Form No. 3359-718 Rev B

TORO®

Count on it.

Operator's Manual

Reelmaster® 2000 Traction Unit

Model No. 03431—Serial No. 280000001 and Up

CE

Register at www.Toro.com.

Original Instructions (EN)

Warning

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

This spark ignition system complies with Canadian ICES-002.

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

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. The model and serial numbers are stamped into a plate that is riveted to the frame of the machine. Write the numbers in the space provided.

Model No. _____

Serial No. _____

This manual identifies potential hazards and has safety messages identified by the safety alert symbol (Figure 1), which signals a hazard that may cause serious injury or death if you do not follow the recommended precautions.

Figure 1

1. Safety alert symbol

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

Contents

8111 Lyndale Avenue South
Bloomington, MN 55420

Contact us at www.Toro.com.
Printed in the USA.

Safety

This machine meets or exceeds CEN standard EN 836:1997, ISO standard 5395:1990, and ANSI B71.4-2004 specifications in effect at time of production, when equipped with rear weight. Refer to the section in this manual on Installing Rear Weight.

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, ISO standard 5395:1990, and ANSI B71.4-2004.

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 or service the mower. Local regulations may 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 and mechanics should seek and obtain professional and practical instruction. The owner is responsible for training the users. 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 brake. The main reasons for loss of control are:
    - ◊ insufficient wheel grip;
    - ◊ 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.

- The owner/user can prevent and is responsible for accidents or injuries occurring to himself or herself, other people, or property.

Preparation

- While mowing, always wear substantial footwear, long trousers, hard hat, safety glasses, and ear protection. Long hair, loose clothing, or jewelry may get tangled in moving parts. 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. Take the following precautions:
  - Store fuel in containers specifically designed for this purpose.
  - Refuel outdoors only and do not smoke while refuelling.
  - 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 tanks and container caps securely.
- Replace faulty silencers/mufflers.
- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by the manufacturer.
- Check that the operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

Operation

- 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, shift into neutral, and engage the parking brake.
- 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 going up or downhill;
  - machine speeds should be kept low on slopes and during tight turns;
  - stay alert for humps and hollows and other hidden hazards;
  - Do not turn sharply. Use care when reversing.
  - Use counterweight(s) or wheel weights when suggested in the operator's manual.
- Stay alert for holes in the terrain and other hidden hazards.
- Watch out for traffic when crossing or near roadways.
- Stop the blades 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. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not change the engine governor settings or over-speed the engine. Operating the engine at excessive speed may increase the hazard of personal injury.
- Before leaving the operator's position:
  - stop on level ground;
  - 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 when transporting or not in use.
- Stop the engine and disengage drive to attachment:
  - before refuelling;
  - before removing the grass catcher/catchers;
  - before making height adjustment unless adjustment can be made from the operator's position.
  - before clearing blockages;
  - before checking, cleaning or working on the mower;
  - after striking a foreign object or if an abnormal vibration occurs. Inspect the mower for damage and make repairs before restarting and operating the equipment.

- Reduce the throttle setting during engine run-out. If the engine is provided with a fuel shut-off valve, turn the fuel off at the conclusion of mowing.
- Keep hands and feet away from the cutting units.
- Look behind and down before backing up to be sure of a clear path.
- Slow down and use caution when making turns and crossing roads and sidewalks. Stop cylinders/reels if not mowing.
- Do not operate the mower under the influence of alcohol or drugs.
- Use care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

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.
- Keep all parts in good working condition and all hardware and hydraulic fittings tightened. Replace all worn or damaged parts and decals.
- If the fuel tank has to be drained, do this outdoors.
- Be careful during adjustment of the machine to prevent entrapment of the fingers between moving blades and fixed parts of the machine.
- On multi-cylinder/multi-reel machines, take care as rotating one cylinder/reel can cause other cylinders/reels to rotate.
- Disengage drives, lower the cutting units, set parking brake, stop engine and remove key from ignition. Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean grass and debris from cutting units, drives, silencers/mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect battery before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking the cylinders/reels. Wear gloves and use caution when servicing them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.

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, ISO, or ANSI standards.

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

Use of this product for purposes other than its intended use could prove dangerous to user and bystanders.

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.

- Know how to stop the engine quickly.
- Do not operate the machine while wearing tennis shoes or sneakers.
- Wearing safety shoes and long pants is advisable and required by some local ordinances and insurance regulations.
- Handle fuel carefully. Wipe up any spills.
- Check the safety interlock switches daily for proper operation. If a switch should fail, replace the switch before operating the machine.
- Before starting the engine, sit on the seat.
- Using the machine demands attention. To prevent loss of control:

  - Do not drive close to sand traps, ditches, creeks, or other hazards.
  - Reduce speed when making sharp turns. Avoid sudden stops and starts.
  - When near or crossing roads, always yield the right-of-way.
  - Apply the service brakes when going downhill to keep forward speed slow and to maintain control of the machine.
- Raise the cutting units when driving from one work area to another.
- Do not touch the engine, silencer/muffler, or exhaust pipe while the engine is running or soon after it has stopped because these areas could be hot enough to cause burns.
- If the engine stalls or loses headway and cannot make it to the top of a slope, do not turn the machine around. Always back slowly, straight down the slope.
- When a person or pet appears unexpectedly in or near the mowing area, stop mowing. Careless operation, combined with terrain angles, ricochets, or improperly positioned guards can lead to thrown object injuries. Do not resume mowing until the area is cleared.

Maintenance and Storage

- Make sure all hydraulic line connectors are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system.
- Keep your body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not your hands, to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. Seek immediate medical attention if fluid is injected into skin.
- Before disconnecting or performing any work on the hydraulic system, all pressure in the system must be relieved by stopping the engine and lowering the cutting units and attachments to the ground.
- Check all fuel lines for tightness and wear on a regular basis. Tighten or repair them as needed.
- If the engine must be running to perform a maintenance adjustment, keep hands, feet, clothing, and any parts of the body away from the cutting units, attachments, and any moving parts. Keep everyone away.
- To ensure safety and accuracy, have an Authorized Toro Distributor check the maximum engine speed with a tachometer. Maximum governed engine speed should be 3200 RPM.
- If major repairs are ever needed or if assistance is desired, contact an Authorized Toro Distributor.
- Use only Toro-approved attachments and replacement parts. The warranty may be voided if used with unapproved attachments.

Sound Pressure Level

These units have an equivalent continuous A-weighted sound pressure at the operator ear of: 87 dB(A), based on measurements of identical machines per ISO 11201.

Sound Power Level

These units have a guaranteed sound power level of: 105 dBA/1 pW, based on measurements of identical machines per ISO 11094.

Vibration Level

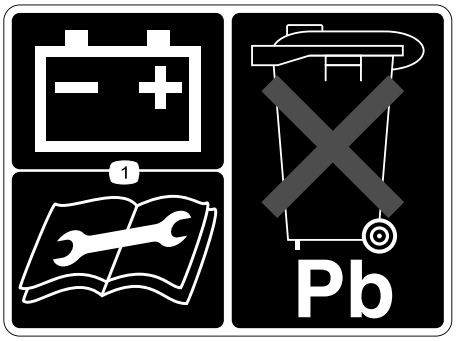
This unit does not exceed a vibration level of 2.5 m/s^2 at the hands based on measurements of identical machines per EN 1033 and EN836.

This unit does not exceed a vibration level of 0.5 m/s^2 at the posterior based on measurements of identical machines per EN 1032 and EN836.

Safety and Instructional Decals

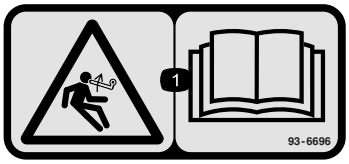
Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost.

67-5360



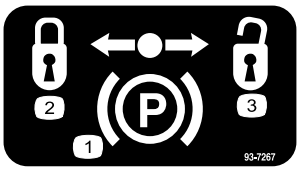
93-6668

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



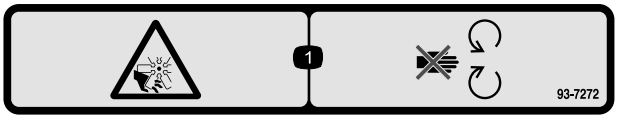
93-6696

1. Stored energy hazard—read the *Operator's Manual*.



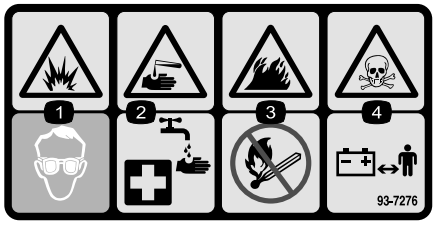
93-7267

1. Parking brake
2. Locked
3. Unlocked



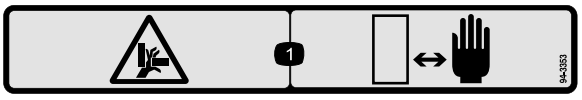
93-7272

1. Cutting/dismemberment hazard; fan—stay away from moving parts.



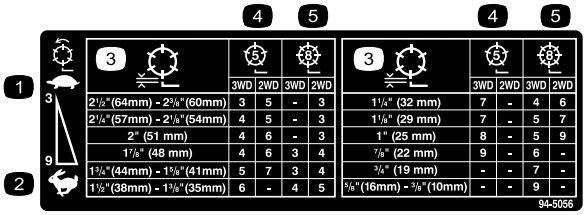
93-7276

1. Explosion hazard—wear eye protection.
2. Caustic liquid/chemical burn hazard—to perform first aid, flush with water.
3. Fire hazard—no fire, open flames, or smoking.
4. Poison hazard—keep children a safe distance from the battery.



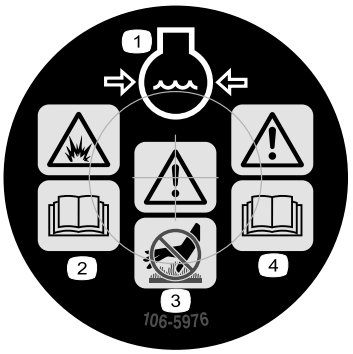
94-3353

1. Crushing hazard of hand—keep your hands a safe distance away.



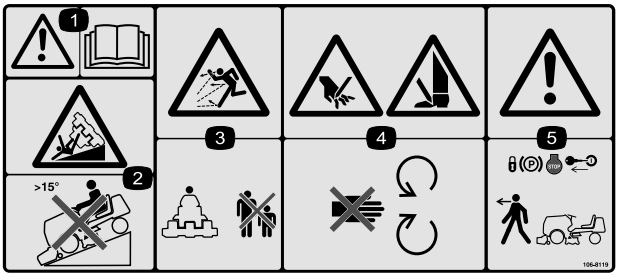
94-5056

1. Reel speed—slow
2. Reel speed—fast
3. Reel height
4. 5 Blade cutting unit
5. 8 Blade cutting unit



106-5976

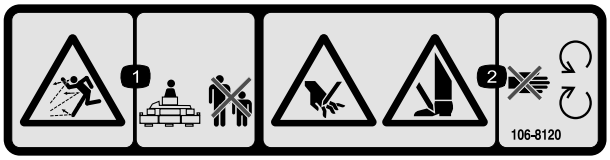
1. Engine coolant under pressure
2. Explosion hazard—read the *Operator's Manual*.
3. Warning—do not touch the hot surface.
4. Warning—read the *Operator's Manual*.



106-8119

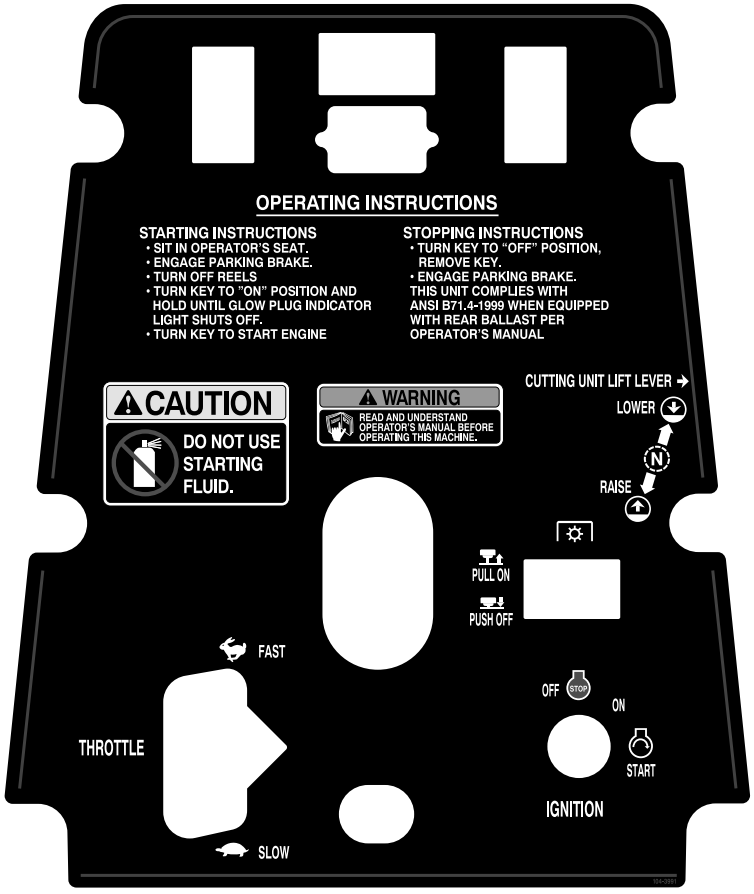
(Affix over decal part no. 104–4096 for CE)

1. Warning—read the *Operator's Manual.*
2. Tipping hazard—do not drive the machine on a slope greater than 15 degrees.
3. Thrown object hazard—keep bystanders a safe distance from the machine.
4. Cutting hazard of hand and foot—stay away from moving parts, keep all guards and shields in place.
5. Warning—lock the parking brake, stop the engine, and remove the ignition key before leaving the machine.

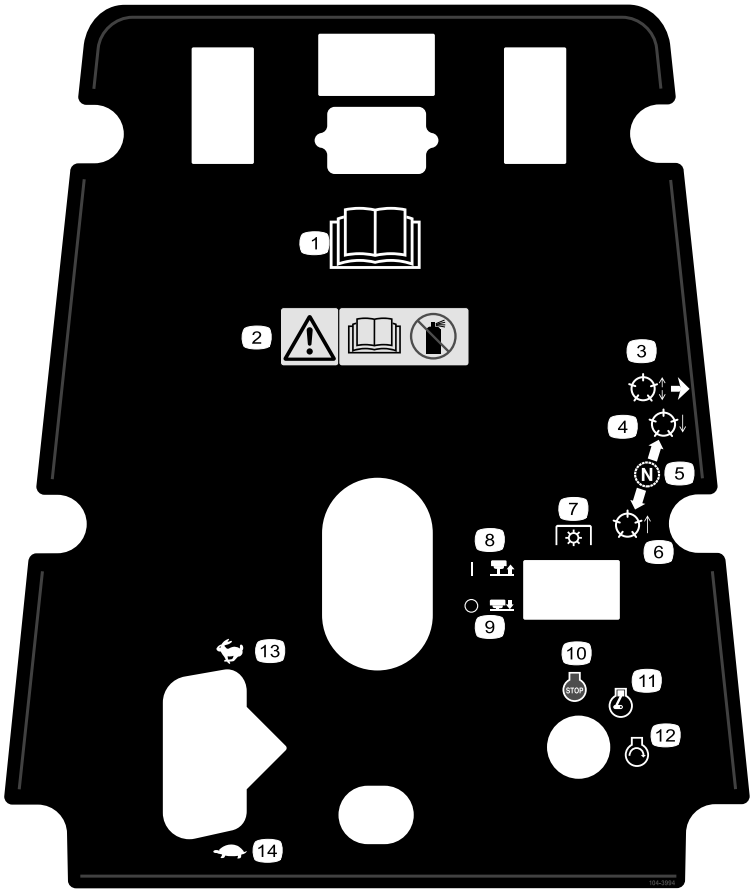


106-8120

1. Thrown object hazard—keep bystanders a safe distance from the machine.
2. Cutting hazard of hand and foot—stay away from moving parts.



104-3991

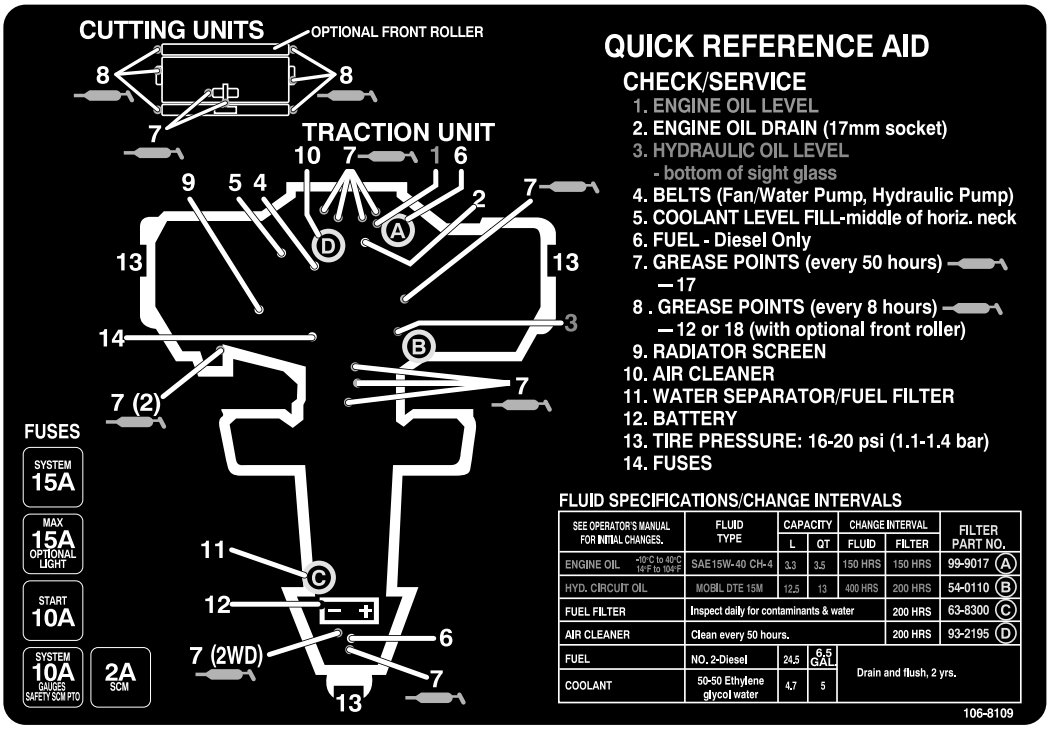


104-3994

(Affix over decal part no. 104–3991 for CE)

1. Read the *Operator's Manual.*
2. Warning—read the *Operator's Manual*, do not use starting fluid.
3. Raise and lower the reels.
4. Lower the reels.
5. Neutral
6. Raise the reels.
7. Power take-off (PTO)
8. Pull on
9. Push off
10. Engine—stop
11. Engine—run
12. Engine—start
13. Fast
14. Slow

104-4096


CUTTING UNITS
OPTIONAL FRONT ROLLER
8
8
7
TRACTION UNIT
10 7 1 6
9 5 4
2
7
13
13
14
3
7 (2)
7
11
12
6
7 (2WD)
7
13
FUSES
SYSTEM 15A
MAX 15A OPTIONAL LIGHT
START 10A
SYSTEM 10A GAUGES SAFETY SCM PTO
2A SCM
QUICK REFERENCE AID
CHECK/SERVICE
1. ENGINE OIL LEVEL
2. ENGINE OIL DRAIN (17mm socket)
3. HYDRAULIC OIL LEVEL
- bottom of sight glass
4. BELTS (Fan/Water Pump, Hydraulic Pump)
5. COOLANT LEVEL FILL-middle of horiz. neck
6. FUEL - Diesel Only
7. GREASE POINTS (every 50 hours) —17
8 . GREASE POINTS (every 8 hours) —12 or 18 (with optional front roller)
9. RADIATOR SCREEN
10. AIR CLEANER
11. WATER SEPARATOR/FUEL FILTER
12. BATTERY
13. TIRE PRESSURE: 16-20 psi (1.1-1.4 bar)
14. FUSES
FLUID SPECIFICATIONS/CHANGE INTERVALS
SEE OPERATOR'S MANUAL FOR INITIAL CHANGES.
FLUID TYPE
CAPACITY L
CAPACITY QT
CHANGE INTERVAL FLUID
CHANGE INTERVAL FILTER
FILTER PART NO.
ENGINE OIL -10°C to 40°C 14°F to 104°F
SAE15W-40 CH-4
3,3
3,5
150 HRS
150 HRS
99-9017 A
HYD. CIRCUIT OIL
MOBIL DTE 15M
12,5
13
400 HRS
200 HRS
54-0110 B
FUEL FILTER
Inspect daily for contaminants & water
200 HRS
63-8300 C
AIR CLEANER
Clean every 50 hours.
200 HRS
93-2195 D
FUEL
NO. 2-Diesel
24,5
6,5 GAL
Drain and flush, 2 yrs.
COOLANT
50-50 Ethylene glycol water
4,7
5
106-8109

106-8109

Setup

Loose Parts

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

Procedure	Description	Qty.	Use
1	Wheel assembly Lug nut	1 4	Install the rear wheel.
2	Rear carrier frame	1	Adjust the rear carrier frame height.
3	Washer Bolt (3/8 x 2-1/4 inches) Locknut (3/8 inch)	6 3 3	Mount the carrier frames to the cutting units.
4	Lift arm Pivot rod Bolt (5/16 x 7/8 inch) Lock washer Lift chain Clevis pin Cotter pin	2 2 2 2 2 4 4	Install the front lift arms (supplied in the Lift Arm Kit).
5	No parts required	–	Mount the cutting unit drive motors (supplied in the Lift Arm Kit).
6	Trust washer Flat washer Flange-head bolt	3 3 3	Mount the cutting units.
7	Spring Vinyl sleeve Spring shackle Clevis pin Cotter pin Shackle (32 inch cutting unit only) Spring anchor (32 inch cutting unit only) Bolt (1/4 x 3/4 inch) (32 inch cutting unit only) Locknut (32 inch cutting unit only)	3 1 3 6 6 2 2 4 4	Install the counterbalance springs (supplied in the lift arm kit).
8	Rear weight kit(s)	Varies	Add rear ballast (order from your Toro Distributor).
9	No parts required	–	Activate and Charge the Battery
10	No parts required	–	Break-in a new machine

Media and Additional Parts

Description	Qty.	Use
Key	2	Start the machine
Hydraulic reservior plug	1	Plugging the hydraulic reservoir during a filter change.
Operator’s Manual Engine Operator’s Manual	1 1	Read before operating the machine.

Description	Qty.	Use
Operator training material	1	View before operating the machine.
Parts Catalog	1	View and order parts.
Certificate of compliance	1	CE certification

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

1

Installing the Rear Wheel

Parts needed for this procedure:

1	Wheel assembly
4	Lug nut

Procedure

1. Mount the wheel assembly onto the rear wheel hub (Figure 2).

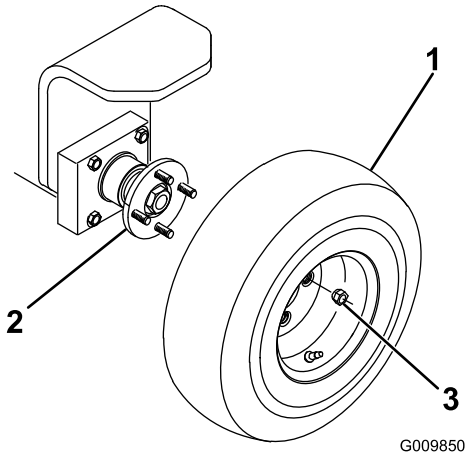


Figure 2

1. Wheel assembly
2. Rear wheel hub
3. Lug nut

2. Install the lug nuts (Figure 2) and tighten them to 45 to 65 ft-lb (3 to 5 N-m).

2

Adjusting the Rear Carrier Frame Height

Parts needed for this procedure:

1	Rear carrier frame

Procedure

1. Slide the rear carrier frame onto the rear lift arm pivot rod (Figure 3). Do not install the carrier frame to the cutting unit at this time.

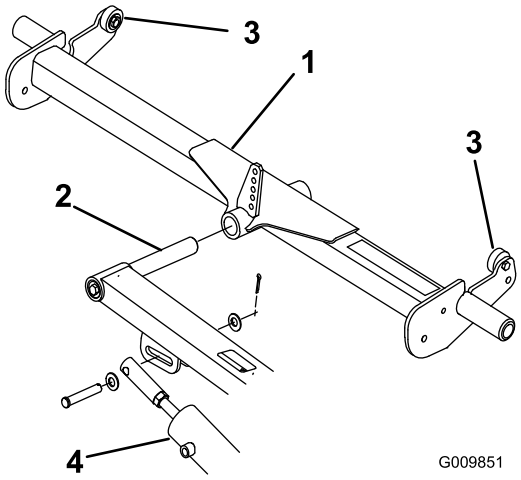


Figure 3

1. Rear carrier frame
2. Pivot rod
3. Up stop
4. Lift cylinder

2. Raise the lift arms and carrier frame fully.
3. Press down on one end of the carrier frame until the up stop on the opposite end contacts the underside of the foot step (Figure 3).

   The distance between the up stop and the underside of the foot step, on the end pressed down, should be approximately 1/4 inch (6 mm).

   - If the distance is correct, remove the carrier frame and proceed with the setup instructions.
   - If the distance is not 1/4 inch (6 mm), adjust the lift cylinder as follows:

A. Remove the clevis pin securing the rod end of the lift cylinder to the lift arm (Figure 3).

B. Loosen the hex nut securing the clevis to the cylinder rod.

C. Rotate the clevis end in or out until you attain 1/4 inch (6 mm) clearance. Check the adjustment and repeat steps 2 through 3 as required.

D. Tighten the hex nut and connect the cylinder rod end to the lift arm (Figure 3).

3

Mounting the Carrier Frames to the Cutting Units

Parts needed for this procedure:

6	Washer
3	Bolt (3/8 x 2-1/4 inches)
3	Locknut (3/8 inch)

Procedure

1. Remove the cutting units from the cartons. Adjust them per the *Cutting Unit Operator's Manual*.
2. Position a carrier frame onto each cutting unit, aligning the mounting holes with the mounting links (Figure 4).

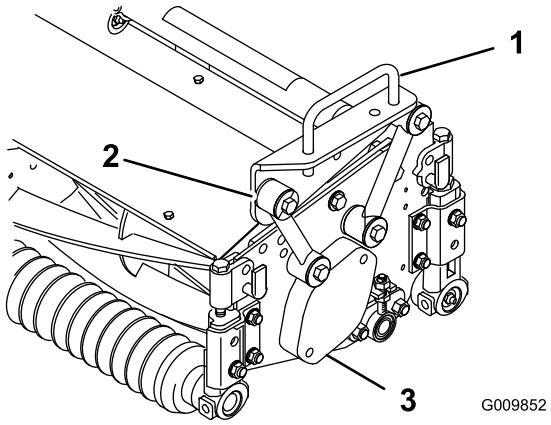


Figure 4

1. Carrier frame
2. Mounting link
3. Bearing housing cover

3. Secure each mounting link to the carrier frame with a bolt (3/8 x 2-1/4 inches), 2 washers, and a locknut, as shown in Figure 4. Position a washer on each side of the link when mounting. Torque to 31 ft-lb (42 N-m).

4

Installing the Front Lift Arms

Parts needed for this procedure:

2	Lift arm
2	Pivot rod
2	Bolt (5/16 x 7/8 inch)
2	Lock washer
2	Lift chain
4	Clevis pin
4	Cotter pin

Procedure

1. Insert a pivot rod into the left lift arm and align the mounting holes (Figure 5).

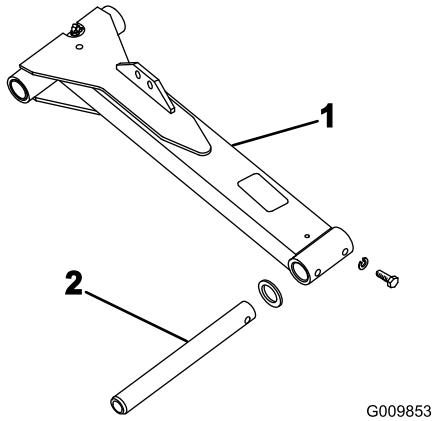


Figure 5

1. Lift arm
2. Pivot rod

2. Secure the pivot rod to the lift arm with a bolt (5/16 x 7/8 inch) and lock washer.
3. Loosen the top bolt securing the left counterbalance arm to the frame (Figure 6).

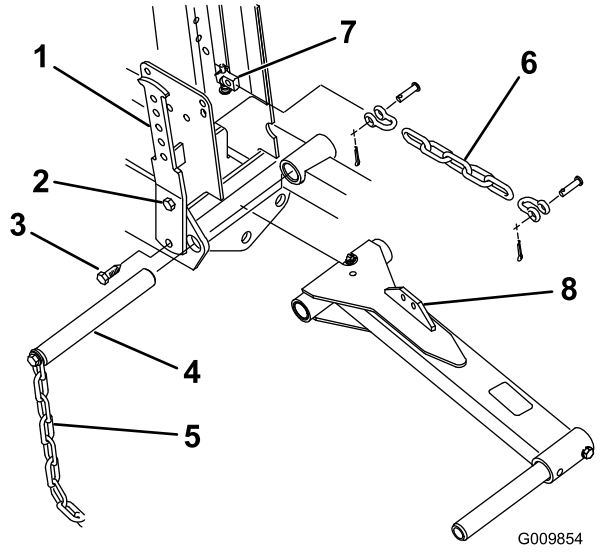


Figure 6

1. Counterbalance arm
2. Top bolt
3. Bottom bolt
4. Lift arm pivot pin
5. Tipper chain
6. Lift chain
7. Cylinder pin
8. Lift arm tab

4. Remove the bottom bolt and nut securing the left counterbalance arm to the frame (Figure 6).
5. Rotate the counterbalance arm outward and remove the lift arm pivot pin and tipper chain (Figure 6).
6. Position the lift arm between the frame members, align the mounting holes, and install the pivot pin (Figure 6). Insert the pivot pin so that the counterbalance arm fits into the slot in the pin. Do not secure the counterbalance arm at this time.
7. Secure one end of the lift chain to the lift cylinder pin with a clevis pin and cotter pin.
8. Secure the other end of the lift chain to the hole in the lift arm mounting tab with clevis pins and cotter pins. Use the appropriate hole in the lift arm as designated in Figure 7.

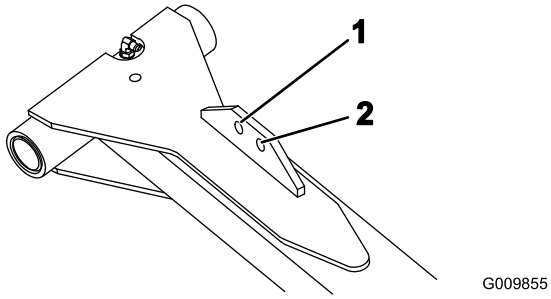


Figure 7

1. 27 inch cutting unit (inner hole)
2. 32 inch cutting unit (outer hole)

9. Repeat the procedure on the right-hand lift arm.

5

Mounting the Cutting Unit Drive Motors

No Parts Required

Procedure

1. Position the cutting units in front of the pivot rods.
2. Remove the bearing housing cover (Figure 4) from the inside end of the right-hand cutting unit. Install the cover and gasket (supplied with the cutting unit) on the outside end. Locate the spider coupling (Figure 8) shipped in the bearing housing.

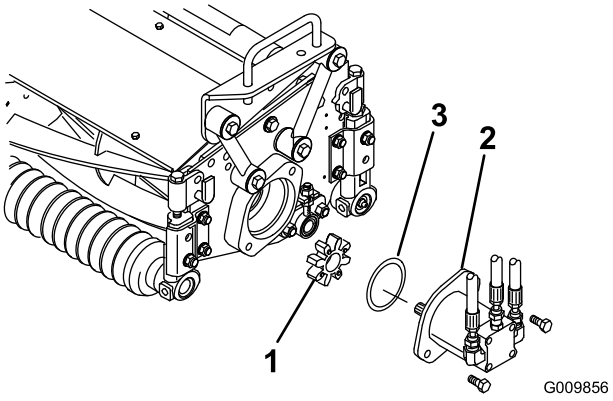


Figure 8

1. Spider coupling
2. Reel motor
3. O-ring

3. Insert the O-ring (supplied with the cutting unit) on the flange of the drive motor (Figure 8).
4. Mount the motor and the spider coupling to the drive end of the cutting unit and secure them with 2 bolts provided with the cutting unit (Figure 8).
5. On the center and left-hand cutting units, remove the bearing housing cover and install the gasket (supplied with the cutting units).

6

Mounting the Cutting Units

Parts needed for this procedure:

3	Trust washer
3	Flat washer
3	Flange-head bolt

Procedure

1. Slide a thrust washer onto the lift arm pivot rod (Figure 9).

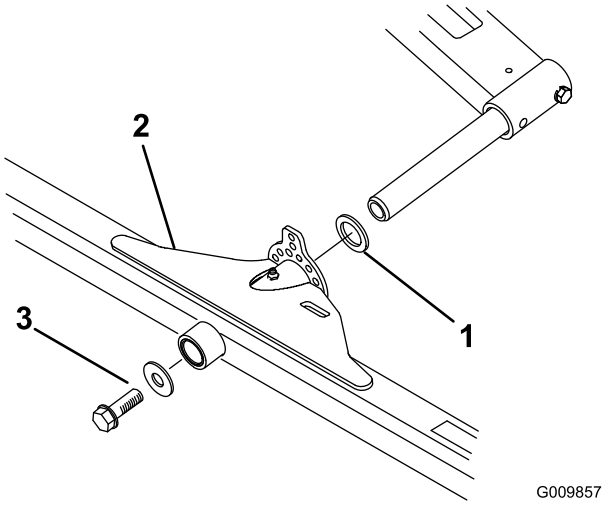


Figure 9

1. Thrust washer
2. Carrier frame
3. Flat washer and flange-head bolt

2. Slide the cutting unit carrier frame onto the pivot rod and secure it with a flat washer and flange-head bolt (Figure 9).

   Note: On the rear cutting unit, position the thrust washer between the rear of the carrier frame and the flat washer.

3. Secure a tipper chain to the top of each 27 inch cutting unit carrier frame and to the bottom of each 32 inch cutting unit carrier frame with a bolt, washer, and locknut (Figure 10).

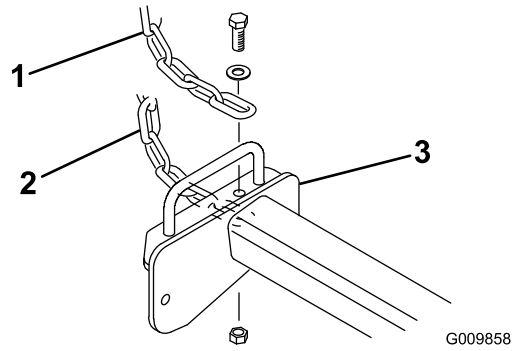


Figure 10

1. Tipper chain (27 inch cutting units)
2. Tipper chain (32 inch cutting units)
3. Carrier frame

4. Grease all lift arm and carrier frame pivot points.

7

Installing the Counterbalance Springs

Parts needed for this procedure:

3	Spring
1	Vinyl sleeve
3	Spring shackle
6	Clevis pin
6	Cotter pin
2	Shackle (32 inch cutting unit only)
2	Spring anchor (32 inch cutting unit only)
4	Bolt (1/4 x 3/4 inch) (32 inch cutting unit only)
4	Locknut (32 inch cutting unit only)

Precautions and Settings for the Counterbalance Springs

Use caution when tensioning the springs as they are under heavy load.

The counterbalance springs help balance the cutting units to allow equal amounts of weight (down pressure) to be distributed to each end of the cutting unit. The springs also transfer weight from the cutting units to the traction unit therefore increasing traction.

The settings recommended in the following procedures may be require minor changes to achieve optimum performance for your turf conditions. The weight, at each end of the cutting unit, can be checked easily with a spring scale.

- **Increasing** the spring tension **reduces** the weight on **inboard** end of the cutting unit and **increases** the weight on the **outboard** end.
- **Decreasing** the spring tension **increases** the weight on the **inboard** end of the cutting unit and **reduces** the weight on **outboard** end.

Installing the Counterbalance Springs on 27 Inch Cutting Units

1. Hook the spring into the third hole from the top on the inboard side of both front cutting unit lift tabs and on the rear cutting unit lift tab (Figure 11).

   Note: Selecting the #4 hole position (increasing the spring tension) will reduce the weight on the inboard end of the cutting unit, increase the weight on the outboard end of the cutting unit, and increase traction. Selecting the #2 hole position has the opposite affect.

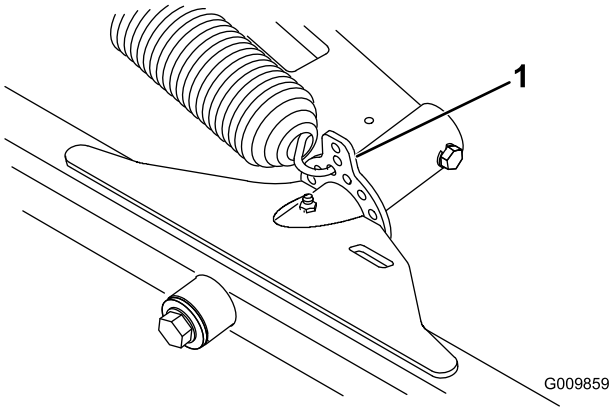


Figure 11

1. Cutting unit lift tab

2. Secure the other end of the spring to the appropriate hole (see below) on the front and rear counterbalance arms (Figure 12 and Figure 13) with the spring shackle, clevis pin, and cotter pin.
   - 5 blade reels—fourth hole from the top
   - 8 blade reels—third hole from the top
   - Reels with baskets—top hole

   Note: On the rear counterbalance spring, install the vinyl cover over the spring before installing.

   Note: Increasing the spring tension will reduce the weight on the inboard end of the cutting unit, increase the weight on the outboard end of the cutting unit, and increase traction. Decreasing the spring tension has the opposite effect.

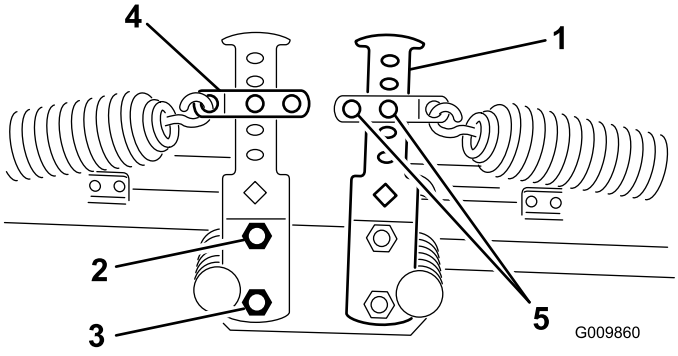


Figure 12

1. Counterbalance arm
2. Top bolt
3. Bottom bolt
4. Spring shackle
5. Clevis pin and cotter pin

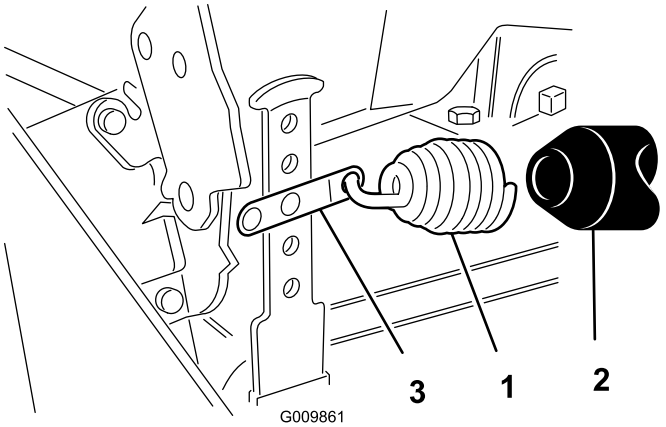


Figure 13

1. Rear counterbalance spring
2. Vinyl cover
3. Spring shackle

3. Insert the breaker bar into the square hole in the counterbalance arm and pivot the arm back to its original position, aligning the mounting holes.
4. Secure the bottom of the counterbalance arm to the frame with the bolt and nut previously removed. Tighten the top bolt (Figure 12).
5. To tension the counterbalance springs, proceed as follows:

   A. Remove the cotter pin and clevis pin securing the spring shackle to the counterbalance arm. Do not remove the other clevis pin.

   B. Move the shackle up or down on the counterbalance arm until it is aligned with the desired hole on the arm. Install the clevis pin and cotter pin.

Installing the Counterbalance Springs on 32 Inch Cutting Units

1. Mount a spring anchor to the rear inboard side of each front cutting unit lift tab with 2 bolts (1/4 x 3/4 inch) and locknuts, as shown in Figure 14.

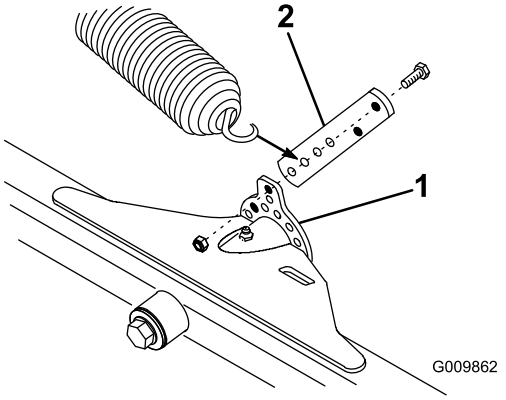


Figure 14

1. Cutting unit lift tab
2. Spring anchor

2. On the front cutting units, hook the spring into the second hole from the bottom (#3 position) in the spring anchor (Figure 14).

   Note: Selecting the #4 hole position (increasing the spring tension) will reduce the weight on the inboard end of the cutting unit, increase the weight on the outboard end of the cutting unit, and increase traction. Selecting the #2 hole position has the opposite affect.

3. On the rear cutting unit, hook the spring into the top hole on the rear cutting unit lift tab.

   Note: Increasing the spring tension will reduce the weight on the inboard end of the cutting unit, increase the weight on the outboard end of the cutting unit, and increase traction. Decreasing the spring tension has the opposite affect.

4. Secure the other end of the spring to the appropriate hole (see below) on the front and rear counterbalance arms (Figure 15 and Figure 16) with the spring shackle with the chain, clevis, clevis pin, and cotter pin.

   - 5 blade reels—third hole from the top
   - 8 blade reels—second hole from the top
   - Reels with baskets—top hole

   Note: On rear counterbalance spring, install the vinyl cover over the spring before installing.

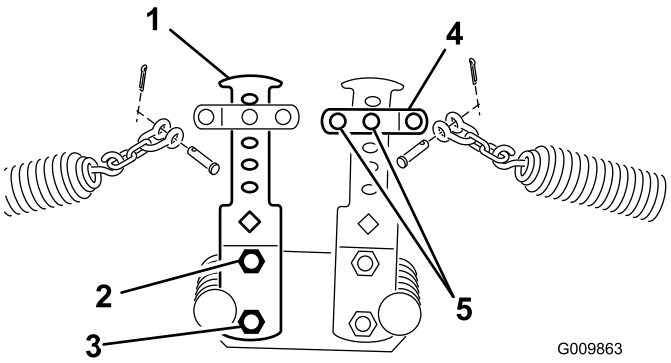


Figure 15

1. Counterbalance arm
2. Top bolt
3. Bottom bolt
4. Spring shackle
5. Clevis pin and cotter pin
6. Chain, clevis, and clevis pin

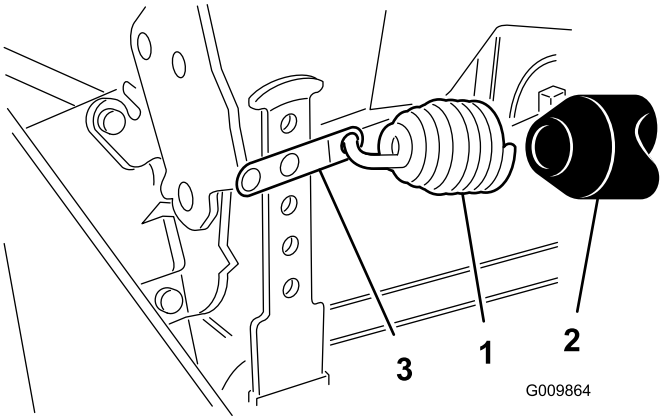


Figure 16

1. Rear counterbalance spring
2. Vinyl cover
3. Spring shackle

5. Secure the other end of the spring to the second hole from the top with the spring shackle with the chain, clevis, clevis pin, and cotter pin (Figure 15).
6. On the rear counterbalance arms, install the vinyl cover over the spring before hooking the other end of the spring into the spring shackle in the second hole from the top (Figure 16).
7. Insert the breaker bar into the square hole in the counterbalance arm and pivot the arm back to its original position, aligning the mounting holes.
8. Secure the bottom of the counterbalance arm to the frame with the bolt and nut previously removed. Tighten the top bolt (Figure 15).
9. To tension the counterbalance springs proceed as follows:

   A. Remove the cotter pin and clevis pin securing the spring shackle to the counterbalance arm. Do not remove the other clevis pin.

B. Move the shackle up or down on the counterbalance arm until it is aligned with the desired hole on the arm. Install the clevis pin and cotter pin.

8

Adding Rear Ballast

Parts needed for this procedure:

Varies	Rear weight kit(s)

Procedure

This unit complies with ANSl B71.4–2004 Standards and all applicable European requirements when equipped with rear ballast. Use the following chart to determine the weight or combinations of weights needed.

Cutting Unit Configuration	Weight Kits Required
Standard machine with 27 inch cutting units	(1) 83-9370 (2) 83-9390
Standard machine with 27 inch cutting units & baskets	(1) 83-9370 (3) 83-9390 (2) 94-3698
Standard machine with three wheel drive kit & 27 inch cutting units	(1) 83-9390 (1) 83–9370
Standard machine with three wheel drive kit, 27 inch cutting units & baskets	(2) 83-9390 (2) 94-3698 (1) 83–9370
Standard machine with 32 inch cutting units	(3) 83-9390 (2) 94-3698 (1) 83–9370
Standard machine with 32 inch cutting units & three wheel drive kit	(1) 83-9370 (2) 83-9390 (1) 94–3698

Note: All configurations require calcium chloride in the rear tire. The tire should be filled to approximately 75% capacity (level with the valve at the top) (60 lb (27 kg) fluid or 74 lb (33.5 kg) tire and fluid).

Important: If a puncture occurs in a tire with calcium chloride, remove the unit from the turf area as quickly as possible. To prevent possible damage to the turf, immediately soak the affected area with water.

Either Type 1 (77%) or Type 2 (94%) commercial calcium chloride flake may be used.

Plain water freezes solid at 32°F (0°C). The 3-1/2 lb. (1.6 kg) calcium chloride to 1 gallon (3.8 l) of water solution is slush free to -12°F (-24°C) and will freeze solid at -52°F (-46°C). The 5 lb. (2.3 kg) per gallon (liter) solution is slush free to -50° F (-45°C) and will freeze solid at -62°F (-52°C).

9

Activating and Charging the Battery

No Parts Required

Procedure

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.

If the battery is not filled with electrolyte or activated, bulk electrolyte with 1.260 specific gravity must be purchased from a local battery supply outlet and added to the battery.

1. Remove the filler caps from the battery and slowly fill each cell until the electrolyte is just above the plates.

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

- **Do not drink electrolyte and avoid contact with skin, eyes or clothing. Wear safety glasses to shield your eyes and rubber gloves to protect your hands.**
- **Fill the battery where clean water is always available for flushing the skin.**

2. Replace the filler caps with the vents pointing to the rear (toward the fuel tank) and connect a 3 to 4 amp battery charger to the battery posts. Charge the battery at a rate of 3 to 4 amperes for 4 to 8 hours.

Charging the battery produces gasses that can explode.

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

3. When the battery is charged, disconnect the charger from the electrical outlet and battery posts.
4. Remove the filler caps. Slowly add electrolyte to each cell until the level is up to the fill ring. Install the filler caps.

   Important: Do not overfill the battery. Electrolyte will overflow onto other parts of the machine and severe corrosion and deterioration will result.
5. Install the positive cable (red) to the positive (+) terminal and the negative cable (black) to the negative (-) terminal of the battery and secure them with bolts and nuts. Slide the rubber boot over the positive terminal to prevent a possible short from occurring.

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 *connect* the positive (red) battery cable before connecting the negative (black) cable.**

10

Breaking-in a New Machine

No Parts Required

Procedure

When the engine is started for the first time, or after overhauling the engine, operate the machine in forward and reverse for one to two minutes. Also operate the lift lever and reel drive switch to be sure of proper operation of all parts.

Turn the steering wheel to the left and right to check the steering response. Then shut the engine off and check for oil leaks, loose parts, and any other noticeable malfunctions.

Shut the engine off and wait for all moving parts to stop before checking for oil leaks, loose parts, and other malfunctions.

Product Overview

Controls

Traction and Stopping Pedal

The traction pedal (Figure 17) has three functions: to make the machine move forward, to move it backward, and to stop the machine. Using the heel and toe of the right foot, press the top of the pedal to move forward and the bottom of the pedal to move backward or to assist in stopping when moving forward (Figure 18). Also, allow the pedal to move or move it to the neutral position to stop the machine. Do not the rest heel of your foot on reverse when operating forward.

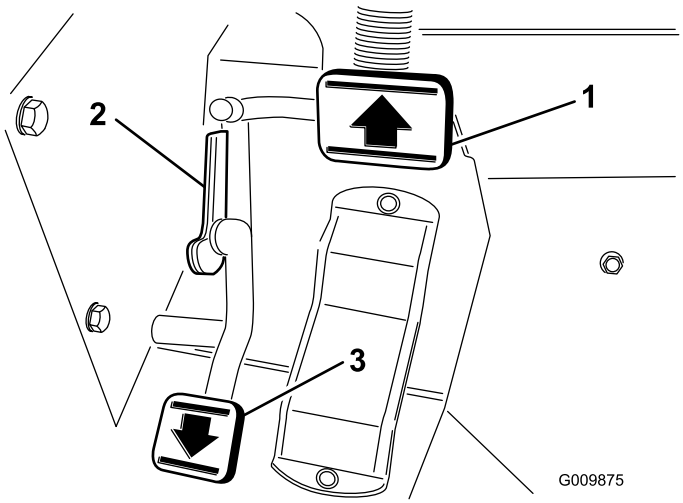


Figure 17

1. Traction pedal
2. Speed selector
3. Pedal stop

Figure 18

Speed Selector

The speed selector is a cam lever at the side of the traction pedal (Figure 17) that can be rotated to maintain desired speed. The reverse pedal stop (under the pedal) (Figure 17) is set at the factory to provide 3 MPH maximum speed in reverse.

Starter Switch

The starter switch (Figure 19), used to start, stop, and preheat the engine, has three positions: Off, On, and Start. Rotate the key clockwise to the On position and hold it until the glow plug light goes out. Then rotate the key clockwise to the Start position to engage the starter motor. Release the key when the engine starts. The key will move automatically to the On position. To shut the engine off, rotate the key counterclockwise to the Off position. Remove the key from the switch to prevent accidental starting.

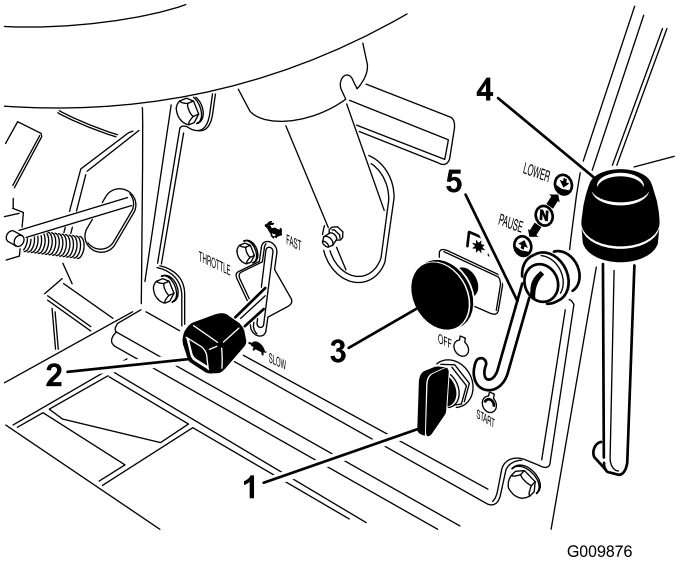


Figure 19

1. Starter switch
2. Throttle
3. Cutting unit drive switch
4. Cutting unit lift lever
5. Cutting unit lift lever lock

Throttle

Moving the throttle (Figure 19) upward increases the engine speed and downward decreases the engine speed.

Cutting Unit Lift Lever

The lift lever (Figure 19) has three positions: Lower, Raise, and Neutral. To lower the cutting units to the ground, move the lift lever forward. When lowering the cutting units, make sure that the front hydraulic cylinder is completely retracted before releasing the lift lever. The cutting units will not operate unless the cylinder is retracted. To raise the cutting units, pull the lift lever rearward to the Raise position.

Cutting Unit Lift Lever Lock

The cutting unit lift lever lock (Figure 19) locks cutting units in the raised position for transporting.

Cutting Unit Drive Switch

The switch (Figure 19) has two positions: Engage and Disengage. The push-pull switch operates a solenoid valve on the valve bank, to drive the cutting units.

Hour Meter

The hour meter (Figure 20) indicates the total hours of machine operation. The hour meter starts to function whenever the key switch is rotated to the On position.

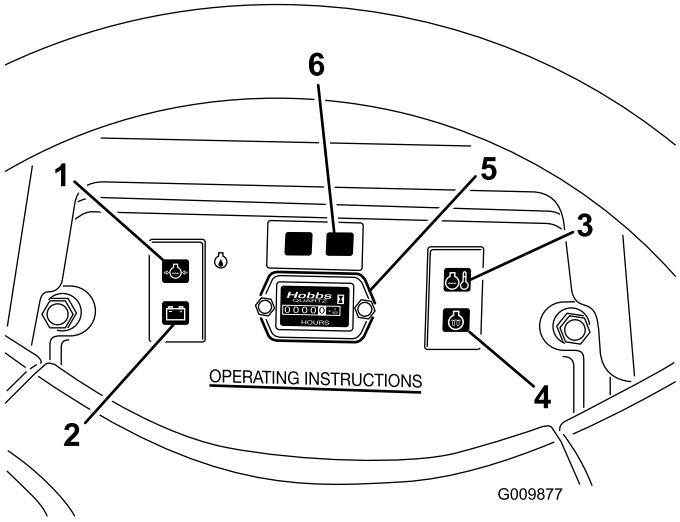


Figure 20

1. Oil pressure light
2. Alternator light
3. High water temperature shut-down light
4. Glow plug indicator light
5. Hour meter
6. Reel operating light

Oil Pressure Light

The oil pressure light (Figure 20) glows if the engine oil pressure drops below a safe level.

Water Temperature Light

The water temperature light (Figure 20) glows and the engine automatically shuts down when the engine coolant temperature gets too high.

Alternator Light

The alternator light (Figure 20) should be off when the engine is running. If it is on, check and repair the charging system as necessary.

Glow Plug Indicator

The indicator light (Figure 20) will glow when glow plugs are operating.

Reel Engage Indicator

The reel engage indicator light (Figure 20) will glow when reels are lowered to cutting position.

Parking Brake

Whenever the engine is shut off, engage the parking brake to prevent accidental movement of the machine. To engage the parking brake, pull back on the lever.

Reel Speed Control

To obtain the desired clip rate (reel speed), rotate the reel speed control knob (Figure 21) to the appropriate setting for the height-of-cut setting and mower speed.

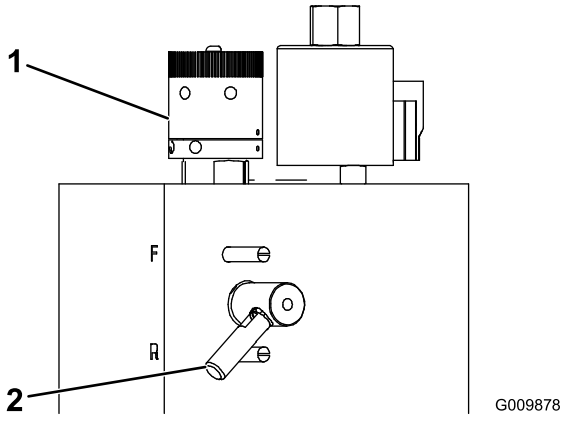


Figure 21

1. Reel speed control
2. Backlap control

Backlap Control

Rotate the knob (Figure 21) to R for backlapping and to F for mowing. Do not change the knob position when the reels are rotating.

Seat Adjustment

Move the lever on the side of the seat outward, slide the seat forward or rearward to the desired position, and release the lever to lock the seat into position.

Fuel Shut-Off Valve

Close the fuel shut-off valve, under the fuel tank (Figure 22), when storing the machine.

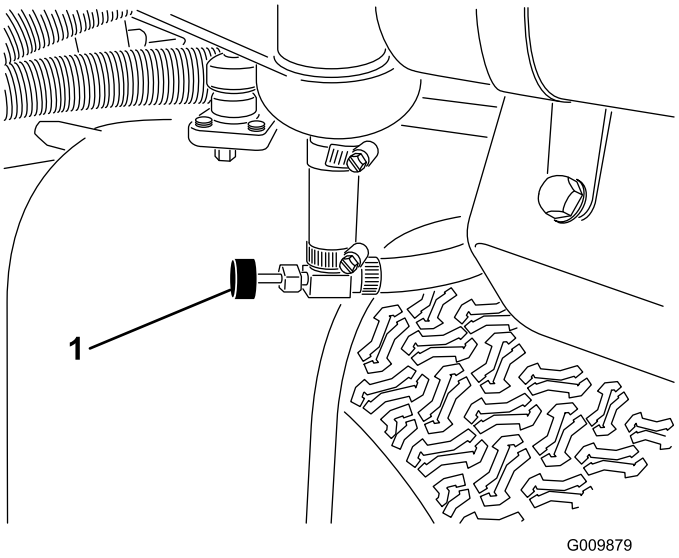


Figure 22

1. Fuel shut-off (under the fuel tank)

Specifications

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

Transport width with 27 inch cutting units	72 inches (183 cm)
Transport width with 32 inch cutting units	85 inches (216 cm)
Width of cut	76-1/2 inches (194 cm)
Length	96 inches (244 cm)
Height without the seat	44 inches (112 cm)
Weight of the traction unit without cutting units	1,066 lb (484 kg)
Transport speed	0–8 mph (0–13 kph)
Mowing speed	0–5 mph (0–8 kph)
Reverse speed	0–8 mph (0–13 kph)

Attachments/Accessories

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

Operation

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

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

Lower the cutting units to the ground, set the parking brake, and remove the key from the ignition switch before servicing or making adjustments to the machine.

Checking the Engine Oil Level

Service Interval: Before each use or daily

The engine is shipped with oil in the crankcase; however, the oil level must be checked before and after the engine is first started.

Crankcase capacity is approximately 3.5 qt. (3.3 l) with the filter.

Use high-quality engine oil that meets the following specifications:

- API Classification Level Required: CH-4, CI-4 or higher
- Preferred oil: SAE 15W-40 (above 0° F/-18° C)
- Alternate oil: SAE 10W-30 or 5W-30 (all temperatures)

Toro Premium Engine oil is available from your distributor in either 15W-40 or 10W-30 viscosity.

1. Park the machine on a level surface, stop the engine, set the parking brake, and remove the key from the ignition switch.
2. Remove the dipstick, wipe it clean, and install it, ensuring that it is fully seated (Figure 23).

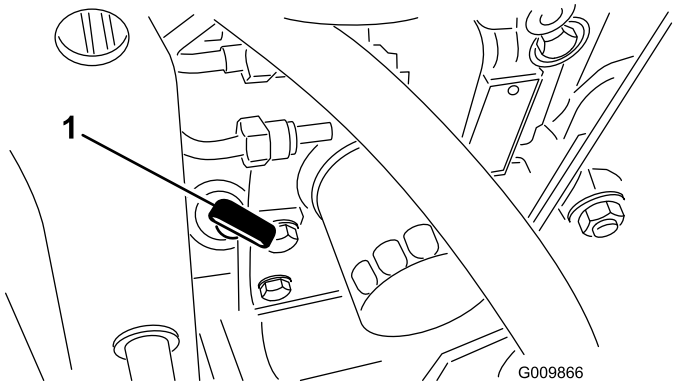


Figure 23

1. Dipstick

3. Remove the dipstick and check the oil level on the dipstick.

   The oil level should be up to the Full mark .

4. If the oil level is below the Full mark, remove the fill cap (Figure 24) and add oil until the level reaches the Full mark on the dipstick. **Do not overfill.**

   Important: Be sure to keep the engine oil level between the upper and lower limits on the oil gauge. Engine failure may occur as a result of over filling or under filling the engine oil.

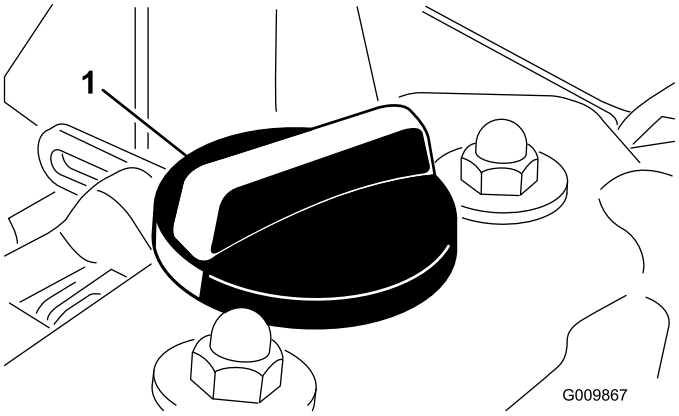


Figure 24

1. Oil fill cap

Important: When adding engine oil or filling oil, there must be clearance between the oil fill device and the oil fill hole in the valve cover as shown in figure 19. This clearance is necessary to permit venting when filling, which prevents oil from overrunning into the breather.

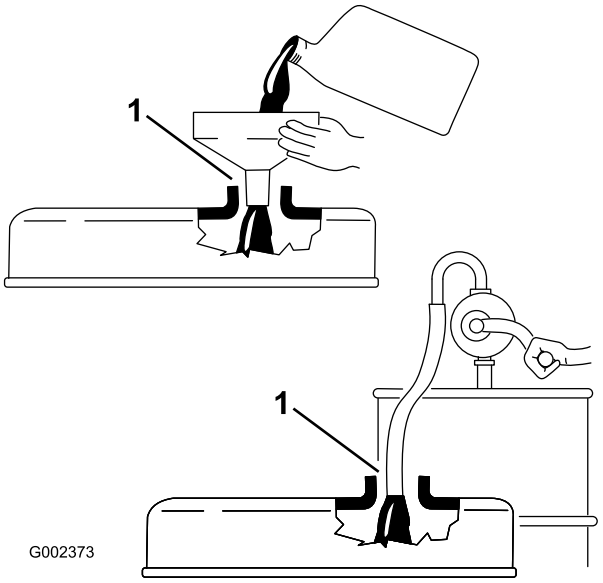


Figure 25

1. Clearance

5. Install the oil fill cap and close the hood.
6. Start and run the engine at idle for 30 seconds. Shut the engine off. Wait 30 seconds and check the oil level. If needed, add oil to raise the level to the Full mark on the dipstick.

Adding Fuel

Use only clean, fresh diesel fuel or biodiesel fuel with low (<500 ppm) or ultra low (<15 ppm) sulfur content. The minimum cetane rating should be 40. Purchase fuel in quantities that can be used within 180 days to ensure fuel freshness.

Fuel tank capacity: 6.5 gallons (24.6 l)

Use summer grade diesel fuel (No. 2-D) at temperatures above 20° F (-7° C) and winter grade (No. 1-D or No. 1-D/2-D blend) below that temperature. Use of winter grade fuel at lower temperatures provides lower flash point and cold flow characteristics which will ease starting and reduce fuel filter plugging.

Use of summer grade fuel above 20° F (-7° C) will contribute toward longer fuel pump life and increased power compared to winter grade fuel.

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 fuel tank or conditioner opening.**
- **Keep fuel away from eyes and skin.**

Biodiesel Ready

This machine can also use a biodiesel blended fuel of up to B20 (20% biodiesel, 80% petrodiesel). The petrodiesel portion should be low or ultra low sulfur. Observe the following precautions:

- The biodiesel portion of the fuel must meet specification ASTM D6751 or EN14214.
- The blended fuel composition should meet ASTM D975 or EN590.
- Painted surfaces may be damaged by biodiesel blends.
- Use B5 (biodiesel content of 5%) or lesser blends in cold weather.
- Monitor seals, hoses, gaskets in contact with fuel as they may be degraded over time.
- Fuel filter plugging may be expected for a time after converting to biodiesel blended.
- Contact your distributor if you wish for more information on biodiesel.

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.**
- **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.**
- **Do not operate without entire exhaust system in place and in proper working condition.**

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

- **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 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.**

Note: If possible, fill the fuel tank after each use. This will minimize possible buildup of condensation inside the fuel tank.

1. Park the machine on a level surface.
2. Using a clean rag, clean the area around the fuel tank cap.
3. Remove the cap from the fuel tank (Figure 26).

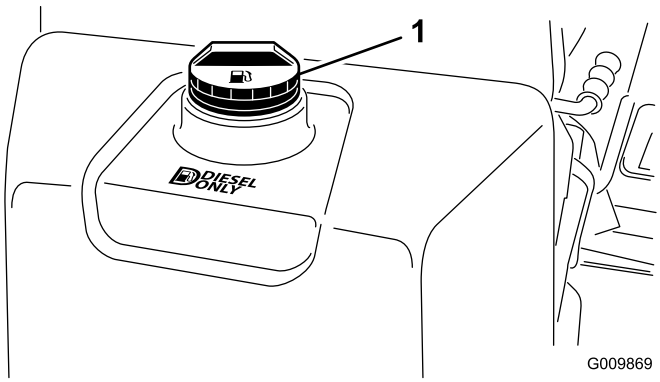


Figure 26

1. Fuel tank cap

4. Fill the tank to about 1 inch (25 mm) below the top of the tank (bottom of the filler neck). **Do not overfill.**
5. Install the fuel tank cap tightly.
6. Wipe up any fuel that may have spilled to prevent a fire hazard.

Checking the Cooling System

Service Interval: Before each use or daily

Clean debris off of the screen, oil cooler, and front of the radiator daily and more often if conditions are extremely dusty and dirty. Refer to Removing Debris from the Cooling System.

The cooling system is filled with a 50/50 solution of water and permanent ethylene glycol antifreeze. Check the level of coolant in the expansion tank at the beginning of each day before starting the engine. The capacity of the cooling system is 5.25 quarts (5 l).

If the engine has been running, the pressurized, hot coolant can escape and cause burns.

- **Do not open the radiator cap when the engine is running.**
- **Use a rag when opening the radiator cap, and open the cap slowly to allow steam to escape.**

1. Carefully remove the radiator cap (Figure 27).

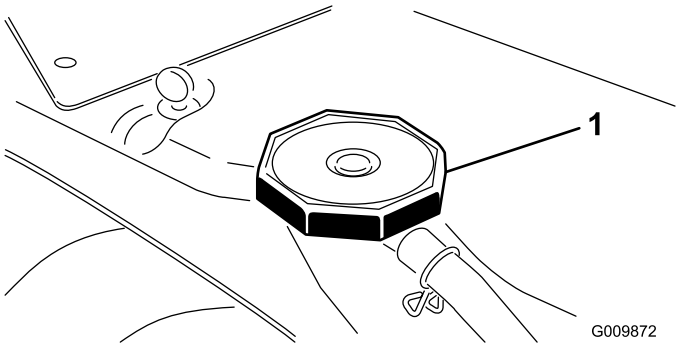


Figure 27

1. Radiator cap

2. Check the level of coolant in the radiator and expansion tank (Figure 28).

   The radiator should be filled to the middle of the horizontal filler neck. The expansion tank should be filled half way between the Full and Low marks.

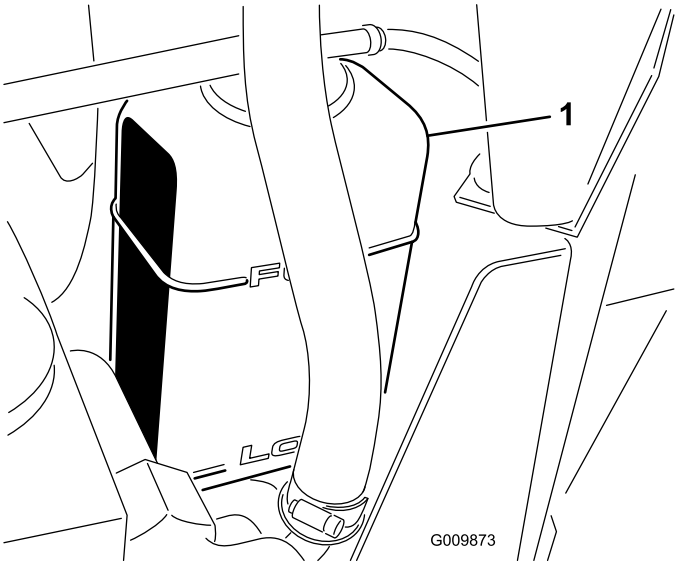


Figure 28

1. Expansion tank

3. If the coolant level is low, replenish the system. **Do not overfill.**
4. Install the radiator and expansion tank caps.

Checking the Hydraulic Fluid

Service Interval: Before each use or daily

The hydraulic reservoir is filled at the factory with approximately 3.3 US gallons (12.5 l) of high quality hydraulic fluid. **Check the level of the hydraulic fluid before the engine is first started and daily thereafter.** The recommended replacement fluid is as follows:

> **Toro Premium All Season Hydraulic Fluid** (Available in 5 gallon pails or 55 gallon drums. See the parts catalog or your Toro distributor for part numbers.)

Alternate fluids: If the Toro fluid is not available, other fluids may be used provided they meet all the following material properties and industry specifications. Toro does not recommend the use of synthetic fluid. Consult with your lubricant distributor to identify a satisfactory product.

Note: Toro will not assume responsibility for damage caused by improper substitutions; use only products from reputable manufacturers who will stand behind their recommendation.

High Viscosity Index/Low Pour Point Anti-wear Hydraulic Fluid, ISO VG 46

Material Properties:

Viscosity, ASTM D445	cSt @ 40°C 44 to 48 cSt @ 100°C 7.9 to 8.5
Viscosity Index ASTM D2270	140 to 160
Pour Point, ASTM D97	-34°F to -49°F

Industry Specifications:

Vickers I-286-S (Quality Level), Vickers M-2950-S (Quality Level), Denison HF-0

Note: Many hydraulic fluids are almost colorless, making it difficult to spot leaks. A red dye additive for the hydraulic system oil is available in 2/3 oz. (20 ml) bottles. One bottle is sufficient for 4-6 gal (15-22 l) of hydraulic oil. Order part no. 44-2500 from your authorized Toro distributor.

Biodegradable Hydraulic Fluid - Mobil 224H

Toro Biodegradable Hydraulic Fluid (Available in 5 gallon pails or 55 gallon drums. See parts catalog or Toro distributor for part numbers.)
Alternate fluid: Mobil EAL 224H

Note: This is vegetable-oil based biodegradable oil tested and approved by Toro for this model. This fluid is not as resistant to high temperatures as standard fluid, so be sure to follow the recommended fluid change intervals with this fluid. Contamination by mineral-based hydraulic fluids will change the biodegradability and toxicity of this oil. When changing from standard fluid to the biodegradable type, be certain to follow the approved flushing procedure. Contact your local Toro Distributor for details.

1. Position the machine on a level surface, lower the cutting units, and stop the engine.
2. Check the fluid level by viewing it in the sight gauge (Figure 29).

   If the fluid is cold, the level should be at the bottom of the gauge. If the fluid is hot, the level should be at the center of the gauge.

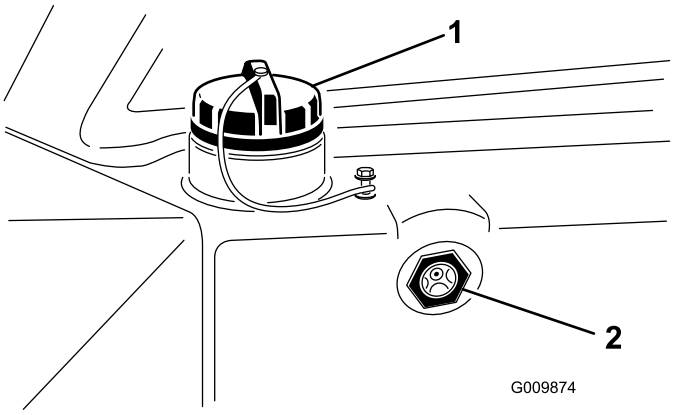


Figure 29

1. Hydraulic reservoir cap 2. Sight gauge

3. To prevent system contamination, clean the top of the hydraulic fluid containers before puncturing. Ensure that the pour spout and funnel are clean. Also, clean around the hydraulic reservoir cap.
4. If the fluid level is not at least at the bottom of the gauge when it is cold, remove the cap from the hydraulic fluid reservoir (Figure 29) and slowly fill the reservoir with high quality hydraulic fluid until the level in it reaches the bottom of the sight gauge. **Do not overfill.**
5. Install the reservoir cap. Wipe up any fluid that may have spilled.

Checking the Tire Pressure

Service Interval: Before each use or daily

Check to ensure that the air pressure in the tires is 16–20 psi (110–138 kPa).

Important: Maintain the recommended pressure in all tires to ensure a good quality-of-cut and proper machine performance. *Do not under-inflate.*

Note: The tires are over-inflated for shipping. Therefore, release some of the air to reduce the pressure before using the machine for the first time.

Checking the Reel to Bedknife Contact

Service Interval: Before each use or daily

Each day before operating, check reel to bedknife contact, regardless if the quality of cut had previously been acceptable. There must be light contact across the full length of the reel and the bedknife (refer to Adjusting the Reel to Bedknife in the cutting unit *Operator's Manual*).

Check the Torque of the Wheel Nuts

Service Interval: After the first hour

After the first 10 hours

Every 250 hours

Torque the wheel lug nuts to 45 to 65 ft-lb (61 to 88 N-m).

Failure to maintain proper torque of the wheel nuts could result in personal injury.

Bleeding the Fuel System

Bleed the fuel system before starting the engine if any of the following situations have occurred:

- Initial start up of a new machine.
- Engine has ceased running due to lack of fuel.
- Maintenance has been performed upon fuel system components; i.e., filter replaced, separator serviced, etc.

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.**
- **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.**
- **Do not operate without entire exhaust system in place and in proper working condition.**

1. Park the machine on a level surface and ensure that the fuel tank is at least half full.
2. Open the hood.
3. Loosen the vent plug on top of fuel filter/water separator (Figure 30).

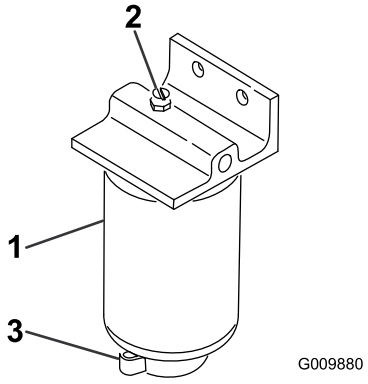


Figure 30

1. Fuel filter/water separator
2. Vent plug
3. Drain valve

4. Turn the key in the ignition switch to the On position. The electric fuel pump will begin operation, thereby forcing air out around the vent plug. Leave the key in the On position until a solid stream of fuel flows out around the plug.
5. Tighten the plug and turn the key to the Off position.

Note: Normally, the engine should start after the above bleeding procedures are followed. However, if the engine does not start, air may be trapped between injection pump and injectors; refer to Bleeding Air from the Injectors.

Starting and Stopping the Engine

Important: You must bleed the fuel system before starting the engine if you are starting the engine for the first time, the engine has stopped due to lack of fuel, or you have performed maintenance on the fuel system; refer to Bleeding the Fuel System.

Starting the Engine

1. Sit on the seat, keep your foot off of the traction pedal so that it is in Neutral, engage the parking brake, set the throttle to the Fast position, and ensure that the reel drive switch is in the Disengage position.
2. Turn the ignition switch to the On position and hold it until the glow plug light goes out, then rotate the key clockwise to the Start position to engage the starter motor. Release the key when the engine starts.

   Important: To prevent overheating of the starter motor, do not engage the starter longer than 10 seconds. After 10 seconds of continuous cranking, wait 60 seconds before engaging the starter motor again.
3. Run the engine at low idle speed until it warms up.

Stopping the Engine

1. Move the reel drive switch to the Disengage position, set the parking brake, and move the throttle to the low idle position.
2. Turn the key to the Off position and remove it from the switch.
3. Close the fuel shut-off valve before storing the machine.

Checking the Operation of the Interlock Switches

Service Interval: Before each use or daily

If the 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.**

1. Ensure that the parking brake is set and all bystanders are away from the area of operation. Keep hands and feet away from the cutting units.
2. With the operator off of the seat, the backlap knob rotated counterclockwise, the traction pedal in neutral, parking brake engaged and the reel switch in the Off position, the engine should start. If either the traction pedal is pressed or the reel switch is turned On, with the operator off of the seat, the engine should stop. Correct the problem if it is not operating properly.
3. With the engine running, the operator off of the seat, and the backlap knob rotated clockwise, the engine should not stop when the reel switch is turned On. Correct the problem if it is not operating properly.
4. With the engine running, the operator off of the seat, and the backlap knob rotated clockwise, the engine should stop if the traction pedal is engaged. Correct the problem if it is not operating properly.
5. With the operator on the seat, the engine running, and the reel switch in the On position, the dash indicator light should be glowing and the reel motors turning when the lift cylinder is fully retracted. As the lift cylinder is extended, the light should go out and the reel motors should stop turning. Correct the problem if it is not operating properly.
6. With the operator on the seat, the engine must not start with either the reel switch engaged or the traction control engaged. Correct the problem if it is not operating properly.

Towing the Traction Unit

In case of an emergency, the machine can be towed for a short distance. However, we do not recommend this as a standard procedure.

Important: Do not tow the machine faster than 2 to 3 MPH because the drive system may become damaged. If the machine must be moved a

considerable distance, transport it on a truck or trailer.

1. Locate the bypass valve on the pump (Figure 31) and rotate it 90° (the bypass valve lever should be horizontal when it is open).

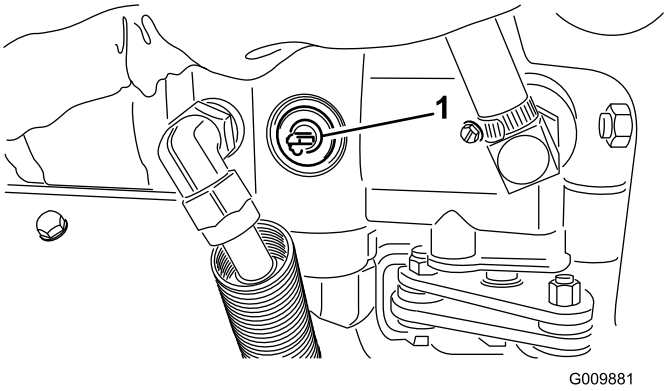


Figure 31

1. Bypass valve

2. Before starting the engine, close the bypass valve by rotating it 90° (the bypass valve lever should be vertical when closed). Do not start the engine when the valve is open.

Operating Characteristics

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.

Practice operating the machine and become thoroughly familiar with it. Because of its hydrostatic transmission, its characteristics differ from many turf maintenance machines. Points to consider when operating are the traction drive, engine speed, and load on the cutting units. Regulate the traction pedal to keep the engine RPM high and somewhat constant while mowing to maintain adequate power for the traction and cutting units. Adjust the speed selector to maintain constant ground speed and quality of cut. However, when on hilly terrain, do not use the speed selector.

Follow the operating guidelines presented in this manual and know how to operate the machine safely on all types of terrain. Hills (or slopes) over 15 degrees should be traversed or mowed up and down, not side to side, and hills over 20 degrees should generally be avoided unless special safeguards, skills, and conditions exist. Always plan well ahead to avoid the need for sudden stops, starts, or turns. To stop, use the reverse pedal for braking. Before stopping the engine, disengage all controls, move the throttle to the Slow position, and set the parking brake.

Setting the Reel Speed

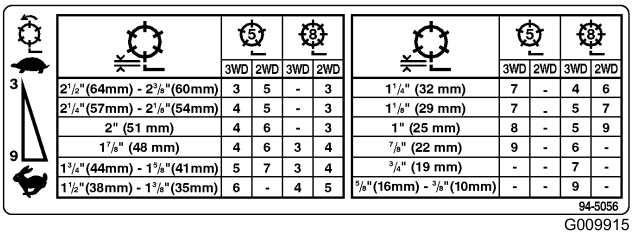


Figure 32

To achieve a consistent, high quality-of-cut and a uniform after cut appearance, it is important that the reel speed be matched to the height-of-cut. Adjust the reel speed controls as follows:

1. Verify the height-of-cut setting on the cutting units. Using the column of the chart listing either 5 or 8 blade reels, find the height of cut listing nearest the actual height-of-cut setting. Look across the chart to find the number corresponding to that height-of-cut.
2. Turn the reel speed control knob (Figure 33) to the number setting determined in step 1.

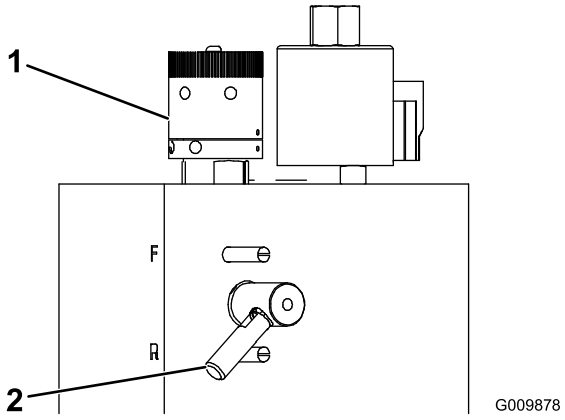


Figure 33

1. Reel speed control knob 2. Backlap knob

3. Operate the machine for several days, then examine the cut to ensure satisfaction with the quality-of-cut. The reel speed knob may be set one position on either side of the position indicated on the chart to account for differences in grass condition, grass length removed, and personal preference of the superintendent.

Variable Reel Speed Selection Chart—5 Blade Reel

Height of Cut (inches)	3WD Speeds 3–5 MPH	2WD Speeds 6–7 MPH
2-1/2 (2.50)	3	5
2-3/8 (2.38)	3	5
2-1/4 (2.25)	4	5
2-1/8 (2.13)	4	5
2 (2.00)	4	6
1-7/8 (1.88)	4	6
1-3/4 (1.75)	5	7
1-5/8 (1.63)	5	7
1-1/2 (1.50)	6	9*
1-3/8 (1.38)	6	9*
1-1/4 (1.25)	7	9*
1-1/8 (1.13)	7	9*
1 (1.00)	8	9*
7/8 (.88)	9	9*
3/4 (.75)	9*	9*
5/8 (.63)	9*	9*
1/2 (.50)	9*	9*
3/8 (.38)	9*	9*

* This height-of-cut and/or mowing speed not recommended for 5 blade reels.

Variable Reel Speed Selection Chart—8 Blade Reel

Height of Cut (inches)	3WD Speeds 3–5 MPH	2WD Speeds 6–7 MPH
2-1/2 (2.50)	3*	3
2-3/8 (2.38)	3*	3
2-1/4 (2.25)	3*	3
2-1/8 (2.13)	3*	3
2 (2.00)	3*	3
1-7/8 (1.88)	3	4
1-3/4 (1.75)	3	4
1-5/8 (1.63)	3	4
1-1/2 (1.50)	4	5
1-3/8 (1.38)	4	5
1-1/4 (1.25)	4	6
1-1/8 (1.13)	5	7
1 (1.00)	5	9
7/8 (.88)	6	9*
3/4 (.75)	7	9*

Variable Reel Speed Selection Chart—8 Blade Reel (cont'd.)

Height of Cut (inches)	3WD Speeds 3–5 MPH	2WD Speeds 6–7 MPH
5/8 (.63)	9	9*
1/2 (.50)	9	9*
3/8 (.38)	9	9*

* This height-of-cut and/or mowing speed not recommended for 8 blade reels.

Training Period

Before mowing with the machine, find a clear area and practice starting and stopping, raising and lowering cutting units, turning, etc. This training period will be beneficial to the operator in gaining confidence in the performance of the machine.

Before Mowing

Inspect the area for debris and clear area if necessary. Determine the best direction to mow on the previous mowing direction. Always mow in an alternate pattern from the previous mowing, so that the grass blades will be less apt to lay down and therefore be difficult to gather between the reel blades and bedknife.

Transport Operation

Be sure that the cutting units are in the fully up position, move the traction pedal stop from under the pedal to allow full traction pedal travel, and place the throttle control in the FAST position. While operating on slopes and uneven terrain, always reduce your speed and use extreme caution before turning to reduce the risk of tipping or losing control. Watch carefully for and avoid holes in the terrain, sudden drop-offs, and other hidden hazards. To prevent costly damage and down time, familiarize yourself with the width of the machine. Do not attempt to pass between immovable objects placed close together.

Inspection and Clean-Up After Mowing

At the completion of the mowing operation, thoroughly wash the machine with a garden hose—without a nozzle—so that excessive water pressure will not cause contamination and damage to the seals and bearings.

Make sure that the radiator screen, radiator, and oil cooler are kept free of dirt or grass clippings. After

cleaning, it is recommended that the machine be inspected for possible hydraulic fluid leaks, damage or wear to the hydraulic and mechanical components, and the cutting units checked for sharpness and proper reel to bedknife adjustment.

Standard Control Module (SCM)

The Standard Control Module is a potted electronic device produced in a one size fits all configuration. The module uses solid state and mechanical components to monitor and control standard electrical features required for safe product operation.

The module monitors inputs including neutral, parking brake, PTO, start, backlap, and high temperature. The module energizes outputs including PTO, Starter, and ETR (energize to run) solenoid.

The module is divided into inputs and outputs. Inputs and outputs are identified by green LED indicators mounted on the printed circuit board.

The start circuit input is energized by 12 VDC. All other inputs are energized when the circuit is closed to ground. Each input has a LED that is illuminated when the specific circuit is energized. Use the input LED's for switch and input circuit troubleshooting.

Output circuits are energized by an appropriate set of input conditions. The three outputs include PTO, ETR, and START. Output LED's monitor relay condition indicating the presence of voltage at one of three specific output terminals.

Output circuits do not determine output device integrity so electrical troubleshooting includes output LED inspection and conventional device and wire harness integrity testing. Measure disconnected component impedance, impedance through wire harness (disconnect at SCM), or by temporarily "test energizing" the specific component.

The SCM does not connect to an external computer or hand held device, can not be re–programmed, and does not record intermittent fault troubleshooting data.

The decal on the SCM only includes symbols. Three LED output symbols are shown in the output box. All other LED's are inputs. Figure 34 identifies the symbols.

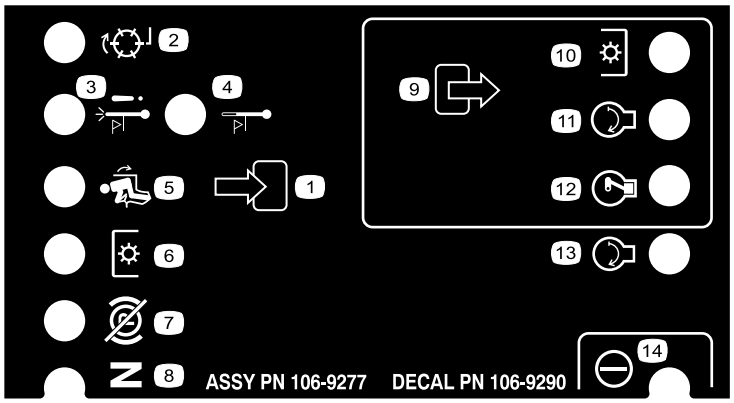


Figure 34

1. Input
2. Backlap
3. High temp shutdown
4. High temp warning (Not used)
5. In seat
6. PTO switch
7. Park brake off
8. Neutral
9. Output
10. PTO
11. Start
12. ETR
13. Start
14. Power

Here are the logical troubleshooting steps for the SCM device.

1. Determine the output fault you are trying to resolve (PTO, Start, or ETR).
2. Move ignition switch to the On position and ensure the red power LED is illuminated.
3. Move all input switches to ensure all LED's change state.
4. Position input devices at appropriate position to achieve the appropriate output. Use the following logic chart to determine the appropriate input condition.
   - If specific output LED is illuminated without appropriate output function, check output

harness, connections, and component. Repair as required.

- If specific output LED is not illuminated, check both fuses.
- If specific output LED is not illuminated and inputs are in appropriate condition, install new SCM and determine if fault disappears.

Each row (across) in the logic chart below identifies input and output requirements for each specific product function. Product functions are listed in the left column. Symbols identify specific circuit condition including: energized to voltage, closed to ground, and open to ground.

	Inputs								Outputs		
Function	Power On	In Neutral	Start On	Brake Off	PTO On	In Seat	Hi Temp	Backlap	Start	ETR	PTO
Start	–	–	+	O	O	–	O	O	+	+	O
Run (off unit)	–	–	O	O	O	O	O	O	O	+	O
Run (on unit)	–	O	O	–	O	–	O	O	O	+	O
Mow	–	O	O	–	–	–	O	O	O	+	+
Backlap	–	–	O	O	–	O	O	–	O	+	+
Hi-Temp	–		O				–		O	O	O

Note: - Indicates a circuit closed to ground. - LED ON

O Indicates a circuit open to ground or de-energized - LED OFF

+ Indicates an energized circuit (clutch coil, solenoid, or start input) LED ON.

" " A Blank indicates a circuit that is not involved with the logic.

To troubleshoot, turn on the key without starting the engine. Identify the specific function that does not work and work across the logic chart. Inspect the condition of each input LED's to ensure it matches the logic chart.

If the input LED's are correct, check the output LED. If the output LED is illuminated but the device is not energized, measure available voltage at the output device, continuity of the disconnected device, and potential voltage on the ground circuit (floating ground). Repairs will vary depending on your findings.

Maintenance

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

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first hour	• Torque the wheel lug nuts to 45 to 65 ft-lb (61 to 88 N-m).
After the first 5 hours	• Change the hydraulic oil filter.
After the first 8 hours	• Check the condition and tension of the alternator belt. • Check the condition and tension of the hydraulic pump belt.
After the first 10 hours	• Torque the wheel lug nuts to 45 to 65 ft-lb (61 to 88 N-m).
After the first 50 hours	• Change the engine oil and filter. • Check the engine RPM (idle and full throttle).
Before each use or daily	• Check the engine oil level. • Check the cooling system. • Check the hydraulic fluid level. • Check the tire pressure. • Check the reel to bedknife contact. • Check the operation of the interlock switches. • Drain water from the water separator. • Remove debris from the screen, oil coolers, and radiator. (Clean more frequently in dirty operating conditions.)
Every 25 hours	• Check the electrolyte level and clean the battery. • Check the battery cable connections.
Every 50 hours	• Grease the bearings and bushings. (Grease immediately after every washing regardless of the interval listed.) • Check the condition and tension of the alternator belt.
Every 100 hours	• Check the condition and tension of the hydraulic pump belt.
Every 150 hours	• Change the engine oil and filter.
Every 200 hours	• Service the air cleaner. (Service it more frequently in extremely dirty or dusty conditions.) • Change the hydraulic oil filter.
Every 250 hours	• Torque the wheel lug nuts to 45 to 65 ft-lb (61 to 88 N-m).
Every 400 hours	• Check the fuel lines and connections for deterioration, damage, or loose connections. • Replace the fuel filter canister. • Change the hydraulic fluid. • Check the engine RPM (idle and full throttle). • Inspect the traction linkage movement.
Every 1,000 hours	• Flush and replace the cooling system fluid and hoses. • Drain and flush the hydraulic tank (contact your local Toro distributor). • Replace all moving hoses. • Replace the thermostat. • Drain and flush the fuel tank. • Drain and flush the hydraulic tank.

Daily Maintenance Checklist

Duplicate this page for routine use.

Maintenance Check Item	For the week of:						
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Check the safety interlock operation.							
Check the brake operation.							
Check the engine oil level.							
Check the cooling system fluid level.							
Drain the water/fuel separator.							
Check the air filter, dust cup, and burp valve.							
Check the oil cooler, radiator and screen for debris.							
Check for unusual engine noises.[1]							
Check for unusual operating noises.							
Check the hydraulic system oil level.							
Check the hydraulic hoses for damage.							
Check for fluid leaks.							
Check the fuel level.							
Check the tire pressure.							
Check instrument operation.							
Check reel-to-bedknife adjustment.							
Check height-of-cut adjustment.							
Lubricate all grease fittings.[2]							
Touch up damaged paint.							

1. Check the glow plug and injector nozzles if hard starting, excess smoke, or rough running is noted.

2. Immediately after every washing, regardless of the interval listed

Notation for Areas of Concern

Inspection performed by:		
Item	**Date**	**Information**
1		
2		
3		
4		
5		
6		
7		
8		

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

Service Interval Chart

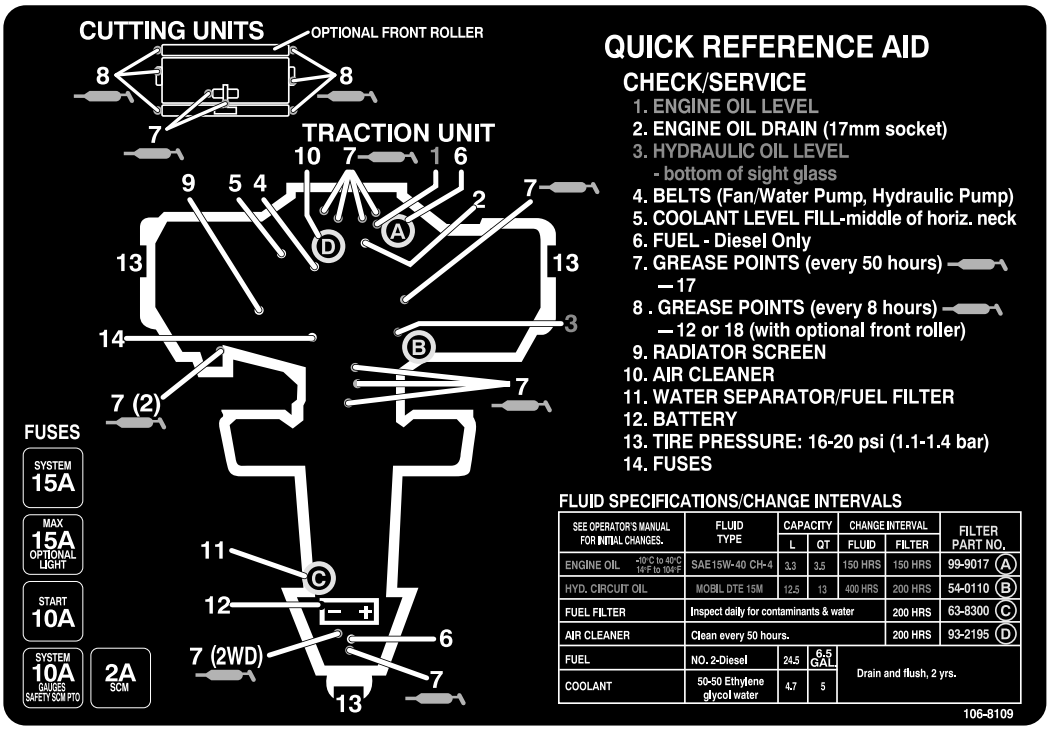
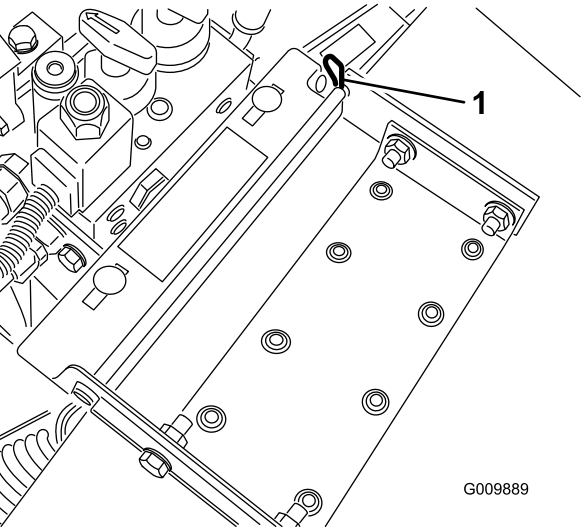


Figure 35



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

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

Premaintenance Procedures

Removing the Hood

Remove the hood to ease maintenance procedures in the engine area of the machine, as follows:

1. Unlatch and raise the hood.
2. Remove the cotter pin securing the hood pivot to the mounting brackets (Figure 36).

Figure 36

1. Cotter pin

3. Slide the hood to the right side, lift the other side, and pull it out of the brackets.
4. Reverse the procedure to install the hood.

Lubrication

Greasing the Bearings and Bushings

Service Interval: Every 50 hours (Grease immediately after every washing regardless of the interval listed.)

Lubricate all grease fittings for the bearings and bushings with No. 2 General Purpose Lithium Base Grease. Lubricate bearings and bushings **immediately** after every washing, regardless of the interval listed.

The grease fitting locations and quantities are as follows:

- Steering column (Figure 37)

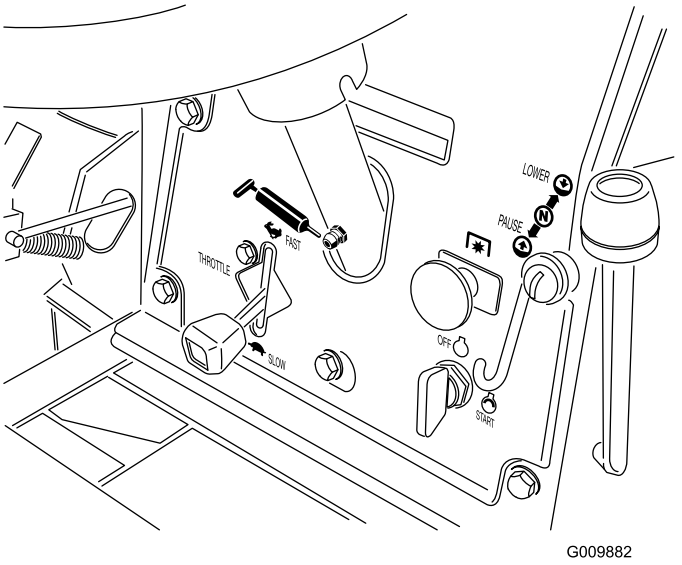


Figure 37

- Steering gears (2) (under the skirt below the steering sector) and the steering shaft (2) (Figure 38)

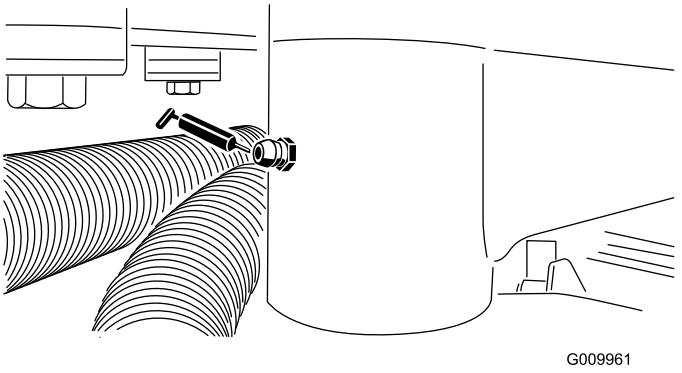


Figure 38

- Lift arms (3) (Figure 39)

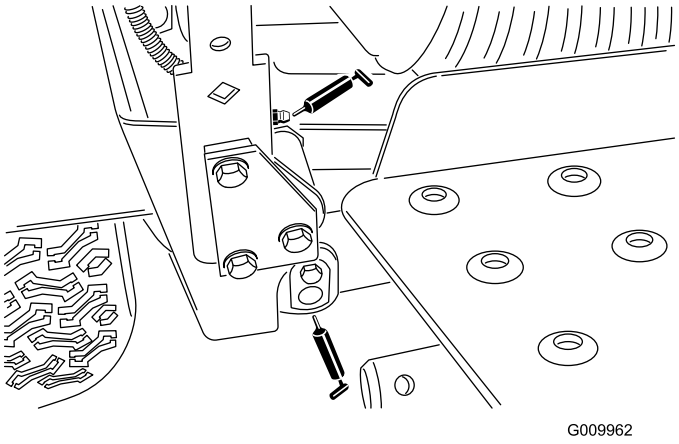


Figure 39

- Rear lift cylinder pivot (Figure 40)

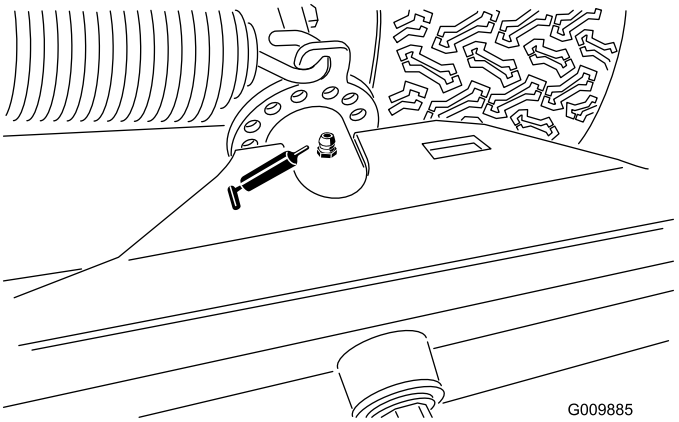


Figure 40

- Pivot rods (3) (Figure 41)

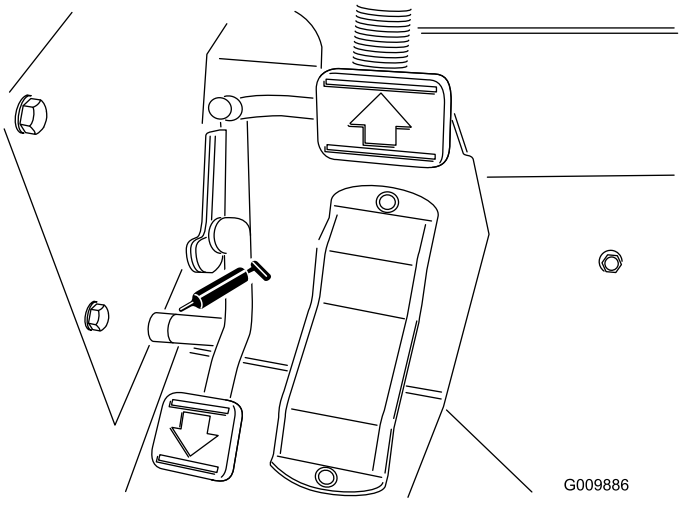


Figure 41

- Traction pedal pivot (Figure 42)

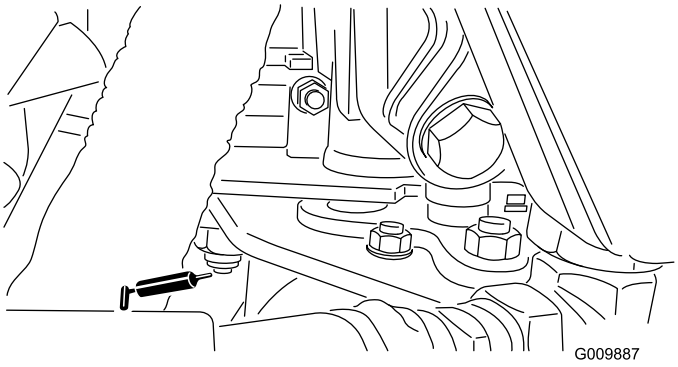


Figure 42

- Neutral centering (Figure 43)

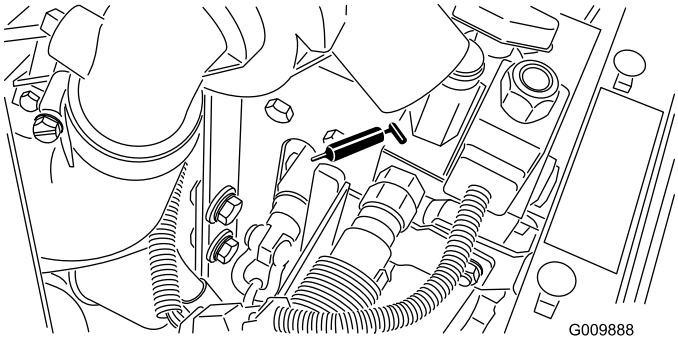


Figure 43

Engine Maintenance

Servicing the Air Cleaner

Service Interval: Every 200 hours (Service it more frequently in extremely dirty or dusty conditions.)

Check the air cleaner body for damage which could cause an air leak. Replace if damaged. Check the whole intake system for leaks, damage or loose hose clamps.

Service the air cleaner filter at the specified interval. Changing the air filter before it is necessary only increases the chance of dirt entering the engine when the filter is removed.

Important: Be sure the cover is seated correctly and seals with the air cleaner body.

1. Release the latches securing the air cleaner cover to the air cleaner body (Figure 44).

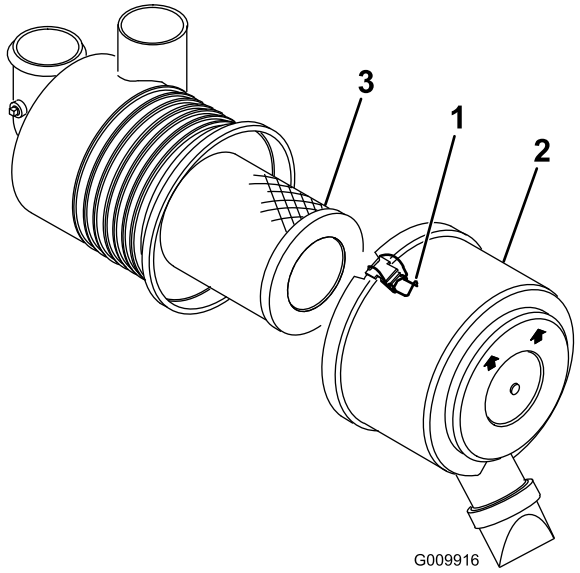


Figure 44

1. Air cleaner cover latch
2. Air cleaner cover
3. Filter

2. Remove the cover from the air cleaner body.
3. Before removing the filter, use low pressure air (40 psi (276 kPa), clean and dry) to help remove large accumulations of debris packed between outside of the filter and the canister. **Avoid using high pressure air which could force dirt through the filter into the intake tract.**

   This cleaning process prevents debris from migrating into the intake when the filter is removed.
4. Remove and discard the filter (Figure 44).

   Cleaning of the used element is not recommended due to the possibility of damage to the filter media.
5. Inspect the new filter for shipping damage, checking the sealing end of the filter and the body. **Do not use a damaged element.**
6. Insert the new filter by applying pressure to the outer rim of the element to seat it in the canister. **Do not apply pressure to the flexible center of the filter.**
7. Clean the dirt ejection port located in the removable cover. Remove the rubber outlet valve from the cover, clean the cavity and replace the outlet valve.
8. Install the cover orienting the rubber outlet valve in a downward position—between approximately 5:00 to 7:00 when viewed from the end.
9. Secure the latches.

Changing the Engine Oil and Filter

Service Interval: After the first 50 hours

Every 150 hours

1. Park the machine on a level surface, lower the cutting units, set the parking brake, and turn the engine off.
2. Remove the drain plug (Figure 45) and let the oil flow into a drain pan.

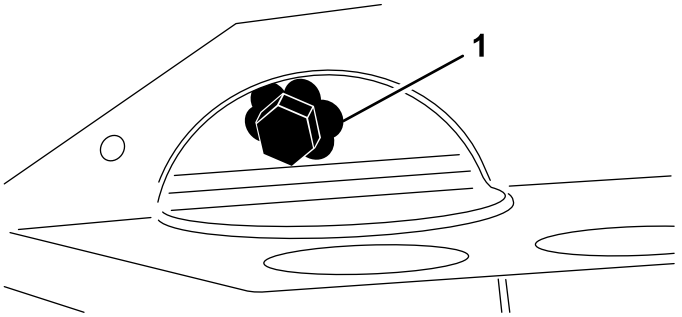


Figure 45

1. Oil drain plug

3. When the oil stops, install the drain plug.
4. Remove the oil filter (Figure 46).

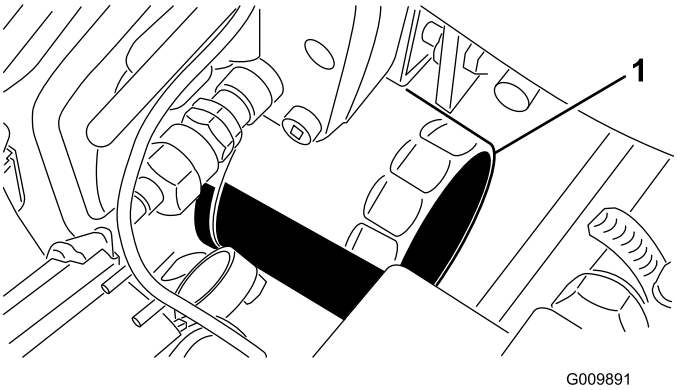


Figure 46

1. Oil filter

5. Apply a light coat of clean oil to the new filter seal.
6. Install the replacement oil filter to the filter adapter. Turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 1/2 to 2/3 turn.

   Important: Do not over-tighten the filter.
7. Add oil to the crankcase; refer to Checking the Engine Oil.

Fuel System Maintenance

Under certain conditions, diesel fuel and fuel vapors are highly flammable and explosive. A fire or explosion from fuel can burn you and others and can cause property damage.

- **Use a funnel and fill the fuel tank outdoors, in an open area, when the engine is off and is cold. Wipe up any fuel that spills.**
- **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 the 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 a clean, safety-approved container and keep the cap in place.**

Checking the Fuel Lines and Connections

Service Interval: Every 400 hours—Check the fuel lines and connections for deterioration, damage, or loose connections.

Draining Water from the Water Separator

Service Interval: Before each use or daily

1. Locate the fuel filter and place a clean container under it.
2. Loosen drain valve on bottom of filter canister and allow the contents to drain (Figure 47).

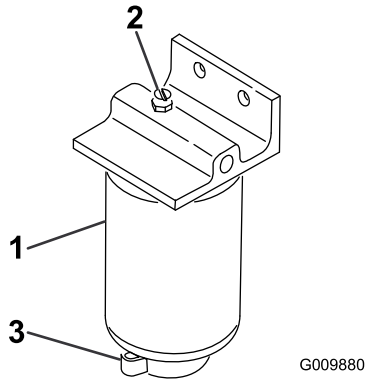


Figure 47

1. Fuel filter/water separator canister
2. Vent plug
3. Drain valve

3. Close and tighten the drain valve.

Replacing the Fuel Filter Canister

Service Interval: Every 400 hours

1. Place a clean container under the fuel filter and clean area where the filter canister mounts.
2. Remove filter canister and clean the mounting surface (Figure 47).
3. Lubricate gasket on filter canister with clean oil.
4. Install the filter canister by hand until the gasket contacts mounting surface, then rotate it an additional 1/2 turn.

Bleeding Air from the Fuel Injectors

Note: This procedure should be used only if the fuel system has been purged of air through normal priming procedures and the engine will not start; refer to Bleeding the Fuel System.

1. Loosen the pipe connection to first nozzle and holder assembly (Figure 48).

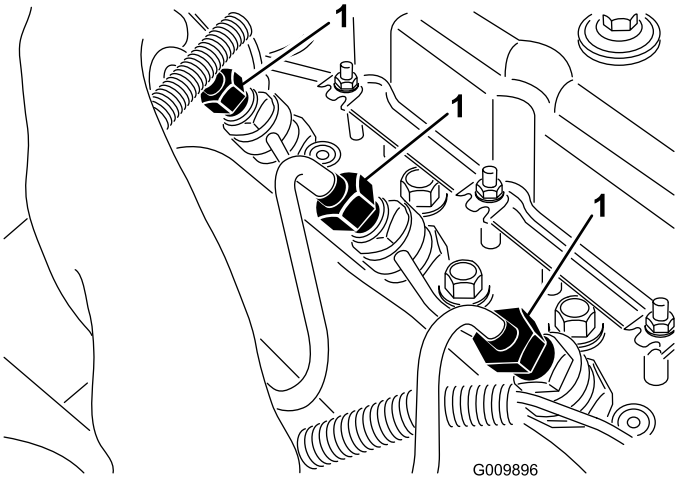


Figure 48

1. Fuel injectors

2. Slowly move the throttle to the full Fast position.
3. Turn the key in the key switch to the Start position and watch the fuel flow around the connector. When you observe a solid flow of fuel, turn the key to the Off position.
4. Tighten the pipe connector securely.
5. Repeat steps 1 through 4 on the remaining nozzles.

Electrical System Maintenance

Important: Before welding on the machine, disconnect both cables from the battery, both wire harness plugs from the electronic control module, and the terminal connector from the alternator to prevent damage to the electrical system.

Servicing the Battery

Service Interval: Every 25 hours—Check the electrolyte level and clean the battery.

Every 25 hours—Check the battery cable connections.

Warning

CALIFORNIA
Proposition 65 Warning

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

⚠

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

- **Do not drink electrolyte and avoid contact with skin, eyes, or clothing. Wear safety glasses to shield your eyes and rubber gloves to protect your hands.**
- **Fill the battery where clean water is always available for flushing the skin.**

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.

The battery electrolyte level must be properly maintained and the top of the battery kept clean. If the machine is stored in a location where temperatures are extremely high, the battery will run down more rapidly than if the machine is stored in a location where temperatures are cool.

Check the electrolyte level every 25 operating hours or, if machine is in storage, every 30 days.

Maintain the cell level with distilled or demineralized water. Do not fill the cells above the bottom of the split ring inside each cell. Install the filler caps with the vents pointing to the rear (toward the fuel tank).

Keep the top of the battery clean by washing it periodically with a brush dipped in ammonia or bicarbonate of soda solution. Flush the top surface with water after cleaning. Do not remove the fill caps while cleaning.

Battery cables must be tight on the terminals to provide good electrical contact.

⚠

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 *connect* the positive (red) battery cable before connecting the negative (black) cable.**

If corrosion occurs at the terminals, disconnect the cables, negative (–) cable first, and scrape clamps and terminals separately. Reconnect the cables, positive (+) cable first, and coat the terminals with petroleum jelly.

Fuses

The fuses in the electrical system are located on the back of the instrument panel (Figure 49).

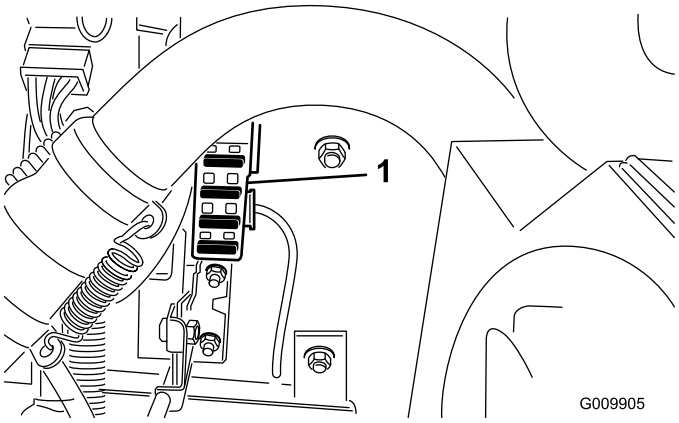


Figure 49

1. Fuse block

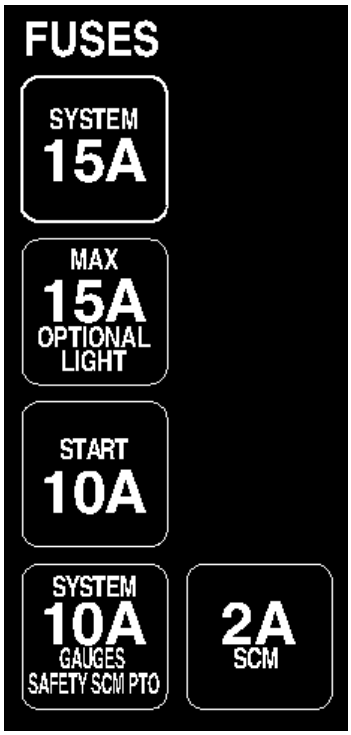


Figure 50

Drive System Maintenance

Adjusting the Traction Drive for Neutral

If the machine moves when the traction pedal is in the neutral position, the traction cam must be adjusted.

1. Park the machine on a level surface and turn the engine off.
2. Raise one front wheel off of the floor and place support blocks under the frame.

If the machine is not supported adequately, it may accidentally fall, injuring anyone under the machine.

3. Loosen the locknut on the traction adjustment cam (Figure 51).

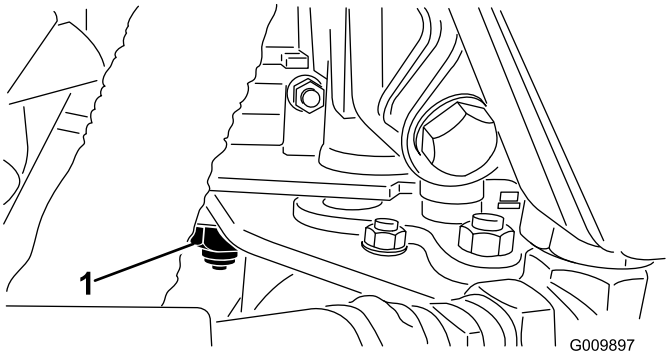


Figure 51

1. Traction adjustment cam

The engine must be running so a final adjustment of the traction adjustment cam can be performed. Contact with hot or moving parts can result in personal injury.

Keep hands, feet, face, and other body parts away from the muffler, other hot parts of the engine, and other rotating parts.

4. Start the engine and rotate the cam hex in both directions to determine the mid position of the neutral span.
5. Tighten the locknut securing the adjustment.
6. Stop the engine.

7. Remove the support blocks and lower the machine to the shop floor. Test drive the machine to make sure it does not move when the traction pedal is in neutral.
8. After adjusting the pump plate, check the neutral switch operation and adjust, if necessary.

Adjusting the Neutral Switch

Whenever the pump plate is adjusted, check the neutral switch (Figure 52) operation and, if necessary, adjust it as follows:

1. Park the machine on a level surface and turn the engine off.
2. Loosen the locknut securing the switch adjusting screw. Thread it away from the switch until the bolt head clears the switch.

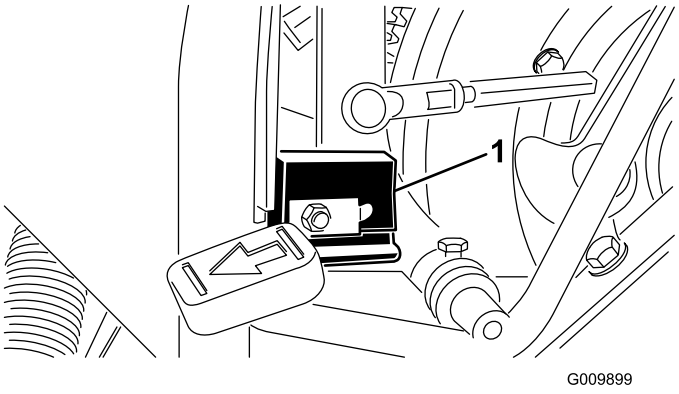


Figure 52

1. Neutral switch

3. Adjust the switch location until a circuit is made when in neutral and broken with 1 inch (2.5 cm) travel of the traction pedal.
4. Tighten the locknut.

Cooling System Maintenance

Removing Debris from the Cooling System

Service Interval: Before each use or daily—Remove debris from the screen, oil coolers, and radiator. (Clean more frequently in dirty operating conditions.)

Every 1,000 hours/Every 2 years (whichever comes first)—Flush and replace the cooling system fluid and hoses.

To prevent the system from overheating, the radiator screen, radiator, and oil cooler must be kept clean.

1. Remove the radiator screen and clean and debris off of it (Figure 53).

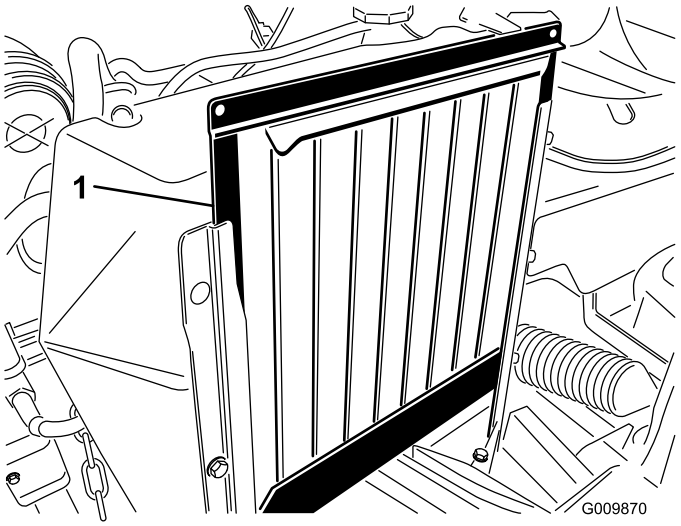


Figure 53

1. Radiator screen

2. Working from the fan side of the radiator, either spray the radiator with a hose or blow it with compressed air (Figure 54).

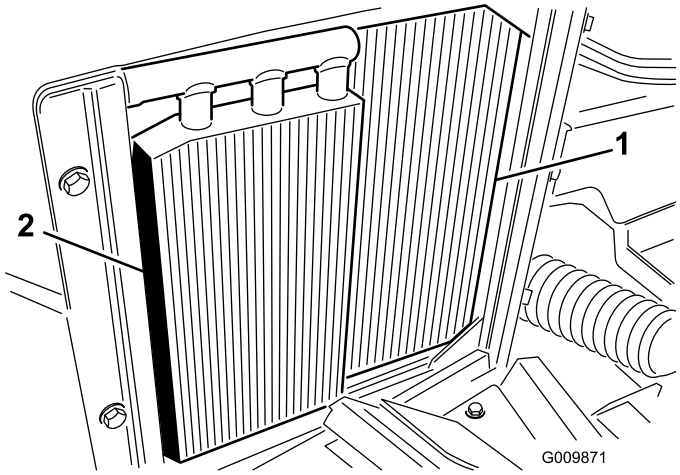


Figure 54

1. Radiator
2. Oil cooler

3. Thoroughly clean the oil cooler (Figure 54) and remove any other debris that may have collected around the components.
4. Install the screen.

Brake Maintenance

Adjusting the Parking Brake

1. Remove both front wheels.
2. Make sure that the brake is in the Off position.
3. Loosen the jam nut on the clevis (Figure 55).

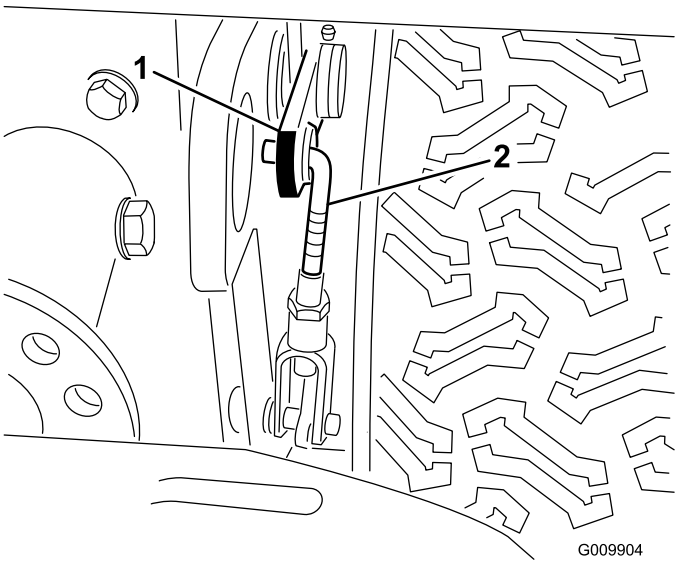


Figure 55

1. Upper brake lever
2. Clevis

4. Remove the cotter pin securing the top of the clevis to the upper brake lever.
5. Rotate the clevis, one turn at a time, to decrease the distance between the levers
6. Install the clevis to the upper brake lever and tighten the jam nut. Repeat the procedure on the opposite side of the machine.
7. After any brake adjustment, operate the vehicle at a low speed (one MPH or less) and check that the brakes engage equally on both wheels. Adjust as necessary.

Belt Maintenance

Make sure the belts are properly tensioned to ensure proper operation of the machine and prevent unnecessary wear. On new belts, check the tension after 8 hours operation.

Tensioning the Alternator Belt

Service Interval: After the first 8 hours

Every 50 hours

Check the tension of the alternator belt by depressing the belt at mid span of crankshaft and alternator pulleys with 22 lb (10 kg) of force. A new belt should deflect 0.3 to 0.5 inch (8 to 12 mm). A used belt should deflect 0.4 to 0.55 inch (10 to 14 mm). If the deflection is incorrect, complete the following procedure to tension the belt:

1. Loosen alternator mounting bolts. (Figure 56).

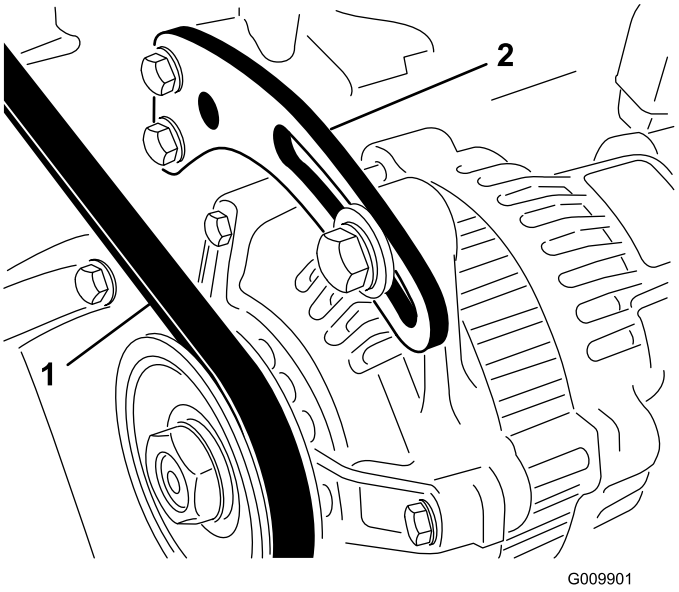


Figure 56

1. Alternator belt
2. Brace

2. Using a bar, rotate alternator until proper belt tension is attained, then tighten mounting bolts.

Tensioning the Hydraulic Pump Belt

Service Interval: After the first 8 hours

Every 100 hours

Tension a new hydraulic pump belt so that it deflects 0.12 inch (3 mm) with a 15 to 17 lb (7 to 7.5 kg) load applied midway in the span of the belt. Tension a used belt so that it deflects 0.12 inch (3 mm) with an 11 to 13 lb (5 to 6 kg) load applied midway in the span of the belt.

Tighten the nut on the adjustment rod (Figure 57) until the desired belt tension is attained.

Note: Tighten the belt to eliminate slippage (squealing under load) but do not overtighten.

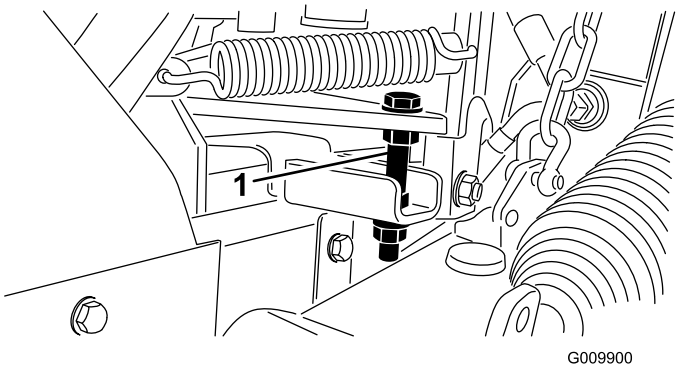


Figure 57

1. Adjustment rod

Controls System Maintenance

Adjusting the Traction Pedal

If the traction pedal contacts the footrest when it is pushed fully forward or maximum forward traction speed is unattainable, adjust the traction pedal linkage.

1. To expose the traction rod, remove the right panel.
2. Loosen the jam nuts on each end of the traction rod barrel (Figure 58).

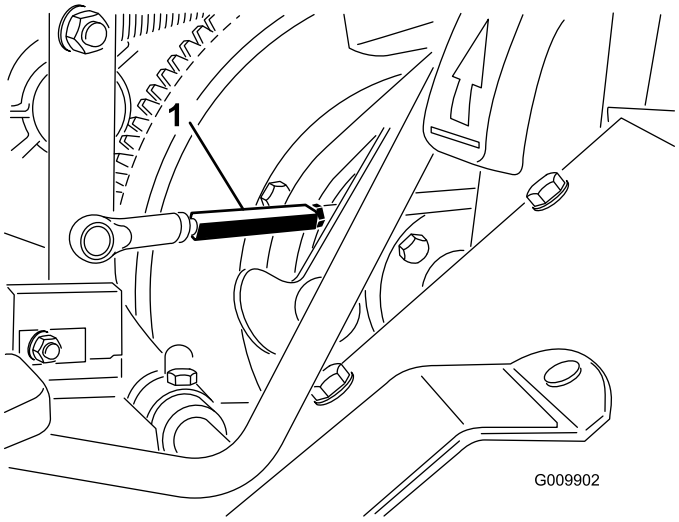


Figure 58

1. Traction rod barrel

3. Rotate the rod barrel until the required pedal clearance or traction speed is attained.
4. Tighten the jam nuts securing the adjustment.
5. The stop for reverse travel (under the pedal) may be adjusted for slower travel. Speeds in excess of 3 mph (5 km/h) are not recommended.
6. Check the neutral switch adjustment.

Adjusting the Traction Pedal Damper

1. To expose the traction pedal damper, remove the right-hand panel.
2. Loosen the locknut securing the damper pivot to the damper bracket (Figure 59).

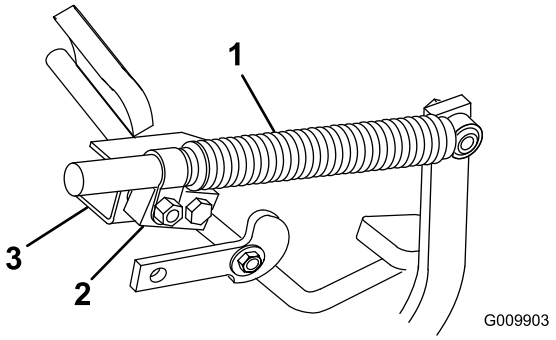


Figure 59

1. Damper
2. Damper pivot
3. Damper bracket

3. Press the traction pedal fully forward.
4. Fully compress the damper and then release it, allowing it to extend 0.08 inch (2 mm). Tighten the locknut securing the adjustment.
5. When the traction pedal is fully pressed in the rearward direction, the damper must contact the reverse stop before extending the damper.
6. Check neutral switch adjustment.

Hydraulic System Maintenance

Changing the Hydraulic Fluid

Service Interval: After the first 5 hours—Change the hydraulic oil filter.

Every 200 hours—Change the hydraulic oil filter.

Every 400 hours/Yearly (whichever comes first)—Change the hydraulic fluid.

Every 1,000 hours/Every 2 years (whichever comes first)—Drain and flush the hydraulic tank (contact your local Toro distributor).

Use a genuine Toro oil filter for replacement. Refer to Checking the Hydraulic Fluid Level for replacement hydraulic fluid specifications.

1. Park the machine on a level surface, lower the cutting units, set the parking brake, and turn the engine off.
2. If only the filter is to be changed, remove the reservoir cap and insert the reservoir plug (Figure 60) to block the outlet. This will retain most of the fluid in the reservoir when the filter is removed.

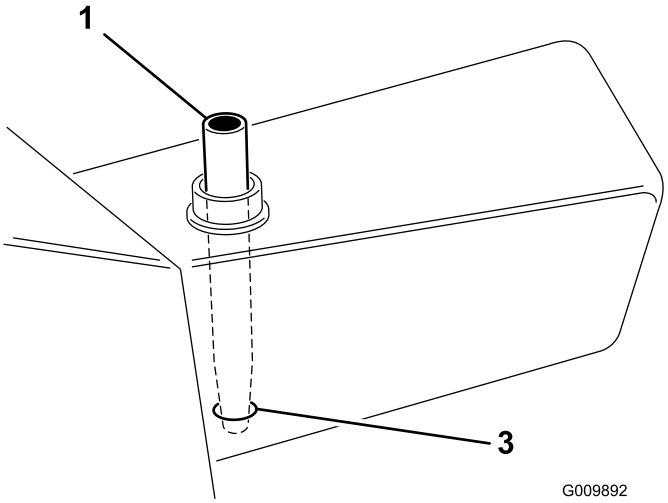


Figure 60

1. Reservoir plug
2. Reservoir outlet

3. Clean the area around the hydraulic oil filter (Figure 61). Remove the filter from the bottom of the filter housing and allow the oil to flow into a drain pan. Use a bottom type filter wrench. Dispose of the oil filter properly.

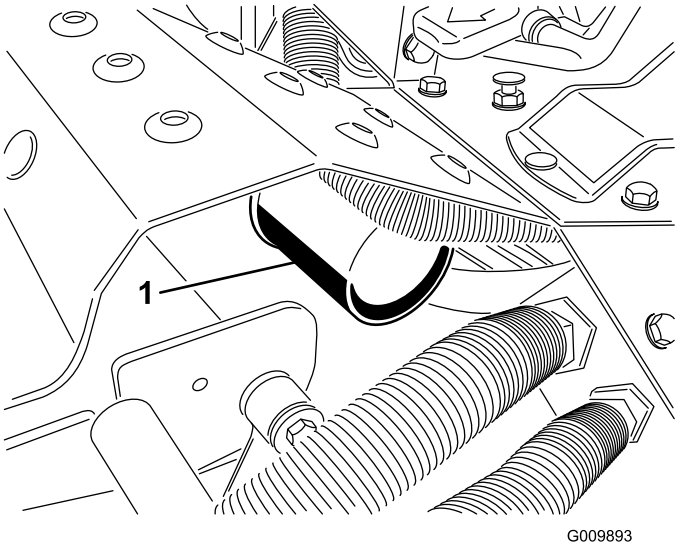


Figure 61

1. Hydraulic oil filter

4. Apply a film of oil on the filter gasket. Install the filter by hand until the gasket contacts the mounting head; then tighten the filter an additional 3/4 turn.
5. Fill the reservoir to the proper level; refer to Checking the Hydraulic System Fluid.
6. Place all controls in neutral or in the disengaged position and start the engine. Run the engine at the lowest possible RPM to purge the system of air.
7. Run the engine until the lift cylinders extend and retract and forward and reverse wheel motion is achieved.
8. Stop the engine and check the oil level in the reservoir. Add oil if necessary.
9. Check all connections and hoses for leaks.

Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

- **Keep your body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.**
- **Use cardboard or paper to find hydraulic leaks, never use your hands.**

Hydraulic System Test Ports

The test ports are used to test pressure in the hydraulic circuits. Contact your local Toro distributor for assistance.

- Use Test Port #1 (Figure 62) to measure forward traction pressure.

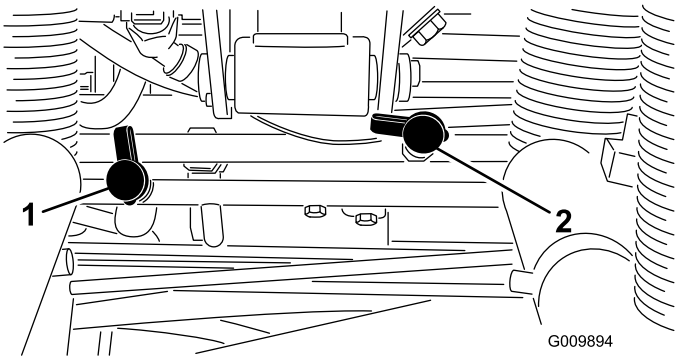


Figure 62

1. Test port #1
2. Test port #2

- Use Test Port #2 (Figure 62) to measure reverse traction pressure.
- Use Test Port #3 (Figure 63) to measure reel circuit pressure.

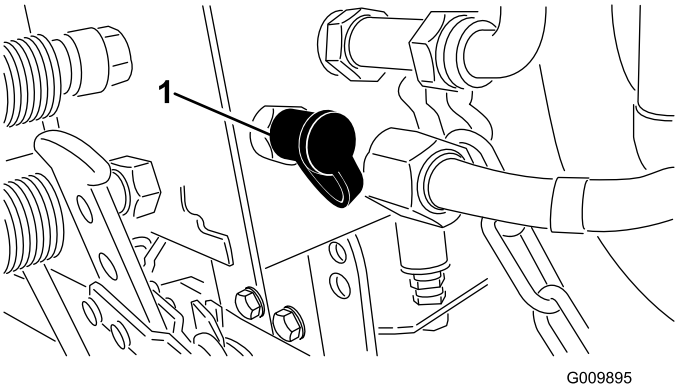


Figure 63

1. Test port #3

Cutting Unit System Maintenance

Backlapping the Cutting Units

While backlapping, the reels may stall and then restart. Placing your hands or feet in the reel area while backlapping will result in injury or death.

- **Never place hands or feet in the reel area while the engine is running.**
- **Do not attempt to restart the reels by hand or foot.**
- **Do not adjust the reels while the engine is running.**
- **If the reel stalls, stop the engine before attempting to clear the reel.**

1. Position the machine on a clean, level surface, lower the cutting units, stop the engine, engage the parking brake, and remove the key from the ignition switch.
2. Unlatch and raise the hood to expose the controls.
3. Rotate the backlap knob, on the valve block (Figure 64), clockwise to the backlap position. Rotate the reel speed knob (Figure 64) to position 1.

   Important: Do not rotate the backlap knob from the mow to the backlap position while the engine is running as damage to the reels may occur.

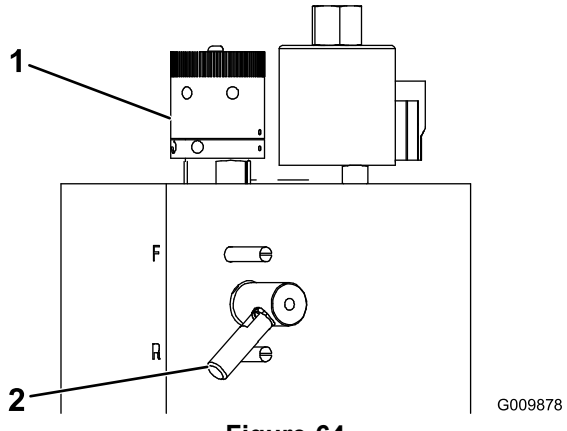


Figure 64

1. Reel speed knob
2. Backlap knob

4. Make the initial reel to bedknife adjustments appropriate for backlapping on all cutting units. Start the engine and set the engine to low idle speed.
5. Engage the reels by pulling out the knob on the instrument panel.
6. Apply lapping compound with the long handled brush supplied with the machine.

Contact with the reels or other moving parts can result in personal injury.

- **Keep fingers, hands, and clothing away from the reels or other moving parts.**
- **Never attempt to turn the reels by hand or foot while the engine is running.**

7. To make an adjustment to the cutting units while backlapping, turn the reels off by pushing in on the knob on the instrument panel and turning the engine off. After adjustments have been completed, repeat steps 4 through 6.
8. When the backlap operation is completed, stop the engine, rotate the backlap knob clockwise to the Mow position, set the reel speed controls to the desired mowing setting and wash all lapping compound off of the cutting units.

Note: Additional instructions and procedures on backlapping are available in the Toro Sharpening Reel & Rotary Mowers Manual, Form No. 80-300SL.

Note: For a better cutting edge, run a file across the front face of the bedknife when the lapping operation is completed. This will remove any burrs or rough edges that may have built up on the cutting edge.

Storage

Preparing the Traction Unit

1. Thoroughly clean the traction unit, cutting units, and engine.
2. Check the tire pressure. Inflate all traction unit tires to 16 to 20 psi (110 to 138 kPa).
3. Check all fasteners for looseness and tighten them as necessary.
4. Grease all grease fittings and pivot points. Wipe up any excess lubricant.
5. Lightly sand and use touch-up paint on painted areas that are scratched, chipped, or rusted. Repair any dents in the metal body.

Storing the Battery

Charging the battery produces gasses that can explode.

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

If the machine will be stored more than 30 days, repare the battery as follows:

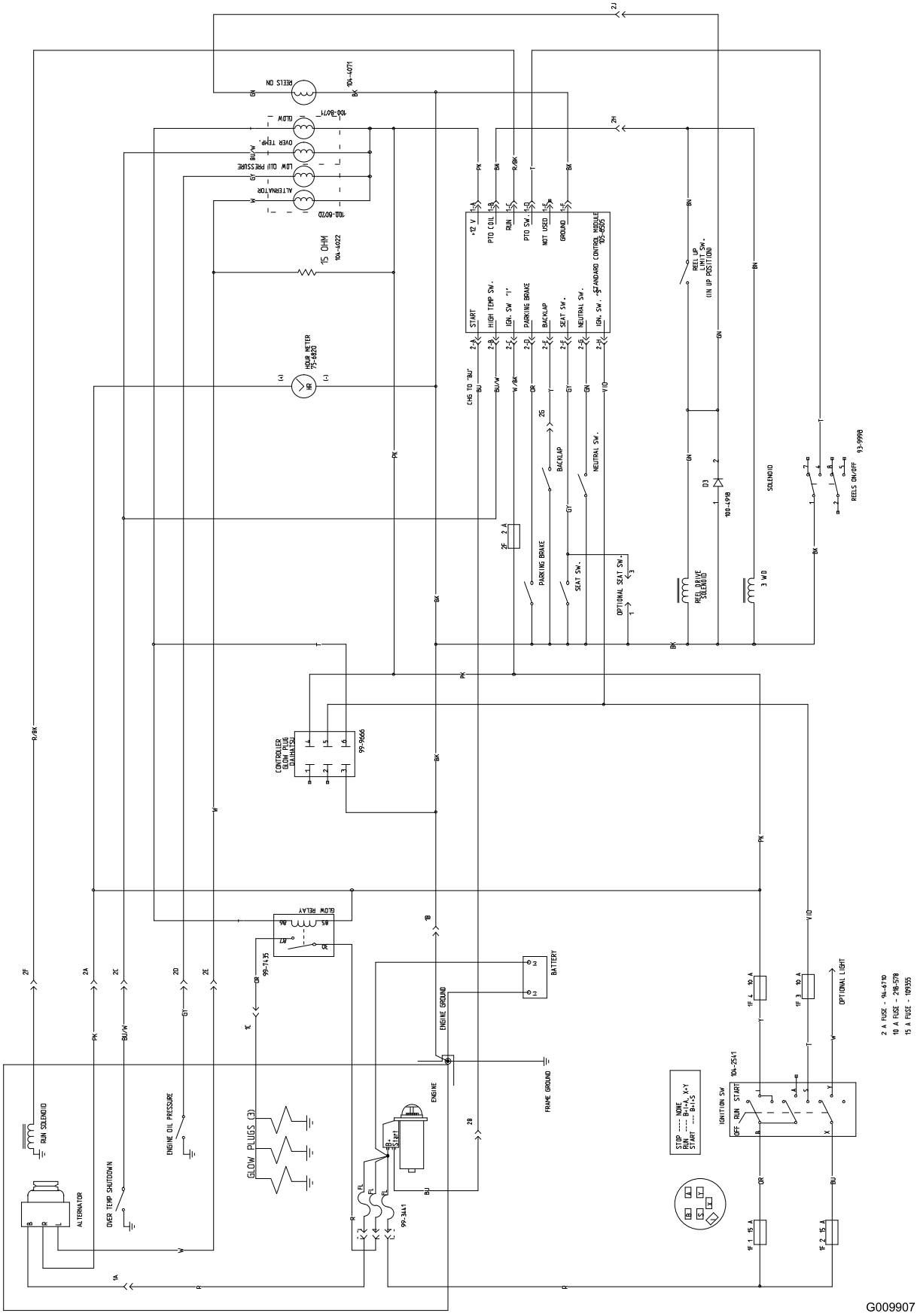
1. Remove the battery terminals from the battery posts and remove the battery from the machine.
2. Clean the battery, terminals, and posts with a wire brush and baking soda solution.
3. Coat the cable terminals and battery posts with Grafo 112X skin-over grease (Toro Part No. 505-47) or petroleum jelly to prevent corrosion.
4. Slowly recharge the battery every 60 days for 24 hours to prevent lead sulfation of the battery. To prevent the battery from freezing, make sure it is fully charged. The specific gravity of a fully charged battery is 1.265 to 1.299.
5. Either store the battery on the shelf or on the machine. Leave the cables disconnected if it is stored on the machine. Store it in a cool atmosphere to avoid quick deterioration of the charge in the battery.

Preparing the Engine

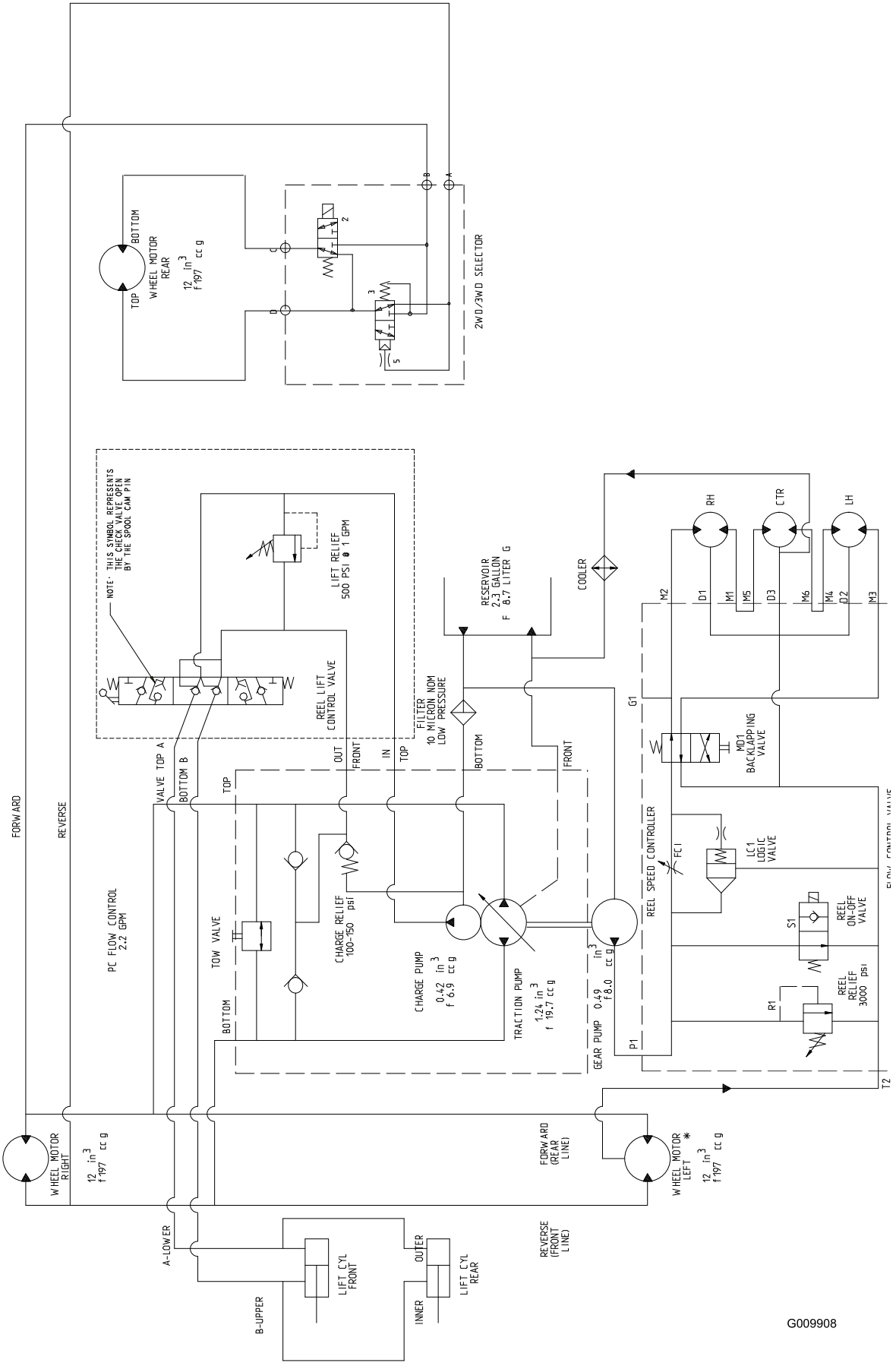
1. Drain the engine oil from the oil pan and replace the drain plug.
2. Remove and discard the oil filter. Install a new oil filter.

3. Refill the oil pan with designated quantity of motor oil.
4. Start the engine and run it at idle speed for approximately two minutes.
5. Stop the engine.
6. Thoroughly drain all fuel from the fuel tank, lines, and the fuel filter/water separator assembly.
7. Flush the fuel tank with fresh, clean diesel fuel.
8. Secure all fuel system fittings.
9. Thoroughly clean and service the air cleaner assembly.
10. Seal the air cleaner inlet and the exhaust outlet with weatherproof tape.
11. Check the antifreeze protection and add as needed for expected minimum temperature in your area.

Schematics



Electrical Schematic (Rev. A)



Hydraulic Schematic (Rev. A)

Notes:

Notes:

The Toro General Commercial Products Warranty

A Two-Year Limited Warranty

Conditions and Products Covered

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrant your Toro Commercial Product ("Product") to be free from defects in materials or workmanship for two years or 1500 operational hours*, whichever occurs first. Where a warrantable condition exists, we will repair the Product at no cost to you including diagnosis, labor, parts, and transportation. This warranty begins on the date the Product is delivered to the original retail purchaser.

* Product equipped with hour meter

Instructions for Obtaining Warranty Service

You are responsible for notifying the Commercial Products Distributor or Authorized Commercial Products Dealer from whom you purchased the Product as soon as you believe a warrantable condition exists.

If you need help locating a Commercial Products Distributor or Authorized Dealer, or if you have questions regarding your warranty rights or responsibilities, you may contact us at:

Toro Commercial Products Service Department
Toro Warranty Company
8111 Lyndale Avenue South
Bloomington, MN 55420-1196
952-888-8801 or 800-982-2740
E-mail: commercial.service@toro.com

Owner Responsibilities

As the Product owner, you are responsible for required maintenance and adjustments stated in your operator's manual. Failure to perform required maintenance and adjustments can be grounds for disallowing a warranty claim.

Items and Conditions Not Covered

Not all product failures or malfunctions that occur during the warranty period are defects in materials or workmanship. This express warranty does not cover the following:

- Product failures which result from the use of non-Toro replacement parts, or from installation and use of add-on, modified, or unapproved accessories
- Product failures which result from failure to perform required maintenance and/or adjustments
- Product failures which result from operating the Product in an abusive, negligent or reckless manner
- Parts subject to consumption through use unless found to be defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to, blades, reels, bedknives, tines, spark plugs, castor wheels, tires, filters, belts, and certain sprayer components such as diaphragms, nozzles, and check valves, etc.
- Failures caused by outside influence. Items considered to be outside influence include, but are not limited to, weather, storage practices, contamination, use of unapproved coolants, lubricants, additives, or chemicals, etc.
- Normal "wear and tear" items. Normal "wear and tear" includes, but is not limited to, damage to seats due to wear or abrasion, worn painted surfaces, scratched decals or windows, etc.

Parts

Parts scheduled for replacement as required maintenance are warranted for the period of time up to the scheduled replacement time for that part.

Parts replaced under this warranty become the property of Toro. Toro will make the final decision whether to repair any existing part or assembly or replace it. Toro may use factory remanufactured parts rather than new parts for some warranty repairs.

General Conditions

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

Neither The Toro Company nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of the Toro Products covered by this warranty, including any cost or expense of providing substitute equipment or service during reasonable periods of malfunction or non-use pending completion of repairs under this warranty. Except for the Emissions warranty referenced below, if applicable, there is no other express warranty. All implied warranties of merchantability and fitness for use are limited to the duration of this express warranty.

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

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

Note regarding engine warranty: The Emissions Control System on your Product may be covered by a separate warranty meeting requirements established by the U.S. Environmental Protection Agency (EPA) and/or the California Air Resources Board (CARB). The hour limitations set forth above do not apply to the Emissions Control System Warranty. Refer to the Engine Emission Control Warranty Statement printed in your operator's manual or contained in the engine manufacturer's documentation for details.

Countries Other than the United States or Canada

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

Part No. 374-0031 Rev. C