Form No. 3386-210 Rev B

TORO®

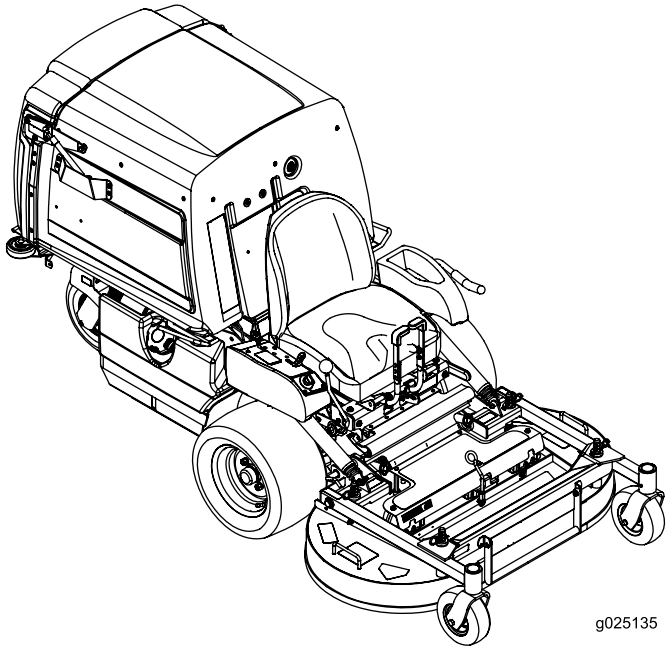
Count on it.

Operator's Manual

Z Master® 8000 Series Riding Mower

with 42in Direct-Collect Cutting Unit

Model No. 74310—Serial No. 314000001 and Up
Model No. 74311—Serial No. 314000001 and Up
Model No. 74312—Serial No. 314000001 and Up



g025135

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

3386-210 B

⚠ WARNING

CALIFORNIA
Proposition 65 Warning

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

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

This spark ignition system complies with Canadian ICES-002.

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

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

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

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

Introduction

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

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

You may contact Toro directly at www.Toro.com for product and accessory information, help finding a dealer, or to register your product.

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

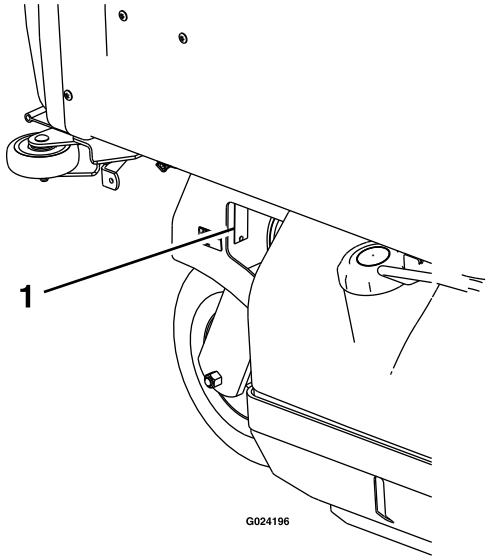


Figure 1

1. Model and serial number location

Model No. _____

Serial No. _____

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



Figure 2

1. Safety alert symbol

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

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Safety

This machine complies to the ANSI B71.4–2012 specification of the American National Standards Institute with the addition of the optional ROPS accessory.

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

Safe Operating Practices

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

Training

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

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. 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.
- Check that operator's presence controls, safety switches, and shields are attached and functioning properly. Do not operate unless they are functioning properly.

Operation

- Lightning can cause severe injury or death. If lightning is seen or thunder is heard in the area, do not operate the machine; seek shelter.
- 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 the engine. Only start the engine from the operator's position.
- Slow down and use extra care on hillsides. Be sure to travel side to side on hillsides. Turf conditions can affect the stability of the machine. Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes.
- Never raise deck with the blades running.
- Never operate with the PTO shield or other guards not securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not change the engine governor setting or overspeed the engine.
- Stop on level ground, disengage drives, engage the parking brake (if provided), and shut off the engine before leaving the operator's position for any reason, including emptying the hopper 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 unit.
- Look behind and down before backing up to be sure of a clear path.
- Never carry passengers on the machine.
- Keep pets and bystanders away.
- Slow down and use caution when making turns and 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 care when loading or unloading the machine into or from a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

Safe Handling of Fuels

- To avoid personal injury or property damage, use extreme care in handling gasoline. Gasoline is extremely flammable and the vapors are explosive.
- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container.
- Never remove fuel cap or add fuel with the engine running.
- Allow engine to cool before refueling.
- Never refuel the machine indoors.
- Never store the machine or fuel container where there is an open flame, spark, or pilot light such as on a water heater or on other appliances.
- Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before filling.
- Remove equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment with a portable container, rather than from a fuel dispenser nozzle.
- Keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.
- Do not use a nozzle lock open device.
- If fuel is spilled on clothing, change clothing immediately.
- Never overfill fuel tank. Replace fuel cap and tighten securely.

Maintenance and Storage

- Disengage drives, set the parking brake, stop the engine and remove the key or disconnect the spark-plug wire. Wait for all movement to stop before adjusting, cleaning or repairing the machine.
- Clean grass and debris from the cutting unit, the drives, the mufflers, and the engine to help prevent fires. Clean up oil or fuel spillage.
- Let the engine cool before storing and do not store near flame.
- Shut off the fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Park the machine on level ground. Set the parking brake. Never allow untrained personnel to service the machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect the battery or the spark-plug wire before making any repairs. Disconnect the negative terminal first and the positive last. Connect the positive first and negative last.
- Use care when checking the blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace blades. Never straighten or weld them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- To best protect your investment and maintain optimal performance of your Toro equipment, count on Toro genuine parts. When it comes to reliability, Toro delivers replacement parts designed to the exact engineering specifications of our equipment. For peace of mind, insist on Toro genuine parts.

Hauling

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

Slope Indicator

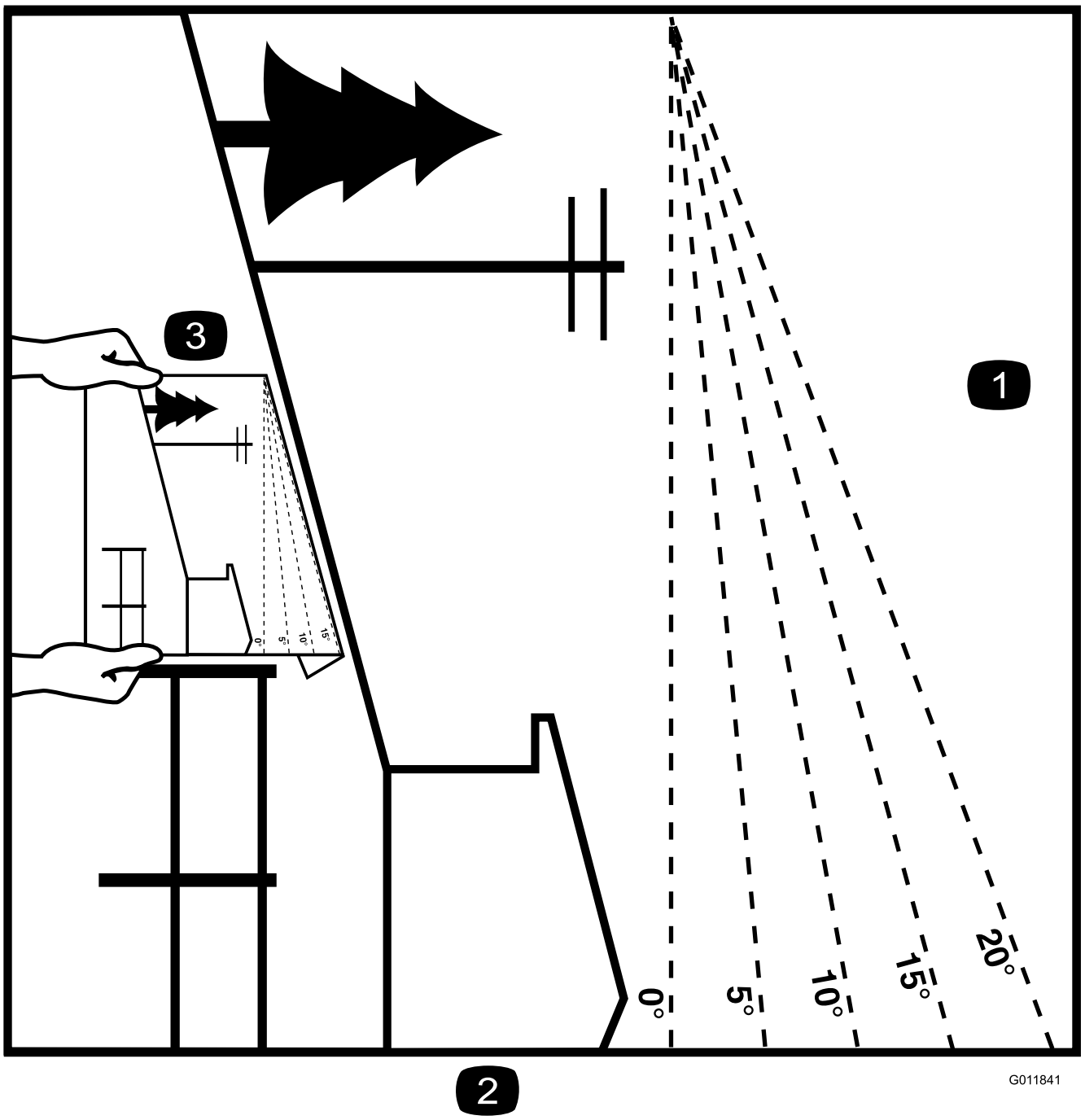


Figure 3

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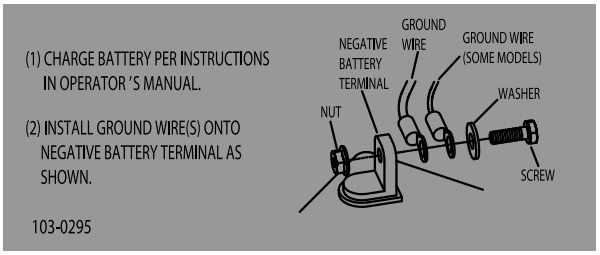
1. The maximum slope you can safely operate the machine on is **15 degrees**. Use the slope chart to determine the degree of slope of hills before operating. **Do not operate this machine on a slope greater than 15 degrees.** Fold along the appropriate line to match the recommended slope.
2. Align this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

Safety and Instructional Decals

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



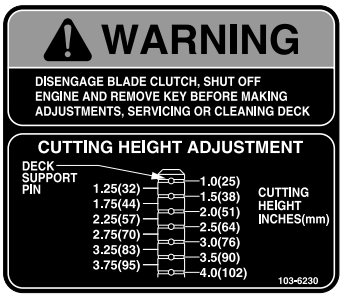
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103–0295



65-2690



103-6230



68-8340



103-8425



98-4361



103-8444



98-5954



103-8495



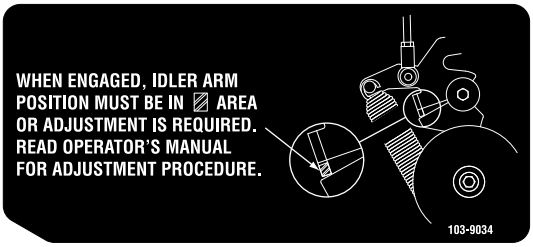
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103-8798



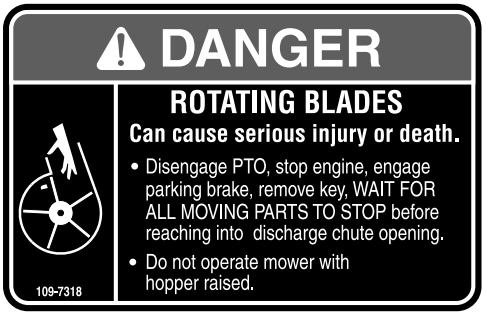
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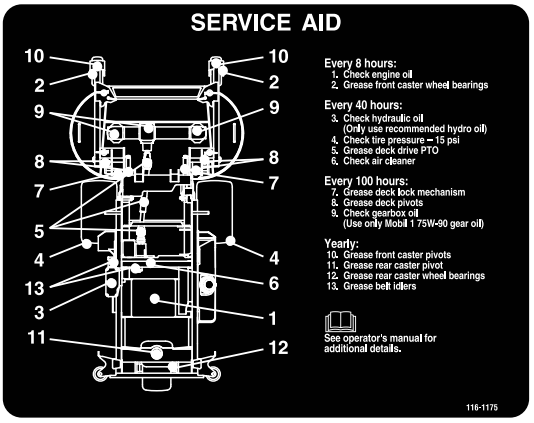


109-7318



115-4212

1. Hydraulic oil level
2. Read the *Operator's Manual*.
3. Warning—do not touch the hot surface.



116-1175



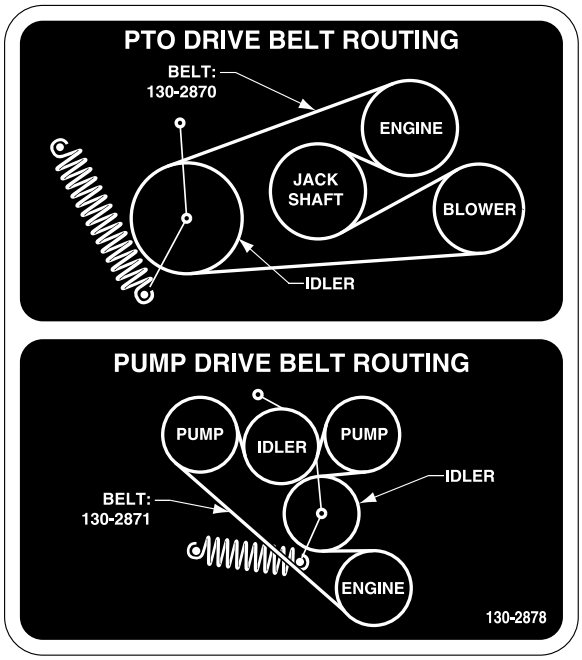
117–2718



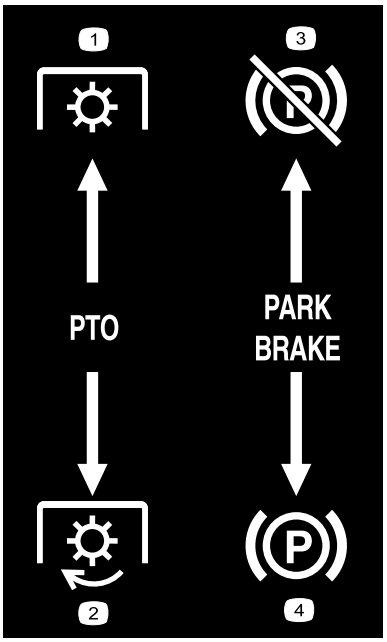
Battery Symbols

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.

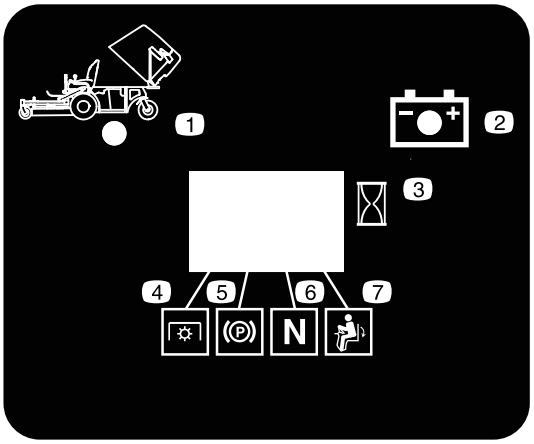


130-2878



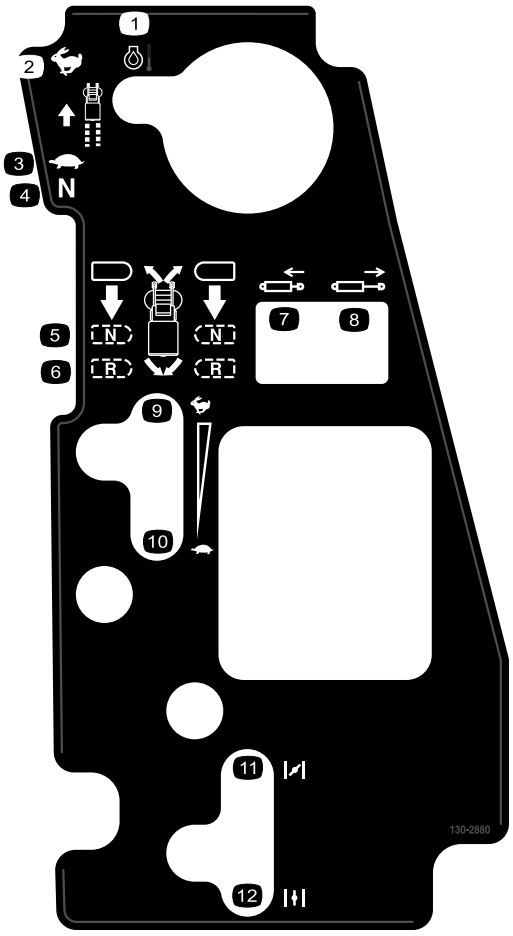
130–2889

1. Power take-off (PTO)—disengage
2. Power take-off (PTO)—engage
3. Release the parking brake
4. Engage the parking brake



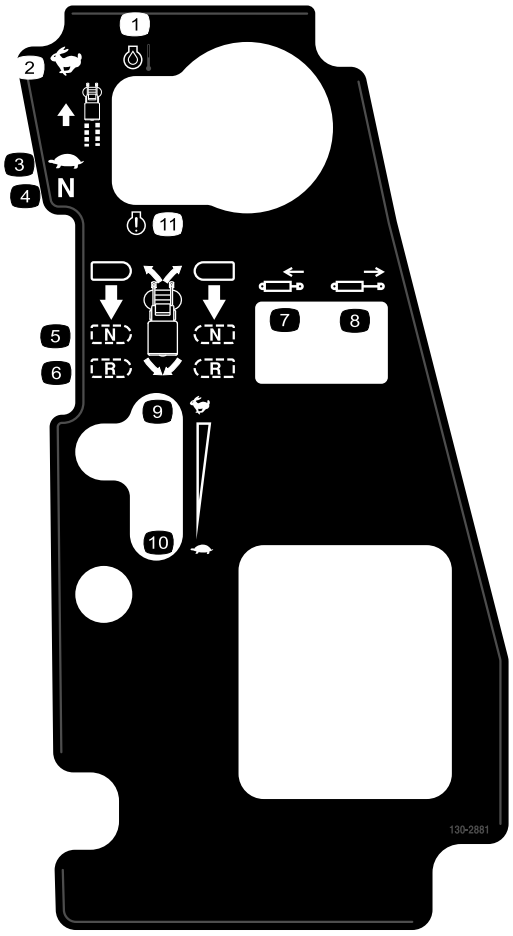
Message Display

1. Hopper up indicator
2. Battery
3. Hour meter
4. PTO
5. Parking brake
6. Neutral
7. Operator presence switch



130-2880

1. Engine temperature
2. Fast
3. Slow
4. Neutral
5. Neutral
6. Reverse
7. Retract the piston
8. Extend the piston
9. Fast
10. Slow
11. Choke—closed/on
12. Choke—open/off



130–2881

1. Engine temperature
2. Fast
3. Slow
4. Neutral
5. Neutral
6. Reverse
7. Retract the piston
8. Extend the piston
9. Fast
10. Slow
11. MIL toggle switch


DANGER
Greater than 15°
• Operating on wet grass or steep slopes can cause sliding and loss of control.
• Wheels dropping over edges can cause rollovers, which may result in serious injury,death or drowning.
• To avoid loss of control and possibility of rollover:
• Do NOT operate near drop-offs or near water.
• Do NOT operate on slopes greater than 15°.
• Reduce speed and use extreme caution on slopes.
• Avoid sudden turns or rapid speed changes.
• A rollbar is available and its use is recommended for areas where there are slopes, drop-offs or water.
• To avoid serious injury or death:
• Avoid blades unless engine and blades are stopped.
WARNING
• To avoid serious injury or death:
• Read and understand the operator's manual before using this machine.
• Do NOT operate unless trained to safely use this machine.
• Pick up objects that could be thrown by the blades.
• Do NOT mow when people and pets are in the area.
• Do NOT carry passengers.
• Do NOT operate under the influence of alcohol or drugs.
• Do NOT operate without shields, guards, and safety devices in place and working.
• Look behind and to the side before changing directions.
• Before leaving operator's position:
- Disengage PTO.
- Move speed control lever to neutral position.
- Engage park brake.
- Stop engine.
• Check the function of the operator presence controls (OPC) safety system daily. Do NOT defeat the OPC system.
• Stop engine and remove key before adjusting, servicing, or cleaning machine and attachments.
• Hearing protection is recommended.

103–8583

Product Overview

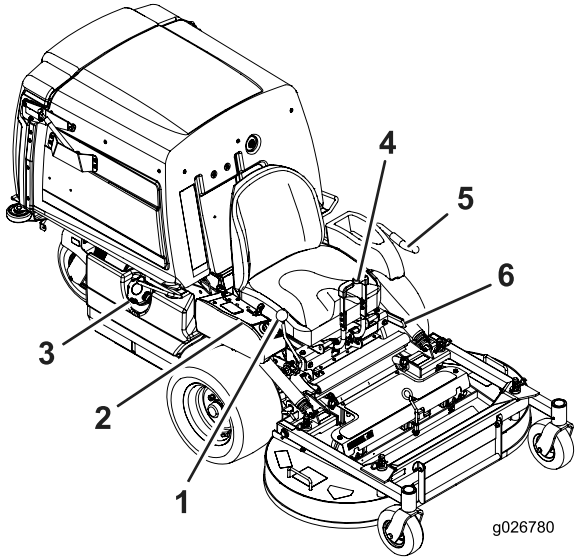


Figure 4

1. Speed control lever
2. Controls
3. Fuel cap
4. Motion contol levers
5. PTO engagement lever
6. Parking brake lever

Controls

Become familiar with all the controls before you start the engine and operate the machine (Figure 4 and Figure 5).

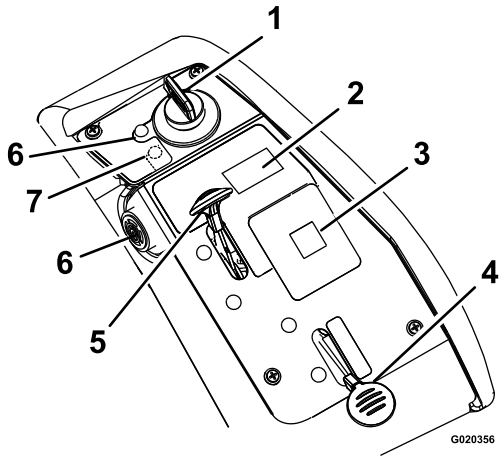


Figure 5

1. Ignition switch
2. Hopper switch
3. Message display
4. Choke (Not on EFI machines)
5. Throttle
6. Engine-oil temperature light and buzzer
7. Check engine light (EFI machines only)

Motion-control Levers

The motion-control levers are used to drive the machine forward, reverse, and turn either direction (Figure 4).

Speed-control Lever

The speed control lever sets maximum forward speed of the machine (Figure 4). Moving speed control lever rearward to the neutral position places the drive system into neutral.

Throttle Control

The throttle is used to control engine speed. The throttle control is variable between **Fast** and **Slow**.

Choke Control (Not on EFI machines)

The choke is used to aid in starting a cold engine. Move the choke to the closed/on position to start a cold engine.

Note: Do not run a warm engine with choke in the **on** position.

Brake Lever

The brake lever engages a parking brake on the drive wheels (Figure 4).

Ignition Switch

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

Hour Meter

The hour meter records the number of hours the engine has operated. The hour meter is recording when the decimal point is flashing in the Hour/Voltage display. Use these times for scheduling regular maintenance (Figure 6).

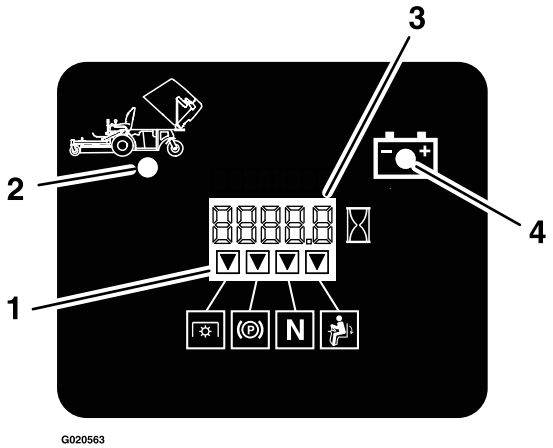


Figure 6

1. Safety interlock indicators
2. Hopper up
3. Hour/Voltage display
4. Low voltage indicator light

Safety Interlock Indicators

There are symbols on the hour meter and the indicate with a black triangle that the interlock component is in the correct position (Figure 6).

Fuel-shutoff Valve

Close the fuel-shutoff valve (under the hopper) when transporting or storing the mower.

PTO Engagement Lever

The PTO engagement lever is used to engage the blades and the blower. Pull the lever up to engage the blades and blower. To disengage the blades blower, push the PTO engagement lever down.

Battery Indicator Light

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

The battery light turns on when the ignition is turned on and when the charge is below the correct operating level (Figure 6).

Engine Oil Temperature Light and Buzzer

The engine oil temperature light monitors the temperature of the engine oil. An illuminated engine oil temperature light and intermittent buzzing sound signals the engine is overheating.

Electronic Control Unit Malfunction Indicator Light

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

If the system detects a problem or fault, the malfunction indicator light (MIL) illuminates.

The MIL is located in the right console panel.

If the MIL illuminates, perform the initial troubleshooting checks; refer to the MIL section in (page).

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

Attachments/Accessories

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

Specifications

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

Width:

	42-inch Mower Deck	**48-inch Mower Deck**
Without Mower Deck	108.2 cm (42.6 inches)	108.2 cm (42.6 inches)
With Mower Deck	109.7 cm (43.2 inches)	125.0 cm (49.2 inches)

Length:

	42-inch Mower Deck	**48-inch Mower Deck**
Without Mower Deck	170.9 cm (67.3 inches)	170.9 cm (67.3 inches)
Mower Deck—Up	209.3 cm (82.4 inches)	207.6 cm (81.8 inches)
Mower Deck—Down	233.2 cm (91.8 inches)	240.0 cm (94.5 inches)

Height:

42-inch Mower Deck	**48-inch Mower Deck**
130.0 cm (51.2 inches)	130.0 cm (51.2 inches)

Weight:

42-inch Mower Deck	**48-inch Mower Deck**
517 kg (1140 lb)	531 kg (1170 lb)

Operation

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

Adding Fuel

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

⚠ DANGER

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

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

⚠ DANGER

In certain conditions during fueling, static electricity can cause 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 fuel the equipment with the wheels on the ground.**
- **If this is not possible, then fuel such equipment on a truck or trailer from a portable container, rather than from a gasoline-dispenser nozzle.**
- **If a gasoline dispenser must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.**

⚠ WARNING

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

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

Using Fuel Stabilizer/Conditioner

Use a fuel stabilizer/conditioner in the machine to keep the fuel fresh during storage of 90 days or less. If you are storing the machine for longer, drain the fuel tank; see your authorized service dealer.

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

Add the correct amount of fuel stabilizer/conditioner to the fuel, and follow the directions of the manufacturer.

Note: 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. Park the machine on level ground.
2. Shut the engine off and set the parking brake.
3. Clean around the fuel-tank cap and remove it. Add regular unleaded gasoline to the fuel tank until the level is 6 to 13 mm (1/4 to 1/2 inch) below the bottom of the filler neck. This space in the tank allows the gasoline to expand. Do not fill the fuel tank completely full; refer to (Figure 4).

Checking the Engine Oil Level

Before you start the engine and use the machine, check the oil level in the engine crankcase; refer to Checking the Engine Oil Level.

Breaking In a New Machine

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

Think Safety First

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

⚠ DANGER

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

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

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.**

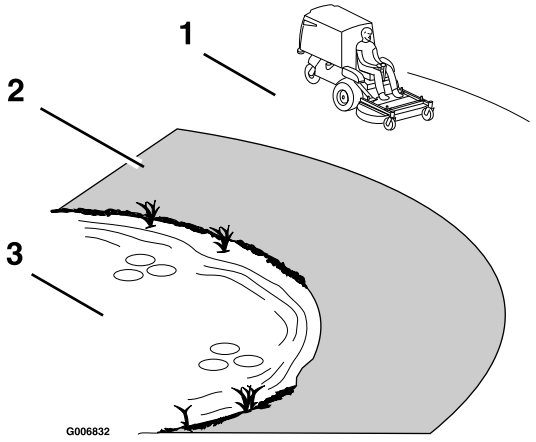


Figure 7

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

⚠ CAUTION

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

Wear hearing protection when operating this machine.

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

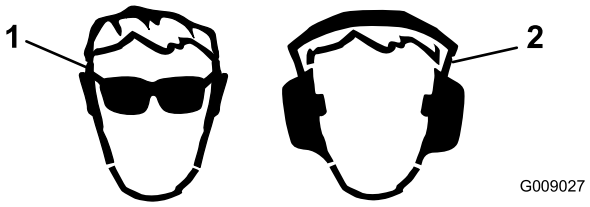


Figure 8

1. Wear safety glasses
2. Wear hearing protection

Operating the Parking Brake

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

Setting the Parking Brake

⚠ WARNING

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

Do not park on slopes unless the wheels are chocked or blocked.

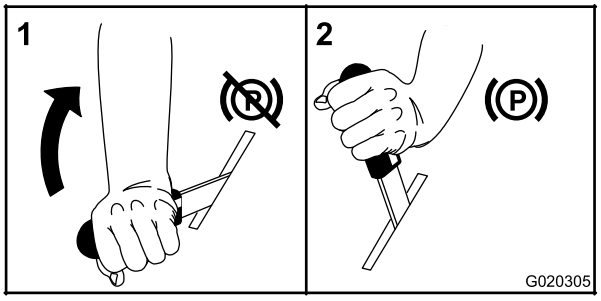


Figure 9

Releasing the Parking Brake

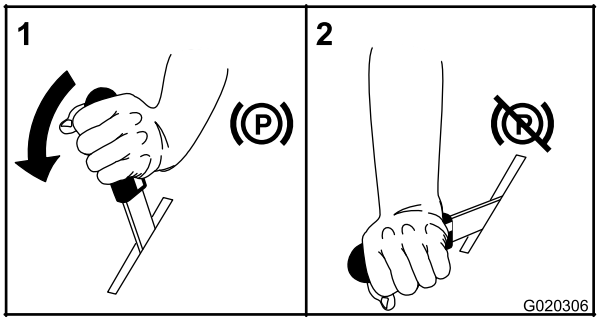


Figure 10

Operating the Throttle

The throttle control can be moved between **Fast** and **Slow** positions (Figure 11).

Always use the middle position when turning on the mower deck and blower with the PTO engagement lever.

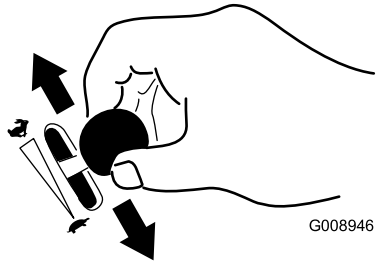


Figure 11

Operating the Ignition Switch

1. Turn the ignition key to the Start position (Figure 12). When the engine starts, release the key.

   Important: Do not engage the starter for more than 10 seconds at a time. If the engine fails to start, allow a 60 second cool-down period between attempts. Failure to follow these instructions can burn out the starter motor.

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

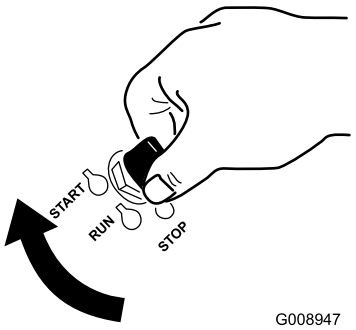


Figure 12

2. To stop the engine, turn the ignition key to the stop position.

Using the Fuel-shutoff Valve

The fuel-shutoff valve is located under the hopper. Raise the hopper to access it.

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

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

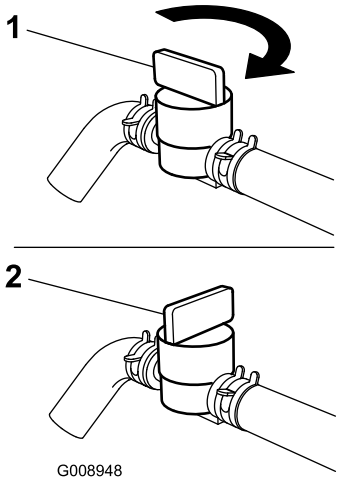


Figure 13

1. On
2. Off

Operating the PTO Engagement Lever

The PTO engagement lever starts and stops the mower blades and blower.

⚠ WARNING

An uncovered discharge opening will allow objects to be thrown in an operator's or bystander's direction. Also, contact with the blower blades could occur. Thrown objects or blade contact can cause serious injury or death.

Never operate the mower with the hopper or hopper door raised, removed, or altered.

Engaging the PTO Engagement Lever

1. Set the throttle to the **middle** position.
2. Pull the PTO lever upward until locked over center.
3. Place the throttle in the **fast** position to begin mowing.

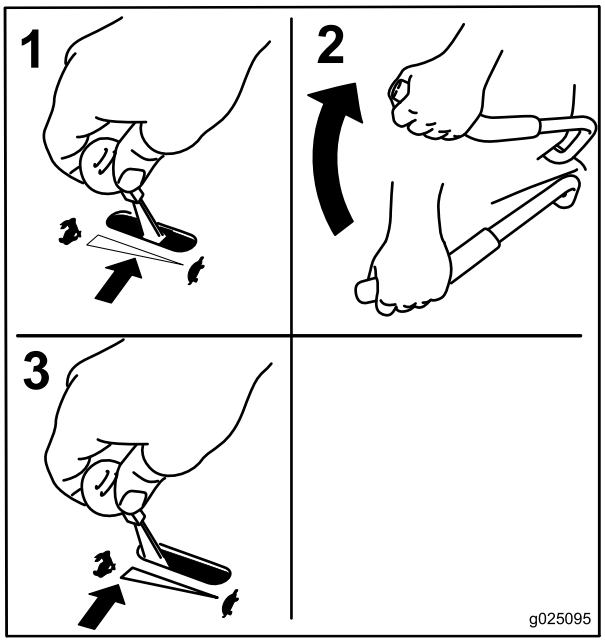


Figure 14

Disengaging the PTO Engagement Lever

1. Set the throttle to the **middle** position.
2. Push PTO lever down to the **stop** position stopping the blades and blower.

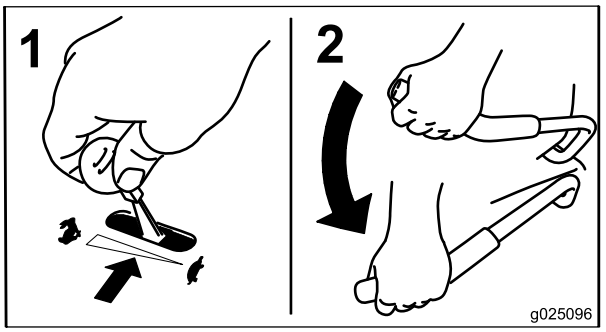


Figure 15

Starting and Stopping the Engine

Starting the Engine

1. Move the speed control lever to the neutral position.
2. Set the parking brake; refer to Setting the Parking Brake.
3. Move the PTO engagement lever to the Off position (Figure 16).
4. Move the throttle lever midway between the Slow and Fast positions.
5. On a cold engine, push the choke lever forward into the closed/on position (Not on EFI engines). On a warm engine, leave the choke in the open/off position.

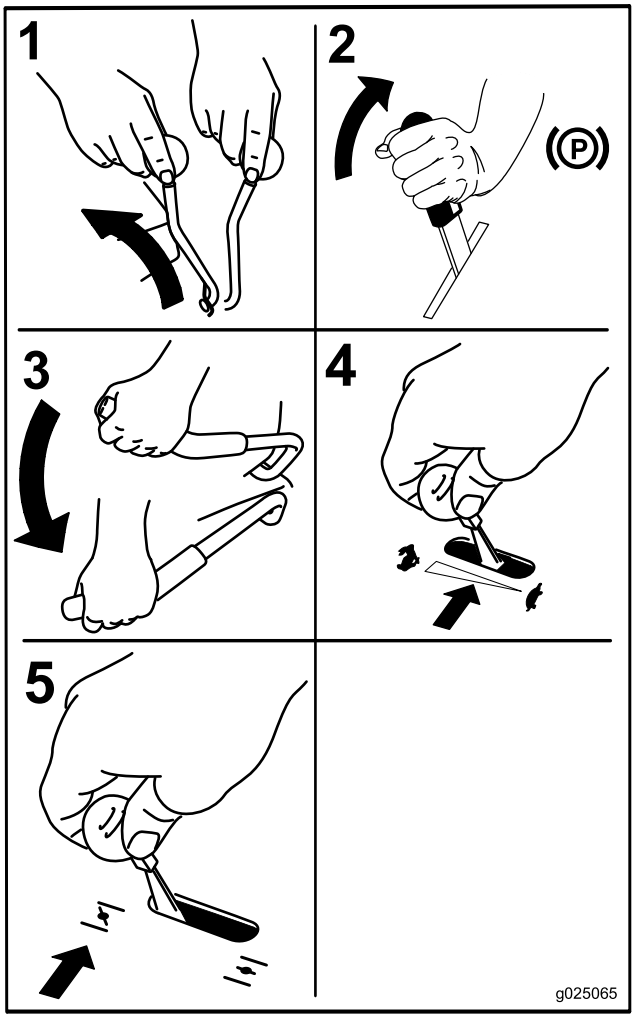


Figure 16

6. Turn the ignition key to the Start position (Figure 12). When the engine starts, release the key.

   Important: Do not crank the engine continuously for more than 10 seconds at a time. If the engine does not start, allow a 60 second cool-down period between starting attempts. Failure to follow these guidelines can burn out the starter motor.

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

7. If the choke is in the closed/on position, gradually return choke to the open/off position as the engine warms up.

Stopping the Engine

⚠ CAUTION

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

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

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.

1. Disengage the PTO.
2. Move speed control lever to the neutral position.
3. Engage the parking brake.
4. Place the throttle to the middle position.
5. Allow the engine to run for a minimum of 15 seconds, then turn the ignition switch to the Off position to stop the engine.
6. Remove the key to prevent children or other unauthorized persons from starting engine.

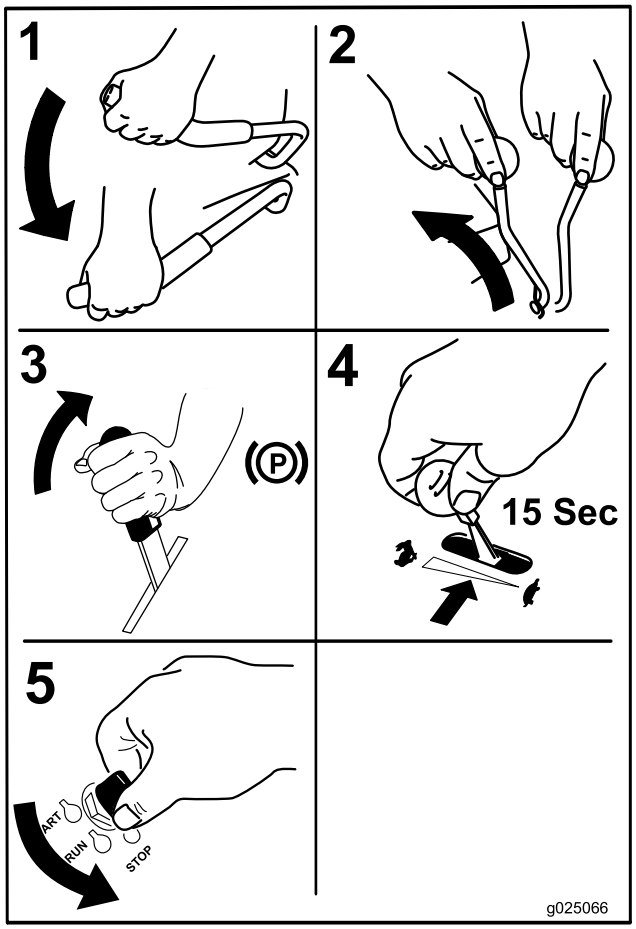


Figure 17

7. Close the fuel shut-off valve when the machine will not be in use for a few days, when transporting, or when the unit is parked inside a building.

The Safety Interlock System

⚠ CAUTION

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

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

Understanding the Safety Interlock System

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

- The parking brake is engaged.
- The PTO engagement lever is disengaged.
- The speed control lever is in the neutral position

The safety interlock system is designed to stop the engine when you rise from the seat when the PTO is engaged.

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

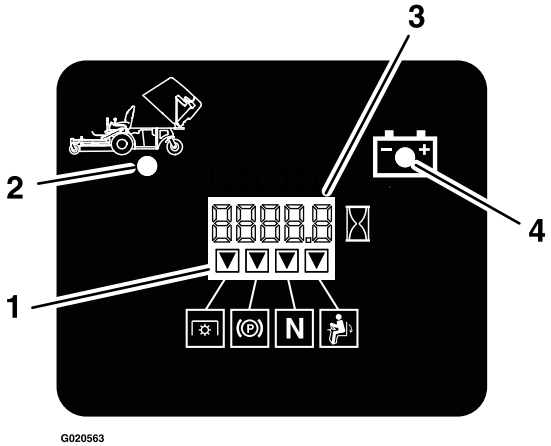


Figure 18

1. Triangles light up when the interlock components are in the correct position
2. Hopper up
3. Hour/Voltage display
4. Low voltage indicator light

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, move the PTO engagement lever to on, and move the speed control lever to neutral position. Try starting the engine; the engine should not crank.
2. Sitting on the seat, engage the parking brake and move the PTO engagement lever to off. Move the speed control lever out of neutral position. Try starting the engine; the engine should not crank.
3. Sitting on the seat, disengage the parking brake, move the PTO engagement lever to off, and move the speed control lever to neutral position. Try starting the engine; the engine should not crank.
4. Sitting on the seat, engage the parking brake, move the PTO engagement lever to off and move the speed control lever to neutral position. Now start the engine. While the engine is running, release the parking brake, engage the PTO engagement lever, and rise slightly from the seat; the engine should stop.
5. Sitting on the seat, engage the parking brake, move the PTO engagement lever to off and move the speed control lever to neutral position. Now start the engine. Move the speed control lever forward; the engine should stop.

Driving Forward or Backward

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

⚠ CAUTION

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

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

Driving Forward

Note: To begin movement (forward or backward) the operator must be in the seat, the brake lever must be disengaged (pushed down) before the speed control lever can be moved forward or the engine will stop.

To stop, pull the speed control lever to the neutral position.

1. Start the engine.
2. Release the parking brake; refer to Releasing the Parking Brake (page 16).

3. To move forward in a straight line move the speed control lever forward.

   Note: The machine will move faster the farther the speed control lever is moved away from neutral.

4. To turn left or right, pull one of the steering levers back toward neutral in the direction desired.
5. To stop, pull the speed control lever back to the neutral position.

Driving Backward

1. To move rearward in a straight line, pull both steering levers rearward equally.

   To turn left or right, release pressure on the steering lever toward the direction desired.

2. To stop, release the steering levers to the neutral position.

Stopping the Machine

1. Pull the speed control lever back to the neutral position, disengage the PTO engagement lever, and turn the ignition key to off.
2. Set the parking brake when you leave the machine; refer to Setting the Parking Brake (page 16).
3. Remove the key from the ignition switch.

⚠ CAUTION

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

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

Raising the Mower Deck into Service Position

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

   ⚠ WARNING

   Incorrectly raising or lowering a mower deck can be dangerous. A dropped mower deck can result in a serious injury or property damage.

   - **Always raise and lower the mower deck on flat, dry ground, free of any obstructions.**
   - **Firmly grasp the mower deck lift handle and lower in a slow controlled manner.**
   - **Always make sure the mower deck is securely latched in the "up" or "down" position.**

2. Release the mower deck locking pins on each side (Figure 19).

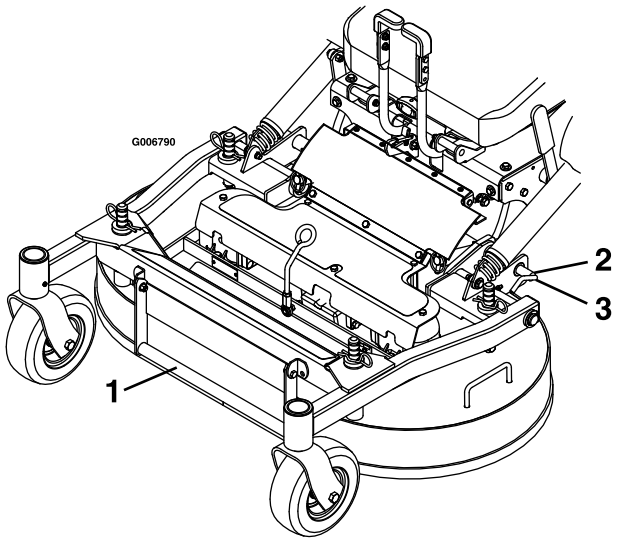


Figure 19

1. Deck lift handle
2. Rotate the mower deck locking pin toward the rear and pull outward to unlock.
3. Push the deck locking pin in and rotate toward the front to lock.

3. Using deck-lift handle, lift deck up and latch in up position (latch is located at front center of seat) (Figure 20).

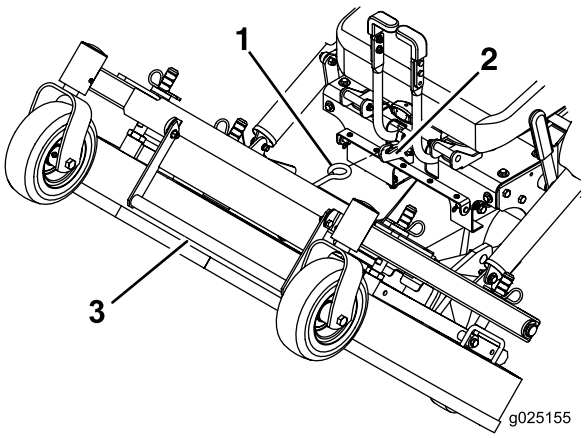


Figure 20

1. Secure the mower deck in the raised position by securing the mower deck latch onto the hook.
2. Hook
3. Deck-lift handle

⚠ WARNING

Operating the mower deck in the raised service position can be dangerous. Engaging the PTO with a deck in the raised position can result in a serious injury or property damage.

Always lower and lock mower deck in the operation position before engaging the PTO.

Lowering the Mower Deck to the Operating Position

1. While firmly holding onto deck-lift handle, unhook mower deck latch from the machine and slowly lower mower deck to ground (Figure 20).
2. Push the deck locking pins inward and rotate them forward to securely lock the mower deck in the lowered position (Figure 19).

⚠ WARNING

Operating mower without locking pins securely latched can result in the mower deck folding up unexpectedly. The mower deck folding up unexpectedly can cause serious injury.

Always operate mower with locking pins securely latched.

Adjusting the Fill Reduction System (FRS) Baffles

The Fill Reduction System has been designed to allow you to reduce the amount of clippings collected by varying degrees.

The advantages include less frequent emptying of the hopper and the return of nutrients to the soil.

The following are possible configurations:

- Baffles open with standard blades—maximum collection
- Baffles closed with standard blades—partial mulching
- Baffles closed with mulch blades—intermediate mulching
- Mulch plug installed with mulch blades—complete mulching (requires mulch kit)

Adjust the FRS baffles as follows:

1. Stop the engine, wait for all moving parts to stop and remove key.
2. Engage the parking brake.
3. Remove the hair pins and clevis pins from both sides of the PTO guard (Figure 21).
4. Fold the guard forward.

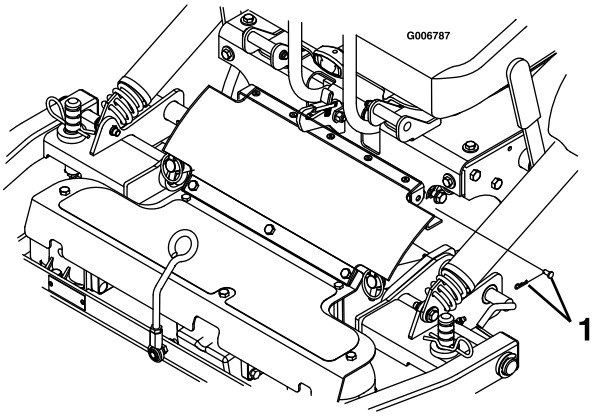


Figure 21

1. Hair pin and clevis pins

5. Loosen the locknuts on the rear studs of the FRS baffles.

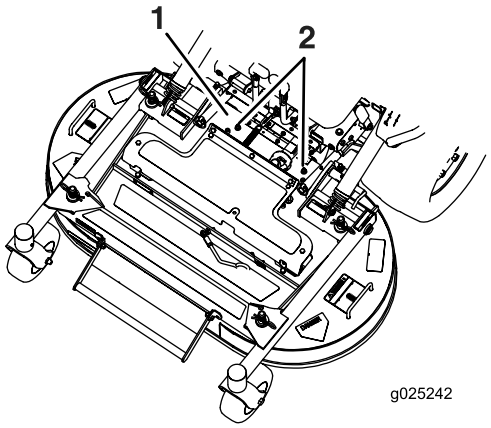


Figure 22

1. PTO guard removed for clarity
2. Loosen locknuts

6. Raise the mower deck; refer to Raising the Mower Deck into Service Position (page 20).
7. Remove the bolt and washer at the front of each FRS baffle (Figure 23).
8. Rotate the baffles into the desired position and install the bolt and washer.

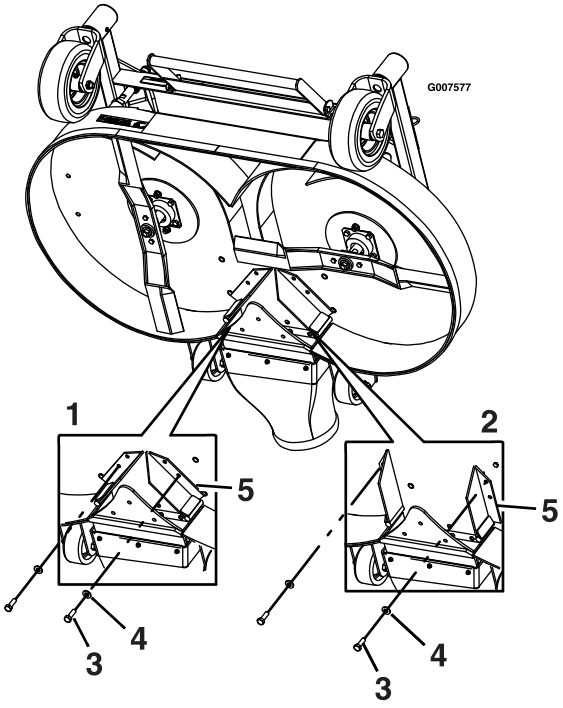


Figure 23

1. Baffles shown in closed position
2. Baffles shown in open position
3. Bolt
4. Washer
5. Baffles

9. Lower the mower deck; refer to Lowering the Mower Deck to the Operating Position (page 21).
10. Slightly tighten the locknuts on the rear studs of the FRS baffles.

    Note: The locknuts on the rear studs may be left slightly loose if frequent baffle adjustment is anticipated.
11. Install the PTO guard using the clevis pins and hair pins removed in step 3.

Adjusting the Height of Cut

The cutting height of the mower deck is adjusted from 2.5 to 10.2 cm (1 to 4 inches) in 6.3 mm (1/4 inch) increments.

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Using the mower-deck handle, raise the mower deck and move the cotter pins to the desired height-of-cut position. Repeat for the opposite side.

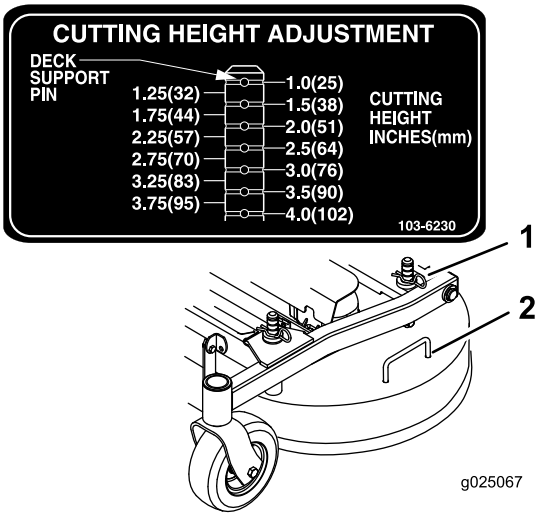


Figure 24

1. Cotter pin
2. Mower-deck handle

Emptying the Hopper

A full hopper is indicated by a buzzer located behind the operator in the hopper. Empty the hopper when the buzzer sounds to prevent clogging of the blower or the mower deck.

1. Disengage the PTO, move the speed control to neutral, set the park brake and dismount the machine to dump hopper.
2. Make sure machine is on a dry level surface.
3. Lift the rear door up and allow it to rest on top of hopper.
4. Using the handles at the lower front of the hopper, raise the hopper to dump the contents.
5. Lower the hopper and close the hopper door.

Clearing the Hopper Screen

Remove the screen by firmly lifting the screen handles (Figure 25).

Pull the screen towards the back to remove it. As needed, gently tap the screen to remove debris.

Note: Excessive build-up on the screen can cause the blower to plug.

Note: In conditions where the screen clogs quickly, the front removable screen panel can be turned and reinstalled under the primary screen to allow free air flow from the hopper.

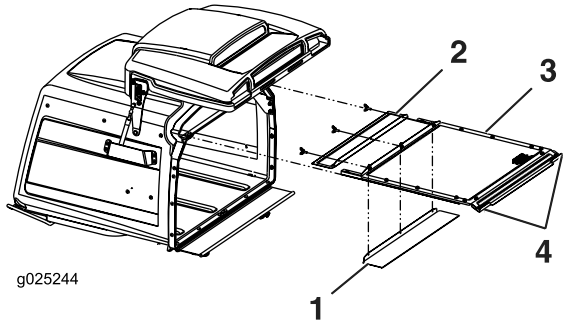


Figure 25

1. Front removable screen can be rotated and stored for wet conditions
2. Front removable screen
3. Primary screen
4. Handles.

Using the Drive Wheel Release Valves

⚠ WARNING

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

Stop the engine, remove the key, and allow all moving parts to stop before accessing the drive wheel release valves.

⚠ WARNING

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

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

The drive wheel release valves are located on the top left front corner of hydrostatic pumps.

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Tilt the seat up to gain access to the pumps.
4. Rotate both release valves one turn counterclockwise to release the drive system This allows the hydraulic oil to by-pass the pump enabling the wheels to turn.
5. Disengage the parking brake before pushing.

   Note: Do not tow the machine.
6. Rotate the valves clockwise to run the machine.

   Note: Do not over tighten the valves.

Transporting the Machine

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

⚠ WARNING

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

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

To transport the machine:

1. If using a trailer, connect it to the towing vehicle and connect the safety chains.
2. If applicable, connect the trailer brakes.
3. Load the machine onto the trailer or truck.
4. Stop the engine, remove the key, set the brake, and close the fuel valve.
5. Securely fasten the machine to the trailer or truck with straps, chains, cable, or ropes.

Loading the Machine

Use extreme caution when loading the machine onto a trailer or truck. 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 machine (Figure 26). The lower rear section of the machine frame extends back between the rear wheels and serves as a stop for tipping backward. Having a full-width ramp provides a surface for the frame members to contact if the machine 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 26). A steeper angle may cause mower components to get caught as the machine moves from the ramp to the trailer or truck. Steeper angles may also cause the machine to tip backward. If loading on or near a slope, position the trailer or truck so that 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 machine 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 machine to tip backward.

⚠ WARNING

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

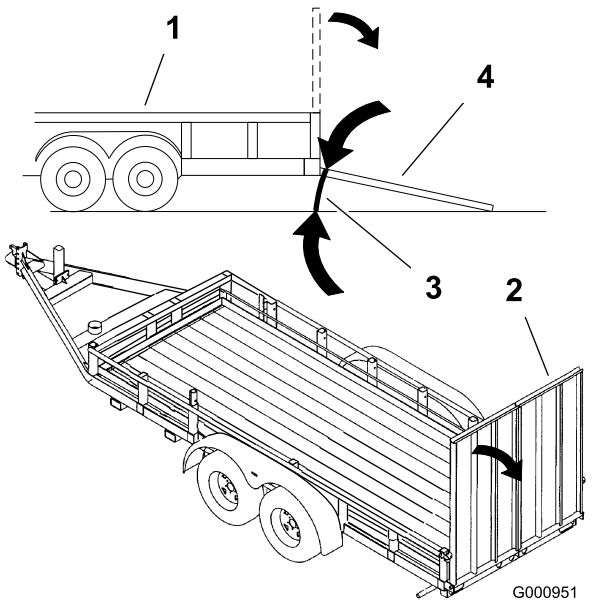


Figure 26

1. Trailer
2. Full-width ramp
3. Not greater than 15 degrees
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 you must stop the forward motion of the machine while mowing, a clump of grass clippings may drop onto your lawn. To avoid this, move onto a previously cut area with the blades engaged.

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 50 hours	• Change oil in all three gearbox housings. Add oil as needed until level with oil drain plug.
After the first 100 hours	• Check the wheel lug nut torque. • Check the wheel hub nut torque. • Check the park brake adjustment. • Change the hydraulic filter and reservoir hydraulic oil when using any type of oil.
Before each use or daily	• Check the safety system. • Grease the front caster wheel hubs. • Check the engine oil level. • Clean the engine screen and the oil cooler. • Clean the hydraulic pumps. • Check the mower blades. • Clean the mower deck. • Clean debris from the machine.
Every 40 hours	• Grease the drive shaft. • Check the tire pressure. • Inspect the belts for cracks and wear. • Check the hydraulic oil level.
Every 50 hours	• Check spark arrester (if equipped).
Every 100 hours	• Grease the mower deck flip-up pivot. • Grease the mower deck push-arm tubes. • Change oil in all three gearbox housings. Add oil as needed until level with oil drain plug. thereafter • Change the engine oil (more often in dirty or dusty conditions). • Clean the engine oil cooler. • Check and clean engine cooling fins and shrouds.
Every 150 hours	• Inspect the primary filter and air-inlet screen.
Every 160 hours	• Lubricate the brake-handle pivot. • Lubricate the brake-rod bushings. • Lubricate the steering linkage rod ends.
Every 200 hours	• Change the engine oil filter. • Check and gap the spark plug (EFI engines only). • Replace the fuel filter (more often in dirty or dusty conditions).
Every 250 hours	• Replace the primary air filter and check the safety air filter (more often in dusty or sandy conditions). • Change the hydraulic filter and reservoir hydraulic oil when using Mobil® 1 oil (more often in dirty or dusty conditions).
Every 500 hours	• Replace the safety air filter. • Check and gap the spark plug (Non-EFI engines only). • Check the wheel lug nut torque. • Check the wheel hub nut torque. • Adjust the caster pivot bearings. • Check the park brake adjustment. • Change the hydraulic filter and reservoir hydraulic oil when using Toro® HYPR-OIL™ 500 hydraulic oil (more often in dirty or dusty conditions).
Monthly	• Check the battery.

Maintenance Service Interval	Maintenance Procedure
Yearly	• Grease the front-caster pivots. • Grease the rear-caster hub. • Grease the pump-belt idler arm. • Grease the PTO-belt idler arm. (more often in dirty or dusty conditions). • Grease the rear-caster pivot. (more often in dirty or dusty conditions). • Lubricate the caster wheel hubs.
Yearly or before storage	• Paint chipped surfaces. • Check all maintenance procedures listed above before storage.

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

⚠ CAUTION

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

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

Lubrication

Lubricating the Machine

Greasing the Machine

Service Interval: Before each use or daily—Grease the front caster wheel hubs.

Every 40 hours—Grease the drive shaft.

Every 100 hours—Grease the mower deck flip-up pivot.

Every 100 hours—Grease the mower deck push-arm tubes.

Yearly—Grease the front-caster pivots.

Yearly—Grease the rear-caster hub.

Yearly—Grease the pump-belt idler arm.

Yearly—Grease the PTO-belt idler arm. (more often in dirty or dusty conditions).

Yearly—Grease the rear-caster pivot. (more often in dirty or dusty conditions).

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

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

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

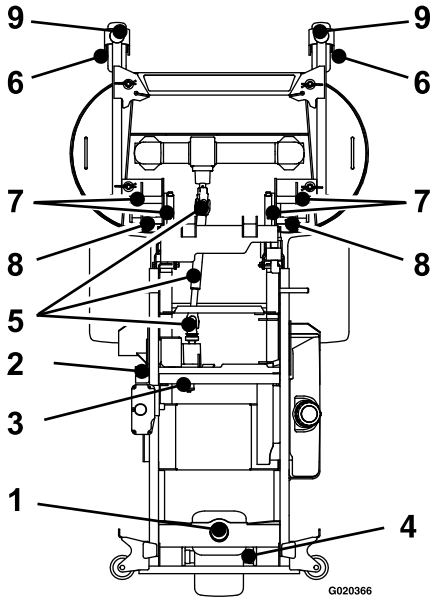


Figure 27

1. Rear-caster pivot—grease yearly
2. PTO belt idler arm—grease yearly
3. Pump belt idler arm—grease yearly
4. Rear-caster hub—grease yearly
5. Drive shaft—grease every 40 hours
6. Front-caster wheel hub—grease every 8 hours
7. Deck flip-up pivot—grease every 100 hours
8. Push-arm tubes—grease every 100 hours
9. Front-caster pivots—grease yearly

Lubricate the Rear Caster Wheel Hub

Service Interval: Yearly

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

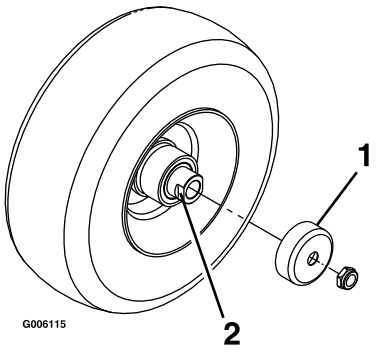


Figure 28

1. Seal guard
2. Spacer nut with wrench flats

2. Raise the front of the machine up and support it with jack stands.
3. Remove the caster wheel from the caster forks.
4. Remove the seal guards from the wheel hub.
5. Remove 1 of the spacer nuts from the axle assembly in the caster wheel.

   Note: Note that thread locking adhesive has been applied to lock the spacer nuts to the axle. Remove the axle (with the other spacer nut still assembled to it) from the wheel assembly.
6. Pry out the seals, and inspect the bearings for wear or damage and replace if necessary.
7. Pack the bearings with a general-purpose grease.
8. Insert 1 bearing and 1 new seal into the wheel.

   Note: The seals must be replaced.
9. If the axle assembly has had both spacer nuts removed (or broken loose), apply a thread locking adhesive to 1 spacer nut and thread it onto the axle with the wrench flats facing outward.

   Note: Do not thread the spacer nut all of the way onto the end of the axle. Leave approximately 3 mm (1/8 inch) from the outer surface of the spacer nut to the end of the axle inside the nut.
10. Insert the assembled nut and axle into the wheel on the side of the wheel with the new seal and bearing.
11. With the open end of the wheel facing up, fill the area inside the wheel around the axle full of general-purpose grease.
12. Insert the second bearing and new seal into the wheel.
13. Apply a thread locking adhesive to the second spacer nut and thread it onto the axle with the wrench flats facing outward.
14. Torque the nut to 8-9 N-m (75-80 in-lb), loosen, then re-torque to 2-3 N-m (20-25 in-lb).

    Note: Make sure that the axle does not extend beyond either nut.
15. Install the seal guards over the wheel hub and insert the wheel into the caster fork. Install the caster bolt and tighten the nut fully.

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

Lubricate the Brake-handle Pivot

Service Interval: Every 160 hours

1. Stop the engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
2. Lubricate the bronze bushings on the brake handle pivot with a spray type lubricant or light oil (Figure 29).

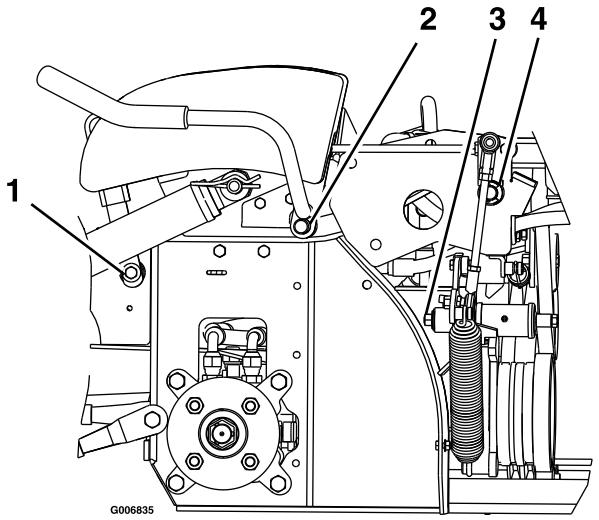


Figure 29

Left Side of machine shown

1. Brake Handle Pivot
2. PTO Handle Pivot
3. Spring Arm Pivot
4. Toggle Pivot

Lubricate the Brake-rod Bushings

Service Interval: Every 160 hours

1. Stop the engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
2. Unhook the seat latch and tilt seat up.
3. Lubricate the bronze bushings on each end of the brake rod shaft with a spray type lubricant or a light oil (bushings are located to the inside of the flange bearings).

Lubricate the Steering-linkage Rod Ends

Service Interval: Every 160 hours

1. Stop the engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
2. Unhook the seat latch and tilt the seat up.
3. Lubricate each end of both steering linkage rods with a spray lubricant or a light oil.

Change the Gearbox Oil

Service Interval: After the first 50 hours—Change oil in all three gearbox housings. Add oil as needed until level with oil drain plug.

Every 100 hours—Change oil in all three gearbox housings. Add oil as needed until level with oil drain plug. thereafter

1. Place the machine on a level surface.
2. Stop the engine, wait for all moving parts to stop, remove the key, and engage the parking brake.
3. Remove the gearbox and drive shaft assembly from the mower deck. Retain the hardware for use later.
4. Remove the large oil drain plug on the front of each of the three gearbox sections and drain the oil (Figure 30).

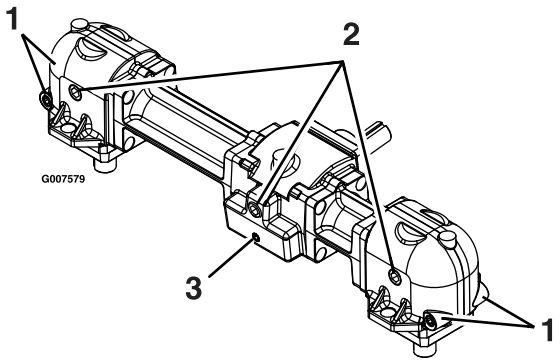


Figure 30

1. Small magnetic plugs (front and back)
2. Large oil drain/fill plug
3. Small magnetic plug (front only)

5. Remove the small magnetic plugs and wipe away any material accumulated on the plugs.
6. Apply a Teflon® pipe sealant to all small magnetic plugs and install them into the gearbox.
7. Install the gearbox and drive shaft assembly to the mower deck.
8. Fill the gearbox with Mobil® SHC (synthetic) 75W-90 gear lube oil until level with oil drain/fill plug.

   Note: Each of the gearbox sections must be filled separately.

   Note: Keep the mower deck level to the ground when filling the gearbox with oil. Do not fill thr gearbox with the mower deck raised in the service position.
9. Apply a Teflon pipe sealant to the 3 large oil plugs and install them into the gearbox.

Engine Maintenance

⚠ WARNING

Contact with hot surfaces may cause personal injury.

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

Servicing the Air Cleaner

Service Interval: Every 150 hours

Every 250 hours/Yearly (whichever comes first)—Replace the primary air filter and check the safety air filter (more often in dusty or sandy conditions).

Every 500 hours—Replace the safety air filter.

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

Removing the Filters

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Release the latches on the air cleaner and pull the air-cleaner cover off the air-cleaner body (Figure 31).
4. Clean the inside of the air-cleaner cover with compressed air.
5. Gently slide the primary filter out of the air-cleaner body (Figure 31).

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

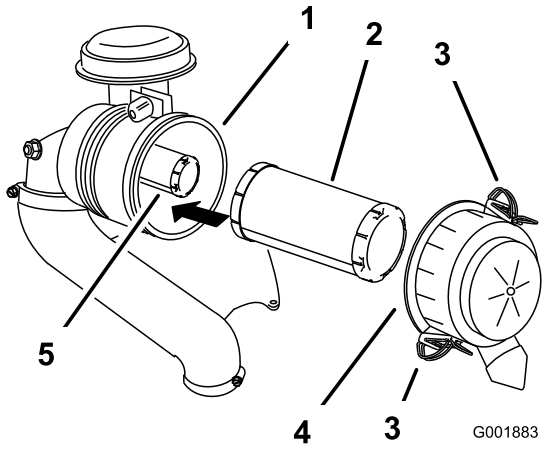


Figure 31

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

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

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

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

Servicing the Primary Filter

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

Servicing the Safety Filter

Replace the safety filter, never clean it.

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

Installing the Filters

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

1. If installing new filters, check each filter for shipping damage. Do not use a damaged filter.
2. If the inner filter is being replaced, carefully slide it into the filter body (Figure 31).
3. Carefully slide the primary filter over the inner filter (Figure 31).

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

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

4. Install the air cleaner cover and secure the latches (Figure 31).

Servicing the Engine Oil

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

Oil Capacity (Non-EFI engines): with a filter change, 1.8 L (1.9 US qt); with no filter change, 1.6 L (1.7 US qt)

Oil Capacity (EFI engines): with a filter change, 1.9 L (2.0 US qt); with no filter change, 1.6 L (1.7 US qt)

Viscosity: See the table below.

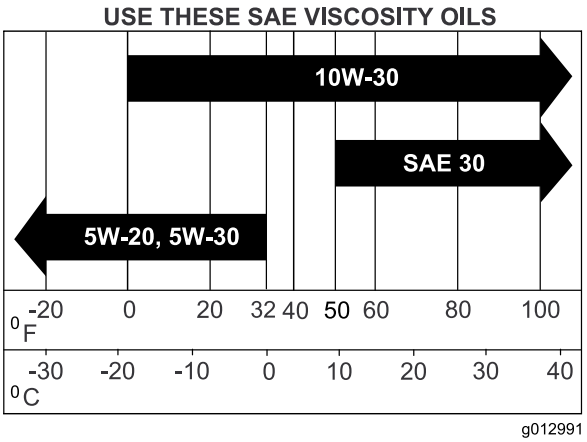


Figure 32

Checking the Engine Oil Level

Service Interval: Before each use or daily

Note: Check the oil when the engine is cold.

⚠ WARNING

Contact with hot surfaces may cause personal injury.

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

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

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Allow the engine to cool.
4. Raise the hopper
5. Clean the area around the dipstick (Figure 33).
6. Remove the dipstick and wipe the oil off.
7. Insert the dipstick and push it all the way down into the tube.
8. Remove the dipstick and read the oil level.

9. If the oil level is low, wipe off the area around the oil fill cap, remove cap and fill to the **full** mark on the dipstick (Figure 33). Do not overfill.

Important: Do not operate the engine with the oil level below the low (or add) mark on the dipstick, or over the full mark.

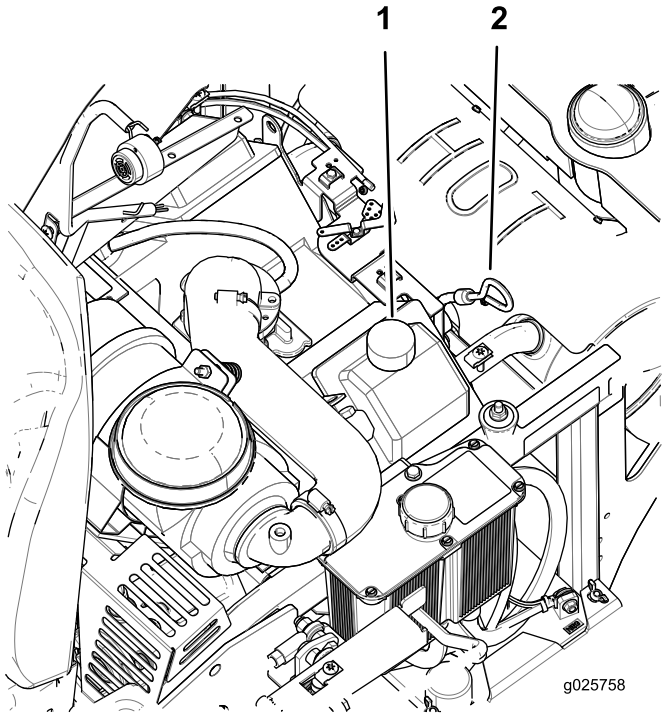


Figure 33

1. Oil fill cap
2. Oil dipstick

Changing the Engine Oil

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

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

1. Park the machine so that the rear is slightly lower than the front to ensure that the oil drains completely.
2. Move the speed control lever to the neutral position to stop the machine.
3. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.

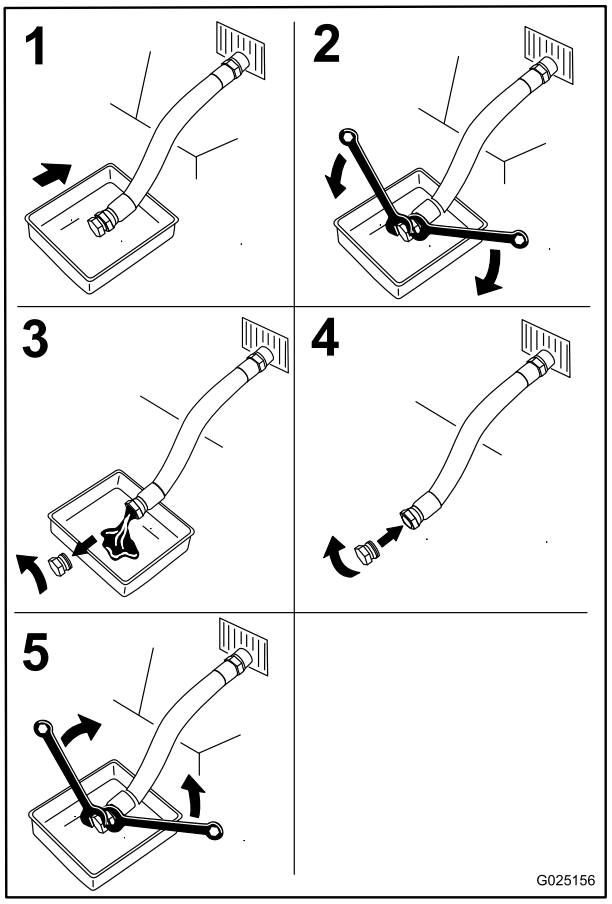


Figure 34

4. Slowly pour approximately 80% of the specified oil into the filler tube and slowly add the additional oil to bring it to the **full** mark on the dipstick (Figure 33).
5. Start the engine and drive to a flat area. Check the oil level again (Figure 33).
6. If needed, add oil to the **full** mark on the dipstick.

Changing the Engine Oil Filter

Service Interval: Every 200 hours

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

1. Drain the oil from the engine; refer to Changing the Engine Oil.
2. Change the engine oil filter (Figure 35).

   Note: Allow 2 minutes for the new oil to be absorbed by the new filter material.

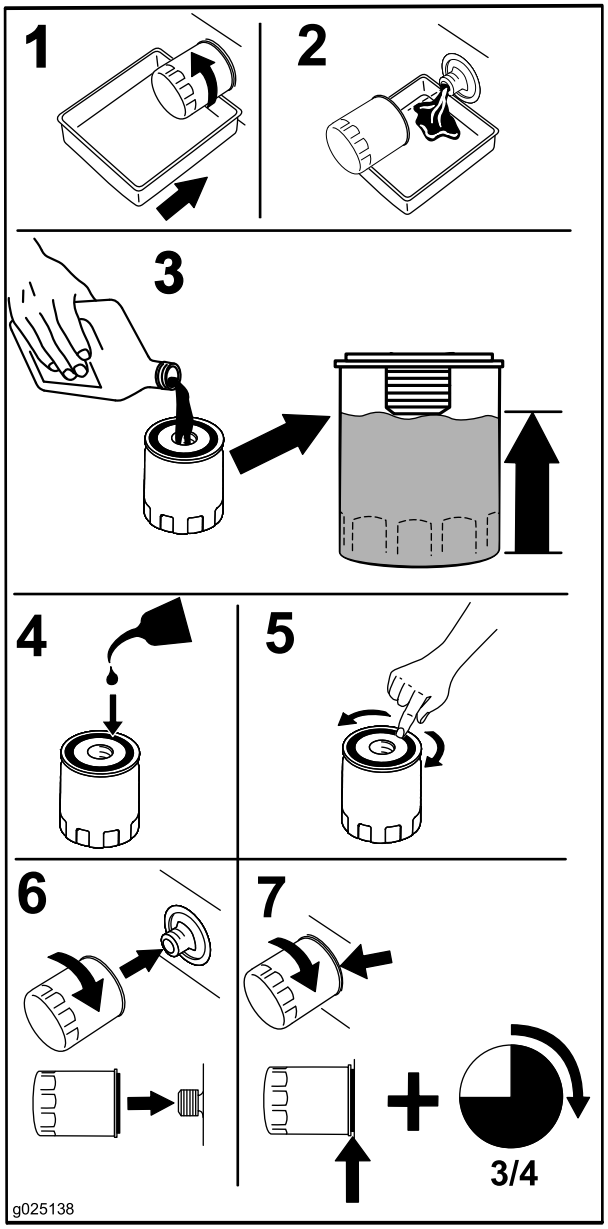


Figure 35

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

3. Fill the crankcase with the proper type of new oil; refer to Changing the Oil.

Servicing the Spark Plugs

Service Interval: Every 200 hours—Check and gap the spark plug (EFI engines only).

Every 500 hours—Check and gap the spark plug (Non-EFI engines only).

Make sure that the air gap between the center and side electrodes is correct before installing the spark plugs. 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 for EFI engines: Champion® XC12YC or equivalent

Type for Non-EFI engines: Champion® RC12YC or equivalent

Air Gap: 0.76 mm (0.030 inch)

Removing the Spark Plugs

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the spark plugs.

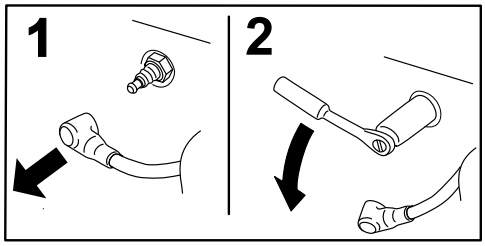


Figure 36

Checking the Spark Plugs

Important: Replace the spark plugs when they have: a black coating, worn electrodes, an oily film, cracks or reuse is questionable.

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.

Set the gap to 0.76 mm (0.030 inch).

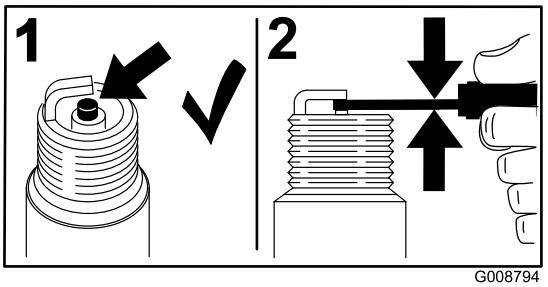


Figure 37

Installing the Spark Plugs

Tighten the spark plugs to 24.4 to 29.8 N-m (18 to 22 ft.-lb).

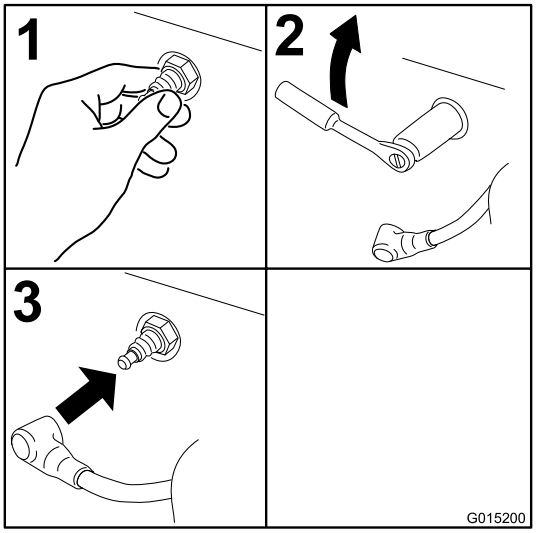


Figure 38

Check Spark Arrester (if equipped)

Service Interval: Every 50 hours

⚠ WARNING

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

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

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

Fuel System Maintenance

⚠ WARNING

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

Use only approved fuel lines and fuel filters.

Servicing the Electronic Fuel Injection System

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

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

If a problem or fault within the system is detected, the malfunction indicator light (MIL) is illuminated. The MIL is the red light located in the right console panel.

Once the MIL illuminates, initial trouble shooting checks should be made. Refer to the MIL section under Troubleshooting.

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

Replacing the Fuel Filter

Service Interval: Every 200 hours/Yearly (whichever comes first) (more often in dirty or dusty conditions).

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

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Allow the machine to cool down.
4. Close the fuel-shutoff valve under the seat (Figure 39).

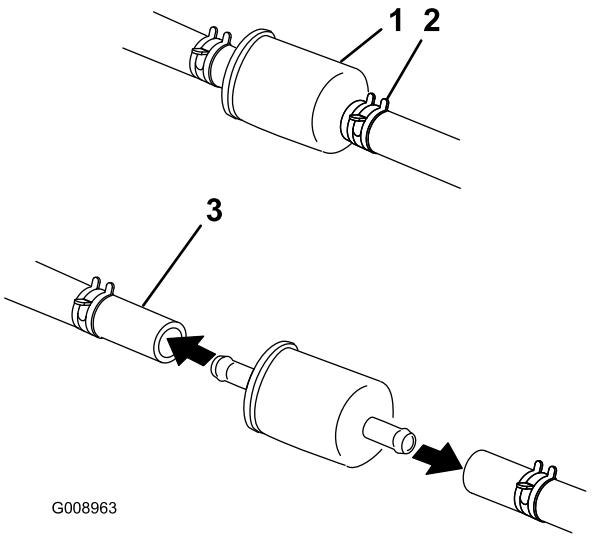


Figure 39

1. Fuel filter
2. Hose clamp
3. Fuel line

5. Squeeze the ends of the hose clamps together and slide them away from the filter (Figure 39).
6. Remove the filter from the fuel lines.
7. Install a new filter and move the hose clamps close to the filter (Figure 39).
8. Open the fuel-shutoff valve.

Note: It is important to install the fuel line hoses and secure them with plastic ties the same as they were originally installed at the factory, to keep the fuel line away from components that could cause fuel line damage.

Servicing the Fuel Tank

Do not attempt to drain the fuel tank. Ensure that an Authorized Service Dealer drains the fuel tank.

Electrical System Maintenance

Servicing the Battery

Service Interval: Monthly

WARNING

CALIFORNIA
Proposition 65 Warning

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

⚠ DANGER

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

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

Removing the Battery

⚠ WARNING

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

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

⚠ WARNING

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

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

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. First disconnect the negative battery cable (black) from the negative (-)(black) battery terminal (Figure 40).
4. Slide the red terminal boot off the positive (red) battery terminal and remove the positive (+)(red) battery cable (Figure 40).
5. Remove the wing nuts securing the J-hooks (Figure 40).
6. Remove the clamp (Figure 40).
7. Remove the battery.

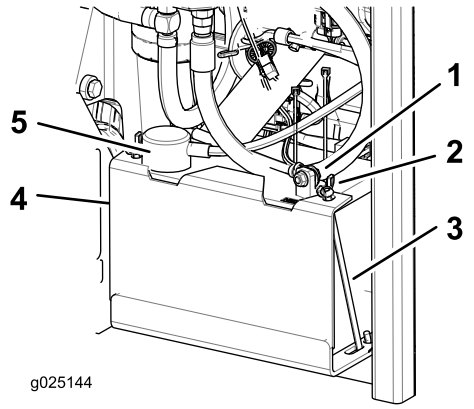


Figure 40

1. Negative (black) battery cable
2. Wing nut
3. J-hook
4. Clamp
5. Positive (red) battery cable

Installing the Battery

1. Position battery in the tray with the terminal posts opposite from the hydraulic tank (Figure 40).
2. First, install the positive (red) battery cable to positive (+) battery terminal.
3. Then install the negative (black) battery cable and ground wire to the negative (-) battery terminal.
4. Secure the cables with 2 bolts, 2 washers, and 2 locknuts (Figure 40).
5. Slide the red terminal boot onto the positive (red) battery post.
6. Install the clamp and secure it with the wing nuts and J-hooks (Figure 40).

Charging the Battery

⚠ WARNING

Charging the battery produces gases that can explode.

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

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

1. Charge battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 10 amps.
2. When the battery is fully charged, unplug the charger from the electrical outlet; then disconnect the charger leads from the battery posts (Figure 41).
3. Install the battery in the machine and connect the battery cables, refer to Installing the Battery.

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

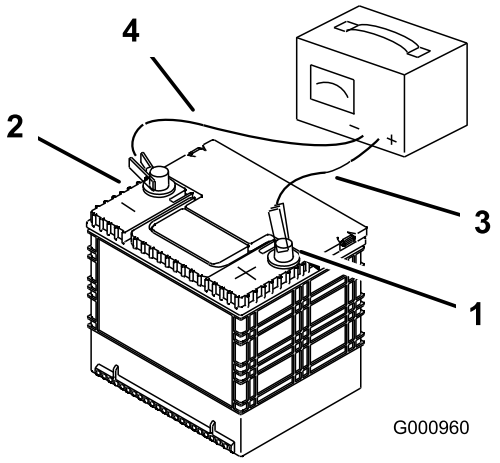


Figure 41

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

Servicing the Fuses

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

1. The fuses are located on right hand side behind the seat.
2. To replace the fuses, pull out on the fuse to remove it.
3. Install a new fuse.

Adjusting the Safety Switches

Adjust all safety switches so plunger extends 4.8 mm to 6.4 mm (3/16 inch to 1/4 inch) from switch body when plunger is compressed (Figure 42).

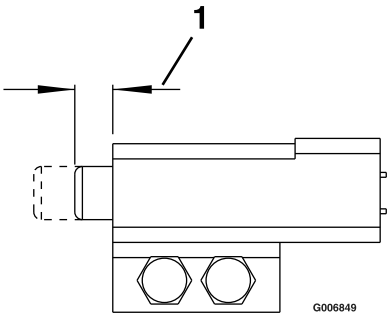


Figure 42

Jump Starting the Machine

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

⚠ CAUTION

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

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

⚠ DANGER

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

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

2. Make sure that the booster battery is a good and fully charged lead-acid battery at 12.6 volts or greater. Use properly sized jumper cables with short lengths to reduce voltage drop between systems. Make sure that the cables are color coded or labeled for the correct polarity.

⚠ CAUTION

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

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

⚠ WARNING

Batteries contain acid and produce explosive gases.

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

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

3. Connect the positive (+) cable to the positive (+) terminal of the discharged battery that is wired to the starter or solenoid as shown in Figure 43.

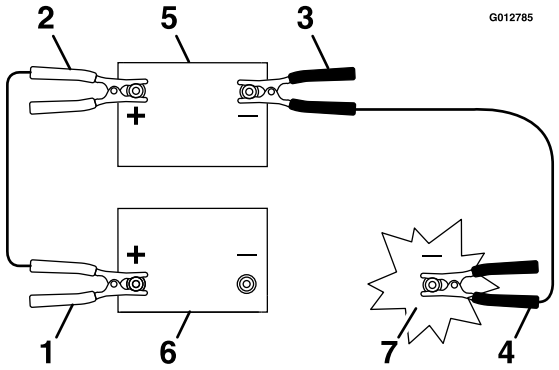


Figure 43

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

4. Connect the other end of the positive cable to the positive terminal of the booster battery.
5. Connect the black negative (–) cable to the other terminal (negative) of the booster battery.

6. **Make the final connection on the engine block of the stalled vehicle (not to the negative battery post) away from the battery and stand back.**
7. Start the vehicle and remove the cables in the reverse order of connection (the engine block (black) connection is the first to disconnect).

Drive System Maintenance

Adjusting the Tracking

The tracking knob is located under the seat.

Rotating this knob allows fine tuning adjustments so that the machine tracks straight with the drive levers in the full forward position.

1. Run unit at 3/4 speed for at least 5 minutes to bring hydraulic oil up to operating temperature. Stop machine and wait for all moving parts to stop.
2. Engage park brake.
3. Tilt seat forward to gain access to the tracking knob.
4. Rotate the knob towards the right to steer right and rotate towards the left to steer left.
5. Adjust in 1/8 turn increments until the machine tracks straight.
6. Check and ensure the machine does not creep when in neutral with the park brakes disengaged (Figure 44).

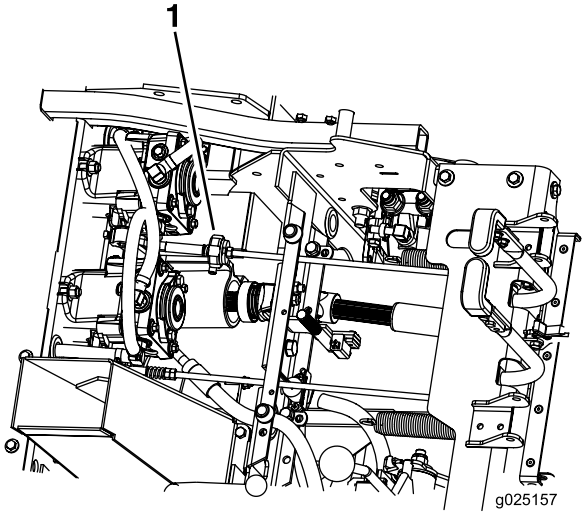


Figure 44

1. Tracking knob

Checking the Tire Pressure

Service Interval: Every 40 hours

Maintain the air pressure in the rear tires at 103 kPa (15 psi). Uneven tire pressure can cause uneven cut. Check the tires when they are cold, to get the most accurate pressure reading.

Note: The rear tire is a semi-pneumatic tire and does not require air pressure maintenance.

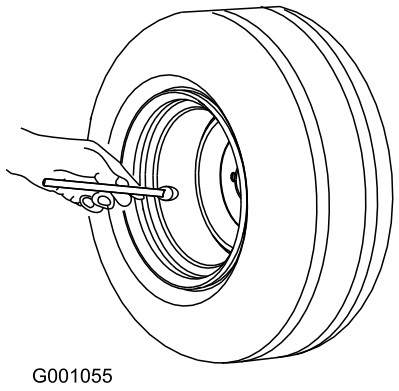


Figure 45

Note: Do not add any type of tire liner or foam fill material to the tires.

Checking the Wheel Lug Nuts

Service Interval: After the first 100 hours

Every 500 hours

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

Checking the Wheel Hub Nuts

Service Interval: After the first 100 hours

Every 500 hours

Check and ensure that the torque of the slotted nut is 373 to 475 N-m (275 to 350 ft-lb).

Adjusting the Caster Pivot Bearings

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

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the dust cap from the caster and tighten the locknut (Figure 46 and Figure 47).
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 46 and Figure 47).

   Important: Make sure that the spring washers are installed correctly as shown in Figure 46 and Figure 47.
5. Install the dust cap.

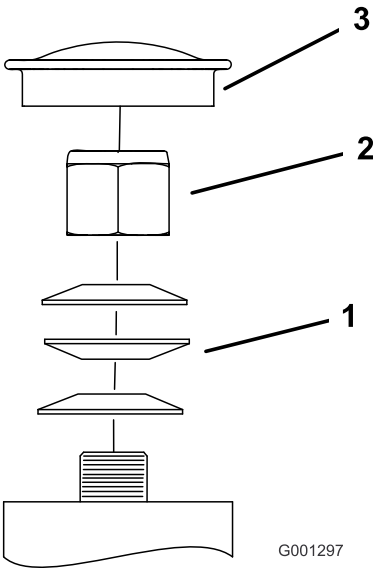


Figure 46
Front caster

1. Spring washers
2. Locknut
3. Dust cap

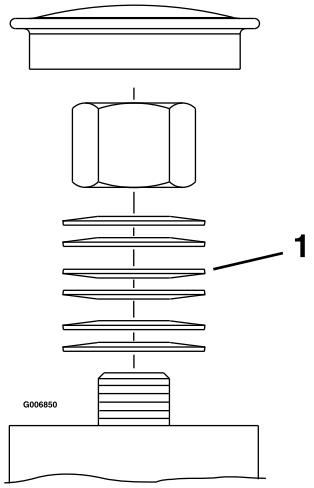


Figure 47
Rear caster

1. Spring washers

Cooling System Maintenance

Cleaning the Engine Screen and Engine Oil Cooler

Service Interval: Before each use or daily

Remove any buildup of grass, dirt, or other debris from the oil cooler.

Before each use remove any buildup of grass, dirt, or other debris from the engine screen. This will help ensure adequate cooling and correct engine speed and will reduce the possibility of overheating and mechanical damage to the engine.

Servicing the Engine Oil Cooler

Service Interval: Every 100 hours

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the fuel tank mounting nuts and swing out the fuel tank.
4. Keep the oil cooler free of debris, by cleaning the fins with a brush.
5. Swing the fuel tank in and secure it with the mounting nuts.
6. Back the mounting nuts off a 1/2 turn to allow for tank expansion.

Cleaning the Engine Cooling Fins and Shrouds

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

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the air intake screen and fan housing.
4. Clean the debris and grass from the engine parts.
5. Install air intake screen and fan housing.

Check and Clean the Hydraulic Pumps

Service Interval: Before each use or daily

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Raise the seat.
4. Clean the debris and grass from the hydraulic pumps.
5. Lower the seat.

Brake Maintenance

Adjusting the Parking Brake

Service Interval: After the first 100 hours

Every 500 hours thereafter

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

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Release the parking brake.
4. Tilt the seat forward.
5. Check and ensure there is no slack between the park brake handle and the linkage.
6. If an adjustment is necessary, remove the clevis pin and rotate the linkage counterclockwise to lengthen or clockwise to shorten.

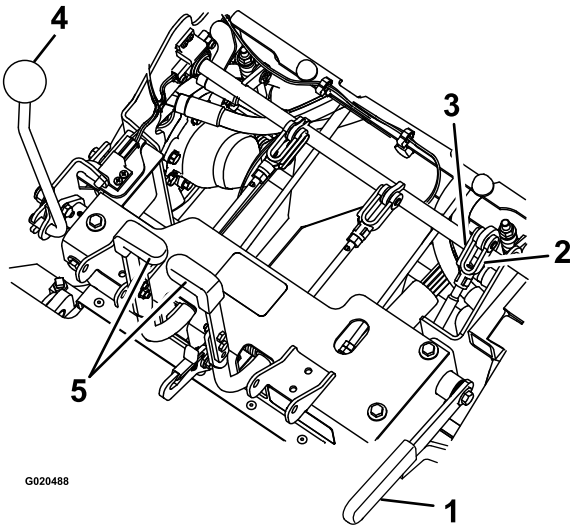


Figure 48

1. Parking brake
2. Rotate yoke
3. Clevis pin
4. Speed control lever
5. Steering levers

7. Measure the compressed spring length on both vertical spring assemblies. The spring should measure between 6 to 7 cm (2.35 to 2.85 inches). If necessary, adjust the nut at the top of the vertical spring assembly to achieve this distance.

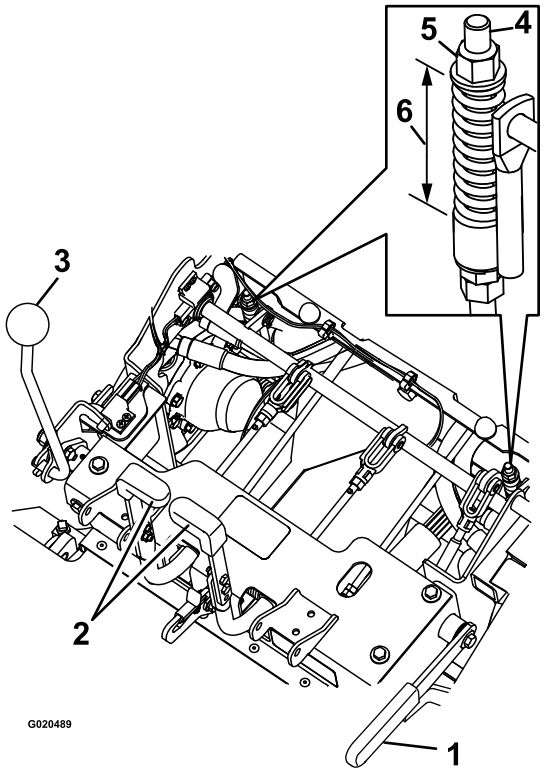


Figure 49

1. Parking brake
2. Steering lever
3. Speed control lever
4. Vertical spring assembly
5. Nut
6. 6 to 7 cm (2.35 to 2.85 inches)

8. The linkage length is adjusted with the two nuts at the bottom of the vertical spring assembly. The linkage should measure 22.7 to 23.3 cm (8.92 to 9.16 inches).

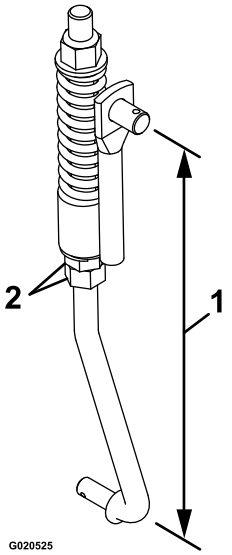


Figure 50

1. 22.7 to 23.3 cm (8.92 to 9.16 inches)
2. Nuts

9. Engage and disengage the brakes to check for proper engagement and disengagement. Adjust if necessary.

Note: When the brakes are disengaged, there should be little to no free play in the brake linkage with no dragging in the brakes.

Belt Maintenance

Inspecting the Belts

Service Interval: Every 40 hours

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Tilt the hopper up and check the pump and PTO drive belts for wear, cracking, or contamination.

   Note: The belts are spring tensioned and no adjustment is necessary unless the belts are replaced.

Replacing the PTO Belts

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. With the engine off, engage the PTO lever, then remove the hairpin and clevis pin at the bottom of the PTO brake band.
4. Rotate the brake band upwards out of the way of the belts keeping clear of the belt drive.
5. Disengage the PTO lever.
6. Loosen belt guides **A** and **B** (Figure 51).
7. Remove the belts.
8. Route the new belts onto the pulleys as shown in Figure 51.

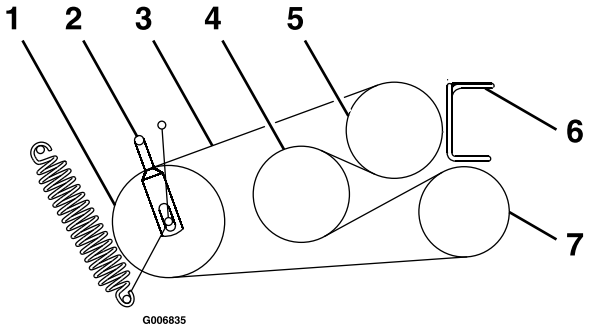


Figure 51

1. Idler
2. Belt guide **B**
3. PTO belt
4. Jackshaft
5. Engine
6. Belt guide **A**
7. Blower

9. Engage the PTO lever.
10. Rotate the brake band down into the original position.
11. Install clevis pin and hairpin to secure brake band.
12. Engage the PTO lever.

13. Loosen the jam nuts and adjust the linkage until the top of the idler arm is aligned with the bottom of the notch on the tension arm as shown in Figure 52.

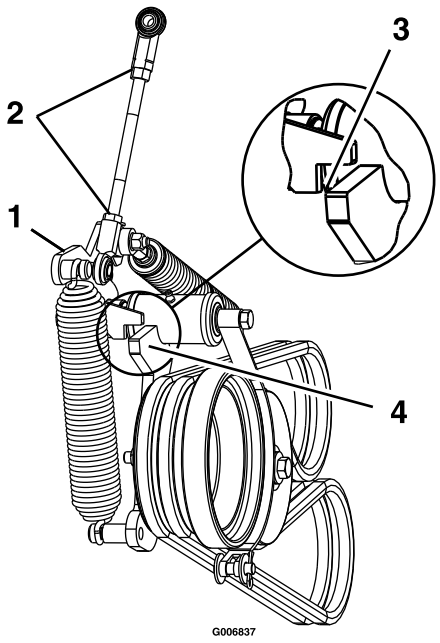


Figure 52

1. Tension Arm
2. Loosen jam nuts
3. When PTO is engaged, align top of idler arm with bottom of notch on tension arm, as shown.
4. Idler Arm

14. Tighten the jam nuts and disengage the PTO lever.
15. Engage PTO lever and check the alignment.
16. Check and adjust the belt guides as stated in Adjusting the Belt Guides (page 43).

Replacing the Pump Drive Belt

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the PTO Belts; refer to Replacing the PTO Belts (page 42).
4. Pull spring idler or remove spring to relieve pump drive belt tension.
5. Remove the old belt.
6. Route new belt onto sheaves as shown in the decal located on the back of the left drive shield (Figure 53).

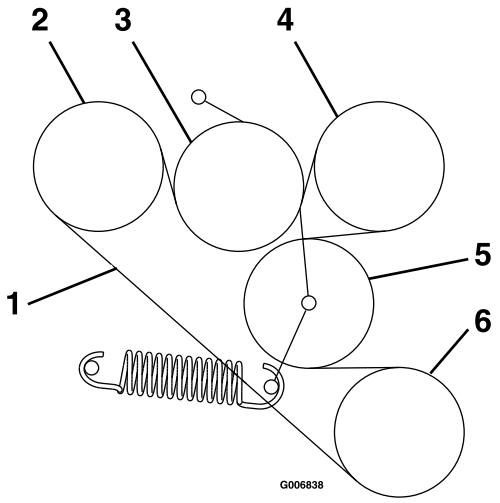


Figure 53

1. Pump Drive Belt
2. Pump
3. Idler
4. Pump
5. Idler
6. Engine

7. Install PTO Belts as stated in Replacing the PTO Belts (page 42).

Adjusting the Belt Guides

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. With the engine off, engage the PTO lever.
4. Adjust belt guides as shown in Figure 54.

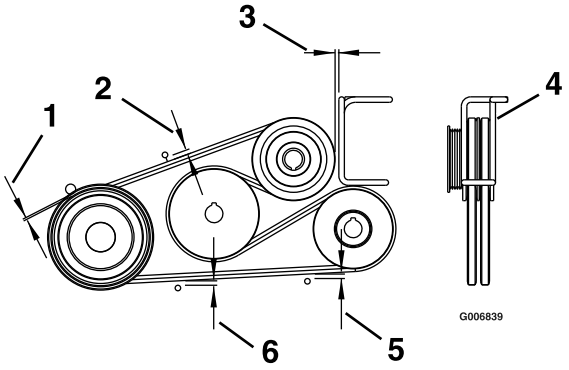


Figure 54

1. 3 mm (1/8 inch)
2. 11 mm (7/16 inch)
3. 3 mm (1/8 inch) Clearance
4. Rotate wireform guide to center belts in guide.
5. 6 mm (1/4 inch)
6. 8 mm (5/16 inch)

Controls System Maintenance

Adjusting the Reverse-Stop Rod

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Check the movement of the steering levers as follows:
   - If the levers move slightly forward up to 3 mm (1/8 inch) then no adjustment is necessary.
   - If the levers do not move, then proceed with the following steps:
     A. Flip up the seat up or remove the seat frame assembly (with the seat attached) to obtain a clear view of the steering control shaft to complete this adjustment.
     B. Place the speed control lever in the neutral position.
     C. Release the parking brake.
     D. Slightly adjust the length of the rod by loosening the jam nut and by rotating the rod.

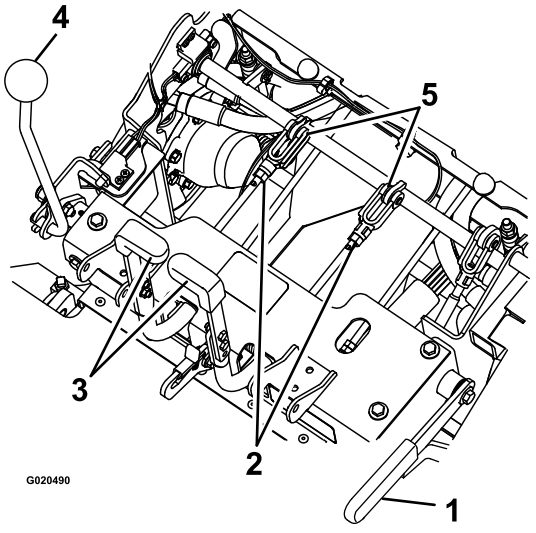


Figure 55

1. Parking brake
2. Nut
3. Steering lever
4. Speed control lever
5. Clevis pin and stop rod

     E. Engage the parking brake and check the steering levers.

     Repeat steps C through E until up to 3 mm (1/8 inch) movement is achieved.

     F. Install the seat frame assembly, if removed in step A.

Adjusting the Speed-Control Lever Tension

1. Stop the machine and move the speed-control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. To adjust the tension, adjust the pivot nut which is located at the end of the motion control shaft in front of the righthand console (Figure 56).

   Note: Set the tension high enough that the speed control lever position is maintained during operation and loose enough to be moved comfortably by the operator.

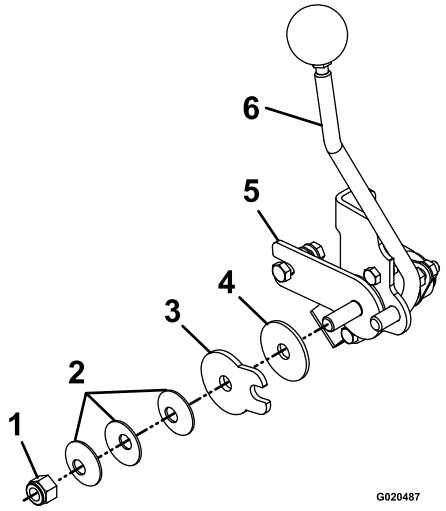


Figure 56

1. Pivot nut
2. Spring disc washers
3. Speed control friction plate
4. Friction disc
5. Speed control friction bracket
6. Speed control lever

Adjusting the Speed-Control Linkage

⚠ WARNING

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

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

⚠ CAUTION

Raising the mower deck for service or maintenance relying solely on mechanical or hydraulic jacks could be dangerous. The mechanical or hydraulic jacks may not be enough support or may malfunction allowing the unit to fall, which could cause injury.

Do Not rely solely on mechanical or hydraulic jacks for support. Use adequate jack stands or equivalent support.

Set neutral position as follows:

1. Stop the machine and move the speed-control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the electrical connection from the seat safety switch, located directly in front of the seat switch assembly.
4. The neutral adjustment must be made with the drive wheels turning. Raise the frame and place on jack stands so that drive wheels can rotate freely.
5. Temporarily install a jumper wire across the terminals in the connector of the wiring harness.
6. Start the engine.
7. Run the unit at least 5 minutes with the speed control lever at full forward speed to bring hydraulic system oil up to operating temperature.
8. Return the speed control lever to neutral (full rear) position.
9. To obtain the neutral position, adjust the left and right pump control rod linkages that connect the steering control to the pump control arms until the wheels stop, or creep slightly in reverse (Figure 57).
10. Adjust the left pump linkage by rotating the tracking adjustment knob.
11. Adjust the right pump linkage by using a wrench to turn the double nuts on the assembly (Figure 57)

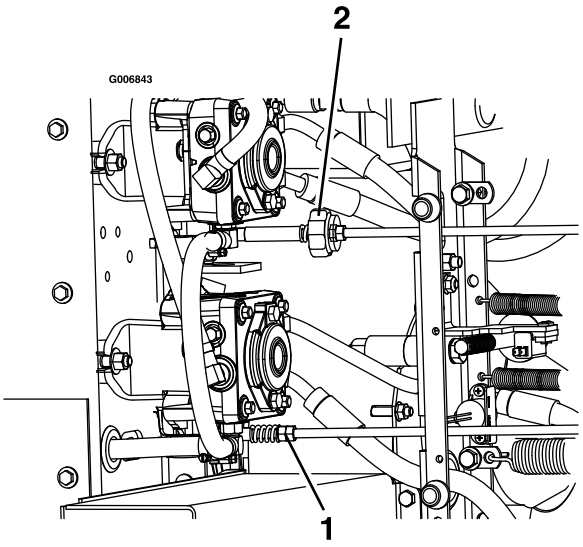


Figure 57

1. Rotate tracking knob on left side
2. Rotate double nuts on right side

12. Move the steering levers to the reverse position. While applying slight pressure to the levers, allow the steering levers to return to neutral. The wheels must stop turning or slightly creep in reverse.
13. Stop the engine and wait for all moving parts to stop.
14. Remove the jumper wire from wire harness connector and plug the connector into seat switch.
15. Lower the machine from the jackstands.

Aligning the PTO Drive Pulley

The PTO drive pulley alignment is necessary for any of the following conditions:

- The blower has been removed or replaced.
- The engine mounting bolts have been loosened or the engine has been moved or replaced.
- The jackshaft mounting bolts have been loosened or the jackshaft has been moved or replaced.

1. Stop the machine and move the speed-control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Remove the fuel tank mounting nuts and swing out the fuel tank.
4. Verify that the blower is installed and tightly secured.
5. Loosen the four engine mounting bolts.
6. Unhook the pump belt tension spring.
7. Loosen the four jackshaft mounting bolts.
8. Measuring from the blower pulley as a baseline, move the engine and jackshaft until the rear surface of all three pulleys are aligned within 0.8 to 1.6 mm (1/32 inch to 1/16 inch) (Figure 58).

Note: Use a straight edge to align all three surfaces.

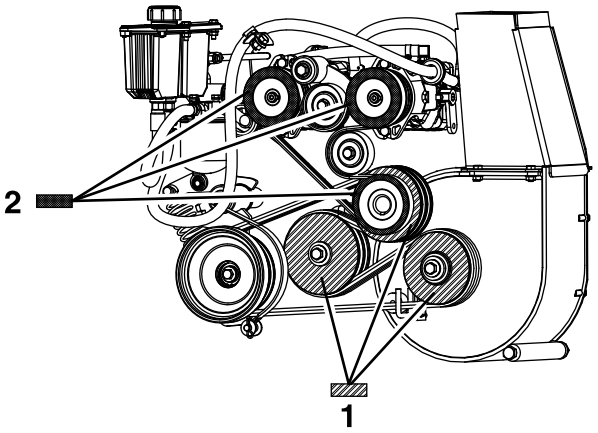


Figure 58

1. Align the three pump drive pulley surfaces shown with this pattern within 0.8 to 1.6 mm (1/32 inch to 1/16 inch).
2. Align the three PTO drive pulley surfaces shown with this pattern within 0.8 to 1.6 mm (1/32 inch to 1/16 inch).

9. Tighten the four engine mounting bolts and four jackshaft mounting bolts. Check the alignment after tightening.
10. Install the pump belt tension spring.
11. Swing the fuel tank in and install tank mounting nuts.
12. Align the pump drive pulley; Aligning the Pump Drive Pulley (page 46).

Aligning the Pump Drive Pulley

The pump drive pulley alignment is necessary for any of the following conditions:

- The engine mounting bolts have been loosened or the engine has been moved or replaced.
- The pump pulleys have been loosened, moved, or replaced.
- The PTO pulley alignment has been performed; refer to Aligning the PTO Drive Pulley (page 45).

1. Stop the machine and move the speed-control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Loosen the set screws on both pump pulleys.
4. Using a straight edge, align each pump pulley with the engine pulley by sliding it along the pump shaft (Figure 58).
5. Tighten the pulley set screws and check the alignment.

Adjusting the PTO Brake Spring

The PTO brake spring adjustment is only necessary if the blower has been removed or replaced or if the PTO drive idler arm has been disassembled.

1. Stop the machine and move the speed-control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Locate the brake spring and thread the two jam nuts out to the end of the brake spring rod (Figure 59).
4. Tighten the jam nuts together at end of the brake-spring rod.

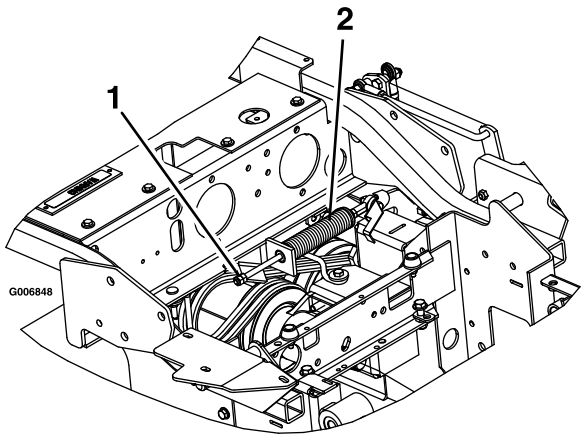


Figure 59

1. Tighten the jam nuts here
2. PTO Brake spring assembly

Adjusting the Hopper Door

1. Stop the machine and move the speed-control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Loosen the six door hinge nuts (Figure 60).
4. Open the door and place a 3/8 inch rubber strip or 3/8 inch diameter hose between the hopper and the hopper door (Figure 60).
5. Close the door and push it tight against the hopper.
6. Tighten the hinge hardware. Open the hopper door and remove the rubber strip.

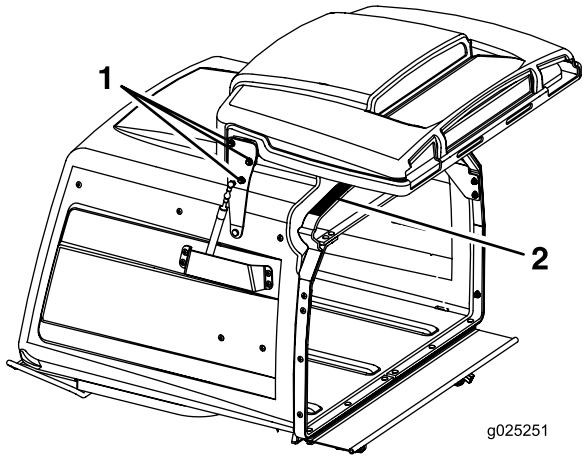


Figure 60

1. Loosen door hinge nuts-three per side
2. Place a piece of 9.5 mm (3/8 inch) rubber on this surface

Mower Deck Locking Pin Stop Adjustment

1. Slide the mower deck locking pins in on both sides and rotate to lock the mower deck in the operation position.
2. Loosen the jam nut and turn the stop screw clockwise until the locking pins is tight and cannot be rotated by hand (Figure 61).

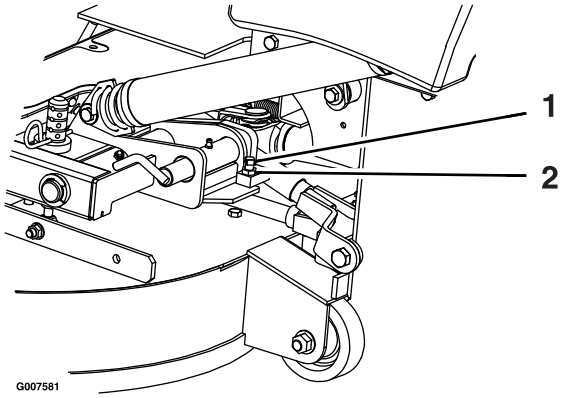


Figure 61

1. Rotate stop screw clockwise until locking pin is tight, then back off 1/2 turn.
2. Loosen jam nut

3. Loosen the stop screw counter clockwise 1/2 turn and tighten the jam nut
4. Test the locking pin to make sure it slides freely. Readjust if necessary.

Hydraulic System Maintenance

Servicing the Hydraulic System

Hydraulic Oil Type: Toro® HYPR-OIL™ 500 hydraulic oil or Mobil® 1 15W-50.

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

Checking the Hydraulic Oil

Service Interval: Every 40 hours—Check the hydraulic oil level.

1. Position the machine on a level surface.
2. Move the speed control lever to the neutral position to stop the machine.
3. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
4. Allow the engine and the hydraulic system to cool for 10 minutes.

   Note: To get the correct reading, check the hydraulic oil level when the machine is not hot.
5. Raise the seat up.
6. Clean the area around the dipstick of the hydraulic-system reservoir (Figure 62).
7. Remove the dipstick from the hydraulic reservoir (Figure 62).
8. Wipe the dipstick off and thread the dipstick into the reservoir.
9. Remove the dipstick and look at the end (Figure 62). If the oil level is at the add mark , slowly pour only enough oil into the hydraulic reservoir to raise the level to the full line.

   Important: Do not overfill the hydraulic units with oil as damage may occur. Do not run the machine with the oil below the add mark.
10. Install the dipstick.

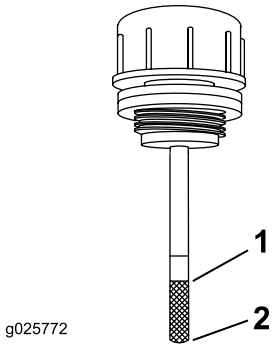


Figure 62

1. Full
2. Add

⚠ WARNING

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

- **If hydraulic oil 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 oil.**
- **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 oil 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

Service Interval: After the first 100 hours—Change the hydraulic filter and reservoir hydraulic oil when using any type of oil.

Every 250 hours—Change the hydraulic filter and reservoir hydraulic oil when using Mobil® 1 oil (more often in dirty or dusty conditions).

Every 500 hours—Change the hydraulic filter and reservoir hydraulic oil when using Toro® HYPR-OIL™ 500 hydraulic oil (more often in dirty or dusty conditions).

Note: Use a summer filter when the temperature is 0 C degrees (32 F degrees) and above. Use a winter filter when the temperature is 0 C degrees (32 F degrees) and below.

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Carefully clean the area around the filter.

   Important: Ensure that no dirt or contamination enter the hydraulic system.
4. Unscrew and remove the filter and allow the oil to drain from the reservoir.

   Note: Do not change hydraulic system oil (except for what can be drained when changing the filter), unless it is felt the oil has been contaminated or been extremely hot. Changing the hydraulic oil unnecessarily could damage the hydraulic system by introducing contaminates into the system.
5. Before installing the new filter, fill it with Toro® HYPR-OIL™ 500 hydraulic oil and apply a thin coat of oil on the surface of the rubber seal.
6. Turn the filter clockwise until the rubber seal contacts the filter adapter, then tighten the filter an additional 2/3 to 3/4 turn.
7. Fill the reservoir as stated in (page).
8. Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.
9. Start the engine and move the throttle control ahead to full throttle position.
10. Move the speed control levers to the full speed position and run the machine for several minutes. Shut down the machine and check the oil level.

Mower Deck Maintenance

Leveling the Mower Deck

Setting Up the Machine

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

1. Position the machine on a flat surface.
2. Move the speed control lever to the neutral position to stop the machine.
3. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
4. Check the tire pressure of the drive tires. If needed, adjust the pressure to 103 kPa (15 psi)

Deck Leveling

1. Stop the machine and move the speed control lever to the neutral position.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Verify all hairpin cotter pins are in the 7.62 cm (3 inch) mower deck height holes with the spacers under the hairpin cotter pins (Figure 63).

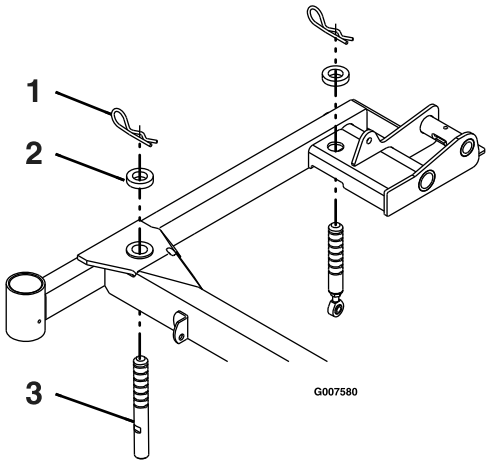


Figure 63
Right Hand Side Shown

1. Hairpin cotter pin
2. Spacer
3. Mower deck support pin

4. Shorten or lengthen each mower deck support pin to obtain blade tip height of 7.62 cm (3 inches) at the front of the deck and 8.26 cm (3 1/4 inches) at the rear of the deck (Figure 63).

   Note: The front pins are thread into the mower deck and have a jam nut. The rear pins have a rod end threaded into them with a jam nut.

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.

⚠ DANGER

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

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

Before Inspecting or Servicing the Blades

Park the machine on a level surface, disengage the blade control switch (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. Lift the mower deck and secure in the raised position. Refer to Raising the Mower Deck into Service Position (page 20).
2. Inspect the cutting edges (Figure 64). If the edges are not sharp or have nicks, remove and sharpen the blades. Refer to Sharpening the Blades.
3. Inspect the blades, especially the curved area (Figure 64). If you notice any damage, wear, or a slot forming in this area (Figure 64), immediately install a new blade.

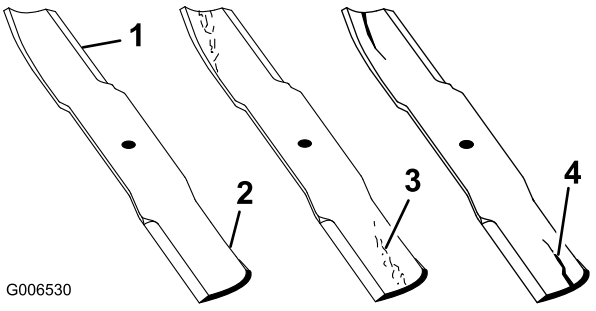


Figure 64

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

4. Lower the mower deck into operating position. Refer to Lowering the Mower Deck to the Operating Position (page 21).

Checking for Bent Blades

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Rotate one blade as shown inFigure 65.
4. Measure from a level surface to the cutting edge at position **A** of the blade (Figure 65). Note this dimension.

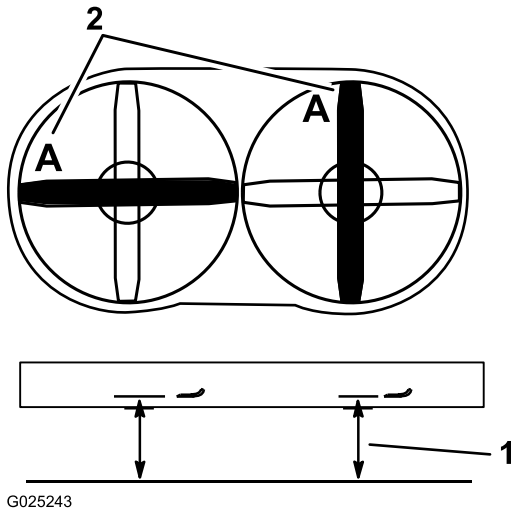


Figure 65

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

5. Rotate the opposite end of the blade to position **A**.
6. Measure from a level surface to the cutting edge of the blade at the same position as in step 3 above. The difference between the dimensions obtained in steps 3 and 5 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.
7. Repeat the previous steps for the opposite blade.

⚠ WARNING

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

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

Removing the Blades

Note: Make note of the red colored blade position. From the normal user position, it is located on the right-hand side.

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

1. Lift the mower deck and secure in the raised position. Refer to Raising the Mower Deck into Service Position (page 20).
2. Hold the blade end using a rag or thickly-padded glove.
3. Remove the blade, washer, and blade bolt that secures the blade and blade driver (Figure 66).

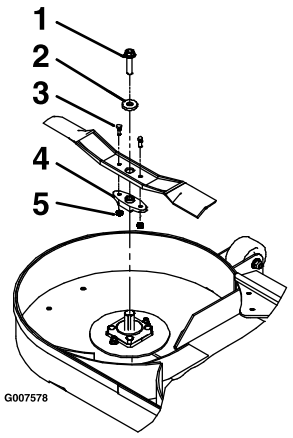


Figure 66

1. Blade bolt— torque to 85-110 ft-lb (115-149 N-m).
2. Washer
3. Shear bolts—torque to 80–100 in-lb (922-1130 N-cm)
4. Blade driver
5. Lock nuts

4. Remove the blade driver from the existing blade (Figure 66).

Sharpening the Blades

⚠ WARNING

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

Wear proper eye protection when sharpening blades.

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 67). Maintain the original angle. The blade retains its balance if the same amount of material is removed from both cutting edges.

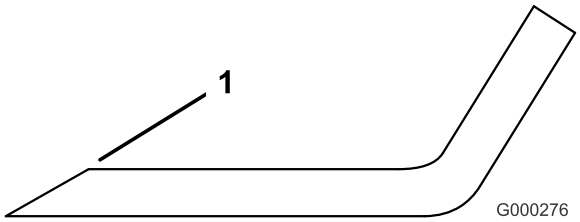


Figure 67

1. Sharpen at original angle

2. Check the balance of the blade by putting it on a blade balancer (Figure 68). 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. Repeat this procedure until the blade is balanced.

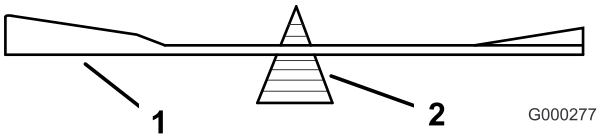


Figure 68

1. Blade
2. Balancer

Installing the Blades

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

Note: Ensure the red colored blade is installed on the right-hand side.

1. Install the blade driver to the new blades with the shear bolts and locknuts (Figure 66).
2. Torque the shear bolts to 80-100 in-lb (922-1130 N-cm).

   Note: The blade-driver flats must be aligned with the flats on the shaft when installing the blade on the mower deck.
3. Install the blade, washer, and blade bolt to the spindle shaft (Figure 66).
4. Torque the blade bolt to 85-110 ft-lb (115-149 N-m).
5. Lower the mower deck to the operating position. Refer to Lowering the Mower Deck to the Operating Position (page 21).

⚠ WARNING

Operating a mower deck with loose or weakened blade bolts can be dangerous. A loose or weakened blade bolt could allow a blade rotating at a high speed to come out from under the mower deck, causing serious injury or property damage.

- **Replace the blade bolt after striking a foreign object.**
- **Use only genuine Toro replacement parts.**
- **Do not lubricate the threads of the bolt or spindle before assembly.**

Removing the Mower Deck

⚠ WARNING

Operating this machine without an approved Toro front mount attachment increases the possibility of operator entanglement in drive wheels or forward tip over. Entanglement or tip-over could cause serious injury or death.

When operating this machine without an approved Toro front mount attachment, observe the following:

- **Keep feet and clothing away from tires.**
- **Limit operation to minimum required to install a different front mount attachment.**
- **Minimize speed and use extreme caution.**
- **Only operate on a flat level surface.**
- **Do Not operate up or down a trailer ramp.**
- **Avoid sudden acceleration or deceleration.**

Important: Do Not transport this machine without an approved Toro front mount attachment.

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Raise mower deck up and latch with deck locking pins. Refer to Raising the Mower Deck into Service Position (page 20).
3. Remove hairpins and washers at the top of the deck lift assist spring on each side of the unit (Figure 69).

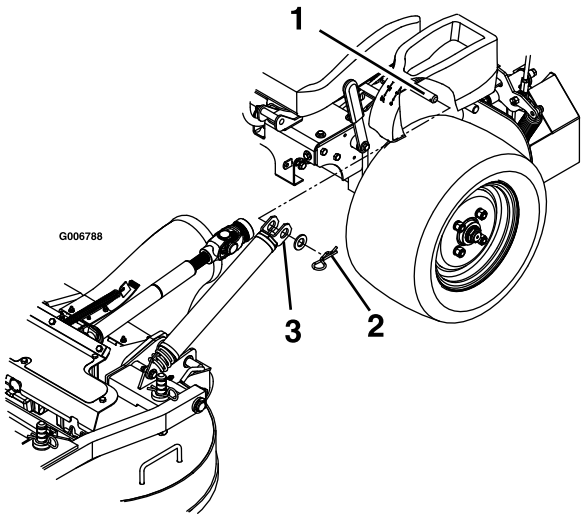


Figure 69

1. Spring anchor pin under console
2. Secure springs with a washer and hairpin
3. Slide spring onto spring anchor pin

4. Remove the spring from the spring anchor. Repeat for other side of unit.
5. Un-latch the mower deck from the raised position and slowly lower the mower deck to ground; refer to Lowering the Mower Deck to the Operating Position (page 21).

   Note: The mower deck will become heavier once the springs are removed from the anchors. Lower the mower deck carefully.
6. Remove the lynch pins at front of push arms on both sides of the machine (Figure 70).

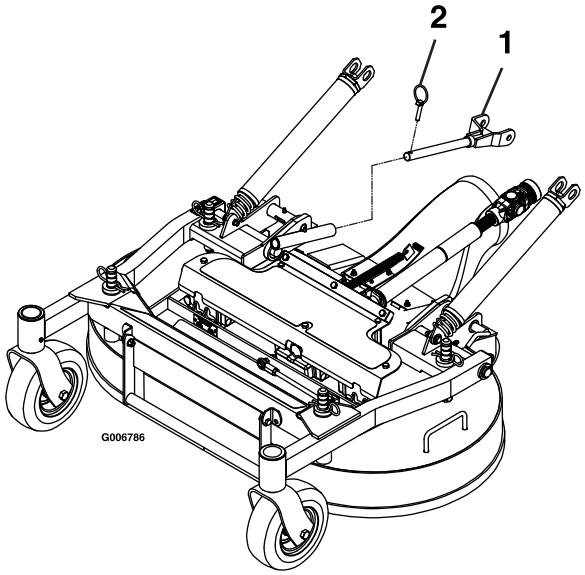


Figure 70

1. Slide the push arm into the deck push arm tube
2. Secure the push pin arm with lynch pin

7. Remove the hairpin and clevis from both sides of the PTO guard (Figure 71).

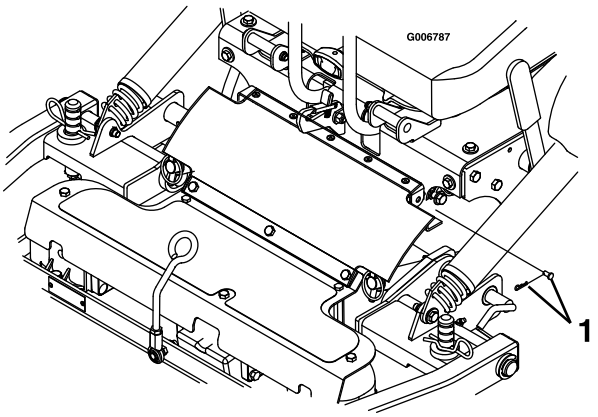


Figure 71

1. Secure PTO guard with clevis pin and hairpin

8. Raise the seat and disconnect the drive shaft using the quick coupler at the jackshaft (Figure 72).

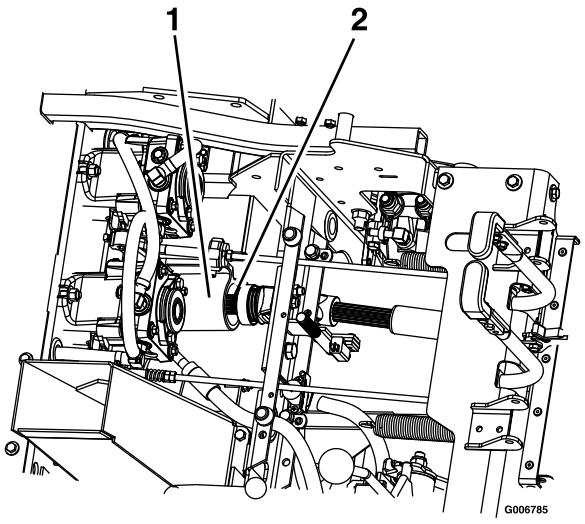


Figure 72

1. Jackshaft
2. Drive shaft

9. Pull the mower deck forward to remove it from the machine.

Installing the Mower Deck

Important: Do not transport the machine without an approved Toro front mount attachment.

1. Stop the engine, wait for all moving parts to stop and remove the key. Engage the parking brake.
2. Roll the mower deck up to the machine with the discharge tube down, making sure the deck springs are located above the drive wheel and below the console on each side.
3. Raise the seat and instal the l drive shaft onto the jackshaft (Figure 72)
4. Align the mower deck push-arm tubes to machine push-arms and push the mower deck rearward.
5. Secure the push arms with the lynch pins on the left and right sides of the machine (Figure 70).
6. Align the upper portion of the rubber PTO guard to the tabs on the front of the console and secure with a clevis pin and hairpin on each side (Figure 71).
7. Release the mower deck locking pins on each side, raise the mower deck to the service position and secure the deck latch onto hook. Refer to Raising the Mower Deck into Service Position (page 20).
8. Install the springs onto the spring anchor pins under the left and right consoles and secure with a washer and hairpin (Figure 69).
9. Un-latch the mower deck from the raised position, slowly lower the mower deck to ground and lock the deck locking pins on each side. Refer to Lowering the Mower Deck to the Operating Position (page 21).

Adjusting the Mower Deck-Locking Pin Stop

1. Slide the mower deck-locking pins in on both sides and rotate to lock the deck in the operation position.
2. Loosen the jam nut and turn the stop screw clockwise until the locking pin is tight and cannot be rotated by hand (Figure 73).

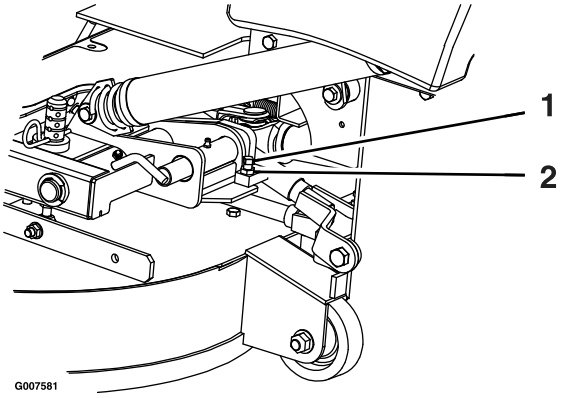


Figure 73

1. Rotate the stop screw clockwise until locking pin is tight, then back off 1/2 turn.
2. Loosen the jam nut

3. Loosen the stop screw counter clockwise 1/2 turn and tighten the jam nut.
4. Test the locking pin to make sure it slides freely. Adjust if necessary.

Cleaning

Cleaning Under the Mower

Service Interval: Before each use or daily

1. Move the speed control lever to the neutral position to stop the machine.
2. Disengage the PTO, engage the parking brake, stop the engine, and wait for all moving parts to stop.
3. Lift the mower deck and secure in the raised position. Refer to Raising the Mower Deck into Service Position (page 20).
4. Clean any grass build-up under the mower deck.
5. Lower the mower deck to the operating position. Refer to Lowering the Mower Deck to the Operating Position (page 21).

Cleaning Debris from the Machine

Service Interval: Before each use or daily

1. Stop the engine, wait for all moving parts to stop, and remove the key. Engage the parking brake.
2. Clean off any oil, debris, or grass build-up on the machine, especially around the fuel tank, around the engine and exhaust area.

Disposing of Waste

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

Storage

Cleaning and Storage

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

   Important: You can wash the machine with mild detergent and water. Do not pressure wash the machine. Avoid excessive use of water, especially near the control panel, engine, hydraulic pumps, and motors.
3. Check the brake; refer to Servicing the Brake in the Maintenance Section.
4. Service the air cleaner; refer to Servicing the Air Cleaner in the Maintenance Section.
5. Grease the machine; refer to Greasing and Lubrication in the Maintenance Section.
6. Change the crankcase oil; refer to Servicing the Engine Oil in the Maintenance Section.
7. Check the tire pressure; refer to Checking the Tire Pressure in the Maintenance Section.
8. Change the hydraulic filters; refer to Servicing the Hydraulic System in the Maintenance Section.
9. Charge the battery; refer to Servicing the Battery in the Maintenance Section.
10. Scrape any heavy buildup of grass and dirt from the underside of the mower, then wash the mower with a garden hose.

    Note: Run the machine with the blade control switch (PTO) engaged and the engine at high idle for 2 to 5 minutes after washing.
11. Check the condition of the blades; refer to Servicing the Cutting Blades in the Maintenance Section.
12. For storage over 30 days, prepare the machine as follows:

    A. Add a petroleum-based stabilizer/conditioner to fuel in the tank. Follow the 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 the Maintenance Section.

D. Restart the engine and run it until it stops.

E. Dispose of fuel properly. Recycle as per local codes.

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

13. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.

14. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.

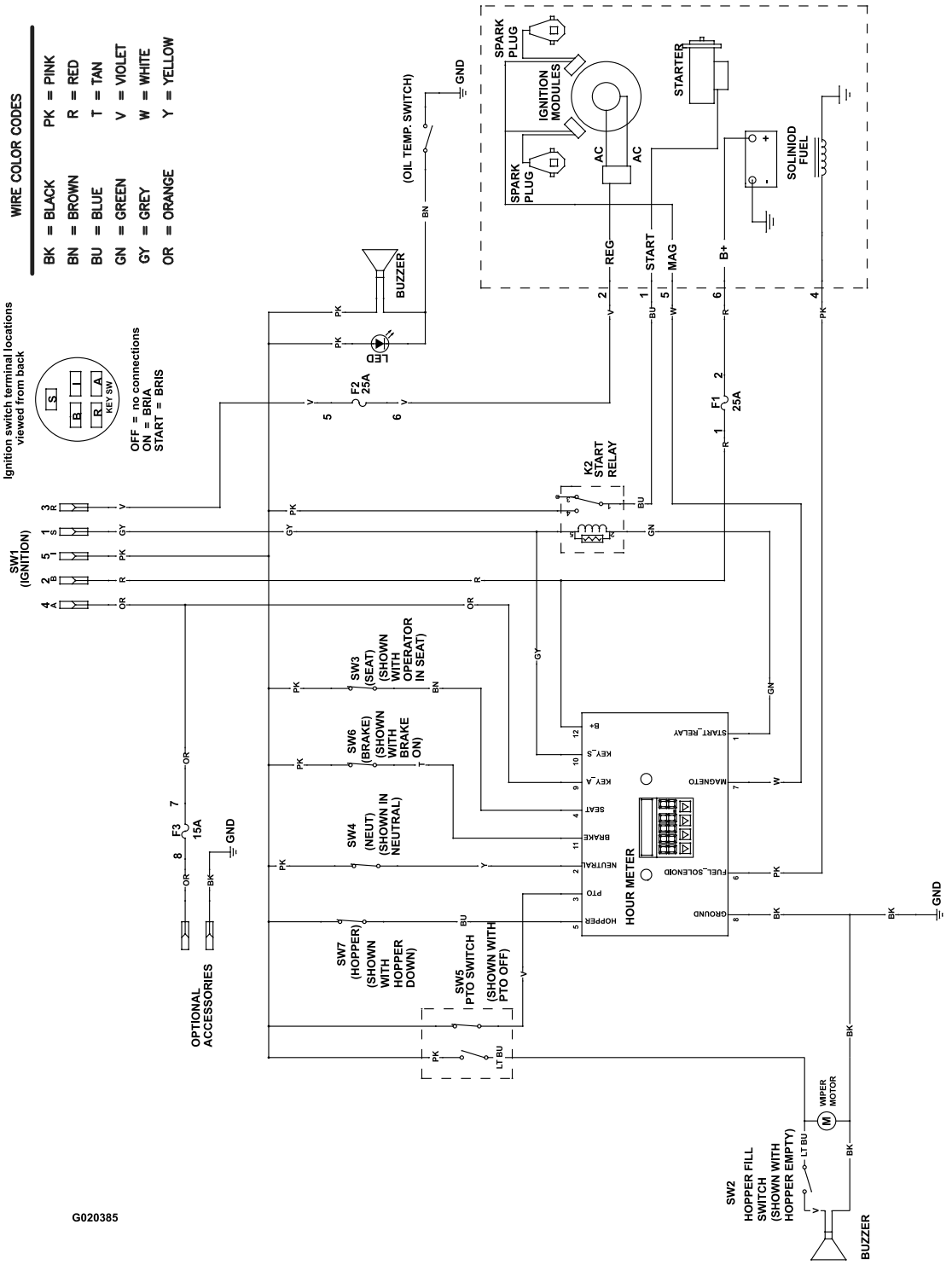
15. Store the machine in a clean, dry garage or storage area. Remove the key from the ignition switch and keep it out of reach of children or other unauthorized users. Cover the machine to protect it and keep it clean.

Troubleshooting

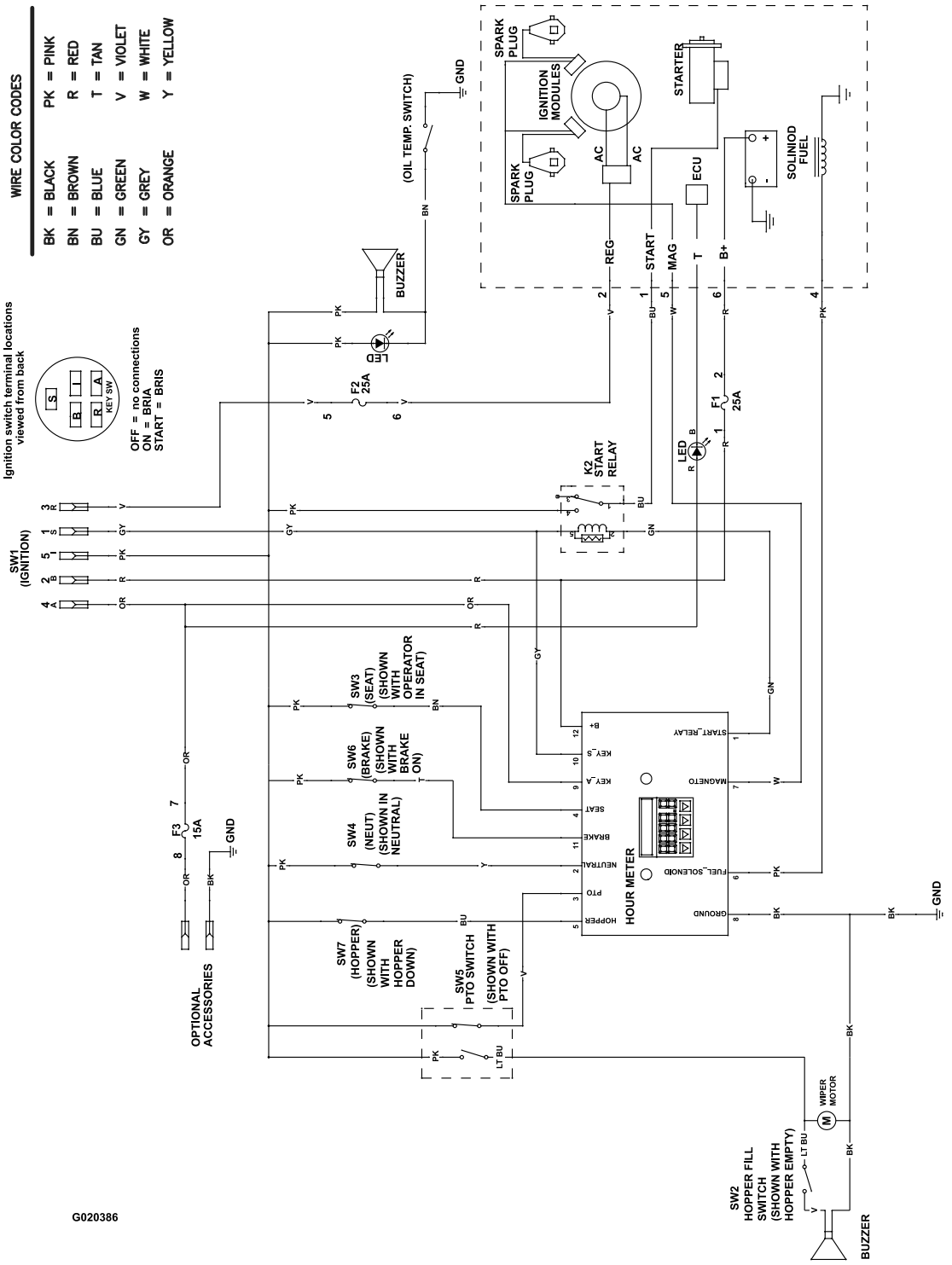
Problem	Possible Cause	Corrective Action
The starter does not crank.	1. PTO is engaged. 2. The parking brake is not set. 3. The speed control lever is not in neutral position. 4. The battery does not have a full charge. 5. The electrical connections are corroded, loose or faulty. 6. The fuse is blown. 7. The relay or switch is worn or damaged.	1. Disengage the PTO. 2. Set the parking brake. 3. Ensure the speed control lever is in the neutral position. 4. Charge the battery. 5. Check the electrical connections for good contact. 6. Replace the blown fuse. 7. Contact an Authorized Service Dealer.
The engine does not start, starts hard, or fails to keep running.	1. The fuel tank is empty. 2. The fuel-shutoff valve is closed. 3. The oil level in the crankcase is low. 4. The throttle and choke are not in the correct position. 5. There is dirt in the fuel filter. 6. There is dirt, water, or stale fuel is in the fuel system. 7. The air cleaner is dirty. 8. The electrical connections are corroded, loose, or damaged. 9. The relay or switch is worn or damaged. 10. The spark plug is fouled or improperly gapped. 11. The spark-plug wire is not connected.	1. Fill the fuel tank. 2. Open the fuel-shutoff valve. 3. Add oil to the crankcase. 4. Be sure the throttle control is midway between the “SLOW” and “FAST” positions, and the choke is in the closed/on position for a cold engine (except Kohler EFI) or the open/off position for a warm engine. 5. Replace the fuel filter. 6. Contact an Authorized Service Dealer. 7. Clean or replace the air-cleaner element. 8. Check the electrical connections for good contact. Clean the connector terminals thoroughly with electrical-contact cleaner, apply dielectric grease, and make the appropriate connections. 9. Contact an Authorized Service Dealer. 10. Adjust or replace the spark plug. 11. Check the spark-plug wire connection.
The engine loses power.	1. The engine load is excessive. 2. The air cleaner is dirty. 3. The oil level in the crankcase is low. 4. The cooling fins and the air passages above the engine are plugged. 5. The vent hole in the fuel cap is plugged. 6. There is dirt in the fuel filter. 7. There is dirt, water, or stale fuel is in the fuel system.	1. Reduce the ground speed. 2. Clean the air-cleaner element. 3. Add oil to the crankcase. 4. Remove the obstruction from the cooling fins and the air passages. 5. Clean or replace the fuel cap. 6. Replace the fuel filter. 7. Contact an Authorized Service Dealer.
The engine overheats.	1. The engine load is excessive. 2. The oil level in the crankcase is low. 3. The cooling fins and air passages for the engine are plugged.	1. Reduce the ground speed. 2. Add oil to the crankcase. 3. Remove the obstructions from the cooling fins and air passages.
The mower pulls left or right (with levers fully forward).	1. The tracking needs adjustment. 2. The tire pressure in drive tires not correct. 3. The reverse indicator and speed control linkage need adjustment.	1. Adjust the tracking. 2. Adjust tire pressure in the drive tires. 3. Adjust the reverse indicator and the speed control linkage.

Problem	Possible Cause	Corrective Action
The machine does not drive.	1. The bypass valve is not closed tight. 2. The drive or pump belt is worn, loose or broken. 3. The drive or pump belt is off a pulley. 4. The idler spring is broken or missing. 5. The hydraulic fluid level is low or too hot.	1. Tighten the bypass valve. 2. Change the belt. 3. Change the belt. 4. Replace the spring. 5. Add hydraulic fluid to reservoir or let it cool down.
The machine vibrates abnormally.	1. The cutting blade(s) is/are bent or unbalanced. 2. The blade mounting bolt is loose. 3. The engine mounting bolts are loose. 4. There is a loose engine pulley, idler pulley, or blade pulley. 5. The engine pulley is damaged. 6. The blade spindle is bent. 7. The belt is damaged.	1. Install new cutting blade(s). 2. Tighten the blade mounting bolt. 3. Tighten the engine mounting bolts. 4. Tighten the appropriate pulley. 5. Contact an Authorized Service Dealer. 6. Contact an Authorized Service Dealer. 7. Install new belt.
The machine produces an uneven cutting height.	1. The blade(s) is/are not sharp. 2. The cutting blade(s) is/are bent. 3. The mower deck is not level. 4. The underside of mower is dirty. 5. The tire pressure in drive tires not correct. 6. The spacers are in the wrong location. 7. The tips of adjacent blades are at an uneven cutting height. Blades tips should be even within 3/16 inch which is approximately one blade thickness.	1. Sharpen the blade(s). 2. Install new cutting blade(s). 3. Level the mower deck from side-to-side and front-to-rear. 4. Clean the underside of the mower. 5. Adjust the tire pressure in the drive tires. 6. Position the spacers under hairpins. 7. Replace blades, spindles and (or) check for damage to mower deck.
The blades do not rotate.	1. The PTO belt is worn, loose, or broken. 2. The PTO shaft is not connected. 3. The PTO belt is off pulley.	1. Check the belt tension or replace belt 2. Connect the PTO shaft. 3. Check the belt for damage. Install the belt and check adjusting shafts and belt guides for correct position.

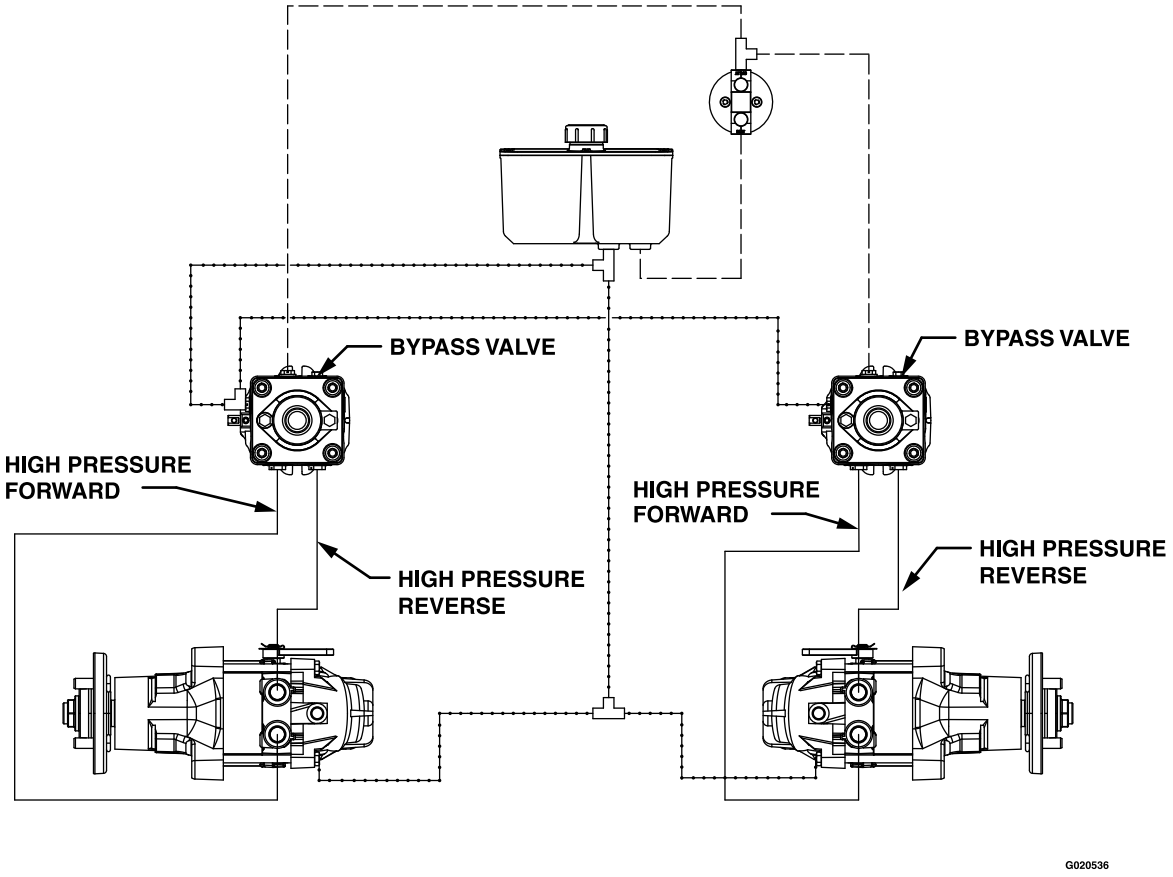
Schematics



Wire Diagram (Not EFI machines) (Rev. A)



Wire Diagram (EFI machines) (Rev. A)



HIGH PRESSURE

CHARGE PUMP

CASE DRAIN

Hydraulic Diagram (Rev. A)

Notes:

Notes:

Notes:

The Toro Total Coverage Warranty

A Limited Warranty (see warranty periods below)

Landscape Contractor Equipment (LCE)

Conditions and Products Covered

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

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

Products	Warranty Period
21 in. Mowers	2 years Residential Use[1] 1 year Commercial Use
• Engines[4]	Honda – 2 years Kawasaki – 3 years
30 in. Mowers	2 years Residential Use[1] 1 year Commercial Use
• Engines[4]	Kawasaki – 3 years
Mid-Size Walk-Behind Mowers	2 years
• Engines[4]	Kawasaki – 3 years
Grand Stand® Mowers	5 years or 1,200 hours[2]
• Engines[4]	3 years
• Frame	Lifetime (original owner only)[3]
Z Master® 2000 Series Mowers	4 years or 500 hours[2]
• Engines[4]	3 years
• Frame	Lifetime (original owner only)[3]
Z Master® 3000 Series Mowers	5 years or 1,200 hours[2]
• Engines[4]	3 years
• Frame	Lifetime (original owner only)[3]
Z Master® 5000 Series Mowers	5 years or 1,200 hours[2]
• Engines[4]	Kohler Command – 2 years Kohler EFI – 3 years
• Frame	Lifetime (original owner only)[3]
Z Master® 6000 Series Mowers	5 years or 1,200 hours[2]
• Engines[4]	Kawasaki – 3 years
• Frame	Lifetime (original owner only)[3]
Z Master®7000 Series Mowers	5 years or 1,200 hours[2]
• Engines[4]	2 years
• Frame	Lifetime (original owner only)[3]
Z Master®8000 Series Mowers	2 years or 1,200 hours[2]
• Engines[4]	2 years
• Frame	Lifetime (original owner only)[3]
All Mowers	
• Battery	90 days Parts and Labor 1 year Parts only
• Belts and Tires	90 days
• Attachments	1 year

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

[2]Whichever occurs first.

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

[4]Some engines used on Toro Products are warranted by the engine manufacturer.

Instructions for Obtaining Warranty Service

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

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

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

Owner Responsibilities

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

Items and Conditions Not Covered

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

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

General Conditions

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

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

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

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

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

Countries Other than the United States or Canada

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

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