Form No. 3464-496 Rev A

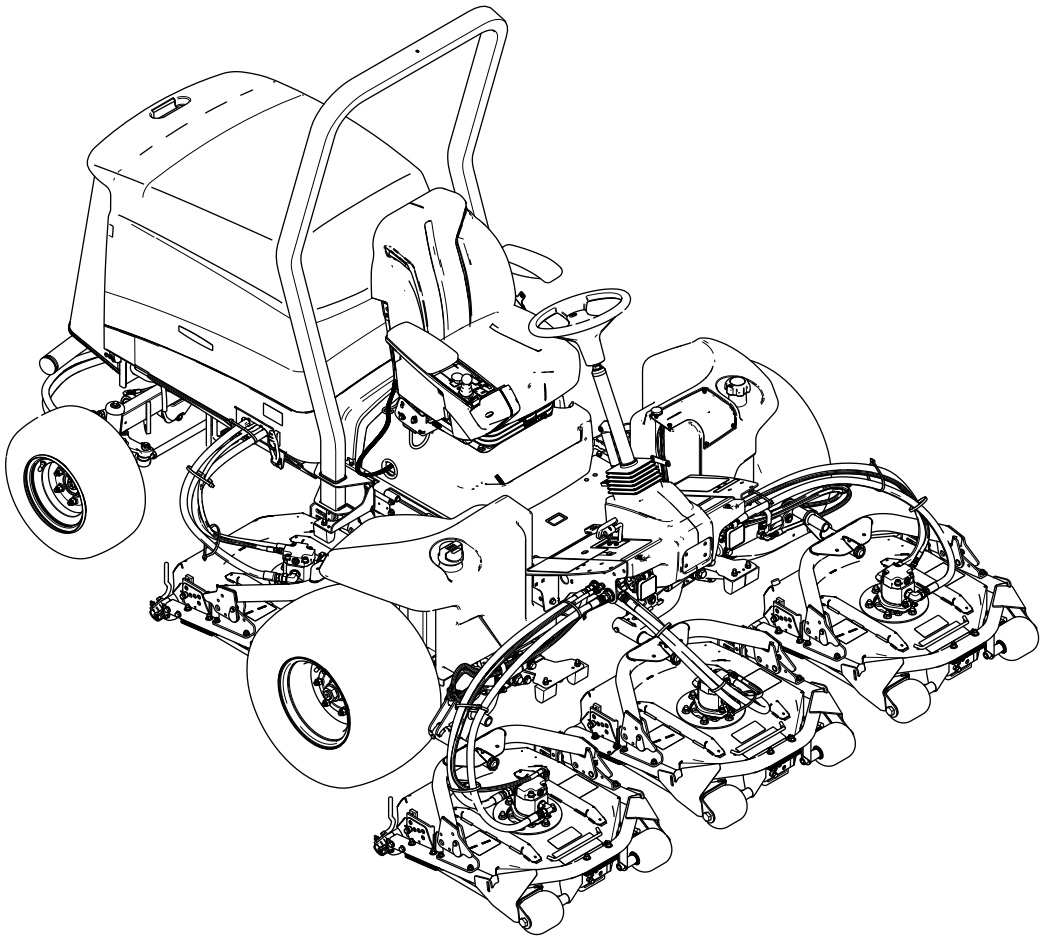
TORO®

Count on it.

Operator's Manual

Groundsmaster® 4300 Traction Unit

Model No. 30879—Serial No. 400000000 and Up



Register at www.Toro.com.
Original Instructions (EN)

CE UK CA

3464-496

This product complies with all relevant European directives; for details, please see the separate product specific Declaration of Conformity (DOC) sheet.

It is a violation of California Public Resource Code Section 4442 or 4443 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land unless the engine is equipped with a spark arrester, as defined in Section 4442, maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire.

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.

⚠ WARNING

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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.

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

Introduction

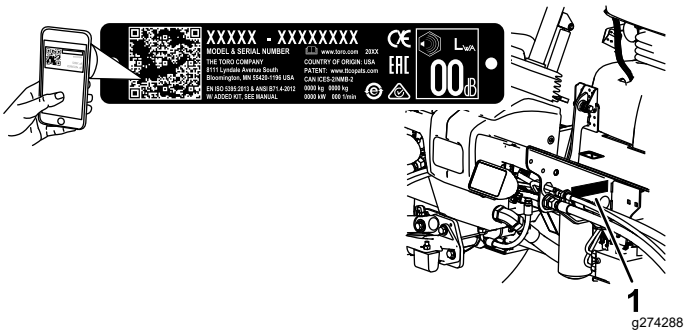
This machine is a ride-on, rotary-blade lawn mower intended to be used by professional, hired operators in commercial applications. It is primarily designed for cutting grass on well-maintained lawns in parks, sports fields, and on commercial grounds. Using this product for purposes other than its intended use could prove dangerous to you and bystanders.

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

Visit www.Toro.com for product safety and operation training materials, 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.

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



g274288

Figure 1

1. Serial number

Model No. _____

Serial No. _____

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



g000502

Figure 2

1. Safety-alert symbol

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

© 2024—The Toro® Company
8111 Lyndale Avenue South
Bloomington, MN 55420

Contact us at www.Toro.com.
Printed in the USA
All Rights Reserved

Contents

Safety 4
General Safety 4
Safety and Instructional Decals 5
Setup 11
1 Preparing the Machine 11
2 Removing the Shipping Blocks and Pins 11
3 Adjusting the Control Arm Position 12
4 Adjusting the Machine Software (CE Machines Only) 12
5 Installing the Hood Latch 12
6 Applying the CE Decals 13
7 Adjusting the Roller Scraper 14
8 Installing the Mulching Baffle 15
Product Overview 16
Controls 16
Seat Controls 17
Specifications 19
Attachments/Accessories 20
Before Operation 21
Before Operation Safety 21
Filling the Fuel Tank 22
Checking the Engine-Oil Level 23
Checking the Cooling System 23
Checking the Hydraulic System 23
Draining the Water Separator 23
Checking the Tire Pressure 23
Checking the Torque of the Wheel-Lug Nuts 24
Adjusting the Height of Cut 24
Checking the Interlock Switches 25
Checking the Blade Stopping Time 26
Selecting a Blade 26
Choosing Accessories 27
Overview of the InfoCenter Display 28
Using the Menus 29
Protected Menus 31
Accessing the Technician Menu 33
Understanding the Diagnostic Light 33
Checking the Hydrostatic Braking Distance 33
Overview of Reverse Speeds 33
Overview of Displayed Traction Speeds 33
Understanding the Warm-Up Mode 34
During Operation 34
During Operation Safety 34
Understanding the Operating Characteristics of the Machine 36
Operating the Machine 36
Overview of the Traction Pedal 36
Using the Virtual Pedal Stop (VPS) Feature 37
Operating the Cruise Control 37
Understanding the Acceleration Mode 38
Understanding Counterbalance 38
Changing the Counterbalance Settings 39
Understanding Toro Smart Power™ 39
Starting the Engine 39
Shutting Off the Engine 39
Cutting Grass with the Machine 39
Understanding the Diesel-Particulate Filter and Regeneration 40
Operating Tips 44
After Operation 45
General Safety 45
Identifying the Tie-Down Points 45
Hauling the Machine 46
Pushing or Towing the Machine 47
Maintenance 48
Maintenance Safety 48
Recommended Maintenance Schedule(s) 48
Daily Maintenance Checklist 50
Pre-Maintenance Procedures 51
Preparing for Maintenance 51
Tilting the Seat 51
Lowering the Seat 51
Jacking Point Locations 51
Lubrication 52
Greasing the Bearings and Bushings 52
Engine Maintenance 54
Engine Safety 54
Servicing the Air Cleaner 54
Servicing the Engine Oil 55
Fuel System Maintenance 56
Fuel Maintenance 56
Storing Fuel 56
Servicing the Fuel-Water Separator 57
Servicing the Fuel Filter 58
Draining the Fuel Tank 58
Inspecting the Fuel Lines and Connections 58
Servicing the Diesel-Oxidation Catalyst (DOC) and the Soot Filter 58
Priming the Fuel System 58
Electrical System Maintenance 59
Electrical System Safety 59
Servicing the Battery 59
Replacing the Fuses 60
Charging the Battery 61
Drive System Maintenance 61
Tightening the Axle Hub Nuts 61
Adjusting the Rear Wheel Toe-in 61
Cooling System Maintenance 62
Cooling System Safety 62
Coolant Specification 62
Checking the Cooling System 63
Cleaning the Cooling System 63
Belt Maintenance 64
Servicing the Alternator Belt 64
Hydraulic System Maintenance 65
Hydraulic System Safety 65
Hydraulic Fluid Specifications 65
Checking the Hydraulic-Fluid Level 65
Changing the Hydraulic Fluid 66

Replacing the Hydraulic Filters 67
Checking the Hydraulic Lines and Hoses 67
Testing the Hydraulic-System Pressure 68
Hydraulic Valve Solenoid Functions 68
Cutting Unit Maintenance 68
Separating the Cutting Unit from the Traction Unit 68
Mounting the Cutting Units to the Traction Unit 69
Servicing the Front Roller 69
Blade Maintenance 70
Blade Safety 70
Servicing the Blade Plane 70
Removing and Installing the Cutting-Unit Blade(s) 71
Inspecting and Sharpening the Blade 71
Storage 72
Storage Safety 72
Preparing the Machine for Storage 72
Storing the Cutting Units 73

Safety

General Safety

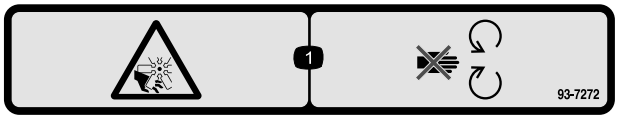
This product is capable of amputating hands and feet and of throwing objects. Always follow all safety instructions to avoid serious personal injury.

- Read and understand the contents of this *Operator's Manual* before starting the engine.
- Use your full attention while operating the machine. Do not engage in any activity that causes distractions; otherwise, injury or property damage may occur.
- Do not operate the machine without all guards and other safety protective devices in place and functioning properly on the machine.
- Keep your hands and feet away from rotating parts. Keep clear of the discharge opening.
- Keep bystanders and children out of the operating area. Never allow children to operate the machine.
- Shut off the engine, remove the key, and wait for all movement to stop before you leave the operator's position. Allow the machine to cool before adjusting, servicing, cleaning, or storing it.

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

Safety and Instructional Decals

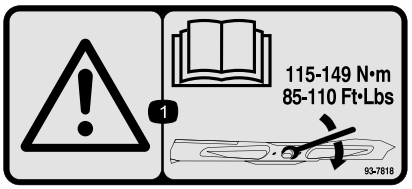
Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or missing.



decal93-7272

93-7272

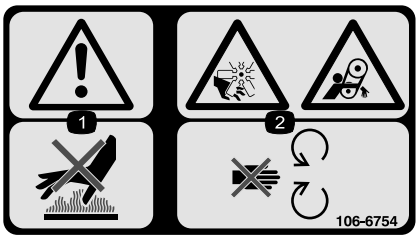
1. Cutting/dismemberment hazard; fan—stay away from moving parts.



decal93-7818

93-7818

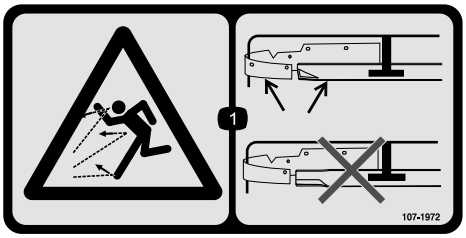
1. Warning—read the *Operator's Manual* for instructions on torquing the blade bolt/nut to 115 to 149 N·m (85 to 110 ft-lb).



decal106-6754

106-6754

1. Warning—do not touch the hot surface.
2. Cutting/dismemberment hazard, fan and entanglement hazard, belt—stay away from moving parts.



decal107-1972

107-1972

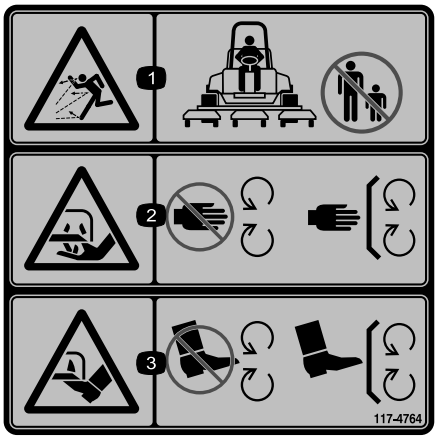
1. Thrown object hazard—use a standard blade when the mulch baffle is installed; do not use a high-lift blade when the mulch baffle is installed.



decal106-6755

106-6755

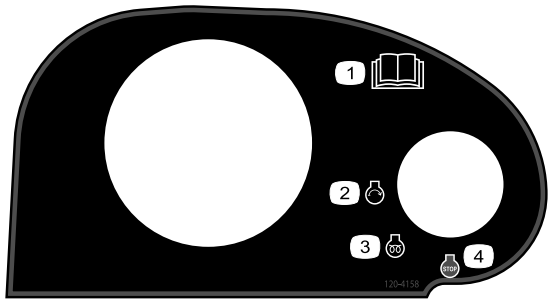
1. Engine coolant under pressure.
2. Explosion hazard—read the *Operator's Manual*.
3. Warning—do not touch the hot surface.
4. Warning—read the *Operator's Manual*.



decal117-4764

117-4764

1. Thrown object hazard—keep bystanders out of the operating area.
2. Cutting hazard of hand, mower blade—stay away from moving parts, keep all guards and shields in place.
3. Cutting hazard of foot, mower blade—stay away from moving parts, keep all guards and shields in place.



decal120-4158

120-4158

1. Read the *Operator's Manual*.
2. Engine—start
3. Engine—preheat
4. Engine—shut off



decalbatterysymbols

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 away 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



decal133-8062

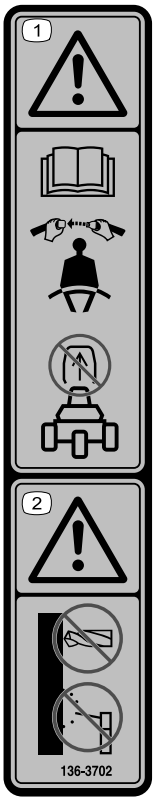
133-8062



decal136-2159

136-2159

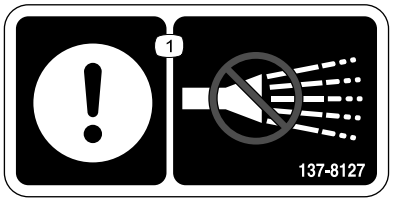
1. Move seat down
2. Slide seat forward
3. Rotate seat



decal136-3702

136-3702

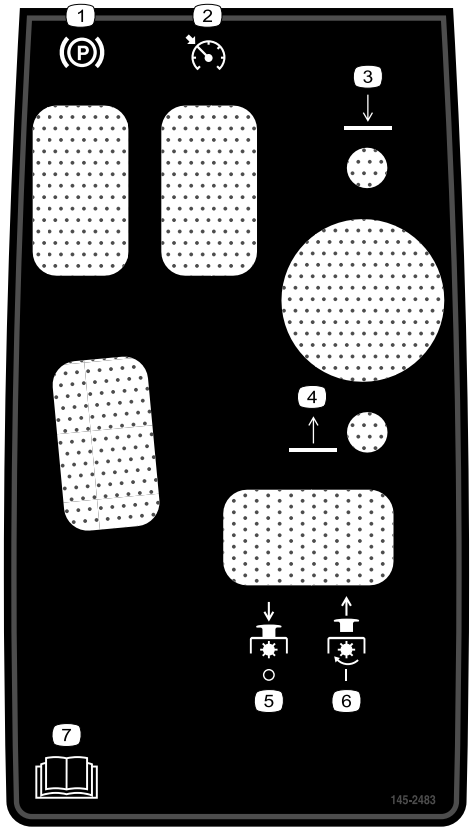
1. Warning—Read the *Operator's Manual*; wear a seatbelt; do not remove the roll bar.
2. Warning—Do not modify the roll bar.



decal137-8127

137-8127

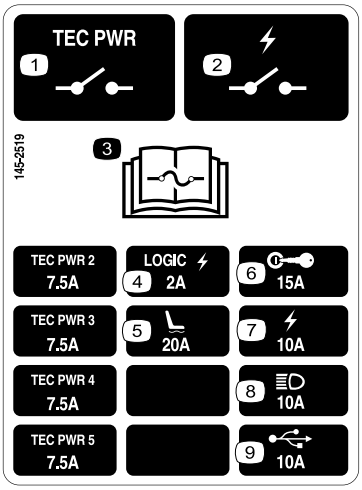
1. Attention—do not spray with high-pressure water.



decal145-2483

145-2483

1. Parking brake
2. Cruise control
3. Lower the cutting units.
4. Raise the cutting units.
5. PTO—Disengage
6. PTO—Engage
7. Read the *Operator's Manual*.



decal145-2519

145-2519

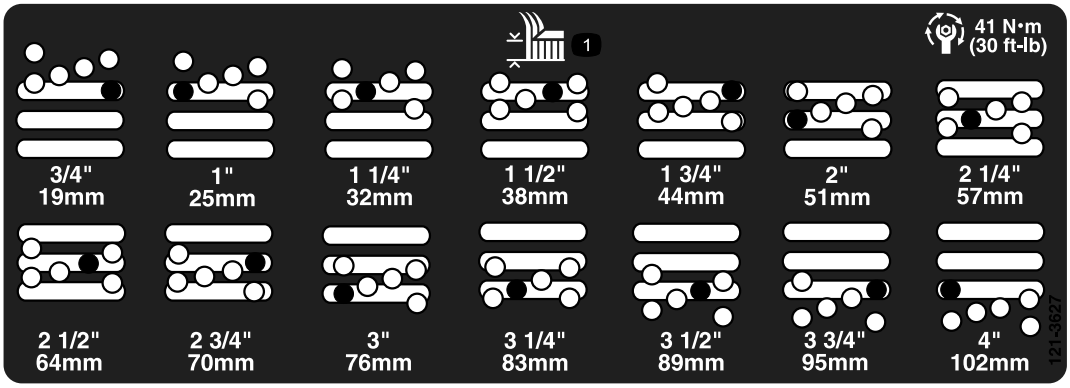
1. TEC power relay
2. Electrical power relay
3. Read the *Operator's Manual* for fuse information.
4. Logic electrical power
5. Air-ride seat
6. Key switch
7. Electrical power
8. Headlights
9. USB power point



decal147-0287

147-0287

1. Torque to 2.82 to 3.16 N·m (25 to 28 in-lb).



decal121-3627

121-3627

1. Height-of-cut settings



decal133-2930

133-2930

1. Warning—do not operate this machine unless you are trained.
2. Warning—wear hearing protection.
3. Thrown object hazard—keep bystanders out of the operating area.
4. Tipping hazard—drive slowly when turning; do not turn sharply while traveling fast; only drive on slopes with the cutting units lowered; always wear a seatbelt.
5. Warning—do not park on slopes; engage the parking brake, lower the cutting units, shut off the engine, and remove the ignition key before leaving the machine.
6. Warning—read the *Operator's Manual*; do not tow the machine.

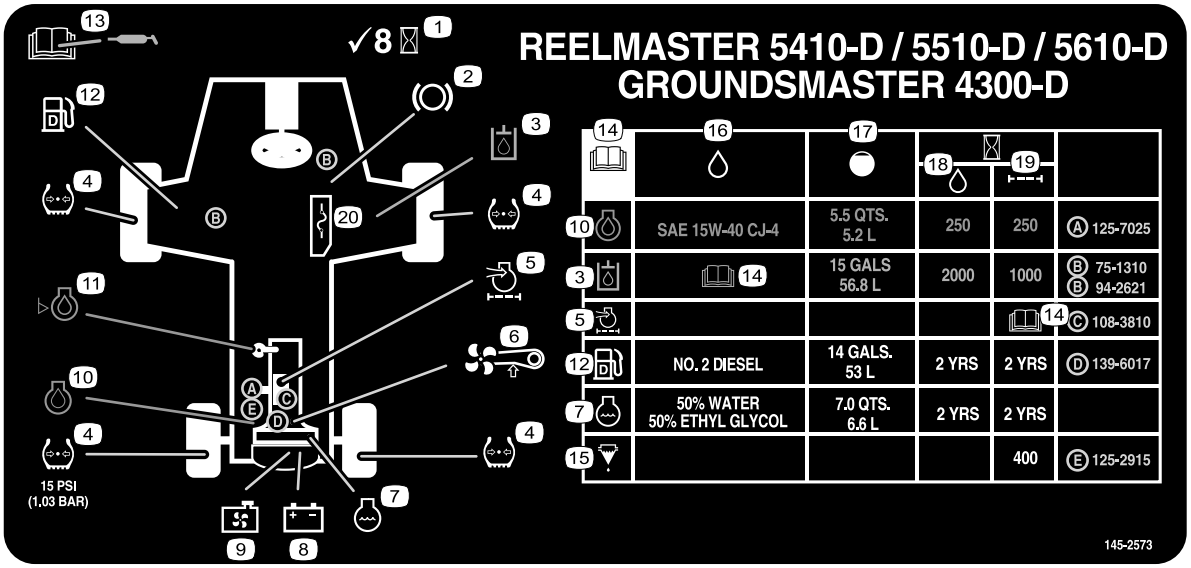


decal133-2931

133-2931

Note: This machine complies with the industry standard stability test in the static lateral and longitudinal tests with the maximum recommended slope indicated on the decal. Review the instructions for operating the machine on slopes in the *Operator's Manual* as well as the conditions in which you would operate the machine to determine whether you can operate the machine in the conditions on that day and at that site. Changes in the terrain can result in a change in slope operation for the machine. If possible, keep the cutting units lowered to the ground while operating the machine on slopes. Raising the cutting units while operating on slopes can cause the machine to become unstable.

1. Warning—read the *Operator's Manual*; do not operate this machine unless you are trained.
2. Warning—wear hearing protection.
3. Thrown object hazard—keep bystanders away.
4. Tipping hazard—do not drive across or down slopes greater than 15°; only drive on slopes with the cutting units lowered; always wear a seatbelt.
5. Warning—do not park on slopes; engage the parking brake, lower the cutting units, shut off the engine, and remove the ignition key before leaving the machine.
6. Warning—read the *Operator's Manual*; do not tow the machine.



decal145-2573

145-2573

1. Check every 8 hours.
2. Brake functions
3. Hydraulic fluid
4. Tire pressure
5. Engine air filter
6. Fan belt
7. Engine coolant
8. Battery
9. Radiator screen
10. Engine oil
11. Engine oil level
12. Fuel
13. Read the *Operator's Manual* for lubrication information.
14. Read the *Operator's Manual*.
15. Fuel/Water separator
16. Fluids
17. Capacity
18. Fluid interval (hours)
19. Filter interval (hours)
20. Fuses

Setup

Loose Parts

Use the chart below to verify that all parts have been shipped.

Procedure	Description	Qty.	Use
1	No parts required	–	Prepare the machine.
2	No parts required	–	Remove shipping blocks and pins.
3	No parts required	–	Adjust the control arm position.
4	No parts required	–	Adjust the machine software (CE machines only).
5	Hood-latch assembly Washer	1 1	Install the hood latch (for CE compliance).
6	CE decal Production year decal Warning decal	1 1 1	Apply the CE decals.
7	No parts required	–	Adjust the roller scraper (optional).
8	No parts required	–	Install the mulching baffle (optional).

Media and Additional Parts

Description	Qty.	Use
Operator's Manual	1	
Engine owner's manual	1	
Declaration of Conformity	1	

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

1

Preparing the Machine

No Parts Required

Checking the Tire Pressure

Check the tire pressure before use; refer to Checking the Tire Pressure (page 23).

Important: **Maintain pressure in all tires to ensure a good quality-of-cut and proper machine performance.** ***Do not underinflate the tires.***

Checking the Fluid Levels

1. Check the engine-oil level before starting the engine; refer to Checking the Engine-Oil Level (page 55).
2. Check the hydraulic-fluid level before starting the engine; refer to Checking the Hydraulic-Fluid Level (page 65).
3. Check the cooling system before starting the engine; refer to Checking the Cooling System (page 63).

Greasing the Machine

Grease the machine before use; refer to Greasing the Bearings and Bushings (page 52). Failure to properly grease the machine results in premature failure of critical parts.

2

Removing the Shipping Blocks and Pins

No Parts Required

Procedure

1. Remove and discard the shipping blocks from the cutting units.
2. Remove and discard the shipping pins from the cutting-unit suspension arms.

   Note: The shipping pins stabilize the cutting units during shipping; remove them before operating the machine.

3

Adjusting the Control Arm Position

No Parts Required

Procedure

You can adjust the control arm position for your comfort.

1. Loosen the 2 bolts securing the control arm to the retaining bracket (Figure 3).

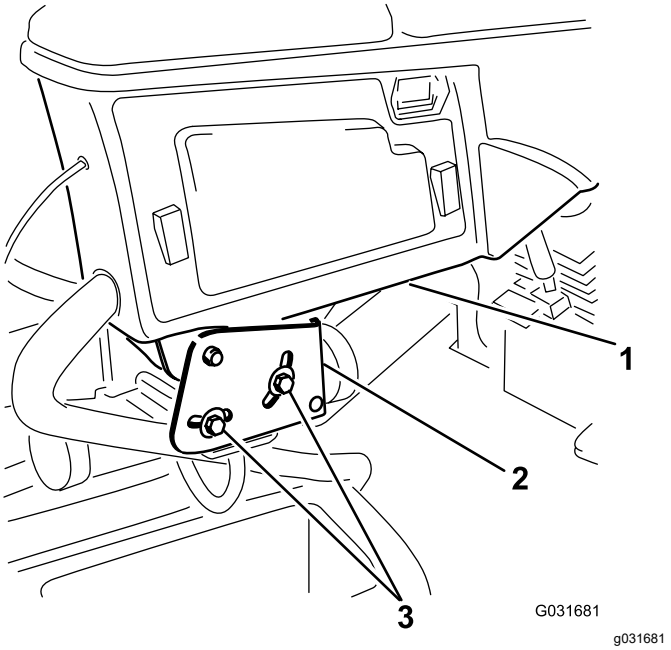


Figure 3

1. Control arm
2. Retaining brackets
3. Bolts (2)

2. Rotate the control arm to the desired position and tighten the 2 bolts.

4

Adjusting the Machine Software (CE Machines Only)

No Parts Required

Procedure

Contact your authorized Toro distributor to set the machine software to the CE mode.

5

Installing the Hood Latch

For CE Compliance

Parts needed for this procedure:

1	Hood-latch assembly
1	Washer

Procedure

1. Unlatch and raise the hood.
2. Remove the rubber grommet from the hole in the left side of the hood (Figure 4).

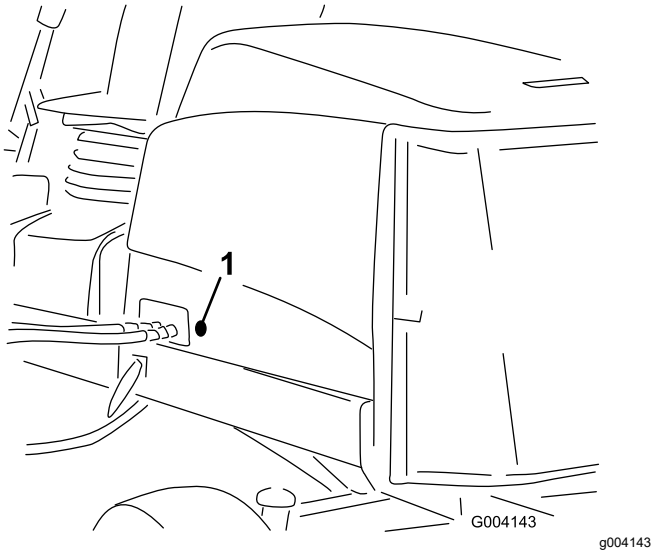


Figure 4

1. Rubber grommet

3. Remove the nut from the hood-latch assembly (Figure 5).

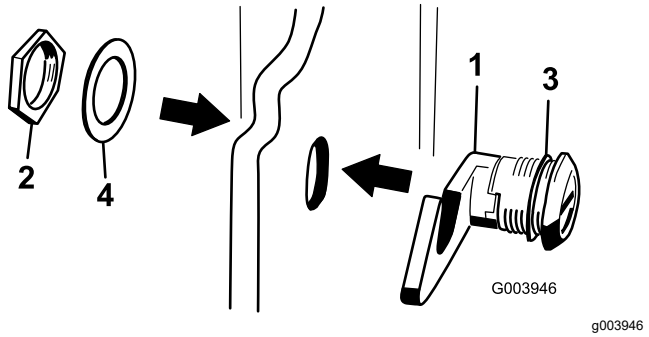


Figure 5

1. Nut
2. Metal washer
3. Hood latch
4. Rubber washer

4. On the outside of the hood, insert the hook end of the latch through the hole in the hood and ensure that the rubber-sealing washer remains to the outer side of the hood (Figure 5).
5. On the inside of the hood, insert the metal washer onto the latch, secure the latch with the nut, and ensure that the latch engages the frame catch when it is locked.

   Note: Use the enclosed hood-latch key to operate the hood latch.

6

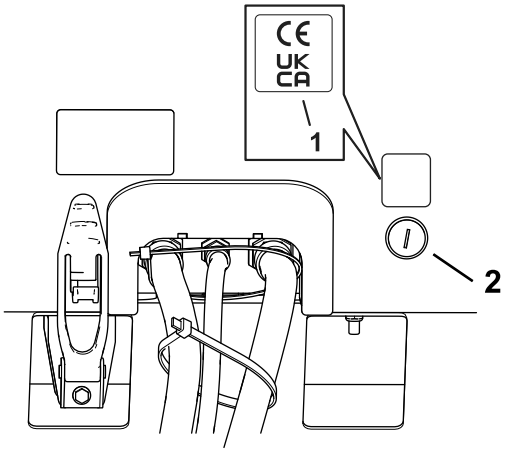
Applying the CE Decals

Parts needed for this procedure:

1	CE decal
1	Production year decal
1	Warning decal

Applying the CE Decal

1. Use rubbing alcohol and a clean rag to clean the area of the hood next to the hood lock, and allow the hood to dry. (Figure 6).



g421402

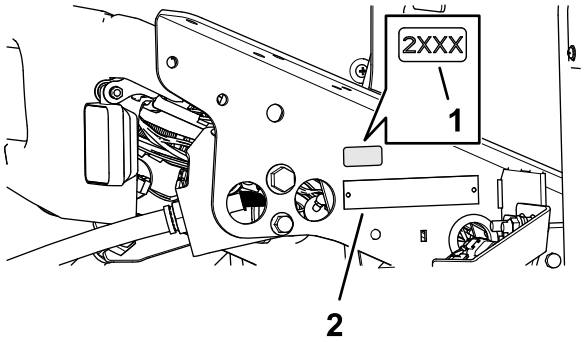
Figure 6

1. CE decal
2. Hood lock

2. Remove the backing from the CE decal.
3. Apply the decal to the hood.

Applying the Year of Production Decal

1. Use rubbing alcohol and a clean rag to clean the floor bracket area next to the serial plate, and allow the bracket to dry (Figure 7).



g375339

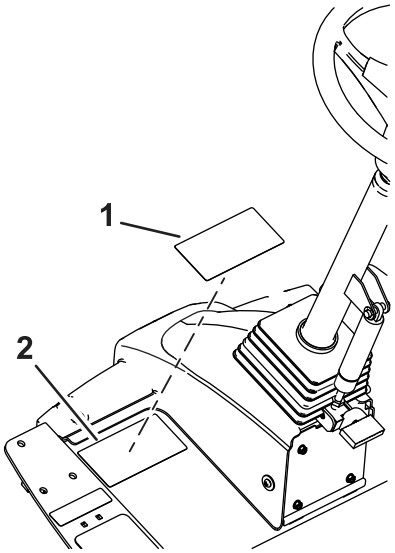
Figure 7

1. Year of production decal
2. Serial plate

2. Remove the backing from the year of production decal.
3. Apply the decal to the floor bracket.

Applying the CE Warning Decal

1. Use rubbing alcohol and a clean rag to clean the surface of warning decal, and allow the decal to dry (Figure 8).



g383678

Figure 8

1. CE warning decal
2. Warning decal 133-2930

2. Remove the backing from the CE warning decal.
3. Apply the CE warning decal over the existing decal.

7

Adjusting the Roller Scraper

Optional

No Parts Required

Procedure

The optional rear roller scraper functions best when there is an even gap of 0.5 to 1 mm (0.02 to 0.04 inch) between the scraper and the roller.

1. Loosen the grease fitting and the mounting screw (Figure 9).

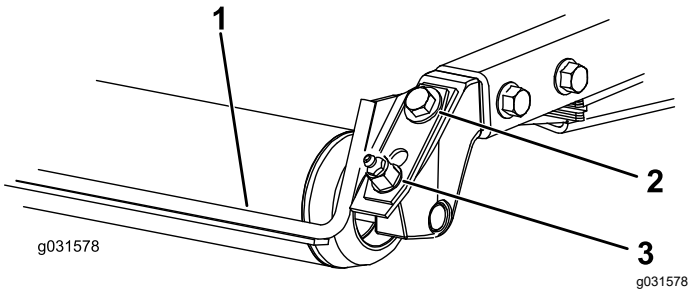


Figure 9

1. Roller scraper
2. Mounting screw
3. Grease fitting

2. Slide the scraper up or down until you obtain a gap of 0.5 to 1 mm (0.02 to 0.04 inch) between the rod and the roller.
3. Tighten the grease fitting and screw to 41 N·m (30 ft-lb) in an alternating sequence.

8

Installing the Mulching Baffle

Optional

No Parts Required

Procedure

Contact your authorized Toro distributor for the correct mulching baffle.

1. Thoroughly clean debris from the mounting holes on the rear wall and left wall of the chamber.
2. Install the mulching baffle in the rear opening and secure it with 5 flange-head bolts (Figure 10).

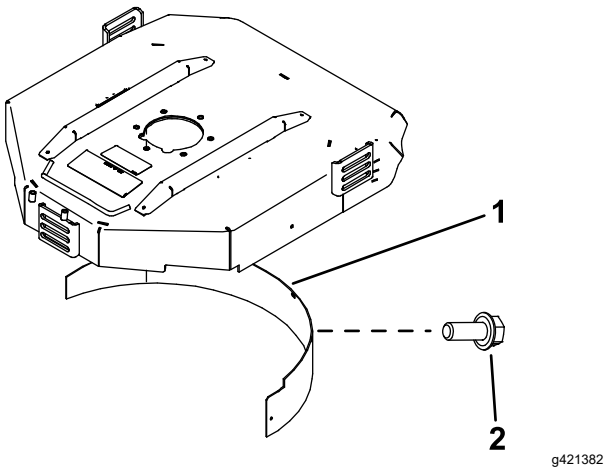


Figure 10

1. Mulching baffle
2. Flange-head bolt

3. Verify that the mulching baffle does not interfere with the tip of the blade and does not protrude inside the surface of the rear chamber wall.

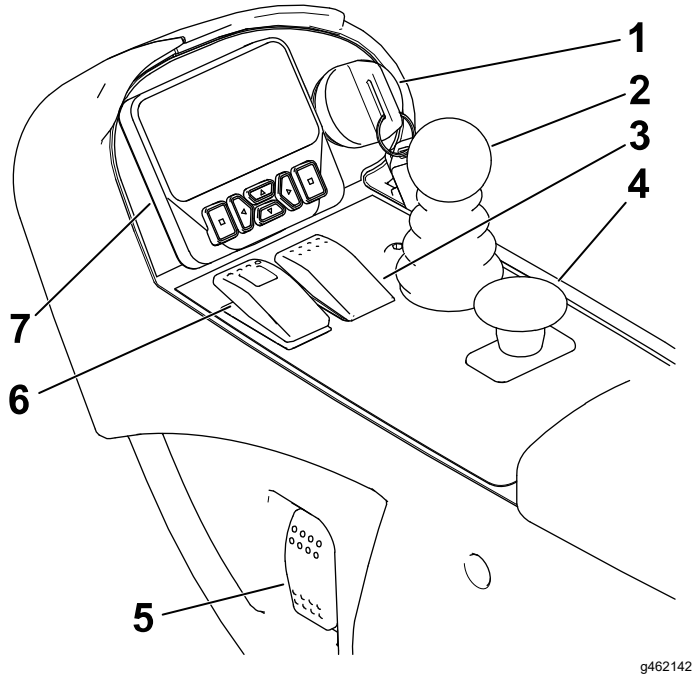
⚠ DANGER

Using the high-lift blade with the mulching baffle could cause the blade to break, resulting in personal injury or death.

Do not use the high-lift blade with the baffle.

Product Overview

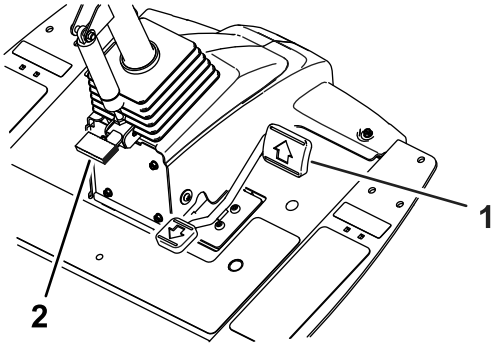
Controls



g462142

Figure 11

1. Key switch
2. Lower mow/raise control lever
3. Cruise control
4. PTO switch
5. Headlight switch
6. Parking brake switch
7. InfoCenter display



g383839

Figure 12

1. Traction pedal
2. Tilt steering pedal

Automotive-Style Throttle

Note: This machine does not have a lever or switch to control the engine speed.

When the PTO is engaged to start spinning the cutting units, the machine automatically changes the engine speed to high idle and stays there until the cutting units are disengaged.

When the PTO is not engaged, the machine's throttle is dependent on the position of the traction pedal, just like the throttle on a car.

Traction Pedal

The traction pedal (Figure 12) controls the forward and reverse operation. Press the top of the pedal to move forward and the bottom to move backward.

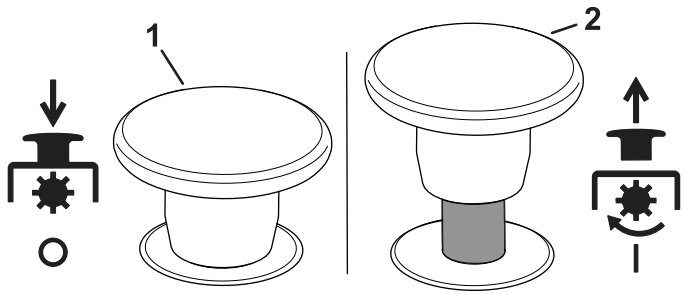
Note: In emergency braking situations, remove your foot from the traction pedal and then pivot the parking-brake switch forward (Figure 11).

Power-takeoff (PTO) Switch

When the PTO switch is engaged, the machine is in MOW mode, which allows you to drive up to 13 km/h (8 mph) when the maximum speed is not limited.

When the PTO switch is not engaged (Figure 11), the machine is in TRANSPORT mode, which allows you to drive up to 16 km/h (10 mph) when the maximum speed is not limited.

Note: Use the protected menus in the InfoCenter to set the maximum speed for each mode.



g424477

Figure 13

1. Disengaged
2. Engaged

Parking Brake

To engage the parking brake, (Figure 11) pivot the switch forward on the console. The red light on the switch turns on when it is set. To release the parking brake, pivot the switch backward.

Activating the parking-brake switch causes the traction to automatically decelerate, regardless of traction pedal position, and engage the parking brake as soon as the machine comes to a stop.

Once the engine has been shut off and the machine is not moving, the parking brake engages, regardless of parking-brake switch position.

Tilt-Steering Pedal

To tilt the steering wheel toward you, press the foot pedal down, pull the steering tower toward you to the most comfortable position, and release the pedal (Figure 12). To move the steering wheel away from you, press the foot pedal and release it when the steering wheel reaches the desired operating position.

Lower Mow/Raise Control Lever

This lever (Figure 11) raises and lowers the cutting units.

To lower the cutting units, push the lever forward. When the PTO switch is ENGAGED, the machine is in MOW mode, and the cutting units will start spinning when lowered.

Note: Ensure that you lower the cutting units **after** the PTO switch has been engaged to start the cutting units. When you lower the cutting units before the PTO switch is engaged, they do not start spinning.

To fully raise the cutting units, pull the lever backward. When the cutting units are raised and the PTO switch is disengaged, the machine is in TRANSPORT mode.

Key Switch

The key switch (Figure 11) has 3 positions: OFF, ON/PREHEAT, and START.

Headlight Switch

Pivot the switch upward to turn on the headlights (Figure 11).

Hydraulic-Filter-Restriction Indicator

The hydraulic-filter-restriction indicator alerts you when the hydraulic filters must be changed; refer to Replacing the Hydraulic Filters (page 67).

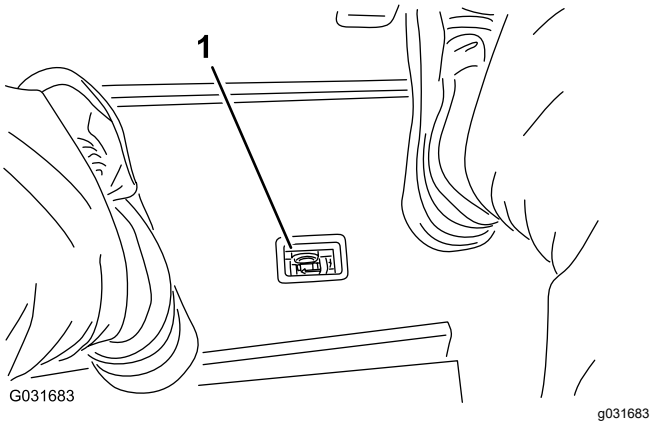


Figure 14

1. Hydraulic-filter-restriction indicator

Power Point

The power point (Figure 15) is a 12 V power supply for electronic devices.

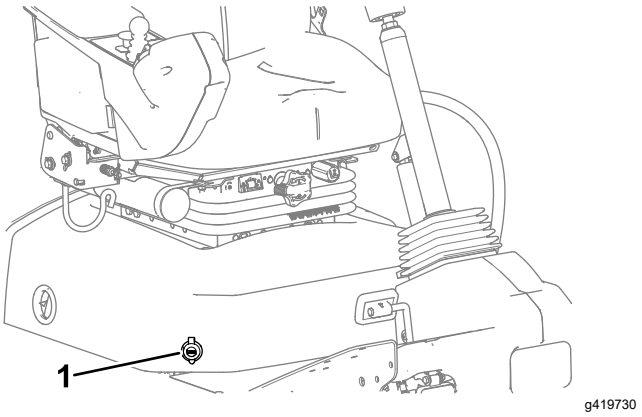


Figure 15

1. Power point

Seat Controls

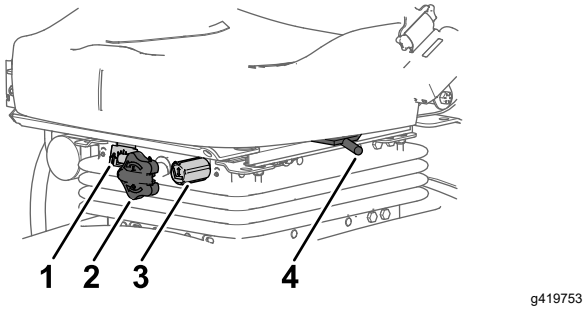


Figure 16

1. Weight gauge
2. Weight-adjusting knob
3. Height-adjusting knob
4. Adjusting lever

Seat-Position Lever

Pull the seat-position lever (Figure 16) to move the seat forward and rearward. Release the lever to lock the seat position.

Weight-Adjusting Knob

Rotate the weight-adjusting knob until your weight is displayed in the window of the weight gauge.

Height-Adjusting Knob

Rotate the height-adjusting knob to change the height of the seat.

InfoCenter

The InfoCenter LCD display shows information about your machine, such as the operating status, various diagnostics, and other information about the machine (Figure 11).

The screens that display, depend on which buttons you select. The purpose of each button may change depending on what is required at the time.

Specifications

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

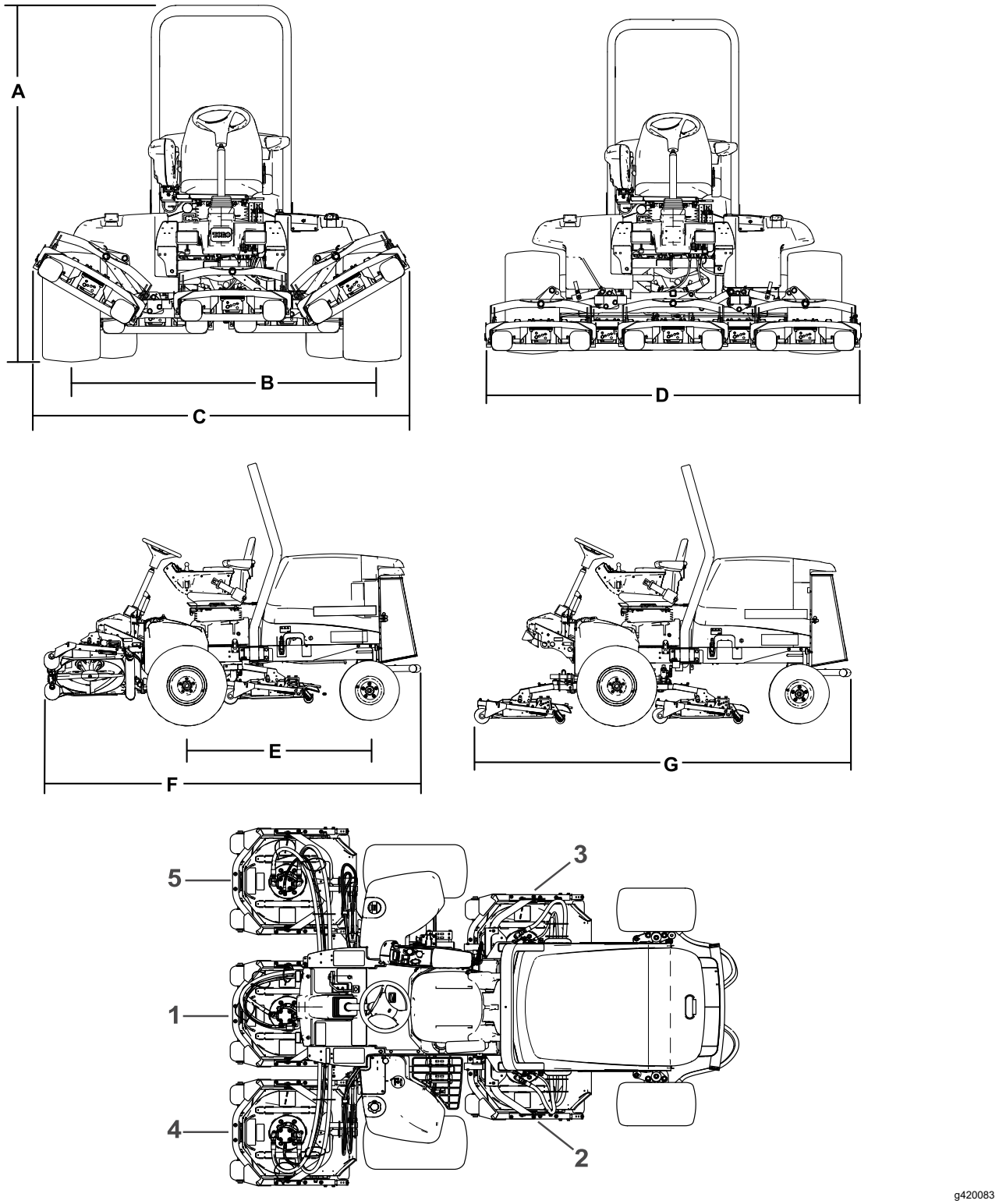


Figure 17

1. Cutting unit 1
2. Cutting unit 2
3. Cutting unit 3
4. Cutting unit 4
5. Cutting unit 5

Description	Figure 17 reference	Dimension or Weight
Overall height	A	217 cm (85.5 inches)
Wheel tread (tire center to center) rear	B	185 cm (72.5 inches)
Overall width (transport position)	C	231 cm (91 inches)
Overall width (mowing position)	D	247 cm (97 inches)
Wheel base	E	152 cm (60 inches)
Overall length (transport position)	F	315 cm (124 inches)
Overall length (mowing position)	G	315 cm (124 inches)
Fuel-tank capacity		53 L (14 US gallons)
Transport speed		0 to 16 km/h (0 to 10 mph)
Mowing speed		0 to 13 km/h (0 to 8 mph)
Net weight (with cutting decks and fluids)		1492 kg (3,289 lb)

Attachments/Accessories

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

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

Operation

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

Before Operation

Before Operation Safety

General Safety

- Never allow children or untrained people to operate or service the machine. Local regulations may restrict the age of the operator. The owner is responsible for training all operators and mechanics.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- Shut off the engine, remove the key, and wait for all movement to stop before you leave the operator's position. Allow the machine to cool before adjusting, servicing, cleaning, or storing it.
- Know how to stop the machine and shut off the engine quickly.
- Check that operator-presence controls, safety switches, and guards are attached and functioning properly. Do not operate the machine unless they are functioning properly.
- Before mowing, always inspect the machine to ensure that the blades, blade bolts, and cutting assemblies are in good working condition. Replace worn or damaged blades and bolts in sets to preserve balance.
- Inspect the area where you will use the machine and remove all objects that the machine could throw.
- This product generates an electromagnetic field. If you wear an implantable electronic medical device, consult your health care professional before using this product.

Fuel Safety

- Use extreme care in handling fuel. It is flammable and its 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 fill the fuel tank while the engine is running or hot.
- Do not add or drain fuel in an enclosed space.
- 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 other appliance.
- If you spill fuel, do not attempt to start the engine; avoid creating any source of ignition until the fuel vapors have dissipated.

Filling the Fuel Tank

Fuel Tank Capacity

53 L (14 US gallons)

Fuel Specification

Important: **Use only ultra-low sulphur diesel fuel. Fuel with higher rates of sulfur degrades the diesel oxidation catalyst (DOC), which causes operational problems and shortens the service life of engine components.**

Failure to observe the following cautions may damage the engine.

- Never use kerosene or gasoline instead of diesel fuel.
- Never mix kerosene or used engine oil with the diesel fuel.
- Never keep fuel in containers with zinc plating on the inside.
- Do not use fuel additives.

Petroleum Diesel

Cetane rating: 45 or higher

Sulfur content: Ultra-low sulfur (<15 ppm)

Fuel Table

Diesel fuel specification	Location
ASTM D975 No. 1-D S15 No. 2-D S15	USA
EN 590	European Union
ISO 8217 DMX	International
JIS K2204 Grade No. 2	Japan
KSM-2610	Korea

- Use only clean, fresh diesel fuel or biodiesel fuels.
- Purchase fuel in quantities that can be used within 180 days to ensure fuel freshness.

Use summer-grade diesel fuel (No. 2-D) at temperatures above -7°C (20°F) and winter-grade fuel (No. 1-D or No. 1-D/2-D blend) below that temperature.

Note: Use of winter-grade fuel at lower temperatures provides lower flash point and cold flow characteristics which eases starting and reduces fuel filter plugging.

Using summer-grade fuel above -7°C (20°F) contributes toward longer fuel pump life and increased power compared to winter-grade fuel.

Biodiesel

This machine can also use a biodiesel blended fuel of up to B20 (20% biodiesel, 80% petroleum diesel).

Sulfur content: Ultra-low sulfur (<15 ppm)

Biodiesel fuel specification: ASTM D6751 or EN14214

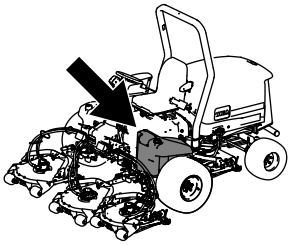
Blended fuel specification: ASTM D975, EN590, or JIS K2204

Important: **The petroleum diesel portion must be ultra-low sulfur.**

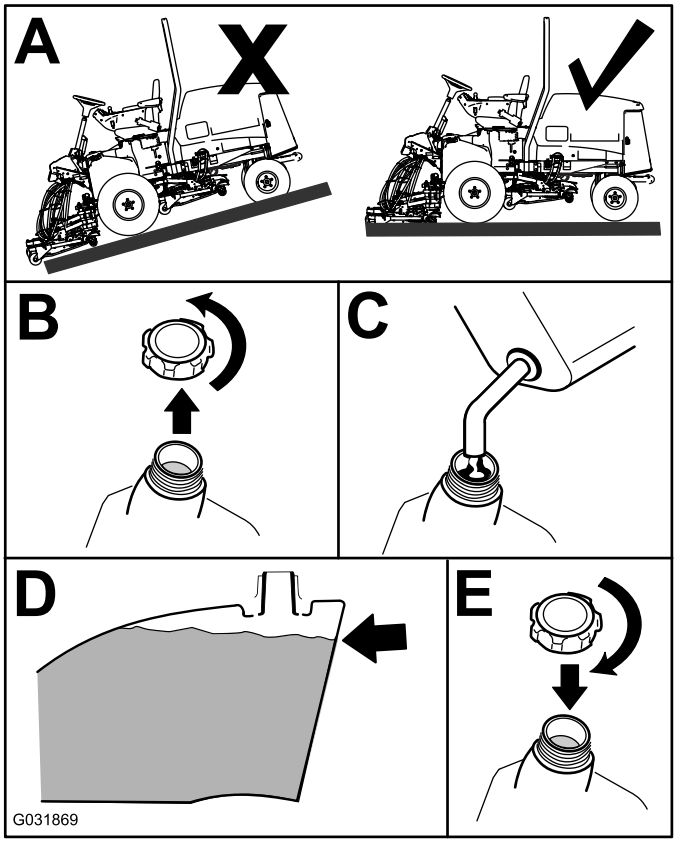
Observe the following precautions:

- Biodiesel blends may damage painted surfaces.
- Use B5 (biodiesel content of 5%) or lesser blends in cold weather.
- Monitor seals, hoses, gaskets in contact with fuel as they may be degraded over time.
- Fuel filter plugging may be expected for a time after converting to biodiesel blends.
- Contact your authorized Toro distributor for more information on biodiesel.

Adding Fuel



g194207



g031869

Figure 18

Fill the tank to about 6 to 13 mm (1/4 to 1/2 inch) below the top of the tank, not the filler neck, with Number 2-D diesel fuel.

Note: If possible, fill the fuel tank after each use; this will minimize possible buildup of condensation inside the fuel tank.

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 55).

Checking the Cooling System

Before you start the engine and use the machine, check the cooling system; refer to Checking the Cooling System (page 23).

Checking the Hydraulic System

Before you start the engine and use the machine, check the hydraulic system; refer to Checking the Hydraulic-Fluid Level (page 65).

Draining the Water Separator

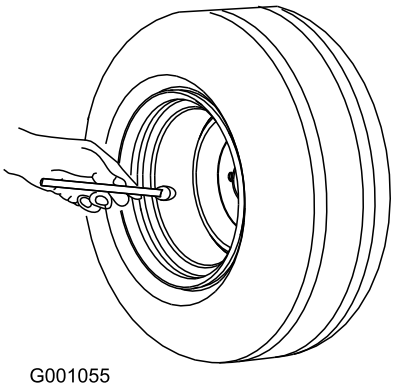
Drain water or other contaminants from the water separator; refer to Draining Water from the Fuel/Water Separator (page 57).

Checking the Tire Pressure

Service Interval: Before each use or daily

The correct air pressure in the front and rear tires is 83 to 103 kPa (12 to 15 psi).

Important: **Maintain pressure in all tires to ensure a good quality of cut and proper machine performance.** ***Do not under-inflate the tires.*** **Check the air pressure in all the tires before operating the machine.**



G001055

g001055

Figure 19

Checking the Torque of the Wheel-Lug Nuts

Service Interval: After the first hour

After the first 10 hours

Every 250 hours

⚠ WARNING

Failure to maintain the proper torque of the wheel nuts could result in failure or loss of a wheel, and may result in personal injury.

Torque the front and rear-wheel nuts to 94 to 122 N·m (70 to 90 ft-lb) at the recommended service intervals.

Adjusting the Height of Cut

Important: **The cutting units often cut approximately 6 mm (1/4 inch) lower than a reel cutting unit with the same bench setting. It may be necessary to set the cutting-unit bench measurement at 6 mm (1/4 inch) above that of reel cutting units cutting in the same area.**

Important: **Access to the rear cutting units is greatly improved by removing the cutting unit from the machine. Lower the cutting units and remove the cutting units from the frames by removing these bolts and pins shown in Figure 20.**

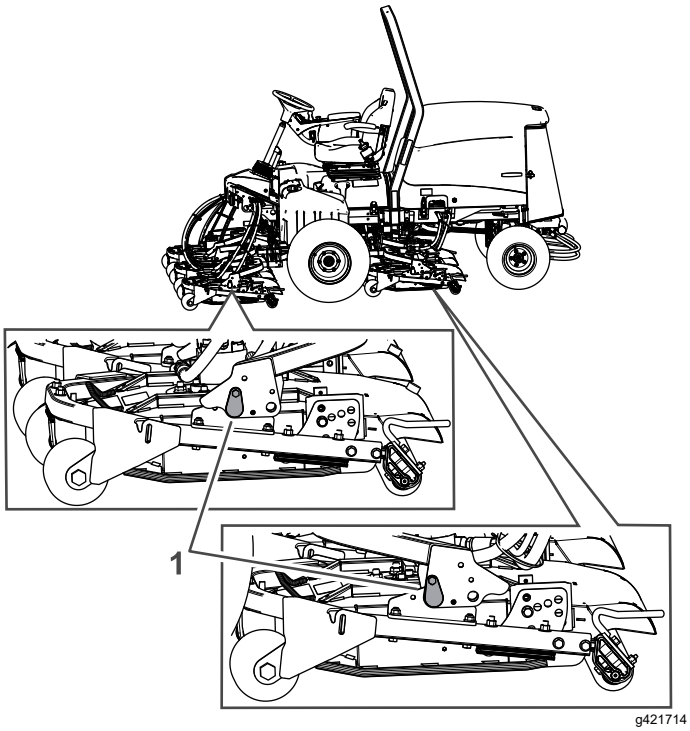


Figure 20

1. Bolt and pin

1. Park the machine on a level surface, engage the parking brake, lower the cutting unit to the ground, shut off the engine, and remove the key.
2. Loosen the bolt securing each height-of-cut bracket to the height-of-cut plate (front and each side) as shown in Figure 21.
3. Beginning with front adjustment, remove the bolt.

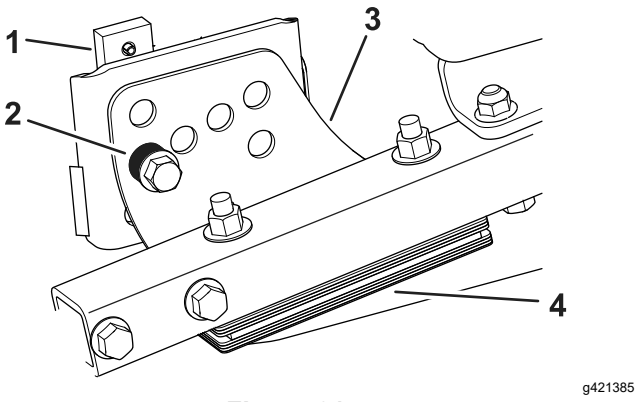


Figure 21

1. Height-of-cut plate
2. Spacer
3. Height-of-cut bracket
4. Shims

4. While supporting the chamber, remove the spacer (Figure 21).
5. Move the chamber to the desired height of cut and install a spacer into the designated height-of-cut hole and slot (Figure 22).

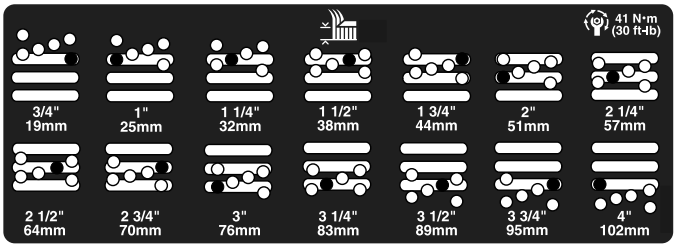


Figure 22

6. Position the tapped plate in-line with the spacer.
7. Install the bolt finger-tight.
8. Repeat steps 4 through 7 for each side adjustment.
9. Torque all 3 bolts to 41 N·m (30 ft-lb). Always tighten the front bolt first.

   Note: Adjustments of more than 3.8 cm (1-1/2 inches) may require temporary assembly to an intermediate height to prevent binding (e.g., changing from 3.1 to 7 cm (1-1/4 to 2-3/4 inches) height of cut).

Checking the Interlock Switches

Service Interval: Before each use or daily

⚠ 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.**

Important: **If your machine fails any of the interlock switch checks, contact your authorized Toro distributor.**

Preparing the Machine

1. Drive the machine slowly to an open area.
2. Lower the cutting units, shut off the engine, and engage the parking brake.

Checking the Traction Pedal Start-Interlock

1. Sit in the operator's seat.
2. Engage the parking brake.
3. Press the PTO switch to the DISENGAGE position.
4. Press the traction pedal.
5. Rotate the key to the START position.

   Note: The engine should not start with the traction pedal pressed.

Checking the PTO-Start Interlock

1. Sit in the operator's seat.
2. Pull up the PTO switch to the ENGAGE position.
3. Rotate the key to the START position.

   Note: The engine should not start with the PTO switch in the ENGAGE position.

Checking the PTO-Run Interlock

1. Sit in the operator's seat.
2. Press the PTO switch to the DISENGAGE position.
3. Start the engine.
4. Pull up the PTO switch to the ENGAGE position.
5. Lower the cutting units to engage the PTO.
6. Rise from the seat.

Note: The PTO should not run when you are out of the operator's seat.

Note: Do not allow the cutting units to spin for more than a couple seconds during this test to prevent unnecessary wear.

Checking the Parking Brake and Traction Pedal Run-Interlock

1. Sit in the operator's seat.
2. Engage the parking brake.
3. Press the PTO switch to the DISENGAGE position.
4. Start the engine.
5. Press the traction pedal.

   Note: There should be no machine response when you press the traction pedal while the parking brake is engaged. An advisory message should appear on the InfoCenter.

Checking the Automatic Parking Brake Engage

1. Sit in the operator's seat.
2. Start the engine.
3. Disengage the parking brake.
4. Rise from the seat.

   Note: The red light on the parking-brake switch should illuminate when you are out of the operator's seat, indicating that the parking brake is on.

Checking the Cutting Unit Lower Disable Interlock

1. Sit in the operator's seat.
2. Start the engine.
3. Ensure that the cutting units are lifted to the transport position.
4. Rise from the seat.
5. Lower the cutting units.

   Note: The cutting units should not lower when you are out of the operator's seat.

Checking the Blade Stopping Time

Service Interval: Before each use or daily

The blades of the cutting unit should come to a complete stop in approximately 5 seconds after you shut down the cutting-unit-engagement switch.

Note: Make sure that the cutting units are lowered onto a clean section of turf or hard surface to avoid thrown dust and debris.

1. Have a second person stand back from the cutting unit at least 6 m (20 feet) and watch the blades on 1 of the cutting unit.
2. While the cutting units are engaged and spinning at full speed, disengage the PTO switch and record the time it takes for the blades to come to a complete stop.

   Note: If this time is greater than 7 seconds, the braking valve needs adjustment. Call your authorized Toro distributor for assistance in making this adjustment.

Selecting a Blade

Standard Combination Sail

This blade was designed to provide excellent lift and dispersion in almost any condition. If more or less lift and discharge velocity is required, consider a different blade.

Attributes: Excellent lift and dispersion in most conditions

Angled Sail (Not CE Compliant)

The blade generally performs best in lower heights of cut—1.9 to 6.4 cm (3/4 to 2-1/2 inches).

Attributes:

- Discharge remains more even at lower heights of cut.
- Discharge has less tendency to throw left and thus a cleaner look around bunkers and fairways.
- Lower power requirement at lower heights and dense turf.

High-Lift Parallel Sail (Not CE Compliant)

The blade generally performs better in the higher heights of cut—7 to 10 cm (2 to 4 inches).

Attributes:

- More lift and higher discharge velocity
- Sparse or limp turf is picked up significantly at higher heights of cut
- Wet or sticky clippings are discharged more efficiently reducing congestion in the cutting unit.
- Requires more horsepower to run
- Tends to discharge further left and can tend to windrow at lower heights of cut

⚠ WARNING

Using a high-lift blade with the mulching baffle could cause the blade to break, resulting in personal injury or death.

Do not use the high-lift blade with the mulching baffle.

Atomic Blade

This blade was designed to provide excellent leaf mulching.

Choosing Accessories

Optional Equipment Configurations

	Angle Sail Blade	**High-Lift, Parallel-Sail Blade** ***(Do not use with the mulching baffle)*** (Not CE Compliant)	**Mulching Baffle**	**Roller Scraper**
Grass Cutting: 1.9 to 4.4 cm (3/4 to 1-3/4 inches) height of cut	Recommended in most applications	May work well in light or sparse turf	Has been shown to improve dispersion and after-cut performance on northern grasses that are cut at least 3 times per week and less than 1/3 of the grass blade is removed. ***Do not use with the high-lift, parallel-sail blade***	Use it whenever the rollers build up with grass or large, flat grass clumps of grass are seen. The scrapers may increase clumping in certain applications.
Grass Cutting: 5 to 6.4 cm (2 to 2-1/2 inches) height of cut	Recommended for thick or lush turf	Recommended for light or sparse turf		
Grass Cutting: 7 to 10 cm (2-3/4 to 4 inches) height of cut	May work well in lush turf	Recommended in most applications		
Leaf Mulching	Recommended for use with the mulching baffle	**Not Allowed**	Use with combination sail or angle sail blade only	
Pros	Even discharge at lower height of cut; cleaner look around bunkers and fairways; lower power requirements	More lift and higher discharge velocity; sparse or limp turf is picked up at high height of cut; wet or sticky clippings are discharged efficiently	May improve dispersion and appearance in certain grass cutting applications; very good for leaf mulching	Reduces roller buildup in certain applications
Cons	Does not lift the grass well in high height-of-cut applications; wet or sticky grass has a tendency to build up in the chamber, leading to poor quality of cut and higher power requirements	Requires more power to run in some applications; tends to windrow at lower height of cut in lush grass; do not use with the mulching baffle	Grass will build up in the chamber if you attempt to remove too much grass with the baffle in place	

Overview of the InfoCenter Display

The display shows information about your machine such as the operating status, various diagnostics and other information about the machine. There are multiple screens on the display. You can switch between the screens, at any time, by pressing any of the display buttons and then selecting the appropriate directional arrow.

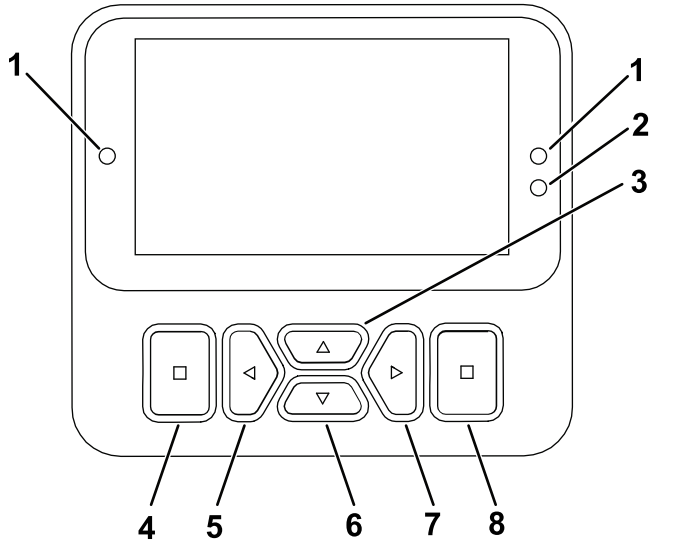


Figure 23

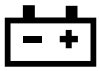
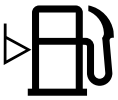
1. Indicator light
2. Display brightness sensor
3. Navigational button— up
4. Back/exit button
5. Navigational button— decrease/ left
6. Navigational button— down
7. Navigational button— increase/ right
8. Enter/select button

Note: The purpose of each button may change depending on what is required at the time. Each button is labeled with an icon displaying its current function.

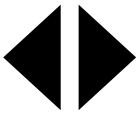
InfoCenter Icon Description

	Hour meter
	Service is due.
n/min	The status of the engine speed (rpm)
	Virtual pedal stop settings
	The glow plugs are active.
	The operator must sit in the seat.
P	The parking brake is engaged.
	Engine coolant temperature (°C or °F)
	Traction or Traction Pedal
	Start the engine.
	The cruise control is engaged.
	Engine
	Warm-up mode
	Reset-standby regeneration request
	Parked or recovery regeneration request
ACK	A parked or recovery regeneration is processing.
	High exhaust temperature

InfoCenter Icon Description (cont'd.)

	NOx control diagnosis malfunction; drive the machine back to the shop and contact your authorized Toro distributor (software version U and later).
	The power take-off is disabled.
	The PTO is on.
	Battery
	Fuel level
	Fuel is low.
	Warning
	Active
	Inactive
	Previous
	Next
	Increase
	Decrease
	Previous screen
	Next screen
	Increase value
	Decrease value

InfoCenter Icon Description (cont'd.)

	Menu
	Scroll up/down
	Scroll left/right
	Locked

🔒 Accessible only by entering PIN

Using the Menus

To access the InfoCenter menu system, press the menu access button while at the main screen. This brings you to the main menu. Refer to the following tables for a synopsis of the options available from the menus:

Main Menu—Menu Item	Description
Faults	The Faults menu contains a list of the recent machine faults. Refer to the *Service Manual* or contact your authorized Toro distributor for more information on the Faults menu and the information contained there.
Service	The Service menu contains information on the machine such as hours of use, counters, and other similar numbers.
Diagnostics	The Diagnostics menu displays the state of each machine switch, sensor, and control output. You can use this to troubleshoot certain issues as it quickly tells you which machine controls are ON and which are OFF.
Settings	The Settings menu allows you to customize and modify configuration variables on the display.
Machine Settings	The Machine Settings menu allows you to adjust the acceleration, speed, and counterbalance thresholds.
About	The About menu lists the model number, serial number, and software version of your machine.

Service—Menu Item	Description
Hours	Lists the total number of hours that the machine, engine, and PTO have been on, as well as the number of hours the machine has been transported and service due.
Counts	Lists numerous counts the machine has experienced.
Traction Pedal🔒	
Traction Pump🔒	
Virtual Speed Sensor🔒	
DPF Regeneration	The diesel particulate filter regeneration option and DPF submenus

Diagnostics—Menu Item	Description
Deck	Indicates the inputs and outputs for raising and lowering the cutting units.
Traction	Indicates the inputs and outputs for the traction pedal.
Cutting Units	Indicates the inputs, qualifiers, and outputs for raising and lowering the cutting units.
PTO	Indicates the inputs, qualifiers, and outputs for enabling the PTO circuit.
Engine	Indicates the inputs, qualifiers, and outputs for starting the engine
CAN Statistics🔒	Indicates the inputs and outputs for the CAN.

Settings—Menu Item	Description
Enter PIN	Allows a person (superintendent/mechanic) authorized by your company with the PIN code to access protected menus.
Backlight	Controls the brightness of the LCD display.
Language	Controls the language used on the InfoCenter*.
Font Size	Controls the size of the font on the display.
Units	Controls the units used on the InfoCenter (English or Metric).
Protected Menus🔒	Allows a person authorized by your company with the PIN code to access protected menus
Protect Settings🔒	Allows the ability to change the settings in the protected settings.

Note: The Machine Settings menu will only show when the PIN is entered.

Machine Settings—Menu Item🔒	Description
Mow Speed 🔒	Controls the maximum speed while in mow (low range).
Transport Speed🔒	Controls the maximum speed while in transport (high range).
Smart Power🔒	Turns Smart Power on and off.
Counterbalance 🔒	Controls the amount of counterbalance applied by the cutting units.
Acceleration 🔒	Low, Medium, and High settings control how quickly the traction speed reacts when you move the traction pedal.

🔒Protected under Protected Menus—accessible only by entering PIN

About—Menu Item	Description
Model	Lists the model number of the machine.
SN	Lists the serial number of the machine.
Machine Controller Revision	Lists the software revision of the master controller.
S/W Revision	Lists the software revision of the primary controller.
InfoCenter Revision🔒	Lists the software revision of the InfoCenter

Protected Menus

There are operating configuration settings that are adjustable within the SETTINGS of the InfoCenter. To lock these settings, use the PROTECTED MENU.

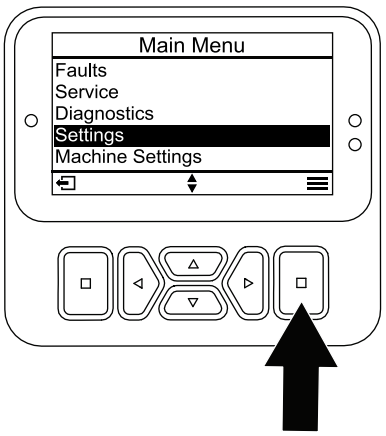
Note: At the time of delivery, the initial password code is programmed by your distributor.

Accessing Protected Menus

Note: The factory default PIN code for you machine is either 0000 or 1234.

If you changed the PIN code and forgot the code, contact your authorized Toro distributor for assistance.

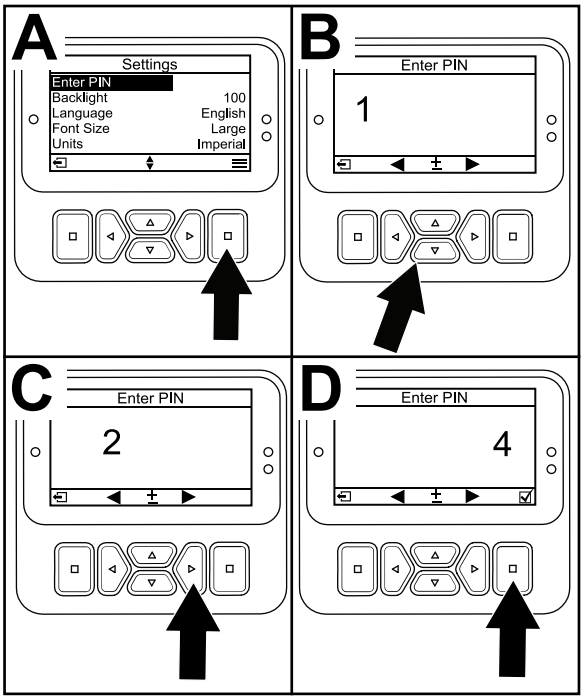
1. From the MAIN MENU, scroll down to the SETTINGS menu and press the select button (Figure 24).



g471349

Figure 24

2. In the SETTINGSmenu, scroll to the ENTEER PIN and press the select button (Figure 25A).



g471350

Figure 25

3. To enter the PIN code, press the up/down navigation buttons until the correct first digit appears, then press the right navigation button to move on to the next digit (Figure 25B and Figure 25C). Repeat this step until the last digit is entered.
4. Press the select button.

   Note: If the display accepts the PIN code and the protected menu is unlocked, the word “PIN” displays in the upper right corner of the screen.
5. To lock the protected menu, rotate the key switch to the OFF position and then to the ON position.

Viewing and Changing the Protected Menu Settings

1. In SETTINGS, scroll down to PROTECT SETTINGS.
2. To view and change the settings without entering a PIN code, use the select button to change the PROTECT SETTINGS to ☐ (Off).
3. To view and change the settings with a PIN code, use the select button to change the PROTECT SETTINGS to ☑ (On), set the PIN code, and turn the key in the ignition switch to the OFF position and then to the ON position.

Setting the Service Due Timer

The service due timer resets the service due hours after a scheduled maintenance procedure is performed.

1. In SETTINGS , scroll to ENTER PIN and press the select button.
2. Enter PIN; refer to Accessing Protected Menus.
3. In SERVICE , navigate to HOURS and press the select button.
4. Scroll down to SERVICE DUE.

   Note: If service is currently due, NOW appears next to SERVICE DUE.
5. Highlight the service interval and press the select button.

   Note: The service interval (250 Hrs, 500 Hrs, etc) is located next to SERVICE DUE. Service interval is a protected menu item.
6. When the RESET SERVICE TIMER? screen appears, press the select button for YES or the back button for NO.
7. After you select YES, the interval screen clears and reverts back to the service hours selections.

Setting the Maximum Allowed Mow Speed

The selected setting is displayed as an X on the traction-speed bar graph along with the cruise control and pedal stop settings. An X in a bar shows you that the maximum speed is limited by the supervisor (Figure 29).

Note: This setting is retained in memory and applied to the traction speed until you change it.

1. In MACHINE SETTINGS, scroll down to MOW SPEED.
2. Use the left and right navigation buttons to increase the maximum mow speed in 0.8 km/h (0.5 mph) increments between 1.6 and 12.9 km/h (1.0 and 8.0 mph).

Setting the Maximum Allowed Transport Speed

The selected setting is displayed as an X on the traction-speed bar graph along with the cruise control and pedal stop settings. An X in a bar shows you that the maximum speed is limited by the supervisor (Figure 29).

Note: This setting is retained in memory and applied to the traction speed until you change it.

1. In MACHINE SETTINGS, scroll down to TRANSPORT SPEED.
2. Use the left and right navigation buttons to increase the maximum transport speed in 0.8 km/h (0.5 mph) increments between 8.0 and 16.0 km/h (5.0 and 10.0 mph).

Turning the Smart Power ON/OFF

1. In SETTINGS, scroll down to SMART POWER.
2. Press the right navigation button to switch between ON and OFF.

Setting the Counterbalance

1. In MACHINE SETTINGS, scroll down to COUNTERBALANCE.
2. Press the right navigation button to select counterbalance and change between the LOW, MEDIUM, and HIGH settings.

Setting the Acceleration Mode

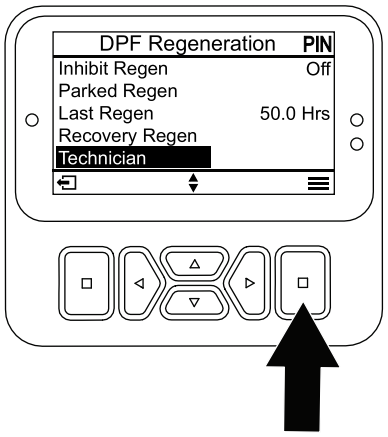
1. In MACHINE SETTINGS, scroll down to ACCELERATION.
2. Press the right navigation button to switch between LOW, MEDIUM, and HIGH.

Accessing the Technician Menu

Note: For operating convenience, you may decide to perform a parked regeneration before the soot load reaches 100%, provided the engine has run more than 50 hours since the last successful reset, parked, or recovery regeneration.

Use the Technician menu to view the current state of engine regeneration control and the current soot level.

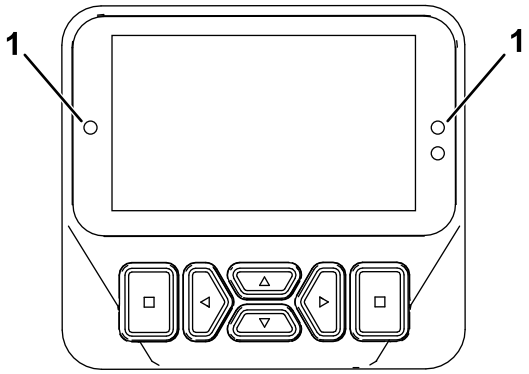
1. In SETTINGS, scroll down to DPF RENGERATION and press the select button.
2. In DPF RENGERATION, scroll down to TECHNICIAN and press the select button.



g484116

Figure 26

Understanding the Diagnostic Light



g462666

Figure 27

1. Diagnostic light

- Flashing red—active fault
- Solid red—active advisory
- Solid blue—calibration/dialog messages
- Solid green—normal operation

Checking the Hydrostatic Braking Distance

This machine will dynamically brake and stop when you return the traction pedal to neutral.

Note: For smooth deceleration, use your foot to slowly control the traction pedal back to neutral. Do not take your foot off the pedal and allow it to snap back to the neutral position unless you intend to stop quickly.

The machine should come to a complete stop in approximately 3.7 m (12 ft) from the maximum transport speed of 10 mph.

1. On flat, dry pavement, mark out the start and end of 3.7 m (12 ft).
2. Drive the machine at the maximum transport speed of 16 km/h (10 mph) and remove your foot at the start of the 3.7 m (12 ft).
3. Check if the machine stops within 0.6 m (2 ft) of the end mark (3.7 m or 12 ft).
4. Contact your Toro distributor if the stopping distance of the machine is not within 0.6 m (2 ft) of this distance.

Overview of Reverse Speeds

Transport Reverse Speed

- If the maximum transport speed set by the supervisor is above 8.0 km/h (5.0 mph), the maximum reverse speed is 8.0 km/h (5.0 mph).
- If the maximum transport speed set by the supervisor is at or below 8.0 km/h (5.0 mph), maximum reverse speed is equal to the transport speed set by the supervisor.

Mowing Reverse Speed

- If the maximum mow speed set by the supervisor is above 6.4 km/h (4.0 mph), the maximum reverse speed is 6.4 km/h (4.0 mph).
- If the maximum mow speed set by the supervisor is at or below 6.4 km/h (4.0 mph), maximum reverse speed is equal to the transport speed set by the supervisor.

Overview of Displayed Traction Speeds

This machine displays estimated traction speeds in kilometers per hour (km/h) or miles per hour (mph).

- The instantaneous speed is displayed in the upper left-hand corner of the cruise control and virtual pedal stop screens.
- The traction speeds are estimated, and calibrated to be most accurate at 8.0 km/h (5.0 mph) while mowing. Displayed speeds are accurate when it is 0.8 km/h (0.5 mph) above or below the display speed while driving on dry, flat pavement.
- Contact your authorized Toro distributor if the machine's observed speeds deviate more than 2.4 km/h (1.5 mph) from the displayed speeds.

Understanding the Warm-Up Mode

When starting the machine in cold weather, warm-up mode limits the engine speed to low idle for a short period after the engine is started, preventing potential component damage from operating the machine with cold oil.

A snowflake icon  on the InfoCenter screen denotes when warm-up mode is active. Do not operate the machine until after the warm-up period.

During Operation

During Operation Safety

General Safety

- The owner/operator can prevent and is responsible for accidents that may cause personal injury or property damage.
- Wear appropriate clothing, including eye protection; long pants; substantial, slip-resistant footwear; and hearing protection. Tie back long hair and do not wear loose clothing or loose jewelry.
- Do not operate the machine while ill, tired, or under the influence of alcohol or drugs.
- Use your full attention while operating the machine. Do not engage in any activity that causes distractions; otherwise, injury or property damage may occur.
- Before you start the engine, ensure that all drives are in neutral, the parking brake is engaged, and you are in the operating position.
- Do not carry passengers on the machine and keep bystanders and children out of the operating area.
- Operate the machine only in good visibility to avoid holes or hidden hazards.
- Avoid mowing on wet grass. Reduced traction could cause the machine to slide.
- Keep your hands and feet away from rotating parts. Keep clear of the discharge opening.
- Look behind and down before backing up to be sure of a clear path.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure your vision.
- Stop the blades whenever you are not mowing.
- Stop the machine, remove the key, and wait for all moving parts to stop before inspecting the attachment after striking an object or if there is an abnormal vibration in the machine. Make all necessary repairs before resuming operation.
- Slow down and use caution when making turns and crossing roads and sidewalks with the machine. Always yield the right-of-way.
- Disengage the drive to the cutting unit, shut off the engine, remove the key, and wait for all movement to stop before adjusting the height of cut (unless you can adjust it from the operating position).
- Operate the engine only in well-ventilated areas. Exhaust gases contain carbon monoxide, which is lethal if inhaled.
- Never leave a running machine unattended.
- Before you leave the operator’s position, do the following:
  - Park the machine on a level surface.
  - Disengage the power takeoff and lower the attachments.
  - Engage the parking brake.
  - Shut off the engine and remove the key.
  - Wait for all movement to stop.
- Operate the machine only in good visibility. Do not operate the machine when there is the risk of lightning.
- Do not use the machine as a towing vehicle.
- Use accessories, attachments, and replacement parts approved by Toro only.
- Use the cruise control (if equipped) only when you can operate the machine in an open, flat area that is free from obstacles and where the machine can move at a constant speed without interruption.

Rollover Protection System (ROPS) Safety

- The ROPS is an integral and effective safety device.
- Do not remove any of the ROPS components from the machine.
- Ensure that the seat belt is attached to the machine.

- Pull the belt strap over your lap and connect the belt to the buckle on the other side of the seat.
- To disconnect the seat belt, hold the belt, press the buckle button to release the belt, and guide the belt into the auto-retract opening. Ensure that you can release the belt quickly in an emergency.
- Check carefully for overhead obstructions and do not contact them.
- Keep the ROPS in safe operating condition by thoroughly inspecting it periodically for damage and keeping all the mounting fasteners tight.
- Replace damaged ROPS components. Do not repair or alter them.

Additional ROPS Safety for Machines with a Cab or a Fixed Roll Bar

- A cab installed by Toro is a roll bar.
- Always wear your seat belt.

Slope Safety

- Slopes are a major factor related to loss of control and rollover accidents, which can result in severe injury or death. You are responsible for safe slope operation. Operating the machine on any slope requires extra caution.
- Evaluate the site conditions to determine if the slope is safe for machine operation, including surveying the site. Always use common sense and good judgment when performing this survey.
- Review the slope instructions listed below for operating the machine on slopes and to determine whether you can operate the machine in the conditions on that day and at that site. Changes in the terrain can result in a change in slope operation for the machine.
- Avoid starting, stopping, or turning the machine on slopes. Avoid making sudden changes in speed or direction. Make turns slowly and gradually.
- Do not operate a machine under any conditions where traction, steering, or stability is in question.
- Remove or mark obstructions such as ditches, holes, ruts, bumps, rocks, or other hidden hazards. Tall grass can hide obstructions. Uneven terrain could overturn the machine.
- Be aware that operating the machine on wet grass, across slopes, or downhill may cause the machine to lose traction. Loss of traction to the drive wheels may result in sliding and a loss of braking and steering.
- Use extreme caution when operating the machine near drop-offs, ditches, embankments, water hazards, or other hazards. The machine could suddenly roll over if a wheel goes over the edge or the edge caves in. Establish a safety area between the machine and any hazard.
- Identify hazards at the base of the slope. If there are hazards, mow the slope with a pedestrian-controlled machine.
- If possible, keep the cutting unit(s) lowered to the ground while operating on slopes. Raising the cutting unit(s) while operating on slopes can cause the machine to become unstable.
- Use extreme caution with grass-collection systems or other attachments. These can change the stability of the machine and cause a loss of control.

Understanding the Operating Characteristics of the Machine

- This machine has an automotive-style throttle that is controlled by the traction pedal.
- This machine does not have a separate throttle switch or throttle lever.
- When you remove your foot from the traction pedal, the machine dynamically brakes to a stop.
- The pedal controls are optimized to provide a reactive yet stable response, allowing you to maintain consistent control over rough terrain, while still allowing for quick, smooth braking.
- While transporting, the traction pedal will operate similar to a car and change the engine and traction speed dependent on the traction pedal position.
- When mowing, the engine speed will automatically raise to high idle.
- If the engine is at low idle, performing a function like lifting the cutting units or pressing the traction pedal raises the engine speed to a minimum working speed, providing enough power to efficiently perform the function.
- Limit the machine idle time as recommended for diesel particulate filter (DPF) regeneration. Shut of the machine to prevent extended idling time.
- The maximum speeds set in the PIN protected menu settings are set by the supervisor to limit the machine's maximum traction speed.
- The achievable traction pedal use, cruise control, and pedal stop traction speeds are all limited by the maximum speeds set in the PIN protected menu.

Operating the Machine

- If an obstacle is in the way, lift the cutting units or mow around it.
- When transporting the machine between work areas, shut off the PTO, and raise the cutting units to the fully upward position. This allows the traction pedal to operate like a car.
- Always drive slowly in rough areas.
- Never shut off the machine while driving the machine.

Practice Operating the Machine

- To get familiar with the features of the machine, practice operating the machine.
- Lift the cutting units, disengage the parking brake, press the forward traction pedal, and carefully drive to an open area.
- Practice driving the machine, because it has a hydrostatic transmission and its features can differ from other turf-maintenance machines.
- Practice moving forward and reverse, and starting and stopping the machine. To stop the machine, remove your foot from the traction pedal and let it return to NEUTRAL.

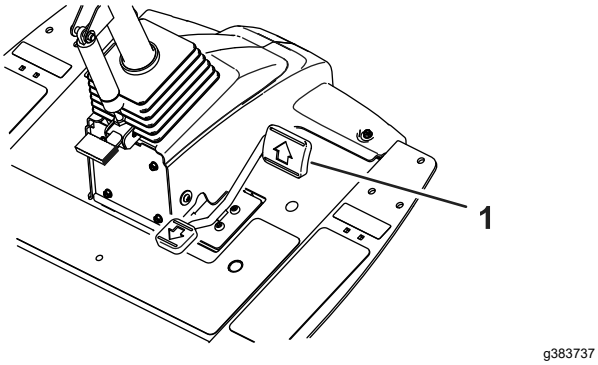
  Note: When going downhill in the machine, you may need to use the reverse pedal to stop.
- Remove your foot from the traction pedal to stop quickly.
- Practice driving around obstacles with the cutting units up and down. Be careful when driving between narrow objects so that you do not damage the machine or cutting units.

Overview of the Traction Pedal

The traction pedal controls the forward and reverse speed of the machine and the dynamic braking when you return it to neutral.

- This machine is equipped with an automotive-style throttle—the engine speed and the machine speed respond to the pedal movement.
- While transporting, the traction pedal will operate similar to a car and change the engine and traction speed dependent on the traction pedal position.
- While mowing, the engine automatically raises to high idle to optimize mowing performance, and the traction pedal only controls traction speed.
- The further you push the pedal forward or reverse, the faster the machine moves.
- To control the machine to a smooth stop while transporting or mowing, use your foot to return the traction pedal to neutral at your desired rate.
- To engage maximum braking, remove your foot from the traction pedal, allowing it to return to neutral. The machine dynamically brakes to a stop.

This traction system allows you to customize the acceleration settings for operator comfort and course conditions. Refer to Understanding the Acceleration Mode (page 38) for changing the settings.



g383737

Figure 28

1. Traction pedal

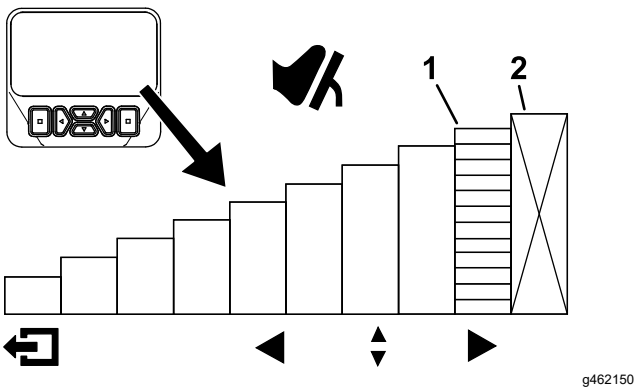
Using the Virtual Pedal Stop (VPS) Feature

The virtual pedal stop (VPS) feature allows you to temporarily set a maximum traction speed that is less than the password-protected supervisor maximum traction speed.

To temporarily set the maximum speed of the machine, press the traction pedal fully forward (Figure 28). You can set a separate speed for the mow range and transport range (Figure 29).

- To access this feature, press the up or down navigation button from the main screen. (Figure 29).

  Note: This feature reverts back to the supervisor maximum speed settings when you turn the key to the OFF position.



g462150

Figure 29

1. Indicates the maximum traction speed (pedal stop)
2. This speed is locked out under the protected PIN menu.

- This feature allows you to customize the speed settings for your comfort level, or to customize the speed settings to fit the application.
- Whenever you change the maximum traction speed using the supervisor maximum speed settings or Virtual Pedal Stop, the traction pedal is automatically reprogrammed to use the full pedal stroke between neutral and the new maximum speed. This means that you gain more precise control of the traction speed at lower maximum speed settings.

Tips for Using Virtual Pedal Stop (VPS)

- Set the maximum speed temporarily lower for mowing the cleanup pass on the fairway.
- Set the maximum speed temporarily lower for improved control operating in or near the maintenance shop.
- Set the maximum speed temporarily lower for improved control loading the machine onto a trailer.

Operating the Cruise Control

Setting the Cruise Control

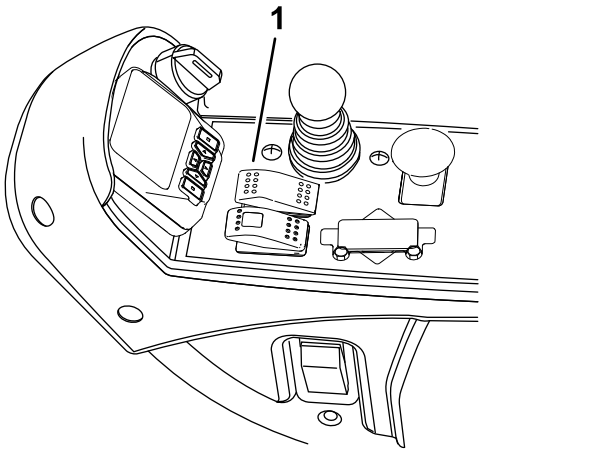
The cruise-control switch locks in the cruise control to maintain the desired ground speed. Pressing the rear of the switch turns the cruise control off, the middle position of the switch enables the cruise-control function, and the front of the switch sets the desired ground speed.

After the cruise control switch is enabled and the speed is set (Figure 30), use the InfoCenter to adjust the speed setting of the cruise control (Figure 30 and Figure 31).

To disengage the cruise control, use the following:

- When in transport range, press the reverse traction pedal, engage the parking brake, or press the cruise control switch to the OFF position.
- When in mow range, press the reverse traction pedal, engage the parking brake, disengage the PTO, or press the cruise control switch to the OFF position.

  Note: Disengaging the cruise control results in the machine dynamically braking to a stop. If you want to disengage cruise control while driving, press the traction pedal for a smooth transition from cruise control to manual speed control.



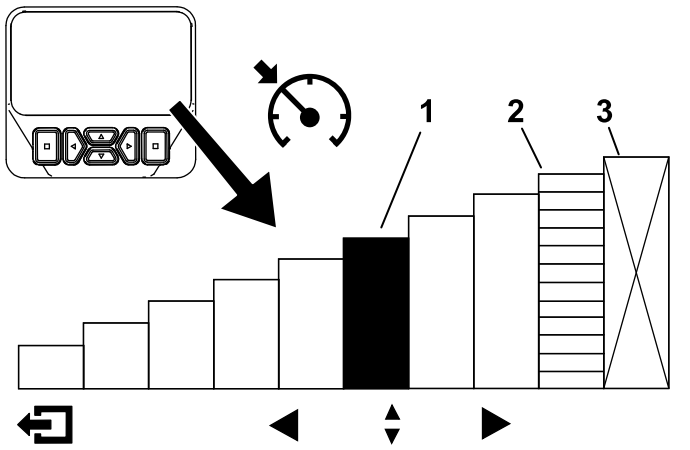
g462144

Figure 30

1. Cruise-control switch

Adjusting the Cruise Control Speed

1. Enable the cruise control switch on the console (Figure 30).
2. Use the InfoCenter display to adjust the speed setting of the cruise control (Figure 31).



g462143

Figure 31

1. Indicates the cruise control speed
2. Indicates the maximum traction speed (pedal stop)
3. This speed is locked out under the protected PIN menu.

Tips for Using the Cruise Control

- Set a cruising speed for long distances without many obstacles.
- On rough terrain, use the InfoCenter to control the speed.
- Use the cruise control for turnarounds as follows:
  1. While mowing, set a safe, comfortable speed for turning around at the end of mowing passes.
  2. Press the traction pedal to increase the speed for mowing during the mowing pass.
  3. Take your foot off the pedal when turning around for the next mowing pass.
  4. The machine will slow down to the low cruise control setting, allowing you to make an efficient turnaround at a constant speed.
  5. After turning around, use the traction pedal to increase the machine speed for the next mowing pass.

Understanding the Acceleration Mode

This feature determines how quickly the machine changes traction speed when the traction pedal is not in the NEUTRAL position.

Note: If you take your foot off the traction pedal, allowing it to return to the NEUTRAL position while the machine is moving, the braking profile is engaged. The braking profile is always the same and cannot be customized by the acceleration mode feature.

Enter the protected menus in the InfoCenter to change the acceleration mode. The acceleration mode has the following 3 positions:

- Low—least aggressive acceleration and deceleration
- Medium (default)—medium acceleration and deceleration
- High—most aggressive acceleration and deceleration

Understanding Counterbalance

The counterbalance system maintains hydraulic back pressure on the cutting-unit lift cylinders. The counterbalance system monitors the real-time traction pressure, dynamically changing the lift-cylinder back pressure to optimize traction capability and after-cut appearance. The counterbalance pressure has been set at the factory to an optimal balance of after-cut appearance and traction capability in most turf conditions. Decreasing the counterbalance setting can produce a more stable cutting unit but can decrease the traction capability. Increasing the counterbalance setting can increase the traction

capability, but may reduce the quality of the after-cut appearance; refer to Changing the Counterbalance Settings (page 39).

The customizable counterbalance setting controls are as follows:

- Low—the most amount of weight on cutting units and the lowest weight on the drive wheels
- Medium—medium weight on cutting units and the drive wheels
- High—the least amount of weight on cutting units and the highest weight on machine drive wheels

Changing the Counterbalance Settings

You can change the amount of required cutting-unit counterbalance (upward lift) to meet your current mowing conditions.

1. Park the machine on a level surface, lower the cutting decks, turn the key in the switch to the OFF position, and engage the parking brake.
2. Turn the key in the switch to the RUN position.
3. In the InfoCenter Settings Menu, scroll down to **Counterbalance**.
4. Press the right button to select counterbalance and change between the low, medium, and high settings.

   Note: After completing the adjustment, move the machine to a test area and operate the machine with the new setting. The new counterbalanced setting may change the effective height of cut.

Understanding Toro Smart Power™

With Smart Power, the operator does not have to listen to the engine speed in heavy load conditions. Smart Power prevents the engine from bogging down in heavy cutting conditions by automatically controlling the machine speed and optimizing cutting performance.

Note: By default, the Smart Power feature is ON.

Starting the Engine

Important: **The fuel system automatically bleeds itself before starting the engine if you are starting the engine for the first time, the engine has shut off due to lack of fuel, or you have performed maintenance on the fuel system.**

1. Sit on the seat, keep your foot off the traction pedal so that it is in NEUTRAL, engage the parking brake, and ensure that the PTO switch is in the DISENGAGED position.
2. Turn the key in the switch to the RUN position.
3. When the glow indicator dims, turn the key in the switch to the START position. Release the key immediately when the engine starts and allow it to return to the RUN position.
4. Run the engine at low idle speed until it warms up.

Shutting Off the Engine

1. Move all controls to NEUTRAL, engage the parking brake, and allow the engine to reach low idle speed.

   Important: **Allow the engine to idle for 5 minutes before shutting it off after a full load operation. Failure to do so may engine components.**
2. Turn the key in the switch to the OFF position and remove the key.

Cutting Grass with the Machine

1. Start the engine, disengage the brake, disengage the PTO switch, and raise the cutting units.
2. Using the traction pedal like an accelerator pedal on a car, drive the machine to the mowing area.
3. Pull the PTO switch to the ENGAGE position.
4. Start driving the machine and lower the cutting units only when all cutting units are over the mowing area.
5. Begin mowing the area.
6. When you complete a mowing pass, tap the lower control lever rearward to lift the cutting units before leaving the mowing area.
7. Perform a tear-shaped turn to quickly line up for your next pass.
8. Press the lower control lever to automatically lower all cutting units in the mowing area and continue mowing.

Understanding the Diesel-Particulate Filter and Regeneration

The diesel-particulate filter (DPF) removes soot from the engine exhaust.

The DPF regeneration process uses heat from the engine exhaust that is increased by the catalyst to reduce accumulated soot into ash.

To keep the DPF clean, remember the following:

- Run the engine at full engine speed when possible to promote DPF self-cleaning.
- Use the correct engine oil.
- Minimize the amount of time that you idle the engine.
- Use only ultra low sulfur diesel fuel.

Operate and maintain your machine with the function of the DPF in mind. Engine under load generally produces adequate exhaust temperature for DPF regeneration.

Important: **Minimize the amount of time that you idle the engine or operate the engine at low-engine speed to help reduce the accumulation of soot in the DPF.**

⚠ CAUTION

The exhaust temperature is hot (approximately 600°C (1,112°F) during DPF regeneration. Hot exhaust gas can harm you or other people.

- **Do not operate the engine in an enclosed area.**
- **Ensure that there are no flammable materials around the exhaust system.**
- **Ensure that the hot exhaust gas does not contact surfaces that may be damaged by heat.**
- **Do not touch a hot exhaust system component.**
- **Do not stand near or around the exhaust pipe of the machine.**

Understanding the Regeneration Icons

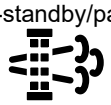
Icon	Icon Definition
	• Parked or recovery regeneration icon-regeneration is requested. • Perform the regeneration immediately.
	• A regeneration is acknowledged and the request is processing.
	• A regeneration is in progress and the exhaust temperature is elevated.
	• NOx control system malfunction; the machine requires service.

Types of Diesel Particulate Filter Regeneration

Types of diesel particulate filter regeneration that are performed while the machine is operating:

Type of Regeneration	Conditions that cause DPF regeneration	DPF description of operation
Passive	Occurs during normal operation of the machine at high-engine speed or highengine load	• The InfoCenter does not display an icon indicating passive regeneration. • During passive regeneration, the DPF processes high-heat exhaust gasses, oxidizing harmful emissions, and burning soot to ash.
Assist	Occurs because of low-engine speed, low-engine load, or after the computer detects the DPF is becoming obstructed with soot	•The InfoCenter does not display an icon indicating assist regeneration. • During assist regeneration, the engine computer adjusts the engine settings to raise the exhaust temperature.
Reset	Occurs every 100 hours Also occurs if normal engine operation surpasses the allowed soot accumulation amount within the filter	• When the high exhaust-temperature icon  is displayed in the InfoCenter, a regeneration is in progress. • During reset regeneration, the engine computer maintains an elevated engine speed to ensure filter regeneration.

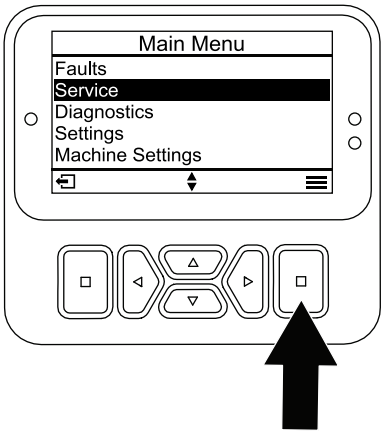
Types of diesel particulate filter regeneration that require you to park the machine:

Type of Regeneration	Conditions that cause DPF regeneration	DPF description of operation
Parked	Occurs because the computer determines that the automatic DPF cleaning has not been sufficient. Also occurs because you initiate a parked regeneration May occur because the inhibit regen has been initiated and has disabled the automatic DPF cleaning from occuring May result from using the incorrect fuel or engine oil	• When the reset-standby/parked or recovery regeneration icon  or a regeneration is requested. • Perform the parked regeneration as soon as possible to avoid needing a recovery regeneration. • A parked regeneration requires 30 to 60 minutes to complete. • You must have at least a 1/4 tank of fuel in the tank. • You must park the machine to perform a parked regeneration.
Recovery	Occurs because the request for parked recovery has been ignored, allowing the DPF to be critically plugged	• When the reset-standby/parked or recovery regeneration icon  a recovery regeneration is requested. • A recovery regeneration requires up to 3 hours to complete. • You must have at least a 1/2 tank of fuel in the machine. • You must park the machine to perform a recovery regeneration.

Using the DPF Regeneration Menus

Accessing the DPF Regeneration Menus

1. From the MAIN MENU, scroll down to SERVICE and press the select button.
2. In SERVICE, scroll to DPF REGENERATION and press the select button.
3. Select the regeneration function you need.



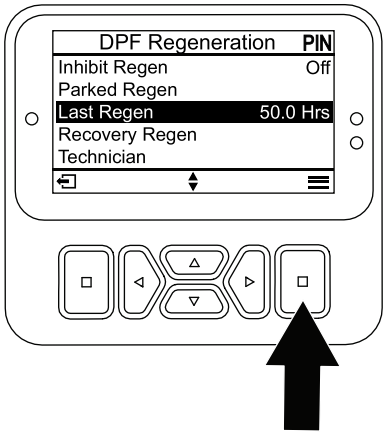
g483678

Figure 32

Time Since Last Regeneration

1. Access the DPF REGENERATION menu, and scroll to LAST REGEN.
2. Select the LAST REGEN entry.

3. Use the LAST REGEN field to determine how many hours you have run the engine since the last reset, parked, or recovery regeneration.
4. Select the back button to return to the DPF REGENERATION screen.



g483679

Figure 33

Setting the Inhibit Regen

Reset Regeneration Only

A reset regeneration produces elevated engine exhaust. If you are operating the machine around trees, brush, tall grass, or other temperature-sensitive plants or materials, you can use the INHIBIT REGEN setting to prevent the engine computer from performing a reset regeneration.

Note: The INHIBIT REGEN option is always used when maintenance is being performed on the machine in an enclosed area.

Note: If you set the InfoCenter to inhibit regeneration, the InfoCenter displays an advisory every 15 minutes while the engine requests a reset regeneration.

Important: **When you shut off the engine and start it again, the inhibit regen setting defaults to OFF.**

1. Access the DPF REGENERATION menu, and scroll down to INHIBIT REGEN.
2. Select the Inhibit REGEN entry.
3. Change the inhibit regeneration setting from OFF to ON.

Preparing to Perform a Parked or Recovery Regeneration

1. Ensure that the machine has fuel in the tank for the type of regeneration you are performing:
   - **Parked Regeneration:** Ensure that you have 1/4 tank of fuel before performing the parked regeneration.
   - **Recovery Regeneration:** Ensure that you have 1/2 tank of fuel before performing the recovery regeneration.
2. Move the machine outside to an area away from combustible materials or items that may be damaged by heat.
3. Park the machine on a level surface, move all controls to NEUTRAL, disengage the PTO, and lower the cutting units.
4. Engage the parking brake and allow the engine to reach low idle speed.

Performing a Parked or Recovery Regeneration

When a parked regeneration is requested by the engine computer, follow the messages on the InfoCenter.

Important: **The computer of the machine cancels DPF regeneration if you increase the engine speed from low idle or release the parking brake.**

1. Access the DPF REGENERATION menu, and scroll down to PARKED REGEN or RECOVERY REGEN.

2. Select the PARKED REGEN entry or the RECOVERY REGEN entry.

   Note: Initiating a recovery regeneration requires you to enter the correct PIN code.

3. At the REGEN PARAMETERS screen, verify that you have 1/4 tank of fuel if you are performing the parked regeneration or 1/2 tank of fuel if you are performing the recovery regeneration. Verify that the parking brake is engaged and the engine speed is set to low idle. Press the select button to continue.
4. At the INITIATE DPF REGEN screen, select the next button to continue.
5. The InfoCenter displays theINITIATE DPF REGEN message.

   Note: If needed, press the cancel icon to cancel the regeneration process.

6. The InfoCenter displays the time to complete message.
7. The InfoCenter displays the home screen and the regeneration acknowledge icon appears 

.

   Note: While the DPF regeneration runs, the InfoCenter displays the high exhaust-temperature icon 
.

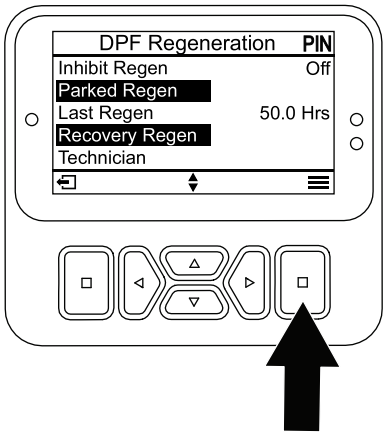
8. When the engine computer completes a parked or recovery regeneration, the InfoCenter displays an advisory. Press any button to exit to the home screen.

   Note: If the regeneration fails to complete, follow the advisory and press any button to exit to the home screen.

Canceling a Parked or Recovery Regeneration

Use the PARKED REGEN CANCEL or RECOVERY REGEN CANCEL setting to cancel a running parked or recovery regeneration process.

1. Access the DPF REGENERATION menu, scroll to PARKED REGEN or RECOVERY REGEN.
2. Press the select button to cancel a Parked Regen or Recovery Regen.



g483825

Figure 34

Operating Tips

Changing Mowing Patterns

Change mowing patterns often to minimize a poor after-cut appearance from repeatedly mowing in the same direction. This is the most effective way to prevent washboarding.

Resolving After-Cut Appearance

Refer to the *After-cut Appearance Troubleshooting Guide* available at www.Toro.com.

Using Proper Mowing Techniques

- To achieve the professional straight-line cut and striping that is desirable for some applications, find

a tree or other object in the distance and drive straight toward it.

- Bolt-in mulching baffles are available for the cutting units. The mulching baffles perform well when you maintain turf on a regular schedule to avoid removing more than 25 mm (1 inch) of growth per cutting. When you cut too much growth with the mulching baffles installed, the after-cut appearance may deteriorate and the observed power to cut the turf increases. The mulching baffles also perform well for shredding leaves in the fall.

Selecting the Proper Height-of-Cut Setting to Suit Conditions

Remove no more than approximately 25 mm (1 inch), or 1/3 of the grass blade when cutting. In exceptionally lush and dense grass, you may need to raise your height-of-cut setting.

Mowing with Sharp Blades

A sharp blade cuts cleanly and without tearing or shredding the grass blades like a dull blade. Tearing and shredding causes the grass to turn brown at the edges, which impairs growth and increases susceptibility to diseases. Ensure that the blade is in good condition and that there is a full sail; refer to Inspecting and Sharpening the Blade (page 71).

Checking the Condition of the Cutting Unit

Ensure that the cutting chambers are in good condition. Straighten any bends in the chamber components to ensure correct blade tip/chamber clearance. Ensure all rollers and pivoting joints do not have play in them to prevent turf damage or poor after cut appearance.

Maintaining the Machine after Mowing

After mowing, thoroughly wash the machine with a garden hose with no nozzle to avoid contamination and damage to the seals and bearings caused by excessive water pressure. Ensure that the radiator and oil cooler are kept free of dirt or grass clippings. After cleaning, inspect the machine for possible hydraulic-fluid leaks, damage, or wear to the hydraulic and mechanical components, and check the cutting-unit blades for sharpness.

After Operation

General Safety

- Shut off the engine, remove the key, and wait for all movement to stop before you leave the operator's position. Allow the machine to cool before adjusting, servicing, cleaning, or storing it.
- To help prevent fires, ensure that the cutting units, drives, mufflers, cooling screens, and engine compartment are free from grass and debris buildup. Clean up oil or fuel spills.
- If the cutting units are in the transport position, use the positive mechanical lock (if available) before you leave the machine unattended.
- Allow the engine to cool before storing the machine in any enclosure.
- Remove the key and shut off the fuel (if equipped) before storing or hauling the machine.
- Never 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.
- Maintain and clean the seat belt(s) as necessary

Identifying the Tie-Down Points

- **Front of the machine**—the hole in the rectangular pad, under the axle tube, inside each front tire (Figure 35).

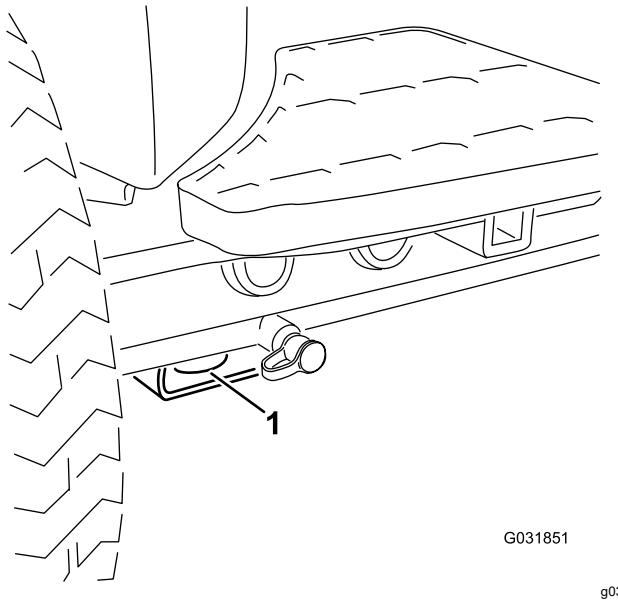


Figure 35

1. Front tie-down

- **Rear of the machine**—each side of the machine on the rear frame (Figure 36).

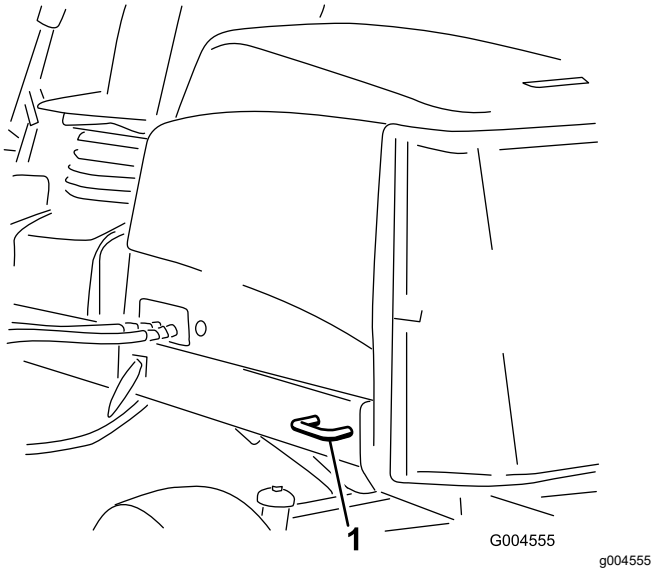


Figure 36

1. Rear tie-down

Hauling the Machine

- Remove the key and shut off the fuel (if equipped) before storing or transporting the machine.
- Use care when loading or unloading the machine into a trailer or a truck.
- Use full-width ramps for loading the machine into a trailer or a truck.
- Tie the machine down securely.

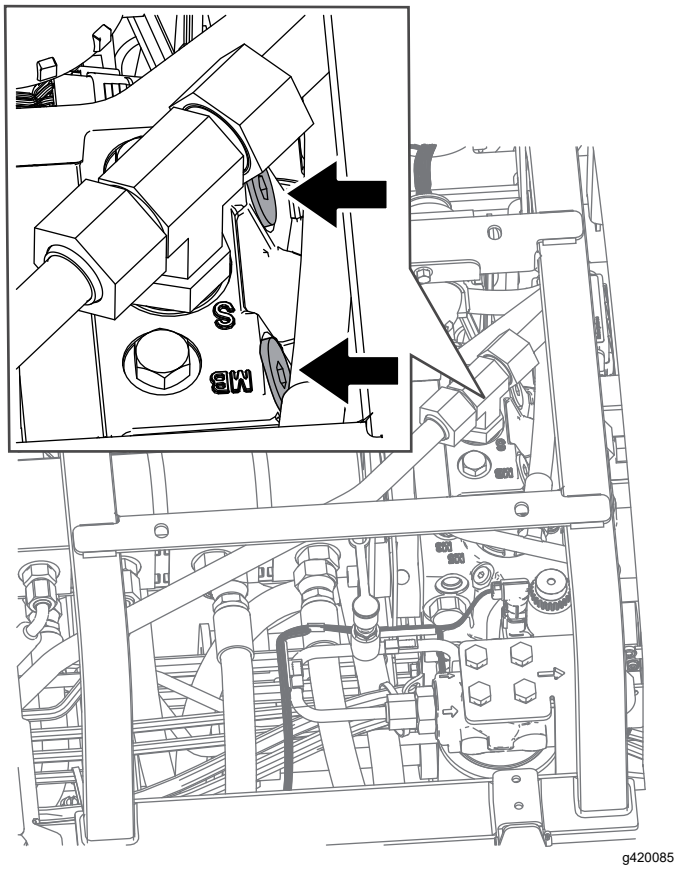
Pushing or Towing the Machine

In an emergency, you can move the machine forward by actuating the bypass valve in the variable-displacement hydraulic pump and pushing or towing the machine.

Important: **Do not push or tow the machine faster than 3 to 4.8 km/h (2 to 3 mph). If you push or tow at a faster speed, internal transmission damage may occur.**

The bypass valves must be open and the brake released whenever you push or tow the machine.

1. Unlatch the seat base and tilt the seat open.
2. Locate the bypass valve under the seat and on the top of the hydrostat (Figure 37).



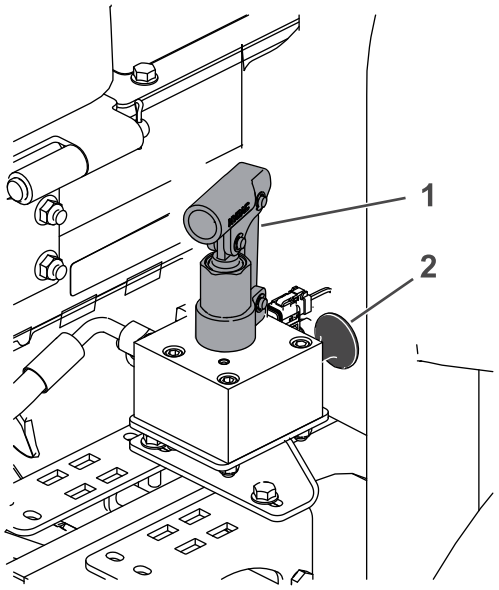
g420085

Figure 37

3. Loosen the valves with 3 turns to allow the oil to bypass internally.

   Note: Because the fluid is bypassed, the machine can be moved slowly without damaging the transmission.

4. Locate the brake release manifold near the front right tire and behind the hydraulic tank (Figure 38).



g420086

Figure 38

1. Pump mechanism on the brake manifold
2. Black knob

5. Insert the long end of a ratchet or similar object, hold the black knob in on the manifold, and pump the manifold 3 times. As soon as there is substantial resistance when pumping the brake is released.

   Important: **Do not pump the manifold after it does not pump easily. Damage could occur if the manifold is pumped too much.**

   Note: Once the pressure is built up in the manifold, the brake will be released for approximately 60 minutes. If needed after 60 minutes, release the brake again by pumping the manifold.

6. Push or tow the machine.
7. Set the brake by pulling the black knob out or starting the engine.

   Note: The brake automatically resets when you start the engine and you do not need to pull the black knob out.

8. Close the bypass valves. Torque the valves to 11 N·m (5 to 8 ft-lb).

   Important: **Ensure that the bypass valves are closed before you start operating the machine. Running the engine with an open bypass valve causes the transmission to overheat.**

Maintenance

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

Maintenance Safety

- Before you leave the operator's position, do the following:
  - Park the machine on a level surface.
  - Disengage the power takeoff and lower the attachments.
  - Engage the parking brake.
  - Shut off the engine and remove the key.
  - Wait for all movement to stop.
- Wear appropriate clothing, including eye-protection; long pants and substantial, slip-resistant footwear. Keep hands, feet, clothing, jewelry, and long hair away from moving parts.
- If you leave the key in the switch, someone could accidently start the engine and seriously injure you or other bystanders. Remove the key from the switch before you perform any maintenance.
- Allow machine components to cool before performing maintenance.
- If the cutting units are in the transport position, use the positive mechanical lock (if equipped) before you leave the machine unattended.
- If possible, do not perform maintenance while the engine is running. Keep away from moving parts.
- Operate the engine only in well-ventilated areas. Exhaust gases contain carbon monoxide, which is lethal if inhaled.
- Support the machine with jack stands whenever you work under the machine.
- Carefully release pressure from components with stored energy.
- Keep all parts of the machine in good working condition and all hardware tightened, especially blade-attachment hardware.
- Replace all worn or damaged decals.
- To ensure safe, optimal performance of the machine, use only genuine Toro replacement parts. Replacement parts made by other manufacturers could be dangerous, and such use could void the product warranty.

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first hour	• Torque the wheel-lug nuts to 94 to 122 N·m (70 to 90 ft-lb). • Torque the front-axle hub nuts to 407 to 542 N·m (300 to 400 ft-lb). • Torque the rear-axle hub nuts to 366 to 447 N·m (270 to 330 ft-lb).
After the first 10 hours	• Torque the wheel-lug nuts to 94 to 122 N·m (70 to 90 ft-lb). • Torque the front-axle hub nuts to 407 to 542 N·m (300 to 400 ft-lb). • Torque the rear-axle hub nuts to 366 to 447 N·m (270 to 330 ft-lb). • Check the condition and alternator-belt tension.
Before each use or daily	• Check the tire pressure. • Check the interlock switches. • Check the blade stopping time. • Inspect the ROPS components for wear or damage. • Check the engine-oil level. • Drain water or other contaminants from the fuel/water separator. • Check the level of coolant in the expansion tank. • Remove debris from the screen, radiator, oil cooler, and engine compartment (more frequently in dirty operating conditions). • Check the hydraulic fluid level. • Check the hydraulic lines and hoses for leaks, kinked lines, loose mounting supports, wear, loose fittings, weather deterioration, and chemical deterioration. • Clean the machine. • Clean, inspect for cuts or damage, and maintain the seat belt(s). Replace the seat belt(s) if any component does not operate properly.

Maintenance Service Interval	Maintenance Procedure
Every 50 hours	• Grease the bearings and bushings (immediately after every washing regardless of the interval listed). • Clean and check the condition of the battery (or weekly, whichever comes first). • Check the battery cable connections.
Every 100 hours	• Inspect the cooling system hoses. • Check the alternator-belt tension.
Every 200 hours	• Drain moisture from the fuel tank and the hydraulic fluid tank.
Every 250 hours	• Torque the wheel-lug nuts to 94 to 122 N·m (70 to 90 ft-lb). • Change the engine oil and filter. • Torque the front-axle hub nuts to 407 to 542 N·m (300 to 400 ft-lb). • Torque the rear-axle hub nuts to 366 to 447 N·m (270 to 330 ft-lb).
Every 400 hours	• Service the air cleaner. (Or earlier if the air-cleaner indicator illuminates red. Service it more frequently in extremely dirty or dusty conditions.) • Replace the fuel/water separator filter. • Replace the engine fuel filter. • Inspect the fuel lines and connections.
Every 800 hours	• Drain and clean the fuel tank. • Check the rear wheel toe-in. • If you are not using the recommended hydraulic fluid or have ever filled the reservoir with an alternative fluid, change the hydraulic fluid. • If you are not using the recommended hydraulic fluid or have ever filled the reservoir with an alternative fluid, replace the hydraulic filter(s) (sooner if the service interval indicator is in the red zone).
Every 1,000 hours	• If you are using the recommended hydraulic fluid, replace the hydraulic filter(s) (sooner if the service interval indicator is in the red zone).
Every 2,000 hours	• If you are using the recommended hydraulic fluid, change the hydraulic fluid.
Every 3,000 hours	• Disassemble, clean, and assemble the soot filter of the DPF.
Before storage	• Drain and clean the fuel tank.
Every 2 years	• Flush and replace the cooling system fluid. • Replace the coolant hoses. • Drain and flush the hydraulic tank. • Replace the hydraulic hoses. • Replace all moving hoses.

Important: **If you are performing maintenance on the machine and run the engine with an engine exhaust-extraction duct, set the inhibit regen setting to ON; refer to Setting the Inhibit Regen (page 43).**

Daily Maintenance Checklist

Duplicate this page for routine use.

Maintenance Check Item	For the week of:						
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Check the safety-interlock operation.							
Check the brake operation.							
Check the engine oil and fuel level.							
Drain the water/fuel separator.							
Check the air-filter-restriction indicator.							
Check the radiator and screen for debris.							
Check unusual engine noises.[1]							
Check unusual operating noises.							
Check the hydraulic system fluid level.							
Check the hydraulic-filter indicator. [2]							
Check hydraulic hoses for damage.							
Check for fluid leaks.							
Check the tire pressure.							
Check the instrument operation.							
Check the height-of-cut adjustment							
Check the condition of the blades							
Check all grease fittings for lubrication [3]							
Touch-up damaged paint.							

1. Check the glow plug and injector nozzles if hard starting, excess smoke, or rough running is noted.
2. Check with the engine running and the oil at operating temperature
3. Immediately after every washing, regardless of the interval listed

Notation for Areas of Concern

Inspection performed by:

Item	Date	Information
1		
2		
3		
4		
5		
6		
7		
8		

Note: Download a free copy of the electrical or hydraulic schematic by visiting www.Toro.com and searching for your machine from the Manuals link on the home page.

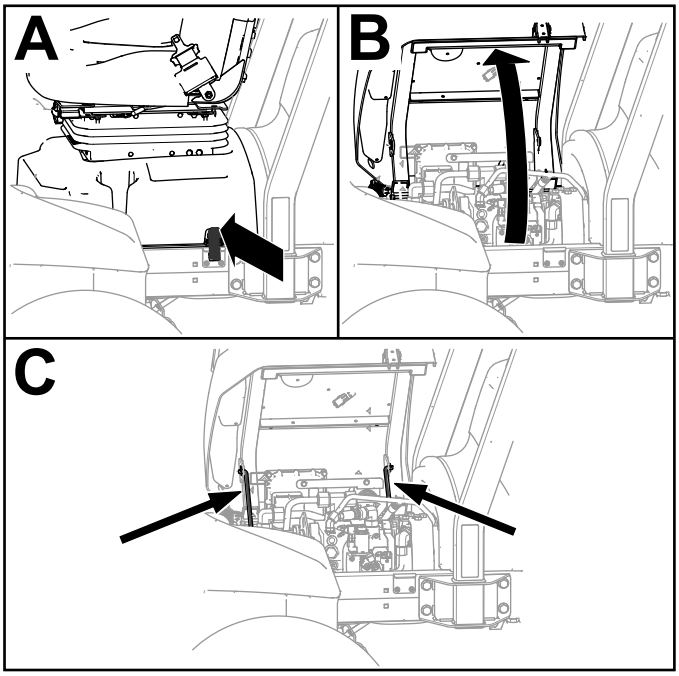
Pre-Maintenance Procedures

Preparing for Maintenance

1. Park the machine on a level surface.
2. Engage the parking brake.
3. Disengage the PTO.
4. Move the lower mow/raise control to the MOW position.
5. Shut off the engine, and remove the key.
6. Wait for all parts to stop moving.
7. Allow the engine to cool.

Tilting the Seat

1. Unlatch the seat base (A of Figure 39).
2. Tilt the seat and base open (B of Figure 39).
3. Support it with the prop rods (C of Figure 39).



g419565

Figure 39

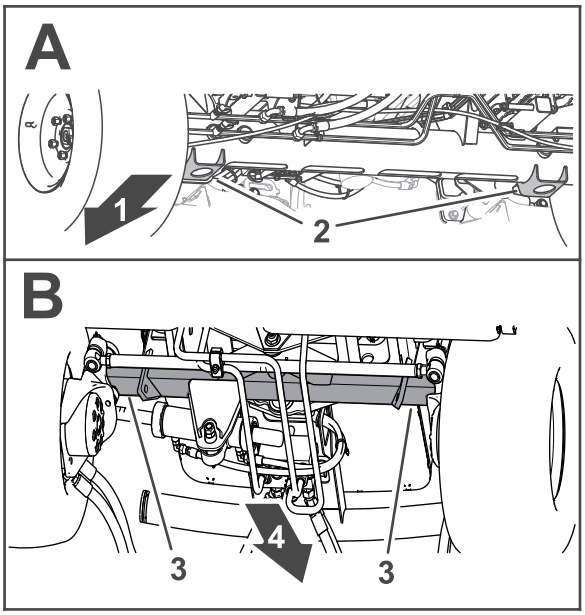
Lowering the Seat

1. Rotate the seat slightly, and lift the front prop rod out of the dent of the seat-support slot.
2. Carefully lower the seat until it latches securely.

Jacking Point Locations

Note: Support the machine with jack stands whenever you work under the machine.

Use the following as machine-lift points:



g421634

Figure 40

1. Front of the machine
2. Jack brackets (front-axle tube)
3. Rear-axle tube
4. Back of the machine

- Front—the jack brackets of the front-axle tube (Figure 40).
- Rear—the rear-axle tube.

Lubrication

Greasing the Bearings and Bushings

If you operate the machine under normal conditions, use No. 2 lithium grease to lubricate all bearings and bushings at the specified maintenance interval. Lubricate bearings and bushings **immediately** after every washing, regardless of the interval listed.

The grease fitting locations and quantities are as follows:

- Pump driveshaft U-joint (3)—Figure 41

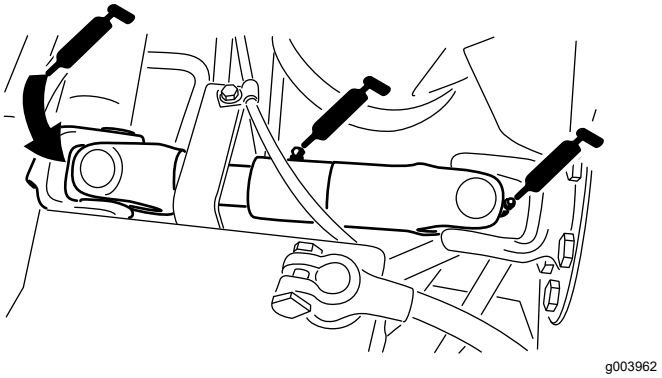


Figure 41

- Cutting unit lift-arm cylinders (2 each)—Figure 42

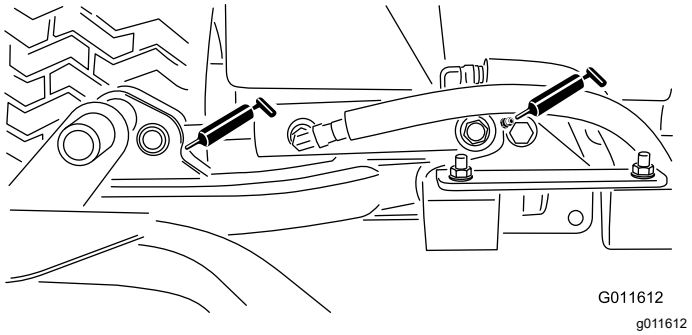


Figure 42

- Lift-arm pivots (1 each)—Figure 42
- Cutting unit carrier-frame pivot (1 each)—Figure 43

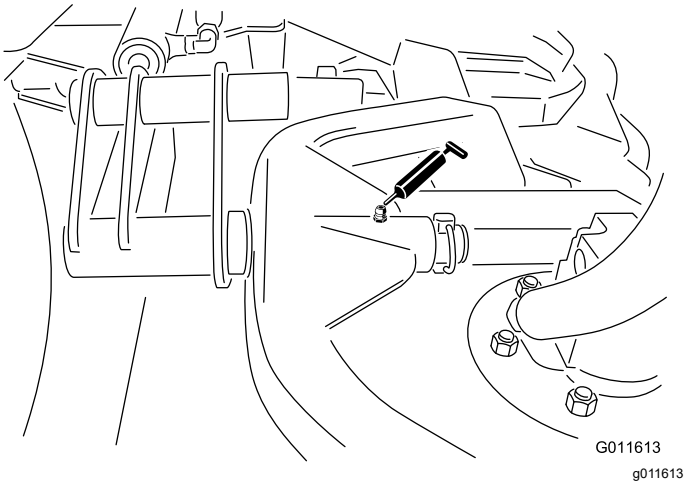


Figure 43

- Lift-arm pivot shaft (1 each)—Figure 44

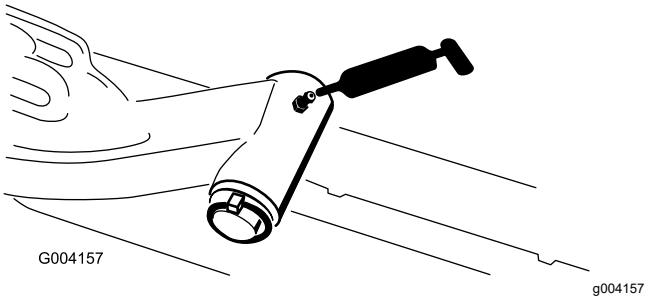


Figure 44

- Axle-steering pivot (1)—Figure 45

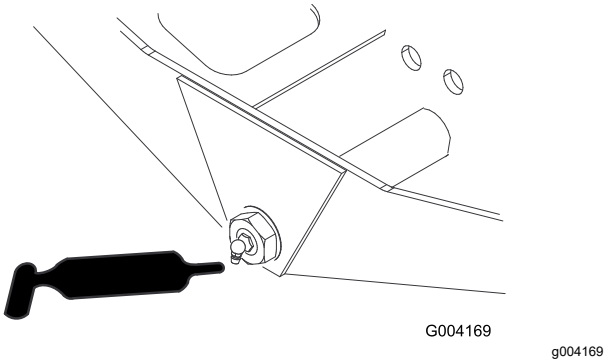


Figure 45

- Steering-cylinder ball joints (2) and rear axle (1)—Figure 46

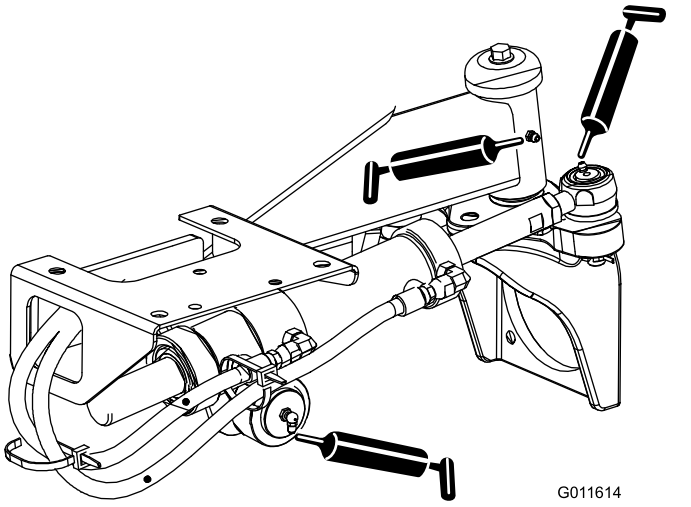


Figure 46

- Cutting unit spindle-shaft bearings (2 per cutting unit)—Figure 47

  Note: You can use either fitting, whichever is more accessible. Pump grease into the fitting until a small amount appears at bottom of the spindle housing (under the cutting unit).

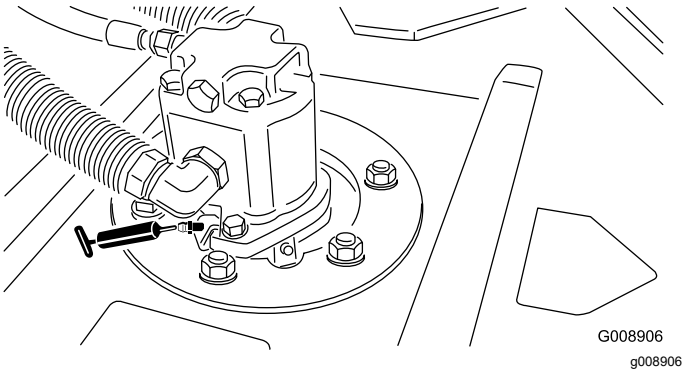


Figure 47

- Rear-roller bearings (2 per cutting unit)—Figure 48

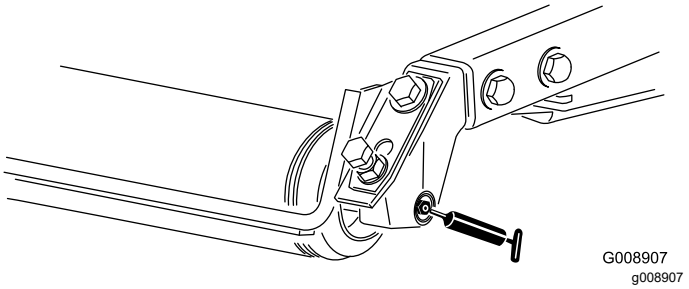


Figure 48

Note: Ensure that the grease groove in each roller mount aligns with the grease hole in each end of the roller shaft. To help align the groove and hole, there is also an alignment mark on 1 end of the roller shaft.

Engine Maintenance

Engine Safety

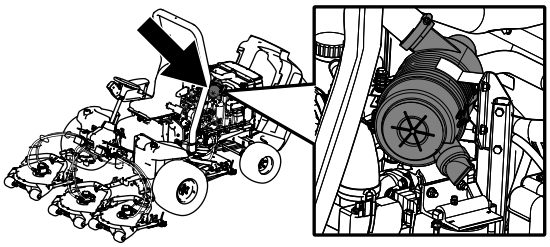
- Shut off the engine and remove the key before checking the oil or adding oil to the crankcase.
- Do not change the governor speed or overspeed the engine.

Servicing the Air Cleaner

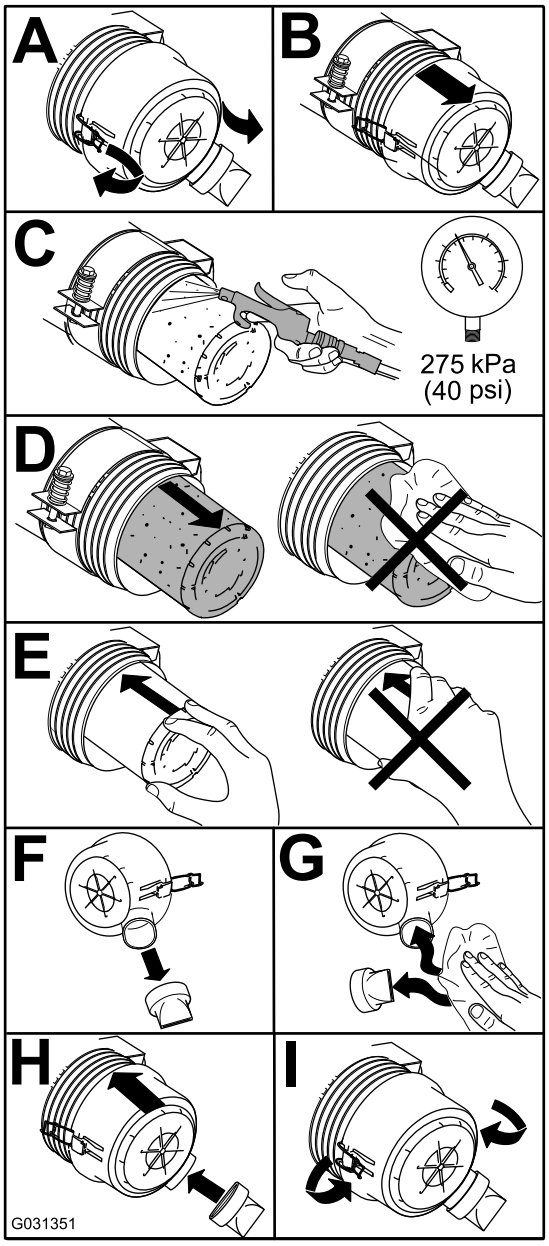
Check the whole intake system for leaks, damage, or loose hose clamps. Do not use a damaged air filter.

Service the air-cleaner filter only when the service indicator requires it. Changing the air filter before it is necessary only increases the chance of dirt entering the engine when the filter is removed.

Important: **Make sure that the cover is seated correctly, seals with the air-cleaner body, and the rubber outlet valve is in a downward position—between the 5 o'clock and 7 o'clock positions when viewed from the end.**



g194209



g031351

Figure 49

Servicing the Engine Oil

Oil Specification

Toro Premium Engine Oil is available from your authorized Toro distributor in either 15W-40 or 10W-30 viscosity grades.

Use high-quality, low-ash engine oil that meets or exceeds the following specifications:

- API service category CJ-4 or higher
- ACEA service category E6
- JASO service category DH-2

Important: **Using engine oil other than API CJ-4 or higher, ACEA E6, or JASO DH-2 may cause the diesel particulate filter to plug or cause engine damage.**

Use the following engine oil viscosity grade:

- Preferred oil: SAE 15W-40 (above 0°F)
- Alternate oil: SAE 10W-30 or 5W-30 (all temperatures)

Checking the Engine-Oil Level

Service Interval: Before each use or daily

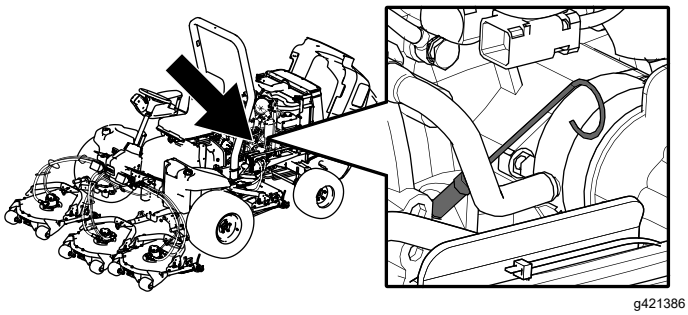
The engine is shipped with oil in the crankcase; however, the oil level must be checked before and after the engine is first started.

Important: **Check the engine oil daily. If the engine-oil level is above the Full mark on the dipstick, the engine oil may be diluted with fuel; If the engine oil level is above the Full mark, change the engine oil.**

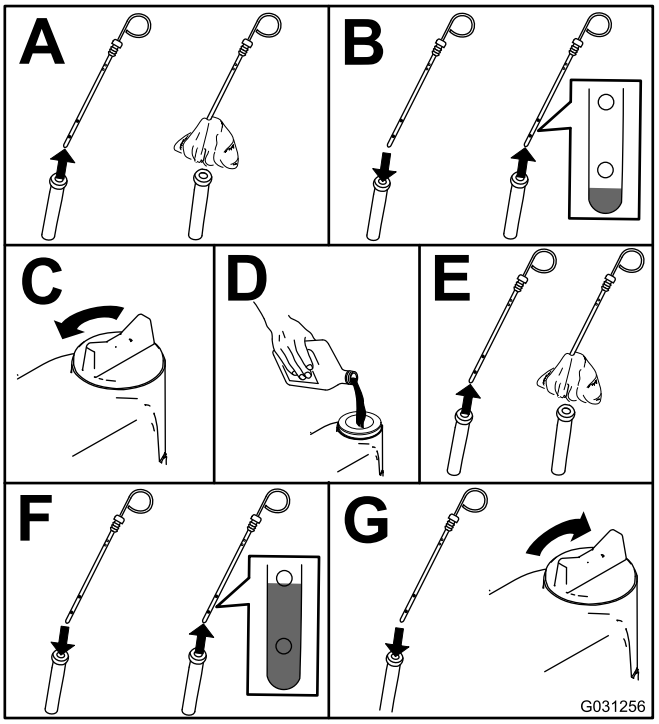
The best time to check the engine oil is when the engine is cool before it has been started for the day. If it has already been run, allow the oil to drain back down to the sump for at least 10 minutes before checking. If the oil level is at or below the Add mark on the dipstick, add oil to bring the oil level to the Full mark. **Do not overfill the engine with oil**.

Important: **Keep the engine oil level between the upper and lower limits on the dipstick; the engine may fail if you run it with too much or too little oil.**

1. Park the machine on a level surface.
2. Check the engine-oil level (Figure 50).



g421386



g031256

Figure 50

Note: When using different oil, drain all old oil from the crankcase before adding new oil.

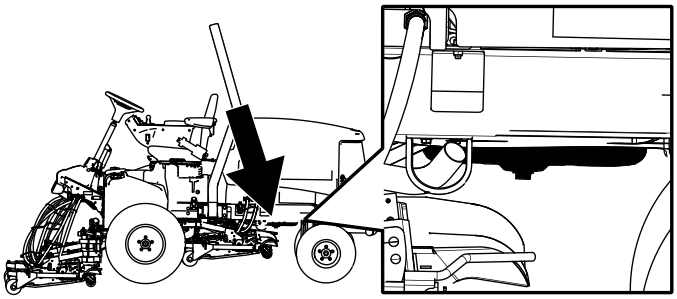
Crankcase Oil Capacity

Approximately 5.2 L (5.5 US qt) with the filter.

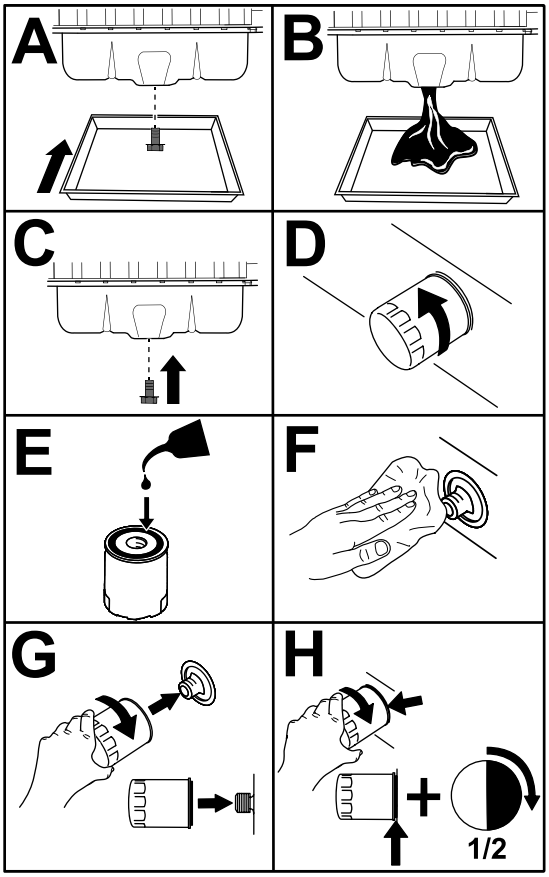
Changing the Engine Oil and Filter

Service Interval: Every 250 hours

1. Start the engine and let it run 5 minutes to allow the oil to warm up.
2. With the machine parked on a level surface, shut off the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Replace the engine oil and filter (Figure 51).



g421388



g424409

Figure 51

4. Add oil to the crankcase.

Fuel System Maintenance

Fuel Maintenance

This *Operator's Manual* contains more detailed fuel and fuel system maintenance information than the Yanmar® engine *Owner's Manual*, which is a general-purpose reference relating to fuel and fuel maintenance.

Ensure that you understand that the fuel system maintenance, fuel storage, and fuel quality require your attention to avoid downtime and extensive engine repairs.

The fuel system has extremely tight tolerances due to the emissions and control requirements. Diesel fuel quality and cleanliness is more important for the longevity of today's high-pressure common rail (HPCR) fuel-injection system used on diesel engines.

Important: **Water or air in the fuel system will damage your engine! Do not assume that new fuel is clean. Ensure that your fuel is from a quality supplier, store your fuel correctly, and use your fuel supply within 180 days.**

Important: **If you do not follow the procedures for fuel filter replacement, fuel system maintenance, and fuel storage, the engine fuel system could fail prematurely. Perform all fuel system maintenance at the specified intervals or whenever the fuel is contaminated or its quality is poor.**

Storing Fuel

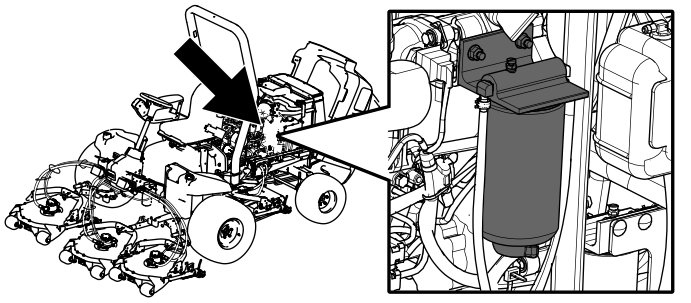
Appropriate fuel storage is critical for your engine. Proper maintenance of fuel storage tanks is often overlooked and leads to the contamination of fuel delivered to the machine.

- Acquire only enough fuel that you will consume within 180 days. Do not use fuel that has been stored for more than 180 days. This helps eliminate water and other contaminates in the fuel.
- If you do not remove the water from the storage tank or machine fuel tank, it can lead to rust or contamination in the storage tank and fuel system components. Tank sludge developed by mold, bacteria, or fungus restricts flow and clogs the filter and fuel injectors.
- Inspect your fuel storage tank and machine fuel tank regularly to monitor the fuel quality in the tank.
- Ensure that your fuel comes from a quality supplier.
- If you find water or contaminants in your storage tank or machine fuel tank, work with your fuel

provider to correct the problem and perform all fuel system maintenance.

- Do not store diesel fuel in tanks or canisters made with zinc-plated components.

Servicing the Fuel-Water Separator



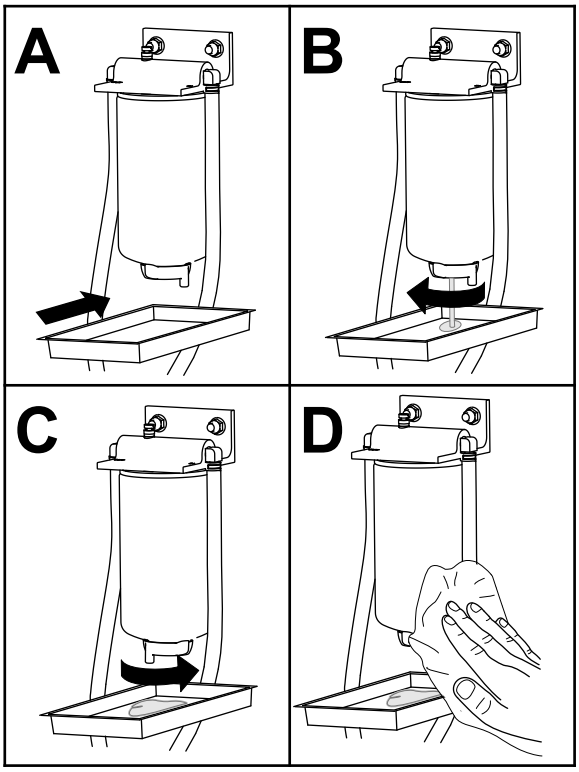
g421389

Figure 52

Draining Water from the Fuel/Water Separator

Service Interval: Before each use or daily—Drain water or other contaminants from the fuel/water separator.

1. Drain water from the fuel/water separator as shown in Figure 53.



g399473

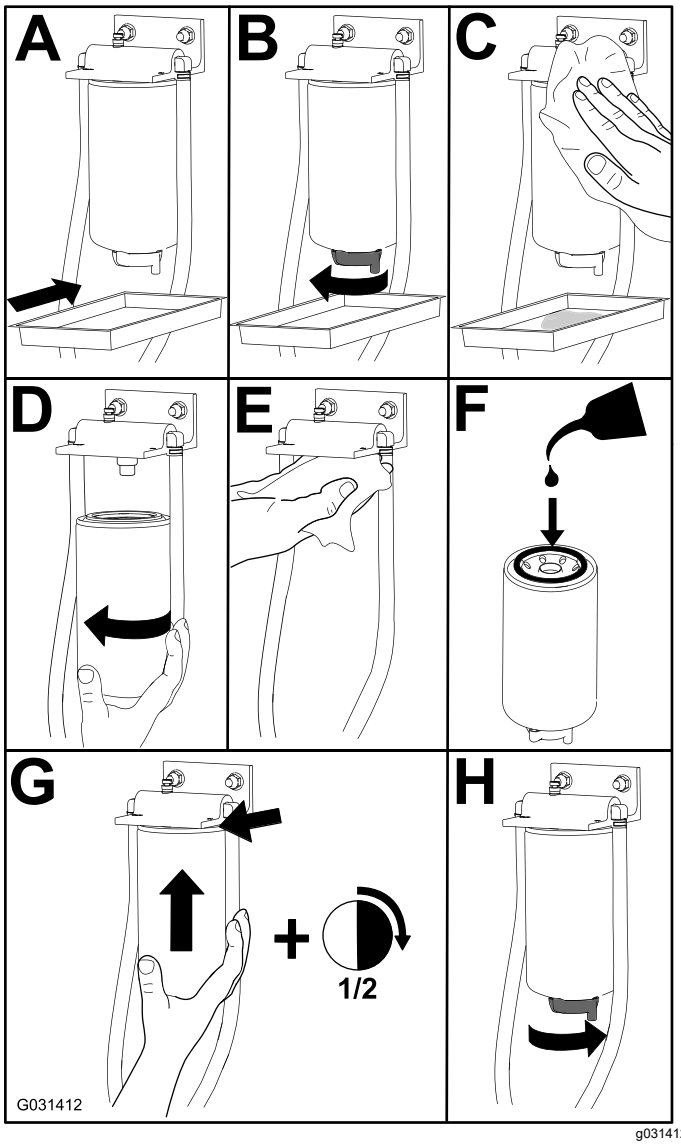
Figure 53

2. Prime the filter and the lines to the high pressure pump; refer to Priming the Fuel System (page 58).

Replacing the Fuel/Water Separator Filter

Service Interval: Every 400 hours—Replace the fuel/water separator filter.

1. Replace the filter as shown in Figure 54.



g031412

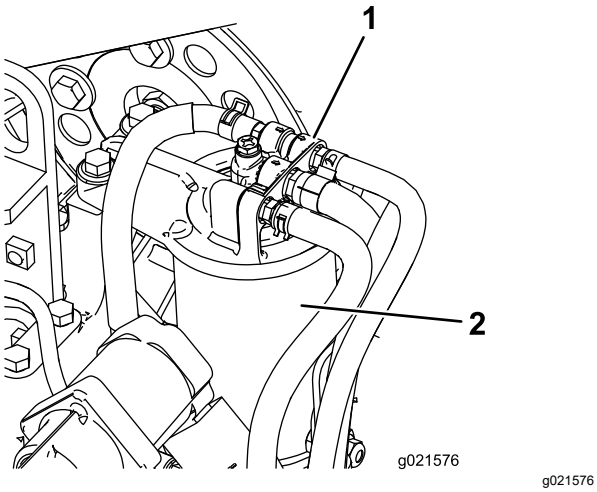
Figure 54

2. Prime the filter and the lines to the high pressure pump; refer to Priming the Fuel System (page 58).

Servicing the Fuel Filter

Service Interval: Every 400 hours

1. Clean the area around the fuel-filter head (Figure 55).



g021576

Figure 55

1. Fuel-filter head
2. Fuel filter

2. Remove the filter and clean the filter head mounting surface (Figure 55).

   Note: Use a clean cloth to clean the filter head.
3. Lubricate the filter gasket with clean lubricating engine oil; refer to the engine owner's manual for additional information.
4. Install the dry filter canister by hand until the gasket contacts the filter head, then rotate it an additional 1/2 turn.
5. Prime the filter and the lines to the high pressure pump; refer to Priming the Fuel System (page 58).
6. Start the engine and inspect for leaks around the filter head again.

Draining the Fuel Tank

Service Interval: Every 800 hours—Drain and clean the fuel tank.

Before storage—Drain and clean the fuel tank.

In addition to the listed service interval, drain and clean the tank if the fuel system becomes contaminated or if you are storing the machine for an extended period. Use clean fuel to flush out the tank.

Prime the filter and the lines to the high pressure pump; refer to Priming the Fuel System (page 58).

Inspecting the Fuel Lines and Connections

Service Interval: Every 400 hours/Yearly (whichever comes first)

Inspect the fuel lines for deterioration, damage, or loose connections.

Replace any deteriorated clamps or hoses.

Note: Prime the fuel system if you replace any fuel lines; refer to Priming the Fuel System (page 58).

Servicing the Diesel-Oxidation Catalyst (DOC) and the Soot Filter

Service Interval: Every 3,000 hours

1. Refer to the Engine section in the *Service Manual* for information on disassembling and assembling the diesel-oxidation catalyst and the soot filter of the DPF.
2. Contact your authorized Toro distributor for diesel-oxidation catalyst and the soot filter replacement parts or service.
3. Contact your authorized Toro distributor to reset the engine ECU after you install a clean DPF.

Priming the Fuel System

Prime the fuel system after the following scenarios:

- Replacing the fuel filter.
- Draining the water separator after each use or daily.
- Running out of fuel.
- Replacing a fuel hose or open the fuel system for any reason.

To prime the fuel system, perform the following steps:

Important: **Do not use the engine-starter motor to crank the engine for fuel-system priming.**

1. Ensure that fuel is in the fuel tank.
2. Perform the following steps to prime the filter and the lines to the high-pressure pump to prevent wear or damage to the pump:
   A. Cycle the key to the ON position for 15 to 20 seconds.
   B. Cycle the key to the OFF position for 30 to 40 seconds.

      Note: This allows the ECU to power down.
   C. Cycle the key to the ON position for 15 to 20 seconds.

D. Inspect for leaks around the filter and hoses.

E. Start the engine and inspect for leaks.

Electrical System Maintenance

Electrical System Safety

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

Servicing the Battery

Service Interval: Every 50 hours

Every 50 hours

Perform the following tasks to service the battery:

- Check the battery condition
- Clean the battery (if necessary)

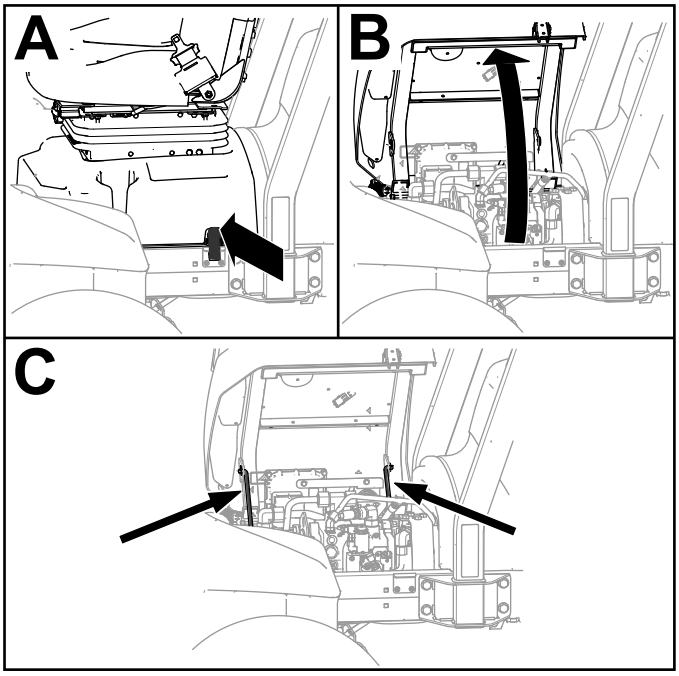
  Note: To clean the battery, wash the entire case with a solution of baking soda and water. Rinse it with clear water.
- Check the battery-cable connections and coat the battery posts and cable connectors with Grafo 112X (skin-over) grease or petroleum jelly to prevent corrosion.

Important: **Before welding on the machine, disconnect the negative cable from the battery to prevent damage to the electrical system. Also, you must disconnect the engine, InfoCenter, and machine controllers before welding on the machine.**

Replacing the Fuses

The fuse block (Figure 57) is located under the seat. Refer to Figure 59 for a description of each fuse.

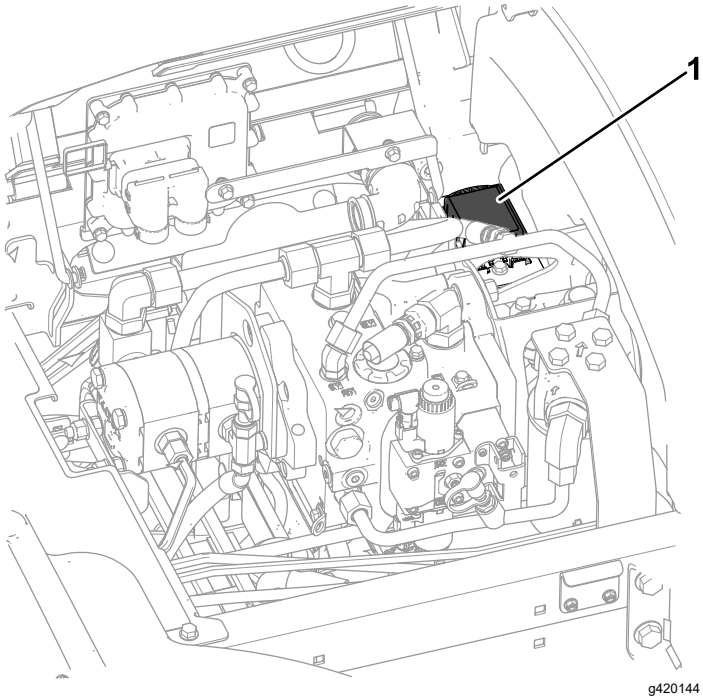
1. Unlatch the seat base, tilt the seat base open, and support it with the prop rods.



g419565

Figure 56

2. Replace the open fuse with the same fuse type and amperage rating.

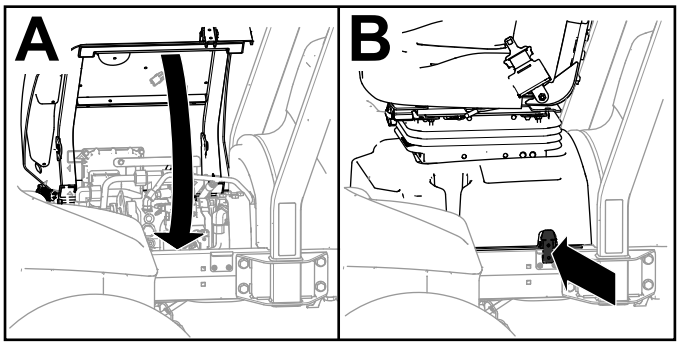


g420144

Figure 57

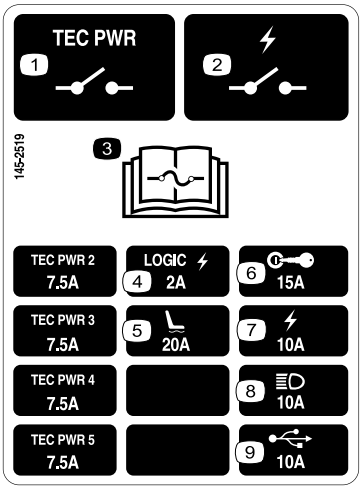
1. Fuse block

3. Rotate the seat and seat base closed and latch the base.



g419732

Figure 58



decal145-2519

Figure 59

1. TEC power relay
2. Electrical power relay
3. Read the *Operator's Manual* for fuse information.
4. Key switch
5. Air-ride seat
6. Electrical power
7. Headlights
8. USB power point

Charging the Battery

⚠ WARNING

Charging the battery produces gasses that can explode.

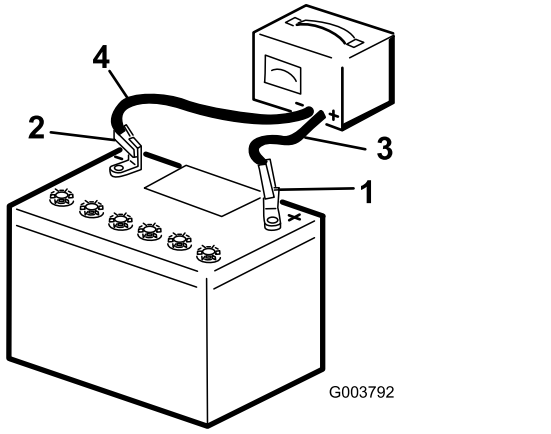
Do not smoke near the battery, and keep sparks and flames away from the battery.

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

1. Clean the exterior of the battery case and the battery posts.

   Note: Connect the leads of the battery charger to battery posts before connecting the charger to the electrical source.

2. Look at the battery and identify the positive and negative battery posts.
3. Connect the positive lead of the battery charger to the positive battery post (Figure 60).



g003792

Figure 60

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

4. Connect the negative lead of the battery charger to the negative-battery post (Figure 60).
5. Connect the battery charger to the electrical source, and charge the battery.

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

6. When the battery is fully charged, unplug the charger from the electrical source, then disconnect the charger leads from the battery posts (Figure 60).

Drive System Maintenance

Tightening the Axle Hub Nuts

Service Interval: After the first hour

After the first 10 hours

Every 250 hours

After the first hour

After the first 10 hours

Every 250 hours

1. Torque the front-axle hub nuts to 407 to 542 N·m (300 to 400 ft-lb).
2. If your machine has the CrossTrax® feature, torque the rear-axle hub nuts to 366 to 447 N·m (270 to 330 ft-lb).

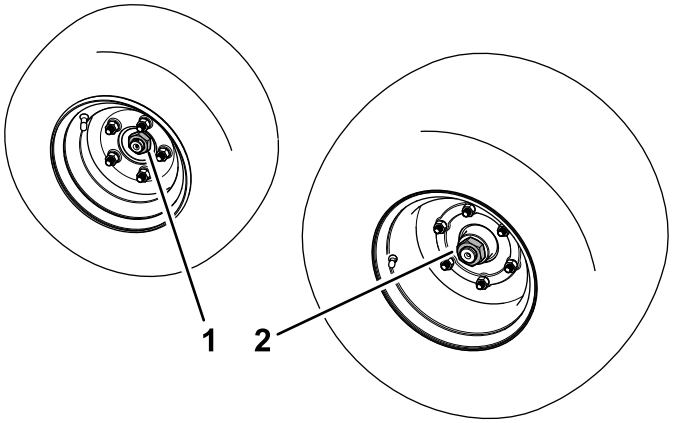


Figure 61

1. Rear-axle hub nut [366 to 447 N·m (270 to 330 ft-lb)]
2. Front-axle hub nut [407 to 542 N·m (300 to 400 ft-lb)]

Adjusting the Rear Wheel Toe-in

Service Interval: Every 800 hours

1. Rotate the steering wheel so that the rear wheels are straight ahead.
2. Loosen the jam nut on each end of the tie rod (Figure 62).

   Note: The end of the tie rod with the external groove is a left-hand thread.

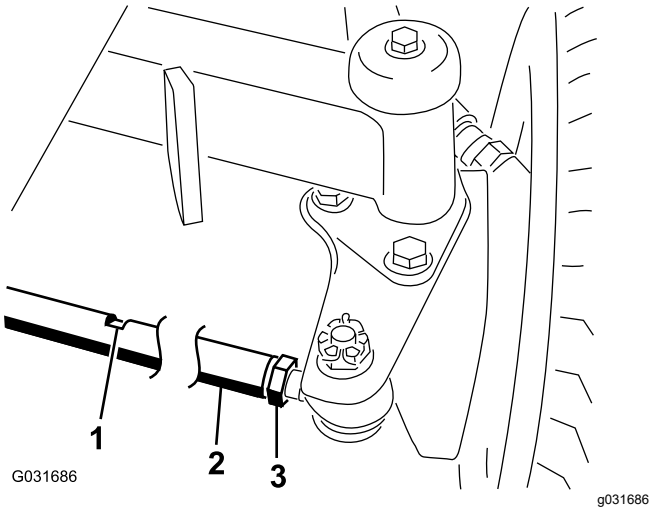


Figure 62

1. Wrench slot
2. Tie rod
3. Jam nut

3. Using the wrench slot, rotate the tie rod.
4. Measure the distance at the front and rear of the rear wheels at axle height.

   Note: The distance at the front of the rear wheels should be less than 6 mm (1/4 inch) of the distance measured at the rear of the wheels.
5. Repeat procedure as required.

Cooling System Maintenance

Cooling System Safety

- Swallowing engine coolant can cause poisoning; keep out of reach from children and pets.
- Discharge of hot, pressurized coolant or touching a hot radiator and surrounding parts can cause severe burns.
  - Always allow the engine to cool at least 15 minutes before removing the radiator cap.
  - Use a rag when opening the radiator cap, and open the cap slowly to allow steam to escape.
- Do not operate the machine without the covers in place.
- Keep your fingers, hands, and clothing clear of the rotating fan and drive belt.

Coolant Specification

The coolant reservoir is filled at the factory with a 50/50 solution of water and ethylene glycol base extended-life coolant.

Important: **Use only commercially available coolants that meet the specifications listed in the Extended Life Coolant Standards Table.**

Do not use conventional (green) inorganic-acid technology (IAT) coolant in your machine. Do not mix conventional coolant with extended-life coolant.

Coolant Type Table

Ethylene-Glycol Coolant Type	Corrosion Inhibitor Type
Extended-life antifreeze	Organic-acid technology (OAT)

Important: **Do not rely on the color of the coolant to identify the difference between conventional (green) inorganic-acid technology (IAT) coolant and extended-life coolant.**

Coolant manufacturers may dye extended-life coolant in one of the following colors: red, pink, orange, yellow, blue, teal, violet, and green. Use coolant that meets the specifications in the Extended Life Coolant Standards Table.

Extended Life Coolant Standards

ATSM International	SAE International
D3306 and D4985	J1034, J814, and 1941

Important: **Coolant concentration should be a 50/50 mixture of coolant to water.**

- **Preferred:** When mixing coolant from a concentrate, mix it with distilled water.
- **Preferred option:** If distilled water is not available, use a pre-mix coolant instead of a concentrate.
- **Minimum requirement:** If distilled water and pre-mix coolant are not available, mix concentrated coolant with clean drinkable water.

Checking the Cooling System

Service Interval: Before each use or daily—Check the level of coolant in the expansion tank.

The cooling system is filled with a 50/50 solution of water and permanent ethylene glycol antifreeze. The capacity of the cooling system is 9.5 L (10 US qt).

1. Check the level of coolant in the expansion tank (Figure 63).

   Note: The coolant level should be between the marks on the side of the tank.

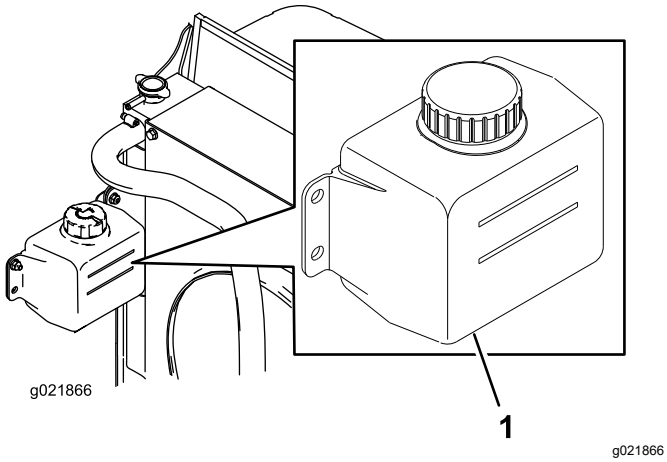


Figure 63

1. Expansion tank

2. If the coolant level is low, remove the expansion-tank cap and replenish the system. **Do not overfill.**
3. Install the expansion-tank cap.

Cleaning the Cooling System

Service Interval: Before each use or daily—Remove debris from the screen, radiator, oil cooler, and engine compartment (more frequently in dirty operating conditions).

Every 100 hours—Inspect the cooling system hoses.

Every 2 years—Flush and replace the cooling system fluid.

Every 2 years—Replace the coolant hoses.

Remove debris from the screen and radiator/oil cooler daily (clean more frequently in dirty conditions).

1. Turn the key in the ignition switch to the OFF position and remove the key.
2. Thoroughly clean all debris out of the engine area.
3. Unlatch the clamp and pivot open the rear screen (Figure 64).

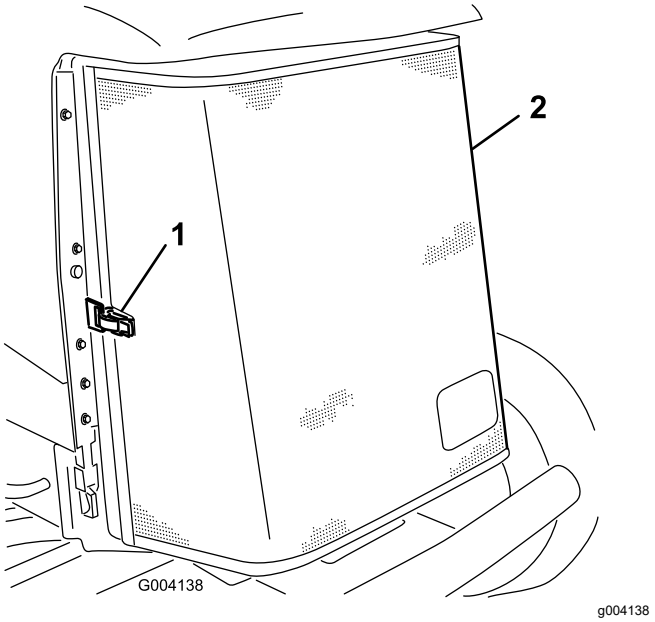


Figure 64

1. Rear screen latch
2. Rear screen

4. Thoroughly clean both sides of the radiator and oil cooler (Figure 65) with compressed air.

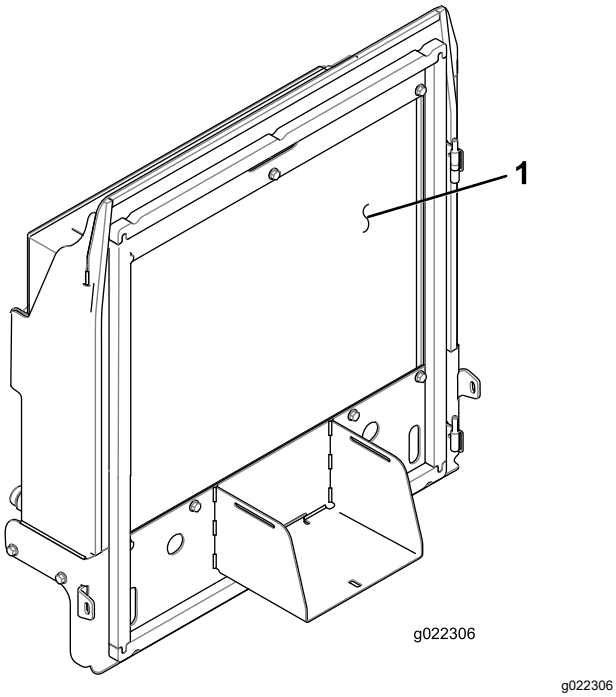


Figure 65

1. Radiator/oil cooler

5. Close the screen and secure the latch.

Belt Maintenance

Servicing the Alternator Belt

Service Interval: After the first 10 hours

Every 100 hours

Note: For proper belt tension, allow 10 mm (3/8 inch) deflection when a force of 44 N (10 lb) is applied on the belt midway between the pulleys.

1. If the deflection is not 10 mm (3/8 inch), loosen the alternator mounting bolts (Figure 66).

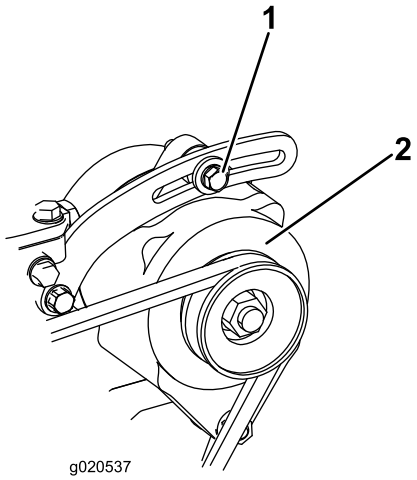


Figure 66

1. Mounting bolt
2. Alternator

2. Increase or decrease the alternator-belt tension and tighten the bolts.
3. Check the deflection of the belt again to ensure that the tension is correct.

Hydraulic System Maintenance

Hydraulic System Safety

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

Hydraulic Fluid Specifications

The reservoir is filled at the factory with high-quality hydraulic fluid. Check the level of the hydraulic fluid before you first start the engine and daily thereafter; refer to Checking the Hydraulic-Fluid Level (page 65).

Recommended hydraulic fluid: Toro PX Extended Life Hydraulic Fluid; available in 19 L (5 US gallon) pails or 208 L (55 US gallon) drums.

Note: A machine using the recommended replacement fluid requires less frequent fluid and filter changes.

Alternative hydraulic fluids: If Toro PX Extended Life Hydraulic Fluid is not available, you may use another conventional, petroleum-based hydraulic fluid having specifications that fall within the listed range for all the following material properties and that it meets industry standards. Do not use synthetic fluid. Consult with your lubricant distributor to identify a satisfactory product.

Note: Toro does not assume responsibility for damage caused by improper substitutions, so use products only from reputable manufacturers who will stand behind their recommendation.

High Viscosity Index/Low Pour Point Anti-wear Hydraulic Fluid, ISO VG 46

Material Properties:	
Viscosity, ASTM D445	cSt @ 40°C (104°F) 44 to 48
Viscosity Index ASTM D2270	140 or higher
Pour Point, ASTM D97	-37°C to -45°C (-34°F to -49°F)
Industry Specifications:	Eaton Vickers 694 (I-286-S, M-2950-S/35VQ25 or M-2952-S)

High Viscosity Index/Low Pour Point Anti-wear Hydraulic Fluid, ISO VG 46 (cont'd.)

Note: Many hydraulic fluids are almost colorless, making it difficult to spot leaks. A red dye additive for the hydraulic fluid is available in 20 ml (0.67 fl oz) bottles. A bottle is sufficient for 15 to 22 L (4 to 6 US gallons) of hydraulic fluid. Order Part No. 44-2500 from your authorized Toro distributor.

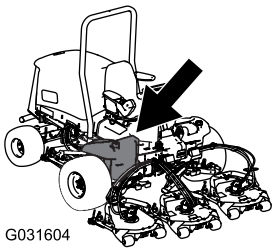
Important: **Toro Premium Synthetic Biodegradable Hydraulic Fluid is the only synthetic biodegradable fluid approved by Toro. This fluid is compatible with the elastomers used in Toro hydraulic systems and is suitable for a wide-range of temperature conditions. This fluid is compatible with conventional mineral oils, but for maximum biodegradability and performance, the hydraulic system should be thoroughly flushed of conventional fluid. The oil is available in 19 L (5 US gallon) pails or 208 L (55 US gallon) drums from your authorized Toro distributor.**

Checking the Hydraulic-Fluid Level

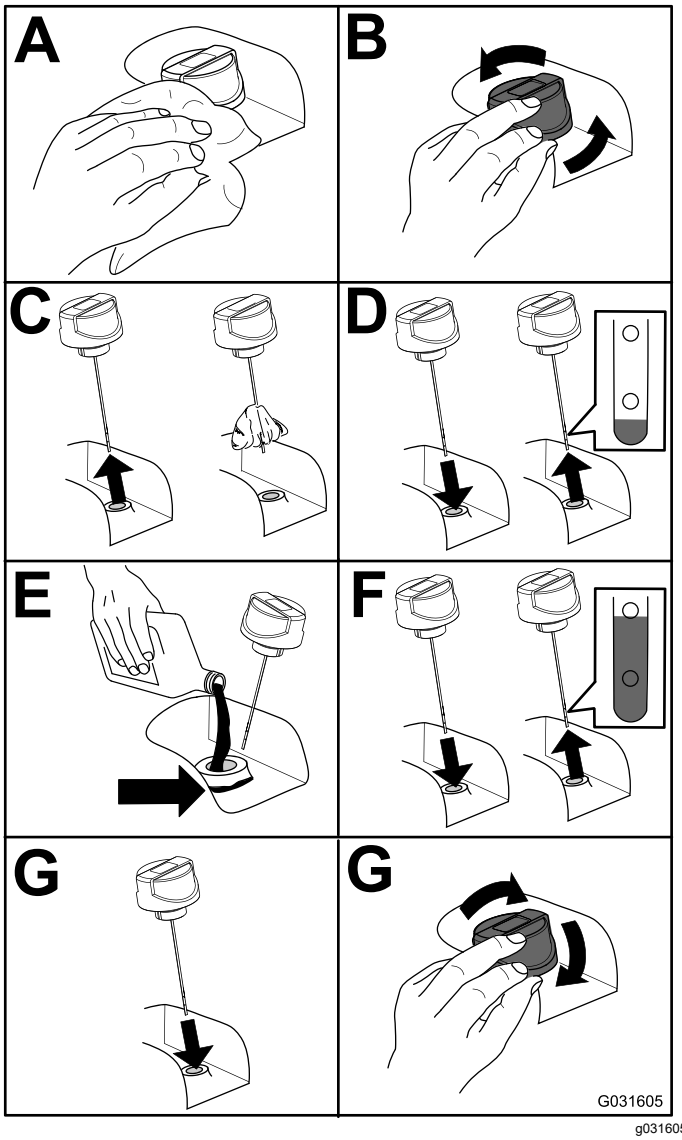
Service Interval: Before each use or daily

Every 200 hours

1. Position the machine on a level surface, lower the cutting decks, and turn the key in the switch to the OFF position.
2. Check the hydraulic-fluid level (Figure 67).



g031604



g031605

Figure 67

Changing the Hydraulic Fluid

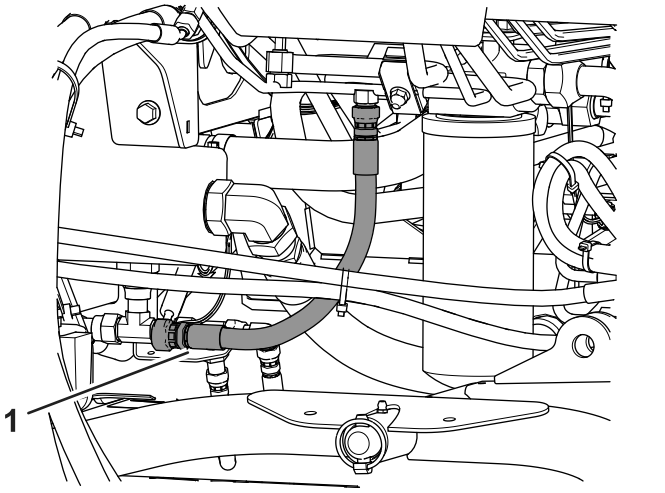
Service Interval: Every 2,000 hours—**If you are using the recommended hydraulic fluid,** change the hydraulic fluid.

Every 800 hours—**If you are not using the recommended hydraulic fluid or have ever filled the reservoir with an alternative fluid,** change the hydraulic fluid.

Hydraulic Fluid Capacity: 56.7 L (15 US gallons)

If fluid becomes contaminated, contact your Toro Distributor because the system must be flushed. Contaminated fluid looks milky or black when compared to clean oil.

1. Turn the key in the switch to the OFF position and raise the hood.
2. Place a large drain pan under the fitting secured to the bottom of the hydraulic-fluid reservoir (Figure 68).



g421391

Figure 68

1. Hose

3. Disconnect the hose from the bottom of the fitting and let the hydraulic fluid flow into the drain pan.
4. Install the hose when hydraulic fluid stops draining.
5. Fill the reservoir with hydraulic fluid (Figure 67).

   Important: **Use only hydraulic fluids specified. Other fluids could cause system damage.**
6. Install the reservoir cap.
7. Turn the key in the switch to the ON position, start the engine, use all of the hydraulic controls to distribute hydraulic fluid throughout the system, and check for leaks.
8. Turn the key in the switch to the OFF position.
9. Check the level of the hydraulic fluid and add enough to raise level to the Full mark on the dipstick.

   Important: **Do not overfill.**

Replacing the Hydraulic Filters

Service Interval: Every 1,000 hours—**If you are using the recommended hydraulic fluid,** replace the hydraulic filter(s) (sooner if the service interval indicator is in the red zone).

Every 800 hours—**If you are not using the recommended hydraulic fluid or have ever filled the reservoir with an alternative fluid,** replace the hydraulic filter(s) (sooner if the service interval indicator is in the red zone).

The hydraulic system is equipped with a service-interval indicator (Figure 69). With the engine running, view the indicator, it should be in the green zone. When the indicator is in the red zone, change the hydraulic filters.

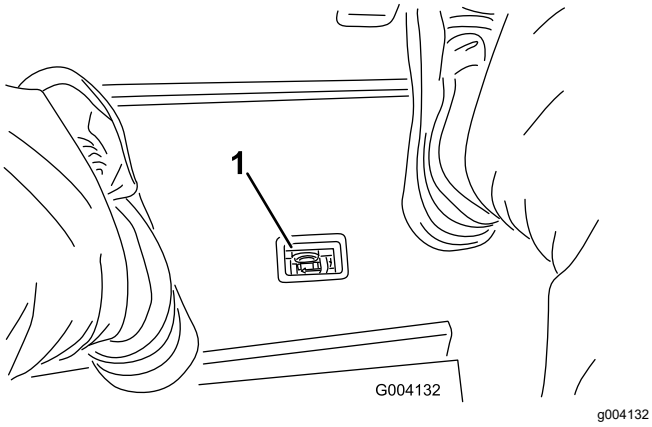
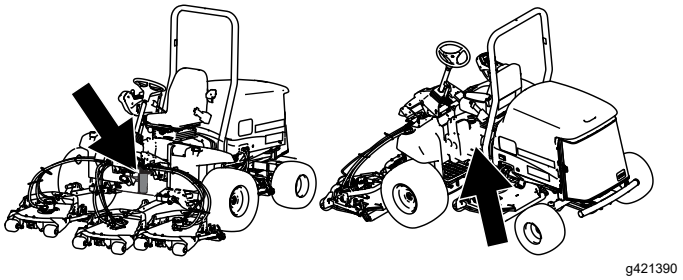


Figure 69

1. Hydraulic-filter restriction indicator

Important: **Use of any other filters may void the warranty on some components.**

1. Position the machine on a level surface, lower the cutting decks, turn the key in the switch to the OFF position, engage the parking brake, and remove the key.
2. Replace both of the hydraulic filters (Figure 70).



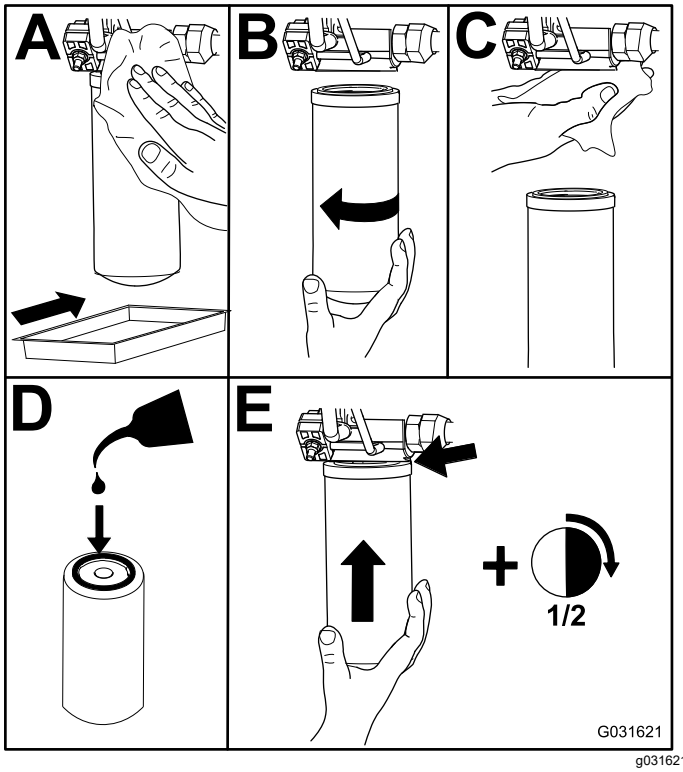


Figure 70

3. Turn the key in the switch to the ON position, start the engine, and let it run for about 2 minutes to purge air from the system.
4. Turn the key in the switch to the OFF position and check for leaks.

Checking the Hydraulic Lines and Hoses

Service Interval: Before each use or daily

Every 2 years—Replace the hydraulic hoses.

Make all necessary repairs before operating.

⚠ WARNING

Hydraulic fluid escaping under pressure can penetrate skin and cause injury.

- **Seek immediate medical help if fluid is injected into skin.**
- **Make sure that all hydraulic-fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to the hydraulic system.**
- **Keep your body and hands away from pinhole leaks or nozzles that eject high-pressure hydraulic fluid.**
- **Use cardboard or paper to find hydraulic leaks.**
- **Safely relieve all pressure in the hydraulic system before performing any work on the hydraulic system.**

Testing the Hydraulic-System Pressure

Use the hydraulic system test ports to test the pressure in the hydraulic circuits. Contact your authorized Toro distributor for assistance.

Hydraulic Valve Solenoid Functions

Use the list below to identify and describe the different functions of the solenoids in the hydraulic manifold. Each solenoid must be energized to allow function to occur.

Solenoid	Function
PRV2	Front mower circuit
PRV1	Rear mower circuit
PRV	Lift/lower cutting decks
S1	Lower cutting decks
S2	Lower cutting decks

Separating the Cutting Unit from the Traction Unit

1. Position the machine on a level surface, lower the cutting units to the floor, turn the key in the switch to the OFF position, and engage the parking brake.
2. Disconnect and remove the hydraulic motor from the cutting unit (Figure 71). Cover the top of the spindle to prevent contamination.

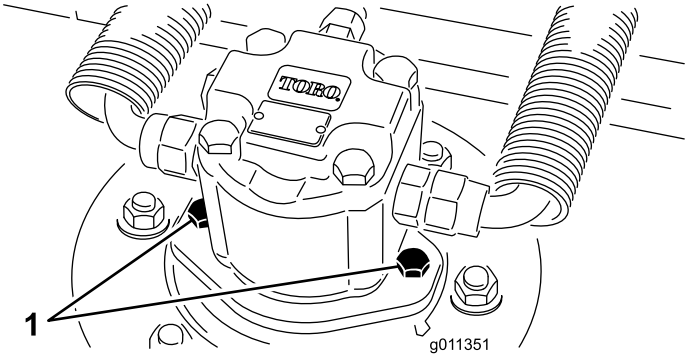


Figure 71

1. Motor-mounting screws

3. Remove the lynch pin securing the deck-carrier frame to the lift-arm pivot pin (Figure 72).

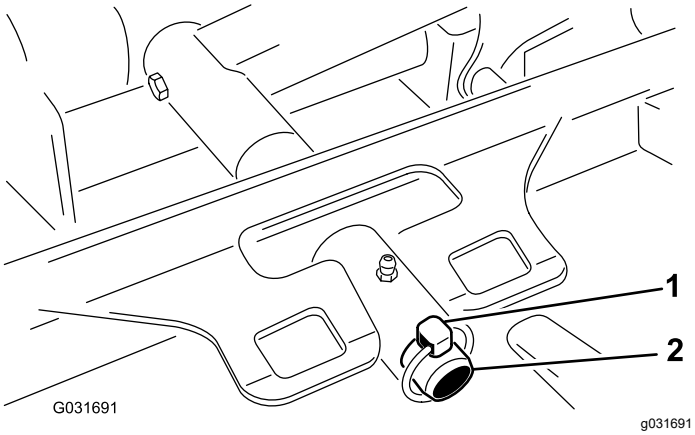


Figure 72

1. Lynch pin
2. Lift-arm pivot pin

4. Roll the cutting unit away from the traction unit.

Mounting the Cutting Units to the Traction Unit

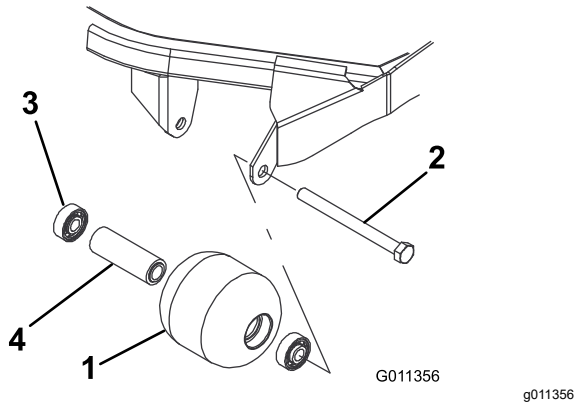
1. Position the machine on a level surface and turn the key in the switch to the OFF position.
2. Move the cutting unit into position in front of the traction unit.
3. Slide the deck-carrier frame onto the lift-arm pivot pin and secure it with the lynch pin (Figure 72).
4. Install the hydraulic motor to the deck (Figure 71). Make sure that the O-ring is in position and not damaged.
5. Grease the spindle.

Servicing the Front Roller

Inspect the front roller for wear, excess wobble, or binding. Service or replace the roller or components if any of these conditions exist.

Disassembling the Front Roller

1. Remove the roller-mounting bolt (Figure 73).
2. Insert a punch through the end of the roller housing and drive the opposite bearing out by alternating taps to the opposite side of inner bearing race. There should be a 1.5 mm (0.060 inch) lip of inner race exposed.



g011356

Figure 73

1. Front roller
2. Mounting bolt
3. Bearing
4. Bearing spacer

3. Push the second bearing out in press.
4. Inspect the roller housing, bearings, and bearing spacer for damage (Figure 73). Replace any damaged components and assemble them.

Assembling the Front Roller

1. Press the first bearing into the roller housing (Figure 73). Press on the outer race only or equally on the inner and outer race.
2. Insert the spacer (Figure 73).
3. Press the second bearing into the roller housing (Figure 73). Pressing equally on the inner and outer race until the inner race contacts the spacer.
4. Install the roller assembly into the cutting-unit frame.
5. Verify that there is no more than a 1.5 mm (0.060 inch) gap between roller assembly and the roller mount brackets of the cutting-unit frame. If there is a gap over 1.5 mm (0.060 inch), install enough 5/8-inch diameter washers to take up the slop.

   Important: **Securing the roller assembly with a gap larger than 1.5 mm (0.060 inch) creates a side load on the bearing and can lead to premature bearing failure**
6. Torque the mounting bolt to 108 N·m (80 ft-lb).

Blade Maintenance

Blade Safety

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

Servicing the Blade Plane

The rotary deck comes from the factory preset at 5 cm (2 inches) height of cut and blade rake of 7.9 mm (0.310 inch). The left and right heights are also preset to within ± 0.7 mm (0.030 inch) of the other.

The cutting deck is designed to withstand blade impacts without deformation of the chamber. If a solid object is struck, inspect the blade for damage and the blade plane for accuracy.

Inspecting the Blade Plane

1. Remove the hydraulic motor from the cutting deck and remove the cutting deck from the tractor.
2. Use a hoist (or minimum of 2 people) and place the cutting deck on a flat table.
3. Mark 1 end of the blade with a paint pen or marker. Use this end of the blade to check all heights.
4. Position the cutting edge of the marked end of the blade at 12 o'clock (straight ahead in the direction of mowing) (Figure 74) and measure height from table to cutting edge of blade.

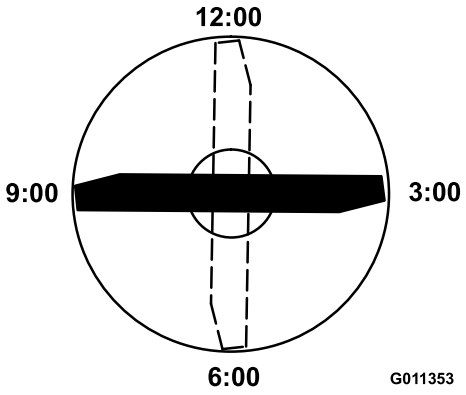


Figure 74

5. Rotate the marked end of the blade to the 3 and 9 o'clock positions (Figure 74) and measure the heights.
6. Compare the 12 o'clock measured height to the height-of-cut setting. It should be within 0.7 mm (0.030 inch). The 3 and 9 o'clock heights should be 1.6 to 6.0 mm (0.06 to 0.24 inch) higher than the 12 o'clock setting and within 1.6 to 6.0 mm (0.06 to 0.24 inch) of each other.

Note: If any of these measurements are not within specification, proceed to Adjusting the Blade Plane (page 70).

Adjusting the Blade Plane

Start with the front adjustment (change 1 bracket at a time).

1. Remove the height-of-cut bracket (front, left, or right) from the deck frame (Figure 75).
2. Adjust 1.5 mm (0.060 inch) shims and/or 0.7 mm (0.030 inch) shim between the deck frame and bracket to achieve the desired height setting (Figure 75).

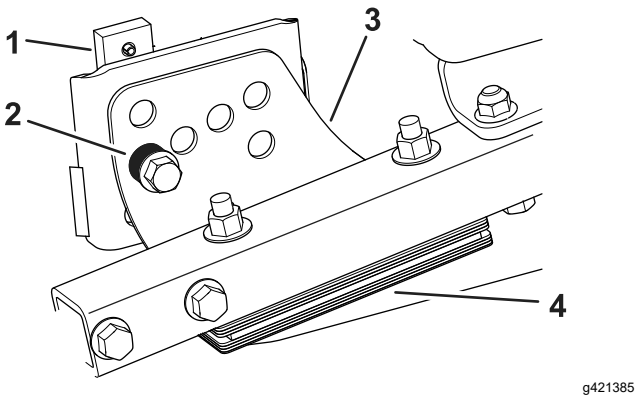


Figure 75

1. Height-of-cut plate
2. Spacer
3. Height-of-cut bracket
4. Shims

3. Install the height-of-cut bracket to the deck frame with the remaining shims assembled below the height-of-cut bracket.
4. Secure the socket-head bolt/spacer and flange nut.

   Note: Socket-head bolt/spacer are held together with thread-locking adhesive to prevent the spacer from falling inside the deck frame.
5. Verify the 12 o'clock height and adjust if needed.
6. Determine if only 1 or both (right and left) height-of-cut brackets need to be adjusted. If the 3 or 9 o'clock side is 1.6 to 6.0 mm (0.06 to 0.24 inch) higher than the new front height then no adjustment is needed for that side. Adjust the other side to within 1.6 to 6.0 mm (0.06 to 0.24 inch) of the correct side.
7. Adjust the right and/or left height-of-cut brackets by repeating steps 1 through 3.

8. Secure the carriage bolts and flange nuts.
9. Again, verify the 12, 3, and 9 o'clock heights.

Removing and Installing the Cutting-Unit Blade(s)

Replace the blade if it hits a solid object, is out of balance, or is bent. Always use genuine Toro replacement blades to ensure safety and optimum performance.

1. Park the machine on a level surface, raise the cutting unit to the transport position, engage the parking brake, shut off the engine, and remove the key.

   Note: Block or lock the cutting unit to prevent it from accidentally falling.

2. Grasp the end of the blade using a rag or thickly-padded glove.
3. Remove the blade bolt, anti-scalp cup, and blade from the spindle shaft (Figure 76).

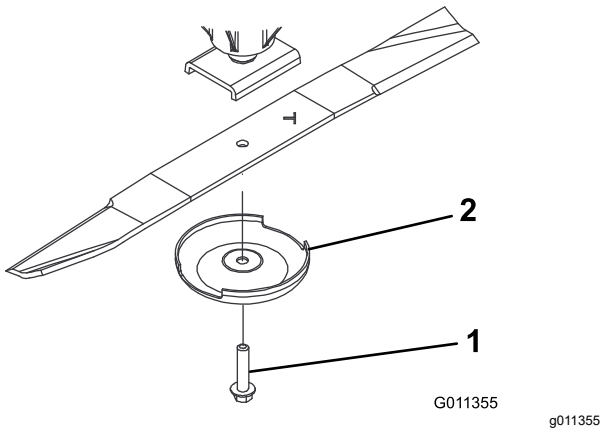


Figure 76

1. Blade bolt
2. Anti-scalp cup

4. Install the blade, anti-scalp cup, and blade bolt and tighten the blade bolt to 115 to 149 N·m (85 to 110 ft-lb).

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

   Note: 7

   After striking a foreign object, torque all spindle-pulley nuts to 115 to 149 N·m (85 to 110 ft-lb).

Inspecting and Sharpening the Blade

1. Raise the cutting deck to the transport position, turn the key in the ignition switch to the OFF position, and engage the parking brake.
2. Block the cutting deck to prevent it from falling accidentally.
3. Examine the cutting ends of the blade carefully, especially where the flat and curved parts of the blade meet (Figure 77).

   Note: Since sand and abrasive material can wear away the metal that connects the flat and curved parts of the blade, check the blade before using the machine.

4. If wear is noticed (Figure 77), replace the blade; refer to Inspecting the Blade Plane (page 70).

⚠ DANGER

If the blade is allowed to wear, a slot will form between the sail and flat part of the blade (Figure 77). Eventually a piece of the blade may break off and be thrown from under the housing, possibly resulting in serious injury to yourself or bystanders.

- **Inspect the blade periodically for wear or damage.**
- **Always replace a worn or damaged blade.**

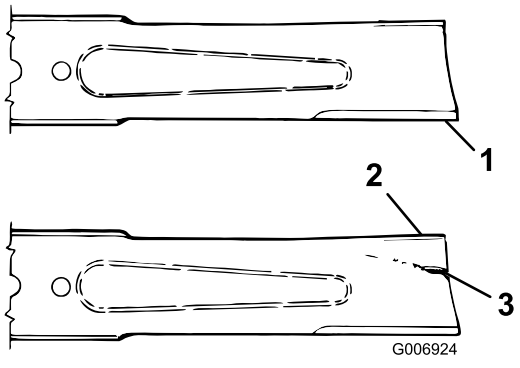


Figure 77

1. Cutting edge
2. Sail
3. Wear/slot/crack

5. Inspect the cutting edges of all blades. Sharpen the cutting edges if they are dull or nicked. Sharpen only the top of the cutting edge and maintain the original cutting angle to make sure that it is sharp (Figure 78).

6. If dull or nicked, sharpen only the top cutting edge while maintaining the original cutting angle (Figure 78).

   Note: The blade will remain balanced if the same amount of metal is removed from both cutting edges.



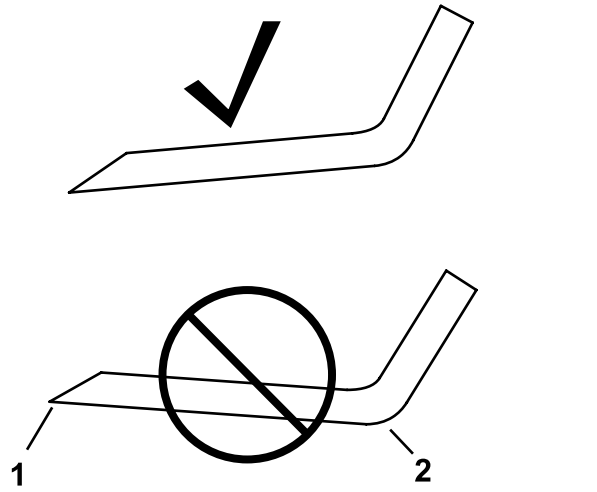
g006926

Figure 78

1. Sharpen at this angle only

7. To check the blade for being straight and parallel, lay the blade on a level surface and check its ends.

   Note: Position the ends of the blade slightly lower than the center, and the cutting edge lower than the heel of the blade. This blade produces a good quality of cut and requires minimal power from the engine. By contrast a blade that is higher at the ends than the center, or if cutting edge is higher than the heel, the blade is bent or warped and must be replaced.



g276373

Figure 79

1. Cutting edge
2. Heel

8. Install the blade, sail facing toward cutting deck, with the anti-scalp cup and blade bolt. Torque the blade bolt to 115 to 149 N·m (85 to 110 ft-lb).

Storage

Storage Safety

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

Preparing the Machine for Storage

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

Preparing the Traction Unit

1. Thoroughly clean the traction unit, cutting units, and engine.
2. Check the tire pressure. Inflate all traction unit tires to 83 to 103 kPa (12 to 15 psi).
3. Check all fasteners for looseness and tighten them as necessary.
4. Grease all grease fittings and pivot points. Wipe up any excess lubricant.
5. Lightly sand and use touch-up paint on painted areas that are scratched, chipped, or rusted. Repair any dents in the metal body.
6. Service the battery and cables as follows:
   A. Remove the battery terminals from the battery posts.

      Note: Always disconnect the negative terminal first and the positive last. Always connect the positive terminal first and the negative last.

   B. Clean the battery, terminals, and posts with a wire brush and baking soda solution.

   C. Coat the cable terminals and battery posts with Grafo 112X skin-over grease (Part Number 505-47) or petroleum jelly to prevent corrosion.

   D. Slowly recharge the battery every 60 days for 24 hours to prevent lead sulfation of the battery.

Preparing the Engine

1. Drain the engine oil from the oil pan and replace the drain plug.
2. Remove and discard the oil filter. Install a new oil filter.
3. Refill the oil pan with designated quantity of motor oil.
4. Turn the key in the switch to the ON position, start the engine, and run it at idle speed for approximately 2 minutes.
5. Turn the key in the switch to the OFF position.
6. Thoroughly drain all fuel from the fuel tank, lines, and the fuel filter/water separator assembly.
7. Flush the fuel tank with fresh, clean diesel fuel.
8. Secure all fuel-system fittings.
9. Thoroughly clean and service the air-cleaner assembly.
10. Seal the air-cleaner inlet and the exhaust outlet with weatherproof tape.
11. Check the antifreeze protection and add as needed for expected minimum temperature in your area.

Storing the Cutting Units

If a cutting unit is separated from the traction unit for any length of time, install a spindle plug in the top of the spindle to protect the spindle from dust and water.

Notes:

Notes:

The Toro Warranty

Two-Year or 1,500 Hours Limited Warranty

Conditions and Products Covered

The Toro Company warrants your Toro Commercial product (“Product”) to be free from defects in materials or workmanship for 2 years or 1,500 operational hours*, whichever occurs first. This warranty is applicable to all products with the exception of Aerators (refer to separate warranty statements for these products). Where a warrantable condition exists, we will repair the Product at no cost to you including diagnostics, labor, parts, and transportation. This warranty begins on the date the Product is delivered to the original retail purchaser.
* Product equipped with an hour meter.

Instructions for Obtaining Warranty Service

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

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

952–888–8801 or 800–952–2740
E-mail: commercial.warranty@toro.com

Owner Responsibilities

As the product owner, you are responsible for required maintenance and adjustments stated in your *Operator's Manual*. Repairs for product issues caused by failure to perform required maintenance and adjustments are not covered under this warranty.

Items and Conditions Not Covered

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

- Product failures which result from the use of non-Toro replacement parts, or from installation and use of add-on, or modified non-Toro branded accessories and products.
- Product failures which result from failure to perform recommended maintenance and/or adjustments.
- Product failures which result from operating the Product in an abusive, negligent, or reckless manner.
- Parts consumed through use that are not defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to, brake pads and linings, clutch linings, blades, reels, rollers and bearings (sealed or greasable), bed knives, spark plugs, castor wheels and bearings, tires, filters, belts, and certain sprayer components such as diaphragms, nozzles, flow meters, and check valves.
- Failures caused by outside influence, including, but not limited to, weather, storage practices, contamination, use of unapproved fuels, coolants, lubricants, additives, fertilizers, water, or chemicals.
- Failure or performance issues due to the use of fuels (e.g. gasoline, diesel, or biodiesel) that do not conform to their respective industry standards.
- Normal noise, vibration, wear and tear, and deterioration. Normal “wear and tear” includes, but is not limited to, damage to seats due to wear or abrasion, worn painted surfaces, scratched decals or windows.

Parts

Parts scheduled for replacement as required maintenance are warranted for the period of time up to the scheduled replacement time for that part. Parts replaced under this warranty are covered for the duration of the original product warranty and become the property of Toro. Toro will make the final decision whether to repair any existing part or assembly or replace it. Toro may use remanufactured parts for warranty repairs.

Deep Cycle and Lithium-Ion Battery Warranty

Deep cycle and Lithium-Ion batteries have a specified total number of kilowatt-hours they can deliver during their lifetime. Operating, recharging, and maintenance techniques can extend or reduce total battery life. As the batteries in this product are consumed, the amount of useful work between charging intervals will slowly decrease until the battery is completely worn out. Replacement of worn out batteries, due to normal consumption, is the responsibility of the product owner.
Note: (Lithium-Ion battery only): Refer to the battery warranty for additional information.

Lifetime Crankshaft Warranty (ProStripe 02657 Model Only)

The Prostripe which is fitted with a genuine Toro Friction Disc and Crank-Safe Blade Brake Clutch (integrated Blade Brake Clutch (BBC) + Friction Disc assembly) as original equipment and used by the original purchaser in accordance with recommended operating and maintenance procedures, are covered by a Lifetime Warranty against engine crankshaft bending. Machines fitted with friction washers, Blade Brake Clutch (BBC) units and other such devices are not covered by the Lifetime Crankshaft Warranty.

Maintenance is at Owner’s Expense

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

General Conditions

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

The Toro Company is not 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. Except for the Emissions warranty referenced below, if applicable, there is no other express warranty. All implied warranties of merchantability and fitness for use are limited to the duration of this 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.

Note Regarding Emissions Warranty

The Emissions Control System on your Product may be covered by a separate warranty meeting requirements established by the U.S. Environmental Protection Agency (EPA) and/or the California Air Resources Board (CARB). The hour limitations set forth above do not apply to the Emissions Control System Warranty. Refer to the Engine Emission Control Warranty Statement supplied with your product or contained in the engine manufacturer’s documentation.

Countries Other than the United States or Canada

Customers who have purchased Toro products exported from 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 your Authorized Toro Service Center.