



**Greensmaster® 3250-D
Traction Unit**

Model No. 04383—200000801 and Up

Operator's Manual

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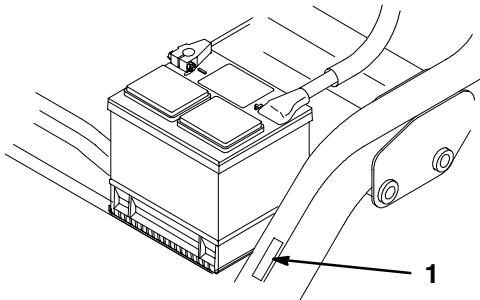
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Introduction

Thank you for purchasing a Toro product.

All of us at Toro want you to be completely satisfied with your new product, so feel free to contact your local Authorized Service Dealer for help with service, genuine Toro replacement parts, or other information you may require.

Whenever you contact your Authorized Service Dealer or the factory, always know the model and serial numbers of your product. These numbers will help the Service Dealer or Service Representative provide exact information about your specific product. You will find the model and serial number plate located in a unique place on the product as shown below.



1. Model and Serial Number Plate

For your convenience, write the product model and serial numbers in the space below.

Model No.: _____

Serial No.: _____

Read this manual carefully to learn how to operate and maintain your product correctly. Reading this manual will help you and others avoid personal injury and damage to the product. Although Toro designs, produces and markets safe, state-of-the-art products, you are responsible for using the product properly and safely. You are also responsible for training persons who you allow to use the product about safe operation.

The Toro warning system in this manual identifies potential hazards and has special safety messages that help you and others avoid personal injury, even death. DANGER, WARNING and CAUTION are signal words used to identify the level of hazard. However, regardless of the hazard, be extremely careful.

DANGER signals an extreme hazard that will cause serious injury or death if the recommended precautions are not followed.

WARNING signals a hazard that may cause serious injury or death if the recommended precautions are not followed.

CAUTION signals a hazard that may cause minor or moderate injury if the recommended precautions are not followed.

Two other words are also used to highlight information. "Important" calls attention to special mechanical information and "Note" emphasizes general information worthy of special attention.

The left and right side of the machine is determined by sitting on the seat in the normal operator's position.



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 this engine on any forest-covered, brush-covered, or grass-covered land. Other states or federal areas may have similar laws.

Safety

This machine conforms to the B71.4—1990 specification of the American National Standards Institute, in effect at the time of production, when 45 lbs. of ballast is added to the rear wheel. However, improper use or maintenance by the operator or owner can result in injury. To reduce the potential for injury, comply with these safety instructions and always pay attention to the safety alert  symbol, which means CAUTION, WARNING, or DANGER—"personal safety instruction." Failure to comply with the instruction may result in personal injury or death.

Before Operating

1. Read and understand the contents of this Operator's Manual before starting and operating the machine. Become familiar with all controls and know how to stop quickly. A replacement manual is available by sending complete Model and Serial Number to:

The Toro Company
8111 Lyndale Avenue South
Bloomington, Minnesota 55420-1196

2. Never allow children to operate the machine or adults to operate it without proper instructions.

3. Become familiar with the controls and know how to stop the engine quickly.
4. Keep all shields, safety devices and decals in place. If a shield, safety device, or decal is damaged or illegible, repair or replace it before operating the machine.
5. Always wear substantial shoes. Do not operate machine while wearing sandals, tennis shoes or sneakers. Do not wear loose fitting clothing because it could get caught in moving parts and possibly cause personal injury.
6. Wearing safety glasses, safety shoes, long pants and a helmet is advisable and required by some local ordinances and insurance regulations.
7. Make sure work area is clear of objects which might be picked up and thrown by the reels.
8. Do not carry passengers on the machine, and keep everyone, especially children and pets, away from the areas of operation.
9. Since diesel fuel is highly flammable, handle it carefully.
 - A. Use an approved fuel container.
 - B. Do not remove cap from fuel tank when engine is hot or running. Remove cap slowly.
 - C. Do not smoke while handling fuel.
 - D. Fill fuel tank outdoors and only to bottom of filler neck. DO NOT OVERFILL.
 - E. Wipe up any spilled fuel.

While Operating

10. Do not run the engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could be deadly.
11. Sit on the seat when starting and operating the machine.
12. Check the safety interlock switches daily for proper operation; refer to page 18. If a switch should fail, replace the switch before operating the machine.
(After every two years, replace all three interlock switches in the safety system, regardless if they are working properly or not.)
13. To start the engine:
 - A. Sit on the seat, make sure cutting units are disengaged.
 - B. Verify that functional control lever is in neutral.
 - C. Verify that parking brake is set.
 - D. Proceed to start engine.
14. Using the machine demands attention, and to prevent loss of control:
 - A. Mow only in daylight or when there is good artificial light.
 - B. Watch for holes or other hidden hazards.
 - C. Do not drive close to sand traps, ditches, creeks or other hazards.
 - D. Reduce speed when making sharp turns. Avoid sudden stops and starts.
 - E. Before backing up, look to the rear to be sure no one is behind the machine.
 - F. Watch out for traffic when near or crossing roads. Always yield the right-of-way.
 - G. Apply the service brakes when going downhill to keep forward speed slow and to maintain control of the machine.
15. Keep hands, feet and clothing away from moving parts and the reel discharge area. The grass baskets must be in place during operation of the reels or thatchers for maximum safety. Shut the engine off before emptying the baskets.
16. This product may exceed noise levels of 85 dB(A) at the operator position. Ear protectors are recommended, for prolonged exposure, to reduce the potential of permanent hearing damage.
17. Raise the cutting units when driving from one work area to another.
18. Do not touch engine, muffler or exhaust pipe while engine is running or soon after it is stopped because these areas could be hot enough to cause burns.
19. If a cutting unit strikes a solid object or vibrates abnormally, stop immediately, turn engine off, wait for all motion to stop and inspect for damage. A damaged reel or bedknife must be repaired or replaced before operation is continued.
20. Before getting off the seat:
 - A. Make sure cutting units are disengaged.
 - B. Verify that functional control system is in neutral.
 - C. Set the parking brake.
 - D. Stop the engine and remove key from ignition switch.
21. Traverse slopes carefully. Do not start or stop suddenly when traveling uphill or downhill.
22. Operator must be skilled and trained in how to drive on hillsides. Avoid wet slopes. Failure to use caution on slopes or hills may cause loss of control and vehicle to tip or roll possibly resulting in personal injury or death.

- 23. If engine stalls or loses headway and cannot make it to the top of a slope, do not turn machine around. Always back slowly straight down the slope.
- 24. **Don't take an injury risk!** 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 area is cleared.
- 25. Whenever machine is left unattended, make sure cutting units are fully raised and reels are not spinning, key is removed from ignition switch and parking brake is set.
- 26. Engine must be shut off before checking oil or adding oil to the crankcase.
- 27. If major repairs are ever needed or if assistance is desired, contact an Authorized Toro Distributor.
- 28. At the time of manufacture, the GREENSMASTER 3250-D conformed to safety standards in effect for riding mowers. To make sure of optimum performance and continued safety certification of the machine, use genuine Toro replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous, and such use could void the product warranty of The Toro Company.

Maintenance

- 26. Before servicing or making adjustments to the machine, stop the engine, remove key from switch to prevent accidental starting of the engine.
- 27. Be sure entire machine is in good operating condition. Keep all nuts, bolts, screws and hydraulic fittings tight.
- 28. Make sure all hydraulic line connectors are tight, and all hydraulic hoses and lines are in good condition before applying pressure to the system.
- 29. Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate skin and do serious damage. If fluid is ejected into the skin it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.
- 30. Before disconnecting or performing any work on the hydraulic system, all pressure in system must be relieved by stopping engine and lowering cutting units and attachments to the ground.
- 31. To reduce potential fire hazard, keep the engine area free of excessive grease, grass, leaves and accumulation of dirt. Never wash a warm engine or electrical connections with water.
- 32. Check all fuel lines for tightness and wear on a regular basis, and tighten or repair as needed.
- 33. If the engine must be running to perform a maintenance adjustment, keep hands, feet, clothing and any other parts of the body away from the cutting units, attachments and any moving parts. Keep everyone away.
- 34. Do not overspeed the engine by changing governor settings. To assure safety and accuracy, have an Authorized Toro Distributor check maximum engine speed with a tachometer. Maximum governed engine speed should be 2750 ± 50 RPM.

- 35. Engine must be shut off before checking oil or adding oil to the crankcase.
- 36. If major repairs are ever needed or if assistance is desired, contact an Authorized Toro Distributor.
- 37. At the time of manufacture, the GREENSMASTER 3250-D conformed to safety standards in effect for riding mowers. To make sure of optimum performance and continued safety certification of the machine, use genuine Toro replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous, and such use could void the product warranty of The Toro Company.

Sound Pressure Level

This unit has an equivalent continuous A-weighted sound pressure at the operator ear of: 84 dBA, based on measurements of identical machines per Directive 84/538/EEC and amendments.

Vibration Level

Hand-Arm

This unit does not exceed a vibration level of 2.5 m/s^2 at the hands based on measurements of identical machines per ISO 5349 procedures.

Whole Body

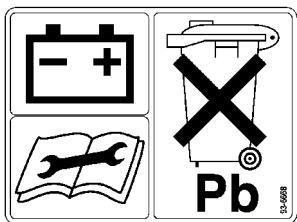
This unit does not exceed a vibration level of 0.5 m/s^2 at the posterior based on measurements of identical machines per ISO 2631 procedures.

Safety and Instruction 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.

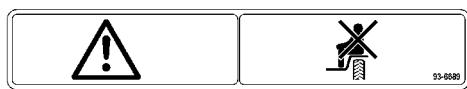
On Battery Base
(Part No. 93-6668)



On Steering Arm
(Part No. 93-8068)



On Seat Support
(Part No. 93-6689)



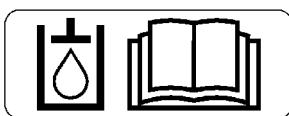
On Muffler Shield
(Part No. 93-8069)



On Neutral Adjustment Weldment
(Part No. 93-8069)



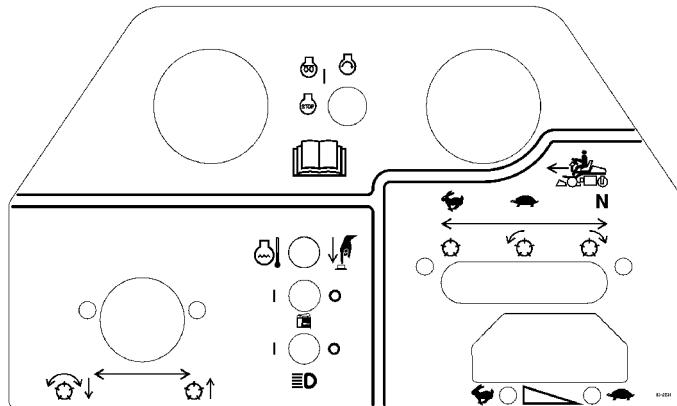
On Seat Back
(Part No. 93-8067)



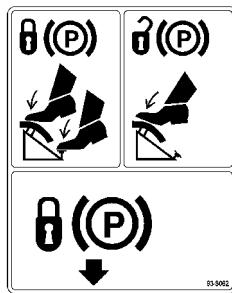
On Seat Back
(Part No. 100-3150)



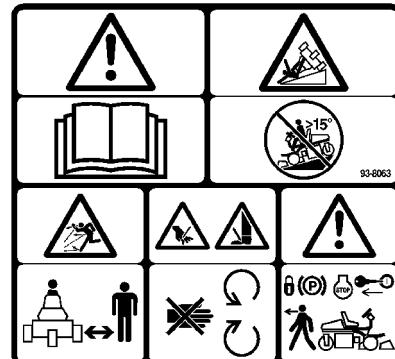
On Control Panel
(Part No. 100-3183)



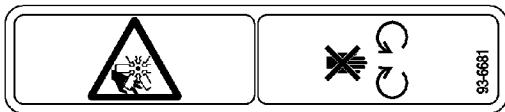
On Floor Plate
(Part No. 93-8062)



On Steering Cover
(Part No. 93-8063)



**On Radiator Support
(Part No. 93-6681)**



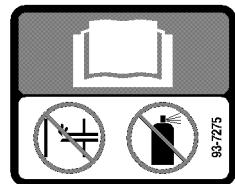
**On Battery
(Part No. 93-7276)**



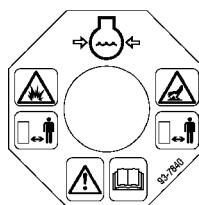
**On Carrier Frames
(Part No. 94-2575)**



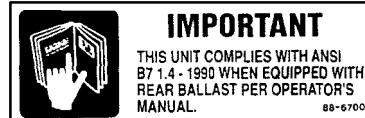
**On Muffler Shield
(Part No. 93-7275)**



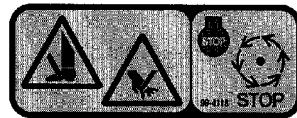
**On Radiator Cap
(Part No. 93-7840)**



**On Frame Cross Tube
(Part No. 88-6700)**



**On Carrier Frames
(Part No. 99-4118)**



Specifications

Configuration: Tricycle vehicle with two front wheels providing drive and one rear wheel providing steering. Operator sits in center over #1 cutting unit with #2 and #3 cutting units in front of vehicle.

Engine: Briggs & Stratton/Daihatsu three cylinder water cooled engine. 51.9 cu. in. (850 cc) Full pressure lubrication, oil filter. 21.0 hp at 3600 rpm, 14.5 hp at 2600 rpm. Engine governed to 2750±50 rpm high idle, 1500±50 rpm low idle (no load).

Frame: Welded steel tube construction in an "A" frame configuration.

Air Cleaner: Donaldson Corp. heavy duty remote air cleaner.

Steering: Power steering. Danfoss open center, non-load reacting steering valve with power beyond for raise/lower circuit and Hydrostat charge circuit. 13" round steering wheel. No-tool quick adjust steering arm position, with arm motion allowing a wide range of operator sizes. Steering cylinder has a 1.50 inch bore x 6.25 stroke with through shaft design for accurate straight line steering.

Fuel Capacity: 6 gallons (22.7 liters) capacity, diesel.

Hydraulic Oil Capacity: 5.5 gallon (20.8 liter) nylon oil reservoir. Mobile DTE 15 M standard, Mobile EAL 224H approved. Hydraulic oil filter has 5 micron long life filtration of circuit.

Traction Drive: Hydrostatic piston pump, closed loop system. Foot pedal forward and reverse; infinitely variable. Two front wheel orbit motors, 10.3 in.³/rev displacement.

Ground Speed: Forward mowing speed is variable from 2 to 5 mph (3.2 to 8 km/h), adjusted by stop on pedal mechanism. Mow speed setting does not affect transport speed. Maximum transport speed is 8.8 mph (14.1 km/h), may be reduced by adjusting stop in footrest pan without affecting mow speeds. Reverse is 2.5 mph (4.0 km/h).

Turf Compaction Pressure: 10 psi average at recommended minimum tire pressures, with a 200 lb. operator and cutting units down.

Tires: Three 19 x 10.50 x 8, 2 ply pneumatic tubeless demountable and interchangeable. Smooth tread.

Tire pressure: 8-12 psi front
8-15 psi rear

Brakes: 6" drum type mechanical with rack and pawl lock for parking.

Cutting Unit Drive: Hydraulic drive; one .58 in.³ (9.5 cc)/rev gear pump section powers three reel motors in series. Manifold block with cartridge valves controls flow, electrical on/off. Reel motors have .73 in.³ (12.0 cc)/rev displacement, low pressure case drains, and Toro exclusive "twist-mount" partial flange cut-away for fast installation.

Clip: Dependent on mowing ground speed, reel rpm, and number of reel blades. Mowing ground speed is easily changed by adjusting the pedal mow stop (this will not affect transport speed). Increasing ground speed will increase clip length and decrease cuts per meter. In general, the quality of cut will be best when clip and HOC are nearly equal.

Cutting Unit Suspension: Cutting units are completely free floating, each attaching to the traction unit by direct pull links and lifted by a centered lift arm. Baskets are supported by carrier frames that are suspended off the ground by adjustable stops in the tractor frame weldment. Cutting unit floatation is unaffected by basket content.

Electrical Features: Maintenance free 12 volt battery with 530 cold cranking amps at 0 degrees F. and 85 minutes reserve capacity at 85 degrees F. 40 amp alternator, circuit fused at 40 amps. Ignition switch/key. Seat switch. High temperature engine kill override switch. Harness terminals, fuse slot, and console switch location available for optional lights installation.

Controls/Gauges: Hand operated throttle, raise/lower mow lever, and functional control (neutral, mow, transport) lever. Foot operated traction drive brakes. Water in fuel warning light. Hour meter and 4 bulb warning cluster.

Interlocks:

Traction pedal locks when functional control lever is in neutral.

Engine cranking requires functional control lever in neutral, operator does not have to be in seat.

Engine will shut off if operator leaves seat without functional control lever in neutral.

Reels turning forward requires operator in seat, functional control lever in mow and raise/lower mow control momentarily engaged.

Reels turning backward for backlap requires optional variable reel speed kit installed. Then the reels are allowed to turn backwards when the functional control lever in neutral and the backlap switch is closed, showing reel direction is reversed.

Seat: Contour seat with high backrest. Seven inch fore/aft slider adjustment with two mounting positions allowing 9 inch total seat travel. Operator manual tube mounted on the seat back for easy access.

General Specifications

Width of Cut:	59.0 in. (150 cm)
Wheel Tread:	50.5 in. (128 cm)
Wheel Base:	48.6 in. (123 cm)
Overall Length (w/baskets):	93.9 in. (238 cm)
Overall Width:	68.0 in. (173 cm)
Overall Height:	50.5 in. (128 cm)
Weight w/reels (8 Blade 4 Bolt):	1,338 lbs. (608 kg)

Optional Equipment

8 Blade, 4 Bolt Cutting Unit	Model No. 04480
11 Blade, 4 Bolt Cutting Unit	Model No. 04481
8 Blade, SPA Cutting Unit	Model No. 04482
11 Blade, SPA Cutting Unit	Model No. 04483
Thatching Reels	Model No. 04493
Spiker	Model No. 04494
Tri-Roller	Model No. 04495
Turf Guardian Leak Detector	Model No. 04497
Backlap/Reel Speed Kit	Model No. 04498
Three Wheel Drive Kit	Model No. 04553
ROPS	Model No. 04552
Light Kit	Model No. 04551
Arm Rests	Model No. 30707
Spark Arrester	Part No. 94-8157
Hose Adapter Kit	Part No. 100-6430
Tie Down Kit	Part No. 94-6379
Oil Cooler Kit	Part No. 100-3166
Traction Tire* (2 wd only)	Part No. 231-124

*Rim, Part No 217-60, and Valve Stem, Part No. 232-24, required with Traction Tire.

Set-Up

Loose Parts

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

DESCRIPTION	QTY.	USE
Wheel Nuts	8	
Wheels	2	Mount front wheels
Wheel Hub	1	
Wheel Nuts	4	
Wheel	1	
Wheel Bolt	1	Mount rear wheel
Locknut	1	
Spacers	2	
Seat	1	
Hex Nut 5/16-18	4	Mount seat to seat base
Control Knob	1	Mount to control lever
Steering Wheel	1	
Cap	1	Mount steering wheel
Screw	1	
Pull Link	2	Mount front rollers
Gauge Bar	1	
Machine Screw #10-32 x 5/8" long	1	Use to set height-of-cut
Jam Nut #10	1	
Breather Extension	1	Mount to hydraulic reservoir
Grass Basket	3	Mounts to pull frame
Ignition Keys	2	
Operator's Manual (Traction Unit)	2	Read before operating machine
Parts Catalog	1	
Registration Card (Traction Unit)	1	
Registration Card (Cutting Unit)	1	Full out and return to Toro

Note: Mounting fasteners for Greensmaster 3250-D cutting units are included with the cutting units.

Install Front Wheels

Mount the front wheels and torque the mounting nuts to 70-90 ft-lbs.

Install Rear Wheel

1. Mount the wheel hub to the rear wheel rim with (4) mounting nuts (Fig. 1). Torque the nuts to 70-90 ft-lbs.

2. Remove the wheel bolt and locknut from the wheel mount holes in the rear castor fork (Fig. 1).
3. Install the rear wheel into the castor fork. Insert the wheel bolt into one of the castor fork mounting holes, install a spacer (supplied in loose parts), and slide the bolt through the wheel.
4. Install another spacer onto the bolt and route the bolt through the remaining castor fork mounting hole.

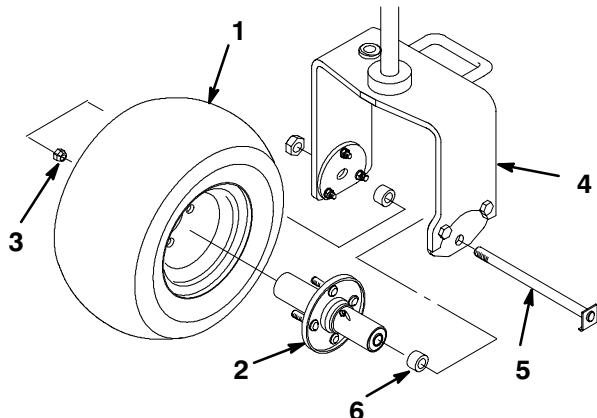


Figure 1

1. Rear wheel	4. Rear castor fork
2. Hub	5. Wheel bolt
3. Nut	6. Spacer (2)

5. Position the bend of the wheel bolt head under the bottom edge of the adapter plate (Fig. 1). Install and tighten the locknut to secure the wheel to the castor fork. Do not overtighten the locknut as the wheel must rotate freely.
6. Wipe the grease fitting clean on the wheel assembly. Pump grease into the wheel hub until grease is seen exiting at both hub bearings. Wipe up excess grease.

Mount Seat

Note: Mount the seat slides in the front set of mounting holes to gain an additional 3" in forward adjustment, or in the rear mounting holes for an additional 3" in rearward adjustment.

1. Remove the locknuts securing the seat slides to the plywood shipping base. Discard the locknuts.
2. Connect the wire harness to the seat switch.
3. Secure the seat slides to the seat support with (4) 5/16-18 locknuts supplied in loose parts (Fig. 2).

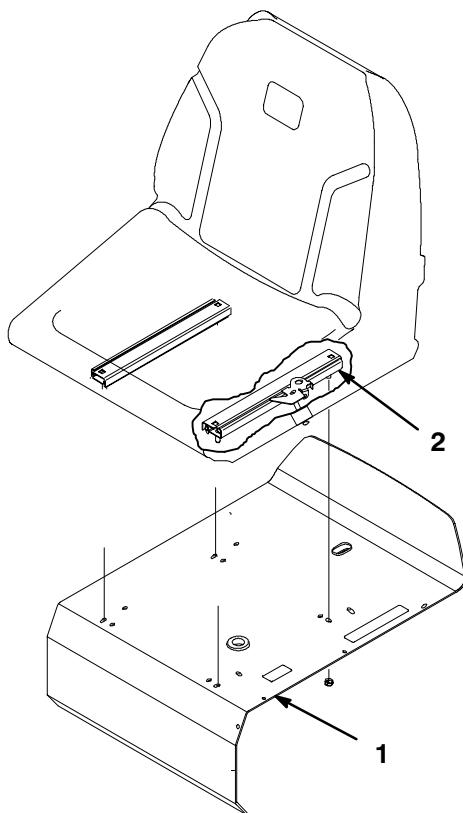


Figure 2

1. Seat support	2. Seat slide
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Charge Battery



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.

1. Remove the battery from the machine.
2. The battery may need to be charged. 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.



WARNING



POTENTIAL HAZARD

- Charging the battery produces gasses.

WHAT CAN HAPPEN

- Battery gasses can explode.

HOW TO AVOID THE HAZARD

- Keep cigarettes, sparks and flames away from battery.

3. When the battery is charged, disconnect the charger from the electrical outlet and battery posts.
4. 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 capscrews and nuts (Fig. 3). Slide the rubber boot over the positive terminal to prevent a possible short from occurring.



WARNING



POTENTIAL HAZARD

- Either the battery terminals or metal tools could short against metal tractor components.
- Incorrect battery cable routing could damage the cables.

WHAT CAN HAPPEN

- Sparks can cause the battery gasses to explode.
- Damaged cables could short against metal tractor components and cause sparks.

HOW TO AVOID THE HAZARD

- When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the tractor.
- Always DISCONNECT the negative (black) battery cable before disconnecting the positive (red) cable.
- Always RECONNECT the positive (red) battery cable before reconnecting the negative (black) cable.
- Do not allow metal tools to short between the battery terminals and metal parts of the tractor.
- Always keep the battery hold-down in place to protect and secure the battery.
- Always route battery cables as illustrated.

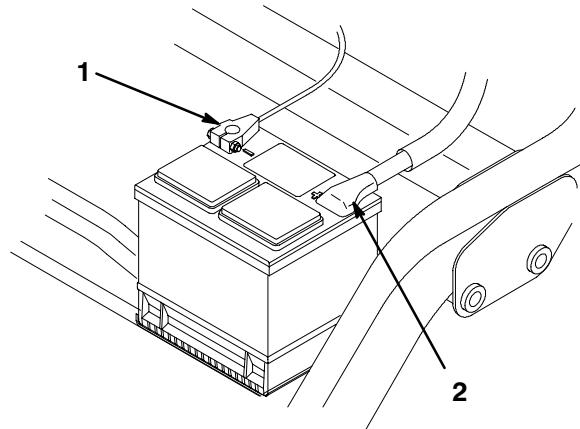


Figure 3

1. Negative (-)

2. Positive (+)

Install Steering Wheel

1. Slide the steering wheel onto the steering shaft.

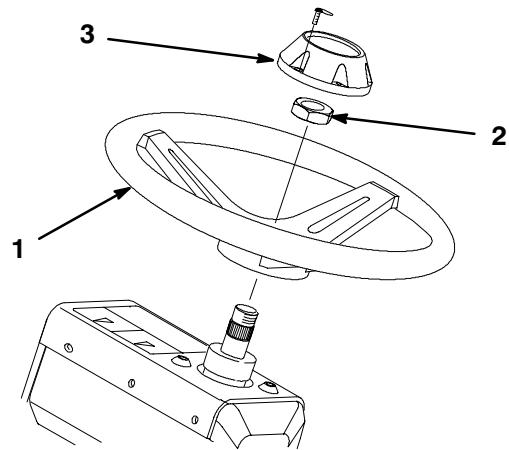


Figure 4

1. Steering wheel

2. Jam nut

3. Cap

2. Secure the steering wheel to the shaft with the jam nut (Fig. 4) and tighten it to 35 ft-lb.
3. Install the cap to the steering wheel with the screws (Fig. 4).

Install Control Lever Knob

1. Thread the control knob onto the lever (Fig. 5).

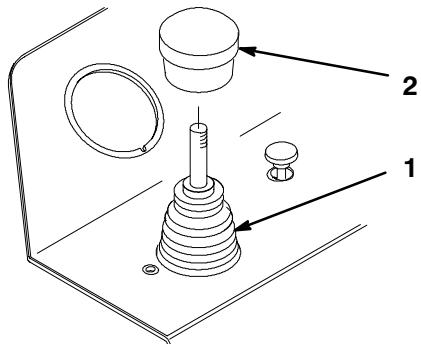


Figure 5

1. Control lever 2. Control knob

Install Breather Extension and Reservoir Cap

1. Remove the breather cap from the hydraulic reservoir (Fig. 6).

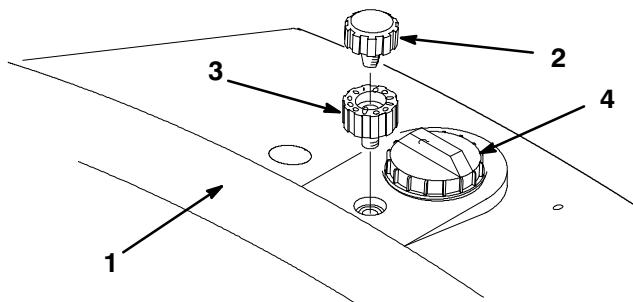


Figure 6

1. Hydraulic reservoir 3. Breather extension
2. Breather cap 4. Reservoir cap

2. Thread the breather extension into the reservoir (Fig. 6).
3. Thread the breather cap into the breather extension (Fig. 6).
4. Remove and discard the shipping cap from the hydraulic reservoir. Install the cap secured to the machine.

Mount Front Rollers

1. Mount an anti-scalp roller and a pull link assembly to the outer end of each front carrier frame with a roller shaft, spacer, washer, and capscrew (Fig. 7). Make sure the nylon bushing is in the pull link.

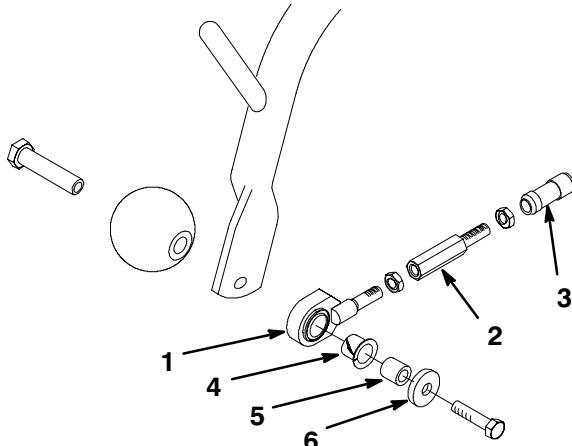


Figure 7

1. Pull link assembly 4. Nylon bushing
2. Pull link extension 5. Spacer
3. Ball joint receiver 6. Washer

2. Make sure all tires are inflated to 8-12 p.s.i.

Adjusting Carrier Frame Rollers

1. Position the traction unit on a level surface and lower the cutting unit carrier frames to the floor.
2. Verify that there is 1/2" clearance between the carrier frame rollers and the floor.
3. If an adjustment is required, loosen the jam nut on the carrier frame stop screw (Fig. 8) and rotate the screw up or down to raise or lower the carrier frame. Tighten the jam nut after adjustment is attained.

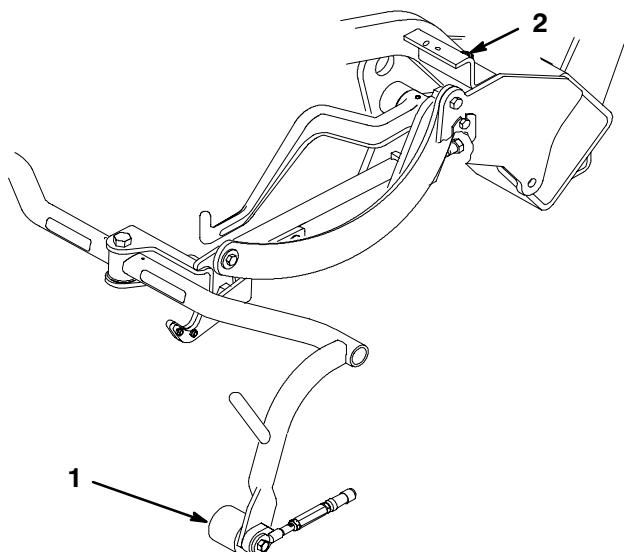


Figure 8
Right Front Shown

1. Carrier frame roller 2. Carrier frame stop screw

Note: If you are operating the machine in hot climates, where ambient temperatures range from 70°F (20°C) to 120°F (49°C), or using it for heavy-duty use (mowing other than greens, such as fairways or verticutting), we strongly recommend installation of an hydraulic Oil Cooler Kit, Part No. 100-3166, to the traction unit.

Install Cutting Units

Note: When sharpening, setting the height-of-cut, or performing other maintenance procedures on the cutting units, store the cutting unit reel motors in the support tubes on the front of the frame to prevent damage to the hoses.

IMPORTANT: Do not raise the suspension to the transport position when the reel motors are in the holders in the traction unit frame. Damage to the motors or hoses could result.

1. Remove the cutting units from the cartons. Assemble and adjust them per the Operator's Manual for the cutting units. Use the Height Gauge bar from the Loose Parts Kit to adjust the height of cut.
2. All cutting units are shipped with the counter weight mounted to the left end and the drive coupler mounted in the right end of the cutting unit. To mount the cutting unit in the right front position, proceed as follows:
 - A. Remove (2) capscrews and lockwashers securing the counter weight to the left end of the cutting unit. Remove the counter weight (Fig. 9, inset).
 - B. Remove the plastic spacer at both ends of the cutting unit (Fig. 9).
 - C. Remove the snap ring securing the drive coupler in the right bearing housing. Remove the drive coupler.
 - D. Apply grease to the inside diameter of the drive coupler. Install the drive coupler to the left end of the cutting unit with a snap ring (Fig. 9).
 - E. Install the plastic spacer (tapered end toward the bearing) at both ends of the cutting unit.
 - F. Install the counter weight to the right end of the cutting unit with capscrews and lockwashers.

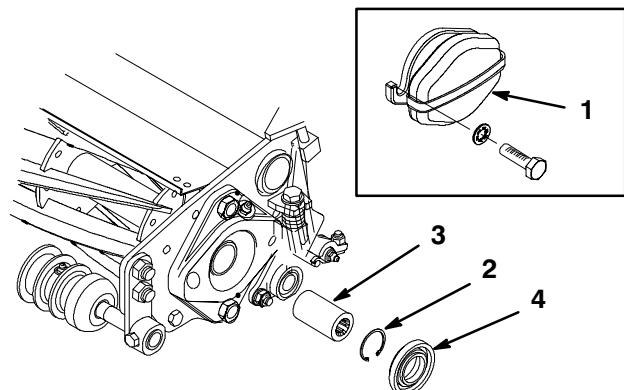


Figure 9

1. Counter weight 3. Drive coupler
2. Snap ring 4. Plastic spacer

3. If you are installing Greensmaster 3200 cutting units with serial numbers ranging from 50001 through 99999, proceed as follows:
 - A. Remove and discard the front shield assembly (Fig. 10). Also, remove and discard the shield mounting studs and fasteners secured to each cutting unit side plate.
 - B. Remove the single point pull arm from the front roller and discard.

C. Bend the grass shield side deflectors outward until they are flush with the cutting unit side plates (Fig. 10).

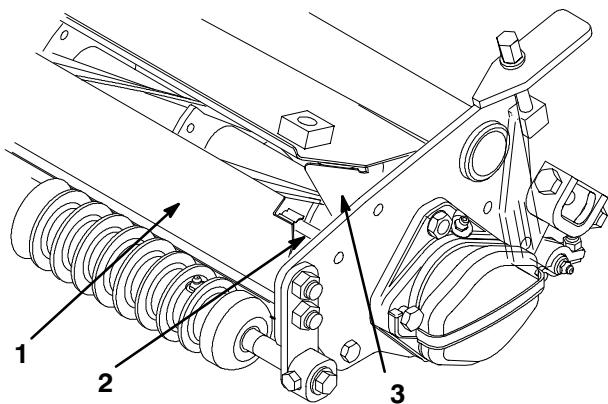


Figure 10

1. Front shield assembly
2. Front shield mounting studs
3. Grass shield side deflectors

4. Thread a ball stud into each end of the cutting unit front roller (Fig. 12).
5. Slide the cutting unit under the pull frame while hooking the lift roller onto the lift arm. To facilitate installation of the rear cutting unit, the pull frame can be rotated and latched into a service position:
 - A. Lower the suspension system completely (cylinders extended).
 - B. Lift the carrier frame by hand until the anti-scalp rollers clear the brake linkage.
 - C. Lift up on the slotted link and rotate the pull frame into the wire hook (Fig. 11).
 - D. With the cutting unit in position, release the wire hook and rotate the pull frame to the operating position. The slotted link locks automatically.
 - E. Attach the motor and pull links.

IMPORTANT: Do not operate the lift system when the center cutting unit is in the service position. Damage could result to the pull frame and clevis assembly.

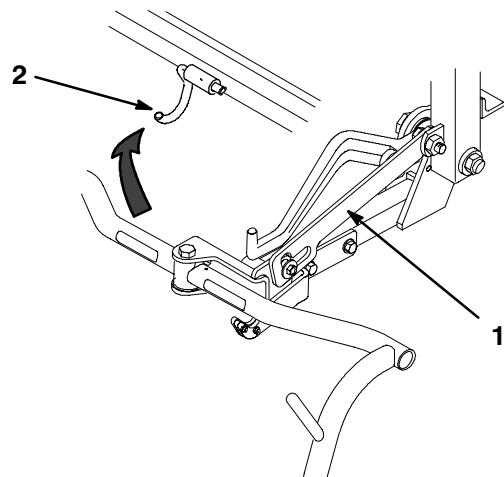


Figure 11

1. Slotted link
2. Wire hook

Note: When installing cutting units with groomers, and the groomer carton label does not read "with extension brackets," Groomer Extension Kit, Part No. 99-4255, is required.

6. Slide the sleeve back on each ball joint receiver and hook onto the cutting unit ball studs (Fig. 12).

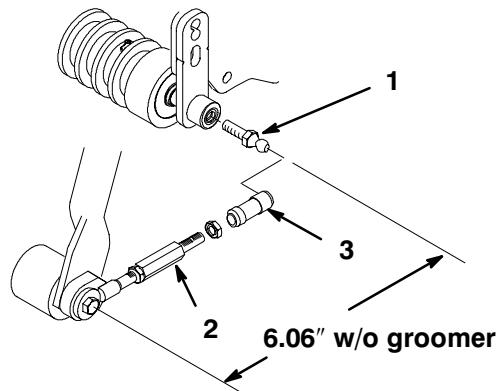


Figure 12

1. Ball stud
2. Pull arm extension
3. Ball joint receiver

Note: The pull link assemblies are preset at the factory. If they ever need to be disassembled, reassemble them to the dimensions shown in Figure 12.

7. Mount the basket onto the carrier frame.

8. Adjust the pull links until there is 1/4" to 3/8" clearance between the lip of the basket and the reel blades. Make sure the basket lips are equidistant from the reel blades all the way across the reel blades.
9. Assemble the mounting capscrews for the reel drive motor to each cutting unit. Leave approximately 1/2 inch of threads exposed on each mounting capscrew (Fig. 13).

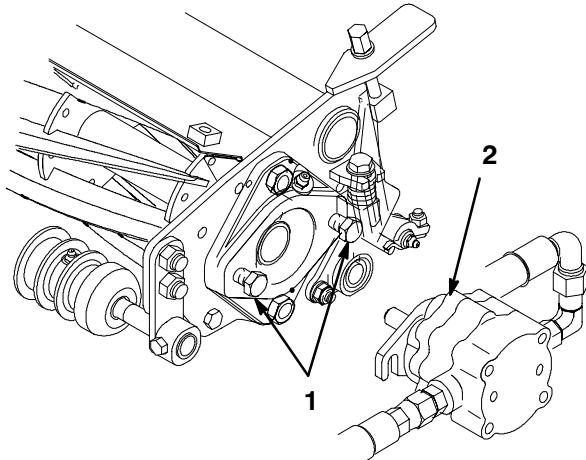


Figure 13

1. Capscrews
2. Drive motor

10. Remove the protective covers from the cutting units and the reel drive motor shafts.

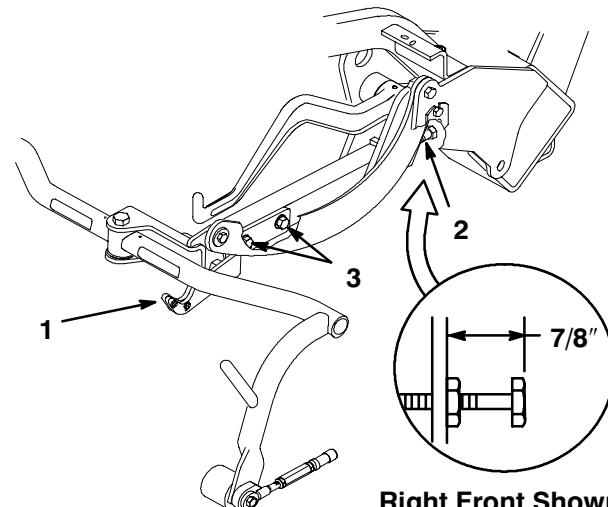
Note: Retain the protective covers for the cutting units. Install them whenever the reel drive motors are removed to protect the cutting unit bearings from contamination.

11. Coat the spline shaft of the motor with clean grease and install the motor by rotating the motor clockwise so the motor flanges clear the studs. Rotate the motor counterclockwise until the flanges are encircling the studs and tighten the mounting capscrews (Fig. 13).
12. Using a hand pump grease gun, fill the cavity at the end of the cutting unit with #2 general purpose grease

Adjusting the Transport Height

Check the transport height (Fig. 14) and adjust, if required, as follows:

1. Position the tractor on a level surface.
2. Verify that the distance from the top of the carrier frame adjusting screw (Fig. 14) and the back of the carrier frame is $7/8"$.
3. Loosen the transport plate mounting screws (Fig. 14).



Right Front Shown

Figure 14

4. Raise the cutting units to the transport position.

IMPORTANT: Do not raise the suspension to the transport position when the reel motors are in the holders in the traction unit frame. Damage to the motors or hoses could result.

5. Ensure each carrier frame is at the same height from the ground. If they are, proceed to step 7.
6. If the carrier frames are not at the same height, loosen the jam nut on the carrier frame adjusting screw (Fig. 14). Rotate the screw outward to raise and inward to lower. Tighten the jam nut after the proper height is obtained.
7. Rotate the transport plate until it locks the pull frame. Tighten the screws.

Before Operating

CAUTION

POTENTIAL HAZARD

- If you leave the key in the ignition switch, someone could start the engine.

WHAT CAN HAPPEN

- Accidental starting of the engine could seriously injure you or other bystanders.

HOW TO AVOID THE HAZARD

- Remove the key from the ignition switch and pull the wire(s) off the spark plug(s) before you do any maintenance. Also push the wire(s) aside so it does not accidentally contact the spark plug(s).

Check Engine Oil

The engine is shipped with 3.5 quarts (w/ filter) (3.3l) of oil in the crankcase; however, the level of oil must be checked before and after the engine is first started.

1. Position the machine on a level surface.
2. Remove the dipstick and wipe it with a clean rag (Fig. 15). Push the dipstick into the tube and make sure it is seated fully. Remove the dipstick from the tube and check the level of oil. If the oil level is low, remove the filler cap from the valve cover and add enough oil to raise the level to the FULL mark on the dipstick. Add the oil slowly and check the level often during this process. **Do not overfill.**

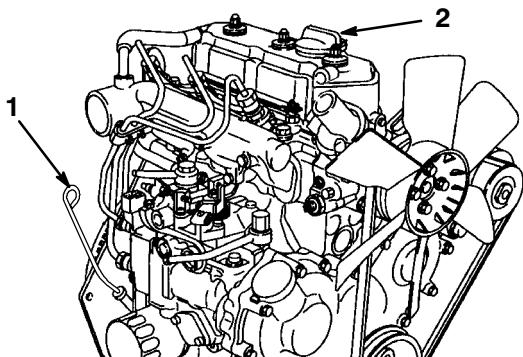


Figure 15

1. Dipstick

2. Filler cap

3. The engine uses any high-quality detergent oil having the American Petroleum Institute -API- "service classification" CD, CE, CF or CF-4 or CG-4 or higher. Recommended viscosity (weight) is SAE 10W30.

IMPORTANT: Check the level of oil every 8 operating hours or daily. Change the oil and filter initially after the first 50 hours of operation, thereafter change the oil every 50 hours and filter every 100 hours. However, change the oil more frequently when the engine is operated in extremely dusty or dirty conditions.

4. Install the filler cap and dipstick firmly in place.

Fill the Fuel Tank

The engine runs on No. 2 diesel fuel.

Fuel tank capacity is approximately 6 gallons (22.7 l).

1. Clean the area around the fuel tank cap (Fig. 16).

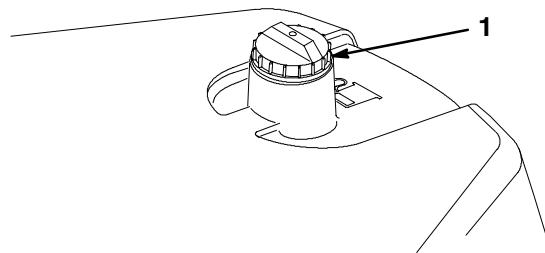


Figure 16

1. Fuel tank cap

2. Remove the fuel tank cap.

DANGER

POTENTIAL HAZARD

- Under certain conditions, diesel fuel and fuel vapors are highly flammable and explosive.

WHAT CAN HAPPEN

- A fire or explosion from fuel can burn you and others and can cause property damage.

HOW TO AVOID THE HAZARD

- 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" (6 mm 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.

3. Fill the tank until the level is 1/4" to 1/2" (6 mm to 13 mm) below the bottom of the filler neck. **Do not overfill.** Install the cap.
4. Wipe up any fuel that may have spilled.

Check Cooling System

Capacity of the cooling system is approximately 3.6 qts. (3.4 L).

Clean debris off the radiator screen and radiator daily (Fig. 17) or hourly if conditions are extremely dusty and dirty; refer to Cleaning the Radiator and Screen, page 29.

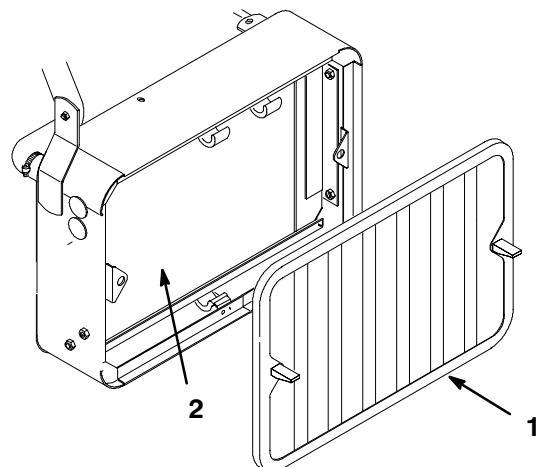


Figure 17

1. Radiator screen 2. Radiator

The cooling system is filled with a 50/50 solution of water and permanent ethylene glycol anti-freeze. Check level of coolant at beginning of each day before starting the engine.

CAUTION

POTENTIAL HAZARD

- If the engine has been running, coolant is hot and under pressure.

WHAT CAN HAPPEN

- Pressurized, hot coolant can escape and cause burns.

HOW TO AVOID THE HAZARD

- 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. Park the machine on a level surface.
2. Check the coolant level (Fig. 18). It should be between the lines on the reserve tank when the engine is cold.
3. If the coolant is low, remove the reserve tank cap and add a 50/50 mixture of water and permanent ethylene glycol antifreeze. **Do not overfill.**
4. Install the reserve tank cap.

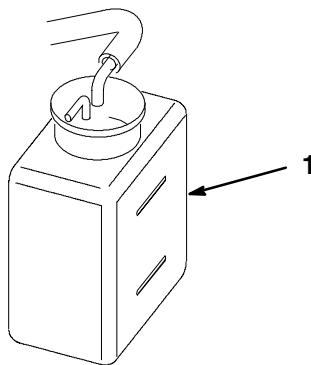


Figure 18

1. Reserve tank

Check Hydraulic System Fluid

Recommended Hydraulic Fluid

The hydraulic system is designed to operate on anti-wear hydraulic fluid. The machine's reservoir is filled at the factory with approximately 5.5 gallons (20.8 l) of Mobil DTE 15M hydraulic fluid. **Check level of hydraulic fluid before engine is first started and daily thereafter.** Appropriate hydraulic oils are listed below.

Group 1 Hydraulic Fluid (Moderate climate—average duty)

Note: The fluids within this group are interchangeable.

ISO VG 46/68 multi-viscosity anti-wear hydraulic fluid

Mobil	DTE 15M
Amoco	Rykon Premium ISO 46
Castrol	AWH 46
Conoco	Hydroclear AW MV46
Gulf	Harmony HVI 46 AW
Kendall	Hyken Golden MV SAE 5W-20
Pennzbell	AWX MV46
Phillips	Magnus A KV 5W-20
Shell	Tellus T 46
Sunoco	Sun Hyd. Oil 2105
Texaco	Rando HDZ 46

Universal Tractor Hydraulic Fluid

Mobil	Mobilfluid 424
Amoco	1000 Fluid
Chevron	Tractor Hydraulic Fluid
Conoco	Hydroclear Powertran
Esso	Hydraul
Gulf	Universal Tractor Fluid
Kendall	Hyken 052

Marathon
Pennzoil
Phillips
Shell
76 Lubricants
Sunoco
Texaco

Marafluid Super HT
Hydra-trans
HG Fluid
Donax TD
Hydraulic/Tractor Fluid
TH Fluid
TDH

Group 2 Hydraulic Fluid (Hot Climate—Heavy Duty)

Note: The fluids within this group are interchangeable.

ISO VG 68 anti-wear hydraulic fluid

Mobil	DTE 26
Amoco	Rykon AW No. 68
Castrol	AWS 68
Chevron	Hydraulic Oil AW ISO 68
Conoco	Hydroclear AW 68
Exxon	Nuto H 68
Gulf	Harmony 68AW
Kendall	Four Seasons AW 68
Marathon	ISO 68
Pennzbell	AW Hydraulic Oil 68
Phillips	Magnus A ISO 68
Shell	Tellus 68
76 Lubricants	AW 68
Sunoco	SunVis 868
Texaco	Rando HD 68

IMPORTANT: Group 1 fluids are recommended for use at typical ambient temperatures of 32°F (0°C) to 105°F (41°C). The ISO Type 46/48 fluid has been found to offer optimal performance in a wide range of temperature conditions for the average user. The Universal Tractor Fluids offer similar performance for those who prefer them, with perhaps some slight loss of efficiency at high ambient temperatures compared to the Type 46/48 fluids.

Group 2 fluids are recommended for heavy-duty use in hot climates where ambient temperatures range from about 70°F (20°C) to 120°F (49°C). Use at lower ambient temperatures may result in hard starting, increased engine laboring while cold, sluggish or non-operating spool valves while cold and high filter back-pressure due to the higher viscosity of these fluids.

Note: When changing from one type of hydraulic fluid to another, be certain to remove all the old fluid from the system, as some fluids are incompatible with others.

Group 3 Hydraulic Fluid (Biodegradable)

ISO VG 32/46 anti-wear hydraulic fluid

Mobil

EAL 224H

Note: This biodegradable hydraulic fluid is not compatible with the fluids in Group 1 and 2.

Note: An Oil Cooler Kit, Part No. 100-3166, is required on the traction unit when using the biodegradable fluid. Fluid temperature should not exceed 180°F (82°C).

Note: When changing from standard fluid to the biodegradable type, be certain to follow approved flushing procedures as published by Mobil. Contact your local Toro Distributor for details.

IMPORTANT: Use only types of hydraulic fluids specified. Other fluids could cause system damage.

Note: A red dye additive for the hydraulic system fluid is available in 2/3 oz bottles. One bottle is sufficient for 4-6 gallons of hydraulic fluid. Order Part No. 44-2500 from your Authorized Toro Distributor.

Filling the Hydraulic Tank

1. Position the machine on a level surface. Make sure the machine has cooled down so the fluid is cold.
2. Remove the cap from the reservoir and check the level of fluid. The fluid should be up to the bottom of the screen in the filler neck (Fig. 19).
3. If the fluid level is low, slowly fill the reservoir with the appropriate hydraulic fluid until the level reaches the bottom of the screen. **Do not overfill.**
4. Install the reservoir cap. Wipe up any fluid that may have spilled.

IMPORTANT: To prevent system contamination, clean the top of the hydraulic fluid containers before puncturing. Ensure the pour spout and funnel are clean.

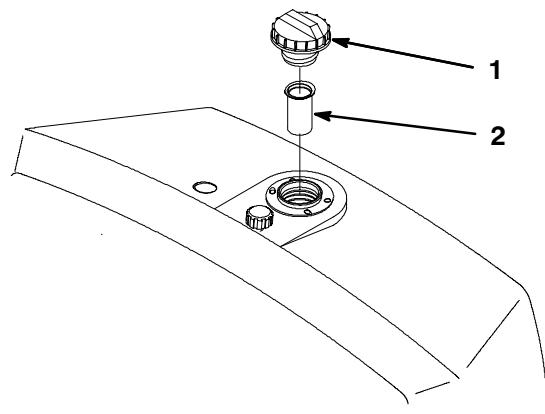


Figure 19

1. Hydraulic reservoir cap 2. Screen

Draining Water From Fuel Filter/Water Separator

Any water accumulation should be drained from the fuel filter/water separator before each use or when the warning light glows.

1. Position the machine on a level surface and stop the engine.
2. Place a drain pan under the fuel filter.
3. Open the drain plug on the fuel filter/water separator approximately one turn and drain any accumulated water. If necessary, operate the priming pump to drain water (Fig. 20). Tighten the plug after draining.
4. Start the engine and make sure the warning light goes out. Check for leaks.

Note: Because the accumulated water will be mixed with diesel fuel, drain the fuel filter into a suitable container and dispose of properly.

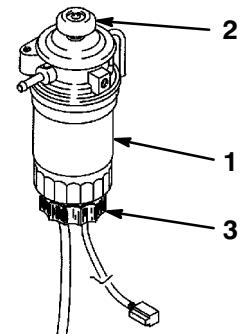


Figure 20

1. Fuel filter 2. Priming pump 3. Drain plug

Check Tire Pressure

The tires are over-inflated for shipping. Therefore, release some of the air to reduce the pressure. The correct air pressure is:

- Front tires: 8-12 psi
- Rear tire: 8-15 psi.

Check Reel to Bedknife Contact

Each day before operating, check the 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 bedknife (refer to Adjusting Reel to Bedknife in the Cutting Unit Operator's Manual).

Check Torque of Wheel Nuts

Torque the wheel nuts to 70-90 ft-lb. after 1-4 hours of operation and again after 10 hours of operation. Torque them every 200 hours thereafter.

WARNING

POTENTIAL HAZARD

- The wheels nuts may become loose.

WHAT CAN HAPPEN

- The wheel may become loose or fall off and cause personal injury.

HOW TO AVOID THE HAZARD

- Maintain the proper torque in the wheel nuts.

Operation

Think Safety First

Please carefully read all the safety instructions on pages 3-6. Knowing this information could help you and others avoid injury.

The use of protective equipment, such as, but not limited to, for eyes, ears, feet, and head is recommended.

CAUTION

POTENTIAL HAZARD

- This machine produces sound levels in excess of 85 dBA at the operator's ear when in operation.

WHAT CAN HAPPEN

- Exposure to sound levels of 85dBA or above for extended periods of time can cause ear damage or hearing loss.

HOW TO AVOID THE HAZARD

- Wear hearing protection when operating this machine.

Controls

Traction Pedal

The traction pedal (Fig. 21) has three functions: (1) to make the machine move forward; (2) to move it backward; and (3) to stop machine. Depress 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. Also, allow the pedal to move to the neutral position to stop the machine. For operator comfort, do not rest the heel of your foot on reverse, when operating forward (Fig. 22).

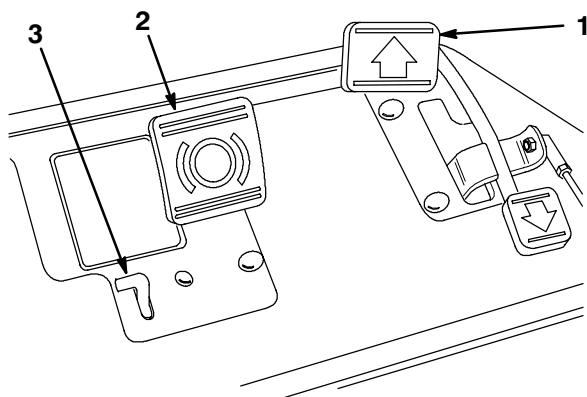


Figure 21

- 1. Traction pedal
- 2. Brake pedal
- 3. Parking brake lever



Figure 22

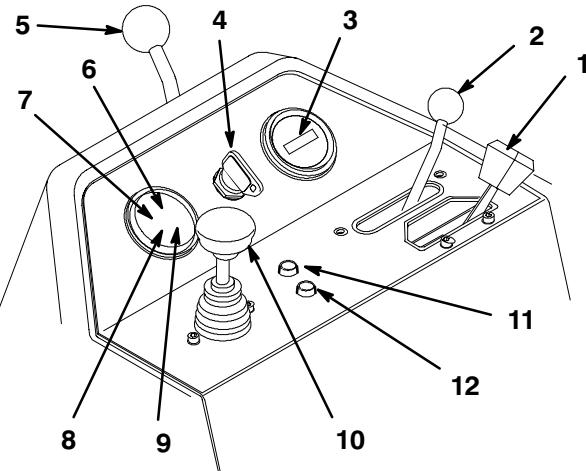


Figure 23

1. Throttle control	8. Battery warning light
2. Functional control lever	9. Glow plug light
3. Hour meter	10. Raise/Lower Mow Control
4. Ignition switch	11. High temperature override button
5. Steering arm locking lever	12. Water in fuel indicator light
6. Water temperature light	
7. Engine oil pressure light	

Brake Pedal

The Brake Pedal (Fig. 21) actuates an automotive drum-type mechanical brake located at each traction wheel.

Parking Brake Lever

Depressing the brake pedal to actuate the brake assembly, then depressing the small lever indicated (Fig. 21) will keep the brakes actuated for parking. Disengage the parking brake by depressing the brake pedal. Form the habit of locking the parking brake before you leave the machine.

Throttle Control

The Throttle Control (Fig. 23) gives the operator the ability to control the speed of the engine. Moving the Throttle Control toward the "FAST" position increases engine RPM; moving Throttle Control toward "SLOW" will decrease engine RPM.

Functional Control Lever

The functional control lever (Fig. 23) provides two (2) traction selections, plus a "NEUTRAL" position. It is permissible to shift from mow to transport or transport to mow (not to neutral) while the machine is in motion. No damage will result.

- Rear Position—neutral and backlapping
- Middle Position—used for mowing operation
- Front Position—used for transport operation

Hour Meter

The hour meter (Fig. 23) indicates the total hours of machine operation. The hour meter starts to function whenever the key switch is rotated to "ON."

Ignition Switch

Insert the key into the switch (Fig. 23) and rotate it clockwise as far as possible to the "START" position to start the engine. Release the key as soon as the engine starts; the key will move to the "ON" position. Rotate the key counterclockwise to the "OFF" position to stop the engine.

Steering Arm Locking Lever

Rotate the lever (Fig. 23) rearward to loosen adjustment, raise or lower the steering arm for operator comfort, then, rotate the lever forward to tighten adjustment.

Water Temperature Light

The light (Fig. 23) glows and the engine automatically shuts down when the engine coolant temperature gets too high.

Water in Fuel Indicator Light

The light (Fig. 23) glows when water is detected in fuel.

IMPORTANT: Water must be drained from the fuel filter/water separator to avoid serious engine damage; refer to Draining Water from Fuel Filter/Water Separator, page 19.

High Temperature Override Button

If the engine kills due to an overheat condition, press the override button (Fig. 23) in and hold it until the machine can be moved to a safe location and allowed to cool down.

Note: When using the override button, it must be held down continuously to operate. Do not use for extended periods of time.

Glow Plug Indicator Light

When the glow plug indicator light (Fig. 23) is lit, it indicates the glow plugs are on.

Battery Warning Light

The light (Fig. 23) glows if the battery charge is low.

Oil Pressure Light

The light (Fig. 23) glows if the engine oil pressure drops below a safe level.

Raise/Lower Mow Control

Moving the control (Fig. 23) forward, during operation, lowers the cutting units and starts the reels. Pull back on the control to stop the reels and raise the cutting units. During operation the reels can be stopped by pulling back on the control momentarily and releasing it. Restart the reels by moving the control forward.

Seat Adjusting Lever

The seat adjusting lever on the left side of the seat (Fig. 24) allows a seven inch fore and aft adjustment.

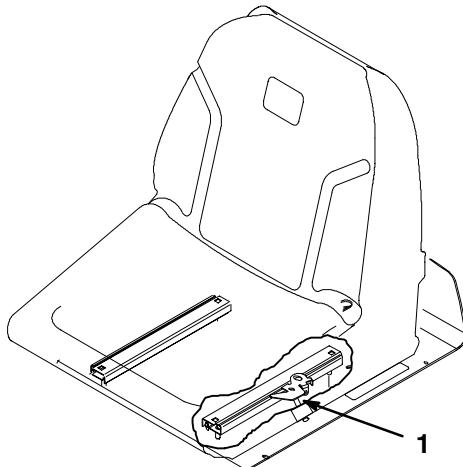


Figure 24

1. Seat adjusting handle

Fuel Shut-Off Valves

Close the fuel shut-off valve (Fig. 25), under fuel tank, when storing the machine.

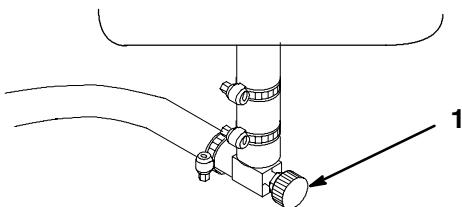


Figure 25

1. Fuel shut-off (under fuel tank)

Break-In Period

1. Only 8 hours of mowing operation is required for the machine break-in period.
2. Since the first hours of operation are critical to future dependability of the machine, monitor its functions and performance closely so that minor difficulties, which could lead to major problems, are noted and can be corrected. Inspect the machine frequently during break-in for signs of oil leakage, loose fasteners, or any other malfunction.
3. To assure optimum performance of the brake system, burnish (break-in) the brakes before use. To burnish the brakes, firmly apply the brakes and drive the machine at mowing speed until the brakes are hot, as indicated by their smell. An adjustment to the brakes may be required after break-in; refer to Adjusting the Brakes, page 31.

Starting and Stopping the Machine

Starting

IMPORTANT: The fuel system may have to be bled if any of the following situations have occurred:

- A. Initial start up of a new engine.
- B. Engine has ceased running due to lack of fuel.
- C. Maintenance has been performed upon fuel system components; ie. filter replaced, etc.

Refer to Bleeding the Fuel System, page 23.

IMPORTANT: Do not use ether or other types of starting fluid.

1. Be sure the parking brake is set, the raise/lower mow control is disengaged, and the functional control is in the neutral position.
2. Remove your foot from the traction pedal and make sure the pedal is in the neutral position.
3. Move the throttle lever to full throttle position.
4. Insert the key into the switch and rotate it to ON. Hold it in the ON position until the glow plug indicator light goes off (approximately 6 seconds).
5. Immediately turn the ignition key to the START position. Release the key when the engine starts and allow it to move to the ON position. Move the throttle control to SLOW.

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.

- When the engine is started for the first time, or after an overhaul of the engine, operate the machine in forward and reverse for one to two minutes. Turn the steering wheel to the left and right to check the steering response. Then shut the engine off (see *Stopping in Starting and Stopping the Engine*, page 23) and wait for all moving parts to stop. Check for oil leaks, loose parts and any other noticeable malfunctions.

Stopping

1. Move the throttle control to SLOW, disengage the raise/lower mow control, and move the functional control to neutral.
2. Rotate the starter key to OFF to shut the engine off. Remove the key from the switch to prevent accidental starting.
3. Close fuel shut off valves before storing machine.

Bleeding the Fuel System

1. Position the machine on a level surface. Make sure the fuel tank is at least half full.
2. Press the primer button on top of the fuel filter until resistance is felt (Fig. 26).

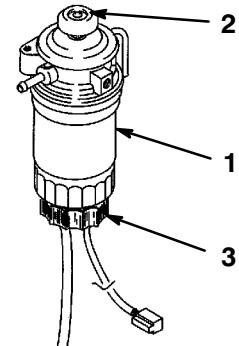


Figure 26

1. Fuel filter
2. Priming pump
3. Drain plug

3. Start the engine and continue to operate the primer button until the engine runs smooth.

Check Interlock System Operation

CAUTION

POTENTIAL HAZARD

- Safety interlock switches may be disconnected or damaged.

WHAT CAN HAPPEN

- The machine could operate unexpectedly.
- Contact with moving parts may cause personal injury.

HOW TO AVOID THE HAZARD

- Do not tamper with the interlock switches.
- Check the operation of the interlock switches daily and replace any damaged switches before operating the machine.
- Replace switches every two years regardless of whether they are operating properly or not.

The purpose of the interlock system is to prevent the engine from cranking or operating the traction pedal if the functional control lever is not in neutral. Also, the engine will shut off if the operator leaves the seat without the functional control lever in neutral. The reels will shut off if the functional control lever is moved to neutral or transport. Perform the following system checks daily to be sure the interlock system is operating correctly:

1. Sit on the seat, engage the parking brake, move the functional control lever to neutral, and try to depress the traction pedal. The pedal should not depress, which means the interlock system is operating correctly. Correct the problem if it is not operating properly.
2. Sit on the seat and engage the parking brake. Put the traction pedal in neutral and the functional control lever in mow or transport and try to start the engine. The engine should not crank, which means the interlock system is operating correctly. Correct the problem if it is not operating properly.
3. Sit on the seat and start the engine. Move the functional control lever to mow and rise from the seat. The engine should kill, which means the interlock system is operating correctly. Correct the problem if it is not operating properly.
4. Sit on the seat and engage the parking brake. Put the traction pedal in neutral and the functional control lever in neutral and start engine. Move the raise/lower mow control forward to lower the cutting units. The cutting units should not start rotating. If they do, the interlock system is not operating correctly. Correct the problem.

Preparing the Machine for Mowing

To assist in aligning the machine for successive cutting passes, it is suggested the following be done to the No. 2 and No. 3 cutting unit baskets:

1. Measure in approximately 5 inches from the outer edge of each basket (Fig. 27).
2. Either place a strip of white tape or paint a line onto each basket paralleling the outer edge of each basket (Fig. 27)

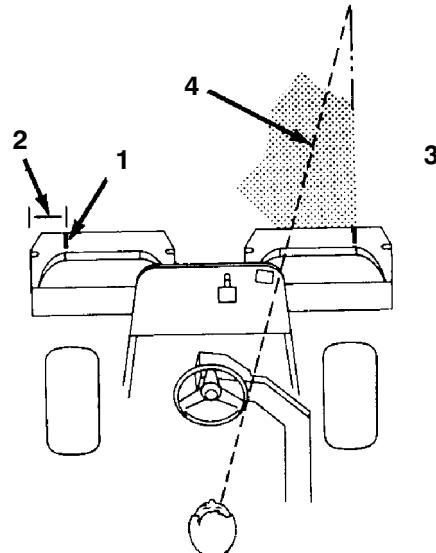


Figure 27

1. Alignment strip	4. Keep focal spot 6-10 feet ahead of the machine
2. Approximately 5 inches	
3. Cut grass on right	

Training Period

Before mowing greens with the machine, we that you find a clear area and practice starting and stopping, raising and lowering the 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 green for debris, remove the flag from the cup, and determine the direction best to mow. Base the 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 trap between the reel blades and bed knife.

Mowing Procedures

1. Approach the green with the functional control lever in the MOW position and the throttle at FULL speed. Start on one edge of the green so the ribbon procedure of cutting may be used. This holds compaction to a minimum and leaves a neat, attractive pattern on the greens.
2. Actuate the raise/lower mow lever as the front edge of the grass baskets cross the outer edge of the green. This procedure drops the cutting units to the turf and starts the reels.

IMPORTANT: Familiarize yourself with the fact that the No. 1 cutting unit reel is delayed, when lowering and raising, therefore, you should practice to try to gain the required timing necessary to minimize the cleanup mowing operation.

3. Overlap a minimal amount with the previous cut on return passes. To assist in maintaining a straight line across the green and keep the machine an equal distance from the edge of the previous cut, establish an imaginary sight line approximately 6 to 10 feet ahead of the machine to the edge of the uncut portion of the green (Fig. 28). Some find it useful to include the outer edge of the steering wheel as part of the sight line; i.e. keep the steering wheel edge aligned with a point that is always kept the same distance away from the front of the machine.

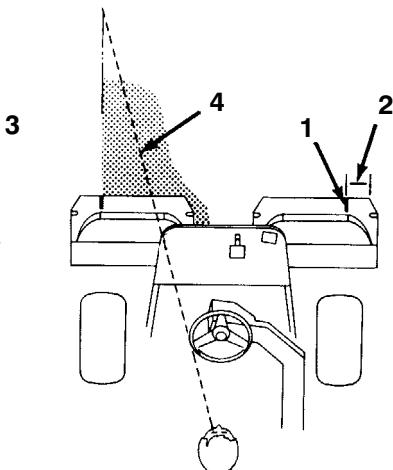


Figure 28

1. Alignment strip	4. Keep focal spot 6-10 feet ahead of machine
2. Approximately 5 inches	
3. Cut grass on right	

4. As the front of the baskets cross the edge of the green, pull back on the raise/lower mow lever. This will stop the reels and lift the cutting units. Timing of this procedure is important, so the mowers do not cut into

the fringe area. However, as much of the green as possible should be cut to minimize the amount of grass left to mow around the outer periphery.

5. Cut down on operating time and ease lineup for the next pass by momentarily turning the machine in the opposite direction, then turning in the direction of the uncut portion; i.e., if intending to turn right, first swing slightly left, then right. This will assist in getting the machine more quickly aligned for the next pass. Follow the same procedure for turning in the opposite direction. It is a good practice to try to make as short a turn as possible. However, turn in a wider arc during warmer weather to minimize the possibility of bruising the turf.

IMPORTANT: The machine should never be stopped on a green with the cutting unit reels operating as damage to the turf may result. Stopping on a wet green with the machine may leave marks or indentations from the wheels.

6. Finish cutting the green by mowing the outer periphery. Be sure to change the direction of cutting from the previous mowing. Always keep weather and turf conditions in mind and be sure to change the direction of mowing from the previous cutting. Replace the flag.
7. Empty the grass baskets of all clippings before transporting to the next green. Heavy wet clippings place an undue strain on the baskets and will add unnecessary weight to the machine, thereby increasing the load on the engine, hydraulic system, brakes, etc.

Transport Operation

Make sure the cutting units are in the full up position. Move the functional control lever to the TRANSPORT position. Use the brakes to slow the machine while going down steep hills to avoid loss of control. Always approach rough areas at a reduced speed and cross severe undulations carefully. Familiarize yourself with the width of the machine. Do not attempt to pass between objects that are close together so that costly damage and down time can be prevented.

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 excessive water pressure will not cause contamination and damage to seals and bearings. **Never wash a warm engine or electrical connections with water.**

After cleaning, it is recommended the machine be inspected for possible hydraulic fluid leaks and damage or wear to hydraulic and mechanical components. The

cutting units should be checked for sharpness. Also, lubricate the mow and lift pedal and brake shaft assembly with SAE 30 oil or spray lubricant to deter corrosion and help keep the machine performing satisfactorily during the next mowing operation.

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 2-3 mph because the drive system may be 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 and rotate it 90° (Fig. 29).

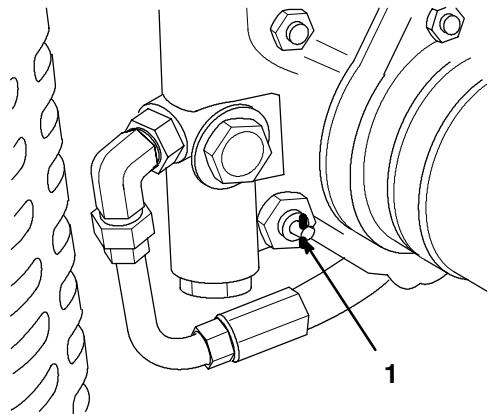


Figure 29

1. Bypass valve

2. Before starting the engine, close the bypass valve by rotating it 90°. Do not start the engine when the valve is open.

Maintenance

Daily Maintenance Checklist

Duplicate this page for routine use.

Note: Check proper section of the operator's manual for fluid specifications.

Maintenance Check Item	Daily Maintenance Check for Week of _____						
	MON	TUES	WED	THURS	FRI	SAT	SUN
Check safety interlock operation							
Check instrument operation							
Check brake operation							
Check fuel filter/water separator							
Check fuel level							
Check engine oil level							
Clean screen and radiator							
Inspect air filter							
Check for unusual engine noises							
Check hydraulic hoses for damage							
Check for fluid leaks							
Check tire pressure							
Check reel-to-bedknife adjustment							
Check height-of-cut adjustment							
Lubricate all grease fittings ¹							
Lubricate traction and brake linkage							
Touch-up damaged paint							

¹Immediately 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		



CAUTION



POTENTIAL HAZARD

- If you leave the key in the ignition switch, someone could start the engine.

WHAT CAN HAPPEN

- Accidental starting of the engine could seriously injure you or other bystanders.

HOW TO AVOID THE HAZARD

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

Lubrication

The traction unit has grease fittings that must be lubricated regularly with No. 2 General Purpose Lithium Base Grease. If the machine is operated under normal conditions, lubricate all bearings and bushings after every 50 hours of operation. Lubricate fittings immediately **after every** washing, regardless of the interval listed.

The traction unit bearings and bushings that must be lubricated are: Rear wheel hub (1), Castor bearing (1), Steering cylinder (2) (Fig. 30), Lift arms (3) (Fig. 31), Traction pedal pivot (1) (Fig. 32).

1. Wipe the grease fitting clean so foreign matter cannot be forced into the bearing or bushing.
2. Pump grease into the bearing or bushing.
3. Wipe up excess grease.
4. Apply grease to the reel motor spline shaft and onto the lift arm when the cutting unit is removed for service.
5. Apply a few drops of SAE 30 engine oil or spray lubricant (WD 40) daily to all pivot points after cleaning.

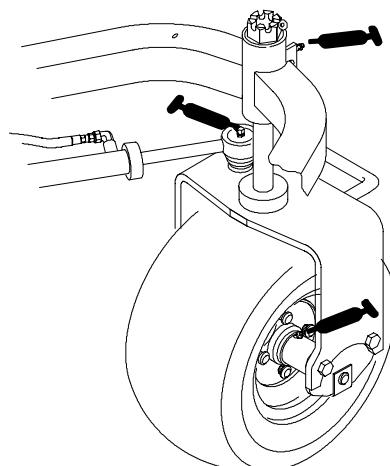


Figure 30

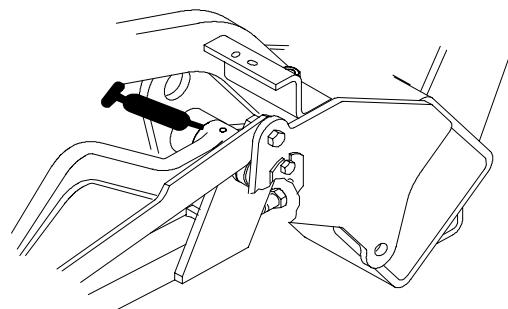


Figure 31

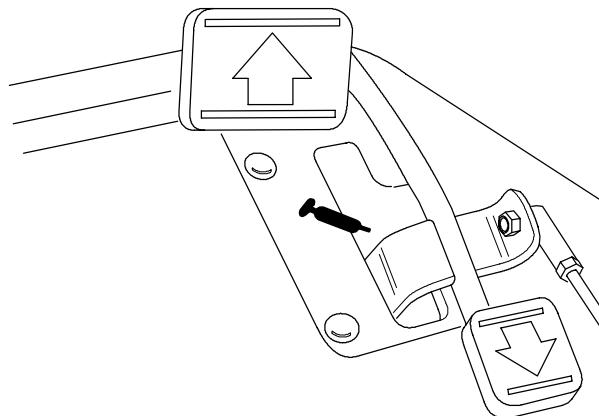


Figure 32

6. Refer to the Cutting Unit Operator's Manual for cutting unit lubrication requirements.

Air Cleaner

Service Interval/Specification

Check the air cleaner body for damage which could possibly cause an air leak. Replace a damaged air cleaner body.

Service the air cleaner filter every 200 hours.

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

Removing the Filter Element

1. Release the latches securing the air cleaner cover to the air cleaner body (Fig. 33). Separate the cover from the body. Clean the inside of the air cleaner cover.

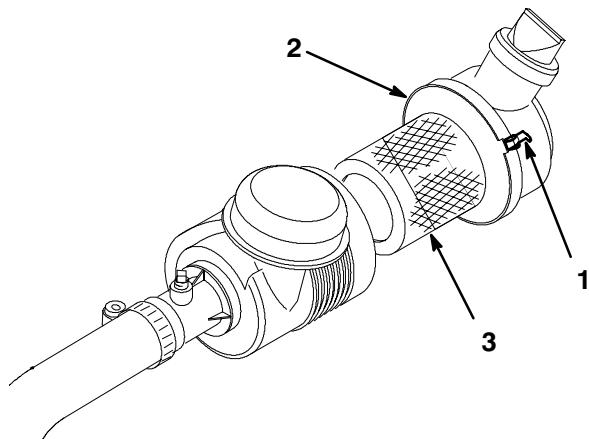


Figure 33

1. Air cleaner latches	3. Filter
2. Dust cap	

2. Gently slide the filter out of the air cleaner body to reduce the amount of dust dislodged. Avoid knocking the filter against the air cleaner body.
3. Inspect the filter and discard it if it is damaged. Do not wash or reuse a damaged filter.

Cleaning the Filter Element

1. Washing method:
 - A. Prepare a solution of filter cleaner and water and soak the filter element about 15 minutes; refer to directions on the filter cleaner carton for complete information.
 - B. After soaking the filter for 15 minutes, rinse it with clear water. The maximum water pressure must not exceed 40 psi to prevent damage to the filter element. Rinse the filter from clean side to dirty to side.
2. Compressed air method:
 - A. Blow the compressed air from inside to the outside of the dry filter element. Keep the air hose nozzle at least 2" from the filter and move the nozzle up and down while rotating the filter element.

IMPORTANT: To prevent damage to the filter element, do not exceed 100 psi air pressure.

- B. Inspect for holes and tears by looking through the filter toward a bright light.

Installing the Filter Element

1. Inspect the new filter for shipping damage. Check the sealing end of the filter.
2. Insert the new filter properly into the air cleaner body. Make sure the filter is sealed properly by applying pressure to the outer rim of the filter when installing. Do not press on the flexible center of filter.
3. Reinstall the cover and secure the latches (Fig. 33).

Cleaning the Radiator Screen

To prevent the system from overheating, the radiator screen and radiator must be kept clean. Check and clean the screen and radiator daily or, if necessary, hourly. Clean these components more frequently in dusty, dirty conditions.

1. Remove the radiator screen (Fig. 34).
2. Working from the fan side of the radiator, blow out the radiator with compressed air.

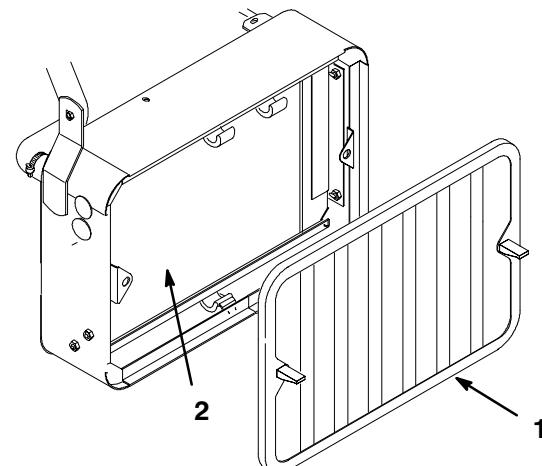


Figure 34

1. Radiator screen	2. Radiator
--------------------	-------------

3. Clean the screen and reinstall it.

Engine Oil

Service Interval/Specification

Change the oil:

- After the first 8 operating hours.

- After every 50 operating hours.

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

Changing Oil and Filter

1. Remove the drain plug and let oil flow into the drain pan. When the oil stops, install the drain plug.
2. Remove the oil filter. Apply a light coat of clean oil to the new filter gasket.
3. Screw the filter on by hand until the gasket contacts the filter adapter, then tighten 1/2 to 3/4 turn further. **Do not overtighten.**
4. Add oil to the crankcase; refer to Check Engine Oil, page 16.
5. Dispose of the oil properly.

Fuel Filter/Water Separator

Service Interval/Specification

Replace the filter element after every 800 operating hours.

Servicing the Filter

1. Clean the area where the filter canister mounts (Fig. 35).
2. Disconnect the sensor wire and remove the drain plug.
3. Remove the filter canister and clean the mounting surface.

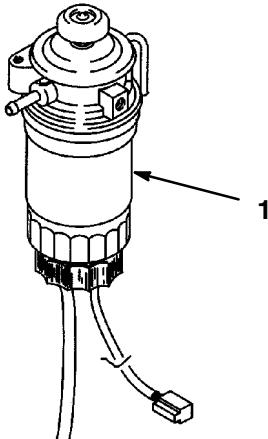


Figure 35

1. Fuel filter with separator

4. Lubricate the gasket on the filter canister with clean oil.

5. Install the filter canister by hand until the gasket contacts the mounting surface, then rotate the canister an additional 1/3 turn.
6. Install the drain plug with a new o-ring. Connect the sensor wire.
7. Push the primer button until resistance is felt.
8. Start the engine and check for leaks.

Adjusting the Throttle Control

Proper throttle operation is dependent upon proper adjustment of the throttle control. Assure the throttle control is operating properly.

1. Move the remote throttle control lever to the SLOW position (Fig. 36).
2. Loosen the cable clamp screw securing the cable to the engine (Fig. 36).
3. Move the cable until the speed control lever contacts the idle speed screw (Fig. 36).

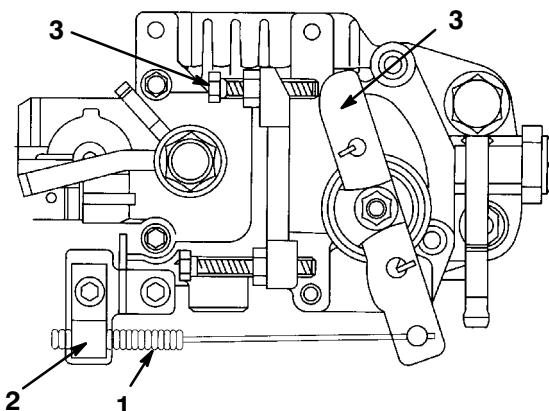


Figure 36

1. Throttle cable	3. Speed control lever
2. Cable clamp	4. Idle speed screw

4. Tighten the cable clamp screw and check the engine RPM setting.

Adjusting Idle Speed

1. Move the remote throttle control lever to the SLOW position (Fig. 36).
2. Loosen the lock nut on the idle speed screw (Fig. 36).
3. Adjust the idle speed screw to obtain 1500 rpm.
4. Tighten the lock nut.

Hydraulic Oil

Service Interval/Specification

Change the hydraulic oil:

- After every 800 operating hours

If the oil becomes contaminated, contact your local Toro distributor because the system must be flushed.

Contaminated oil looks milky or black when compared to clean oil.

Change the filter:

- After the first 50 operating hours
- After every 800 operating hours

Changing the Hydraulic Oil and Filter

1. Clean the area around the filter mounting area (Fig. 37). Place a drain pan under the filter and remove the filter.

Note: If the oil is not going to be drained, disconnect and plug the hydraulic line going to the filter.

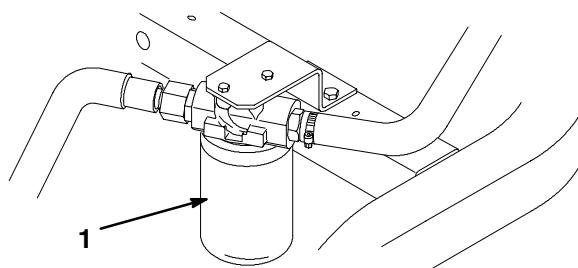


Figure 37

1. Hydraulic filter

- 2.

2. Fill the replacement filter with Mobil DTE 15 M hydraulic fluid, lubricate the sealing gasket, and hand turn until the gasket contacts the filter head. Then tighten 3/4 turn further. The filter should now be sealed.
3. Fill the hydraulic reservoir with approximately 5.5 gallons of hydraulic oil; refer to Check Hydraulic System Fluid, page 18.
4. Start the machine and run it at idle for 3 to 5 minutes to circulate the fluid and remove any air trapped in the system. Stop the machine and recheck the fluid level.
5. Dispose of oil properly.

Checking Hydraulic Lines and Hoses

Inspect the hydraulic lines and hoses daily for leaks, kinked lines, loose mounting supports, wear, loose fittings, weather deterioration and chemical deterioration. Make all necessary repairs before operating.



DANGER



POTENTIAL HAZARD

- Hydraulic fluid is under pressure.

WHAT CAN HAPPEN

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

HOW TO AVOID THE HAZARD

- Keep body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper to find hydraulic leaks.

Adjusting the Brakes

A brake adjustment rod is located on each side of the machine so the brakes can be equally adjusted. Adjust the brakes as follows:

1. Drive the machine and depress the brake pedal; both wheels should lock equally.



CAUTION



POTENTIAL HAZARD

- Brakes may become worn.

WHAT CAN HAPPEN

- Worn brakes may not hold properly and could injure you or bystanders.

HOW TO AVOID THE HAZARD

- Always check brakes in a wide, open-spaced, flat area which is free of other persons and obstructions.

2. Loosen the jam nut and adjust the clevis accordingly (Fig. 38).

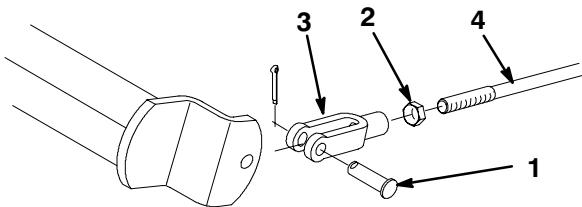


Figure 38

1. Clevis pin and cotter pin	3. Clevis
2. Jam nut	4. Brake shaft

3. Assemble the clevis to the brake shaft (Fig. 38).
4. Check the amount of free travel of the brake pedal when the adjustment is completed. There should be 1/2 inch to 1 inch travel before the brake shoes make contact with the brake drums. Readjust, if necessary, to achieve this setting.
5. Drive the machine and depress the brake pedal; both brakes should lock equally. Readjust if necessary.
6. It is recommended that the brakes be burnished annually; refer to Break-In Period, page 22.

Adjusting the Transmission for Neutral

If the machine “creeps” when the traction control pedal is in the neutral position, the neutral return mechanism must be adjusted.

1. Block up under the frame so one of the front wheels is off the floor.
2. Start the engine, move the throttle to SLOW, and check the front wheel that is off the floor; it must not be rotating.
3. If the wheel is rotating, stop the engine and proceed as follows:
 - A. Loosen both jam nuts securing the traction control cable to the bulkhead on the hydrostat (Fig. 39). Make sure the jam nuts are loosened equally and sufficiently to allow adjustment.
 - B. Loosen the nut securing the eccentric to the top of the hydrostat (Fig. 39).
 - C. Move the functional control lever to neutral and the throttle to slow. Start the engine.
 - D. Rotate the eccentric until creep does not occur in either direction. When the wheel stops rotating, tighten the nut locking the eccentric and adjustment (Fig. 39). Verify the adjustment with the throttle in the SLOW and FAST position.

- E. From each side of the bulkhead, tighten the locknuts **evenly**, securing the traction cable to the bulkhead (Fig. 39). Do not twist the cable.

Note: If cable tension exists when in neutral, the machine may creep when the functional control lever is moved to the Mow or Transport position.

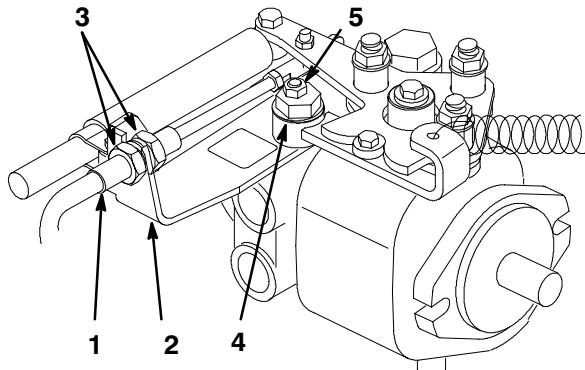


Figure 39

1. Traction cable	4. Eccentric
2. Bulkhead	5. Locknut
3. Jam nuts	

Adjusting Transport Speed

The traction pedal is adjusted for maximum transport speed at the factory, but an adjustment may be required if the pedal reaches full stroke before it contacts the pedal stop, or if a decrease in transport speed is desired.

1. Press down on the traction pedal. If the pedal contacts the stop (Fig. 40) before tension is felt on the cable, adjustment is required:
 - A. Loosen flangehead locknuts securing pedal stop to floor plate (Fig. 40).
 - B. Adjust the pedal stop so it contacts the pedal rod and tighten the nuts.

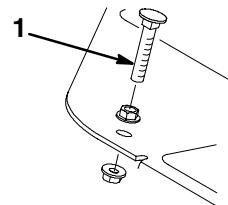


Figure 40

1. Pedal stop

Adjusting Mowing Speed

The machine is adjusted at the factory, but speed may be varied if desired.

1. Loosen the jam nut on the trunion capscrew (Fig. 41).
2. Loosen the nut securing the lock and mow brackets on the pedal pivot.

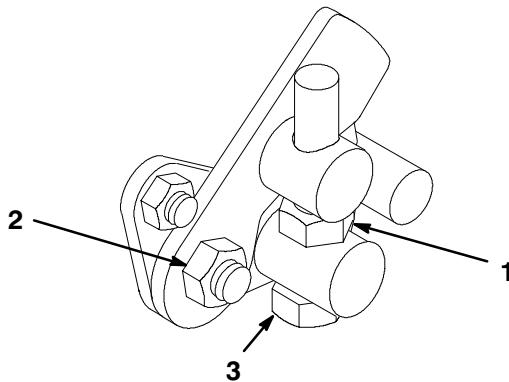


Figure 41

1. Jam nut
2. Nut
3. Trunion capscrew

3. Rotate the trunion capscrew clockwise to reduce mowing speed and counterclockwise to increase mowing speed.
4. Tighten the jam nut on the trunion capscrew and the nut on pedal pivot to lock the adjustment (Fig. 41). Check the adjustment and readjust as required.

Adjusting Cutting Unit Lift/Drop

The machine's cutting unit lift/drop circuit is equipped with a flow control valve (Fig. 42). This valve is preset at the factory at approximately 3 turns open, but an adjustment may be required to compensate for differences in hydraulic oil temperatures, mowing speeds, etc. If an adjustment is required, proceed as follows:

Note: Allow the hydraulic oil to reach full operating temperature before adjusting the flow control valve.

1. Raise the seat and locate the flow control valve (Fig. 42) mounted to the hydraulic cylinder for the center pull frame.
2. Loosen the set screw on the adjusting knob on the flow control.
3. Rotate the knob 1/4 turn counterclockwise if the center cutting unit is dropping too late or 1/4 turn clockwise if the center cutting unit is dropping too early.

4. After the desired setting has been achieved, tighten the set screw.

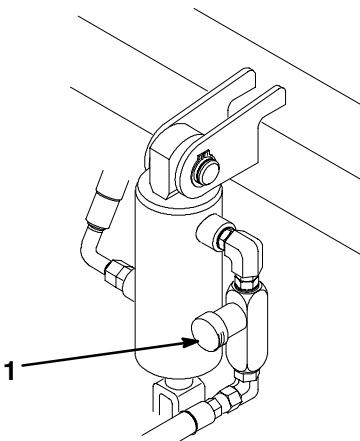


Figure 42

1. Flow control valve

Belt Adjustments

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

The engine belt (Fig. 43) should be tensioned so it deflects .20 inch with a 2-3 pound load applied midway between the crankshaft and the alternator pulley.

1. Loosen the bolts securing the alternator to the engine and adjusting strap.

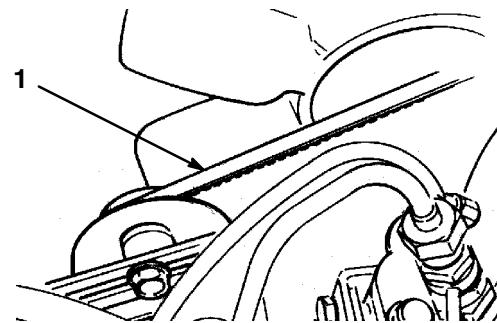


Figure 43

1. Engine belt
2. Adjust the belt to the proper tension and tighten the bolts.

Battery

Battery Care

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.

1. 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.
2. Check the electrolyte level every 25 operating hours or, if the machine is in storage, every 30 days.
3. 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).

DANGER

POTENTIAL HAZARD

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

WHAT CAN HAPPEN

- If you carelessly drink electrolyte you could die or if it gets onto your skin you will be burned.

HOW TO AVOID THE HAZARD

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

4. 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.
5. The battery cables must be tight on the terminals to provide good electrical contact.

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

WARNING

POTENTIAL HAZARD

- Either the battery terminals or metal tools could short against metal tractor components.
- Incorrect battery cable routing could damage the cables.

WHAT CAN HAPPEN

- Sparks can cause the battery gasses to explode.
- Damaged cables could short against metal tractor components and cause sparks.

HOW TO AVOID THE HAZARD

- When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the tractor.
- Always DISCONNECT the negative (black) battery cable before disconnecting the positive (red) cable.
- Always RECONNECT the positive (red) battery cable before reconnecting the negative (black) cable.
- Do not allow metal tools to short between the battery terminals and metal parts of the tractor.
- Always keep the battery hold-down in place to protect and secure the battery.
- Always route battery cables as illustrated.

Battery Storage

If the machine will be stored more than 30 days, remove the battery and charge it fully. Either store it on the shelf on the machine. Leave the cables disconnected if it is stored on the machine. Store the battery in a cool atmosphere to avoid quick deterioration of the charge in the battery. To prevent the battery from freezing, make sure it is fully charged. The specific gravity of a fully charged battery is 1.265-1.299.

34

Fuses

The fuses in the machine's electrical system are located under the seat (Fig. 44).

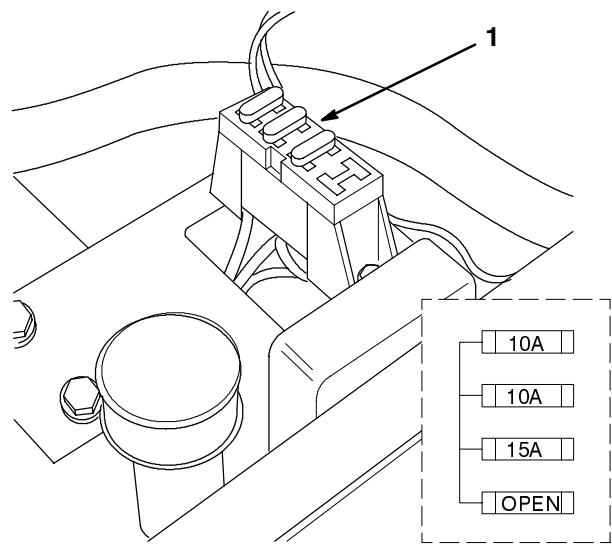
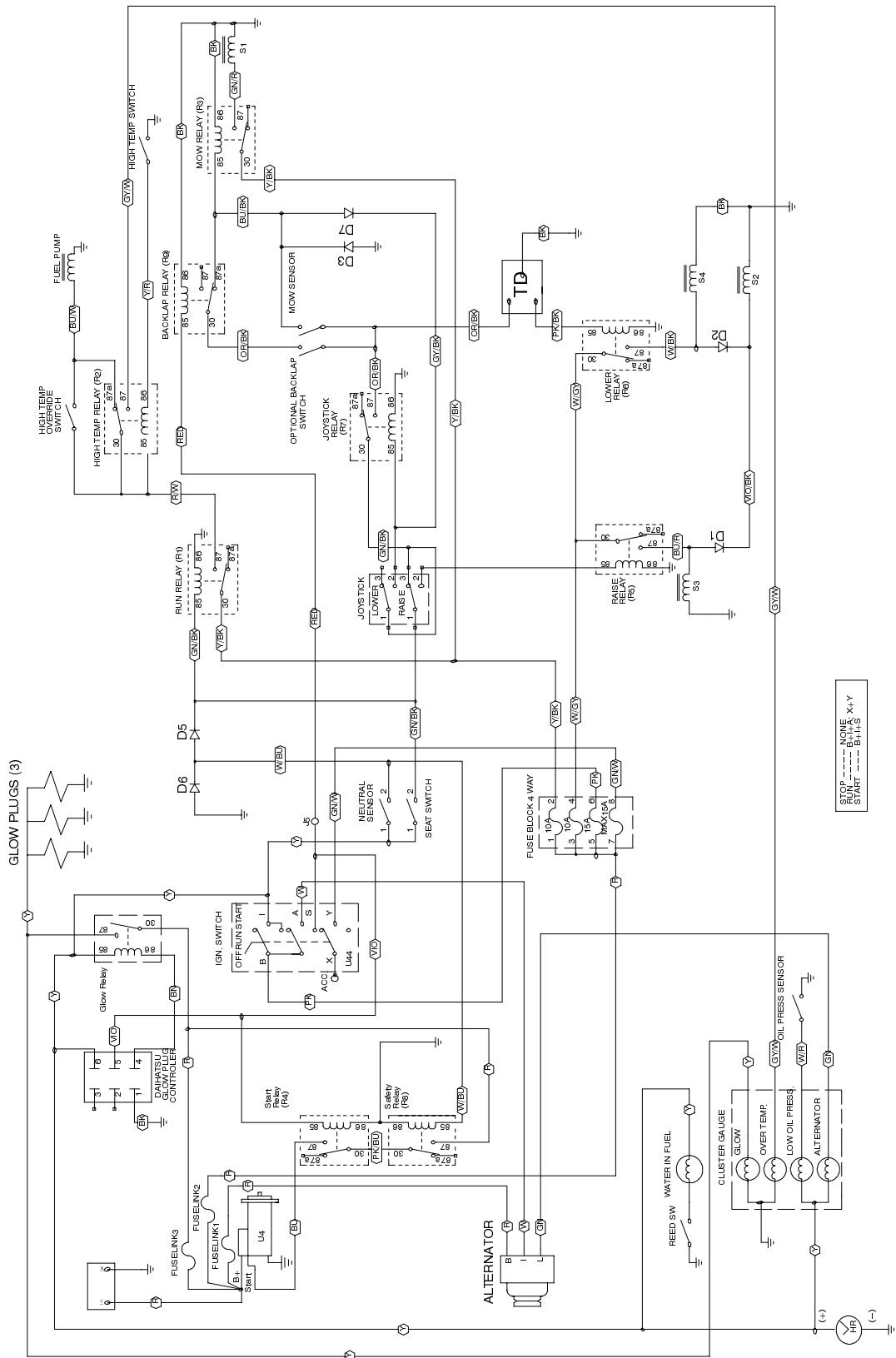


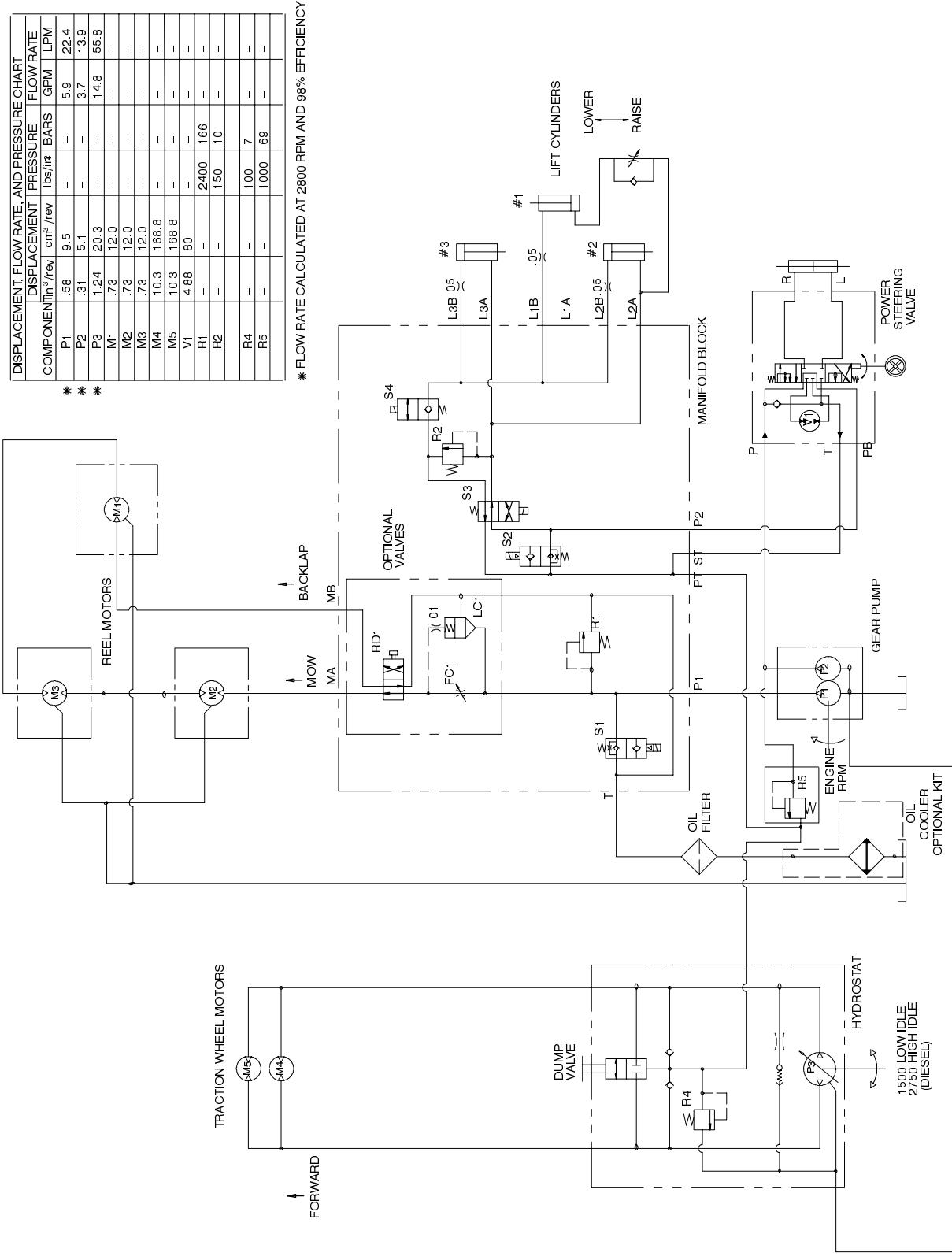
Figure 44

1. Fuses

Electrical Schematic



Hydraulic Schematic



T-2276-5

Minimum Recommended Maintenance Intervals

Maintenance Procedure	Maintenance Interval and Service					
	Every 8 Hours	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 800 Hours	Every 2000 hrs. or 2 Years
Change Engine Oil—initial						
Check Fan/Alternator Belt Tension—initial						
Replace Engine Oil Filter—initial						
Replace Hydraulic Oil Filter—initial						
Check Engine RPM (idle and full throttle)—initial						
Check Battery Fluid Level						
Check Battery Cable Connections						
Service Air Filter						
Lubricate All Grease Fittings						
Change Engine Oil						
Check Fan/Alternator Belt Tension						
Replace Engine Oil Filter						
Replace Air Filter Element						
Torque Wheel Lug Nuts						
Replace Hydraulic Oil						
Replace Hydraulic Oil Filter						
Check Engine RPM (idle and full throttle)						
Replace Fuel Filter/Water Separator Canister						
Replace Moving Hoses						
Replace Safety Switches						
Drain/Flush Fuel Tank						
Drain/Flush Hydraulic Tank						
Drain/Flush Cooling System						

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



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 1996 or newer Toro Commercial Product ("Product") purchased after January 1, 1997, 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
612-888-8801
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:

- 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, etc.

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.

- 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.