



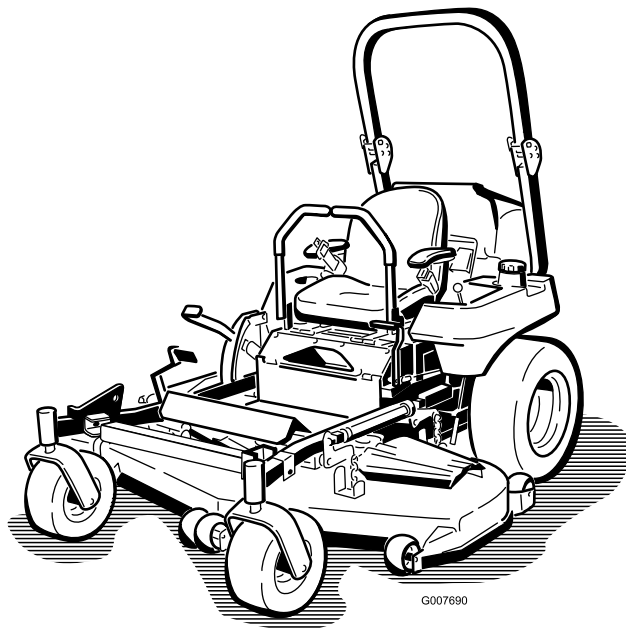
**Count on it.**

# Operator's Manual

## **Z590-D Z Master<sup>®</sup> with 60in or 72in TURBO FORCE<sup>®</sup> Side Discharge Mower**

**Model No. 74268—Serial No. 290000001 and Up**

**Model No. 74269—Serial No. 290000001 and Up**



## 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.

**Important:** This engine is not equipped with a spark arrester muffler. It is a violation of California Public Resource Code Section 4442 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land. Other states or federal areas may have similar laws.

This spark ignition system complies with Canadian ICES-002.

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

## Introduction

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

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

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

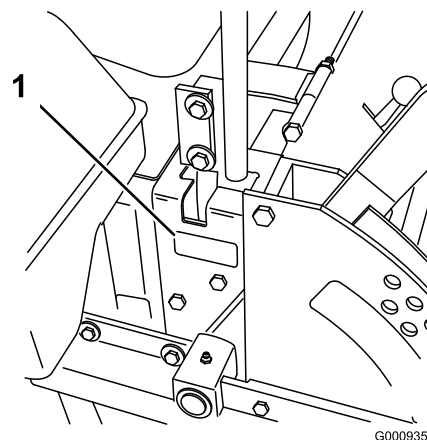


Figure 1

1. Model and serial number location

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

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

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



Figure 2

1. Safety alert symbol

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

## Contents

Introduction.....	2
Safety .....	4
Safe Operating Practices .....	4
Slope Chart .....	6
Safety and Instructional Decals .....	7
Product Overview .....	13
Controls .....	13
Operation.....	15
Adding Fuel .....	15
Checking the Engine Oil Level.....	16
Switching the Fuel Tanks .....	16

Using the Rollover Protection System (ROPS) .....	17	Belt Maintenance.....	47
Think Safety First .....	18	Inspecting the Belts .....	47
Understanding the Audible Alarms .....	18	Replacing the Mower Belt .....	47
Operating the Parking Brake .....	19	Replacing the Drive Belts .....	48
Starting and Stopping the Engine .....	19	Adjusting the Drive Belts .....	49
Operating the Power Take Off (PTO) .....	21	Checking and Replacing the Pump Drive Belt .....	49
The Safety Interlock System.....	21	Replacing and Tensioning the Alternator Belt .....	50
Driving Forward or Backward .....	22	Controls System Maintenance.....	51
Stopping the Machine .....	23	Adjusting the Control Handle Neutral Position .....	51
Adjusting the Control Lever Resistance .....	23	Hydraulic System Maintenance .....	52
Adjusting the Height-of-Cut .....	23	Servicing the Hydraulic System .....	52
Using the Lift Assist Lever .....	24	Setting the Hydraulic Pump Neutral Position .....	54
Adjusting the Anti-Scalp Rollers .....	24	Mower Deck Maintenance .....	56
Adjusting the Flow Baffle .....	25	Leveling the Mower at Three Positions .....	56
Positioning the Flow Baffle .....	25	Servicing the Cutting Blades .....	57
Positioning the Seat .....	26	Replacing the Grass Deflector.....	59
Unlatching the Seat.....	27	Cleaning.....	60
Pushing the Machine by Hand.....	27	Cleaning Under the Mower .....	60
Using the Side Discharge .....	27	Waste Disposal .....	60
Transporting Machines .....	28	Storage.....	61
Loading Machines .....	28	Cleaning and Storage .....	61
Using the Z Stand®.....	29	Troubleshooting.....	62
Operating Tips .....	30	Schematics .....	64
Maintenance.....	32		
Recommended Maintenance Schedule(s) .....	32		
Lubrication.....	33		
Greasing and Lubrication .....	33		
Greasing the Mower Deck and Belt Idlers.....	33		
Where to Add Light Oil or Spray Lubrication.....	34		
Grease the Idler Arms .....	34		
Greasing the Front Caster Pivots.....	34		
Lubricate Caster Wheel Hubs .....	34		
Engine Maintenance.....	36		
Servicing the Air Cleaner .....	36		
Servicing the Engine Oil.....	37		
Fuel System Maintenance .....	39		
Servicing the Fuel Filter and Water Separator.....	39		
Servicing the Fuel Tank .....	40		
Electrical System Maintenance.....	40		
Servicing the Battery.....	40		
Servicing the Fuses .....	42		
Drive System Maintenance .....	43		
Adjusting the Tracking.....	43		
Checking the Tire Pressure .....	43		
Checking the Wheel Hub Slotted Nut.....	43		
Adjusting the Caster Pivot Bearing .....	44		
Cooling System Maintenance .....	45		
Servicing the Cooling System .....	45		
Brake Maintenance .....	46		
Adjusting the Parking Brake.....	46		

# Safety

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

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

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

## Safe Operating Practices

The following instructions are from ANSI standard B71.4-2004.

### Training

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

### Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including hard hat, safety glasses and hearing protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is to be used and remove all objects such as rocks, toys and wire which can be thrown by the machine.

- Use extra care when handling diesel and other fuels. They are flammable and vapors are explosive.
  - Use only an approved container
  - Never refuel or drain the machine indoors.
  - Never remove gas cap or add fuel with engine running. Allow engine to cool before refueling. Do not smoke.
- Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

### Operation

- Never run an engine in an enclosed area.
- Only operate in good light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine. Start the engine only from the operator's position. Use seat belts.
- Never raise mower with the blades running.
- Never operate without the PTO shield, or other guards securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- Do not change the engine governor setting or overspeed the engine.
- Stop on level ground, lower implements, disengage drives, engage parking brake, shut off engine before leaving the operator's position for any reason including emptying the catchers or unclogging the chute.
- Stop equipment and inspect blades after striking objects or if an abnormal vibration occurs. Make necessary repairs before resuming operations.
- Keep hands and feet away from the cutting units.
- Never carry passengers and keep pets and bystanders away.
- Be alert, slow down and use caution when making turns. Look behind and to the side before changing directions.
- Slow down and use caution when crossing roads and sidewalks. Stop blades if not mowing.
- Be aware of the mower discharge direction and do not point it at anyone.
- Do not operate the mower under the influence of alcohol or drugs.

- Use extreme care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

## Slope Operation

- Do not mow slopes greater than 15 degrees.
- Do not mow near drop-offs, ditches, steep banks or water. Wheels dropping over edges can cause rollovers, which may result in serious injury, death or drowning.
- Do not mow slopes when grass is wet. Slippery conditions reduce traction and could cause sliding and loss of control.
- Do not make sudden turns or rapid speed changes.
- Use a walk behind mower and/or a hand trimmer near drop-offs, ditches, steep banks or water.
- Reduce speed and use extreme caution on slopes.
- Remove or mark obstacles such as rocks, tree limbs, etc. from the mowing area. Tall grass can hide obstacles.
- Watch for ditches, holes, rocks, dips, and rises that change the operating angle, as rough terrain could overturn the machine.
- Avoid sudden starts when mowing uphill because the mower may tip backwards.
- Be aware that loss of traction may occur going downhill. Weight transfer to the front wheels may cause drive wheels to slip and cause loss of braking and steering.
- Always avoid sudden starting or stopping on a slope. If tires lose traction, disengage the blades and proceed slowly off the slope.
- Follow the manufacturer's recommendations for wheel weights or counterweights to improve stability.
- Use extreme care with grass catchers or other attachments. These can change the stability of the machine and cause loss of control.

## Using the Rollover Protection System (ROPS)

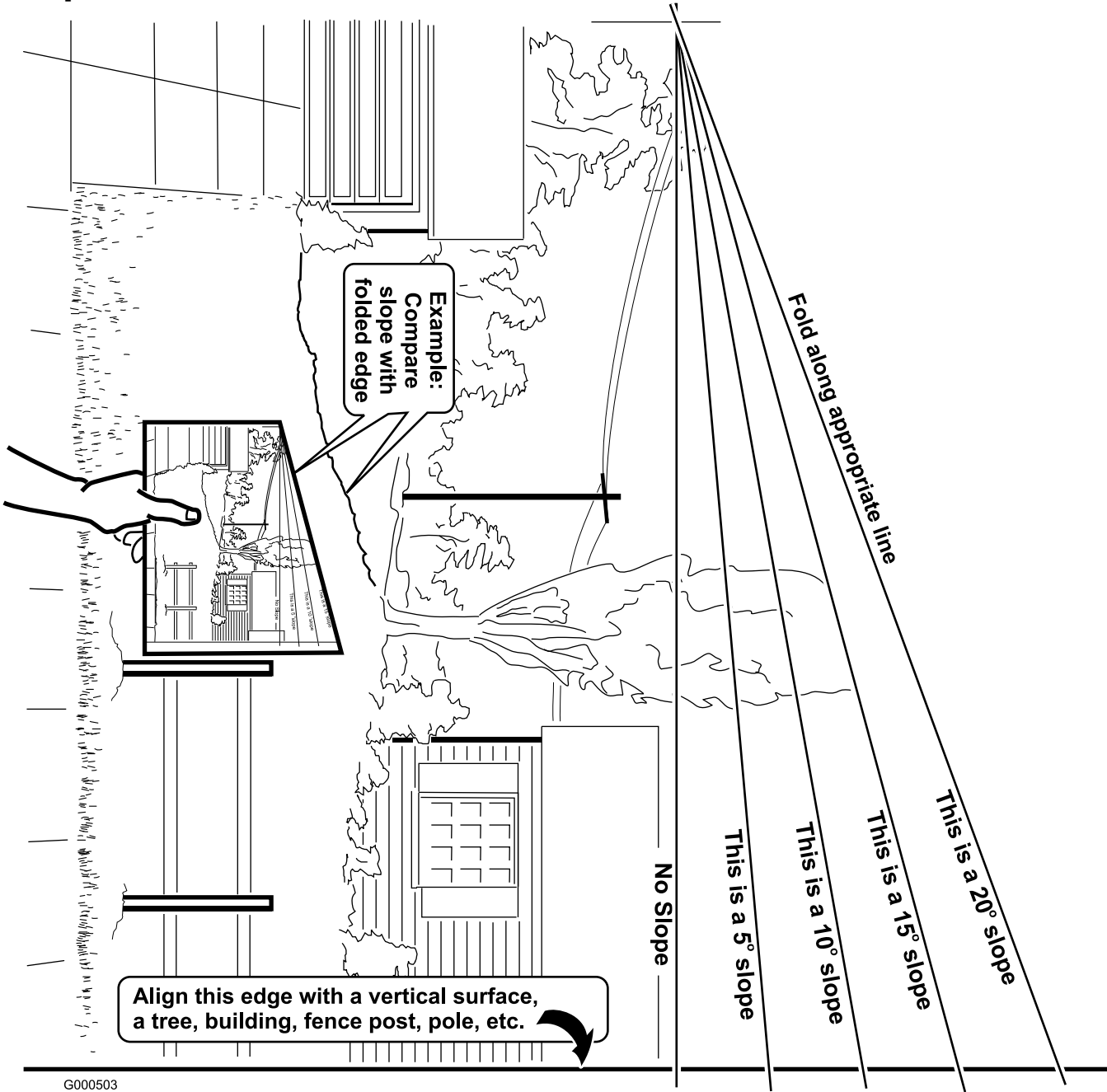
- Keep the roll bar in the raised and locked position and use the seat belt when operating the machine.
- Be certain that the seat belt can be released quickly in the event of an emergency.
- Be aware there is no rollover protection when the roll bar is down.

- Check the area to be mowed and never fold the ROPS in areas where there are slopes, drop offs or water.
- Lower the rollbar only when absolutely necessary. Do not wear the seat belt with the roll bar folded down.
- Check carefully for overhead clearances (i.e. branches, doorways, electrical wires) before driving under any objects and do not contact them.

## Maintenance and storage

- Disengage drives, lower implement, set parking brake, stop engine and remove key or disconnect spark plug wire. Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean grass and debris from cutting units, drives, mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.
- Let engine cool before storing and do not store near flame.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Park machine on level ground. Never allow untrained personnel to service machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect battery or remove spark plug wire before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace blades. Never straighten or weld them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- Use only Toro approved attachments. Warranty may be voided if used with unapproved attachments.

# Slope Chart



G000503

# Safety and Instructional Decals



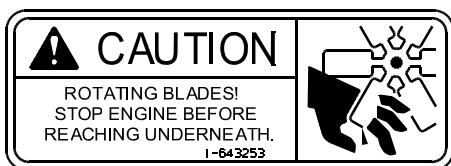
Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost.



1-403005



1-523552



1-643253



54-9220



1  
58-6520

1. Grease



66-1340



65-2690



68-8340

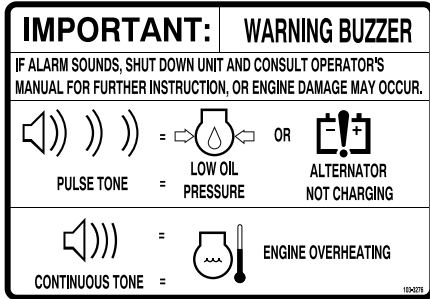


98-4387

1. Warning—wear hearing protection.



98-5954



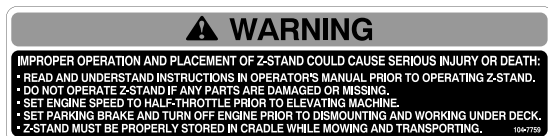
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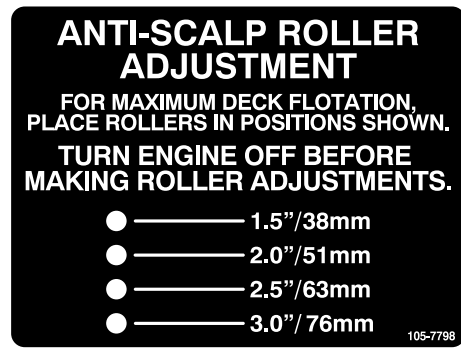
103-5881



104-2449



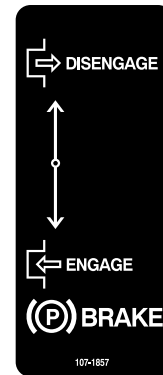
104-7759



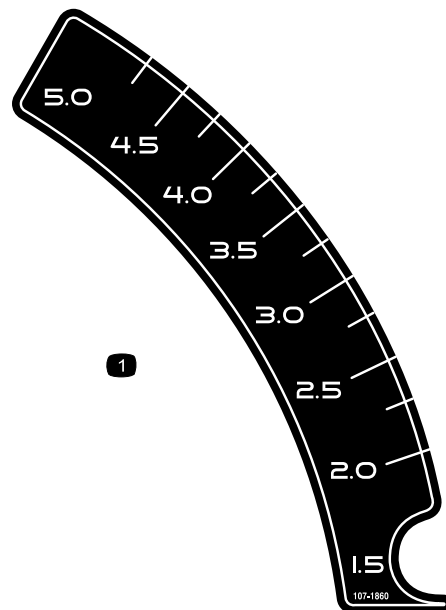
105-7798



107-1613



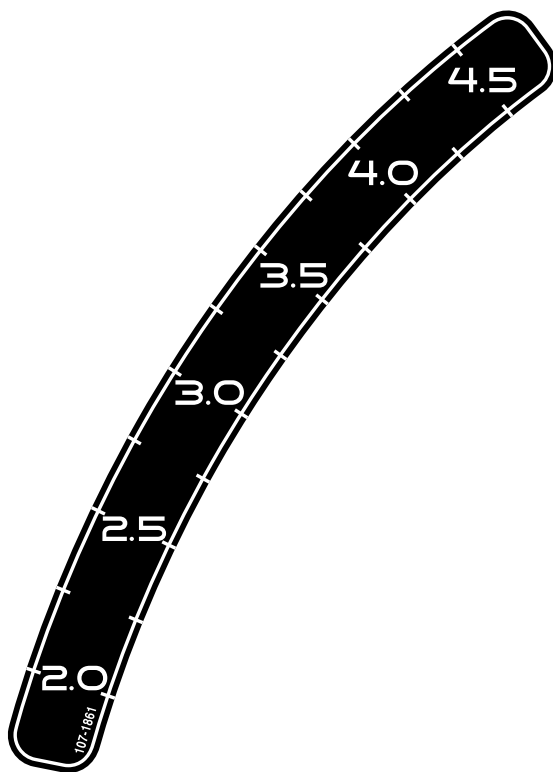
107-1857



107-1860

1. Height of cut





107-1861



107-1864

**⚠ WARNING**



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



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

107-2102

107-2102

**⚠ WARNING**

- Operating on wet grass or steep slopes can cause sliding and loss of control.
- Wheels dropping over edges can cause rollovers, which may result in serious injury, death or drowning.
- To avoid loss of control and possibility of rollover:
  - Do NOT operate near drop-offs or near water.
  - Do NOT operate on slopes greater than 15°.
  - Reduce speed and use extreme caution on slopes.
  - Avoid sudden turns or rapid speed changes.
- There is no rollover protection when the roll bar is down.
- Always keep roll bar in the raised and locked position and use seat belt.
- Read and follow rollover protection instructions and warning.

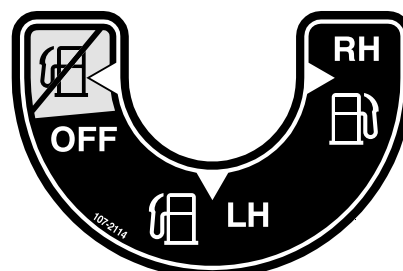


Greater than 15°

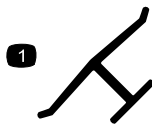


107-2112

107-2112

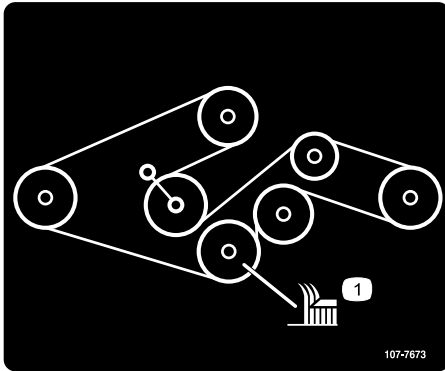


107-2114



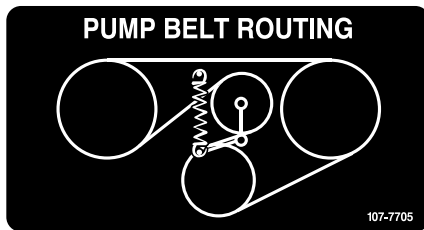
### Manufacturer's Mark

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

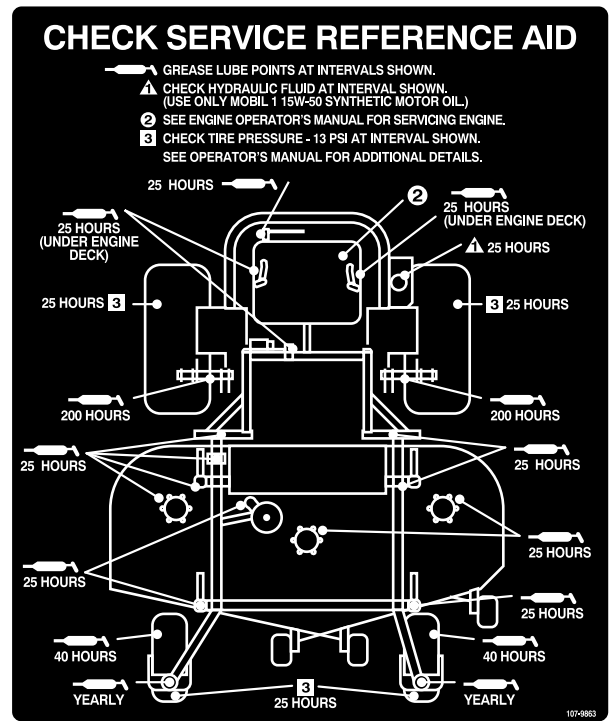


107-7673

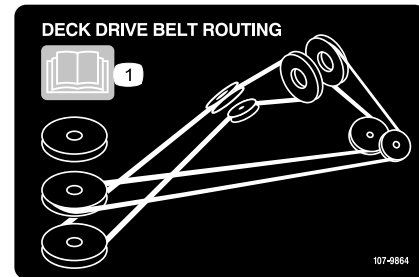
1. Cutting blade



107-7705



107-9863

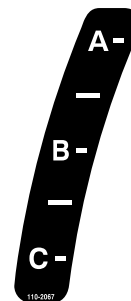


107-9864

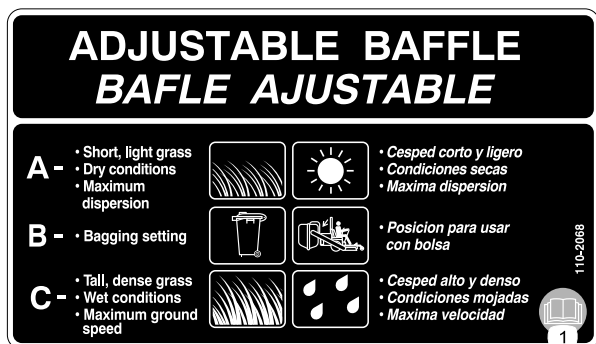
1. Read the *Operator's Manual*.

Torque Wheel Lug Nuts to 90-95 ft-lbs (122-129 N-m).	Check after first 100 hrs then every 500 hrs thereafter.
Torque Wheel Hub Slotted Nut to 125 ft-lbs (169 N-m) min.	
See Operator's Manual for more details.	

109-7949

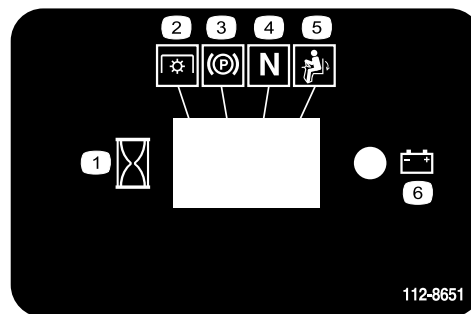


110-2067



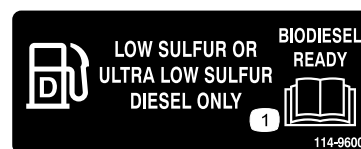
110-2068

1. Read the *Operator's Manual*.



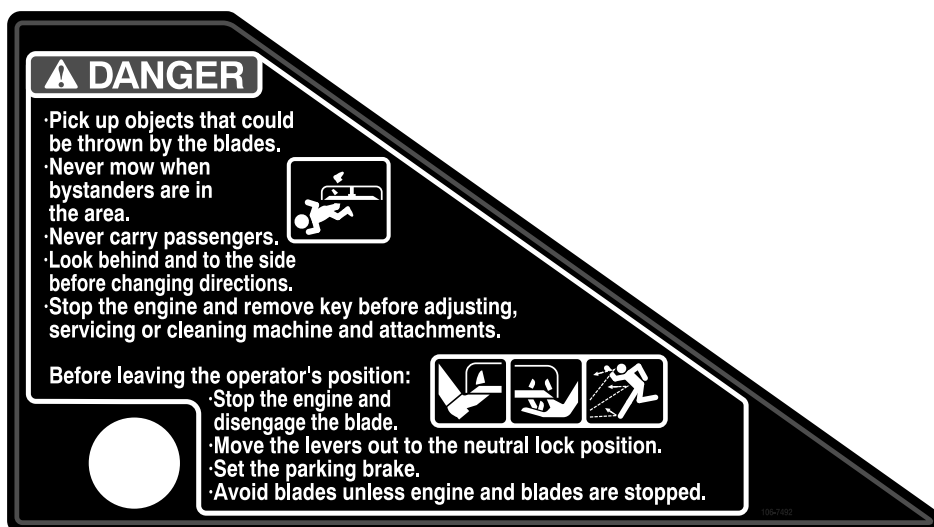
112-8651

1. Interval
2. Power Take-off (PTO)
3. Parking brake
4. Neutral
5. Operator presence switch
6. Battery

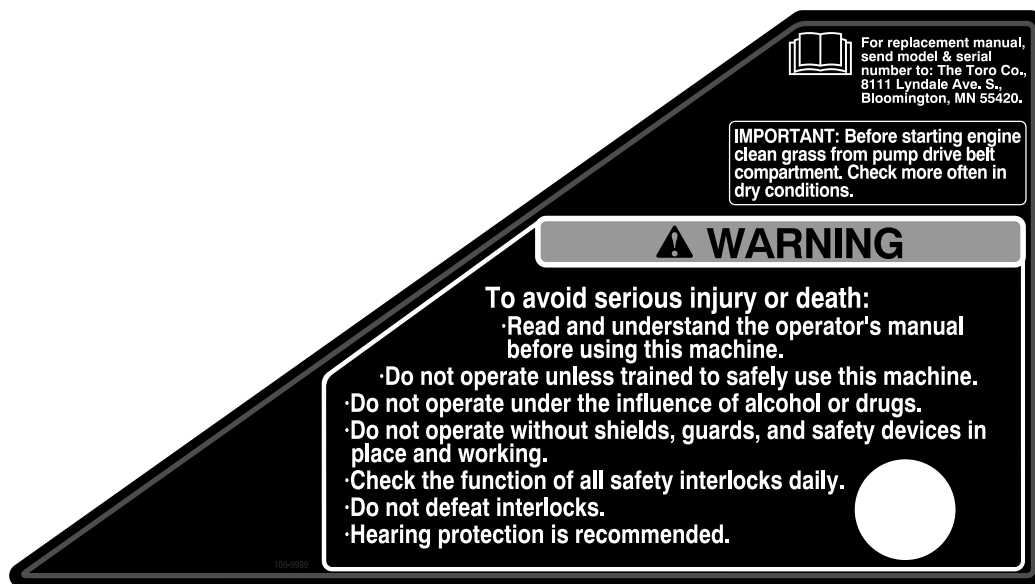


114-9600

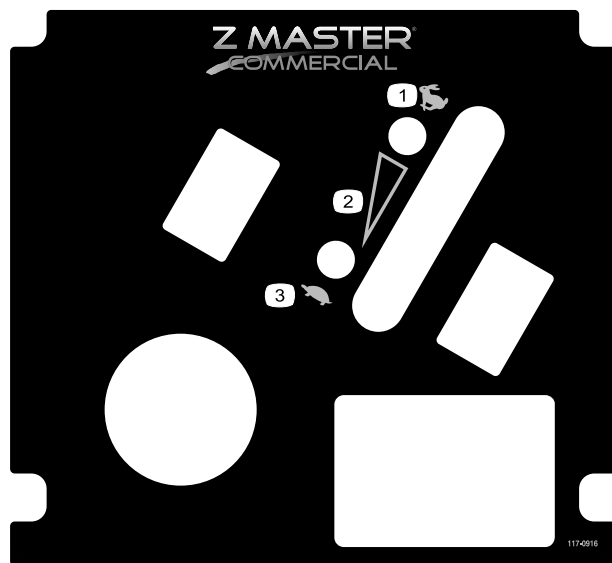
1. Read the *Operator's Manual*.



106-7492

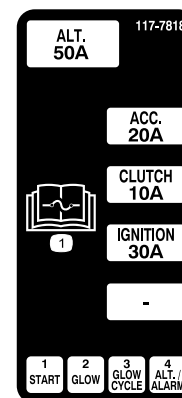


106-9989



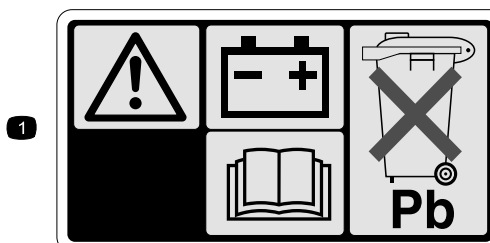
117-0916

1. Fast
2. Continuous variable setting
3. Slow



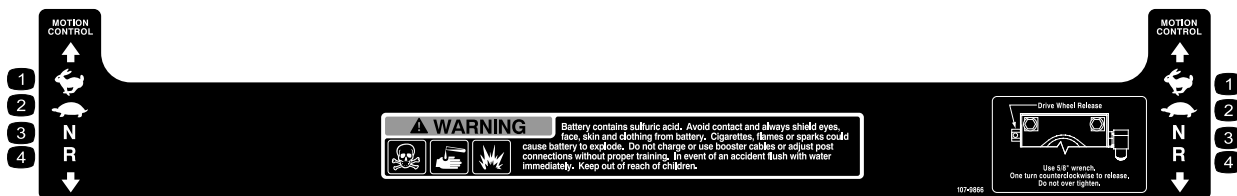
117-7818

1. Read the *Operator's Manual* for information on fuses.



107-9309

1. Warning—read the *Operator's Manual* for information on charging the battery; contains lead; do not discard.
2. Read the *Operator's Manual*.



107-9866

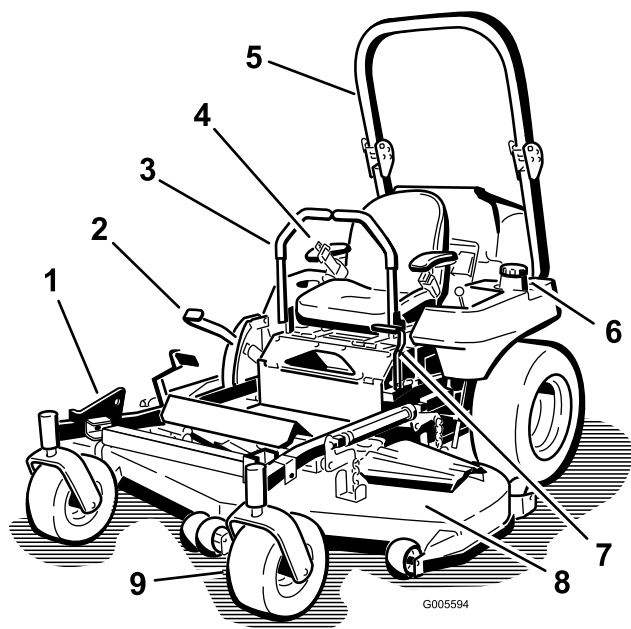
1. Fast

2. Slow

3. Neutral

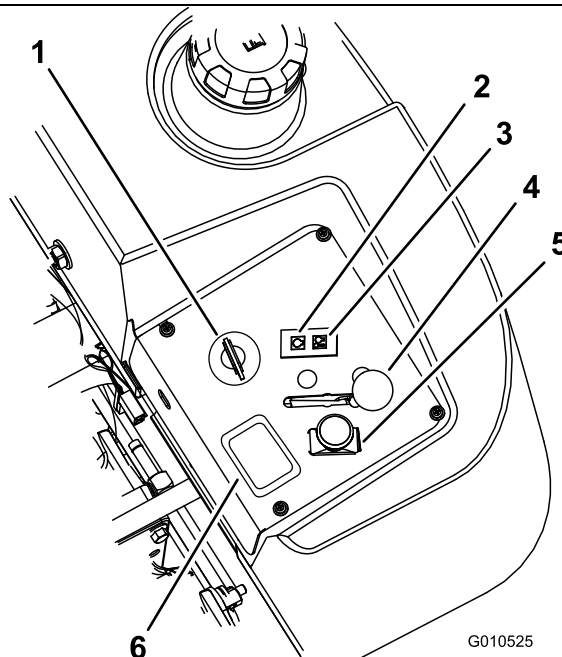
4. Reverse

## Product Overview



**Figure 3**

- |                         |                          |
|-------------------------|--------------------------|
| 1. Z Stand®             | 6. Fuel cap (both sides) |
| 2. Height-of-cut lever  | 7. Parking brake lever   |
| 3. Motion control lever | 8. Mower deck            |
| 4. Seat belt            | 9. Caster wheel          |
| 5. Roll bar             |                          |



**Figure 4**

- |                             |                                |
|-----------------------------|--------------------------------|
| 1. Ignition switch          | 4. Throttle control            |
| 2. Glow plug light          | 5. Power take off (PTO) Switch |
| 3. Engine Temperature light | 6. Hour meter                  |

## Controls

Become familiar with all the controls before you start the engine and operate the machine (Figure 3 and Figure 4).

## Hour Meter

The hour meter records the number of hours the engine has operated. It operates when the engine is running. Use these times for scheduling regular maintenance (Figure 4).

## Safety Interlock Indicators

There are symbols on the hour meter and they indicate with a black triangle that the interlock component is in the correct position (Figure 5).

## Battery Indicator Light

When the ignition key is initially turned to the **Run** position for a few seconds, the battery voltage will be displayed in the area where the hours are normally displayed.

The battery light turns on when the ignition is turned on and when the charge is below the correct operating level (Figure 5).

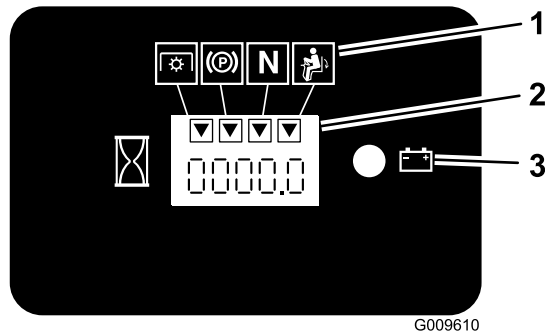


Figure 5

1. Safety interlock symbols
2. Hour meter
3. Battery light

## Throttle Control

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

## Blade Control Switch (PTO)

The blade control switch (PTO) is used to engage the electric clutch to drive the mower blades with the motion control levers in the center, un-locked position. Pull the switch up to engage the blades and release. To disengage the blades, push the blade control switch (PTO) down.

## Neutral Lock Position

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

## Ignition Switch

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

## Glow Plug Light (Orange Light)

The glow plug indicator light turns on when the ignition switch is turned to the on position. When the light turns off, the engine is ready to be started (Figure 4).

## Temperature Light

The temperature light comes on when the engine is over heating (Figure 4).

## Audible Alarm

This machine has an audible alarm that alerts the user to turn off the engine or engine damage can occur from

over heating. Refer to Servicing the Cooling System in Maintenance.

## Fuel Selector Valve

The fuel selector valve is located behind the left side of the seat.

Close the fuel selector valve when transporting or storing mower.

Move the selector valve to the lefthand (LH) or righthand (RH) position for operation.

## Attachments/Accessories

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

# Operation

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

## Adding Fuel

The engine runs on clean, fresh diesel fuel with a minimum octane rating of 40. Purchase fuel in quantities that can be used within 30 days to ensure fuel freshness.

Use summer grade diesel fuel (No. 2-D) at temperatures above 20° F (-7° C) and winter grade diesel fuel (No. 1-D or No. 1-D/2-D blend) below 20° F (-7° C). Use of winter grade diesel fuel at lower temperatures provides lower flash point and pour point characteristics, therefore easing startability and lessening chances of chemical separation of the fuel due to lower temperatures (wax appearance, which may plug filters).

Use of summer grade diesel fuel above 20° F (-7° C) will contribute toward longer life of the pump components.

**Important:** Do not use kerosene or gasoline instead of diesel fuel. Failure to observe this caution will damage the engine.



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

- Avoid prolonged breathing of vapors.
- Keep face away from nozzle and gas tank or conditioner opening.
- Keep gas away from eyes and skin.



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

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



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

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

## Biodiesel Ready

This machine can also use a biodiesel blended fuel of up to B20 (20% biodiesel, 80% petrodiesel). The petrodiesel portion should be low or ultra low sulfur.

Observe the following precautions:

- The biodiesel portion of the fuel meet specification ASTM D6751 or EN14214.
- The blended fuel composition should meet ASTM D975 or EN590.
- Painted surfaces may be damaged by biodiesel blends.
- Use B5 (biodiesel content of 5%) or lesser blend in cold weather.
- Monitor seals, hoses, gaskets in contact with fuel as they may be degrade over time.
- Fuel filter plugging maybe expected for a time after converting to biodiesel blends.
- Contact your distributor if you wish for more information on biodiesel.

## Filling the Fuel Tank

1. Shut the engine off and set the parking brake.
2. Clean around each fuel tank cap and remove the cap. Add fuel to both fuel tanks, until the level is 1/4 to 1/2 inch (6 to 13 mm) below the bottom of the filler neck. This space in the tank allows the fuel to expand. Do not fill the fuel tanks completely full.
3. Install fuel tank caps securely. Wipe up any fuel that may have spilled.
4. 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 Oil Level in Maintenance.

## Switching the Fuel Tanks

**Important:** Do not run the machine out of fuel.

The fuel selector valve is located behind the left side of the seat.

The unit has two fuel tanks. One tank is on the left side and one on the right side. Each tank connects to the fuel selector valve. From there a common fuel line leads to the engine (Figure 6).

To use the left side fuel tank rotate the fuel selector valve to the LH position, lefthand location. To use the right side fuel tank rotate the fuel selector valve to the RH position, righthand location (Figure 6)

Close the fuel selector valve before transporting or storing machine.

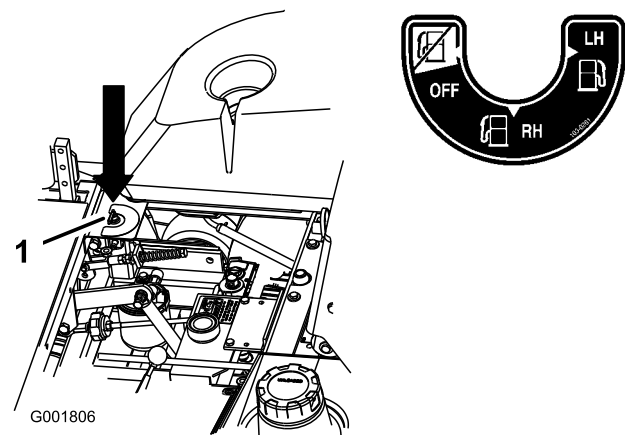


Figure 6

1. Left side fuel tank
2. Fuel selector valve



# Using the Rollover Protection System (ROPS)



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

Ensure that the rear part of the seat is secured with the seat latch.

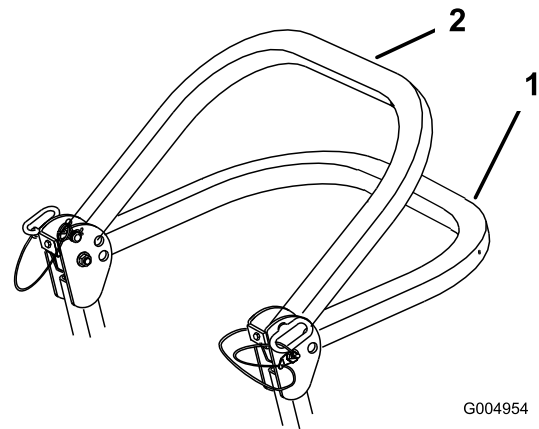


There is no rollover protection when the roll bar is in the down position.

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

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

1. Remove the hairpin cotter pins and remove the two pins (Figure 8).
2. Lower the roll bar to the down position. There are two down positions. See Figure 7 for the positions.
3. Install the two pins and secure them with the hairpin cotter pins (Figure 8).



G004954

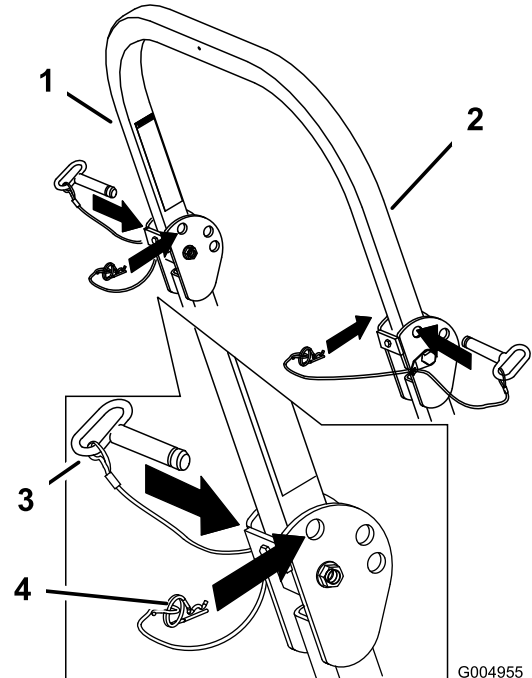
**Figure 7**

1. Full down position
2. Down position with bagger installed

**Important:** Ensure that the rear part of the seat is secured with the seat latch.

4. To raise the roll bar, remove the hairpin cotter pins and remove the two pins (Figure 8).
5. Raise the roll bar to the upright position and install the two pins and secure them with the hairpin cotter pins (Figure 8).

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



G004955

**Figure 8**

1. Roll bar
2. Raised position
3. Pin
4. Hairpin cotter pin

# Think Safety First

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



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

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

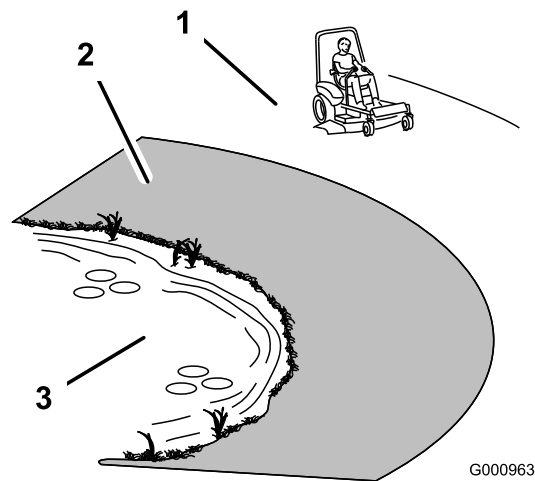
**There is no rollover protection when the roll bar is down.**

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

**Read and follow the rollover protection instructions and warnings.**

**To avoid loss of control and possibility of rollover:**

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



**Figure 9**

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



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

**Wear hearing protection when operating this machine.**

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



**Figure 10**

1. Warning— wear hearing protection

## Understanding the Audible Alarms

This machine has an audible alarm that alerts the user to turn off the engine or engine damage can occur.

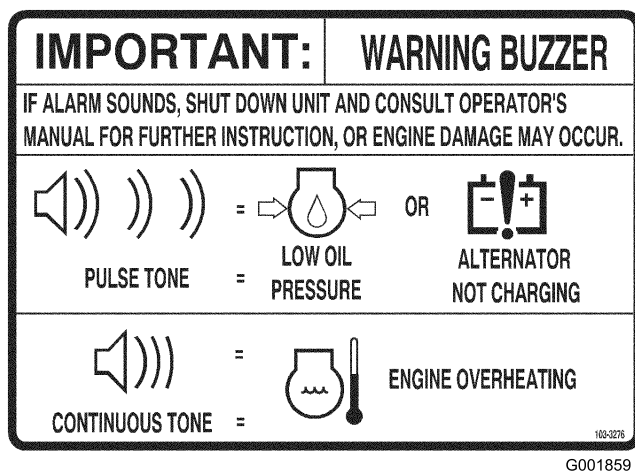


Figure 11

## Continuous Audible Alarm

The continuous audible alarm alerts the user that the engine is over heating. Refer to Servicing the Cooling System.

## Pulsing Audible Alarm

The pulsing audible alarm alerts the user to low oil pressure or the alternator is not charging. Refer to Checking the Engine Oil and check the alternator belt.

## Operating the Parking Brake

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

### Setting the Parking Brake

1. Move the motion control levers (Figure 18) out to the neutral lock position.
2. Pull up and back on the parking brake lever to set the parking brake (Figure 12). The parking brake lever should stay firmly in the engaged position.



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

**Do not park on slopes unless wheels are chocked or blocked**

### Releasing the Parking Brake

Push forward and down on the parking brake lever to release the parking brake (Figure 12). The parking

brake is disengaged and the lever will rest against the brake stop.

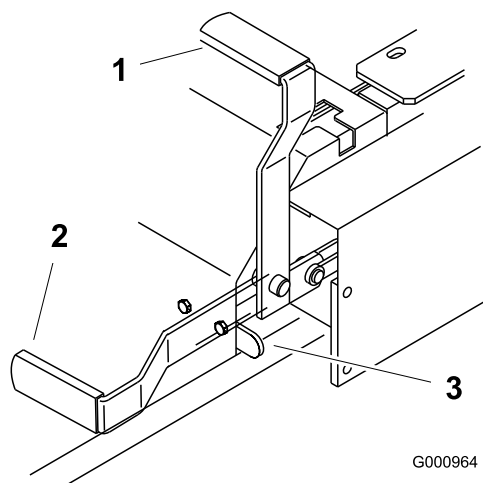


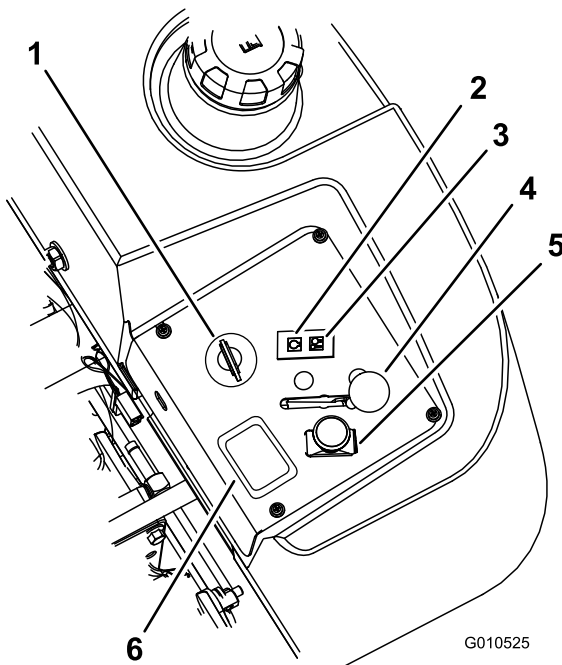
Figure 12

1. Parking brake-ON
2. Parking brake-OFF
3. Brake Stop

## Starting and Stopping the Engine

### Starting the Engine in Normal Weather

1. Raise the ROPS up and lock into place, sit on the seat and fasten the seat belt.
2. Move the motion controls to the neutral locked position.
3. Set the parking brake; refer to Setting the Parking Brake.
4. Move the PTO (power take off) switch to the off position (Figure 13).
5. Move the throttle lever to the middle position (Figure 13).
6. Turn the ignition key clockwise to the run position (Figure 13). The glow plug light will turn on.
7. After the glow plug indicator light goes out, turn the key to the start position. when the engines starts release the key.



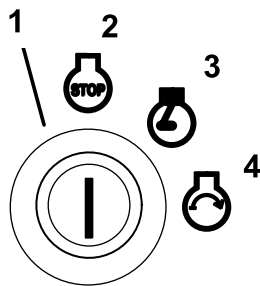
**Figure 13**

- |                             |                                |
|-----------------------------|--------------------------------|
| 1. Ignition switch          | 4. Throttle control            |
| 2. Glow plug light          | 5. Power take off (PTO) Switch |
| 3. Engine Temperature light | 6. Hour meter                  |

**Important:** Use starting cycles of no more than 30 seconds per minute to avoid overheating the starter motor.

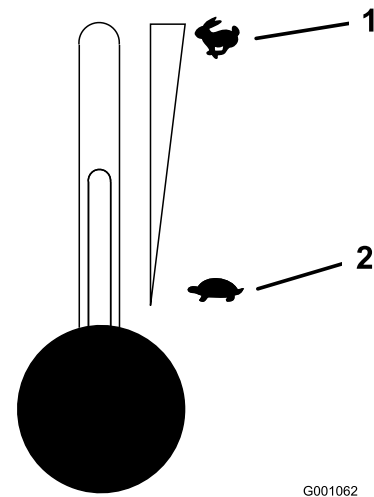
- If the engine does not start immediately, move the throttle control to fast and turn the key to the start position.

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



**Figure 14**

- |                    |          |
|--------------------|----------|
| 1. Ignition switch | 3. Run   |
| 2. Off             | 4. Start |



G001062

**Figure 15**

- |                  |                  |
|------------------|------------------|
| 1. Throttle—fast | 2. Throttle—slow |
|------------------|------------------|

## Starting the Engine in Cold Weather (Below 14°F or -10°C)

Use the correct engine oil for the starting temperature. Refer to Servicing the Engine Oil in , page .

- Start the engine with the throttle in the **Fast** position.
- Turn the ignition key clockwise to the run position (Figure 14). The glow plug light will turn on.
- After the glow plug indicator light goes out, turn the key to the start position. when the engines starts release the key.

**Important:** Use starting cycles of no more than 30 seconds per minute to avoid overheating the starter motor.

## Stopping the Engine

- Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake (Figure 16 ).
- Move the throttle lever midway between the slow and fast positions (Figure 15 ).
- Let the engine idle for 60 seconds.
- Turn the ignition key to the off position (Figure 14). Wait for all moving parts to stop before leaving the operating position.
- Remove the key to prevent possibility of someone accidentally starting the machine before transporting or storing machine.
- Close the fuel selector valve before transporting or storing the machine.

**Important:** Make sure that the fuel selector valve is closed before transporting or storing the machine, as fuel leakage may occur. Set the parking brake before transporting.

**Important:** Make sure to remove the key as the fuel pump may run and cause the battery to lose charge.

## Disengaging the PTO

To disengage, push the PTO switch to the **off** position (Figure 16).

## The Safety Interlock System



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.

## Operating the Power Take Off (PTO)

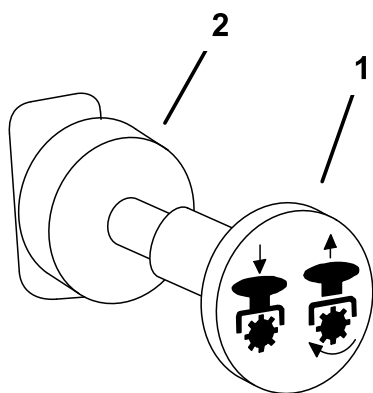
The power take off (PTO) switch starts and stops the mower blades and any powered attachments.

### Engaging the PTO

1. If the engine is cold, allow the engine to warm up 5 to 10 minutes before engaging the PTO.
2. While seated in the seat, release the pressure on the traction control levers and place in neutral.
3. Place the throttle in the fast position.

**Note:** Engaging the PTO with the throttle at the half or less position will cause excessive wear to the drive belts.

4. Pull out on the power take off (PTO) switch to engage it (Figure 16).



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**Figure 16**

1. PTO-On

2. PTO-Off

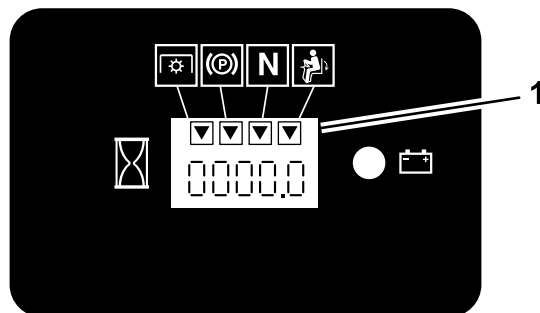
## Understanding the Safety Interlock System

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

- The parking brake is engaged.
- The power take off (PTO) is disengaged.
- The motion control levers are in the neutral locked position

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

The hour meter has symbols to notify the user when the interlock component is in the correct position. When the component is in the correct position, a triangle will light up in the corresponding square.



G009612

**Figure 17**

1. Triangles light up when the interlock components are in the correct position

## Testing the Safety Interlock System

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

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

1. Sitting on the seat, engage the parking brake and move the PTO to on. Try starting the engine; the engine should not crank.
2. Sitting on the seat, engage the parking brake and move the PTO to off. Move either motion control lever (out of neutral locked position). Try starting the engine; the engine should not crank. Repeat for other control lever.
3. Sitting on the seat, engage the parking brake, move the PTO switch to off and move the motion control levers to neutral lock position. Now start the engine. While the engine is running, release the parking brake, engage the PTO and rise slightly from the seat; the engine should stop.
4. Sitting on the seat, engage the parking brake, move the PTO switch to off and move the motion control levers to neutral lock position. Now start the engine. While the engine is running, center either motion control and move (forward or reverse); the engine should stop. Repeat for other motion control.
5. Sitting on the seat, disengage the parking brake, move the PTO switch to off and move the motion control levers to neutral lock position. Try starting the engine; the engine should not crank.

## Driving Forward or Backward

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



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

- Use caution when making turns.
- Slow the machine down before making sharp turns.
- Look behind and to the side before changing direction.

## Driving Forward

1. Release the parking brake; refer to Releasing the Parking Brake.
2. Move the levers to the center, un-locked position.
3. To go forward, slowly push the motion control levers forward (Figure 18).

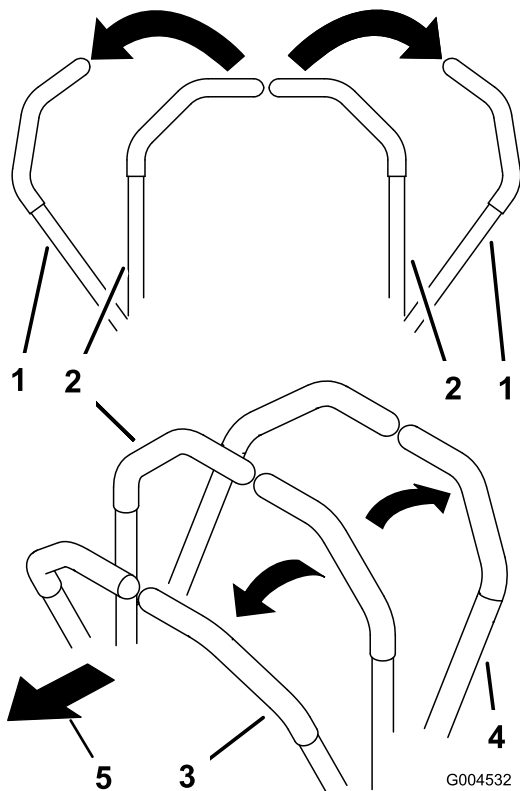
**Note:** The engine will kill if the traction control levers are moved with the parking brake engaged.

To go straight, apply equal pressure to both motion control levers (Figure 18).

To turn, move the motion control lever toward neutral in the direction you want to turn (Figure 18).

The farther you move the traction control levers in either direction, the faster the machine will move in that direction.

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



**Figure 18**

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

## Driving Backward

1. Move the levers to the center, un-locked position.
2. To go backward, slowly pull the motion control levers rearward (Figure 18).

To go straight, apply equal pressure to both motion control levers (Figure 18).

To turn, release pressure on the motion control lever toward the direction you want to turn (Figure 18).

To stop, push the motion control levers to the neutral position.

## Stopping the Machine

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

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



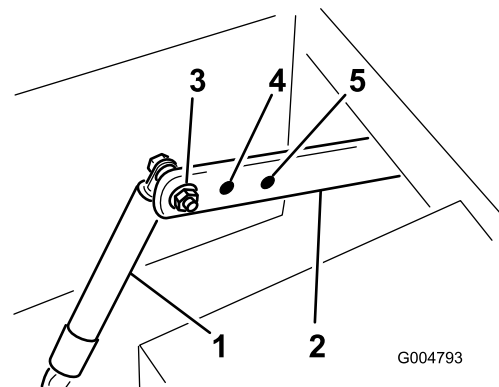
Children or bystanders may be injured if they move or attempt to operate the tractor while it is unattended.

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

## Adjusting the Control Lever Resistance

The top damper mounting bolt can be adjusted to obtain a desired motion control lever resistance. Refer to Figure 19 for the mounting options.

Torque the bolt to 200 in-lb (22.6 N·m).



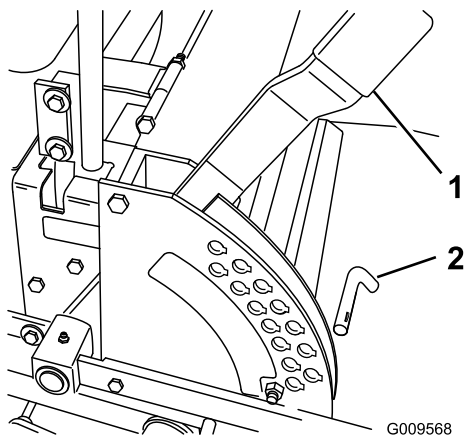
**Figure 19**

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 1. Damper                          | 4. Medium resistance or medium feel |
| 2. Motion control bracket          | 5. Least resistance or softest feel |
| 3. Most resistance or firmest feel |                                     |

## Adjusting the Height-of-Cut

The height-of-cut is adjusted from 1-1/2 to 5 inch (38 to 127 mm) in 1/4 inch (6 mm) increments by relocating the pin into different hole locations.

1. Raise the height-of-cut lever to the transport position (also the 5 inch (127 mm) cutting height position) (Figure 20).



**Figure 20**

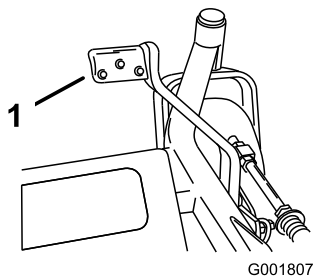
1. Height of cut lever
2. Pin

2. To adjust, remove the pin from the height-of-cut bracket (Figure 20).
3. Select a hole in the height-of-cut bracket corresponding to the height-of-cut desired and, insert the pin (Figure 20).
4. Move the lever to the selected height.

## Using the Lift Assist Lever

The lift assist lever is used along with the height-of-cut lever for raising the mower. This allows for easier raising of the mower.

1. Place your foot onto lift assist lever.
2. Press on the lift assist lever while pulling up on the height-of-cut lever (Figure 21).



**Figure 21**

1. Lift Assist Lever

## Adjusting the Anti-Scalp Rollers

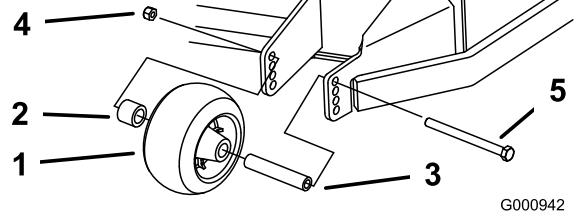
Whenever you change the height-of-cut, it is recommended to adjust the height of the anti-scalp rollers.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.

2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. After adjusting the height-of-cut, adjust the rollers by removing the flange nut, bushing, spacer, and bolt (Figure 22 , Figure 23 and Figure 24 ).

**Note:** The two middle rollers will not have a spacer (Figure 23).

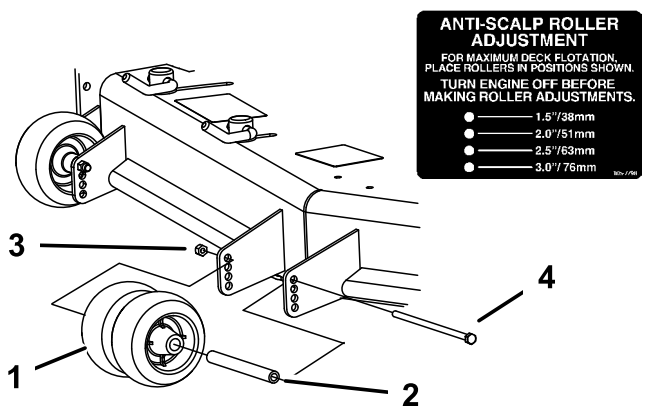
4. Select a hole so the anti-scalp roller is positioned to the nearest corresponding height-of-cut desired.
5. Install the flange nut bushing, spacer, and bolt. Torque to 40-45 ft-lb (54-61 N-m) (Figure 22 , Figure 23 and Figure 24 ).
6. Repeat this adjustment on the other anti-scalp rollers.



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**Figure 22**

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



G000943

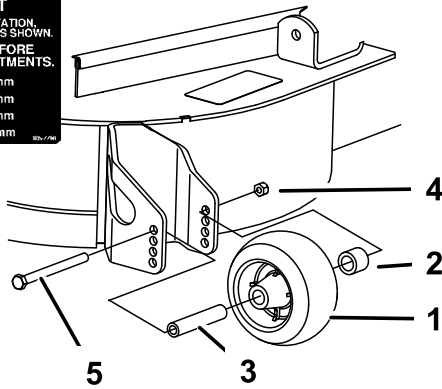
**Figure 23**

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



**ANTI-SCALP ROLLER  
ADJUSTMENT**  
FOR MAXIMUM DECK FLOTATION,  
PLACE ROLLERS IN POSITIONS SHOWN.  
TURN ENGINE OFF BEFORE  
MAKING ROLLER ADJUSTMENTS.

- 1.5" / 38mm
- 2.0" / 51mm
- 2.5" / 63mm
- 3.0" / 76mm



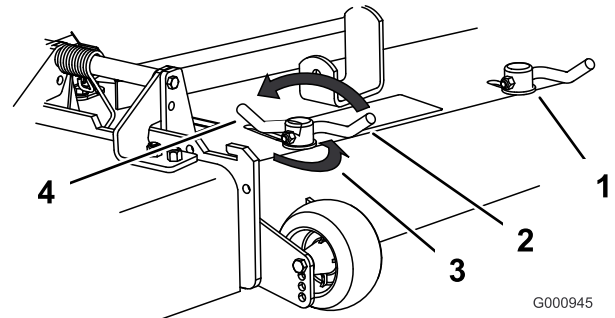
**Figure 24**

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

## Adjusting the Flow Baffle

The mower discharge flow can be adjusted for different types of mowing conditions. Position the cam locks and baffle to give the best quality of cut.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. To adjust the cam locks, swing the lever up to loosen the cam lock (Figure 25).
4. Adjust the baffle and cam locks in the slots to the desired discharge flow.
5. Swing the lever back over to tighten the baffle and cam locks (Figure 25).
6. If the cams do not lock the baffle into place or it is too tight, loosen the lever and then rotate the cam lock. Adjust the cam lock until the desired locking pressure is achieved.



**Figure 25**

1. Cam lock
2. Lever
3. Rotate cam to increase or decrease locking pressure
4. Slot

## Positioning the Flow Baffle

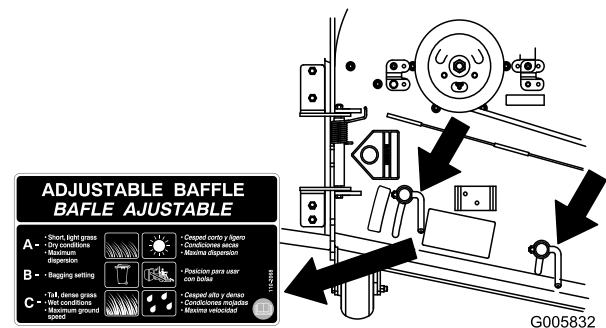
The following figures are only recommendations for use. Adjustments will vary by grass type, moisture content, and height of grass.

**Note:** If the engine power draws down and the mower ground speed is the same, open up the baffle.

### Position A

This is the full rear position. The suggested use for this position is as follows.

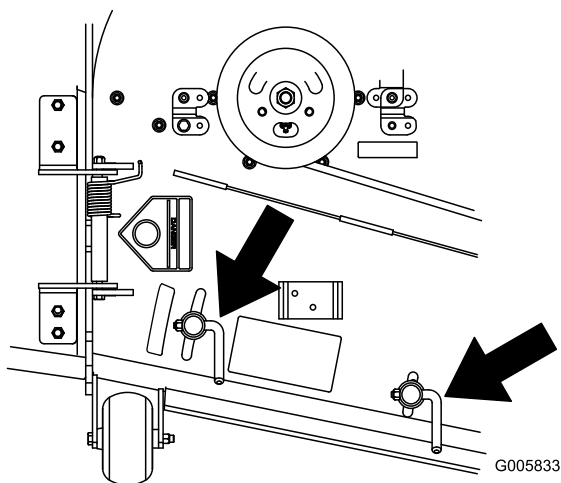
- Use for short, light grass mowing conditions.
- Use in dry conditions.
- For smaller grass clippings.
- Propels grass clippings farther away from the mower.



**Figure 26**

### Position B

Use this position when bagging.

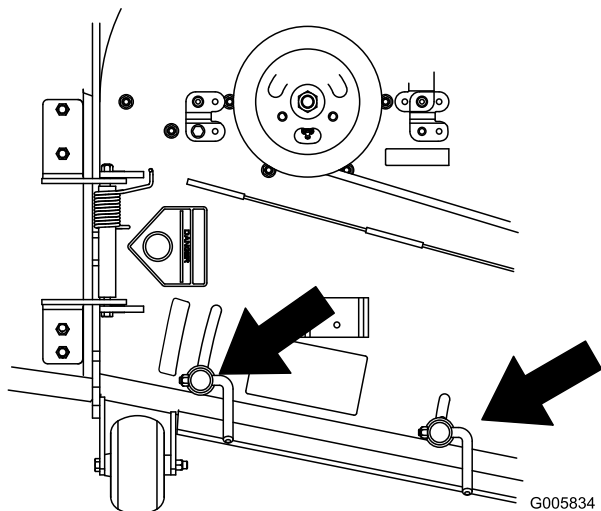


**Figure 27**

## Position C

This is the full open position. The suggested use for this position is as follows.

- Use in tall, dense grass mowing conditions.
- Use in wet conditions.
- Lowers the engine power consumption.
- Allows increased ground speed in heavy conditions.
- This position is similar to the benefits of the Toro SFS mower.



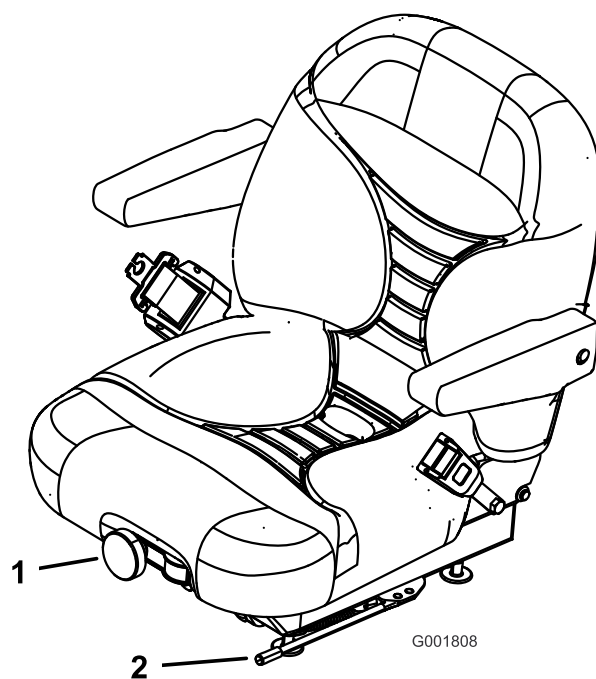
**Figure 28**

## Positioning the Seat

### Changing the Seat Position

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

1. To adjust, move the lever sideways to unlock seat (Figure 29).



**Figure 29**

1. Seat suspension knob
  2. Seat position adjustment lever
2. Slide the seat to the desired position and release lever to lock in position.

### Changing the Seat Suspension

The seat can be adjusted to provide a smooth and comfortable ride. Position the seat where you are most comfortable.

To adjust it, turn the knob in front either direction to provide the best comfort (Figure 29).

### Changing the Back Position

The back of the seat can be adjusted to provide a comfortable ride. Position the back of the seat where it is most comfortable.

To adjust it, turn the knob, under the right-side arm rest, in either direction to provide the best comfort (Figure 30).

## Pushing the Machine by Hand

**Important:** Always push the machine by hand. Never tow the machine because hydraulic damage may occur.

### Pushing the Machine

1. Disengage the power take off (PTO) and turn the ignition key to off. Move the levers to neutral locked position and apply parking brake. Remove the key.
2. Rotate the by-pass valves counterclockwise 1 turn to push. This allows hydraulic fluid to by-pass the pump enabling the wheels to turn (Figure 32).

**Important:** Do not rotate by-pass valves more than 1 turn. This prevents valves from coming out of the body and causing fluid to run out.

3. Disengage parking brake before pushing.

### Changing to Machine Operation

Rotate the by-pass valves clockwise 1 turn to operate machine (Figure 32).

**Note:** Do not over tighten the by-pass valves.

The machine will not drive unless by-pass valves are turned in.

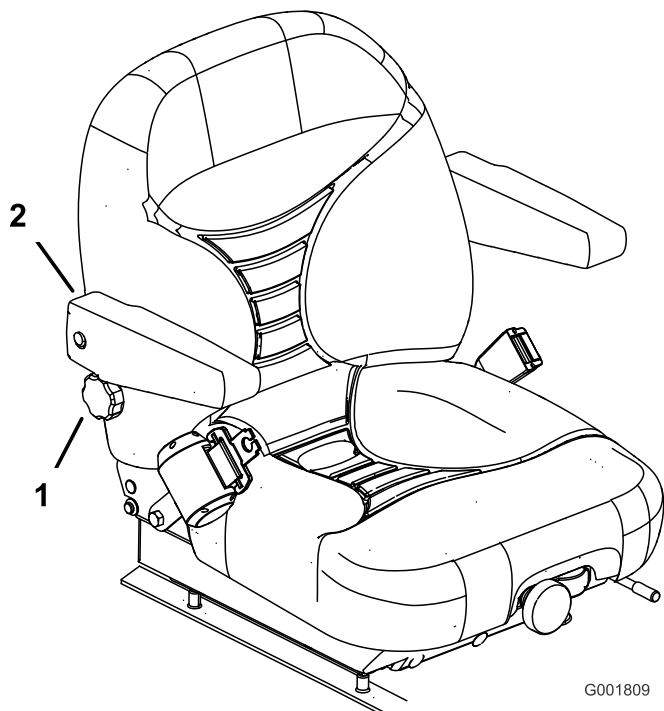


Figure 30

1. Back rest knob                      2. Right-side arm rest

## Unlatching the Seat

Push the seat latch rearward to unlatch the seat. This will allow access to the machine under the seat (Figure 31).

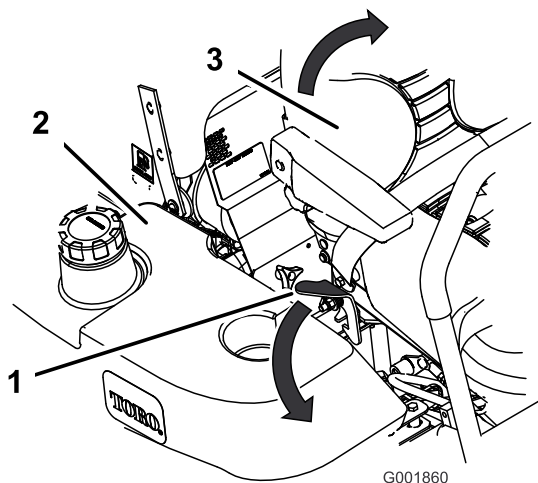


Figure 31

1. Seat latch                              3. Seat  
2. Fuel cap

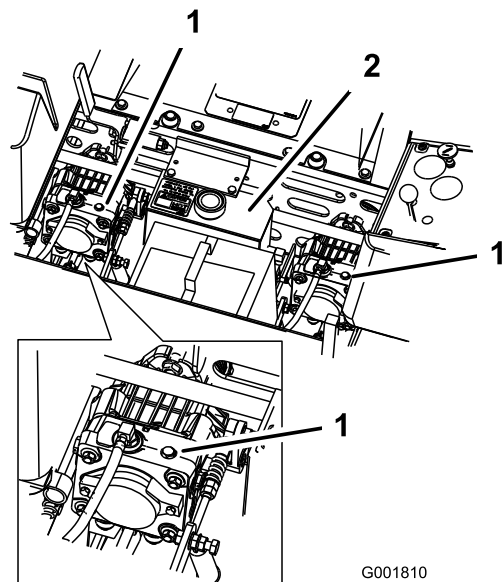


Figure 32

1. Side console controls              3. Hydraulic pumps  
2. By-pass valve

## Using the Side Discharge

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



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

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

## Transporting Machines

Use a heavy-duty trailer or truck to transport the machine. Ensure that the trailer or truck has all necessary lighting and marking as required by law. Please carefully read all the safety instructions. Knowing this information could help you, your family, pets or bystanders avoid injury.

To transport the machine:

- Lock the brake and block the wheels.
- Securely fasten the machine to the trailer or truck with straps, chains, cable, or ropes.
- Secure a trailer to the towing vehicle with safety chains.



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

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

## Loading Machines

Use extreme caution when loading units on trailers or trucks. One full width ramp that is wide enough to extend beyond the rear tires is recommended instead of individual ramps for each side of the unit (Figure 33). The lower rear section of the tractor frame extends back between the rear wheels and serves as a stop for tipping backward. Having a full width ramp provides a surface for the frame members to contact if the unit starts to tip backward. If it is not possible to use one full width ramp, use enough individual ramps to simulate a full width continuous ramp.

The ramp should be long enough so that the angles do not exceed 15 degrees (Figure 33). A steeper angle may cause mower components to get caught as the unit moves from ramp to trailer or truck. Steeper angles may also cause the unit to tip backward. If loading on or near a slope, position the trailer or truck so it is on the down side of the slope and the ramp extends up the slope. This will minimize the ramp angle. The trailer or truck should be as level as possible.

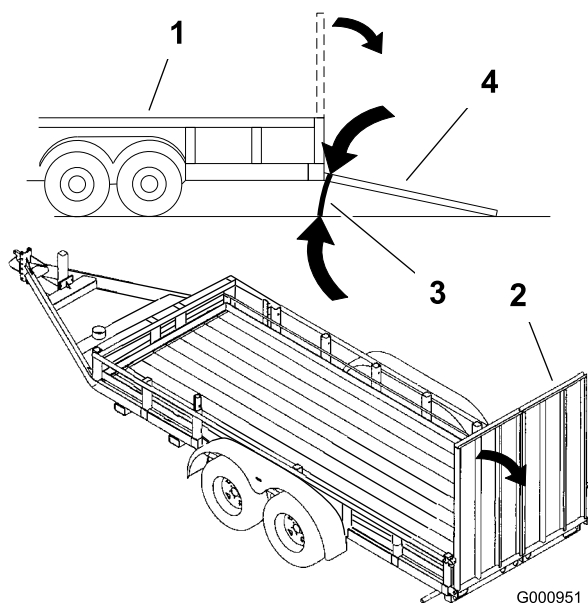
**Important: Do Not attempt to turn the unit while on the ramp; you may lose control and drive off the side.**

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



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

- **Use extreme caution when operating a unit on a ramp.**
- **Use only a single, full width ramp; Do Not use individual ramps for each side of the unit.**
- **If individual ramps must be used, use enough ramps to create an unbroken ramp surface wider than the unit.**
- **Do not exceed a 15 degree angle between ramp and ground or between ramp and trailer or truck.**
- **Avoid sudden acceleration while driving unit up a ramp to avoid tipping backward.**
- **Avoid sudden deceleration while backing unit down a ramp to avoid tipping backward.**



**Figure 33**

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

## Using the Z Stand®

The Z Stand raises the front end of the machine to allow you to clean the mower and remove the blades.



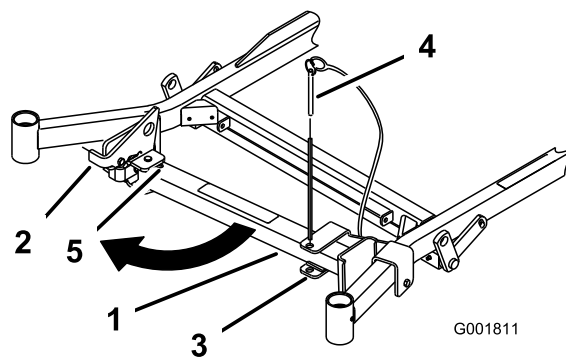
**The machine could fall onto someone and cause serious injury or death.**

- Use extreme caution when operating the machine on the Z Stand®.
- Use only for cleaning the mower and removing the blades.
- Do not keep the machine on the Z Stand for extended periods of time.
- Always turn the engine off, set the parking brake, and remove the key before performing any maintenance to the mower.

## Driving up onto the Z Stand

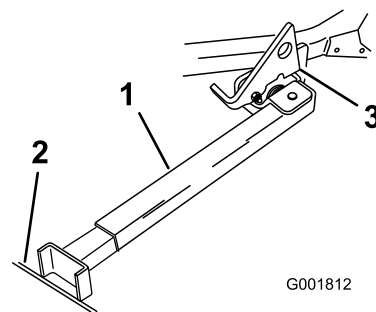
**Important:** Use the Z Stand on a level surface.

1. Raise the mower to the transport position.
2. Remove the bracket pin (Figure 34).



**Figure 34**

1. Z Stand
  2. Latch
  3. Bracket
  4. Bracket Pin
  5. Bottom of slot
3. Raise the latch. Swing the stand foot out front and slide stand toward machine, into the bottom of slot (Figure 34 and Figure 35).
  4. Lengthen the Z Stand by removing the clevis pin and hairpin cotter pin from the outer tube and sliding the foot out.
  5. Align the holes and install the clevis pin and hairpin cotter pin.



**Figure 35**

1. Z Stand (Positioned in slot)
2. Crack in side walk or turf
3. Latch resting on pivot tab

6. Set the foot of stand on the ground and rest the latch on the pivot tab (Figure 35).
7. Start the engine and put it at half throttle.

**Note:** For best results, place the foot of stand into seams in sidewalks or into the turf (Figure 35).

8. Drive onto the stand. Stop when the latch drops over the tab into the locked position (Figure 35). Once onto the stand, engage the parking brake and turn off the engine.
9. Chock or block the drive wheels.



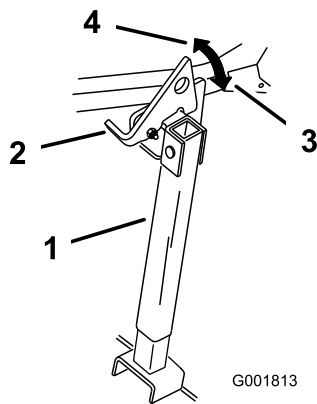
**Parking brake may not hold machine parked on Z Stand and could cause personal injury or property damage.**

**Do not park on Z Stand unless wheels are chocked or blocked.**

10. Perform the maintenance.

## Driving off the Z Stand

1. Remove the chocks or blocks.
2. Raise the latch to the unlocked position (Figure 36).



**Figure 36**

- |            |                      |
|------------|----------------------|
| 1. Z Stand | 3. Locked position   |
| 2. Latch   | 4. Unlocked position |

3. Start the engine and place it at half throttle. Disengage the parking brake.
4. Slowly drive backwards off of the stand.
5. Shorten the Z Stand by removing the clevis pin and hairpin cotter pin from the outer tube and sliding the foot in.
6. Align the holes and install the clevis pin and hairpin cotter pin.
7. Return the stand to its rest position (Figure 34).

## Operating Tips

### Fast Throttle Setting

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

## Cutting a Lawn for the First Time

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

## Cut 1/3 of the Grass Blade

It is best to cut only about 1/3 of the grass blade. Cutting more than that is not recommended unless grass is sparse, or it is late fall when grass grows more slowly.

## Mowing Direction

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

## Mow at Correct Intervals

Normally, mow every four days. But remember, grass grows at different rates at different times. So to maintain the same cutting height, which is a good practice, mow more often in early spring. As the grass growth rate slows in mid summer, mow less frequently. If you cannot mow for an extended period, first mow at a high cutting height; then mow again two days later at a lower height setting.

## Cutting Speed

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

## Avoid Cutting Too Low

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

## Long Grass

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

## When Stopping

If the machine's forward motion must be stopped while mowing, a clump of grass clippings may drop onto your

lawn. To avoid this, move onto a previously cut area with the blades engaged.

## **Keep the Underside of the Mower Clean**

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

## **Blade Maintenance**

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

# Maintenance

## ***Recommended Maintenance Schedule(s)***

Maintenance Service Interval	Maintenance Procedure
After the first 8 hours	<ul style="list-style-type: none"> <li>• Check cooling system level.</li> <li>• Check the hydraulic fluid.</li> </ul>
After the first 25 hours	<ul style="list-style-type: none"> <li>• Change the hydraulic filter.</li> </ul>
After the first 50 hours	<ul style="list-style-type: none"> <li>• Change the engine oil.</li> <li>• Change the engine oil filter.</li> </ul>
After the first 100 hours	<ul style="list-style-type: none"> <li>• Check the wheel hub slotted nut.</li> <li>• Check the wheel lug nuts.</li> </ul>
Before each use or daily	<ul style="list-style-type: none"> <li>• Check the safety system.</li> <li>• Check the engine oil.</li> <li>• Check cooling system level.</li> <li>• Clean the cooling system.</li> <li>• Check the mower blades.</li> <li>• Clean the mower deck.</li> </ul>
Every 25 hours	<ul style="list-style-type: none"> <li>• Grease the mower deck and spindles.</li> <li>• Grease the mower belt idler arm.</li> <li>• Grease the pump belt idler arm.</li> <li>• Grease the drive belt idler arm.</li> <li>• Grease the brake lever.</li> <li>• Check the hydraulic fluid.</li> </ul>
Every 40 hours	<ul style="list-style-type: none"> <li>• Drain the water separator.</li> </ul>
Every 50 hours	<ul style="list-style-type: none"> <li>• Check the tire pressure</li> <li>• Check the pump drive belt.</li> <li>• Check the alternator belt.</li> </ul>
Every 100 hours	<ul style="list-style-type: none"> <li>• Change the engine oil.</li> <li>• Check the cooling system hoses.</li> <li>• Inspect the belts for cracks and wear.</li> <li>• Check the hydraulic hoses.</li> </ul>
Every 150 hours	<ul style="list-style-type: none"> <li>• Lubricate the machine with light oil.</li> </ul>
Every 200 hours	<ul style="list-style-type: none"> <li>• Replace the primary air filter.</li> <li>• Change the engine oil filter.</li> <li>• Grease the brake pivot.</li> </ul>
Every 400 hours	<ul style="list-style-type: none"> <li>• Replace the fuel filter (more often in dirty or dusty conditions).</li> </ul>
Every 500 hours	<ul style="list-style-type: none"> <li>• Check the wheel hub slotted nut.</li> <li>• Check the wheel lug nuts.</li> <li>• Adjust the caster pivot bearing or at storage, which ever comes first.</li> <li>• Replace the fan hydraulic filter</li> </ul>
Every 600 hours	<ul style="list-style-type: none"> <li>• Replace the safety air filter.</li> </ul>
Yearly	<ul style="list-style-type: none"> <li>• Grease the front caster pivots (more often in dirty or dusty conditions).</li> <li>• Lubricate the caster wheel hubs</li> <li>• Change the engine coolant.</li> <li>• Change the hydraulic filter and oil.</li> </ul>

**Important:** Refer to your *Engine Operator's Manual* for additional maintenance procedures.





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

Remove the key from the ignition and disconnect the wire from the spark plug(s) before you do any maintenance. Set the wire aside so that it does not accidentally contact the spark plug.

## Lubrication

### Greasing and Lubrication

Lubricate the machine when shown on the Check Service Reference Aid decal (Figure 37). Grease more frequently when operating conditions are extremely dusty or sandy.

Grease Type: General-purpose grease.

#### How to Grease

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Clean the grease fittings with a rag. Make sure to scrape any paint off the front of the fitting(s).
4. Connect a grease gun to the fitting. Pump grease into the fittings until grease begins to ooze out of the bearings.
5. Wipe up any excess grease.

#### Where to Add Grease

Lubricate the grease fittings as shown on the Check Service Reference Aid decal (Figure 37).

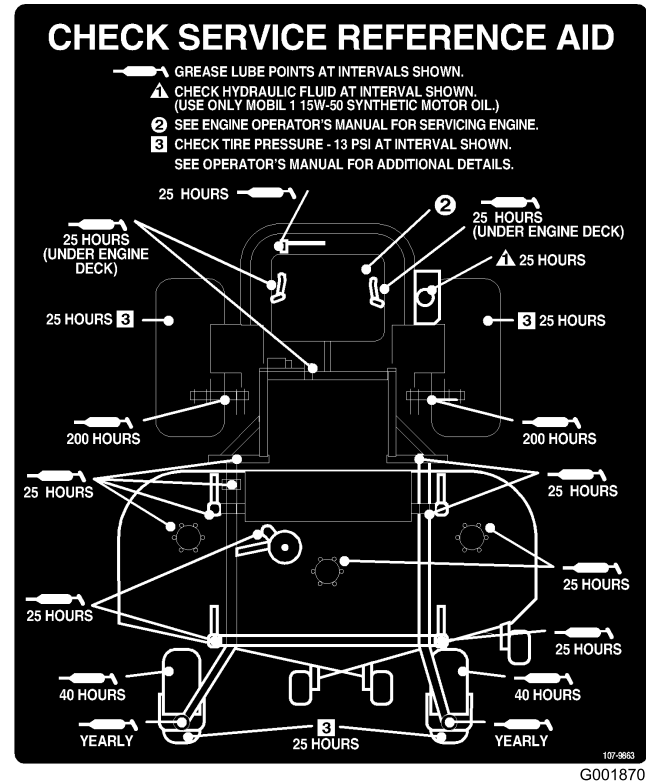


Figure 37

### Greasing the Mower Deck and Belt Idlers

**Service Interval:** Every 25 hours—Grease the mower deck and spindles.

Every 25 hours—Grease the mower belt idler arm.

Every 25 hours—Grease the pump belt idler arm.

Every 25 hours—Grease the drive belt idler arm.

Grease with No. 2 general purpose lithium base or molybdenum base grease.

**Important:** Make sure cutting unit spindles are full of grease weekly.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the belt covers.
4. Grease the three spindle bearings under the pulleys until grease comes out the lower seals (Figure 38).
5. Grease the idler arm on the mower deck (Figure 38).
6. Grease the fittings on the push arms (Figure 38).

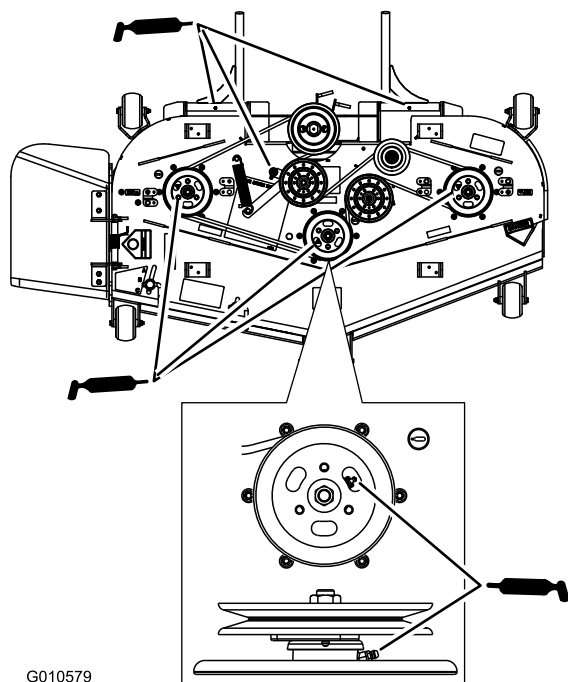


Figure 38

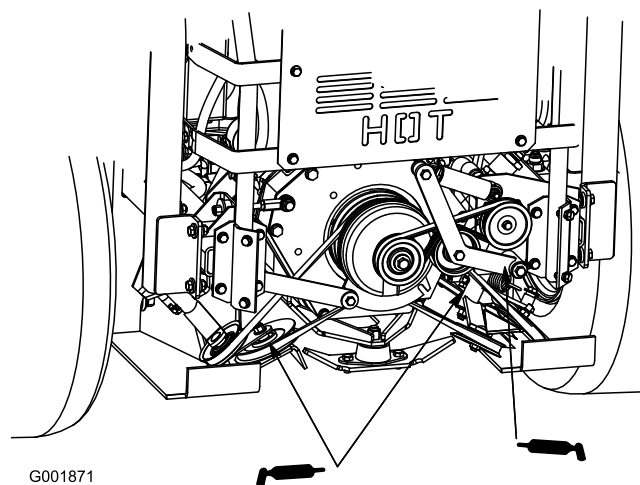


Figure 39

3. Grease the pump belt idler arm.

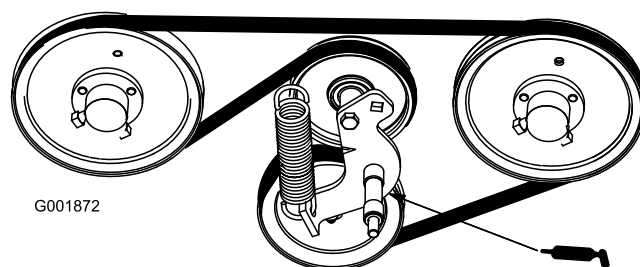


Figure 40

## Where to Add Light Oil or Spray Lubrication

**Service Interval:** Every 150 hours

Lubricate the machine in the following areas with spray type lubricant or light oil.

- Seat switch actuator.
- Brake handle pivot.
- Brake rod bushings.
- Motion control bronze bushings.

## Grease the Idler Arms

1. Grease the cooling fan belt idler arm (Figure 39).
2. Grease the drive belt idler arms (Figure 39).

## Greasing the Front Caster Pivots

**Service Interval:** Yearly

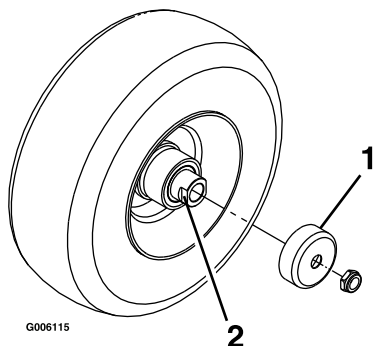
Lubricate the front caster pivots once a year.

1. Remove the dust cap and adjust the caster pivots. Keep the dust cap off until greasing is done. Refer to Adjusting the Caster Pivot Bearing in Maintenance Section.
2. Remove the hex plug. Thread a grease zerk into the hole.
3. Pump grease into the zerk until it oozes out around the top bearing.
4. Remove the grease zerk in the hole. Install the hex plug and cap.

## Lubricate Caster Wheel Hubs

**Service Interval:** Yearly

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



**Figure 41**

1. Seal guard
2. Spacer nut with wrench flats

13. Torque the nut to 75-80 in-lb (8-9 N-m), loosen, then re-torque to 20-25 in-lb (2-3 N-m). Make sure axle does not extend beyond either nut.
14. Reinstall the seal guards over the wheel hub and insert wheel into caster fork. Reinstall caster bolt and tighten nut fully.

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

2. Remove the caster wheel from the caster forks.
  3. Remove the seal guards from the wheel hub.
  4. Remove one of the spacer nuts from the axle assembly in the caster wheel. Note that thread locking adhesive has been applied to lock the spacer nuts to the axle. Remove the axle (with the other spacer nut still assembled to it) from the wheel assembly.
  5. Pry out seals, and inspect bearings for wear or damage and replace if necessary.
  6. Pack the bearings with a general-purpose grease.
  7. Insert one bearing, one new seal into the wheel.
- Note:** The seals must be replaced.
8. If the axle assembly has had both spacer nuts removed (or broken loose), apply a thread locking adhesive to one spacer nut and thread onto the axle with the wrench flats facing outward. Do Not thread spacer nut all of the way onto the end of the axle. Leave approximately 1/8 inch (3 mm) from the outer surface of the spacer nut to the end of the axle inside the nut.
  9. Insert the assembled nut and axle into the wheel on the side of the wheel with the new seal and bearing.
  10. With the open end of the wheel facing up, fill the area inside the wheel around the axle full of general-purpose grease.
  11. Insert the second bearing and new seal into the wheel.
  12. Apply a thread locking adhesive to the 2nd spacer nut and thread onto the axle with the wrench flats facing outward.

# Engine Maintenance

## Servicing the Air Cleaner

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

### Removing the Filters

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

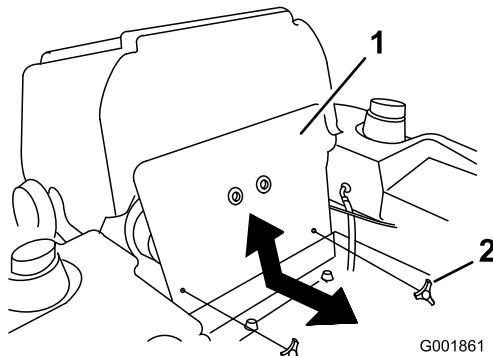


Figure 42

1. Front engine panel
2. Knob

4. Release the latches on the air cleaner and pull the air cleaner cover off of the air cleaner body (Figure 43).
5. Clean the inside of the air cleaner cover with compressed air.
6. Gently slide the primary filter out of the air cleaner body (Figure 43). Avoid knocking the filter into the side of the body.
7. Remove the safety filter only if you intend to replace it.

**Important:** Never attempt to clean the safety filter. If the safety filter is dirty, then the primary filter is damaged and you should replace both filters.

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

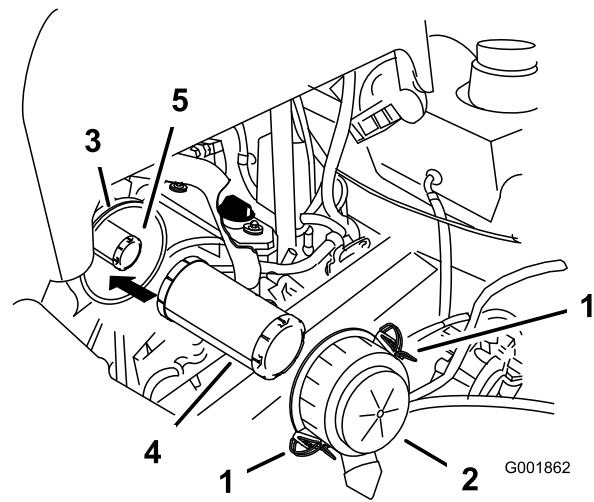


Figure 43

1. Latches
2. Air cleaner cover
3. Air filter body
4. Primary filter
5. Safety filter

### Servicing the Primary Filter

**Service Interval:** Every 200 hours—Replace the primary air filter.

1. Do not clean the paper filter, replace it (Figure 43).
2. Inspect the element for tears, an oily film, or damage to the rubber seal.
3. Replace the paper element if it is damaged.

### Servicing the Safety Filter

**Service Interval:** Every 600 hours—Replace the safety air filter.

Do not clean the safety filter, replace it.

**Important:** Never attempt to clean the safety filter. If the safety filter is dirty, then the primary filter is damaged and you should replace both filters.

### Installing the Filters

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

1. If installing new filters, check each filter for shipping damage. Do not use a damaged filter.
2. If the safety filter is being replaced, carefully slide it into the filter body (Figure 43).
3. Carefully slide the primary filter over the safety filter (Figure 43). Ensure that it is fully seated by pushing on the outer rim of the filter while installing it.

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

4. Install the air cleaner cover with the side indicated as UP facing up and secure the latches (Figure 43).
5. Install the front engine panel.

## Servicing the Engine Oil

**Oil Type:** High-quality detergent oil classified “API Service CF or CF-4” or higher for diesel engines. Do not use special additives with recommended oils.

**Crankcase Capacity:** 3.5 quarts (3.3 liters)

**Viscosity:** See the table below.

### USE THESE SAE VISCOSITY OILS

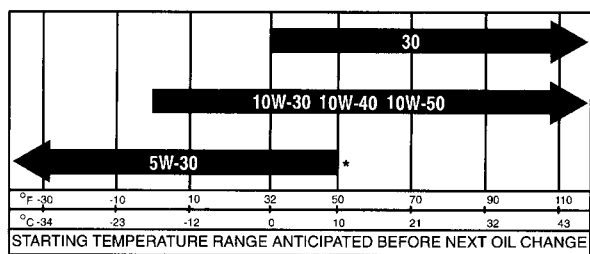


Figure 44

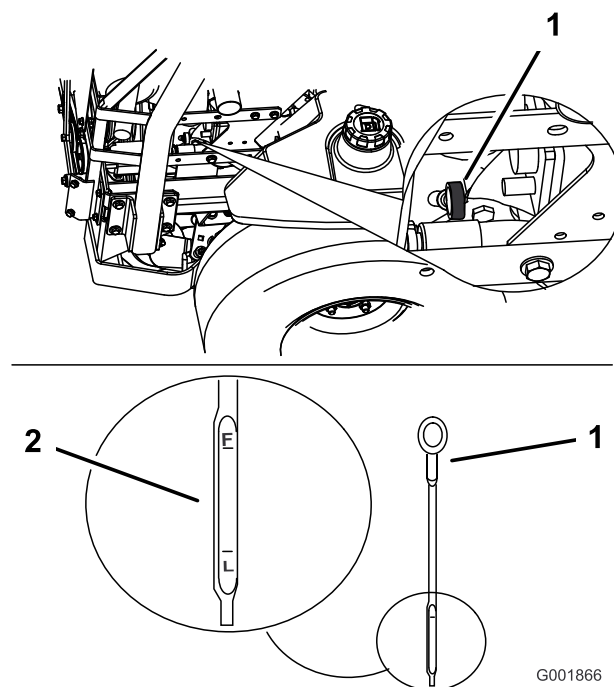


Figure 45

1. Oil dipstick
2. Metal end
3. Right side of machine

## Checking the Engine Oil Level

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

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Clean around the oil dipstick (Figure 45) so dirt cannot fall into the filler hole and damage the engine.
4. Pull the oil dipstick out and wipe the metal end clean (Figure 45).
5. Slide the oil dipstick fully into the tube. Pull the dipstick out and look at the metal end (Figure 45). If the oil level is low, slowly pour only enough oil into the fill hole to raise the level to the full mark.

**Important:** Do not overfill the crankcase with oil because this may cause engine damage. Do not run the engine with oil below the low mark because the engine may be damaged as a result.

## Changing the Engine Oil

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

Every 100 hours

1. Start the engine and let it run for five minutes. This warms the oil so it drains better.
2. Park the machine on a level surface.
3. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
4. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
5. Place a pan below the oil drain. Remove the drain plug and let the oil drain completely (Figure 49).
6. Remove the oil filler cap from the top of the engine (Figure 47). This will help the oil to drain.
7. Install the drain plug and tighten it to 25-1/2 ft-lb (35 N-m).

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

## Adding Engine Oil

1. Tilt the seat forward and remove the front engine panel (Figure 46).

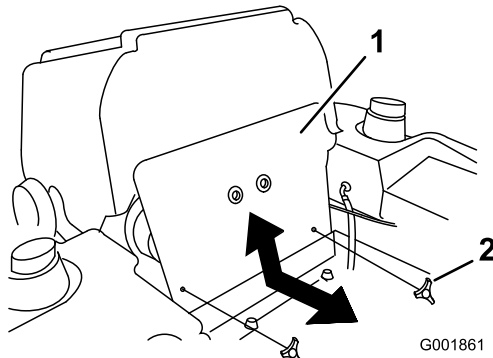


Figure 46

1. Front engine panel
2. Knob

2. Remove the oil filler cap and the dipstick (Figure 47).

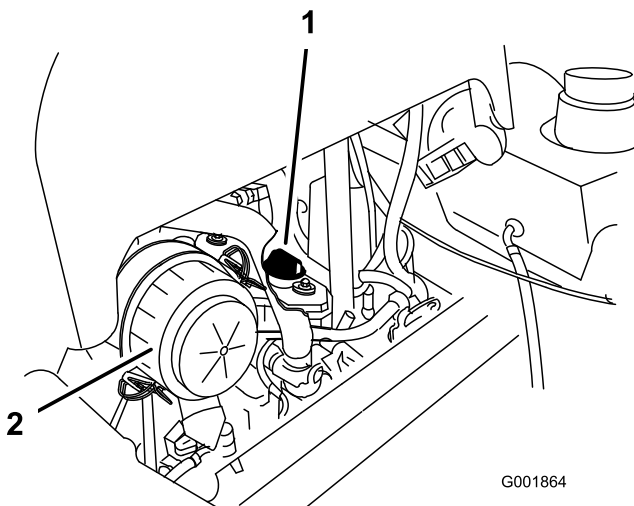


Figure 47

1. Engine
2. Oil fill cap

3. To add oil to the engine, locate and use a hose and funnel for adding oil.
4. Add oil slowly, checking the level with the dipstick frequently until the level reaches the upper hole on the dipstick. For the correct oil type and viscosity to use in different temperature conditions, refer to Servicing the Engine Oil in Engine Maintenance.

**Important:** Add the oil very slowly and do not block the opening of the filler hole (Figure 48). If you add oil too fast or block the hole, the oil could back up and foul the air intakes, causing engine damage.

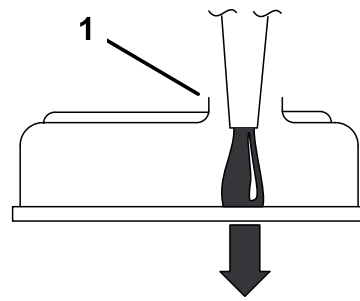


Figure 48

1. Note the clearance left in the filler opening.

5. Replace the dipstick and install the front engine panel.
6. Start the engine and run it at idle for 5 minutes.
7. Shut off the engine.
8. Wait 3 minutes and check the oil level.
9. Add oil, if required, to bring the level to the upper hole on the dipstick.
10. Replace the dipstick and , filler cap, and the front engine panel.
11. Check for leaks.

**Important:** Do not overfill the crankcase with oil because this may cause engine damage.

## Changing the Engine Oil Filter

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

Every 200 hours

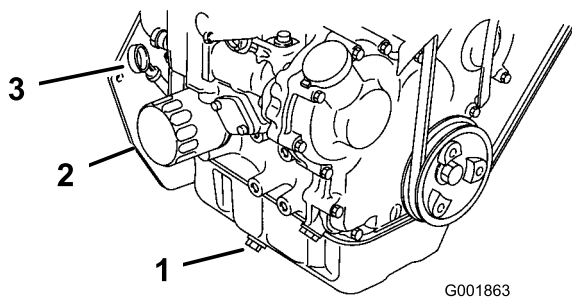
1. Drain the oil from the engine; refer to Changing the Engine Oil.

Place a drip pan beneath the oil drip tray to receive oil from the oil filter and oil passages in the engine.

2. Turn the filter counterclockwise to remove it (Figure 50 and Figure 50).

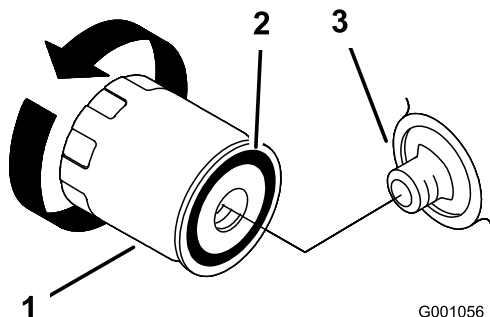
**Note:** Dispose of the oil filter properly. Recycle in accordance with local codes.

3. Before installing the filter, lightly oil the gasket on the filter with fresh, clean oil. Screw the filter on by hand until the gasket contacts the oil filter adapter. Tighten 1/2 to 3/4 turn more.
4. Add oil; refer to Adding Engine Oil.



**Figure 49**

- |               |              |
|---------------|--------------|
| 1. Drain plug | 3. Dip stick |
| 2. Oil filter |              |



**Figure 50**

- |               |            |
|---------------|------------|
| 1. Oil filter | 3. Adapter |
| 2. Gasket     |            |

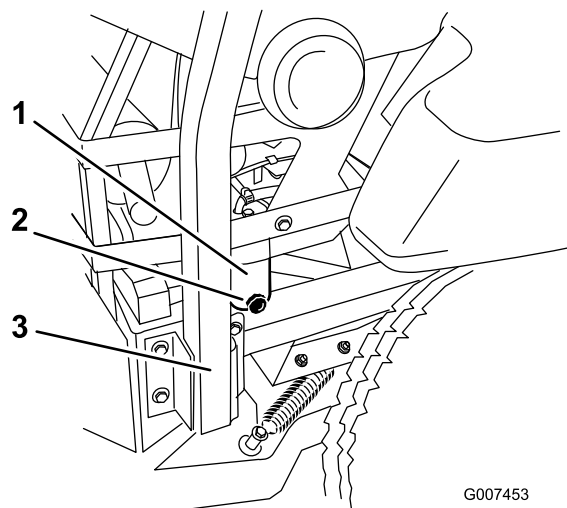
# Fuel System Maintenance

## Servicing the Fuel Filter and Water Separator

### Draining the Water Separator

**Service Interval:** Every 40 hours

1. Position the machine on a level surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Locate the water separator at the back left of the machine.
5. Place a drain pan below the water separator.
6. Open the drain valve on the water separator approximately one turn to allow water and other contaminants to drain (Figure 51).
7. Close the drain valve when only diesel fuel comes out (Figure 51).



**Figure 51**

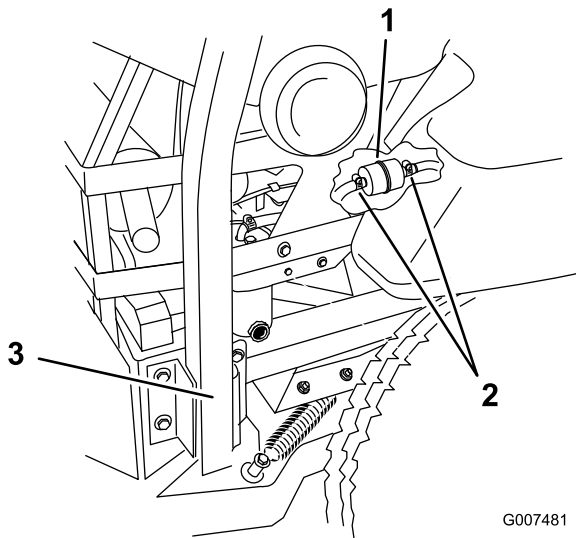
- |                    |                          |
|--------------------|--------------------------|
| 1. Water separator | 3. Right side of machine |
| 2. Drain valve     |                          |

## Changing the Fuel Filter

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

Never install a dirty fuel filter if it is removed from the fuel line.

1. Allow the machine to cool down.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Close the fuel shut-off valve.
5. Loosen the two hose clamps and disconnect the fuel lines from the fuel filter (Figure 52).
6. Install a new filter. Connect the fuel lines to the fuel filter and install the two hose clamps.
7. Open the fuel shut-off valve.
8. Start the engine and check for leaks.



**Figure 52**

1. Fuel filter
2. Hose clamps
3. Right side of machine

## Electrical System Maintenance

### Servicing the Battery

#### Warning

##### CALIFORNIA

##### Proposition 65 Warning

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

Wash hands after handling.



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

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

### Removing the Battery



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

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

## Servicing the Fuel Tank

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

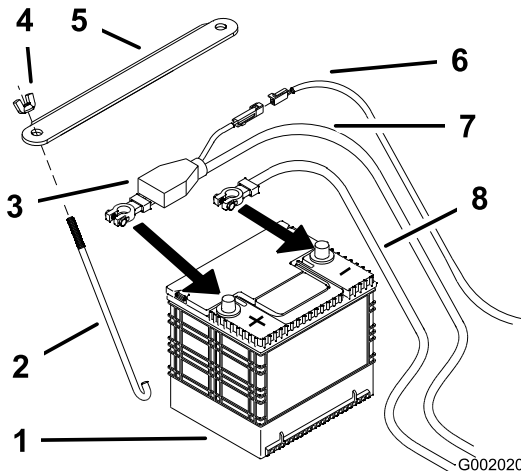




**Incorrect battery cable routing could damage the machine and cables causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.**

- **Always Disconnect the negative (black) battery cable before disconnecting the positive (red) cable.**
- **Always Reconnect the positive (red) battery cable before reconnecting the negative (black) cable.**

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Unlatch the seat and tilt the seat up.
4. First disconnect the negative battery cable from the negative (-) battery terminal (Figure 53).
5. Slide the red terminal boot off the positive (red) battery terminal. Then remove the positive (red) battery cable (Figure 53).



**Figure 53**

- |                        |                    |
|------------------------|--------------------|
| 1. Battery             | 5. Battery clamp   |
| 2. J-bolts             | 6. Ground wire     |
| 3. Terminal boot       | 7. Red (+) cable   |
| 4. Wing nut (1/4 inch) | 8. Black (-) cable |

6. Remove the battery.

## Installing the Battery

1. Position battery in the tray with the terminal posts opposite from the hydraulic tank (Figure 53).

2. First, install the positive (red) battery cable to positive (+) battery terminal.
3. Then install the negative battery cable and ground wire to the negative (-) battery terminal.
4. Secure the cables with 2 bolts (1/4 x 3/4 inch), 2 washers (1/4 inch), and 2 locknuts (1/4 inch) (Figure 53).
5. Slide the red terminal boot onto the positive (red) battery post.
6. Secure the battery with J-bolts, hold down clamp, 2 washers (1/4 inch), and 2 wing nuts (1/4 inch) (Figure 53).

## Charging the Battery



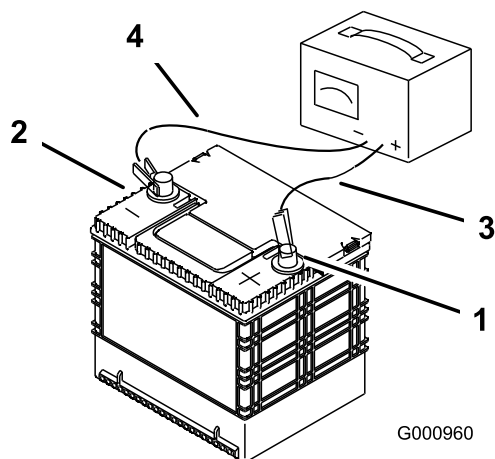
**Charging the battery produces gasses that can explode.**

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

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

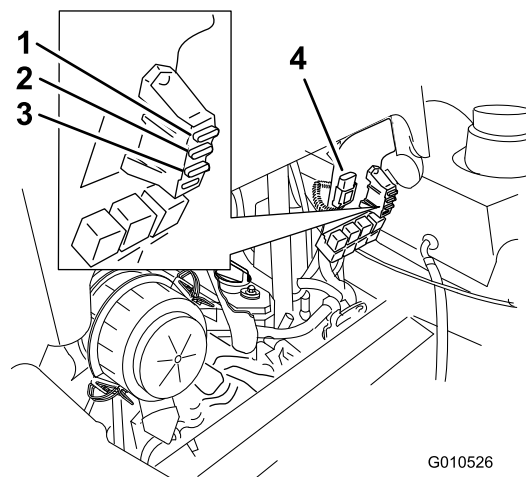
1. Make sure the filler caps are installed in battery. Charge battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 10 amps.
2. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Figure 54).
3. Install the battery in the machine and connect the battery cables, refer to Installing the Battery.

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



**Figure 54**

- |                          |                           |
|--------------------------|---------------------------|
| 1. Positive Battery Post | 3. Red (+) Charger Lead   |
| 2. Negative Battery Post | 4. Black (-) Charger Lead |



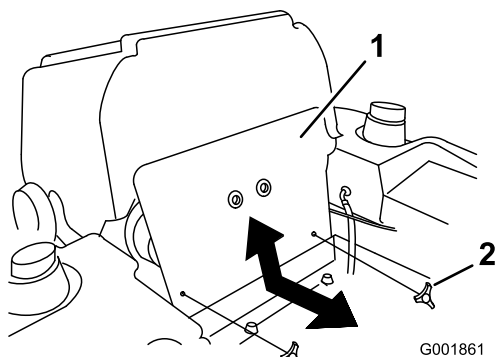
**Figure 56**

- |                     |                       |
|---------------------|-----------------------|
| 1. Accessory-20 amp | 3. Ignition-30 amp    |
| 2. Clutch-10 amp    | 4. Alternator- 50 amp |

## Servicing the Fuses

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

1. Tilt the seat forward and remove the front engine panel (Figure 55).



**Figure 55**

- |                       |         |
|-----------------------|---------|
| 1. Front engine panel | 2. Knob |
|-----------------------|---------|

2. To replace a fuse, pull out on the fuse to remove it (Figure 56).

# Drive System Maintenance

## Adjusting the Tracking

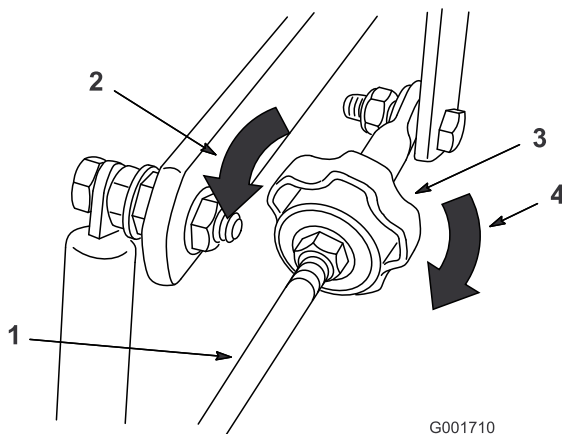
The machine has a knob for adjusting the tracking located under the seat.

**Important:** Adjust the handle neutral and hydraulic pump neutral before adjusting the tracking. Refer to **Adjusting the Handle Neutral in Controls System Maintenance** and **Adjusting the Hydraulic Pump Neutral in Hydraulic System Maintenance**.

1. Push both control levers forward the same distance.
2. Check if the machine pulls to one side. If it does, stop the machine and set the parking brake.
3. Unlatch the seat and tilt the seat forward to access the tracking knob.

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

4. To make the machine go right, turn the knob towards the rightside of the machine. Refer to Figure 57.
5. To make the machine go left, turn the knob towards the leftside of the machine. Refer to Figure 57.
6. Repeat adjustment until the tracking is correct.



**Figure 57**

- |                    |                                 |
|--------------------|---------------------------------|
| 1. Tracking knob   | 4. Turn this way to track right |
| 2. Hydraulic tank  | 5. Turn this way to track left  |
| 3. Hydraulic pumps |                                 |

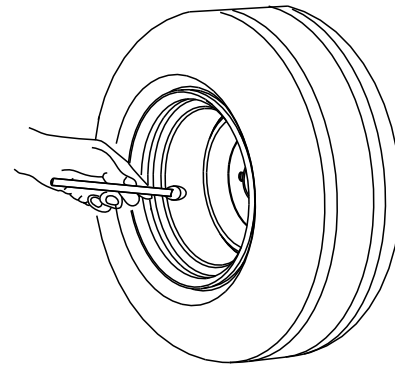
## Checking the Tire Pressure

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

Check the pressure at the valve stem (Figure 58).

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

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



**Figure 58**

## Checking the Wheel Hub Slotted Nut

**Service Interval:** After the first 100 hours—Check the wheel hub slotted nut.

Every 500 hours—Check the wheel hub slotted nut.

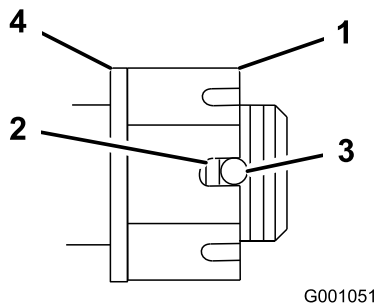
After the first 100 hours—Check the wheel lug nuts.

Every 500 hours—Check the wheel lug nuts.

The slotted nut needs to be torqued to 125 ft-lb (170 N-m).

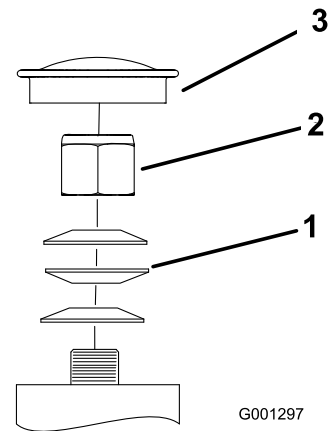
1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the cotter pin.
4. Torque the slotted nut to 125 ft-lb (170 N-m) (Figure 59).

5. Check the distance from bottom of slot in nut to inside edge of hole. Two threads or less should be showing (Figure 59).
6. If more than two threads are showing remove nut and install washer between hub and nut.
7. Torque the slotted nut to 125 ft-lb. (170 N-m) (Figure 59).
8. Tighten the nut until the next set of slots line up with the hole in the shaft (Figure 59).
9. Replace the cotter pin.



**Figure 59**

- |                                |                           |
|--------------------------------|---------------------------|
| 1. Slotted Nut                 | 3. Hole in threaded shaft |
| 2. Two threads or less showing | 4. Washer (if needed)     |



**Figure 60**

- |                   |             |
|-------------------|-------------|
| 1. Spring Washers | 3. Dust Cap |
| 2. Lock Nut       |             |

## Adjusting the Caster Pivot Bearing

**Service Interval:** Every 500 hours or at storage, whichever comes first.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the dust cap from caster and tighten lock nut (Figure 60).
4. Tighten the locknut until the spring washers are flat and then back off a 1/4 turn to properly set the pre-load on the bearings (Figure 60).

**Important:** Make sure spring washers are installed correctly as shown in Figure 60.

5. Install the dust cap (Figure 60).

# Cooling System Maintenance

## Servicing the Cooling System



Discharge of hot pressurized coolant or touching hot radiator and surrounding parts can cause severe burns.

- Do not remove the radiator cap when the engine is hot. Always allow the engine to cool at least 15 minutes or until the radiator cap is cool enough to touch without burning your hand before removing the radiator cap.
- Do not touch radiator and surrounding parts that are hot.



Rotating shaft and fan can cause personal injury.

- Do not operate the machine without the covers in place.
- Keep fingers, hands and clothing clear of rotating fan and drive shaft.
- Shut off the engine and remove the ignition key before performing maintenance.



Swallowing engine coolant can cause poisoning.

- Do not swallow engine coolant.
- Keep out of reach from children and pets.

## Checking the Radiator Coolant

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

After the first 8 hours

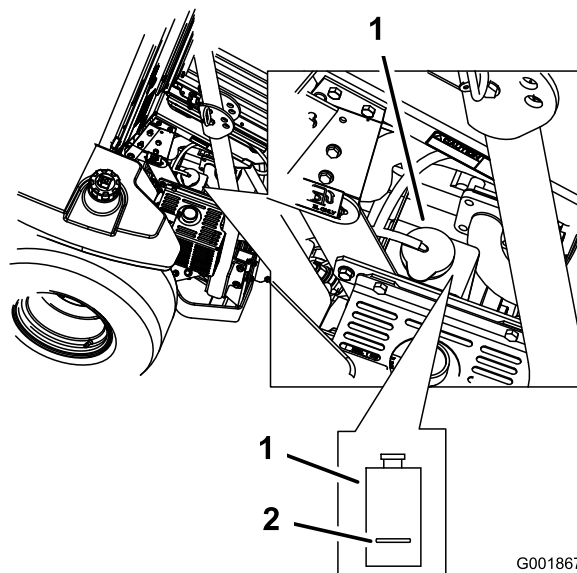
Every 100 hours

**Fluid Type:** 50/50 mix of extended life antifreeze/Dex-Cool® and water

**Cooling System Capacity:** 128 ounces (3.8 l)

**Note:** Do not open the radiator cap. Doing this may induce air into the cooling system.

1. Position the machine on a level surface, stop the engine, and set the parking brake.
2. Unlatch the seat and tilt the seat up.
3. With the engine cool, check the overflow bottle level. The fluid needs to be up to the bump on the outside of the overflow bottle (Figure 61).
4. If the coolant level is low, add a 50/50 mix of extended life antifreeze/Dex-Cool® and water to the overflow bottle (Figure 61).
5. Add the 50/50 coolant mix to the overflow bottle and fill it to the indicator line on the bottle (Figure 61).



G001867

**Figure 61**

1. Antifreeze overflow bottle
2. Indicator line on side of overflow bottle

## Cleaning the Cooling System

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

Clean the cooling system daily before each use.

1. Position the machine on a level surface, stop the engine, and set the parking brake.
- Important:** Before starting the engine, clean grass from the pump drive belt compartment. Check more often in dry conditions.
2. Unlatch the seat, tilt the seat up and raise the rubber flap above the drive belt compartment.
  3. Remove debris from the drive belt compartment and hydraulic pumps.
  4. Remove debris from the screen on the engine cover.
  5. Tilt the engine cover forward.

6. Remove debris from the radiator core and engine.

**Important:** Do not damage the radiator cooling fins.

7. Inspect the seals on the engine cover and replace them if needed.
8. Close the engine cover and tilt the seat back.

## Changing the Engine Coolant

**Service Interval:** Yearly

Change the engine coolant every year.

Contact an Authorized Service Dealer for changing the coolant.

# Brake Maintenance

## Adjusting the Parking Brake

**Service Interval:** Every 25 hours—Grease the brake lever.

Every 200 hours—Grease the brake pivot.

1. Disengage the brake lever (lever down).
2. Measure the length of the spring. The measurement should be 2-3/4 inch (70 mm) between the washers (Figure 62).
3. If an adjustment is necessary, loosen the jam nut below the spring and tighten the nut directly below the yoke (Figure 62). Turn the nut until the correct measurement is obtained. Tighten the two nuts together and repeat on the opposite side of the unit.
4. Turn the nuts clockwise to shorten the spring length and counterclockwise to lengthen the spring.
5. Engage the parking brake, lever up.
6. Measure the distance between the spring bracket and the adjusting nut under spring bracket. The measurement should be 1/4-5/16 inch (5-8 mm) (Figure 62).
7. If an adjustment is necessary, loosen the jam nut directly above the trunion roller. Turn the lock nut below the trunion roller until the correct measurement is obtained (Figure 62).
8. Tighten the jam nut directly above the trunion roller (Figure 62).

**Note:** If the 1/4-5/16 inch (5-8 mm) can not be achieved, remove a pin from either yoke at the ends of the brake rod. Adjust the length of the rod so 1/4-5/16 inch (5-8 mm) can be achieved and install the brake rod.

# Belt Maintenance

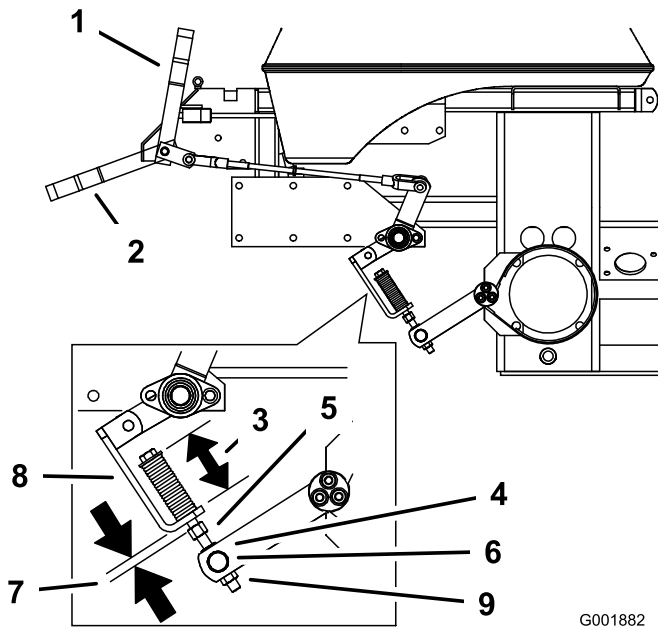
## Inspecting the Belts

**Service Interval:** Every 100 hours

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

## Replacing the Mower Belt

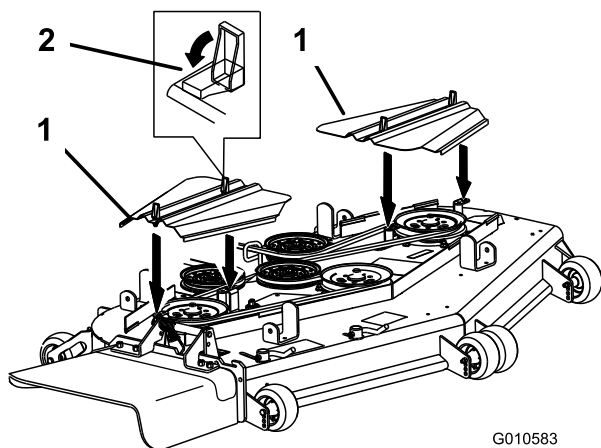
Squealing when the belt is rotating, blades slipping when cutting grass, frayed belt edges, burn marks and cracks are signs of a worn mower belt. Replace the mower belt if any of these conditions are evident.



**Figure 62**

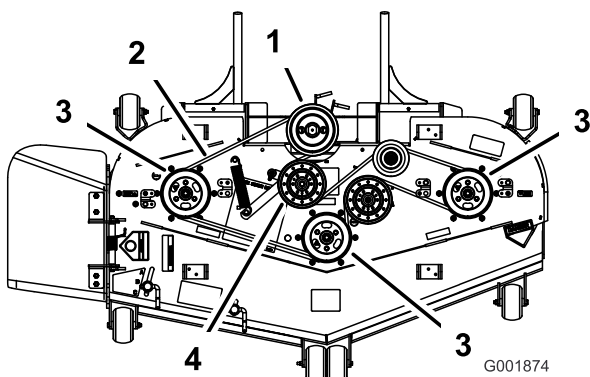
- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1. Brake lever-engaged          | 7. 1/4-5/16 inch (5-8 mm)        |
| 2. Brake lever-disengaged       | 8. Spring bracket                |
| 3. Spring, 2-3/4 inch (70 mm)   | 9. Lock nut below trunion roller |
| 4. Jam nut above trunion roller | 10. Brake rod                    |
| 5. Nut below spring bracket     | 11. Yoke                         |
| 6. Trunion roller               |                                  |

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the belt covers (Figure 63).
4. Pull on the spring loaded idler arm to loosen the belt tension.
5. Remove the mower belt from the mower pulleys and the top pulley of the three stacked pulleys (Figure 63 and Figure 64).
6. Install the new belt around the mower pulleys and the top pulley of the three stacked pulleys (Figure 63 and Figure 64).
7. Pull on the spring loaded idler arm to loosen the belt tension and align the mower belt onto the idler pulley (Figure 64).
8. Install the belt covers and close the latches (Figure 63).



**Figure 63**

1. Belt cover
2. Latch



**Figure 64**

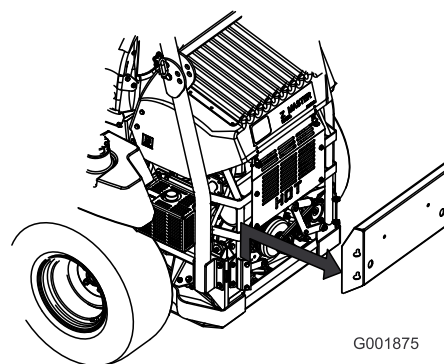
1. Three stacked pulleys
2. Mower belt
3. Mower spindle pulley
4. Mower idler pulley

## Replacing the Drive Belts

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

**Note:** Remove the top drive belt first if the bottom drive belt needs to be replaced.

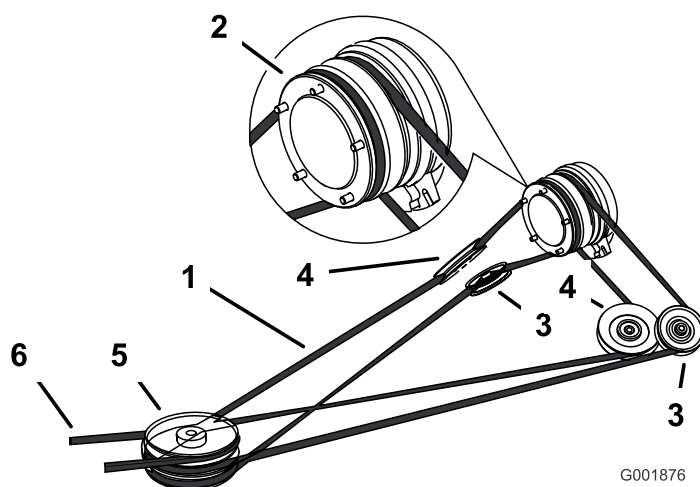
1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the rear engine panel (Figure 65).



**Figure 65**

1. Rear engine panel

4. Pull on the spring loaded idler pulley to loosen the belt tension (Figure 66).
5. Remove the mower belt from the top pulley of the three stacked pulleys (Figure 64 and Figure 66).
6. Remove the worn drive belt.
7. Install the new drive belt around the clutch pulley, the adjustable idler pulleys, the spring loaded idler pulley, and the front three stacked pulleys (Figure 66).
8. Adjust the belt tension; refer to Adjusting the Drive Belts.
9. Install the mower belt around the mower pulleys and the top pulley of the three stacked pulleys (Figure 64 and Figure 66).



**Figure 66**

1. Drive belt
2. Clutch
3. Spring loaded idler pulley
4. Adjustable idler pulley
5. Three stacked pulleys
6. Mower belt

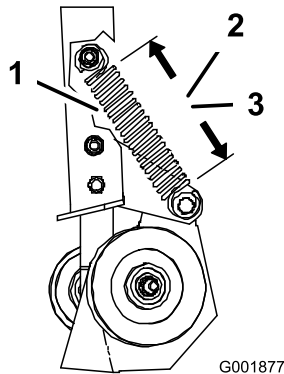


## Adjusting the Drive Belts

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

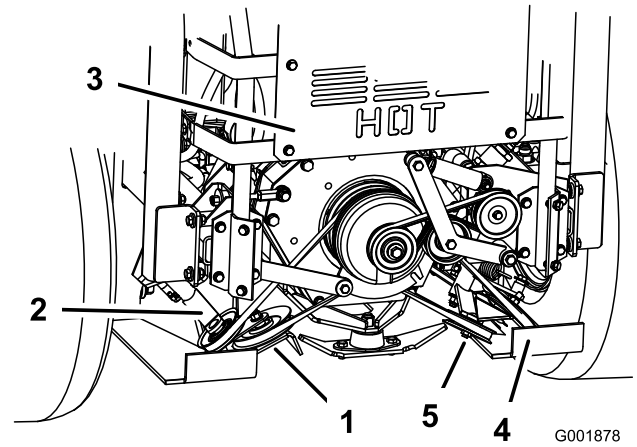
**Note:** Measure only the spring coils.

3. Measure the length of the spring. Check to make sure the coils of the spring on the spring-loaded idler pulley measures as listed below (Figure 67 and Figure 68).
  - Left spring measurement:  $5\text{-}3/4 \pm 1/8$  inch ( $14.6 \pm 0.3$  cm) (Figure 67).
  - Right spring measurement:  $5\text{-}1/2 \pm 1/8$  inch ( $14.0 \pm 0.3$  cm) (Figure 67).
4. If the spring does not have the correct measurement, loosen the nut holding the adjustable idler pulley so it can move up and down in the slot (Figure 68).
5. Relieve the pressure on the spring-loaded idler pulley (Figure 68).
6. Position the adjustable pulley lower in the slot and tighten the nut (Figure 68).
7. Check to make sure the coils of the spring on the spring-loaded idler pulley have the correct measurement (Figure 67).
8. Repeat as necessary on the opposite side of the machine.



**Figure 67**

- |  |   |
|--|---|
| 1. Spring/Spring coils   | 3. Right spring measurement- $5\text{-}1/2 \pm 1/8$ inch ( $14.0 \pm 0.3$ cm) |
| 2. Left spring measurement- $5\text{-}3/4 \pm 1/8$ inch ( $14.6 \pm 0.3$ cm) |   |



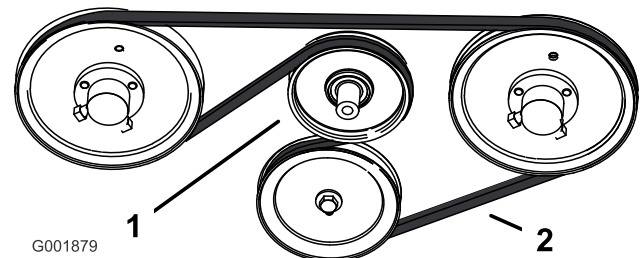
**Figure 68**

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 1. Left adjustable pulley          | 4. Right adjustable pulley          |
| 2. Left spring loaded idler pulley | 5. Right spring loaded idler pulley |
| 3. Back of the machine             |                                     |

## Checking and Replacing the Pump Drive Belt

**Service Interval:** Every 50 hours—Check the pump drive belt.

1. Tilt the seat forward and remove the front engine panel.
2. Check the pump drive belt for wear.
3. To replace the belt, pull the spring loaded idler down and remove the traction belt from the engine and hydro pump pulleys (Figure 69). Remove the belt between the pulleys.
4. Install the new belt around the engine and hydro pump pulleys (Figure 69).
5. Pull the spring loaded idler down and align it below the traction belt. Release the pressure on the spring loaded idler (Figure 69).



**Figure 69**

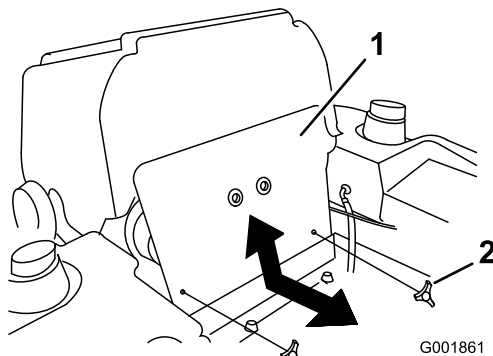
- |                               |                    |
|-------------------------------|--------------------|
| 1. Spring loaded idler pulley | 2. Pump drive belt |
|-------------------------------|--------------------|

# Replacing and Tensioning the Alternator Belt

## Replacing the Alternator Belt

**Service Interval:** Every 50 hours—Check the alternator belt.

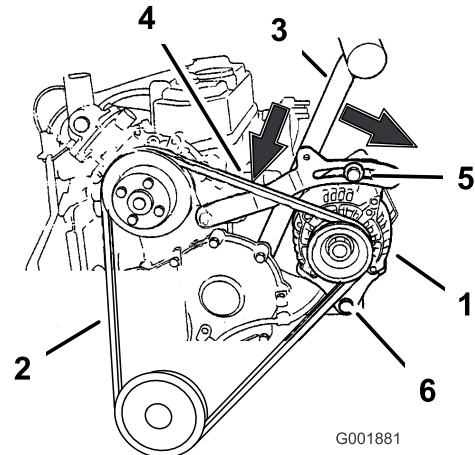
1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Tilt the seat forward and remove the front engine panel (Figure 70).



**Figure 70**

1. Front engine panel
2. Knob

5. If the deflection is correct, torque the upper bolt to 170 in-lb (19 N-m) and the bottom bolt to 45 ft-lb (61 N-m) (Figure 71).
6. Install the pump drive belt; refer to Replacing the Pump Drive Belt.
7. Install the front engine panel (Figure 70).



**Figure 71**

- |                    |  |
|--------------------|--|
| 1. Alternator      | 4. Deflection, 3/8 to 1/2 inch (10 to 13 mm) |
| 2. Alternator belt | 5. Top bolt                                  |
| 3. Handle          | 6. Bottom bolt                               |

4. Check the alternator belt for wear.
5. To replace the alternator belt, remove the pump drive belt. Refer to Removing the Pump Drive Belt.
6. Loosen the two bolts holding the alternator (Figure 71).
7. Remove the belt from the pulleys and alternator (Figure 71).
8. Install a new belt around the pulleys and the alternator (Figure 71).

## Tensioning the Alternator Belt

1. Place a handle between the alternator and cylinder block (Figure 71).
2. Adjust the alternator to the outside until there is 3/8 to 1/2 inch (10 to 13 mm) deflections in the belt between the engine and the alternator (Figure 71).
3. Tighten the alternator bolts.
4. Check the deflection in the belt again and adjust the belt if needed.

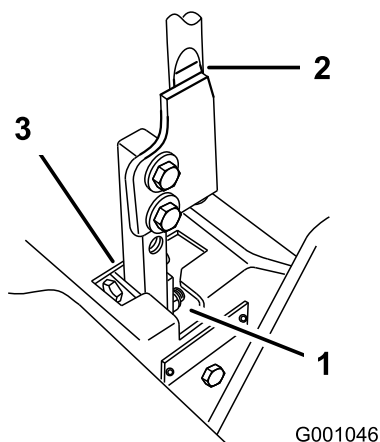
# Controls System Maintenance

## Adjusting the Control Handle Neutral Position

If motion control levers do not align, or move easily into the console notch, adjustment is required. Adjust each lever, spring and rod separately.

**Note:** Motion control levers must be installed correctly. See Installing the Motion Control Levers in the set up instructions.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Unlatch the seat and tilt the seat forward.
4. Begin with either the left or right motion control lever.
5. Move the lever to the neutral position but **not locked** (Figure 72).
6. Pull the lever back until the clevis pin (on arm below pivot shaft) contacts the end of the slot (just beginning to put pressure on the spring) (Figure 72).
7. Check where the control lever is relative to notch in console (Figure 72). It should be centered allowing lever to pivot outward to the neutral lock position.



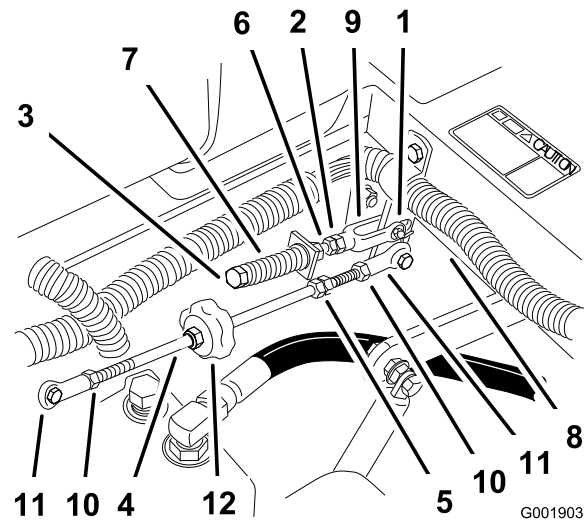
**Figure 72**

- |                            |                     |
|----------------------------|---------------------|
| 1. Neutral locked position | 3. Neutral position |
| 2. Control lever           |                     |

9. Apply slight rearward pressure on the motion control lever, turn the head of the adjustment bolt in the appropriate direction until the control lever is centered in the neutral lock position (Figure 73).

**Note:** Keeping rearward pressure on the lever will keep the pin at the end of the slot and allow the adjustment bolt to move the lever to the appropriate position.

10. Tighten the nut and jam nut (Figure 73).
11. Repeat for the opposite side of the machine.



**Figure 73**

- |                       |                   |
|-----------------------|-------------------|
| 1. Clevis pin in slot | 7. Spring         |
| 2. Nut against yoke   | 8. Pivot shaft    |
| 3. Adjustment bolt    | 9. Yoke           |
| 4. Pump rod           | 10. Locknut       |
| 5. Double nuts        | 11. Ball joint    |
| 6. Jam Nut            | 12. Tracking knob |

8. If adjustment is needed, loosen the nut and jam nut against the yoke (Figure 73).

# Hydraulic System Maintenance

## Servicing the Hydraulic System

### Checking the Hydraulic Fluid

**Service Interval:** After the first 8 hours  
Every 25 hours

Fluid Type: Mobil 1 15W-50 synthetic motor oil or equivalent synthetic oil.

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

Hydraulic System Oil Capacity: 132 ounces (3.9 l)

**Note:** There are two ways of checking the hydraulic oil. One is when the oil is warm and one is when the oil is cold. The baffle inside the tank has two levels depending if the oil is warm or cold.

1. Position the machine on a level surface and set the parking brake.
2. Clean the area around filler neck of hydraulic tank (Figure 74).
3. Remove the cap from the filler neck. Look inside to check if there is fluid in the reservoir (Figure 74).
4. If there is no fluid, add fluid to the reservoir until it reaches the cold level of the baffle.
5. Run the machine at low idle for 15 minutes to allow any air to purge out of the system and warm the fluid. Refer to Starting and Stopping the Engine in , page .
6. Recheck the fluid level while the fluid is warm. The fluid should be between cold and hot.
7. If required, add fluid to the hydraulic tank.

**Note:** The fluid level should be to the top of the hot level of the baffle, when the fluid is hot (Figure 74).

8. Install cap on filler neck.

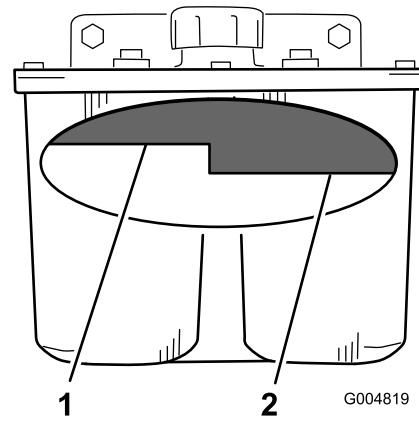


Figure 74

1. Hot fluid level-full
2. Cold fluid level-full



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

- If hydraulic fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result if this is not done.
- Keep body and hands away from pin hole 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.
- Make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to hydraulic system.

### Replacing the Hydraulic Filter and Oil

**Service Interval:** After the first 25 hours—Change the hydraulic filter.

Yearly—Change the hydraulic filter and oil.

Use summer filter above 32°F (0°C)

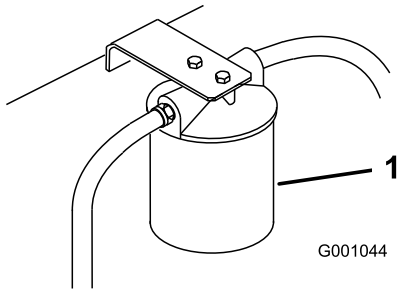
Use winter filter below 32°F (0°C)

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.

2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

**Important:** Do not substitute automotive oil filter or severe hydraulic system damage may result.

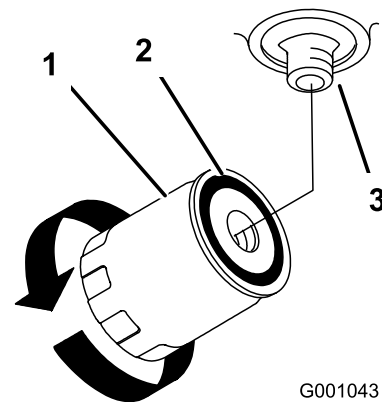
3. Place drain pan under filter, remove the old filter and wipe the filter adapter gasket surface clean (Figure 75).



**Figure 75**

1. Hydraulic filter

4. Apply a thin coat to the rubber gasket on the replacement filter (Figure 76).
5. Install the replacement hydraulic filter onto the filter adapter. Do not tighten.
6. Fill the hydraulic tank with hydraulic fluid until the fluid overflows the filter and then turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 turn (Figure 76).
7. Clean up any spilled fluid.
8. Add fluid to the cold level of the baffle in the hydraulic tank.
9. Start the engine and let it run for about two minutes to purge air from the system. Stop the engine and check for leaks. If one or both wheels will not drive, refer to Bleeding Hydraulic System.
10. Recheck the fluid level while the fluid is warm. The fluid should be between cold and hot.
11. If required, add fluid to the hydraulic tank. Do not overfill.



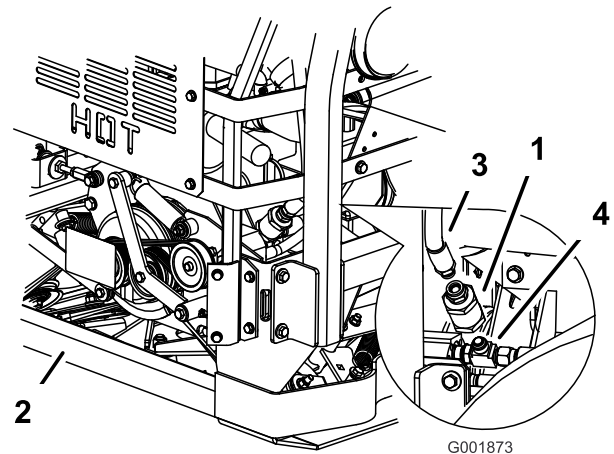
**Figure 76**

1. Hydraulic filter
2. Gasket
3. Adapter

## Replacing the Cooling Fan Hydraulic Filter

**Service Interval:** Every 500 hours or after any part of the hydraulic cooling fan system is repaired or replaced.

1. Place drain pan under filter, remove the hydraulic hose from the filter (Figure 77).
2. Remove the cooling fan hydraulic filter from the T-fitting on the bottom of the filter (Figure 77).



**Figure 77**

1. Cooling fan hydraulic filter
2. Back of machine
3. Hydraulic hose
4. T-fitting

3. Install the filter to the T-fitting on the bottom and the hydraulic hose to the top (Figure 77).

## Bleeding the Hydraulic System

The traction system is self bleeding, however, it may be necessary to bleed the system if fluid is changed or after work is performed on the system.

1. Raise rear of the machine so wheels are off the ground and support with jack stands.
2. Start the engine and run at low idle speed. Engage the lever and traction on one side and spin the wheel by hand.
3. When the wheel begins to spin on its own, keep it engaged until wheel drives smoothly. (minimum 2 minutes)
4. Check hydraulic fluid level and add as required to maintain proper level.
5. Repeat this procedure on the opposite wheel.

## Checking the Hydraulic Hoses

**Service Interval:** Every 100 hours

Check the hydraulic hoses for leaks, loose fittings, kinked lines, loose mounting supports, wear, weather and chemical deterioration. Make necessary repairs before operating.

**Note:** Keep areas around the hydraulic system clean from grass and debris build up.



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

- If hydraulic fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result if this is not done.
- Keep body and hands away from pin hole 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.
- Make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to hydraulic system.

## Setting the Hydraulic Pump Neutral Position

**Note:** Adjust the handle neutral first. That needs to be correct before the following adjustment can be made.

This adjustment must be made with drive wheels turning.



**Mechanical or hydraulic jacks may fail to support machine and cause a serious injury.**

- Use jack stand when supporting machine.
- Do not use hydraulic jacks.



**Engine must be running so motion control adjustment can be performed. Contact with moving parts or hot surfaces may cause personal injury.**

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

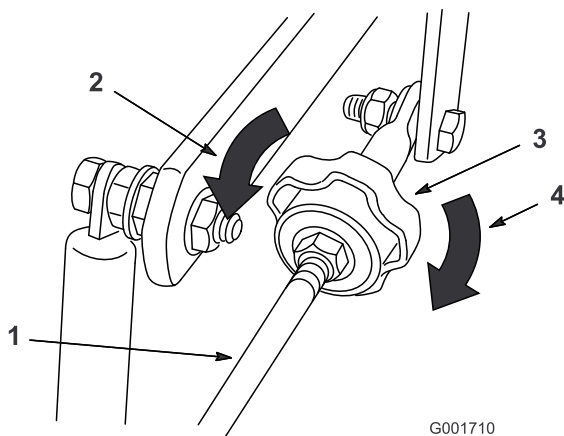
1. Raise the frame and block up the machine so drive wheels can rotate freely.
2. Disconnect the electrical connector from the seat safety switch. Temporarily install a jumper wire across terminals in the wiring harness connector.
3. Unlatch the seat and slide seat forward.
4. Disconnect the seat rod and tilt the seat fully forward.

## Setting the Left-hand Hydraulic Pump Neutral Position

1. Start the engine, open the throttle 1/2 way and release parking brake. Refer to Starting and Stopping the Engine in Operation.

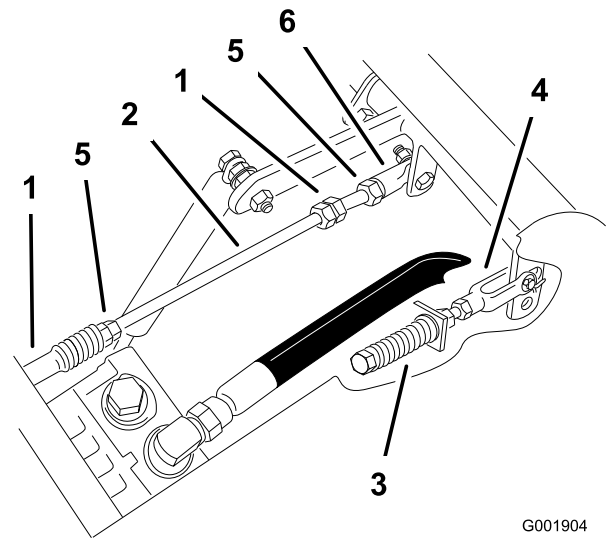
**Note:** The motion control lever must be in neutral while making any adjustments.

2. Adjust the pump rod length by rotating the knob, in the appropriate direction, until the wheel is still or slightly creeping in reverse (Figure 78).



**Figure 78**

- |                    |                                 |
|--------------------|---------------------------------|
| 1. Tracking knob   | 4. Turn this way to track right |
| 2. Hydraulic tank  | 5. Turn this way to track left  |
| 3. Hydraulic pumps |                                 |



**Figure 79**

- |                    |               |
|--------------------|---------------|
| 1. Double nuts     | 4. Locknut    |
| 2. Pump rod        | 5. Ball joint |
| 3. Adjustment bolt | 6. Pumps      |

3. Move the motion control lever forward and reverse, then back to neutral. The wheel must stop turning or slightly creep in reverse.
4. Open the throttle to fast. Make sure wheel remains stopped or slightly creeps in reverse, adjust if necessary.

## Setting the Right-hand Hydraulic Pump Neutral Position

1. Loosen the locknuts at the ball joints on the pump control rod (Figure 79).
2. Start the engine, open throttle 1/2 way and release parking brake. Refer to Starting and Stopping the Engine in Operation.

**Note:** The motion control lever must be in neutral while making any adjustments.

**Note:** The front nut on the pump rod has left-hand threads.

3. Adjust the pump rod length by rotating double nuts on rod, in the appropriate direction, until wheel is still or slightly creeps in reverse (Figure 79).
4. Move the motion control lever forward and reverse, then back to neutral. The wheel must stop turning or slightly creep in reverse.
5. Open the throttle to fast. Make sure the wheel remains stopped or slightly creeps in reverse, adjust if necessary.
6. Tighten the locknuts at the ball joints (Figure 79).

**Electrical system will not perform proper safety shut off with jumper wire installed.**

- Remove jumper wire from wire harness connector and plug connector into seat switch when adjustment is completed.
- Never operate this unit with jumper installed and seat switch bypassed.

7. After both pump neutrals are set, shut off the machine.
8. Remove the jumper wire from the wire harness connector and plug the connector into the seat switch.
9. Install the seat rod and lower the seat into position.
10. Remove the jack stands.

# Mower Deck Maintenance

## Leveling the Mower at Three Positions

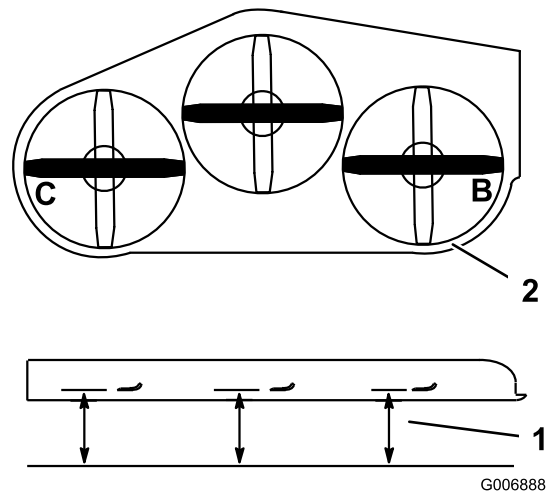
**Important:** There are only three measuring positions needed to level the mower.

### Setting Up the Machine

1. Position the mower on a flat surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Check tire pressure of all four tires. If needed, adjust to 13 psi (90 kPa)
5. Lower the mower to the 3 inch (76 mm) height-of-cut position.
6. Inspect the four chains. The chains need to have tension.
  - If one rear chain is loose, lower (loosen) the front support arm on the same side. Refer to Adjusting the Front-to-Rear Mower Pitch.
  - If one front chain is loose, raise (tighten) the front support arm for that chain. Refer to Adjusting the Front-to-Rear Mower Pitch.

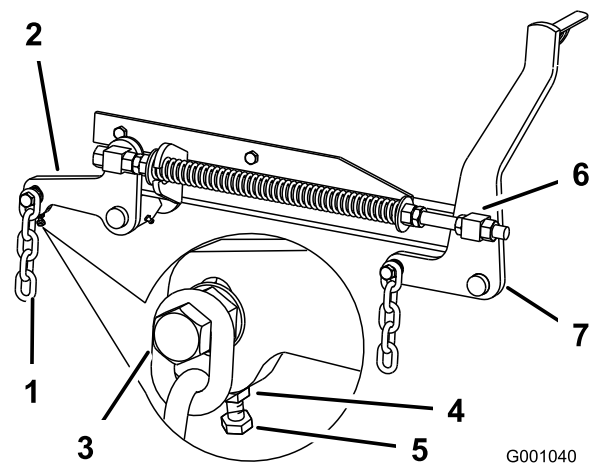
### Leveling the Mower Side-to-Side

1. Position the **right** blade side-to-side (Figure 80).



**Figure 80**

1. Measure here from blade to hard surface
  2. Measure at B and C
2. Measure the right blade at the **B** location, from a level surface to the cutting edge of the blade tip (Figure 80).
  3. Record this measurement. This measurement needs to be 3-1/8 to 3-1/4 inches.
  4. Position the left blade side-to-side (Figure 80).
  5. Measure the left blade at the **C** location (Figure 80), from a level surface to the cutting edge of the blade tip.
  6. Record this measurement. This measurement needs to be 3-1/8 to 3-1/4 inches (80 to 83 mm).
  7. If the measurements at positions **B** or **C** are not correct, loosen the bolt attaching the rear chain to the rear support arm (Figure 81).



**Figure 81**

1. Rear chain
2. Rear support arm
3. Bolt
4. Jam Nut
5. Adjustment bolt
6. Front swivel
7. Front support arm



- Loosen the jam nut under the rear support arm and adjust the adjustment bolt to get a measurement of 3-1/8 to 3-1/4 inches (80 to 83 mm) (Figure 81).

**Note:** It is recommended that both sides of the mower are adjusted the same distance.

- Tighten the jam nut under the rear support arm and tighten the bolt securing the chain to the rear support arm.
- Adjust the opposite side if needed.

## Adjusting the Front-to-Rear Mower Pitch

- Position the right blade front-to-rear (Figure 82).
- Measure the right blade at the **A** location, from a level surface to the cutting edge of the blade tip (Figure 82).

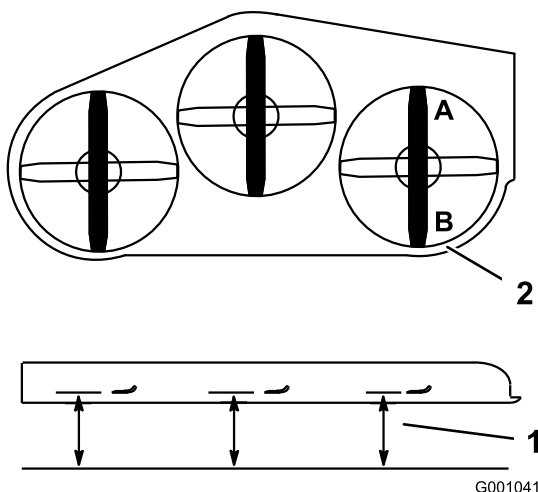


Figure 82

- Measure here from blade
- Measure at A and B to hard surface

- Record this measurement.
  - Measure the right blade at the **B** location, from a level surface to the cutting edge of the blade tip (Figure 82).
  - Record this measurement.
  - The mower blade should be a 1/4 to 3/8 inch (6 to 10 mm) lower at position **A** than at position **B** (Figure 82). If it is not correct, proceed to the following steps.
- Note:** Both of the front swivels need to be adjusted the same amount to maintain equal chain tension.
- Loosen the front swivel jam nuts, at the front of the right and left swivels, approximately a 1/2 inch (13 mm) (Figure 81).
  - Adjust the lift nuts on both the left and the right side of the machine to achieve 1/4 to 3/8 inch

(6 to 10 mm) lower in front at **A** than in the rear at **B** (Figure 81).

- Tighten both swivel jam nuts against the front swivel to lock the height.
- Check to make sure there is equal tension on the chains and adjust again if needed.

## Adjusting the Compression Spring

- Raise the mower lift lever to the transport position.
- Check the distance between the two large washers, it needs to be 11-1/2 inches (29.2 cm) (Figure 83).
- Adjust this distance, by loosening the spring jam nut and turning the nut in front of each spring (Figure 83). Turning the nut clockwise will shorten the spring; counter-clockwise will lengthen the spring.
- Lock the nut into position by tightening the spring jam nut (Figure 83).

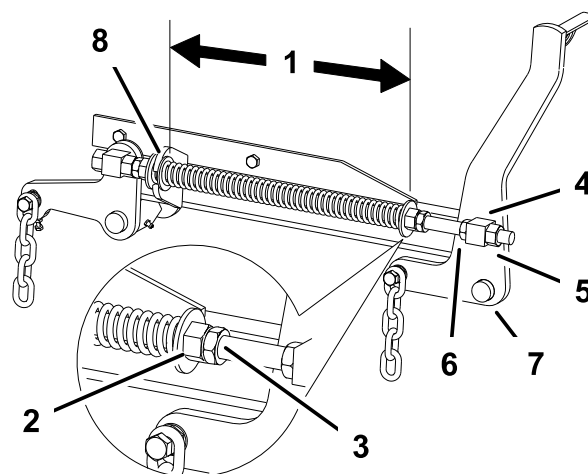


Figure 83

- 11-1/2 inch (29.2 cm) between the large washers
- Front nut
- Spring jam nut
- Front swivel
- Swivel jam nut
- Lift nut
- Front support arm
- Large washer

## Servicing the Cutting Blades

Maintain sharp blades throughout the cutting season because sharp blades cut cleanly without tearing or shredding the grass blades. Tearing and shredding turns grass brown at the edges, which slows growth and increases the chance of disease.

Check the cutter blades daily for sharpness, and for any wear or damage. File down any nicks and sharpen the blades as necessary. If a blade is damaged or worn, replace it immediately with a genuine Toro replacement

blade. For convenient sharpening and replacement, you may want to keep extra blades on hand.



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

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

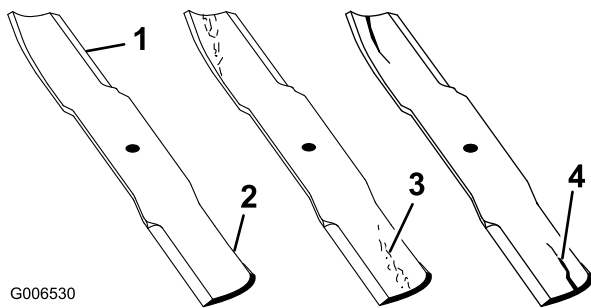
## Before Inspecting or Servicing the Blades

Park the machine on a level surface, disengage the blade control (PTO), and set the parking brake. Turn the ignition key to Off. Remove the key.

## Inspecting the Blades

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

1. Inspect the cutting edges (Figure 84). If the edges are not sharp or have nicks, remove and sharpen the blades. Refer to Sharpening the Blades.
2. Inspect the blades, especially the curved area (Figure 84). If you notice any damage, wear, or a slot forming in this area (Figure 84), immediately install a new blade.



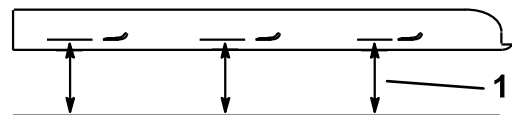
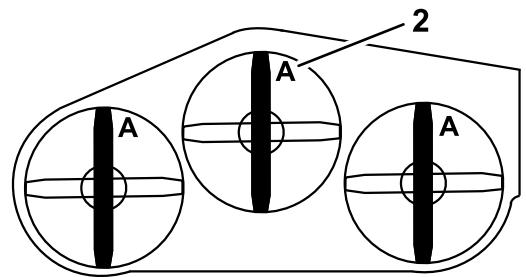
**Figure 84**

- |                 |                      |
|-----------------|----------------------|
| 1. Cutting Edge | 3. Wear/slot Forming |
| 2. Curved Area  | 4. Crack             |

## Checking for Bent Blades

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

3. Rotate the blades until the ends face forward and backward (Figure 85). Measure from a level surface to the cutting edge, position **A**, of the blades (Figure 85). Note this dimension.



G000975

**Figure 85**

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

4. Rotate the opposite ends of the blades forward.
5. Measure from a level surface to the cutting edge of the blades at the same position as in step 3 above. The difference between the dimensions obtained in steps 3 and 4 must not exceed 1/8 inch (3 mm). If this dimension exceeds 1/8 inch (3 mm), the blade is bent and must be replaced; refer to Removing the Blades and Installing the Blades.



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

- Always replace bent or damaged blade with a new blade.
- Never file or create sharp notches in the edges or surfaces of blade.

## Removing the Blades

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



Contact with a sharp blade can cause serious injury.

Wear gloves or wrap sharp edges of the blade with a rag.

1. Hold the blade end using a rag or thickly-padded glove.
2. Remove the blade bolt, spring disk and blade from the spindle shaft (Figure 88).

## Sharpening the Blades



When sharpening blade, pieces of blade could be thrown and cause serious injury.

Wear proper eye protection when sharpening blade.

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 86). Maintain the original angle. The blade retains its balance if the same amount of material is removed from both cutting edges.

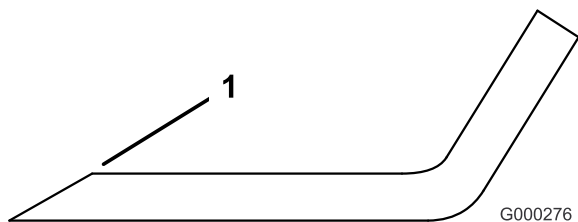


Figure 86

1. Sharpen at original angle

2. Check the balance of the blade by putting it on a blade balancer (Figure 87). If the blade stays in a horizontal position, the blade is balanced and can be used. If the blade is not balanced, file some metal off the end of the sail area only (Figure 88). Repeat this procedure until the blade is balanced.

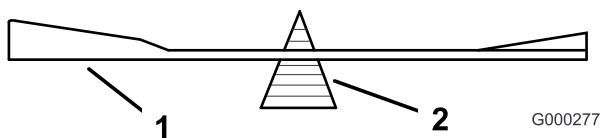


Figure 87

1. Blade
2. Balancer

## Installing the Blades

1. Install the blade onto the spindle shaft (Figure 88).

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

2. Install the spring disk and blade bolt. The spring disk cone must be installed toward the bolt head (Figure 88). Torque the blade bolt to 85-110 ft-lb (115-150 N-m).

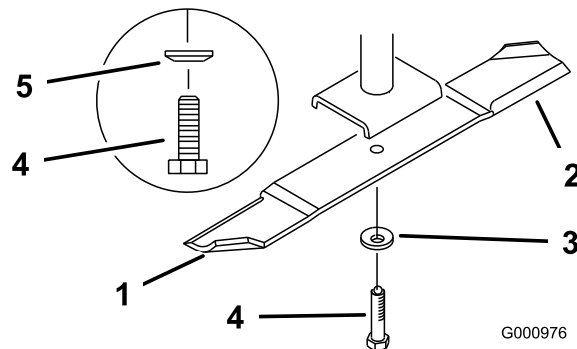


Figure 88

1. Sail Area of Blade
2. Blade
3. Spring Disk
4. Blade Bolt
5. Cone Towards Bolt Head

## Replacing the Grass Deflector



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

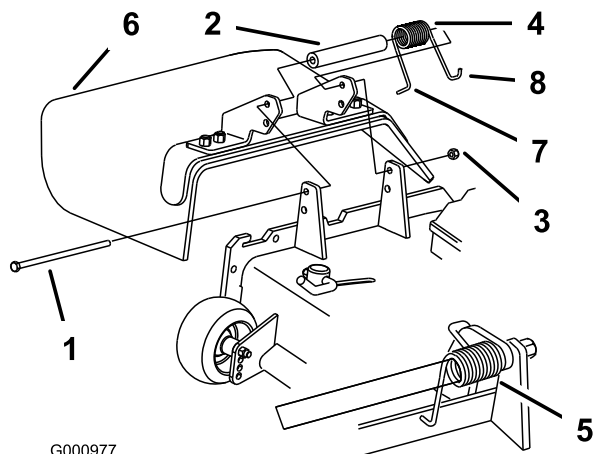
- Never operate the lawn mower unless you install a cover plate, a mulch plate, or a grass chute and catcher.
- Make sure the grass deflector is in the down position.

1. Remove the locknut, bolt, spring and spacer holding the deflector to the pivot brackets (Figure 89). Remove the damaged or worn grass deflector.
2. Place the spacer and spring onto grass deflector. Place the L end of spring behind deck edge.

**Note:** Make sure the L end of the spring is installed behind the deck edge before installing the bolt as shown in Figure 89.

3. Install the bolt and nut. Place the J hook end of the spring around the grass deflector (Figure 89).

**Important:** The grass deflector must be able to lower down into position. Lift the deflector up to test that it lowers into the full down position.



**Figure 89**

- |            |   |
|------------|---|
| 1. Bolt    | 5. Spring installed   |
| 2. Spacer  | 6. Grass Deflector  |
| 3. Locknut | 7. L end of spring, place behind deck edge before installing bolt |
| 4. Spring  | 8. J hook end of spring   |

## Cleaning

### Cleaning Under the Mower

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

Remove the grass buildup under the mower daily.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the mower to the transport position.
4. Raise the front of the machine by using the Z Stand®.



**The machine could fall onto someone and cause serious injury or death.**

- Use extreme caution when operating the machine on the Z Stand®.
- Use only for cleaning the mower and removing the blades.
- Do not keep the machine on the Z Stand® for extended periods of time.
- Always turn the engine off, set the parking brake, and remove the key before performing any maintenance to the mower.

### Waste Disposal

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

# Storage

## Cleaning and Storage

1. Disengage the power take off (PTO), set the parking brake, and turn the ignition key to Off. Remove the key.
2. Remove grass clippings, dirt, and grime from the external parts of the entire machine, especially the engine and hydraulic system. Clean dirt and chaff from the outside of the engine cylinder head fins and blower housing.

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

3. Check the brake; refer to Servicing the Brake in , page .
4. Service the air cleaner; refer to Servicing the Air Cleaner in , page .
5. Grease the machine; refer to Greasing and Lubrication in , page .
6. Change the crankcase oil; refer to Servicing the Engine Oil in , page .
7. Check the tire pressure; refer to Checking the Tire Pressure in , page .
8. Change the hydraulic filter; refer to Servicing the Hydraulic System in , page .
9. Charge the battery; refer to Servicing the Battery in , page .
10. Scrape any heavy buildup of grass and dirt from the underside of the mower, then wash the mower with a garden hose.

**Note:** Run the machine with the PTO engaged and the engine at high idle for 2 to 5 minutes after washing.

11. Check the condition of the blades; refer to Servicing the Cutting Blades in , page .
12. Prepare the machine for storage when non-use occurs over 30 days. Prepare the machine for storage as follows:
  - A. Add a petroleum based stabilizer/conditioner to fuel in the tank. Follow mixing instructions from the stabilizer manufacturer. Do not use an alcohol based stabilizer (ethanol or methanol).

**Note:** A fuel stabilizer/conditioner is most effective when mixed with fresh fuel and used at all times.

- B. Run the engine to distribute conditioned fuel through the fuel system (5 minutes).
- C. Stop the engine, allow it to cool, and drain the fuel tank; refer to Servicing the Fuel Tank in , page .
- D. Restart the engine and run it until it stops.
- E. Dispose of fuel properly. Recycle as per local codes.

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

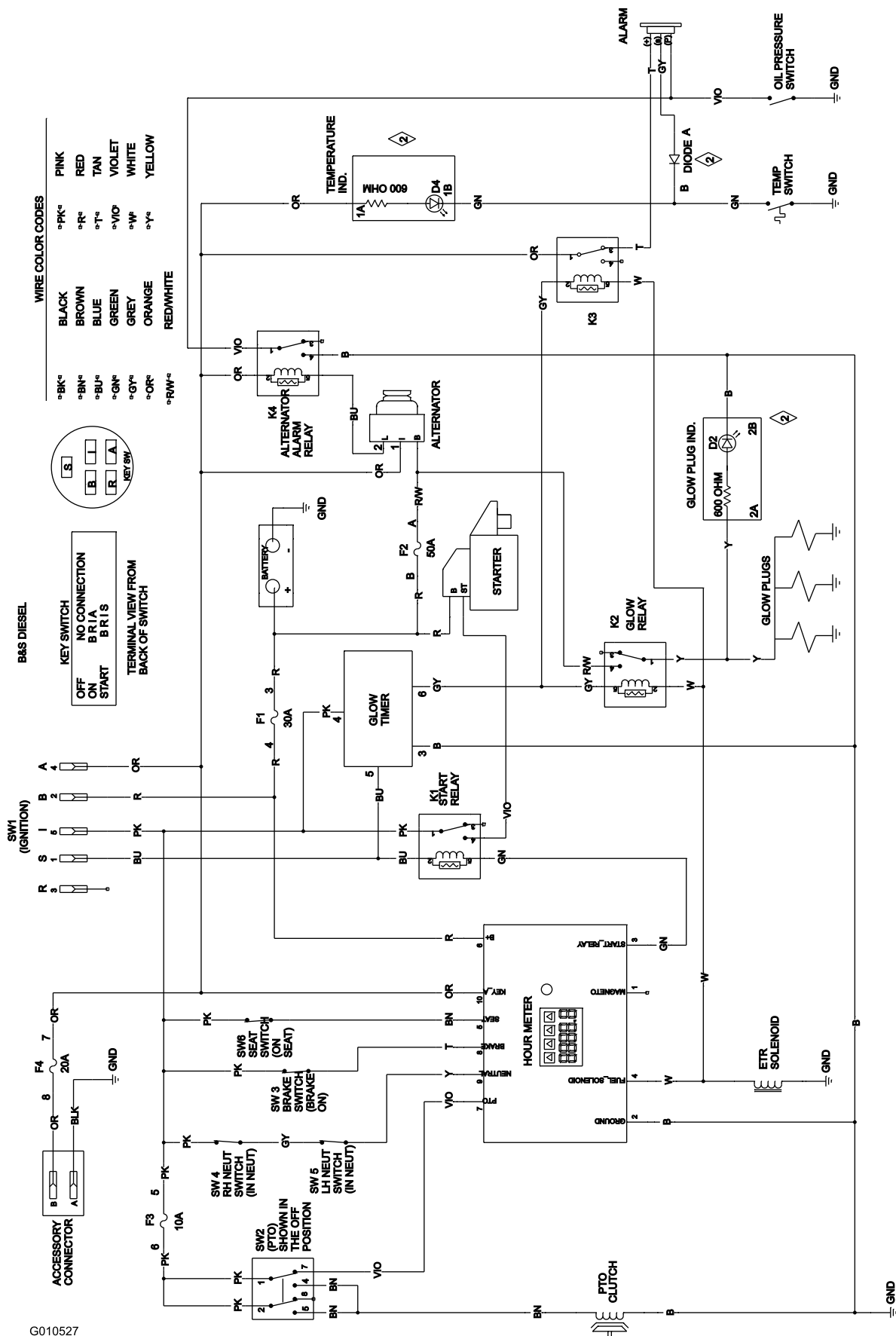
13. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
14. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
15. Store the machine in a clean, dry garage or storage area. Remove the key from the ignition switch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

# Troubleshooting

Problem	Possible Cause	Corrective Action
Starter does not crank	<ol style="list-style-type: none"> <li>1. Blade control (PTO) is engaged.</li> <li>2. Parking brake is not on.</li> <li>3. Operator is not seated.</li> <li>4. Battery is dead.</li> <li>5. Electrical connections are corroded or loose.</li> <li>6. Fuse is blown.</li> <li>7. Relay or switch is defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Move the blade contro (PTO) to disengaged.</li> <li>2. Set the parking brake.</li> <li>3. Sit on the seat.</li> <li>4. Charge the battery.</li> <li>5. Check the electrical connections for good contact.</li> <li>6. Replace the fuse.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>
Engine will not start, starts hard, or fails to keep running.	<ol style="list-style-type: none"> <li>1. Fuel tank is empty.</li> <li>2. Air cleaner is dirty.</li> <li>3. Dirt in the fuel filter.</li> <li>4. Dirt, water, or stale fuel is in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill the fuel tank with fuel.</li> <li>2. Clean or replace the air cleaner element.</li> <li>3. Replace the fuel filter.</li> <li>4. Contact an Authorized Service Dealer.</li> </ol>
Engine loses power.	<ol style="list-style-type: none"> <li>1. Engine load is excessive.</li> <li>2. Air cleaner is dirty.</li> <li>3. Oil level in the crankcase is low.</li> <li>4. Cooling fins and air passages above the engine are plugged.</li> <li>5. Vent hole in the fuel cap is plugged.</li> <li>6. Dirt in the fuel filter.</li> <li>7. Dirt, water, or stale fuel is in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Clean the air cleaner element.</li> <li>3. Add oil to the crankcase.</li> <li>4. Remove the obstruction from the cooling fins and air passages.</li> <li>5. Clean or replace the fuel cap.</li> <li>6. Replace the fuel filter.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>
Engine overheats.	<ol style="list-style-type: none"> <li>1. Engine load is excessive.</li> <li>2. Oil level in the crankcase is low.</li> <li>3. Cooling fins and air passages above the engine are plugged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Add oil to the crankcase.</li> <li>3. Remove the obstruction from the cooling fins and air passages.</li> </ol>
Machine does not drive.	<ol style="list-style-type: none"> <li>1. By pass valve is not closed tight.</li> <li>2. Drive or pump belt is worn, loose or broken.</li> <li>3. Drive or pump belt is off a pulley.</li> <li>4. Broken or missing idler spring.</li> <li>5. Hydraulic fluid level is low or too hot.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the by pass valve.</li> <li>2. Change the belt.</li> <li>3. Change the belt.</li> <li>4. Replace the spring.</li> <li>5. Add hydraulic fluid to the reservoir or let it cool down.</li> </ol>
Abnormal vibration.	<ol style="list-style-type: none"> <li>1. Cutting blade(s) is/are bent or unbalanced.</li> <li>2. Blade mounting bolt is loose.</li> <li>3. Engine mounting bolts are loose.</li> <li>4. Loose engine pulley, idler pulley, or blade pulley.</li> <li>5. Engine pulley is damaged.</li> <li>6. Blade spindle is bent.</li> <li>7. Motor mount is loose or worn.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install new cutting blade(s).</li> <li>2. Tighten the blade mounting bolt.</li> <li>3. Tighten the engine mounting bolts.</li> <li>4. Tighten the appropriate pulley.</li> <li>5. Contact an Authorized Service Dealer.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Uneven cutting height.	<ol style="list-style-type: none"> <li>1. Blade(s) not sharp.</li> <li>2. Cutting blade(s) is/are bent.</li> <li>3. Mower is not level.</li> <li>4. Underside of mower is dirty.</li> <li>5. Tire pressure is not correct.</li> <li>6. Blade spindle bent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen the blade(s).</li> <li>2. Install new cutting blade(s).</li> <li>3. Level the mower from side-to-side and front-to-rear.</li> <li>4. Clean the underside of the mower.</li> <li>5. Adjust the tire pressure.</li> <li>6. Contact an Authorized Service Dealer.</li> </ol>
Blades do not rotate.	<ol style="list-style-type: none"> <li>1. Drive belt is worn, loose or broken.</li> <li>2. Drive belt is off pulley.</li> <li>3. Deck belt is worn, loose or broken.</li> <li>4. Deck belt is off pulley.</li> <li>5. Broken or missing idler spring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the belt tension.</li> <li>2. Install the drive belt and check adjusting shafts and belt guides for correct position.</li> <li>3. Install a new deck belt.</li> <li>4. Install the deck pulley and check the idler pulley, idler arm and spring for correct position and function.</li> <li>5. Replace the spring.</li> </ol>

# Schematics



G010527

Wire Diagram (Rev. -)





**Notes:**

**Notes:**



## The Toro Total Coverage Guarantee

A Limited Warranty (see warranty periods below)

Landscape  
Contractor  
Equipment (LCE)

### Conditions and Products Covered

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

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

Product	Warranty Period
Mid-Size Walk-Behind Mowers	2 years**
GrandStand™ Mowers <ul style="list-style-type: none"><li>• Engine</li><li>• Frame</li></ul>	5 years or 1,200 hours* 2 years** Lifetime (original owner only)***
Z Master® Z300, Z400, Z500 Mowers <ul style="list-style-type: none"><li>• Engine</li><li>• Frames</li></ul>	4 years or 1,200 hours* 2 years** Lifetime (original owner only)***
Z Master® G3 Mowers <ul style="list-style-type: none"><li>• Engine</li><li>• Frame</li></ul>	5 years or 1,200 hours* 2 years** Lifetime (original owner only)***
Batteries (for above units)	1 year
Attachments (for above units)	1 year

\*Whichever occurs first.

\*\*Some engines used on Toro LCE Products are warranted by the engine manufacturer.

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

This warranty includes the cost of parts and labor, but you must pay transportation costs.

### Instructions for Obtaining Warranty Service

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

1. Contact any Authorized Toro Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, refer to the *Yellow Pages* of your telephone directory (look under "Lawn Mowers") or access our web site at [www.Toro.com](http://www.Toro.com). You may also call the numbers listed in item #3 to use the 24-hour Toro Dealer locator system.
2. Bring the product and your proof of purchase (sales receipt) to the Service Dealer. The dealer will diagnose the problem and determine if it is covered under warranty.
3. If for any reason you are dissatisfied with the Service Dealer's analysis or with the assistance provided, contact us at:  
LCB Customer Service Department  
Toro Warranty Company  
8111 Lyndale Avenue South  
Bloomington, MN 55420-1196  
888-865-5676 (U.S. Customers)  
888-865-5691 (Canada customers)

### Countries Other than the United States or Canada

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

### Owner Responsibilities

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

### Items and Conditions Not Covered

There is no other express warranty except for special emission system and engine warranty coverage on some products.

This express warranty does not cover:

- Cost of regular maintenance service or parts, such as filters, fuel, lubricants, tune-up parts, blade sharpening, brake and clutch adjustments.
- Any product or part which has been altered or misused or required replacement or repair due to normal wear, accidents, or lack of proper maintenance.
- Repairs necessary due to improper fuel, contaminants in the fuel system, or failure to properly prepare the fuel system prior to any period of non-use over three months.
- Pickup and delivery charges.

### General Conditions

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

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

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

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

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