



# **Hydroject® 3000**

## **Aerator**

**Model No. 09801—210000001 and Up**

### **Operator's Manual**



## Warning



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

This spark ignition system complies with Canadian ICES-002.

Ce système d'allumage par étincelle de véhicule est conforme à la norme NMB-002 du Canada.

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## Introduction

Read this manual carefully to learn how to operate and maintain your product properly. The information in this manual can help you and others avoid injury and product damage. Although Toro designs and produces safe products, you are responsible for operating the product properly and safely.

Whenever you need service, genuine Toro parts, or additional information, contact an Authorized Service Dealer or Toro Customer Service and have the model and serial numbers of your product ready. The model and serial numbers are stamped on a plate which is riveted to the frame.

Write the product model and serial numbers in the space below:

<b>Model No.</b> _____
<b>Serial No.</b> _____

This manual identifies potential hazards and has special safety messages that help you and others avoid personal injury and 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 you do not follow the recommended precautions.

***Warning*** signals a hazard that *may* cause serious injury or death if you do not follow the recommended precautions.

***Caution*** signals a hazard that may cause minor or moderate injury if you do not follow the recommended precautions.

This manual uses two other words to highlight information.

**Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

## Safety

Hazard control and accident prevention are dependent upon the awareness, concern, and proper training of the personnel involved in the operation, transport, maintenance, and storage of the machine. Improper use or maintenance of the machine can result in injury or death. To reduce the potential for injury or death, comply with the following safety instructions.

### Before Operating

- Read and understand the contents of this Operator's Manual before operating the machine. Become familiar with all of the controls and know how to stop quickly. A free replacement manual is available by sending your complete Model and Serial Number to:  
The Toro Company  
8111 Lyndale Avenue South  
Bloomington, Minnesota 55420
- Never allow children to operate the machine. Do not allow adults to operate the machine without proper instruction. Only trained operators who have read this manual should operate this machine.
- Never operate the machine when under the influence of drugs or alcohol.

- Before attempting to start the engine, engage the parking brake.
- Remove all debris or other objects that might interfere with operation. Keep all bystanders away from the work area.
- Keep all shields and safety devices in place. If a shield, safety device, or decal is damaged, repair or replace it before operation is commenced. Also tighten any loose nuts, bolts, and screws to ensure that the machine is in safe operating condition.
- Do not operate machine while wearing sandals, tennis shoes, sneakers, or shorts. Also, do not wear loose fitting clothing which could get caught in moving parts. Always wear long pants and substantial shoes. Wearing safety glasses, safety shoes, ear protection, and a helmet is advisable and required by some local ordinances and insurance regulations.
- Fill the fuel tank with gasoline before starting the engine. Avoid spilling gasoline. Since gasoline is flammable, handle it carefully.
  - Use an approved gasoline container.
  - Do not fill the tank while the engine is hot or running.
  - Do not smoke while handling gasoline.
  - Fill the fuel tank outdoors and up to about one in. (25 mm) from the top of the tank, not the filler neck.
  - Wipe up any spilled gasoline.
- Check the interlock switches daily for proper operation. If a switch fails, replace it before operating the machine. The interlock system is for your protection, so do not bypass it. Replace all interlock switches every two years.

### While Operating

- **Do not take an injury risk!** When a person or pet appears unexpectedly in or near the working area, **stop aerating**.
- Keep hands and feet away from the nozzle and roller area. High velocity water jets can penetrate hands and feet. Penetration by the high velocity water jets can cause serious personal injury. If accidental penetration occurs, seek medical attention immediately.
- Never use chemicals in the water supply system.
- Do not operate the water injection system on concrete or asphalt because water jets will permanently damage these surfaces.
- Start the engine with the parking brake engaged.

- Do not run the engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could possibly be deadly.
- Using the machine demands attention. To prevent loss of control:
  - Use only in daylight or when there is good artificial light.
  - Watch for holes or other hidden hazards.
  - Do not transport machine close to a sand trap, ditch, creek, or other hazard.
- If the machine starts to vibrate abnormally, shut the engine off. Remove the wires from the spark plugs to prevent possibility of accidental starting. Check the machine for damaged parts. Repair any damage before restarting the engine and operating the machine.
- Do not touch the engine or muffler while the engine is running or soon after it is stopped. These areas could be hot enough to cause a burn.
- Before leaving the operator's position (behind the handle), engage the parking brake.
- When leaving the machine unattended, engage the parking brake, shut the engine OFF, and remove the key from the ignition switch.

## Maintenance

- Disconnect the wires from the spark plugs to prevent accidental starting of the engine when servicing, adjusting, or storing the machine.
- If the machine must be tipped to perform maintenance or an adjustment, close the fuel shut-off valve, drain the gasoline from the fuel tank, the oil from the crankcase, and remove the battery.
- To reduce the potential for a fire hazard, keep the engine free of excessive grease, grass, leaves, and accumulation of dirt.
- Be sure that the machine is in safe operating condition by keeping nuts, bolts, and screws tight. Check all bolts and nuts frequently to be sure that they are tightened to specification.
- If the engine must be running to perform a maintenance adjustment, keep hands, feet, clothing, and other parts of the body away from any moving parts.
- Make sure that all hydraulic line connectors are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system.
- Keep your body and hands away from pin hole leaks or nozzles that eject water or hydraulic fluid under high pressure. Use paper or cardboard, not your hands, to search for leaks. Hydraulic fluid or water escaping under pressure can have sufficient force to penetrate skin and do serious damage. If either of these fluids are injected into the skin they must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.
- Before disconnecting or performing any work on the hydraulic oil system, all pressure in the system must be relieved by stopping the engine and opening the bypass valve.
- Before disconnecting or performing any work on the water system, all pressure in the system must be relieved by stopping the engine and opening the bleed valve. Opening the bleed valve allows any trapped water to escape from the system and also allows the accumulator piston to move to the bottom of the accumulator cylinder.
- The accumulator in this machine contains high pressure dry nitrogen. Accumulator servicing requires special tools and precautions. Accumulators do not contain user serviceable components. Improper accumulator servicing can cause dismemberment or death. Do not attempt to disassemble a accumulator; have this work done by an Authorized Toro Distributor.
- Do not overspeed the engine by changing the governor settings. To be sure of safety and accuracy, have an Authorized Toro Distributor check the maximum engine speed with a tachometer.
- The engine must be shut off before checking the oil or adding oil to the crankcase.
- Allow the engine to cool before storing the machine in any enclosure such as a garage or storage shed. Make sure that the fuel tank is empty if the machine is to be stored in excess of 30 days. Do not store the machine near any open flame or where gasoline fumes may be ignited by a spark. Always store gasoline in a safety approved, red metal container.
- When storing or transporting the machine (trailer), make sure that the fuel shut-off valve is closed.
- Perform only those maintenance instructions described in this manual. If major repairs are ever needed or assistance is desired, contact an Authorized Toro Distributor. To ensure optimum performance and safety, always purchase genuine Toro replacement parts and accessories. **Never use "will-fit" replacement parts and accessories** made by other manufacturers. Look for the Toro logo to ensure genuineness. Using unapproved replacement parts and accessories could void the warranty.

# 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.



80-8000



80-8070



80-9350



80-8290



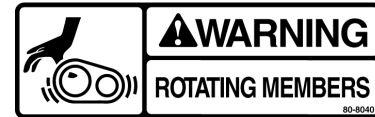
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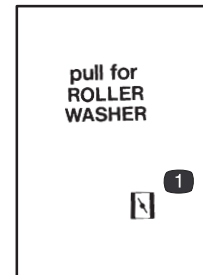
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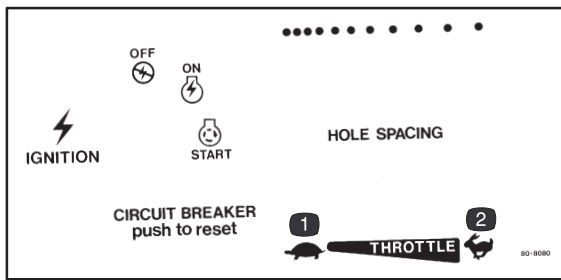


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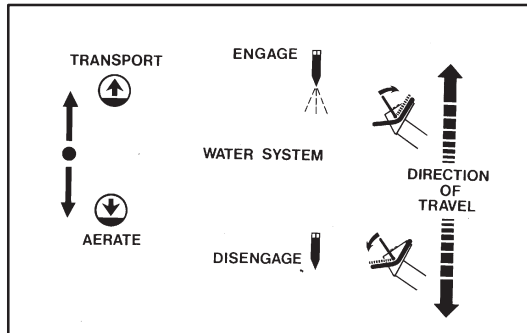
80-8150 (Replace control panel)

1. Choke



### 80-8110 (Replace control panel)

1. Slow throttle
2. Fast throttle



80-9240

### IMPORTANT

- THE FIVE MICRON FILTER ELEMENT (86-8620) MUST BE IN PLACE AT ALL TIMES.
- OPERATION WITHOUT PROPER FILTRATION WILL RESULT IN PREMATURE WEAR AND FAILURE OF THE WATER SYSTEM COMPONENTS.
- USE OF ADDITIONAL FILTRATION OR POTABLE WATER MAY BE NECESSARY TO PROLONG THE LIFE OF THE FILTRATION SYSTEM.
- SEE OPERATOR'S MANUAL FOR MORE INFORMATION.

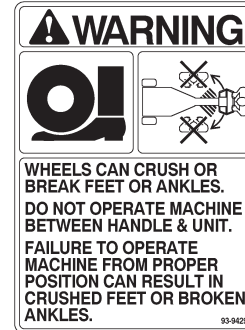
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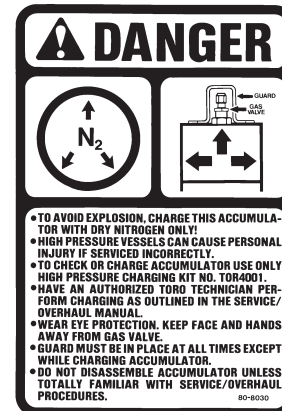
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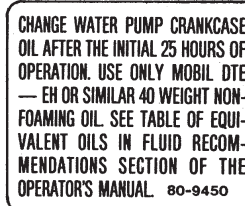
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93-9429



80-8030



80-9450

# Specifications

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

## General Specifications

Engine	Onan, 4 cycle, opposed twin, air cooled, 24 hp @ 3600 RPM, 60 cu. in (983 cc) displacement. Electric start. Heavy duty valve package. Extended service air cleaner. 3 quart oil capacity. Solid state ignition. Meets California Exhaust Emission Standard for 1995 Lawn and Garden Equipment.
Clutches	Electromagnetic, dual groove belt drive for water pump and driveshaft flange brake/clutch for main valve gearbox.
Electrical	12 volt system with 20 amp circuit breaker protection. Relays for all high current switching. Electronic controller and sensors for automatic startup and shutdown sequence of water injection system. Group 28 battery with 525 cold crank amps.
Traction Drive	Closed loop hydrostatic drive consisting of Sundstrand variable volume pump and Parker low speed, high torque wheel motor mounted to steering fork. Hydraulic system contains 5 quarts with 25 micron suction line filter and gearbox reservoir.
Tires/Wheels	Three, smooth tread 2 ply, 18 x 9.50-8, pneumatic tubeless, tires. Demountable drop center steel wheels with 4 lug nuts mounted to tapered roller bearing hubs on transport arms and brake hub on wheel motor. All are interchangeable.
Brake	Drum and shoe-type parking brake mounted to wheel motor. Holds unit on a 30% grade.
Transport Lift	12 volt Warner Electric linear screw actuator with 6 inch stroke. Raises and lowers lift arm/transport tires and activates hole spacing control.
Fuel Capacity	10.5 gallons gasoline
Ground Speed	Aerating: 0–2 MPH (both directions) Transport: 0–4 MPH (both directions)
Aeration Width	33 inches with 11 nozzles on 3 inch centers
Aeration Depth	4 to 6 inches depending on turf conditions and nozzle configuration
Hole Pattern	Variable from 1-1/2 to 6 in. spacing in the direction of travel, and 3 or 6 in. increments in width

## Controls

Engine Panel	Throttle, choke, spray wash control, hour meter, water pressure gauge, spacing control lever, key switch, and circuit breaker reset button
Steering Tiller Panel	Traction bail, water system engage and disengage buttons, transport/aerate lift toggle switch, and parking brake with buzzer alarm.
Electronic Control Module	Solid state potted device for sequencing start and stop of water system. Interlocks for water pressure, transport lift, and traction neutral.

## Water Injection System

Pre-Filter	Spin down type with washable cartridge in clear plastic housing and plastic ball valve for flushing.
Supply Filter	Replaceable cartridge in plastic housing with air bleed button.
Water Pressure Switch	Senses for water pressure after filter and turns on when pressure is over 20–28 psi and turns off when pressure drops below 7–13 psi.
Pump	Pump is a Toro exclusive design (patent pending) with cast stainless steel head and 3 piston plungers. Vee packing seals and Kevlar guides. Forged crankshaft with plasma sprayed ceramic on stainless steel plungers and cast iron connecting rods. Nominal performance is 4 gpm @ 5000 psi with 1400 RPM input.
Accumulator	Toro exclusive design with low charge pressure sensor, nitrogen gas charged to a maximum of 2500psi.
Cam and Gearbox	Reduction gear drive for cam that actuates main water valve. Roller cam follower rides on cam specifically designed (patent pending) to control water injection at 5.3 cycles per second (320 RPM) and store energy in accumulator between injections. Cast iron case also serves as 4 quart hydraulic reservoir.
Valve	Cast stainless steel valve body functions as mounting base for accumulator, gearbox, and manifold outlet. All high pressure water flows in and out through the valve body. Pressure balanced valve spool with floating (patent pending), hardened stainless seat aligns during assembly. Bleed valve in base allows for bleed-off of high pressure and drain down for cold weather storage. Bolted flanges and polyurethane o-rings mate all components to valve body.
Rollers	Pivoting aluminum rollers uniformly smooth the turf and provide protection from the nozzle discharge. Adjustable flow (0–3 gpm) spray wash system with 6 flood tip nozzles maintain clean rollers.
Pressure Relief Valve	Circle Seal Controls poppet-type valve preset to 5000 psi with corrosion resistant stainless and brass materials.
Manifold and Nozzles	Extruded stainless steel manifold with 11 flanged nozzle extensions containing check valves and hardened stainless discharge orifice. Check valves may be reversed in housing to block unused nozzles.

## Dimensions

Length	96.2 in. (244 cm)
Wheelbase	53.2 in. (135 cm)
Width	63 in. (160 cm)
Height	42.7 in. (108 cm)
Weight	1150 lb. (522 kg)

# Depths and Nozzle Configurations

All nozzles are identified with numbers indicating the drill size of the orifice. The standard configuration is 11 nozzles producing depths of 4 to 6 inches depending on turf conditions. Blocked nozzle locations are obtained by reversing the nozzle check valve ball and spring. See nozzle size chart and illustrations below:

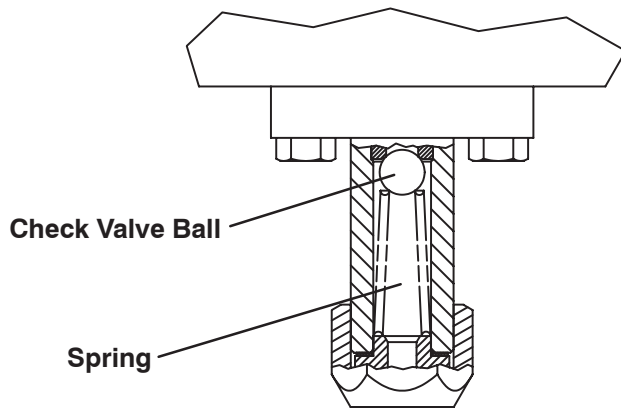
**Important** Use only nozzle configurations shown or damage to the machine may occur.

Nozzle Size and Approximate Depth Chart						
Part No.	Drill Size	Decimal Size (inch)	Metric Size (mm)	Quantity of Nozzles		Approx. Depth
				Open	Blocked	
86-8130	#56	0.0465	1.181	*	*	*
86-8131	#53	0.0595	1.511	11	0	4–6 in.
86-8133	#46	0.081	2.057	6	5	6–8 in.
* Use only with varied size configurations						

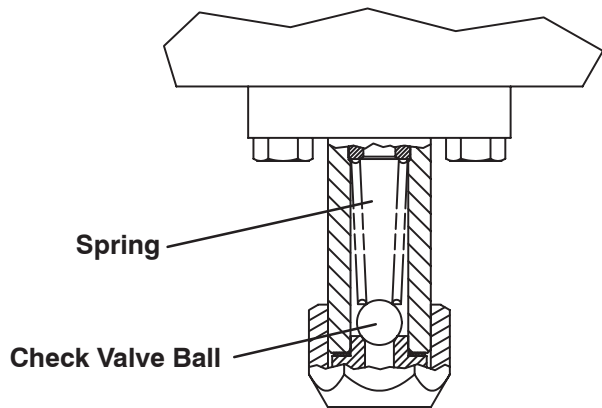
**Note:** Aluminum Washer, Toro Part no. 80-6680, is required with any nozzle change.

Optional Staggered Size Nozzle Configuration						
Part No.	Drill Size	Decimal Size (inch)	Metric Size (mm)	Quantity of Nozzles		Approx. Depth
				Open	Blocked**	
86-8130	#56	0.0465	1.181	6 and	0**	3–4 in.
86-8133	#46	0.081	2.057	5	0**	6–8 in.
** Additional nozzles may be blocked to compensate for pump wear.						

**Note:** Aluminum Washer, Toro Part no. 80-6680, is required with any nozzle change.



**Open Nozzle**



**Closed (Blocked) Nozzle**

## Fluid Recommendations

### Fuel

Unleaded regular gasoline recommended to minimize engine intake valve and combustion chamber deposits.

### Engine Oil

Service classification API SF, SG, SF/CC or SG/CC in a 30 weight viscosity grade.

### Engine Oil Filter

Order Part No. 57-8530

### Hydraulic Oil Filter

Order Part No. 67-8110

### Hydraulic Oil

Mobil DTE 26 or other interchangeable equivalent. See the chart below for equivalent oils.

Mobil	DTE 26
Shell	Tellus 68
Amoco	Rykon Oil #68
Conoco	Super Hydraulic Oil 68
Exxon	Nuto H 68
Kendall	Kenoil R&O 68
Pennzoil	Penreco 68
Phillips	Magnus A 68
Standard	Energol HLP 68
Sun	Sunvis 831 WR
Union	Unax AW 68

### Water Pump Case Oil

Mobil DTE Extra Heavy or other interchangeable ISO Grade 150 PE-700-A (Heavy Inhibited Hydraulic & General Purpose). See the chart below for equivalent oils.

Mobil	DTE EH (Extra Heavy)
Shell	Turbo 150
Amoco	American Ind. Oil 150
Chevron	AW Machine Oil 150
Conoco	Dectol R & O 150
Exxon	Terresstic 150
Kendall	Ken-Tran 080
Pennzoil	Penreco 150/AW 150
Phillips	Magnus Oil 150

Standard	Energol HLP 150
Sun	Sunvis 150
Union	Unax RX 150/Turbine Oil 150
Valvoline	ETC (R&O) #70

### Water Supply

Recommended source with 7–8 gallons per minute. A minimum pressure of 30 psi at the machine is required for the pump to engage. Maximum allowable pressure of 200 psi. Although irrigation water pumped from ponds or effluent holding pools can be used, not all conditions can be handled by the filtration system. Additional or alternative filtration may be required.

### Water Filter Cartridge

Order Part No. 86-8630

**Important** Do not use chemicals! Concern for environmental issues and corrosive affects on machine components.

# Setup

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

## Loose Parts

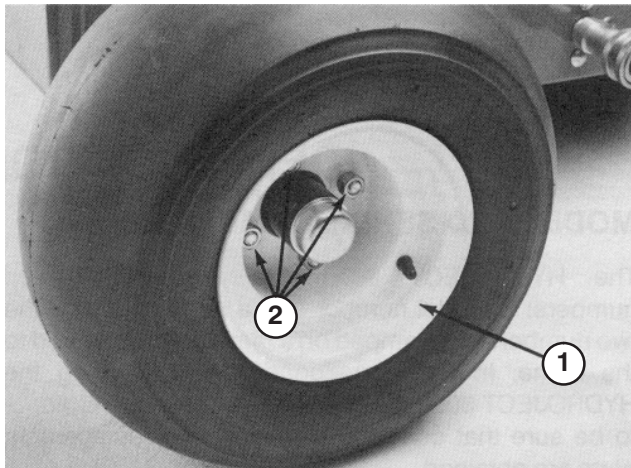
**Note:** Use this chart as a checklist to ensure that all parts have been received. Without these parts, total setup cannot be completed.

Description	Qty.	Use
Wheel	3	Installing the rear wheels
Lug nut	12	
Ignition key	1	Use in ignition switch.
Hose adapter	1	Mount to quick coupler on side of machine.
Spanner wrench	1	Use for installation and removal of water filter.
Parts catalog	1	
Operator's manual	1	Read before operating the machine.
Registration card	1	Fill out and return to Toro.

## Installing the Rear Wheels

1. Remove the wheels from the shipping pallet.
2. Mount the wheels to the hubs with the lug nuts (supplied in loose parts) (Fig. 1) and torque the nuts to 45–55 ft.-lb. (61–75 N·m).
3. Remove any shipping blocks or braces, which may obstruct machine removal from the pallet.

**Important** Refer to the Before Operating section in this manual, page 12, for instructions on preparing the machine for operation.



**Figure 1**

1. Wheel                      2. Lug nuts

# Before Operating

## Activating and Charging the 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. Since the battery is not filled with electrolyte or activated, bulk electrolyte with 1.260 specific gravity must be purchased from a local battery supply outlet.



### Danger



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

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

2. Release the hood latches and raise the hood.
3. Loosen the capscrew securing the battery clamp to the machine and remove the battery (Fig. 2). Remove the filler caps from the battery and slowly fill each cell until electrolyte is just above the plates.



### Warning



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

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



Figure 2

1. Battery

4. Replace the filler caps and connect a 3 to 4 amp battery charger to the battery posts. Charge the battery at a rate of 3 to 4 amperes for 4 to 8 hours.



### Warning



Charging the battery produces gasses that can explode.

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

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

**Important** Do not overfill the battery. Electrolyte will overflow onto other parts of the machine and severe corrosion and deterioration will result.

7. Install the battery and secure it with the battery clamp.



### Warning



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

- Always *disconnect* the negative (black) battery cable before disconnecting the positive (red) cable.
- Always *connect* the positive (red) battery cable before connecting the negative (black) cable.

8. Install the positive cable (rubber boot over end) to the positive (+) terminal and the negative cable (black) to the negative (–) terminal of the battery and secure them with capscrews and nuts. Slide the rubber boot over the positive terminal to prevent a possible short-out from occurring (Fig. 2).
9. Lower the hood and secure the latches.

## Checking the Engine Oil

The engine is shipped with 3 quarts of oil in the crankcase; however, the oil level must be checked before and after the engine is first started.

1. Position the machine on a level surface.
2. Unscrew the dipstick (Fig. 3) and wipe it with a clean rag. Screw the dipstick into the filler neck and make sure it is seated fully. Unscrew the dipstick out of the filler neck and check the oil level. If the oil level is low, add enough oil to raise the level to the FULL mark on the dipstick.

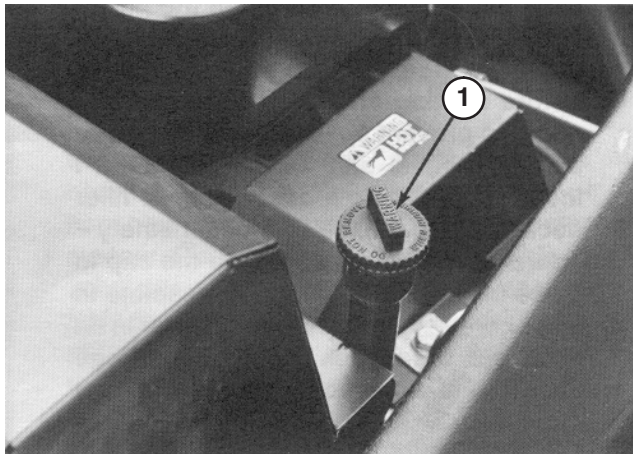


Figure 3

1. Dipstick

**Note:** If the oil level is at the ADD mark on the dipstick, add 1 quart of oil to raise the oil level to FULL. Do not overfill.

3. Pour oil into the filler neck until the level is at the FULL mark on the dipstick. The engine uses any high-quality oil having the American Petroleum Institute (API) “service classification” SF or SG. The recommended viscosity (weight) of oil to use is SAE 30.

**Important** The aerator operates at very high engine loads, so check the oil level every 8 operating hours or daily. A new engine may consume some oil until it is broken in. Initially, change the oil after the first 25 hours of operation; thereafter, under normal conditions, change the

oil and filter after every 100 hours of operation. Change the oil more frequently when the engine is operated in extremely dusty or dirty conditions.

## Filling the Gas Tank

We recommend the use of fresh, clean, unleaded regular grade gasoline. Unleaded gasoline burns cleaner, extends engine life, and promotes good starting by reducing the build-up of combustion chamber deposits.



### Danger

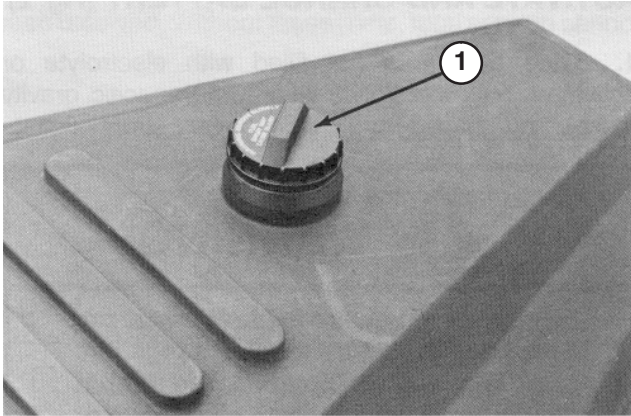


**In certain conditions, gasoline is extremely flammable and highly explosive. A fire or explosion from gasoline can burn you and others and can damage property.**

- Fill the fuel tank outdoors, in an open area, when the engine is cold. Wipe up any gasoline that spills.
- Do not fill the fuel tank completely full. Add gasoline to the fuel tank until the level is 1 in. (25 mm) below the bottom of the filler neck. This empty space in the tank allows gasoline to expand.
- Never smoke when handling gasoline, and stay away from an open flame or where gasoline fumes may be ignited by a spark.
- Store gasoline in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of gasoline.
- Always place gasoline containers on the ground away from your vehicle before filling.
- Do not fill gasoline containers inside a vehicle or on a truck or trailer bed because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove gas-powered equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a gasoline dispenser nozzle.
- If a gasoline dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

**Note:** Do not mix oil with the gasoline. Never use **methanol**, gasoline containing **methanol**, gasohol, gasoline additives, premium gasoline, or white gas because engine and fuel system damage could result.

1. Remove the cap from the fuel tank (Fig. 4) and fill the 10 gallon tank to about 1 inch (25 mm) from the top of tank (the bottom of the filler neck) with unleaded gasoline. Install the fuel tank cap tightly.
2. Wipe up gasoline that may have spilled to prevent a fire hazard.



**Figure 4**

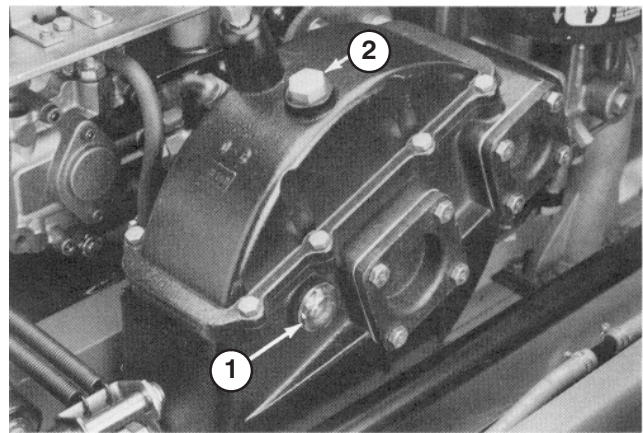
1. Fuel tank cap

## Checking the Gear Case Fluid Level

The gear case, which acts as the reservoir for the hydraulic system, is filled at the factory with approximately 4–5 quarts of Mobil DTE 26 hydraulic oil. Check the level of hydraulic oil on the sight gauge before the engine is first started and daily thereafter. Change the filter after the first 25 hours of operation; thereafter change the oil and filter every 250 hours of operation.

**Important** The oil and filter must be changed **immediately** when any contamination, sludge, water or condensation appears in oil or on sight gauge. Determine and correct oil contamination problem before restarting engine and operating machine.

1. Position the machine on a level surface.
2. Release the hood latches and raise the hood.
3. Check the level of hydraulic oil on the sight gauge (Fig. 5). The fluid level should be up to the middle of the gauge window.



**Figure 5**

1. Sight gauge
2. Filler cap

4. If the fluid level is low, remove the filler cap and add enough Mobil DTE 26 hydraulic oil or equivalent oil (refer to Fluid Recommendations, page 10) to bring the oil up to the proper level.
5. Lower the hood and secure the latches.

## Checking the Pump Case Fluid Level

The pump crank case is filled at the factory with approximately 40 ounces of Mobil DTE Extra Heavy oil. Check the oil level on the dipstick before the engine is first started and daily thereafter. **Change the oil initially after 25 hours of operation**, thereafter change every 200 hours of operation.

**Important** The oil must be changed immediately when any contamination, sludge, water, or condensation appears in the oil. Determine and correct any oil contamination problem before restarting the engine and operating the machine.

1. Position the machine on a level surface.
2. Release the hood latches and raise the hood.
3. Remove the dipstick/filler cap and check the oil level on the dipstick. The fluid level should be up to the FULL mark (Fig. 6).
4. If the fluid level is low, add enough Mobil DTE Extra Heavy oil or equivalent oil (refer to Fluid Recommendations, page 10) to bring the oil up to the proper level. **Do not overfill.**

5. Lower the hood and secure the latches.

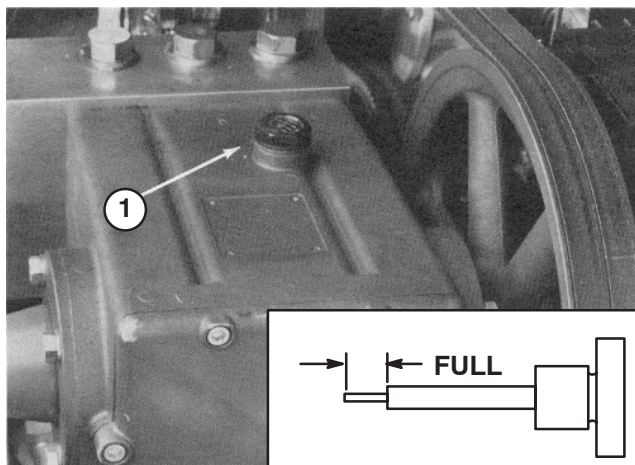


Figure 6

1. Dipstick/filler cap

## Checking the Tire Pressure

The tires are over inflated for shipping. Make sure that the front and rear tires are inflated to 8 to 12 p.s.i. (55 to 83 kPa).

## Water System Accumulator

The Hydroject accumulator contains a high pressure nitrogen gas pre-charge. The safety system on the aerator will disable the water injection if the accumulator pressure is too low or too high, and will illuminate one of the accumulator pressure lights on the operators console.

Due to the operational requirements of the accumulator design, the high pressure internal gas pre-charge can bleed out during periods of inactivity. Storing the Hydroject for extended periods of time (3 months or longer) and/or seasonal temperature variances can affect the accumulators ability to retain a sufficient pre-charge and seasonal servicing (recharge) may be required.

If one of the accumulator charge indicator lamps illuminates, contact your authorized Toro Distributor for accumulator maintenance services.



### Warning



Charge accumulators contain high pressure nitrogen. Nitrogen is the only gas to use for accumulator charging. Installing *improper* gases in an accumulator can cause an *explosion* and *death*. Charging requires special tools and precautions.

- Charge the accumulator in a well ventilated area.
- Have the accumulator checked and charged by an Authorized Toro Distributor.
- Wear eye protection.
- Keep your hands and face away from the gas valve.



### Warning



Failure to open the bleed valve before servicing high pressure water components can cause personal injury, *dismemberment*, or *death*.

Slowly open the high pressure water bleed valve before servicing any component connected to the high pressure water system. Opening the high pressure bleed valve allows any trapped water to escape from the system and also allows the accumulator piston to move to the bottom of the accumulator cylinder.

**Note:** Charged accumulators cannot be shipped via air freight.

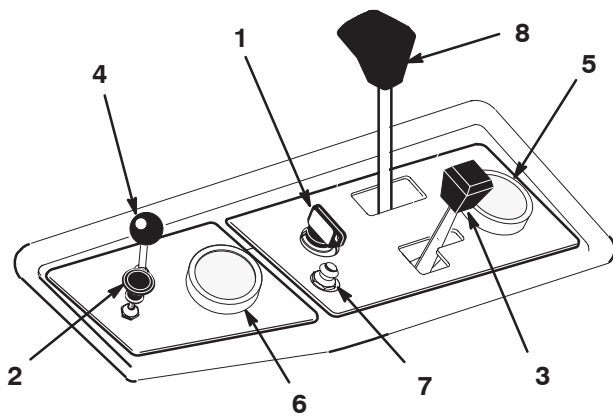
## Operation

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

## Controls

### Ignition Switch

The ignition switch (Fig. 7), which is used to start and stop the engine, has three positions: OFF, ON, and START.



**Figure 7**

- |                       |                                 |
|-----------------------|---------------------------------|
| 1. Ignition switch    | 6. Water pressure gauge         |
| 2. Choke              | 7. Circuit breaker reset button |
| 3. Throttle           | 8. Spacing control lever        |
| 4. Spray wash control |                                 |
| 5. Hour meter         |                                 |

## Choke

To start the engine, close the carburetor choke by pulling the choke control (Fig. 7) outward to the FULL position. After the engine starts, regulate the choke to keep the engine running smoothly. As soon as possible, open the choke by pushing it inward to the OFF position.

## Throttle

The throttle (Fig. 7) is used to regulate the engine speed. Moving the throttle forward increases the engine speed (FAST); rearward decreases the engine speed (SLOW).

## Spray Wash Control

Pull the handle (Fig. 7) upward to activate the roller spray wash system. Move the control knob up or down to adjust the spray rate to keep the rollers free of debris.

## Hour Meter

The hour meter (Fig. 7) registers accumulated hours of engine operation. Use the hour meter to determine intervals for service maintenance and lubrication.

## Water Pressure Gauge

The water pressure gauge (Fig. 7) registers supply water pressure in the system. It also acts as an interlock switch, preventing the water pump from starting if the water pressure is below 20–28 p.s.i., or stopping the water pump if the water pressure drops below 7–13 p.s.i. Check the gauge frequently to monitor the water pressure.

## Circuit Breaker Reset Button

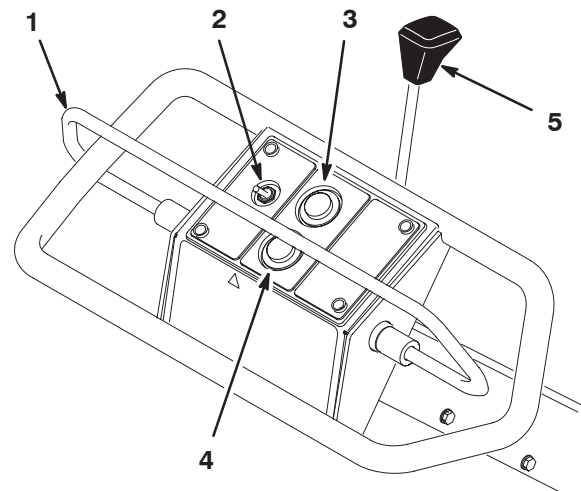
Push the button (Fig. 7) to reset the breaker after correcting a malfunction in the electrical system. The button also serves as a switch to interrupt power to the relays.

## Spacing Control Lever

Moving the control (Fig. 7) away from the handle increases the aerating ground speed and the distance between holes. Moving the control toward the handle decreases the aerating ground speed and the distance between holes. The setting will be overridden when the machine is shifted to the transport position.

## Traction Bail

The traction bail (Fig. 8) engages and regulates fore and aft traction operation of the machine. Releasing the bail stops traction operation and will also stop water injection in 3 to 4 seconds, unless the bail is engaged. The transport speed is regulated by the amount the bail is moved.



**Figure 8**

- |                                   |                         |
|-----------------------------------|-------------------------|
| 1. Traction bail                  | 4. Aeration stop button |
| 2. Transport/aerate toggle switch | 5. Parking brake        |
| 3. Aeration engagement button     |                         |

## Transport/Aerate Toggle Switch

The switch (Fig. 8) lowers machine onto the rollers to commence aeration. The switch will override the spacing control setting when it is moved to the transport position.

## Aeration Engagement Button

Depressing the button (Fig. 8), starts the water injection system only when the water pressure is above 28 p.s.i. and the rollers are on the ground.

## Aeration Stop Button

The red button (Fig. 8) stops the water injection system. The system continues for a few seconds after the button is pressed.

## Parking Brake

Push the lever (Fig. 8) toward the machine to engage the parking brake. A warning buzzer will sound if you attempt to move the machine with parking brake engaged.

## Fuel Shut-Off Valve

The fuel shut-off valve is located under the fuel tank. Close the valve when storing or transporting (trailer) the machine.

## Operating Precautions

Follow these precautions when operating the aerator:

- Before aerating, inspect the work area for debris and obstacles. Determine the best direction and pattern to operate the machine. Always maintain awareness of what lies ahead in the direction of forward travel.
- If the machine starts to vibrate abnormally, shut the engine off. Remove the key from the ignition switch to prevent the possibility of accidental starting. Check the machine for damaged parts. Repair any damage before restarting the engine and operating the machine.
- Only use the aerator in daylight or when there is good artificial light. Watch for holes or other hidden hazards. Do not transport the machine close to a sand trap, ditch, creek, or other hazard.
- To prevent roller marks, always raise the machine to the transport position when parked on a green.
- Do not operate the water injection system on concrete or asphalt because water jets will permanently damage these surfaces. Do not run over the hose as damage will occur.
- Do not operate the aerator with the roller or injection system over the edge of anything that could be hit, damaged, or injured by high velocity water blasts.
- Water jets from the injection system should not damage irrigation heads on one pass of the machine. Do not allow multiple shots from the injection system to hit irrigation heads as damage will occur.
- Use a good, clean, quality water supply in the system. If good quality water is not available, additional filtration equipment may be required. **Do not use chemicals in the water system.**

- Do not allow the machine to be subject to freezing temperatures without draining, as damage to the system will occur.

## Starting and Stopping the Engine

1. Make sure that the wires are installed on the spark plugs and the fuel shut-off valve is open.
2. Make sure that the parking brake is engaged.
3. Pull the choke lever out to the FULL position and move the throttle lever to the half throttle position.

**Note:** When starting a warm engine, the choke may not be necessary, but HALF throttle is.

4. Insert the key into the ignition switch and rotate it clockwise to start the engine. Release the key when the engine starts. Gradually return the choke lever to the OFF position (lever all the way in) after the engine starts and warms up.

**Important** To prevent overheating of the starter motor, do not engage the starter longer than 30 seconds. After 30 seconds of continuous cranking, wait 2 minutes before engaging the starter motor again.

**Important** The engine is equipped with an oil pressure interlock switch which interrupts the engine operation if there is not sufficient oil pressure in the engine during starting or operation. The engine may start but will not continue to run due to a lack of oil pressure.

5. To stop the engine, move the throttle control downward to the SLOW position and turn the ignition key to OFF. Remove the ignition key.

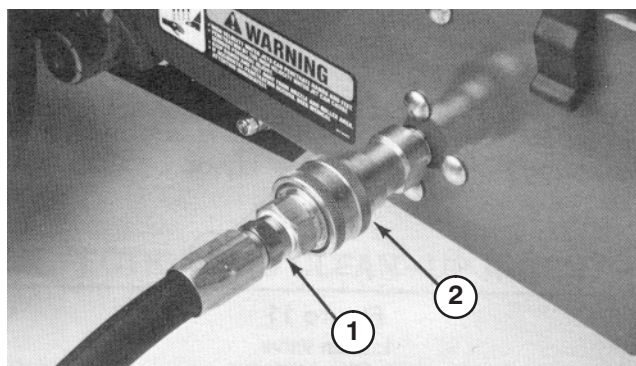
## Training Period

Before aerating with the machine, it is suggested that you find a clear area and practice starting and stopping, raising and lowering machine, turning, etc. This training period will be beneficial to the operator in gaining confidence in the performance of the aerator.

## Operating Procedure

1. Make sure that the wires are installed on the spark plugs and the fuel shut-off valve is open.
2. Uncoil a garden hose, making sure that there are no kinks or bends in the hose. Lay out the hose so that there are no obstructions between the machine and the area to be aerated. Turn on the water supply to purge any air from the hose. Turn off the water.

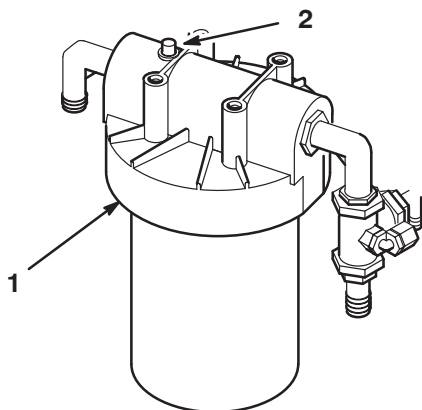
3. Connect the hose adapter (Fig. 9) to the garden hose, then connect the adapter to the quick coupler on the side of the machine.



**Figure 9**

1. Hose adapter
2. Quick coupler

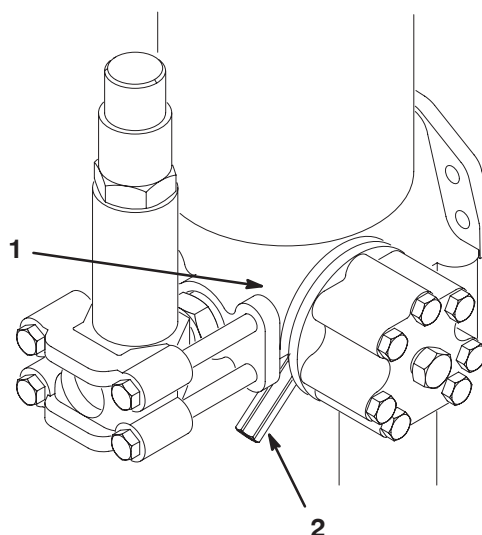
4. Turn on the water supply and check the water pressure. The water pressure must be at least 30 p.s.i.. If the system pressure is not 30 p.s.i., make sure that the hose is not kinked or obstructed, the water supply is turned on, and the water filter is not plugged.
5. Reach under the fuel tank and press the bleed button on top of the water filter head (Fig. 10). Hold the bleed button down until all air is purged from the filter and water comes out of the opening.



**Figure 10**

1. Main water filter head
2. Bleed button

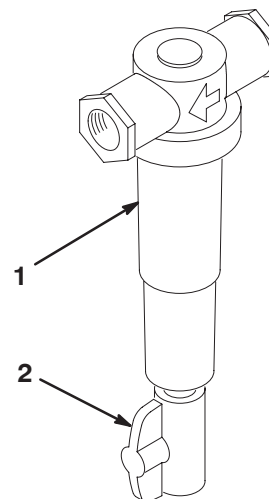
6. Reach under the hood and open the bleed valve on the main valve at the rear of the machine (Fig. 11). Bleed the system until a steady flow of water comes from the outlet; then close the valve.



**Figure 11**

1. Main valve
2. Bleed valve

7. If desired, the valve on the pre-filter (Fig. 12) may be opened slightly (cracked) to provide continuous flushing during operation of the machine.



**Figure 12**

1. Pre-filter
2. Valve

8. Start the engine; refer to Starting and Stopping the Engine, page 17. Move the throttle to the FAST position and disengage the parking brake.
9. Engage the traction bail and approach the area to be aerated. Make sure that there are no obstructions between the aerator and water supply.
10. Engage and hold the transport/aerate toggle switch to fully lower the machine onto the rollers. Release the switch when the machine is fully lowered; then press the engagement button to start water injection.

**Note:** The injection operation starts approximately 4–5 seconds after the pump engages. Also, the injection system will automatically stop if the traction bail is not engaged within 3–4 seconds after starting the water system.

11. When aerating, work moving perpendicular from the water supply to avoid running over the garden hose. Use the front edge of the hood or rear corner of the frame to align rows, if desired. When at the end of a row, make an “S” maneuver and reverse the direction of the aerator. Do not make sharp turns on a green or scuffing from the tire may occur. Always maintain awareness of what lies ahead in the direction of forward travel.

12. Regulate the roller spray wash, if required, to remove debris from the rollers.

**Note:** A small amount of water from the regulator bypass may come out of the spray wash nozzles even with the spray wash in the “OFF” position.

13. In areas where greater hole depth or more frequent holes are desired, the engage button can be held down to allow multiple shots while machine is stopped.

**Important** Hole depths can reach 20 inches or more when making multiple shots, so be aware of what is buried below the turf. Also, an excessive amount of holes and muddy turf conditions may occur when making multiple shots.

14. To stop water injection, press the red button. The system continues for a few seconds after the button is pressed. Raise the machine to the transport position, disconnect the supply hose, and move to the next location.

## Checking the Interlock System



### Caution



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

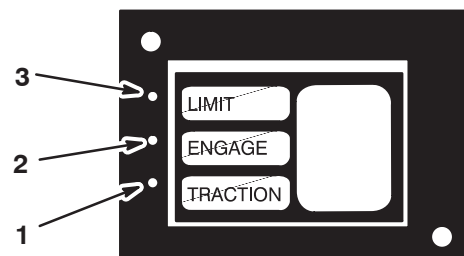
- Do not tamper with the interlock switches.
- Check the operation of the interlock switches daily and replace any damaged switches before operating the machine.
- Replace switches every two years regardless of whether they are operating properly or not.

The purpose of the safety interlock system is to prevent the engine from cranking or starting unless the traction bail is in NEUTRAL and prevents the water system from engaging if the machine is in the transport (raised) position. It also stops aeration if the traction bail is released while operating or if the machine is raised to the transport position.

To do a functional check of interlock system:

1. Position the machine in a flat, open area on rough turf and away from buried wires, plumbing, etc. Stop the engine.
2. Move the traction bail up and down while trying to start the engine. If the engine cranks, there is a malfunction in the interlock system that must be corrected. If the engine does not crank, proceed to step 3.
3. Connect the water supply to the machine. Turn on the water supply and bleed all air out of the system. The water pressure must be 30 psi or more. Start the engine. Raise the machine to the transport position (up off the rollers). Push the aerate ENGAGE button. If the water pump engages and the machine begins aerating, there is a malfunction in the interlock system that must be corrected. If the machine does not begin aerating, proceed to step 4.
4. Lower the machine to the aerate position (on the rollers). Engage the traction bail to start the machine moving. Push, then release the aerate ENGAGE button. The water pump should engage immediately, then the machine should begin aerating 5 seconds after the pump engages. Release the traction bail to the neutral position so that the machine stops moving. The water pump should disengage 4 seconds after the traction bail returns to neutral, then stop aerating after another 3 seconds. If the machine does not stop aerating when the traction bail returns to neutral, there is a malfunction in the interlock system that must be corrected. If the machine stops aerating, proceed to step 5.
5. Engage the traction bail to start the machine moving, then push the aerate ENGAGE button to begin aerating. Push the aerate DISENGAGE button. The water pump should disengage immediately, then stop aerating after 3 seconds. If the machine does not stop aerating, there is a malfunction in the interlock system that must be corrected.

**Note:** Lights (LED's) on the controller (Fig. 13) indicate when the following inputs are made to the controller:



**Figure 13**

- |                |                 |
|----------------|-----------------|
| 1. Red light   | 3. Yellow light |
| 2. Green light |                 |

**Red:** Transport switch closed (traction bail in neutral)

**Green:** Aerate start (engage) switch closed. If the red and yellow lights are on, the green light will stay on until either the red or yellow goes off.

**Yellow:** Pump start limit switch closed (machine lowered to aerate position) and water pressure switch closed (water pressure of more than 30 psi) and accumulator charge pressure switch (nitrogen pressure more than 1800 psi).

## Transport Operation

Use the traction bail to slow the machine while crossing undulating terrain to avoid loss of control. The smooth tires do not grip turf very well so use caution when transporting the machine. Always approach rough areas at a reduced speed and cross severe undulations carefully.

## Inspection and Clean-Up After Use

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

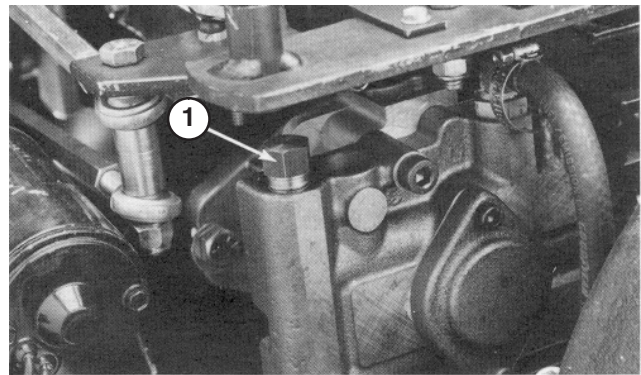
## Pushing or Towing the Machine

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

**Important** Do not push or the tow machine faster than 3 MPH because pump damage may occur. If the machine must be moved a considerable distance, transport it on a truck or trailer or pull it with the traction wheel raised and secured to a dolly. Whenever the machine is pushed or towed, the bypass valve must be opened. The hook on the front of the handle is used as a tie-down only, not a hitch point.

1. Unlatch and raise the hood.
2. Locate the bypass valve cap on the left side of the hydraulic pump (Fig. 14).
3. Rotate the valve cap counterclockwise, move the machine to the desired location, and close the valve cap.
4. Lower the hood and secure the latches.

**Important** Do not run any chemicals through the Hydroject water system (except Toro Wetting Agent 86–8530). Chemicals can have corrosive effects on machine components and environmental laws and concerns exist when injecting chemical sub-surface.



**Figure 14**

- 
1. Bypass valve

# Maintenance

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

## Recommended Maintenance Schedule

Maintenance Service Interval	Maintenance Procedure
After first 25 hours	<ul style="list-style-type: none"><li>• Change the engine oil and filter.</li><li>• Change the gear case oil and filter.</li><li>• Change the pump case oil.</li><li>• Torque the wheel lug nuts.</li></ul>
After first 50 hours	<ul style="list-style-type: none"><li>• Torque head and adjust the valves.</li><li>• Check the engine RPM (idle and full throttle).</li></ul>
Every 50 hours	<ul style="list-style-type: none"><li>• Check the battery fluid level.</li><li>• Check the battery cable connections.</li><li>• Lubricate all grease fittings.</li></ul>
Every 100 hours	<ul style="list-style-type: none"><li>• Change the engine oil and filter.</li><li>• Change the engine pre-cleaner (air filter).</li></ul>
Every 200 hours	<ul style="list-style-type: none"><li>• Replace the air filter element.</li><li>• Replace the fuel filter.</li><li>• Adjust the water system cam—valve clearance.</li><li>• Clean the engine crankcase breather.</li><li>• Change the gear case oil and filter.</li><li>• Change the pump case oil.</li><li>• Torque the wheel lug nuts.</li></ul>
Every 400 hours	<ul style="list-style-type: none"><li>• Adjust the parking brake.</li><li>• Calibrate the aeration traction speed.</li><li>• Service the injector nozzles and springs.</li><li>• Replace the spark plugs.</li><li>• Decarbon the combustion chambers.</li><li>• Torque head and adjust the valves.</li><li>• Check the engine RPM (idle and full throttle).</li></ul>
Every 1000 hours or 2 years, whichever occurs first	<ul style="list-style-type: none"><li>• Replace moving hoses.</li><li>• Replace safety switches.</li><li>• Drain and flush the fuel tank.</li><li>• Drain and flush the hydraulic tank.</li></ul>

## Water System Accumulator

Due to the operational requirements of the accumulator design, the high pressure internal gas pre-charge can bleed out during periods of inactivity. Storing the Hydroject for extended periods of time (3 months or longer) and/or seasonal temperature variances can affect the accumulators ability to retain a sufficient pre-charge and seasonal servicing (recharge) may be required.

If one of the accumulator charge indicator lamps illuminates, contact your authorized Toro Distributor for accumulator maintenance services.

# Daily Maintenance Checklist

Duplicate this page for routine use.

Maintenance Check Item	For the week of:						
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Check safety interlock operation.							
Check brake operation.							
Check the engine oil level.							
Check the engine air filter pre-cleaner.							
Check the engine cooling fins for debris.							
Check unusual engine noises.							
Check unusual operating noises.							
Check the water filter/pressure.							
Check the water pre-filter.							
Check the gear case oil level.							
Check the pump case oil level.							
Check they hydraulic hoses for damage.							
Check for fluid leaks.							
Check the tire pressure.							
Check instrument operation.							
Lubricate all grease fittings. <sup>1</sup>							
Touch up damaged paint.							

<sup>1</sup>Immediately after every washing, regardless of the interval listed

## Notation for Areas of Concern

Inspection performed by:		
Item	Date	Information
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		



## Caution



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

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



## Caution



Contact with hot surfaces could cause burns.

Wait for the unit to cool before servicing or making adjustments to the machine.

## Lubricating the Machine

The aerator has 5 grease fittings that must be lubricated every 50 hours of operation with No. 2 General Purpose Lithium Base Grease. Lubricate all fittings immediately after every washing, regardless of the interval listed.

The bearings and bushings that must be lubricated are: steering pivot shaft (Fig. 15), limit switch housing (Fig. 16) (2) on lift arm shaft (Fig. 16), and neutral pivot shaft (Fig. 17).

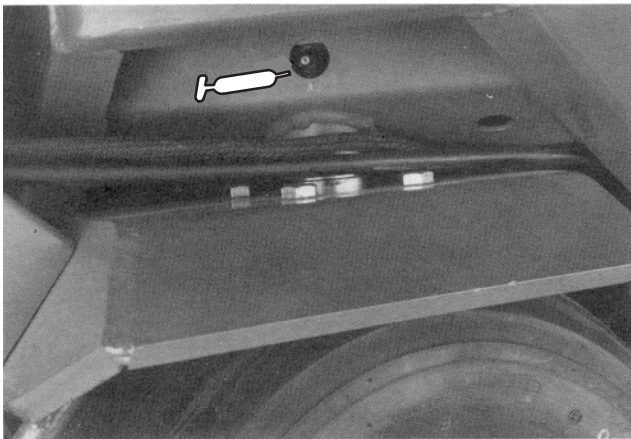


Figure 15

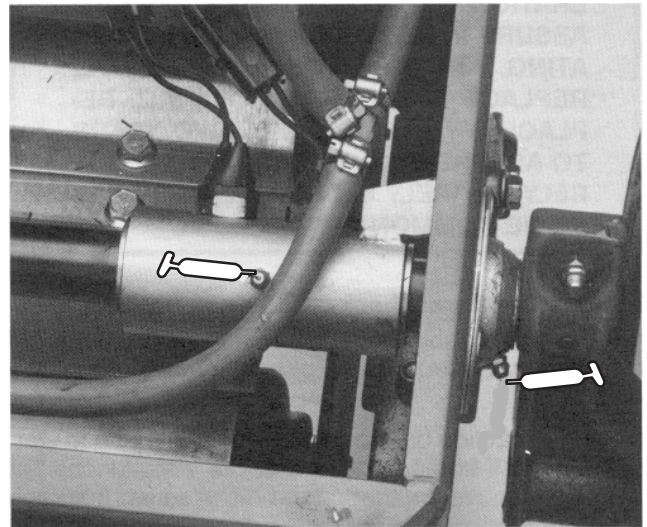


Figure 16

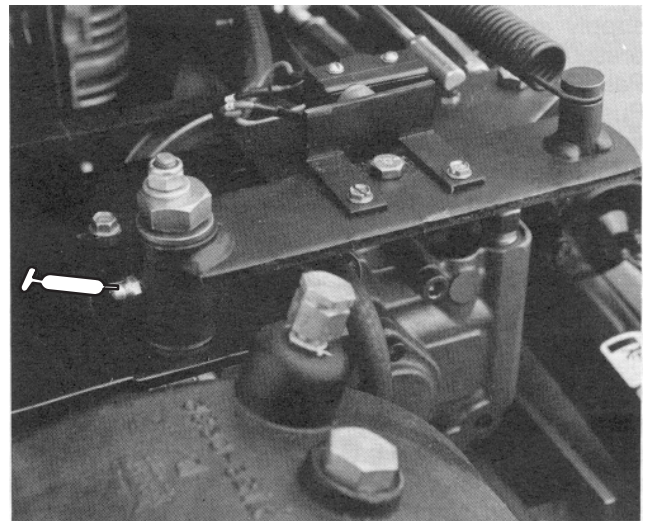


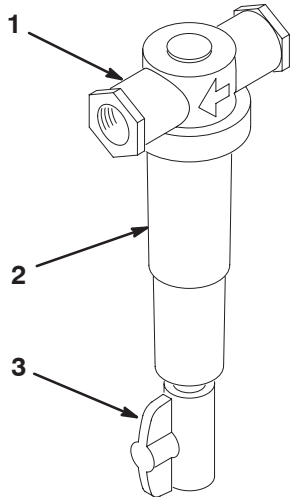
Figure 17

1. Wipe the grease fitting clean so that foreign matter cannot be forced into the bearing or bushing.
2. Pump grease into the bearing or bushing.
3. Wipe up excess grease.

## Servicing the Pre-Filter

Sediment can be removed by opening the ball valve, with the water source attached, to flush (Fig. 18). The reusable filter screen may be removed for cleaning by untwisting the clear cover (Fig. 18) from the filter by hand. Replace the clear cover and hand tighten only.

**Important** Use of tools will damage the filter.



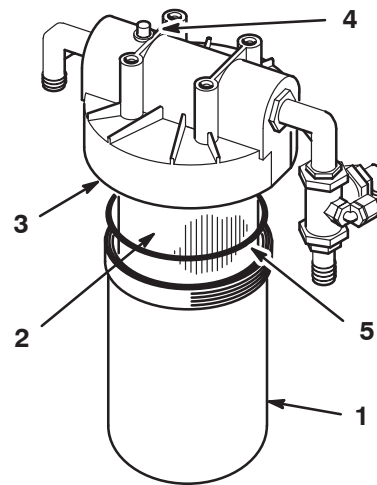
**Figure 18**

- 1. Body
- 2. Clear cover
- 3. Ball valve for flushing

## Replacing the Main Water Filter

The machine is a precision piece of equipment and the quality or cleanliness of your water supply is very important in determining the life of the machine. If your water supply contains silt, sand, or other debris, you may be required to install additional filtration or separation equipment between your supply source and the machine. Depending on the quality of water, the frequency of the filter change will vary greatly. When the pump inlet pressure decreases or the water system shuts down, it usually means the water filter is restricted and must be replaced. **Never operate machine without a water filter as severe damage may occur.**

1. Position the machine on a level surface and make sure that the engine is shut off. Shut off the water supply.
2. Locate the main water filter assembly mounted below the fuel tank. Press the bleed button (Fig. 19) to release air pressure from the filter body.



**Figure 19**

- 1. Filter body
- 2. Filter cartridge
- 3. Filter head
- 4. Bleed button
- 5. O-ring

3. Unscrew the filter body of the assembly (Fig. 19) counterclockwise (as viewed from the bottom). Remove the filter cartridge and discard it.

**Note:** To ease the removal of the filter body from the filter head, a filter wrench is available. Contact your Authorized Toro Distributor.



### Caution



**The water filter body is very heavy when filled with water and the filter. Use caution when unscrewing the filter body from the filter head.**

4. Thoroughly rinse out the filter body to avoid contaminating the water system. Make sure that the o-ring (Fig. 19) is in the groove. If it has come out, wipe it dry, lubricate it with a light coating of petroleum jelly, and replace it in the groove.
5. Thoroughly clean the filter head mounting surface to avoid contaminating the water system when the filter is installed.
6. Insert the new filter cartridge into the filter body.
7. Thread the filter body with the filter onto the filter head. Hand tighten them.
8. Turn on the water supply and press the bleed button on the top of the water filter head (Fig. 19). Hold the bleed button down until all air is purged from the filter and water comes out of the opening.

# Changing the Engine Oil and Filter

For new engines, change the oil after the first 25 operating hours. Thereafter, under normal conditions, change the oil and filter after every 100 hours of operation. However, an engine operated in dusty or dirty conditions requires more frequent oil changes. If possible, run the engine just before changing the oil. Warm oil flows more freely and carries more contaminants than cold oil.

1. Position the machine on a level surface.
2. Disengage the hood latches and open the hood.
3. Place an oil drain pan below the drain cap on the bottom of the crankcase (Fig. 20). Clean the area around the drain cap.
4. Remove the drain cap and allow oil to flow into a drain pan. After the oil has drained, install the oil drain cap.

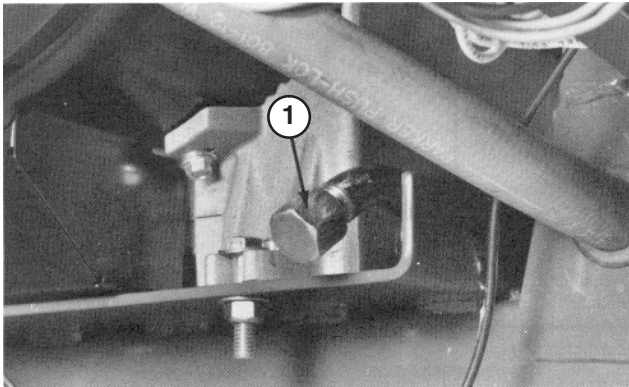


Figure 20

1. Drain cap

5. Remove the oil filter (Fig. 21) and discard it. Thoroughly clean the filter mounting surface and make sure that a new gasket is installed in the new filter.

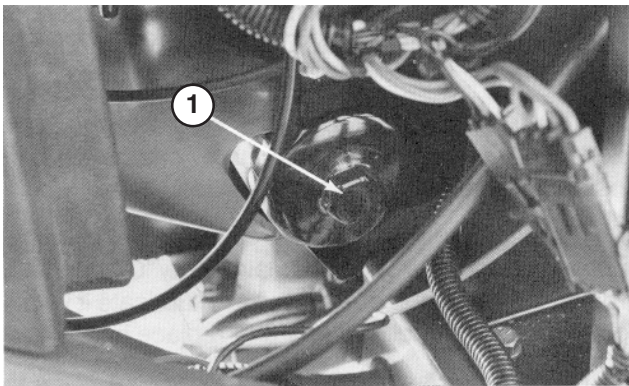


Figure 21

1. Oil filter

6. Apply a thin film of clean oil to the gasket. Install a new filter by hand until the gasket just touches the mounting surface, then turn the filter an additional 1/2 to 3/4 turn.
7. Remove the filler cap (Fig. 22) and pour approximately 3 quarts of oil having the API "service classification" SF or SG into the filler neck. The recommended viscosity (weight) of oil to use is SAE 30.

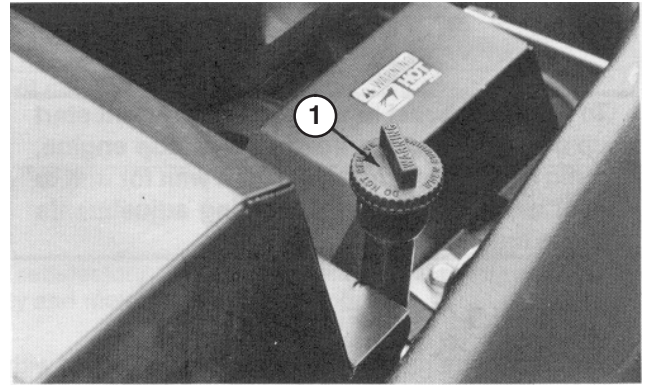


Figure 22

1. Filler cap

8. Start the engine and check for leaks around the oil filter. Tighten the filter only enough to eliminate leaks. **Do not overtighten.**
9. Turn off the engine and allow the machine to stand for 2 minutes.
10. Check the oil and make sure that the level is up to the FULL mark on the dipstick. Add more oil if the level is low; however, **do not overfill.**
11. Lower the hood and secure the latches.

## Servicing the Air Cleaner

The foam pre-cleaner must be cleaned and oiled after every 100 hours of engine operation. The paper element must be checked and/or replaced after every 200 hours of engine operation. However, the air cleaner must be cleaned more frequently if operating conditions are extremely dusty or sandy.

1. Remove the knob and cover from the air cleaner (Fig. 23).

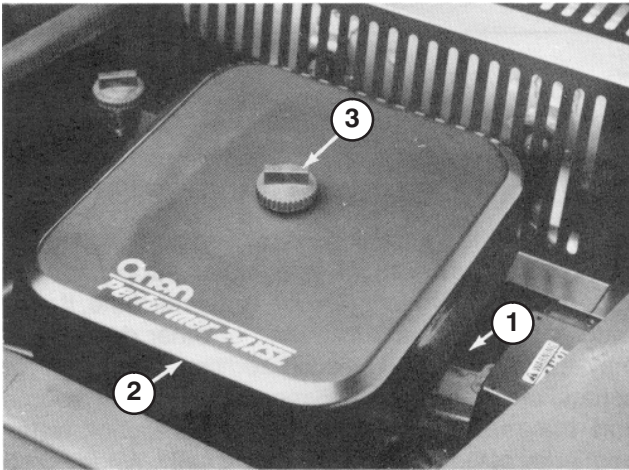


Figure 23

1. Air cleaner
2. Air cleaner cover
3. Knob

2. Remove the foam pre-cleaner by sliding it off of the paper element (Fig. 24).

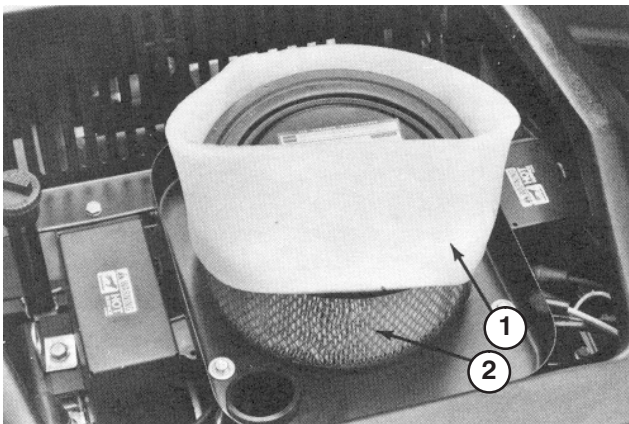


Figure 24

1. Foam pre-cleaner
2. Paper element

3. Wash the foam pre-cleaner in detergent soap and warm water.

4. Wrap the foam pre-cleaner in a clean cloth and squeeze it dry. Do not wring the pre-cleaner.
5. Add and evenly distribute one tablespoon of engine oil to the foam pre-cleaner. Squeeze the foam pre-cleaner to remove excess oil.
6. Inspect the paper element and replace it if is dirty or damaged.

**Important** Do not wash the paper element or clean it with compressed air as damage will occur.

7. Install the pre-cleaner on the paper element.

**Note:** With the air cleaner disassembled, check the air cleaner components for damage. Replace them if necessary.

8. Install the paper element with the foam pre-cleaner, air cleaner element cover, nut, air cleaner cover, and knob.
9. Tighten the knob 1/2 to 1 turn after it contacts the cover. Do not overtighten.

## Adjusting the Carburetor

The carburetor has been adjusted at the factory and should not have to be reset. Should the carburetor require adjustment, use the following procedure:

**Important** Check the fuel filter and air cleaner and make sure that the choke is operating correctly before the carburetor is adjusted.

1. Disengage the hood latches and open the hood.
2. Start the engine and let it run for 10 minutes to warm up. The engine must be warm before making final adjustments.



### Warning

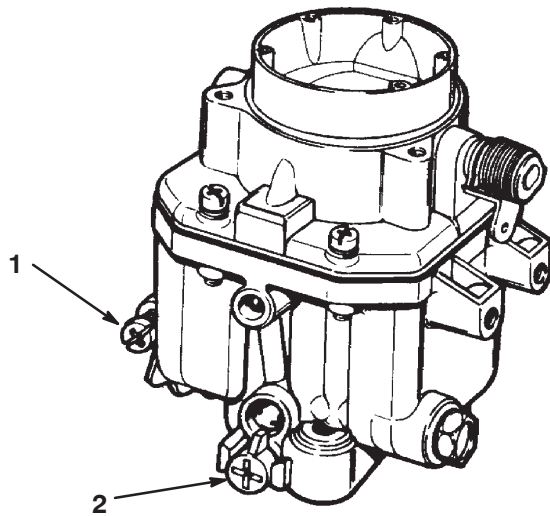


The engine must be running so adjustment of the carburetor can be performed.

To guard against possible personal injury, keep hands, feet, face, and other parts of the body away from the muffler, hot parts of the engine, and moving or rotating parts of the engine.

3. Move the throttle control to the SLOW position and check the low idle speed setting (1500–1800 RPM); then, move the throttle control to the FAST position and check the high speed setting (3450–3550 RPM) to determine if the throttle control linkage is allowing full travel at the engine. With the throttle control in the FAST position, the control lever should not be touching the control panel and the engine mounted throttle lever

(Fig. 25) should be touching the high speed stop. Loosen the cable clamp and adjust the cable so that the lever touches the stop.



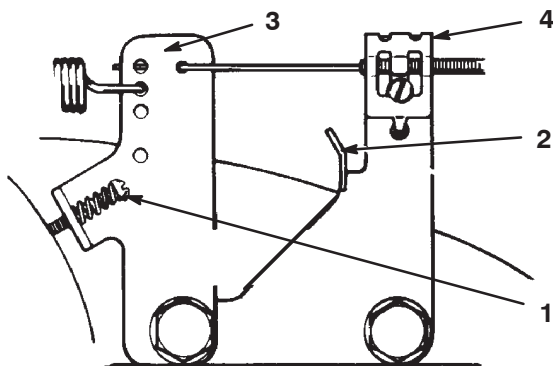
**Figure 25**

- |                        |                          |
|------------------------|--------------------------|
| 1. Throttle stop screw | 2. Idle fuel limiter cap |
|------------------------|--------------------------|

- Close the idle mixture screw by gently rotating it clockwise.

**Important** Do not close the screw too tight because the screw will likely become damaged.

- Rotate (open) the screw 1-1/8 turns counterclockwise.
- With the cable clamp loose, turn the low speed screw on the governor (Fig. 26) so that the throttle stop screw (Fig. 25) on the carburetor controls the engine speed. Adjust the carburetor throttle stop screw for 1000 RPM idle.



**Figure 26**

- |                    |                   |
|--------------------|-------------------|
| 1. Low speed screw | 3. Throttle lever |
| 2. High speed stop | 4. Cable clamp    |

- Adjust the governor low speed stop for 1500–1800 RPM.

- Move the throttle control to the FAST position. Bend the high speed stop on the governor so that the engine runs at 3450–3550 RPM.

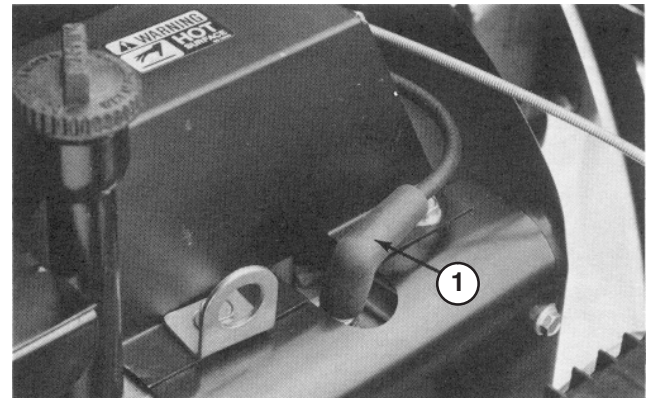
- Repeat step 3, then tighten the cable clamp.

- Lower the hood and secure the latches.

## Checking and Replacing the Spark Plugs

Since the air gap between the center and side electrodes increases gradually during normal engine operation, change the spark plugs at 100 hour intervals. The correct spark plug to use in the engine is a Champion RS14 YC or equivalent. Set the air gap at .025 in.

- Disengage the hood latches and open the hood.
- Clean the area around the spark plugs (Fig. 27) so that dirt does not fall into the cylinder when the plugs are removed.



**Figure 27**

- Spark plug

- Pull the wires off of the spark plugs and remove the plugs from the cylinder head.
- Check the condition of the center and side electrodes to determine the operating temperature of the engine.
  - Light brown insulator tip indicates correct spark plug and heat range.
  - Black or oily insulator tip indicates an excessively rich fuel mixture, possibly caused by a dirty air cleaner element or a carburetor that is set too rich.
  - Light gray or blistered-white insulator indicates overheating caused by a lean carburetor setting or incorrect spark plug (heat range too high).

**Important** A cracked, fouled, or dirty spark plug must be replaced. Do not sandblast, scrape, or clean the electrodes by using a wire brush because grit may release from the plug and enter the combustion chamber, resulting in engine damage.

5. After setting the air gap at .025 in., install the spark plugs in the cylinder head. Tighten the plugs to 10–15 ft.-lb. (14–20 N·m). Push the wires onto the spark plugs.
6. Lower the hood and secure the latches.

## Cleaning the Cylinder Head Fins

To avoid overheating and possible engine damage, clean the cooling fins on the cylinder head every day if necessary.

1. Disengage the hood latches and open the hood.
2. Pull the wires off of the spark plugs.
3. Clean dirt, grass, and chaff from the outside of the cylinder, the cylinder head fins, and the air intake screen.
4. Push the wires onto the spark plugs.
5. Lower the hood and secure the latches.

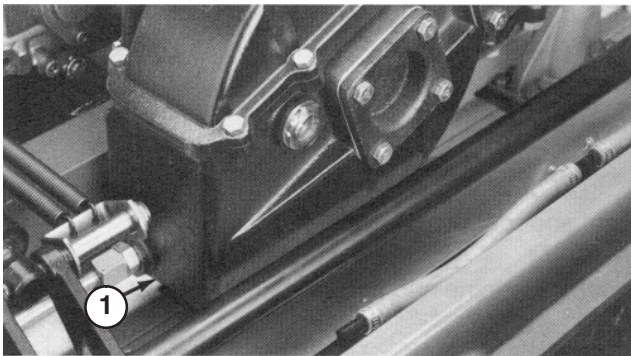
## Changing the Gear Case Oil and Filter

Change the hydraulic oil and filter initially after 25 hours of operation; thereafter change them every 200 hours of operation.

**Important** The gear case oil and filter must be changed immediately when any contamination, sludge, water or condensation appears.

1. Disengage the hood latches and open the hood.
2. Place a drain pan under the bottom of the gear case. Clean the area around the drain plug (Fig. 28).

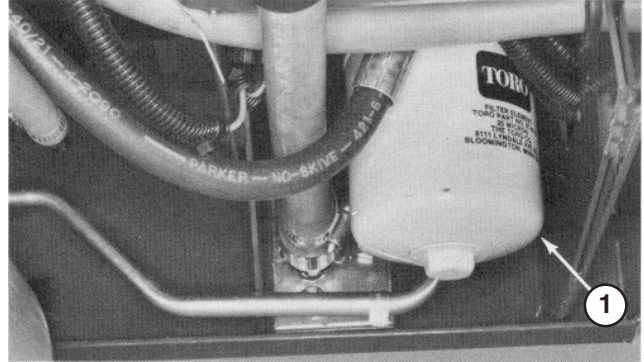
**Note:** When draining the oil, use a funnel or some type of channel to divert the draining oil away from the machine components and into a drain pan.



**Figure 28**

1. Drain plug location

3. Remove the drain plug and allow the oil to flow into a drain pan. After the oil has drained, install the oil drain plug.
4. Remove the oil filter (Fig. 29), mounted below control panel base, and discard the filter. Thoroughly clean the filter mounting surface and make sure that a new gasket is installed in the new filter.



**Figure 29**

1. Oil filter

5. Fill the new filter with new Mobil DTE 26 hydraulic oil or equivalent oil (refer to Fluid Recommendations, page 10). Apply a thin film of clean oil to the filter gasket.
6. Install the new filter by hand until the gasket just touches the mounting surface, then turn it an additional 1/2 to 3/4 turn.
7. Remove the filler cap and add approximately 4–5 quarts of Mobil DTE 26 hydraulic oil or equivalent oil (refer to Fluid Recommendations, page 10) to the gear case reservoir. Install the filler cap.
8. Check for leaks around the oil filter. Tighten the filter only enough to eliminate leaks. **Do not overtighten.**
9. Lower the hood and secure the latches.

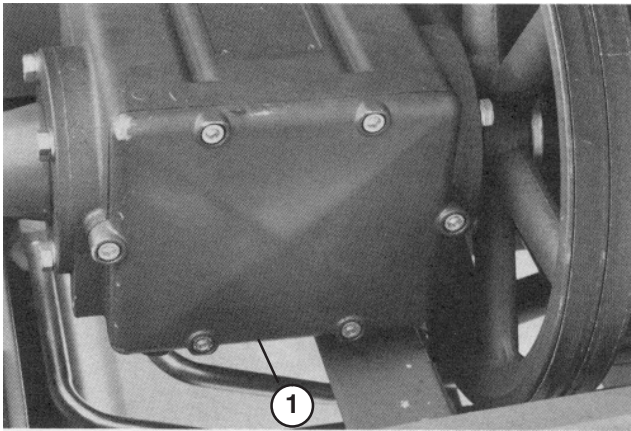
## Changing the Pump Case Oil

Change the pump oil initially after 25 hours of operation; thereafter change it every 200 hours of operation.

**Important** The pump case oil must be changed immediately when any contamination, sludge, water or condensation appears.

1. Disengage the hood latches and open the hood.
2. Place a drain pan under the pump case. Clean the area around the drain plug on the bottom of the case (Fig. 30).

**Note:** When draining the oil, use a funnel or some type of channel to divert the draining oil away from the machine components and into a drain pan.



**Figure 30**

1. Drain plug location

3. Remove the drain plug and allow oil to flow into a drain pan. After the oil has drained, install the oil drain plug.
4. Remove the dipstick/filler cap and add approximately 40 ounces of Mobil DTE Extra Heavy oil or equivalent oil (refer to Fluid Recommendations, page 10) to the pump case. Install the filler cap.
5. Check the oil level. If the fluid level is low, add enough Mobil DTE Extra Heavy oil or equivalent to bring the oil up to the proper level. **Do not overfill.**
6. Check for possible leaks. Lower the hood and secure the latches.

## Checking the Hydraulic Lines and Hoses

Check 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.



### Warning



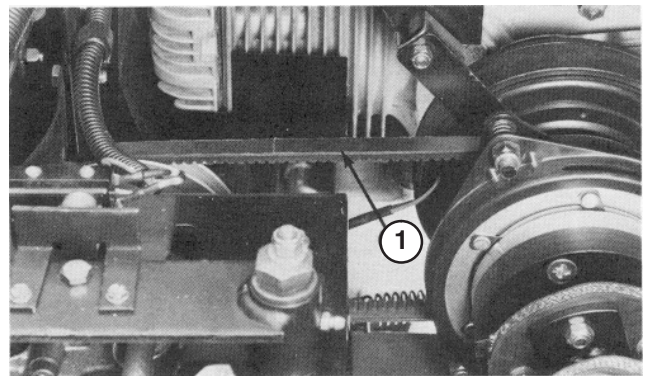
**Hydraulic fluid escaping under pressure can penetrate skin and cause injury.**

- Make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to the hydraulic system.
- Keep your body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper to find hydraulic leaks.
- Safely relieve all pressure in the hydraulic system before performing any work on the hydraulic system.
- Get immediate medical help if fluid is injected into skin.

## Adjusting the Traction Pump Belt

Make sure that the traction pump belt is properly tensioned to ensure correct operation of the unit and unnecessary wear. Check the belt midway in the span of the belt.

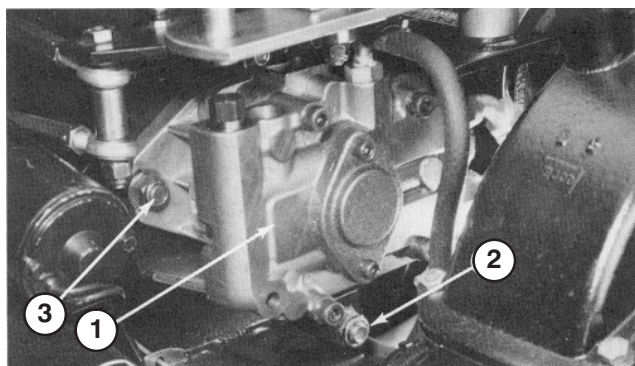
1. Disengage the hood latches and open the hood.
2. Check the belt tension by depressing the belt midway between the pulleys with 3 lb. of force. The belt should deflect 9/64 in. (Fig. 31).



**Figure 31**

1. Traction pump belt

3. If an adjustment is necessary, adjust as follows:
  - A. Loosen the pivot nut securing the pump mount to the pump support (Fig. 32).



**Figure 32**

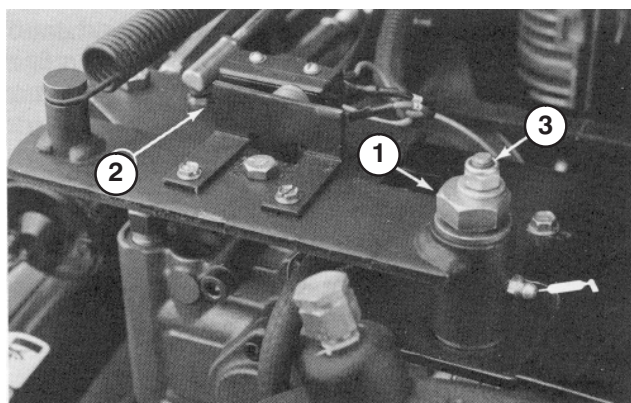
1. Pump
2. Pivot nut
3. Adjusting nut

- B. Loosen the adjusting nut securing the pump and pump mount to the slotted pump support (Fig. 32).
- C. Loosen the 3 capscrews securing the pulley guard bracket to the control panel and pump support.
- D. Use a pry bar to pull the pump toward the outside of the machine until the proper belt tension is attained; then tighten the adjusting nut securing the pump and pump mount to the pump support (Fig. 32).
- E. Tighten the pivot nut securing the pump mount to the pump support (Fig. 32).
- F. Tighten the 3 capscrews securing the pulley guard bracket to the control panel and pump support.

## Adjusting the Transmission for Neutral

If the machine moves when the lever is released, an adjustment to the transmission neutral is required.

1. Park the machine on a level surface, stop the engine, and open the hood.
2. Lift the drive wheel off of the ground using a jack. Block the front and rear of the wheels.
3. Start the engine and release the parking brake.
4. Slightly loosen the locknut on the top of the neutral adjustment cam (Fig. 33) and rotate the cam hex until the traction wheel stops rotating. Tighten the locknut.



**Figure 33**

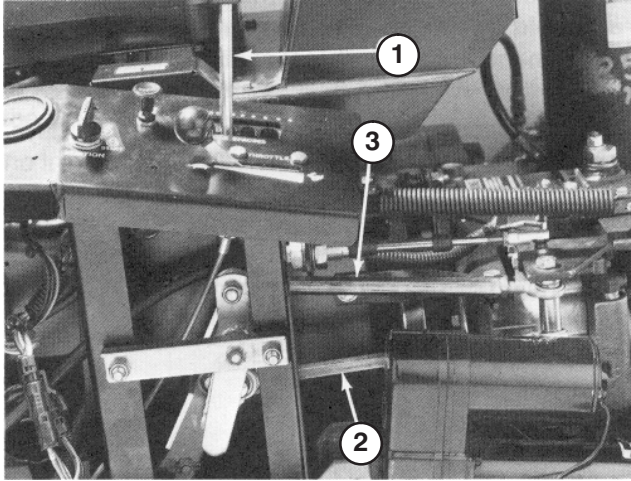
1. Neutral adjustment cam
2. Locknut
3. Switch tab

5. Move the traction bail completely up and down. Release the handle and check for wheel rotation. If the wheel continues rotating, repeat step 4.
6. If the problem continues, stop the engine, check the linkage for binding or damage, then do the adjustment procedure again.
7. Set the hole spacing control in the lowest setting (to the left) and move the transport/aerate switch to the aerate position (transport tires retracted). Loosen the 2 screws and adjust the switch tab (Fig. 33) so that the switches are actuated when the pump control is in neutral and not actuated when the pump is stroked.
8. Move the ignition switch to the ON position, but do not start the engine. Move the traction bail in both directions; the red traction light should come on. Repeat step 7 if the light does not come on when the bail is moved in both directions. The second limit switch must simultaneously activate when the red traction light is OFF. This switch enables the engine start circuit.

## Adjusting the Aeration Speed

1. Park the machine on a level surface, stop the engine, and open the hood.
2. Put the speed control lever (Fig. 34) into the second slot from the left (while facing the control panel).
3. Lower the machine into aerate mode so that the transport wheels are off of the ground.
4. Lift the drive wheel off of the ground using a jack.
5. Start the engine and release the parking brake.
6. Operate the engine at full speed.
7. Move the traction handle UP to full speed.

8. Loosen the jam nuts and adjust the LOWER speed rod (Fig. 34) until the traction wheel rotates at 20–22 RPM. Tighten the jam nuts.
9. Move the traction handle DOWN to the full speed position.
10. Adjust the UPPER speed rod (Fig. 34) until the traction wheel rotates at 20–22 RPM. Tighten the jam nuts.



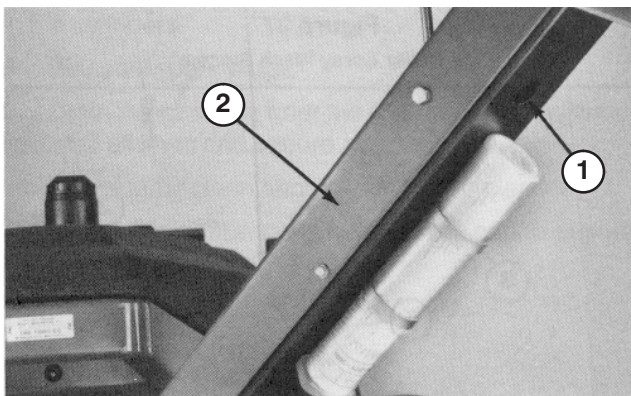
**Figure 34**

- |                        |                      |
|------------------------|----------------------|
| 1. Speed control lever | 3. Upper control rod |
| 2. Lower control rod   |                      |

## Adjusting the Parking Brake

Adjust the parking brake every 400 hours.

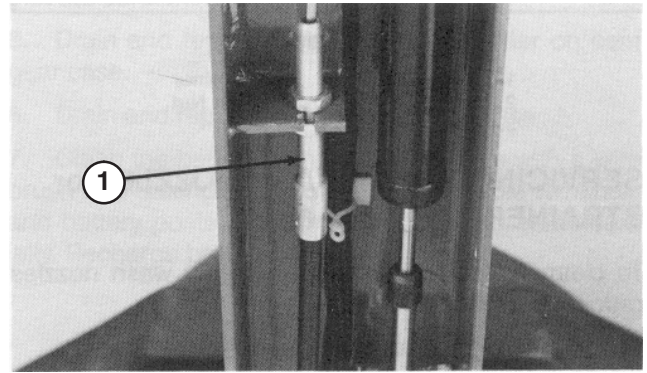
1. Remove the screws securing the cover to the underside of the handle (Fig. 35). Remove the cover.



**Figure 35**

- |          |           |
|----------|-----------|
| 1. Cover | 2. Handle |
|----------|-----------|

2. Loosen the upper jam nut securing the brake cable to the bracket (Fig. 36).



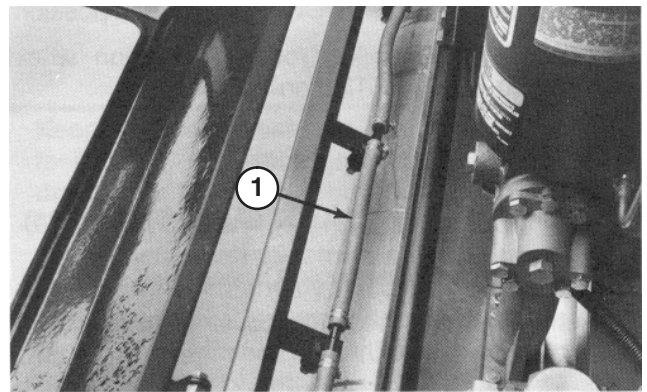
**Figure 36**

1. Brake cable

3. Tighten the lower jam nut until 25 to 30 pounds of force are required to actuate the brake lever. Tighten the jam nut.
4. Install the cover to the underside of the handle.

## Adjusting the Roller Spray Wash System

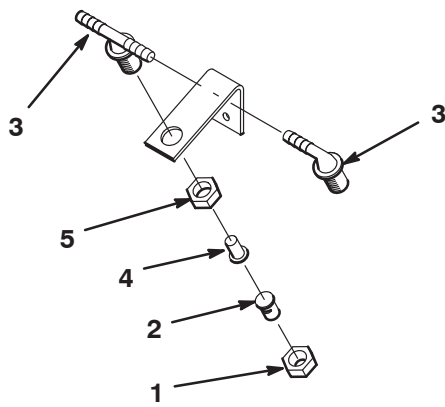
If the spray wash system (Fig. 37) on the rollers needs to be adjusted, proceed as follows:



**Figure 37**

1. Roller spray wash system

1. Loosen the cap on the bottom of the fitting (Fig. 38).
2. Rotate the nozzle so that the slot in the tip is parallel to the roller.
3. Tighten the cap and check the adjustment.



**Figure 38**

- |                |             |
|----------------|-------------|
| 1. Fitting cap | 4. Strainer |
| 2. Nozzle      | 5. Hex. nut |
| 3. Fitting     |             |

## Servicing the Spray Wash Nozzles or Strainers

To clean or replace the strainers in the spray wash nozzles, proceed as follows:

1. Loosen and remove the cap on the bottom of the fitting (Fig. 38).
2. Remove the nozzle and strainer assembly (Fig. 38). Clean or replace the strainer and replace it in the nozzle.
3. Loosely secure the nozzle and strainer to the fitting with the cap.
4. Rotate the nozzle so that slot in the tip is parallel to the roller.
5. Tighten the cap and check the adjustment.

## Caring for the Battery

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

Check the electrolyte level every 50 operating hours or, if the machine is in storage, every 30 days.

Maintain the cell level with distilled or de-mineralized water. Do not fill the cells above the bottom of the split ring inside each cell.

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.

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

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

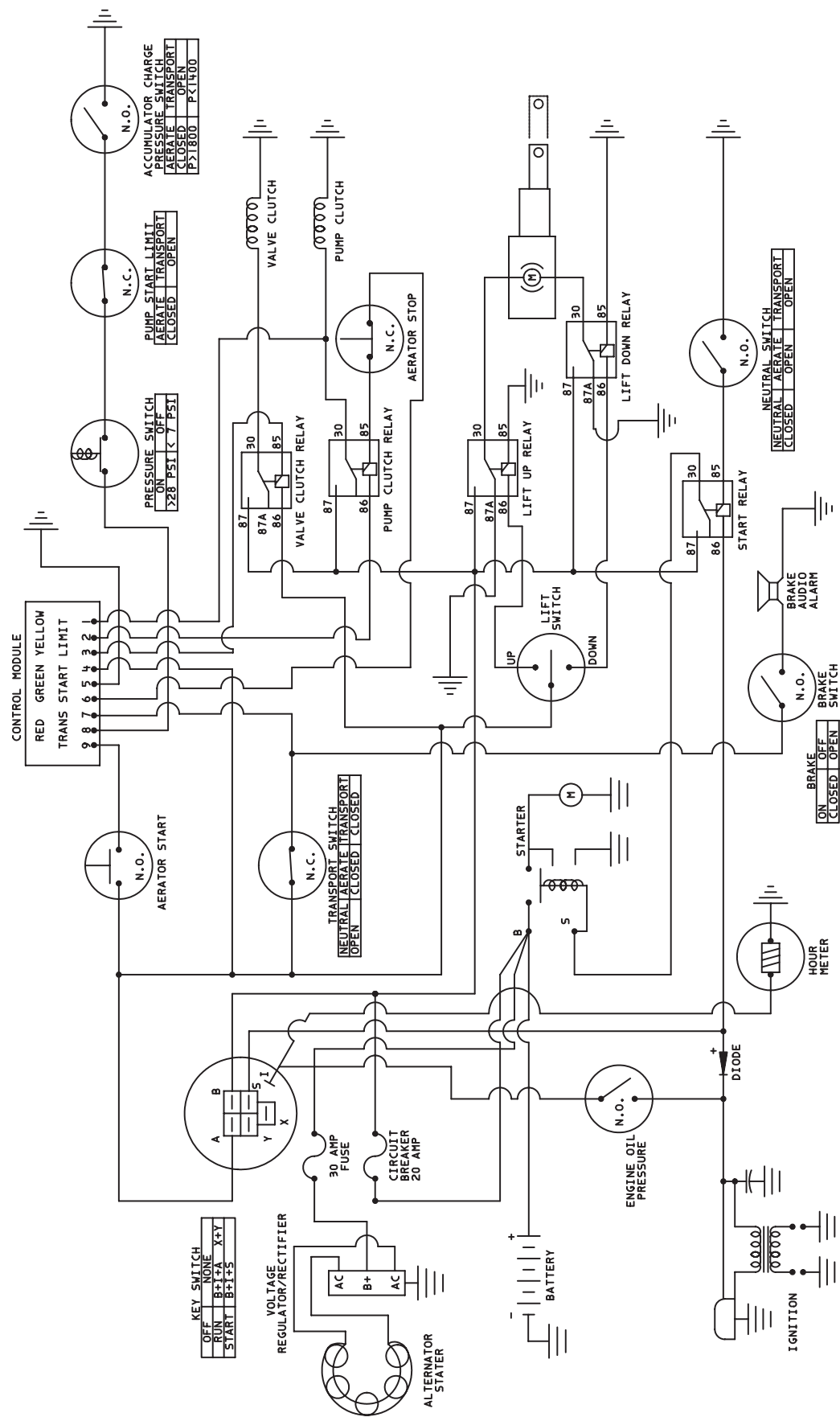


**Incorrect battery cable routing could damage the aerator and cables causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.**

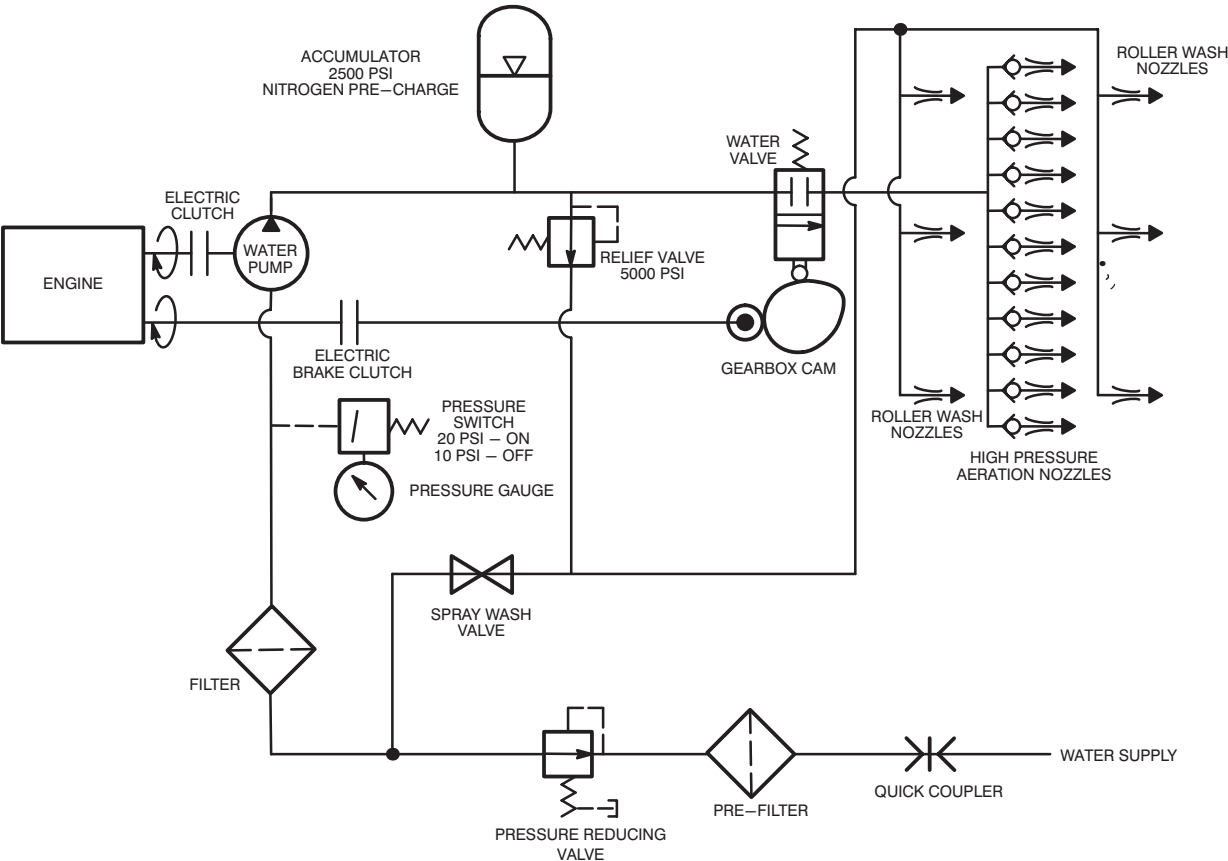
- **Always *disconnect* the negative (black) battery cable before disconnecting the positive (red) cable.**
- **Always *connect* the positive (red) battery cable before connecting the negative (black) cable.**

If the machine will be stored more than 30 days, remove the battery and charge it fully. Either store it on the shelf or 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.

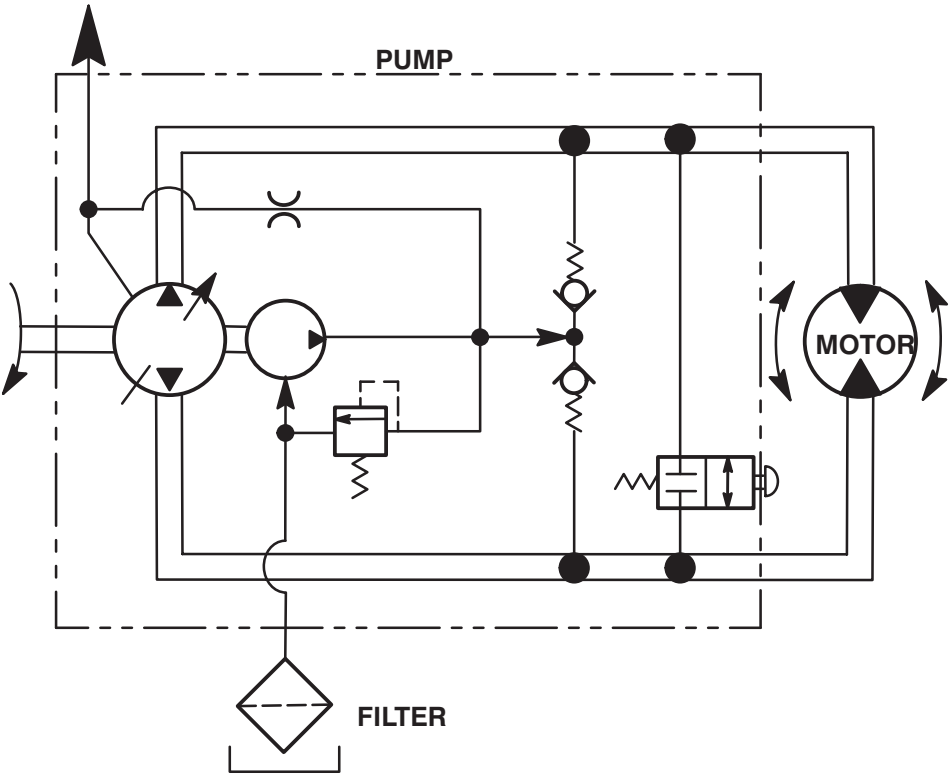
Electrical Schematic



# Water System Schematic



# Hydraulic Schematic



# Seasonal Storage

## Preparing the Water System

**Important** It is very important that the water system be drained to avoid freezing and damaging the components.

Drain system as follows:

1. Stop the engine, remove the key from the ignition switch, and remove the wires from the spark plugs.
2. Remove the 2 screws securing the drive shield to the frame and remove the shield.
3. With the engine "OFF" and the key removed from ignition, rotate the drive coupling by hand until resistance is felt. Continue to rotate the coupling about 1/4 revolution, opening the cycling valve.
4. Using the appropriate reducers (National Pipe thread), connect a source of compressed air (maximum pressure 150 psi; minimum pressure 90 psi) to the water inlets on either side of the machine.



### Danger



Compressed air can penetrate the skin and cause physical harm.

- Use extreme caution and wear protective goggles and gloves when working with high pressure air.
- Get prompt medical attention if an injury occurs.

5. Let compressed air flow through the machine for 3 minutes. While compressed air is flowing, temporarily open the spray wash and high pressure drain valve, purging water from the spray wash and high pressure system.
6. Disconnect compressed air and reducers. Install the drive shield previously removed and tighten the relief valve tube.
7. Remove and drain the water filter container. Install a new filter and replace the filter container.

## Preparing the Engine

1. Drain the engine oil from the oil pan and replace the drain cap.
2. Remove and discard the oil filter. Install a new filter.
3. Refill the engine with 3 qts. of recommended SAE 30 wt. motor oil.
4. Start the engine and run it at idle speed for two minutes. **Do not run it for longer than two minutes.**
5. Stop the engine; remove the spark plugs.
6. Pour one ounce of clean engine oil into the spark plug holes.
7. With the spark plugs removed, crank the engine with the starter for a least 12 revolutions to distribute oil in the cylinders.
8. Install the spark plugs.
9. Drain the gasoline from the fuel tank and fuel lines. Reinstall all lines and secure all connections.
10. Thoroughly clean and service the air cleaner.
11. Check the oil filler cap and fuel tank cap to ensure that they are securely in place.

## Preparing the Traction Unit

1. Thoroughly clean the machine.
2. Grease or oil all fittings and pivot points.
3. Check to make sure that all tires are over-inflated to 20–30 p.s.i.
4. Lightly sand and use touch up paint on all areas that are scratched, chipped, or rusted.
5. Drain and replace the hydraulic oil and filter on the cam gear case.
6. Drain and replace the oil in the water pump case.
7. Clean the battery, terminals, and posts with a wire brush and baking soda solution. Coat the cable terminals and battery posts with skin over grease or petroleum jelly. Recharge the battery.

# Troubleshooting

Problem	Possible Causes	Corrective Action
The unit will not move when the traction ball is engaged.	<ol style="list-style-type: none"> <li>1. Check that motion occurs at the pump pivot plate when the traction ball is moved.</li> <li>2. The oil level in the hydraulic reservoir (gearbox) is low.</li> <li>3. Bypass valve is not fully closed.</li> <li>4. The traction drive belt tension is incorrect.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect the traction push/pull cable and override assembly under the tiller handle.</li> <li>2. Replenish, if necessary.</li> <li>3. Close the valve.</li> <li>4. Adjust the belt tension.</li> </ol>
The unit will not transport at full speed.	<ol style="list-style-type: none"> <li>1. The unit is not fully raised to the transport position.</li> <li>2. The oil level in the hydraulic reservoir (gearbox) is low.</li> <li>3. Bypass valve is not fully closed.</li> <li>4. The traction drive belt tension is incorrect.</li> <li>5. Check that motion occurs at the pump pivot plate when the traction ball is moved.</li> </ol>	<ol style="list-style-type: none"> <li>1. Hold the lift toggle switch until the slip clutch in the actuator can be heard ratcheting and the spindle lift arms are nearly vertical with the rear axle spindle tipped away from the engine.</li> <li>2. Replenish, is necessary.</li> <li>3. Close the valve.</li> <li>4. Adjust the belt tension.</li> <li>5. Inspect the traction push/pull cable and override assembly under the tiller handle.</li> </ol>
The engine dies during startup.	<ol style="list-style-type: none"> <li>1. The fuel shut-off valve is closed.</li> <li>2. Fuel in the fuel tank is low.</li> <li>3. The engine choke is not operating correctly.</li> <li>4. Check the engine oil level.</li> <li>5. Starting conditions are cold (30°).</li> </ol>	<ol style="list-style-type: none"> <li>1. Open the fuel shut-off valve.</li> <li>2. Replenish, if necessary.</li> <li>3. Check the choke connections and operation. Regulate the choke until the engine is warm when starting a cold engine.</li> <li>4. The oil pressure switch is bypassed during start, but must activate to protect the engine while running.</li> <li>5. Multiple start attempts may be required to trip the oil pressure switch.</li> </ol>

<b>Problem</b>	<b>Possible Causes</b>	<b>Corrective Action</b>
The engine dies when the water system is engaged.	<ol style="list-style-type: none"> <li>1. The throttle is in the wrong operating position.</li> <li>2. The engine speed is set incorrectly.</li> <li>3. Engine power is low.</li> </ol>	<ol style="list-style-type: none"> <li>1. Put the throttle in the FAST position when aerating.</li> <li>2. Adjust the carburetor fast setting to 3450–3550 RPM.</li> <li>3. Fuel is contaminated, there is a plugged fuel filter or air filter, or there is a bad spark plug.</li> <li>4. Have the system serviced by an Authorized Toro Distributor.</li> </ol>
The engine does not start (will not engage the starter).	<ol style="list-style-type: none"> <li>1. The traction bail is not in the neutral position.</li> <li>2. The neutral switch tab is out of adjustment.</li> <li>3. The battery voltage is low.</li> <li>4. There is a malfunction in the electrical system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct the traction bail position.</li> <li>2. Adjust the switch tab until the red traction light is OFF in neutral.</li> <li>3. Check the battery.</li> <li>4. Check the circuit breaker and electrical connections.</li> </ol>
The unit is not producing aeration holes (the pump or water valve will not start).	<ol style="list-style-type: none"> <li>1. The supply hose is kinked, there is a restriction in the line, or the valve at the water source is only partially opened.</li> <li>2. There is inadequate water pressure or flow from the source.</li> <li>3. Check the water pressure at the gauge when the pump is engaged if the water pressure drops to less than 25 psi, but was initially higher.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct the condition.</li> <li>2. Check the water pressure (from the water source) at the inlet (8 gpm – 40 psi).</li> <li>3. Replace the water filter.</li> </ol>
The unit stops aerating in one direction or stops aerating in the lowest hole spacing.	<ol style="list-style-type: none"> <li>1. The supply hose is kinked, there is a restriction in the line, or the valve at the water source is only partially opened.</li> <li>2. There is inadequate water pressure or flow from the source.</li> <li>3. Check the water pressure at the gauge when the pump is engaged if the water pressure drops to less than 25 psi, but was initially higher.</li> <li>4. The neutral switch tab is out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct the condition.</li> <li>2. Check the water pressure (from the water source) at the inlet (8 gpm – 40 psi).</li> <li>3. Replace the water filter.</li> <li>4. Adjust the switch tab until the red traction light is ON while the traction bail is actuated in both directions.</li> <li>5. The red traction light must be OFF, when in neutral, to allow the engine start interlock to function.</li> </ol>

<b>Problem</b>	<b>Possible Causes</b>	<b>Corrective Action</b>
The unit is not producing aeration holes (the pump and valve are operating correctly).	<ol style="list-style-type: none"> <li>1. There is air in the system.</li> <li>2. A nozzle(s) is plugged.</li> <li>3. The soil composition is hard.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open the main bleed valve to purge air from the system.</li> <li>2. Inspect the nozzles.</li> <li>3. A different nozzle configuration may be required.</li> <li>4. Have the water system checked by an Authorized Toro Distributor.</li> </ol>
The unit is not producing aeration holes (the injection pump stops after the unit stops moving).	<ol style="list-style-type: none"> <li>1. This is a normal condition of the neutral interlock system.</li> </ol>	<ol style="list-style-type: none"> <li>1. The operator must hold the Engage (start) button to aerate without moving.</li> </ol>
The holes are shallow or the improper depth.	<ol style="list-style-type: none"> <li>1. There is air in the system.</li> <li>2. If the hole depth was satisfactory earlier, check the density and moisture content of the soil.</li> <li>3. The soil composition is hard.</li> <li>4. There are too many large nozzles, causing a loss in pressure which could damage the accumulator or other water system components.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open the main bleed valve to purge air from the system.</li> <li>2. A different nozzle configuration may be required.</li> <li>3. A different nozzle configuration may be required.</li> <li>4. Open the bleed valve and examine the nozzles. Verify the size and quantity per the recommendation chart.</li> <li>5. Have the water system checked by an Authorized Toro Distributor.</li> </ol>
The water injection system is making an unusual noise when aerating.	<ol style="list-style-type: none"> <li>1. There is air in the system.</li> <li>2. A nozzle is missing or there are too many large nozzle installed.</li> <li>3. There are broken springs in the nozzle extension check valve.</li> <li>4. The gearbox drive shaft or couplers are worn.</li> </ol>	<ol style="list-style-type: none"> <li>1. With the water supply on, open the bleed valve under the accumulator/valve body. If mechanical noise continues during aeration, stop the unit and have it serviced by an Authorized Toro Distributor.</li> <li>2. Open the bleed valve and examine the nozzles. Verify the size and quantity per the recommendation chart.</li> <li>3. Replace the springs and inspect the ball and seat.</li> <li>4. Remove the drive shaft guard and repair or replace as necessary.</li> </ol>





## The Toro Aerator 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 Hydroject® 3000, Hydroject® 4000, Greens, Fairway Aerator or ProCore™ Aerator ("Product") purchased after January 1, 1997, to be free from defects in materials or workmanship for two years or 500 operational hours\*, whichever occurs first. Where a warrantable condition exists, we will repair the Product at no cost to you including diagnosis, labor, parts, and transportation. This warranty begins on the date the Product is delivered to the original retail purchaser.

\* Product equipped with hour meter

#### Instructions for Obtaining Warranty Service

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

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

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

#### Owner Responsibilities

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

#### Items and Conditions Not Covered

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

- Product failures which result from the use of non-Toro replacement parts, or from installation and use of add-on, modified, or unapproved accessories
- Product failures which result from failure to perform required maintenance and/or adjustments
- Product failures which result from operating the Product in an abusive, negligent or reckless manner
- Parts subject to consumption through use unless found to be defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to, blades, reels, bedknives, tines, spark plugs, castor wheels, tires, filters, belts, 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.