Form No. 3354-434 Rev A

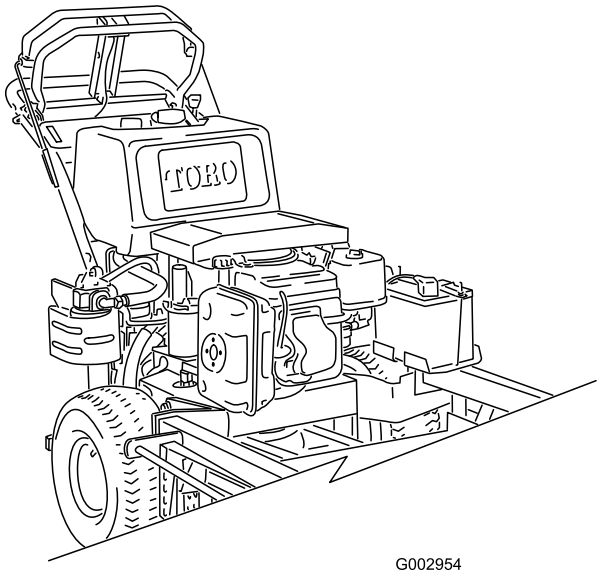
TORO®

Count on it.

Operator's Manual

Mid-Size T-bar Hydro, 15hp Traction Unit

Model No. 30187—Serial No. 260000001 and Up



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Warning

CALIFORNIA
Proposition 65 Warning

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

This spark ignition system complies with Canadian ICES-002

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

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

Introduction

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

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

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

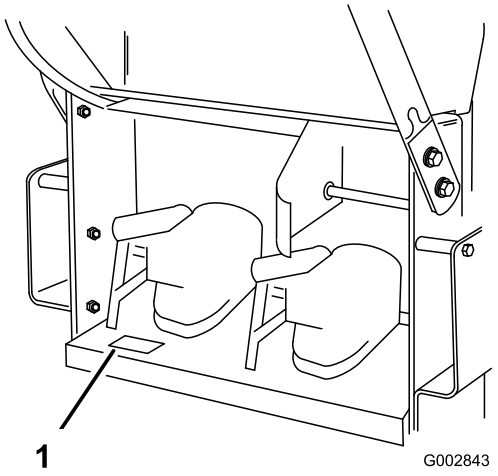


Figure 1

1. Model and serial number location

Model No. _____

Serial No. _____

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

Figure 2

1. Safety alert symbol

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

Contents

8111 Lyndale Avenue South
Bloomington, MN 55420

Safety

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

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

Safe Operating Practices

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

Training

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

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including hard hat, safety glasses and hearing protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is to be used and remove all objects such as rocks, toys and wire which can be thrown by the machine.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
  - Use only an approved container
  - Never remove gas cap or add fuel with engine running. Allow engine to cool before refueling. Do not smoke.
  - Never refuel or drain the machine indoors.
- Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

Operation

- Never run an engine in an enclosed area.
- Only operate in good light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine. Only start engine from the operator's position.
- Be sure of your footing while using this machine, especially when backing up. Walk, don't run. Never operate on wet grass. Reduced footing could cause slipping.
- Slow down and use extra care on hillsides. Be sure to travel side to side on hillsides. Turf conditions can affect the machine's stability. 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.
- Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- Do not change the engine governor setting or overspeed the engine.
- Stop on level ground, disengage drives, engage parking brake (if provided), shut off engine before leaving the operator's position for any reason including emptying the catchers or unclogging the chute.

- Stop equipment and inspect blades after striking objects or if an abnormal vibration occurs. Make necessary repairs before resuming operations.
- Keep hands and feet away from the cutting unit.
- Look behind and down before backing up to be sure of a clear path.
- 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.

Maintenance and storage

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

Toro Mower Safety

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

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

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

General Operation

- Be sure the area is clear of other people before mowing. Stop the machine if anyone enters the area.
- Do not touch equipment or attachment parts which may be hot from operation. Allow to cool before attempting to maintain, adjust or service.
- Use only Toro approved attachments. Warranty may be voided if used with unapproved attachments.
- Check carefully for overhead clearances (i.e. branches, doorways, electrical wires) before operating under any objects and do not contact them.

Slope Operation

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

- Remove obstacles such as rocks, tree limbs, etc. from the mowing area.
- Watch for holes, ruts or bumps. Tall grass can hide obstacles.
- Use caution near drop-offs, ditches, or embankments. The machine could suddenly

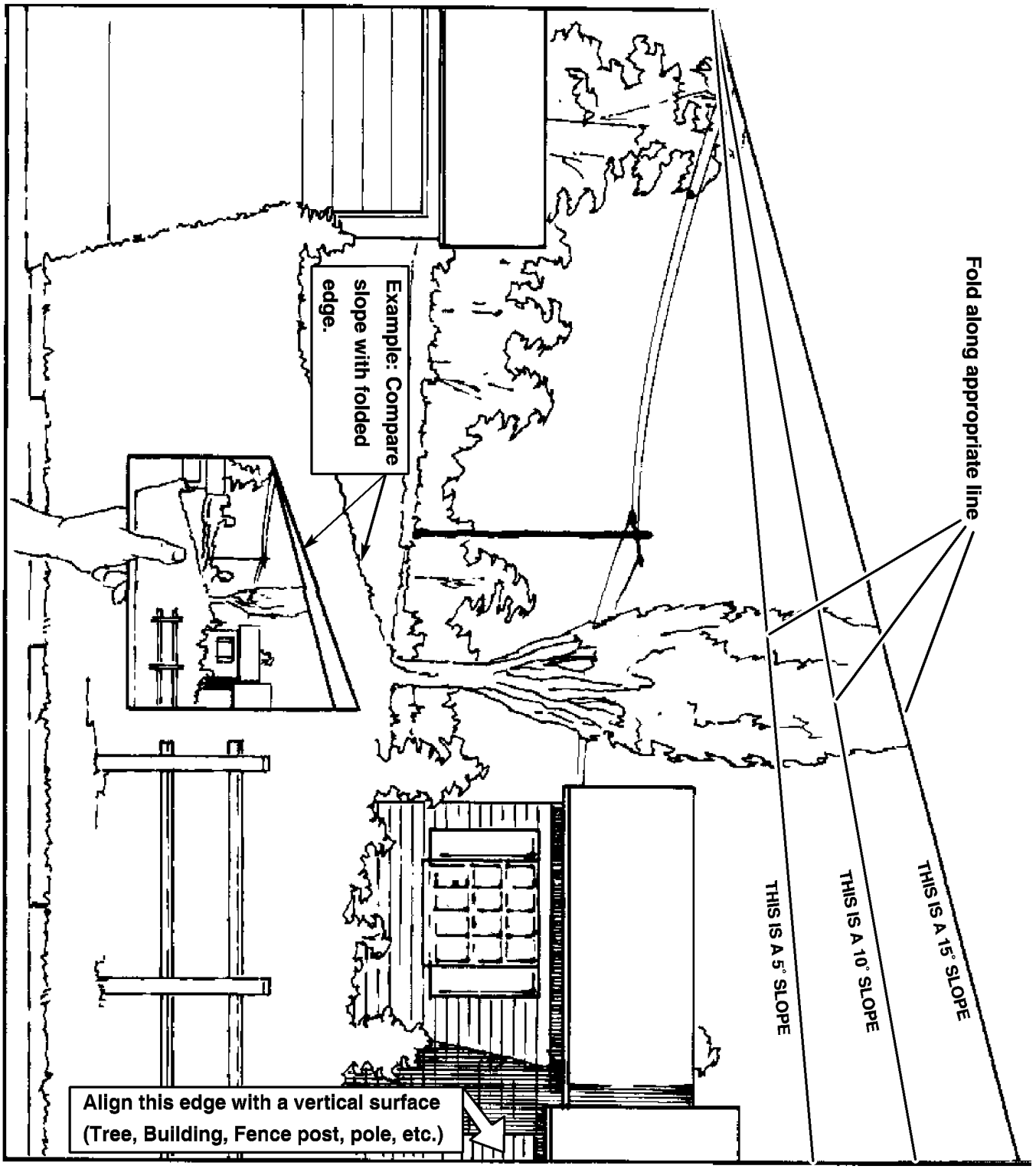
turn over if a wheel goes over the edge of a cliff or ditch, or if an edge caves in.

- Use extra care with grass catchers or other attachments. These can change the stability of the machine.
- Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction.
- Mow slopes side to side.
- Do not mow slopes greater than 15 degrees.

Service

- Never store the machine or fuel container inside where there is an open flame, such as near a water heater or furnace.
- Keep nuts and bolts tight, especially the blade attachment bolts. Keep equipment in good condition.
- Never tamper with safety devices. Check safety systems for proper operation before each use.
- Use only genuine replacement parts to ensure that original standards are maintained.
- Check brake operation frequently. Adjust and service as required.

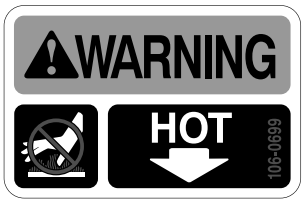
Slope Chart


Fold along appropriate line
Example: Compare slope with folded edge.
THIS IS A 5° SLOPE
THIS IS A 10° SLOPE
THIS IS A 15° SLOPE
Align this edge with a vertical surface
(Tree, Building, Fence post, pole, etc.)

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.

82-4590



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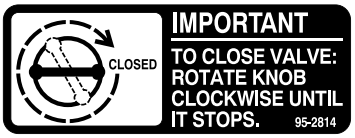

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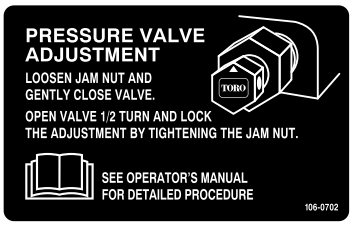

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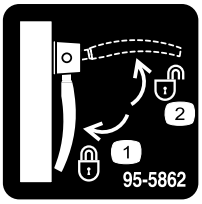


95-5862

1. Locked
2. Unlocked

Battery Symbols

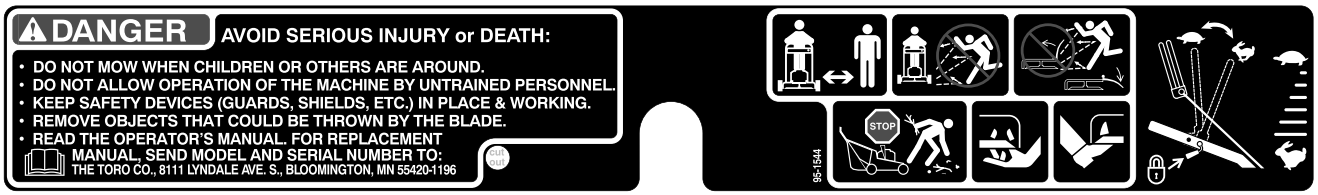
Some or all of these symbols are on your battery

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.

98-4387

1. Warning—wear hearing protection.

104-2838



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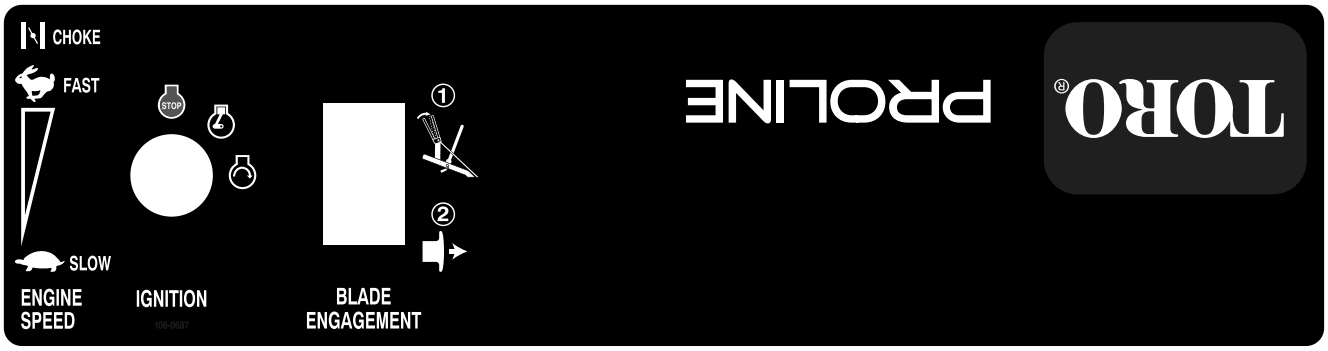

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Setup

Loose Parts

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

Step	Description	Qty.	Use
1	Wheel Lug nut	2 8	Install the drive wheels.
2	Handle assembly Flanged bolt, (3/8 x 1 inch) Flange nut, (3/8 inch)	1 4 4	Install the upper handle.
3	Left control rod Hairpin cotter pin Clevis pin Rod fitting	1 1 1 1	Install the left control rod.
4	Right control rod Hairpin cotter pin Clevis pin Rod fitting	1 1 1 1	Install the right control rod.
5	No parts required	–	Adjust the tracking.
6	Battery Battery holder bracket Battery pad Battery strap Battery support rod Terminal boot Bolt, (3/8 x 1-3/4 inches) Locknut, (3/8 inch) Carriage bolt, (1/4 x 3/4 inch) Locknut, (1/4 inch) Nut, (1/4 inch)	1 2 2 1 2 2 2 2 2 2 2	Install the battery.
7	No parts required	–	Activate the battery.
8	Operator's Manual Engine Operator's Manual Parts Catalog Safety Video Registration Card	1 1 1 1 1	Read the Operator's Manual and watch the video before operating the machine.

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

Step 1

Installing the Drive Wheels

Parts needed for this step:

2	Wheel
8	Lug nut

Procedure

Mount wheels to wheel motor hubs with 8 lug nuts. Torque bolts to 55 ft-lb (75 N·m) (Figure 3).

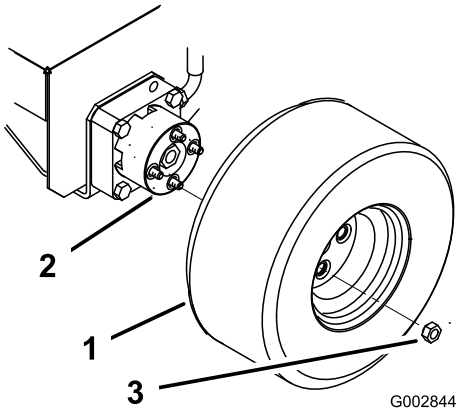


Figure 3

1. Wheel
2. Hub
3. Lug nut

Step 2

Installing the Upper Handle

Parts needed for this step:

1	Handle assembly
4	Flanged bolt, (3/8 x 1 inch)
4	Flange nut, (3/8 inch)

Procedure

1. Align handle with upper mounting holes in rear frame (Figure 4).
2. Secure the handle at each upper mounting hole with a flange bolt (3/8 x 1 inch) and flange nut (Figure 4).
3. Select the high, medium, or low position for the lower mounting hole. Secure the handle at each lower mounting hole with a flange bolt (3/8 x 1 inch) and flange nut (Figure 4).

   Note: The handle position can be adjusted to match the operator's height preference.

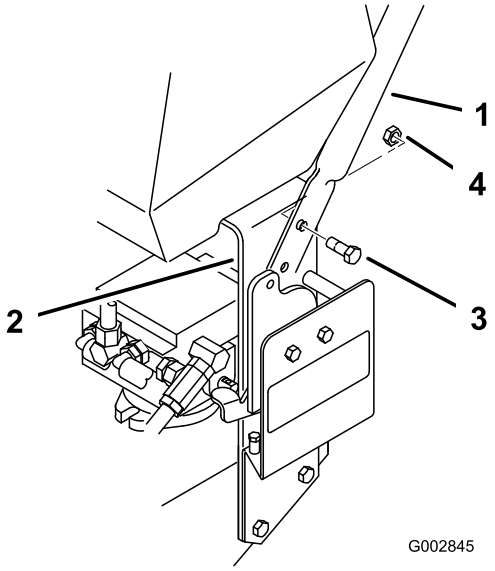


Figure 4

1. Upper handle
2. Rear frame
3. Flange bolt, (3/8 x 1 inch)
4. Flange nut, (3/8 inch)

Step 3

Installing the Left Control Rod

Parts needed for this step:

1	Left control rod
1	Hairpin cotter pin
1	Clevis pin
1	Rod fitting

Procedure

1. Slide clevis pin through rod fitting and mounting hole in control bracket from the

outside. Secure it with a washer and hairpin cotter pin (Figure 5).

2. Remove the hairpin cotter pin and rod from the upper control bars.
3. Press and hold upper control bars against the reference bar, so the stop hits.
4. Push the rod forward until the bearing is against control bracket stop. Thread the rod in or out of fitting on control bracket until the rod aligns with holes in upper control bars (Figure 5).
5. When the rod and holes in the upper control bars line up, turn the rod one additional turn, so the rod is shorter.

   Note: The upper control bar stop must hit the reference bar before the roller hits the control bracket stop (Figure 5).
6. Connect the rod to upper control bars with the previously removed hairpin cotter (Figure 5).

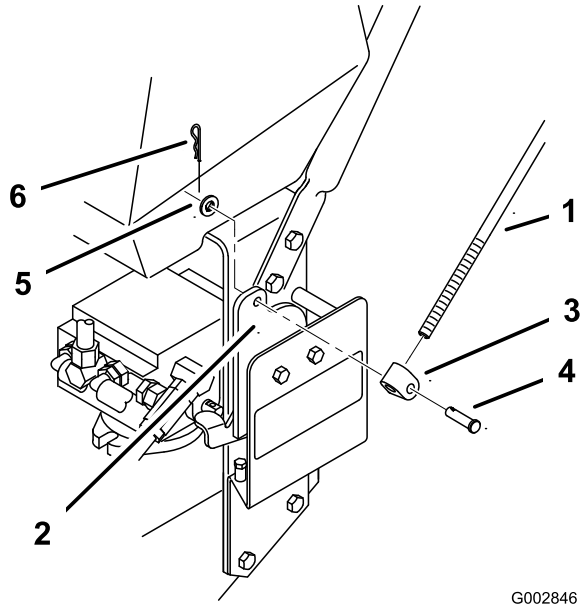


Figure 5

1. Control rod
2. Control bracket
3. Rod fitting
4. Clevis pin
5. Washer
6. Hairpin cotter pin

Step 4

Installing the Right Control Rod

Parts needed for this step:

1	Right control rod
1	Hairpin cotter pin
1	Clevis pin
1	Rod fitting

Procedure

1. Slide the rod into the control bracket and secure it with a hairpin cotter pin (Figure 6).
2. Remove the hairpin cotter pin and rod from the upper control bars.
3. Press and hold upper control bars against the reference bar, so the stop hits.
4. Push the rod forward until the bearing is against the control bracket stop. Thread the rod in or out of fitting on control bracket until the rod aligns with holes in upper control bars (Figure 6).
5. When the rod and holes in the upper control bars line up, rotate the turnbuckle one additional turn, so the rod is shorter.

   Note: The upper control bar stop must hit the reference bar before the roller hits the control bracket stop (Figure 6).
6. Connect the rod to upper control bars with the previously removed hairpin cotter, tighten the wing nut and turnbuckle (Figure 6).

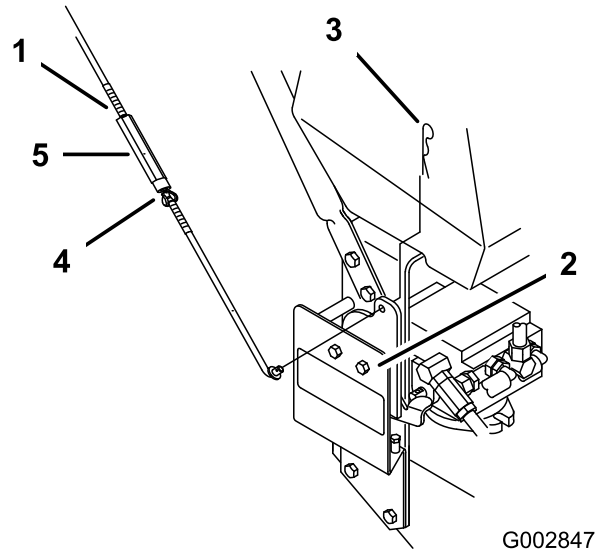


Figure 6

1. Control rod
2. Control bracket
3. Hairpin cotter pin
4. Wing nut
5. Turnbuckle

Step 5

Adjusting the Tracking

No Parts Required

Procedure

1. After completing the setup, check the machine tracking. Operate the machine by holding the upper control bar against the reference bar with the wheels engaged.
2. If the machine does not track straight, adjustment is required.
3. Loosen the wing nut on right control rod and rotate the turnbuckle in or out to change the tracking. Secure the turnbuckle in position with the wing nut (Figure 5).
4. Check for proper tracking.

   Note: The control rod must be adjusted if the handle height position is changed.

Step 6

Installing the Battery

Parts needed for this step:

1	Battery
2	Battery holder bracket
2	Battery pad
1	Battery strap
2	Battery support rod
2	Terminal boot
2	Bolt, (3/8 x 1-3/4 inches)
2	Locknut, (3/8 inch)
2	Carriage bolt, (1/4 x 3/4 inch)
2	Locknut, (1/4 inch)
2	Nut, (1/4 inch)

Procedure

Bulk electrolyte with 1.265 specific gravity must be purchased from a local battery supply outlet.

Warning

CALIFORNIA
Proposition 65 Warning

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

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

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

Fill the battery where clean water is always available for flushing the skin.

Follow all instructions and comply with all safety messages on the electrolyte container.

1. Mount the battery holder brackets to the back left rear corner of mower deck carrier frame with 2 bolts (3/8 x 1-3/4 inches) and locknuts (3/8 inch) (Figure 7).
2. Peel off backing from battery pads and affix pads to the battery holder, positioning as shown in Fig. 6.

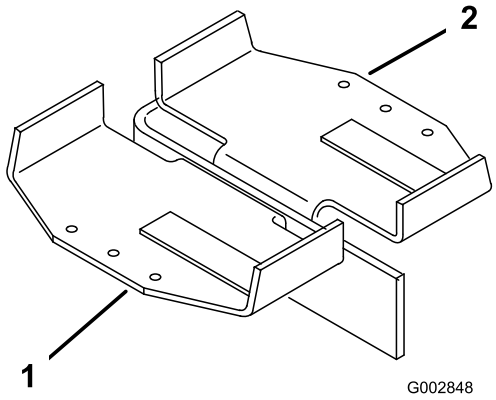


Figure 7

1. Battery holder
2. Battery pads

3. Fill the battery with electrolyte and charge it, refer to Servicing the Battery.
4. Position battery onto the holder with the terminal posts away from the engine (Figure 8).
5. Slide the red terminal boot onto the red battery cable and the black terminal boot onto the black battery cable.
6. Install the positive (red) battery cable to positive (+) battery terminal and the negative battery cable to the negative (-) battery terminal. Secure cables with 2 carriage bolts (1/4 x 3/4 inch) and locknuts (1/4 inch).
7. Mount battery to holder with 2 support rods, a battery clamp and 2 locknuts (1/4 inch). Position the support rods in the mounting holes (Figure 8). Tighten the locknuts so the battery is held securely in position and will not slide. Do not overtighten.
8. Slide the vent tube through the hole, next to the support rod, in the battery holder.

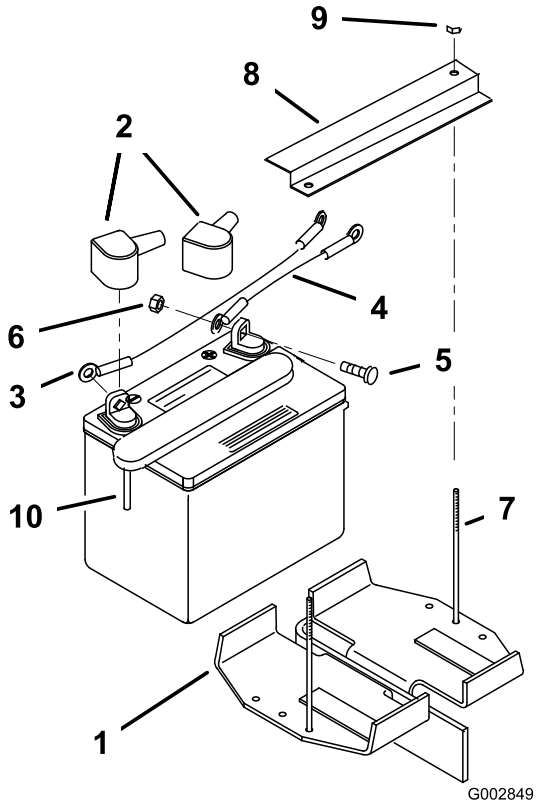


Figure 8

1. Battery holder
2. Terminal boot
3. Positive cable
4. Negative cable
5. Carriage bolt, (1/4 x 3/4 inches)
6. Nut, (1/4 inch)
7. Battery support rod
8. Battery clamp
9. Locknut, (1/4 inch)
10. Vent tube

Step 7

Activating the Battery

No Parts Required

Procedure

Bulk electrolyte with 1.265 specific gravity must be purchased from a local battery supply outlet.

Warning

CALIFORNIA
Proposition 65 Warning

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

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

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

Fill the battery where clean water is always available for flushing the skin.

Follow all instructions and comply with all safety messages on the electrolyte container.

1. Remove the battery from the machine. Refer to Removing the Battery.

   Important: Do not damage the long vent tube when removing the battery.

2. Clean the top of the battery with a paper towel.

   Note: Never fill the battery with electrolyte while the battery is installed on the machine. Electrolyte can be spilled on other parts and cause corrosion.

3. Remove the vent caps from the battery (Figure 9).

4. Slowly pour electrolyte into each battery cell until the level is up to the **upper** line on the battery case.

   Important: Do not overfill the battery because electrolyte (sulfuric acid) can cause severe corrosion and damage to the chassis.

5. Wait five to ten minutes after filling the battery cells. Add electrolyte, if necessary, until the electrolyte level is up to the **upper** line on the battery case.

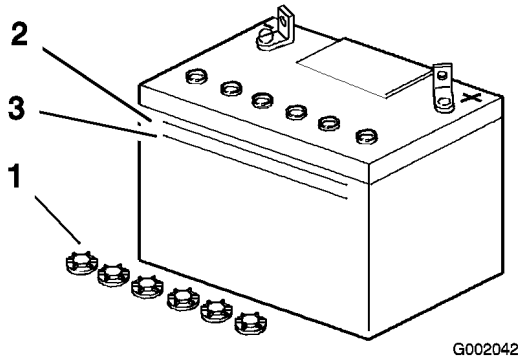


Figure 9

1. Fill caps
2. Upper line
3. Lower line

6. Install the battery fill caps (Figure 9).

Charging the battery produces gasses that can explode and cause serious injury.

- **Keep cigarettes, sparks and flames away from the battery.**
- **Make sure the ignition switch is off.**
- **Ventilate when charging or using the battery in an enclosed space.**

7. Make sure the vent caps are installed in the battery. Charge the battery. Refer to Charging the Battery.

8. Install the battery in the machine and connect the battery cables. Refer to Installing the Battery.

   Important: Do not run the machine with the battery disconnected; electrical damage may occur to the engine.

Step
8

Reading the Manual and Viewing the Safety Video

Parts needed for this step:

1	Operator's Manual
1	Engine Operator's Manual
1	Parts Catalog
1	Safety Video
1	Registration Card

Procedure

- Read the Operator's Manual.
- View the safety video.
- Fill out the registration card and mail it in or register online at www.Toro.com.

Product Overview

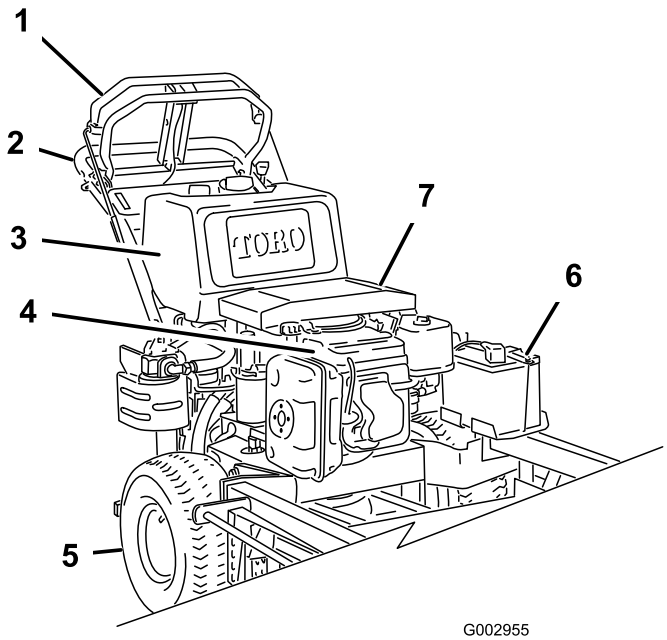


Figure 10

1. T-bar control
2. Handle
3. Gas tank
4. Engine
5. Tire
6. Battery
7. Engine cooling screen

Controls

Become familiar with all the controls (Figure 11) before you start the engine and operate the machine.

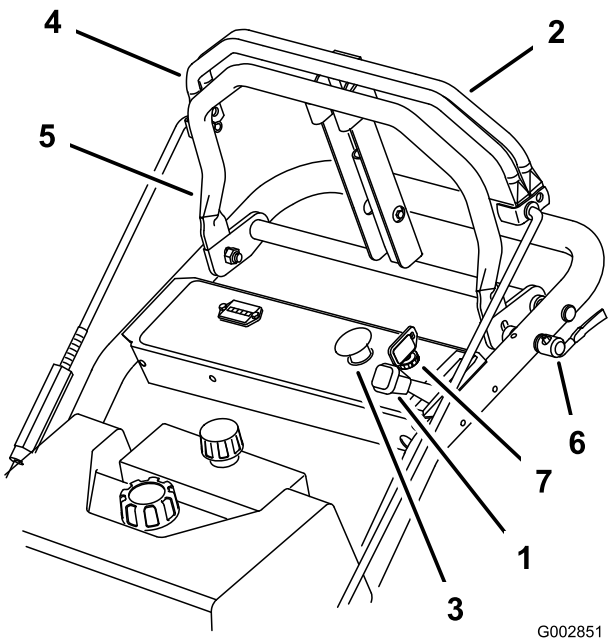


Figure 11

1. Throttle control
2. Blade control bail
3. Blade control switch (PTO)
4. Upper control bar
5. Reference handle
6. Quick release lever
7. Ignition switch

Throttle Control

The throttle control has three positions: **Choke**, **Fast** and **Slow**.

Blade Control Bail

The bail is used in conjunction with the power take off switch (PTO) to engage the clutch to drive the mower blades. Release the mower control bail to disengage the mower blades.

Blade Control Switch (PTO)

This pull switch is used in conjunction with the blade control bail to engage the clutch to drive the mower blades.

Upper Control Bar

Shift to the desired gear and push forward on the upper control bar to engage forward traction operation and pull back to brake forward movement. Pull back on right side of upper control bar to turn right and left side to turn left.

Reference Handle

Limits forward travel of the control bar to a pre-set position to help maintain desired ground speed

and direction of travel. It is locked into position with quick release levers.

Ignition Switch

This switch is used in conjunction with recoil starter and has two positions: **Run** and **Off**.

Fuel Shut-off Valve

Close the fuel shut-off valve when transporting or storing mower.

Operation

Recommended Gasoline

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

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

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

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

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

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

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

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

Using Stabilizer/Conditioner

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

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

- Cleans the engine while it runs
- Eliminates gum-like varnish buildup in the fuel system, which causes hard starting

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

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

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

Filling the Fuel Tank

1. Shut the engine off, lean around fuel tank cap and remove the cap. Add unleaded regular gasoline to fuel tank, until the level is 1/4 to 1/2 inch (6 to 13 mm) below the bottom of the filler neck. This space in the tank allows gasoline to expand. Do not fill the fuel tank completely full.
2.
3. Install fuel tank cap securely. Wipe up any gasoline that may have spilled.

Checking the Engine Oil Level

Before you start the engine and use the machine, check the oil level in the engine crankcase; refer to Checking Oil Level in Engine Maintenance, page 25

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

Think Safety First

Carefully read all the safety instructions and decals in the safety section. Knowing this information could help you or any bystanders avoid injury.

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

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.

Figure 12

1. Warning—wear hearing protection.

Starting and Stopping the Engine

Starting the Engine

1. Make sure spark plug wire(s) are installed on spark plug(s) and fuel valve is open.
2. Move the shift lever to neutral and turn ignition key to run.
3. Move the throttle control to the choke position before starting a cold engine.

   Note: A warm or hot engine usually does not require any choking. To start a warm engine, move throttle control to the fast position.
4. Turn the ignition key to start to energize the starter. When the engines starts, release key.

   Important: Do not engage starter for more than 10 seconds at a time. If the engine fails to start allow 30 second cool-down period between attempts. Failure to follow these instructions can burn out starter motor.
5. When engine starts move the throttle control to the fast position.

Stopping the Engine

1. Move the throttle lever to the**slow** position (Figure 13).
2. Let engine idle for 30 to 60 seconds before turning the ignition key to **off**.
3. Turn the ignition key to **off** (Figure 13).

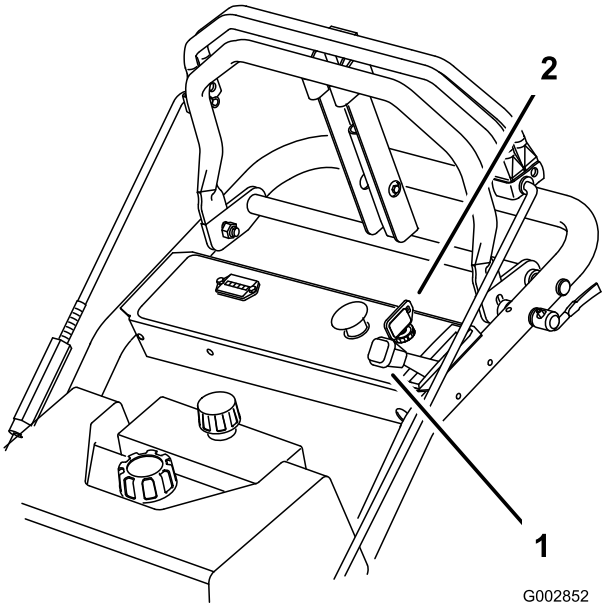


Figure 13

1. Throttle lever
2. Ignition key

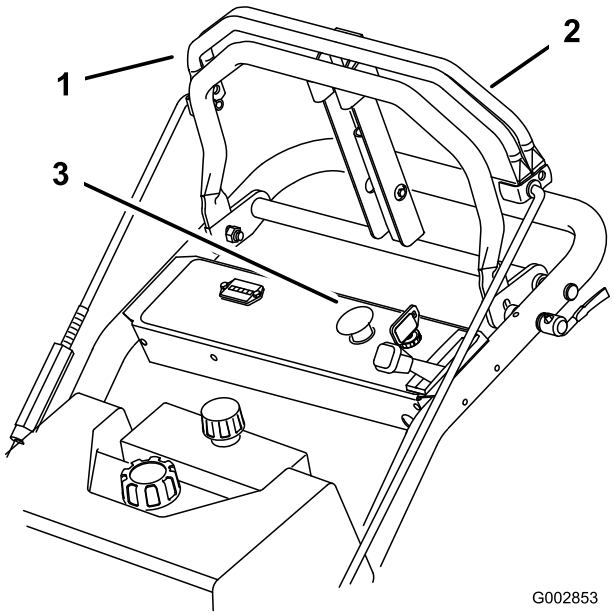


Figure 14

1. Upper control bar
2. Blade control bail
3. Power take off switch (PTO)

4. Remove key and pull the wire off the spark plug(s) to prevent the possibility of accidental starting before storing the machine.
5. Close the fuel shut off valve before storing machine.

   Important: Make sure fuel shut off valve is closed before transporting or storing machine, as fuel leakage may occur.

Operating the Mower Power Take Off (PTO)

The power take off switch (PTO) in conjunction with the blade control bail engages and disengages power to the electric clutch and mower blades.

Engaging the Mower Blades (PTO)

1. Release the upper control bar to stop the machine (Figure 14).
2. To engage blade, squeeze blade control bail against the upper control bar (Figure 14).
3. Pull the power take off switch (PTO) up and release. Hold the blade control bail against the upper control bar while operating.
4. Repeat the procedure to engage the mower blades if the blade control bail is released.

Disengaging the Mower Blades (PTO)

Release the blade control bail to disengage the blades (Figure 14).

The Safety Interlock System

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

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

Understanding the Safety Interlock System

The safety interlock system is designed to prevent the mower blades from rotating unless:

- The control bail is depressed.
- The power take off switch (PTO) is pulled **on**.

  The safety interlock system is designed to stop the mower blades if you release the blade control bail.

Testing the Safety Interlock System

Test the safety interlock system before you use the machine each time.

Note: If the safety system does not operate as described below, have an Authorized Service Dealer repair the safety system immediately.

1. Start the engine; refer to Starting and Stopping the Engine in Operation, page 19.
2. Squeeze the blade control bail against upper control bar. **The blades should not rotate.**
3. Then continue holding the blade control bail and pull up on the blade control switch and release. The clutch should engage and the mower blades begin rotating.
4. Release the blade control bail. **The blades should stop rotating.**
5. With the engine running, pull up the power take off switch (PTO) and release without holding the blade control bail. **The blades should not rotate.**

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 mowing performance.

Selecting a Ground Speed

1. Place the quick release levers in the unlock position (Figure 15).
2. Move the reference bar forward or backward to set the desired forward speed. The pointer indicates approximate ground speed (Figure 15). When the bar is in the full forward position the ground speed is approximately 6 mph. When the reference bar is in the middle position the ground speed is approximately 3 mph.

   Note: In normal conditions, a 2.5 to 3.0 mph ground speed (middle position of the reference bar) is best for cutting performance. Use a faster ground speed for light cutting or transport. Use a slower ground speed in heavy cutting loads.
3. Place the quick release levers in the lock position (Figure 15).

Driving Forward

1. To go forward, slowly press on the upper control bar against the reference bar (Figure 15).
2. To go straight, apply equal pressure to both ends of the upper control bar (Figure 15).
3. To turn, release pressure on the upper control bar side toward the direction you want to turn (Figure 15).
4. Adjust reference bar to maintain a comfortable pre-set ground speed (Figure 15).
5. To stop, release the upper control bar to stop both wheels (Figure 15).

   Note: If the front of the deck lifts off the ground when the upper control bar is quickly pushed forward or the machine is unable to drive uphill, an adjustment may be needed. Refer to Adjusting the By-pass Valve.

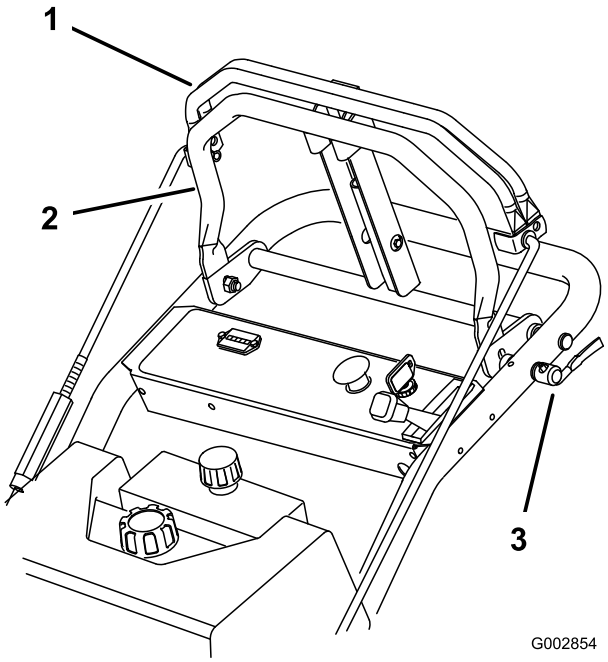


Figure 15

1. Upper control bar
2. Lower control bar
3. Shift lever

Driving Backward

1. To go backward, slowly pull the control bar rearward (Figure 15).
2. To go straight, apply equal pressure to both ends of the upper control bar (Figure 15).

3. To turn, release pressure on the upper control bar side away from the direction you want to turn
4. To stop, release the upper control bar to stop both wheels (Figure 15).

Placing the Machine in Neutral Position

Release the upper control bar to stop. The machine will automatically return to neutral. When in neutral, the hydrostatic drive system will provide dynamic braking so the machine will not roll.

Note: Very slow drive motion with engine running and the control in neutral is normal. Excessive drive motion when the control is in neutral may indicate adjustment is needed. Refer to Adjusting the Machine Neutral Position.

Stopping the Machine

1. To stop, release the upper control bar to stop both wheels
2. Release the blade control bail (PTO), to stop the mower blades. Move the engine speed throttle control to to the slow position.
3. Turn the ignition key to off and remove the key from the ignition switch.

   Important: If the machine is on a slope, block the wheels to prevent the machine from slowly rolling.

   Important: If the machine will be left unattended, close the fuel shut off valve and disconnect the wire(s) from the spark plug(s).

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 chock block the wheels when leaving the machine unattended, even if just for a few minutes.

Transporting Machines

Use a heavy-duty trailer or truck to transport the machine. Ensure that the trailer or truck has all necessary lighting and marking as required by law.

Please carefully read all the safety instructions. Knowing this information could help you, your family, pets or bystanders avoid injury.

To transport the machine:

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

Side Discharging or Mulching the Grass

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

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

- **Never remove the grass deflector from the mower because the grass deflector routes material down toward the turf. If the grass deflector is ever damaged, replace it immediately.**
- **Never put your hands or feet under the mower.**
- **Never try to clear discharge area or mower blades unless you release the bail and the power take off (PTO) is off. Rotate the ignition key to Off. Also remove the key and pull the wire off the spark plug(s).**

Pushing the Machine by Hand

The by-pass valve also allows the machine to be pushed by hand with the engine not running for easier servicing. If the by-pass valve is opened to push the machine by hand, adjustment is required for operation.

To Push the Machine

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

1. Disengage the power take off (PTO) and turn the ignition key to off.
2. Loosen the jam nuts and rotate the by-pass valves open 5 turns to push the machine. This allows hydraulic fluid to by-pass the pump and the wheels to turn (Figure 16).

   Important: Rotate by-pass valve a maximum of 5 turns so the valve does not come out of the body causing fluid to run out.

To Operate the Machine

If the by-pass valve is opened to push the machine by hand, an adjustment is required for machine operation. Refer to Adjusting the By-pass Valve.

Note: The machine will not drive unless the by-pass valves are properly adjusted.

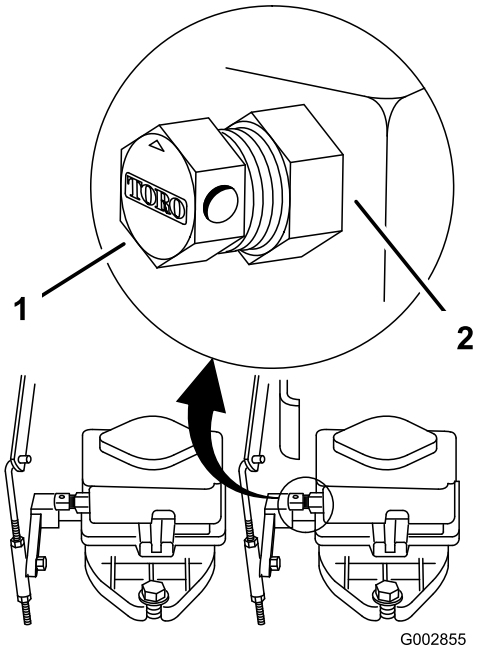


Figure 16

1. By-pass valve
2. Jam nut

Maintenance

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

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 8 operating hours	• Change the engine oil. • Change the hydraulic filter.
Before each use or daily	• Check the safety interlock system. • Check the engine oil level. • Clean the air intake screen. • Check the hydraulic fluid.
Every 25 hours	• Clean and re-oil the foam element (more often in dusty dirty conditions). • Check the battery electrolyte level.
Every 50 hours	• Check the tire pressure. • Check the transmission belt.
Every 100 hours	• Replace the paper element (more often in dusty dirty conditions). • Change the engine oil. • Adjust the electric clutch. • Clean the engine and engine oil cooler. • Check the hydraulic lines.
Every 200 hours	• Replace the oil filter. • Check the spark plug. • Replace the fuel filter. • Change the hydraulic filter.
Before storage	• Paint chipped surfaces. • Perform all maintenance procedures listed above before storage.

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

⚠

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

Engine Maintenance

Servicing the Air Cleaner

Foam element: Clean and re-oil after every 25 operating hours.

Paper element: Replace it after every 100 operating hours or yearly, which ever comes first.

Inspect the foam and paper elements, and replace them if they are damaged or excessively dirty.

Note: Service the air cleaner more frequently (every few operating hours) if the operating conditions are extremely dusty or sandy.

Removing the Foam and Paper Elements

1. Disengage the power take off (PTO) and turn the ignition key to off. Remove the key.
2. Clean around the air cleaner to prevent dirt from getting into the engine and causing damage. Unscrew the cover nut and remove the air cleaner cover (Figure 17).
3. Remove the air cleaner assembly (Figure 17).
4. Carefully slide the foam element off the paper element (Figure 17).

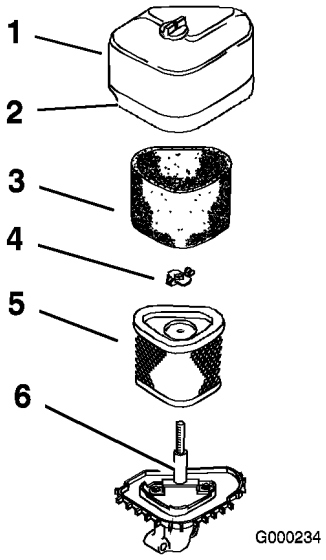


Figure 17

1. Cover and nut
2. Wing nut
3. Foam element
4. Washer and grommet
5. Paper element
6. Air cleaner base

Cleaning the Foam Element

1. Wash the foam element in liquid soap and warm water. When the element is clean, rinse it thoroughly.
2. Dry the element by squeezing it in a clean cloth.
3. Put one or two ounces of oil on the element (Figure 19). Squeeze the element to distribute the oil.

   Note: Excess oil in the foam element restricts the air flow through the element and may reach the paper filter and clog it.

   Important: Replace the foam element if it is torn or worn.

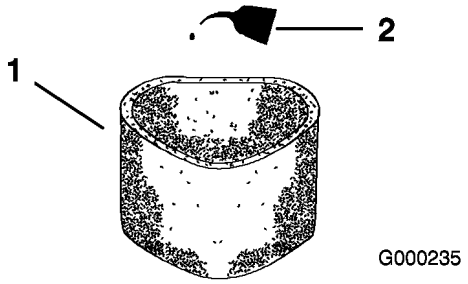


Figure 18

1. Foam element
2. Oil

Inspecting the Paper Element

Important: Never clean the paper element with pressurized air or liquids, such as solvent, gas, or kerosene.

1. Inspect the element for tears, an oily film, and damage to the rubber seal.
2. Replace the paper element if it is damaged or excessively dirty (Figure 19).

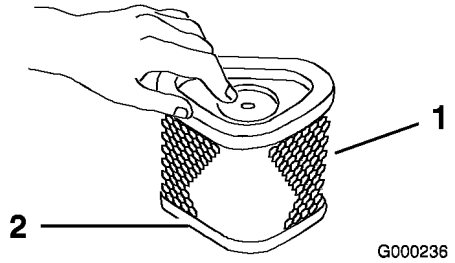


Figure 19

1. Paper element
2. Rubber seal

Installing the Foam and Paper Elements

Important: To prevent engine damage, always operate the engine with the complete foam and paper air cleaner assembly installed.

1. Carefully slide the foam element onto the paper air cleaner element (Figure 17).
2. Place the air cleaner assembly onto the air cleaner base (Figure 17).
3. Install the air cleaner cover and secure with cover nuts (Figure 17).

Servicing the Engine Oil

Change the engine oil after every 100 operating hours.

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

Oil Type: Detergent oil (API service SG, SH, SH or higher)

Crankcase Capacity: w/filter, 64 oz. (1.9 l)

Viscosity: See table below

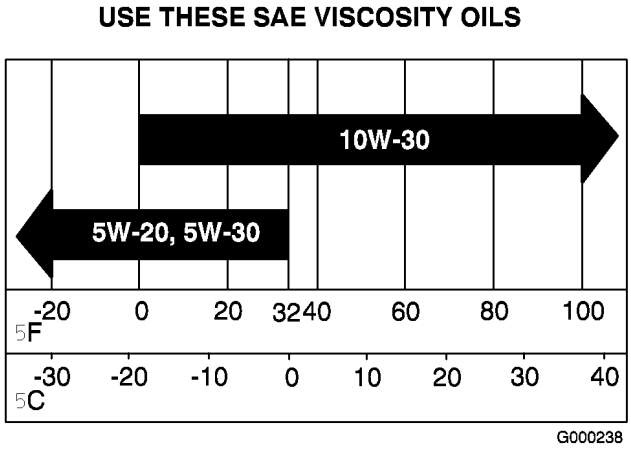


Figure 20

Checking the Engine Oil Level

1. Park the machine on a level surface.
2. Disengage the PTO, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Clean around the oil dipstick (Figure 21) so that dirt cannot fall into the filler hole and damage the engine.

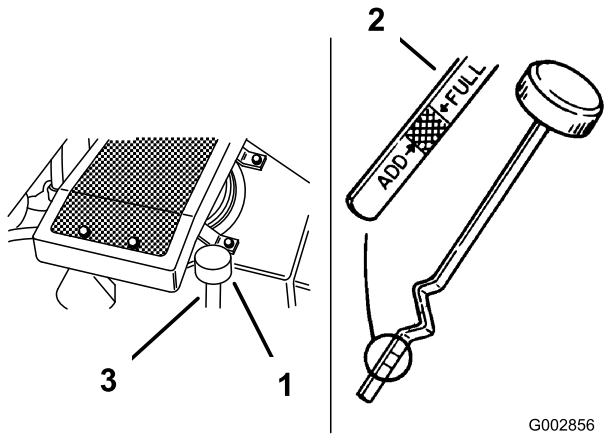


Figure 21

1. Oil dipstick
2. Metal end
3. Filler tube

4. Unscrew the oil dipstick and wipe the end clean (Figure 21).
5. Slide the oil dipstick fully into the filler tube, but do not thread onto tube (Figure 21).
6. Pull the dipstick out and look at the end. If the oil level is low, slowly pour only enough oil into the filler tube to raise the level to the full mark.

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

Changing the Engine Oil

1. Start the engine and let it run five minutes. This warms the oil so it drains better.
2. Park the machine so that the drain side is slightly lower than the opposite side to assure the oil drains completely.
3. Disengage the power take off (PTO), stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Slide the drain hose over the oil drain valve.
5. Place a pan below the drain hose. Rotate oil drain valve to allow oil to drain (Figure 22).
6. When oil has drained completely, close the drain valve.
7. Remove the drain hose (Figure 22).

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

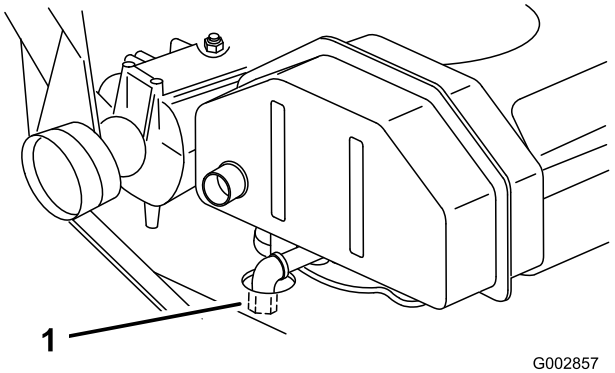


Figure 22

1. Oil drain valve

8. Slowly pour approximately 80% of the specified oil into the filler cap (Figure 21).

9. Check the oil level; refer to Checking the Engine Oil Level in theEngine Maintenance, page 25.
10. Slowly add the additional oil to bring it to the Full mark.

Changing the Oil Filter

Replace the oil filter every 200 hours or every other oil change.

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

1. Drain the oil from the engine; refer to Changing the Oil.
2. Remove the old filter and wipe the filter adapter (Figure 23) gasket surface.
3. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Figure 23).

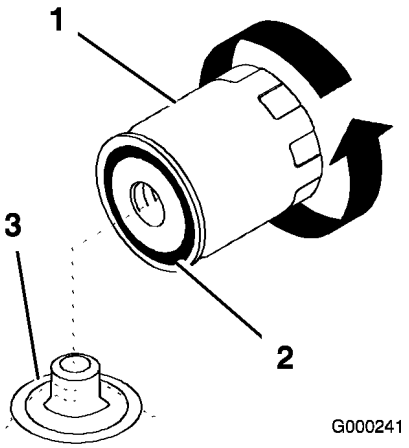


Figure 23

1. Oil filter
2. Gasket
3. Adapter

4. Install the replacement oil filter to the filter adapter. Turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 turn (Figure 23).
5. Fill the crankcase with the proper type of new oil; refer to Changing the Oil.

Servicing the Spark Plug

Check the spark plug(s) after every 200 operating hours. Make sure the air gap between the center and side electrodes is correct before installing the spark plug. Use a spark plug wrench for removing and installing the spark plug(s) and a gapping tool/feeler gauge to check and adjust the air gap. Install a new spark plug(s) if necessary.

Type: Champion® RC12YC or Champion® Premium Gold 2071 (or equivalent)

Air Gap: 0.040 inch (1.02 mm)

Removing the Spark Plug(s)

1. Disengage the power take off (PTO) and turn the ignition key to off. Remove the key.
2. Pull the wire(s) off the spark plug(s) (Figure 24). Now clean around the spark plug(s) to prevent dirt from falling into the engine and potentially causing damage.
3. Remove the spark plug(s) and metal washer.

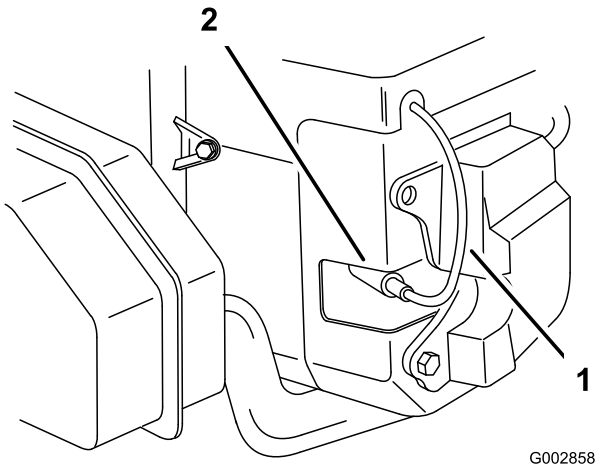


Figure 24

1. Spark plug wire
2. Spark plug

Checking the Spark Plug

1. Look at the center of the spark plug(s) (Figure 25). If you see light brown or gray on the insulator, the engine is operating properly. A black coating on the insulator usually means the air cleaner is dirty.

   Important: Never clean the spark plug(s). Always replace the spark plug(s) when it has: a black coating, worn electrodes, an oily film, or cracks.

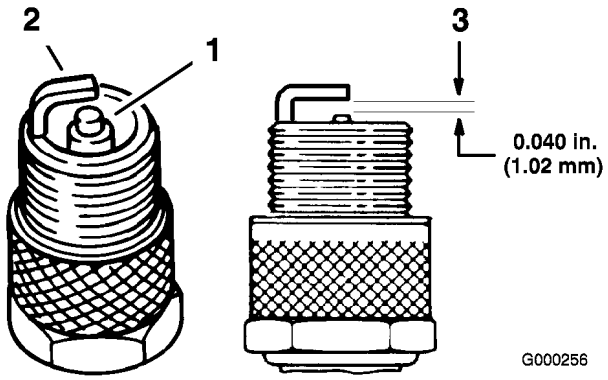


Figure 25

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

2. Check the gap between the center and side electrodes (Figure 25). Bend the side electrode if the gap is not correct.

Installing the Spark Plug(s)

1. Install the spark plug(s) and metal washer. Make sure the air gap is set correctly.
2. Tighten the spark plug(s) to 30 ft-lb (41 N·m).
3. Push the wire(s) onto the spark plug(s) (Figure 24).

Fuel System Maintenance

Draining the Fuel Tank

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

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

1. Park the machine on a level surface, to assure fuel tank drains completely. Then disengage the power take off (PTO) and turn the ignition key to off. Remove the key.
2. Close the fuel shut-off valve at the fuel tank (Figure 26).
3. Squeeze the ends of the hose clamp together and slide it up the fuel line away from fuel filter (Figure 27).
4. Pull the fuel line off the fuel filter (Figure 27). Open the fuel shut-off valve and allow the gasoline to drain into a gas can or drain pan.

   Note: Now is the best time to install a new fuel filter because the fuel tank is empty. Refer to Replacing the Fuel Filter.
5. Install the fuel line onto the fuel filter. Slide the hose clamp close to the valve to secure the fuel line.

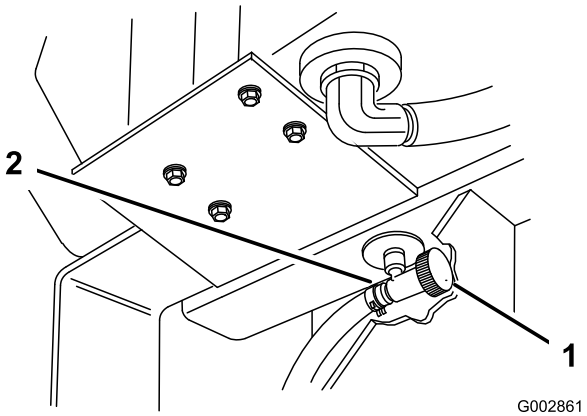


Figure 26

1. Fuel shut-off valve
2. Clamp

Replacing the Fuel Filter

Replace the fuel filter after every 200 operating hours or yearly, whichever occurs first.

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

Note: Remember how the fuel filter is installed.

Note: Wipe up any spilled fuel.

1. Disengage the PTO, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Close fuel shut-off valve at the fuel tank (Figure 26).

   Note: Remove the fuel line from the fuel valve that is closest to the engine.

3. Squeeze the ends of the hose clamps together and slide them away from the filter (Figure 27).

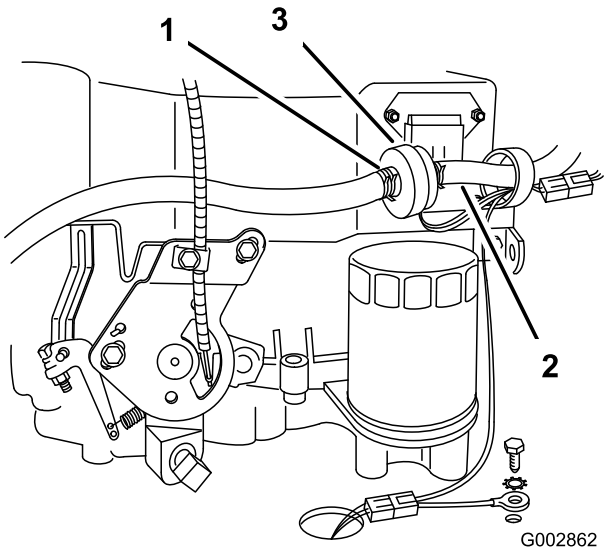


Figure 27

1. Hose clamp
2. Fuel line
3. Filter

4. Remove the filter from the fuel lines.
5. Install a new filter and move the hose clamps close to the filter.
6. Open fuel shut-off valve at fuel tank (Figure 26).
7. Check for fuel leaks and repair if needed.

Electrical System Maintenance

Servicing the Battery

Check the electrolyte level in the battery every 25 hours. Always keep the battery clean and fully charged. Use a paper towel to clean the battery case. If the battery terminals are corroded, clean them with a solution of four parts water and one part baking soda. Apply a light coating of grease to the battery terminals to prevent corrosion.

Voltage: 12 V

Warning

CALIFORNIA
Proposition 65 Warning

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

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

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

Removing the Battery

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

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

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

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

1. Disengage the PTO and chock or block the wheels.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Lift the black rubber cover on the negative cable. Disconnect the negative battery cable from the negative (-) battery terminal (Figure 28).
4. Slide the red terminal boot off the positive (red) battery terminal. Then remove the positive (red) battery cable (Figure 28).
5. Remove the battery clamp and remove the battery (Figure 28).

Installing the Battery

1. Place the battery onto the machine (Figure 28).
2. Secure the battery with the battery clamp, battery supports, and locknuts.
3. First, install the positive (red) battery cable to positive (+) battery terminal with a nut, washer and bolt (Figure 28). Slide the rubber cover over the post.
4. Then install the negative battery cable and ground wire to the negative (-) battery terminal with a nut, washer and bolt (Figure 28). Slide the rubber cover over the post.

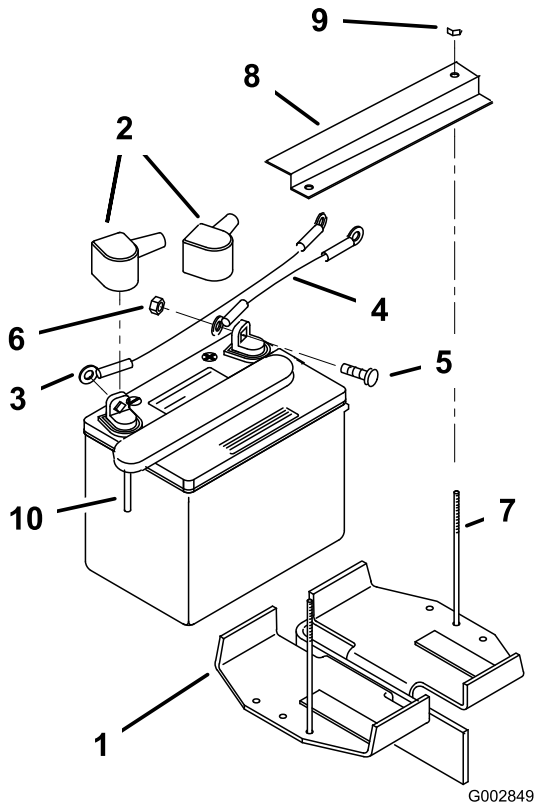


Figure 28

1. Battery holder
2. Terminal boot
3. Positive cable
4. Negative cable
5. Carriage bolt, (1/4 x 3/4 inches)
6. Nut, (1/4 inch)
7. Battery support rod
8. Battery clamp
9. Locknut, (1/4 inch)
10. Vent tube

Checking the Battery Electrolyte Level

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.**
- **Fill the battery where clean water is always available for flushing the skin.**

1. Look at the side of the battery. The electrolyte must be up to the **upper** line (Figure 29). Do not allow the electrolyte to fall below the **lower** line (Figure 29).

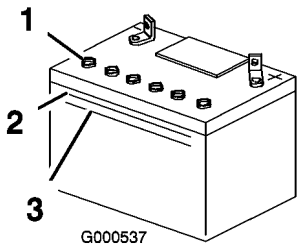


Figure 29

1. Vent caps
2. Upper line
3. Lower line

2. If the electrolyte is low, add the required amount of distilled water; refer to Adding Water to the Battery.

Adding Water to the Battery

The best time to add distilled water to the battery is just before you operate the machine. This lets the water mix thoroughly with the electrolyte solution.

1. Remove the battery from the machine; refer to Removing the Battery.

   Important: Never fill the battery with distilled water while the battery is installed in the machine. Electrolyte could be spilled on other parts and cause corrosion.

2. Clean the top of the battery with a paper towel.
3. Remove the vent caps from the battery (Figure 29).
4. Slowly pour distilled water into each battery cell until the electrolyte level is up to the Upper line (Figure 29) on the battery case.

   Important: Do not overfill the battery because electrolyte (sulfuric acid) can cause severe corrosion and damage to the chassis.

5. Wait five to ten minutes after filling the battery cells. Add distilled water, if necessary, until the electrolyte level is up to the Upper line (Figure 29) on the battery case.
6. Reinstall the battery vent caps.

Charging the Battery

Charging the battery produces gasses that can explode.

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

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

1. Remove the battery from the chassis; refer to Removing the Battery.
2. Check the electrolyte level; refer to Checking the Electrolyte Level.
3. Make sure the filler caps are installed in battery. Charge battery for 1 hour at 25 to 30 amps or 6 hours at 4 to 6 amps.
4. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Figure 30).
5. Install the battery onto 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.

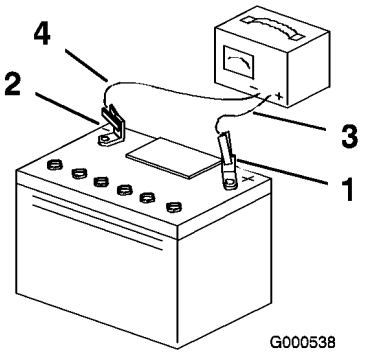


Figure 30

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

Servicing the Fuse

The electrical system is protected by a fuse. It requires no maintenance. If the fuse blows check

component or circuit for malfunction or short. To replace fuse pull out on the fuse (Figure 31) to remove or replace it.

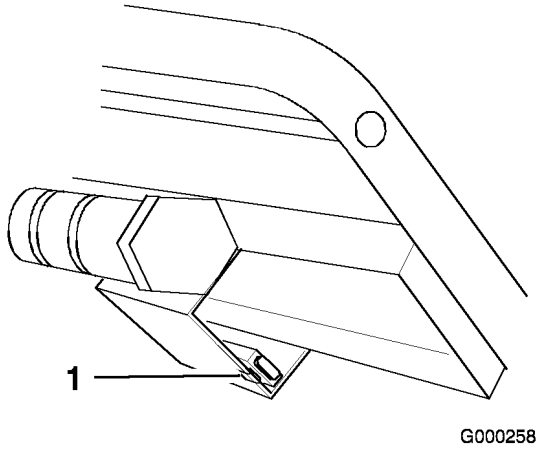


Figure 31

1. Fuse, 7.5 amp, blade type

Drive System Maintenance

Checking the Tire Pressure

Maintain the air pressure in the front and rear tires as specified. Check the pressure at the valve stem after every 50 operating hours or monthly, whichever occurs first (Figure 32).

Rear Tire Pressure: 12-14 psi (83-97 kPa)

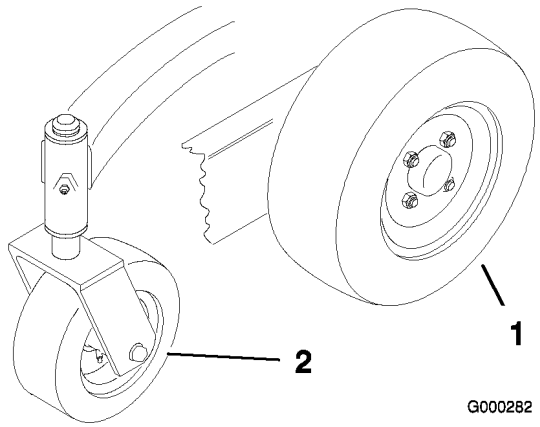


Figure 32

1. Rear Tire
2. Caster tire

Adjusting the Electric Clutch

The clutch is adjustable to ensure proper engagement and proper braking. Check adjustment after every 100 hours of operation.

1. To adjust the clutch, tighten or loosen the lock nuts on the flange studs (Figure 33).

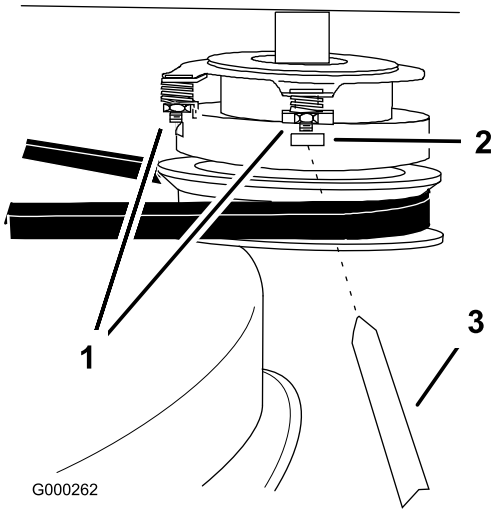


Figure 33

1. Adjusting nut
2. Slot
3. Feeler gauge

2. Check adjustment by inserting a feeler gauge through the slots next to the studs (Figure 33).
3. The proper disengaged clearance between the clutch plates is 0.012-0.024 inch (0.30-0.60 mm). It will be necessary to check this clearance at each of the three slots to ensure the plates are parallel to each other.

Adjusting the Machine Neutral Position

If the wheels turn when control bar is in neutral, adjustment is required

1. Raise rear of the machine so wheels are off the ground and support with jack stands

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 chock or block tires when leaving the machine unattended, even if just for a few minutes.

2. Start engine and run for 5 minutes at 3/4 throttle, to warm hydraulic fluid
3. Move control bar rearward and forward then release. If wheels rotate when control bar is in neutral, adjustment is required.
4. Loosen top and bottom jam nuts at pump arm neutral adjustment sleeve (Figure 34).
5. Push down on Pump Arm until Sleeve contacts bottom nut (Figure 34). Wheel should now be rotating slowly in reverse.
6. Turn bottom nut up slowly, moving sleeve and pump arm up, until wheel stops rotating (Figure 34).
7. Turn top nut down against sleeve and tighten to lock the adjustment (Figure 34).
8. Repeat step 3 above to check adjustment. Repeat the adjustment procedure if necessary.
9. Repeat for other wheel, if necessary.

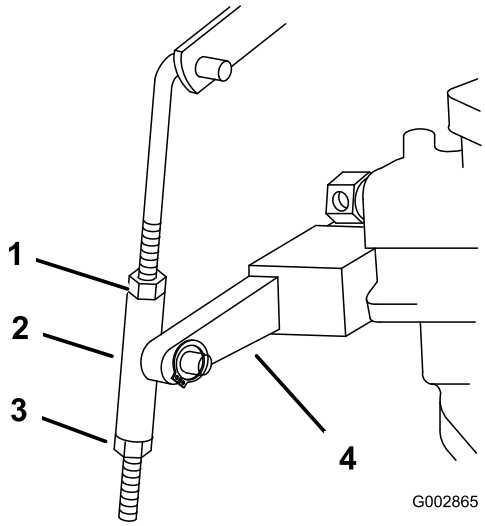


Figure 34

1. Top jam nut
2. Sleeve
3. Bottom jam nut
4. Pump arm

Cooling System Maintenance

Cleaning the Cooling Systems

Before each use, check and clean hydraulic and engine cooling systems. Remove any build-up of grass, dirt or other debris from the oil cooler screen and engine air intake. Every 100 hours clean oil cooler, engine cylinder and cylinder head cooling fins. Also clean around carburetor, governor levers and linkage. This will help insure adequate cooling to hydraulic pumps, motors and engine and will reduce the possibility of overheating and mechanical damage.

1. Remove oil cooler from the engine (Figure 35). Save all mounting hardware.
2. Blow out fins of oil cooler and area between fins and screen with compressed air. If area between screen and fins is tightly packed, remove oil cooler from screen. Removing two retaining screws. Save all mounting hardware (Figure 35).
3. Clean off engine air intake.
4. Install oil cooler onto engine with the previously removed hardware (Figure 35).

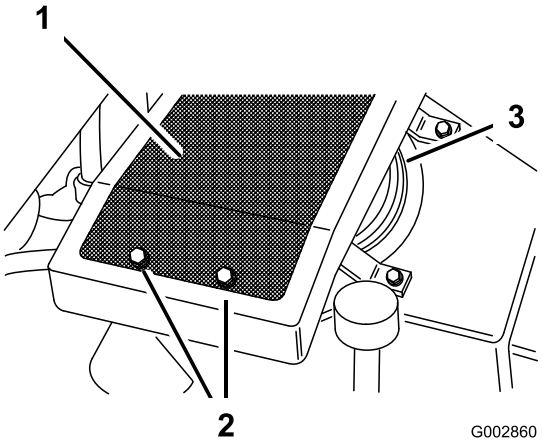


Figure 35

1. Oil cooler screen
2. Oil cooler retaining screw
3. Engine air intake

Belt Maintenance

Replacing the Transmission Belt

1. Disengage the PTO, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Remove PTO drive belt. Refer to Replacing the PTO Drive Belt in theBelt Maintenance, page 34.
3. Raise the front of the machine and hold with jack stands.

4. Disconnect clutch wire connector from wire harness.
5. Disconnect clutch retainer from the engine deck (Figure 36).

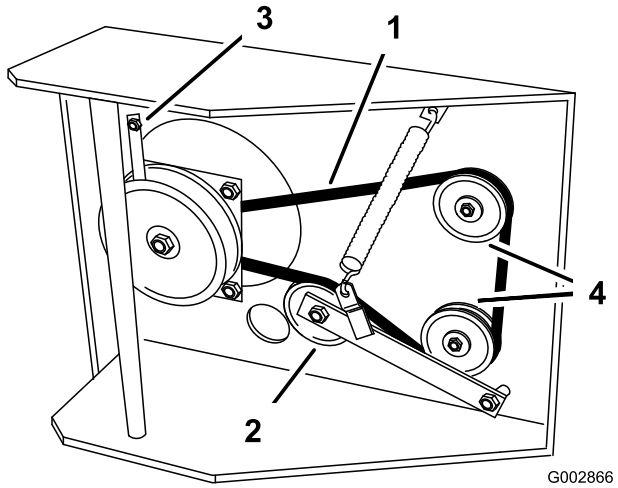


Figure 36

1. Transmission belt
2. Idler pulley
3. Clutch retainer
4. Drive pulley

6. Unhook tension spring from side of frame (Figure 36).
7. Loosen pivot bolt enough to remove traction belt from the drive pulley and clutch.
8. Install new belt around clutch and drive pulley.
9. Torque pivot bolt to 35-40 ft-lb (47-54 N·m). Install tension spring between idler arm and frame bracket (Figure 36).
10. Install clutch retainer to the engine deck (Figure 36).
11. Connect clutch wire connector to wire harness.
12. Install PTO drive belt.

Hydraulic System Maintenance

Servicing the Hydraulic System

Checking the Hydraulic Fluid

Check the hydraulic fluid level before engine is first started and there after every 8 operating hours.

Fluid Type: Mobilube 424 (ISO 68) or equivalent anti-wear hydraulic fluid.

Tank Capacity: 1-3/4 quarts (1.6 liter)

Important: Use only hydraulic oils specified. Other fluids could cause system damage.

1. Position machine on a level surface and stop the engine.
2. Clean area around filler neck and cap\dipstick of hydraulic tank (Figure 37).
3. Remove cap\dipstick from filler neck and wipe with a clean rag. Insert cap\dipstick and seat cap all the way into filler neck; then remove and check fluid level. Fluid level should be in between marks on dipstick.
4. If level is low, add fluid to raise level to full mark.
5. Install cap\dipstick onto filler neck.

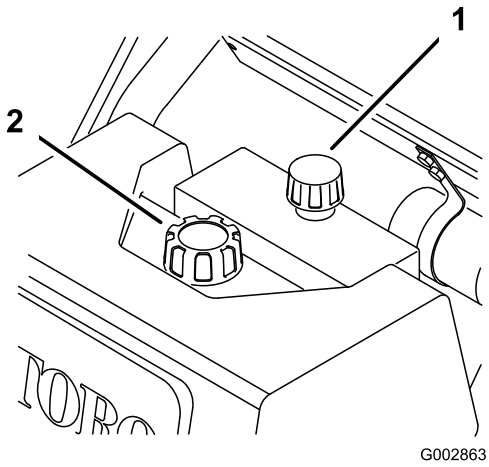


Figure 37

1. Hydraulic tank cap
2. Fuel tank cap\dipstick

Replacing the Hydraulic Filter

Change the hydraulic filter as follows:

- After the first 8 operating hours.
- After every 200 operating hours.

1. Position the machine on a level surface, stop the engine, and remove the key from ignition switch.

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

2. Place a drain pan under the filter, remove the old filter and wipe the filter adapter gasket surface (Figure 38).

Note: Make sure the fluid is completely drained before installing a new filter.

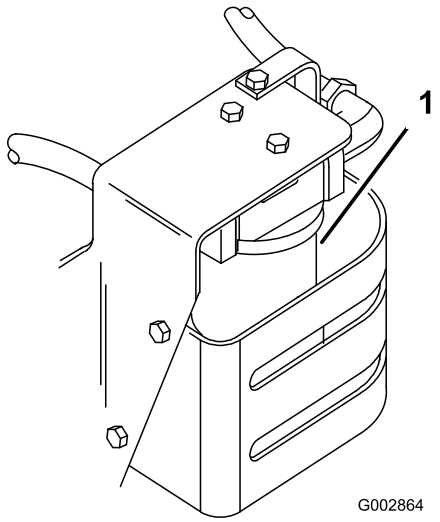


Figure 38

1. Hydraulic filter

3. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Figure 39).
4. Install replacement hydraulic filter onto the filter adapter. Turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 turn (Figure 39).
5. Start engine and let run for about two minutes to purge air from the system. Stop the engine and check for leaks. If one or both wheels will not drive, refer to Bleeding the Hydraulic System.
6. Check the fluid level in the hydraulic tank and add to raise level to **full** mark on dipstick. **Do Not over fill.**

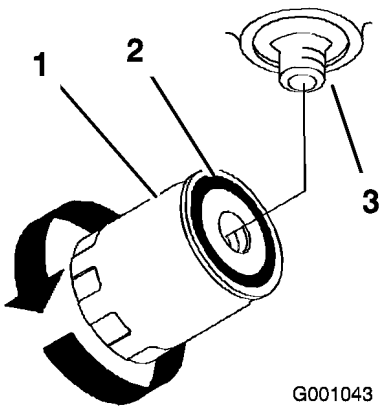


Figure 39

1. Hydraulic filter
2. Gasket
3. Adapter

Bleeding the Hydraulic System

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

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

Checking the Hydraulic Lines

After every 100 operating hours, check hydraulic lines and hoses for leaks, loose fittings, kinked lines, loose mounting supports, wear, weather and chemical deterioration. Make necessary repairs before operating.

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

- **If hydraulic fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result if this is not done.**
- **Keep body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.**
- **Use cardboard or paper to find hydraulic leaks.**
- **Safely relieve all pressure in the hydraulic system before performing any work on the hydraulic system.**
- **Make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to hydraulic system.**

Servicing the By-pass Valve

The by-pass valve is adjustable to ensure easy operation with a variety of deck sizes. If the front of the deck lifts off the ground when the upper control bar is quickly pushed forward or the machine is unable to drive up hills, an adjustment may be needed.

Testing the By-pass Valve

1. Start engine and run for 5 minutes at 3/4 throttle, to warm hydraulic fluid.
2. 2. Drive the machine to a clear and level open area such as a driveway. There should be at least 10 feet of clear area in front of the machine.
3. 3. Loosen the quick release levers and push the reference bar forward to the fast position. Lock the quick release levers to secure the reference bar.
4. 4. Move throttle control to 3/4 throttle.
5. 5. Quickly push the upper control bar against the reference bar. The front caster wheels should almost lift off the ground. If front caster wheels lift the off the ground, the machine is too aggressive and adjustment is required.
6. 6. Move the engine throttle to the fast position.
7. 7. Quickly push the upper control bar against the reference bar. The front caster wheels should lift approximately 1 inch off the ground. If front caster wheels lift the off the ground more than 2 inches, the machine is too aggressive. Adjustment is required.
8. 8. If the machine accelerates slowly, and the front caster wheels do not lift off the ground, the machine is too un-responsive. Adjustment is required.

Adjusting the By-pass Valve

The by-pass valve should be adjusted to deliver best performance for the size (weight) mower you have. The by-pass valve factory setting is 1/2 turn out.

The following values can be used as initial settings for different size mowers:

- 52 inch – 1/2 turn out
- 44 inch – 1 turn out
- 37 inch – 1-1/6 turn out
- 36 inch – 1-1/6 turn out

1. Loosen the large jam nut several turns (Figure 40).
2. Gently close the by-pass valve. Do not over-tighten the valve or the needle and seat may be damaged. Do not exceed 50 in-lb (5.6 N·m) of torque to close the valve.
3. Open by-pass valve a 1/2 turn (Figure 40).
4. Tighten the jam nut to lock the adjustment (Figure 40).
5. Repeat the Test Procedure to check for proper operation. The by-pass valve adjustment is very sensitive, do not adjust it more than a 1/6 turn (one flat) at a time.
6. If the machine is too aggressive or tends to jump forward, the valve needs to be opened further.
7. If the machine is slow to respond, the valve needs to be closed further.
8. Repeat the Test Procedure to check for proper operation. Re-adjust the by-pass valves until proper performance is achieved.

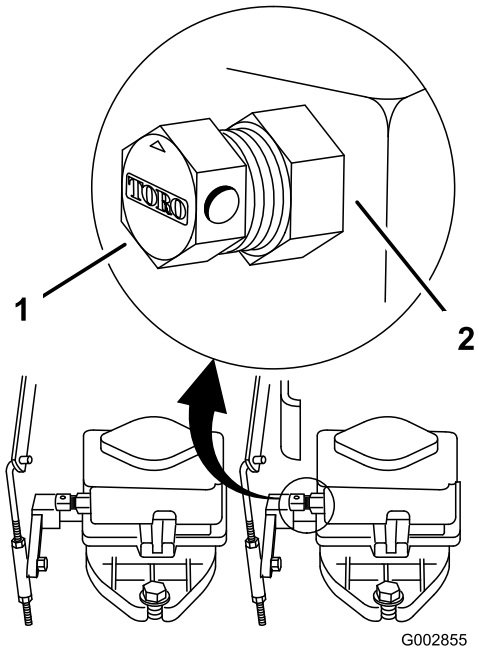


Figure 40

Storage

Cleaning and Storage

1. Disengage the power take off (PTO) 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. Clean dirt and chaff from the outside of the engine's 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 shift lever plate, and engine.
3. Service the air cleaner; refer to Servicing the Air Cleaner in Engine Maintenance, page 25.
4. Change the crankcase oil; refer to Servicing the Engine in Engine Maintenance, page 25.
5. Check the tire pressure; refer to Checking the Tire Pressure in Drive System Maintenance, page 33.
6. For long-term storage (more than 90 days) add stabilizer/conditioner additive to fuel in the tank.
   A. Run engine to distribute conditioned fuel through the fuel system (5 minutes).
   B. Stop engine, allow to cool and drain the fuel tank; refer to Servicing the Fuel Tank in Fuel System Maintenance, page 29, or operate engine until it stops.
   C. Restart engine and run until it stops. Repeat, on Choke until engine will not restart.
   D. Dispose of fuel properly. Recycle as per local codes.

   Note: Do not store stabilizer/conditioned gasoline over 90 days.
7. Remove the spark plug(s) and check its condition; refer to Servicing the Spark Plug in Engine Maintenance, page 25. With the spark plug(s) removed from the engine, pour two tablespoons of engine oil into the spark plug hole. Now use the starter to crank the engine and distribute the oil inside the cylinder. Install the spark plug(s). Do not install the wire on the spark plug(s).
8. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged or defective.
9. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
10. Store the machine in a clean, dry garage or storage area. Remove the key from the ignition switch and keep it in a memorable place. Cover the machine to protect it and keep it clean.

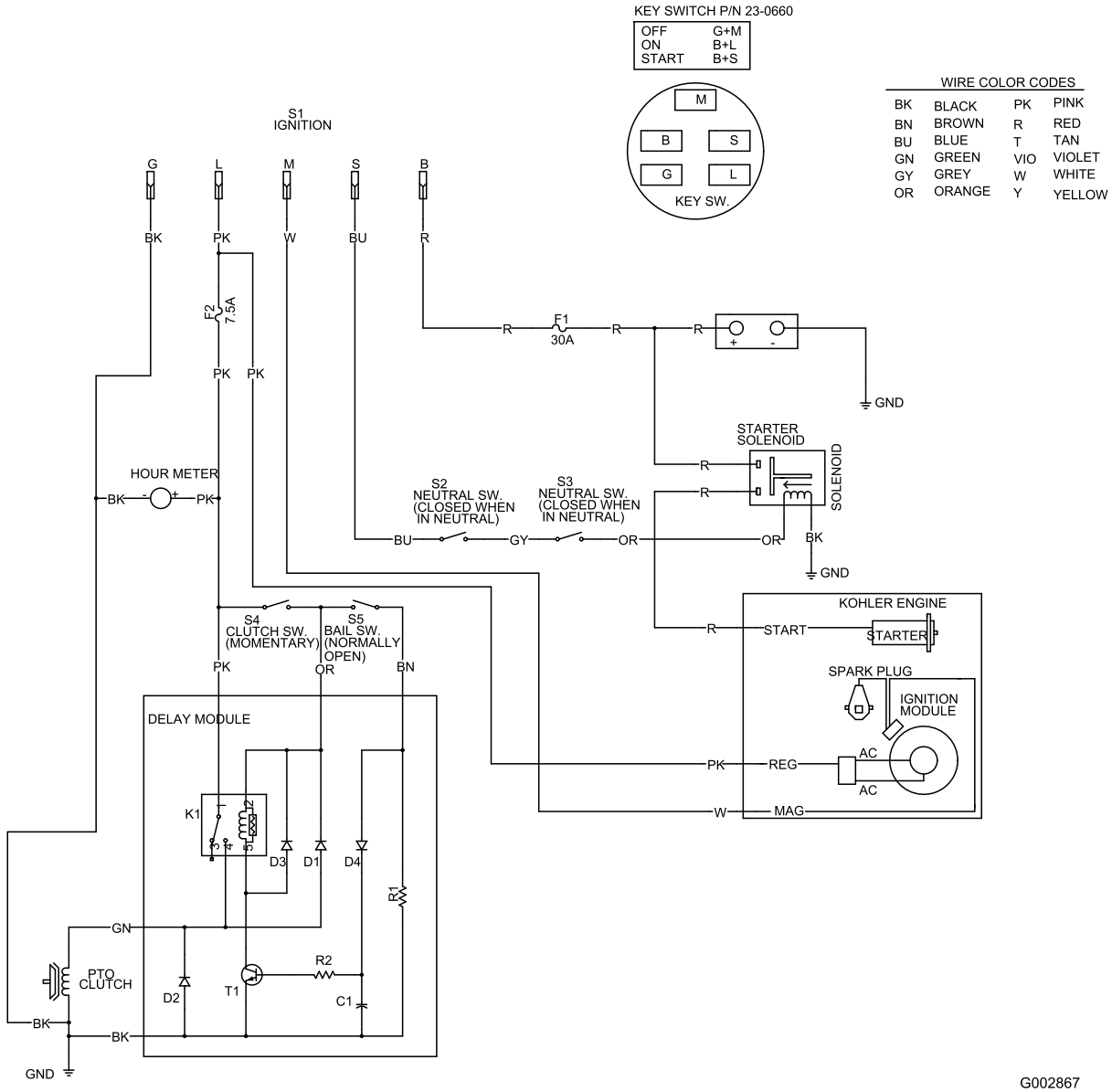
Troubleshooting

Problem	Possible Cause	Corrective Action
Engine will not start, starts hard, or fails to keep running.	1. Fuel tank is empty.	1. Fill fuel tank with gasoline.
	2. Choke is not on.	2. Move the throttle lever to choke position.
	3. Air cleaner is dirty.	3. Clean or replace the air cleaner element.
	4. Spark plug wire is loose or disconnected.	4. Install wire on spark plug.
	5. Spark plug is pitted, fouled, or the gap is incorrect.	5. Install a new, correctly gapped spark plug.
	6. Dirt in the fuel filter.	6. Replace the fuel filter.
	7. Dirt, water, or stale fuel is in the fuel system.	7. Contact an Authorized Service Dealer.
Engine loses power.	1. Engine load is excessive.	1. Reduce the ground speed.
	2. Air cleaner is dirty.	2. Clean the air cleaner element.
	3. Oil level in the crankcase is low.	3. Add oil to the crankcase.
	4. Cooling fins and air passages under the engine blower housing are plugged.	4. Remove the obstruction from the cooling fins and air passages.
	5. Spark plug is pitted, fouled, or the gap is incorrect.	5. Install a new, correctly gapped spark plug.
	6. Vent hole in the fuel cap is plugged.	6. Clean or replace the fuel cap.
	7. Dirt in the fuel filter.	7. Replace the fuel filter.
	8. Dirt, water, or stale fuel is in the fuel system.	8. Contact an Authorized Service Dealer.
Engine overheats.	1. Engine load is excessive.	1. Reduce the ground speed.
	2. Oil level in the crankcase is low.	2. Add oil to the crankcase.
	3. Cooling fins and air passages under the engine blower housing are plugged.	3. Remove the obstruction from the cooling fins and air passages.

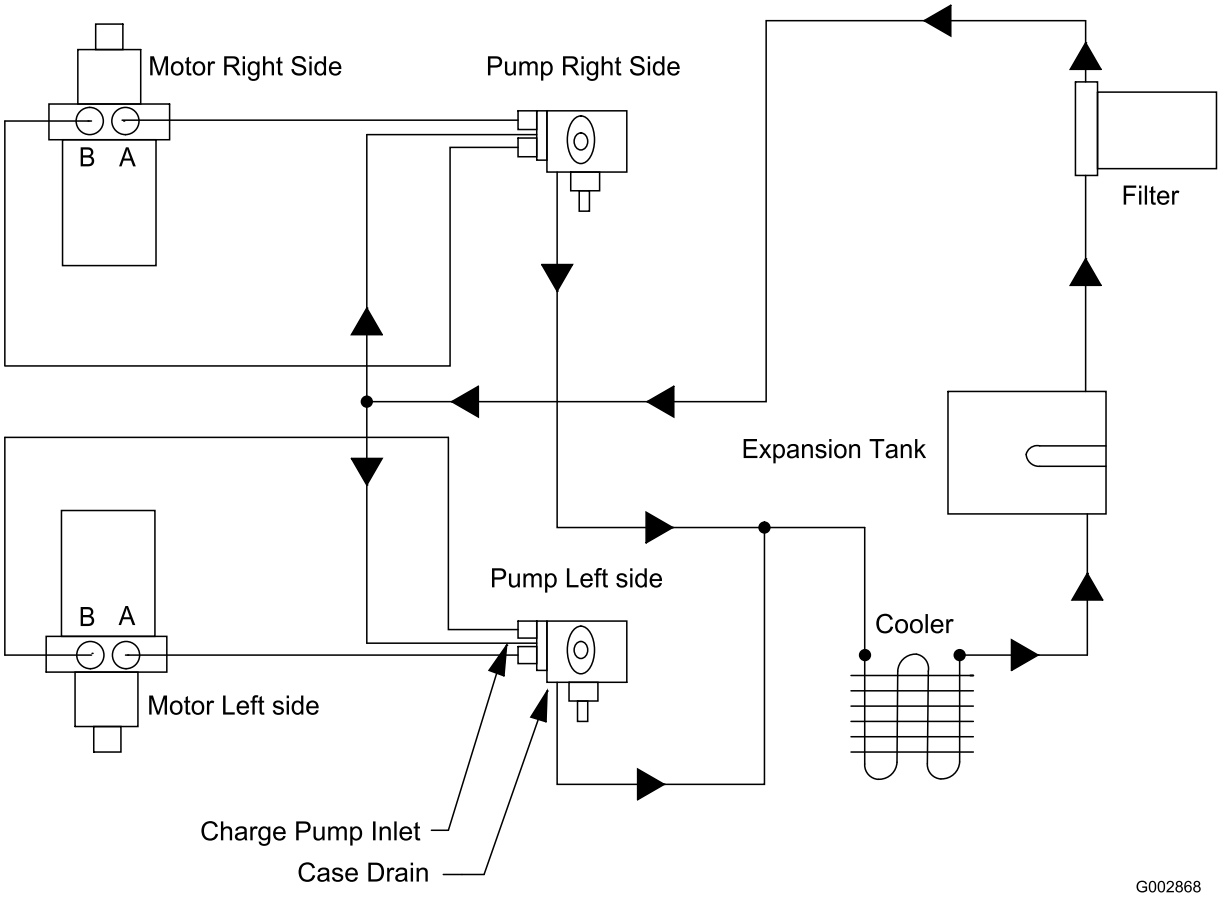
Problem	Possible Cause	Corrective Action
Machine does not drive.	1. Shift lever is in neutral. 2. Traction belt is worn, loose or broken. 3. Traction belt is off a pulley. 4. Broken or missing idler spring.	1. Move shift lever to a drive gear position. 2. Change the belt. 3. Change the belt. 4. Replace the spring.
Abnormal vibration.	1. Cutting blade(s) is/are bent or unbalanced. 2. Blade mounting bolt is loose. 3. Engine mounting bolts are loose. 4. Loose engine pulley, idler pulley, or blade pulley. 5. Engine pulley is damaged. 6. Blade spindle is bent.	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.
Uneven cutting height.	1. Blade(s) not sharp. 2. Cutting blade(s) is/are bent. 3. Mower is not level. 4. Underside of mower is dirty. 5. Tire pressure is not correct. 6. Blade spindle bent.	1. Sharpen the blade(s). 2. Install new cutting blade(s). 3. Level mower from side-to-side and front-to-rear. 4. Clean the underside of the mower. 5. Adjust the tire pressure. 6. Contact an Authorized Service Dealer.

Problem	Possible Cause	Corrective Action
Blades do not rotate.	1. Drive belt is worn, loose or broken.	1. Check the belt tension.
	2. Drive belt is off pulley.	2. Install drive belt and check adjusting shafts and belt guides for correct position.
	3. Deck belt is worn, loose or broken.	3. Install new deck belt.
	4. Deck belt is off pulley.	4. Install deck pulley and check the idler pulley, idler arm and spring for correct position and function.
	5. Broken or missing idler spring.	5. Replace the spring.

Schematics



Electrical Schematic (Rev. A)



Hydraulic Schematic (Rev. A)

Evaporative Emission Control Warranty Statement

California Evaporative Emission Control Warranty Statement
Your Warranty Rights and Obligations

Introduction

The California Air Resources Board and The Toro® Company are pleased to explain the evaporative emission control system's warranty on your 2006 model year equipment. In California, new equipment that use small off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. The Toro® Company must warrant the evaporative emission control system on your equipment for two years provided there has been no abuse, neglect or improper maintenance of your equipment.

Your evaporative emission control system may include parts such as: fuel lines, fuel line fittings, and clamps.

Manufacturer's Warranty Coverage:

This evaporative emission control system is warranted for two years. If any evaporative emission-related part on your equipment is defective, the part will be repaired or replaced by The Toro® Company.

Owner's Warranty Responsibilities:

- As the equipment owner, you are responsible for performance of the required maintenance listed in your Operator's Manual. The Toro® Company recommends that you retain all receipts covering maintenance on your equipment, but The Toro® Company cannot deny warranty solely for the lack of receipts.
- As the equipment owner, you should however be aware that The Toro® Company may deny you warranty coverage if your emission warranty parts have failed due to abuse, neglect, or improper maintenance or unapproved modifications.
- You are responsible for presenting your equipment to an Authorized Service Dealer as soon as the problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact The Toro® Company at 1-952–948–4027 or call us toll free at the number listed in your Toro Warranty statement.

Defects Warranty Requirements:

1. The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser.
2. General Evaporative Emissions Warranty Coverage. The emission warranty parts must be warranted to the ultimate purchaser and any subsequent owner that the evaporative emission control system when installed was:
   A. Designed, built, and equipped so as to conform with all applicable regulations; and
   B. Free from defects in materials and workmanship that causes the failure of a warranted part for a period of two years.
3. The warranty on evaporative emissions-related parts will be interpreted as follows:
   A. Any warranted part that is not scheduled for replacement as required maintenance in the written instructions must be warranted for the warranty period of two years. If any such part fails during the period of warranty coverage, it must be repaired or replaced by The Toro® Company. Any such part repaired or replaced under the warranty must be warranted for a time not less than the remaining warranty period.
   B. Any warranted part that is scheduled only for regular inspection in the written instructions must be warranted for the warranty period of two years. A statement in such written instructions to the effect of "repair or replace as necessary" will not reduce the period of warranty coverage. Any such part repaired or replaced under warranty must be warranted for a time not less than the remaining warranty period.
   C. Any warranted part that is scheduled for replacement as required maintenance in the written instructions must be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part must be repaired or replaced by The Toro® Company. Any such part repaired or replaced under warranty must be warranted for a time not less than the remainder of the period prior to the first scheduled replacement point for the part.
   D. Repair or replacement of any warranted part under the warranty provisions of this article must be performed at no charge to the owner at an Authorized Service Dealer.
   E. Notwithstanding the provisions of subsection (D) above, warranty services or repairs must be provided at an Authorized Service Dealer.
   F. The owner must not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at an Authorized Service Dealer.
   G. Throughout the evaporative emission control system's two year warranty period, The Toro® Company must maintain a supply of warranted parts sufficient to meet the expected demand for such parts.
   H. Manufacturer approved replacement parts must be used in the performance of any warranty maintenance or repairs and must be provided without charge to the owner. Such use will not reduce the warranty obligations of The Toro® Company.
   I. The use of any add-on or modified parts will be grounds for disallowing a warranty claim made in accordance with this article. The Toro® Company will not be liable under this Article to warrant failures of warranted parts caused by the use of an add-on or modified part.
   J. The Toro® Company shall provide any documents that describe the warranty procedures or policies within five working days of request by the Air Resources Board.

Emission Warranty Parts List:

The following lists includes the parts covered under this warranty:

- Fuel Lines
- Fuel Line Fittings
- Clamps

LCE

The Toro Total Coverage Guarantee

A Limited Warranty

Conditions and Products Covered

The Toro® Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly promise to repair the listed Toro Products if defective in materials or workmanship. The following time periods apply from the date of purchase:

Products	Warranty Period
All Products	1 year
All Spindles	2 years (parts and labor; third year, parts only)
Engines/Hydraulic Systems* on the following: Outfront and Mid-Mount Z's ProLine Mid-Size Mowers Groundsmaster[Symbol_registersans] Riding Mowers Backpack Blowers	2 years
Deck Shells (32²-72²) on the following: ProLine Mid-Size Mowers Mid-Mount Z's	2 years
Electric Clutch on 500 Series Mid-Mount Z's	2 years

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

This warranty applies to:

- Outfront and Mid-Mount Z's
- ProLine Mid-Size Mowers
- Groundsmaster Riding Mowers
- Turf Maintenance Equipment
- Debris Management Equipment

Some engines used on Toro LCE 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 Toro Authorized or Master Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, access our website at www.Toro.com. You may also call our Toro Customer Care Department toll free at 888–577–7466 (U.S. Customers) or 877–484–9255 (Canada customers).
2. Bring the product and your proof of purchase (sales receipt) to the Service Dealer.

If for any reason you are dissatisfied with the Service Dealer's analysis or with the assistance provided, contact us at:

Owner Responsibilities

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

Items and Conditions Not Covered

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

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

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

General Conditions

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

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

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

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

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

LCB Customer Service Department
Toro Warranty Company
8111 Lyndale Avenue South
Bloomington, MN 55420-1196

Countries Other than the United States or Canada

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