

TORO[®]

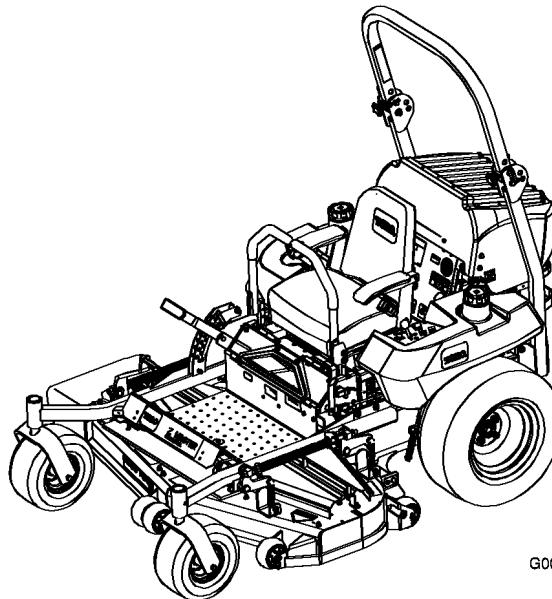
Count on it.

Operator's Manual

Z597-D Z Master® with 60in or 72in TURBO FORCE® Side Discharge Mower

Model No. 74268TE—Serial No. 270000001 and Up

Model No. 74269TE—Serial No. 270000001 and Up



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

Introduction

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

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

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

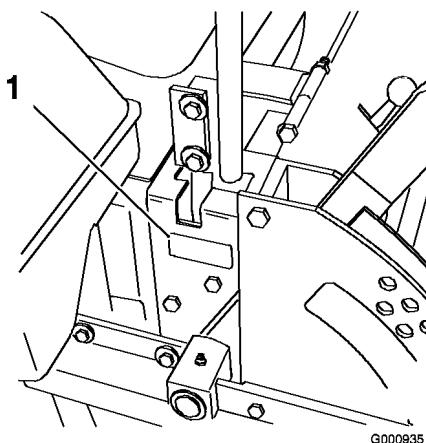


Figure 1

1. Model and serial number location

Model No. _____

Serial No. _____

This manual identifies potential hazards and has safety messages identified by the safety alert symbol (Figure 2), which signals a hazard that may

cause serious injury or death if you do not follow the recommended precautions.



Figure 2

1. Safety alert symbol

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

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Safety

This machine meets or exceeds European Standards in effect at the time of production. However, 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 the CEN standard EN 836:1997.

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

Training

- Read the operator's manual and other training material carefully. Be familiar with the controls, safety signs, and the proper use of the equipment.
- Never allow children or people unfamiliar with these instructions to use the lawnmower. Local regulations can restrict the age of the operator.
- Never mow while people, especially children, or pets are nearby.
- Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.
- Do not carry passengers.
- All drivers should seek and obtain professional and practical instruction. Such instruction should emphasize:
 - the need for care and concentration when working with ride-on machines;
 - control of a ride-on machine sliding on a slope will not be regained by the application of the control levers. The main reasons for loss of control are:
 - ◊ insufficient wheel grip, especially on wet grass;
 - ◊ being driven too fast;
 - ◊ inadequate braking;

- ◊ the type of machine is unsuitable for its task;
- ◊ lack of awareness of the effect of ground conditions, especially slopes;
- ◊ incorrect hitching and load distribution.

Preparation

- While mowing, always wear substantial footwear and long trousers. Do not operate the equipment when barefoot or wearing open sandals.
- Thoroughly inspect the area where the equipment is to be used and remove all objects which may be thrown by the machine.
- **Warning**-Fuel is highly flammable.
 - Store fuel in containers specifically designed for this purpose.
 - Refuel outdoors only and do not smoke while refueling.
 - Add fuel before starting the engine. Never remove the cap of the fuel tank or add fuel while the engine is running or when the engine is hot.
 - If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have dissipated.
 - Replace all fuel tank and container caps securely.
- Replace faulty silencers/mufflers.
- Before using, always visually inspect to see that the blades, blade bolts and cutter assembly are not worn or damaged. Replace worn or damaged blades and bolts in sets to preserve balance.
- On multi-bladed machines, take care as rotating one blade can cause other blades to rotate.

Operation

- Be alert, slow down and use caution when making turns. Look behind and to the side before changing directions.
- Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

- Mow only in daylight or in good artificial light.
- Before attempting to start the engine, disengage all blade attachment clutches and shift into neutral.
- Do not use on slopes greater than 15 degrees.
- Remember there is no such thing as a safe slope. Travel on grass slopes requires particular care. To guard against overturning:
 - do not stop or start suddenly when on a slope;
 - use slow speeds on slopes and during tight turns;
 - stay alert for humps and hollows and other hidden hazards;
- Use care when pulling loads or using heavy equipment.
 - Use only approved drawbar hitch points.
 - Limit loads to those you can safely control.
 - Do not turn sharply. Use care when reversing.
- Watch out for traffic when crossing or near roadways.
- Stop the blades from rotating before crossing surfaces other than grass.
- When using any attachments, never direct discharge of material toward bystanders nor allow anyone near the machine while in operation.
- Never operate the machine with damaged guards, shields, or without safety protective devices in place.
- Do not change the engine governor settings or overspeed the engine. Operating the engine at excessive speed may increase the hazard of personal injury.
- Before leaving the operator's position:
 - disengage the power take-off and lower the attachments;
 - change into neutral and set the parking brake;
 - stop the engine and remove the key.
- Disengage drive to attachments, stop the engine, and disconnect the spark plug wire(s) or remove the ignition key:
 - before clearing blockages or unclogging chute;
 - before checking, cleaning or working on the lawnmower;
 - after striking a foreign object. Inspect the lawnmower for damage and make repairs before restarting and operating the equipment;
 - if the machine starts to vibrate abnormally (check immediately).
- Disengage drive to attachments when transporting or not in use.
- Stop the engine and disengage drive to attachment
 - before refuelling;
 - before removing the grass catcher;
 - before making height adjustment unless adjustment can be made from the operator's position.
- Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of mowing.

Maintenance and Storage

- Keep all nuts, bolts and screws tight to be sure the equipment is in safe working condition.
- Never store the equipment with fuel in the tank inside a building where fumes may reach an open flame or spark.
- Allow the engine to cool before storing in any enclosure.
- To reduce the fire hazard, keep the engine, silencer/muffler, battery compartment and fuel storage area free of grass, leaves, or excessive grease.
- Check the grass catcher frequently for wear or deterioration.
- Replace worn or damaged parts for safety.
- If the fuel tank has to be drained, do this outdoors.
- On multi-bladed mowers, take care as rotating one blade can cause other blades to rotate.
- When machine is to be parked, stored or left unattended, lower the cutting means unless a positive mechanical lock is used.

Toro Riding Mower Safety

The following list contains safety information specific to Toro products or other safety information that you must know that is not included in the CEN standard.

- Engine exhaust contains carbon monoxide, which is an odorless, deadly poison that can kill you. Do not run engine indoors or in an enclosed area.
- Keep hands, feet, hair and loose clothing away from attachment discharge area, underside of mower and any moving parts while engine is running.
- Do not touch equipment or attachment parts which may be hot from operation. Allow to cool before attempting to maintain, adjust, or service.
- Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes and clothing. Protect your face, eyes, and clothing when working with a battery.
- Battery gases can explode. Keep cigarettes, sparks and flames away from battery.
- Use only genuine Toro replacement parts to ensure that original standards are maintained.
- Use only Toro approved attachments. Warranty may be voided if used with unapproved attachments.

Slope Operation

- Do not mow slopes greater than 15 degrees.
- Do not mow near drop-offs, ditches, steep banks or water. Wheels dropping over edges can cause rollovers, which may result in serious injury, death or drowning.
- Do not mow slopes when grass is wet. Slippery conditions reduce traction and could cause sliding and loss of control.
- Do not make sudden turns or rapid speed changes.
- Use a walk behind mower and/or a hand trimmer near drop-offs, ditches, steep banks or water.
- Reduce speed and use extreme caution on slopes.
- Remove or mark obstacles such as rocks, tree limbs, etc. from the mowing area. Tall grass can hide obstacles.

- Watch for ditches, holes, rocks, dips, and rises that change the operating angle, as rough terrain could overturn the machine.
- Avoid sudden starts when mowing uphill because the mower may tip backwards.
- Be aware that loss of traction may occur going downhill. Weight transfer to the front wheels may cause drive wheels to slip and cause loss of braking and steering.
- Always avoid sudden starting or stopping on a slope. If tires lose traction, disengage the blades and proceed slowly off the slope.
- Follow the manufacturer's recommendations for wheel weights or counterweights to improve stability.
- Use extreme care with grass catchers or other attachments. These can change the stability of the machine and cause loss of control.

Using the Rollover Protection System (ROPS)

- Keep the roll bar in the raised and locked position and use the seat belt when operating the machine.
- Be certain that the seat belt can be released quickly in the event of an emergency.
- Be aware there is no rollover protection when the roll bar is down.
- Check the area to be mowed and never fold the ROPS in areas where there are slopes, drop offs or water.
- Lower the rollbar only when absolutely necessary. Do not wear the seat belt with the roll bar folded down.
- Check carefully for overhead clearances (i.e. branches, doorways, electrical wires) before driving under any objects and do not contact them.

Sound Pressure Level

This unit has a maximum sound pressure level at the operator's ear of 94 dBA, based on measurements of identical machines per EN 11094 and EN 836.

Sound Power Level

This unit has a guaranteed sound power level of 105 dBA, based on measurements of identical machines per EN 11094.

Vibration Level

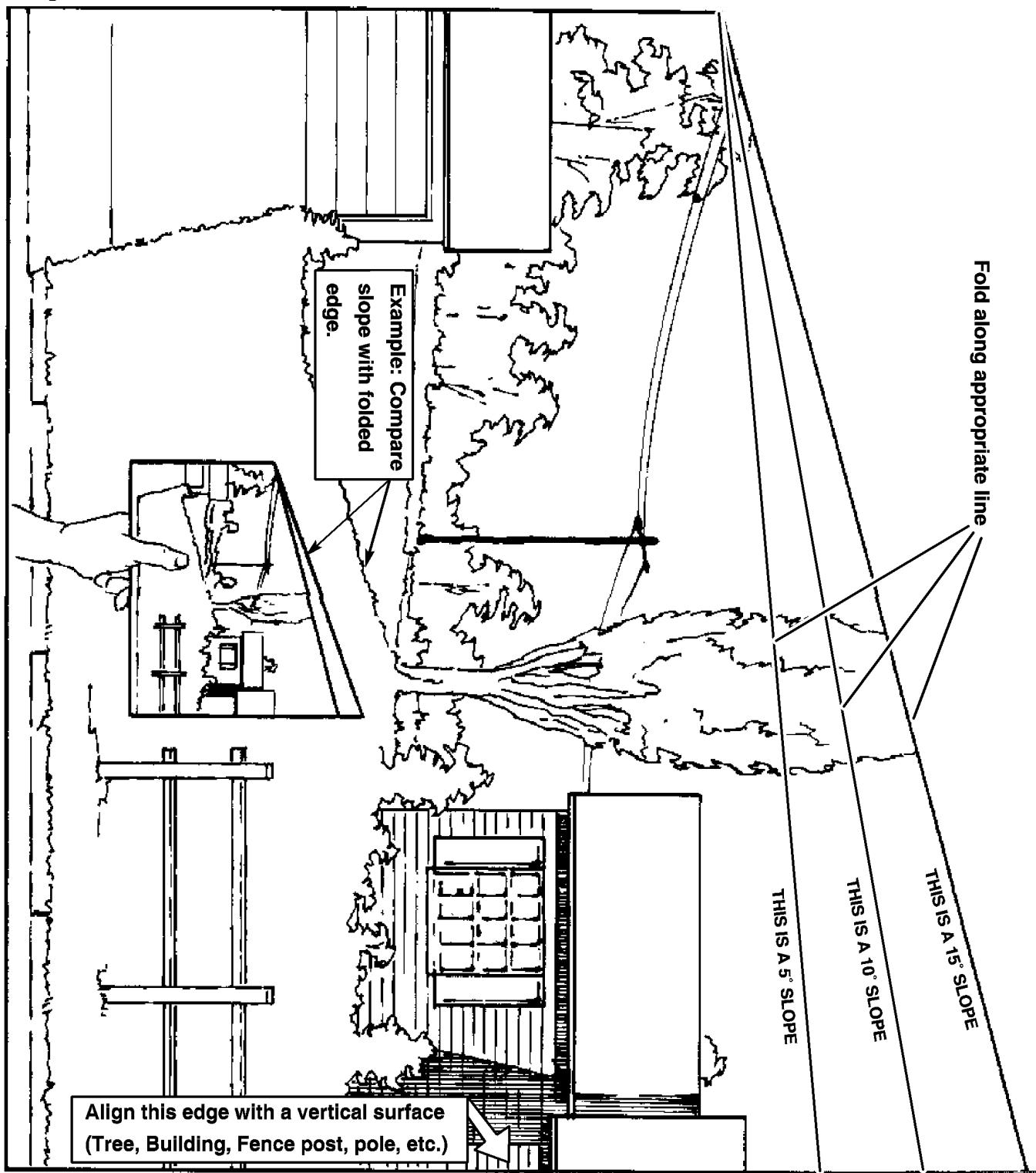
Hand-Arm

This unit does not exceed a hand/arm vibration level of 1.26 m/s², based on measurements of identical machines per EN 1033.

Whole Body

This unit does not exceed a whole body vibration level of 0.06 m/s², based on measurements of identical machines per EN 1032.

Slope Chart



Safety and Instructional Decals



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



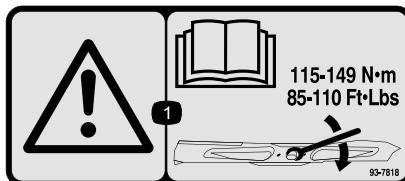
58-6520

1. Grease



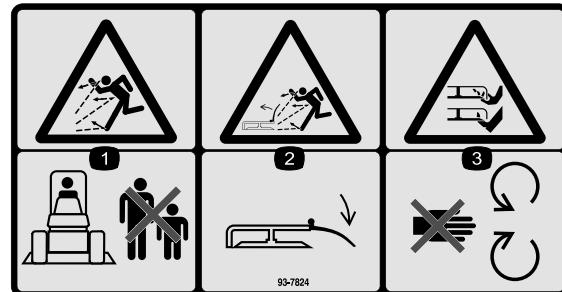
93-7010

1. Throw object hazard—
2. Throw object hazard, mower—keep the deflector in place.
3. Cutting/dismemberment of hand or foot—stay away from moving parts.



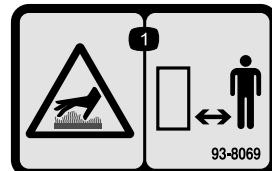
93-7818

1. Warning—read the *Operator's Manual* for instructions on torquing the blade bolt/nut to 115-149 N·m (85-110 ft-lb).



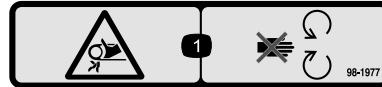
93-7824

1. Thrown object hazard—stay a safe distance from the machine.
2. Thrown object hazard, mower—keep the deflector in place.
3. Cutting/dismemberment of hand or foot—stay away from moving parts.



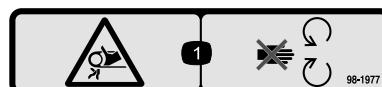
93-8069

1. Hot surface/burn hazard—stay a safe distance from the hot surface.



98-1977

1. Entanglement hazard, belt—stay away from moving parts.



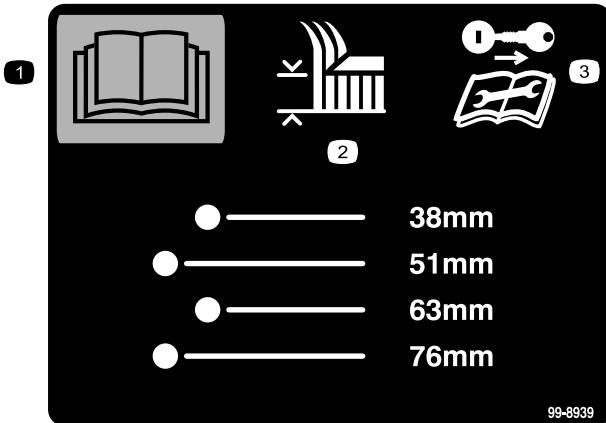
98-1977

1. Entanglement hazard, belt—stay away from moving parts.



98-4387

1. Warning—wear hearing protection.



99-8939

1. Read the *Operator's Manual*.
2. Height of cut
3. Remove the ignition key and read the instructions before servicing or performing maintenance.

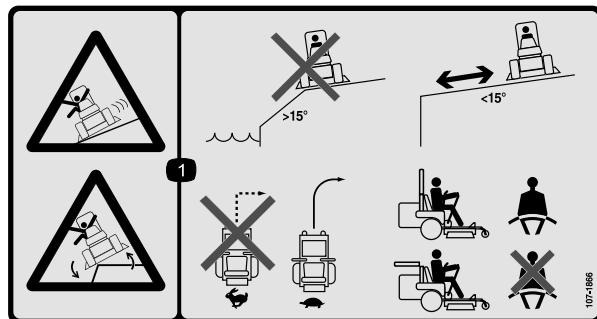


103-1636



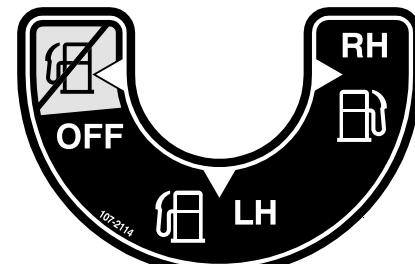
DEX-COOL is a registered trademark of General Motors Corp. 104-2449

104-2449



107-1866

1. Sliding and loss of control hazard and tipping hazard, drop-offs—do not operate the machine near drop-offs, slopes greater than 15 degrees, or water; keep a safe distance from drop-offs; do not turn sharply while traveling fast, instead, slow down and turn gradually; if the roll bar is raised, wear the seat belt; if the roll bar is lowered, do not wear the seat belt.



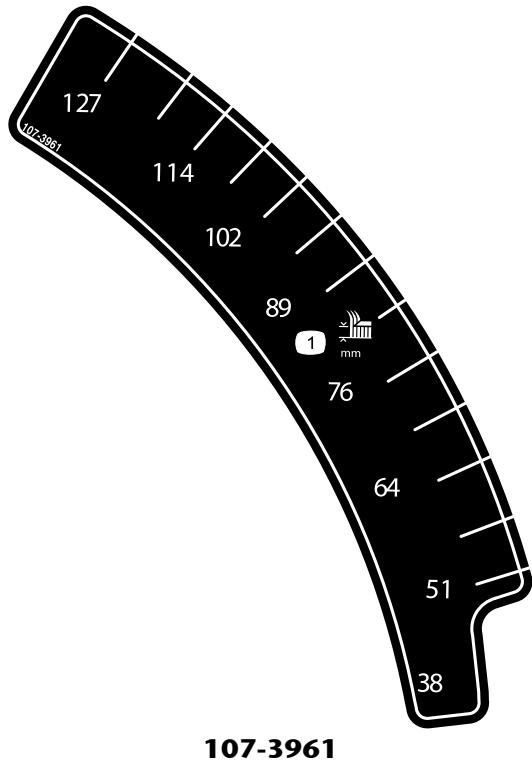
107-2114



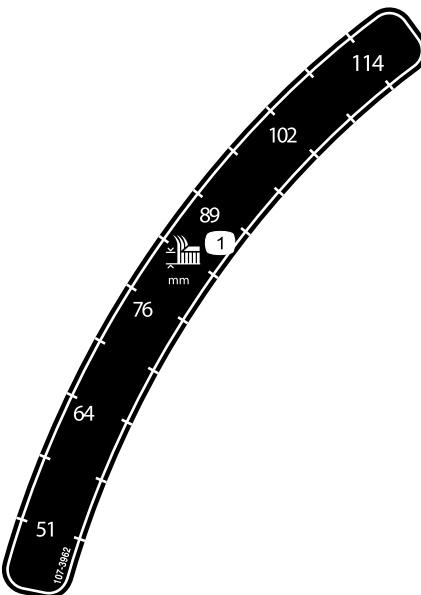
1. Hydraulic oil level 2. Warning—do not touch the hot surface.



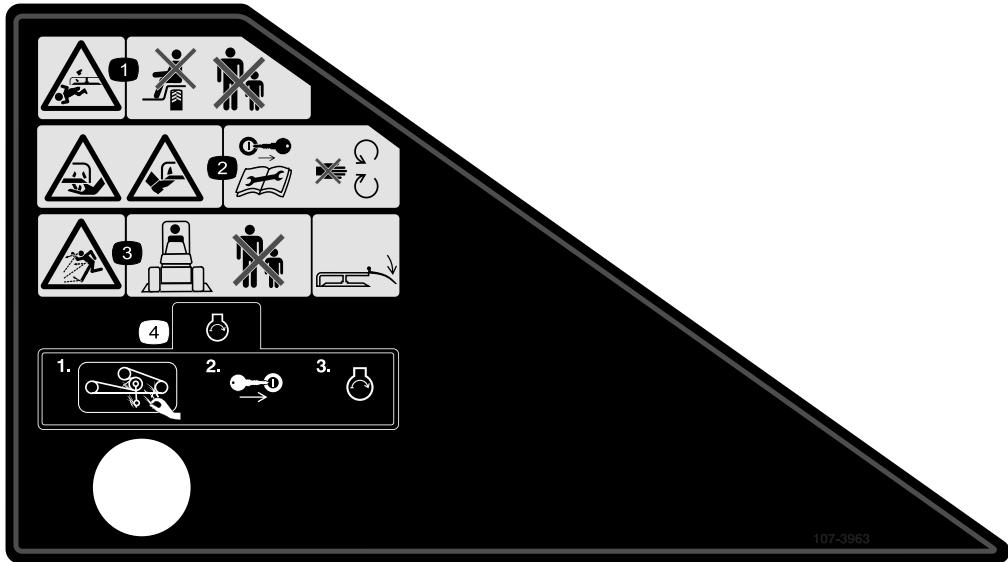
1. Warning—there is no rollover protection when the roll bar is down.
 2. To avoid injury or death from a rollover accident, keep the roll bar in the raised and locked position and wear the seat belt. Lower the roll bar only when absolutely necessary; do not wear the seat belt when the roll bar is down.
 3. Read the *Operator's Manual*; drive slowly and carefully.



1. Height of cut in millimeters

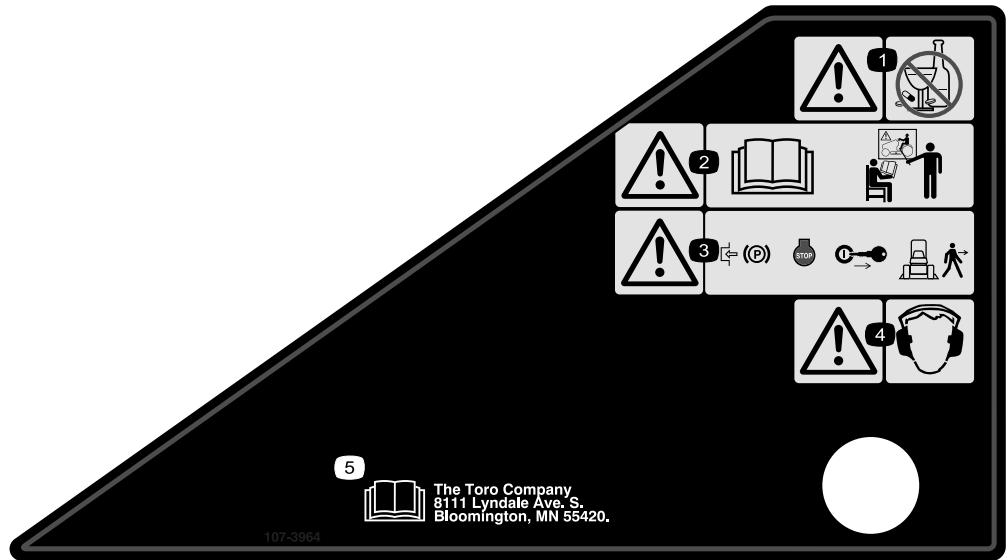


1. Height of cut in millimeters



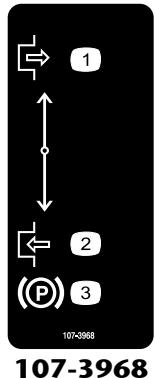
107-3963

1. Cutting/dismemberment hazard, mower blade—do not carry passengers and keep bystanders away.
2. Cutting/dismemberment hazard of hand or foot, mower blade—remove the ignition key and read the instructions before servicing or performing maintenance; stay away from moving parts.
3. Thrown object hazard—keep bystanders a safe distance from the machine and keep the deflector in place.
4. Before starting the engine, clean grass and debris from the mower belt and pulleys, insert the ignition key, and start the engine.



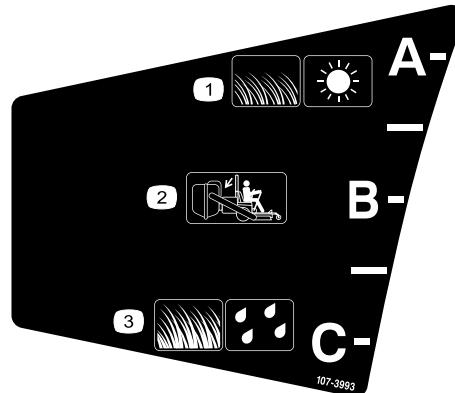
107-3964

1. Warning—do not use drugs or alcohol.
2. Warning—read the *Operator's Manual* and receive training.
3. Warning—engage the parking brake, stop the engine, and remove the ignition key before leaving the machine.
4. Warning—wear hearing protection.
5. Read the *Operator's Manual*.

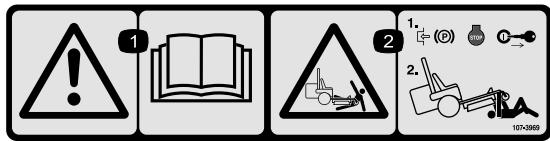


1. Disengage
2. Engage

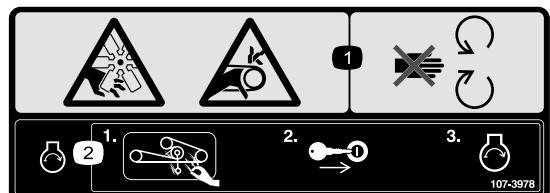
3. Parking brake



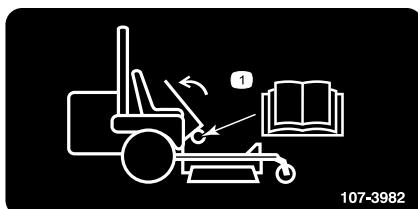
1. Short, sparse grass and dry conditions.
2. Bagging
3. Long, thick grass and wet conditions.



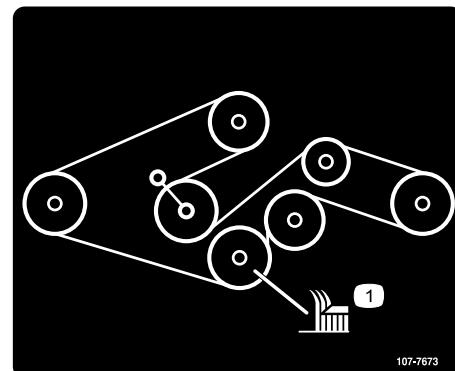
1. Warning—read the *Operator's Manual*.
2. Crushing hazard, mower—engage the parking brake, stop the engine, and remove the ignition key before working under the mower.



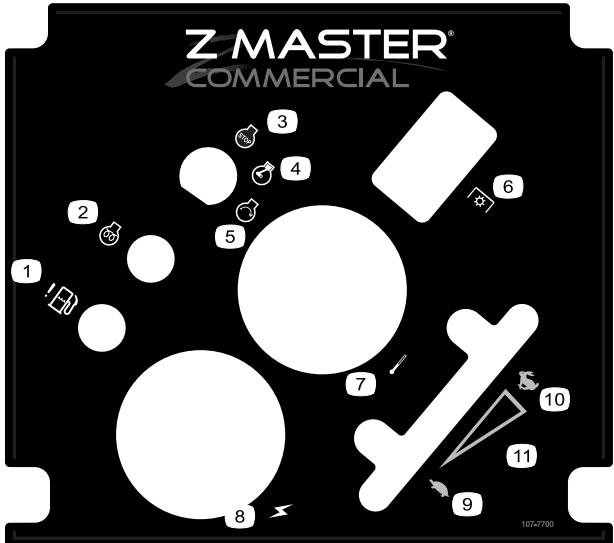
1. Cutting/dismemberment hazard, fan and entanglement hazard, belt—stay away from moving parts.
2. Before starting the engine, clean grass and debris from the mower belt and pulleys, insert the ignition key, and start the engine.



1. *Operator's Manual* location

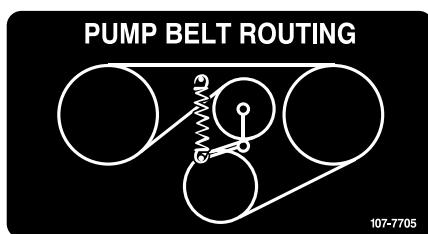


1. Cutting blade

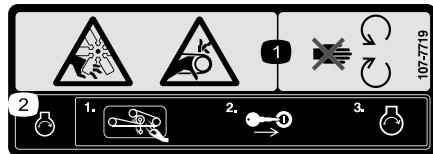


107-7700

1. Water in fuel warning	7. Temperature
2. Engine—preheat	8. Power (Volts)
3. Engine—stop	9. Slow
4. Engine—run	10. Fast
5. Engine—start	11. Continuous variable setting
6. Power take-off (PTO)	

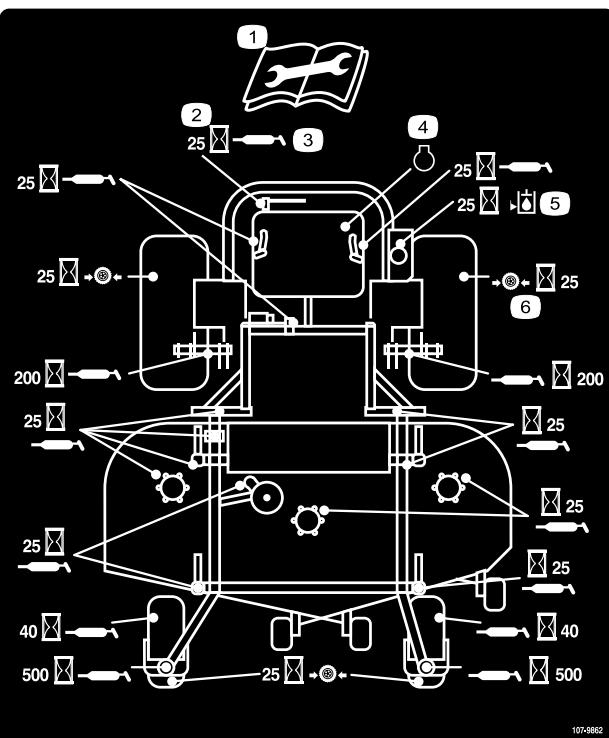


107-7705

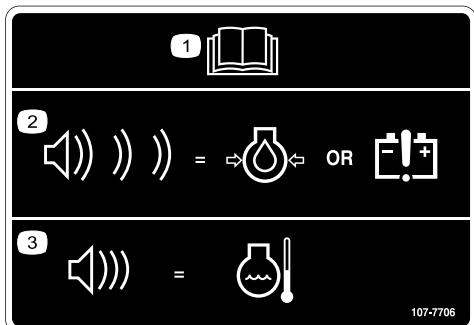


107-7719

1. Cutting/dismemberment hazard, fan and entanglement hazard, belt—stay away from moving parts.
2. Before starting the engine, clean grass and debris from the mower belt and pulleys, insert the ignition key, and start the engine.

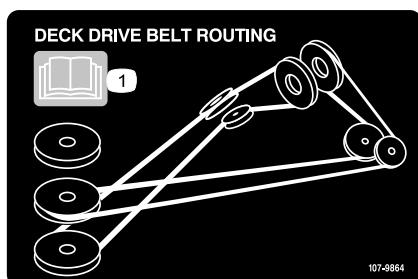


107-9862



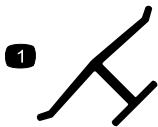
107-7706

1. Read the *Operator's Manual*.
2. Pulsing tone indicates low oil pressure or alternator not charging.
3. Continuous tone indicates that the engine is overheating.



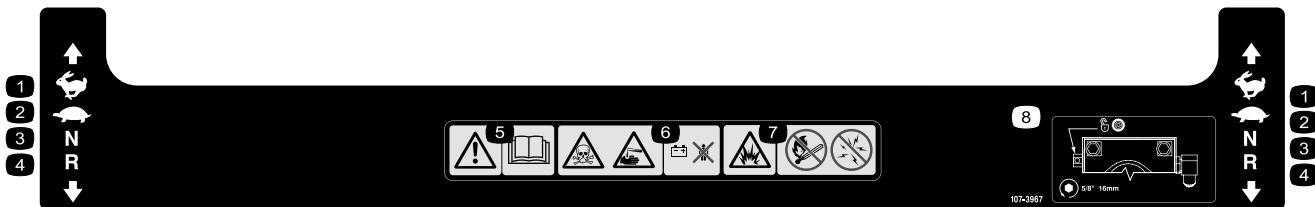
107-9864

1. Read the *Operator's Manual*.



Manufacturer's Mark

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



107-3967

1. Fast	3. Neutral	5. Warning—read the <i>Operator's Manual</i> .	7. Explosion hazard—no fire, open flames, or smoking; avoid sparks.
2. Slow	4. Reverse	6. Poison and caustic liquid/chemical burn hazard—keep children a safe distance from the battery.	8. To unlock the traction drive, turn the by-pass valve 1 complete revolution counterclockwise using a 5/8 inch or 16 mm wrench

Product Overview

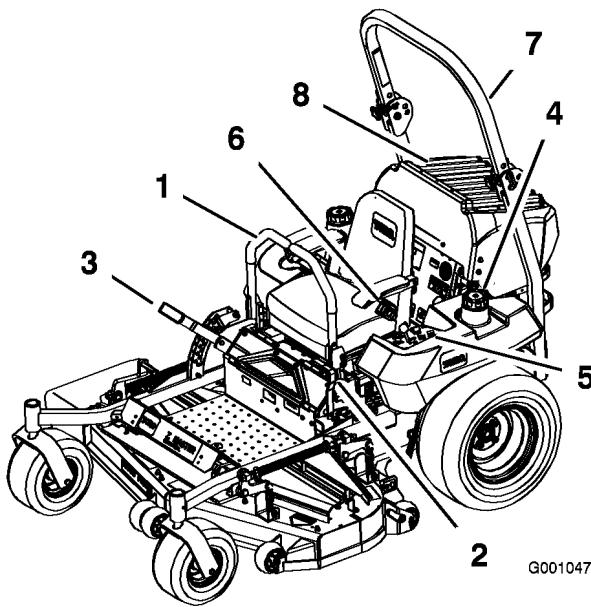


Figure 3

1. Motion control lever	5. Controls
2. Parking brake lever	6. Seat belt
3. Height-of-cut lever	7. Roll bar
4. Fuel cap (both sides)	8. Engine screen

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Controls

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

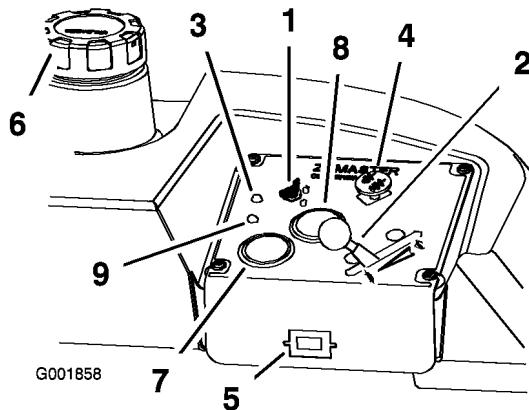


Figure 4

1. Ignition switch	6. Fuel cap
2. Throttle control	7. Volt meter
3. Glow plug light	8. Engine Temperature gauge
4. Power take off (PTO) Switch	9. Water in fuel light
5. Hour meter	

Hour Meter

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

Glow Plug Light (Orange Light)

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

Water in Fuel Light (Red Light)

The water in fuel light turns on when there is water in the fuel. When the indicator light turns off, the engine is ready to be started (Figure 4).

Temperature Gauge

The temperature gauge registers the temperature of the coolant in the cooling system (Figure 4).

Audible Alarm

This machine has an audible alarm that alerts the user to turn off the engine or engine damage can occur from over heating. Refer to Servicing the Cooling System in Cooling System Maintenance, page 45.

Volt Meter

The volt meter registers the output of the charging system (Figure 4).

Operation

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

Adding Fuel

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

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

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

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

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

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



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

- Fill the fuel tank outdoors, in an open area, when the engine is cold. Wipe up any fuel that spills.
- Never fill the fuel tank inside an enclosed trailer.
- Do not fill the fuel tank completely full. Add fuel to the fuel tank until the level is 1/4 to 1/2 inch (6 to 13 mm) below the bottom of the filler neck. This empty space in the tank allows fuel to expand.
- Never smoke when handling fuel, and stay away from an open flame or where fuel fumes may be ignited by a spark.
- Store fuel in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of fuel.
- Always place fuel containers on the ground away from your vehicle before filling.
- Do not fill fuel containers inside a vehicle or on a truck or trailer bed because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove gas-powered equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a fuel dispenser nozzle.
- If a fuel dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

Filling the Fuel Tank

1. Shut the engine off and set the parking brake.

- Clean around each fuel tank cap and remove the cap. Add fuel to both fuel tanks, until the level is 1/4 to 1/2 inch (6 to 13 mm) below the bottom of the filler neck. This space in the tank allows the fuel to expand. Do not fill the fuel tanks completely full.
- Install fuel tank caps securely. Wipe up any fuel that may have spilled.
- If possible, fill the fuel tank after each use. This will minimize possible buildup of condensation inside the fuel tank.

Checking the Engine Oil Level

Before you start the engine and use the machine, check the oil level in the engine crankcase; refer to Checking Oil Level in Engine Maintenance, page 36

Switching the Fuel Tanks

Important: Do not run the machine out of fuel.

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

The unit has two fuel tanks. One tank is on the left side and one on the right side. Each tank connects to the fuel selector valve. From there a common fuel line leads to the engine (Figure 5).

To use the left side fuel tank rotate the fuel selector valve to the LH, lefthand location. To use the right side fuel tank rotate the fuel selector valve to the RH, righthand location (Figure 5)

Close the fuel selector valve before transporting or storing machine.

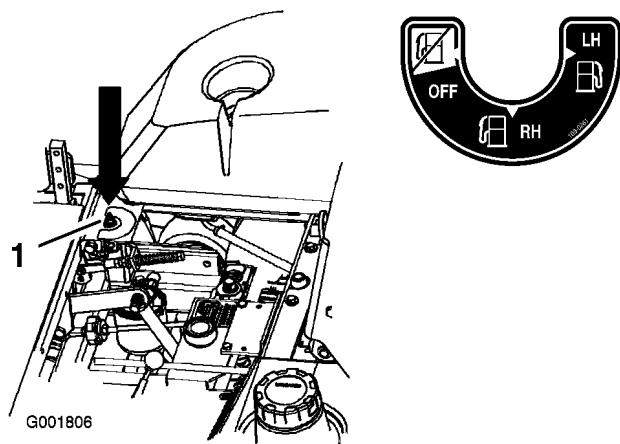


Figure 5

1. Left side fuel tank 2. Fuel selector valve

Using the Rollover Protection System (ROPS)



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

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



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

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

Important: Lower the roll bar only when absolutely necessary.

- To lower the roll bar, loosen the front knobs (Figure 8).

2. Remove the hairpin cotter pins and remove the two pins (Figure 7).
3. Lower the the roll bar to the down position. There are two down positions. See Figure 6 for the positions.
4. Install the two pins and secure them with the hairpin cotter pins (Figure 7).

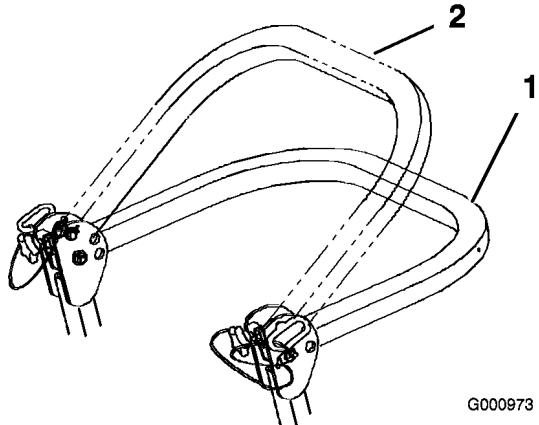


Figure 6

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

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

5. To raise the roll bar, remove the hairpin cotter pins and remove the two pins (Figure 7).
6. Raise the roll bar to the upright position and install the two pins and secure them with the hairpin cotter pins (Figure 7).

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

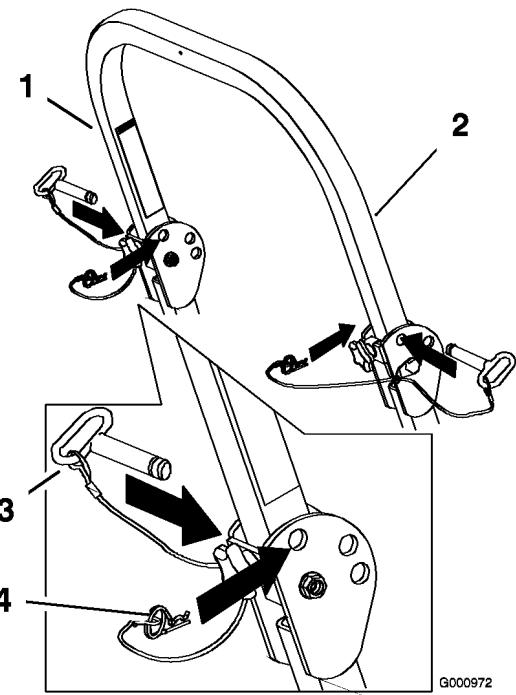


Figure 7

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

Important: Tighten the front knobs against the center roll bar ends (Figure 8).

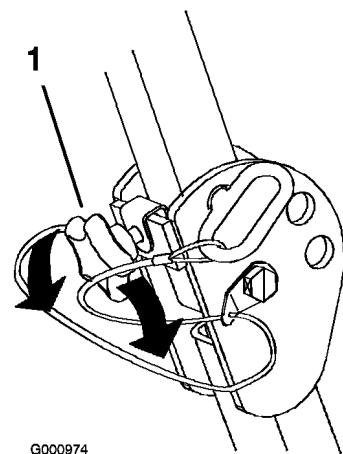


Figure 8

1. Front handle

Think Safety First

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



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

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

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

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

Read and follow the rollover protection instructions and warnings.

To avoid loss of control and possibility of rollover:

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

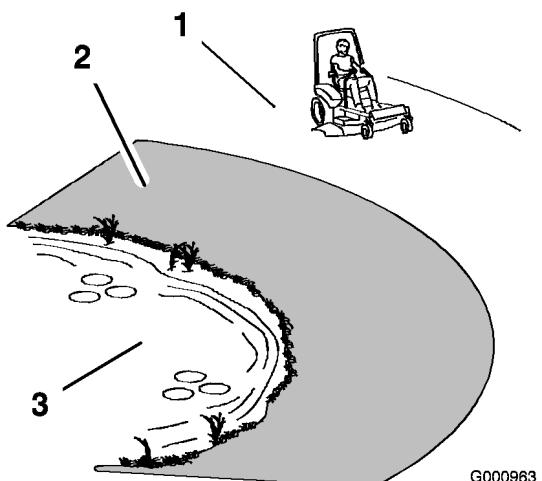


Figure 9

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



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

Wear hearing protection when operating this machine.

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

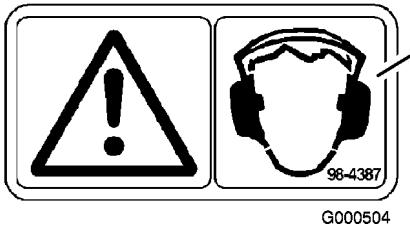


Figure 10

1. Warning— wear hearing protection

Understanding the Audible Alarms

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

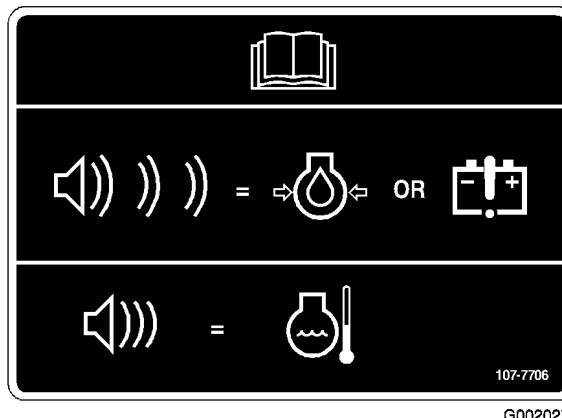


Figure 11

Continuous Audible Alarm

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

Pulsing Audible Alarm

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

Operating the Parking Brake

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

Setting the Parking Brake

1. Move the motion control levers (Figure 16) out to the neutral lock position.
2. Pull up and back on the parking brake lever to set the parking brake (Figure 12). The parking brake lever should stay firmly in the engaged position.



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

Do not park on slopes unless wheels are chocked or blocked

Releasing the Parking Brake

Push forward and down on the parking brake lever to release the parking brake (Figure 12). The parking brake is disengaged and the lever will rest against the brake stop.

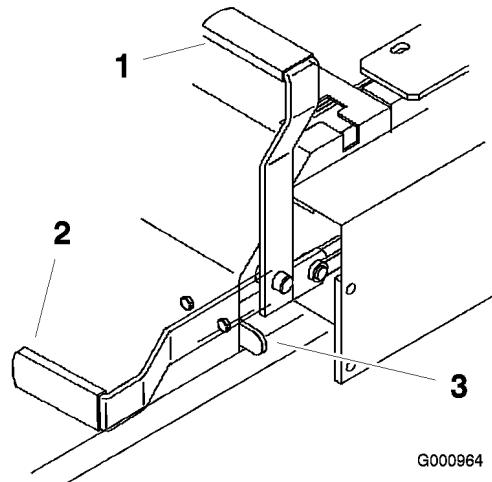


Figure 12

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

Starting and Stopping the Engine

Starting the Engine in Normal Weather

1. Raise the ROPS up and lock into place, sit on the seat and fasten the seat belt.
2. Move the motion controls to the neutral locked position.
3. Set the parking brake; refer to Setting the Parking Brake.
4. Move the PTO (power take off) switch to the off position.
5. Move the throttle lever to the middle position (Figure 14).
6. Turn the ignition key clockwise to the run position (Figure 13). The glow plug light will turn on.
7. After the glow plug indicator light goes out, turn the key to the start position. When the engine starts release the key.

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

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

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

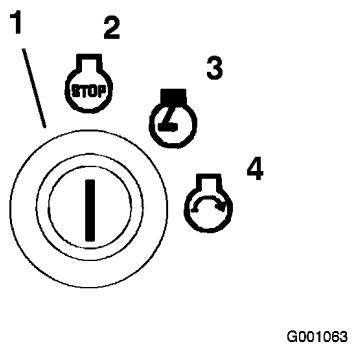


Figure 13

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

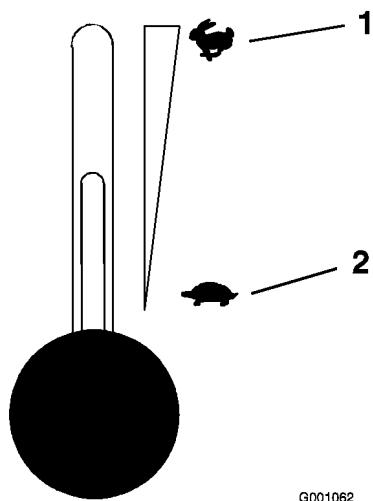


Figure 14

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

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

Use the correct engine oil for the starting temperature. Refer to Servicing the Engine Oil in Engine Maintenance, page 36.

1. Start the engine with the throttle in the **Fast** position.

2. Turn the ignition key clockwise to the **run** position (Figure 13). The glow plug light will turn on.
3. After the glow plug indicator light goes out, turn the key to the **start** position. When the engine starts release the key.

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

Stopping the Engine

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake (Figure 15).
2. Move the throttle lever midway between the slow and fast positions (Figure 14).
3. Let the engine idle for 60 seconds.
4. Turn the ignition key to the **off** position (Figure 13). Wait for all moving parts to stop before leaving the operating position.
5. Remove the key to prevent possibility of someone accidentally starting the machine before transporting or storing machine.
6. Close the fuel selector valve before transporting or storing the machine.

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

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



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

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

Operating the Power Take Off (PTO)

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

Engaging the PTO

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

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

4. Pull out on the power take off (PTO) switch to engage it (Figure 15).

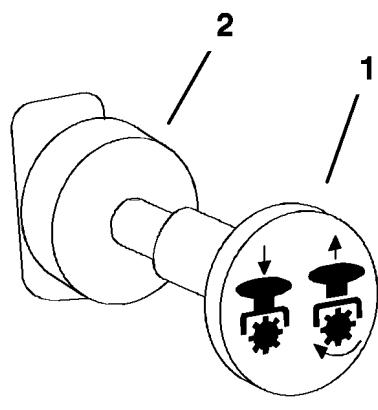


Figure 15

1. PTO-On
2. PTO-Off

Disengaging the PTO

To disengage, push the PTO switch to the **off** position (Figure 15).

The Safety Interlock System



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

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

Understanding the Safety Interlock System

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

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

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

Testing the Safety Interlock System

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

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

PTO and rise slightly from the seat; the engine should stop.

4. Sitting on the seat, engage the parking brake, move the PTO switch to off and move the motion control levers to neutral lock position. Now start the engine. While the engine is running, center either motion control and move (forward or reverse); the engine should stop. Repeat for other motion control.
5. Sitting on the seat, disengage the parking brake, move the PTO switch to off and move the motion control levers to neutral lock position. Try starting the engine; the engine should not crank.

Driving Forward or Backward

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



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

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

Driving Forward

1. Release the parking brake; refer to Releasing the Parking Brake in Operation, page 17.
2. Move the levers to the center, un-locked position.
3. To go forward, slowly push the motion control levers forward (Figure 16).

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

To go straight, apply equal pressure to both motion control levers (Figure 16).

To turn, move the motion control lever toward neutral in the direction you want to turn (Figure 16).

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

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

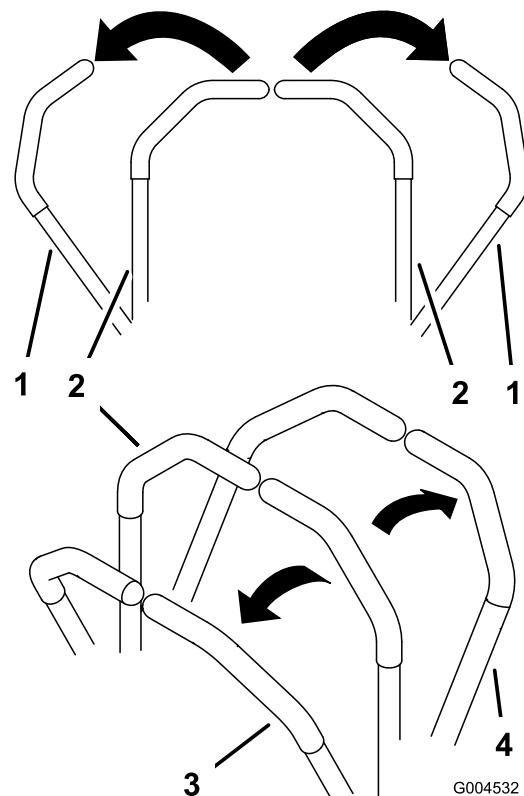


Figure 16

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

Driving Backward

1. Move the levers to the center, un-locked position.
2. To go backward, slowly pull the motion control levers rearward (Figure 16).

To go straight, apply equal pressure to both motion control levers (Figure 16).

To turn, release pressure on the motion control lever toward the direction you want to turn (Figure 16).

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

Stopping the Machine

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

Set the parking brake when you leave the machine; refer to Setting the Parking Brake in Operation, page 17. Remember to remove the key from the ignition switch.



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

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

Adjusting the Control Lever Resistance

The top damper mounting bolt can be adjusted to obtain a desired motion control lever resistance. Refer to Figure 17 for the mounting options.

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

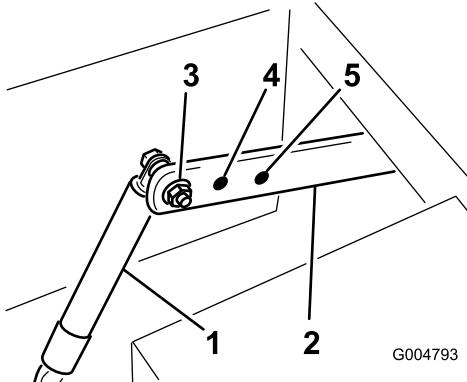


Figure 17

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

Adjusting the Height-of-Cut

The height-of-cut is adjusted from 1-1/2 to 5 inch (38 to 127 mm) in 1/4 inch (6 mm) increments

by relocating the clevis pin into different hole locations.

1. Raise the height-of-cut lever to the transport position (also the 5 inch (127 mm) cutting height position) (Figure 18).
2. To adjust, remove the clevis pin from the height-of-cut bracket (Figure 18).
3. Select a hole in the height-of-cut bracket corresponding to the height-of-cut desired and, insert the clevis pin (Figure 18).
4. Move the lever to the selected height.

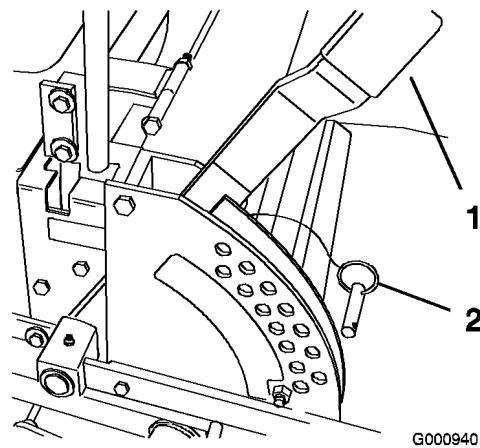


Figure 18

1. Height of cut lever 2. Clevis Pin

Using the Lift Assist Lever

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

1. Place your foot onto lift assist lever.
2. Press on the lift assist lever while pulling up on the height-of-cut lever (Figure 19).

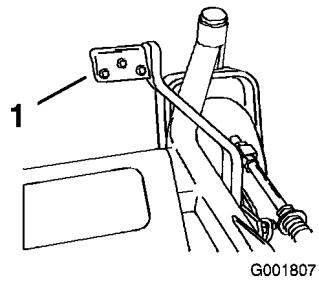


Figure 19

1. Lift Assist Lever

Adjusting the Anti-Scalp Rollers

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. After adjusting the height-of-cut, adjust the rollers by removing the flange nut, bushing, spacer, and bolt (Figure 20 , Figure 21 and Figure 22).

Note: The two middle rollers will not have a spacer (Figure 21).

4. Select a hole so the anti-scalp roller is positioned to the nearest corresponding height-of-cut desired.
5. Install the flange nut bushing, spacer, and bolt. Torque to 40-45 ft-lb (54-61 N•m) (Figure 20 , Figure 21 and Figure 22).
6. Repeat this adjustment on the other anti-scalp rollers.

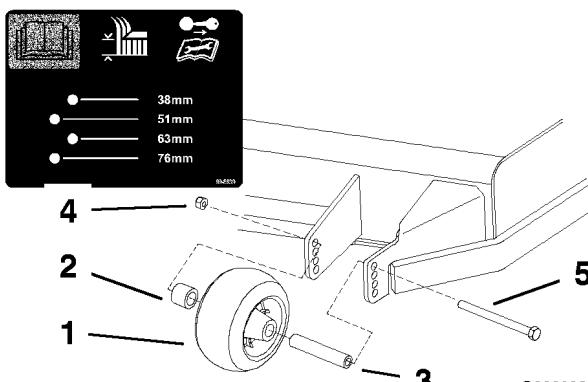


Figure 20

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

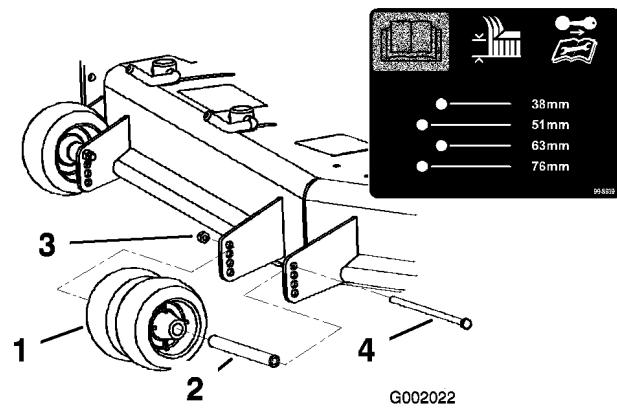


Figure 21

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

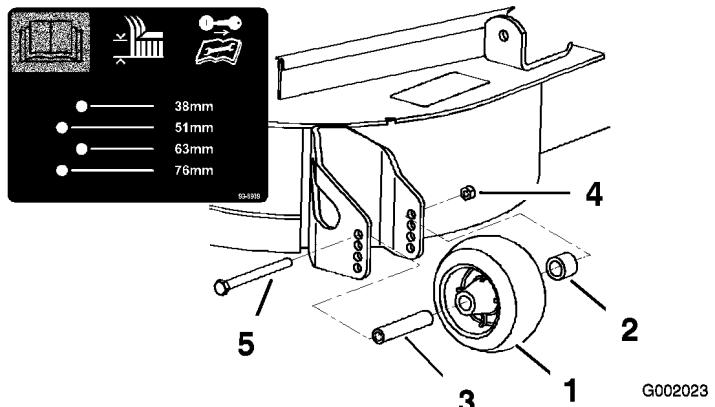


Figure 22

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

Adjusting the Flow Baffle

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. To adjust the cam locks, swing the lever up to loosen the cam lock (Figure 23).
4. Adjust the baffle and cam locks in the slots to the desired discharge flow.

5. Swing the lever back over to tighten the baffle and cam locks (Figure 23).
6. If the cams do not lock the baffle into place or it is too tight, loosen the lever and then rotate the cam lock. Adjust the cam lock until the desired locking pressure is achieved.

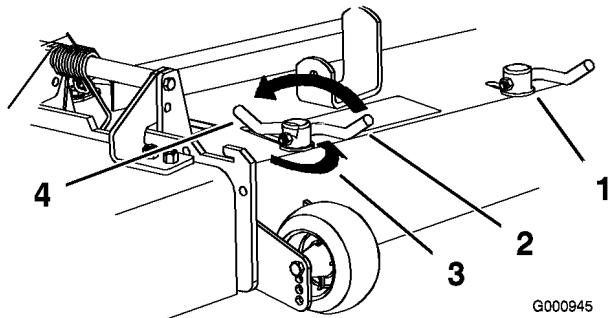


Figure 23

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

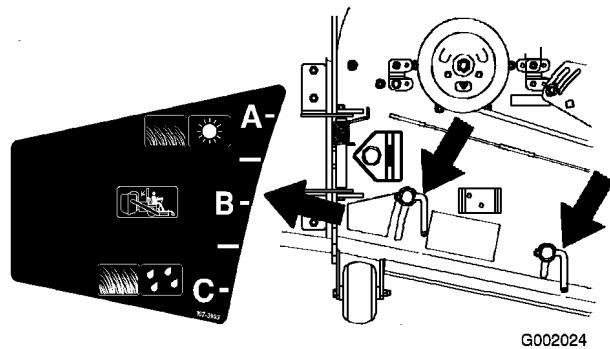


Figure 24

Position B

Use this position when bagging.

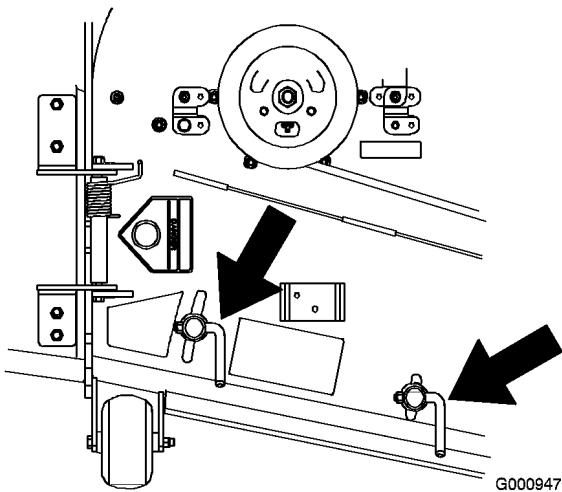


Figure 25

Positioning the Flow Baffle

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

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

Position A

This is the full rear position. The suggested use for this position is as follows (Figure 24).

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

Position C

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

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

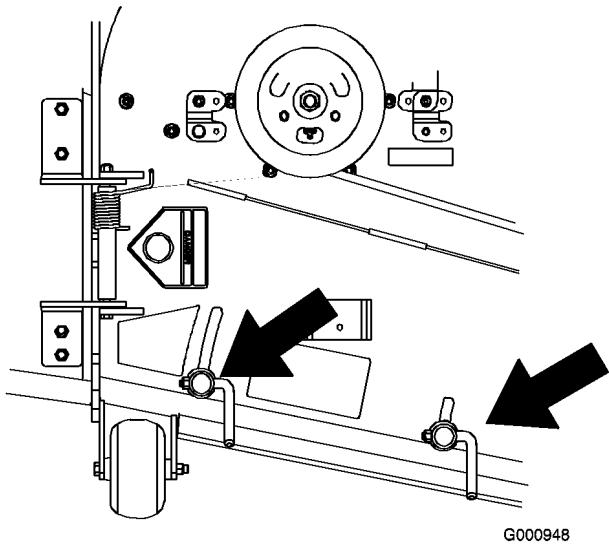


Figure 26

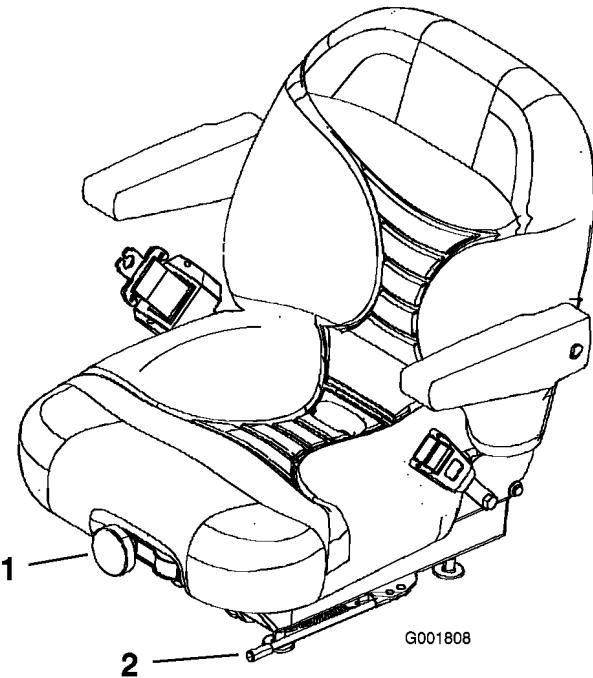


Figure 27

Positioning the Seat

Changing the Seat Position

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

1. To adjust, move the lever sideways to unlock seat (Figure 27).

1. Seat suspension knob
2. Seat position adjustment lever

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

Changing the Seat Suspension

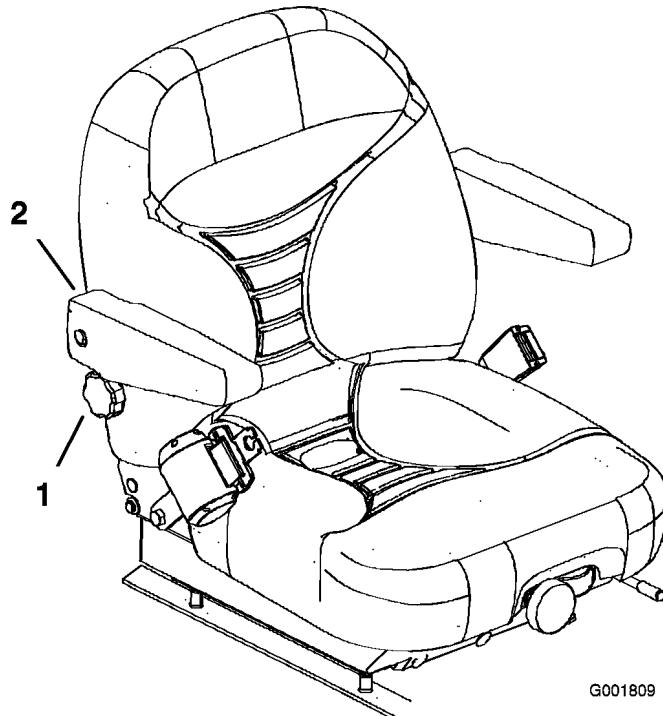
The seat can be adjusted to provide a smooth and comfortable ride. Position the seat where you are most comfortable.

To adjust it, turn the knob in front either direction to provide the best comfort (Figure 27).

Changing the Back Position

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

To adjust it, turn the knob, under the right-side arm rest, in either direction to provide the best comfort (Figure 28).



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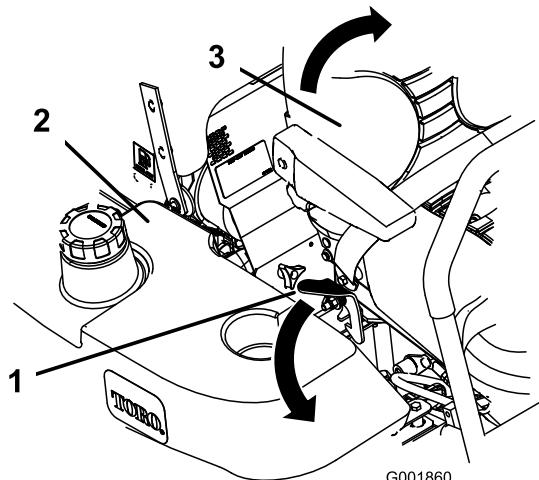
Figure 28

1. Back rest knob

2. Right-side arm rest

Unlatching the Seat

Push the seat latch rearward to unlatch the seat. This will allow access to the machine under the seat (Figure 29).



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Figure 29

1. Seat latch
2. Fuel cap

3. Seat

Pushing the Machine by Hand

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

Pushing the Machine

1. Disengage the power take off (PTO) and turn the ignition key to off. Move the levers to neutral locked position and apply parking brake. Remove the key.
2. Rotate the by-pass valves counterclockwise 1 turn to push. This allows hydraulic fluid to by-pass the pump enabling the wheels to turn (Figure 30).

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

3. Disengage parking brake before pushing.

Changing to Machine Operation

Rotate the by-pass valves clockwise 1 turn to operate machine (Figure 30).

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

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

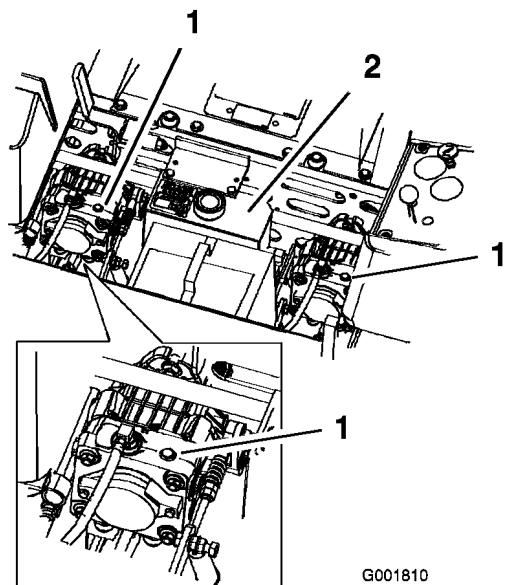


Figure 30

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

Using the Side Discharge

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



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

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



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

Do not drive machine on a public street or roadway.

Loading Machines

Use extreme caution when loading units on trailers or trucks. One full width ramp that is wide enough to extend beyond the rear tires is recommended instead of individual ramps for each side of the unit (Figure 31). The lower rear section of the tractor frame extends back between the rear wheels and serves as a stop for tipping backward. Having a full width ramp provides a surface for the frame members to contact if the unit starts to tip backward. If it is not possible to use one full width ramp, use enough individual ramps to simulate a full width continuous ramp.

The ramp should be long enough so that the angles do not exceed 15 degrees (Figure 31). A steeper angle may cause mower components to get caught as the unit moves from ramp to trailer or truck. Steeper angles may also cause the unit to tip backward. If loading on or near a slope, position the trailer or truck so it is on the down side of the slope and the ramp extends up the slope. This will minimize the ramp angle. The trailer or truck should be as level as possible.

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

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

Transporting Machines

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

To transport the machine:

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



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

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

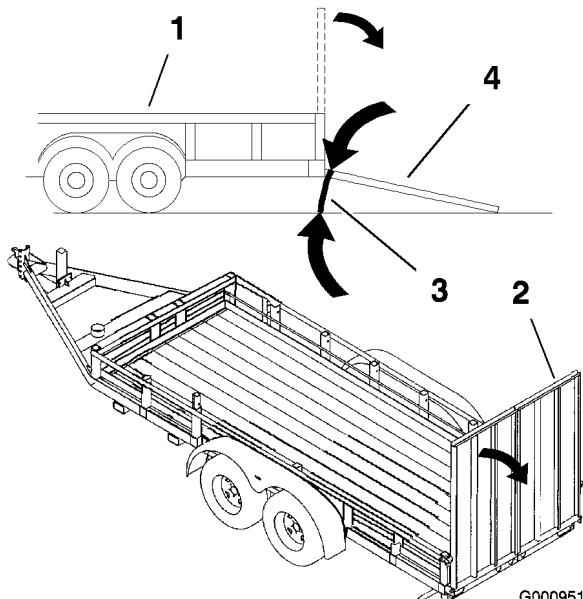


Figure 31

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

Using the Z Stand®

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



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

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

Driving up onto the Z Stand

Important: Use the Z Stand on a level surface.

1. Raise the mower to the transport position.
2. Remove the bracket pin (Figure 32).

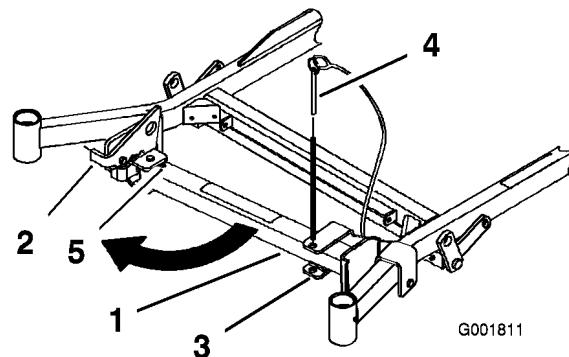


Figure 32

1. Z Stand	4. Bracket Pin
2. Latch	5. Bottom of slot
3. Bracket	

3. Raise the latch. Swing the stand foot out front and slide stand toward machine, into the bottom of slot (Figure 32 and Figure 33).

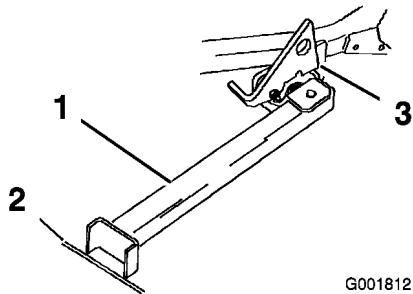


Figure 33

G001812

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

4. Set the foot of stand on the ground and rest the latch on the pivot tab (Figure 33).
5. Start the engine and put it at half throttle.

Note: For best results, place the foot of stand into seams in sidewalks or into the turf (Figure 33).

6. Drive onto the stand. Stop when the latch drops over the tab into the locked position (Figure 33). Once onto the stand, engage the parking brake and turn off the engine.
7. Chock or block the drive wheels.



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

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

8. Perform the maintenance.

Driving off the Z Stand

1. Remove the chocks or blocks.
2. Raise the latch to the unlocked position (Figure 34).

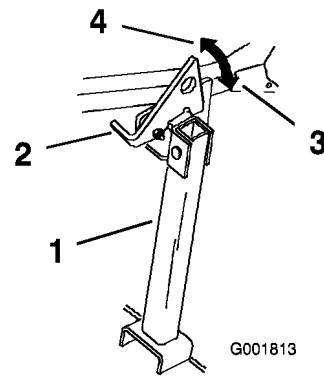


Figure 34

G001813

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

3. Start the engine and place it at half throttle. Disengage the parking brake.
4. Slowly drive backwards off of the stand.
5. Return the stand to its rest position (Figure 32).

Operating Tips

Fast Throttle Setting

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

Cutting a Lawn for the First Time

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

Cut 1/3 of the Grass Blade

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

Mowing Direction

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

Mow at Correct Intervals

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

Cutting Speed

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

Avoid Cutting Too Low

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

Long Grass

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

When Stopping

If the machine's forward motion must be stopped while mowing, a clump of grass clippings may drop onto your lawn. To avoid this, move onto a previously cut area with the blades engaged.

Keep the Underside of the Mower Clean

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

Blade Maintenance

Maintain a sharp blade throughout the cutting season because a sharp blade cuts cleanly without

tearing or shredding the grass blades. Tearing and shredding turns grass brown at the edges, which slows growth and increases the chance of disease. Check the cutter blades daily for sharpness, and for any wear or damage. File down any nicks and sharpen the blades as necessary. If a blade is damaged or worn, replace it immediately with a genuine TORO replacement blade.

Maintenance

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 8 operating hours	<ul style="list-style-type: none">Check cooling system level.Check the hydraulic fluid.
After the first 25 operating hours	<ul style="list-style-type: none">Change the hydraulic filter and oil.
After the first 50 operating hours	<ul style="list-style-type: none">Change the engine oil.Change the engine oil filter.
Before each use or daily	<ul style="list-style-type: none">Test the safety system.Check the engine oil.Check cooling system level.Clean the cooling system.Check the mower blades.Clean the mower deck.
Every 25 hours	<ul style="list-style-type: none">Grease the mower deck and spindles.Grease the mower belt idler arm.Grease the pump belt idler arm.Grease the drive belt idler arm.Grease the brake lever.Check the hydraulic fluid.
Every 50 hours	<ul style="list-style-type: none">Check the tire pressure.Check the pump drive belt.Check the alternator belt.
Every 100 hours	<ul style="list-style-type: none">Change the engine oil.Check the cooling system hoses.Inspect the belts for cracks and wear.Check the hydraulic hoses.
Every 150 hours	<ul style="list-style-type: none">Lubricate the machine with light oil (Refer to Lubrication).
Every 200 hours	<ul style="list-style-type: none">Replace the primary air filter.Change the engine oil filter.Grease the brake pivot.
Every 500 hours	<ul style="list-style-type: none">Check the wheel hub slotted nut.Adjust the caster pivot bearing.Replace the fan hydraulic filter.
Every 600 hours	<ul style="list-style-type: none">Replace the safety air filter.
Every 800 hours	<ul style="list-style-type: none">Replace the fuel filter.
Yearly	<ul style="list-style-type: none">Grease the front caster pivots (more often in dirty or dusty conditions).Change the engine coolant.Change the hydraulic filter and oil.

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



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

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

Lubrication

Greasing and Lubrication

Lubricate the machine when shown on the Check Service Reference Aid decal (Figure 35). Grease more frequently when operating conditions are extremely dusty or sandy.

Grease Type: General-purpose grease.

How to Grease

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

Greasing the Front Caster Pivots

Lubricate the front caster pivots once a year.

1. Remove the dust cap and adjust the caster pivots. Keep the dust cap off until greasing is done. Refer to Adjusting the Caster Pivot Bearing in Drive System Maintenance, page 43.
2. Remove the hex plug. Thread a grease zerk into the hole.
3. Pump grease into the zerk until it oozes out around the top bearing.
4. Remove the grease zerk in the hole. Install the hex plug and cap.

Where to Add Grease

Lubricate the grease fittings as shown on the Check Service Reference Aid decal (Figure 35).

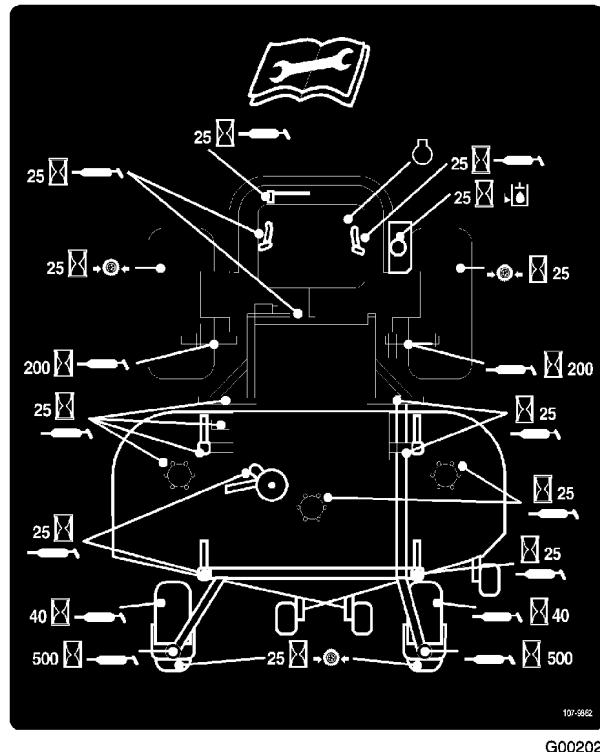


Figure 35

Greasing the Mower Deck and Belt Idlers

The mower deck must be lubricated weekly or every 25 hours. Grease with No. 2 general purpose lithium base or molybdenum base grease.

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

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

2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the screws and belt covers.
4. Grease the three spindle bearings under the pulleys until grease comes out the lower seals (Figure 36).
5. Grease the idler arm on the mower deck (Figure 36).
6. Grease the fittings on the push arms (Figure 36).

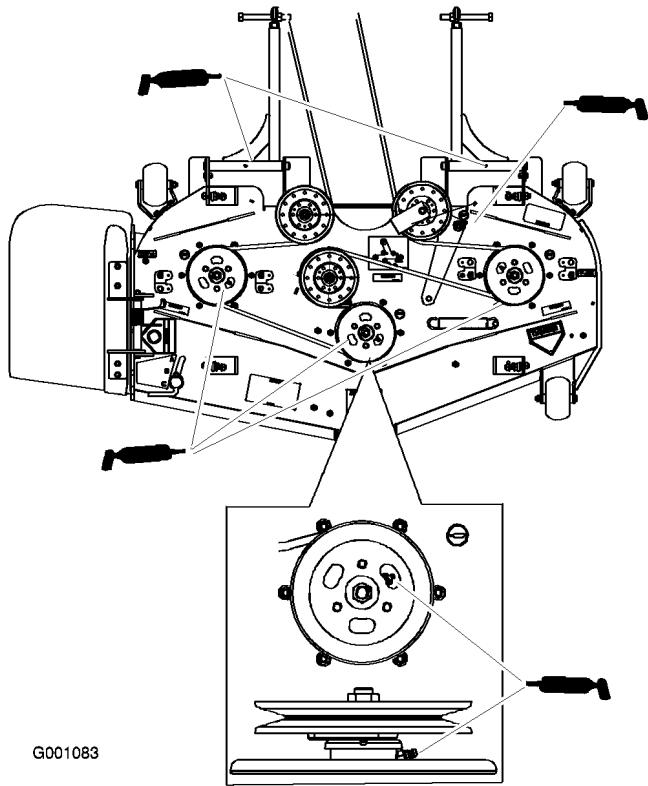


Figure 36

Where to Add Light Oil or Spray Lubrication

Lubricate the machine in the following areas with spray type lubricant or light oil. Lubricate every 150 hours.

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

Grease the Idler Arms

1. Grease the cooling fan belt idler arm (Figure 37).
2. Grease the drive belt idler arms (Figure 37).

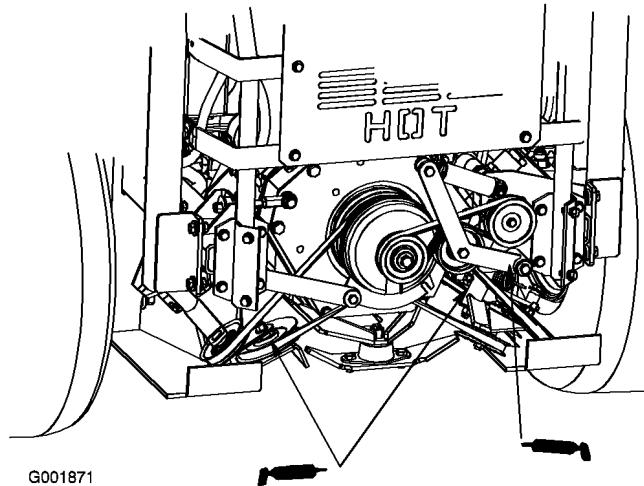


Figure 37

1. Left adjustable pulley 2. Back of the machine

3. Grease the pump belt idler arm.

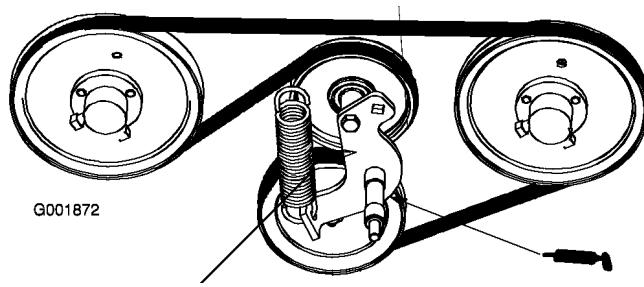


Figure 38

Engine Maintenance

Servicing the Air Cleaner

Primary Filter: Check and/or replace after every 200 operating hours or more often in dusty conditions.

Safety Filter: Replace after every 600 operating hours.

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

Removing the Filters

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Tilt the seat forward and remove the front engine panel (Figure 39).

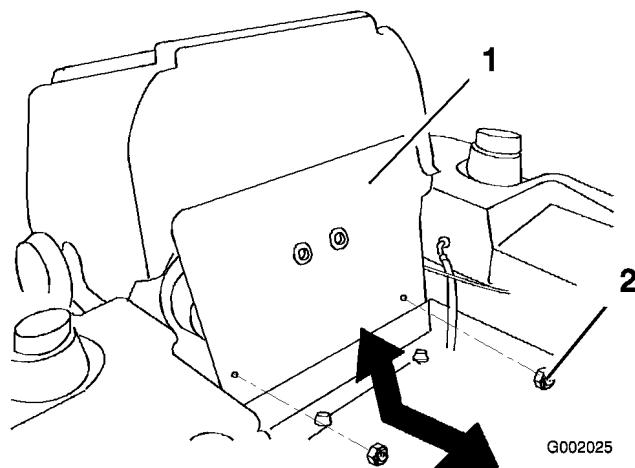


Figure 39

1. Front engine panel 2. Nut

4. Release the latches on the air cleaner and pull the air cleaner cover off of the air cleaner body (Figure 40).
5. Clean the inside of the air cleaner cover with compressed air.
6. Gently slide the primary filter out of the air cleaner body (Figure 40). Avoid knocking the filter into the side of the body.
7. Remove the safety filter only if you intend to replace it.

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

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

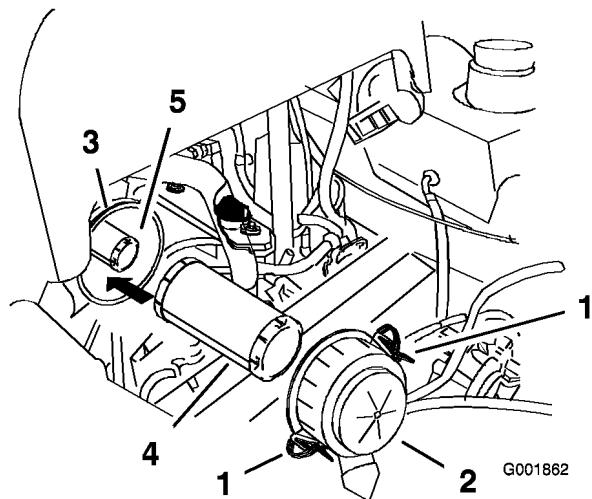


Figure 40

1. Latches
2. Air cleaner cover
3. Air filter body

4. Primary filter
5. Safety filter

Servicing the Primary Filter

1. Do not clean the paper filter. Replace it after 200 operating hours (Figure 40).
2. Inspect the element for tears, an oily film, or damage to the rubber seal.
3. Replace the paper element if it is damaged.

Servicing the Safety Filter

Do not clean the safety filter. Replace it after 600 operating hours.

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

Installing the Filters

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

1. If installing new filters, check each filter for shipping damage. Do not use a damaged filter.
2. If the safety filter is being replaced, carefully slide it into the filter body (Figure 40).
3. Carefully slide the primary filter over the safety filter (Figure 40). Ensure that it is fully seated by pushing on the outer rim of the filter while installing it.

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

4. Install the air cleaner cover with the side indicated as UP facing up and secure the latches (Figure 40).
5. Install the front engine panel.

Servicing the Engine Oil

Change oil after the first 50 operating hours and then every 150 operating hours thereafter.

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

Crankcase Capacity: 3.5 quarts (3.3 liters)

Viscosity: See the table below.

USE THESE SAE VISCOSITY OILS

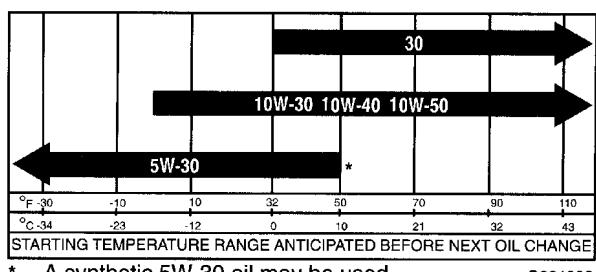


Figure 41

Checking the Engine Oil Level

Note: Check the oil when the engine is cold.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Clean around the oil dipstick (Figure 42) so dirt cannot fall into the filler hole and damage the engine.
4. Pull the oil dipstick out and wipe the metal end clean (Figure 42).
5. Slide the oil dipstick fully into the tube. Pull the dipstick out and look at the metal end (Figure 42). If the oil level is low, slowly pour only enough oil into the fill hole to raise the level to the full mark.

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

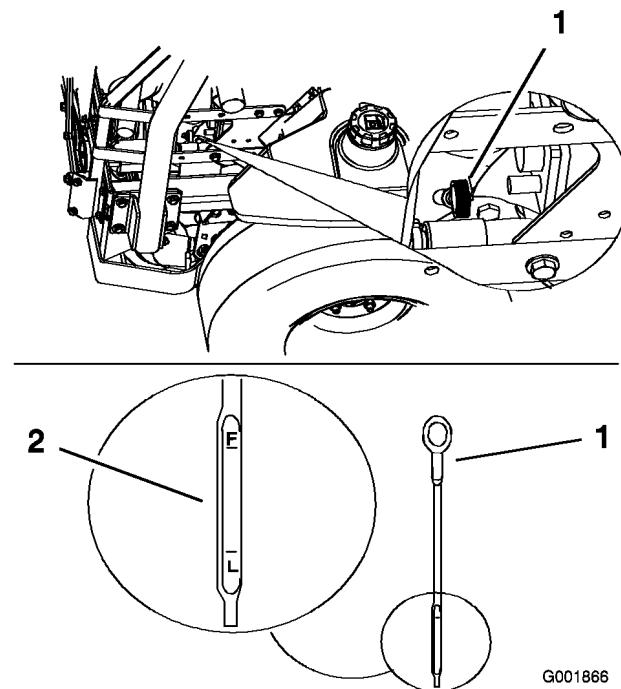


Figure 42

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

Changing the Engine Oil

1. Start the engine and let it run for five minutes. This warms the oil so it drains better.
2. Park the machine on a level surface.
3. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
4. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
5. Place a pan below the oil drain. Remove the drain plug and let the oil drain completely (Figure 46).
6. Remove the oil filler cap from the top of the engine (Figure 44). This will help the oil to drain.
7. Install the drain plug and tighten it to 25-1/2 ft-lb (35 N•m).

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

Adding Engine Oil

1. Tilt the seat forward and remove the front engine panel (Figure 43).

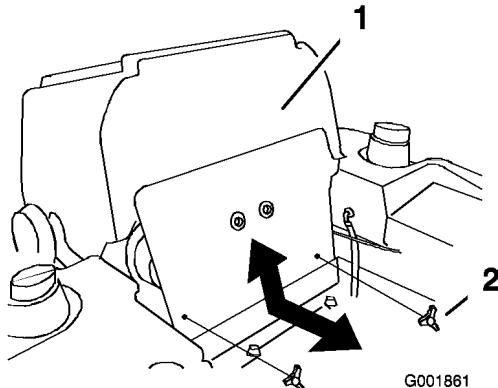


Figure 43

1. Front engine panel 2. Knob

2. Remove the oil filler cap and the dipstick (Figure 44).

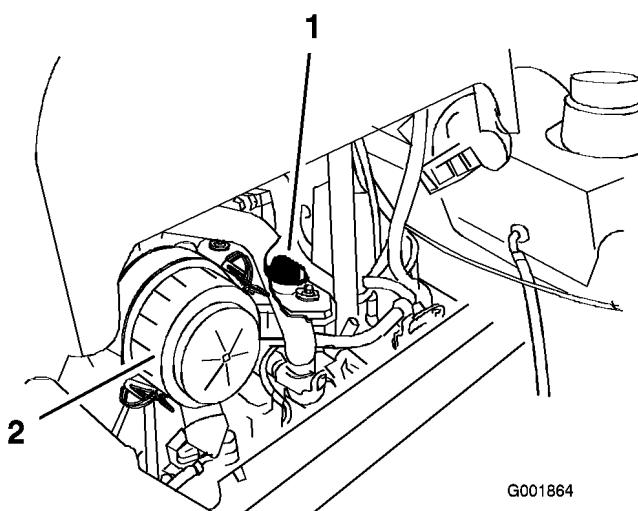


Figure 44

1. Engine 2. Oil fill cap

3. To add oil to the engine, locate and use a hose and funnel for adding oil.
4. Add oil slowly, checking the level with the dipstick frequently until the level reaches the upper hole on the dipstick. For the correct oil type and viscosity to use in different temperature conditions, refer to Servicing the Engine Oil in Engine Maintenance, page 36,).

Important: Add the oil very slowly and do not block the opening of the filler hole (Figure 45). If you add oil too fast or block the hole, the oil could back up and foul the air intakes, causing engine damage.

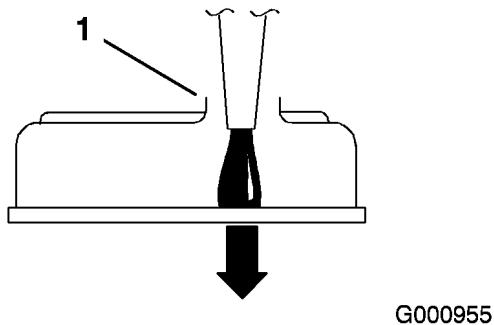


Figure 45

1. Note the clearance left in the filler opening.

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

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

Changing the Engine Oil Filter

Replace the oil filter after the first 50 operating hours and then every 200 operating hours thereafter.

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

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

2. Turn the filter counterclockwise to remove it (Figure 47 and Figure 47).

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

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

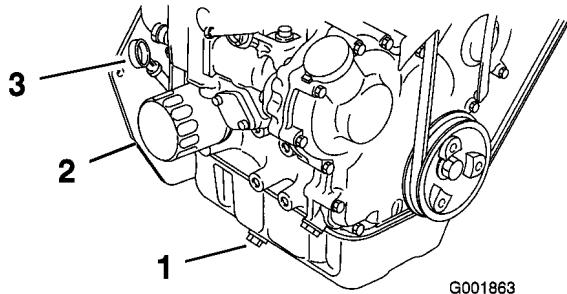


Figure 46

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

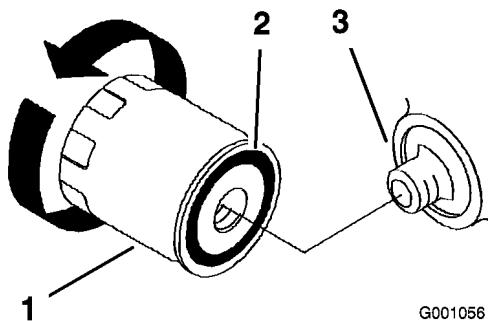


Figure 47

1. Oil filter
2. Gasket
3. Adapter

Fuel System Maintenance

Servicing the Fuel Filter

Draining Water from the Fuel Filter

If the water in fuel light comes on stop the engine and drain the water from the fuel filter.

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

3. Disconnect the negative battery cable; Refer to Removing the Battery.
4. Allow the machine to cool down.
5. Place a drain pan under the fuel filter and loosen the drain plug 1 turn.
6. Let the water drain. If necessary, operate the priming pump to drain water, but only until fuel flows from the filter.
7. Tighten the drain plug when fuel begins to flow.
8. Bleed the air from the fuel line by priming the fuel system; refer to Priming the Fuel System.

Changing the Fuel Filter

Replace the fuel filter after every 800 operating hours or yearly, whichever occurs first.

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

1. Allow the machine to cool down.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Close the fuel shut-off valve.
5. Disconnect the sensor wire.
6. Remove the drain plug and discard the o-ring (Figure 48).
7. Remove the filter.
8. Install a new filter on by hand until the gasket contacts the housing, then tighten an extra 1/3 of a turn (Figure 48).
9. Install the drain plug with a new O-ring and connect the sensor wire.
10. Bleed the air from the fuel line by priming the fuel system, refer to Priming the Fuel System.
11. Open fuel shut-off valve.
12. Start the engine and check for leaks.

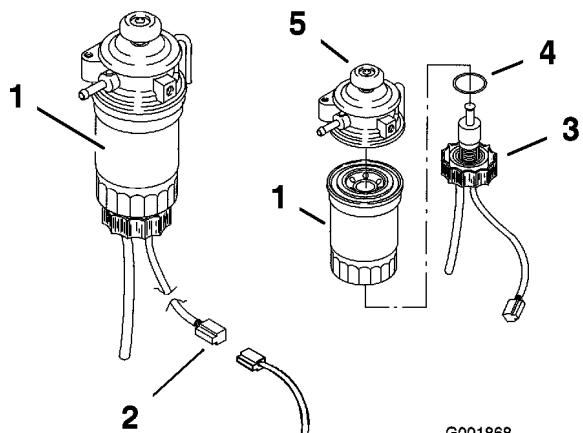


Figure 48

1. Fuel filter
2. Sensor wire
3. Drain plug
4. O-ring
5. Metal primer button

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Priming the Fuel System

The primer pump is the gold metal button on top of the fuel filter (Figure 49).

To bleed air from the fuel system, push down on the primer pump until resistance becomes firm. This should take about 10-15 pushes on the primer pump.

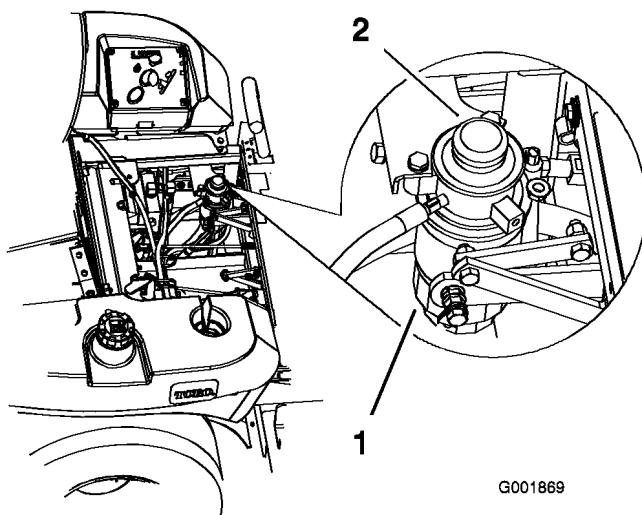


Figure 49

1. Fuel filter
2. Gold metal primer pump

Electrical System Maintenance

Servicing the Battery

Warning

CALIFORNIA Proposition 65 Warning

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



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

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

Removing the Battery



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

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

Servicing the Fuel Tank

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



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

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Unlatch the seat and tilt the seat up.
4. First disconnect the negative battery cable from the negative (-) battery terminal (Figure 50).
5. Slide the red terminal boot off the positive (red) battery terminal. Then remove the positive (red) battery cable (Figure 50).

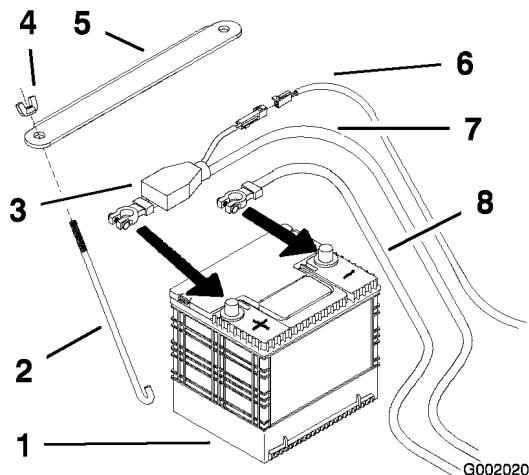


Figure 50

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

6. Remove the battery.

Installing the Battery

1. Position battery in the tray with the terminal posts opposite from the hydraulic tank (Figure 50).
2. First, install the positive (red) battery cable to positive (+) battery terminal.
3. Then install the negative battery cable and ground wire to the negative (-) battery terminal.
4. Secure the cables with 2 bolts (1/4 x 3/4 inch), 2 washers (1/4 inch), and 2 locknuts (1/4 inch) (Figure 50).
5. Slide the red terminal boot onto the positive (red) battery post.
6. Secure the battery with J-bolts, hold down clamp, 2 washers (1/4 inch), and 2 wing nuts (1/4 inch) (Figure 50).

Charging the Battery



Charging the battery produces gasses that can explode.

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

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

1. Make sure the filler caps are installed in battery. Charge battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 10 amps.
2. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Figure 51).
3. Install the battery in the machine and connect the battery cables, refer to Installing the Battery.

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

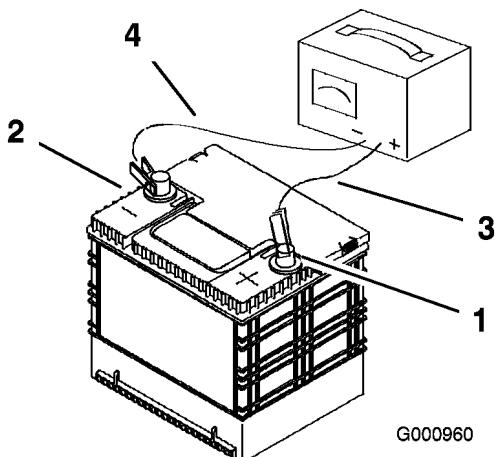


Figure 51

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

Servicing the Fuses

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

Fuse: Main/Ignition -20 amp, blade-type

Glow plug/Alternator -40 amp, blade-type

1. To gain access to the main fuse, unlatch the seat and tilt the seat forward. To gain access to the fan and alternator fuses, raise the seat and tilt the engine cover forward.
2. To replace a fuse, pull out on the fuse to remove it (Figure 52).

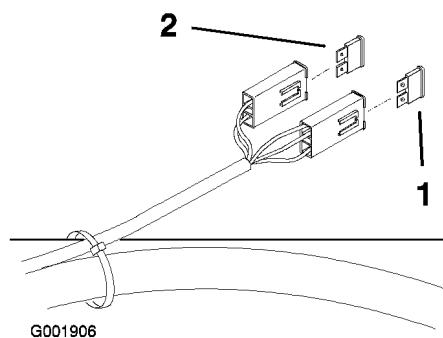


Figure 52

1. Glow plug/Alternator-40 amp 2. Main/Ignition-20 amp

Drive System Maintenance

Adjusting the Tracking

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

Important: Adjust the handle neutral and hydraulic pump neutral before adjusting the tracking. Refer to Adjusting the Handle Neutral in Controls System Maintenance, page 50 and Adjusting the Hydraulic Pump Neutral in Hydraulic System Maintenance, page 51.

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

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

4. To make the machine go right, turn the knob towards the rightside of the machine. Refer to Figure 53.
5. To make the machine go left, turn the knob towards the leftside of the machine. Refer to Figure 53.
6. Repeat adjustment until the tracking is correct.

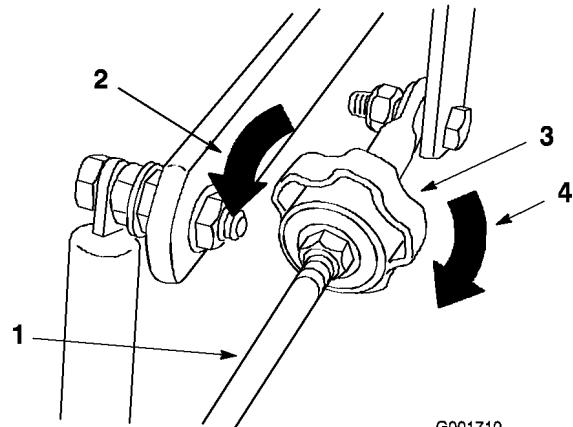


Figure 53

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

Checking the Tire Pressure

Check the pressure at the valve stem after every 50 operating hours or monthly, whichever occurs first (Figure 54).

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

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

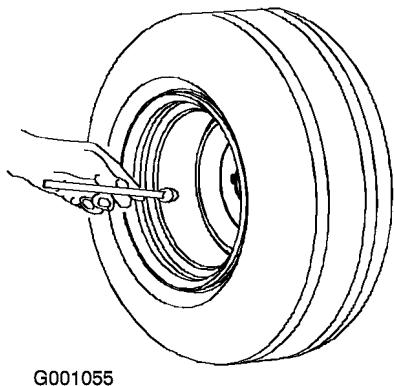


Figure 54

Checking the Wheel Hub Slotted Nut

Check after every 500 operating hours.

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the cotter pin.
4. Torque the slotted nut to 125 ft-lb (170 N•m) (Figure 55).
5. Check the distance from bottom of slot in nut to inside edge of hole. Two threads or less should be showing (Figure 55).
6. If more than two threads are showing remove nut and install washer between hub and nut.

7. Torque the slotted nut to 125 ft-lb. (170 N•m) (Figure 55).
8. Tighten the nut until the next set of slots line up with the hole in the shaft (Figure 55).
9. Replace the cotter pin.

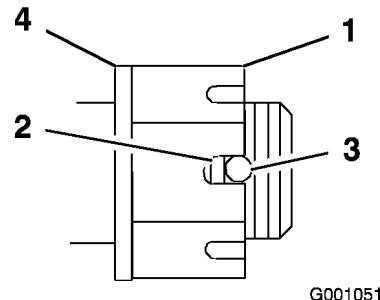


Figure 55

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

Adjusting the Caster Pivot Bearing

Check after every 500 operating hours or at storage, whichever comes first.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the dust cap from caster and tighten lock nut (Figure 56).
4. Tighten the locknut until the spring washers are flat and then back off a 1/4 turn to properly set the pre-load on the bearings (Figure 56).

Important: Make sure spring washers are installed correctly as shown in Figure 56.

5. Install the dust cap (Figure 56).

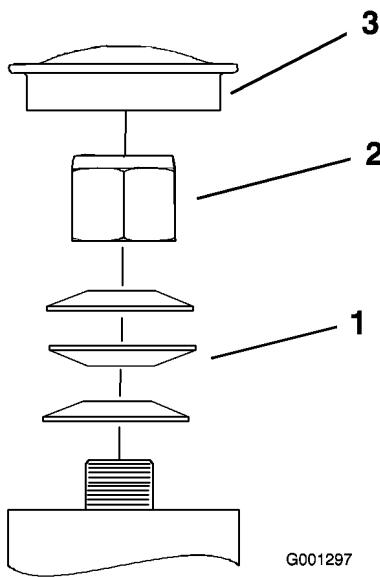


Figure 56

1. Spring Washers
2. Lock Nut

G001297

3

2

1



Rotating shaft and fan can cause personal injury.

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



Swallowing engine coolant can cause poisoning.

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

Cooling System Maintenance

Servicing the Cooling System



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

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

Checking the Radiator Coolant

Check the cooling system level daily.

Check the cooling system hoses every 100 hours.

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

Cooling System Capacity: 128 ounces (3.8 l)

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

1. Position the machine on a level surface, stop the engine, and set the parking brake.
2. Unlatch the seat and tilt the seat up.
3. With the engine cool, check the overflow bottle level. The fluid needs to be up to the bump on the outside of the overflow bottle (Figure 57).
4. If the coolant level is low, add a 50/50 mix of extended life antifreeze/Dex-Cool® and water to the overflow bottle (Figure 57).
5. Add the 50/50 coolant mix to the overflow bottle and fill it to the indicator line on the bottle (Figure 57).

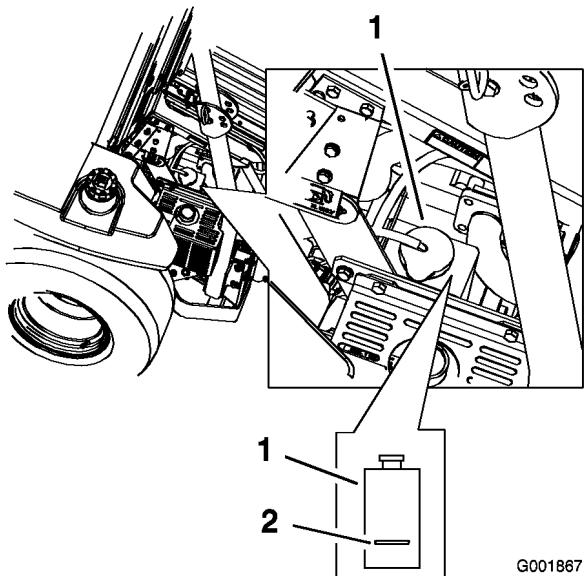


Figure 57

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

Cleaning the Cooling System

Clean the cooling system daily before each use.

1. Position the machine on a level surface, stop the engine, and set the parking brake.
2. Unlatch the seat, tilt the seat up and raise the rubber flap above the drive belt compartment.
3. Remove debris from the drive belt compartment and hydraulic pumps.
4. Remove debris from the screen on the engine cover.
5. Tilt the engine cover forward.
6. Remove debris from the radiator core and engine.

Important: Do not damage the radiator cooling fins.

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

Changing the Engine Coolant

Change the engine coolant every year.

Contact an Authorized Service Dealer for changing the coolant.

Brake Maintenance

Adjusting the Parking Brake

1. Disengage the brake lever (lever down).
2. Measure the length of the spring. The measurement should be 2-3/4 inch (70 mm) between the washers (Figure 58).
3. If an adjustment is necessary, loosen the jam nut below the spring and tighten the nut directly below the yoke (Figure 58). Turn the nut until the correct measurement is obtained. Tighten the two nuts together and repeat on the opposite side of the unit.
4. Turn the nuts clockwise to shorten the spring length and counterclockwise to lengthen the spring.
5. Engage the parking brake, lever up.
6. Measure the distance between the spring bracket and the adjusting nut under spring bracket. The measurement should be 1/4-5/16 inch (5-8 mm) (Figure 58).
7. If an adjustment is necessary, loosen the jam nut directly above the trunion roller. Turn the lock nut below the trunion roller until the correct measurement is obtained (Figure 58).
8. Tighten the jam nut directly above the trunion roller (Figure 58).

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

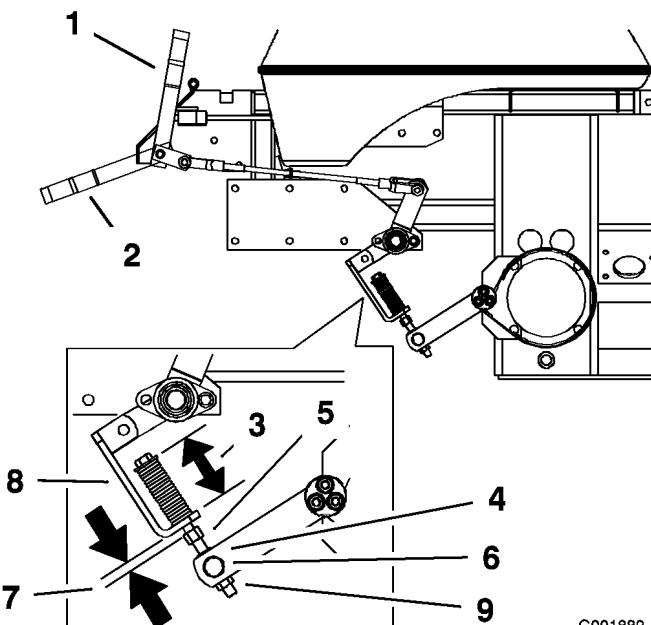


Figure 58

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

Belt Maintenance

Inspecting the Belts

Inspect all belts every 100 hours.

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

Replacing the Mower Belt

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the screws and belt covers (Figure 59).

4. Pull on the spring loaded idler arm to loosen the belt tension.
5. Remove the mower belt from the mower pulleys and the top pulley of the three stacked pulleys (Figure 59 and Figure 60).
6. Install the new belt around the mower pulleys and the top pulley of the three stacked pulleys (Figure 59 and Figure 60).
7. Pull on the spring loaded idler arm to loosen the belt tension and align the mower belt onto the idler pulley (Figure 60).
8. Install the belt covers with the tabs in the slots. Install the screws and close the latches (Figure 59).

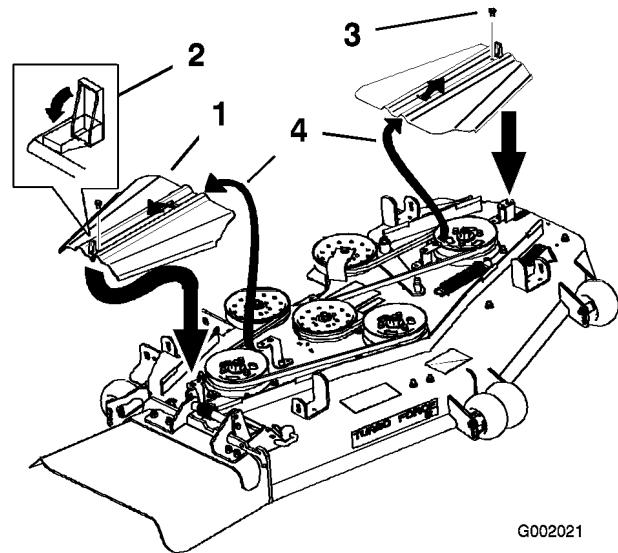


Figure 59

1. Belt cover
 2. Latch
 3. Screw
 4. Install tab into the slot

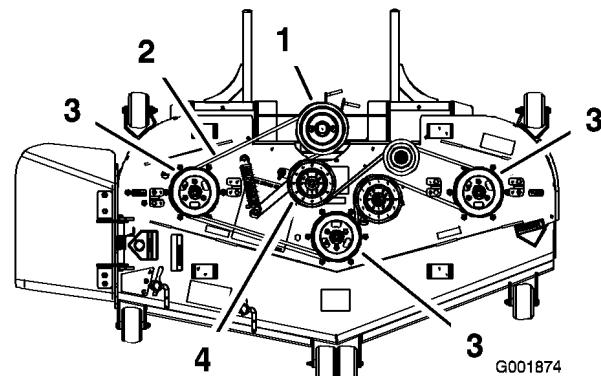


Figure 60

1. Belt cover
 2. Latch

Replacing the Drive Belts

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

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the rear engine panel (Figure 61).

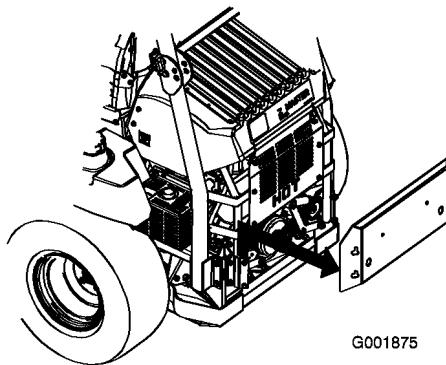


Figure 61

1. Rear engine panel

4. Pull on the spring loaded idler pulley to loosen the belt tension (Figure 62).
5. Remove the mower belt from the top pulley of the three stacked pulleys (Figure 60 and Figure 62).
6. Remove the worn drive belt.
7. Install the new drive belt around the clutch pulley, the adjustable idler pulleys, the spring loaded idler pulley, and the front three stacked pulleys (Figure 62).
8. Adjust the belt tension; refer to Adjusting the Drive Belts.
9. Install the mower belt around the mower pulleys and the top pulley of the three stacked pulleys (Figure 60 and Figure 62).

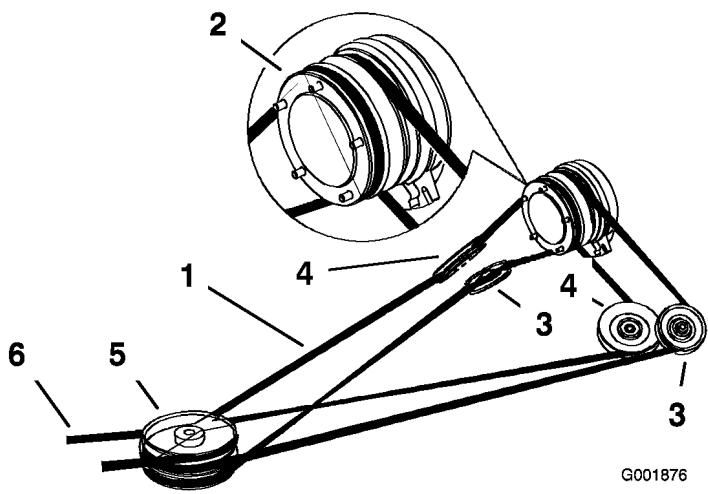


Figure 62

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

Adjusting the Drive Belts

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

Note: Measure only the spring coils.

3. Measure the length of the spring. Check to make sure the coils of the spring on the spring-loaded idler pulley measures as listed below (Figure 63 and Figure 64).
 - Left spring measurement: $5\frac{3}{4} \pm 1\frac{1}{8}$ inch (14.6 ± 0.3 cm) (Figure 63).
 - Right spring measurement: $5\frac{1}{2} \pm 1\frac{1}{8}$ inch (14.0 ± 0.3 cm) (Figure 63).
4. If the spring does not have the correct measurement, loosen the nut holding the adjustable idler pulley so it can move up and down in the slot (Figure 64).
5. Relieve the pressure on the spring-loaded idler pulley (Figure 64).
6. Position the adjustable pulley lower in the slot and tighten the nut (Figure 64).

7. Check to make sure the coils of the spring on the spring-loaded idler pulley have the correct measurement (Figure 63).
8. Repeat as necessary on the opposite side of the machine.

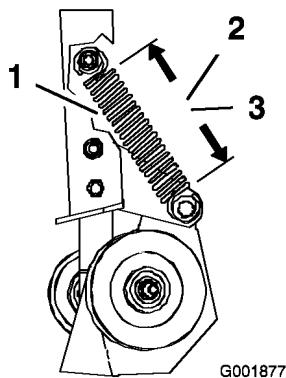


Figure 63

1. Spring/Spring coils	3. Right spring measurement-5-1/2 ± 1/8 inch (14.0± 0.3 cm)
2. Left spring measurement-5-3/4± 1/8 inch (14.6± 0.3 cm)	

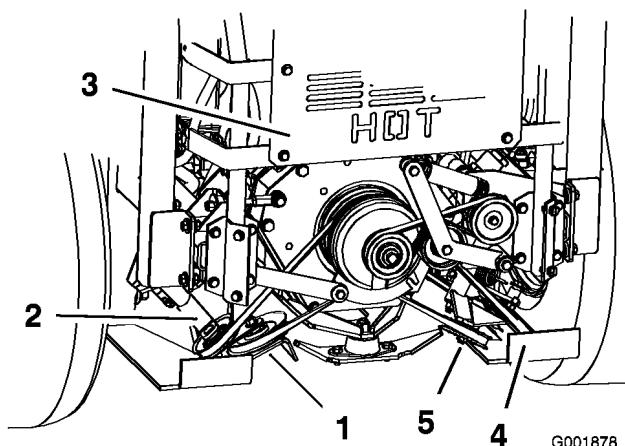


Figure 64

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

2. Pull the spring loaded idler down and remove the traction belt from the engine and hydro pump pulleys (Figure 65). Remove the belt between the pulleys.
3. Install the new belt around the engine and hydro pump pulleys (Figure 65).
4. Pull the spring loaded idler down and align it below the traction belt. Release the pressure on the spring loaded idler (Figure 65).

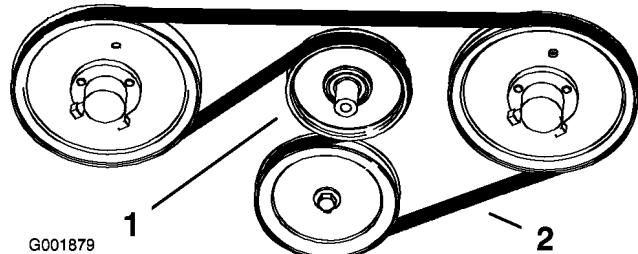


Figure 65

1. Spring loaded idler pulley
2. Pump drive belt

Replacing and Tensioning the Alternator Belt

Check the alternator belt for wear after every 50 hours of operation.

Replacing the Alternator Belt

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Tilt the seat forward and remove the front engine panel (Figure 66).

Replacing the Pump Drive Belt

Check pump drive belt for wear after every 50 hours of operation.

1. Tilt the seat forward and remove the front engine panel.

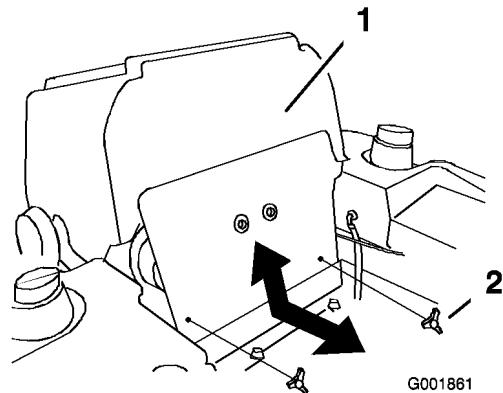


Figure 66

1. Front engine panel 2. Knob

4. Remove the pump drive belt. Refer to Removing the Pump Drive Belt.
5. Loosen the two bolts holding the alternator (Figure 67).
6. Remove the belt from the pulleys and alternator (Figure 67).
7. Install a new belt around the pulleys and the alternator (Figure 67).

Tensioning the Alternator Belt

1. Place a handle between the alternator and cylinder block (Figure 67).
2. Adjust the alternator to the outside until there is 3/8 to 1/2 inch (10 to 13 mm) deflections in the belt between the engine and the alternator (Figure 67).
3. Tighten the alternator bolts.
4. Check the deflection in the belt again and adjust the belt if needed.
5. If the deflection is correct, torque the upper bolt to 170 in-lb (19 N•m) and the bottom bolt to 45 ft-lb (61 N•m) (Figure 67).
6. Install the pump drive belt; refer to Replacing the Pump Drive Belt.
7. Install the front engine panel (Figure 66).

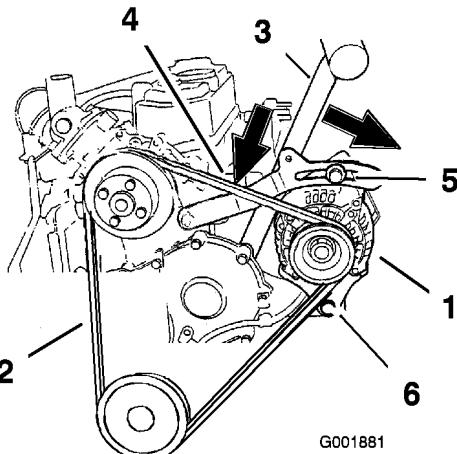


Figure 67

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

Controls System Maintenance

Adjusting the Control Handle Neutral Position

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

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

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Unlatch the seat and tilt the seat forward.
4. Begin with either the left or right motion control lever.
5. Move the lever to the neutral position but **not locked** (Figure 68).
6. Pull the lever back until the clevis pin (on arm below pivot shaft) contacts the end of the slot (just beginning to put pressure on the spring) (Figure 68).

7. Check where the control lever is relative to notch in console (Figure 68). It should be centered allowing lever to pivot outward to the neutral lock position.

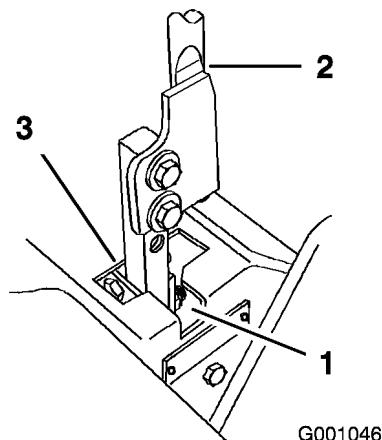


Figure 68

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

8. If adjustment is needed, loosen the nut and jam nut against the yoke (Figure 69).
9. Apply slight rearward pressure on the motion control lever, turn the head of the adjustment bolt in the appropriate direction until the control lever is centered in the neutral lock position (Figure 69).

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

10. Tighten the nut and jam nut (Figure 69).
11. Repeat for the opposite side of the machine.

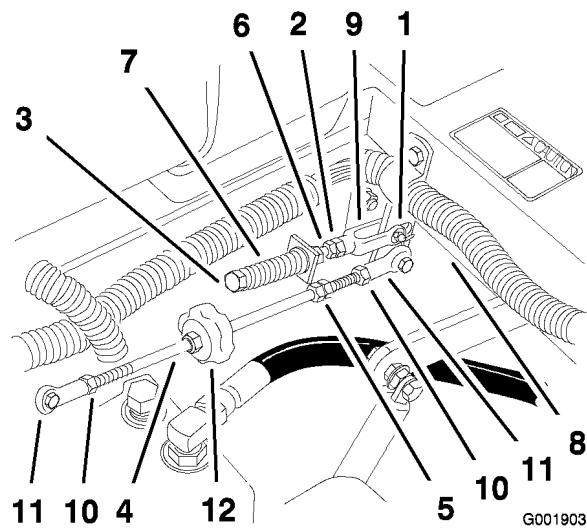


Figure 69

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

Hydraulic System Maintenance

Servicing the Hydraulic System

Checking the Hydraulic Fluid

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

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

Hydraulic System Oil Capacity: 132 ounces (3.9 l)

Check the hydraulic fluid level:

- Before the engine is first started.
- After the first 8 operating hours.
- After every 25 operating hours.

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

1. Position the machine on a level surface and set the parking brake.

2. Clean the area around filler neck of hydraulic tank (Figure 70).
3. Remove the cap from the filler neck. Look inside to check if there is fluid in the reservoir (Figure 70).
4. If there is no fluid, add fluid to the reservoir until it reaches the cold level of the baffle.
5. Run the machine at low idle for 15 minutes to allow any air to purge out of the system and warm the fluid. Refer to Starting and Stopping the Engine in Operation, page 17.
6. Recheck the fluid level while the fluid is warm. The fluid should be between cold and hot.
7. If required, add fluid to the hydraulic tank.

Note: The fluid level should be to the top of the hot level of the baffle, when the fluid is hot (Figure 70).

8. Install cap on filler neck.

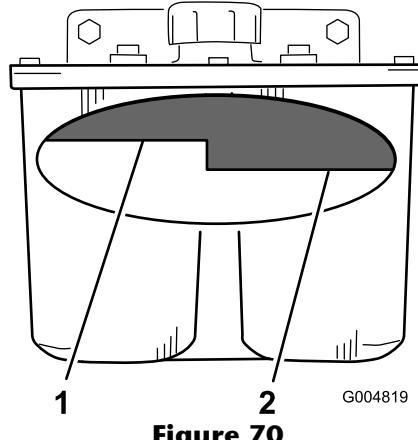


Figure 70

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



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

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

Replacing the Hydraulic Filter and Oil

Change the hydraulic filter and oil:

- After the first 25 operating hours.
- Change yearly after the first 25 operating hours.

Use summer filter above 32°F (0°C)

Use winter filter below 32°F (0°C)

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

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

3. Place drain pan under filter, remove the old filter and wipe the filter adapter gasket surface clean (Figure 71).

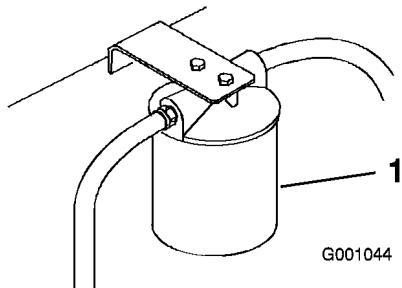


Figure 71

1. Hydraulic filter

4. Apply a thin coat to the rubber gasket on the replacement filter (Figure 72).
5. Install the replacement hydraulic filter onto the filter adapter. Do not tighten.
6. Fill the hydraulic tank with hydraulic fluid until the fluid overflows the filter and then turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 turn (Figure 72).
7. Clean up any spilled fluid.
8. Add fluid to the cold level of the baffle in the hydraulic tank.
9. Start the engine and let it run for about two minutes to purge air from the system. Stop the engine and check for leaks. If one or both wheels will not drive, refer to Bleeding Hydraulic System.
10. Recheck the fluid level while the fluid is warm. The fluid should be between cold and hot.
11. If required, add fluid to the hydraulic tank. Do not overfill.

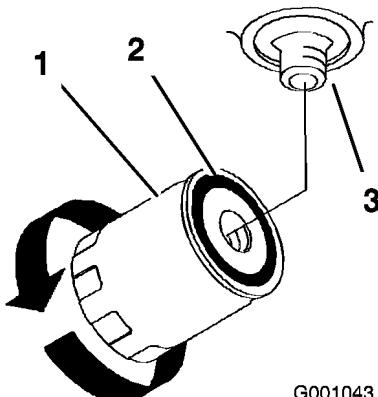


Figure 72

1. Hydraulic filter
2. Gasket

3. Adapter

Replacing the Cooling Fan Hydraulic Filter

Replace the cooling fan hydraulic filter:

- After every 500 operating hours.
- After any part of the hydraulic cooling fan system is repaired or replaced.

1. Place drain pan under filter, remove the hydraulic hose from the filter (Figure 73).
2. Remove the cooling fan hydraulic filter from the T-fitting on the bottom of the filter (Figure 73).

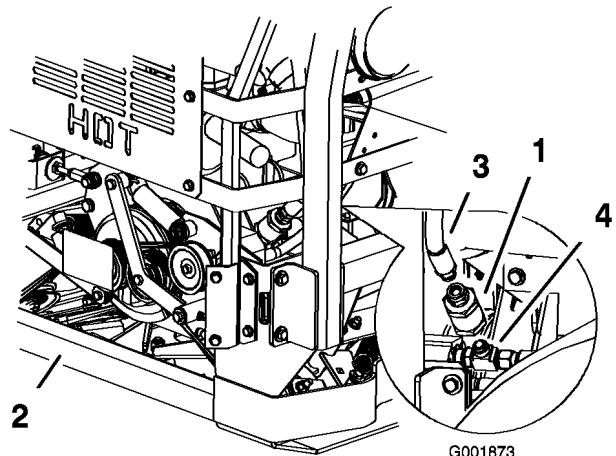


Figure 73

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

3. Install the filter to the T-fitting on the bottom and the hydraulic hose to the top (Figure 73).

Bleeding the Hydraulic System

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

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

Checking the Hydraulic Hoses

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

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



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

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



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

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



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

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

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

Setting the Left-hand Hydraulic Pump Neutral Position

1. Start the engine, open the throttle 1/2 way and release parking brake. Refer to Starting and Stopping the Engine in Operation, page 17.

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

2. Adjust the pump rod length by rotating the knob, in the appropriate direction, until the wheel is still or slightly creeping in reverse (Figure 74).

Setting the Hydraulic Pump Neutral Position

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

This adjustment must be made with drive wheels turning.

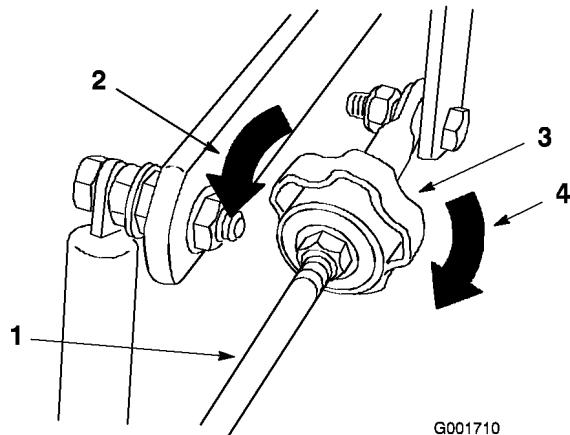


Figure 74

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

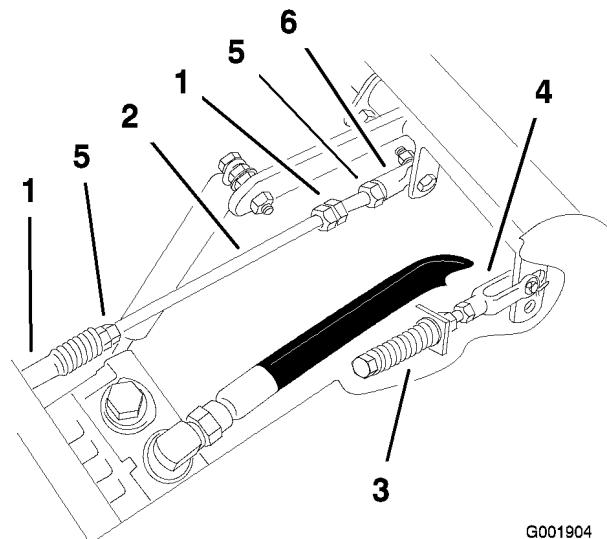


Figure 75

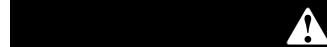
1. Double nuts
2. Pump rod
3. Adjustment bolt
4. Locknut
5. Ball joint
6. Pumps

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

Setting the Right-hand Hydraulic Pump Neutral Position

1. Loosen the locknuts at the ball joints on the pump control rod (Figure 75).
2. Start the engine, open throttle 1/2 way and release parking brake. Refer to Starting and Stopping the Engine in Operation, page 17.
- Note:** The motion control lever must be in neutral while making any adjustments.
- Note:** The front nut on the pump rod has left-hand threads.
3. Adjust the pump rod length by rotating double nuts on rod, in the appropriate direction, until wheel is still or slightly creeps in reverse (Figure 75).

4. Move the motion control lever forward and reverse, then back to neutral. The wheel must stop turning or slightly creep in reverse.
5. Open the throttle to fast. Make sure the wheel remains stopped or slightly creeps in reverse, adjust if necessary.
6. Tighten the locknuts at the ball joints (Figure 75).



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

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

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

Mower Deck Maintenance

Leveling the Mower at Three Positions

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

Setting Up the Machine

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

Leveling the Mower Side-to-Side

1. Position the right blade front-to-rear (Figure 76).
2. Measure the right blade at the **B** location, from a level surface to the cutting edge of the blade tip (Figure 76).
3. Record this measurement. This measurement needs to be 3-1/8 to 3-1/4 inches.
4. Position the left blade front-to-rear (Figure 76).
5. Measure the left blade at the **C** location (Figure 76), from a level surface to the cutting edge of the blade tip.
6. Record this measurement. This measurement needs to be 3-1/8 to 3-1/4 inches.

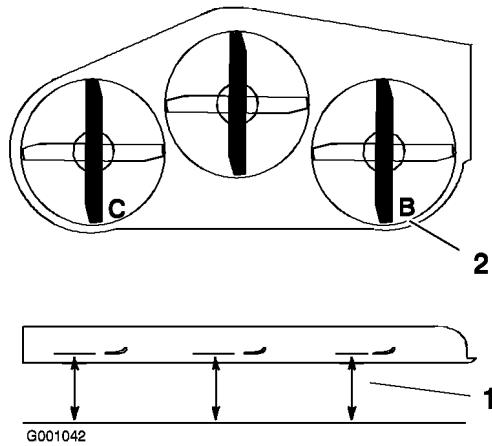


Figure 76

1. Measure here from blade 2. Measure at B and C to hard surface
7. If the measurements at positions **B** or **C** are not correct, loosen the bolt attaching the rear chain to the rear support arm (Figure 77).
8. Loosen the jam nut under the rear support arm and adjust the adjustment bolt to get a measurement of 3-1/8 to 3-1/4 inches (Figure 77).

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

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

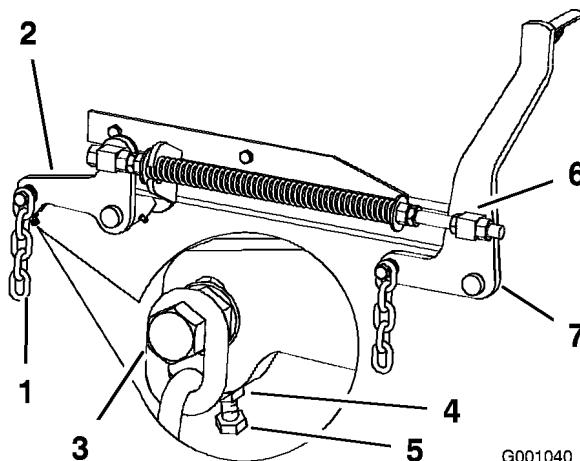


Figure 77

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

Adjusting the Front-to-Rear Mower Pitch

1. Position the right blade front-to-rear (Figure 78).
2. Measure the right blade at the **A** location, from a level surface to the cutting edge of the blade tip (Figure 78).

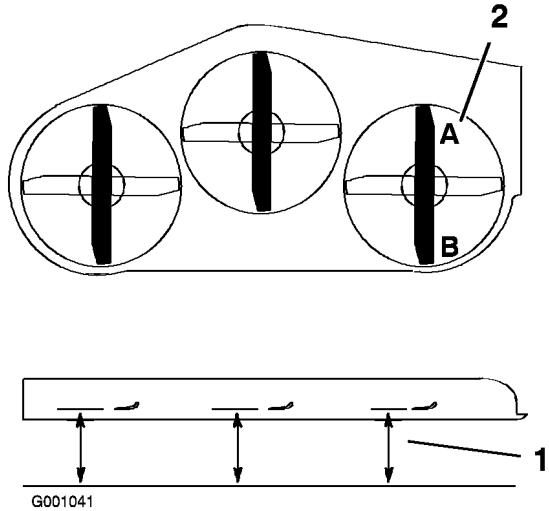


Figure 78

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

3. Record this measurement.
4. Measure the right blade at the **B** location, from a level surface to the cutting edge of the blade tip (Figure 78).
5. Record this measurement.
6. The mower blade should be a 1/4 to 3/8 inch (6 to 10 mm) lower at position **A** than at position **B** (Figure 78). If it is not correct, proceed to the following steps.

Note: Both of the front swivels need to be adjusted the same amount to maintain equal chain tension.

7. Loosen the front swivel jam nuts, at the front of the right and left swivels, approximately a 1/2 inch (13 mm) (Figure 77).
8. Adjust the lift nuts on both the left and the right side of the machine to achieve 1/4 to 3/8 inch (6 to 10 mm) lower in front at **A** than in the rear at **B** (Figure 77).

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

Adjusting the Compression Spring

1. Raise the mower lift lever to the transport position.
2. Check the distance between the two large washers, it needs to be 11-1/2 inches (29.2 cm) (Figure 79).
3. Adjust this distance, by loosening the spring jam nut and turning the nut in front of each spring (Figure 79). Turning the nut clockwise will shorten the spring; counter-clockwise will lengthen the spring.
4. Lock the nut into position by tightening the spring jam nut (Figure 79).

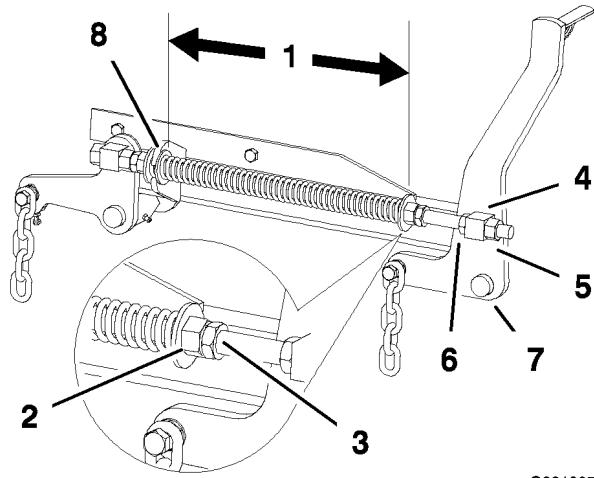


Figure 79

1. 11-1/2 inch (29.2 cm)	5. Swivel jam nut
between the large washers	
2. Front nut	6. Lift nut
3. Spring jam nut	7. Front support arm
4. Front swivel	8. Large washer

Servicing the Cutting Blades

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

Check the cutter blades daily for sharpness, and for any wear or damage. File down any nicks and sharpen the blades as necessary. If a blade is

damaged or worn, replace it immediately with a genuine Toro replacement blade. For convenient sharpening and replacement, you may want to keep extra blades on hand.



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

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

Inspect and check the blades every 8 hours.

Before Inspecting or Servicing the Blades

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

Inspecting the Blades

1. Inspect the cutting edges (Figure 80). If the edges are not sharp or have nicks, remove and sharpen the blades. Refer to Sharpening the Blades.
2. Inspect the blades, especially the curved area (Figure 80). If you notice any damage, wear, or a slot forming in this area (Figure 80), immediately install a new blade.

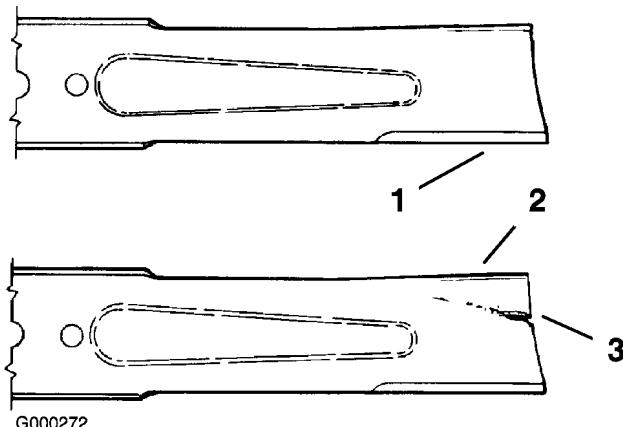


Figure 80

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

Checking for Bent Blades

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Rotate the blades until the ends face forward and backward (Figure 81). Measure from a level surface to the cutting edge, position A, of the blades (Figure 81). Note this dimension.

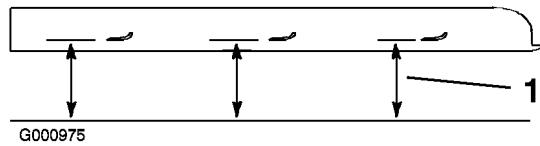
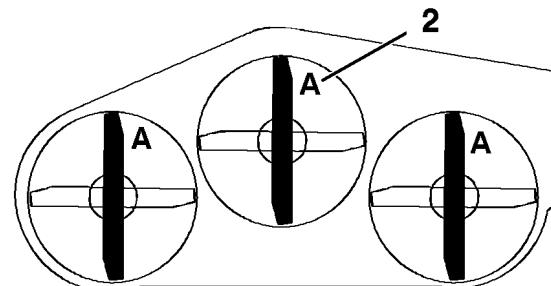


Figure 81

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

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



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

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

Removing the Blades

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



Contact with a sharp blade can cause serious injury.

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

1. Hold the blade end using a rag or thickly-padded glove.
2. Remove the blade bolt, spring disk and blade from the spindle shaft (Figure 84).

Sharpening the Blades



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

Wear proper eye protection when sharpening blade.

1. Use a file to sharpen the cutting edge at both ends of the blade (Figure 82). Maintain the original angle. The blade retains its balance if the same amount of material is removed from both cutting edges.

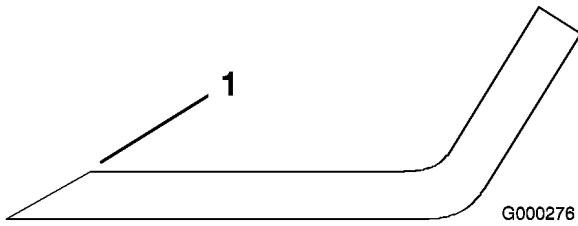


Figure 82

1. Sharpen at original angle

2. Check the balance of the blade by putting it on a blade balancer (Figure 83). 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 84). Repeat this procedure until the blade is balanced.

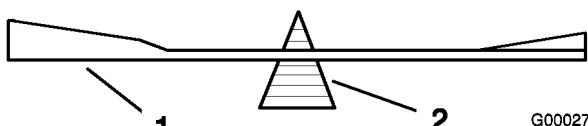


Figure 83

Installing the Blades

1. Install the blade onto the spindle shaft (Figure 84).

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

2. Install the spring disk and blade bolt. The spring disk cone must be installed toward the bolt head (Figure 84). Torque the blade bolt to 85-110 ft-lb (115-150 N•m).

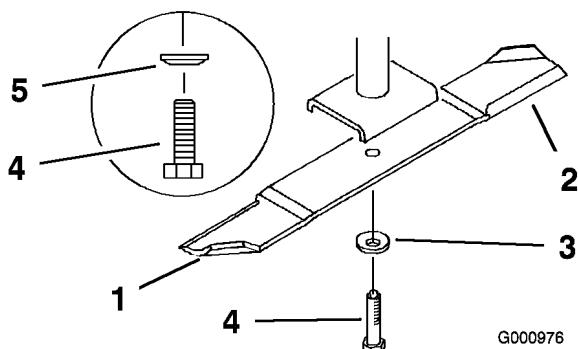


Figure 84

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

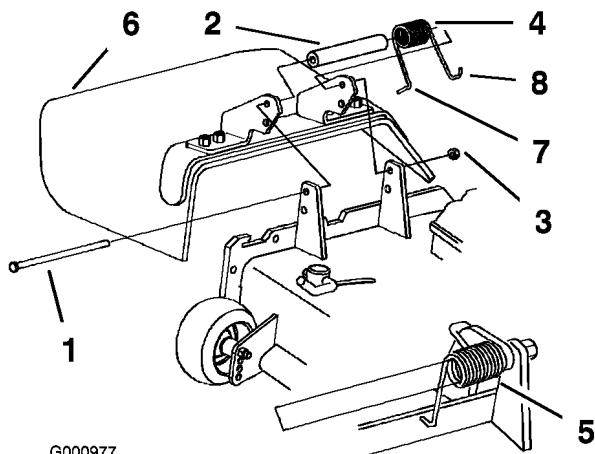


Figure 85

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

Replacing the Grass Deflector



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

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

1. Remove the locknut, bolt, spring and spacer holding the deflector to the pivot brackets (Figure 85). Remove the damaged or worn grass deflector.
2. Place the spacer and spring onto grass deflector. Place the **L** end of spring behind deck edge.

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

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

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

Cleaning

Cleaning Under the Mower

Remove the grass buildup under the mower daily.

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



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

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

Waste Disposal

Engine oil, batteries, hydraulic oil, and engine coolant are pollutants to the environment.

Dispose of these according to your state and local regulations.

Storage

Cleaning and Storage

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

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

3. Check the brake; refer to Servicing the Brake in Brake Maintenance, page 46.
4. Service the air cleaner; refer to Servicing the Air Cleaner in Engine Maintenance, page 36.
5. Grease the machine; refer to Greasing and Lubrication in Lubrication, page 35.
6. Change the crankcase oil; refer to Servicing the Engine Oil in Engine Maintenance, page 36.
7. Check the tire pressure; refer to Checking the Tire Pressure in Drive System Maintenance, page 43.
8. Change the hydraulic filter; refer to Servicing the Hydraulic System in Hydraulic System Maintenance, page 51.
9. Charge the battery; refer to Servicing the Battery in Electrical System Maintenance, page 41.
10. Scrape any heavy buildup of grass and dirt from the underside of the mower, then wash the mower with a garden hose.

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

11. Check the condition of the blades; refer to Servicing the Cutting Blades in Mower Deck Maintenance, page 55.
12. Prepare the machine for storage when non-use occurs over 30 days. Prepare the machine for storage as follows:

- A. Add a petroleum based stabilizer/conditioner to fuel in the tank. Follow mixing instructions from the stabilizer manufacturer. Do not use an alcohol based stabilizer (ethanol or methanol).

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

- B. Run the engine to distribute conditioned fuel through the fuel system (5 minutes).
- C. Stop the engine, allow it to cool, and drain the fuel tank; refer to Servicing the Fuel Tank in Fuel System Maintenance, page 40.
- D. Restart the engine and run it until it stops.
- E. Dispose of fuel properly. Recycle as per local codes.

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

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

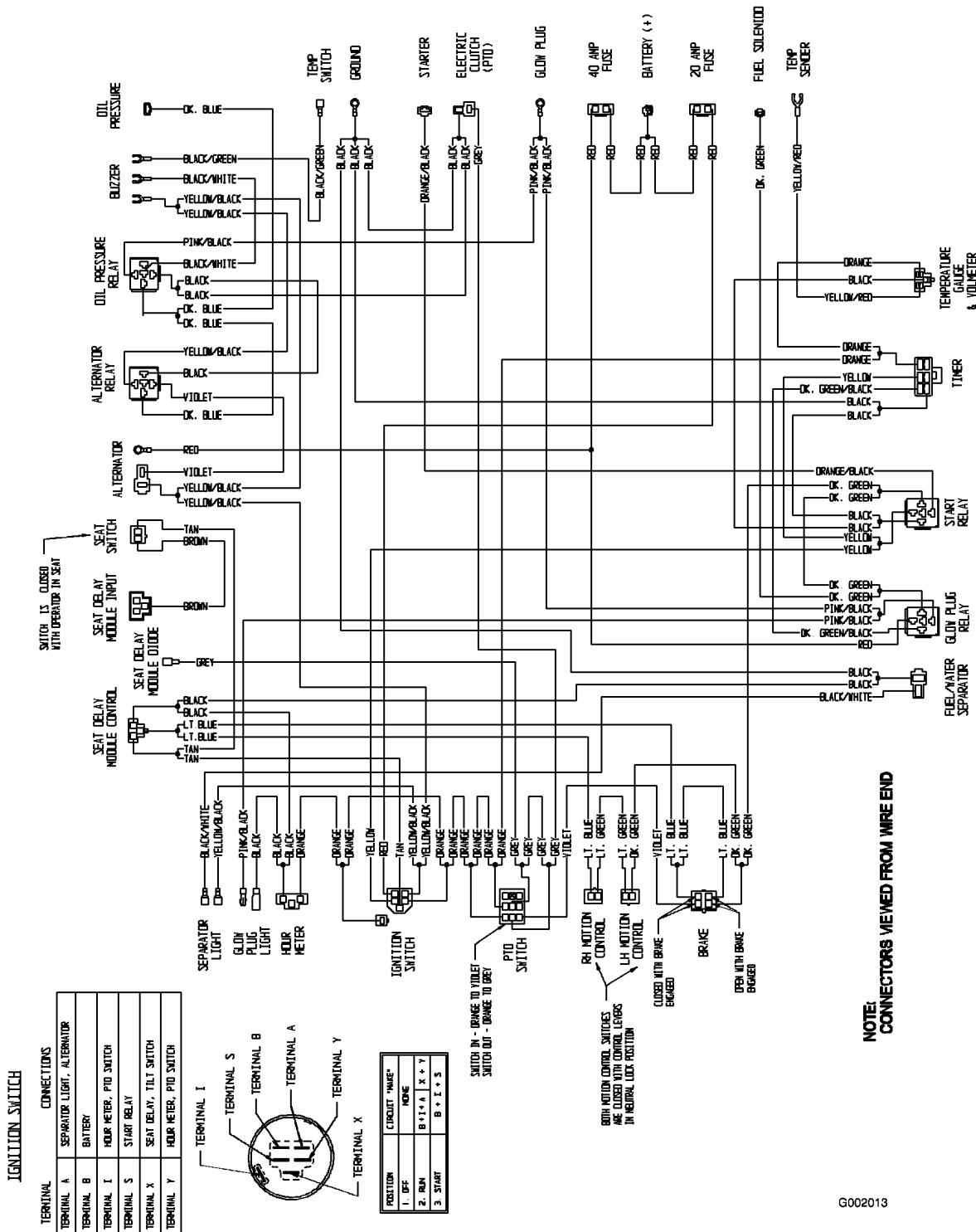
Troubleshooting

Problem	Possible Cause	Corrective Action
Starter does not crank	<ol style="list-style-type: none"> 1. Blade control (PTO) is engaged. 2. Parking brake is not on. 3. Operator is not seated. 4. Battery is dead. 5. Electrical connections are corroded or loose. 6. Fuse is blown. 7. Relay or switch is defective. 	<ol style="list-style-type: none"> 1. Move the blade control (PTO) to disengaged. 2. Set the parking brake. 3. Sit on the seat. 4. Charge the battery. 5. Check the electrical connections for good contact. 6. Replace the fuse. 7. Contact an Authorized Service Dealer.
Engine will not start, starts hard, or fails to keep running.	<ol style="list-style-type: none"> 1. Fuel tank is empty. 2. Air cleaner is dirty. 3. Dirt in the fuel filter. 4. Dirt, water, or stale fuel is in the fuel system. 	<ol style="list-style-type: none"> 1. Fill the fuel tank with fuel. 2. Clean or replace the air cleaner element. 3. Replace the fuel filter. 4. Contact an Authorized Service Dealer.
Engine loses power.	<ol style="list-style-type: none"> 1. Engine load is excessive. 2. Air cleaner is dirty. 3. Oil level in the crankcase is low. 4. Cooling fins and air passages above the engine are plugged. 5. Vent hole in the fuel cap is plugged. 6. Dirt in the fuel filter. 7. Dirt, water, or stale fuel is in the fuel system. 	<ol style="list-style-type: none"> 1. Reduce the ground speed. 2. Clean the air cleaner element. 3. Add oil to the crankcase. 4. Remove the obstruction from the cooling fins and air passages. 5. Clean or replace the fuel cap. 6. Replace the fuel filter. 7. Contact an Authorized Service Dealer.
Engine overheats.	<ol style="list-style-type: none"> 1. Engine load is excessive. 2. Oil level in the crankcase is low. 3. Cooling fins and air passages above the engine are plugged. 	<ol style="list-style-type: none"> 1. Reduce the ground speed. 2. Add oil to the crankcase. 3. Remove the obstruction from the cooling fins and air passages.

Problem	Possible Cause	Corrective Action
Machine does not drive.	<ol style="list-style-type: none"> 1. By pass valve is not closed tight. 2. Drive or pump belt is worn, loose or broken. 3. Drive or pump belt is off a pulley. 4. Broken or missing idler spring. 5. Hydraulic fluid level is low or too hot. 	<ol style="list-style-type: none"> 1. Tighten the by pass valve. 2. Change the belt. 3. Change the belt. 4. Replace the spring. 5. Add hydraulic fluid to the reservoir or let it cool down.
Abnormal vibration.	<ol style="list-style-type: none"> 1. Cutting blade(s) is/are bent or unbalanced. 2. Blade mounting bolt is loose. 3. Engine mounting bolts are loose. 4. Loose engine pulley, idler pulley, or blade pulley. 5. Engine pulley is damaged. 6. Blade spindle is bent. 7. Motor mount is loose or worn. 	<ol style="list-style-type: none"> 1. Install new cutting blade(s). 2. Tighten the blade mounting bolt. 3. Tighten the engine mounting bolts. 4. Tighten the appropriate pulley. 5. Contact an Authorized Service Dealer. 6. Contact an Authorized Service Dealer. 7. Contact an Authorized Service Dealer.
Uneven cutting height.	<ol style="list-style-type: none"> 1. Blade(s) not sharp. 2. Cutting blade(s) is/are bent. 3. Mower is not level. 4. Underside of mower is dirty. 5. Tire pressure is not correct. 6. Blade spindle bent. 	<ol style="list-style-type: none"> 1. Sharpen the blade(s). 2. Install new cutting blade(s). 3. Level the mower from side-to-side and front-to-rear. 4. Clean the underside of the mower. 5. Adjust the tire pressure. 6. Contact an Authorized Service Dealer.

Problem	Possible Cause	Corrective Action
Blades do not rotate.	<ol style="list-style-type: none"> 1. Drive belt is worn, loose or broken. 2. Drive belt is off pulley. 3. Deck belt is worn, loose or broken. 4. Deck belt is off pulley. 5. Broken or missing idler spring. 	<ol style="list-style-type: none"> 1. Check the belt tension. 2. Install the drive belt and check adjusting shafts and belt guides for correct position. 3. Install a new deck belt. 4. Install the deck pulley and check the idler pulley, idler arm and spring for correct position and function. 5. Replace the spring.

Schematics



Wire Diagram (Rev. A)



Count on it.