Form No. 3354-447 Rev A

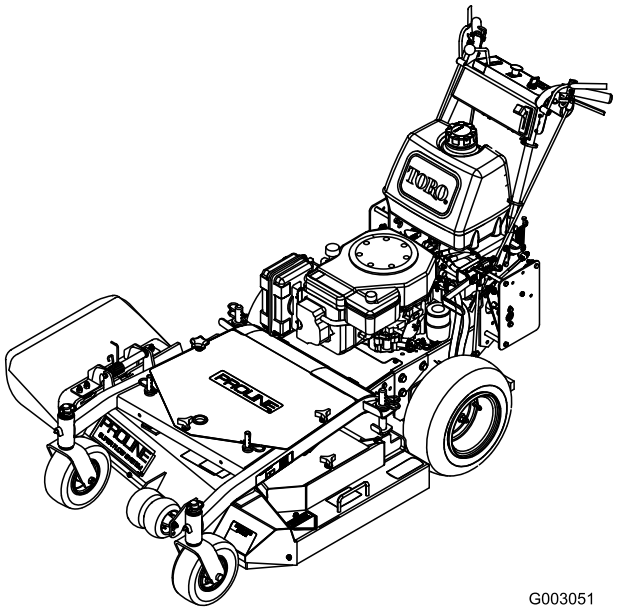
TORO®

Count on it.

Operator's Manual

Mid-Size Pistol Grip, Hydro, 15hp with 36in Side Discharge Mower

Model No. 30433—Serial No. 260000001 and Up



G003051

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.

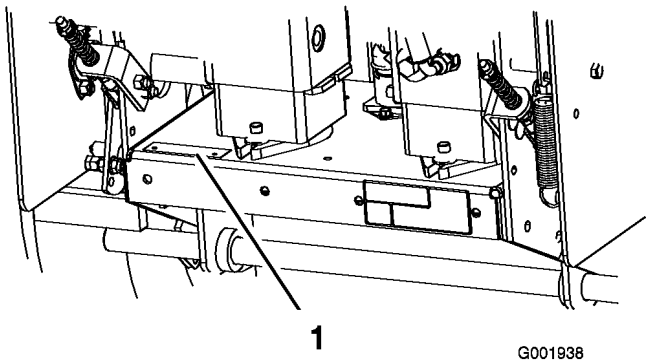


Figure 1

1. Location of the model and serial numbers

Model No. _____

Serial No. _____

This manual identifies potential hazards and has safety messages identified by the following words:

- **Danger** signals an extreme hazard that **will** cause serious injury or death if you do not follow the recommended precautions.
- **Warning** signals a hazard that **may** cause serious injury or death if you do not follow the recommended precautions.
- **Caution** signals a hazard that may cause minor or moderate injury if you do not follow the recommended precautions.

This manual uses two 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

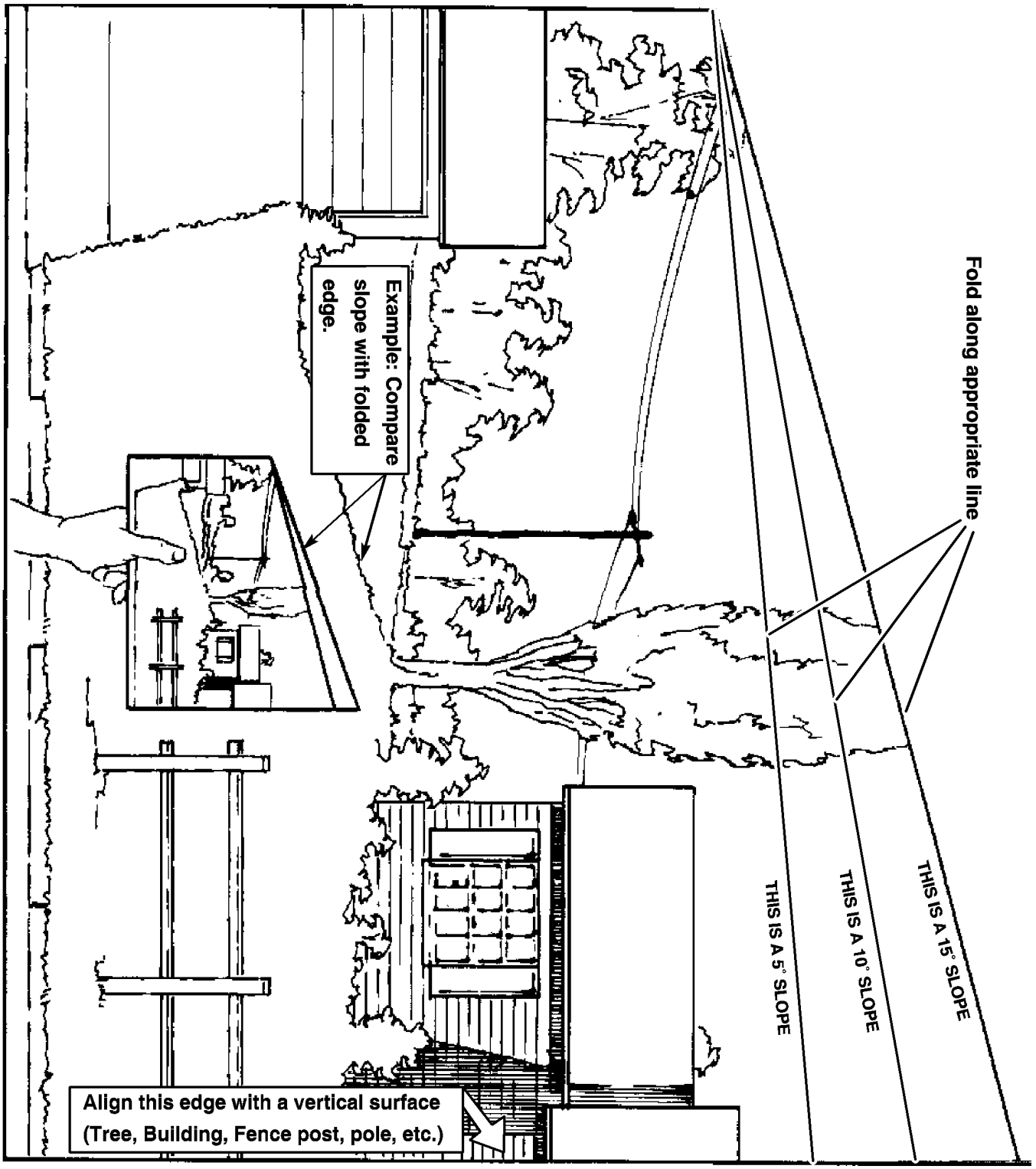
turn over if a wheel goes over the edge of a cliff or ditch, or if an edge caves in.

- 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.

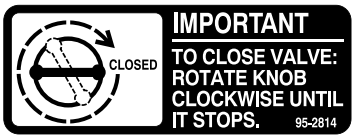
1-523552

68-8340

43-8480

93-1122

66-1340



95-2814

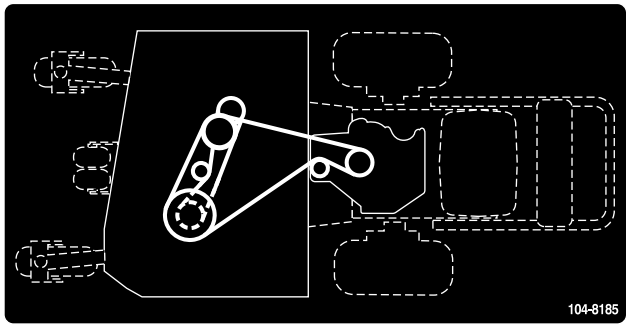
67-5360

98-0776

98-4387

1. Warning—wear hearing protection.

104-2838



104-8185

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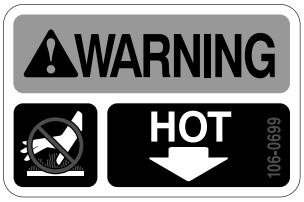
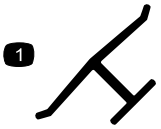
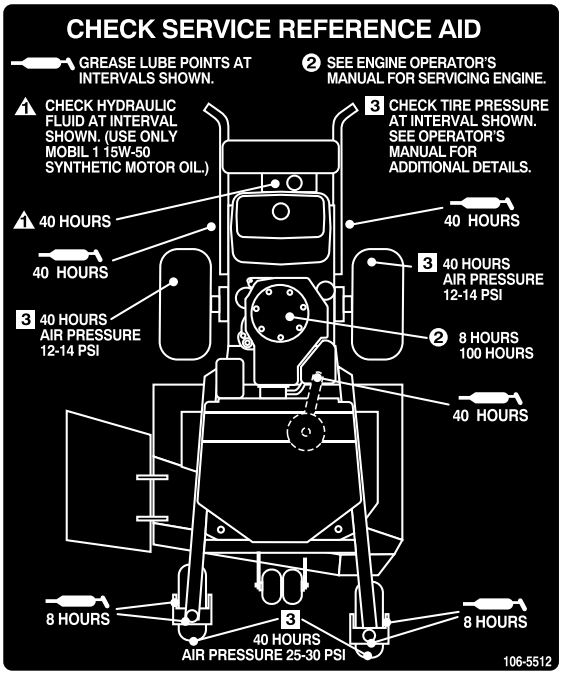


106-0699

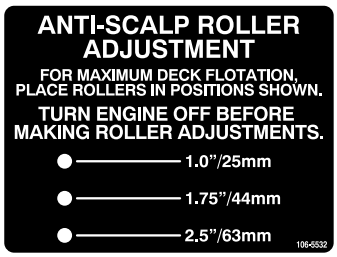


Manufacturer's Mark

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



106-5512

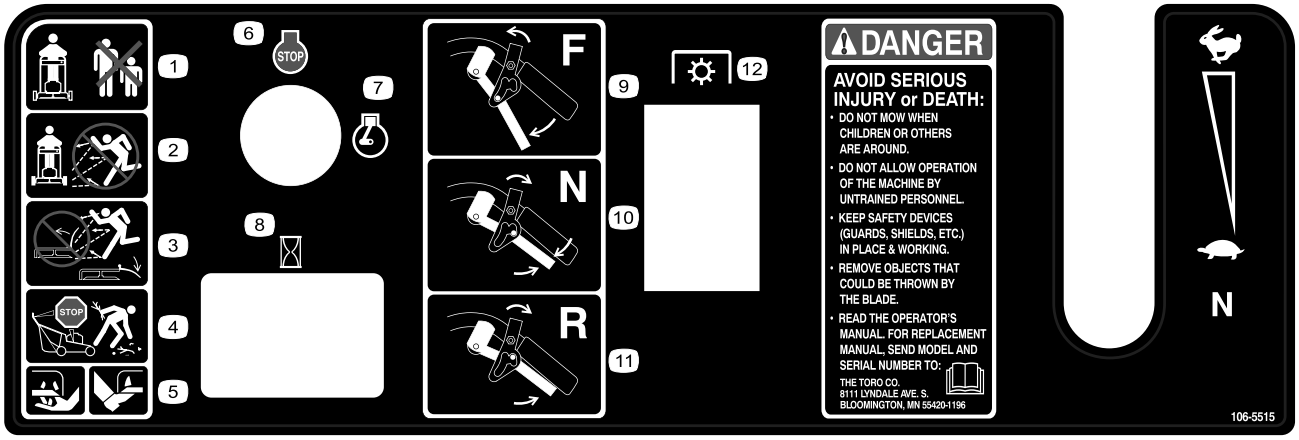


106-5532

106-0635

106-5501

1. Choke
2. Fast
3. Continuous variable setting
4. Slow



106-5515

1. Keep bystanders a safe distance from the machine.
2. Do not allow bystanders to be hit by thrown objects.
3. Do not operate the mower with the deflector up or removed.
4. Stop the engine and pick up debris before operating.
5. Mower can cut hands or feet.
6. Engine—stop
7. Engine—run
8. Hour meter
9. To park, squeeze the drive levers and rotate the neutral locks forward.
10. To drive, rotate the neutral locks and slowly release the drive levers.
11. To place the machine in neutral, squeeze the drive levers and rotate the neutral locks backward.
12. Power take-off (PTO)

Setup

Loose Parts

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

Step	Description	Qty.	Use
1	No parts required	–	Remove the shipping bracket and shipping washers.
2	Handle assembly Flanged bolt (3/8 x 1 inch) Flanged bolt (3/8 x 1-1/4 inches) Flange nut (3/8 inch)	1 2 2 4	Install the handle assembly.
3	Fuel tank with studs installed Bolt (5/16 x 7/8 inch) Lock nut (5/16 inch) Washer (5/16 inch) Hose clamp Lock washer (5/16 inch) Spring	1 2 2 4 1 2 2	Install the fuel tank.
4	Control rods E-ring	2 2	Install the control rods.
5	Washer Cotter pin	1 1	Install the speed control rod.
6	Hairpin cotter pin Spacers	2 6	Install the hairpin cotter pins and spacers.
7	No parts required	–	Check the engine oil and hydraulic fluid level.
8	No parts required	–	Set up the hydro linkage.
9	Operator's Manual Engine Operator's Manual Parts Catalog Safety Video/DVD Registration Card Oil drain hose	1 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

Removing the Shipping Bracket and Shipping Washers

No Parts Required

Procedure

1. Remove the center gage wheel nut, 2 large washers, angle bracket and 1 small washer (Figure 2). Discard the 2 large washers and the angle bracket.

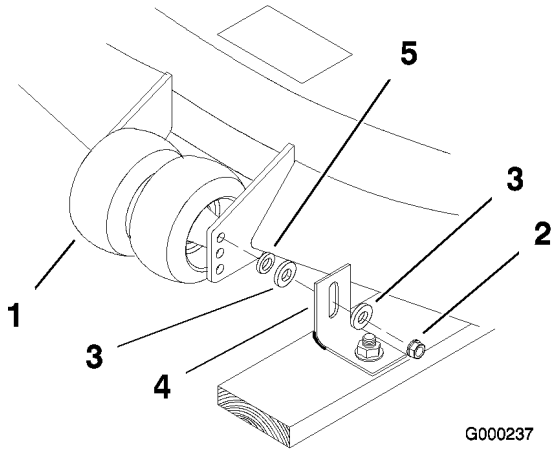


Figure 2

1. Center Gage Wheels and Spacer
2. Nut
3. Large washer-discard
4. Angle bracket-discard
5. Small washer

2. Install the center gage wheels with the previously removed bolt, spacer, small washer, and nut (Figure 3).

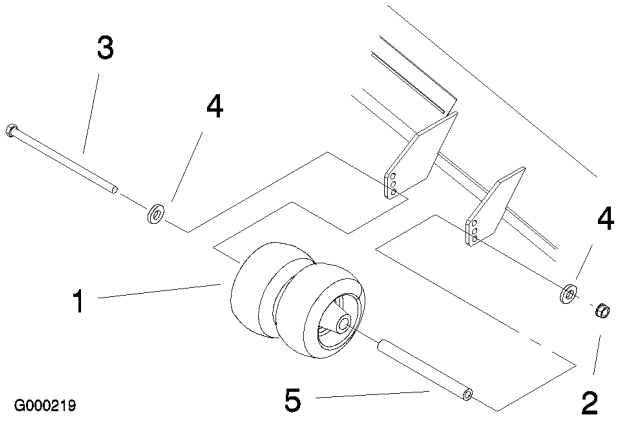


Figure 3

1. Center Gage Wheels and Spacer
2. Nut
3. Bolt
4. Washer
5. Spacer

3. Remove the hairpin cotter and washer on both front height-of-cut posts (Figure 4). Discard the washers, these are not to be used for adjusting the height-of-cut.

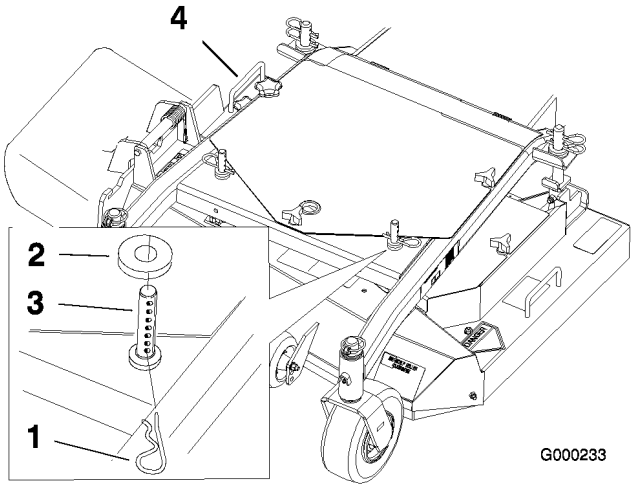


Figure 4

1. Hairpin cotter
2. Shipping washer
3. Height-of-cut post
4. Mower

Step
2

Installing the Handle Assembly

Parts needed for this step:

1	Handle assembly
2	Flanged bolt (3/8 x 1 inch)
2	Flanged bolt (3/8 x 1-1/4 inches)
4	Flange nut (3/8 inch)

Procedure

1. Align handle with upper mounting holes in rear frame (Figure 5).
2. Secure the handle at each upper mounting hole with a flange bolt (3/8 x 1-1/4 inches) and flange nut (3/8 inch) (Figure 5).
3. Select the low position for the lower mounting hole (Figure 5).
4. Secure the handle at each lower mounting hole with a flange bolt (3/8 x 1 inch) and flange nut (3/8 inch) (Figure 5).

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

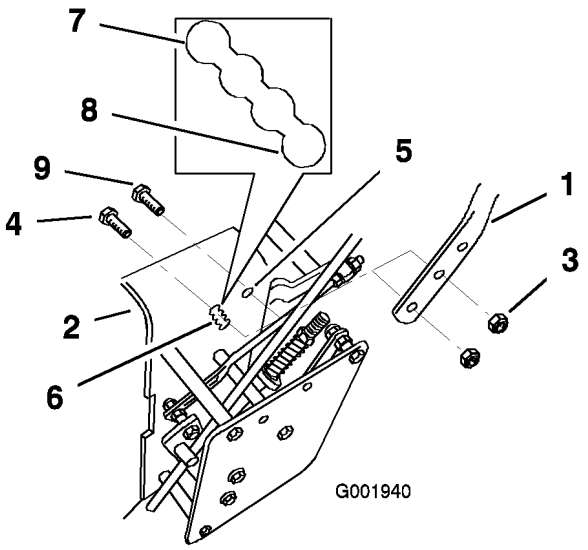


Figure 5

1. Upper handle
2. Rear frame
3. Flange nut, 3/8 inch
4. Flange bolt, 3/8 x 1 inch
5. Upper mounting hole
6. Lower mounting holes
7. Low position
8. High position
9. Flange bolt, 3/8 x 1–1/4 inch

Note: Install the handle assembly before the fuel tank.

Step
3

Installing the Fuel Tank

Parts needed for this step:

1	Fuel tank with studs installed
2	Bolt (5/16 x 7/8 inch)
2	Lock nut (5/16 inch)
4	Washer (5/16 inch)
1	Hose clamp
2	Lock washer (5/16 inch)
2	Spring

Procedure

1. Align fuel tank with the top of the rear frame (Figure 8).
2. Push the fuel line through the grommet and hole in the hydraulic oil filter bracket (Figure 6).

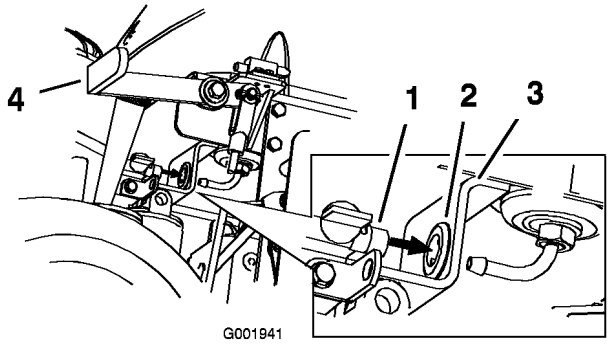


Figure 6

1. Fuel line
2. Grommet and hole
3. Hydraulic oil filter bracket
4. Brake handle

Note: Remove the plastic cap from the fuel fitting before installing the fuel line.

3. Push the fuel line onto the fuel tank connection and secure it with the hose clamp that is on the fuel line (Figure 7).

Note: To ease assembly of the fuel line to the fuel tank connection, apply a light lubricant, such as WD-40® to the end of the fuel line.

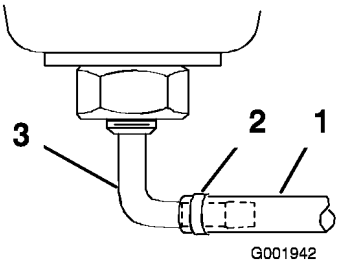


Figure 7

1. Fuel line
2. Clamp
3. Fuel tank connectin

4. Secure the right side of the fuel tank to the rear frame with 2 bolts (5/16 x 7/8 inch), lock washers (5/16 inch) and washers (5/16 inch) (Figure 8).

5. Secure the left side of the fuel tank to the rear frame with washers (5/16 inch), springs and locknuts (5/16 inch) (Figure 8).

Note: Tighten left side of the fuel tank until it is completely tight and then unscrew the locknut one full turn. This will allow the spring to work.

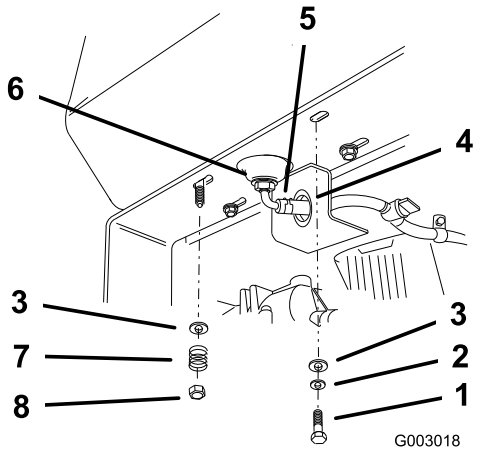


Figure 8

1. Bolt, (5/16 x 7/8 inch)
2. Lock washer, (5/16 inch)
3. Washer, (5/16 inch)
4. Grommet and hole
5. Hose clamp
6. Fuel tank connection
7. Spring
8. Locknut

Step 4

Installing the Control Rods

Parts needed for this step:

2	Control rods
2	E-ring

Procedure

1. For a starting point, make sure the rod fittings are threaded approximately 2-1/2 inches (63 mm) onto the control rods (Figure 9)..
2. Install the control rod fittings into the control arm and secure them with E-rings (Figure 9).

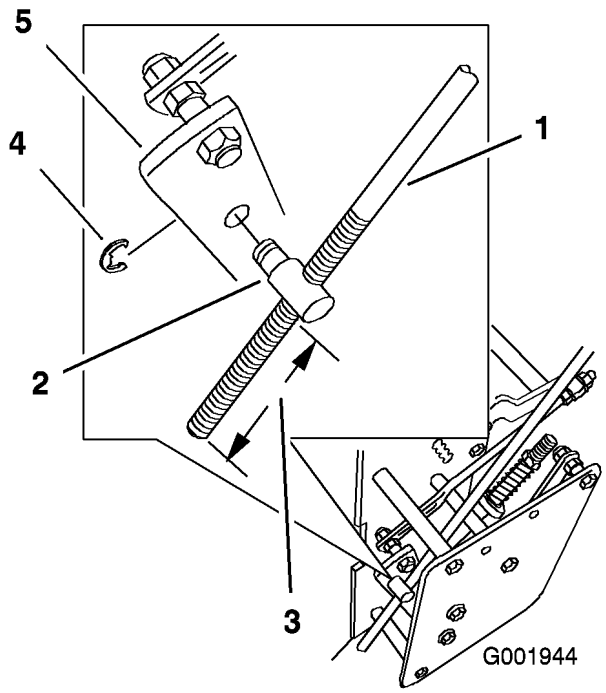


Figure 9

1. Control rod
2. Rod fitting
3. 2–1/2 inch (63.5 mm) from the bottom
4. E-ring
5. Control arm

3. Place the clevis pin into the control rod, drive lever and neutral lock (Figure 10).
4. Install the hairpin cotter between the drive levers and the neutral locks and into the clevis pins (Figure 10).

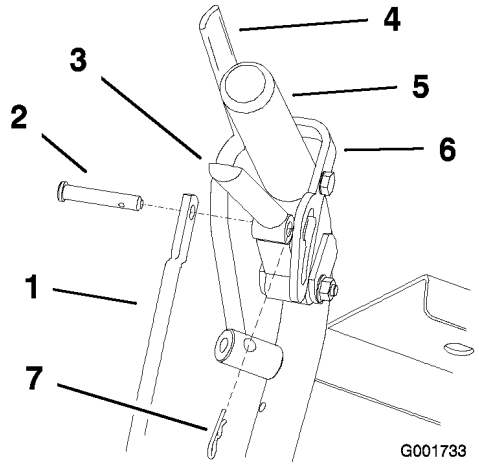


Figure 10

1. Control rod
2. Clevis pin
3. Drive lever
4. Operator Presence Control lever (OPC)
5. Left handle shown
6. Neutral lock
7. Hairpin cotter pin

Step 5

Install the Speed Control Rod

Parts needed for this step:

1	Washer
1	Cotter pin

Procedure

Install the swivel into the speed control crank and secure it with a washer and cotter pin (Figure 11).

Note: If necessary, move the speed control lever until the swivel will go into the speed control crank.

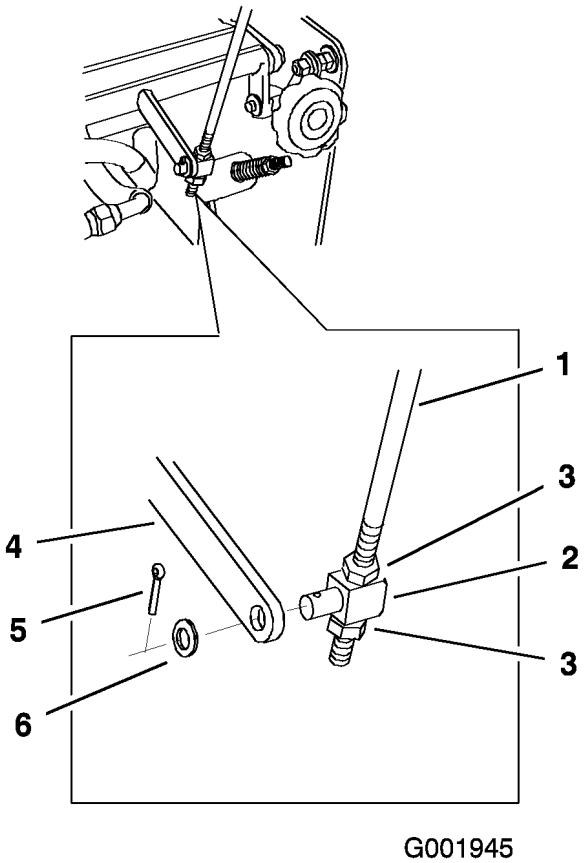


Figure 11

1. Speed control rod
2. Swivel
3. Nut
4. Speed control crank
5. Cotter pin
6. Washer

Step 6

Installing the Hairpin Cotter Pins and Spacers

Parts needed for this step:

2	Hairpin cotter pin
6	Spacers

Procedure

Store unused height-of-cut spacers on posts and retain them by a hairpin cotter.

Note: Make sure there is at least one spacer used on each height-of-cut post.

1. Remove the existing rear hairpin cotter pins from the rear height-of-cut posts (Figure 12).
2. Install a spacer onto both rear height-of-cut posts and install the hairpin cotter pins (Figure 12).

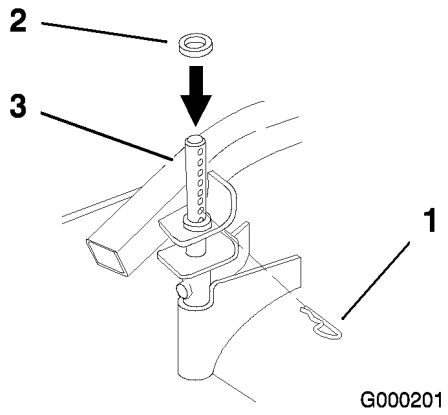


Figure 12

1. Hairpin cotter
2. Spacer
3. Height-of-cut post (rear shown)

3. Install a spacer onto both front height-of-cut posts and install the hairpin cotter pins.
4. On the opposite side of the muffler, install unused spacers onto front and rear height-of-cut pins and insert the hairpin cotter pins (Figure 13).

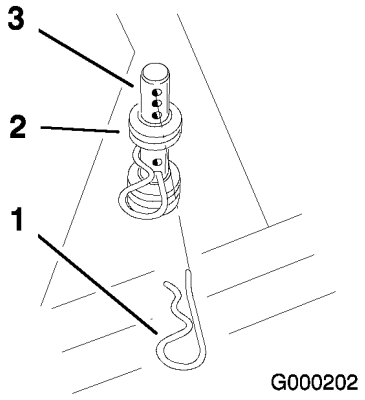


Figure 13

1. Hairpin cotter
2. Unused spacers
3. Height-of-cut post (front shown)

Step 7

Checking the Hydraulic Fluid and Engine Oil Level

No Parts Required

Procedure

Before you start the engine do the following:

- check the oil level in the engine crankcase; refer to Checking the Engine Oil Level.
- check the hydraulic fluid level in the engine crankcase; refer to Checking Hydraulic the Fluid Level.

Step 8

Setting Up the Hydro Linkage

No Parts Required

Procedure

Check the following adjustments when the machine is first set up and adjust only as needed. Do them in the order that they are listed here.

1. Check the speed control linkage; refer to Adjusting the Speed Control Linkage.
2. Check the temporary neutral stud adjustment; refer to Temporary Neutral Stud Adjustment
3. Check the hydro control linkages; refer to Adjusting the Hydro Control Linkages.
4. Check the neutral stud; refer to Adjusting the Neutral Stud.
5. Check the control rods; refer to Adjusting the Control Rods.
6. Checking the tracking; refer to Adjusting the Tracking.

Step 9

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/DVD
1	Registration Card
1	Oil drain hose

Procedure

- Read the *Operator's Manual* and *Engine Operator's Manual*.
- View the safety video.
- Fill out the registration card and mail it in or register online at www.Toro.com.
- Use the oil drain hose when changing the engine oil.

Product Overview

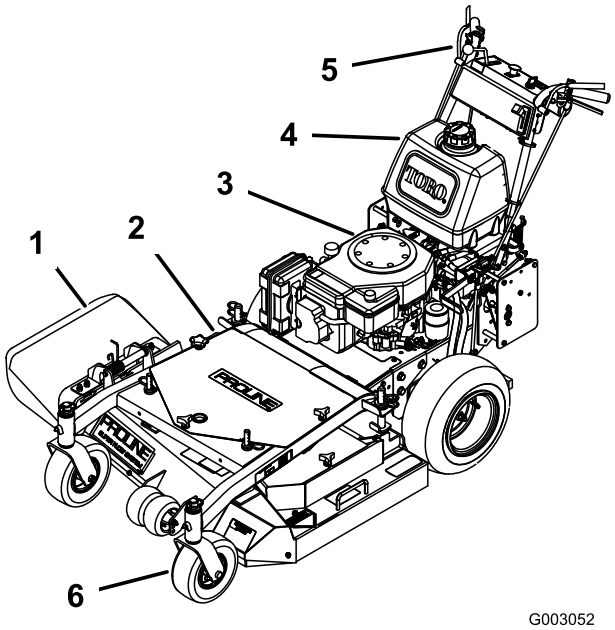


Figure 14

1. Side discharge chute
2. Mower deck
3. Engine
4. Gas tank
5. Controls
6. Front caster wheel

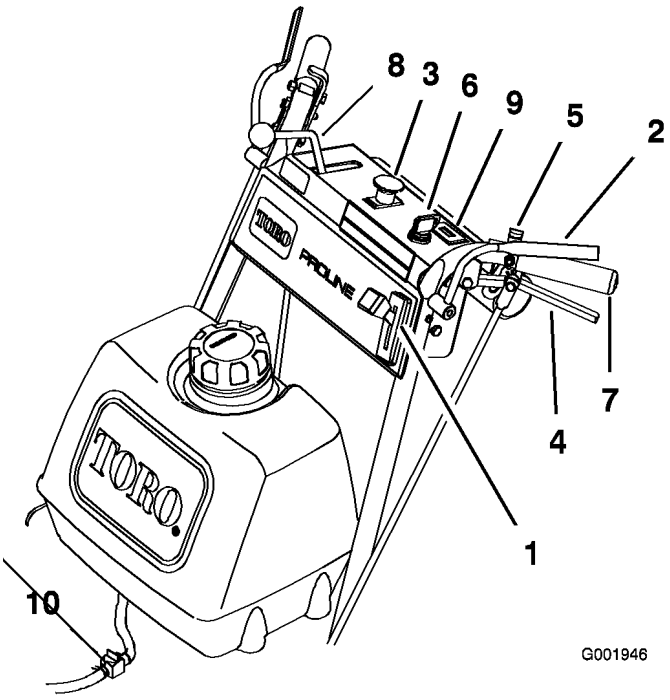


Figure 15

1. Throttle control
2. Operator Presence Control levers (OPC)
3. Blade control switch (PTO)
4. Drive Lever
5. Neutral lock
6. Ignition switch
7. Handle
8. Speed control lever
9. Hour meter
10. Fuel shut-off valve

Controls

Become familiar with all the controls (Figure 15) before you start the engine and operate the machine.

Throttle Control

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

Operator Presence Control (OPC) Levers

When you squeeze the OPC levers against the handles, the OPC system senses that the operator is in the normal operating position. When you release the OPC levers, the OPC system senses that the operator has left the normal operating position, and the system will stop the engine if either the speed control lever is not in the **neutral** position or the blade control (PTO) switch is engaged.

Blade Control Switch (PTO)

The blade control switch (PTO) is used to engage and disengage the drive belt to drive the mower blades with the OPC levers pressed against the handles. Pull the switch up to engage the blades and down to disengage the blades.

Ignition Switch

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

Recoil Starter

Pull the recoil starter handle to start the engine.

Speed Control Lever

This machine has a variable speed control with a neutral position. This controls how fast the machine will travel forward.

Drive Levers

Release drive levers to engage forward traction operation and squeeze the levers until an increase in force is felt to go into neutral position and continue to squeeze to go in reverse. Squeeze right side of drive lever to turn right and left side to turn left.

Neutral Lock

Squeeze drive levers back until an increase in force is felt and move locks to the rear for neutral lock.

Fuel Shut-off Valve

Close the fuel shut-off valve (under fuel tank) when transporting or storing mower.

Hour Meter

Shows the total hours the machine has been operated. This operates only when the mower blades are operating.

The hour meter will flash 3 hours before and after a service interval. The service intervals are set for the first 8 hours, every 100 hours there after, and every 400 hours.

Note: Make sure maintenance is done at all recommended intervals shown in the Recommended Maintenance Schedule.

Operation

Adding Fuel

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

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

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

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

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

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

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

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

Using Stabilizer/Conditioner

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

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

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

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

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

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

Filling the Fuel Tank

1. Shut the engine off and set the parking brake.
2. Clean around 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.
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 32

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 16

1. Warning—wear hearing protection.

Operating the Parking Brake

Always set the parking brake when you stop the machine or leave it unattended. Before each use, check the parking brake for proper operation.

If the parking brake does not hold securely, adjust it. Refer to Servicing the Parking Brake.

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.

Setting the Parking Brake

Pull the parking brake lever rearward (Figure 17).

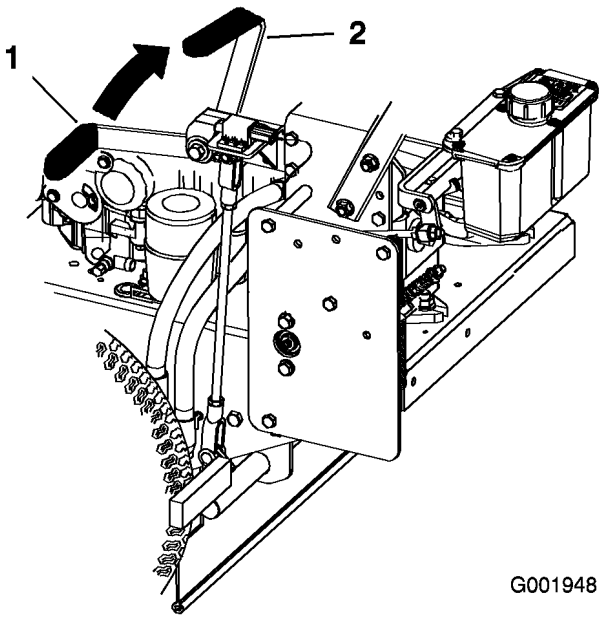


Figure 17

1. Parking brake lever (in the released position)

Releasing the Parking Brake

Push the parking brake lever forward.

Starting and Stopping the Engine

Starting the Engine

Note: The engine can not be started with the recoil unless the battery is installed and has sufficient charge to allow fuel to the carburetor.

1. Connect the wires to the spark plugs.
2. Open the fuel valve.
3. Disengage the blade control switch (PTO) and move the speed control lever to neutral.
4. Move the drive levers to neutral and set the neutral locks.
5. Set the parking brake.
6. Move the throttle control to the choke position before starting a cold engine (Figure 18).

   Note: A warm or hot engine may not require choking.
7. When using the electric start, turn the ignition key to the start position to energize the starter. When the engine starts, release the key.

   Note: Do not engage the starter for more than 5 seconds at a time. If the engine fails to start, allow for a 15 second cool-down period between attempts. Failure to follow these instructions can burn out the starter motor.
8. When using the recoil start, grasp the recoil starter handle firmly and pull out until positive engagement results; then pull handle vigorously to start engine and allow rope to recoil slowly. (Figure 18).

   Important: Do not pull recoil rope to its limit or let go of the starter handle when rope is pulled out because rope may break or recoil assembly may be damaged.
9. When engine starts, move the throttle control between the fast and slow position. Allow engine to warm up and then move the throttle control to the fast position.

Stopping the Engine

1. Move the throttle lever to slow (Figure 18).
2. Move drive levers to neutral and set neutral locks.
3. Disengage the blade control knob (PTO) and move the speed control lever to neutral.
4. If the engine has been working hard or is hot, let the engine idle for 30 to 60 seconds before turning the engine off.
5. To stop the engine, turn the ignition key to off (Figure 18).

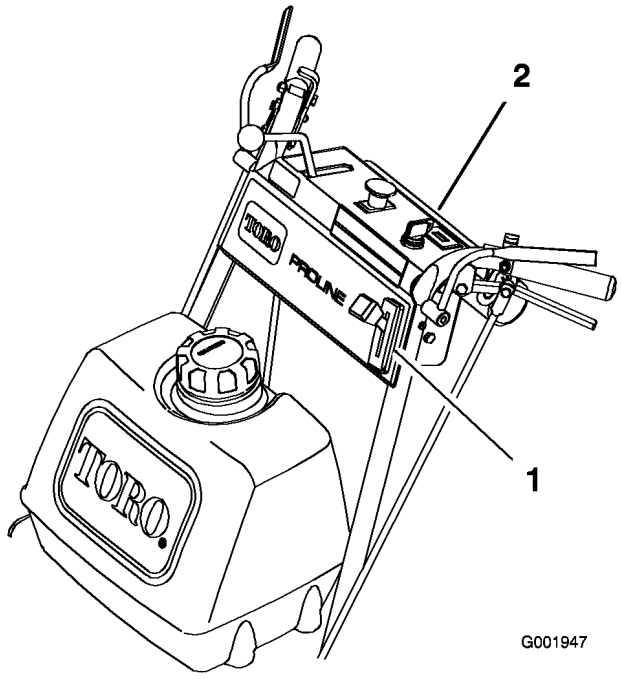


Figure 18

1. Throttle lever
2. Ignition switch

Important: **Make sure fuel shut off valve is closed before transporting or storing machine, as fuel leakage may occur. Before storing machine, pull wire off spark plug(s) to prevent possibility of accidental starting.**

Operating the Neutral Locks

Always set the neutral lock when you stop the machine. Set the parking brake if it is left unattended.

Setting the Neutral Lock

1. Squeeze the drive levers back until an increase in force is felt.
2. Place thumbs on the upper part of the locks and move them back (Figure 19).

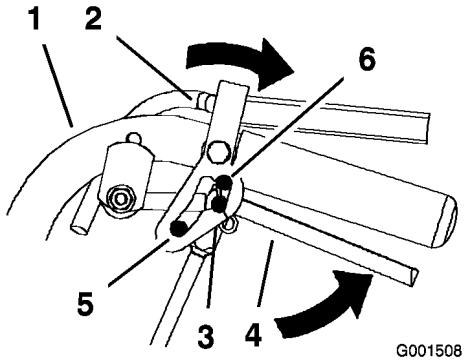


Figure 19

1. Handle
2. Neutral lock
3. Neutral position
4. Drive lever
5. Full speed forward
6. Reverse position

Releasing the Neutral Lock

1. Squeeze the drive levers back until an increase in force is felt.
2. Place thumbs on the upper part of locks and move them forward until the pins are in the forward slot (Figure 20).

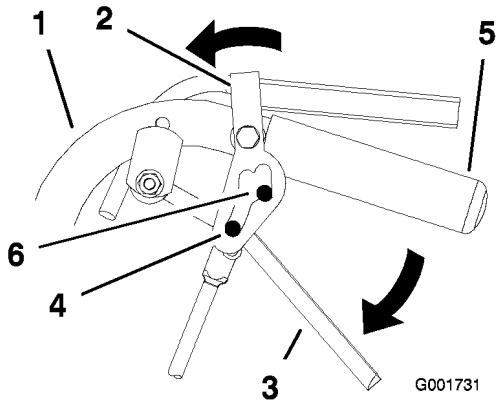


Figure 20

1. Handle
2. Neutral lock
3. Drive lever
4. Pin in full speed forward
5. Handle
6. Forward slot

Operating the Mower Blade Control (PTO)

The blade control knob (PTO) is used in conjunction with the Operator Presence Control (OPC) levers to engage and disengage the mower blades.

Engaging the Mower Blades (PTO)

1. To engage blades, squeeze the Operator Presence Control (OPC) levers against handle grips (Figure 21).
2. Pull the blade switch (PTO) up and release it while holding the OPC levers against handle grip.

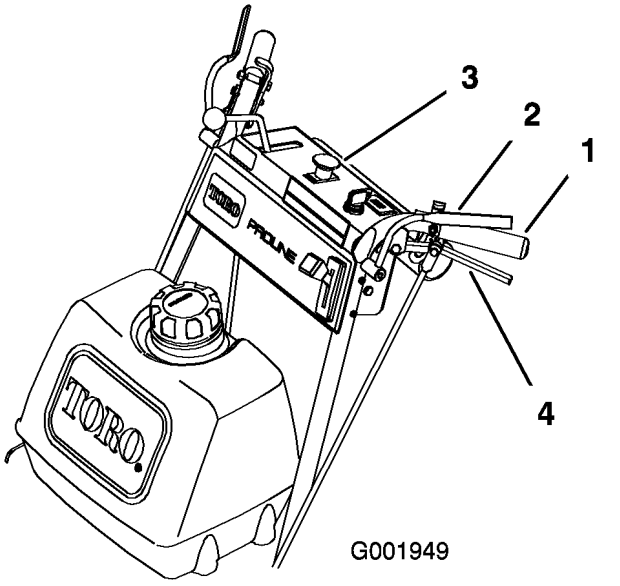


Figure 21

1. Handle
2. Operator Presence Control levers (OPC)
3. Blade control switch (PTO)
4. Drive Lever

Disengaging the Mower Blades (PTO)

Release the Operator Presence Control (OPC) levers to stop the blades (Figure 21).

Note: The engine will kill if the OPC levers are released with the mower running.

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 from starting unless:

- The blade control switch (PTO) is off.
- The speed control lever is in neutral.

The safety interlock system is designed to kill the engine when:

- The Operator Presence Control (OPC) levers are released with the mower engaged and/or the speed control is out of neutral.
- The speed control lever is shifted out of neutral without holding OPC levers or with the brake engaged.
- The blade control switch (PTO) is pulled up without holding the OPC levers.

Testing the Safety Interlock System

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

While testing the safety interlock system, the machine may move forward and cause personal injury or property damage.

- **Perform the safety interlock test in an open area.**
- **Ensure no one is standing in front of the machine while performing the safety interlock test.**

1. Set the neutral locks and place speed control lever in neutral. Start the engine; refer to Starting and Stopping the Engine.
2. Without holding the Operator Presence Control (OPC) levers, pull the blade control knob (PTO) up. The engine should kill.
3. With engine running, hold down the OPC levers. Pull the blade control switch (PTO) up. The drive belt should engage and the mower blades begin rotating.
4. Release the OPC levers. The engine should kill.
5. With the engine running, move the speed control lever forward. Release the OPC levers. The engine should kill.

6. With the engine running, set the parking brake and hold down the OPC levers. Move the speed control lever forward. The engine should kill.
7. If all the above conditions are not met have an Authorized Service Dealer repair the safety system immediately.

Driving the Machine Forward and 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.

The forward speed of the machine can be increased or decreased by moving the speed control lever while the machine is in motion.

Driving Forward

1. Release the parking brake.
2. To go forward, move the speed control lever to desired speed.
3. Release the neutral lock. Refer to Releasing the Neutral Lock.
4. Slowly release the drive levers to move forward (Figure 22).

   To go straight, release drive levers equally (Figure 22).

   To turn, squeeze the drive lever on the side and direction you want to turn (Figure 22).

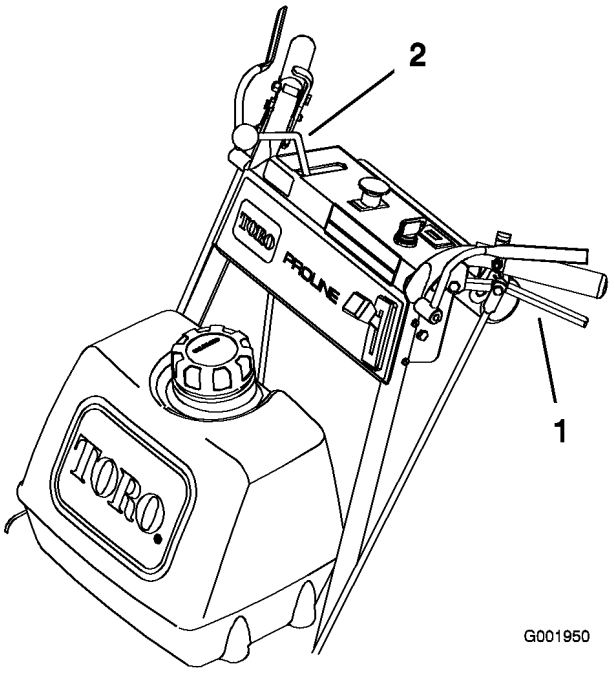


Figure 22

1. Drive lever
2. Speed control lever

Driving Backward

Slowly squeeze the drive levers back together to move rearward (Figure 22).

Bringing the Machine to Neutral Position

Always set the neutral lock and parking brake when you stop the machine.

1. Squeeze the drive levers to neutral position.
2. Set the neutral locks. Refer to Operating Neutral Locks.
3. Move speed control lever to neutral position.

Stopping the Machine

1. To stop the machine, squeeze the drive levers to neutral position and engage neutral locks.
2. Move speed control lever into neutral.
3. Stop the engine by turning the ignition key to off.
4. Wait for all moving parts to stop before leaving the operating position. Set the parking brake.

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.

Pushing the Machine by Hand

The by-pass valves allow the machine to be pushed by hand without the engine running.

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

To Push the Machine

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Open the by-pass valves by turning them counter clockwise 1 to 2. This allows hydraulic fluid to by-pass the pumps and the wheels to turn (Figure 23).

   Note: Rotate the by-pass valves a maximum of 2 turns so the valve does not come out of the body causing fluid to run out.
3. Release the parking brake.
4. Push the machine to the desired location.
5. Set the parking brake.
6. Close the by-pass valves, but do not overtighten them.

   Important: Do not start or operate the machine with the by-pass valves open. Damage to system may occur.

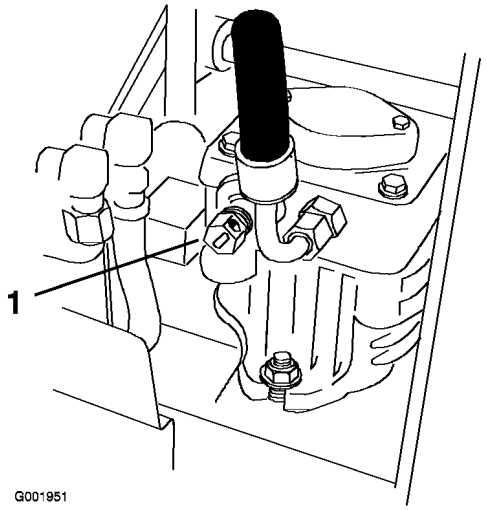


Figure 23

1. By-pass valve

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:

- Stop the engine, remove the key, lock the brake, close the fuel valve and block the wheels.
- Securely fasten the machine to the trailer or truck with straps, chains, cable, or ropes.
- Secure a trailer to the towing vehicle with safety chains.

Using the Side Discharge

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).**

Adjusting the Height-of-Cut

The height-of-cut can be adjusted from 1 to 4-1/2 inch (25 to 114 mm) in 1/4 inch (6 mm) increments. Adjustment is done by relocating four hairpin cotter pins in different hole location and by adding or removing spacers.

Note: All height-of-cut pins need at least one spacer or damage can occur to bushing if none are used.

Note: All height-of-cut pins can use only two spacers maximum.

1. Select hole in height-of-cut post and number of spacers corresponding to the height-of-cut desired (Figure 24).
2. Using the lift handle, raise side of deck and remove hairpin cotter.
3. Add or remove spacers if needed and then align holes and insert hairpin cotter (Figure 24).

   Note: Spare height-of-cut spacers may be stored on posts and retained by a hairpin cotter.

   Important: All four hairpin cotter pins must be in the same hole location and with the correct number of spacers for a level cut.

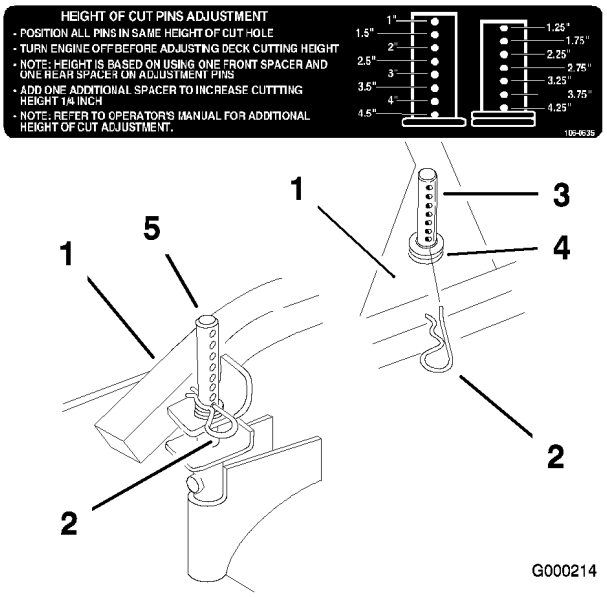


Figure 24

1. Carrier Frame
2. Hairpin Cotter
3. Front height-of-cut post
4. Spacers
5. Back height-of-cut post

Adjusting the Center Gage Wheels

The gage wheels need to be adjusted in the proper hole location for each height-of-cut position. There needs to be 3/8 inch (10 mm) minimum clearance above the ground.

1. After adjusting height-of-cut, check the gage wheels so that there is a minimum of 3/8 inch (10 mm) clearance above the ground (Figure 25).
2. If adjustment is needed, remove the bolt, washers and nut (Figure 25).
3. Select a hole position so the gage wheels are a minimum of 3/8 inch (10 mm) off the ground (Figure 25).
4. Install the bolt, washers and nut (Figure 25).

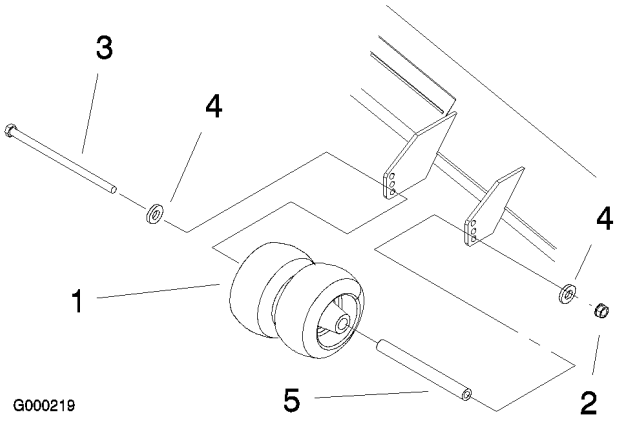


Figure 25

1. Center Gage Wheels and Spacer
2. Nut
3. Bolt
4. Washer
5. Spacer

Adjusting the Handle Height

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

1. Remove the hairpin cotter pins and clevis pins from the drive levers and neutral locks (Figure 26).

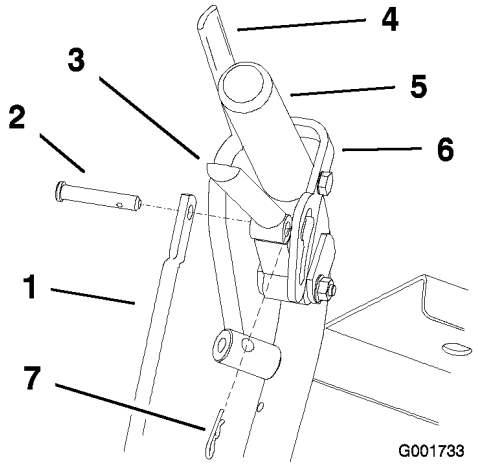


Figure 26

1. Control rod
2. Clevis pin
3. Drive lever
4. Operator Presence Control lever (OPC)
5. Left handle shown
6. Neutral lock
7. Hairpin cotter pin

2. Loosen the nuts holding the swivel connected to the speed control crank (Figure 27).

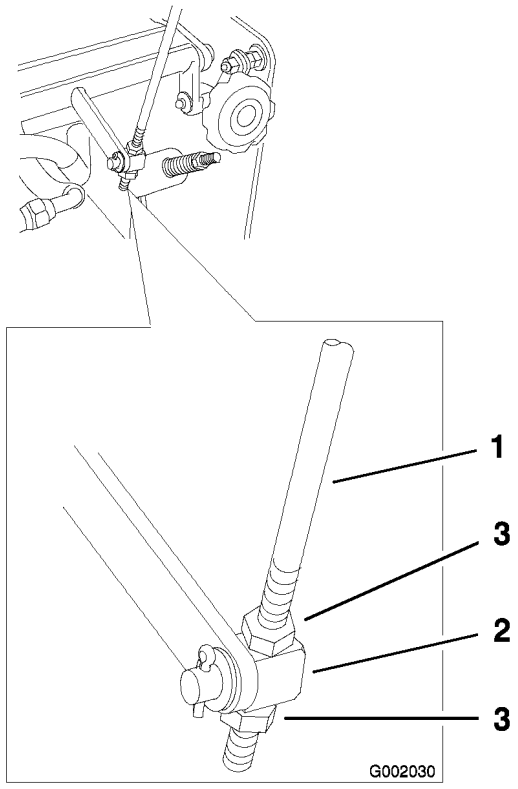


Figure 27

1. Speed control rod
2. Swivel
3. Nut

3. Loosen the upper flange bolts (3/8 x 1-1/4 inches) and flange nut securing handle to rear frame (Figure 28).
4. Remove the lower flange bolts (3/8 x 1 inch) and flange nuts securing handle to rear frame (Figure 28).
5. Pivot handle to desired operating position and install lower flange bolts (3/8 x 1 inch)and flange nuts into mounting holes. Tighten all flange bolts.

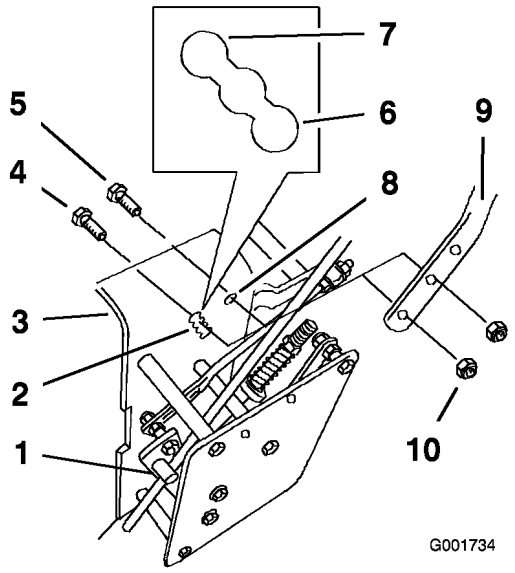


Figure 28

1. Control rod fitting
2. Lower mounting holes
3. Rear frame
4. Lower flange bolt (3/8 x 1 inch)
5. Upper flange bolt (3/8 x 1-1/4 inches)
6. High position
7. Lower position
8. Upper mounting hole
9. Handle
10. Flange nut (3/8 inch)
11.

6. Adjust the swivel on the speed control rod and tighten the nuts against the swivel (Figure 27).
7. Adjust the control rod length by rotating the control rod in the rod fitting (Figure 27).
8. Install hairpin cotter between drive levers and neutral locks and into clevis pins (Figure 26).

   Note: Make sure the clevis pins are inserted into the neutral locks.
9. Perform the hydraulic linkage adjustments when the handle height is changed; refer Hydraulic Linkage Adjustments.

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	• Check the hydraulic fluid level.
Before each use or daily	• Check the safety system. • Grease the front caster pivot bearing. • Check the engine oil level. • Clean the air intake screen. • Check the brakes. • Inspect the blades.
Every 25 hours	• Clean and re-oil the foam element (more often in dusty dirty conditions). • Check the hydraulic fluid level.
Every 50 hours	• Grease the side bearings. • Grease the PTO belt idler. • Check the tire pressure. • Check the mower belt.
Every 100 hours	• Replace the paper element (more often in dusty dirty conditions). • Change the engine oil. • Adjust the electric clutch. • Check the hydraulic lines.
Every 200 hours	• Replace the oil filter. • Check the spark plug. • Replace the fuel filter.
Every 400 hours	• Grease the front wheel bearings (more often in dirty or dusty conditions).
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.

Lubrication

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

How to Grease

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

3. Clean the grease fittings with a rag. Make sure to scrape any paint off the front of the fitting(s).
4. Connect a grease gun to the fitting. Pump grease into the fittings until grease begins to ooze out of the bearings.
5. Wipe up any excess grease.

Where to Add Grease

Lubricate the grease fittings as shown on the Check Service Reference Aid decal (Figure 29).

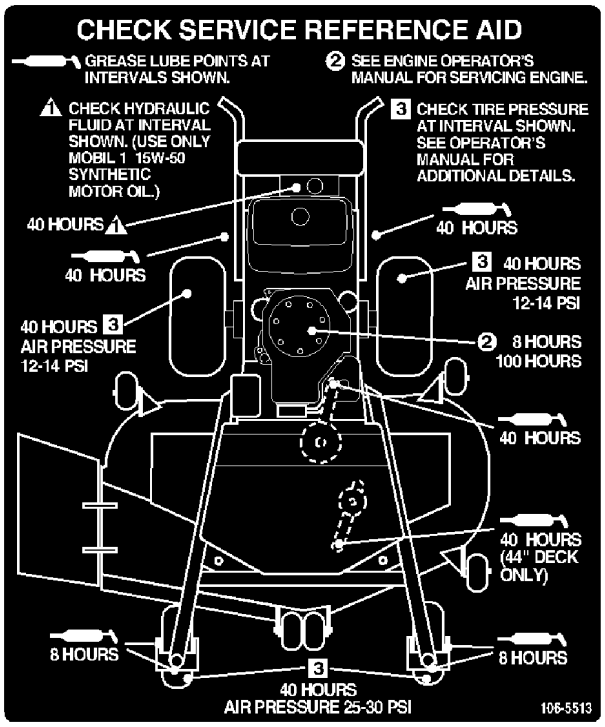


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Figure 29

Lubricating the Bearings

1. Lubricate the front wheel bearings and front spindles (Figure 30).

   Note: Make sure the rear wheel grease caps are removed before lubricating rear wheels.

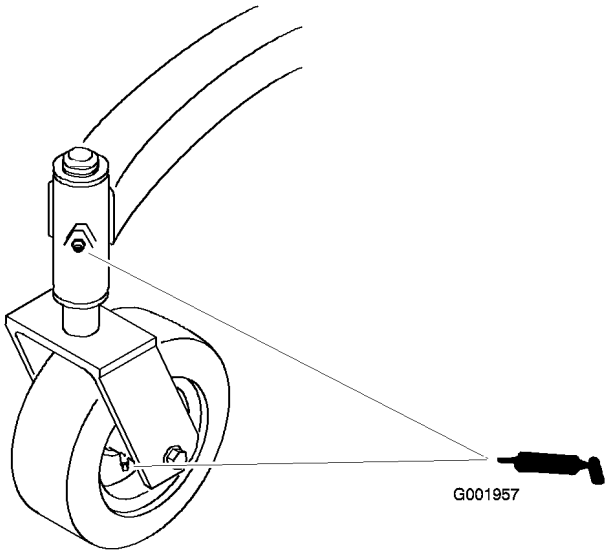


Figure 30

2. Grease the bearings on both sides of the machine (Figure 31).

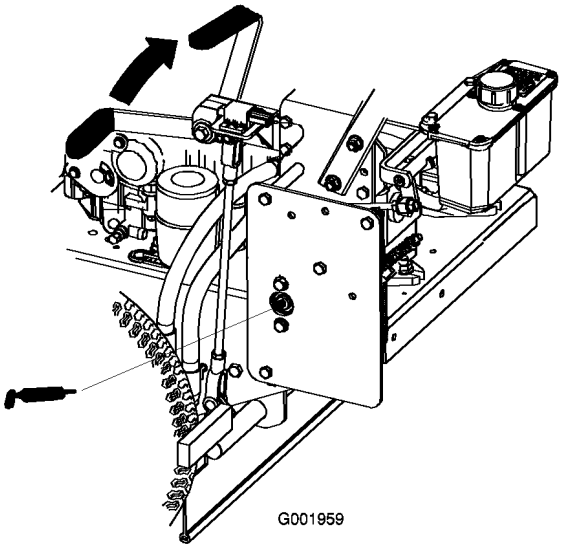


Figure 31

Greasing the PTO Drive Belt Idler

Grease the fitting on the PTO belt idler arm pivot (Figure 32).

Note: You will have to remove the carrier covers to access the grease fitting for the deck.

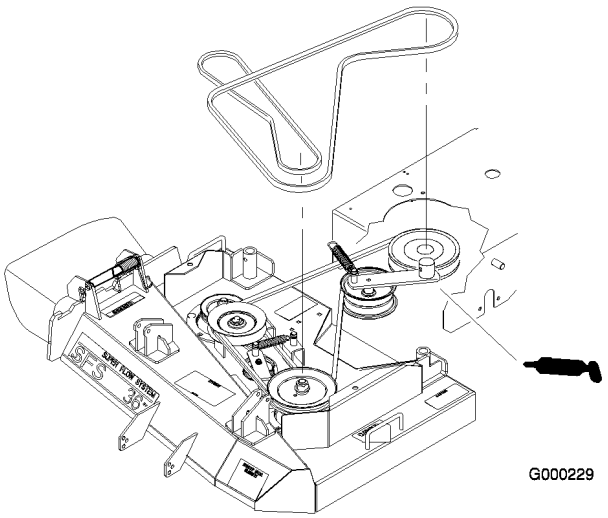


Figure 32

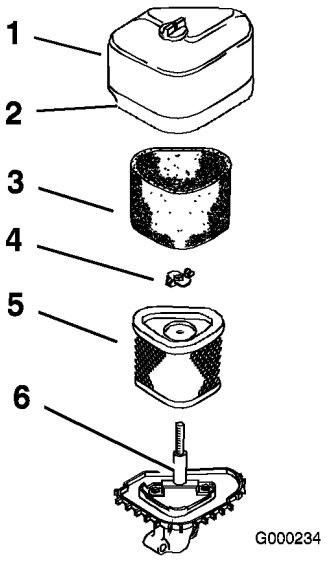


Figure 33

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

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), set the parking brake, 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 33).
3. Remove the air cleaner assembly (Figure 33).
4. Carefully slide the foam element off the paper element (Figure 33).

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 35). 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.

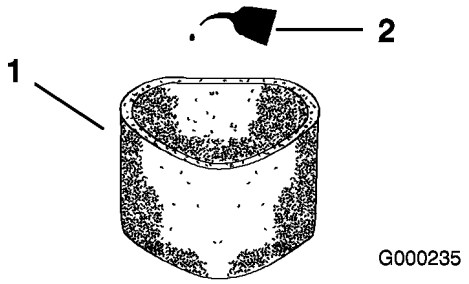


Figure 34

1. Foam element
2. Oil

Cleaning the Paper Element

Note: Never try to brush dirt off the paper element; brushing forces the dirt into the fibers.

1. Lightly tap the element on a flat surface to remove dust and dirt (Figure 34).
2. Inspect the element for tears, an oily film, and damage to the rubber seal.

   Important: Never clean the paper element with pressurized air or liquids, such as solvent, gas, or kerosene. Replace the paper element if it is damaged, defective, or cannot be cleaned thoroughly.

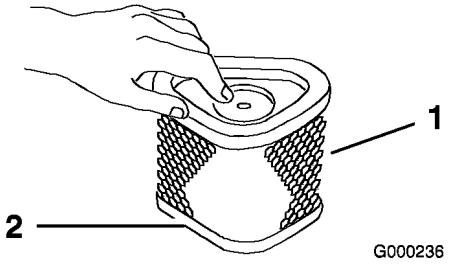


Figure 35

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 33).
2. Place the air cleaner assembly onto the air cleaner base (Figure 33).
3. Install the air cleaner cover and secure with cover nuts (Figure 33).

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 SF, SG or SH)

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

Viscosity: See table below

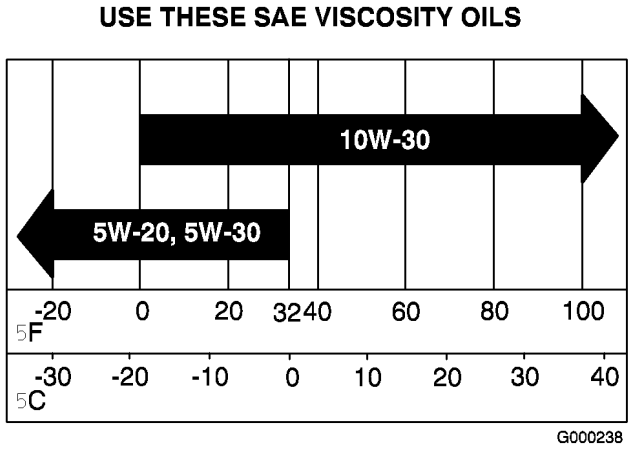


Figure 36

Checking the Engine Oil Level

1. Park the machine on a level surface.
2. Disengage the PTO and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Clean around the oil dipstick (Figure 37) so that dirt cannot fall into the filler hole and damage the engine.

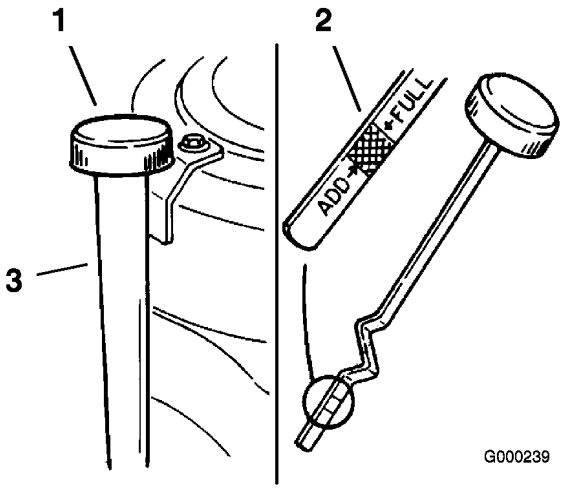


Figure 37

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

5. Unscrew the oil dipstick and wipe the end clean (Figure 37).

6. Slide the oil dipstick fully into the filler tube, but do not thread onto tube (Figure 37).
7. 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 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) and set the parking brake.
4. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
5. Slide the drain hose over the oil drain valve.
6. Place a pan below the drain hose. Rotate oil drain valve to allow oil to drain (Figure 38).
7. When oil has drained completely, close the drain valve.
8. Remove the drain hose (Figure 38).

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

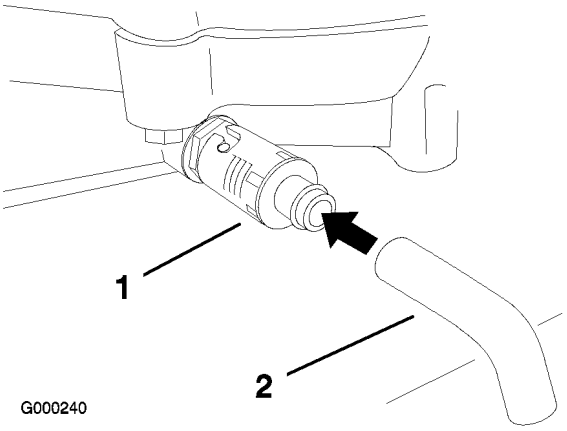


Figure 38

1. Oil drain valve
2. Oil drain hose

9. Slowly pour approximately 80% of the specified oil into the filler cap (Figure 37).
10. Check the oil level; refer to Checking the Engine Oil Level in theEngine Maintenance, page 32.
11. 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 39) gasket surface.
3. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Figure 39).

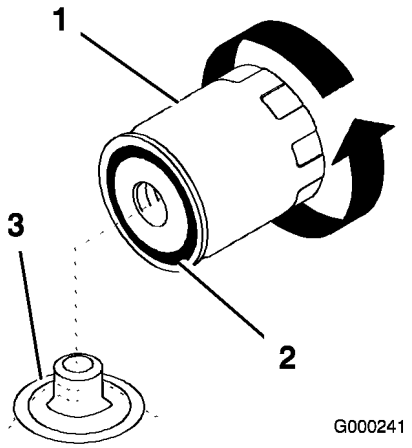


Figure 39

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 39).
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 in. (1.02 mm)

Removing the Spark Plug(s)

1. Disengage the power take off (PTO), set the parking brake, and turn the ignition key to off. Remove the key.
2. Pull the wire(s) off the spark plug(s) (Figure 40). 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.

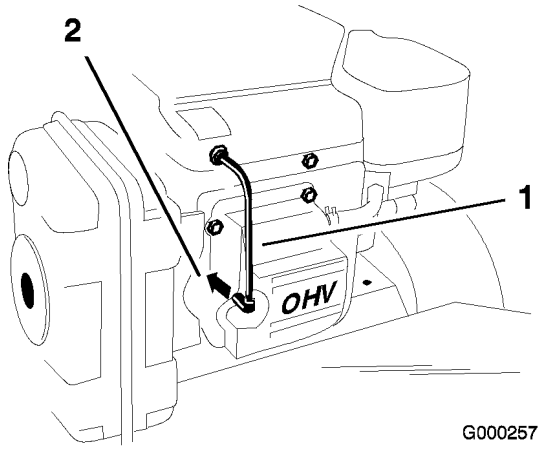


Figure 40

1. Spark plug wire
2. Spark plug

Checking the Spark Plug

1. Look at the center of the spark plug(s) (Figure 41). 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.

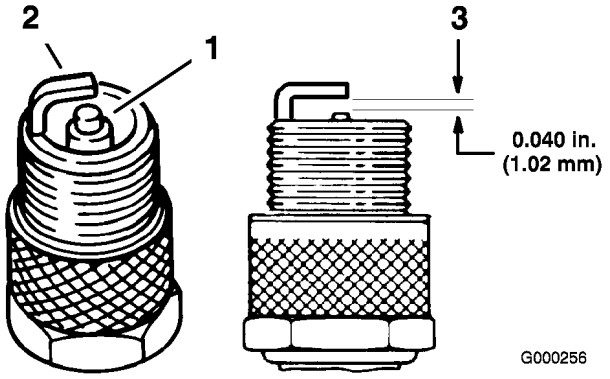


Figure 41

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

2. Check the gap between the center and side electrodes (Figure 41). 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 40).

Fuel System Maintenance

Servicing the Fuel Tank

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

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

Draining the Fuel Tank

1. Park the machine on a level surface, to assure fuel tank drains completely. Then disengage the power take off (PTO), set the parking brake, and turn the ignition key to **off**. Remove the key.
2. Close the fuel shut-off valve at the fuel tank (Figure 42).
3. Squeeze the ends of the hose clamp together and slide it up the fuel line away from fuel filter (Figure 42).
4. Pull the fuel line off the fuel filter (Figure 42). 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.

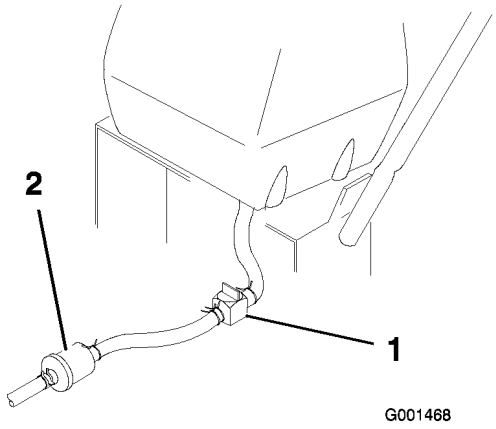


Figure 42

1. Fuel shut-off valve
2. Clamp

Servicing the Fuel Filter

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

Replacing the Fuel Filter

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

Note: Note how the fuel filter is installed.

Note: Wipe up any spilled fuel.

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Close fuel shut-off valve at fuel tank (Figure 42).

   Note: Remove the fuel line from the fuel valve that is closest to the engine.
4. Squeeze the ends of the hose clamps together and slide them away from the filter (Figure 43).

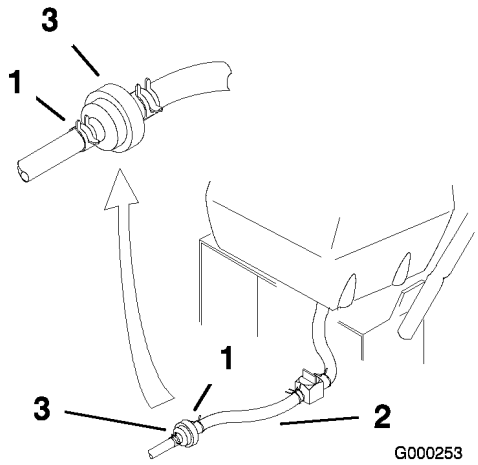


Figure 43

1. Hose clamp
2. Fuel line
3. Filter

5. Remove the filter from the fuel lines.
6. Install a new filter and move the hose clamps close to the filter.
7. Open fuel shut-off valve at fuel tank (Figure 42).
8. Check for fuel leaks and repair if needed.

Electrical System Maintenance

Servicing the Fuses

The electrical system is protected by fuses. It requires no maintenance. If a fuse blows, check the component or circuit for a malfunction or short. Pull out on the fuse to remove or replace it (Figure 44).

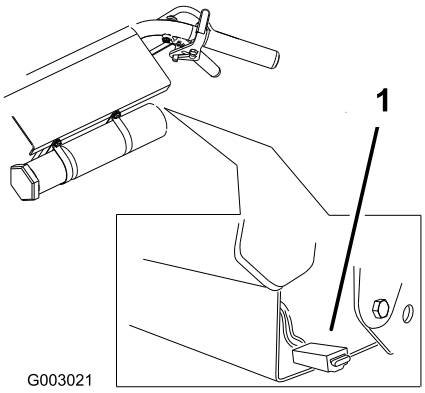


Figure 44

1. Fuse, 25 amp, blade type
2. Fuse, 30 amp, blade type

Drive System Maintenance

Perform the following linkage adjustments when the machine needs maintenance. Perform steps Adjust the Speed Control Linkage through Adjusting the Tracking. If and adjustment is needed , do them in the order that they are listed.

Adjusting the Speed Control Linkage

1. Disengage the PTO and set the parking brake.
2. Stop the engine and wait for all moving parts to stop before leaving the operating position.
3. Move the speed control lever (located on the console) to the full forward position.

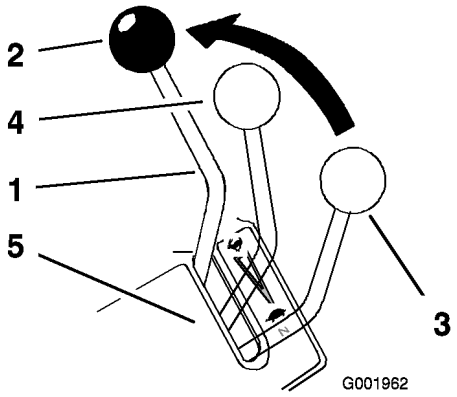


Figure 45

1. Speed control lever
2. Full speed position
3. Neutral position
4. Medium speed position
5. Control panel

4. Check the orientation of the tabs on the ends of the speed control crank. These tabs should be pointing straight down at the 6 o'clock position approximately (Figure 46).
5. If adjustment is needed, loosen the nuts on both sides of the swivel on the speed control rod (Figure 46).
6. Adjust the swivel until the tabs are at the 6 o'clock position (Figure 46).
7. Tighten the nuts on both sides of the swivel (Figure 46).

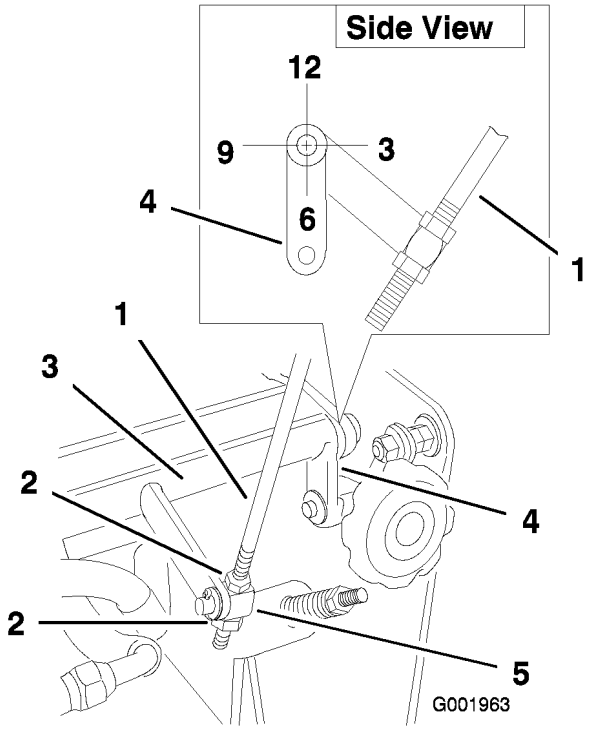


Figure 46

1. Speed control rod
2. Jam nut
3. Speed control crank
4. Tabs, 6 o'clock position
5. Swivel

8. Pull the speed control lever back to neutral.
9. Check the travel of the shift lever in the control panel slot. The shift lever travel should be approximately centered in the control panel slot (Figure 47).
10. If needed, adjust the swivel on the speed control rod to center the shift lever travel (Figure 46).
11. With the speed control lever in the neutral position, check to make sure the safety switch is depressed and there is an 1/8 to 1/4 inch (3 to 6 mm) space between the actuating tab and the safety switch (Figure 47)..

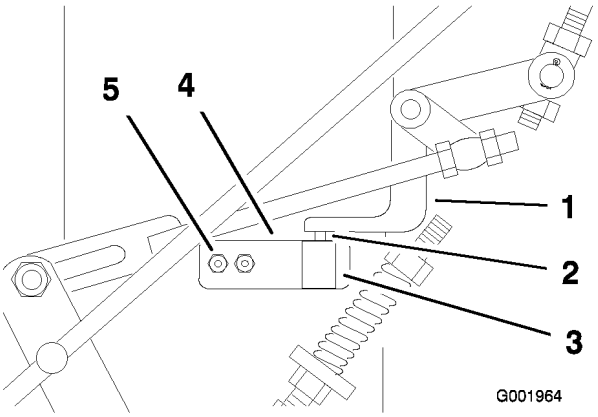


Figure 47

1. Actuating tab
2. 1/8 to 1/4 inch (3 to 6 mm) space
3. Safety switch

12. To adjust the switch location, loosen the two neutral bracket screws holding the switch plate to the frame (Figure 47).
13. Adjust the switch up or down to obtain an 1/8 to 1/4 inch (3 to 6 mm) space (Figure 47).
14. Tighten the two neutral bracket screws holding the switch plate (Figure 47).

Temporary Neutral Stud Adjustment

Note: Perform the following procedures on both the left and right sides.

1. Move the left and right hand neutral lock latches to the unlatched position.
2. Move the speed control lever to the neutral position (Figure 48).
3. Loosen the nut against the yoke Figure 48).
4. Adjust the length of the neutral stud and yoke assembly so the clevis pin does not contact the back of the slot in the control arm bracket Figure 48).
5. Tighten the nut against the yoke Figure 48).

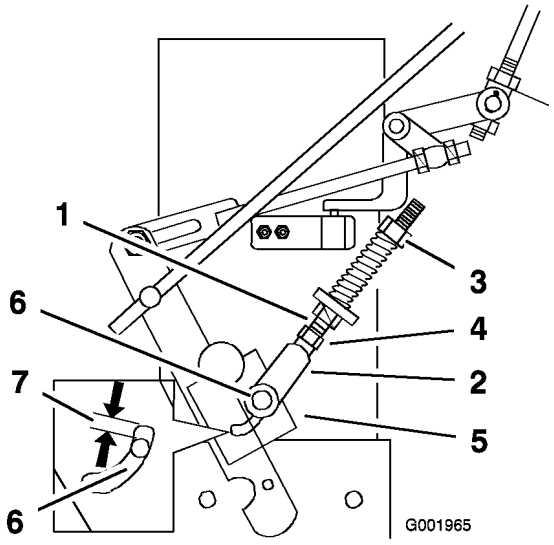


Figure 48

1. Neutral control linkage
2. Yoke
3. Neutral stud
4. Nut against yoke
5. Slot in control arm bracket
6. Clevis pin
7. Clevis pin does not contact the back of slot

Adjusting the Hydro Control Linkages

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

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

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

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

Adjusting the Left Side Linkage

1. Disengage the PTO and set the parking brake.
2. Stop the engine and wait for all moving parts to stop before leaving the operating position.

3. Raise the rear of the machine onto jack stands high enough to raise the drive wheels off of the ground.
4. Disengage the parking brake.
5. Start the engine and move the throttle ahead to the full throttle position.
6. Press and hold the OPC levers down.

   Note: The OPC levers must be held down whenever the speed control lever is out of the neutral position or the engine will kill.
7. Place the left drive lever in the full forward position.
8. Place the speed control lever in the neutral position.

Electrical system will not perform proper safety shut off with Operator Presence Control (OPC) levers held in place.

- **Make sure Operator Presence Control (OPC) levers are working when adjustment is completed.**
- **Never operate this unit with Operator Presence Control (OPC) levers held in place.**

9. Loosen the front adjusting nut on left hydro control linkage as shown in Figure 50.
10. Turn the left rear adjusting nut counter-clockwise until wheel rotates forward (Figure 50).
11. Turn the rear adjusting nut clockwise 1/4 of a turn at a time. Then move the speed control lever forward and back to neutral. Repeat this until left wheel stops rotating forward (Figure 50).

    Note: Make sure flat part of linkage is perpendicular to the pin of swivel (Figure 49).

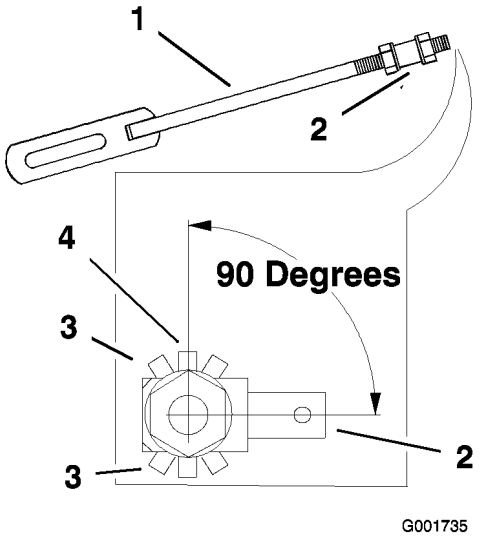


Figure 49

1. Hydro control linkage
2. Swivel
3. Incorrect position
4. Correct position

12. After adjusting the left hydro control linkage, move the speed control lever forward and then back to the neutral position.
13. Make sure the speed control lever is in the neutral position and the tire does not rotate.
14. Repeat the adjustment if needed.

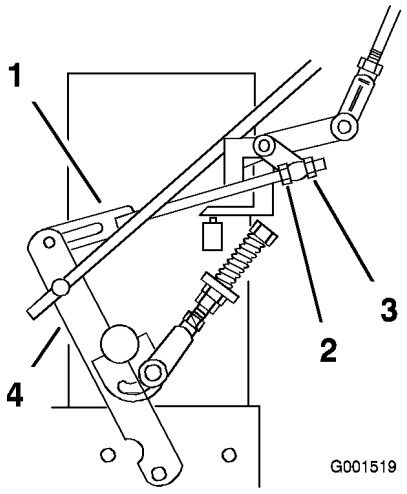


Figure 50

1. Hydro control linkage
2. Front adjustingnut
3. Rear adjusting nut
4. Control arm

Note: If inconsistent neutral occurs, check to be sure both springs are properly tightened on the speed control lever under the console, especially the rear pivot spring. Repeat above adjustments if necessary (Figure 51).

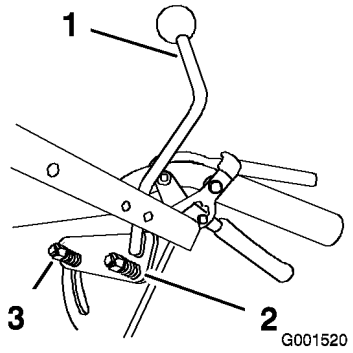


Figure 51

1. Speed control lever
2. Rear pivot spring
3. spring

15. Tighten the front nut on left hydro control linkage shown in Figure 50.

Adjusting the Right Side Linkage

1. With the machine on jack stands, place the speed control lever in the neutral position.
2. Place the right drive lever in the full forward position.
3. Hold the OPC levers down.

   Note: The OPC levers must be held down whenever the speed control lever is out of the neutral position or the engine will kill.
4. Adjust the right side linkage by turning the quick track knob counterclockwise until the tire begins to rotate forward (Figure 52).
5. Turn the knob clockwise a 1/4 of a turn at a time. Then move the speed control forward and back to neutral. Repeat this until right wheel stops rotating forward (Figure 52).
6. The spring that keeps tension on the knob should normally not need adjustment. However if an adjustment is needed, adjust the length of spring to 1 inch (26 mm) between the washers (Figure 52).
7. Adjust the spring length by turning the nut at the front of spring (Figure 52).
8. After adjusting the right hydro control linkage, move the speed control lever forward and then back to the neutral position.
9. Make sure the speed control lever is in the neutral position and the tire does not rotate.
10. Repeat adjustment if needed.

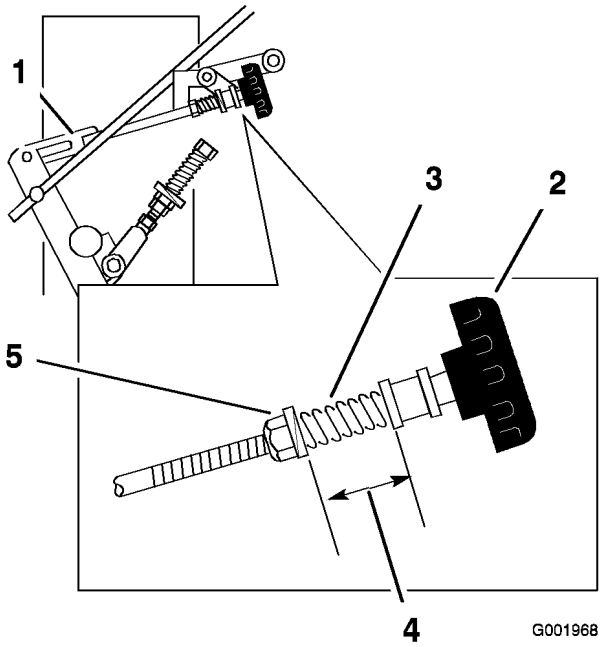


Figure 52

1. Hydro control linkage
2. Quick track knob
3. Spring
4. 1 inch (26 mm)
5. Nut in front of spring

Adjusting the Neutral Stud

Electrical system will not perform proper safety shut off with Operator Presence Control (OPC) levers held in place.

- **Make sure Operator Presence Control (OPC) levers are working when adjustment is completed.**
- **Never operate this unit with Operator Presence Control (OPC) levers held in place.**

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

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

1. With the machine on jack stands, place the speed control lever in the neutral position.
2. Hold the OPC levers down.

Note: The OPC levers must be held down whenever the speed control lever is out of the neutral position or the engine will kill.

3. Adjust the left and right neutral stud until the clevis pin in the yoke touches the back end of the slot in the control arm (Figure 53).
4. Move the speed control lever to the full forward position.
5. Squeeze one drive lever until an increased resistance is felt. This is neutral position. This is where the clevis pin in the yoke comes to the back end of the slot in the control arm bracket.

   Note: Make sure you have not reached the end of the neutral lock slot. If you have, shorten the control lever linkage. Refer to Adjusting the Control Rod.
6. If the wheel turns while holding the drive lever in neutral, the neutral stud needs to be adjusted (Figure 53). If wheel stops then go to .
7. Loosen the nut against the yoke (Figure 53).
8. Adjust the adjustment stud until the respective drive wheel stops while holding the drive in the neutral position (increased resistance) (Figure 53).
9. Turn the adjusting bolt approximately 1/4 turn clockwise if the wheel is turning in reverse or turn the bolt approximately 1/4 turn counter-clockwise if the wheel is turning forward (Figure 53).
10. Release the drive lever to the forward drive position and squeeze back into the neutral position. Check to see if the wheel stops. If not, repeat the above adjustment procedure.
11. After adjustments are made, tighten the nuts against the yokes.
12. Repeat this procedure for the opposite side.

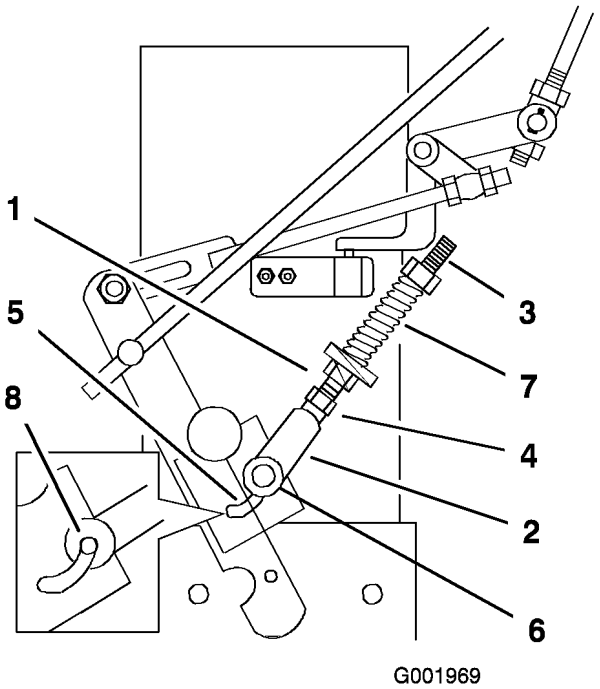


Figure 53

1. Neutral control linkage
2. Yoke
3. Neutral stud
4. Nut
5. Slot in control arm bracket
6. Clevis pin
7. Spring
8. Back end of slot

Adjusting the Control Rod

Checking the Control Rod

1. With rear of machine still on jack stands and engine running at full throttle, move the speed control lever to the medium speed position.

   Note: The OPC levers must be held down whenever the speed control lever is out of the neutral position or the engine will kill.
2. Move the respective drive lever upward until it reaches the neutral position and engage neutral locks.
3. If the tire rotates in either direction, the length of the control rod will need to be adjusted.

Adjusting the Control Rod

1. Adjust the rod length by releasing the drive lever and removing the hairpin cotter pin and clevis pin. Rotate the rod in the rod fitting (Figure 54).
2. Lengthen the control rod if the tire is turning in reverse and shorten the rod if the tire is turning forward.

3. Rotate the rod several turns if the tire is rotating fast. Then, adjust the rod in 1/2 turn increments.
4. Place the clevis pin into the drive lever (Figure 54).

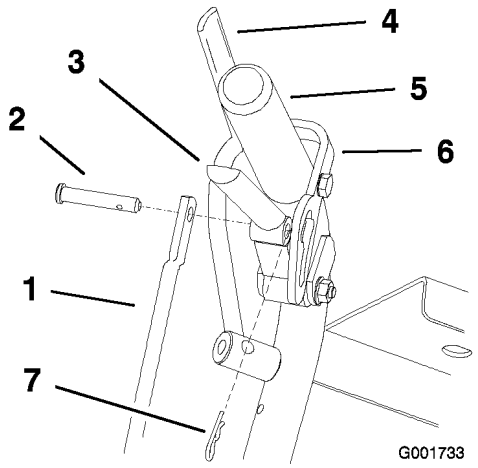


Figure 54

1. Control rod
2. Clevis pin
3. Drive lever
4. Operator Presence Control lever (OPC)
5. Left handle shown
6. Neutral lock
7. Hairpin cotter pin

5. Release and engage neutral lock checking that the tire does not rotate (Figure 55). Continue this process until the tire does not rotate.
6. Install the hairpin cotter pin between the drive levers and the neutral locks and into the clevis pins (Figure 54).

   Note: Make sure the clevis pins are inserted into the neutral locks.
7. Repeat this adjustment for the opposite side.

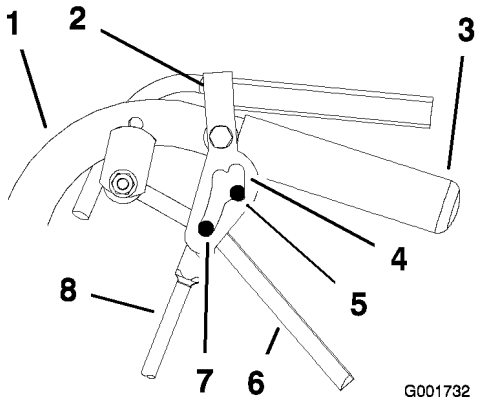


Figure 55

1. Handle
2. Neutral lock
3. Handle
4. Neutral lock slot
5. Neutral position
6. Drive lever
7. Full speed forward
8. Control rod

Adjusting the Tracking

1. Remove machine from any jack stands.
2. Check the rear tire pressure. Refer to Checking the Tire Pressure.
3. Start and run the machine. Observe the tracking on a level, smooth, hard surface such as concrete or asphalt.
4. If the unit tracks to one side or the other, turn the quick track knob. Turn the knob right to steer right and turn the knob left to steer left (Figure 56).

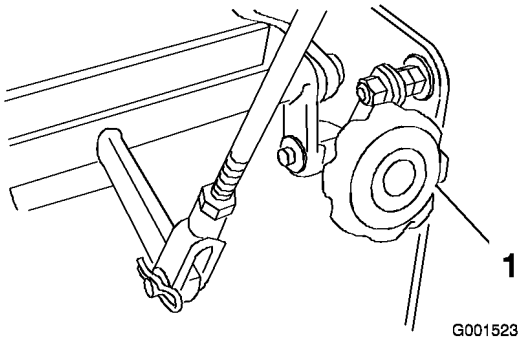


Figure 56

1. Quick track knob

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 57). Check the

tires when they are cold to get the most accurate pressure reading.

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

Caster Tire Pressure: 25-30 psi (172-207 kPa)

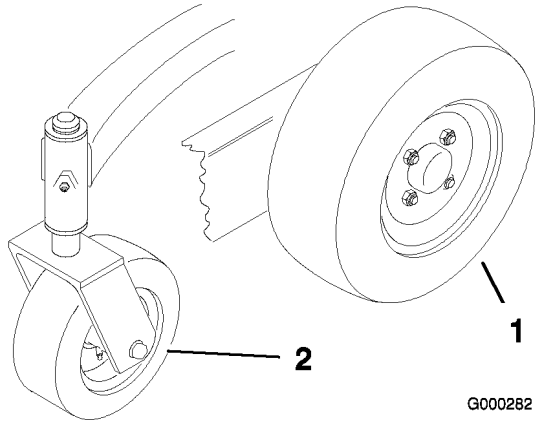


Figure 57

1. Rear Tire
2. Caster tire

Replacing the Caster Wheel Fork Bushings

The caster wheel forks are mounted in bushings pressed into the top and bottom of the carrier frame mounting tubes. To check the bushings, move the caster forks back and forth and side-to-side. If a caster fork is loose, the bushings are worn and must be replaced.

1. Raise the cutting unit so the caster wheels are off the floor, then block up the front of the mower with jack stands.
2. Remove the locking pin and spacer(s) from the top of the caster wheel fork (Figure 58).

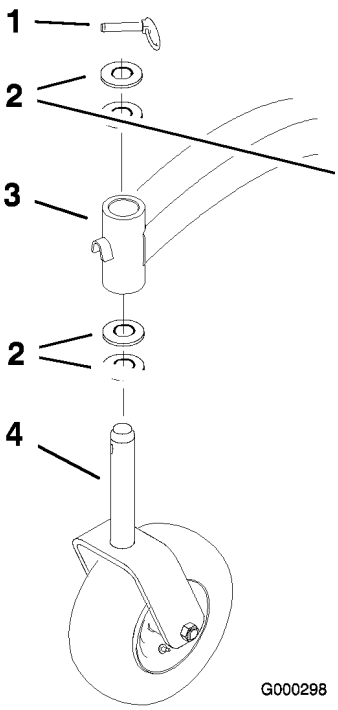


Figure 58

1. Locking Pin
2. Spacers (locate as required)
3. Carrier frame mounting tube
4. Caster wheel fork

3. Pull the caster wheel fork out of the mounting tube, leaving the spacer(s) on the bottom of the fork. Remember the location of the spacers on each fork to ensure correct installation, and to maintain a level deck.
4. Insert a pin punch into the mounting tube and carefully drive out the bushings (Figure 59). Clean the inside of the mounting tube.

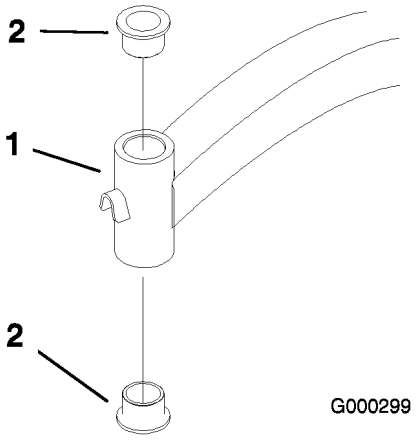


Figure 59

1. Mounting Tube
2. Bushing

5. Grease the inside and outside of the new bushings. Use a hammer and flat plate to carefully drive the bushings into the mounting tube.
6. Inspect the caster wheel fork for wear and replace if necessary (Figure 58).
7. Slide the caster wheel fork through the bushings in the mounting tube. Replace the spacer(s) onto the fork and secure with the retaining ring (Figure 58).

   Important: The inside diameter of the bushings may collapse slightly when installed. If the caster wheel fork does not slide into the new bushings, ream both bushings to an inside diameter of 1.126 inch (29 mm).
8. Grease the fitting on the carrier frame mounting tube using No. 2 general purpose lithium base or molybdenum base grease.

Servicing the Caster Wheel and Bearings

The caster wheels rotate on a roller bearing supported by a spanner bushing. If the bearing is kept well lubricated, wear will be minimal. Failure to keep the bearing well lubricated will cause rapid wear. A wobbly caster wheel usually indicates a worn bearing.

1. Remove the locknut and wheel bolt holding the caster wheel to the caster fork (Figure 60).

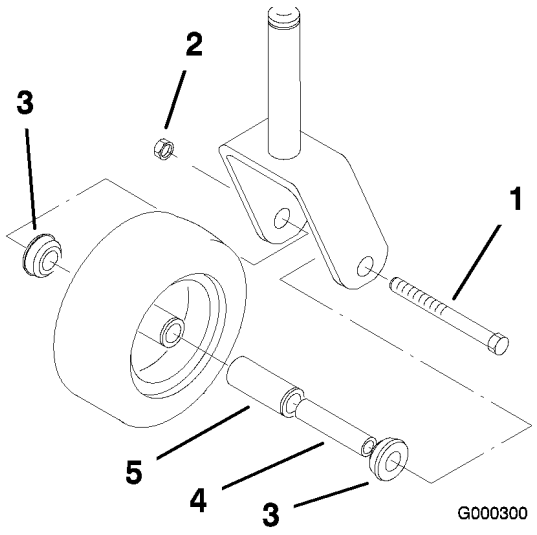


Figure 60

1. Locknut
2. Wheel Bolt
3. Bushing
4. Spanner Bushing
5. Roller Bearing

2. Remove one bushing, then pull the spanner bushing and roller bearing out of the wheel hub (Figure 60).
3. Remove the other bushing from the wheel hub and clean any grease and dirt from the wheel hub (Figure 60).
4. Inspect the roller bearing, bushings, spanner bushing and inside of the wheel hub for wear. Replace any defective or worn parts (Figure 60).
5. To assemble, place one bushing into the wheel hub. Grease the roller bearing and spanner bushing and slide them into the wheel hub. Place the second bushing into the wheel hub (Figure 60).
6. Install the caster wheel into the caster fork and secure with the wheel bolt and locknut. Tighten the locknut until the spanner bushing bottoms against the inside of the caster forks (Figure 60).
7. Grease the fitting on the caster wheel.

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 61).

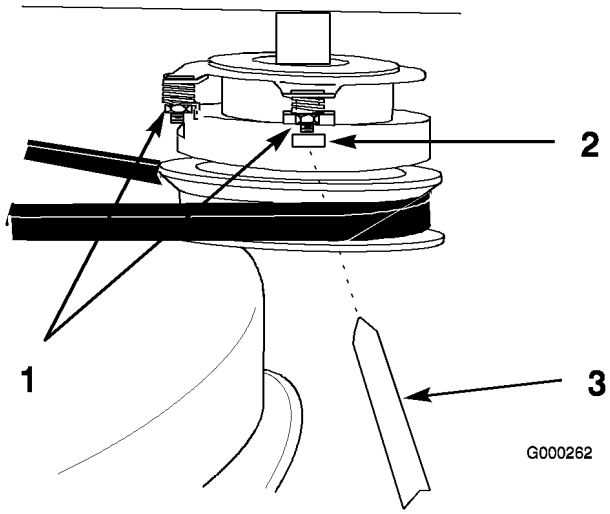


Figure 61

1. Adjusting nut
2. Slot
3. Feeler gauge

2. Check adjustment by inserting a feeler gauge through the slots next to the studs (Figure 61).
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.

Cooling System Maintenance

Cleaning the Air Intake Screen

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

Brake Maintenance

Servicing the Brake

Before each use, check brakes on both a level surface and slope.

Always set the parking brake when you stop the machine or leave it unattended. If the parking brake does not hold securely, an adjustment is required.

Checking the Parking Brake

1. Park the machine on a level surface, disengage the PTO.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Apply the parking brake. Setting the parking brake should take a reasonable amount of force. If the parking brake does not hold securely, an adjustment is required. Refer to Adjusting the Parking Brake.

   Note: When the brake is engaged, the brake handle should be in the 1 o'clock position.

Adjusting the Brakes

The brake lever is on the upper control bar. If the parking brake does not hold securely, an adjustment is required.

1. Park the machine on a level surface, disengage the PTO, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Check the brake before you adjust it; refer to Checking the Brakes.
4. Release the parking brake; refer to Releasing the Parking Brake in Operation, page 20.
5. Loosen the top and bottom jam nuts (Figure 62).
6. To adjust the brake, remove the hair pin cotter and clevis pin from the lower brake lever (Figure 62).
7. Rotate the brake rod in the yokes. To tighten the brake, lengthen the rod between the yokes. To loosen the brake, shorten the rod between the yokes (Figure 62).

   Note: The brake rod should be threaded into both yokes the same distance.
8. Secure the yoke to lower brake lever with the hair pin cotter and clevis pin (Figure 62).
9. Tighten the top and bottom jam nuts (Figure 62).
10. Check the brake operation again; refer to Checking the Brake.

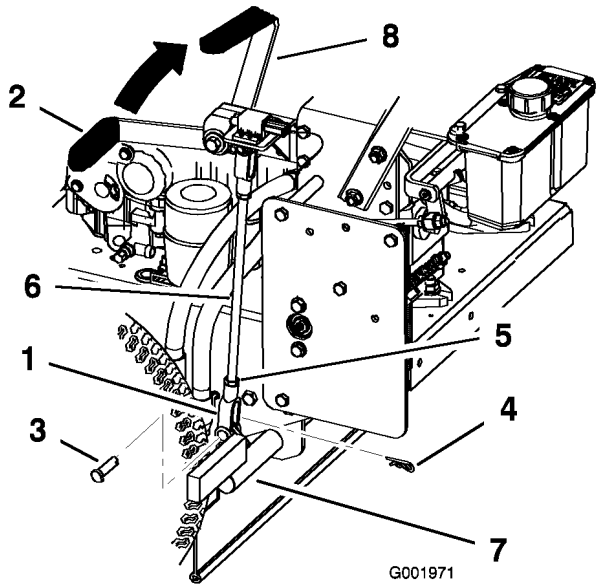


Figure 62

1. Yoke
2. Parking brake lever (released position)
3. Clevis pin
4. Haripin cotter
5. Jam Nut
6. Brake rod
7. Lower brake lever
8. 1 o'clock position

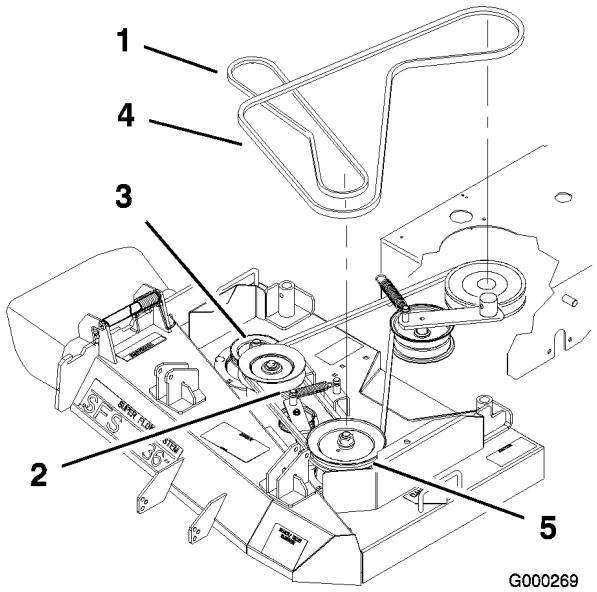


Figure 63

1. Mower belt
2. Idler arm spring
3. Outward pulley
4. PTO Drive Belt
5. Double Spindle Pulley

Belt Maintenance

Replacing the Mower Belt

Check the belts every 50 hours.

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

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the knobs/rubber washers holding the carrier frame cover and remove the carrier frame cover.
4. Remove the knobs/rubber washers holding the belt cover to the cutting unit and remove the belt cover.
5. Remove the PTO drive belt. Refer to Replacing the PTO Drive Belt in Belt Maintenance, page 46.
6. Disconnect the idler arm spring to relieve tension on the idler arm and idler pulley, then remove the worn mower belt (Figure 63).
7. Install the new mower belt around the outward spindle pulley, the idler pulley, and in the lower groove of the double spindle pulley (Figure 63).
8. Reconnect the idler arm spring (Figure 63).
9. Install the PTO drive belt. Refer to Replacing the PTO Drive Belt in theBelt Maintenance, page 46.
10. Reinstall the belt cover onto the cutting unit, then reinstall and tighten the knobs/rubber washers.
11. Install the carrier frame cover onto the cutting unit, then install and tighten the knobs/rubber washers.

Replacing the PTO Drive Belt

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

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the knobs/rubber washers holding the carrier frame cover and remove the carrier frame cover.

4. Remove the knobs/rubber washers holding the belt covers to the top of the cutting unit and remove the belt covers.
5. Remove the heat shield from the engine deck and carrier frame.
6. Remove the idler spring from idler arm. Remove the drive belt from the PTO clutch pulley, idler pulleys and the left spindle pulley (Figure 64).
7. Install the new drive belt onto the PTO engagement pulley and the top groove of the center spindle pulley (Figure 64).
8. Install belt onto idler pulleys and then install idler spring (Figure 64).
9. Install the heat shield to the engine deck and carrier frame.
10. Reinstall the belt covers onto the cutting unit, then reinstall and tighten the knobs/rubber washers.
11. Reinstall the carrier frame cover onto the cutting unit, then reinstall and tighten the knobs/rubber washers.

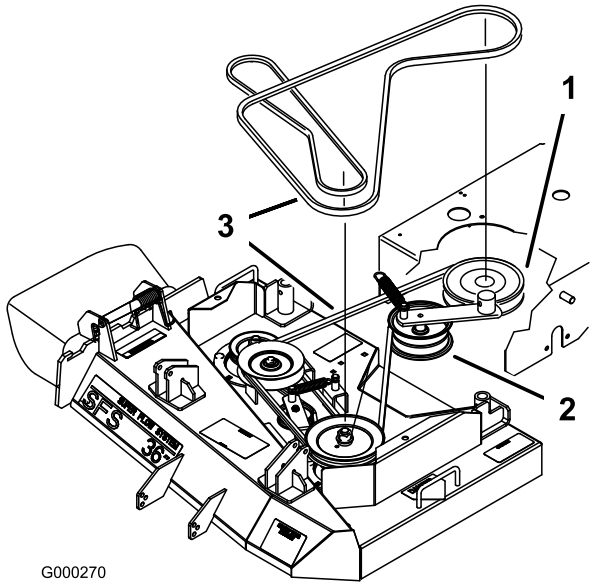


Figure 64

1. PTO clutch pulley
2. Drive belt idler
3. Drive Belt
4. Double Spindle Pulley

Hydraulic System Maintenance

Servicing the Hydraulic System

Checking the Hydraulic Fluid

Check the hydraulic fluid level as follows:

- Check the hydraulic fluid level before engine is first started.
- Check the hydraulic fluid level after first 8 operating hours.
- Check the hydraulic fluid level after every 25 operating hours.

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

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

Hydraulic System Oil Capacity: 67 oz. (2.0 l)

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

1. Position machine on a level surface.
2. Disengage the power take off (PTO) and shut off the engine.
3. Wait for all moving parts to stop before leaving the operating position and then set the parking brake.
4. Clean area around cap and filler neck of hydraulic tank (Figure 65).

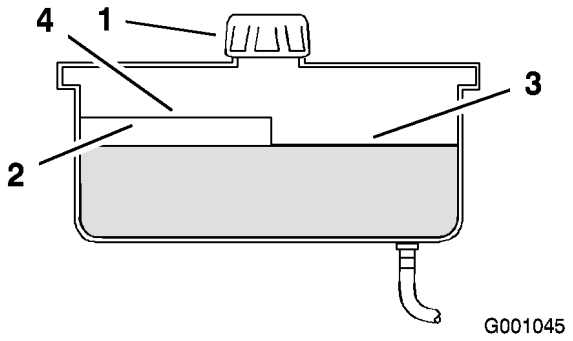


Figure 65

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

5. Remove cap from filler neck. Look inside to check if there is fluid in the reservoir. (Figure 65).
6. If there is no fluid, add fluid to the reservoir until it reaches the cold level of the baffle.
7. Run the machine at low idle for 15 minutes to allow any air to purge out of the system and warm fluid. Refer to Starting and Stopping the Engine.
8. Recheck the fluid level while the fluid is warm. If required, add fluid to the reservoir until it reaches the hot level of the baffle.

   Note: The fluid level should be to the top of the hot level of the baffle, when the fluid is warm (Figure 65).
9. Install cap on filler neck.

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

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

Replacing the Hydraulic Filter

Hot hydraulic fluid can cause severe burns.

Allow the hydraulic fluid to cool before performing any maintenance to the hydraulic system.

Change the hydraulic filter as follows:

- After the first 8 operating hours.
- After every 200 operating hours or yearly before storage.

1. Disengage the PTO and set the parking brake.
2. Stop the engine and wait for all moving parts to stop before leaving the operating position.

   Important: Do not substitute automotive oil filter or severe hydraulic system damage may result.
3. Remove hydraulic reservoir cap and temporarily cover opening with a plastic bag and rubber band to prevent all hydro fluid from draining out.
4. Locate the filter under engine base and place drain pan under filter (Figure 66).

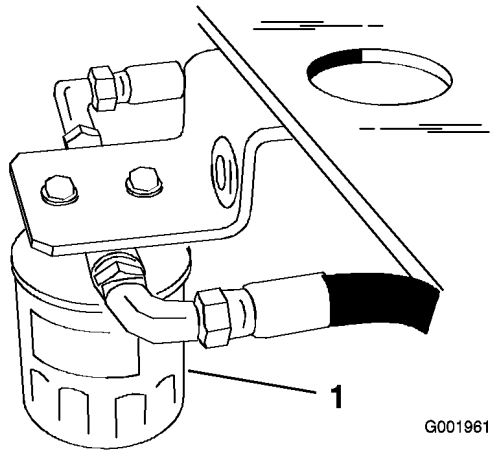


Figure 66

5. Remove the old filter and wipe the filter adapter gasket surface clean (Figure 67).
6. Apply a thin coat hydro fluid to the rubber gasket on the replacement filter.
7. Install replacement hydraulic filter onto the filter adapter. Do not tighten.

8. Remove plastic bag from reservoir opening and allow filter to fill with hydraulic fluid.
9. When the hydraulic filter is full, turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 turn (Figure 67).

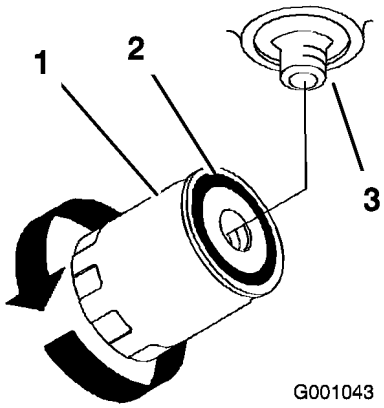


Figure 67

1. Hydraulic filter
2. Gasket
3. Adapter

10. Clean up any spilled fluid.
11. If there is no fluid or it is low, add fluid to the tank until it reaches the cold baffle of the tank.

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

12. 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 Hydraulic System.
13. Recheck level and add fluid, if required. **Do not overfill.**

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. Disengage the PTO and set the parking brake.
2. Stop the engine and wait for all moving parts to stop before leaving the operating position.
3. Raise the rear of the machine up onto jack stands high enough to raise the drive wheels off the ground.
4. Start the engine and move the throttle control to idle position. Move the speed control lever to the middle speed position and place one drive lever into the drive position.

   If the drive wheel does not rotate, it is possible to assist the purging of the system by carefully rotating the tire in the forward direction.
5. Check the hydraulic fluid level as it drops add fluid as required to maintain the proper level.
6. Repeat this procedure for the opposite wheel.
7. Thoroughly clean the area around each of the charge pump housings.

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.

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

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

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

Mower Deck Maintenance

Servicing the Cutting Blades

To ensure a superior quality of cut, keep the blades sharp. For convenient sharpening and replacement, you may want to keep extra blades on hand.

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

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

Before Inspecting or Servicing the Blades

Park the machine on a level surface, disengage the blade control bail and set the parking brake. Turn the ignition key to off. Remove the key and disconnect the spark plug wire(s) from the spark plug(s).

Inspecting the Blades

Inspect the blades every 8 hours.

1. Inspect the cutting edges (Figure 68). If the edges are not sharp or have nicks, remove and sharpen the blades. Refer to Sharpening the Blades.

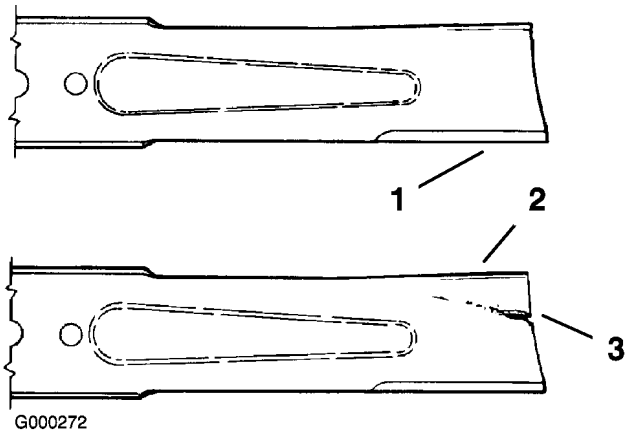


Figure 68

1. Cutting Edge
2. Curved Area
3. Wear/slot Forming

2. Inspect the blades, especially the curved area (Figure 68). If you notice any damage, wear, or a slot forming in this area (item 3 in Figure 68), immediately install a new blade.

Checking for Bent Blades

1. Rotate the blades until the ends face forward and backward (Figure 69).

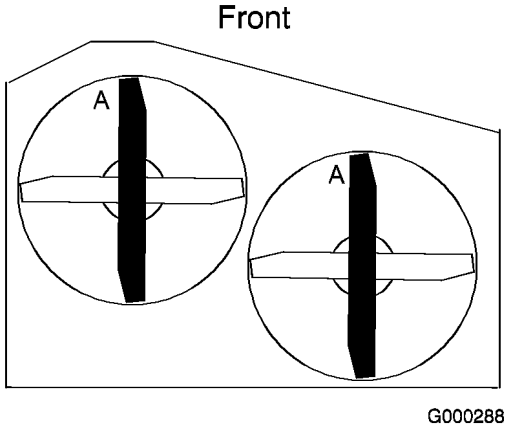


Figure 69

2. Measure from a level surface to the cutting edge, position A, of the blades (Figure 70). Note this dimension.

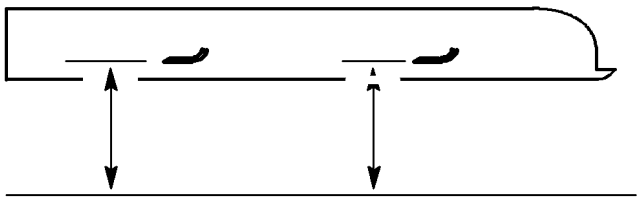


Figure 70

3. Rotate the opposite ends of the blades forward.
4. Measure from a level surface to the cutting edge of the blades at the same position as in step 1. The difference between the dimensions obtained in steps 1 and 2 must not exceed 1/8 inch (3 mm). If this dimension exceeds 1/8 inch (3 mm), the blade is bent and must be replaced. Refer to Removing the Blades and Installing the Blades.

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

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

Removing the Blades

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

1. Hold the blade end using a rag or thickly-padded glove.
2. Remove the blade bolt, blade stiffener, washer, and blade from the spindle shaft (Figure 71).

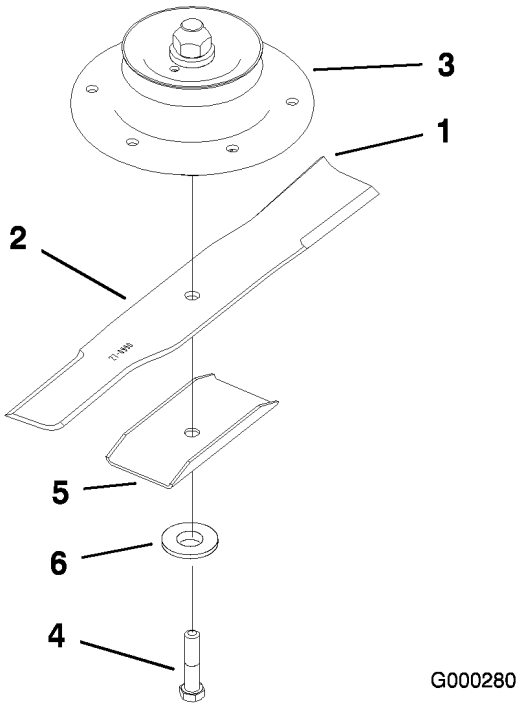


Figure 71

1. Sail Area of Blade
2. Blade
3. Blade spindle
4. Blade Bolt
5. Blade stiffener
6. Flat washer

Sharpening the Blades

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 72). Maintain the original angle. The blade retains its balance if the same amount of material is removed from both cutting edges.

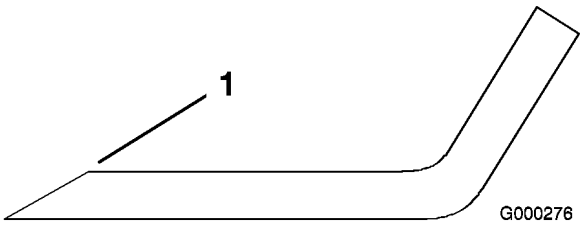


Figure 72

1. Sharpen at original angle

2. Check the balance of the blade by putting it on a blade balancer (Figure 73). If the blade stays in a horizontal position, the blade is balanced and can be used. If the blade is not balanced, file some metal off the end of the sail area only (Figure 71). Repeat this procedure until the blade is balanced.

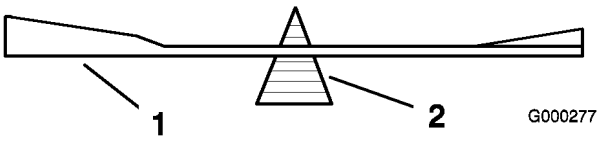


Figure 73

1. Blade
2. Balancer

Installing the Blades

1. Install the blade onto the spindle shaft (Figure 71).

   Important: The sail part of the blade must be pointing upward, toward the inside of the mower to ensure proper cutting (Figure 71).

2. Install the flat washer, lock washer, and blade bolt (Figure 71).
3. Torque the blade bolt to 85-110 ft-lb (115-140 N•m).

Correcting the Mower Quality of Cut

If one deck blade cuts lower than the other, correct as follows.

Note: Tire air pressure is critical in these procedures. Make sure all tires have correct pressure.

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position. Disconnect the spark plug wire(s) from the spark plug(s).
3. Adjust the tire pressure in all tires to specifications on page .
4. Check that the blades and spindle shafts are not bent. Refer to Checking for Bent Blades.
5. Set the height-of-cut to the 4 inch (101.6 mm) position. Refer to Adjusting the Height-Of-Cut in Operation, page 20.
6. Perform the steps in the following sections Frame Set Up, Checking Front-to-Rear Pitch, and Checking Side-to-Side Leveling.

Frame Set Up

Checking the Carrier Frame and Deck Alignment

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Place a long straight edge on top of the engine deck as shown in Figure 74.
4. At the carrier frame cross tube, measure the height at location **A** (Figure 74). This measurement must be 1-5/16 inch (33 mm), plus or minus a 1/4 inch (6 mm).
5. If the height at location **A** is not correct, adjustment is needed.
6. Loosen the carrier frame mounting bolts on both sides of the machine (Figure 74).
7. Align the carrier frame and engine deck to match 1-5/16 inch (33 mm), plus or minus a 1/4 inch (6 mm) at location **A** (Figure 74).
8. Tighten the carrier frame mounting bolts on both sides of the machine.

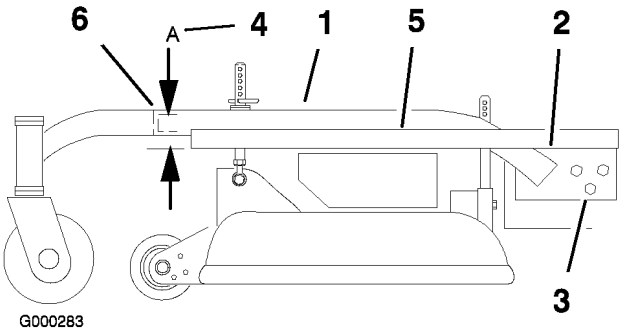


Figure 74

1. Carrier Frame
2. Top of engine deck
3. Carrier frame mounting bolts
4. Location A, 1-5/16 inch (33 mm) ±1/4 inch (6 mm)
5. Straight edge
6. Carrier frame cross tube

Checking the Engine Deck Height

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Adjust the tire pressure in all tires.
4. Measure engine deck height at location **A** (Figure 75).

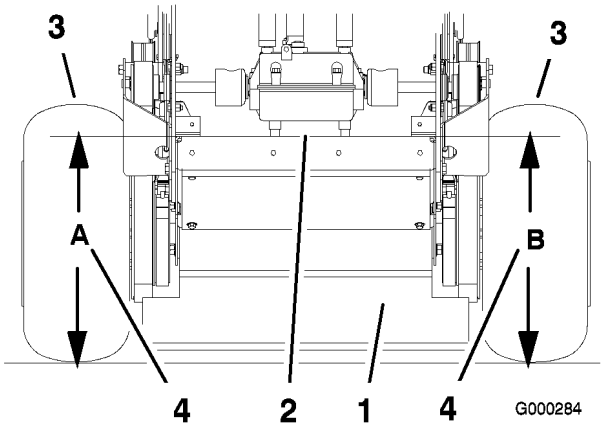


Figure 75

1. Back view of machine
2. Top of engine deck
3. Tires
4. Same height at locations **A** and **B**

5. Measure engine deck height at location **B** (Figure 75).
6. If the height at location **A** and **B** are not the same, change tire pressure slightly to make them the same.

Checking Carrier Frame Front-to-Rear Pitch

The carrier frame must have a pitch of a 1/4 inch (6 mm) over the length of 24 inches (61 cm) on the carrier frame (Figure 76).

1. Measure out 24 inches (61 cm) on the carrier frame (Figure 76).

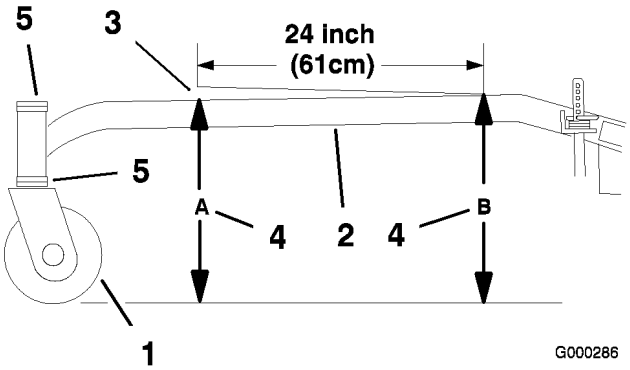


Figure 76

1. Caster Wheel
2. Carrier Frame
3. 1/4-3/8 inch (6-10 mm) pitch over 24 inch (61 cm) length
4. Height at locations **A** and **B**
5. Caster spacers

2. Measure carrier frame height at location **A** (Figure 76).
3. Measure carrier frame height at location **B** (Figure 76).
4. The height at location **A** must be a 1/4-3/8 inch (6 mm -10 mm) lower than location **B** (Figure 76).
5. If the carrier frame is not correct, move caster spacers to make it a 1/4-3/8 inch (6 -10 mm) pitch (Figure 76). Move spacers from top or bottom to make the correct pitch.
6. The tire pressure may also be adjusted slightly to make a 1/4 inch (6 mm) pitch.

Checking the Carrier Frame Side-to-Side Position

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Adjust the tire pressure in all tires to specifications; refer toDrive System Maintenance, page 37 .
4. Measure carrier frame height at location **A** (Figure 77).
5. Measure carrier frame height at location **B** (Figure 77).
6. If the carrier frame height is not the same move spacers from top or bottom of caster wheel, to make it level. The tire pressure may also be adjusted slightly to make it level.

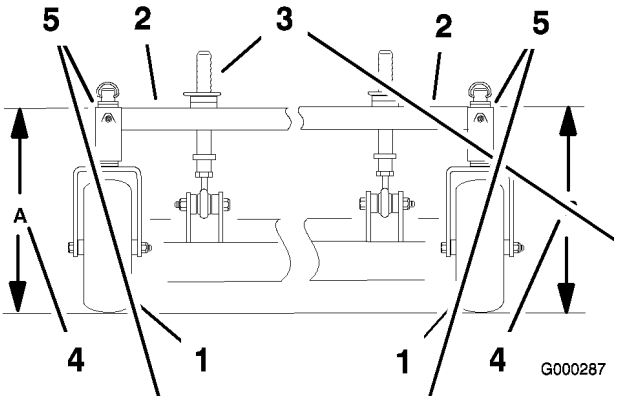


Figure 77

1. Caster Wheel
2. Carrier Frame
3. Front height-of-cut pins
4. Same height at locations A and B
5. Caster spacers

Checking the Mower Deck Front-to-Rear Pitch

1. Check the tire pressure on both deck and traction unit.
2. Position one blade front-to-rear (Figure 78). Measure at **C** and **D** locations (Figure 78) from a level surface to the cutting edge of the blade tips (Figure 79).
3. The mower blade should be 1/4 inch (6 mm) lower in front at **C** than in the rear at **D**. Rotate blades and repeat for other blades. If it is not correct, proceed to Changing the Deck Front-to-Rear Pitch.

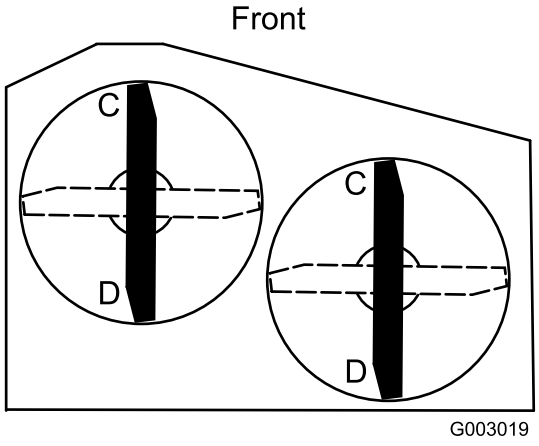
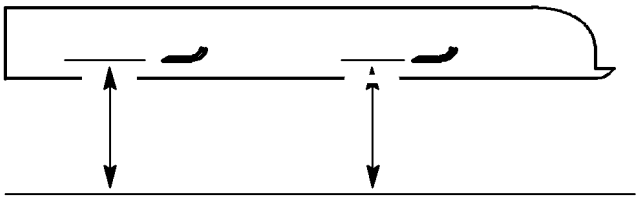


Figure 78



MEASURE FROM CUTTING EDGE TO A LEVEL SURFACE G000289

Figure 79

Changing the Deck Front-to-Rear Pitch

Changing the front-to-rear pitch is done by adjusting the front height-of-cut posts.

1. To change the front-to-rear pitch, the front height-of-cut posts can be adjusted (Figure 80).

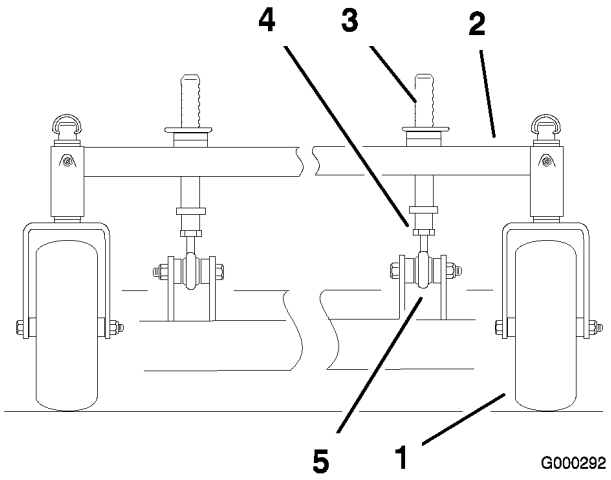


Figure 80

1. Caster Wheel
2. Carrier Frame
3. Front height-of-cut pins
4. Jam nut
5. Ball joint

2. To raise the front of the deck, loosen jam nut and rotate the front pin clockwise (Figure 80).
3. To lower the front of the deck, loosen jam nut and rotate the front pin counter clockwise (Figure 80).
4. Position the blades front-to-rear. Measure at **C** and **D** locations (Figure 78) from a level surface to the cutting edge of the blades.
5. Check the side-to-side leveling of the cutting unit.
6. Tighten the jam nuts (Figure 80).

Checking the Deck Side-to-Side Measurements

1. Check the tire pressure on both deck and traction unit.
2. Position the blades side-to-side (Figure 81). Measure at **A** and **B** locations (Figure 81) from a level surface to the cutting edge of blade tips (Figure 82).

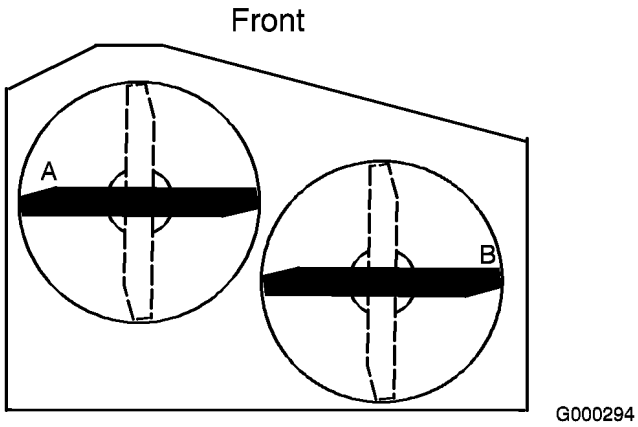


Figure 81

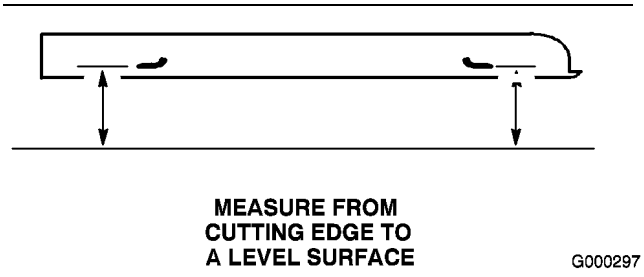


Figure 82

3. The difference between measurements **A** and **B** should be no more than 1/4 inch (6 mm).

Changing the Side-to-Side Measurements

Changing the side-to-side leveling is done by adjusting tire pressure.

1. Change the tire pressure on both deck and traction unit. Do this to the corresponding side that needs adjustment.
2. Recheck the front-to-rear pitch and side to side leveling of the cutting unit.

Matching the Height of Cut

1. Check the tire pressure on both deck and traction unit.
2. Set the height-of-cut to the 4 inch (101.6 mm) position following the height-of-cut decal.
3. With the machine on level surface, position one blade front-to-rear (Figure 83). Measure at **A** and from level surface to the cutting edge of the blade tips (Figure 84).

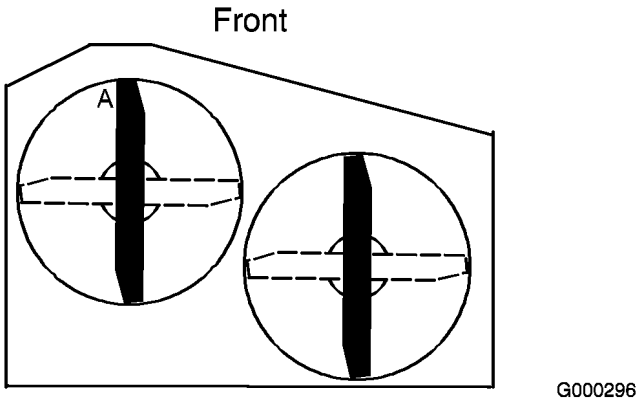


Figure 83

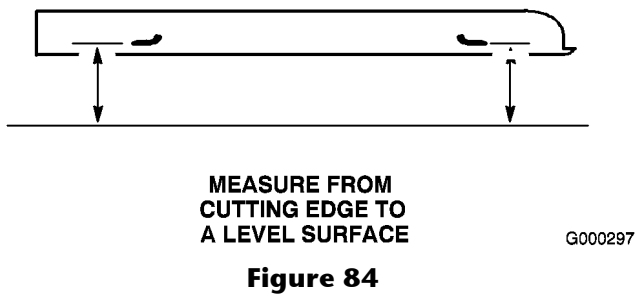


Figure 84

4. The measurement should be 4 inch (101.6 mm).
5. If it does not measure correctly, add air pressure in the rear tires to raise the height-of-cut.
6. If it does not measure correctly, decrease air pressure in rear tires to lower the height-of-cut.
7. Check the carrier frame front-to-rear pitch.

Replacing the Grass Deflector

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

Never operate the lawn mower unless you install a cover plate, a mulch plate, or a grass chute and catcher.

1. Remove the locknut, bolt, spring and spacer holding the deflector to the pivot brackets

(Figure 85). Remove damaged or worn grass deflector.

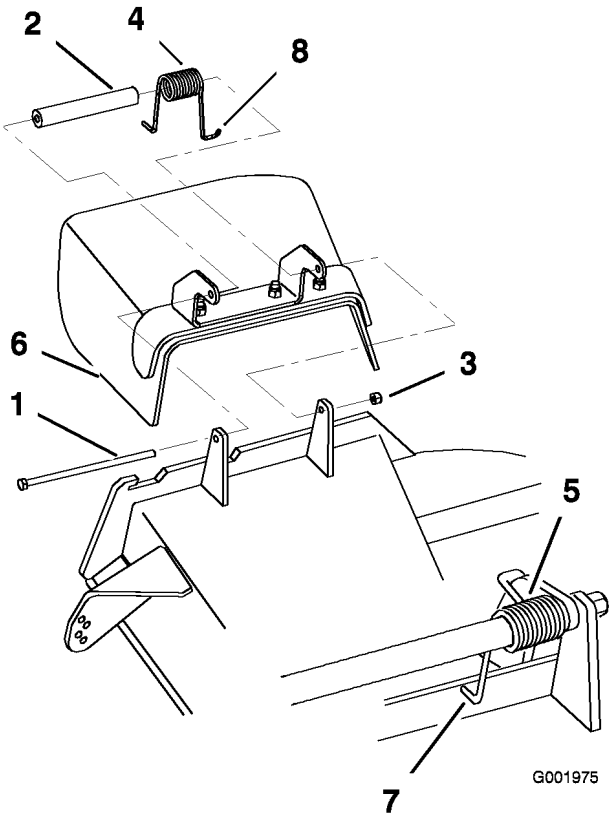


Figure 85

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

2. Place spacer and spring onto grass deflector. Place the L end of spring behind deck edge.

   Note: Make sure the L end of spring is installed behind deck edge before installing the bolt as shown in Figure 85.

3. Install bolt and nut. Place the **J** hook end of spring around grass deflector (Figure 85).

   Important: The grass deflector must be able to rotate. Lift the deflector up to the full open position and ensure that it rotates into the full down position.

Storage

Cleaning and Storage

1. Disengage the power take off (PTO), set the parking brake, and turn the ignition key to off. Remove the key.
2. Remove grass clippings, dirt, and grime from the external parts of the entire machine, especially the engine. 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. Check the brake; refer to Servicing the Brake in Brake Maintenance, page 45.
4. Service the air cleaner; refer to Servicing the Air Cleaner in Engine Maintenance, page 32.
5. Grease the machine; refer to Greasing and Lubrication in Lubrication, page 30.
6. Change the crankcase oil; refer to Servicing the Engine in Engine Maintenance, page 32.
7. Check the tire pressure; refer to Checking the Tire Pressure in Drive System Maintenance, page 37.
8. 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 35, 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.
9. Remove the spark plug(s) and check its condition; refer to Servicing the Spark Plug in Engine Maintenance, page 32. 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).
10. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged or defective.
11. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
12. 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.

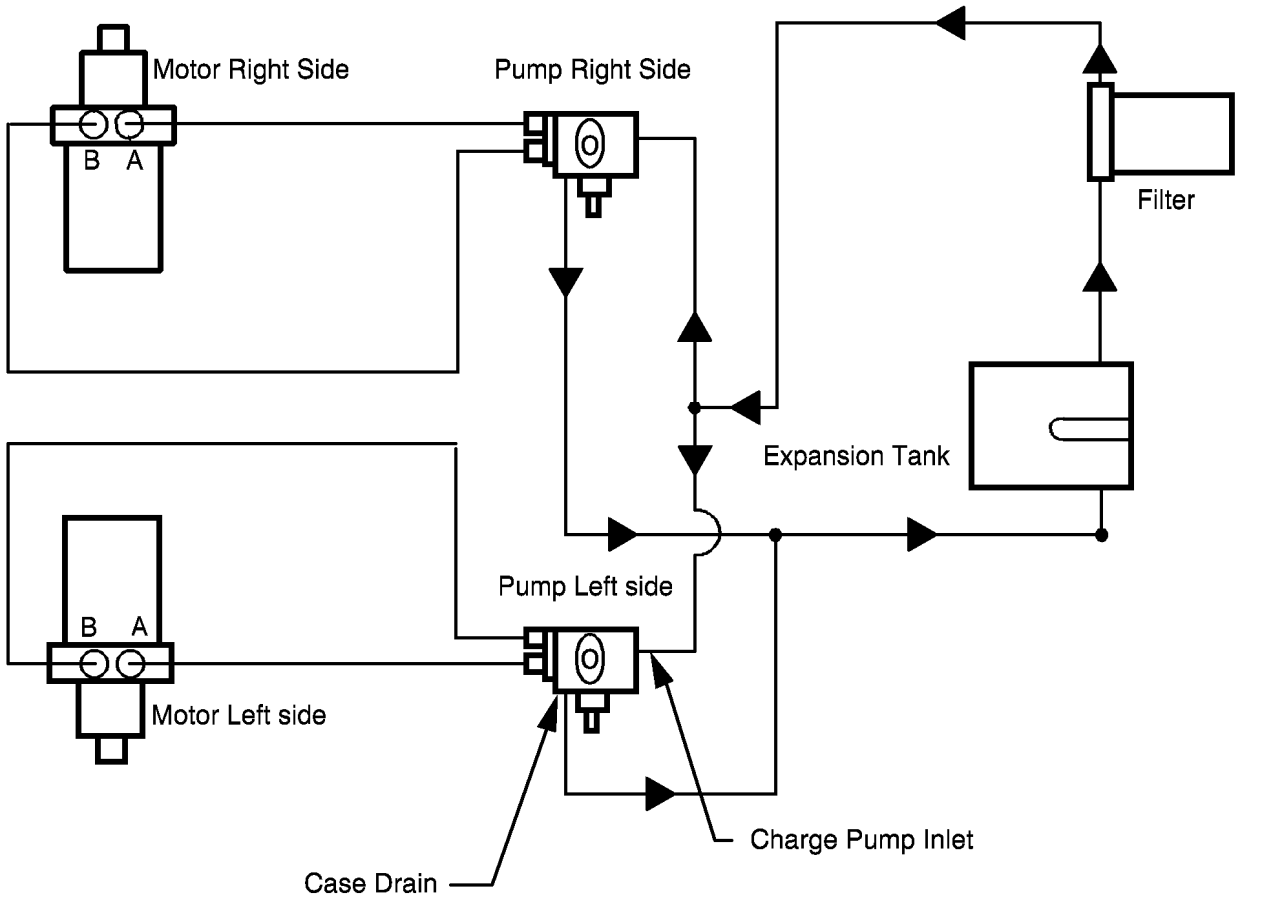
Troubleshooting

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.

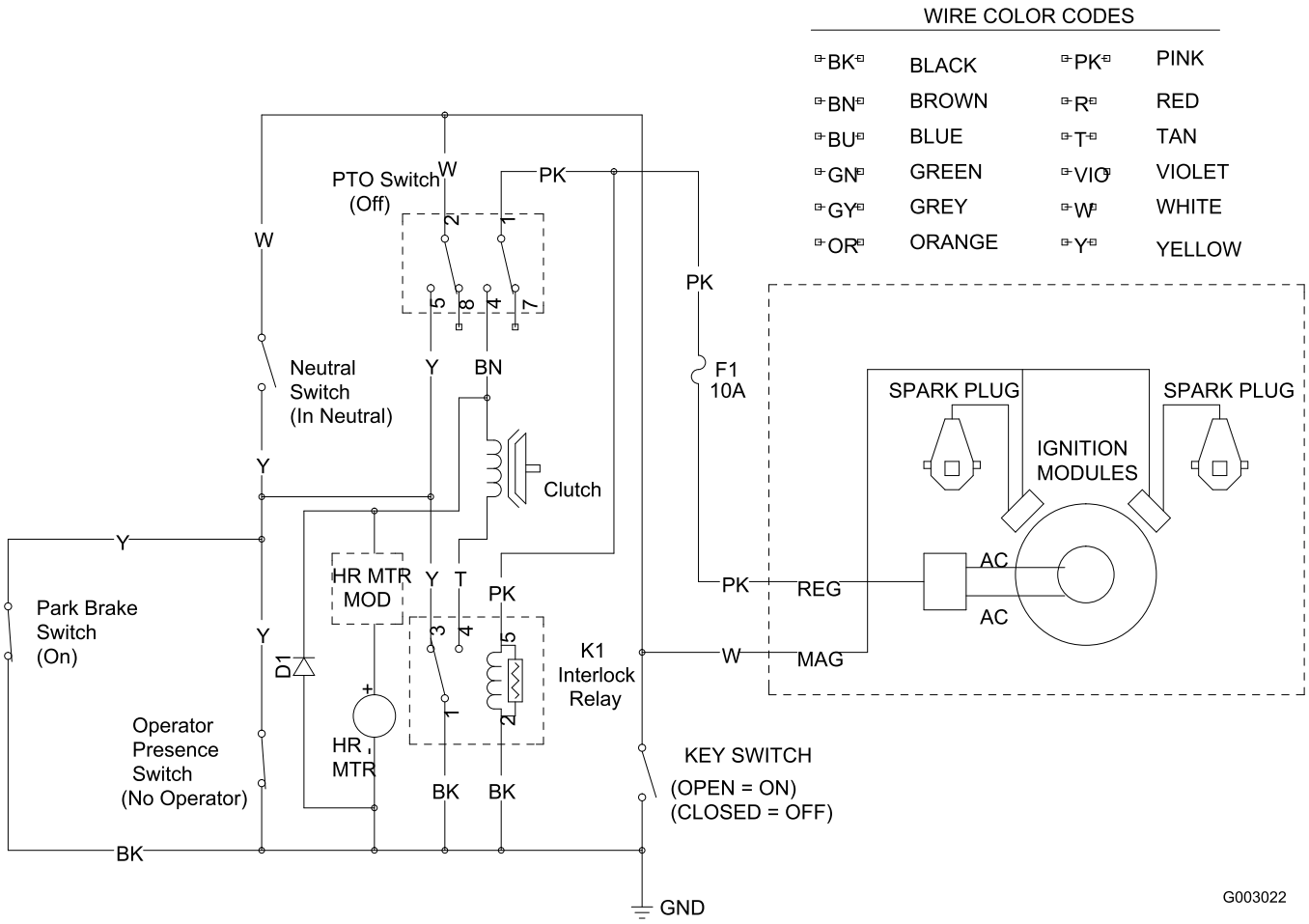
Problem	Possible Cause	Corrective Action
Machine does not drive.	1. Shift lever is in neutral.	1. Move shift lever to a drive gear position.
	2. Traction belt is worn, loose or broken.	2. Change the belt.
	3. Traction belt is off a pulley.	3. Change the belt.
	4. Broken or missing idler spring.	4. Replace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



Hydraulic Schematic (Rev. A)



Electrical 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.

This warranty applies to:

- ProLine Mid-Size Walk Power Mowers and Accessories
- Z Master Mid-Mount ZRTs and Accessories
- Z Master Outfront ZRTs and Accessories
- Groundsmaster 120 OFRs and Accessories

The following time periods apply from the date of purchase:

Components	Warranty Period
Engines	2 years
Hydraulic Systems	2 years
Traction Unit Frame	2 years
Carrier Frame	2 years
Deck Shells	2 years
Deck Spindles	3 years Parts 2 years Labor
Z500 Series Clutches	2 years
Remaining Components	1 year

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

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
888-577-7466 (U.S. customers)
877-484-9255 (Canada customers)

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.