FORM NO. 3317-584 Rev. B

TORO®

MODEL NO. 09801–50001 thru 60001 & UP

OPERATOR'S MANUAL

HYDROJECT® 3000 AERATOR

To assure maximum safety, optimum performance, and to gain knowledge of the product, it is essential that you or any other operator of the machine read and understand the contents of this manual before the engine is ever started. Pay particular attention to the SAFETY INSTRUCTIONS highlighted by this symbol —

The safety alert symbol means CAUTION, WARNING or DANGER — personal safety instruction. Failure to comply with the instruction may result in personal injury.

FOREWORD

The Hydroject 3000 is a water aerification device that penetrates and breaks up the soil with high velocity water jets. This machine operates with minimal disruption to the playing surface since there are no cores to remove after aerification. After a quick rinse or irrigation cycle, the putting surface is ready for play.

The machine was designed designed to use water and NOT CHEMICALS. Since so many varieties of chemicals are used in the Golf environment and since these chemicals react differently with Hydroject components, the Toro Company will not accept responsibility for equipment or environmental damage caused by using chemicals. Using chemicals in your equipment is done at your own risk!

The Hydroject 3000 releases a tremendous energy through the spray nozzles. DO NOT OPERATE THIS UNIT ON CONCRETE OR ASPHALT BECAUSE IT WILL PENETRATE THESE SURFACES.

Since this is a high–quality product, Toro is concerned about the future use of the machine and safety of the user. Therefore, read this manual to familiarize yourself with proper set–up, operation and maintenance instructions. The major sections of the manual are:

1. Safety Instructions
2. Set–up Instructions
3. Before Operating
4. Operation
5. Maintenance

Certain information in this manual is emphasized. DANGER, WARNING and CAUTION identify personal safety related information. IMPORTANT identifies mechanical information demanding special attention. Be sure to read this directive because it deals with the possibility of damaging a part or parts of the machine. NOTE identifies general information worthy of special attention.

⚠ WARNING: ⚠

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

SERVICE MANUAL

A service manual is available for the Hydroject 3000 Aerator. This publication provides information for trouble shooting, testing, adjusting and repairing the machine. To order this publication, contact your local authorized Toro Distributor. Ask for Form 91–764–SL, Hydroject 3000 service manual.

Whenever you have questions or need service, contact your local authorized Toro Distributor. In addition to having a complete line of accessories and professional turf care service technicians, the distributor has a complete line of genuine TORO replacement parts to keep your machine operating properly. Keep your TORO all TORO. Buy genuine TORO parts and accessories.

TABLE OF CONTENTS

SAFETY INSTRUCTIONS

This safety alert symbol means CAUTION, WARNING or DANGER – "personal safety instruction". Read and understand the instruction because it has to do with safety. Failure to comply with the instruction may result in personal injury.

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

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

The Toro Company
8111 Lyndale Avenue South
Minneapolis, Minnesota 55420

2. Never allow children to operate the machine. Do not allow adults to operate machine without proper instruction. Only trained operators who have read this manual should operate this machine.

3. Never operate the machine when under the influence of drugs or alcohol.

4. Before attempting to start engine engage parking brake.

5. Remove all debris or other objects that might interfere with operation. Keep all bystanders away from the work area.

6. Keep all shields and safety devices in place. If a shield, safety device or decal is defective or damaged, repair or replace it before operation is commenced. Also tighten any loose nuts, bolts and screws to assure machine is in safe operating condition.

7. 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.

8. Fill fuel tank with gasoline before starting the engine. Avoid spilling gasoline. Since gasoline is flammable, handle it carefully.

A. Use an approved gasoline container.

B. Do not fill tank while engine is hot or running.

C. Do not smoke while handling gasoline.

D. Fill fuel tank outdoors and up to about one inch (25 mm) from top of the tank, not the filler neck.

E. Wipe up any spilled gasoline.

9. Check 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

10. DON'T TAKE AN INJURY RISK! When a person or pet appears unexpectedly in or near the WORKING area, **STOP AERATING**.

11. Keep hands and feet away from 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.

12. Never use chemicals in the water supply system.

13. Do not operate water injection system on concrete or asphalt because water jets will permanently damage these surfaces.

14. Start engine with parking brake engaged.

15. Do not run the engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could possibly be deadly.

16. Using the machine demands attention, and to prevent loss of control:

A. Use only in daylight or when there is good artificial light.

B. Watch for holes or other hidden hazards.

C. Do not transport machine close to a sand trap, ditch, creek or other hazard.

17. If the machine starts to vibrate abnormally, shut the engine off. Remove wires from spark plugs to prevent possibility of accidental starting. Check machine for damage and defective parts. Repair any damage before restarting the engine and operating the machine.

18. Do not touch engine or muffler while engine is running or soon after it is stopped. These areas could be hot enough to cause a burn.

19. Before leaving the operator's position – behind handle – engage parking brake.

20. When leaving the machine unattended, engage parking brake , shut engine OFF and remove key from ignition switch.

SAFETY INSTRUCTIONS

MAINTENANCE

21. Disconnect wires from spark plugs to prevent accidental starting of the engine when servicing, adjusting or storing the machine.

22. If machine must be tipped to perform maintenance or an adjustment, close fuel shut–off valve, drain gasoline from fuel tank, oil from crankcase and remove battery.

23. To reduce potential fire hazard, keep the engine free of excessive grease, grass, leaves and accumulations of dirt.

24. Be sure machine is in safe operating condition by keeping nuts, bolts and screws tight. Check all bolts and nuts frequently to be sure they are tightened to specification.

25. 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.

26. Make sure all hydraulic line connectors are tight, and all hydraulic hoses and lines are in good condition before applying pressure to the system.

27. Keep body and hands away from pin hole leaks or nozzles that eject water or hydraulic fluid under high pressure. Use paper or cardboard, not 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 ejected 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.

28. Before disconnecting or performing any work on the hydraulic oil system, all pressure in system must be relieved by stopping engine and opening by–pass valve.

29. Make sure all water line connectors are tight, and all hoses and lines are in good condition before applying pressure to the system.

30. Before disconnecting or performing any work on the water system, all pressure in system must be relieved by stopping engine and opening bleed valve. Opening the 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.

31. 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 a Authorized Toro Distributor.

32. Do not overspeed the engine by changing governor settings. To be sure of safety and accuracy, have an Authorized T0R0 Distributor check maximum engine speed with a tachometer.

33. Engine must be shut off before checking oil or adding oil to the crankcase.

34. Allow engine to cool before storing machine in any enclosure such as a garage or storage shed. Make sure the fuel tank is empty if machine is to be stored in excess of 30 days. Do not store 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.

35. When storing or transporting machine (trailering), make sure fuel shut–off valve is closed.

36. 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 to keep the Toro all TORO. NEVER USE "WILL–FIT" REPLACEMENT PARTS AND ACCESSORIES MADE BY OTHER MANUFACTURERS. Look for the TORO logo to assure genuineness. Using unapproved replacement parts and accessories could void the warranty of The Toro Company.

SAFETY AND INSTRUCTION DECALS

The following decals are installed on the machine. If any become damaged or illegible, replace it. The decal part number is listed below and in your parts catalog. Replacement can be ordered from your Authorized Toro Distributor. Foreign language decal sets are also available from your Authorized Toro Distributor.

On Drive Shaft Shield
(Part No. 80–8000)

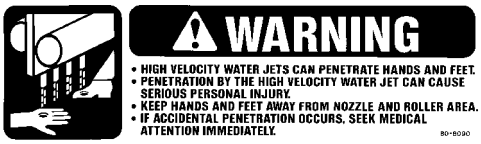
On Top Of Tiller Arm
(Part No. 80–8070)

On Each Side Of Engine (2)
(Part No. 80–9350)

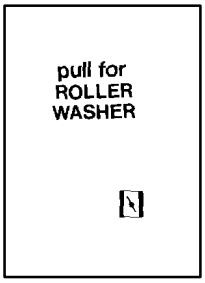
On Accumulator body
(Part No. 80–8880)

On Trans. Pump Bracket – under shield
(Part No. 80–8760)

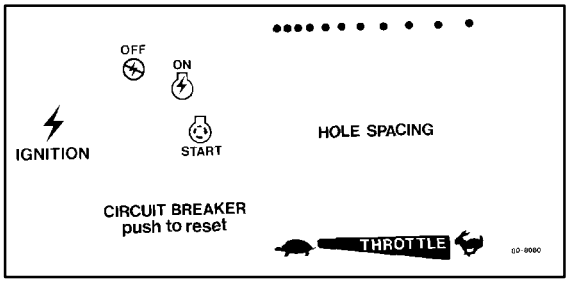
On Muffler Shield (3)
(Part No. 80–8290)



On Sides and Behind Rollers (3
(Part No. 80–8090)



On Control Panel
(Part No. 80–8150)



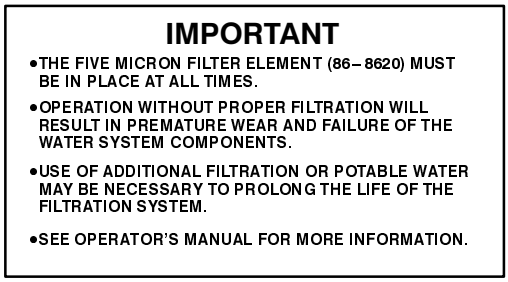
On Control Panel
(Part No. 80–8110)

On Lift Actuator
(Part No. 80–8010)

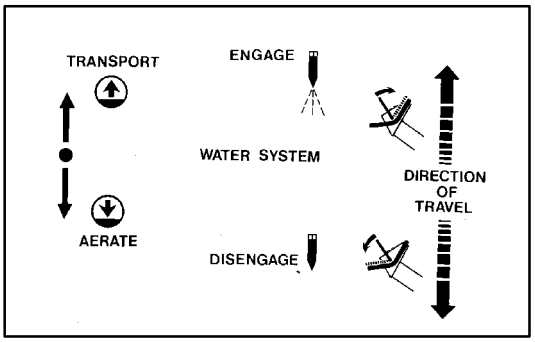
On Drive Shaft Guard
(Part No. 80–8040)

On Underside of Tiller Control Panel
(Part No. 80–8020)

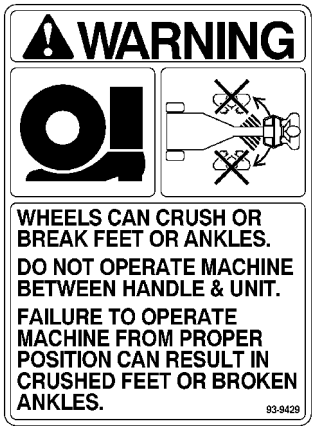
On Wheel Motor Fork
(Part No. 72–4080)



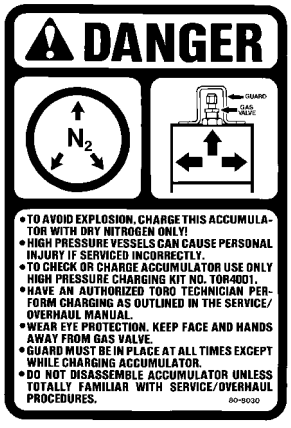
On Each Side Of Machine (2)
(Part No. 92–9542)



On Tiller Control Panel
(Part No. 80–9240)



On Tiller Arm
(Part No. 93–9429)



On Accumulator body
(Part No. 80–8030)

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 start–up and shut–down 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.

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 with11 flanged nozzle extensions containing check valves and hardened stainless discharge orifice. Check valves may be reversed in housing to block unused nozzles.

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.

Ground Speed:

Aerating: 0–2 mph (both directions)
Transport: 0–4 mph (both directions)

Dimensions:

Length – 96.2 inches.
Wheelbase – 53.2 inches
Width – 63 inches.
Height – 42.7 inches.
Weight –1150 pounds.

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" spacing in the direction of travel, and 3 or 6" increments in width.

SPECIFICATIONS

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.

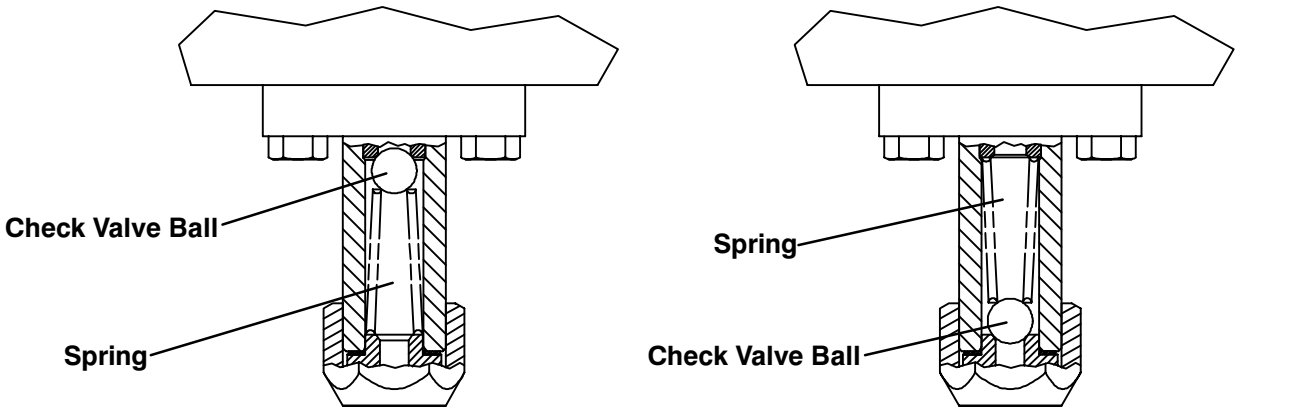
NOZZLE SIZE AND APPROXIMATE DEPTH CHART						
Part No.	Drill Size	Decimal Size (inch)	Metric Size (mm)	Quantity of Nozzles		Approx. Depth
				Open	Blocked **	
86–8130	#56	.0465	1.181	*	*	*
86–8131	#53	.0595	1.511	11	0	4–6”
86–8133	#46	.0810	2.057	6	5	6–8”
* Use only with varied size configurations						

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	.0465	1.181	6 and	0**	3–4”
86–8133	#46	.0810	2.057	5	0**	6–8”

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

****Additional nozzles may be blocked to compensate for pump wear.**



Specifications and design subject to change without notice.

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 – Toro part no. 57–8530

Hydraulic Oil – Mobil DTE 26 or other interchangeable equivalent. See 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

Hydraulic Oil Filter – Toro part no. 67–8110

Water Pump Case Oil – Mobil DTE Extra Heavy or other interchangeable ISO Grade 150 PE–700–A (Heavy Inhibited Hydraulic & General Purpose) See following chart for equivalent oils.

Mobil	DTE EH (Extra Heavy)
Shell	Turbo 150
Amoco	American Ind. Oil 150
Chevron	AW Machine Oil 150
Conoco	Dectol R & O150
Exxon	Terresstic 150
Kendall	Ken–Tran 080
Pennzoil	Penreco 150/AW150
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 – Recommend a 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 machines filtration system, additional or alternative filtration may be required.

Water Filter Cartridge – Toro part no. 86–8630

DO NOT USE CHEMICALS -- Concern for environmental issues and corrosive affects on machine components.

IDENTIFICATION AND ORDERING

MODEL AND SERIAL NUMBERS

The HYDROJECT 3000 has two identification numbers: a model number and a serial number. The two numbers are stamped on a plate which is riveted to the frame. In any correspondence concerning the HYDROJECT 3000, supply model and serial numbers to be sure that correct information and replacement parts are obtained.

To order replacement parts from an authorized TORO Distributor, supply the following information:

1. Model and serial numbers of the machine.

2. Part number, description and quantity of parts desired.

Note: Do not order by reference number if a parts catalog is being used; use the part number.

LOOSE PARTS

NOTE: Use this chart as a checklist to assure all parts have been received. Without these parts, total set–up cannot be completed.

Description	Qty.	Use
Wheels Lug Nuts	3 12	Install on Wheel Hubs
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
Operator's Manual Parts Catalog Registration Card	1 1 1	Read Before Operating Machine Fill Out and Return To Toro

SET–UP INSTRUCTIONS

INSTALL REAR WHEELS (Fig. 1)

1. Remove wheels from shipping pallet.

2. Mount wheels to hubs with lug nuts (supplied in loose parts) and torque nuts to 45–55 ft.lb.

3. Remove any shipping blocks or braces, which may obstruct machine removal from pallet.

IMPORTANT: Refer to Before Operating section in manual for instructions on preparing machine for operation.

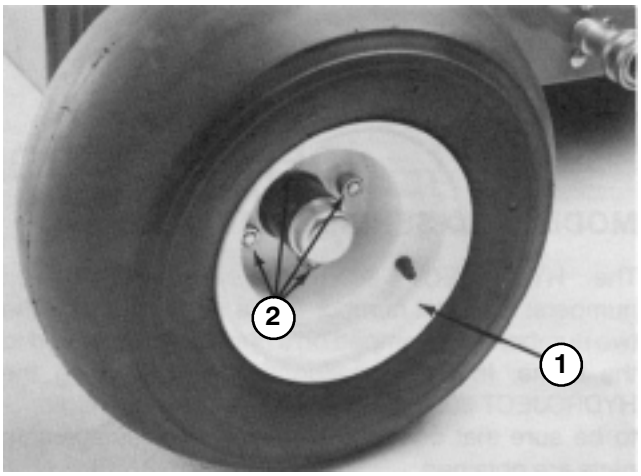


Figure 1

1. Wheel 2. Lug Nuts

BEFORE OPERATING

ACTIVATE AND CHARGE BATTERY (Fig. 2)

1. Since battery is not filled with electrolyte or activated, bulk electrolyte with 1.260 specific gravity must be purchased from a local battery supply outlet.

WARNING

Electrolyte gases are explosive and can cause serious injury to eyes, lungs and skin. Wear safety goggles and rubber gloves when working with electrolyte or battery. Charge the battery in a well ventilated place so gasses produced while charging can dissipate. Since the gases are explosive, keep open flames and electrical spark away from the battery; do not smoke. Nausea may result if the gases are inhaled. Unplug charger from electrical outlet before connecting to or disconnecting charger leads from battery posts.

2. Release hood latches and raise hood.

3. Loosen capscrew securing battery clamp to machine and remove battery. Remove filler caps from battery and slowly fill each cell until electrolyte is just above the plates.

Figure 2
1. Battery

4. Replace 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.

5. When battery is charged, disconnect charger from electrical outlet and battery posts.

6. Remove filler caps. Slowly add electrolyte to each cell until level is up to fill ring. Install filler caps.

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

7. Install battery and secure with battery clamp.

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 with capscrews and nuts. Slide the rubber boot over the positive terminal to prevent possible short−out from occurring (Fig. 2).

9. Lower hood and secure latches.

CHECK ENGINE OIL (Fig. 3)

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

1. Position machine on a level surface.

2. Unscrew dipstick and wipe it with a clean rag. Screw dipstick into filler neck and make sure it is seated fully. Unscrew dipstick out of filler neck and check level of oil. If oil level is low, add enough oil to raise level to FULL mark on dipstick.

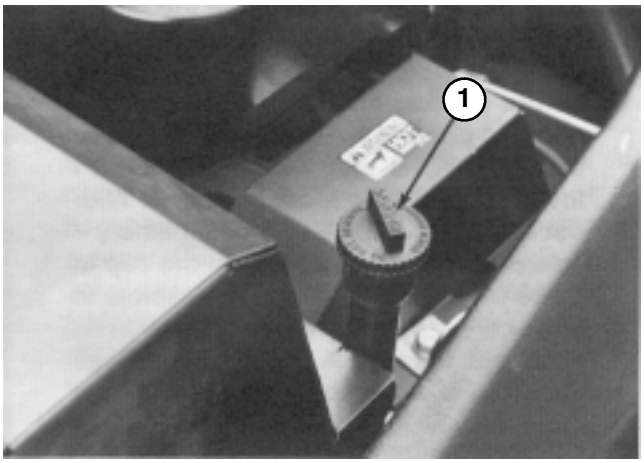


Figure 3
1. Dipstick

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

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

IMPORTANT: The Hydroject 3000 operates at very high engine loads, so check level of oil every 8 operating hours or daily. A new engine may consume some oil until broken in. Initially, change oil after the first 25 hours of operation; thereafter, under normal conditions, change oil and filter after every 100 hours of operation. However, change oil more frequently when engine is operated in extremely dusty or dirty conditions.

BEFORE OPERATING

FILL FUEL TANK WITH GASOLINE (Fig. 4)

THE TORO COMPANY STRONGLY RECOMMENDS THE USE OF FRESH CLEAN, UNLEADED REGULAR GRADE GASOLINE IN TORO GASOLINE POWERED PRODUCTS. UNLEADED GASOLINE BURNS CLEANER, EXTENDS ENGINE LIFE, AND PROMOTES GOOD STARTING BY REDUCING THE BUILD–UP OF COMBUSTION CHAMBER DEPOSITS.

DANGER

Because gasoline is flammable, caution must be used when storing or handling it. Do not fill fuel tank while engine is running, hot or when machine is in an enclosed area. Vapors may build up and be ignited by a spark or flame source many feet away. DO NOT SMOKE while filling the fuel tank to prevent the possibility of an explosion. Always fill fuel tank outside and wipe up any spilled gasoline before starting engine. Use a funnel or spout to prevent spilling gasoline before starting engine and fill tank to about I inch (25 mm) below the bottom of filler neck. Store gasoline in a clean safety–approved container and keep the cap in place on the container. Keep gasoline in a cool, well–ventilated place; never in an enclosed area such as a hot storage shed. To assure volatility, do not buy more than a 30 day supply of gasoline. Gasoline is a fuel for internal combustion engines; therefore, do not use it for any other purpose. Since many children like the smell of gas, keep it out of their reach because the fumes are explosive and dangerous to inhale.

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

1. Remove cap from the fuel tank and fill the 10 gallon tank to about 1 inch from the top of tank, bottom of filler neck with unleaded gasoline. Install fuel tank cap tightly.

2. Wipe up gasoline that may have spilled to prevent a fire hazard.

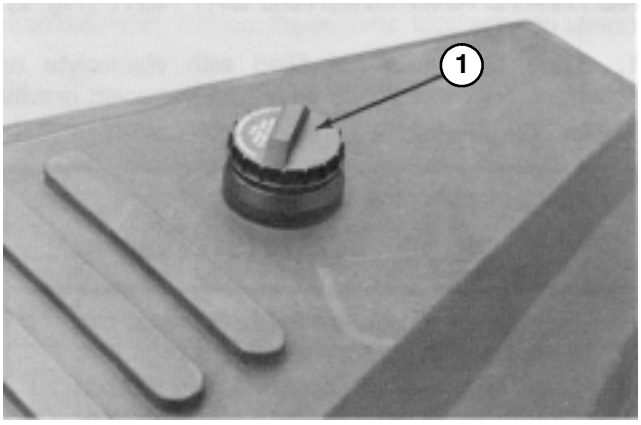


Figure 4
1. Fuel Tank Cap

CHECK GEAR CASE FLUID LEVEL (Fig. 5)

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 level of hydraulic oil on sight gauge before engine is first started and daily thereafter. Change filter initially after 25 hours of operation, thereafter change oil and filter every 250 hours of operation. **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 machine on a level surface.

2. Release hood latches and raise hood.

3. Check level of hydraulic oil on sight gauge. Fluid level should be up to middle of gauge window.

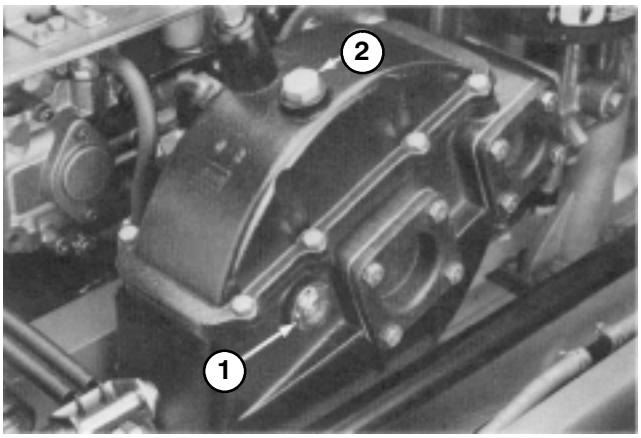


Figure 5
1. Sight Gauge 2. Filler Cap

4. If fluid level is low, remove filler cap and add enough Mobil DTE 26 hydraulic oil or equivalent oil (refer to fluid recommendation table on page 9) to bring oil up to proper level.

5. Lower hood and secure latches.

BEFORE OPERATING

CHECK PUMP CASE FLUID LEVEL (Fig. 6)

The pump crank case is filled at the factory with approximately 40 ounces of Mobil DTE Extra Heavy oil. Check level of oil on dipstick before engine is first started and daily thereafter. **Change oil initially after 25 hours of operation,** thereafter change every 200 hours of operation.**The oil must be changed immediately when any contamination, sludge, water or condensation appears in oil. Determine and correct oil contamination problem before restarting engine and operating machine.**

1. Position machine on a level surface.

2. Release hood latches and raise hood.

3. Remove dipstick/filler cap and check level of oil on dipstick. Fluid level should be up to FULL mark.

4. If fluid level is low, add enough Mobil DTE Extra Heavy oil or equivalent oil (refer to fluid recommendation table on page 9) to bring oil up to proper level. DO NOT OVERFILL.

5. Lower hood and secure latches.

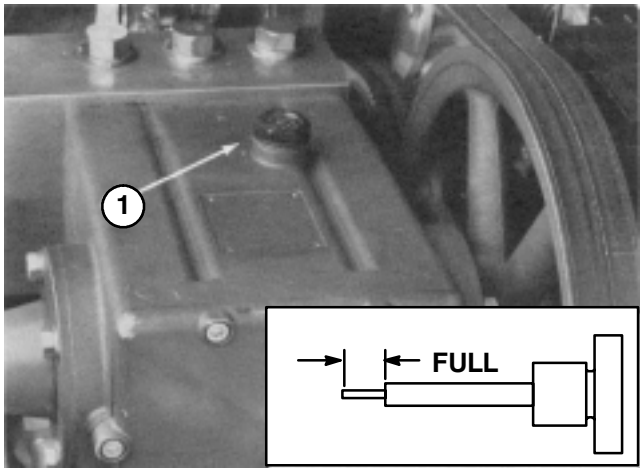


Figure 6
1. Dipstick / Filler Cap

CHECK TIRE PRESSURE

Tires are over inflated for shipping, make sure front and rear tires are inflated to 8 to 12 p.s.i.

CHECK ACCUMULATOR CHARGE

Have accumulator charge checked before and after each operating season by an Authorized TORO Distributor.

WARNING

Charged 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 accumulators in a well ventilated area. Have accumulator checked and charged by an Authorized TORO Distributor.

Wear eye protection. Keep hands and face away from gas valve.

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. Failure to open bleed valve before servicing high pressure water components can cause personal injury, DISMEMBERMENT OR DEATH.

Charged accumulators cannot be shipped via air freight.

CONTROLS

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

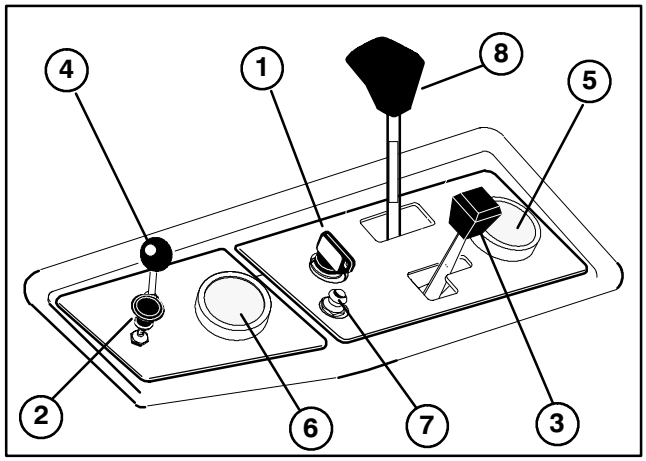


Figure 7

1. Ignition Switch
2. Choke
3. Throttle
4. Spray Wash Control
5. Hour Meter
6. Water Pressure Gauge
7. Circuit Breaker Reset Button
8. Spacing Control Lever

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

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

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

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

Water Pressure Gauge (Fig. 7) – Registers supply water pressure in system. Also acts as a interlock switch preventing water pump from starting if water pressure is below 20-28 p.s.i. or stopping water pump if water pressure drops below 7-13 p.s.i. Check gauge frequently to monitor water pressure.

Circuit Breaker Reset Button (Fig. 7) – Push button to reset breaker, after correcting malfunction in electrical system. Button also serves as a switch to interrupt power to the relays.

Spacing Control Lever (Fig. 7) – Moving control away from handle increases aerating ground speed and distance between holes. Moving control toward handle decreases aerating ground speed and distance between holes. Setting will be overridden when machine is shifted to transport position.

Traction Bail (Fig. 7) – Engages and regulates fore and aft traction operation of machine. Releasing bail stops traction operation and will also stop water injection in 3 to 4 seconds, unless bail is engaged. Transport speed is regulated by amount bail is moved.

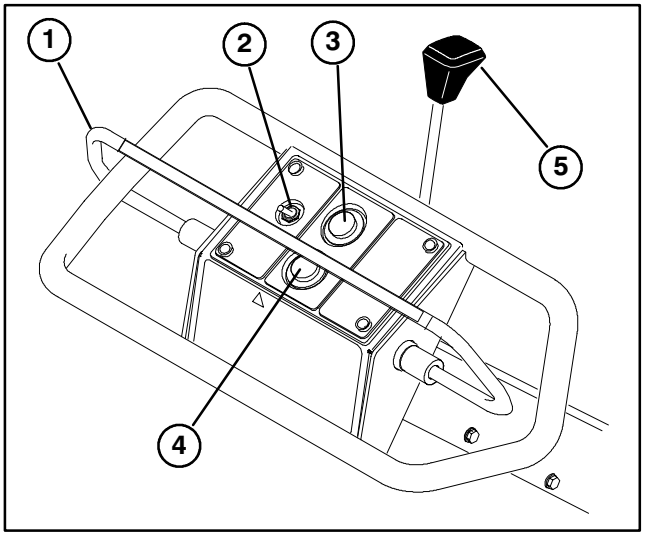


Figure 8

1. Traction Bail
2. Transport / Aerate Toggle Switch
3. Aeration Engagement Button
4. Aeration Stop Button
5. Parking Brake

Transport / Aerate Toggle Switch (Fig. 8) – Lowers machine onto rollers to commence aeration. Switch will override spacing control setting when it is moved to transport position.

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

Aeration Stop Button (Fig. 8) – Red button stops water injection system. System continues for a few seconds after button is pressed.

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

Fuel Shut–Off Valve — Located Under Fuel Tank. Close fuel shut–off valve when storing or transporting (trailering) machine.

OPERATING INSTRUCTIONS

OPERATING PRECAUTIONS

1. Before aerating, inspect the work area for debris and determine the best direction and pattern to operate machine.

2. If the machine starts to vibrate abnormally, shut the engine off. Remove wires from spark plugs to prevent possibility of accidental starting. Check machine for damage and defective parts. Repair any damage before restarting the engine and operating the machine.

3. 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.

4. Always raise machine to transport position when parked on a green to prevent roller marks.

5. Do not operate water injection system on concrete or asphalt because water jets will permanently damage these surfaces. Do not run over hose as damage will occur.

6. Do not operate aerator with roller or injection system over the edge of anything that could be hit, damaged or injured by high velocity water blasts.

7. Water jets from injection system should not damage irrigation heads on one pass of machine. Do not allow multiple shots from injection system to hit irrigation heads as damage will occur.

8. 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 WATER SYSTEM.**

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

STARTING / STOPPING ENGINE

1. Make sure wires are installed on spark plugs and fuel shut–off valve is open.

2. Make sure parking brake is engaged.

3. Pull choke lever out to FULL position and move throttle lever to half throttle position.

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

4. Insert key into ignition switch and rotate it clockwise to start the engine. Release key when 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 starter longer than 30 seconds. After 30 seconds of continuous cranking, wait 2 minutes before engaging starter motor again.

IMPORTANT: Engine is equipped with a oil pressure interlock switch which interrupts engine operation if there is not sufficient oil pressure in engine during starting or operation of engine. Engine may start but will not continue to run due to a lack of oil pressure.

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

TRAINING PERIOD

Before aerating with the Hydroject 3000, 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 Hydroject 3000.

OPERATING PROCEDURE

1. Make sure wires are installed on spark plugs and fuel shut-off valve is open.

2. Uncoil garden hose making sure there are no kinks or bends in hose. Lay out hose so there are no obstructions between machine and area to be aerated. Turn on water supply to purge any air from hose. Turn off water.

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

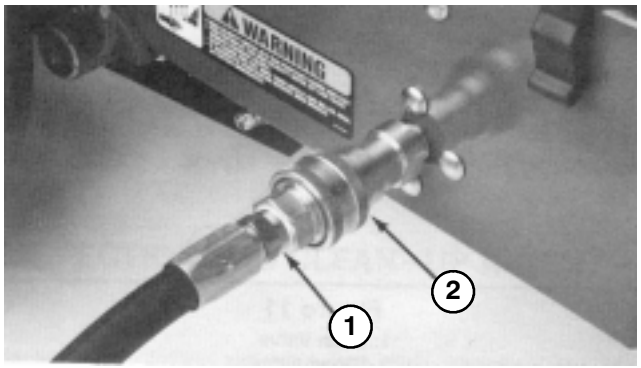


Figure 9
1. Hose Adapter 2. Quick Coupler

4. Turn on water supply and check water pressure. Water pressure must be at least 30 p.s.i.. If system pressure is not 30 p.s.i., make sure your hose is not kinked or obstructed, water supply is turned on or if water filter is plugged.

5. Reach under fuel tank and press bleed button on top of water filter head (Fig. 10). Hold bleed button down until all air is purged from filter and water comes out opening.

OPERATING INSTRUCTIONS

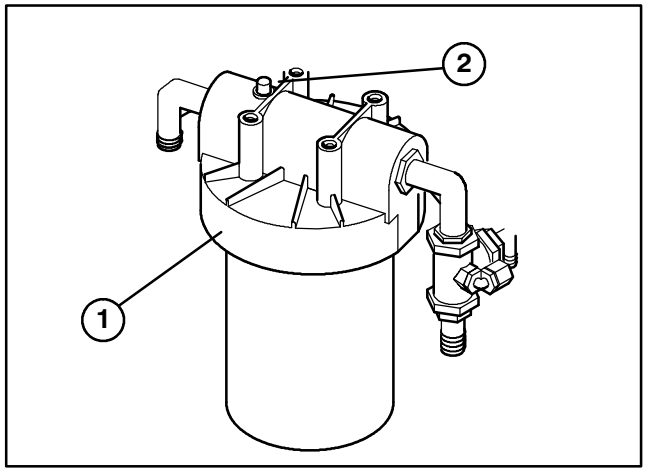


Figure 10
1. Main Water Filter Head
2. Bleed Button

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

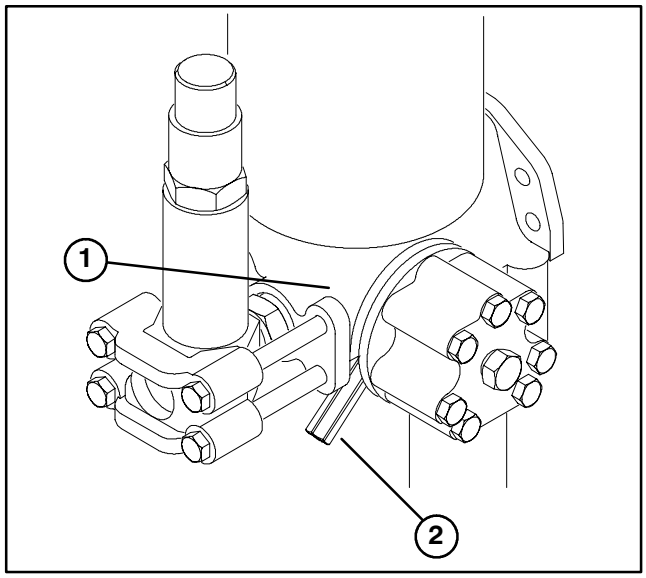


Figure 11
1. Main Valve
2. Bleed Valve

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

8. Start the engine: refer to Starting/Stopping instructions. Move throttle to FAST position and disengage parking brake.

9. Engage traction bail and approach the area to be aerated. Make sure there are no obstructions between aerator and water supply.

10. Engage and hold the transport / aerate toggle switch to fully lower machine onto rollers, release switch when fully lowered, then press engagement button to start water injection.

NOTE: Injection operation starts approximately 4-5 seconds after pump engages. Also, injection system will automatically stop if traction bail is not engaged within 3-4 seconds after starting water system.

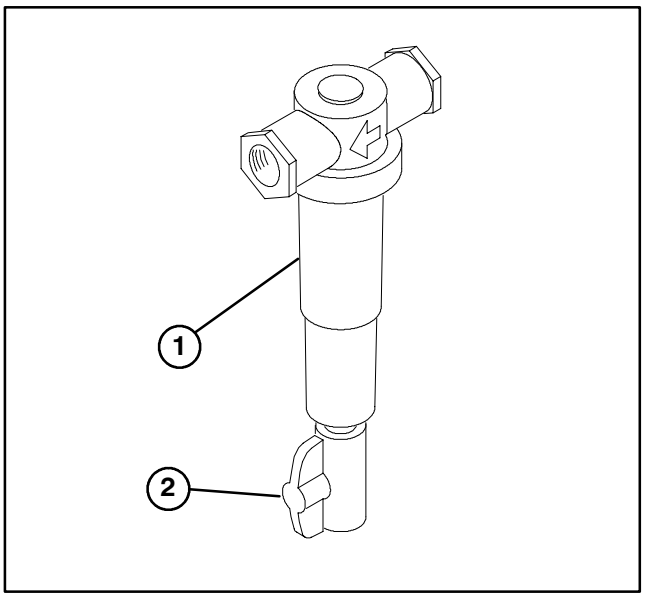


Figure 12
1. Pre–filter
2. Valve

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

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

Note: A small amount of water from the regulator by–pass may come out the spray wash nozzles even with 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.

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

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

OPERATING INSTRUCTIONS

CHECK INTERLOCK SYSTEM

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 traction bail is released while operating or if machine is raised to the transport position.

CAUTION

THE INTERLOCK SWITCHES ARE FOR THE OPERATOR'S PROTECTION, SO DO NOT DISCONNECT THEM. CHECK OPERATION OF THE SWITCHES DAILY TO ASSURE INTERLOCK SYSTEM IS OPERATING. IF A SWITCH IS DEFECTIVE, REPLACE IT BEFORE OPERATING. REPLACE SWITCHES EVERY TWO YEARS TO ASSURE MAXIMUM SAFETY. DO NOT RELY ENTIRELY ON SAFETY SWITCHES -- USE COMMON SENSE!

To do a functional check of interlock system:

1. Position machine in a flat, open area on rough turf away from buried wires, plumbing, etc. Stop the engine.

2. Move traction bail up and down while trying to start the engine. If engine cranks there is a malfunction in the interlock system that must be corrected. If engine does not crank, go to step 3.

3. Connect water supply to machine. Turn on water supply and and bleed all air out of system. Water pressure must be 30 psi or more. Start the engine. Raise machine to transport position (up off rollers). Push aerate ENGAGE button. If water pump engages and machine begins aerating, there is a malfunction in the interlock system that must be corrected. If machine does not begin aerating, go to step 4.

4. Lower machine to aerate position (on rollers). Engage traction bail to start machine moving. Push, then release aerate ENGAGE button. Water pump should engage immediately, then machine should begin aerating 5 seconds after pump engages. Release traction bail to neutral position so machine stops moving. The water pump should disengage 4 seconds after traction bail returns to neutral, then stop aerating after another 3 seconds. If machine does not stop aerating when traction bail returns to neutral, there is a malfunction in the interlock system that must be corrected. If machine stop aerating, go to step 5.

5. Engage traction bail to start machine moving, then push aerate ENGAGE button to begin aerating. Push aerate DISENGAGE button. The water pump should disengage immediately, then stop aerating after 3 seconds. If 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:

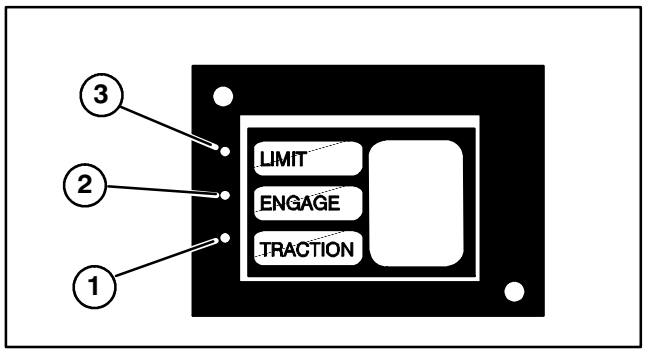


Figure 13

1. Red Light 2. Green Light 3. Yellow Light

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

Green: Aerate start (engage) switch closed. If red and yellow lights are on, green light will stay on until either 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 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 MACHINE (Fig. 14)

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

OPERATING INSTRUCTIONS

IMPORTANT: Do not push or tow machine faster than 3 mph because pump damage may occur. If machine must be moved a considerable distance, transport it on a truck, trailer or pulling it with traction wheel raised and secured to a dolly. Whenever machine is pushed or towed by--pass valve must be opened. Hook on front of handle is used for a tie--down only, not a hitch point.

1. Unlatch and raise hood.

2. Locate by--pass valve cap on left side of hydraulic pump.

3. Rotate valve cap counterclockwise, move machine to desired location and close valve cap.

4. Lower hood and secure latches.

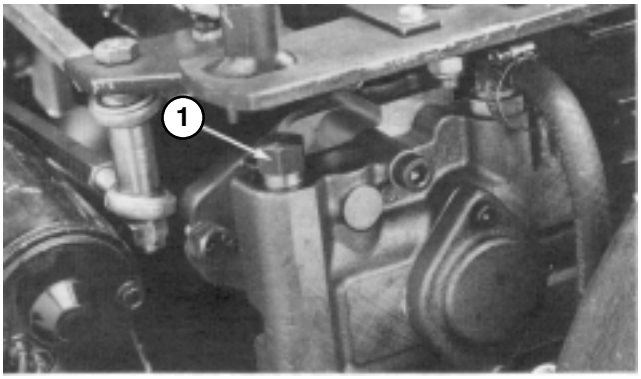


Figure 14

1. By--pass valve

LUBRICATION

LUBRICATION

(Fig. 15--17)

CAUTION

To avoid personal injury from inadvertent start up or contact with a hot surface, stop engine, remove key from the switch and wait for unit to cool before servicing or making adjustments to the machine, .

The Hydroject 3000 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 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).

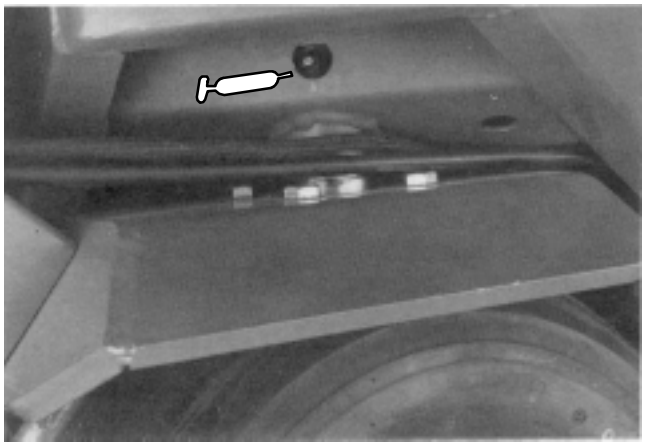


Figure 15

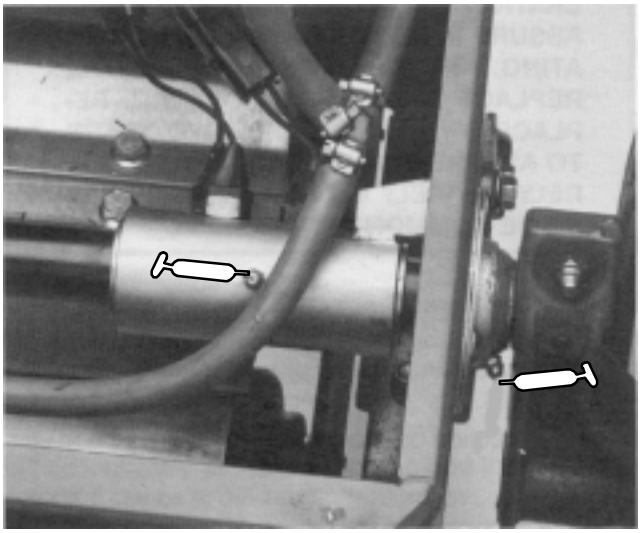


Figure 16

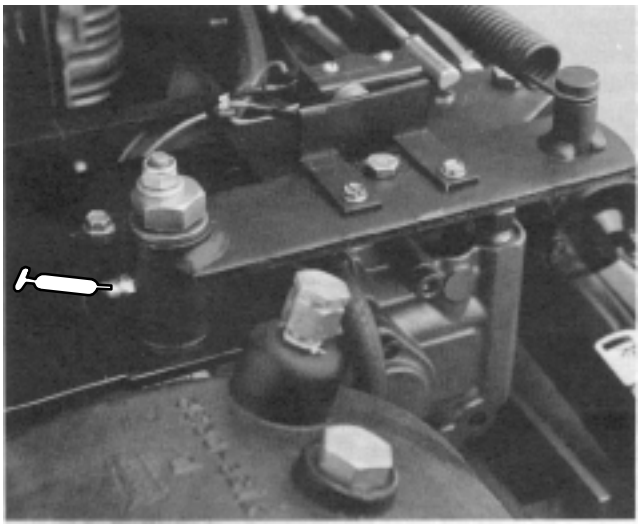


Figure 17

1. Wipe grease fitting clean so foreign matter cannot be forced into the bearing or bushing.

2. Pump grease into the bearing or bushing.

3. Wipe up excess grease.

MAINTENANCE CHART AND CHECKLIST

Daily Maintenance: (duplicate this page for routine use)
Check proper section of Operator's Manual for fluid specifications

Maintenance Check Item ➧	**Daily Maintenance Check For Week Of** _____						
	MON	TUES	WED	THURS	FRI	SAT	SUN
✓ Safety Interlock Operation							
✓ Brake Operation							
✓ Engine Oil Level							
✓ Engine Air Filter Pre-Cleaner							
✓ Engine Cooling FIns for Debris							
✓ Unusual Engine Noises							
✓ Unusual Operating Noises							
✓ Water Filter/Pressure							
✓ Water Prefilter							
✓ Gear Case Oil Level							
✓ Pump Case Oil Level							
✓ Hydraulic Hose for Damages							
✓ Fluid Leaks							
✓ Tire Pressure							
✓ Instrument Operations							
Lubricate All Grease Fittings[1]							
Touch-up Damaged Paint							

[1] = Immediately <u>after every</u> 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		

TROUBLE SHOOTING

Condition	Cause	Correction
Unit will not move when traction bail is engaged *	1. Check that motion occurs at pump pivot plate when the traction bail is moved	1. Inspect traction push/pull cable and override assembly under tiller handle
	2. Check oil level in Hydraulic reservoir (gearbox)	2. Replenish, if necessary
	3. Check that by–pass valve is fully closed (clockwise)	3. Close valve
	4. Check belt tension on traction drive	4. Adjust belt tension
Unit will not transport at full speed*	1. Check that unit is fully raised to transport position	1. Hold lift toggle switch until slip clutch in actuator can be heard ratcheting and spindle lift arms are nearly vertical with rear axle spindle tipped away from engine
	2. Check oil level in Hydraulic reservoir (gearbox)	2. Replenish, if necessary
	3. Check that by–pass valve is fully closed (clockwise)	3. Close valve
	4. Check belt tension on traction drive	4. Adjust belt tension
	5. Check that motion occurs at pump pivot plate when the traction bail is moved	5. Inspect traction push/pull cable and override assembly under tiller handle
Engine dies during start–up *	1. Fuel shut off valve closed	1. Open fuel shut off valve
	2. Check for fuel in tank	2. Replenish, if necessary
	3. Check operation of engine choke	3. Check choke connections and operation. Regulate choke until engine is warm, when starting a cold engine,
	4. Check engine oil level	4. The oil pressure switch is by–passed during start, but must activate to protect engine while running
	5. Cold start conditions (30°)	5. Multiple start attempts may be required to trip oil pressure switch
Engine dies when water system is engaged *	1. Throttle in wrong operating position	1. Throttle must be in FAST position for aerating
	2. Check engine speed	2. Adjust carburetor fast setting to 3450 – 3550 rpm
	3. Low engine power	3. Contaminated fuel, plugged fuel or air filter, bad spark plug
		4. Have system serviced by an Authorized Toro Distributor

* Make all checks with engine off and parking brake engaged

TROUBLE SHOOTING

Condition	Cause	Correction
Engine does not start – will not engage starter	1. Traction bail not in neutral position	1. Correct position of traction bail
	2. Neutral switch tab out of adjustment	2. Adjust switch tab until Red traction light is OFF in neutral.
	3. Battery voltage low	3. Check battery
	4. Malfunction in electrical system	4. Check circuit breaker and electrical connections
Unit not producing aeration holes (Pump or water valve will not start) *	1. Check to ensure that transport arms are fully retracted	1. Unit in aerate mode
	2. Check that water pressure gauge reads	2. Gauge must read 30 psi or more
	3. Check that yellow LED is lit on electronic controller	3. Check for loose wires or connections. Have machine checked by an Authorized Toro Distributor.
Unit not producing aeration holes (Pump shuts down intermittently)*	1. Check for kinked supply hose, restriction in the line or partially open valve at water source	1. Correct condition
	2. Inadequate water pressure or flow from source	2. Check water pressure (from water source) at inlet (8 gpm – 40 psi)
	3. Check water pressure at gauge when pump is engaged If pressure drops to less than 25 psi, but was initially higher	3. Replace water filter.
Unit stops aerating in one direction or stops aerating in the lowest hole spacing	1. Check for kinked supply hose, restriction in the line or partially open valve at water source	1. Correct condition
	2. Inadequate water pressure or flow from source	2. Check water pressure (from water source) at inlet (8 gpm – 40 psi)
	3. Check water pressure at gauge when pump is engaged If pressure drops to less than 25 psi, but was initially higher	3. Replace water filter.
	4. Neutral switch tab out of adjustment	4. Adjust switch tab until Red traction light is ON while traction bail is actuated in both directions
		5. Red traction light must be OFF, when in neutral, to allow engine start interlock to function
Unit not producing aeration holes (Pump and valve operating correctly)*	1. Air in system	1. Open main bleed valve to purge air from system
	2. Plugged nozzle(s)	2. Inspect nozzles
	3. Soil composition (hard)	3. Different nozzle configuration required
* Make all checks with engine off and parking brake engaged		4.Have water system checked by an Authorized Toro Distributor

TROUBLE SHOOTING

Condition	Cause	Correction
Unit not producing aeration holes (Injection pump stops after unit stops moving) *	1. Normal condition of neutral interlock system	1. Operator must hold Engage (start) button to aerate without moving
Shallow or improper hole depth *	1. Air in system	1. Open main bleed valve to purge air from system
	2. If hole depth was satisfactory earlier, check density and moisture content in soil.	2. Different nozzle configuration may be required
	3. Soil composition (hard)	3. Different nozzle configuration may be required
	4. Too many large nozzles will cause a loss in pressure and could damage accumulator or other water system components	4. Open bleed valve and examine nozzles. Verify size and quantity per the recommendation chart. 5. Have water system checked by Authorized Toro Distributor
Water injection system making unusual noise when aerating *	1. Air in system	1. With water supply on, open bleed valve under accumulator/ valve body. If mechanical noise continues during aeration, stop unit and have it serviced by an Authorized Toro Distributor.
	2. Missing nozzle or too many large nozzles installed	2. Open bleed valve and examine nozzles. Verify size and quantity per the recommendation chart.
	3. Broken springs in nozzle extension check valve.	3. Replace springs, inspect ball and seat.
	4. Gear box drive shaft or couplers worn	4. Remove drive shaft guard and repair or replace as necessary.
* Make all checks with engine off and parking brake engaged		

MAINTENANCE

CAUTION

To avoid personal injury from inadvertent start up or contact with a hot surface, stop engine, remove key from the switch and wait for unit to cool before servicing or making adjustments to the machine.

SERVICING PRE–FILTER (Fig. 18)

Sediment can be removed by opening ball valve, with water source attached, to flush. Reusable filter screen may be removed for cleaning by untwisting clear cover from filter by hand. Replace clear cover and hand tighten only.

IMPORTANT: Use of tools will damage filter.

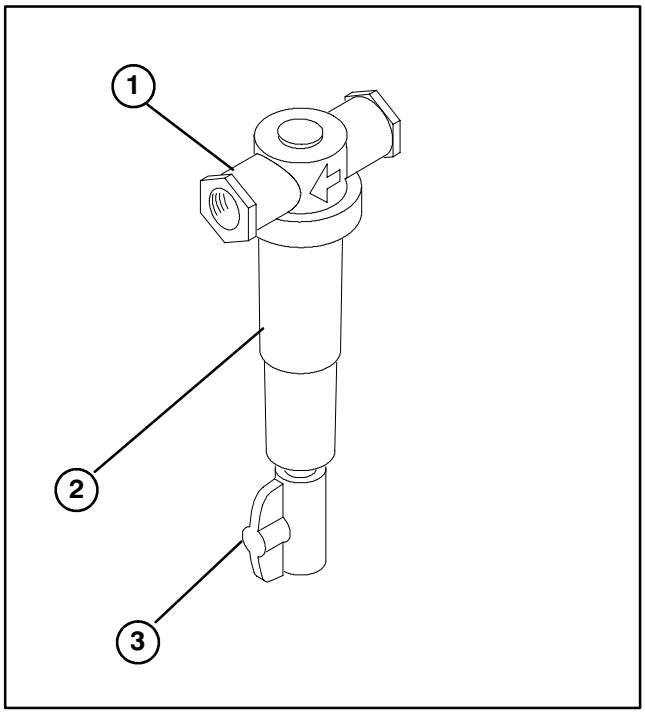


Figure 18

1. Body
2. Clear Cover
3. Ball Valve for Flushing

REPLACING MAIN WATER FILTER (Fig. 19)

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 quality of water, frequency of filter change will vary greatly. When pump inlet pressure decreases or 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 machine on a level surface and make sure engine is shut off. Shut off water supply.

2. Locate main water filter assembly mounted below fuel tank. Press bleed button to release air pressure from filter body.

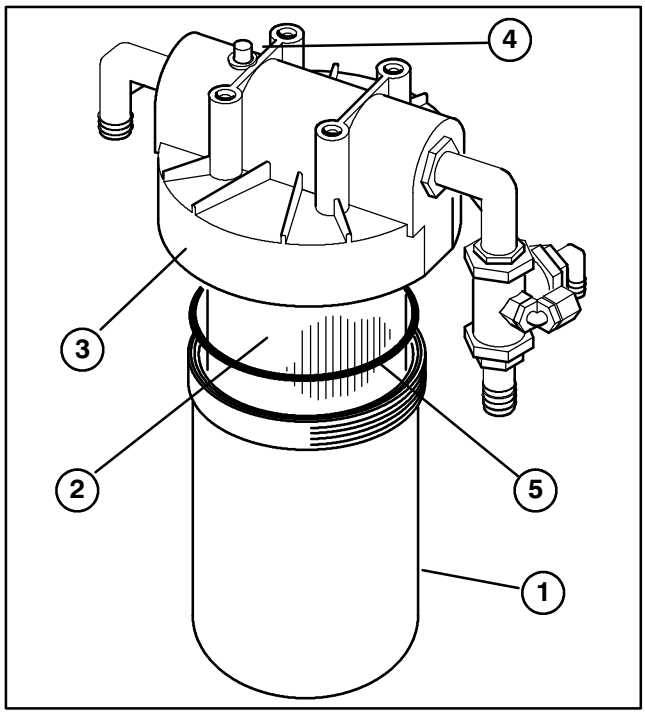


Figure 19

1. Filter Body
2. Filter Cartridge
3. Filter Head
4. Bleed Button
5. O–ring

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

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

CAUTION: Water filter body is very heavy when filled with water and filter, use caution when unscrewing filter body from filter head.

4. Thoroughly rinse out the filter body to avoid contaminating water system. Make sure “O” ring is in groove. If it has come out, wipe it dry, lubricate it with a light coating of petroleum jelly and replace in groove.

5. Thoroughly clean filter head mounting surface to avoid contaminating water system when filter is installed.

6. Insert new filter cartridge into filter body.

7. Thread filter body with filter onto filter head. Hand tighten.

8. Turn on water supply and press bleed button on top of water filter head. Hold bleed button down until all air is purged from filter and water comes out opening.

MAINTENANCE

CHANGING ENGINE OIL AND FILTER

(Fig. 20 – 22)

For new engines, change oil after first 25 operating hours. Thereafter, under normal conditions, change 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 engine just before changing oil. Warm oil flows more freely and carries more contaminants than cold oil.

1. Position machine on a level surface.

2. Disengage hood latches and open hood.

3. Place an oil drain pan below the drain cap on bottom of crankcase. Clean area around drain cap.

4. Remove drain cap and allow oil to flow into drain pan. After oil is drained, reinstall oil drain cap.

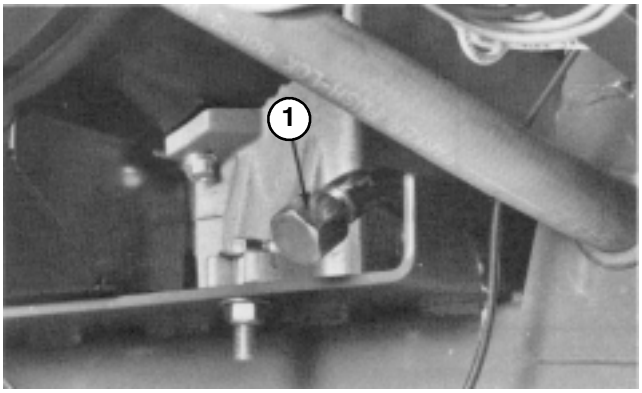


Figure 20
1. Drain Cap

5. Remove oil filter and discard. Thoroughly clean filter mounting surface and make sure a new gasket is installed in new filter.

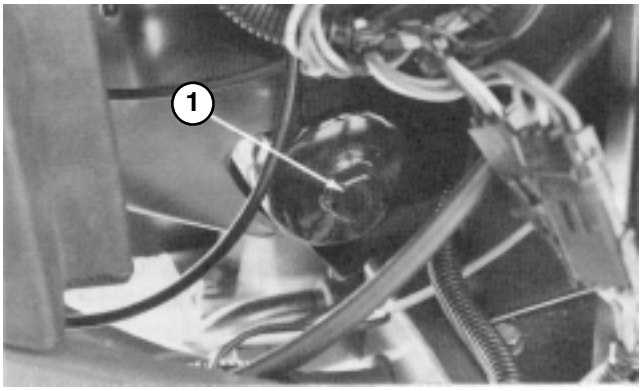


Figure 21
1. Oil Filter

6. Apply a thin film of clean oil to gasket. Install new filter by hand until gasket just touches mounting surface, then turn an additional 1/2 to 3/4 turn.

7. Remove filler cap and pour approx. 3 quarts of oil having the API "service classification" SF or SG into the filler neck. Recommended viscosity (weight) of oil to use is SAE 30.

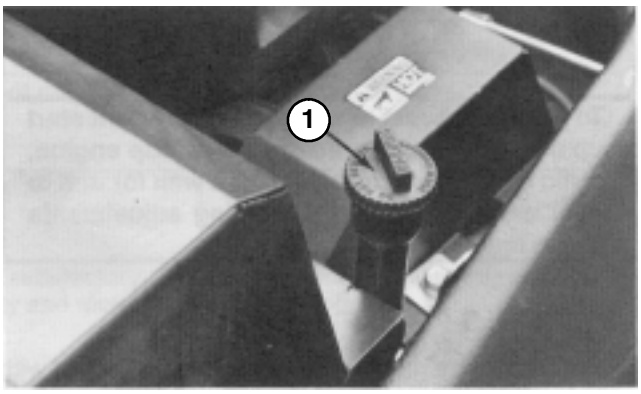


Figure 22
1. Filler Cap

8. Start engine and check for leaks around oil filter. tighten filter only enough to eliminate leaks. DO NOT OVERTIGHTEN.

9. Turn off engine and allow machine to stand for 2 minutes.

10. Check oil and make sure level is up to the FULL mark on dipstick. Add more oil if level is low; however, DO NOT OVER FILL.

11. Lower hood and secure latches.

SERVICING AIR CLEANER (Fig. 23 & 24)

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

1. Remove knob and cover from air cleaner.

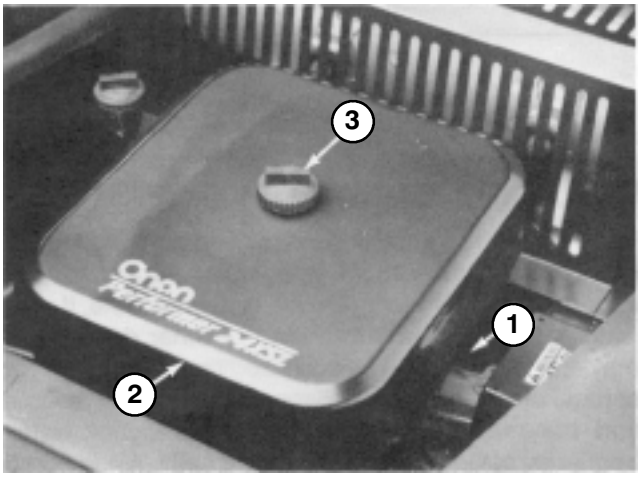


Figure 23
1. Air Cleaner
2. Air Cleaner Cover
3. Knob

2. Remove foam pre–cleaner by sliding it off the paper element.

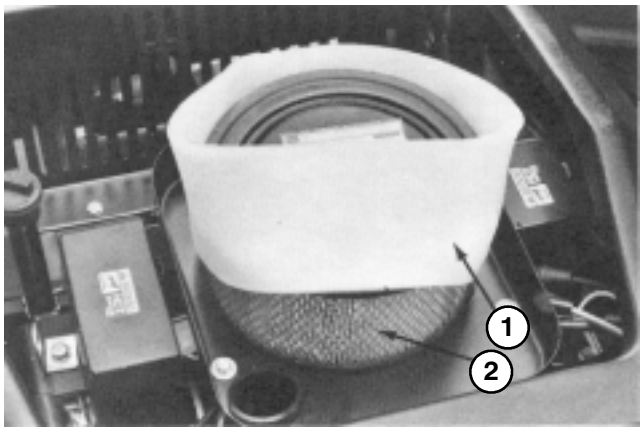


Figure 24
1. Foam Pre–cleaner
2. Paper Element

3. A. Wash foam pre–cleaner in detergent soap and warm water.

B. Wrap foam pre–cleaner in cloth and squeeze dry. Do not wring precleaner.

C. Add and evenly distribute one tablespoon of engine oil to foam pre–cleaner. Squeeze foam pre–cleaner to remove excess oil.

4. Reinstall on paper element.

Inspect paper element every 200 hours of operation and replace when dirty or damaged. Do not wash paper element or do not clean with compressed air as damage will occur.

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

5. Reinstall paper element with foam pre–cleaner, air cleaner element cover, nut, air cleaner cover and knob.

6. Tighten knob 1/2 to 1 turn after it contacts cover. Do not overtighten.

ADJUSTING CARBURETOR (Fig. 25 – 26)

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 fuel filter and air cleaner, and make sure the choke is operating correctly before the carburetor is adjusted.

1. Disengage hood latches and open hood.

2. Start engine and let it run for 10 minutes to warm up. Engine must be warm before making final adjustments.

WARNING

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, other hot parts of the engine, and other moving or rotating parts of the engine.

3. Move the throttle control to the SLOW position and check low idle speed setting (1500–1800 rpm), then, move the throttle control to the FAST position and check high speed setting (3450–3550 rpm) to determine if throttle control linkage is allowing full travel at engine. With throttle control in FAST position, control lever should not be touching control panel and engine mounted throttle lever (Fig. 25) should be touching high speed stop. Loosen cable clamp and adjust cable so lever touches stop.

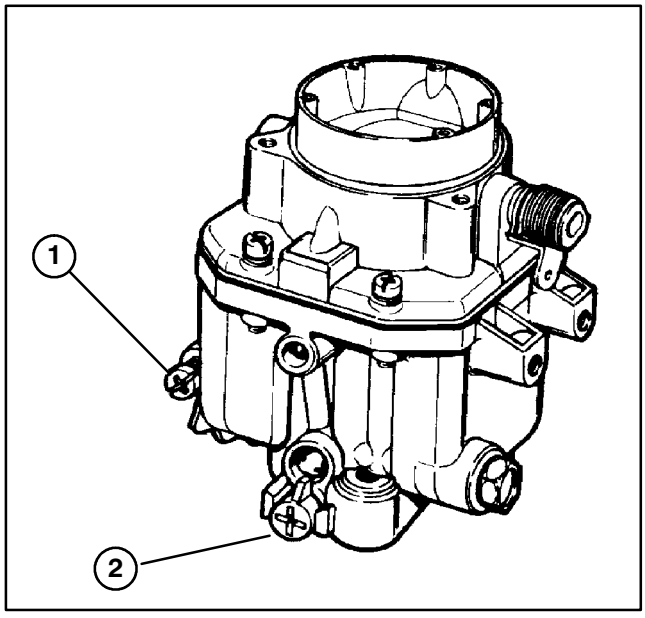


Figure 25
1. Throttle Stop Screw
2. Idle Fuel Limiter Cap

4. Idle mixture screw — Close screw by gently rotating it clockwise.

IMPORTANT: Do not close the screw too tight because the screw will likely be damaged.

5. Rotate — open — the screw 1–1 /8 turns counterclockwise.

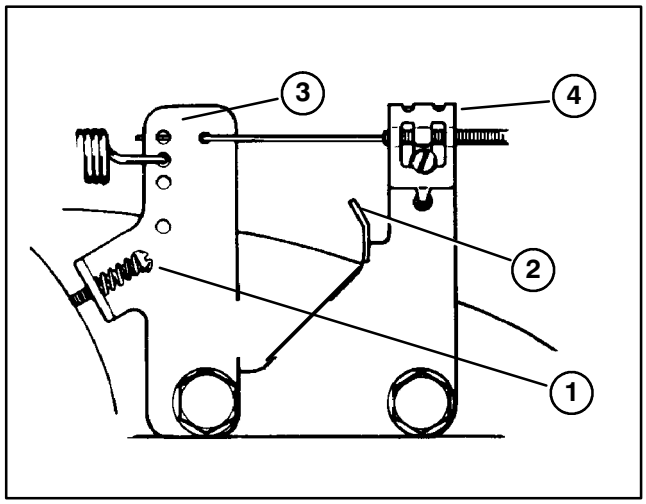


Figure 26

1. Low Speed Screw
2. High Speed Stop
3. Throttle Lever
4. Cable Clamp

6. With cable clamp loose, turn the low speed screw on the governor so that the throttle stop screw on the carburetor controls engine speed. Adjust the carburetor throttle stop screw for 1000 rpm idle.

7. Adjust the governor low speed stop for 1500–1800 rpm.

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

9. Repeat step 3, then tighten cable clamp.

10. Lower hood and secure latches.

CHECKING and REPLACING SPARK PLUG (Fig. 27)

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

1. Disengage hood latches and open hood.

2. Clean area around spark plugs so dirt does not fall Into cylinder when plugs are removed.

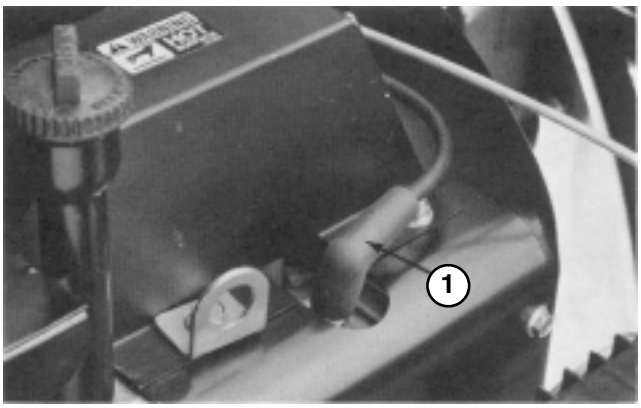


Figure 27

1. Spark Plug

3. Pull wires off spark plugs and remove plugs from cylinder head.

4. Check condition of center and side electrodes to determine operating temperature of engine.

A. Light brown insulator tip indicates correct spark plug and heat range.

B. 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.

C. 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 electrodes by using a wire brush because grit may release from the plug and enter combustion chamber resulting in engine damage.

5. After setting air gap at .025", install spark plugs in cylinder head. Tighten the plugs to 10–15 ft–lb. Push wires onto spark plugs.

6. Lower hood and secure latches.

CLEANING CYLINDER HEAD FINS

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

1. Disengage hood latches and open hood.

2. Pull wires off spark plugs.

3. Clean dirt, grass and chaff from outside of cylinder, cylinder head fins and air intake screen.

4. Push wires onto spark plugs.

5. Lower hood and secure latches.

MAINTENANCE

CHANGING GEAR CASE OIL and FILTER (Fig. 28–29)

Change hydraulic oil and filter initially after 25 hours of operation, thereafter change every 200 hours of operation. **The gear case oil and filter must be changed immediately when any contamination, sludge, water or condensation appears.**

1. Disengage hood latches and open hood.

2. Place a drain pan under bottom of gear case. Clean area around drain plug.

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

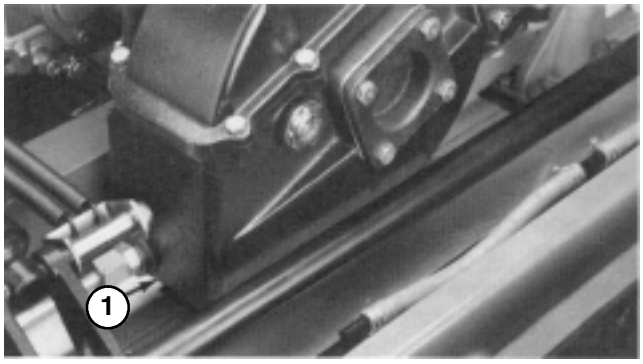


Figure 28
1. Drain Plug Location

3. Remove drain plug and allow oil to flow into drain pan. After oil is drained, reinstall oil drain plug.

4. Remove oil filter (Fig. 28), mounted below control panel base, and discard filter. Thoroughly clean filter mounting surface and make sure a new gasket is installed in new filter.

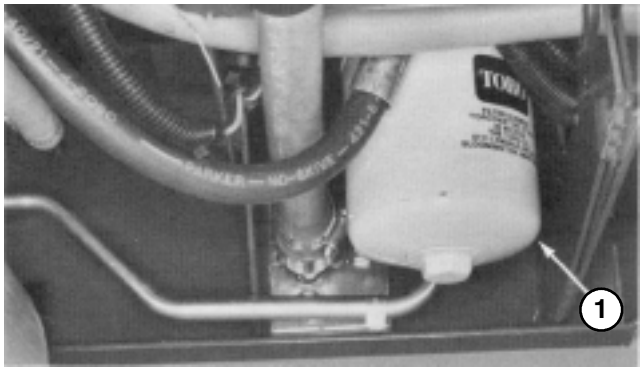


Figure 29
1. Oil Filter

5. Fill new filter with new Mobil DTE 26 hydraulic oil or equivalent oil (refer to fluid recommendation table on page 9). Apply a thin film of clean oil to filter gasket.

6. Install new filter by hand until gasket just touches mounting surface, then turn an additional 1/2 to 3/4 turn.

7. Remove filler cap and add approximately 4–5 quarts of Mobil DTE 26 hydraulic oil or equivalent oil (refer to fluid recommendation table on page 9) to gear case reservoir. Install filler cap.

8. Check for leaks around oil filter. Tighten filter only enough to eliminate leaks. DO NOT OVERTIGHTEN.

9. Lower hood and secure latches.

CHANGING PUMP CASE OIL (Fig. 30)

Change pump oil initially after 25 hours of operation, thereafter change every 200 hours of operation. **The pump case oil must be changed immediately when any contamination, sludge, water or condensation appears.**

1. Disengage hood latches and open hood.

2. Place a drain pan under pump case. Clean area around drain plug on bottom of case.

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

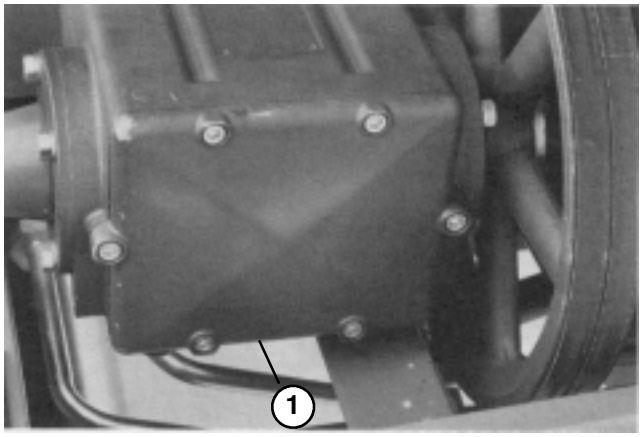


Figure 30
1. Drain Plug Location

3. Remove drain plug and allow oil to flow into drain pan. After oil is drained, reinstall oil drain plug.

4. Remove dipstick/filler cap and add approximately 40 ounces of Mobil DTE Extra Heavy oil or equivalent oil (refer to fluid recommendation table on page 9) to pump case. Install filler cap.

5. Check oil level. If fluid level is low, add enough Mobil DTE Extra Heavy oil or equivalent to bring oil up to proper level. DO NOT OVERFILL.

6. Check for possible leaks. Lower hood and secure latches.

CHECKING HYDRAULIC LINES AND HOSES

Check 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

Keep body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid. Use cardboard or paper to find hydraulic leaks. Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

ADJUSTING TRACTION PUMP BELT

(Fig. 31 – 32)

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

1. Disengage hood latches and open hood.

2. Check belt tension by depressing belt midway between pulleys with 3 lb. of force. Belt should deflect 9/64".

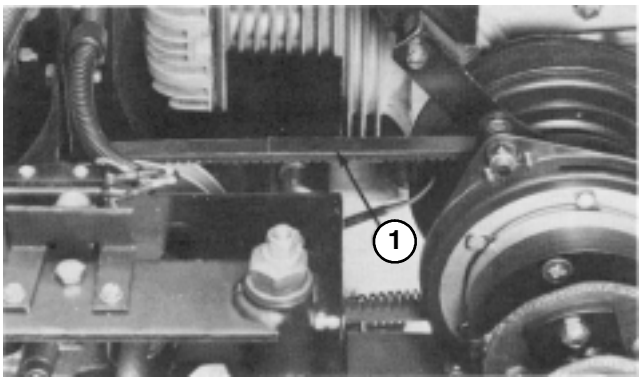


Figure 31
1. Traction Pump Belt

3. If an adjustment is necessary:

A. Loosen pivot nut securing pump mount to pump support.

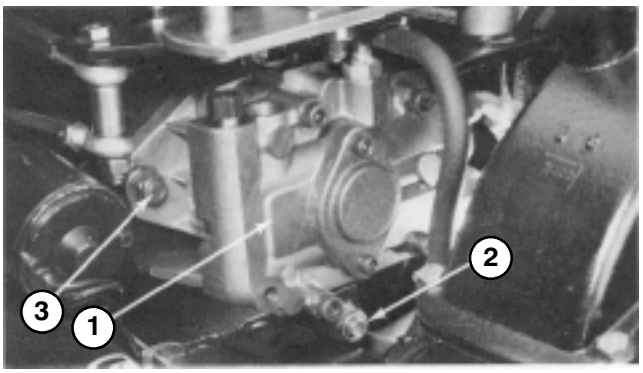


Figure 32
1. Pump 2. Pivot Nut 3. Adjusting Nut

B. Loosen adjusting nut securing pump and pump mount to slotted pump support.

C. Loosen (3) capscrews securing pulley guard bracket to control panel and pump support.

D. Use a pry bar to pull pump towards outside of machine until proper belt tension is attained, then tighten adjusting nut securing pump and pump mount to pump support.

E. Tighten pivot nut securing pump mount to pump support.

F. Tighten (3) capscrews securing pulley guard bracket to control panel and pump support.

TRANSMISSION NEUTRAL ADJUSTMENT

(Fig. 33)

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

1. Park machine on a level surface, stop the engine and open the hood.

2. Lift drive wheel off the ground using a jack. Block front and rear of wheels.

3. Start engine and release parking brake.

4. Slightly loosen locknut on top of neutral adjustment cam and rotate cam hex until traction wheel stops rotating. Tighten the locknut.

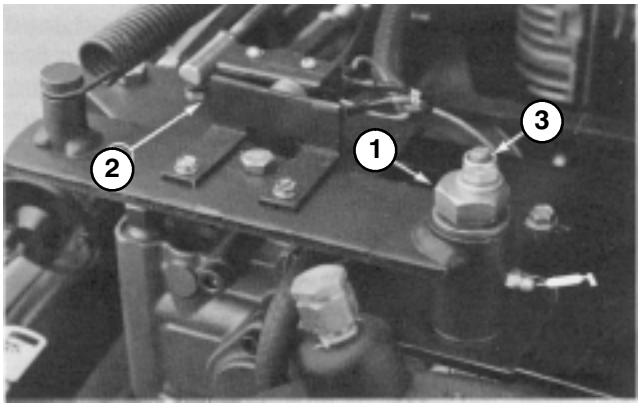


Figure 33
1. Neutral Adjustment Cam
2. Locknut
3. Switch tab

5. Move traction bail completely up and down. Release handle and check for wheel rotation. If wheel continues to rotating, repeat step 4.

6. If problem continues, stop the engine, check linkage for binding or damage, then do adjustment procedure again.

7. Set the hole spacing control in lowest setting (to left) and move Transport / Aerate switch to aerate position (transport tires retracted). Loosen two (2) screws and adjust switch tab so switches are actuated when pump control is in neutral and not actuated when pump is stroked.

8. Move ignition switch to ON position, but do not start engine. Move traction bail in both directions, Red traction light should come on. Repeat step 7 if light does not come on when 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.

AERATION SPEED ADJUSTMENT (Fig. 34)

1. Park machine on a level surface, stop the engine and open the hood.

2. Put speed control lever into second slot from left (while facing control panel).

3. Lower machine into aerate mode so transport wheels are off the ground.

4. Lift drive wheel off the ground using a jack.

5. Start engine and release parking brake.

6. Operate engine at full speed.

7. Move traction handle UP to full speed.

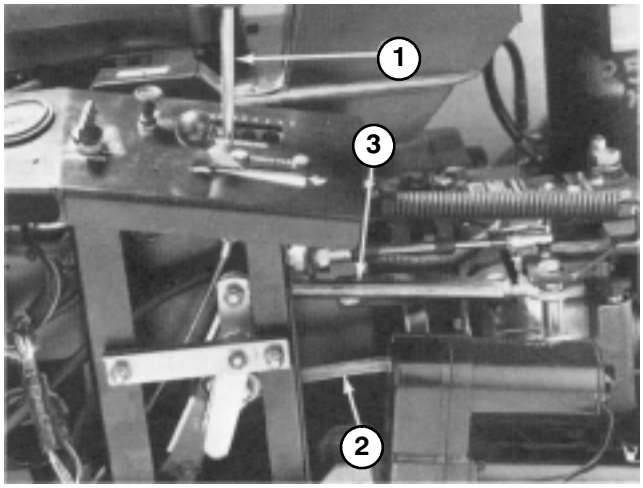


Figure 34
1. Speed Control Lever
2. Lower Control Rod
3. Upper Control Rod

8. Loosen jam nuts and adjust LOWER speed rod until traction wheel rotates at 20–22 PRM. Tighten jam nuts.

9. Move traction handle DOWN to full speed position.

10. Adjust UPPER speed rod until traction wheel rotates at 20–22 PRM. Tighten jam nuts.

ADJUSTING PARKING BRAKE (Fig. 35–36)

Adjust parking brake every 400 hours.

1. Remove screws securing cover to underside of handle. Remove cover.

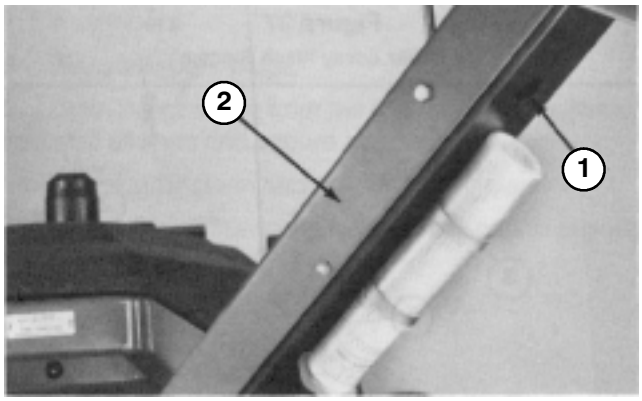


Figure 35
1. Cover 2. Handle

2. Loosen upper jam nut securing brake cable to bracket.

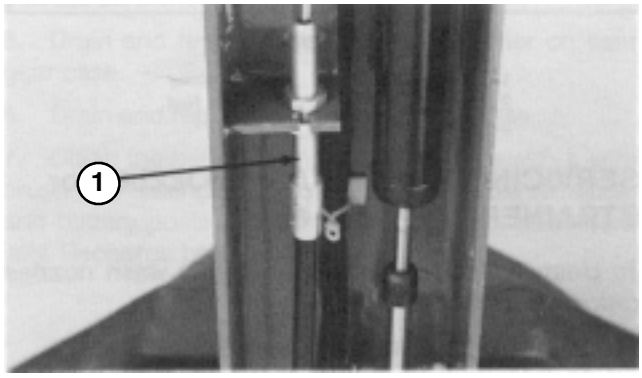


Figure 36
1. Brake Cable

3. Tighten lower jam nut until 25 to 30 pounds of force are required to actuate brake lever. Tighten jam nut.

4. Reinstall cover to underside of handle.

ADJUSTING ROLLER SPRAY WASH SYSTEM (Fig. 37–38)

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

1. Loosen cap on bottom of fitting.

2. Rotate nozzle so slot in tip is parallel to roller.

3. Tighten cap and check adjustment.

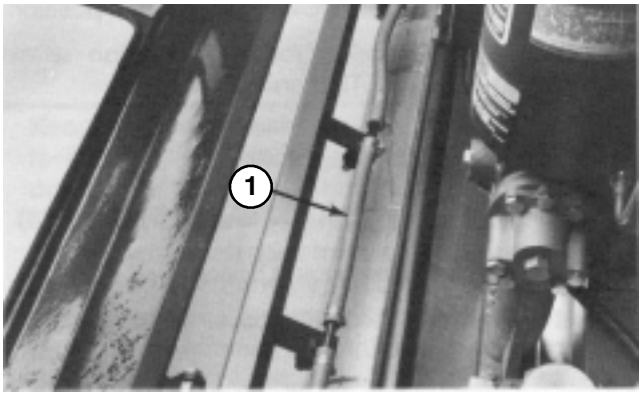


Figure 37
1. Roller Spray Wash System

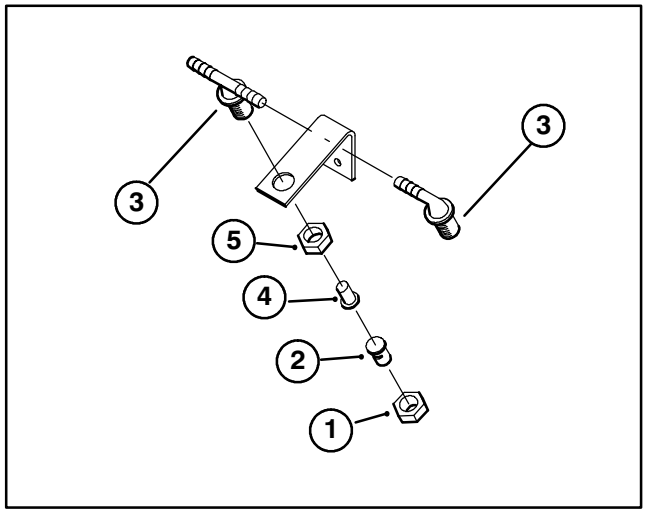


Figure 38

1. Fitting Cap
2. Nozzle
3. Fitting
4. Strainer
5. Hex Nut

SERVICING SPRAY WASH NOZZLES or STRAINERS (Fig. 37–38)

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

1. Loosen and remove cap on bottom of fitting.

2. Remove nozzle and strainer assembly. Clean or replace strainer and replace in nozzle.

3. Loosely secure nozzle and strainer to fitting with cap.

4. Rotate nozzle so slot in tip is parallel to roller.

5. Tighten cap and check adjustment.

BATTERY CARE

1. 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.

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

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

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

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

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

WARNING

Connecting cables to the wrong post could result in personal injury and/or damage to the electrical system.

7. 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 stored on the machine. Store the battery in a cool atmosphere to avoid quick deterioration of the charge in the battery.

SEASONAL STORAGE

Water System

It is very important that the water system be drained to avoid freezing and damaging the components. Drain system as follows:

1. Stop engine, remove key from ignition switch and remove wires from spark plugs.

2. Remove (2) screws securing drive shield to frame and remove shield.

3. With the engine ”OFF” and 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 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. Reinstall the drive shield previously removed and tighten the relief valve tube.

7. Remove and drain the water filter container. Install new filter and replace the filter container.

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 at idle speed for two minutes. DO NOT RUN LONGER THAN TWO MINUTES.

5. Stop the engine; remove the spark plugs.

6. Pour one ounce of clean engine oil into 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. Reinstall 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 they securely in place.

Traction Unit

1. Thoroughly clean machine.

2. Grease or oil all fittings or pivot points.

3. Check to make sure all tires are over inflated to 20 – 30 p.s.i.

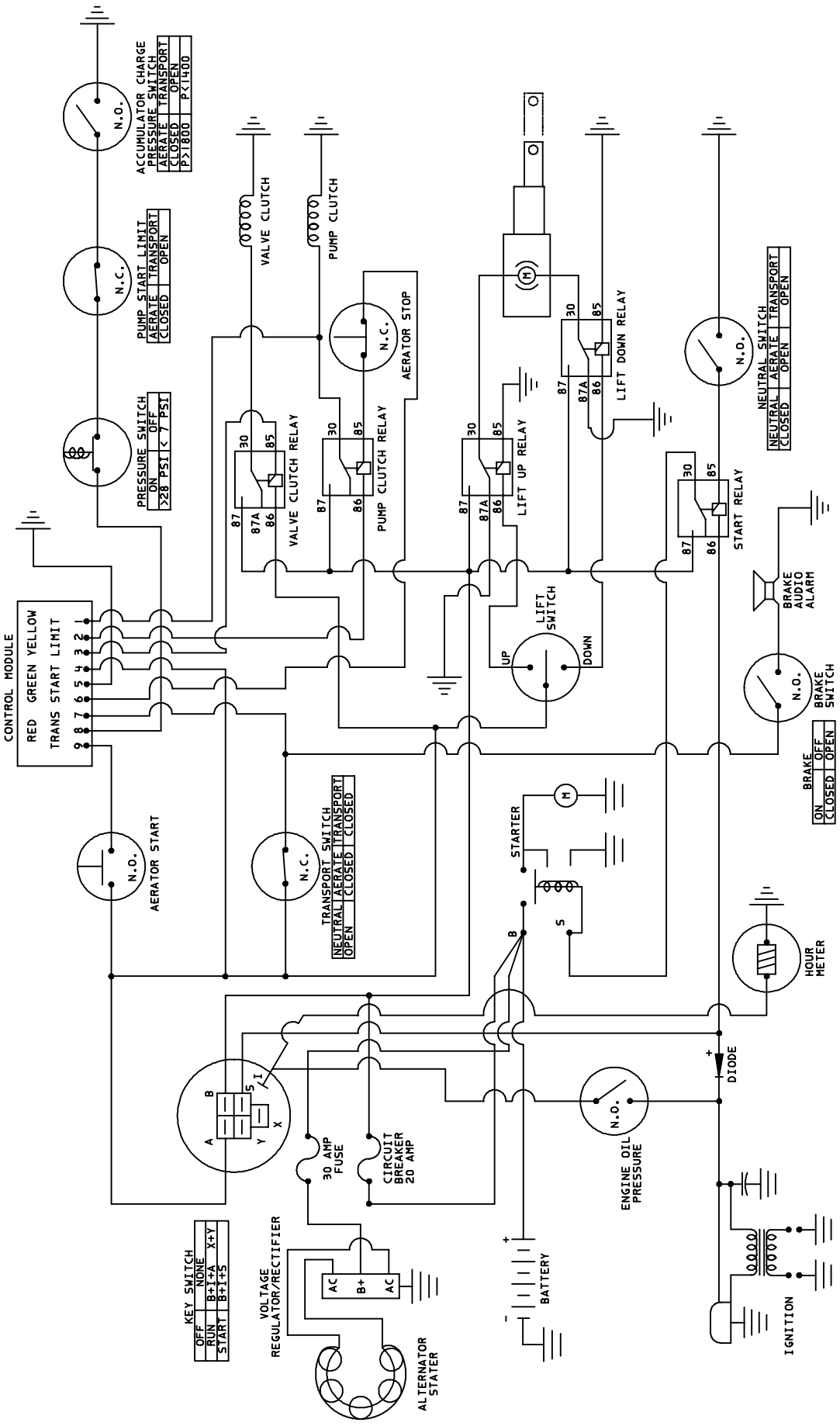
4. Lightly sand and use touch up paint on all areas that are scratched, chipped or rusted.

5. Drain and replace hydraulic oil and filter on cam gear case.

6. Drain and replace oil in water pump case.

7. Clean the battery, terminals and posts with a wire brush and baking soda solution. Coat cable terminals and battery posts with skin over grease or petroleum jelly. Recharge battery.

ELECTRICAL SCHEMATIC



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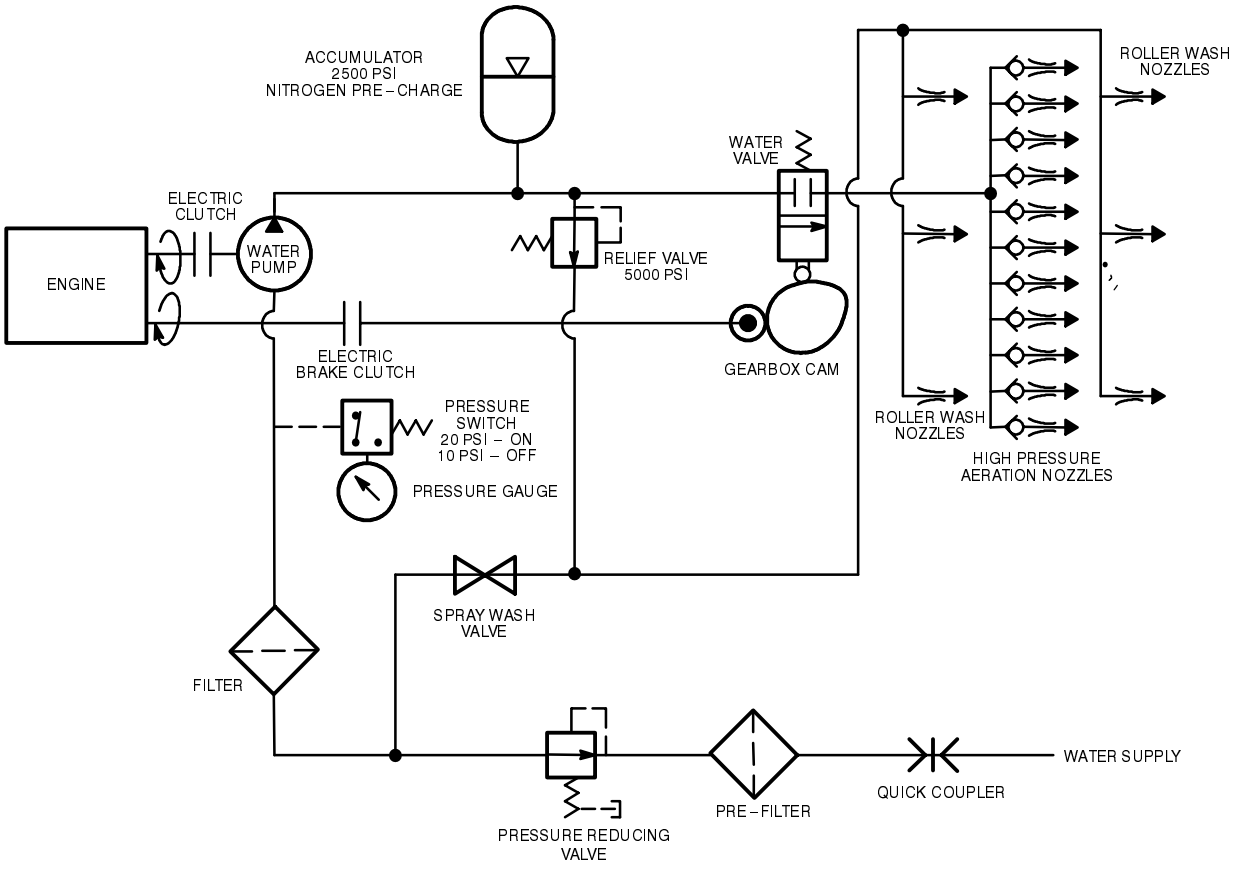
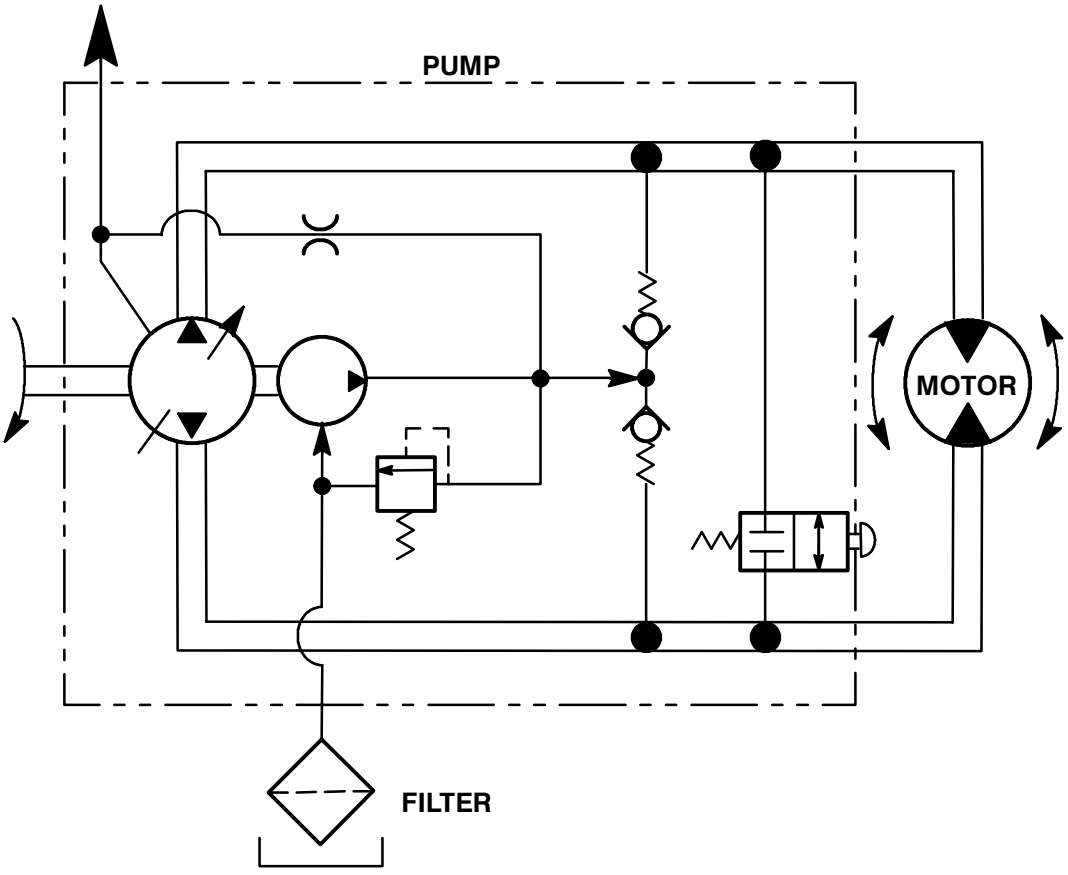
WATER SYSTEM SCHEMATIC



HYDRAULIC SCHEMATIC



MAINTENANCE SCHEDULE

Minimum Recommended Maintenance Intervals

Maintenance Procedure	Every 50hrs	Every 100hrs	Every 200hrs	Every 400hrs
Check Battery Fluid Level	●			
Check battery Cable Connections	●			
Lubricate All Grease Fittings	●			
† Change Engine Oil		●		
† Change Engine Oil Filter		●		
Change Engine Pre–cleaner (Air Filter)		●		
Replace Air Filter Element			●	
Replace Fuel Filter			●	
Adjust Water System Cam–Valve Clearance			●	
Clean Engine Crankcase Breather			●	
† Change Gear Case Oil and Filter			●	
† Change Pump Case Oil			●	
† Torque Wheel Lug Nuts			●	
Adjust Parking Brake				●
Calibrate Aeration Traction Speed				●
Service Injector Nozzles and Springs				●
Replace Spark Plugs				●
Decarbon Combustion Chambers				●
‡ Torque Head and Adjust Valves				●
‡ Check Engine RPM (idle and full throttle)				●

† Initial break in at 25 hours
‡ Initial break in at 50 hours

Replace Moving Hoses
Replace Safety Switches
Fuel Tank – Drain/Flush
Hydraulic Tank – Drain/Flush

Annual Recommendations:
Items listed are recommended every 1000 hours or 2 years, whichever occurs first.

(See Operator's and Service Manual for specifications and procedures)

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.

NOTES

The Toro Promise

A One Year Limited Warranty

The Toro Company promises to repair your model 09801 HYDROJECT® 3000 if defective in materials or workmanship. The following time periods from the date of purchase apply:

Single or *Shared Owner Use. . . . . 1 Year or 500 Hours (Whichever occurs first)
Contractor–Type or Rental Use. . . . . 120 Days or 500 Hours (Whichever occurs first)

The cost of parts, labor and transportation are included.

If you feel your TORO Product is defective and wish to rely on The Toro Promise, the following procedure is recommended:

1. Contact your Authorized TORO Distributor or Commercial Dealer (the Yellow Pages of your telephone directory is a good reference source).

2. The TORO Distributor or Commercial Dealer will advise you on the arrangements that can be made to inspect and repair your product.

3. The TORO Distributor or Commercial Dealer will inspect the product and advise you whether the product is defective and, if so, make all repairs necessary to correct the defect without an extra charge to you.

If for any reason you are dissatisfied with the distributor's analysis of the defect or the service performed, you may contact us.

Write:

TORO Commercial Products Service Department
8111 Lyndale Avenue South
Minneapolis, MN 55420

The above remedy of product defects through repair by an Authorized TORO Distributor or Commercial Dealer is the purchaser's sole remedy for any defect.

THERE IS NO OTHER EXPRESS WARRANTY. ALL IMPLIED WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR USE ARE LIMITED TO THE DURATION OF THE EXPRESS WARRANTY.

This Warranty applies only to parts or components which are defective and does not cover repairs necessary due to normal wear, misuse, accidents, or lack of proper maintenance. **In addition, this warranty will become VOID if "non–approved" chemicals or substances are introduced into the Hydroject water injection system, or if the water filters are not replaced as required to Genuine Toro Replacement filters of the specified micron rating. Regular, routine maintenance of the unit to keep it in proper operating condition is the responsibility of the owner.** All warranty repairs reimbursable under the Toro Promise must be performed by an Authorized TORO Commercial Dealer or Distributor using Toro approved replacement parts.

Repairs or attempted repairs by anyone other than an Authorized TORO Distributor or Commercial Dealer are not reimbursable under the TORO Promise. In addition, these unauthorized repair attempts may result in additional malfunctions, the correction of which is not covered by warranty.

THE TORO COMPANY IS NOT LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE USE OF THE PRODUCT INCLUDING ANY COST OR EXPENSE OF PROVIDING SUBSTITUTE EQUIPMENT OR SERVICE DURING PERIODS OF MALFUNCTION OR NON–USE.

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

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 The Toro Company.

Compliance with Radio Interference Regulations Certified.