



**Count on it.**

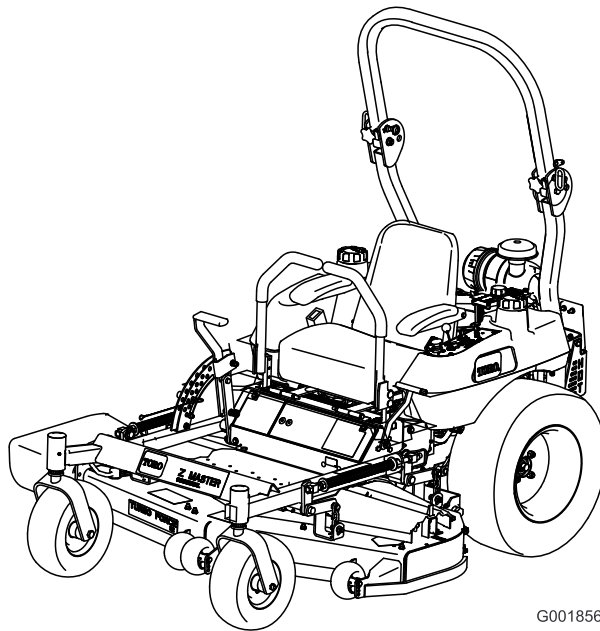
# Operator's Manual

## **Z400 Z Master**

**with a 48in or 52in 7-Gauge Side Discharge Mower**

**Model No. 74448—Serial No. 280000001 and Up**

**Model No. 74449—Serial No. 280000001 and Up**



G001856

## Warning

### CALIFORNIA

#### Proposition 65 Warning

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

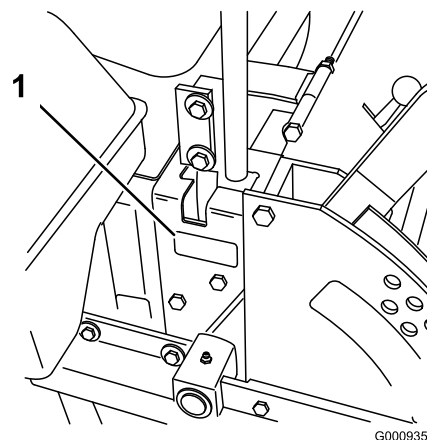


Figure 1

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 .....	10
Controls .....	11
Operation.....	12
Adding Fuel .....	12
Checking the Engine Oil Level.....	13

Using the Rollover Protection System (ROPS) .....	13	Setting the Hydraulic Pump Neutral Position .....	41
Think Safety First .....	14	Mower Deck Maintenance .....	43
Operating the Parking Brake .....	15	Leveling the Mower at Three Positions .....	43
Starting and Stopping the Engine .....	16	Servicing the Cutting Blades .....	45
Operating the Power Take Off (PTO) .....	17	Replacing the Grass Deflector.....	47
The Safety Interlock System.....	17	Cleaning.....	48
Driving Forward or Backward.....	18	Cleaning Under the Mower.....	48
Stopping the Machine.....	19	Waste Disposal.....	48
Adjusting the Height-of-Cut .....	19	Storage.....	48
Adjusting the Anti-Scalp Rollers .....	19	Troubleshooting.....	50
Positioning the Seat .....	20	Schematics .....	52
Unlatching the Seat.....	20		
Pushing the Machine by Hand.....	21		
Using the Side Discharge .....	21		
Transporting Machines .....	21		
Loading Machines .....	22		
Operating Tips .....	22		
Maintenance.....	24		
Recommended Maintenance Schedule(s) .....	24		
Lubrication.....	24		
Greasing and Lubrication .....	24		
Greasing the Mower Deck and Belt Idlers.....	25		
Engine Maintenance.....	26		
Servicing the Air Cleaner .....	26		
Servicing the Engine Oil.....	27		
Servicing the Spark Plugs.....	28		
Fuel System Maintenance .....	29		
Replacing the Fuel Filter .....	29		
Servicing the Fuel Tank .....	30		
Electrical System Maintenance.....	30		
Servicing the Battery.....	30		
Servicing the Fuses.....	32		
Drive System Maintenance .....	33		
Adjusting the Tracking.....	33		
Checking the Tire Pressure .....	33		
Checking the Wheel Hub Slotted Nut.....	33		
Adjusting the Caster Pivot Bearing.....	34		
Cooling System Maintenance.....	35		
Cleaning the Air Intake Screen .....	35		
Cleaning the Cooling System.....	35		
Brake Maintenance .....	36		
Adjusting the Parking Brake.....	36		
Belt Maintenance.....	36		
Inspecting the Belts .....	36		
Replacing the Mower Belt .....	36		
Replacing the Pump Drive Belt .....	37		
Adjusting the Push Arms.....	37		
Controls System Maintenance.....	38		
Adjusting the Control Handle Neutral Position.....	38		
Hydraulic System Maintenance .....	39		
Servicing the Hydraulic System .....	39		

# 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 gasoline 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)

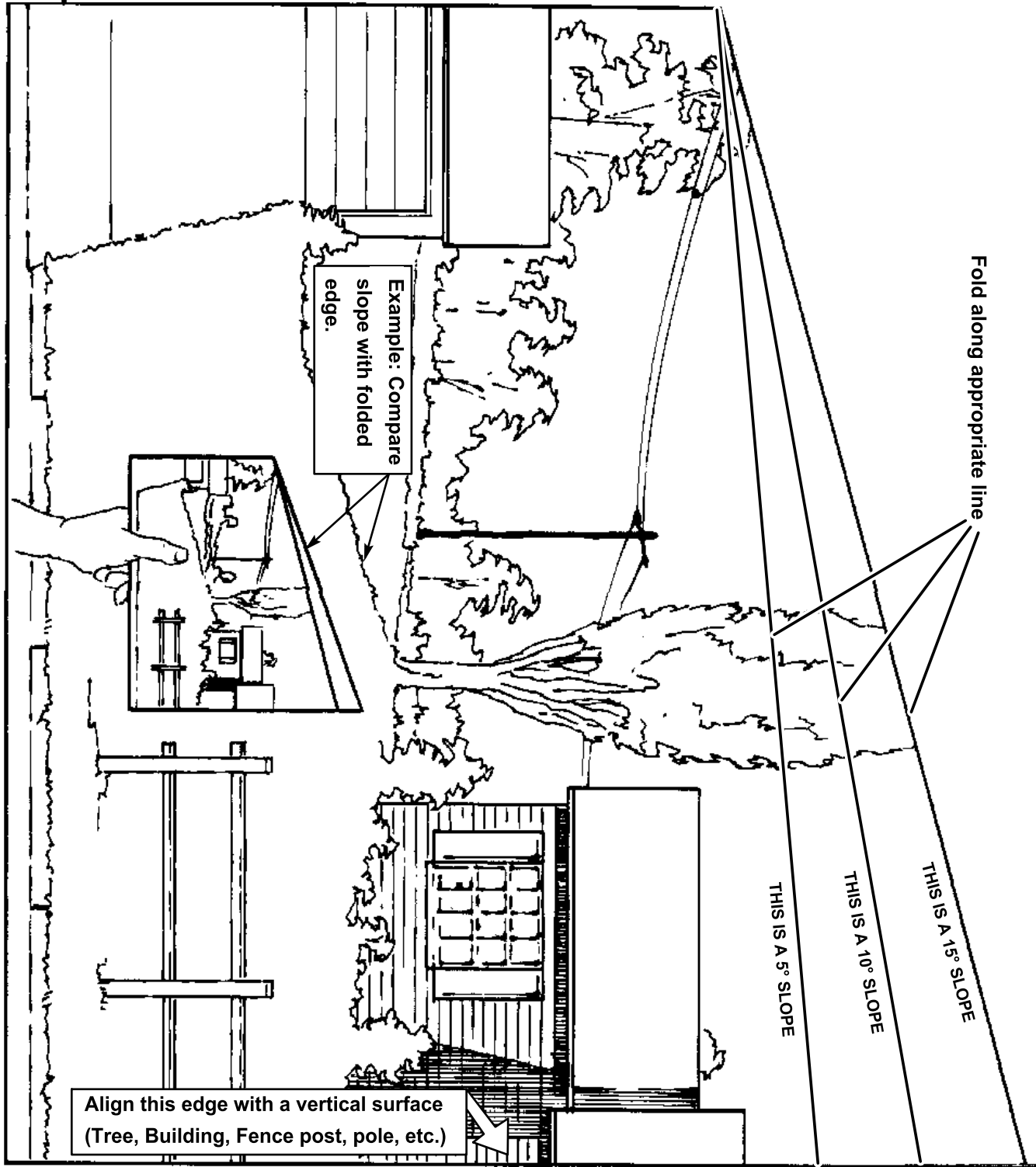
- Keep the roll bar in the raised and locked position and use the seat belt when operating the machine.
- Be certain that the seat belt can be released quickly in the event of an emergency.
- Be aware there is no rollover protection when the roll bar is down.

- 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



# Safety and Instructional Decals



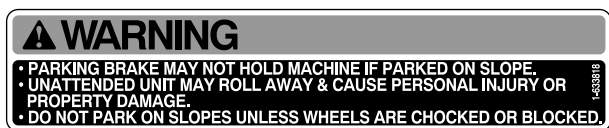
Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost.



1-403005



1-523552



1-633818



54-9220



1  
58-6520

1. Grease



66-1340



65-2690



68-8340



98-4387

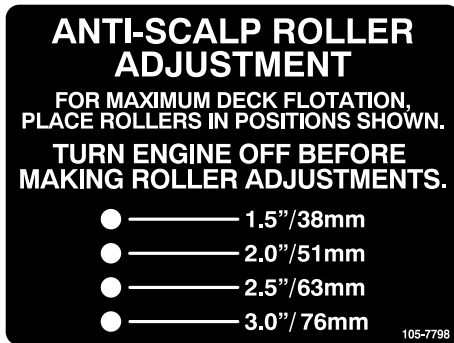
1. Warning—wear hearing protection.



98-5954



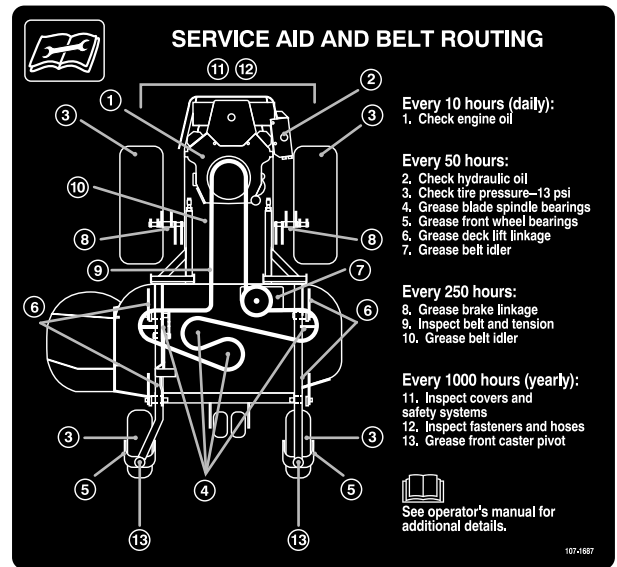
103-2644



105-7798



107-1613



107-1687



### Battery Symbols

Some or all of these symbols are on your battery

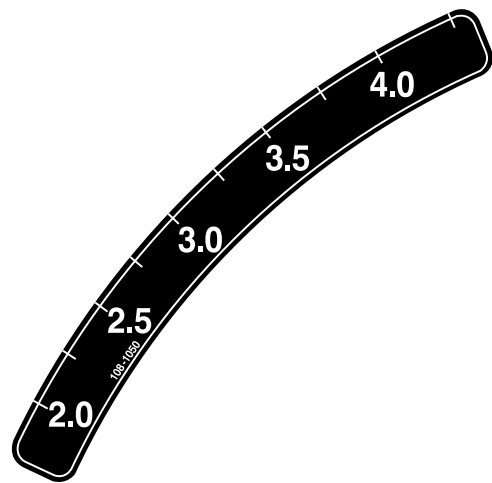
1. Explosion hazard
2. No fire, open flame, or smoking.
3. Caustic liquid/chemical burn hazard
4. Wear eye protection
5. Read the *Operator's Manual*.
6. Keep bystanders a safe distance from the battery.
7. Wear eye protection; explosive gases can cause blindness and other injuries
8. Battery acid can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



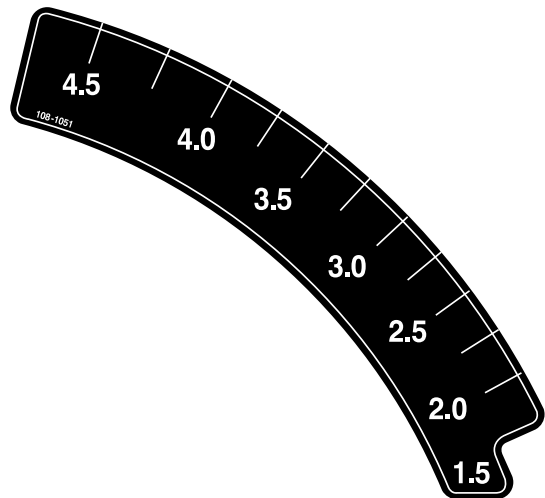
107-2102



107-2112



108-1050

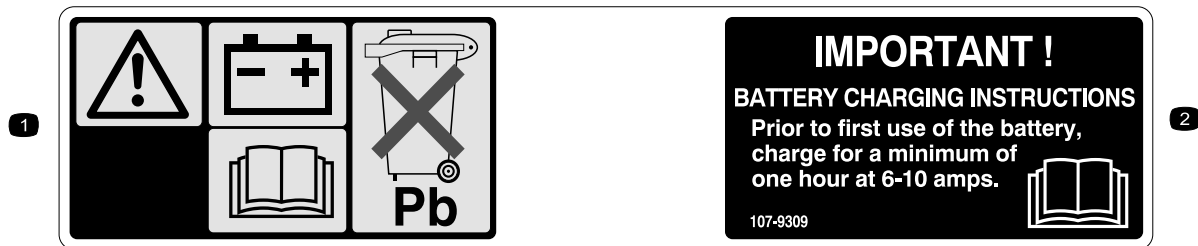
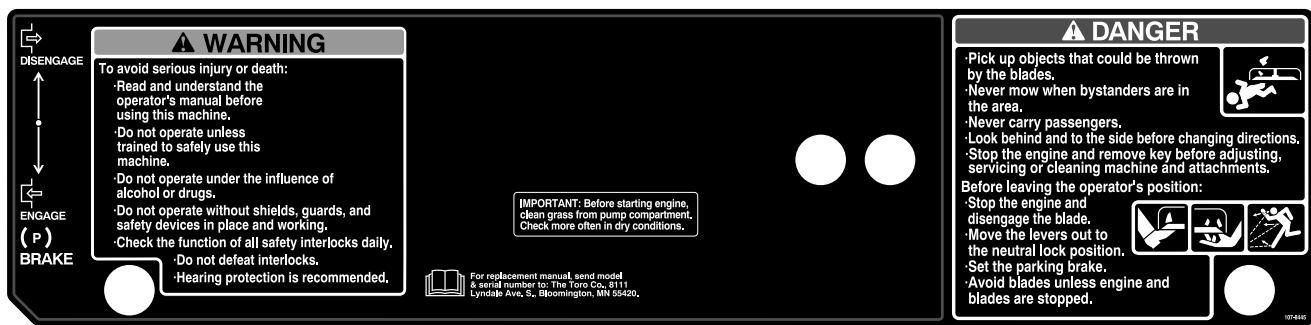


108-1051

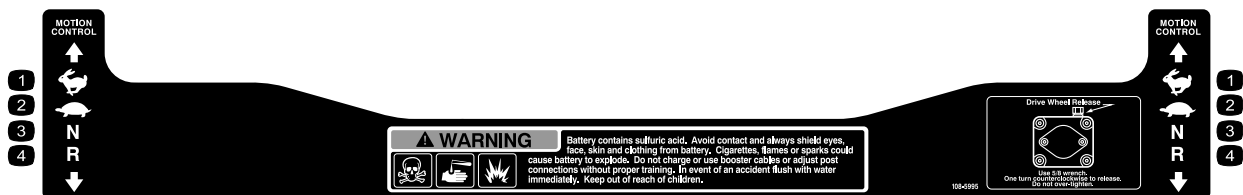


**Manufacturer's Mark**

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



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



1. Fast
2. Slow
3. Neutral
4. Reverse



1. Choke
2. Engine—stop
3. Engine—run
4. Engine—start
5. Fast
6. Continuous variable setting
7. Slow
8. Power take-off (PTO)

## Product Overview

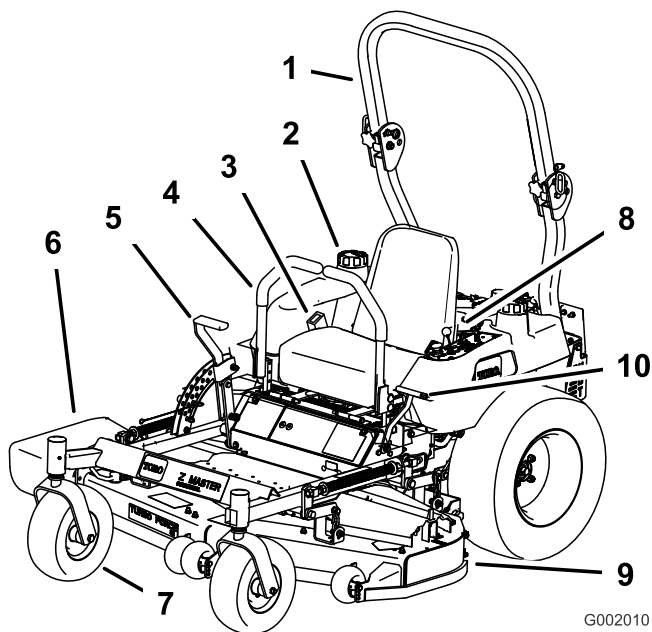


Figure 3

- |                          |                         |
|--------------------------|-------------------------|
| 1. Rollbar               | 6. Side discharge       |
| 2. Fuel cap (both sides) | 7. Front caster wheel   |
| 3. Seat belt             | 8. Controls             |
| 4. Motion control lever  | 9. Mower deck           |
| 5. Height-of-cut lever   | 10. Parking brake lever |

## Controls

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

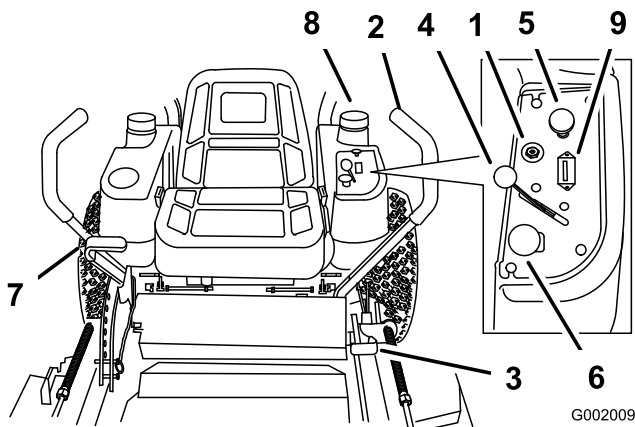


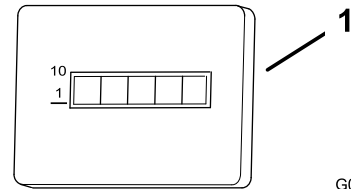
Figure 4

- |                         |                          |
|-------------------------|--------------------------|
| 1. Ignition switch      | 6. PTO Switch            |
| 2. Motion control lever | 7. Height-of-cut lever   |
| 3. Brake lever          | 8. Fuel cap (both sides) |
| 4. Throttle control     | 9. Hour meter            |
| 5. Choke                |                          |

## Using the Hour Meter

The hour meter (Figure 5) records the number of hours the engine has operated. It operates when the engine

is running. Use these times for scheduling regular maintenance.



G001664

Figure 5

1. Hour meter

## Throttle Control

The throttle control has two positions: **Fast** and **Slow**.

## Choke

Use the choke to start a cold engine.

## 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.

## Ignition Switch

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

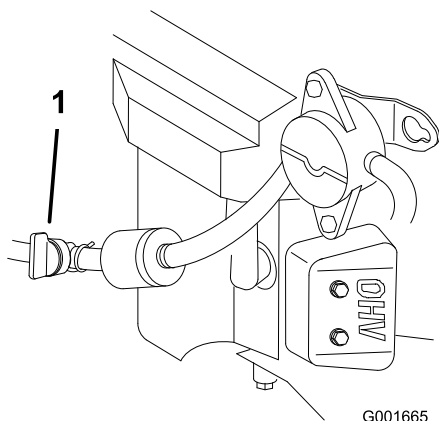
## Attachments/Accessories

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.

## Using the Fuel Shutoff Valve

The machine has 2 fuel tanks, one on the left side and the other on the right side. Each tank connects to a check valve and then to a tee. From there a common fuel line leads to the engine (Figure 6).

Close the fuel shutoff valve before transporting or storing the machine.



**Figure 6**

1. Fuel shutoff valve

# Operation

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

## Adding Fuel

Use **Unleaded** Regular Gasoline suitable for automotive use (85 pump octane minimum). Leaded regular gasoline may be used if unleaded regular is not available.

**Important:** Never use methanol, gasoline containing methanol, or gasohol containing more than 10% ethanol because the fuel system could be damaged. Do not mix oil with gasoline.



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

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



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

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



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

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

## Using Stabilizer/Conditioner

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

- Keeps gasoline fresh during storage of 90 days or less. For longer storage it is recommended that the fuel tank be drained.
- Cleans the engine while it runs
- Eliminates gum-like varnish buildup in the fuel system, which causes hard starting

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

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

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

## Filling the Fuel Tank

1. Shut the engine off and set the parking brake.
2. Clean around each fuel tank cap and remove the cap.
3. Add unleaded regular gasoline to both fuel tanks, until the level is 1/4 to 1/2 inch (6 mm to 13 mm) below the bottom of the filler neck.

This space in the tank allows gasoline to expand. Do not fill the fuel tanks completely full.

4. Install fuel tank caps securely.
5. Wipe up any gasoline that may have spilled.

## 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 Oil Level in Engine Maintenance , page 26

## 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.

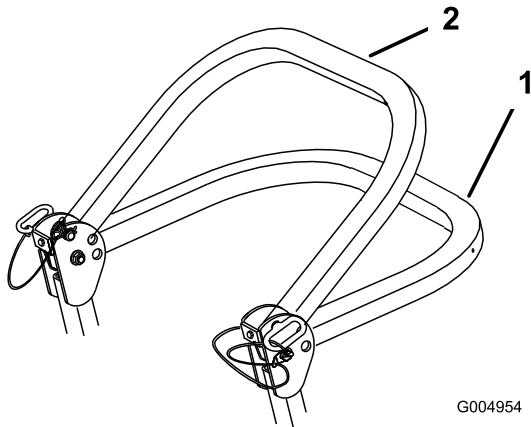


There is no rollover protection when the roll bar is in the down position.

- 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.

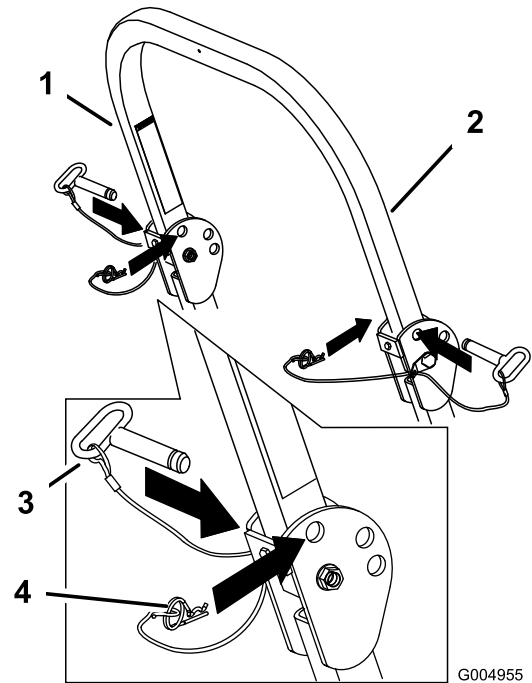
1. Remove the hairpin cotter pins and remove the two pins (Figure 8).
2. Lower the roll bar to the down position. There are two down positions. See Figure 7 for the positions.
3. Install the two pins and secure them with the hairpin cotter pins (Figure 8).



**Figure 7**

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

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



**Figure 8**

- |                    |                       |
|--------------------|-----------------------|
| 1. Roll bar        | 3. Pin                |
| 2. Raised position | 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.

**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).



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.

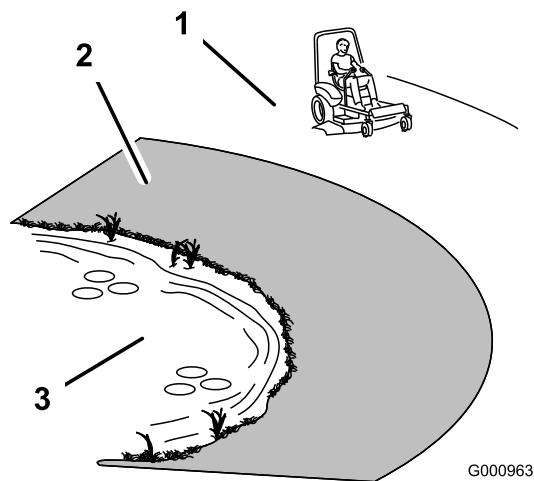
There is no rollover protection when the roll bar is down.

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.

Use protective equipment for your eyes, ears, feet, and head.



**Figure 10**

1. Warning— wear hearing protection

## Operating the Parking Brake

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

### Setting the Parking Brake

1. Move the motion control levers (Figure 17) out to the neutral lock position.
2. Pull up and back on the parking brake lever to set the parking brake (Figure 11). The parking brake lever should stay firmly in the engaged position.

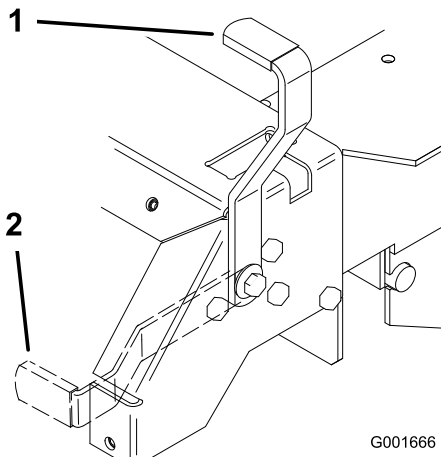


Parking brake may not hold machine parked on a slope and could cause personal injury or property damage.

Do not park on slopes unless wheels are chocked or blocked

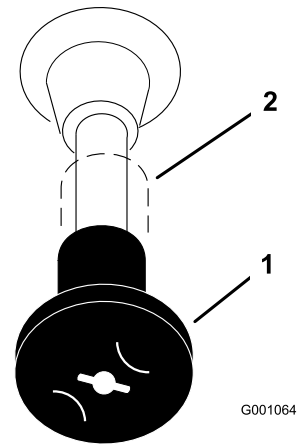
### Releasing the Parking Brake

Push forward and down on the parking brake lever to release the parking brake (Figure 11).



**Figure 11**

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



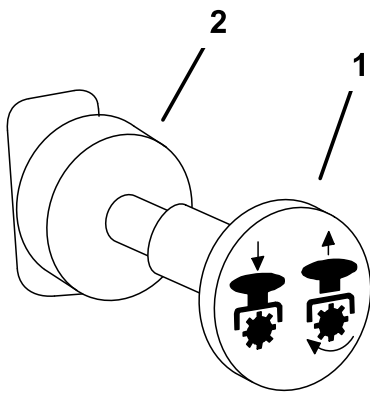
**Figure 13**

1. Choke—on
2. Choke—off

## Starting and Stopping the Engine

### Starting the Engine

1. Sit on the seat and move the motion controls to neutral locked position.
2. Set the parking brake; refer to Setting the Parking Brake.
3. Move the PTO (power take off) switch to the Off position (Figure 12).



G000937

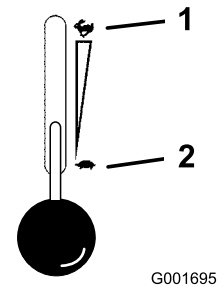
**Figure 12**

1. PTO—on
2. PTO—off

4. Move the choke control to the **on** position before starting a cold engine (Figure 13).

**Note:** A warm or hot engine may **not** require choking. After engine starts, move choke control to Run position.

5. Move the throttle control to the Fast position before starting a cold engine (Figure 14).

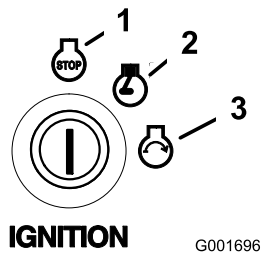


**Figure 14**

1. Throttle—fast
2. Throttle—slow

6. Turn the ignition key to Start. When the engines starts, release the key (Figure 15).

**Important:** Do not engage starter for more than 10 seconds at a time. If engine fails to start allow 30 second cool-down period between attempts. Failure to follow these instructions can burn out starter motor.



**Figure 15**

1. Off
2. Run
3. Start

7. After the engine starts, move the choke to off (Figure 13). If the engine stalls or hesitates, move the choke back to on for a few seconds, then move the throttle lever to desired setting. Repeat this as required.

## Stopping the Engine

1. Push the PTO to the off position (Figure 12).
2. Move the throttle lever midway between the slow and fast positions (Figure 14).
3. Let the engine idle for 60 seconds.
4. Turn the ignition key to the off position and remove the key (Figure 15).
5. Close the fuel shut off valve before transporting or storing the machine.

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



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.

## Operating the Power Take Off (PTO)

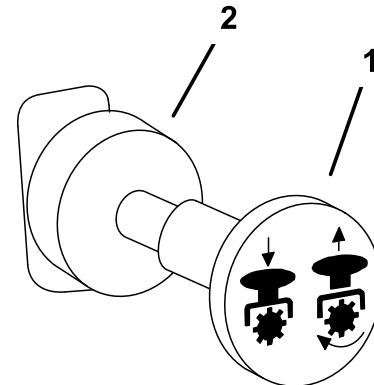
The power take off (PTO) switch starts and stops the mower blades and any powered attachments.

## 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).



G000937

**Figure 16**

1. PTO-On
2. PTO-Off

## 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.

## Understanding the Safety Interlock System

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

- You are sitting on the seat.
- 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.

## 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.

## Driving Forward

1. Release the parking brake; refer to Releasing the Parking Brake in Operation , page 12.
2. Move the levers to the center, un-locked position.
3. To go forward, slowly push the motion control levers forward (Figure 17).

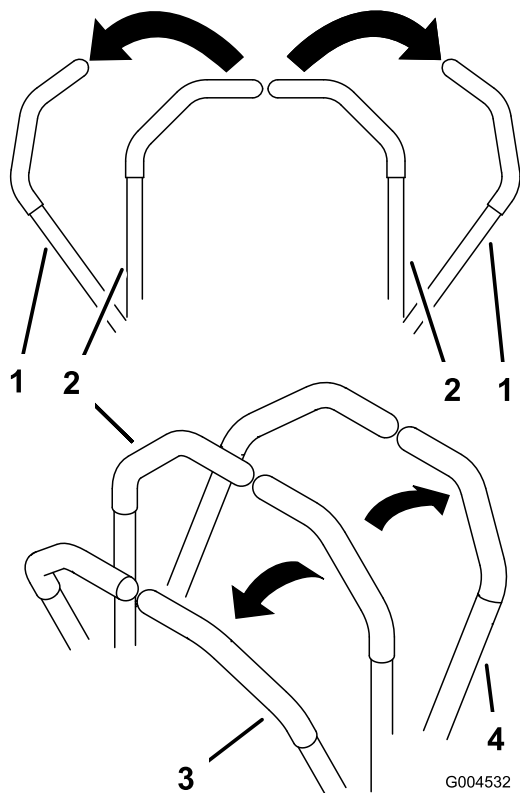
**Note:** The engine will kill if the traction control levers are moved with the parking brake engaged.

To go straight, apply equal pressure to both motion control levers (Figure 17).

To turn, move the motion control lever toward neutral in the direction you want to turn (Figure 17).

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 17**

- |   |             |
|---|-------------|
| 1. Motion control lever-neutral lock position | 3. Forward  |
| 2. Center un-lock position                    | 4. Backward |

## Driving Backward

1. Move the levers to the center, un-locked position.
2. To go backward, slowly pull the motion control levers rearward (Figure 17).

To go straight, apply equal pressure to both motion control levers (Figure 17).

To turn, release pressure on the motion control lever toward the direction you want to turn (Figure 17).

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 Operation , page 12. Remember to remove the key from the ignition switch.



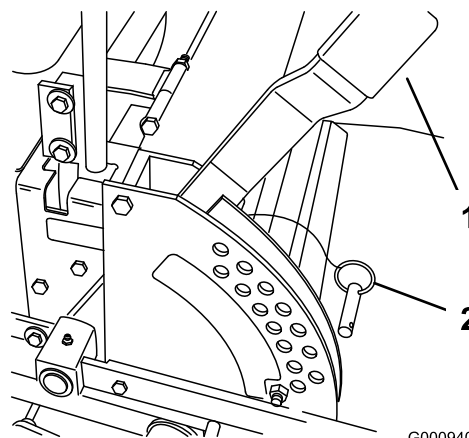
**Children or bystanders may be injured if they move or attempt to operate the tractor while it is unattended.**

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

## Adjusting the Height-of-Cut

The height-of-cut is adjusted from 1-1/2 to 4-1/2 inch (38 to 114 mm) in 1/4 inch (6 mm) increments by relocating the clevis pin into different hole locations.

1. Raise the height-of-cut lever to the transport position (also the 4-1/2 inch (114 mm) cutting height position) (Figure 18).
2. To adjust, remove the clevis pin from the height-of-cut bracket (Figure 18).
3. Select a hole in the height-of-cut bracket corresponding to the height-of-cut desired and, insert the clevis pin (Figure 18).
4. Move the lever to the selected height.



**Figure 18**

- |                        |               |
|------------------------|---------------|
| 1. Height of cut lever | 2. Clevis Pin |
|------------------------|---------------|

## Adjusting the Anti-Scalp Rollers

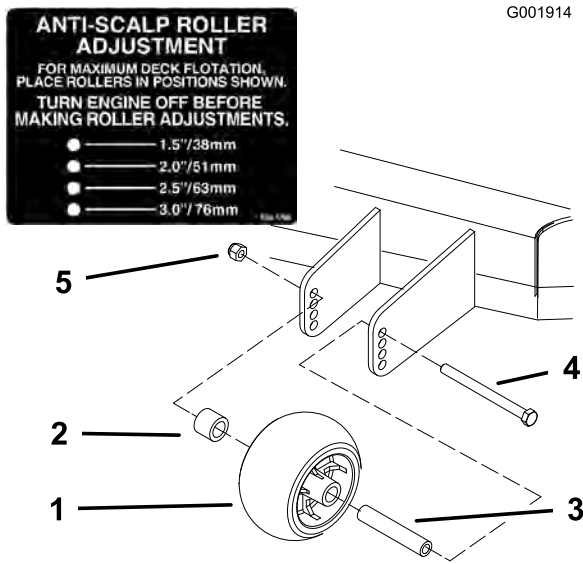
Whenever you change the height-of-cut, adjust the height of the anti-scalp rollers.

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 19 , Figure 20 and Figure 45 ).

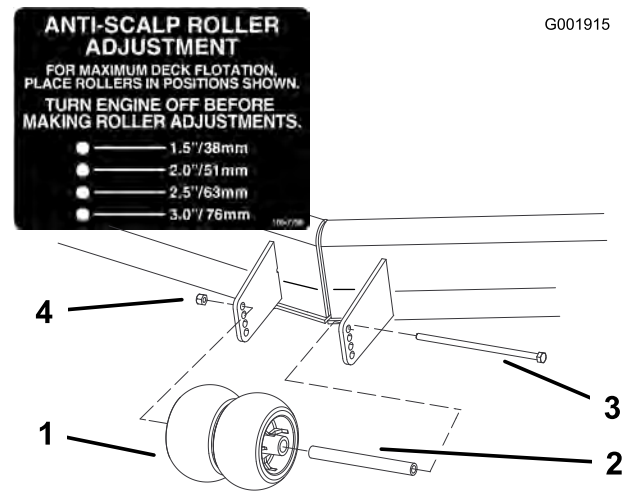
**Note:** The two middle rollers will not have a spacer (Figure 20).

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 19 , Figure 20 and Figure 45 ).
6. Repeat this adjustment on the other anti-scalp rollers.



**Figure 19**

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



**Figure 20**

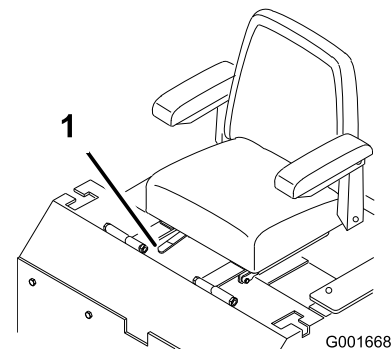
- |                      |               |
|----------------------|---------------|
| 1. Anti-scalp roller | 3. Flange Nut |
| 2. Bushing           | 4. Bolt       |

## Positioning the Seat

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

**Important:** To adjust, move the lever sideways to unlock seat (Figure 21).

Slide the seat to the desired position and release lever to lock in position.



**Figure 21**

1. Adjustment lever

## Unlatching the Seat

Push the seat latch rearward to unlatch the seat. This will allow access to the machine under the seat (Figure 22).

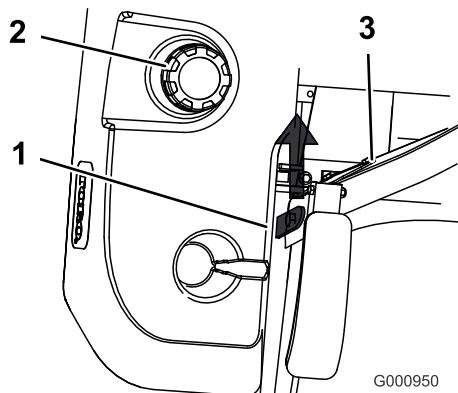


Figure 22

1. Seat latch
2. Fuel cap
3. Seat

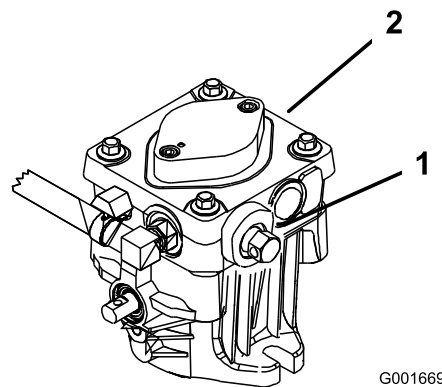


Figure 23

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

## 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 23).

**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 23).

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

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

## 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.**

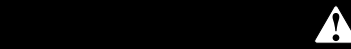
## Loading Machines

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 24). 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 24). 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.

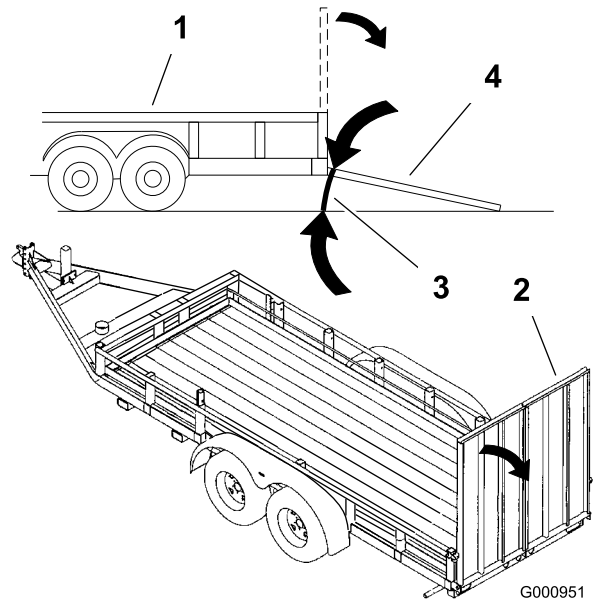
**Important: Do Not attempt to turn the unit while on the ramp; you may lose control and drive off the side.**

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 24**

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

## 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>• Change the engine oil.</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>
Before each use or daily	<ul style="list-style-type: none"><li>• Check the safety system.</li><li>• Check the engine oil level.</li><li>• Clean the engine air intake screen from grass and debris.</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>• Check the hydraulic fluid.</li></ul>
Every 50 hours	<ul style="list-style-type: none"><li>• Check the tire pressure.</li><li>• Check the pump drive belt.</li></ul>
Every 100 hours	<ul style="list-style-type: none"><li>• Change the engine oil.</li><li>• Check the spark plugs.</li><li>• Check the wheel hub slotted nut.</li><li>• Check and clean engine cooling fins and shrouds.</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 (Refer to Lubrication).</li></ul>
Every 200 hours	<ul style="list-style-type: none"><li>• Replace the air filter (more often in dirty or dusty conditions).</li><li>• Replace the oil filter.</li><li>• Replace the fuel filter</li></ul>
Every 500 hours	<ul style="list-style-type: none"><li>• Adjust the caster pivot bearing or at storage, which ever comes first.</li></ul>
Yearly	<ul style="list-style-type: none"><li>• Grease the front caster pivots (more often in dirty or dusty conditions).</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 25). 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.

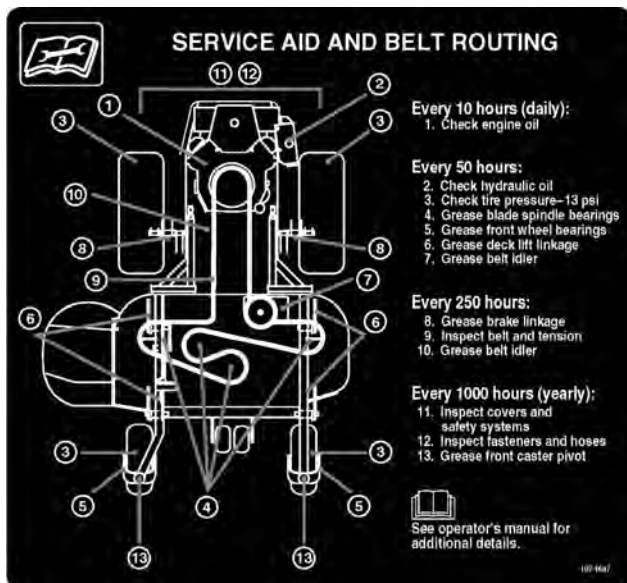
## Greasing the Front Caster Pivots

**Service Interval:** Yearly

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 Drive System Maintenance , page 33.
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.

## Where to Add Grease

Lubricate the grease fittings as shown on the Check Service Reference Aid decal (Figure 25).



G001671

Figure 25

## Where to Add Light Oil or Spray Lubrication

**Service Interval:** Every 150 hours

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

## 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 26).
5. Grease the idler arm on the mower deck (Figure 26).
6. Grease the fittings on the push arms (Figure 26).

# Engine Maintenance

## Servicing the Air Cleaner

**Note:** Service the filter 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. Release the latches on the air cleaner and pull the air cleaner cover off of the air cleaner body (Figure 27).

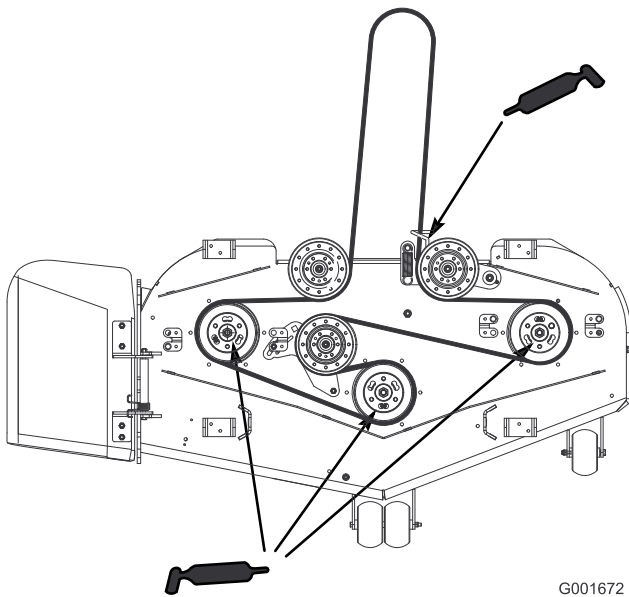


Figure 26

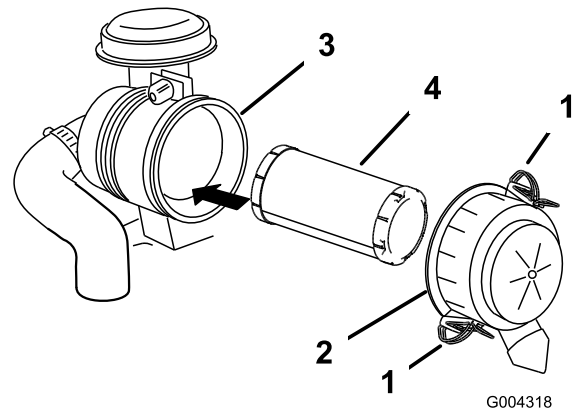


Figure 27

- |                      |                    |
|----------------------|--------------------|
| 1. Latches           | 3. Air filter body |
| 2. Air cleaner cover | 4. Primary filter  |

4. Clean the inside of the air cleaner cover with compressed air.
5. Gently slide the air filter out of the air cleaner body (Figure 27). Avoid knocking the filter into the side of the body.
6. Inspect the air filter for damage by looking into the filter while shining a bright light on the outside of the filter. Holes in the filter will appear as bright spots. If the filter is damaged discard it.

### Servicing the Air Filter

**Service Interval:** Every 200 hours

Do not clean the filter, replace it.

### Installing the Air Filter

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

1. If installing a new filter, check it for shipping damage. Do not use a damaged filter.
2. Carefully slide the air filter into the body (Figure 27).  
**Note:** 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.
3. Install the air cleaner cover with the side indicated as UP facing up and secure the latches (Figure 27).

## Servicing the Engine Oil

### Service Interval/Specification

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

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

**Crankcase Capacity:** 58 ounces (1.7 liter) with the filter removed; 51 ounces (1.5 liter) without the filter removed

**Viscosity:** Refer to the table below

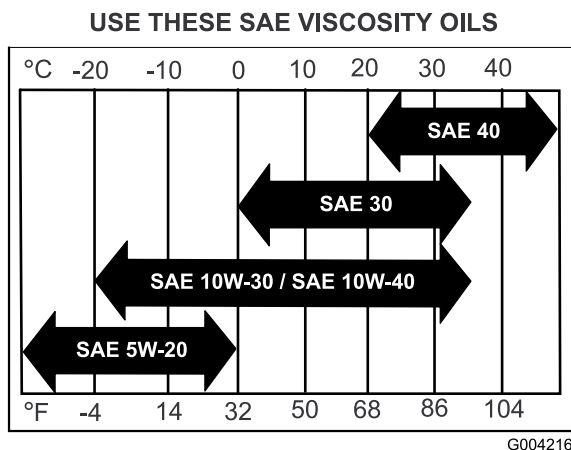


Figure 28

### Checking the Engine Oil Level

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

1. Park the machine on a level surface.
2. Disengage the PTO, turn the ignition key to off, and remove the key.
3. Wait for all moving parts to stop before leaving the operating position and then chock or block tires.
4. Clean around the oil dipstick (Figure 29) so that dirt cannot fall into the filler hole and damage the engine.

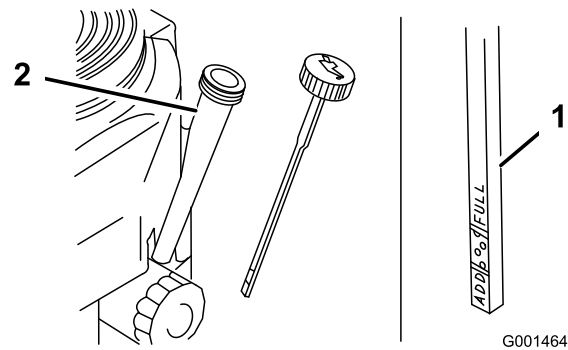


Figure 29

1. Oil dipstick
2. Filler tube

5. Unscrew the oil dipstick and wipe the end clean (Figure 29).
6. Slide the oil dipstick fully into the filler tube, but do not thread onto tube (Figure 29).
7. Pull the dipstick out and look at the metal end. If the oil level is low, slowly pour only enough oil into the filler tube to raise the level to the Full mark.

**Important:** Do not overfill the crankcase with oil and run the engine; engine damage can result.

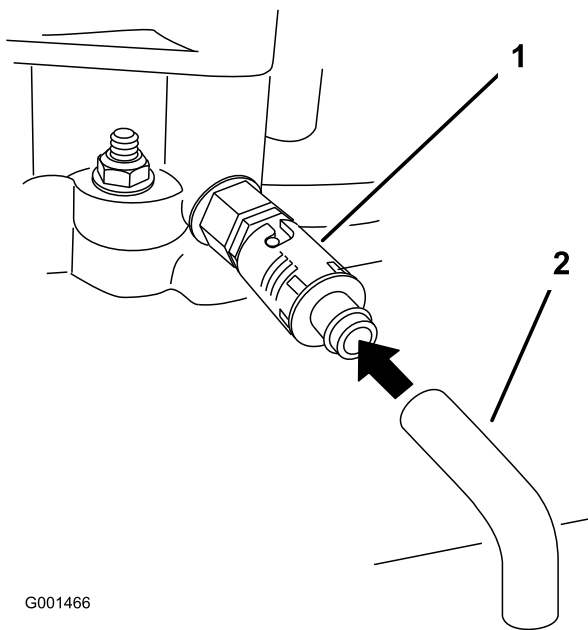
### Changing the Oil

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

Every 100 hours

1. Start the engine and let it run five minutes. This warms the oil so it drains better.
2. Park the machine so that the drain side is slightly lower than the opposite side to assure the oil drains completely.
3. Disengage the PTO 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. Slide the drain hose over the oil drain valve.
6. Place a pan below the drain hose. Rotate oil drain valve to allow oil to drain (Figure 30).
7. When oil has drained completely, close the drain valve.
8. Remove the drain hose (Figure 30).

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



G001466

**Figure 30**

1. Oil drain valve                      2. Oil drain hose

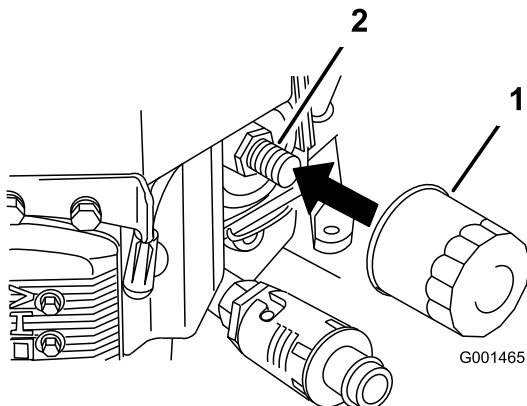
9. Slowly pour approximately 80% of the specified oil into the filler tube (Figure 29).
10. Check the oil level; refer to Checking the Engine Oil Level.
11. Slowly add the additional oil to bring it to the **Full** mark.

## Changing the Oil Filter

**Service Interval:** Every 200 hours

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

1. Drain the oil from the engine; refer to Changing the Engine Oil.
2. Remove the old filter (Figure 31).



G001465

**Figure 31**

1. Oil filter                      2. Adapter

3. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Figure 31).
4. Install the replacement oil filter to the filter adapter, turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 3/4 turn (Figure 31).
5. Fill the crankcase with the proper type of new oil; refer to Servicing the Engine Oil.
6. Run the engine for about 3 minutes, stop the engine, and check for oil leaks around the oil filter.
7. Check the engine oil level and add oil if needed.

## Servicing the Spark Plugs

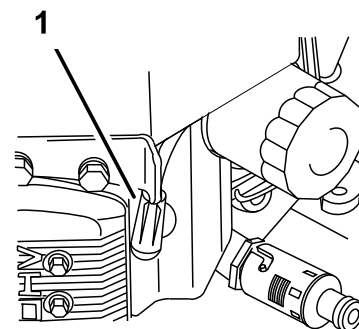
### Service Interval/Specification

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

**Type:** Champion® RCJ8Y or equivalent Air Gap: 0.030 inch (0.75 mm)

### Removing the Spark Plugs

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Disconnect the wires from the spark plugs (Figure 32).



G001694

**Figure 32**

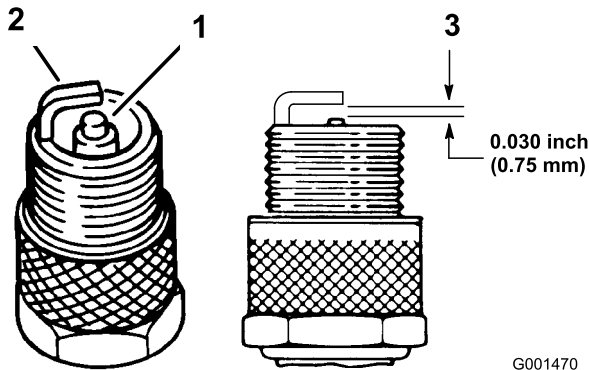
1. Spark-plug wire/spark plug

4. Clean around the spark plugs to prevent dirt from falling into the engine and potentially causing damage.
5. Remove the spark plugs and the metal washers.

## Checking the Spark Plugs

**Service Interval:** Every 100 hours

1. Look at the center of the spark plugs (Figure 33). If you see light brown or gray on the insulator, the engine is operating properly. A black coating on the insulator usually means that the air cleaner is dirty.
2. If needed, clean the spark plug with a wire brush to remove carbon deposits.



**Figure 33**

1. Center electrode insulator    3. Air gap (not to scale)  
2. Side electrode

**Important:** Always replace the spark plugs when it has a black coating, worn electrodes, an oily film, or cracks.

3. Check the gap between the center and side electrodes (Figure 33). Bend the side electrode (Figure 33) if the gap is not correct.

## Installing the Spark Plugs

1. Install the spark plugs and the metal washer. Ensure that the air gap is set correctly.
2. Tighten the spark plugs to 16 ft-lb (22 N·m).
3. Connect the wires to the spark plugs (Figure 33).

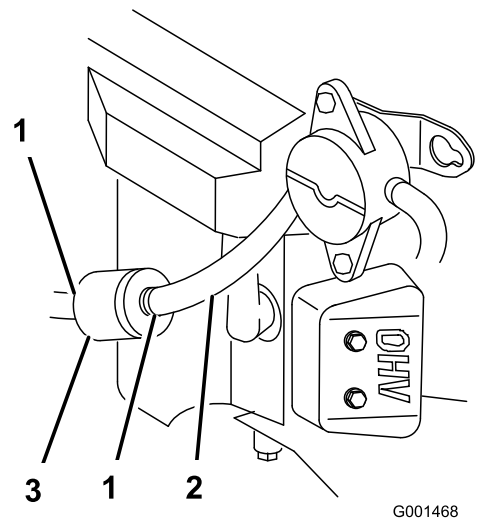
## Fuel System Maintenance

### Replacing the Fuel Filter

**Service Interval:** Every 200 hours—Replace the fuel filter

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

1. Disengage the PTO, move the motion control levers to the neutral locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Allow the machine to cool down.
4. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
5. Close the fuel shutoff valve (Figure 34).



**Figure 34**

1. Hose clamp                      3. Filter  
2. Fuel line

6. Squeeze the ends of the hose clamps together and slide them away from the filter (Figure 34).
7. Remove the filter from the fuel lines.
8. Install a new filter and move the hose clamps close to the filter (Figure 34).
9. Open the fuel shutoff valve.

## Servicing the Fuel Tank



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

- Drain gasoline from the fuel tank when the engine is cold. Do this outdoors in an open area. Wipe up any gasoline that spills.
- Never smoke when draining gasoline, and stay away from an open flame or where a spark may ignite the gasoline fumes.

1. Park the machine on a level surface to ensure that the fuel tanks drain completely.
2. Disengage the power takeoff (PTO), set the parking brake, stop the engine, and remove the key.
3. Close the fuel shutoff valve (Figure 34).
4. Loosen the hose clamp at the fuel filter and slide it up the fuel line away from the fuel filter (Figure 34).
5. Disconnect the fuel line from the fuel filter (Figure 34).
6. Open the fuel shutoff valve.

**Note:** Allow gasoline to drain into a fuel container can or drain pan (Figure 34).

**Note:** Now is the best time to install a new fuel filter because the fuel tank is empty.

7. Install the fuel line onto the fuel filter. Slide the hose clamp close to the fuel filter to secure the fuel line (Figure 34).

## 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.

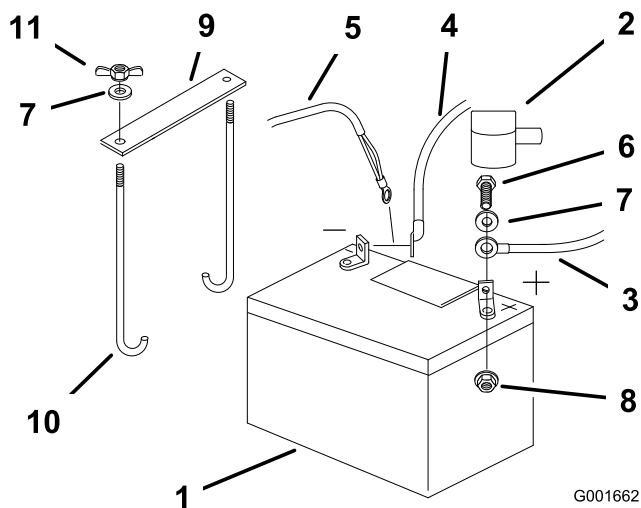
- When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine.
- Do not allow metal tools to short between the battery terminals and metal parts of the machine.



**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 and ground wire from the negative (-) battery terminal (Figure 35).
5. Slide the red terminal boot off the positive (red) battery terminal. Then remove the positive (red) battery cable (Figure 35).



**Figure 35**

- |                           |                        |
|---------------------------|------------------------|
| 1. Battery                | 7. Washer (1/4 inch)   |
| 2. Terminal boot          | 8. Locknut (1/4 inch)  |
| 3. Positive battery cable | 9. Battery clamp       |
| 4. Negative battery cable | 10. J-bolts            |
| 5. Ground wire            | 11. Wingnut (1/4 inch) |
| 6. Bolt (1/4 x 3/4 inch)  |                        |

6. Remove both wing nuts (1/4 inch) securing the battery clamp (Figure 35).

7. Remove the battery.

## Installing the Battery

1. Position battery in the tray with the terminal posts toward the engine (Figure 35).
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 35).
5. Slide the red terminal boot onto the positive (red) battery post.
6. Secure battery with J-bolts, hold down clamp and 2 washers (1/4 inch), and 2 wing nuts (1/4 inch) (Figure 35).

## Charging the Battery

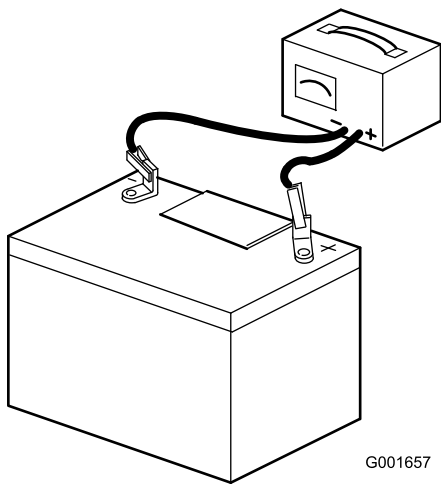


**Charging the battery produces gasses that can explode.**

**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. Charge battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 4-6 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 36).



**Figure 36**

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

3. Install the battery in the machine and connect the battery cables; refer to Installing the Battery.

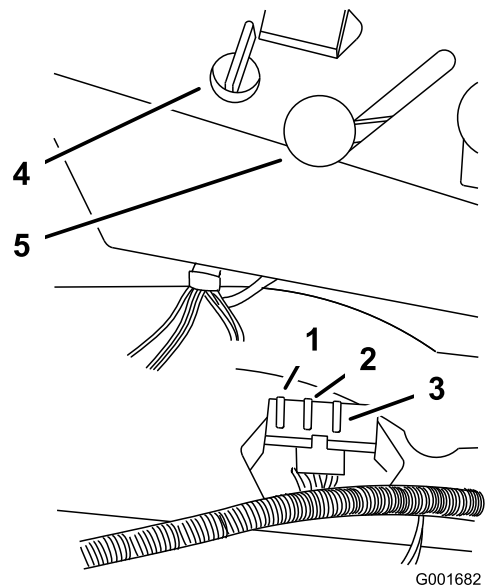
**Note:** Do not run the machine with the battery disconnected, electrical damage may occur.

## 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.

Fuse:

- Main, F1-30 amp, blade-type
  - Charge circuit, F2-25 amp, blade-type
  - Optional head light kit, 10 amp, blade-type
1. Raise the seat to gain access to the fuse holder (Figure 37).
  2. To replace the fuses, pull out on the fuse to remove it.
  3. Install a new fuse (Figure 37).



**Figure 37**

- |  |                    |
|--|--------------------|
| 1. Main, 30 amp                        | 4. Ignition switch |
| 2. Charge circuit, 25 amp              | 5. Throttle lever  |
| 3. For optional head light kit, 10 amp |                    |

# Drive System Maintenance

## Adjusting the Tracking

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

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 , page 38 and Adjusting the Hydraulic Pump Neutral in Hydraulic System Maintenance , page 39.

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.
4. To make the machine go right, turn the knob towards the right-side of the machine. Refer to Figure 38.
5. To make the machine go left, turn the knob towards the left-side of the machine. Refer to Figure 38.
6. Repeat adjustment until the tracking is correct.

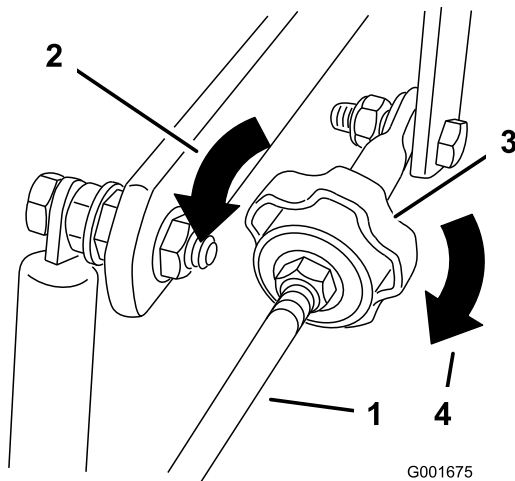
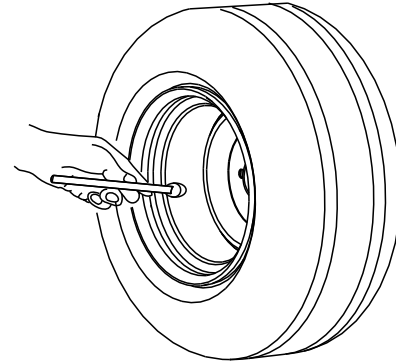


Figure 38

- |                                |                                 |
|--------------------------------|---------------------------------|
| 1. Pump rod                    | 3. Tracking knob                |
| 2. Turn this way to track left | 4. Turn this way to track right |

Check the pressure at the valve stem (Figure 39).

Maintain the air pressure in the front and 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.



G001055

Figure 39

## Checking the Wheel Hub Slotted Nut

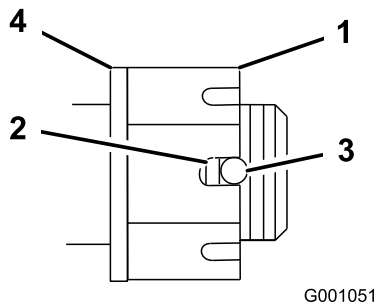
**Service Interval:** Every 100 hours

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 40).

## Checking the Tire Pressure

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



G001051

**Figure 40**

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

5. Check the distance from bottom of slot in nut to inside edge of hole. Two threads or less should be showing (Figure 40).
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 40).
8. Tighten the nut until the next set of slots line up with the hole in the shaft (Figure 40).
9. Replace the cotter pin.

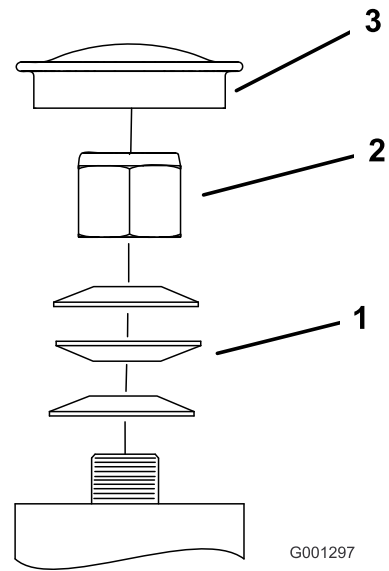
## Adjusting the Caster Pivot Bearing

**Service Interval:** Every 500 hours or at storage, whichever ever 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 41).
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 41).

**Important:** Make sure spring washers are installed correctly as shown in Figure 41.

5. Install the dust cap (Figure 41).



G001297

**Figure 41**

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

# Cooling System Maintenance

## Cleaning the Air Intake Screen

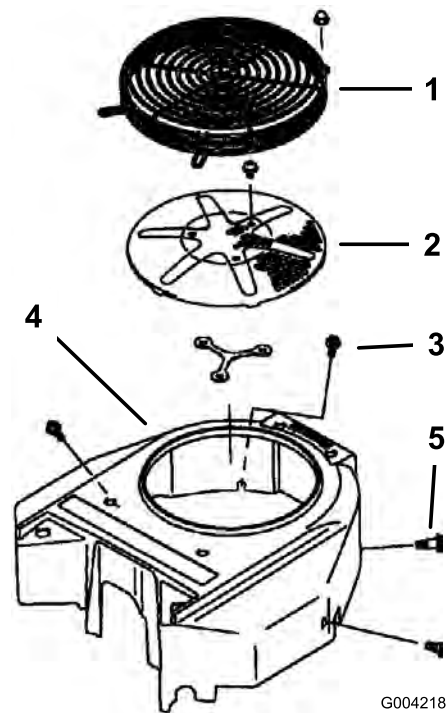
**Service Interval:** Before each use or daily—Clean the engine air intake screen from grass and debris.

Before each use remove any build-up of grass, dirt or other debris from the cylinder and cylinder head cooling fins, air intake screen on flywheel end, and carburetor-governor levers and linkage. This will help insure adequate cooling and correct engine speed and will reduce the possibility of overheating and mechanical damage to the engine.

## Cleaning the Cooling System

**Service Interval:** Every 100 hours/Yearly (whichever comes first)—Check and clean engine cooling fins and shrouds.

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the air intake screen, recoil starter and fan housing (Figure 42).
4. Clean the debris and grass from the engine parts.
5. Install air intake screen, recoil starter and fan housing (Figure 42).



**Figure 42**

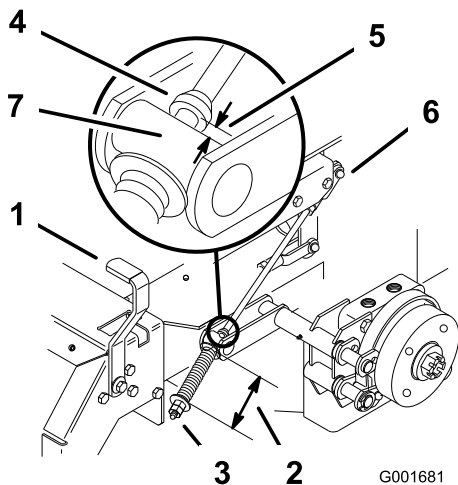
- |                      |                |
|----------------------|----------------|
| 1. Guard             | 4. Fan housing |
| 2. Air intake screen | 5. Bolt        |
| 3. Bolt              |                |

# Brake Maintenance

## Adjusting the Parking Brake

Check the parking brake for proper adjustment.

1. Disengage the brake lever (lever down).
2. Measure the length of the spring; the measurement should be 2-3/4 inch (74 mm) between the washers (Figure 43).



**Figure 43**

- |                               |                                 |
|-------------------------------|---------------------------------|
| 1. Brake lever                | 5. 3/16 to 1/4 inch (5 to 7 mm) |
| 2. Spring, 2-3/4 inch (74 mm) | 6. Jam nut and yoke             |
| 3. Adjusting nuts             | 7. Trunnion                     |
| 4. Collar on brake rod        |                                 |

3. If an adjustment is necessary, do the following:
  - A. Loosen the jam nut below the spring and tighten the nut directly below the yoke (Figure 43).
  - B. Turn the nut until you obtain the correct measurement.
  - C. Tighten the 2 nuts together and repeat on the opposite side of the machine.
4. Turn the nuts clockwise to shorten the spring length; counterclockwise to lengthen the spring.
5. Engage the parking brake, with the lever up.
6. Measure the distance between the trunnion roller and the collar on the brake rod. The measurement should be 3/16 to 1/4 inch (5 to 7 mm) (Figure 43).
7. If an adjustment is necessary, do the following:
  - A. Loosen the jam nut directly below the yoke.
  - B. Turn the bottom adjusting nuts until the correct measurement is obtained (Figure 43).
  - C. Tighten the jam nut at the yoke.

# Belt Maintenance

## Inspecting the Belts

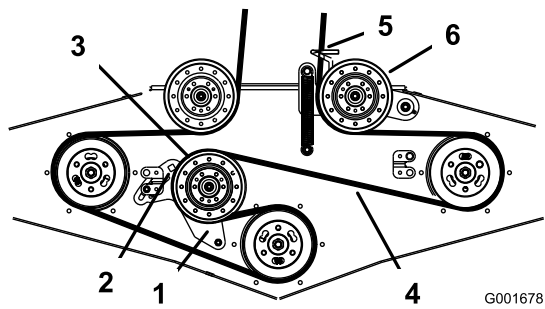
**Service Interval:** Every 100 hours

Check belts for cracks, frayed edges, burn marks or any other damage. Replace damaged belts.

## Replacing the Mower Belt

The signs of a worn mower belt are squealing while the belt is rotating, blades slipping while you are cutting grass, frayed belt edges, burn marks, and cracks. Replace the mower belt if you detect any of these signs.

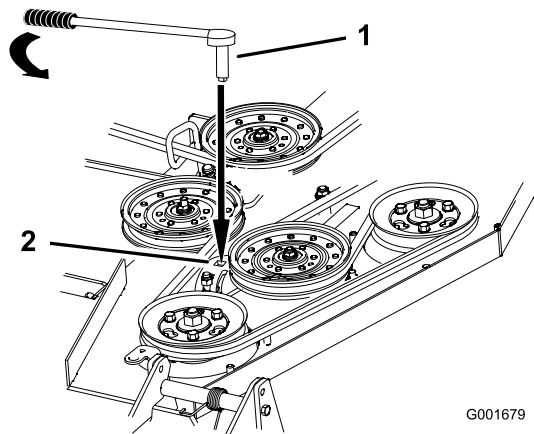
1. Disengage the PTO, move the motion control levers to the neutral locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the belt covers over the outside spindles.
4. Loosen the fixed idler arm and adjust it to relieve the belt tension on the fixed idler pulley (Figure 44).



**Figure 44**

- |                       |                               |
|-----------------------|-------------------------------|
| 1. Fixed idler arm    | 4. Mower belt                 |
| 2. Square hole        | 5. Belt guide                 |
| 3. Fixed Idler pulley | 6. Spring-loaded idler pulley |

- Remove the old belt.
- Install the new belt through the belt guide and on the pulleys (Figure 44).
- Insert a ratchet with a short extension or a breaker bar into the square hole in the fixed idler arm (Figure 45).



**Figure 45**

- |  |                |
|--|----------------|
| 1. Ratchet with short extension or breaker bar | 2. Square hole |
|--|----------------|

- To increase the belt tension, rotate the ratchet or breaker bar counterclockwise to move the fixed idler arm until you feel increased resistance and the spring-loaded idler pulley stops moving.

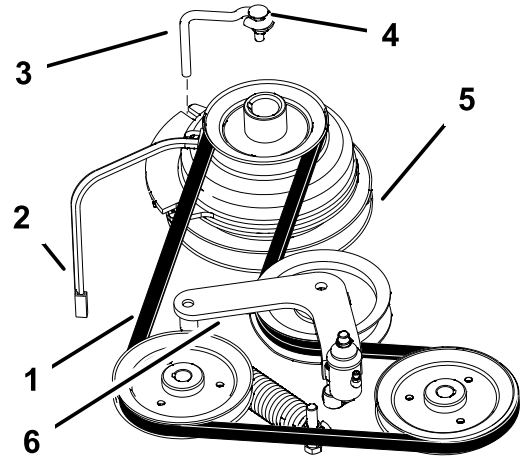
**Note:** Do not increase the belt tension beyond the point where the fixed idler arm stops.

- While holding the belt in tension, tighten the 2 bolts that secure the fixed idler arm.
- Remove the ratchet or breaker bar from the square hole in the fixed idler arm.
- Install the belt covers over the outside spindles.

## Replacing the Pump Drive Belt

**Service Interval:** Every 50 hours

- Remove the mower belt first; refer to Replacing the Mower Belt.
- Remove the bolt from the clutch stop and unplug the clutch electrical wire (Figure 46).
- Pull the spring loaded idler to the side.
- Remove the traction belt from the engine and the hydraulic pump pulleys (Figure 46).
- Install the new belt around the engine and the hydraulic pump pulleys (Figure 46).
- Pull the spring-loaded idler to the side and align the belt.
- Release the pressure on the spring loaded idler (Figure 46).
- Install the mower belt.



**Figure 46**

- |                           |           |
|---------------------------|-----------|
| 1. Belt                   | 4. Bolt   |
| 2. Clutch electrical wire | 5. Clutch |
| 3. Clutch stop            | 6. Idler  |

## Adjusting the Push Arms

If needed, adjust the push arms to increase or decrease the mower belt tension.

- Loosen the jam nut and rotate the ball joint counterclockwise, one turn at a time (Figure 47).

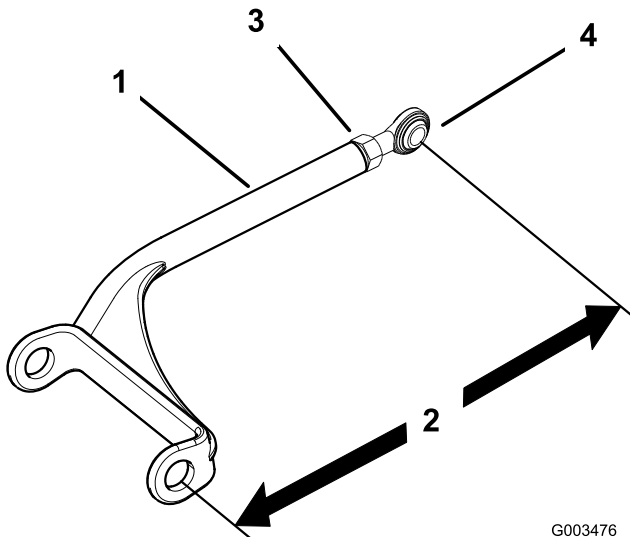
# Controls System Maintenance

## Adjusting the Control Handle Neutral Position

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

**Note:** The motion control levers must be installed correctly. See Installing the Motion Control Levers in the *Setup 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. Tilt the seat forward.
4. Begin with either the left or right motion control lever.
5. Move lever to the neutral position but not locked (Figure 48).

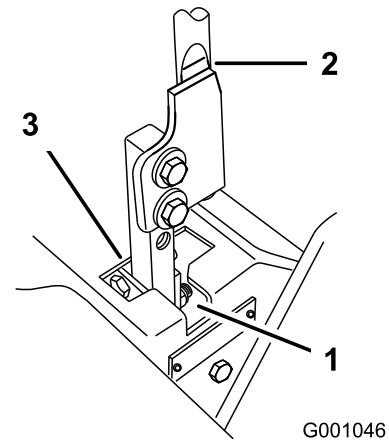


**Figure 47**

- |                         |               |
|-------------------------|---------------|
| 1. Push arm             | 3. Jam nut    |
| 2. 15-1/8 inch (384 mm) | 4. Ball joint |

2. Adjust each side the same amount. Each push arm should have a length of 15-1/8 inch (384 mm) (Figure 47).

**Note:** Increase the tension by lengthening the push arms; decrease the tension by shortening the push arms.



**Figure 48**

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

6. Pull the lever back until the clevis pin (on the arm below the pivot shaft) contacts the end of the slot (just beginning to put pressure on the spring) (Figure 49).

# 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.

**Hydraulic System Oil Capacity:** 67 ounces (2.0 l)

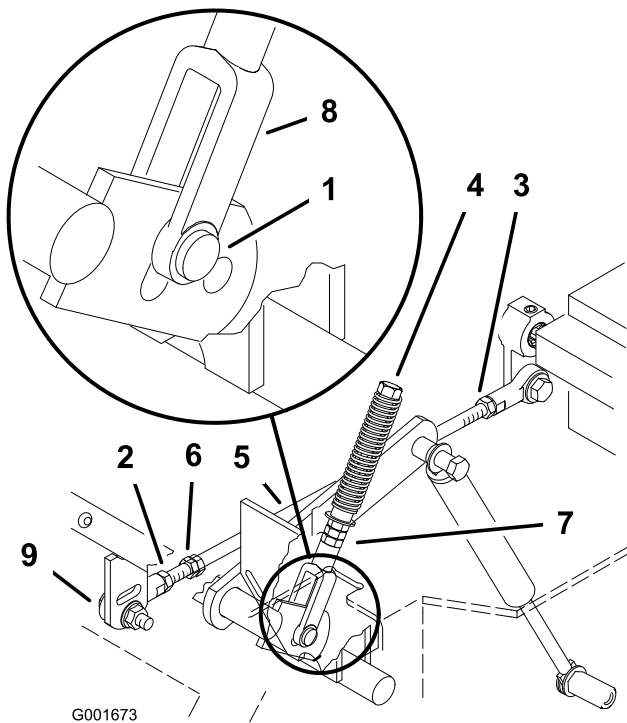
**Important:** Use oil specified or equivalent. Other fluids could cause system damage.

**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 50).
3. Remove the cap from the filler neck. Look inside to check if there is fluid in the reservoir (Figure 50).
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 Operation , page 12.
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.

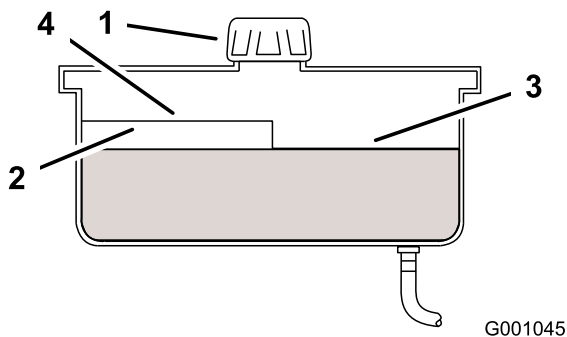
**Note:** The fluid level should be to the top of the hot level of the baffle, when the fluid is hot (Figure 50).

8. Install the cap on filler neck.



**Figure 49**

- |                         |                |
|-------------------------|----------------|
| 1. Clevis pin in slot   | 6. Double nuts |
| 2. Nut                  | 7. Jam nut     |
| 3. Nut-Left hand thread | 8. Yoke        |
| 4. Adjustment bolt      | 9. Ball joint  |
| 5. Pump rod             |                |
7. Check where the control lever is relative to the notch in the console (Figure 48). It should be centered, allowing the lever to pivot outward to the neutral lock position.
  8. If adjustment is needed, loosen the nut and jam nut against the yoke (Figure 49).
  9. Apply slight rearward pressure on the motion control lever, and turn the head of the adjustment bolt in the appropriate direction until the control lever is centered in the neutral lock position.
- 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 49).
  11. Repeat on the opposite side of machine.



**Figure 50**

- |           |                          |
|-----------|--------------------------|
| 1. Cap    | 3. Cold fluid level-full |
| 2. Baffle | 4. Hot 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 Hydraulic 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)

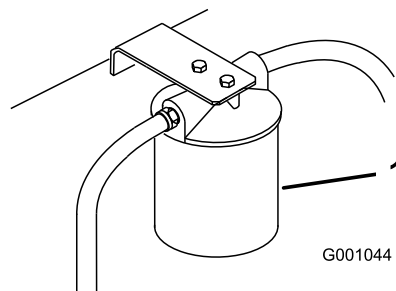
Use winter filter below 32°F (0°C)

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.

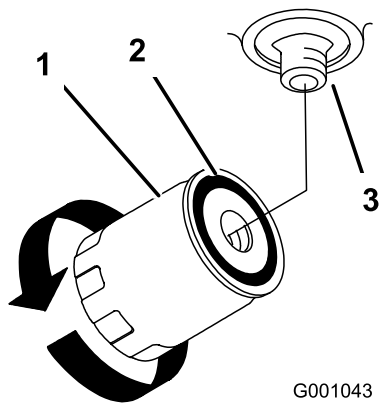
3. Place a drain pan under filter, remove the old filter and wipe the filter adapter gasket surface clean (Figure 51).



**Figure 51**

1. Hydraulic filter

4. Apply a thin coat to the rubber gasket on the replacement filter (Figure 52).
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 52).
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 52**

1. Hydraulic filter
2. Gasket
3. Adapter

## 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 the 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.

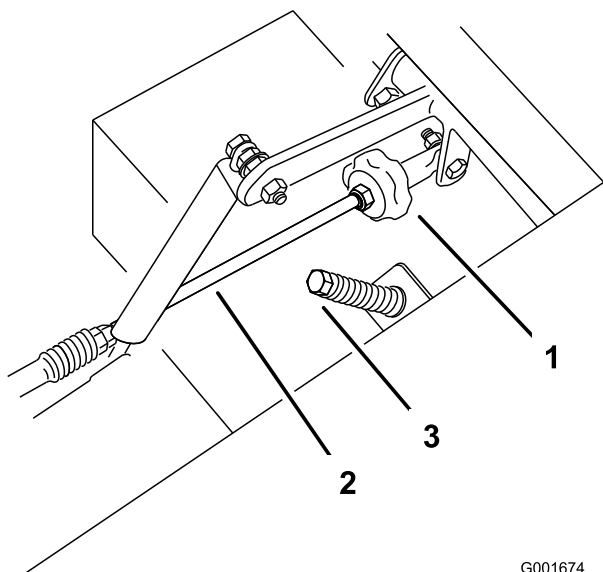
1. Raise the frame and block up the machine so drive wheels can rotate freely.
2. Disconnect the electrical connector from the seat safety switch. **Temporarily** install a jumper wire across terminals in the wiring harness connector.
3. Unlatch the seat and slide seat forward.
4. Disconnect the seat 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 , page 12.

**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 53).
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.



**Figure 53**

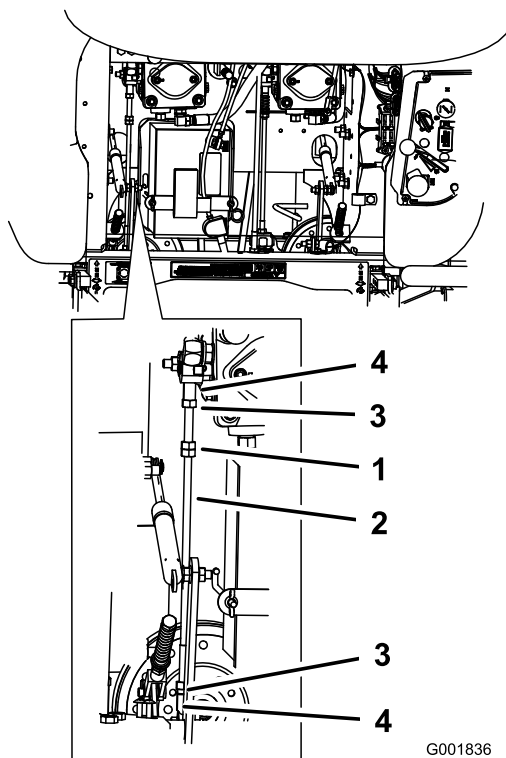
- |                  |                    |
|------------------|--------------------|
| 1. Tracking knob | 3. Adjustment bolt |
| 2. Pump rod      |                    |

2. Start the engine, open throttle 1/2 way and release parking brake. Refer to Starting and Stopping the Engine in Operation , page 12.

**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 the rod, in the appropriate direction, until the wheel is still or slightly creeps in reverse (Figure 54).
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 54).



**Figure 54**

- |                |               |
|----------------|---------------|
| 1. Double nuts | 3. Locknut    |
| 2. Pump rod    | 4. Ball joint |

## Setting the Right-hand Hydraulic Pump Neutral Position

1. Loosen the locknuts at the ball joints on the pump control rod (Figure 54).



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.

#### Preparing the Machine

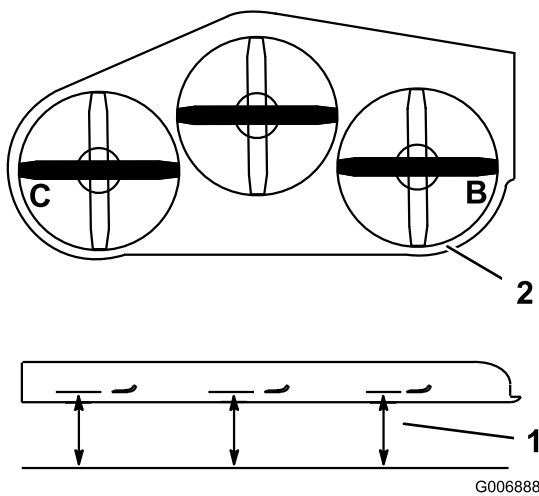
1. Position mower on a flat surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Check tire pressure of all four tires. 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.

**Note:** Adjust the rear chains to the top of the slot, where they are attached to the mower.

- 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 front-to-rear (Figure 55).
2. Measure the right blade at the **B** location, from a level surface to the cutting edge of the blade tip (Figure 55).
3. Record this measurement. This measurement needs to be 3-1/8 to 3-1/4 inches.
4. Position the left blade front-to-rear (Figure 55).
5. Measure the left blade at the **C** location (Figure 55), 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 (79 to 83mm).



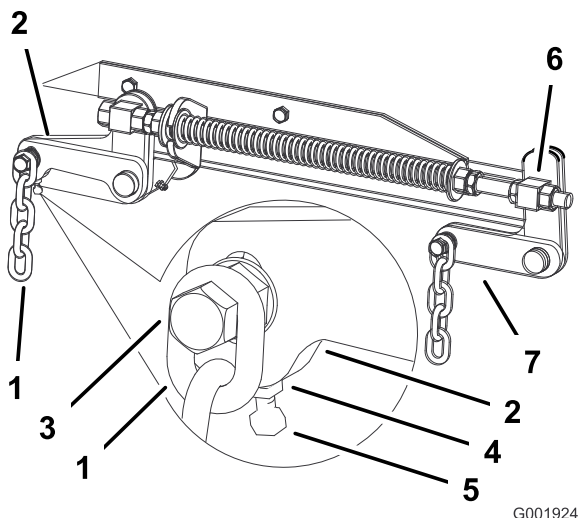
**Figure 55**

1. Measure here from blade to hard surface
2. Measure at B and C

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 56).
8. 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 (Figure 56).

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

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

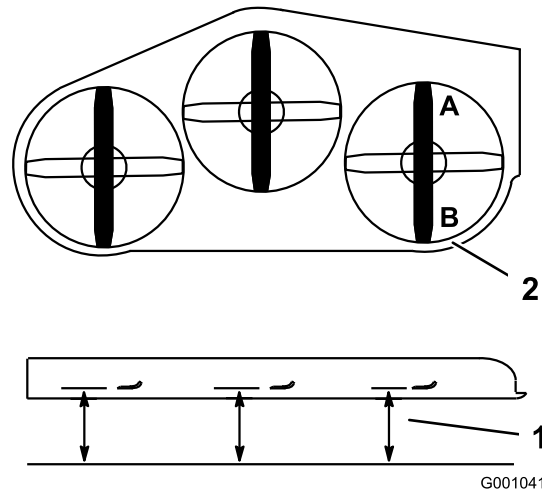


**Figure 56**

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

## Adjusting the Front-to-Rear Mower Pitch

1. Position the right blade front-to-rear (Figure 57).
2. Measure the right blade at the **A** location, from a level surface to the cutting edge of the blade tip (Figure 57).



**Figure 57**

1. Measure here from blade to hard surface
2. Measure at A and B

3. Record this measurement.
4. Measure the right blade at the **B** location, from a level surface to the cutting edge of the blade tip (Figure 57).
5. Record this measurement.
6. 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 57). 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.

7. Loosen the front swivel jam nuts, at the front of the right and left swivels, approximately a 1/2 inch (13 mm) (Figure 56).
8. 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 56).
9. Tighten both swivel jam nuts against the front swivel to lock the height.
10. Check to make sure there is equal tension on the chains and adjust again if needed.

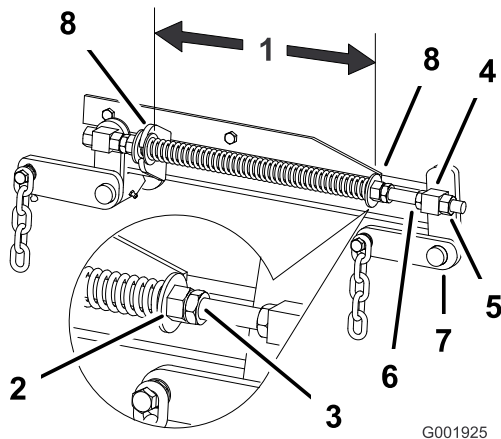
## Adjusting the Compression Spring

1. Raise the mower lift lever to the transport position.

2. Check the distance between the two large washers, it needs to be 11-1/8 inches (28.2 cm) for 52 inch mower decks and 10-1/2 inches (26.7 cm) for 60 inch mower decks (Figure 58).
3. Adjust this distance, by loosening the spring jam nut and turning the nut in front of each spring (Figure 58).

**Note:** Turning the nut clockwise will shorten the spring; counter-clockwise will lengthen the spring.

4. Lock the nut into position by tightening the spring jam nut (Figure 58).



**Figure 58**

- |  |                      |
|--|----------------------|
| 1. 10-1/2 inch (26.7 cm) for 60in mower decks and 11.125 inch (28.2 cm) for 52in mower decks | 5. Swivel jam nut    |
| 2. Front nut   | 6. Lift nut          |
| 3. Spring jam nut  | 7. Front support arm |
| 4. Front swivel  | 8. 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.

Inspect and check the blades every 8 hours.

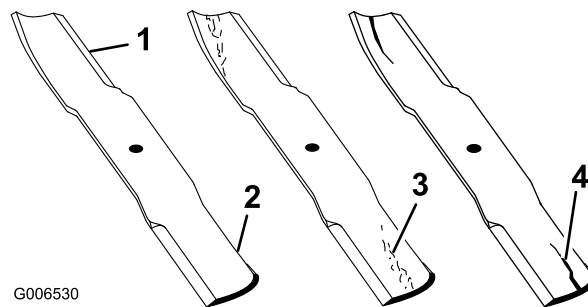
## Before Inspecting or Servicing the Blades

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 59). 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 59). If you notice any damage, wear, or a slot forming in this area (Figure 59), immediately install a new blade.



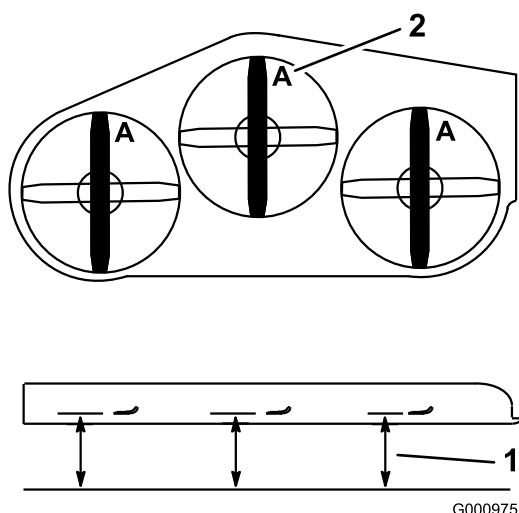
**Figure 59**

- |                 |                      |
|-----------------|----------------------|
| 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 60). Measure from a level surface

to the cutting edge, position **A**, of the blades (Figure 60). Note this dimension.



**Figure 60**

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 nonconformance 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 63).

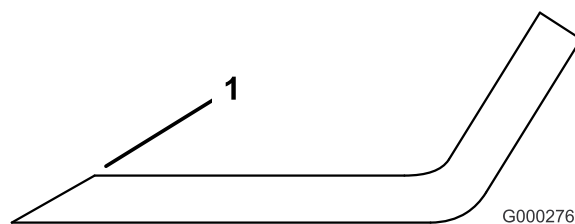
## Sharpening the Blades



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

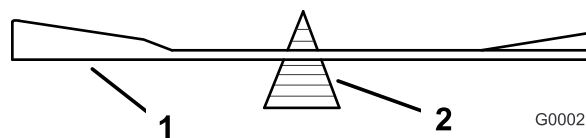
**Wear proper eye protection when sharpening blade.**

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 61). Maintain the original angle. The blade retains its balance if the same amount of material is removed from both cutting edges.



**Figure 61**

1. Sharpen at original angle
2. Check the balance of the blade by putting it on a blade balancer (Figure 62). 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 63). Repeat this procedure until the blade is balanced.



**Figure 62**

1. Blade
2. Balancer

## Installing the Blades

1. Install the blade onto the spindle shaft (Figure 63).

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

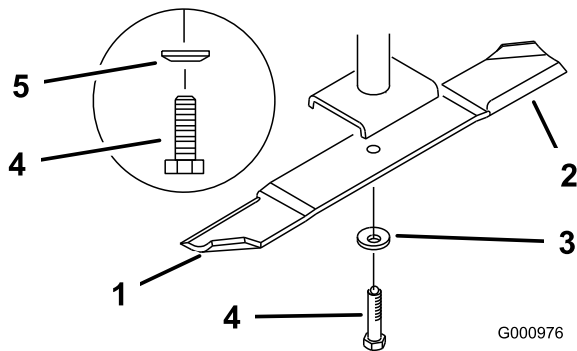
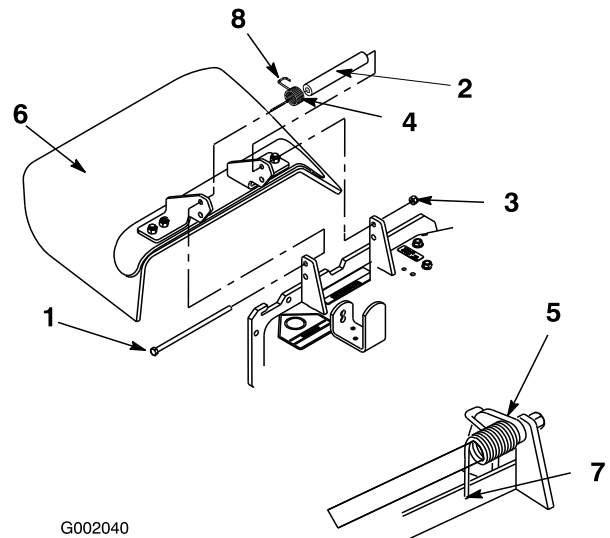


Figure 63

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

**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.



G002040

Figure 64

- |            |   |
|------------|---|
| 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   |

## 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 64). 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 64.

3. Install the bolt and nut. Place the **J** hook end of the spring around the grass deflector (Figure 64).

# 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. Lift the front of the machine and support the machine using jack stands.

## 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

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 Brake Maintenance , page 36.
4. Service the air cleaner; refer to Servicing the Air Cleaner in Engine Maintenance , page 26.
5. Grease the machine; refer to Greasing and Lubrication in Lubrication , page 24.
6. Change the crankcase oil; refer to Servicing the Engine Oil in Engine Maintenance , page 26.
7. Check the tire pressure; refer to Checking the Tire Pressure in Drive System Maintenance , page 33.
8. Change the hydraulic filter; refer to Servicing the Hydraulic System in Hydraulic System Maintenance , page 39.
9. Charge the battery; refer to Servicing the Battery in Electrical System Maintenance , page 30.
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 *Mower Deck Maintenance*, page 43.
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 Fuel System Maintenance , page 29.
- 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.**

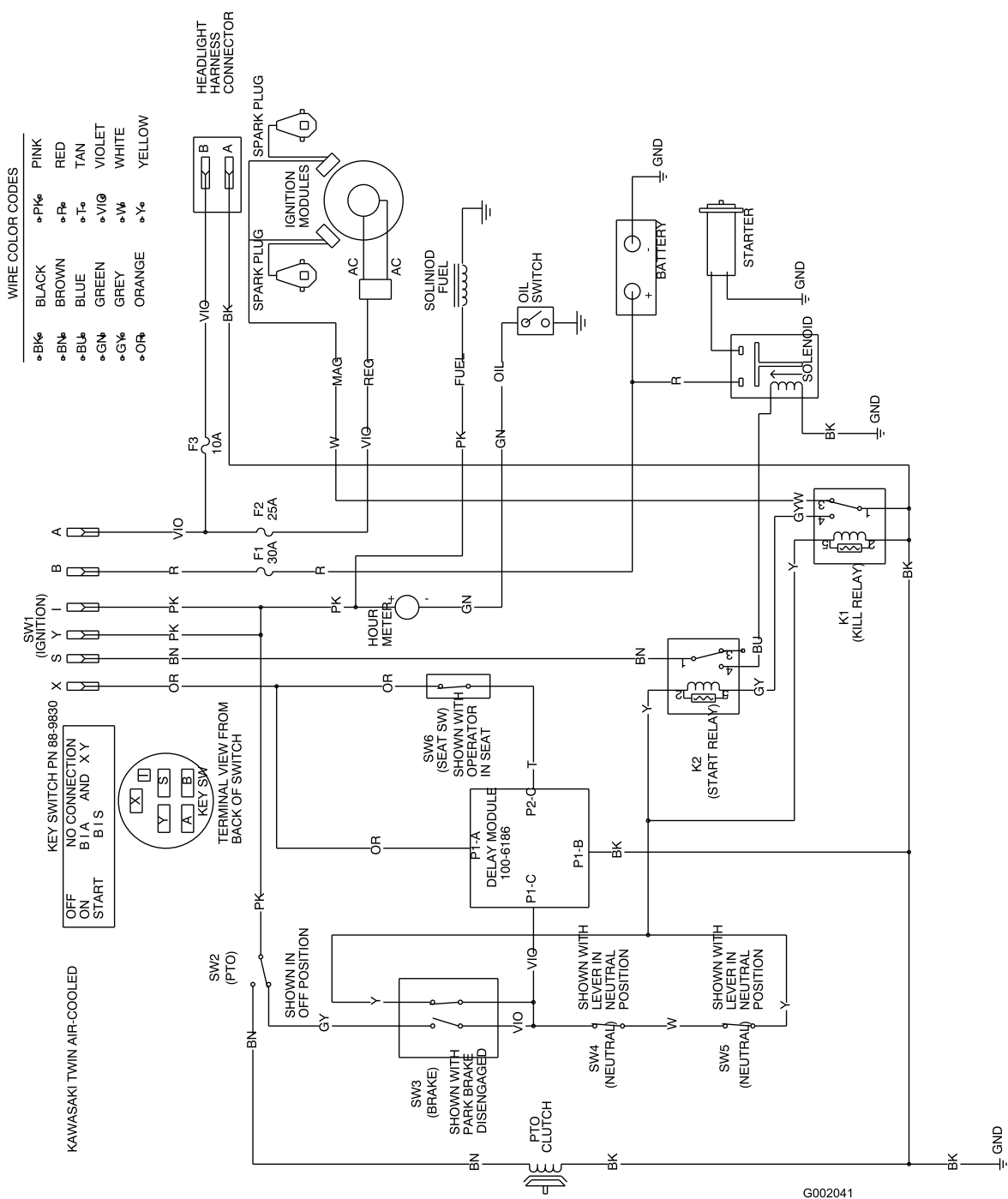
- 13. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
- 14. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
- 15. Store the machine in a clean, dry garage or storage area. Remove the key from the ignition switch 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 control (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 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



Wire Diagram (Rev. A)

**Notes:**

**Notes:**

**Notes:**



Landscape  
Contractor  
Equipment (LCE)

## The Toro Total Coverage Guarantee

### A Limited Warranty

#### 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 time periods apply from the date of purchase:

This warranty applies to:

- ProLine Mid-Size Mowers and Attachments 1 year
- Z Master Mid-Mount ZRTs and Attachments 1 year

Components	Warranty Period
Traction Unit Frame and Carrier Frame	2 year
All Spindles	3 years Parts 2 years Labor
Engines* and /Hydraulic System	2 years
Deck Shells (34 <sup>2</sup> -72 <sup>2</sup> )	2 years
Z500 Series Electric Clutch	2 years
Remaining Components	1 year

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

- Contact any Toro Authorized or Master Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, access our website at [www.Toro.com](http://www.Toro.com). You may also call our Toro Customer Care Department toll free at 888-865-5676 (U.S. Customers) or 888-865-5691 (Canada customers).
- Bring the product and your proof of purchase (sales receipt) to the Service Dealer.

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

#### Owner Responsibilities

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

#### Items and Conditions Not Covered

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

- 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.**

**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.**

**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.**

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

#### Countries Other than the United States or Canada

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