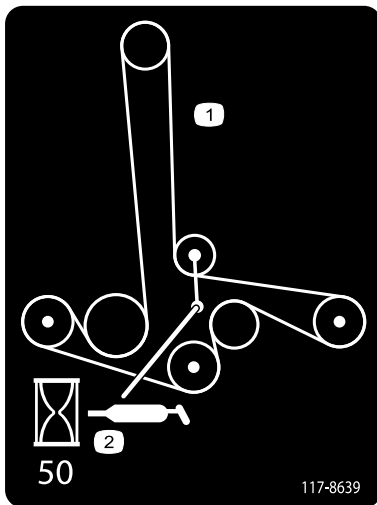


117-1158

1. Bypass lever position for operating the machine.
2. Bypass lever position for pushing the machine.

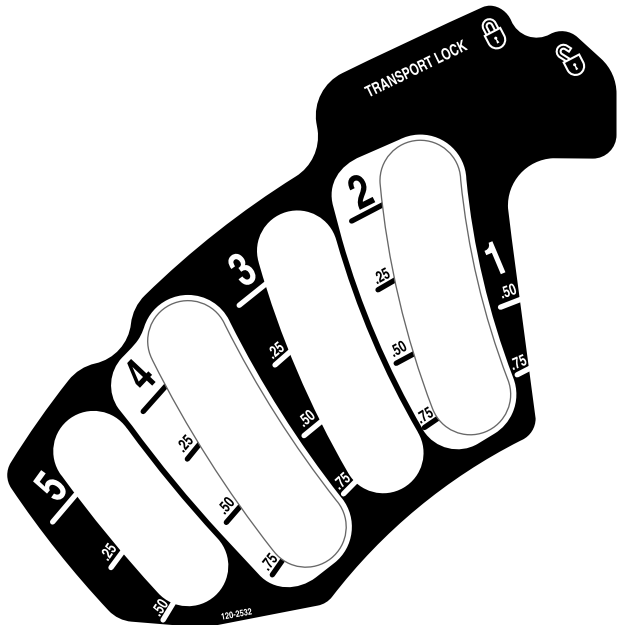


120-2522



117-8639

1. Belt routing
2. Grease pulley, maintenance interval—50 hours



120-2532



### Battery Symbols

Some or all of these symbols are on your battery

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

**! WARNING**



**TO AVOID INJURY OR DEATH FROM ROLLOVER:**  
Keep roll bar in the raised and locked position and use seat belt.



**THERE IS NO ROLL OVER PROTECTION WHEN THE ROLL BAR IS DOWN.**  
Lower the roll bar only when absolutely necessary.  
Do not wear seat belt when the roll bar is down.  
Drive slowly and carefully.  
Raise the roll bar as soon as clearance permits.  
Read and follow slope operation instructions and warnings.

107-2102

107-2102

**! WARNING**

**! DANGER**

**! WARNING**

**To avoid serious injury or death:**

- Read and understand the operator's manual before using this machine.
- Do NOT operate unless trained to safely use this machine.
- Do NOT operate under the influence of alcohol or drugs.
- Hearing protection is recommended.
- Do NOT operate without shields, guards, and safety devices in place and working.
- Check the function of the operator presence controls (OPC) safety system daily. Do NOT defeat the OPC system.
- Stop engine and remove key before adjusting, servicing or cleaning machine and attachments.

**To avoid serious injury or death:**

- Avoid blades unless engine and blades are stopped.



109-7069

**To avoid serious injury or death:**

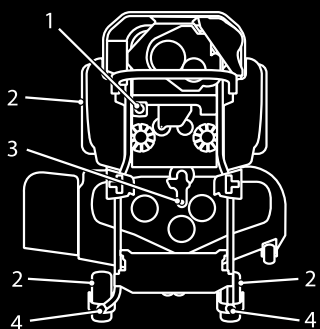
- Pick up objects that could be thrown by the blades.
- Do NOT mow when people and pets are in the area.
- Do NOT carry passengers. Look behind and to the side before changing directions.
- Before leaving the operator's position:
  - Disengage PTO.
  - Move drive levers out to neutral lock position.
  - Engage park brake.
  - Stop engine.



109-7069

## SERVICE AID

121-3223



**EVERY 25 HOURS:**

1. Check hydraulic oil  
(Only use recommended hydro oil)

**EVERY 50 HOURS:**

2. Check tire pressure in pneumatic tires - 13 psi
3. Grease belt idler

**YEARLY:**

4. Grease front caster pivots

See operator's manual for additional details.

121-3223

# Product Overview

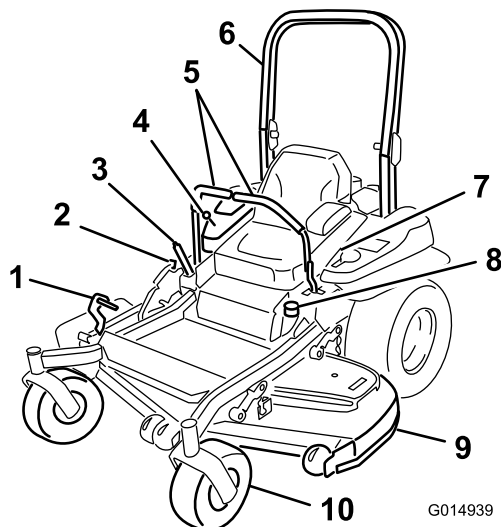


Figure 4

- |                                  |                  |
|----------------------------------|------------------|
| 1. Height-of-cut 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 (Figure 4 and Figure 5).

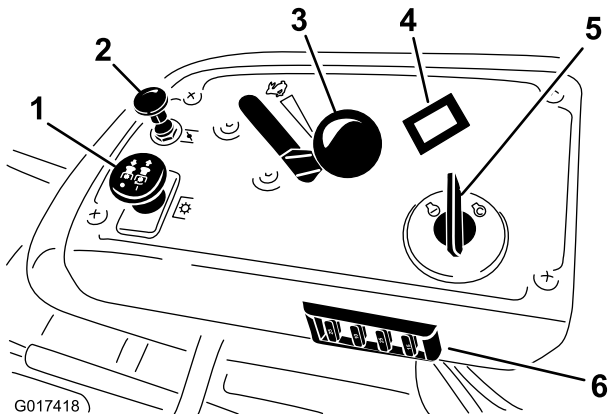


Figure 5

- |                     |                    |
|---------------------|--------------------|
| 1. PTO Switch       | 4. Hour meter      |
| 2. Choke            | 5. Ignition switch |
| 3. Throttle control | 6. Fuses           |

## 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 5).

## Throttle Control

The throttle control is variable between **Fast** and **Slow**.

## Choke

Use the choke to start a cold engine. Pull the choke knob up to engage it.

## Blade-control Switch (PTO)

The blade-control switch (PTO) is used to engage the electric clutch and drive the mower blades. Pull the switch up to engage the blades and release. To disengage the blades, push the blade-control switch (PTO) down or move a motion-control lever into the neutral-lock position.

## Ignition Switch

This switch is used to start the mower engine and has 3 positions: **Start**, **Run** and **Off**.

## Motion-control Levers

The motion-control levers are used to drive the machine forward, reverse, and turn either direction.

## Neutral-lock Position

The neutral-lock position is used with the safety-interlock system to engage and to determine the neutral position.

## Fuel Shut-off Valve

Close the fuel shut-off valve (under the seat) when transporting or storing the mower.

## 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 Distributor or go to [www.Toro.com](http://www.Toro.com) for a list of all approved attachments and accessories.

# Specifications

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

## Width:

	48-inch Deck	52-inch Deck	60-inch Deck
Without Deck	115.1 cm (45.3 inches)	119.4 cm (47 inches)	134.6 cm (50.5 inches)
Deflector Up	130.8 cm (51.5 inches)	135.4 cm (53.3 inches)	156.0 cm (61.4 inches)
Deflector Down	160.3 cm (63.1 inches)	171.8 cm (67.2 inches)	191.3 cm (75.3 inches)

## Length:

	48-inch Deck	52-inch Deck	60-inch Deck
Roll Bar - Up	199.6 cm (78.6 inches)	201.7 cm (79.4 inches)	210.8 cm (83 inches)
Roll Bar - Down	204.2 cm (80.4 inches)	206.2 cm (81.2 inches)	215.4 cm (84.8 inches)

## Height:

Roll Bar - Up	Roll Bar - Down
178.3 cm (70.2 inches)	118.1 cm (46.5 inches)

## Weight:

Model	Weight
<b>74141</b>	420 kg (926 lbs)
<b>74143</b>	428 kg (944 lbs)
<b>74145</b>	448 kg (988 lbs)

# Operation

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

## Adding 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 a fuel stabilizer is used.
- **Do not** add oil to gasoline.

### ⚠ DANGER

In certain conditions, gasoline is extremely flammable and highly explosive. A fire or explosion from gasoline can burn you and others and can damage property.

- Fill the fuel tank outdoors, in an open area, when the engine is cold. Wipe up any gasoline that spills.
- Never fill the fuel tank inside an enclosed trailer.
- Do not fill the fuel tank completely full. Add gasoline to the fuel tank until the level is 6 to 13 mm (1/4 to 1/2 inch) below the bottom of the filler neck. This empty space in the tank allows gasoline to expand.
- Never smoke when handling gasoline, and stay away from an open flame or where gasoline fumes may be ignited by a spark.
- Store gasoline in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of gasoline.
- Do not operate without entire exhaust system in place and in proper working condition.

### ⚠ DANGER

In certain conditions during fueling, static electricity can be released causing a spark which can ignite the gasoline vapors. A fire or explosion from gasoline can burn you and others and can damage property.

- Always place gasoline containers on the ground away from your vehicle before filling.
- Do not fill gasoline containers inside a vehicle or on a truck or trailer bed because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove gas-powered equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a gasoline dispenser nozzle.
- If a gasoline dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

### ⚠ WARNING

Gasoline is harmful or fatal if swallowed. Long-term exposure to vapors can cause serious injury and illness.

- Avoid prolonged breathing of vapors.
- Keep face away from nozzle and gas tank or conditioner bottle opening.
- Avoid contact with skin; wash off spillage with soap and water.

## Using Stabilizer/Conditioner

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

- Keeps gasoline fresh during storage of 90 days or less. For longer storage it is recommended that the fuel tank be drained.
- 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 gas stabilizer/conditioner to the gas.

**Note:** A fuel stabilizer/conditioner is most effective when mixed with fresh gasoline. To minimize the chance

of varnish deposits in the fuel system, use fuel stabilizer at all times.

## Filling the Fuel Tank

**Note:** Do not fill the fuel tank completely full. Fill the fuel tank to the bottom of the filler neck. The empty space in the tank allows the gasoline to expand.

1. Park the machine on level ground.
2. Shut the engine off and set the parking brake.
3. Clean around the fuel-tank cap.
4. Fill the fuel tank to the bottom of the filler neck.
5. Ensure that there is empty space in the tank to allow the gasoline to expand (Figure 6).

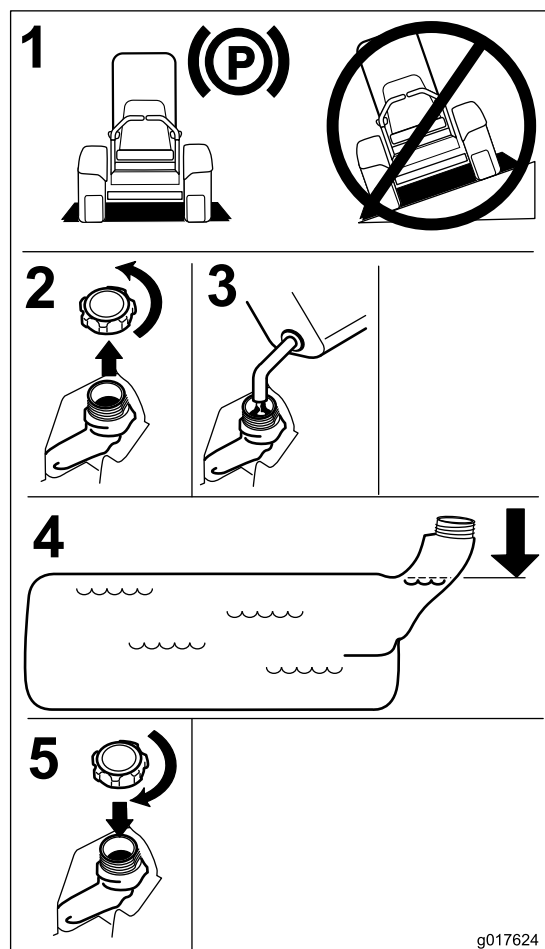


Figure 6

## Checking the Engine-oil Level

Before you start the engine and use the machine, check the oil level in the engine crankcase; refer to Checking the Engine-oil Level (page 31).

## 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 the seat is secured to the machine.

### ⚠ WARNING

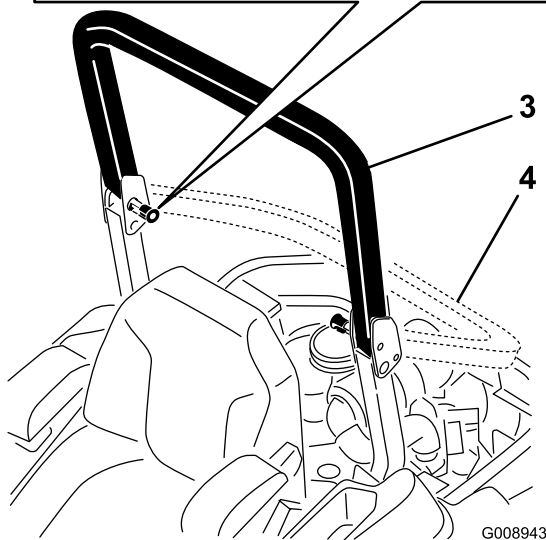
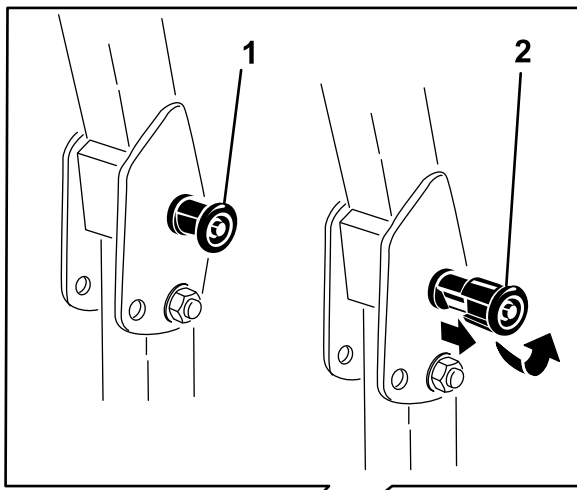
There is no rollover protection when the roll bar is in the down position.

- 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.

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

**Important:** Ensure the seat is secured to the machine.

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° so they are not engaged (Figure 7).
3. Lower the roll bar to the down position (Figure 7).



**Figure 7**

- |   |                                     |
|---|-------------------------------------|
| 1. ROPS knob                                | 3. Roll bar in the upright position |
| 2. Pull ROPS knob out and rotate 90 degrees | 4. Roll bar in the folded position  |

- To raise the roll bar, raise the roll bar to the operate position, rotate the knobs so that they move partially into the grooves (Figure 7).
- Raise the roll bar to the full upright position while pushing on the upper roll bar and the pins will snap into position when the holes align with the pins (Figure 7).

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

- Push on the roll bar and ensure that both pins are engaged.

## Think Safety First

Please read all safety instructions and symbols in the safety section. Knowing this information could help you or bystanders avoid injury.

## ⚠ DANGER

Operating on wet grass or steep slopes can cause sliding and loss of control.

Wheels dropping over edges can cause rollovers, which may result in serious injury, death or drowning.

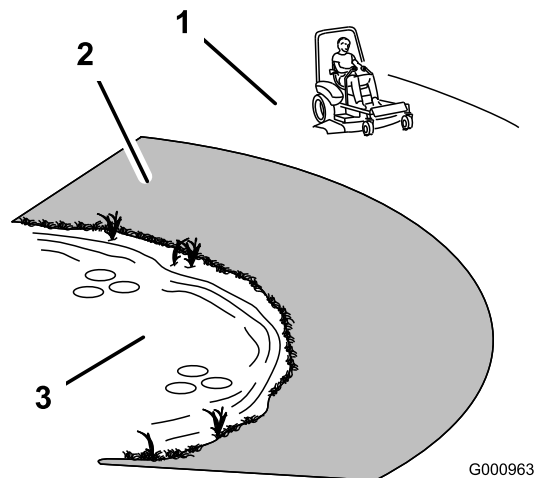
There is no rollover protection when the roll bar is down.

Always keep the roll bar in the raised and locked position and use the seat belt.

Read and follow the rollover protection instructions and warnings.

To avoid loss of control and possibility of rollover:

- Do not operate near drop-offs or near water.
- Do not operate on slopes greater than 15 degrees.
- Reduce speed and use extreme caution on slopes.
- Avoid sudden turns or rapid speed changes.



**Figure 8**

- |   |          |
|---|----------|
| 1. Safe Zone—use the Z Master here on slopes less than 15 degrees or flat areas.  | 3. Water |
| 2. Danger Zone—use a walk-behind mower and/or a hand trimmer on slopes greater than 15 degrees, near drop-offs and water. |          |

## ⚠ CAUTION

This machine produces sound levels in excess of 85 dBA at the operators ear and can cause hearing loss through extended periods of exposure.

Wear hearing protection when operating this machine.



The use of protective equipment for eyes, ears, feet, and head is recommended.

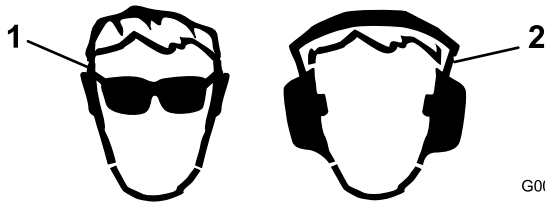


Figure 9

G009027

1. Wear safety glasses
2. Wear hearing protection

## Operating the Parking Brake

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

### Setting the Parking Brake

#### ⚠ WARNING

Parking brake may not hold machine parked on a slope and could cause personal injury or property damage.

Do not park on slopes unless wheels are chocked or blocked

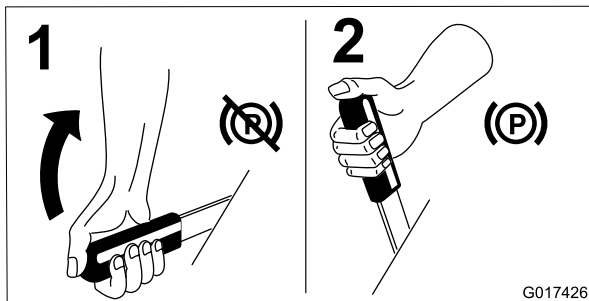


Figure 10

G017426

### Releasing the Parking Brake

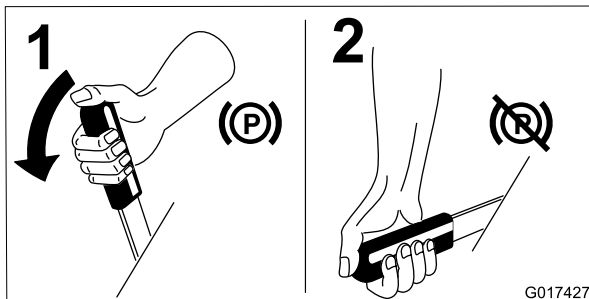


Figure 11

G017427

## 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 will cause excessive wear to the drive belts.

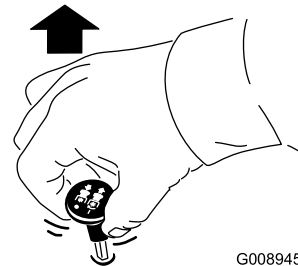


Figure 12

G008945

### Disengaging the Blade-control Switch (PTO)

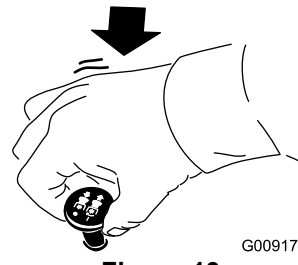


Figure 13

G009174

## Operating the Throttle

The throttle control can be moved between **Fast** and **Slow** positions (Figure 14).

Always use the Fast position when turning on the mower deck with the blade-control switch (PTO).

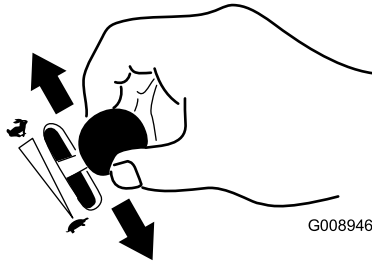


Figure 14

## Operating the Choke

Use the choke to start a cold engine.

1. If the engine is cold, use the choke to start the engine.
2. Pull up on the choke knob to engage the choke before using the ignition switch (Figure 15).
3. Push down on the choke to disengage the choke after the engine has started (Figure 15).

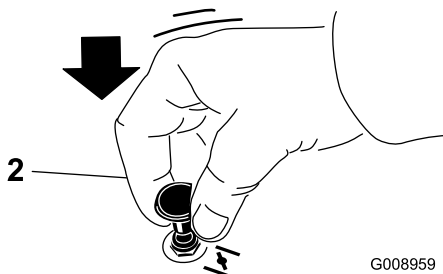
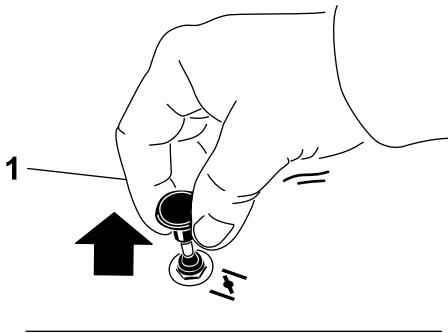


Figure 15

1. On position

2. Off position

## Operating the Ignition Switch

1. Turn the ignition key to the Start position (Figure 16).

**Note:** When the engine starts, release the key.

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

**Note:** Additional starting cycles may be required when starting the engine for the first time after the fuel system has been without fuel completely.

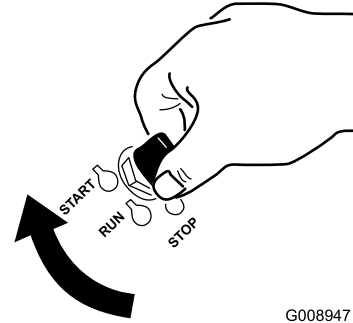


Figure 16

2. Turn the ignition key to stop to stop the engine.

# Using the Fuel Shut-off Valve

The fuel shut-off valve is located behind the seat.

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

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

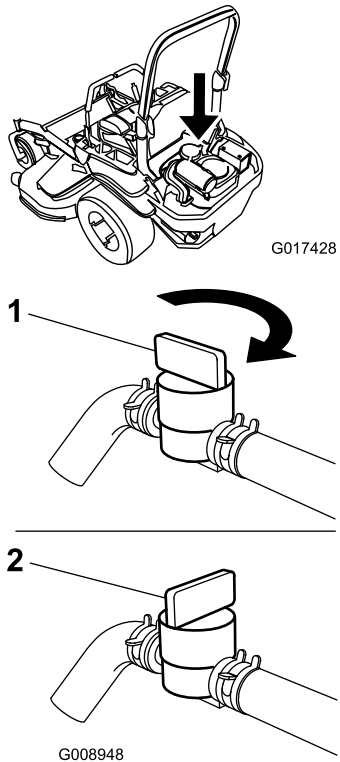
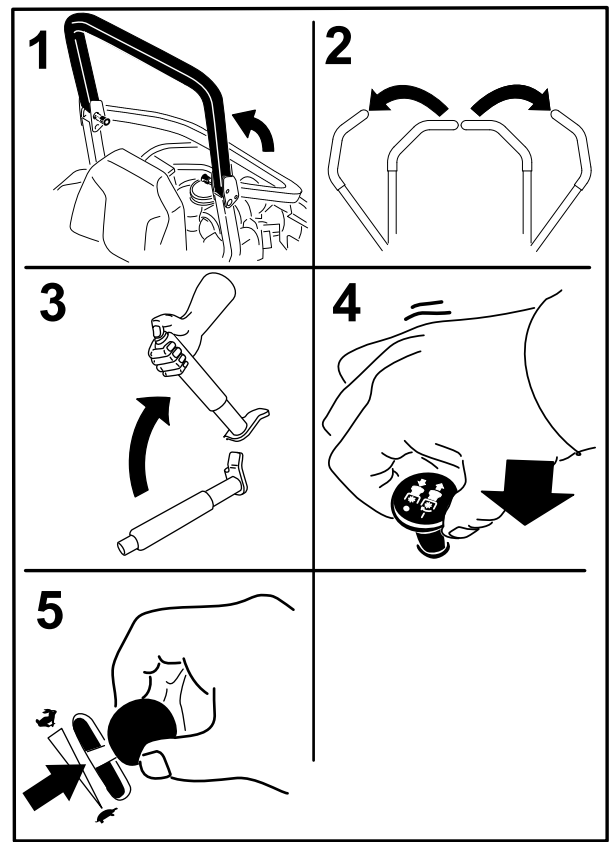


Figure 17

1. On position                      2. Off position



G008949

Figure 18

6. Turn the ignition key to the Start position (Figure 19).

**Note:** When the engine starts, release the key.

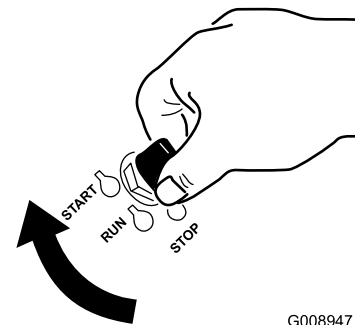
**Important:** Do not engage starter for more than 5 seconds at a time. If the engine fails to start allow a 15 second cool-down period between attempts. Failure to follow these instructions can burn out the starter motor.

**Note:** Additional starting cycles may be required when starting the engine for the first time after the fuel system has been without fuel completely.

## Starting and Stopping the Engine

### Starting the Engine

1. Raise the ROPS up and lock into place, sit on the seat, and fasten the seat belt.
2. Move the motion controls to neutral-locked position.
3. Set the parking brake; refer to Setting the Parking Brake (page 17).
4. Move the blade-control switch (PTO) to the Off position (Figure 18).
5. Move the throttle lever midway between the Slow and Fast positions.



G008947

Figure 19

1. Off                                      3. Start  
2. Run

## Stopping 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 ignition key and set the parking brake when leaving the machine unattended, even if just for a few minutes.

Let the engine idle at slow throttle (turtle) for 60 seconds before turning the ignition switch off.

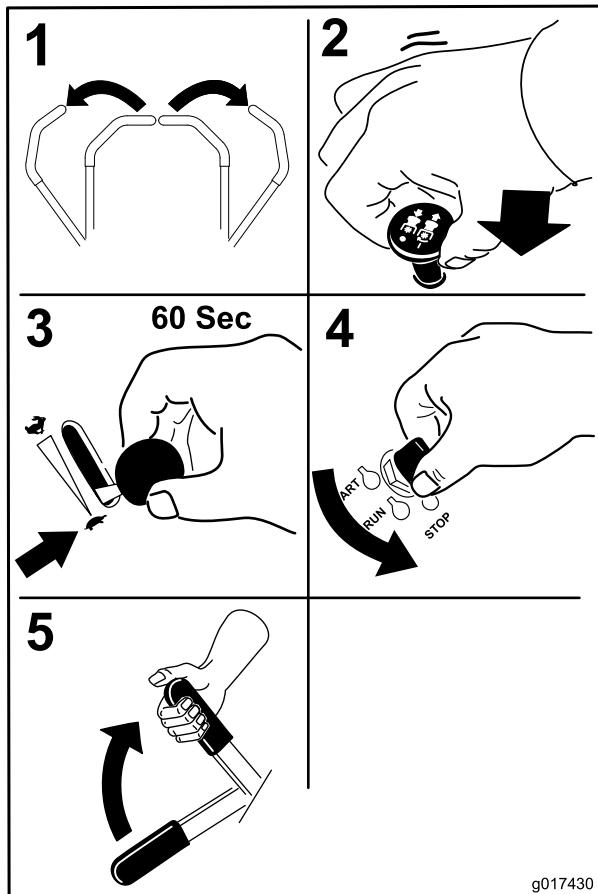


Figure 20

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

## Using the Safety-interlock System

### ⚠ CAUTION

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

The safety-interlock system also is designed to stop the engine when the traction controls are moved from the locked position with the parking brake engaged or if you rise from the seat when the PTO is engaged.

## 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. Sitting 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 crank.
2. Sitting 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 neutral locked position). Try starting the engine; the engine should not crank. Repeat for other control lever.
3. Sitting on the seat, engage the parking brake, move the blade-control switch (PTO) to the Off position, and move the motion-control levers to neutral-lock position. Now start the engine. While the engine is running, release the parking brake, engage the blade-control switch (PTO) and rise slightly from the seat; the engine should stop.
4. Sitting on the seat, engage the parking brake, move the blade-control switch (PTO) to the Off position, and move the motion-control levers to neutral-lock position. Now start the engine. While the engine is running, center either motion control and move

(forward or reverse); the engine should stop. Repeat for other motion control.

5. Sitting on the seat, disengage the parking brake, move the blade-control switch (PTO) to the Off position, and move the motion-control levers to neutral-lock position. Try starting the engine; the engine should not crank.

## Driving Forward or Backward

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.

### ⚠ CAUTION

Machine can spin very rapidly. Operator may lose control of machine and cause personal injury or damage to machine.

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

### Using the Motion-control Levers

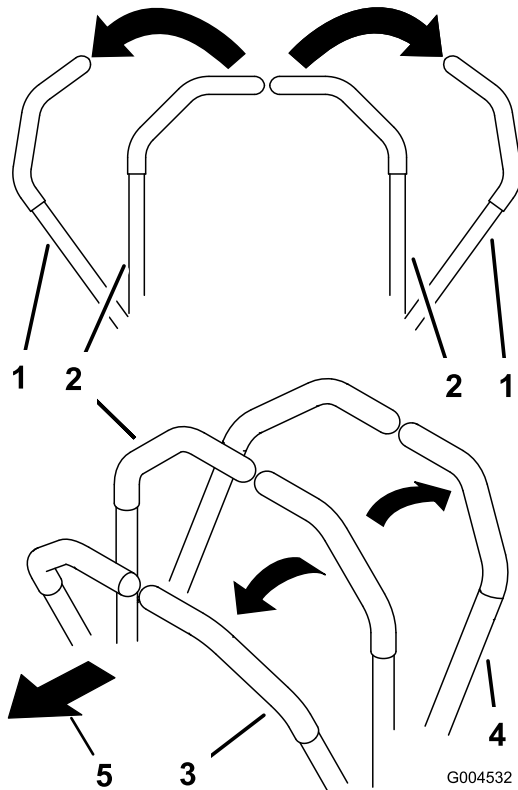


Figure 21

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

## Driving Forward

**Note:** The engine will kill if the traction-control levers are moved with the parking brake engaged.

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

1. Release the parking brake; refer to Releasing the Parking Brake (page 17).
2. Move the levers to the center, unlocked position.
3. To go forward, slowly push the motion-control levers forward (Figure 22).

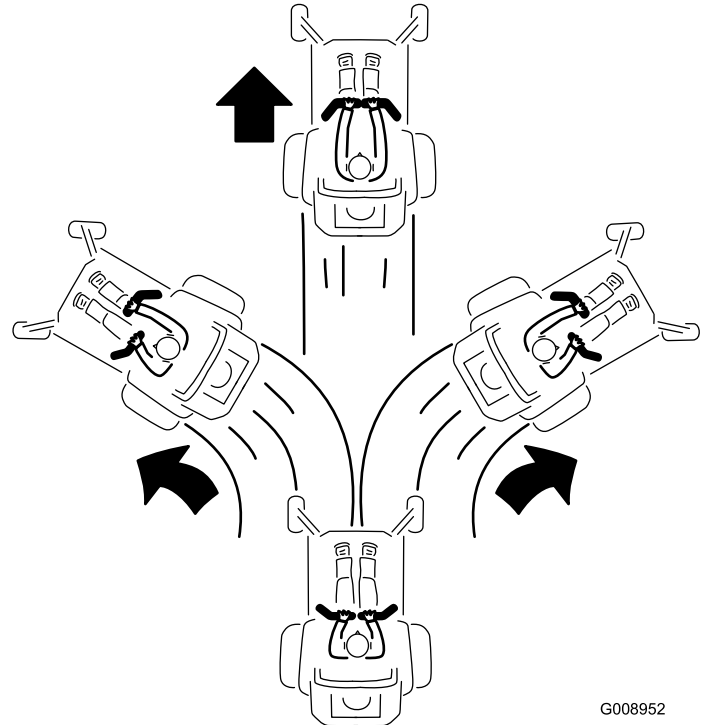


Figure 22

G008952

## Driving Backward

1. Move the levers to the center, unlocked position.
2. To go backward, slowly pull the motion-control levers rearward (Figure 23).

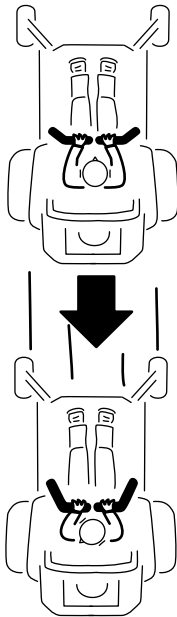


Figure 23

G008953

## Stopping the Machine

To stop the machine, move the traction-control levers to neutral, and then move them to the locked position, disengage the power take off (blade-control switch (PTO)), and turn the ignition key to the Off position.

Set the parking brake when you leave the machine; refer to Setting the Parking Brake (page 17). Remember to remove the key from the ignition switch.

### ⚠ CAUTION

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

Always remove the ignition key and set the parking brake when leaving the machine unattended, even if just for a few minutes.

## 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 a unlock position for the transport position. The transport lock is used with the deck-lift pedal (Figure 24).

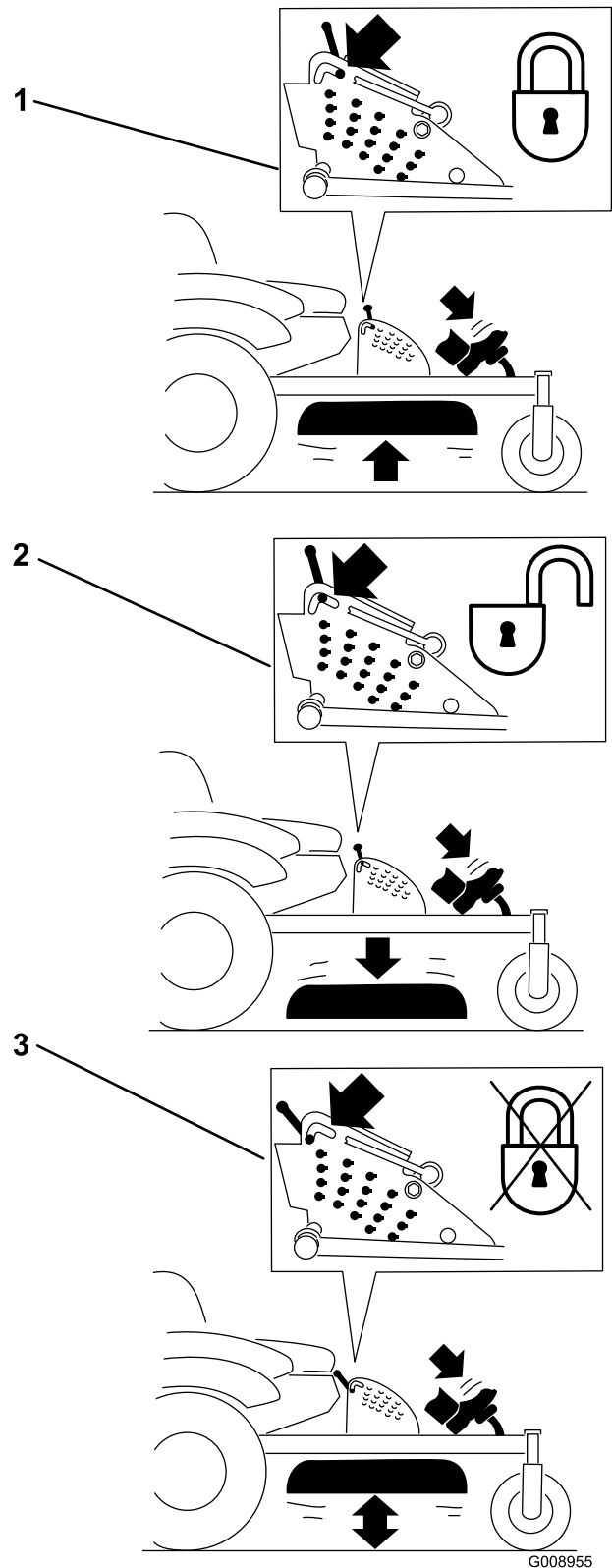


Figure 24

Transport-Lock Positions

G008955

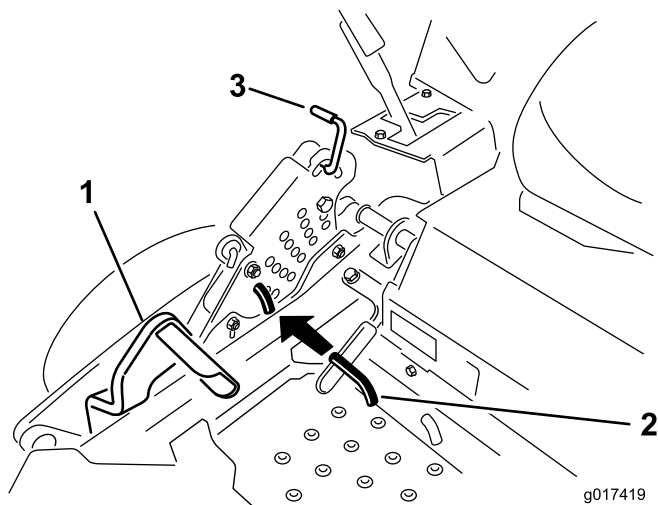
1. Transport lock
2. Lock position—mower deck will lock into transport position
3. Unlock position—does not lock the mower deck into transport position

## Adjusting the Height-of-Cut Pin

Mower deck size	Height-of-cut range	Increments
48-inch deck	38 to 127 mm (1-1/2 to 5 inches)	6 mm (1/4 inch)
52-inch and 60-inch decks	38 to 140 mm (1-1/2 to 5-1/2 inches)	6 mm (1/4 inch)

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 inches) cutting height position) as shown in Figure 25.
3. To adjust, rotate the pin 90 degrees and remove the pin from the height-of-cut bracket (Figure 25).
4. Select a hole in the height-of-cut bracket corresponding to the height-of-cut desired, and insert the pin (Figure 25).
5. Push on the deck lift, pull back on the transport lock, and slowly lower the mower deck.



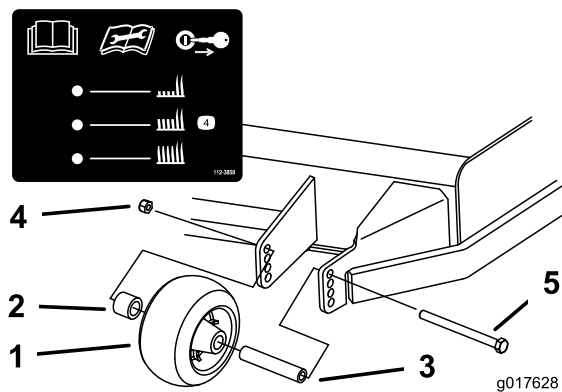
**Figure 25**

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

## Adjusting the Anti-scalp Rollers

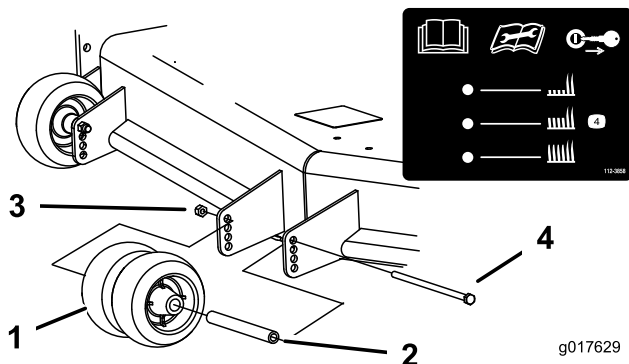
Whenever you change the height-of-cut, it is recommended to adjust the height of the anti-scalp rollers.

1. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.



**Figure 26**

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



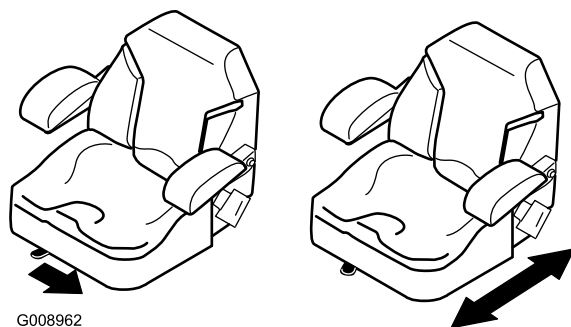
**Figure 27**

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

## 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.

To adjust, move the lever sideways to unlock seat (Figure 28).



**Figure 28**

# 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.

Stop 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 behind the seat and down in the engine compartment.

1. Disengage the PTO (blade-control switch), turn the ignition key to off, move the levers to the neutral-locked position, apply the parking brake, and remove the key.
2. Locate the bypass levers behind the seat, down on the left and right side of the frame.
3. To push the machine, move the bypass levers rearward and out to lock them into place (Figure 29).
4. Repeat this on each side of the machine.
5. Disengage parking brake before pushing.

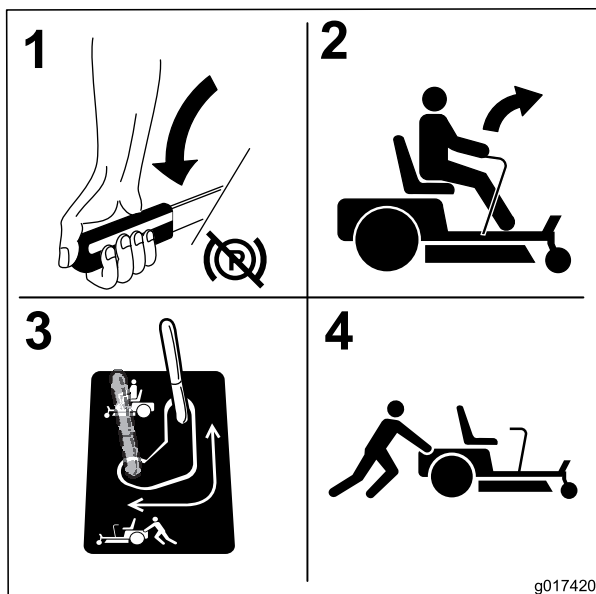


Figure 29

6. To run the machine, move the bypass levers to the forward position (Figure 29).

# Using the Side Discharge

The mower has a hinged grass deflector that disperses clippings to the side and down toward the turf.

## ⚠ DANGER

Without a grass deflector, discharge cover, or a complete grass-catcher assembly mounted in place, you and others are exposed to blade contact and thrown debris. Contact with rotating mower blade(s) and thrown debris will cause injury or death.

- Never remove the grass deflector from the mower because the grass deflector routes material down toward the turf. If the grass deflector is ever damaged, replace it immediately.
- Never put your hands or feet under the mower.
- Never try to clear the discharge area or mower blades unless you move the power take off (blade-control switch (PTO)) to the Off position, rotate the ignition key to the Off position, and remove the key.
- Make sure the grass deflector is in the down position.

# Loading Machines

Use extreme caution when loading units on trailers or trucks. One full-width ramp that is wide enough to extend beyond the rear tires is recommended instead of individual ramps for each side of the unit (Figure 30). The lower, rear section of the machine frame extends back between the rear wheels, and serves as a stop for tipping backward. Having a full-width ramp provides a surface for the frame members to contact if the unit starts to tip backward. If it is not possible to use one full-width ramp, use enough individual ramps to simulate a full-width continuous ramp.

The ramp should be long enough so that the angles do not exceed 15 degrees (Figure 30). A steeper angle may cause mower components to get caught as the unit moves from ramp to trailer or truck. Steeper angles may also cause the unit to tip backward. If loading on or near a slope, position the trailer or truck so it is on the down side of the slope and the ramp extends up the slope. This will minimize the ramp angle. The trailer or truck should be as level as possible.

**Important:** Do not attempt to turn the unit while on the ramp; you may lose control and drive off the side.

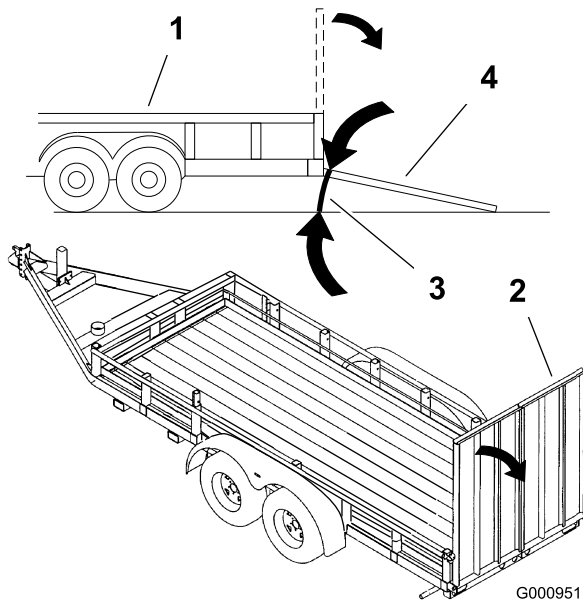
Avoid sudden acceleration when driving up a ramp and sudden deceleration when backing down a ramp. Both maneuvers can cause the unit to tip backward.



## ⚠ WARNING

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

- Use extreme caution when operating a unit on a ramp.
- Ensure the ROPS is in the up position while using the seat belt when loading the machine. Ensure the ROPS will clear the top of an enclosed trailer.
- Use only a single, full-width ramp; do not use individual ramps for each side of the unit.
- If individual ramps must be used, use enough ramps to create an unbroken ramp surface wider than the unit.
- Do not exceed a 15-degree angle between ramp and ground or between the ramp and trailer or truck.
- Avoid sudden acceleration while driving unit up a ramp to avoid tipping backward.
- Avoid sudden deceleration while backing unit down a ramp to avoid tipping backward.



**Figure 30**

- |                    |                                |
|--------------------|--------------------------------|
| 1. Trailer         | 3. Not greater than 15 degrees |
| 2. Full-width ramp | 4. Full-width ramp—side view   |

## Transporting Machines

Use a heavy-duty trailer or truck to transport the machine. 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, your family, pets or bystanders avoid injury.

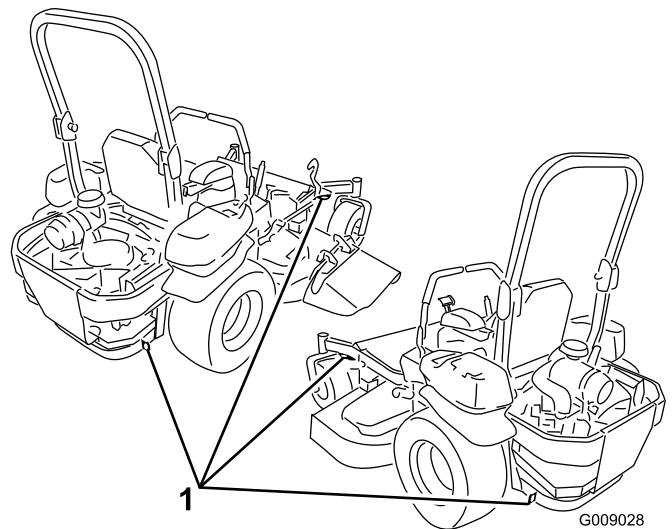
## ⚠ WARNING

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 machine on a public street or roadway.**

To transport the machine:

1. If using a trailer, connect it to the towing vehicle, and connect the safety chains.
2. If applicable, connect the trailer brakes.
3. Load the machine onto the trailer or truck.
4. Stop the engine, remove the key, set the brake, and close the fuel valve.
5. Use the metal tie-down loops on the machine to securely fasten the machine to the trailer or truck with straps, chains, cable, or ropes (Figure 31).



**Figure 31**

1. Traction unit tie-down loops

# Operating Tips

## Using the Fast Throttle Setting

For best mowing and maximum air circulation, operate the engine at the Fast throttle 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 by uncut grass. Always try to have one side of the mower free from uncut grass, which allows air to be drawn into the mower.

## Cutting a Lawn for the First Time

Cut grass slightly longer than normal to ensure that the cutting height of the mower 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 six inches tall, you may want to cut the lawn twice to ensure an acceptable quality of cut.

## Cutting 1/3 of the Grass Blade

It is best to cut only about 1/3 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 mowing direction to keep the grass standing straight. This also helps disperse clippings which enhances decomposition and fertilization.

## Mowing at Correct Intervals

Normally, mow every four days. But remember, grass grows at different rates at different times. So to maintain the same cutting height, which is a good practice, 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 two days later at a lower height setting.

## Adjusting the Cutting Speed

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

## Avoiding Cutting Too Low

If the cutting width of the mower is wider than the mower you previously used, raise the cutting height to ensure that uneven turf is not cut too short.

## Cutting Long Grass

If the grass is ever allowed to grow slightly longer than normal, or if it contains a high degree of moisture, raise the cutting height higher than usual and cut the grass at this setting. Then cut the grass again using the lower, normal setting.

## Stopping

If the machine's forward motion must be stopped 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.

## Keeping the Underside of the Mower Clean

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

## Maintaining the Blade

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 cutter blades daily 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.

# Maintenance

## Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 8 hours	<ul style="list-style-type: none"><li>• Change the engine oil.</li><li>• Check the torque on the wheel lug nuts.</li></ul>
After the first 50 hours	<ul style="list-style-type: none"><li>• Change the hydraulic-system filter and oil.</li></ul>
Before each use or daily	<ul style="list-style-type: none"><li>• Check the safety system.</li><li>• Check the engine-oil level.</li><li>• Check the seat belt.</li><li>• Check the rollover-protection-system (ROPS) knobs.</li><li>• Clean the engine screen.</li><li>• Inspect the blades.</li><li>• Clean the mower deck.</li></ul>
Every 25 hours	<ul style="list-style-type: none"><li>• Check the hydraulic-oil level in the expansion tank.</li></ul>
Every 50 hours	<ul style="list-style-type: none"><li>• Grease the mower deck idler arm.</li><li>• Check spark arrester (if equipped).</li><li>• Check the tire pressure.</li><li>• Inspect the belts for cracks and wear.</li></ul>
Every 100 hours	<ul style="list-style-type: none"><li>• Lubricate the mower deck-lift pivots.</li><li>• Change the engine oil (more often in dirty or dusty conditions).</li><li>• Check, clean and regap the spark plug.</li><li>• Check and clean engine cooling fins and shrouds.</li></ul>
Every 200 hours	<ul style="list-style-type: none"><li>• Change the engine-oil filter.</li></ul>
Every 250 hours	<ul style="list-style-type: none"><li>• Replace the primary air filter (more often in dusty or sandy conditions).</li><li>• Check the safety air filter.</li></ul>
Every 400 hours	<ul style="list-style-type: none"><li>• Change the hydraulic-system filter and oil.</li></ul>
Every 500 hours	<ul style="list-style-type: none"><li>• Replace the safety air filter.</li><li>• Replace the fuel filter (more often in dirty or dusty conditions).</li><li>• Adjust the caster-pivot bearing.</li><li>• Check the electric clutch.</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 front caster pivots (more often in dirty or dusty conditions).</li><li>• Lubricate the caster-wheel hubs.</li><li>• Check the torque on the wheel lug nuts.</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 operator's manual for additional maintenance procedures.

### **⚠ CAUTION**

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

Remove the key from the ignition before you do any maintenance.

# Lubrication

## Greasing and Lubrication

Grease more frequently when operating conditions are extremely dusty or sandy.

**Grease Type:** No. 2 general-purpose lithium base or molybdenum-base grease

1. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop 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:** Make sure to scrape any paint off the front of the fitting(s).

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

## Adding Light Oil or Spraying on Lubrication

**Service Interval:** Every 100 hours

Lubricate the deck-lift pivots.

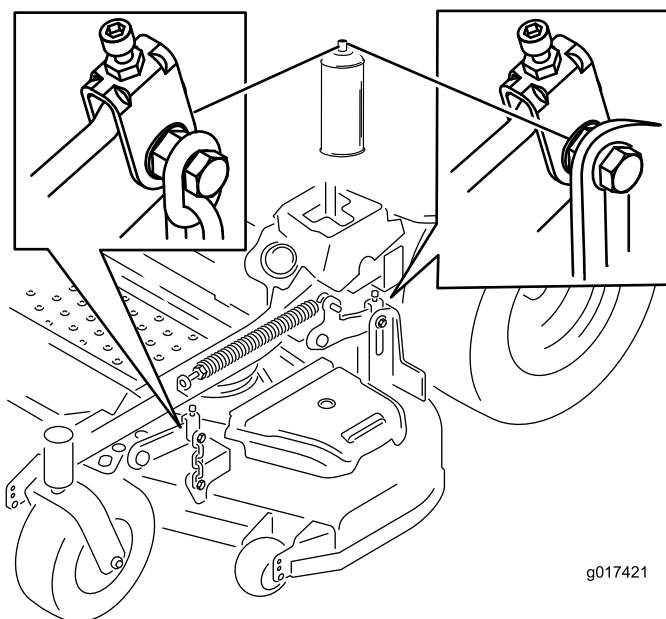


Figure 32

## Greasing the Mower

**Service Interval:** Every 50 hours—Grease the mower deck idler arm.

Yearly—Grease the front caster pivots (more often in dirty or dusty conditions).

1. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Grease the mower deck idler-pulley pivot until grease comes out of the bottom (Figure 33).

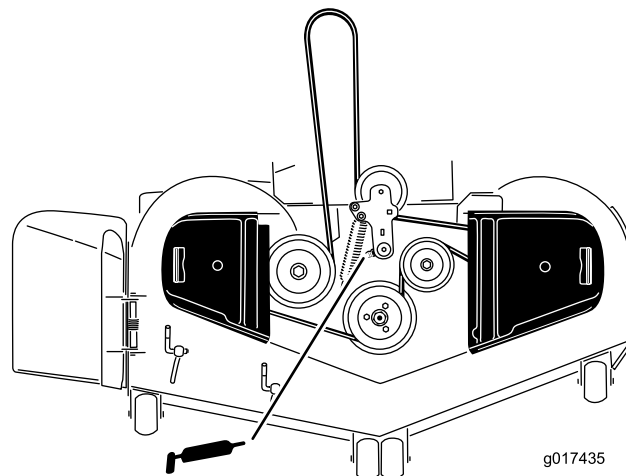


Figure 33

4. Remove the dust cap and adjust the caster pivots.

**Note:** Keep the dust cap off until greasing is done; refer to Adjusting the Caster-pivot Bearing (page 39).

5. Remove the hex plug.
6. Thread a grease fitting into the hole.
7. Pump grease into the fitting until it oozes out around the top bearing.
8. Remove the grease fitting in the hole.
9. Install the hex plug and dust cap (Figure 34).

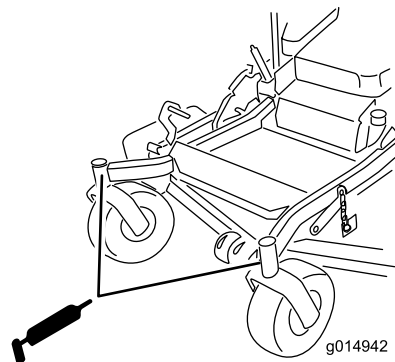
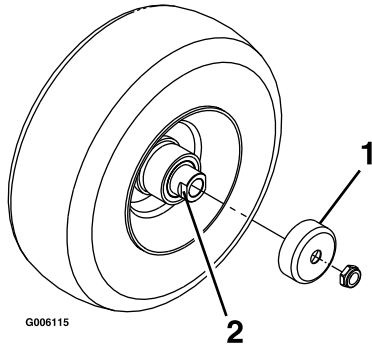


Figure 34

# Lubricating the Caster-wheel Hubs

**Service Interval:** Yearly

1. Stop the engine, wait for all moving parts to stop, remove the key, and engage the parking brake.



**Figure 35**

1. Seal guard
2. Spacer nut with wrench flats

14. Torque the nut to 8 to 9 N-m (75 to 80 in-lb), loosen, then torque to 2 to 3 N-m (20 to 25 in-lb).

**Note:** Make sure axle does not extend beyond either nut.

15. Install the seal guards over the wheel hub, and insert wheel into the caster fork.
16. 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 adhesive.

2. Remove the caster wheel from the caster forks.
3. Remove the seal guards from the wheel hub.
4. Remove one of the spacer nuts from the axle assembly in the caster wheel.

**Note:** Thread-locking adhesive has been applied to lock the spacer nuts to the axle.

5. Remove the axle (with the other spacer nut still assembled to it) from the wheel assembly.
6. Pry out seals and inspect bearings for wear or damage and replace if necessary.
7. Pack the bearings with a general-purpose grease.
8. Insert 1 bearing and 1 new seal into the wheel.

**Note:** The seals must be replaced.

9. If the axle assembly has had both spacer nuts removed (or broken loose), apply a thread-locking adhesive 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.

10. Insert the assembled nut and axle into the wheel on the side of the wheel with the new seal and bearing.
11. With the open end of the wheel facing up, fill the area inside the wheel around the axle full of general-purpose grease.
12. Insert the second bearing and new seal into the wheel.
13. Apply a thread-locking adhesive to the second spacer nut, and thread it onto the axle with the wrench flats facing outward.

# Engine Maintenance

## ⚠ WARNING

Contact with hot surfaces may cause personal injury.

Keep hands, feet, face, clothing and other body parts away the muffler and other hot surfaces.

## Servicing the Air Cleaner

**Service Interval:** Every 250 hours—Replace the primary air filter (more often in dusty or sandy conditions).

Every 250 hours—Check the safety air filter.

Every 500 hours—Replace the safety air filter.

**Note:** Check the filters more frequently if the operating conditions are extremely dusty or sandy.

## Removing the Filters

1. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop 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-cleaner cover off the air-cleaner body (Figure 36).

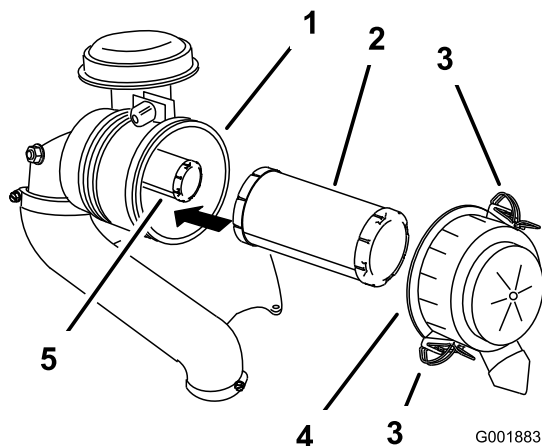


Figure 36

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

4. Clean the inside of the air-cleaner cover with compressed air.
5. Gently slide the primary filter out of the air-cleaner body (Figure 36).

**Note:** Avoid knocking the filter into the side of the body.

6. Remove the safety filter only if you intend to replace it.

**Important:** Do not attempt to clean the safety filter. If the safety filter is dirty, then the primary filter is damaged. Replace both filters.

7. Inspect the primary filter for damage by looking into the filter while shining a bright light on the outside of the filter. Holes in the filter will appear as bright spots. If the filter is damaged, discard it.

## Servicing the Primary Filter

- If the primary filter is dirty, bent, or damaged, replace it.
- Do not clean the primary filter.

## Servicing the Safety Filter

Replace the safety filter, never clean it.

**Important:** Do not attempt to clean the safety filter. If the safety filter is dirty, then the primary filter is damaged. Replace both filters.

## Installing the Filters

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

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

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

2. If the safety filter is being replaced, carefully slide it into the filter body (Figure 36).
3. Carefully slide the primary filter over the safety filter (Figure 36).

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

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

4. Install the air-cleaner cover with the side indicated as up facing upward and secure the latches (Figure 36).

# Servicing the Engine Oil

**Oil Type:** Detergent oil (API service SF, SG, SH, SJ, or SL)

**Crankcase Capacity:** with a filter change, 2.1 L (71 oz);  
without a filter change, 1.8 L (61 oz)

**Viscosity:** See the table below.

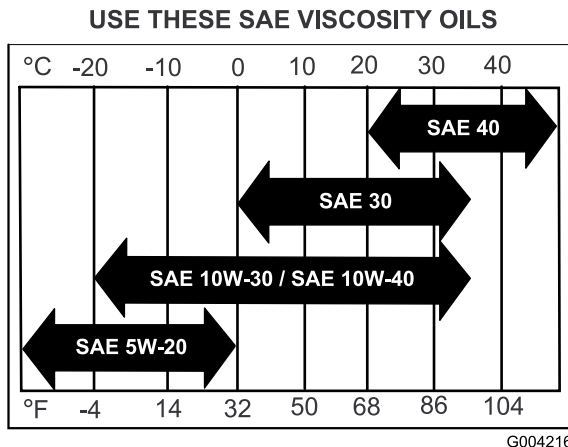


Figure 37

**Note:** Use of multi-grade oils (5W-20, 10W-30, or 10W-40) will increase oil consumption. Check the oil level more frequently when using them.

## Checking the Engine-oil Level

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

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

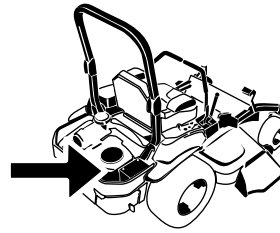
### ⚠ WARNING

Contact with hot surfaces may cause personal injury.

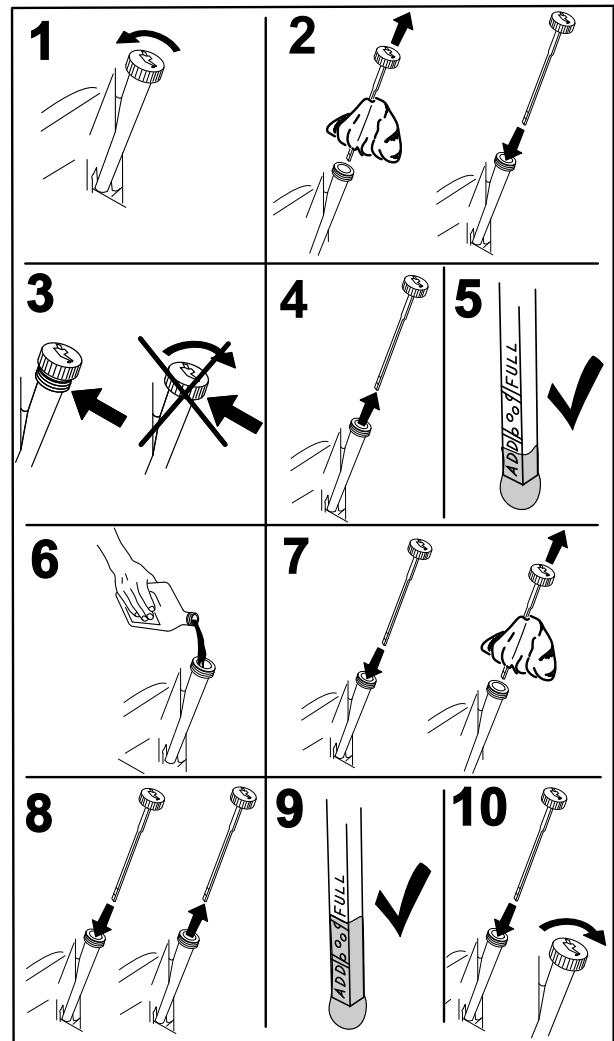
Keep hands, feet, face, clothing, and other body parts away from the muffler and other hot surfaces.

**Important:** Do not overfill the crankcase with oil because damage to the engine may result. Do not run engine with oil below the Low mark because the engine may be damaged.

1. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position (Figure 38).



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Figure 38

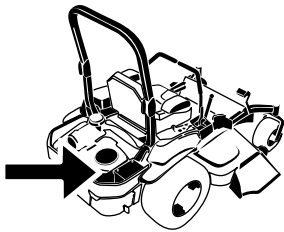
# Changing the Engine Oil

**Service Interval:** After the first 8 hours

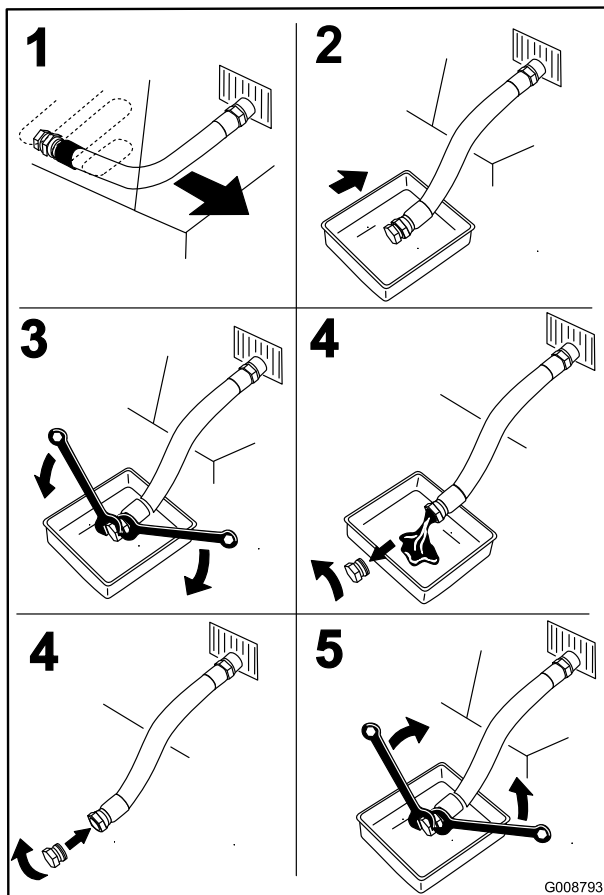
Every 100 hours (more often in dirty or dusty conditions).

**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 it drains better.
2. Park the machine so that the rear is slightly lower than the front to ensure that the oil drains completely.
3. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
4. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position (Figure 39).



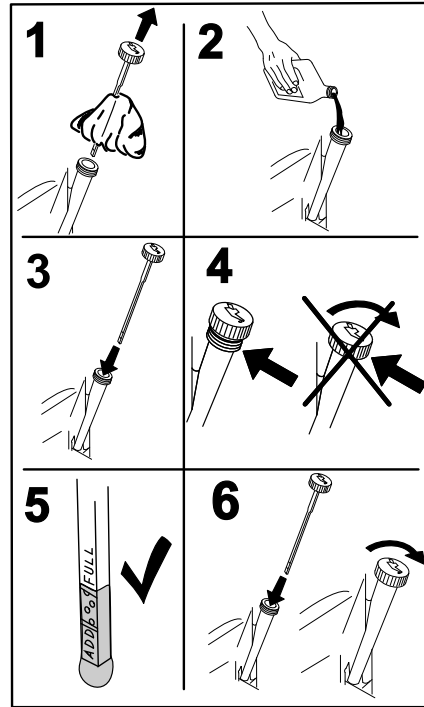
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**Figure 39**

5. 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 40).



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**Figure 40**

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

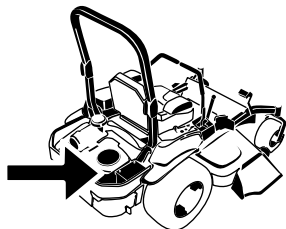


## Changing the Engine-oil Filter

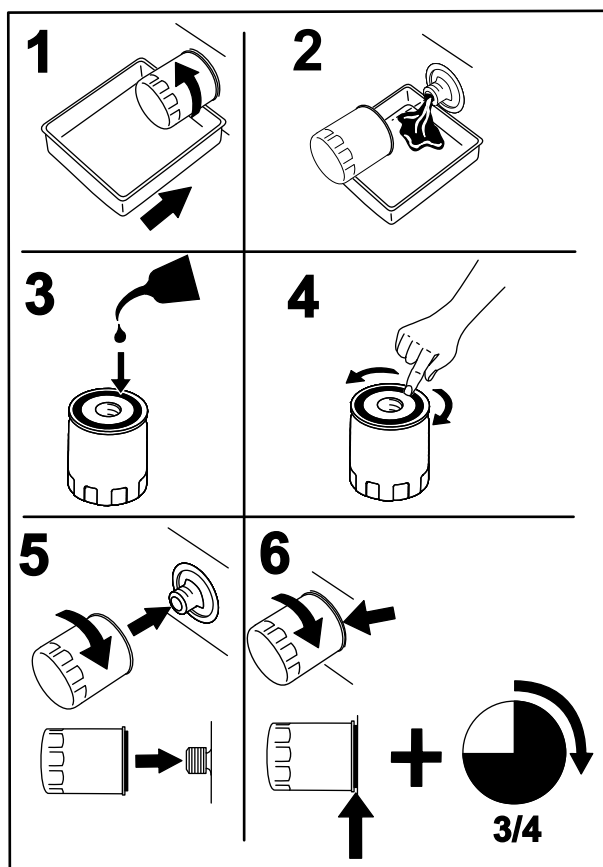
**Service Interval:** Every 200 hours

**Note:** Change the engine-oil filter more frequently when operating conditions are extremely dusty or sandy.

1. Drain the oil from the engine; refer to Changing the Engine Oil (page 32).
2. Change the engine-oil filter (Figure 41).



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**Figure 41**

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

3. Fill the crankcase with the proper type of new oil; refer to Changing the Engine Oil (page 32).

## Servicing the Spark Plug

**Service Interval:** Every 100 hours

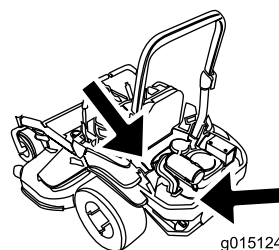
Make sure the air gap between the center and side electrodes is correct before installing the spark plug. Use a spark plug wrench for removing and installing the spark plug(s) and a gapping tool/feeler gauge to check and adjust the air gap. Install a new spark plug(s) if necessary.

**Type of Spark Plug:** NGK® BPR4ES or equivalent

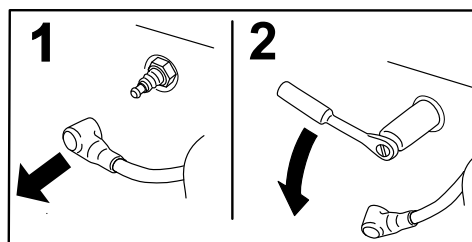
**Air Gap:** 0.75 mm (0.03 inch)

### Removing the Spark Plug

1. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
3. Locate and remove the spark plugs (Figure 42).



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**Figure 42**

## 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).

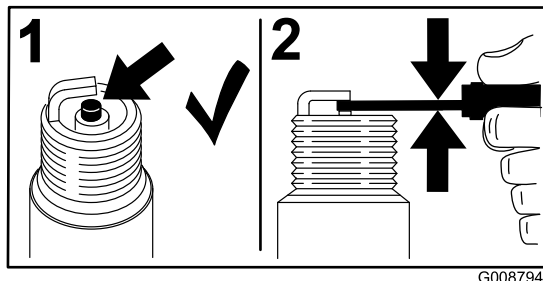


Figure 43

## Installing the Spark Plug

Tighten the spark plug(s) to 22 N-m (16 ft.-lb).

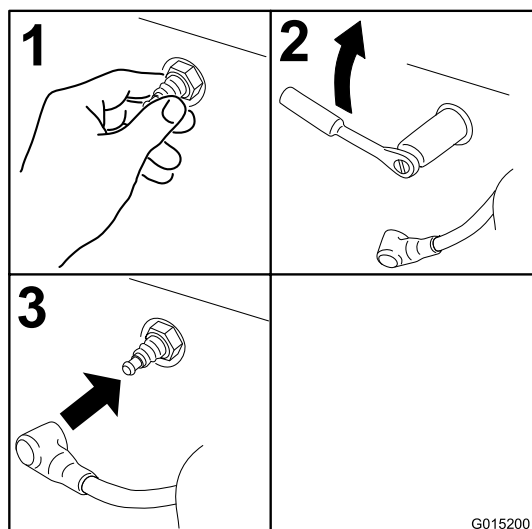


Figure 44

## Checking the Spark Arrester (if equipped)

Service Interval: Every 50 hours

### ⚠ WARNING

Hot exhaust system components may ignite gasoline vapors even after the engine is stopped. Hot particles exhausted during engine operation may ignite flammable materials. Fire may result in personal injury or property damage.

Do not fuel or run engine unless spark arrester is installed.

1. Stop engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
2. Wait for muffler to cool.
3. If there are any breaks in the screen or welds are observed, replace the arrester.
4. If plugging of the screen is observed, remove the arrester and shake loose particles out of the arrester, and clean screen it with a wire brush (soak in solvent if necessary).
5. Install arrester on exhaust outlet.

# Fuel System Maintenance

## Servicing the Fuel Tank

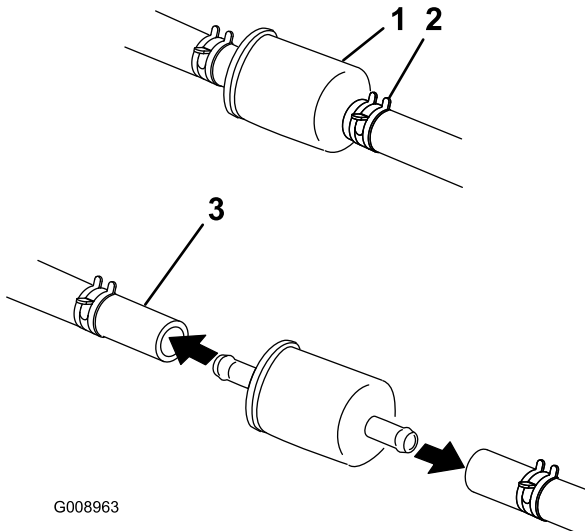
Do not attempt to drain the fuel tank. Ensure that an Authorized Service Dealer drains the fuel tank and services any components of the fuel system.

## Replacing the Fuel Filter

**Service Interval:** Every 500 hours/Yearly (whichever comes first) (more often in dirty or dusty conditions).

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

1. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Allow the machine to cool down.
4. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
5. Close the fuel-shutoff valve under the seat (Figure 45).



**Figure 45**

- |                |                       |
|----------------|-----------------------|
| 1. Fuel filter | 3. Fuel shutoff valve |
| 2. Hose clamp  |                       |

6. Squeeze the ends of the hose clamps together and slide them away from the filter (Figure 45).
7. Remove the filter from the fuel lines.
8. Install a new filter and move the hose clamps close to the filter (Figure 45).
9. Open the fuel-shutoff valve.

**Note:** It is important to 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.

# Electrical System Maintenance

## Servicing the Battery

Service Interval: Monthly

### WARNING

#### CALIFORNIA Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.

*Wash hands after handling.*

### ⚠ DANGER

Battery electrolyte contains sulfuric acid which is a deadly poison and causes severe burns.

Do not drink electrolyte and avoid contact with skin, eyes, or clothing. Wear safety glasses to shield your eyes and rubber gloves to protect your hands.

## 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.

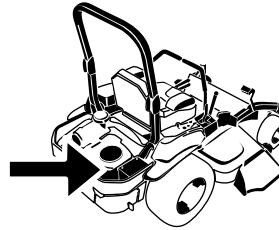
- When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine.
- Do not allow metal tools to short between the battery terminals and metal parts of the machine.

### ⚠ WARNING

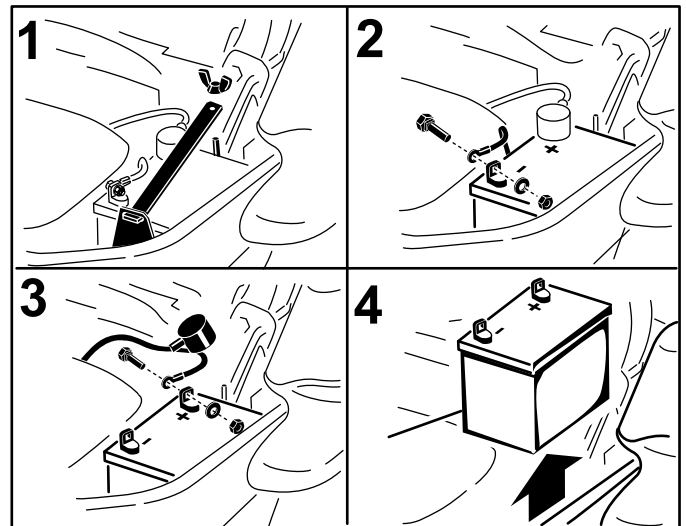
Incorrect battery cable routing could damage the machine and cables causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.

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

1. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Disconnect the negative battery cable (black) from the negative (-) battery terminal (Figure 46).
4. Slide the red terminal boot off the positive (red) battery terminal, and remove the positive (+) battery cable (Figure 46).
5. Remove the wing nut securing the battery clamp (Figure 46).
6. Remove the clamp (Figure 46).
7. Remove the battery.



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Figure 46

1. Remove the wing nut and clamp
2. Remove the negative battery cable before the positive
3. Remove the positive battery cable
4. Remove the battery

## Installing the Battery

1. Position the battery in the tray with the terminal posts opposite from the hydraulic tank (Figure 46).
2. Install the positive (red) battery cable to positive (+) battery terminal.
3. Install the negative (black) battery cable and ground wire to the negative (-) battery terminal.
4. Secure the cables with 2 bolts, 2 washers, and 2 locknuts (Figure 46).
5. Slide the red terminal boot onto the positive (red) battery post.
6. Install the clamp and secure it with the wing nut (Figure 46).

## Charging the Battery

### ⚠ WARNING

Charging the battery produces gasses that can explode.

Never smoke near the battery and keep sparks and flames away from 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. Charge battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 10 amps.
2. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Figure 47).
3. Install the battery in the machine and connect the battery cables; refer to Installing the Battery (page 37).

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

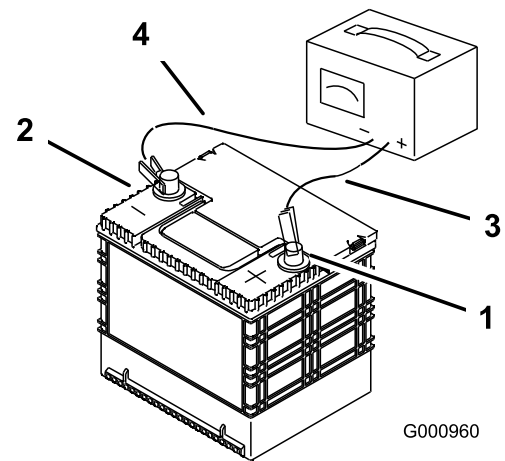


Figure 47

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

## Servicing the Fuses

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.

1. The fuses are located on right hand console next to the seat (Figure 48).
2. To replace the fuses, pull out on the fuse to remove it.
3. Install a new fuse (Figure 48).

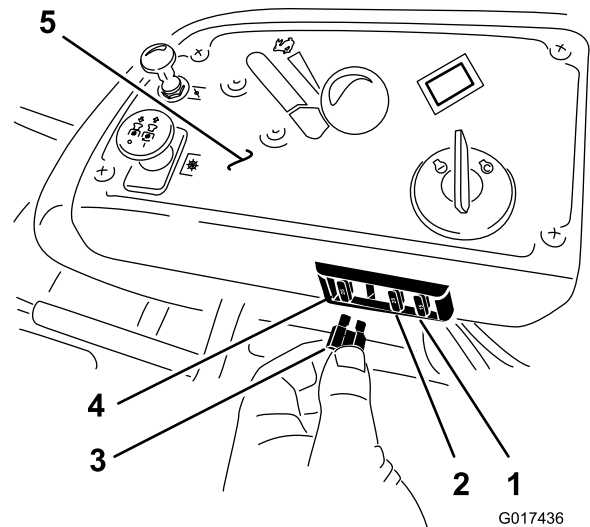


Figure 48

- |                                 |                |
|---------------------------------|----------------|
| 1. Optional<br>accessory—15 amp | 4. Main—25 amp |
| 2. Charge—25 amp                | 5. Console     |
| 3. PTO—10 amp                   |                |

# Drive System Maintenance

## Checking the Seat Belt

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

Visually inspect the seat belt for wear, cuts, and proper operation of retractor and buckle. Replace it before operating if it is damaged.

## Checking the Rollover-Protection-System (ROPS) Knobs

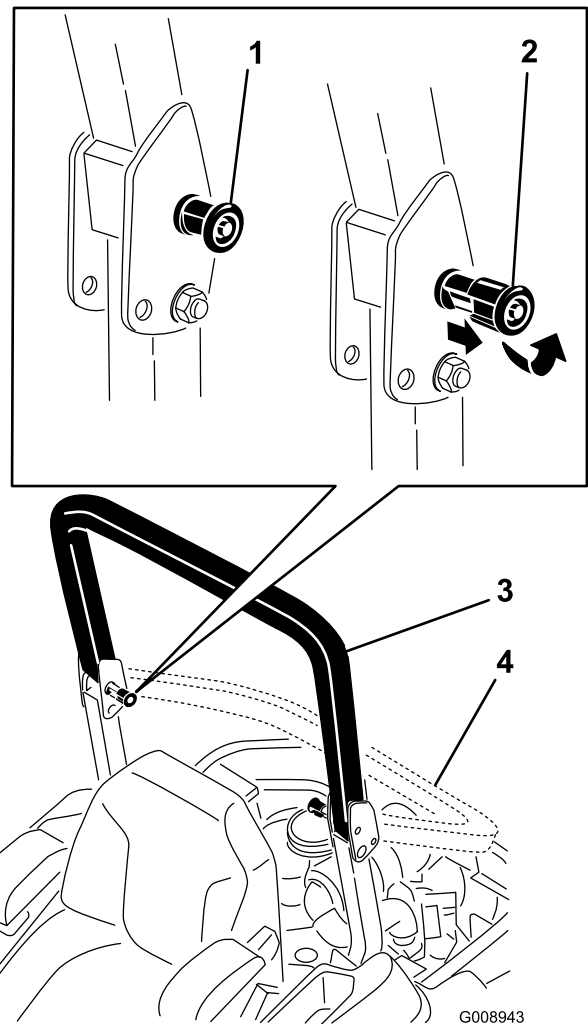
**Service Interval:** Before each use or daily

### ⚠ WARNING

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

Ensure 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 ROPS in the raised position. The upper hoop of the roll bar may need to be pushed forward or pulled rearward to get both knobs fully engaged (Figure 49).

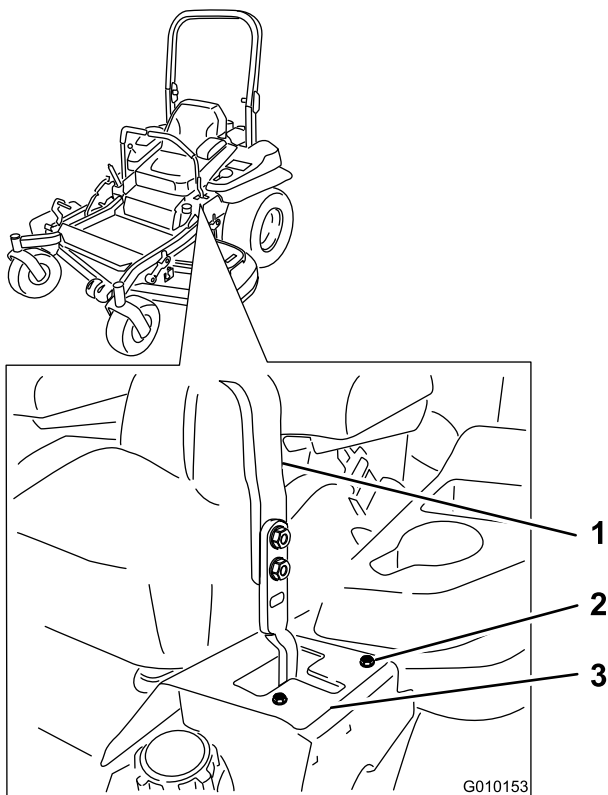


**Figure 49**

1. ROPS knob (locked position)
2. Pull the ROPS knob out, and rotate it 90 degrees to change the roll bar position
3. Roll bar in the upright position
4. Roll bar in the folded position

## Adjusting the Tracking

1. Disengage the blade-control switch (PTO).
2. Drive to an open, flat area, and move the motion-control levers to the neutral-locked position.
3. Move the throttle midway between Fast and Slow.
4. Move both motion-control levers forward until they both hit the stops in the T-slot.
5. Check which way the machine tracks.
6. If it 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 50).
7. If it 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 50).
8. Tighten the stop plate (Figure 50).



**Figure 50**

Left control lever shown

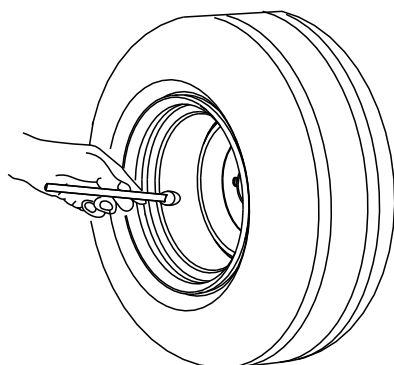
- |                  |               |
|------------------|---------------|
| 1. Control lever | 3. Stop plate |
| 2. Bolt          |               |

## Checking the Tire Pressure

**Service Interval:** Every 50 hours/Monthly (whichever comes first)

Maintain the air pressure in the rear tires at 90 kPa (13 psi). Uneven tire pressure can cause uneven cut. Check the tires when they are cold to get the most accurate pressure reading.

**Note:** The front tires are semi-pneumatic tires and do not require air pressure maintenance.



**Figure 51**

## Checking the Wheel Lug Nuts

**Service Interval:** After the first 8 hours

Yearly

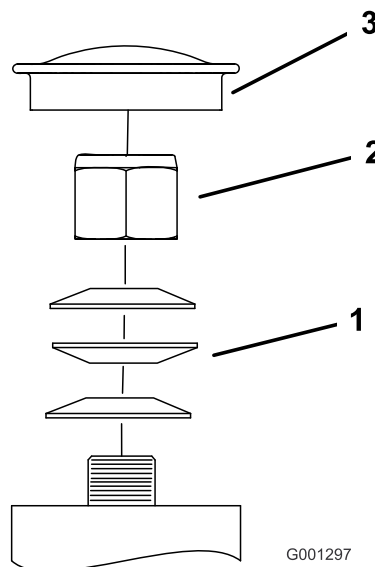
Check and torque the wheel lug nuts to 122 to 136 N-m (90 to 100 ft-lb).

## Adjusting the Caster-pivot Bearing

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

1. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop 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 lock nut (Figure 52).
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 52).
5. Install the dust cap (Figure 52).

**Important:** Make sure that the spring washers are installed correctly as shown in Figure 52.



**Figure 52**

- |                   |             |
|-------------------|-------------|
| 1. Spring washers | 3. Dust cap |
| 2. Lock nut       |             |

# Adjusting the Electric Clutch

**Service Interval:** Every 500 hours—Check the electric clutch.

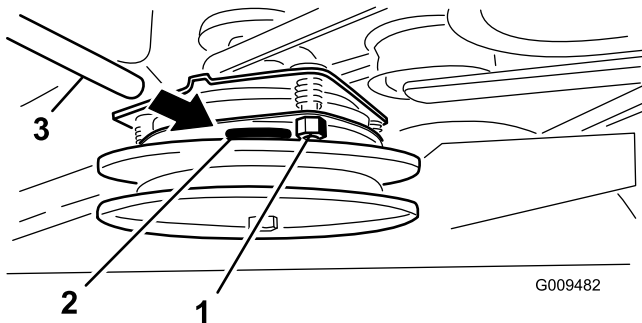
The clutch is adjustable to ensure proper engagement and proper braking.

1. Insert a 0.38 to 0.53 mm (0.015–0.02 inch) feeler gauge through one inspection slot in the side of the assembly.

**Note:** Make sure it is between the armature and the rotor-friction surfaces.

**Note:** The gap needs to be at least 0.38 mm (0.015 inch), and not more than 0.53 mm (0.02 inch).

2. If adjustment is needed, then set at 0.38 mm (0.015 inch) for each of the three adjustment slot positions.
3. Tighten the locknuts until there is a slight binding on the feeler gauge, but it can be moved easily within the air gap (Figure 53).
4. Repeat this for the remaining slots.
5. Check each slot again and make slight adjustments until the feeler gauge between the rotor and armature with very slight contact between them.



**Figure 53**

- |                  |                 |
|------------------|-----------------|
| 1. Adjusting nut | 3. Feeler gauge |
| 2. Slot          |                 |

# Cooling System Maintenance

## Cleaning the Engine Screen

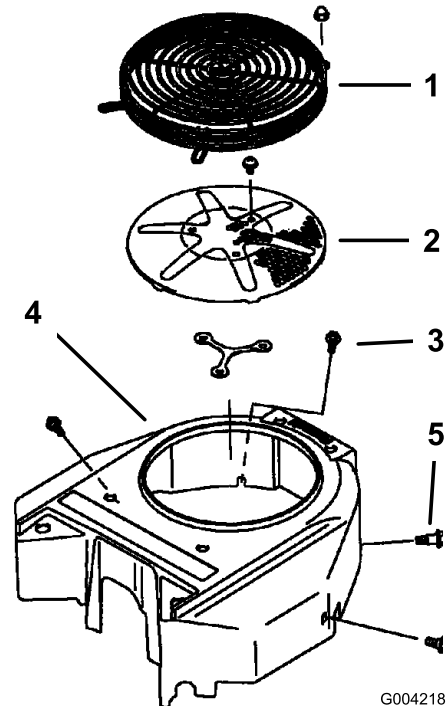
**Service Interval:** Before each use or daily

Before each use remove any build-up of grass, dirt or other debris from the engine screen. This will help insure adequate cooling and correct engine speed and will reduce the possibility of overheating and mechanical damage to the engine (Figure 54).

## Cleaning the Engine Cooling Fins and Shrouds

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

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the air intake screen, recoil starter and fan housing (Figure 54).
4. Clean the debris and grass from the engine parts.
5. Install air intake screen, recoil starter and fan housing (Figure 54).



**Figure 54**

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



# Belt Maintenance

## Inspecting the Belts

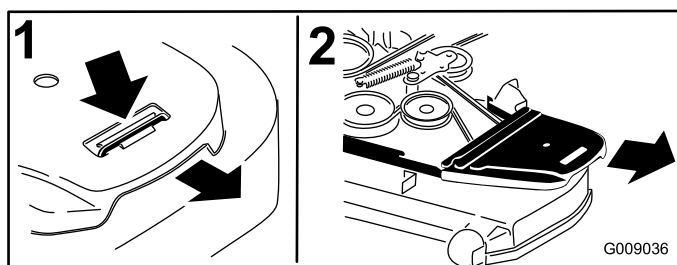
**Service Interval:** Every 50 hours

Check the belts for squealing when the belt is rotating, blades slipping when cutting grass, frayed belt edges, burn marks, and cracks are signs of a worn mower belt. Replace the mower belt if any of these conditions are evident.

## Replacing the Mower Belt

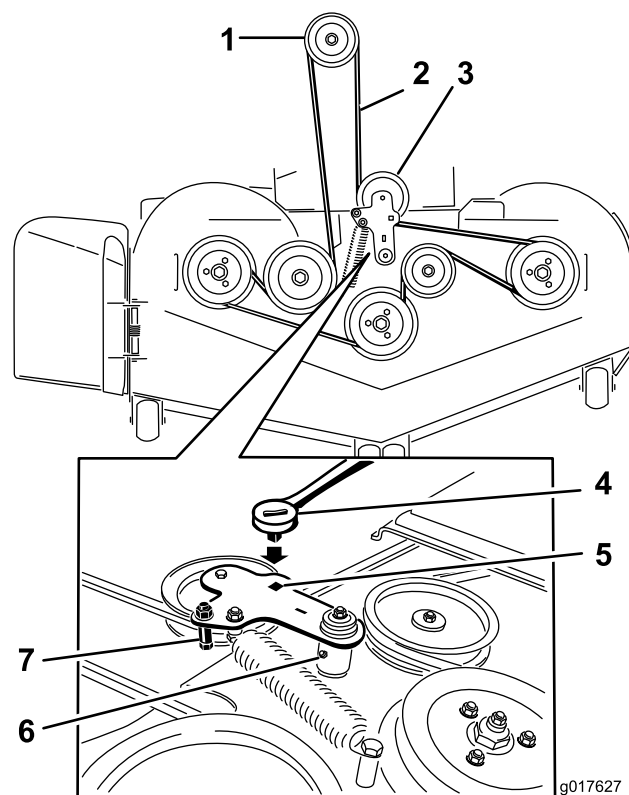
Squealing when the belt is rotating, blades slipping when cutting grass, frayed belt edges, burn marks, and cracks are signs of a worn mower belt. Replace the mower belt if any of these conditions are evident.

1. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop 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 55).



**Figure 55**

1. Push the tab down
2. Remove the belt cover



**Figure 56**

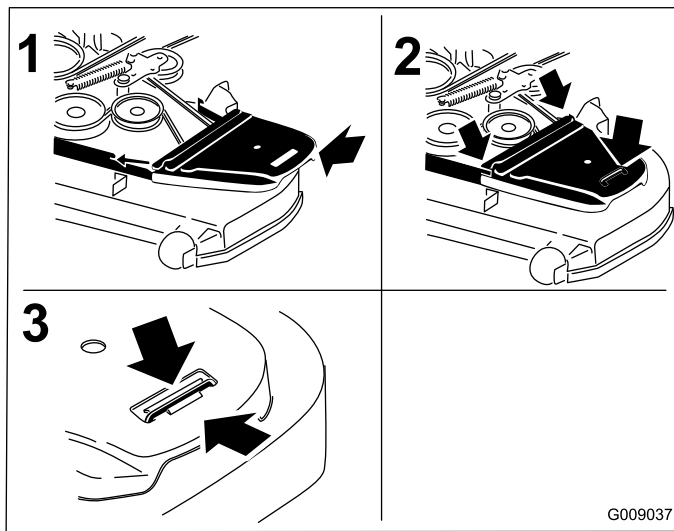
- |                               |   |
|-------------------------------|---|
| 1. Clutch pulley              | 5. Square hole in the idler arm for the ratchet |
| 2. Mower belt                 | 6. Idler-grease fitting                         |
| 3. Spring-loaded idler pulley | 7. Belt guide                                   |
| 4. Ratchet                    |   |

10. Install the belt guide on the idler arm (Figure 56).
11. Using the ratchet in the square hole, install the idler spring (Figure 56).

**Note:** Make sure the spring ends are seated in the anchor grooves.

12. Install the belt covers (Figure 57).

5. Use a ratchet in the square hole in the idler arm to remove tension on the idler spring (Figure 56).
6. Remove the belt from the mower-deck pulleys.
7. Remove the belt guide on the spring-loaded idler arm (Figure 56).
8. Remove the existing belt.
9. Install the new belt around the mower pulleys and the clutch pulley under the engine (Figure 56).

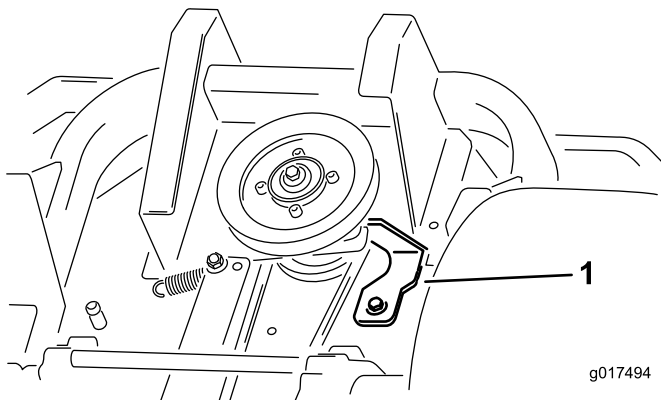


**Figure 57**

1. Position the belt cover
2. Slide the belt cover under the side catches
3. Ensure that the tab is under the metal catch

## Replacing the Hydraulic Pump-drive Belt

1. Disengage the PTO and set the parking brake.
2. Stop 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 (page 41).
4. Raise the machine and support it with jack stands (Figure 59).
5. Remove the clutch stop (Figure 58).

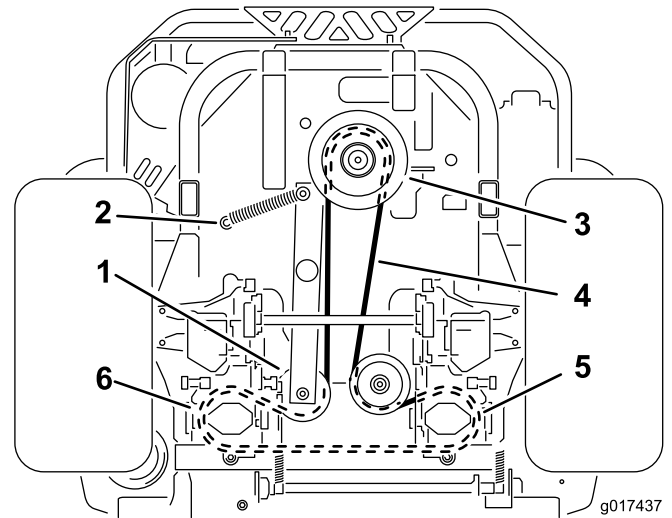


**Figure 58**

1. Clutch stop

6. Remove the idler spring from the post (Figure 59).
7. Remove the existing belt from the hydraulic unit drive pulleys and the engine pulley

8. Install the new belt around the engine pulley and the 2 drive pulleys.



**Figure 59**

1. Idler pulley
2. Idler-spring post
3. Engine pulley
4. Pump-drive belt
5. Right hand hydraulic-pump pulley
6. Left hand hydraulic-pump pulley

9. Install the clutch stop (Figure 58).
10. Install the mower belt; refer to Replacing the Mower Belt (page 41).

# 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. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop 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 60).
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 61).

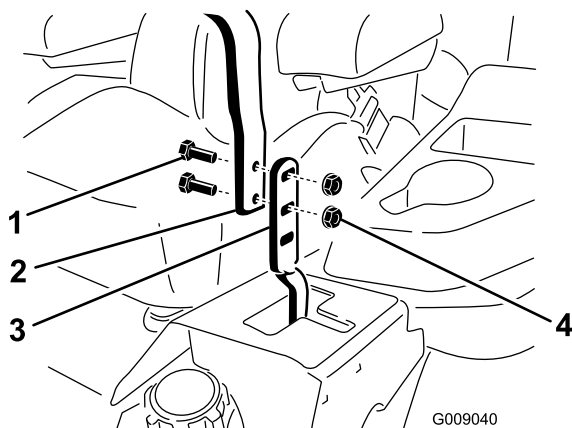


Figure 60

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

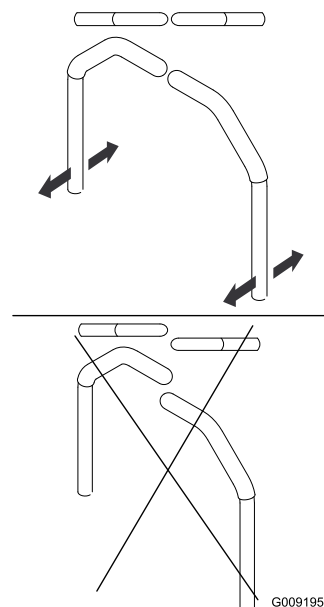


Figure 61

5. If the ends of the levers hit against each other, refer to Adjusting the Motion Control Neutral-lock Pivot (page 45).
6. Repeat to adjust the control levers.

## Adjusting the Motion-control Linkage

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

### **⚠ WARNING**

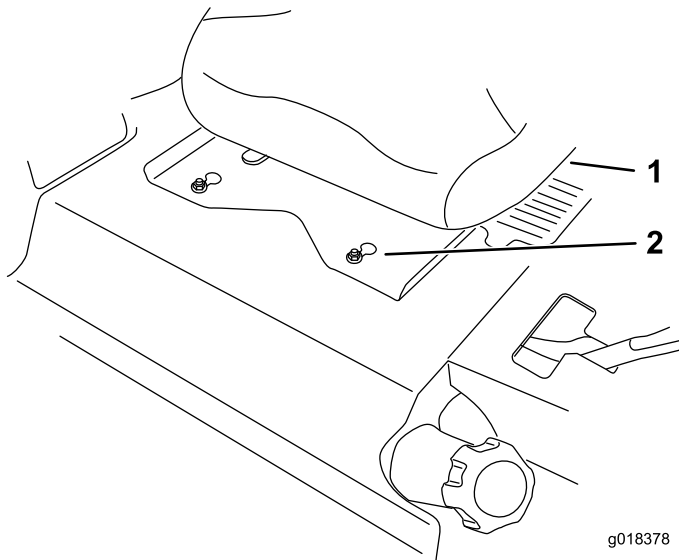
**The engine must be running and the drive wheels must be turning, so the motion-control adjustment can be performed. Contact with moving parts or hot surfaces may cause personal injury.**

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

1. Prior to starting the engine, push the deck-lift pedal, remove the height-of-cut pin, and lower the deck to the ground.
2. Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow the drive wheels to turn freely.
3. Move the seat to the furthest rear position to expose the front nuts.
4. Loosen the front nuts.

**Note:** The nuts do not need to be removed.

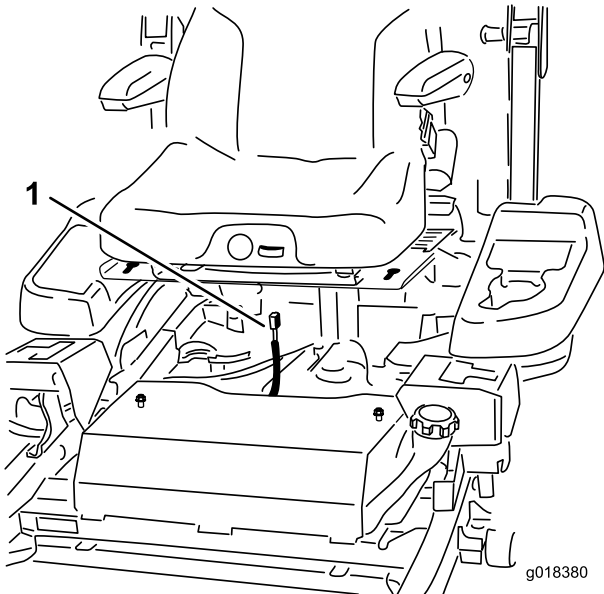
5. Move the seat to the furthest forward position to expose the rear nuts.
  6. Loosen the rear nuts.
- Note:** The nuts do not need to be removed.
7. Slide the seat and seat plate forward to allow the front nuts to go through the key hole (Figure 62).



**Figure 62**

1. Seat
2. Front nuts with key hole

8. Remove the seat and seat plate from the machine.
9. Unplug the harness connector from the seat switch located under the seat (Figure 63).



**Figure 63**

1. Harness connector

10. Loosen the bolts holding the seat to the machine, and slide the seat forward in the slots to remove the seat.

11. 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.

12. **Temporarily** install a jumper wire across the terminals in the connector of the main wiring harness.
13. Start the engine, run the engine at full throttle, and release the brake.

**Important:** The brake must be engaged, and the motion-control levers must be out to start the engine. The operator does not have to be in the seat because of the jumper wire being used.

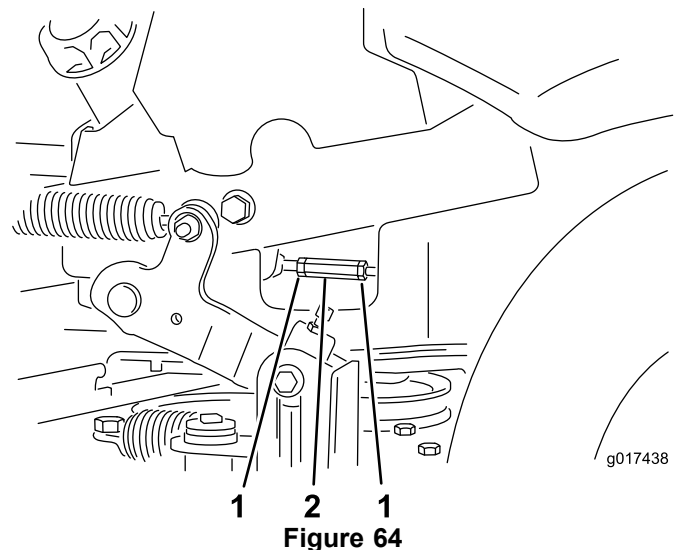
14. Run the unit at least 5 minutes with the drive levers at full forward speed to bring the hydraulic oil up to operating temperature.

**Note:** The motion-control lever needs to be in neutral while making any necessary adjustments.

15. Bring the motion-control levers into the neutral position.
16. Adjust the pump-control rods by loosening the 2 jam nuts and rotating the adjustment nut in the appropriate direction until the wheels slightly creep in reverse (Figure 64).
17. 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 must stop turning or slightly creep in reverse.

18. Tighten the 2 jam nuts against the adjustment nut (Figure 64).



**Figure 64**

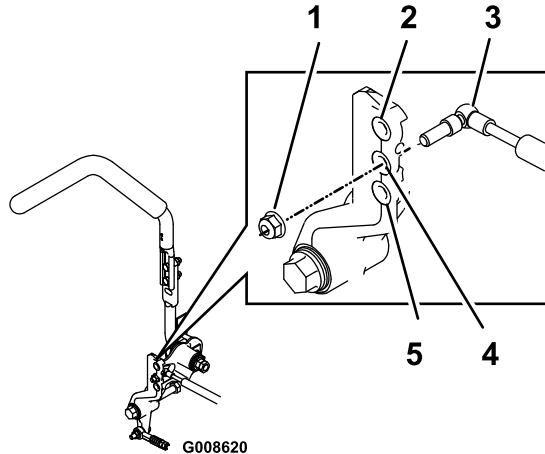
1. Jam nut
2. Adjustment nut

19. Shut off the machine
20. Remove the jumper wire from the wire harness, and plug the connector into the seat switch.

21. Install the seat.
22. Remove the jack stands.
23. Raise the deck and install the height-of-cut pin.
24. Ensure that the machine does not creep in neutral with the parking brakes disengaged.

## Adjusting the Motion-control Damper

The top damper-mounting bolt can be adjusted to obtain a more desired motion-control lever resistance. See Figure 65 for mounting options.



**Figure 65**

RH Motion Control Shown

1. Torque the lock nut 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

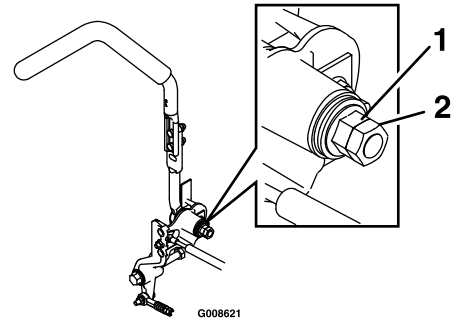
The flanged nut can be adjusted to obtain a more desired motion-control lever resistance when moving it to the neutral-lock position. See Figure 66 for adjustment options.

1. Loosen the jam nut.
2. Tighten or loosen the flanged nut to the desired feel.

**Note:** For more resistance, tighten the flanged nut.

**Note:** For less resistance, loosen the flanged nut

3. Tighten the jam nut.



**Figure 66**

1. Flanged nut
2. Jam nut

# Hydraulic System Maintenance

## Servicing the Hydraulic System

**Hydraulic Oil Type:** Toro® HYPR-OIL™ 500 hydraulic oil or 20W-50 engine oil.

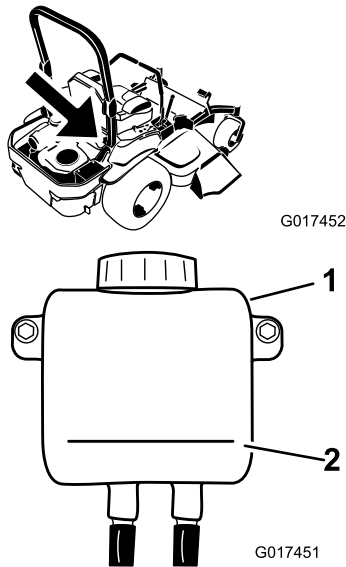
**Important:** Use oil specified. Other fluids could cause system damage.

**Hydraulic System Capacity (with filters removed):** 4.45 L (150 oz)

## Checking the Hydraulic-oil Level

**Service Interval:** Every 25 hours

1. Allow the hydraulic oil to cool down, and check the oil level when the oil is cold.
2. Check the expansion reservoir, and, if necessary, add Toro® HYPR-OIL™ 500 hydraulic oil to the **FULL COLD** line.



**Figure 67**

1. Expansion reservoir
2. FULL COLD line

## Changing the Hydraulic-system Filter and Oil

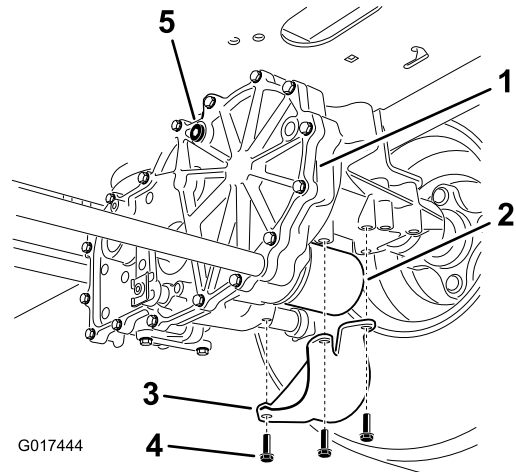
The filter and oil are changed at the same time. **Do not** use the oil again. Once the new filter is installed, and the oil is added, any air in the system must be purged.

The bleeding process is repeated until the oil remains at the FULL COLD line in the reservoir after purging. **Failure to**

properly perform this procedure can result in irreparable damage to the transaxle drive system.

## Removing Hydraulic-system Filters

1. Stop the engine, wait for all moving parts to stop, allow the engine to cool, remove the key, and engage the parking brake.
2. Locate the filter and guards on each transaxle-drive system (Figure 68).
3. Remove three screws securing the filter guard and guard (Figure 68).



**Figure 68**

Right side shown

1. Transaxle drive
2. Oil filter
3. Filter guard
4. Screws
5. Vent plug

4. Carefully clean the area around the filters.

**Important:** Do not allow dirt to enter the hydraulic system, or contamination may occur.

5. Place a drain pan below the filter to catch the oil that drains when the filter and vent plugs are removed.
6. Locate and remove the vent plug on each transmission.
7. Unscrew the filter to remove it, and allow the oil to drain from drive system.
8. Repeat this procedure for both filters.

## Installing the Hydraulic-system Filters

**Service Interval:** After the first 50 hours

Every 400 hours

1. Apply a thin coat of oil on the surface of the rubber seal of each filter.
2. Turn the filter clockwise until the rubber seal contacts the filter adapter, then tighten the filter an additional 3/4 to 1 full turn.

3. Repeat for the other filter.
4. Install the filter guards over each filter as previously removed.
5. Use the 3 screws to secure the filter guards.
6. Verify that the vent plugs are removed before adding the oil.
7. Slowly pour the specified oil through the expansion reservoir until oil comes out of **one** of the vent-plug holes.
8. Stop and install that vent plug.
9. Torque the plug to 20 N-m (15 ft-lb).
10. Continue to add oil through the expansion reservoir until oil comes out of the remaining vent-plug hole on the second transmission.
11. Stop and install that vent plug.
12. Torque the plug to 20 N-m (15 ft-lb).
13. Continue to add oil through the expansion reservoir until it reaches the FULL COLD line on the expansion reservoir.
14. Proceed to Bleeding the Hydraulic System (page 47).

**Important:** Failure to perform the *Bleeding the Hydraulic System* procedure after changing hydraulic filters and oil can result in irreparable damage to the transaxle drive system.

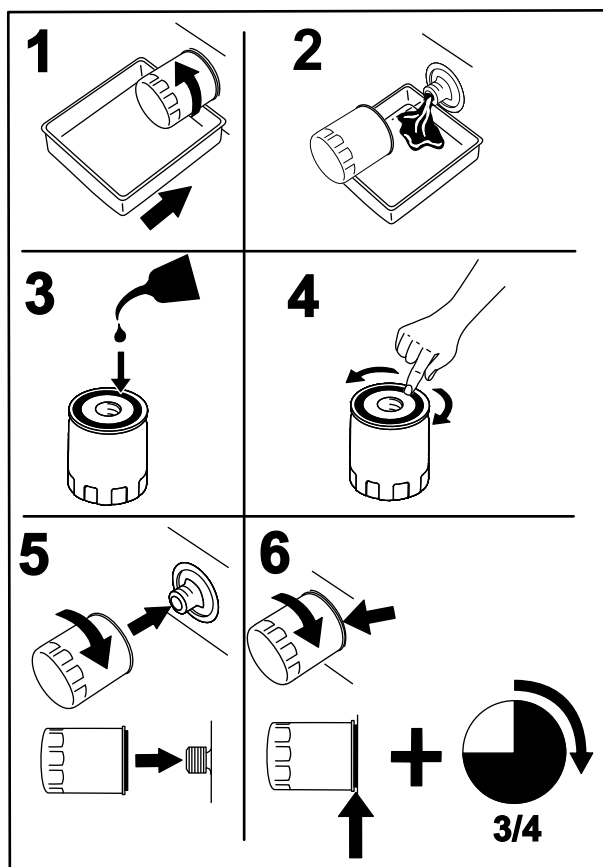


Figure 69

G008748

## Bleeding the Hydraulic System

1. Raise the rear of machine up, and support it with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.

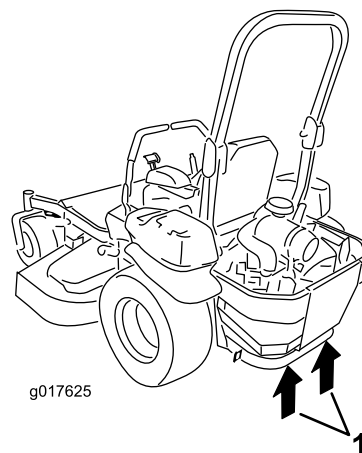


Figure 70

1. Jacking points
  2. Enter the operator's position, start the engine, move the throttle control ahead to the 1/2 throttle position, and disengage parking brake.
    - A. Move the bypass levers into the pushing the machine position. With the bypass valves open and the engine running, slowly move the motion-control levers in both forward and reverse (5 or 6 times).
    - B. Move the bypass levers into the operating the machine position. With the bypass valve closed and the engine running, slowly move the directional control in both forward and reverse directions (5 to 6 times).
    - C. Stop the engine and check the oil level in the expansion reservoir. Add the specified oil as until it reaches the FULL COLD line on the expansion reservoir.
  3. Repeat step 2 until all the air is completely purged from the system.
- Note:** When the transaxle operates at normal noise levels, moves smoothly forward, and reverses at normal speeds, then the transaxle is considered purged.
4. Check the oil level in the expansion reservoir one last time. Add the specified oil as until it reaches the FULL COLD line on the expansion reservoir if necessary.

# Mower Deck Maintenance

## Leveling the Mower Deck

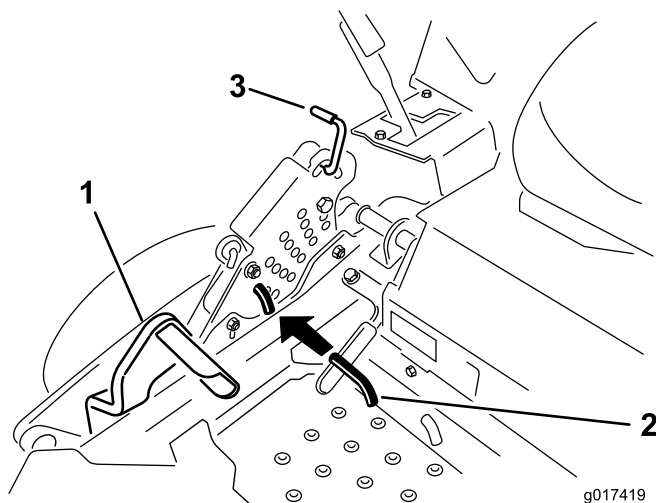
### Setting Up the Machine

**Note:** Ensure that the mower deck is leveled before matching the height-of-cut (HOC).

1. Position the mower on a flat surface.
2. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Check tire pressure of the drive tires.
5. If needed, adjust to 90 kPa (13 psi).
6. Position the mower to the 76 mm (3 inches) height-of-cut position.

### Deck Leveling

1. Position the mower on a flat surface.
  2. Stop engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
  3. Check the tire pressure in the drive tires.
- Note:** Proper inflation pressure for the tires is 90 kPa (13 psi).
4. Position the transport lock in the latching position.
  5. Push the deck-lift pedal all the way forward and the deck will latch at the 14 cm (5-1/2 inches) transport position (Figure 71).

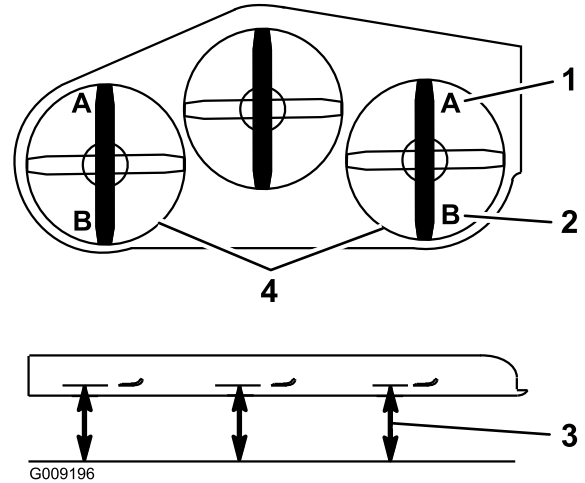


**Figure 71**

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

6. Insert the height adjustment pin into the 7.6 cm (3 inches) cutting height location.
7. Release the transport lock and allow the deck to lower to the cutting height.
8. Raise the discharge chute.
9. On both sides of the deck, measure from the level surface to the front tip of the blade (Position A) as shown in Figure 72.

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



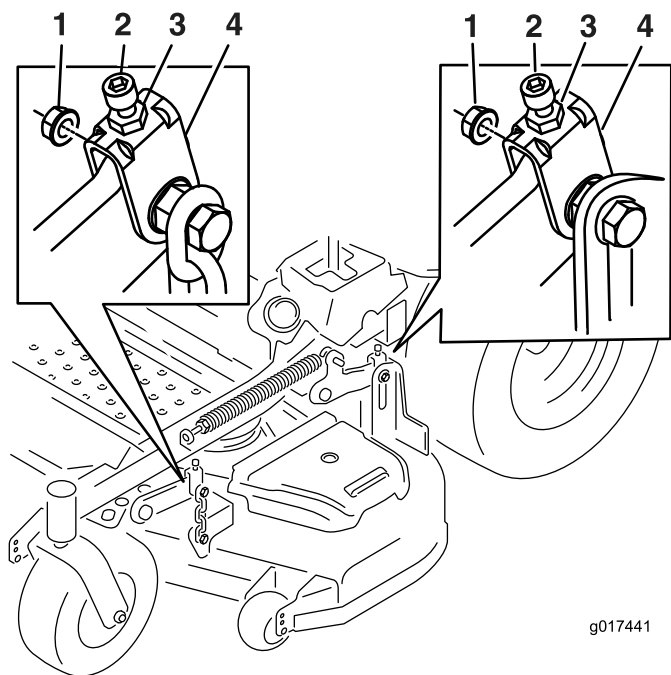
**Figure 72**

1. 7.6 cm (3 inches) at position A is correct
  2. 8.3 cm (3-1/4 inches) 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
10. If needed, loosen the whizlock nut on the side of the yoke and the jam nut on top (Figure 73).
  11. Fine tune the screw adjuster by turning it to get 7.6 mm (3 inches) height.

**Note:** To increase the height, turn the adjuster screw clockwise; to decrease, turn it counterclockwise.

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

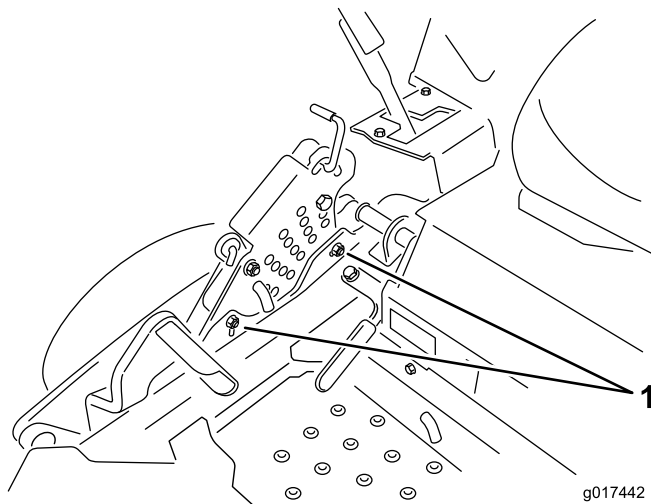




**Figure 73**

- |                   |            |
|-------------------|------------|
| 1. Whizlock nut   | 3. Jam nut |
| 2. Adjuster screw | 4. Yoke    |

12. To adjust the single point system, loosen the 2 bolts at the bottom of the height-of-cut plate (Figure 74).

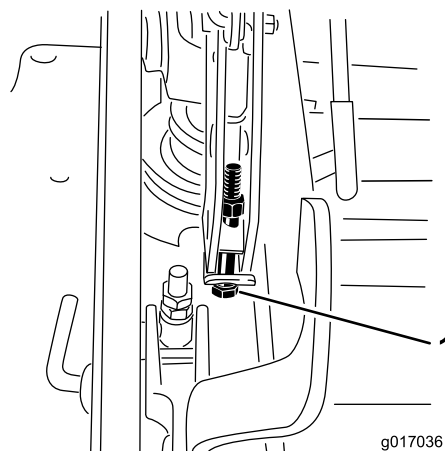


**Figure 74**

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

13. 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 75).

**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 will regain some up and down adjustment on each of the 4 deck links.



**Figure 75**

1. Single-point adjustment bolt

14. Tighten the 2 bolts at the bottom of the height-of-cut plate (Figure 74). T

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

15. Torque the 2 bolts to 37 to 45 N-m (27 to 33 ft-lb).

16. On both sides of the deck, measure from the level surface to the back tip of the blade (postion B) as shown in Figure 72.

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

17. Fine tune the screw adjuster by turning it to get 8.3 mm (3-1/4 inches) height (Figure 73).

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

18. Measure until all 4 sides are the correct height.

19. Tighten all of the nuts on the deck-lift-arm assemblies.

20. Lower the discharge chute.

# 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.

## ⚠ WARNING

A worn or damaged blade can break, and a piece of the blade could be thrown into the operator's or bystanders' area, resulting in serious personal injury or death.

- Inspect the blades periodically for wear or damage.
- Replace a worn or damaged blade.

## Before Inspecting or Servicing the Blades

Park the machine on a level surface, disengage the blades and set the parking brake. Turn the ignition key to off. 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 76).
2. If the edges are not sharp or have nicks, remove and sharpen the blade; refer to Sharpening the Blades (page 51).
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 76).

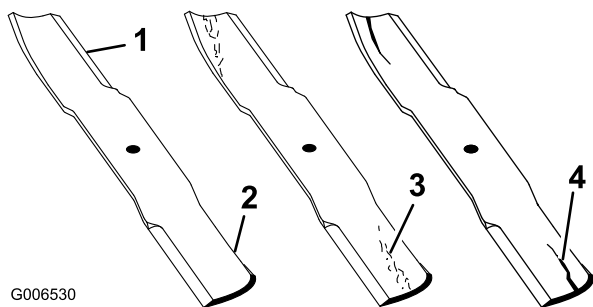


Figure 76

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

## Checking for Bent Blades

1. Disengage the PTO, move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Rotate the blades until the ends face forward and backward.
4. Measure from a level surface to the cutting edge, position A, of the blades (Figure 77).

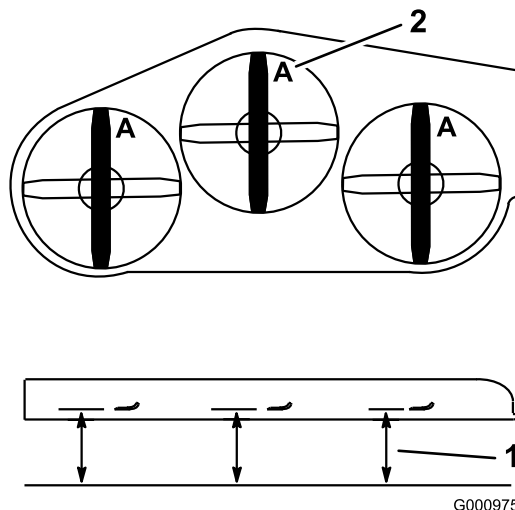


Figure 77

- |  |               |
|--|---------------|
| 1. Measure here from blade to hard surface | 2. Position A |
|--|---------------|

5. Rotate the opposite ends of the blades forward.
6. Measure from a level surface to the cutting edge of the blades at the same position as in step 4 above.

**Note:** The difference between the dimensions obtained in steps 4 and 5 must not exceed 3 mm (1/8 inch).

**Note:** If this dimension exceeds 3 mm (1/8 inch), the blade is bent and must be replaced.

## ⚠ WARNING

A blade that is bent or damaged could break apart and could seriously injure or kill you or bystanders.

- Always replace bent or damaged blade with a new blade.
- Do not file or create sharp notches in the edges or surfaces of the blade.

## Removing the Blades

Blades must be replaced if a solid object is hit, if the blade is out of balance, or if the blade is bent. To ensure optimum performance and continued safety conformance of the machine, use genuine Toro replacement blades. Replacement blades made by other manufacturers may result in nonconformance with safety standards.

1. Hold the blade end using a rag or a thickly-padded glove.
2. Remove the blade bolt, the curved washer, and the blade from the spindle shaft (Figure 78).

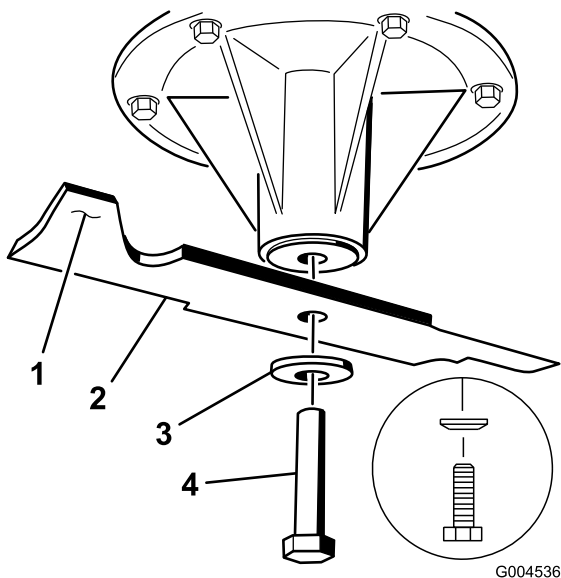


Figure 78

- |                           |                  |
|---------------------------|------------------|
| 1. Sail area of the blade | 3. Curved washer |
| 2. Blade                  | 4. Blade bolt    |

## Sharpening the Blades

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 79).

**Note:** Maintain the original angle.

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

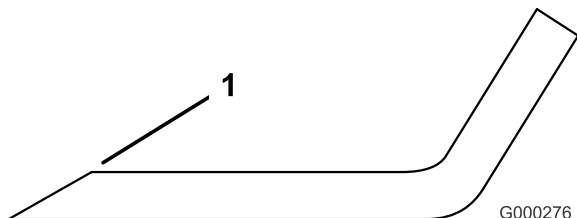


Figure 79

1. Sharpen at the original angle

2. Check the balance of the blade by putting it on a blade balancer (Figure 80).

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

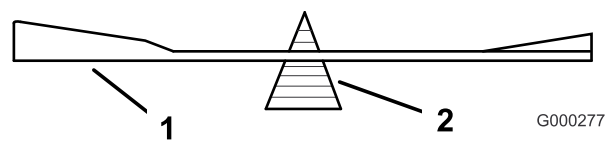


Figure 80

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

3. If the blade is not balanced, file some metal off the end of the sail area only (Figure 78).
4. Repeat this procedure until the blade is balanced.

## Installing the Blades

1. Install the blade onto the spindle shaft (Figure 81).

**Important:** The curved part of the blade must be pointing upward toward the inside of the mower to ensure proper cutting.

2. Install the spring disk and blade bolt (Figure 81).

**Note:** The spring-disk cone must be installed toward the bolt head (Figure 81).

3. Torque the blade bolt to 115 to 150 N-m (85 to 110 ft-lb).

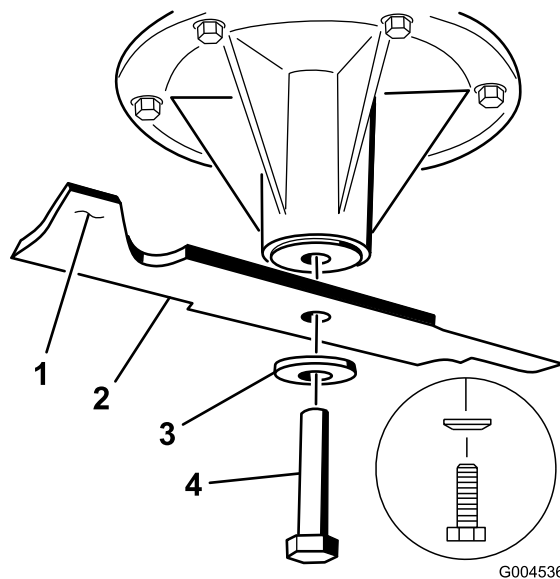


Figure 81

- |                           |                |
|---------------------------|----------------|
| 1. Sail area of the blade | 3. Spring disk |
| 2. Blade                  | 4. Blade bolt  |

# Removing the Mower Deck

Before servicing or removing the mower deck, the spring-loaded deck arms must be locked out.

## **⚠ WARNING**

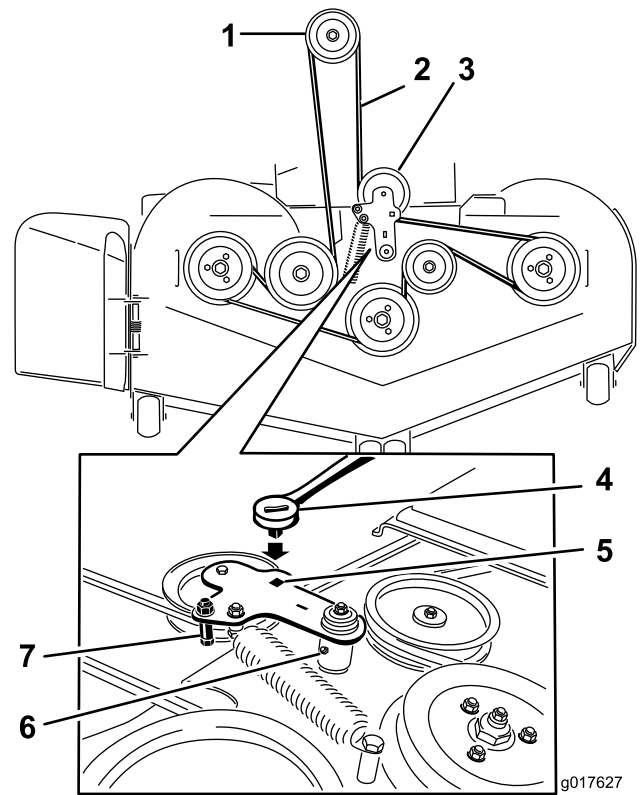
**Deck-lift-arm assemblies have stored energy. Removing the deck without releasing the stored energy can cause serious injury or death.**

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

1. Stop the engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
2. Remove the height-adjustment pin and lower the deck to the ground.
3. Place the height-adjustment pin in the 7.6 cm (3 inches) cutting-height location.

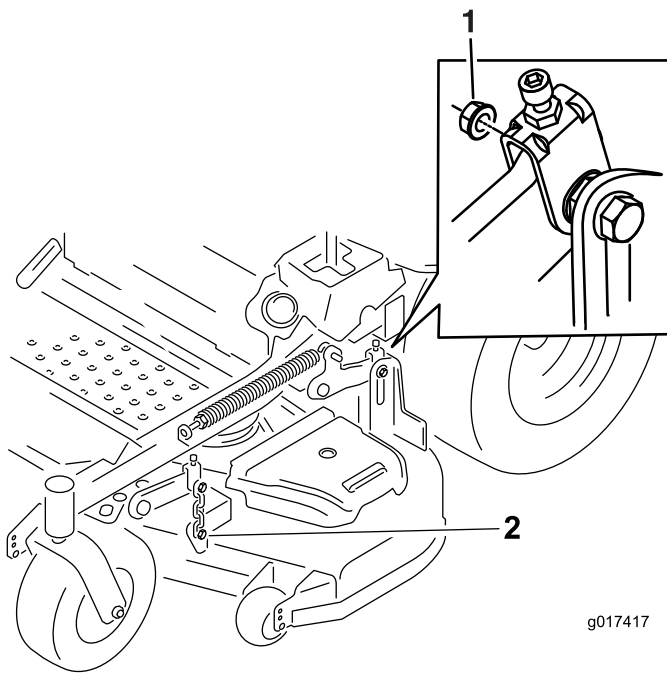
**Note:** This locks the deck-lift arms in the lowest position when the deck is removed and the stored energy in the deck spring is released.

4. Remove the belt covers.
5. Lift up the floor pan and insert a ratchet into the square hole in the deck idler (Figure 82).
6. Rotate the deck idler clockwise and remove the mower belt (Figure 82).



**Figure 82**

- |                               |   |
|-------------------------------|---|
| 1. Clutch pulley              | 5. Square hole in the idler arm for the ratchet |
| 2. Mower belt                 | 6. Idler grease fitting                         |
| 3. Spring-loaded idler pulley | 7. Belt guide                                   |
| 4. Ratchet                    |   |
- 
7. Remove and retain the hardware on both sides of the deck (Figure 83).



**Figure 83**

1. Remove the rear deck lift attachment shoulder bolt and nut.
  2. Remove the front deck lift attachment shoulder bolt and nut.
- 
8. Slide the deck out to the right side of the machine.

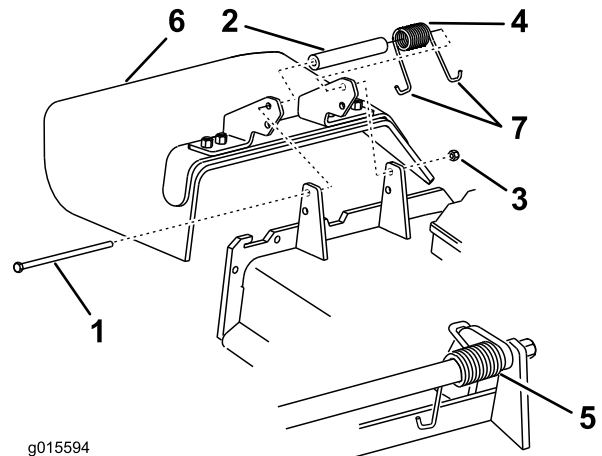
## Replacing the Grass Deflector

### ⚠ WARNING

An uncovered discharge opening could allow the lawn mower to throw objects in the operator's or bystander's direction and result in serious injury. Also, contact with the blade could occur.

Do not operate the lawn mower unless you install a cover plate, a mulch plate, grass deflector or bagger.

1. Remove the locknut, the bolt, the spring, and the spacer holding the deflector to the pivot brackets (Figure 84).
2. Remove the damaged or worn grass deflector (Figure 84).



**Figure 84**

- |            |                         |
|------------|-------------------------|
| 1. Bolt    | 5. Spring installed     |
| 2. Spacer  | 6. Grass Deflector      |
| 3. Locknut | 7. J hook end of spring |
| 4. Spring  |                         |

3. Place the spacer and the spring onto grass deflector.
4. Place one **J** end of the spring behind the deck edge.

**Note:** Make sure one **J** end of the spring is installed behind the deck edge before installing the bolt as shown in Figure 84.

5. Install the bolt and the nut.
6. Place one **J** hook end of the spring around the grass deflector (Figure 84).

**Important:** The grass deflector must be able to rotate. Lift the deflector up to the full open position and ensure that it rotates into the full down position.

# Cleaning

## Cleaning Under the Mower

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

1. Disengage the blade-control switch (PTO), move the motion-control levers to the neutral-locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the mower to the transport position.

## Disposing of Waste

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

# Storage

## Cleaning and Storage

1. Disengage the power take off (blade-control switch (PTO), set the parking brake, and turn the ignition key to Off. Remove the key.
2. 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.

3. Check the brake.
4. Service the air cleaner; refer to Servicing the Air Cleaner (page 30).
5. Grease the machine; refer to Greasing and Lubrication (page 28).
6. Change the crankcase oil; refer to Changing the Engine Oil (page 32).
7. Check the tire pressure; refer to Checking the Tire Pressure (page 39).
8. Change the hydraulic filters; refer to Servicing the Hydraulic System (page 46).
9. Charge the battery; refer to Servicing the Battery (page 36).
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 50).
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 (5 minutes).
- C. Stop the engine, allow it to cool, and drain the fuel tank; refer to Servicing the Fuel Tank (page 35).

- D. Restart the engine and run it until it stops.
- E. Dispose of fuel properly. Recycle as per local codes.

**Important: Do not store stabilizer/conditioned fuel over 90 days.**

- 13. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
- 14. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
- 15. Store the machine in a clean, dry garage or storage area. Remove the key from the ignition switch and keep it out of reach of children or other unauthorized users. Cover the machine to protect it and keep it clean.

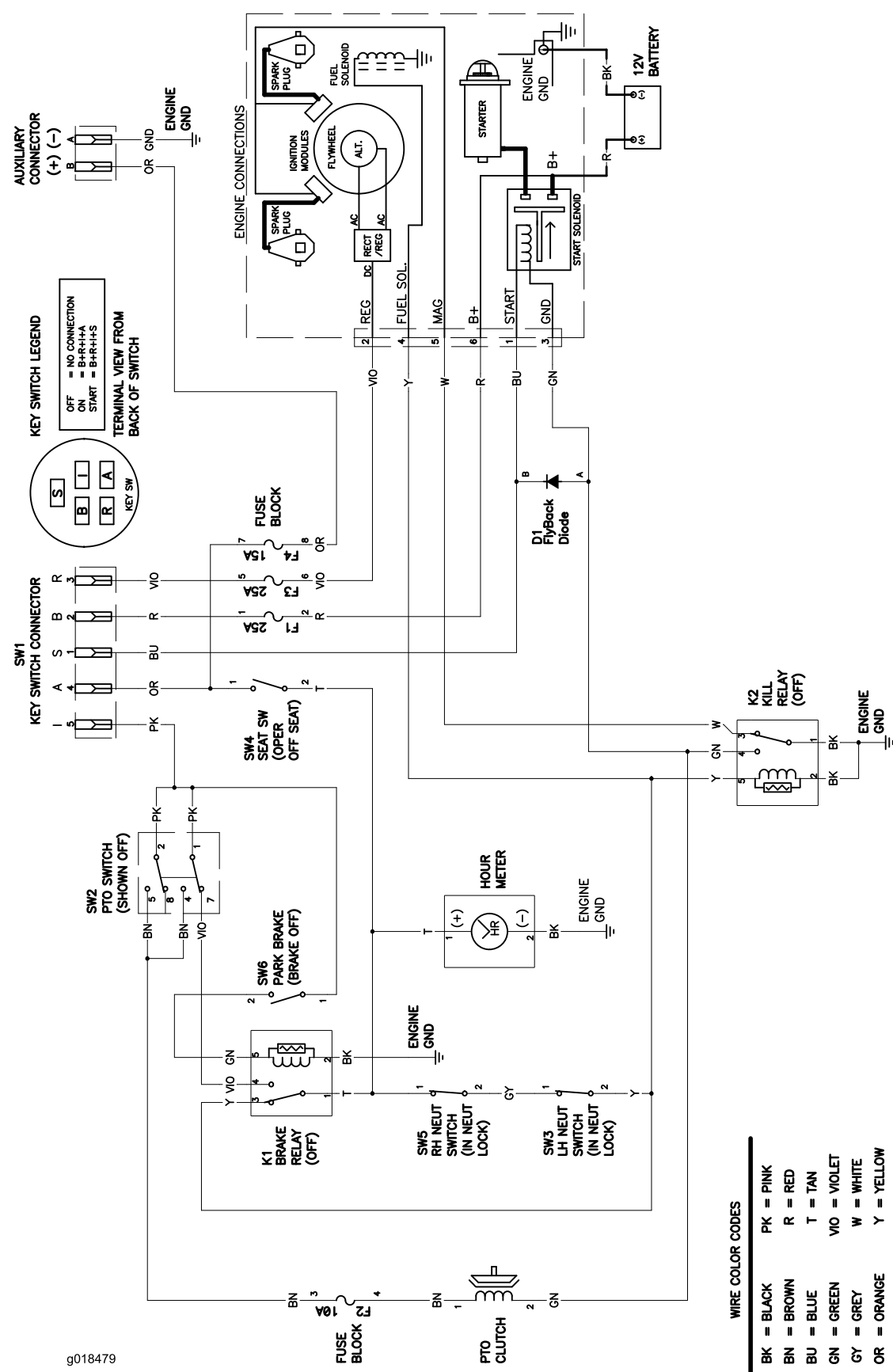
# Troubleshooting

Problem	Possible Cause	Corrective Action
The starter does not crank.	<ol style="list-style-type: none"> <li>1. The blade-control switch (PTO) is engaged.</li> <li>2. The parking brake is not on.</li> <li>3. The motion-control levers are not in the neutral-lock position.</li> <li>4. The operator is not seated.</li> <li>5. The battery is dead.</li> <li>6. The electrical connections are corroded or loose.</li> <li>7. The fuse is blown.</li> <li>8. The relay or switch is worn or damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Move the blade-control switch (PTO) to the disengaged position.</li> <li>2. Set the parking brake.</li> <li>3. Ensure that the motion-control levers are in the neutral-lock position.</li> <li>4. Sit on the 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>
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 the air passages above the engine are plugged.</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 the air passages.</li> </ol>
The mower pulls to the left or right (with 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>



<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
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 oil 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 oil 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 machine produces an uneven cutting height.	<ol style="list-style-type: none"> <li>1. The blade(s) is/are not sharp.</li> <li>2. The cutting blade(s) is/are bent.</li> <li>3. The mower deck is not level.</li> <li>4. The underside of mower is dirty.</li> <li>5. The tire pressure is not correct.</li> <li>6. The blade spindle is bent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen the blade(s).</li> <li>2. Install new cutting blade(s).</li> <li>3. Level the mower deck from side-to-side and front-to-rear.</li> <li>4. Clean the underside of the mower.</li> <li>5. Adjust the tire pressure.</li> <li>6. Contact an Authorized Service Dealer.</li> </ol>
The blades do not rotate.	<ol style="list-style-type: none"> <li>1. The mower deck belt is worn, loose, or broken.</li> <li>2. The mower deck belt is off 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 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



Wire Diagram (Rev. A)

WIRE COLOR CODES	
BK = BLACK	PK = PINK
BN = BROWN	R = RED
BU = BLUE	T = TAN
GN = GREEN	VIO = VIOLET
GY = GREY	W = WHITE
OR = ORANGE	Y = YELLOW

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**Notes:**



# The Toro Total Coverage Warranty

A Limited Warranty (see warranty periods below)

Landscape  
Contractor  
Equipment (LCE)

## Conditions and Products Covered

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly promise to the original purchaser to repair the Toro Products listed below if defective in materials or workmanship.

The following time periods apply from the date of purchase by the original owner:

Products	Warranty Period
21 in. Mowers	2 years Residential Use <sup>1</sup> 1 year Commercial Use
• Engines <sup>4</sup>	Honda – 2 years Kawasaki – 3 years
30 in. Mowers	2 years Residential Use <sup>1</sup> 1 year Commercial Use
• Engines <sup>4</sup>	Kawasaki – 3 years
Mid-Size Walk-Behind Mowers	2 years
• Engines <sup>4</sup>	Kawasaki – 3 years
Grand Stand® Mowers	5 years or 1,200 hours <sup>2</sup>
• Engines <sup>4</sup>	3 years
• Frame	Lifetime (original owner only) <sup>3</sup>
Z Master® 2000 Series Mowers	4 years or 500 hours <sup>2</sup>
• Engines <sup>4</sup>	3 years
• Frame	Lifetime (original owner only) <sup>3</sup>
Z Master® 3000 Series Mowers	5 years or 1,200 hours <sup>2</sup>
• Engines <sup>4</sup>	3 years
• Frame	Lifetime (original owner only) <sup>3</sup>
Z Master® 5000 Series Mowers	5 years or 1,200 hours <sup>2</sup>
• Engines <sup>4</sup>	Kohler Command – 2 years Kohler EFI – 3 years
• Frame	Lifetime (original owner only) <sup>3</sup>
Z Master® 6000 Series Mowers	5 years or 1,200 hours <sup>2</sup>
• Engines <sup>4</sup>	Kawasaki – 3 years
• Frame	Lifetime (original owner only) <sup>3</sup>
Z Master® 7000 Series Mowers	5 years or 1,200 hours <sup>2</sup>
• Engines <sup>4</sup>	2 years
• Frame	Lifetime (original owner only) <sup>3</sup>
All Mowers	
• Battery	90 days Parts and Labor 1 year Parts only
• Belts and Tires	90 days
• Attachments	1 year

<sup>1</sup>Residential use means use of the product on the same lot as your home. Use at more than one location is considered commercial use and the commercial warranty would apply.

<sup>2</sup>Whichever occurs first.

<sup>3</sup>Lifetime Frame Warranty - If the main frame, consisting of the parts welded together to form the tractor structure that other components such as the engine are secured to, cracks or breaks in normal use, it will be repaired or replaced, at Toro's option, under warranty at no cost for parts and labor. Frame failure due to misuse or abuse and failure or repair required due to rust or corrosion are not covered.

<sup>4</sup>Some engines used on Toro Products are warranted by the engine manufacturer.

## Instructions for Obtaining Warranty Service

If you think that your Toro Product contains a defect in materials or workmanship, follow this procedure:

1. Contact any Authorized Toro Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, refer to the Yellow Pages of your telephone directory (look under "Lawn Mowers") or access our web site at [www.Toro.com](http://www.Toro.com). You may also call the numbers listed in item #3 to use the 24-hour Toro Dealer locator system.
2. Bring the product and your proof of purchase (sales receipt) to the Service Dealer. The dealer will diagnose the problem and determine if it is covered under warranty.
3. If for any reason you are dissatisfied with the Service Dealer's analysis or with the assistance provided, contact us at:

RLC Customer Care Department  
Toro Warranty Company  
8111 Lyndale Avenue South  
Bloomington, MN 55420-1196  
888-865-5676 (U.S. Customers)  
888-865-5691 (Canada customers)

## Owner Responsibilities

You must maintain your Toro Product by following the maintenance procedures described in the *Operator's Manual*. Such routine maintenance, whether performed by a dealer or by you, is at your expense.

## Items and Conditions Not Covered

There is no other express warranty except for special emission system coverage and engine warranty coverage on some products. This express warranty does not cover the following:

- Cost of regular maintenance service or parts, such as filters, fuel, lubricants, oil changes, spark plugs, air filters blade sharpening or worn blades, cable/linkage adjustments, or brake and clutch adjustments
- Components failing due to normal wear
- Any product or part which has been altered or misused or neglected and requires replacement or repair due to accidents or lack of proper maintenance
- Pickup and delivery charges
- Repairs or attempted repairs by anyone other than an Authorized Toro Service Dealer
- Repairs necessary due to failure to follow recommended fuel procedure (consult *Operator's Manual* for more details)
  - Removing contaminants from the fuel system is not covered
  - Use of old fuel (more than one month old) or fuel which contains more than 10% ethanol or more than 15% MTBE
  - Failure to drain the fuel system prior to any period of non-use over one month

## General Conditions

All repairs covered by these warranties must be performed by an Authorized Toro Service Dealer using Toro approved replacement parts.

**Neither The Toro Company nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of the Toro Products covered by this warranty, including any cost or expense of providing substitute equipment or service during reasonable periods of malfunction or non-use pending completion of repairs under this warranty.**

**All implied warranties of merchantability (that the product is fit for ordinary use) and fitness for use (that the product is fit for a particular purpose) are limited to the duration of the express warranty.**

**Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.**

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

## Countries Other than the United States or Canada

Customers who have purchased Toro products outside the United States or Canada should contact their Toro Distributor (Dealer) to obtain guarantee policies for your country, province, or state. If for any reason you are dissatisfied with your Distributor's service or have difficulty obtaining guarantee information, contact the Toro importer. If all other remedies fail, you may contact us at Toro Warranty Company.

**Australian Consumer Law:** Australian customers will find details relating to the Australian Consumer Law either inside the box or at your local Toro Dealer.