

TORO®TRACTION UNIT MODEL:
30794 — 80001 & UP**OPERATOR'S
MANUAL****GROUNDMASTER® 220D****TORO®**THIS UNIT CONFORMS
TO ANSI B71.4 - 1984

To assure maximum safety, optimum performance, and to gain knowledge of the product, it is essential that you or any other operator of the mower 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 GROUNDMASTER 220D was developed to satisfy the demand for a maneuverable, intermediate size, turf maintenance rotary mower. The machine has advanced concepts in engineering, design and safety; and if maintained properly, it will give excellent service.

Since the GROUNDMASTER 220D is a high quality product, Toro is concerned about the future use of the machine and the safety of the user. Read this manual to familiarize yourself with the proper set up, operation, and maintenance instructions. The major sections of this manual are:

- | | |
|------------------------|---------------------------|
| 1. Safety Instructions | 4. Operating Instructions |
| 2. Set Up Instructions | 5. Maintenance |
| 3. Before Operating | |

The hydrostatic transmission, axle and power steering units are not covered in great detail in this manual. Service manuals are available however from the respective manufactures.

A hydrostatic axle service manual (bulletin no. 5323) can be obtained from:

Dana Corporation
P.O. Box 2229
Ft. Wayne, Indiana 46801

A hydrostatic transmission service manual (bulletin no. 9646) and a repair manual (bulletin 9659) can be obtained from:

Sunstrand Corporation
2800 East 13th Street
Ames, Iowa 50010

A manual (MM 433654) for the Mitsubishi Diesel "L3C" engine can be obtained from:

Mitsubishi Engine North America, Inc.
610 Supreme Drive
Bensenville, IL 60106

A power steering unit manual (HGF-100) can be obtained for the TRW, HGF12 Hydraquide Hydrostatic Steering System from:

Ross Gear Division
800 Heath Street
Lafayette, IN 47902

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 the directive because it deals with the possibility of damaging a part or parts of the machine. NOTE identifies general information worthy of special attention.

If help concerning set up, operation, maintenance or safety is ever needed, contact a local Authorized Toro Distributor. In addition to genuine Toro replacement parts, the distributor also has optional equipment from the complete line of Toro turf care equipment. Keep your Toro all TORO — buy genuine Toro replacement parts and accessories.

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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.

The GROUNDMASTER® 220D has been tested and verified for compliance with the B71.4 - 1984 specifications of the American National Standards Institute. However, improper use or maintenance by the owner or operator of the machine can result in injury. To reduce the potential for injury, follow these safety instructions.

BEFORE OPERATING

1. Read and understand the contents of this Operator's Manual before starting and operating the machine. Become familiar with all controls and how to stop quickly. A 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 or adults unfamiliar with it's operation to operate the machine, and keep everyone, especially children and pets, away from the area of operation.

3. Remove sticks, stones, wire and any other debris or objects that might be picked up and thrown by the cutter blades.

4. 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 make sure machine is in safe operating condition.

5. Do not operate machine while wearing sandals, tennis shoes, sneakers or shorts. Also, do not wear loose fitting clothing because it could get caught in moving parts. Always wear long pants and substantial shoes. Wearing safety glasses, safety shoes and a helmet is advisable and required by some local ordinances and insurance regulations.

6. Be sure interlock switches are adjusted correctly so engine cannot be started unless traction pedal is released — neutral position — and PTO switch is in OFF position.

7. Fill fuel tank with diesel fuel before starting the engine. Avoid spilling any fuel. Since fuel is highly flammable, handle it carefully — **DO NOT SMOKE.**

- A. Use an approved container.
- B. Do not fill tank while engine is hot or running.
- C. Do not smoke while handling diesel fuel.
- 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 fuel. Install fuel container cap and machine fuel tank cap securely before starting the engine.

WHILE OPERATING

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

9. Maximum seating capacity is one person. Never carry passengers.

10. Sit on the seat when starting the engine and operating the machine.

11. When starting the engine:

- A. Engage parking brake.
- B. Be sure traction pedal is in neutral and PTO switch is in OFF position.
- C. After engine is started, release parking brake and keep foot off traction pedal. Machine must not move. If movement is evident, the neutral return mechanism is adjusted incorrectly; therefore, shut engine off and adjust until machine does not move when traction pedal is released.

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

- A. Mow only in daylight or when there is good artificial light.
- B. Watch for holes or other hidden hazards.
- C. Do not drive close to a sand trap, ditch, creek or other hazard.
- D. Reduce speed when making sharp turns and when turning on hillsides.
- E. Avoid sudden stops and starts.
- F. Before backing up, look to the rear to be sure no one is behind the machine.
- G. Watch out for traffic when near or crossing roads. Always yield the right-of-way.

SAFETY INSTRUCTIONS

13. The grass deflector must always be installed on the cutting unit. If the cutting unit discharge area ever plugs, turn PTO switch OFF and shut engine off. Use a stick to remove the obstruction.

14. Never raise the cutting unit while the blades are rotating.

15. If the cutting blades strike a solid object or the machine vibrates abnormally, turn PTO switch OFF, move throttle to SLOW, set parking brake and shut engine off. Remove key from switch to prevent possibility of accidental starting. Check cutting unit and traction unit for damage and defective parts. Make all repairs before restarting the engine and operating the cutting unit. Make sure blades are in good condition and blade bolts are tight.

16. Cut grass slopes carefully. When going uphill or downhill do not start or top suddenly.

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

18. Lower the cutting unit or other attached implement to the ground and remove key from switch whenever machine is left unattended.

19. Before getting off the seat:

- A. Move traction pedal to neutral position and remove foot from pedal.
- B. Set the parking brake and turn the PTO switch OFF.
- C. Shut the engine off and remove key from ignition switch. Wait for all movement to stop before getting off the seat.

MAINTENANCE

20. Remove key from ignition switch to prevent accidental starting of the engine when servicing, adjusting or storing the machine.

21. Perform only those maintenance instructions described in this manual. If major repairs are ever needed or assistance is desired, contact an Authorized TORO Distributor.

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

23. Be sure machine is in safe operating condition by keeping nuts, bolts and screws tight. Check the blade mounting bolts frequently to be sure they are tight (75 to 100 ft-lb) (102 to 136 N·m).

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

25. Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate skin and do serious damage. If fluid is ejected into the skin it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

26. Before disconnecting or performing any work on the hydraulic system, all pressure in system must be relieved by stopping engine and lowering implement to the ground.

27. If the engine must be running to perform a maintenance adjustment, keep hands, feet, clothing and other parts of the body away from the PTO shaft, cutting unit blades, radiator fan and other moving parts.

28. Do not overspeed the engine by changing governor settings. Maximum engine speed (with engine coupled to transmission) is 3200-3250 rpm. To ensure safety and accuracy, have an Authorized TORO Distributor check maximum engine speed with a tachometer.

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

30. When manufactured, the GROUNDMASTER® 220D conformed to safety standards in effect for riding mowers. Therefore, 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. Using unapproved replacement parts and accessories could void the warranty of The Toro Company.

CAUTION

1. KEEP ALL SHIELDS IN PLACE.
2. BEFORE LEAVING OPERATOR'S POSITION.
 - A. MOVE TRANSMISSION TO NEUTRAL.
 - B. SET PARKING BRAKE.
 - C. TURN PTO SWITCH OFF.
 - D. SHUT OFF ENGINE.
 - E. REMOVE IGNITION KEY.
3. WAIT FOR ALL MOVEMENT TO STOP BEFORE SERVICING MACHINE.
4. KEEP BYSTANDERS FROM AREAS BEING MOWED.



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.

CAUTION

MAINTAIN WHEEL FASTENER TORQUE AT 45-55 ft.-lb.
SEE OPERATORS MANUAL FOR INSTRUCTIONS. 67-1720

ON FRAME IN
FRONT OF DRIVE WHEELS
(Part No. 67-1720)

CAUTION

CHECK PERFORMANCE OF ALL INTERLOCK SWITCHES DAILY.
SEE OPERATOR'S MANUAL FOR INSTRUCTION. DO NOT
DEFEAT INTERLOCK SYSTEM. IT IS FOR YOUR PROTECTION. 67-1710

SEAT FRONT PLATE
(Part No. 67-1710)

WARNING

PTO universal shaft is attached to
traction unit. DO NOT ENGAGE PTO
without first removing universal
shaft or coupling it to a suitable
implement. 52-1420

TAG ON PTO SWITCH
(Part No. 52-1420)

1 INCH (25 mm)



CAUTION

FILL FUEL TANK TO ONE
INCH BELOW FILLER NECK.
DO NOT OVERFILL. 27-7310

TOOL BOX REAR
(Part No. 27-7310)



NEAR FUEL CAP
(Part No. 52-1320)

CAUTION

DO NOT USE
STARTING FLUID. 67-1700

AIR CLEANER
(Part No. 67-1700)

TRACTION PEDAL

FORWARD



REVERSE



NO STEP
use other
side

RIGHT SIDE OF PLATFORM
(Part No. 66-8890)



ON FUEL CAP
(Part No. 63-4490)



 CAUTION
ROTATING MEMBER

ON FAN SHROUD
(Part No. 67-1650)



FLOAT



LOWER



RAISE

LIFT
CONTROL



THROTTLE



RIGHT OF SEAT
(Part No. 66-8750)

STARTING INSTRUCTIONS (SEE OPERATOR'S MANUAL)

1. Disengage power take-off.
2. Place traction drive in neutral position.
3. Depress brake pedal.
4. Set throttle control — full open.
5. Push glow plug switch to on position and preheat.
6. Turn key to start position.

To stop, turn key to off position and remove key.

CAUTION

1. DISENGAGE POWER TAKE-OFF BEFORE RAISING IMPLEMENT TO TRANSPORT POSITION.
2. DO NOT OPERATE IMPLEMENT IN TRANSPORT POSITION.
3. KEEP ALL GUARDS AND COVERS IN PLACE.
4. BEFORE LEAVING OPERATOR'S POSITION:
 - MOVE TRANSMISSION TO NEUTRAL.
 - SET PARKING BRAKE.
 - DISENGAGE POWER TAKE-OFF.
 - SHUT OFF ENGINE.
 - REMOVE IGNITION KEY.
5. WAIT FOR ALL MOVEMENT TO STOP BEFORE SERVICING.
6. STOP ENGINE BEFORE ADDING FUEL OR LIFTING HOOD.
7. KEEP PEOPLE AND PETS A SAFE DISTANCE AWAY FROM MACHINE.

66-8880

ON TOOL BOX
(Part No. 66-8880)

SPECIFICATIONS

Engine:

Manufacturer — Mitsubishi
Horsepower — 18 (13.4 Kw) @ 3000 RPM.
Torque — 30 lb-ft (40.7 N·m) @ 2300 RPM.
Displacement — 49.3 cu in. (808 cc).
Crankcase Capacity — 3.8 qt. (3.6 L).
Governor — Mechanical.
Governor Limit — 3200-3250 RPM.
Idle Speed — 1700 RPM.

Air Cleaner: Donaldson heavy duty with precleaner. Remote mounted.

Fuel Tank Capacity: 8 gal. (34 L).

Electrical: Battery — 12 volt, BCI group size 26, 530 Amp at 0° F. 35 amp alternator with regulator/rectifier.

Drive Coupling: Transmission driven by steel shaft with flexible rubber couplings at each end.

Transmission:

Manufacturer & Type — Sundstrand hydrostatic, Type V15.
Normal Charge Pressure — 70-150 psi (483-1034 kPa).
Implement Relief Setting — 700-800 psi (4 826 - 5 516 kPa).

Hydraulic Filter: 25 micron mounted directly to transmission. Replaceable (Toro Part No. 23-2300).

Drive Axle: Manufacturer — Dana Corp., Model GT-20. Axle serves as a hydraulic fluid reservoir and mates directly with the transmission.

Brakes: Mechanical drum type, 7 in. (17.8 cm) dia. x 1-3/4 in. (45 mm) wide. Individually controlled by two pedals connected by cable and conduit for steering assist. Pedals may be latched together for two wheel braking. Lever provided for parking brake.

Tires, Wheels, Pressure:

Front Tires — 23 x 8.50 x 12
Rear Tires — 16 x 6.50 x 8
All tires 4 ply rating, tubeless type.
(Pressure — 10-15 psi (69-103 kPa).

Steering: 15 in. (38 cm) steering wheel. TRW power steering valve no. HGF12003-A12000.

Main Frame: Frame is welded, formed steel.

Instrumentation: Fuel gauge, water temperature gauge, hour meter and warning lights for high temperature shutdown, oil pressure, amperage and glow plug are mounted on the console.

Controls: Throttle, PTO switch, parking brake, implement lift, ignition switch and glow plug switch are all hand-operated. Forward/reverse traction pedal and turning brakes are foot operated.

PTO Drive: Splined PTO shaft is driven by HA Section Torque Team spring tensioned V-belt directly from engine output shaft. PTO shaft engaged by electric clutch/brake assembly. PTO speed — 2235 RPM @ 3250 RPM engine speed.

Implement connection — Weasler universal joint and telescoping shaft assembly.

Lift Cylinders: Two, with 2 in. (51 mm) bore, 3.5 in. (89 mm) stroke.

Interlock Switches: Prevents engine starting if traction pedal or PTO switch are engaged. Stops engine if operator leaves seat with either traction pedal or PTO switch engaged.

Dimensions and Weight (approx):

Traction Unit	Length:	82 in. (2.08 m)
w/Standard	Width:	44 in. (1.11 m)
Seat	Height:	50 in. (1.27 m)
	Weight:	1120 lb (508 kg)

OPTIONAL EQUIPMENT:

52" Cutting Unit — Model No. 30555

62" Cutting Unit — Model No. 30562/30564

72" Cutting Unit — Model No. 30575

Mulcher Kit — Model No. 30779. Use with 72" Model 30575 Cutting Unit.

Mulcher Kit — Model No. 30792. Use with 62" Model 30562 Cutting Unit.

Mulcher Kit — Model No. 30700. Use with 52" Model 30555 Cutting Unit.

Mulcher Plate — Model No. 57-0700. Use with 62" & 72" Model 30562 and 30575 Cutting Units.

Grass Collection System — Model No. 30561. Use with Cutting Unit Model 30555.

Wheel Weights — Model No. 11-0440. 50 lb (23 kg).

Rear Weight Kit — Part No. 24-5780. 70 lb (31.8 kg).

Tire Chains — Part No. 11-0390. 20 lb (9.07 kg).

Standard Seat Kit — Model No. 30769.

Deluxe Seat Kit — Model No. 30772.

LOOSE PARTS

Note: Use this chart as a checklist to make sure all parts have been received. Without these parts, total set-up cannot be completed.

DESCRIPTION	QTY.	USE
Steering Wheel	1	Mount on steering shaft.
Cap-steering Wheel	1	Install in wheel.
Nut-steering Wheel	1	Secure steering wheel.
Cylinder Pin	2	Secure frame to lift cylinders.
Cotter Pin 3/16 x 1-1/2 in. (38 mm)	4	Secure cylinder pins.
Roll Pin	1	Secure universal shaft
Capscrew 5/16 - 18 x 1-3/4 in.	2	to implement.
Locknut 5/16 - 18	2	
Brake Return Springs	2	Use to mount cutting unit.
Pivot Pin	2	
Capscrew 1/4 - 20 x 1/2 in.	2	
Flatwasher 1/4	2	
Lockwasher 1/4	2	
Cotter Pin 1/8 x 1-1/4	2	

SET-UP INSTRUCTIONS



WARNING

PTO universal shaft is attached to traction unit. **DO NOT ENGAGE PTO** without first removing universal shaft or coupling it to a suitable implement.

INSTALL STEERING WHEEL

Tools Required: 15/16 inch socket and torque wrench.

1. Remove jam nut from steering shaft. Slide steering wheel onto steering shaft.
2. Secure steering wheel in place with jam nut (Fig. 1 and tighten it to 70 ft-lb (95 N·m).
3. Insert tab of steering cap into cutout in steering wheel hub (Fig. 1). Press cap into groove in hub.

INSTALLING OPTIONAL SEAT

1. Attach "U" springs to seat mounting brackets using bolts and locknut as shown in (Fig. 2).
2. Align mounting holes of seat mounting brackets with mounting holes in seat. Secure each seat mounting bracket to seat with capscrews and lock-washers (Fig. 2).

Note: Mount the bracket in the forward set of tapped mounting holes in seat.

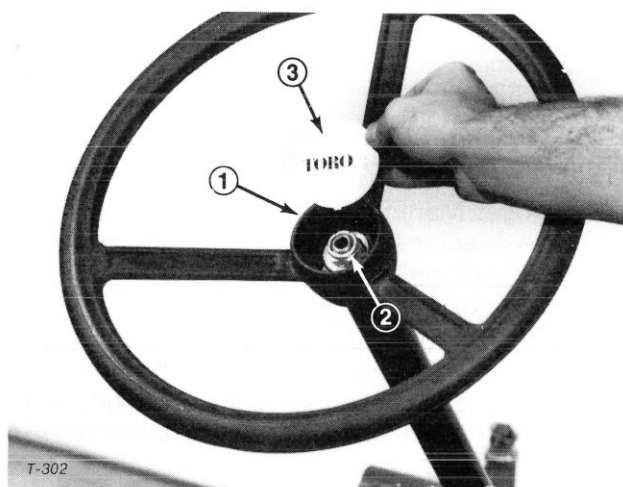


Figure 1

1. Cutout
2. Jam nut
3. Steering wheel cap

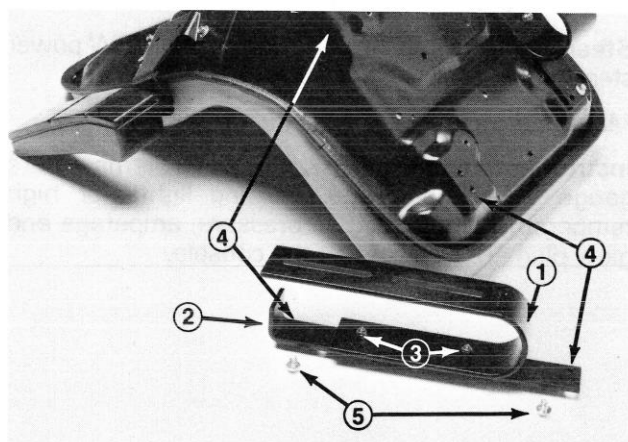


Figure 2

1. "U" spring
2. Seat mounting bracket
3. Bolts with lock nuts
4. Mounting holes
5. Mounting cap screws & lock washers

SET-UP INSTRUCTIONS

3. Mount seat and spring assembly to rear holes in traction unit mount plate with two shoulder bolts, flat washers and locknuts (Fig. 3).

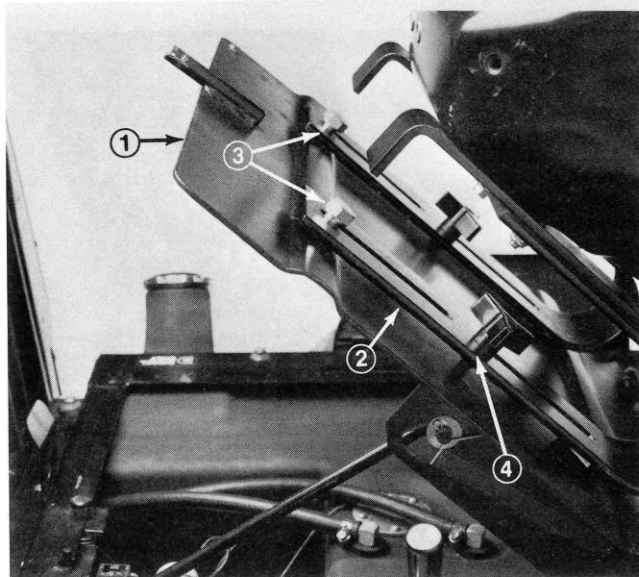


Figure 3

1. Mounting plate
2. Seat spring
3. Shoulder bolt with washer and locknut (2)
4. Adjustment handle (2)

Note: Be sure to use flat washers with small I.D.

Note: Traction unit mounting plate can be flipped up by removing the hair pin and pulling back on the locking spring flap (Fig. 4).

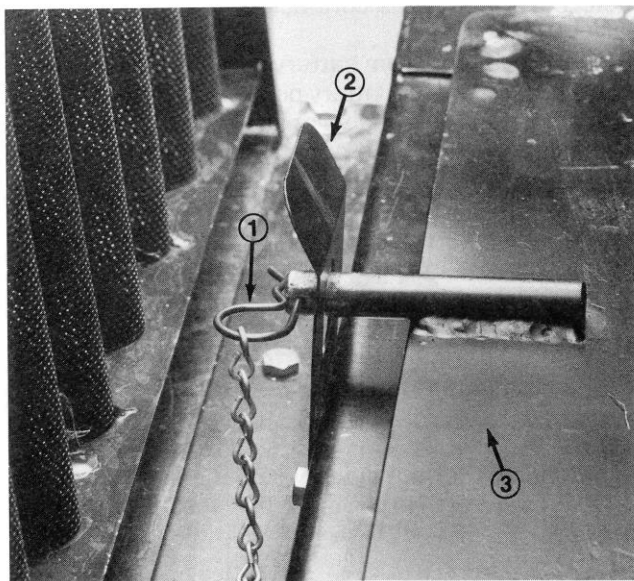


Figure 4

1. Hair pin
2. Lock spring flap
3. Seat mounting plate

Note: To secure traction unit mounting plate in an upright position the support rod must be snapped into the indent (Fig. 5).

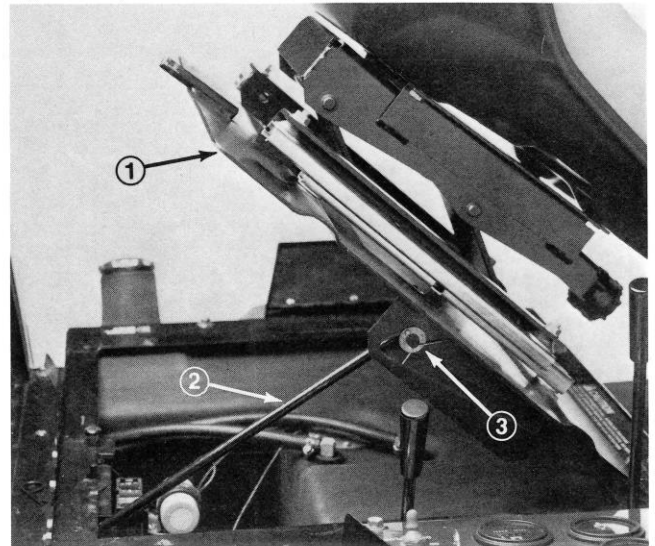


Figure 5

1. Mounting plate
2. Support rod
3. Indent

4. Secure front slots of seat springs to traction unit front mounting holes with adjustment handles and flatwashers (Fig. 3).

INSTALLING DELUXE ADJUSTABLE SUSPENSION SEAT

1. Attach suspension assembly to the seat with capscrews and lockwashers as shown in (Fig. 6).

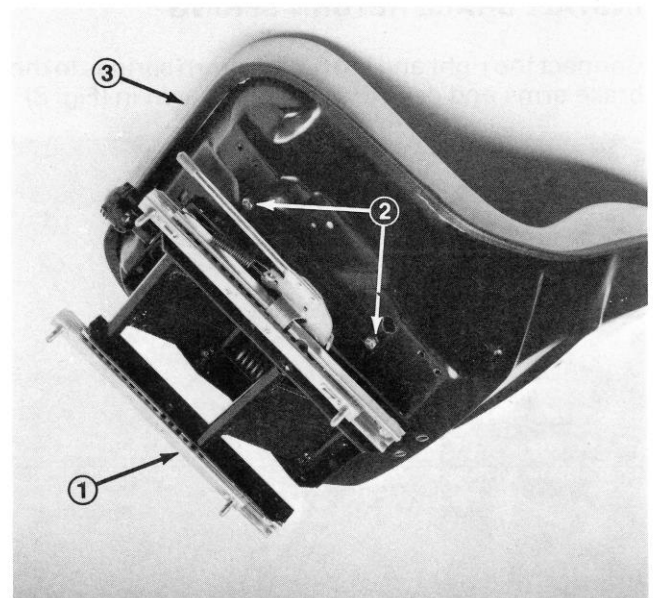


Figure 6

1. Adjustable suspension unit
2. Cap screws with lock washers (4)
3. Seat

2. Attach seat and suspension assembly to traction unit mounting plate with bolts, flat washers, lockwashers and nuts as shown in (Fig. 7).

SET-UP INSTRUCTIONS

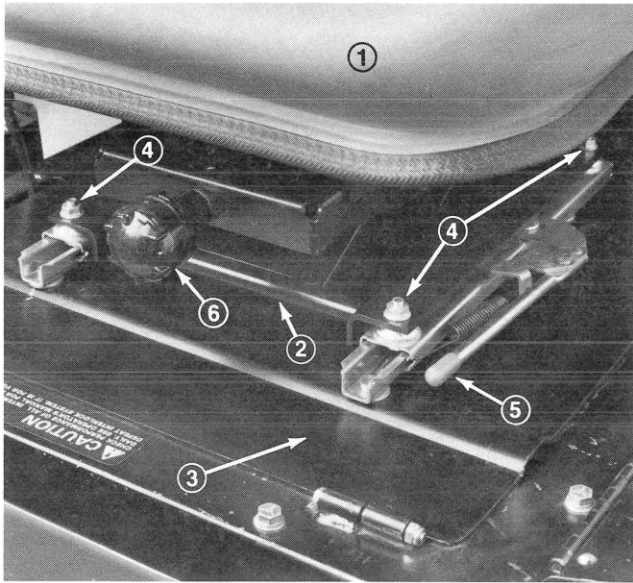


Figure 7

1. Seat
2. Suspension assembly
3. Mounting plate
4. Bolt, flat washer, lock washer, nut (4)
5. Forward/backward handle
6. Spring tension knob

Note: Lift handle to move seat forward or backward (Fig. 7).

Note: Rotate spring tension knob clockwise for greater tension to support a heavier operator (Fig. 7).

INSTALL BRAKE RETURN SPRING

Connect the right and left brake return springs to the brake arms and deck brackets as shown in (Fig. 8).

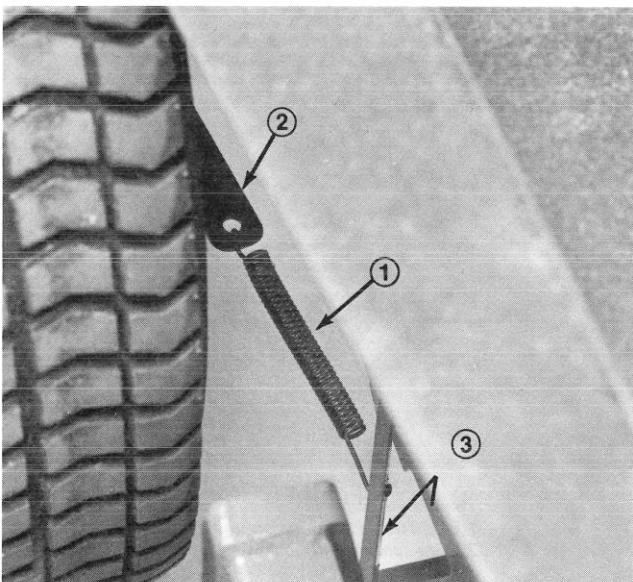


Figure 8

1. Brake return spring (2)
2. Brake arm
3. Deck brake

CONNECT BATTERY

1. Lift engine cover. Check to see that the battery is securely fastened in place (Fig. 9).

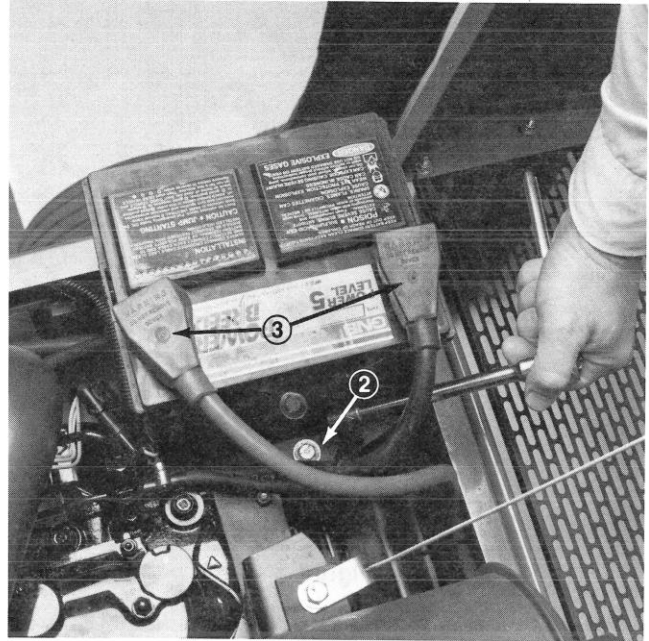


Figure 9

1. Battery
2. Battery securing bolt (2)
3. Rubber boots over battery posts

2. Check battery charge with a hydrometer. If battery needs charging be sure that at least one of the battery cables is disconnected from the battery before the charger is connected.

3. Remove tape from battery cables and secure the cables to the proper battery post. The positive "+" red cable goes to the positive post and the negative "-" black cable goes to the negative post on the battery.



WARNING

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

4. Coat the terminal with sealant such as Gafto 112X, Toro Part No. 505-47 and install the rubber boots.

CHECK TIRE PRESSURE

The tires are over-inflated for shipping. Therefore, release some of the air to reduce the pressure. Correct air pressure in front and rear tires is 10 to 15 psi (68.9 to 103.4 Kpa).

BEFORE OPERATING

CHECK CRANKCASE OIL

The engine is shipped with 3.8 qts. (3.6 L) 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. Open the hood.
3. Remove dipstick and wipe it with a clean rag. Insert dipstick into the tube and make sure it is seated fully. Remove dipstick and check level of oil (Fig. 10). If oil level is low, add enough oil to raise level to FULL mark on dipstick. Do not overfill (Fig. 11).

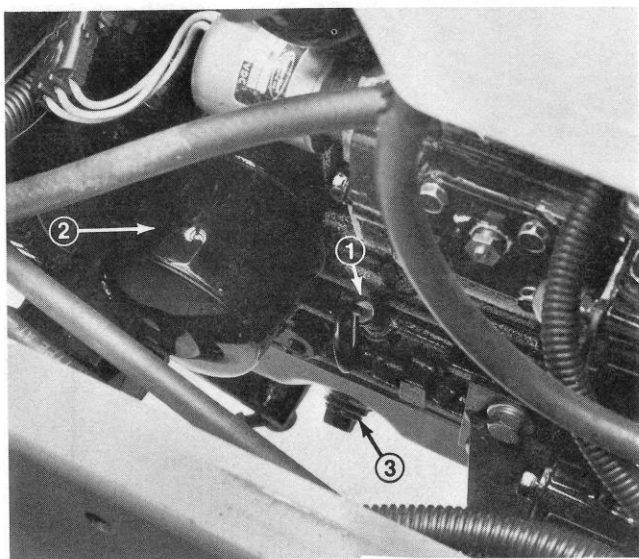


Figure 10

1. Engine oil dipstick
2. Engine oil filter
3. Oil drain plug

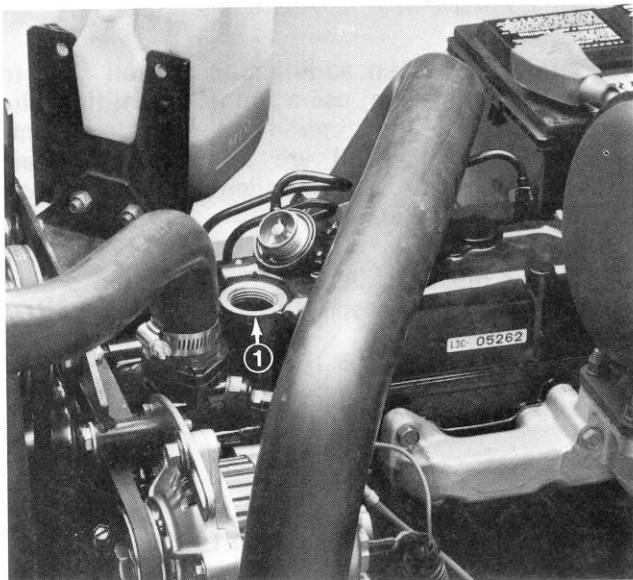


Figure 11

1. Engine oil add hole

Note: If level of oil is at the ADD mark on the dipstick, add 1 pint (0.47 L) of oil and recheck level. Do not overfill.

4. The engine uses any high-quality 10W30 detergent oil having the American Petroleum Institute — API — “service classification” CD.

IMPORTANT: Check level of oil every 5 operating hours or daily. Change oil after every 50 hours of operation.

5. Insert dipstick into tube.

CHECK COOLING SYSTEM

Clean debris off screen and front of radiator daily (Fig. 12), hourly if conditions are extremely dusty and dirty; refer to Cleaning Radiator and Screen Section.

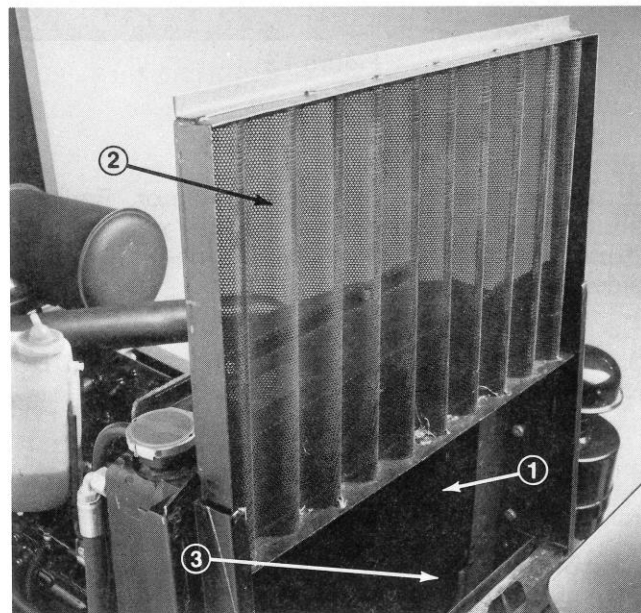


Figure 12

1. Radiator
2. Radiator screen
3. Screen channel

The cooling system is filled with a 50/50 solution of water and permanent ethylene glycol anti-freeze. Check level of coolant at beginning of each day (Fig. 13) before starting the engine. Capacity of cooling system is approximately 6 quarts (5.7 L).

1. Carefully remove radiator cap and the expansion tank cap.



CAUTION

If engine has been running, pressurized hot coolant can escape when radiator cap is removed and cause burns.

BEFORE OPERATING

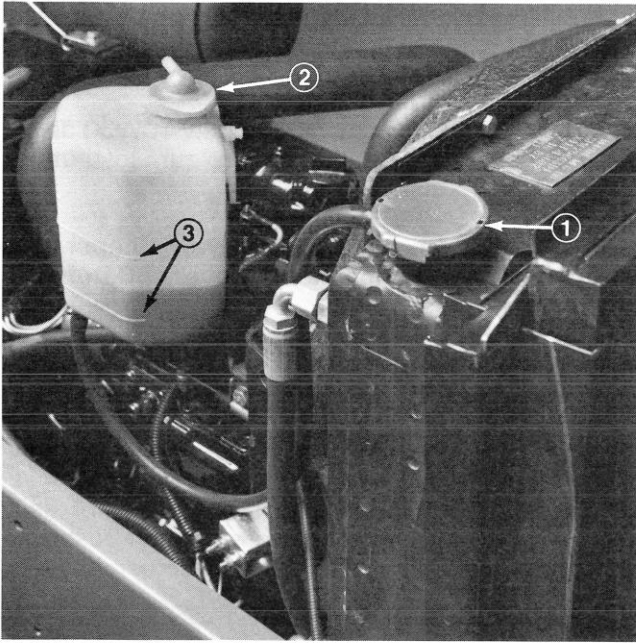


Figure 13

1. Radiator cap
2. Expansion tank cap
3. Expansion tank fill marks

2. Check level of coolant in radiator. Radiator should be filled to the top of the filler neck and the expansion tank filled to between the marks on its side.

3. If coolant level is low, replenish the system. **DO NOT OVERFILL.**

4. Install radiator cap and expansion tank cap.

CHECK HYDRAULIC SYSTEM FLUID

The axle housing acts as the reservoir for the system. The machine's transmission and axle housing is filled at the factory with approximately 5 quarts (4.73 L) of SAE 10W-30 engine oil. However, check level of transmission fluid before engine is first started and daily thereafter. If oil is required, use the following:

Above 32° F (0° C) — Use SAE 10W-30 engine oil. SAE 10W-40 engine oil. Type A automatic transmission fluid may be used as a substitute.

Below 32° F (0° C) — Use type A automatic transmission fluid. SAE 5W-20 engine oil may be used as a substitute.

IMPORTANT: DO NOT intermix automatic transmission fluid with engine oil. When changing from one type of fluid to another, be sure to thoroughly drain the old fluid and change the filter. **DO NOT USE DEXTRON II ATF.**

1. Position machine on a level surface. Place all controls in neutral position and start the engine. Run engine at lowest possible RPM to purge the system of air. **Do not engage PTO.** Cycle steering wheel several times fully to the left and right. Raise the cutting unit to extend lift cylinders, aiming steering wheels straight forward and stop the engine.

2. Remove dipstick cap (Fig. 14) from filler neck and wipe it with a clean rag. Screw dipstick cap finger-tight onto filler neck; then remove it and check level of fluid. If level is not within 1/2 inch (13 mm) from the groove in the dipstick (Fig. 14), add SAE 10W-30 engine oil, or, if used, automatic transmission fluid to raise level to groove mark. Do not overfill.

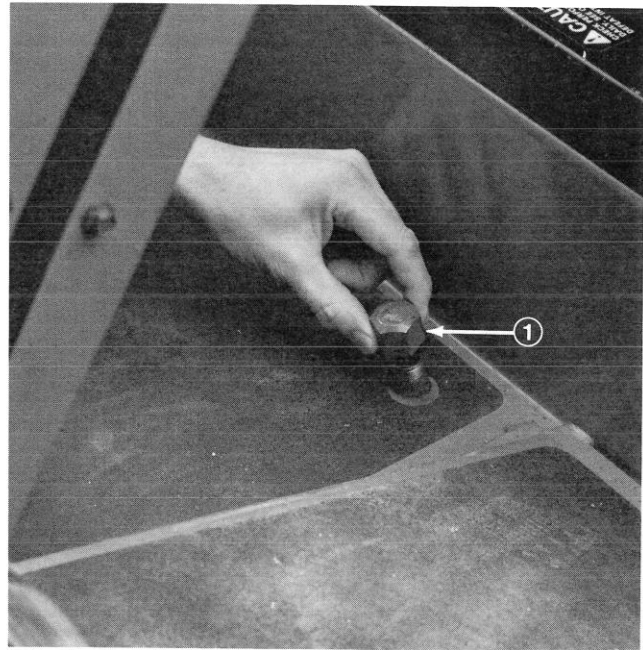


Figure 14

1. Hydraulic system reservoir fluid/add dipstick cap

IMPORTANT: When adding transmission fluid to the hydraulic system, use a funnel with a fine wire screen — 200 mesh or finer — and make sure funnel and transmission fluid are immaculately clean. This procedure prevents accidental contamination of the hydraulic system.

3. Thread dipstick filler cap finger-tight onto filler neck. It is not necessary to tighten cap with a wrench.

4. Check all hoses and fittings for leaks.

FILL FUEL TANK WITH DIESEL FUEL

The engine runs on No. 2-D or 1-D automotive type diesel fuel with a minimum cetane rating of 40.

BEFORE OPERATING

Note: Higher cetane rated fuel may be required if machine is to be used at high altitudes and low-atmospheric temperatures.

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

Use of No. 2-D diesel fuel above 20°F (-7°C) will contribute toward longer life of the pump components. Do not use furnace oil. Furnace oils usually contain heavy cracked distillates which are not suitable for diesel engines.

Store fuel outside of buildings in a convenient location. Tipping the front of the tank up slightly will allow contaminants to collect at the lower end away from the outlet. Never empty the tank below 4 in. (10 cm) from the bottom of the tank to avoid picking up water and other contaminants that may have collected at the bottom. Either filter the remainder at the bottom through a chamois or dispose of it periodically to prevent excessive build-up of contaminants.

Keep all fuel containers free of dirt, water, scale and other contaminants. Many engine difficulties can be traced to contaminants in the fuel.

Use only metal containers for fuel storage. DO NOT store the fuel in a galvanized metal container. A chemical reaction will result, which will plug the filters and cause possible fuel system damage.

If possible, fill the fuel tank at the end of each day. This will prevent possible buildup of condensation inside the fuel tank, preventing possible engine damage. Allow the engine to thoroughly cool down before refueling.

1. Using a clean rag, clean area around fuel tank cap.
2. Remove cap from the fuel tank (Fig. 15) and fill the 8 gallon (34 L) tank to within 1 inch (25 mm) from the top with diesel fuel. Install fuel tank cap tightly after filling tank.

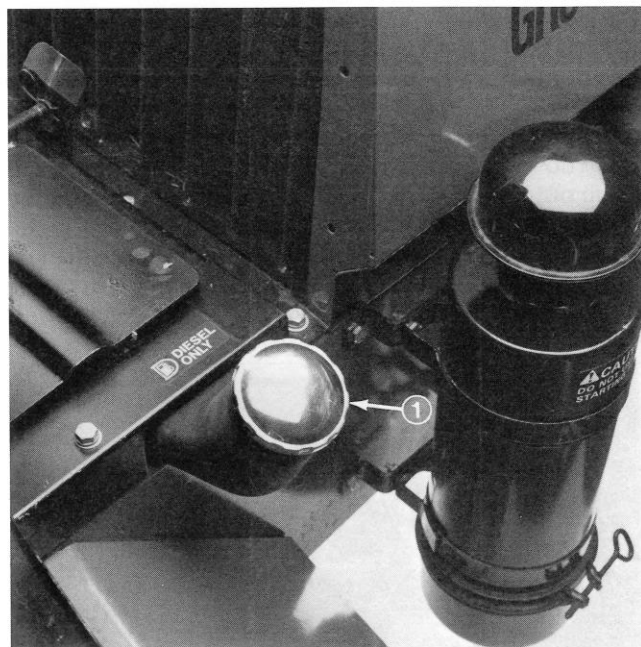


Figure 15

1. Fuel tank cap



DANGER

Because diesel fuel 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 diesel fuel before starting engine. Use a funnel or spout to prevent spilling diesel fuel and fill tank to about 1 inch (25 mm) below the filler neck. Store diesel fuel in a clean safety-approved container and keep the cap in place on the container. Keep diesel fuel in a cool, well-ventilated place; never in an enclosed area such as a hot storage shed. To assure volatility and to prevent contamination, do not buy more than a 6 month supply.

CONTROLS

Parking Brake — Whenever the engine is shut off, the parking brake must be engaged to prevent accidental movement of the machine. To engage the parking brake, push lock arm (Fig. 16) on left brake pedal so that it locks together with the right pedal. Next, push down fully on both pedals and pull parking brake knob out (Fig. 17) then release the pedals. To release parking brake, depress both pedals until parking brake knob retracts. Before starting the engine, however, lock arm may be disengaged from left brake pedal so both pedals work independently with each front wheel.

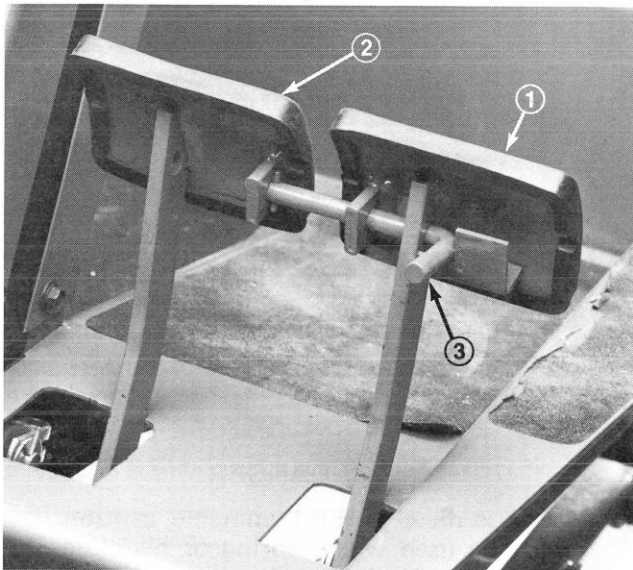


Figure 16

- 1. Left brake pedal
- 2. Right brake pedal
- 3. Lock arm

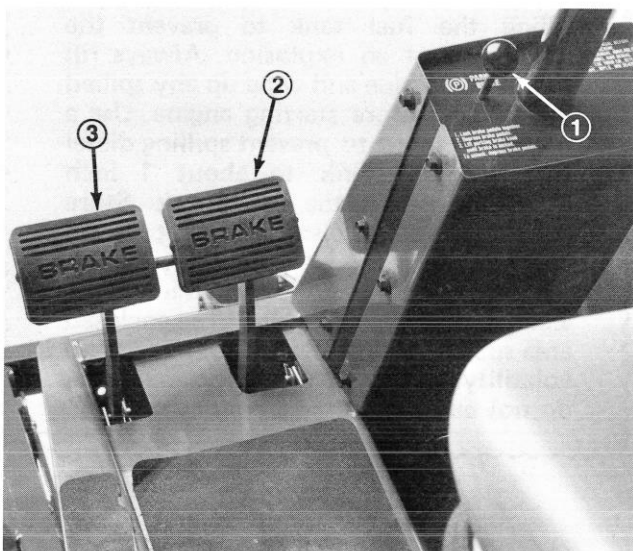


Figure 17

- 1. Parking brake knob
- 2. Right brake pedal
- 3. Left brake pedal

Amp Light (Fig. 18) — The amp light should be off when engine is running. If it is on the charging system should be checked and repaired if necessary.

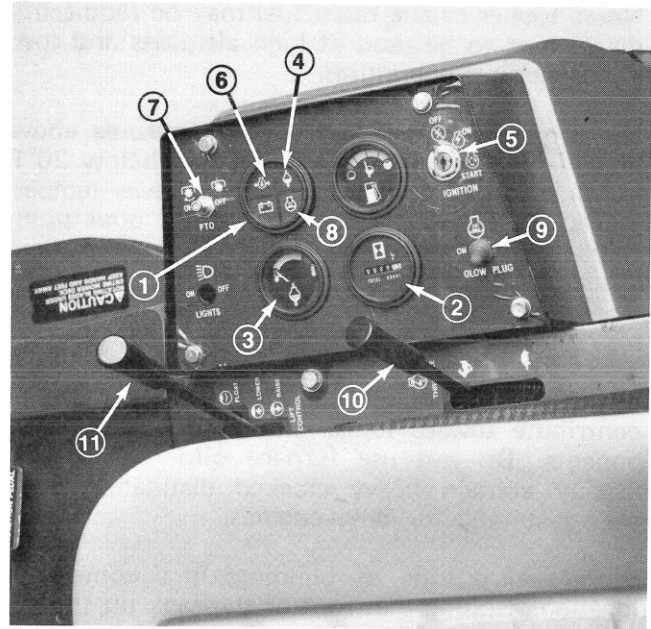


Figure 18

- 1. Amp light
- 2. Hour meter
- 3. Coolant temperature gauge
- 4. High temperature shutoff light
- 5. Ignition key switch
- 6. Oil pressure light/buzzer
- 7. PTO switch
- 8. Glow plug indicator
- 9. Glow plug switch
- 10. Throttle
- 11. Hydraulic lift lever

Hour Meter (Fig. 18) — Accumulated engine operating time registers on the hour meter.

Temperature Gauge and High Temperature Light (Fig. 18) — The coolant temperature gauge registers the coolant temperature in the system. If the temperature gets too high the engine will automatically shut off and the High Temperature Shutoff Light will light. When this happens, turn the ignition key off, check radiator for debris, check the fan belt and check the expansion tank for proper coolant level. The high temperature shutoff will automatically reset when the coolant temperature has reached a safe level.

Low Oil Pressure Light (Fig. 18) — If oil pressure falls below a safe level, the light glows. Stop engine and repair before resuming operation.

PTO Switch (Fig. 18) — Turn PTO switch ON (lift switch while moving it to ON position) to ENGAGE and turn the PTO switch OFF to DISENGAGE the power takeoff electric clutch. The only time the PTO switch should be in the ENGAGE position is when cutting unit is on the turf and grass is actually being mowed.

Ignition Key Switch (Fig. 18) — The ignition switch, which is used to start and stop the engine, has three positions: OFF, RUN and START. Rotate key clockwise — START position — to engage starter mower. Release key when engine starts. The key will move automatically to the ON position. To shut engine off, rotate key counterclockwise to the OFF position.

CONTROLS

Glow Plug Switch and Indicator (Fig. 18) — Use to preheat engine cylinders before and during starting procedures. Push switch lever upward and hold while watching indicator. Indicator light will glow orange when the glow plugs are activated. Length of time necessary to preheat cylinders should be determined by atmospheric temperature; refer to Starting/Stopping Engine procedure.

Throttle (Fig. 18) — Throttle is used to operate engine at various speeds. Moving throttle forward increases engine speed — FAST; rearward decreases engine speed — SLOW. The throttle controls the speed of the cutter blades and, in conjunction with traction pedal, controls ground speed of the engine.

Hydraulic Lift Lever (Fig. 18) — The hydraulic lift lever has three positions: FLOAT, TRANSPORT and RAISE. To lower cutting unit to the ground, move lift lever forward into notch in seat platform — FLOAT. The FLOAT position is used for mowing and when machine is not in operation. To raise cutting unit, pull lift lever rearward to the RAISE position. After cutting unit is raised, allow lift lever to move to the TRANSPORT position. Cutting unit must be raised when driving from one work area to another.



CAUTION

Never raise cutting unit while blades are rotating because it is hazardous.

Service Brakes (Fig. 17) — The left and right brake pedals are connected to the left and right front wheels. Since both brakes work independently of each other, the brakes can be used to turn sharply or to increase traction if one wheel tends to slip while operating on certain slope conditions. However, wet grass or soft turf could be damaged when brakes are used to turn sharply. To make a "quick-stop", depress both brake pedals together. Always lock brakes together when transporting the traction unit.

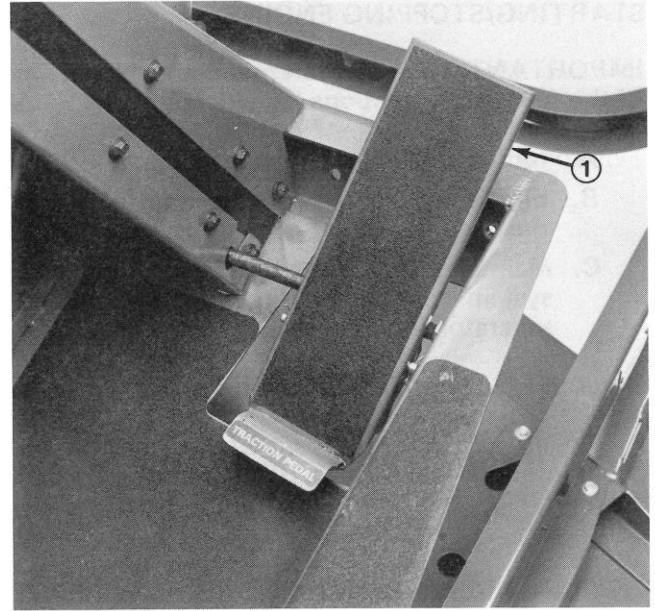


Figure 19

1. Traction pedal

Traction Pedal (Fig. 19) — Traction pedal has two functions: one is to make the machine move forward, the other is to make it move rearward. Using the heel and toe of the right foot, depress top of pedal to move forward and bottom of pedal to move rearward. Ground speed is proportionate to how far pedal is depressed. For maximum ground speed with no load, traction pedal must be fully depressed while throttle is in FAST position. Maximum speed forward is 10 mph (16 Km/hr)(approx), 4 mph (6.4 Km/hr)(approx) in reverse. To get maximum power under heavy load or when ascending a hill, have throttle in FAST position while depressing traction pedal slightly to keep engine rpm high. When engine rpm begins to decrease, release traction pedal slightly to allow rpm to increase.

Seat Adjusting Handle — To adjust seat, loosen adjusting knobs and slide seat to desired position. Tighten knobs to lock seat in place.

Seat Adjusting Handle — Deluxe Seat (Not Shown) — To adjust seat, move lever on left side outward, slide seat to desired position and release lever so it will lock in track.

OPERATING INSTRUCTIONS

STARTING/STOPPING ENGINE

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

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

Refer to Bleeding The Fuel System.

1. Ensure parking brake is set, PTO switch is in OFF position and lift lever is in TRANSPORT or FLOAT position (Fig. 18). Remove foot from traction pedal and insure it is in neutral.

2. Move throttle control (Fig. 18) to full FAST position.

3. When temperature is below 15°C (60°F), push glow plug switch to ON position (Fig. 18) and hold for suggested interval.

Note: Refer to chart indicating approximate preheat time suggested in various temperature ranges.

Temperature	Preheat time (sec)
Above 5°C (41°F)	10
+5°C (41°F) to -5°C (23°F)	20
Below -5°C (23°F)	30

4. Turn key in key switch to START position (Fig. 18). Release key immediately when engine starts and allow it to return to RUN position. Move throttle control to SLOW position.

Note: Do not exceed 1 minute of continuous use or glow plug may burn out prematurely.

Note: Do not run starter motor more than 10 seconds at a time or premature starter failure may result. If engine fails to start after 10 seconds, turn key to OFF position, recheck controls and procedures, wait 10 additional seconds and repeat starter operation.

5. When engine is started for the first time, or after overhaul of engine, transmission or axle, operate the machine in forward and reverse for one to two minutes. Also operate the lift lever and PTO lever to assure proper operation of all parts. Turn power steering wheel to the left and right to check steering response. Then shut engine off and check fluid levels, check for oil leaks, loose parts and any other noticeable defects.



CAUTION

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

6. To stop engine, move throttle control backward to SLOW position, move PTO switch to OFF position and rotate ignition key to OFF. Remove key from switch to prevent accidental starting.

BLEEDING FUEL SYSTEM

- 1. Raise hood over engine.
- 2. Loosen air bleed screw on top of fuel filter/water separator (Fig. 20).

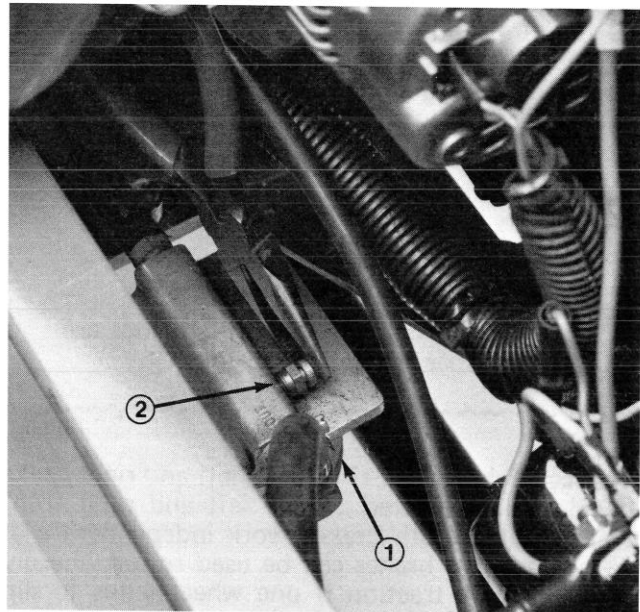


Figure 20

- 1. Fuel filter
- 2. Air bleeder screw

3. Turn key in ignition switch to the RUN position. Electric fuel pump will begin operation, thereby forcing air out around air bleed screw. Leave key in RUN position until solid stream of fuel flows out around screw. Tighten screw and turn key to OFF.

4. Open the air bleed screw on the fuel injection pump (Fig. 21) with a 12 mm wrench.

5. Turn key in ignition switch to the RUN position. Electric fuel pump will begin operation, thereby forcing air out around air bleed screw on fuel injection pump. Leave key in RUN position until solid stream of fuel flows out around the screw. Tighten screw and turn key to OFF.

OPERATING INSTRUCTIONS

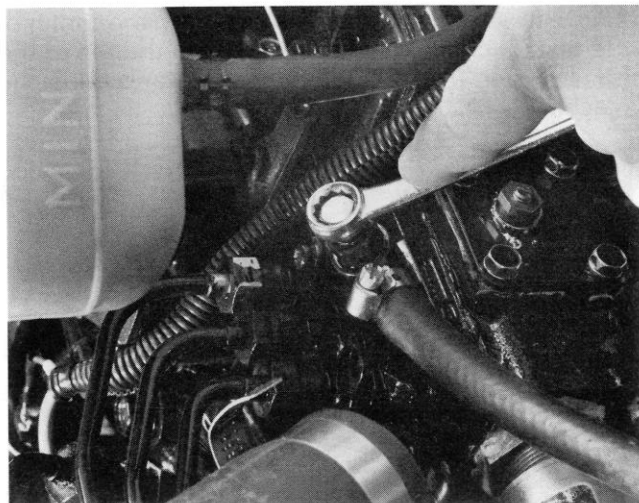


Figure 21

1. Fuel injection pump bleeder

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

CHECKING OPERATION OF INTERLOCK SWITCHES

The purpose of the safety interlock system is to prevent the engine from cranking or starting unless the traction pedal is in neutral and the PTO switch is in the OFF position. In addition, the engine will stop when the PTO control is engaged or traction pedal is depressed with operator off the seat.



CAUTION

Do not disconnect the safety switches because they are for the operator's protection. Check operation of the switches daily to be sure the interlock system is operating correctly. If a switch is defective, replace it before operating the machine. Replace the switches every 2 years to be sure of maximum safety.

1. Move PTO switch to off position and remove foot from traction pedal so it is fully released.

2. Rotate the ignition key to START. Engine should crank. If engine cranks, proceed to step 3. If engine does not crank, there may be a defect in the interlock system.

3. Raise off the seat and engage the PTO switch while the engine is running. The engine should stop within 2 seconds. If engine stops, the switch is

operating correctly; thus, proceed to step 4. If engine does not stop, there is a defect in the interlock system.

4. Raise off the seat and depress the traction pedal while engine is running and PTO lever is disengaged. The engine should stop within 2 seconds. If engine stops the switch is operating correctly; thus, continue operation. If engine does not stop, there is a defect in the interlock system.

OPERATING CHARACTERISTICS

Practice driving the GROUNDMASTER® 220D before initial operation because it has a hydrostatic transmission and its characteristics are different than some turf maintenance machines. Some points to consider when operating the traction unit and cutting unit are the transmission, engine speed, load on the cutting blades, and the importance of the brakes.

To maintain enough power for the traction unit and cutting unit while mowing, regulate traction pedal to keep engine rpm high and somewhat constant. A good rule to follow is: decrease ground speed as the load on the cutting blades increases; and increase ground speed as load on the blades decreases. This allows the engine, working with the transmission, to sense the proper ground speed while maintaining high blade tip speed, necessary for good quality-of-cut. Therefore, allow traction pedal to move upward as engine speed decreases; and depress pedal slowly as speed increases. By comparison, when driving from one work area to another — with no load and cutting unit raised — have throttle in FAST position and depress traction pedal slowly but fully to attain maximum ground speed.



CAUTION

Adequate rear weight is necessary to prevent the rear wheels from leaving the ground. Do not stop suddenly while deck is raised. Do not travel down hill with the deck raised. If the rear wheels leave the ground steering is lost.

Another characteristic to consider is the operation of the brakes. The brakes can be used to assist in turning the machine; however, use them carefully, especially on soft or wet grass because the turf may be torn accidentally. The brakes can be used to great advantage to control the direction of the cutting unit when trimming along fences or similar objects. The other benefit of the brakes is to maintain traction. For example: in some slope conditions, the uphill wheel slips and loses trac-

OPERATING INSTRUCTIONS

tion. If this situation occurs, depress uphill brake pedal gradually and intermittently until the uphill wheel stops slipping; thus, increasing traction on the downhill wheel. If independent braking is not desired, engage the lever on right brake pedal with left pedal. This provides simultaneous braking at both wheels.

Before stopping the engine, disengage all controls and move throttle to SLOW. Moving throttle to SLOW reduces high engine speed, noise and vibration. Turn key to OFF to stop the engine.

PUSHING OR TOWING TRACTION UNIT

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

IMPORTANT: Do not push or tow the traction unit faster than 2 to 3 mph (3.2 to 4.8 Km/hr) because transmission may be damaged. If traction unit must be moved a considerable distance, transport it on a truck or trailer. Whenever traction unit is pushed or towed, by-pass valve must be open.

1. Remove hair pin, pivot seat platform forward and locate seat support rod in detent notch.

2. Depress and hold the pins located in the center of the two (2) check valve assemblies in the top of the transmission (Fig. 22) while pushing or towing the machine.

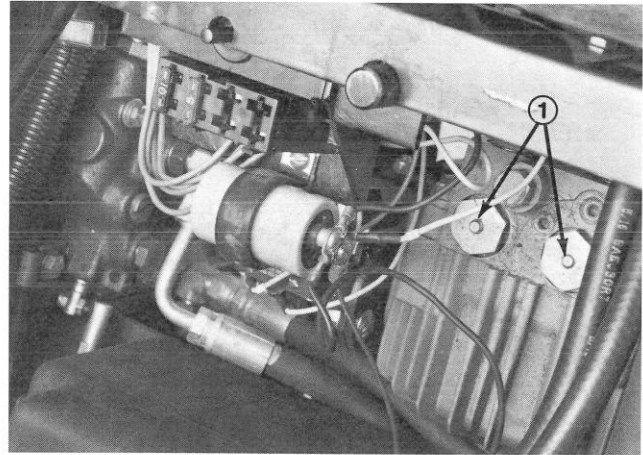


Figure 22

1. Transmission check valve bypass pins (2)

3. Start engine momentarily after repairs are completed and make sure the pins are in the full disengaged (fully up) position.

IMPORTANT: Running the machine with by-pass valve open will cause the transmission to overheat.

LUBRICATION MAINTENANCE

GREASING BEARINGS AND BUSHINGS

The traction unit has grease fittings that must be lubricated regularly with No. 2 General Purpose Lithium Base Grease. If machine is operated under normal conditions, lubricate all bearings and bushings after every 25 hours of operation. Bearings and bushings must be lubricated daily when operating conditions are extremely dusty and dirty. Dusty and dirty operating conditions could cause dirt to get into the bearings and bushings, resulting in accelerated wear.

Apply a liberal coating of grease to the check valve pins once each year (Fig. 22). Also grease the bearings in the Dana axle every 500 hours, or yearly, whichever comes first (not shown). The traction unit has bearings and bushings that must be lubricated, and these lubrication points are: PTO shaft (Fig. 23); lift arm pivot bushings (Fig. 24); brake pivot bushings (Fig. 25); rear wheel spindle bushings (Fig. 26); steering plate bushings (Fig. 27); axle pin bushing (Fig. 27); PTO tension pivot (Fig. 28). Also apply grease to both brake cables at the drive wheel and brake pedal ends (Fig. 25). Lubricate the traction pedal (Fig. 29).

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.

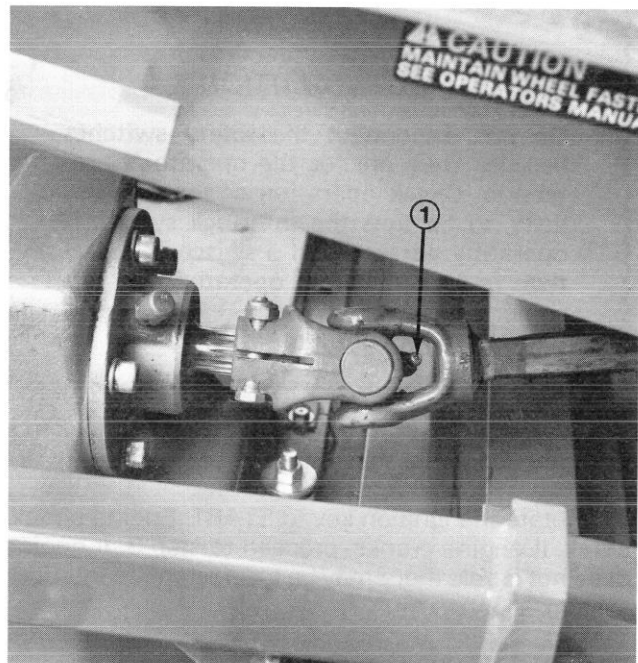


Figure 23

1. PTO shaft lubrication 3 places on shaft

LUBRICATION MAINTENANCE

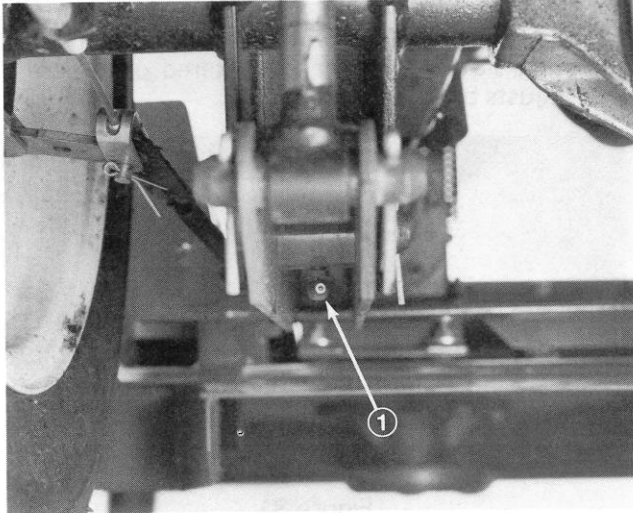


Figure 24

1. Lift arm pivot bushings on each side

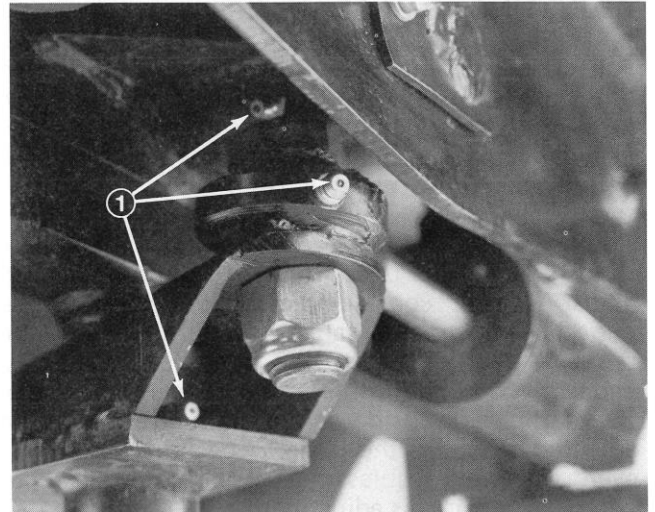


Figure 27

1. 3 fittings rear axle

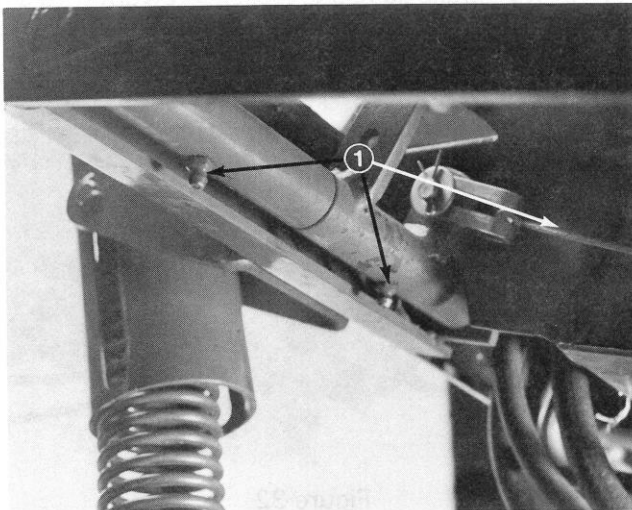


Figure 25

1. Apply grease to both ends of both brake cables

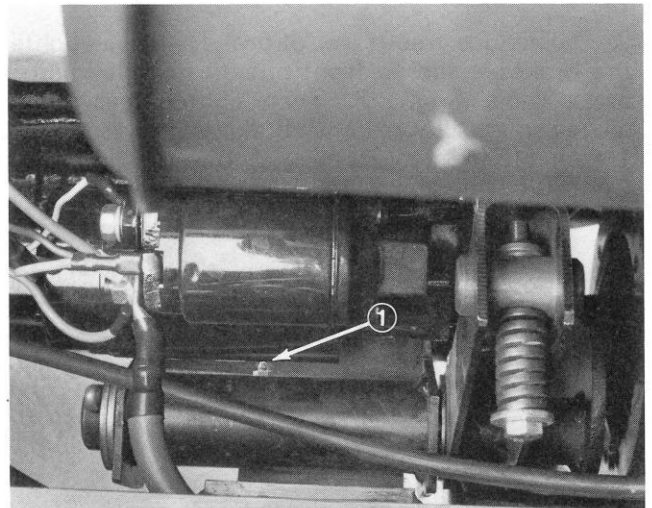


Figure 28

1. Grease PTO tension pivot

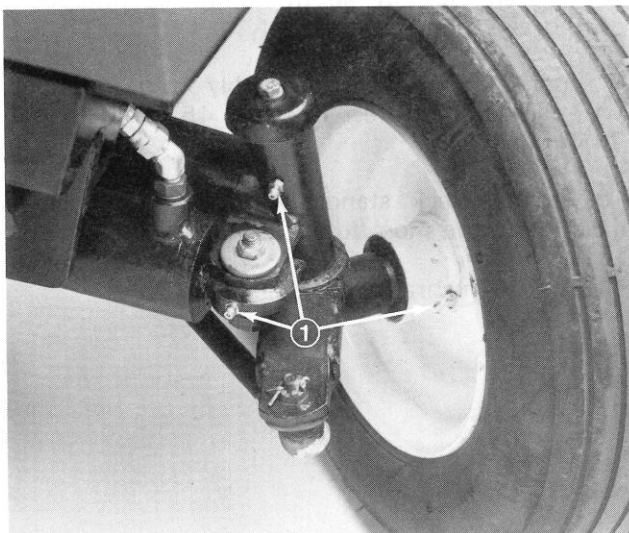


Figure 26

1. Steering arm & wheel lubrication, 3 fittings on one side, 2 on the other side.

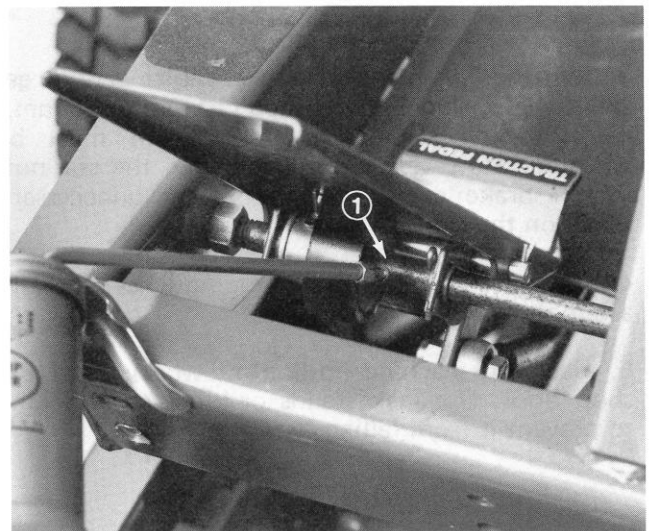


Figure 29

1. Lubricate traction pedal

BRAKE MAINTENANCE

ADJUSTING SERVICE BRAKES

Adjust the service brakes when there is more than one inch (25 mm) of "free travel" of the brake pedals, or when the brakes do not work effectively. Free travel is the distance the brake pedal moves before braking resistance is felt.

The brakes should be checked for adjustment after the first 25 hours operation and should only need adjusting after considerable use thereafter. These periodic adjustments can be performed where the brake cables connect to the bottom of the brake pedals. When the cable is no longer adjustable, the star nut on inside of the brake drum must be adjusted to move the brake shoes outward. However, the brake cables must be adjusted again to compensate for this adjustment.

1. Disengage lock arm from right brake pedal so both pedals work independently of each other.

2. To reduce free travel of brake pedals — tighten the brakes — loosen front nut on threaded end of brake cable (Fig. 30). Then tighten rear nut to move cable backward until brake pedals have 1/2 to 1 inch (13 mm to 25 mm) of free travel. Tighten front nut after brakes are adjusted correctly.

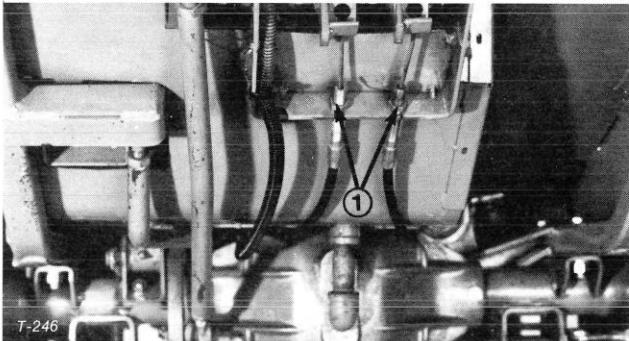


Figure 30
1. Jam nuts

3. When adjustment of brake cables cannot get free travel within 1/2 to 1 inch (13 mm to 25 mm), the star-nut inside the brake drum must be adjusted. However, before adjusting the star-nut, loosen brake cable nuts to prevent unnecessary strain on the cables.

4. Loosen five wheel nuts holding wheel and tire assembly on wheel studs.

5. Jack up machine until front wheel is off the shop floor. Use jack stands or block the machine to prevent it from falling accidentally.

6. Remove wheel nuts and slide wheel and tire assembly off studs. Rotate brake drum until adjusting slot is at top and centered over star-nut that adjusts brake shoes (Fig. 31).

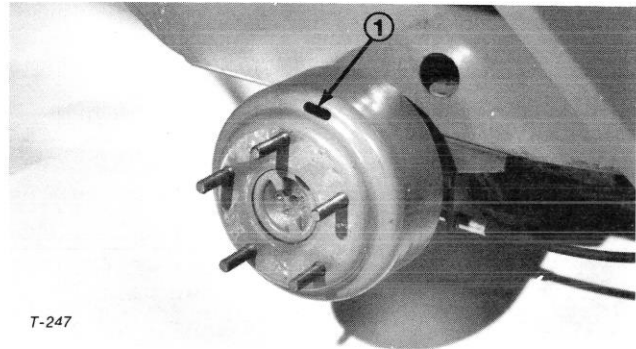


Figure 31

1. Brake adjusting slot

7. Using a brake adjusting tool or screwdriver rotate star-nut (Fig. 32) until brake drum (Fig. 31) locks because of outward pressure of brake shoes (Fig. 32).

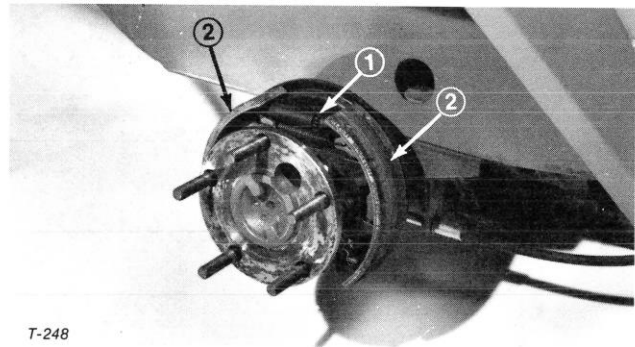


Figure 32

1. Star nut 2. Brake shoe

8. Loosen star-nut about 12 to 15 notches or until brake drum rotates freely.

9. Install wheel and tire assembly on studs with five wheel nuts. Tighten nuts to 45-55 ft-lb (61-74 N·m).

10. Remove jack stands or blocking and lower machine to the shop floor.

11. Adjust the brake cables; use step 2.

AIR CLEANER MAINTENANCE

GENERAL MAINTENANCE PRACTICES

Inspect air cleaner and hose periodically to maintain maximum engine protection and to ensure maximum service life.

1. Assure hose between air cleaner and carburetor is clamped securely in place. Replace the hose if it is cracked or punctured.
2. Check air cleaner body for dents and other damage which could possibly cause an air leak. Replace a damaged air cleaner body.
3. Insure dust cap is sealing around bottom of air cleaner body.
4. Mounting screws and nuts holding air cleaner in place must be tight.
5. Inlet cap must be free of obstructions.

SERVICING DUST CUP AND BAFFLE

Inspect the dust cup and rubber baffle once a week or every 50 hours operation; however, daily or more frequent inspection is required when operating conditions are extremely dusty and dirty. Never allow dust to build up closer than one inch (25 mm) from the rubber baffle.

Note: If conditions are extremely dusty and dirty, begin by checking dust cup and baffle after each day's operation to establish approximately how long an interval passes before dust cup should be emptied. Base further maintenance requirements on this figure. These conditions may be particularly prevalent if the rear discharge cutting unit is attached.

1. Loosen thumb screw until dust cap and baffle can be removed (Fig. 33). Separate dust cap and baffle (Fig. 33).
2. Dump dust out of the dust cup. After cleaning cup and baffle, assemble and reinstall both parts.

SERVICING AIR CLEANER FILTER

Service the air cleaner filter every 250 hours or more frequently in extreme dusty or dirty conditions by washing or using compressed air. Replace the element after every six cleanings (1500 hours) or annually, whichever comes first.

1. Remove and service dust cup; refer to Servicing Dust Cup and Baffle.
2. Remove wing nut w/gasket and slide filter element out of air cleaner body (Fig. 33).



Figure 33

- | | |
|----------------|-------------------------|
| 1. Thumb screw | 4. Wing nut with gasket |
| 2. Dust cap | 5. Filter element |
| 3. Baffle | 6. Air cleaner body |

3. Clean the element by washing it in a solution of filter cleaner (Part No. 27-7220, available from Toro) and water, or blow dirt out of filter by using compressed air.

Note: Compressed air is recommended when element must be used immediately after servicing because a washed element must be dried before it is used. By comparison, washing the element cleans better than blowing dirt out with compressed air. Remember though, filter must be washed when exhaust soot is lodged in the filter pores.

Washing Method

IMPORTANT: Do not remove plastic fin assembly because washing removes dust from beneath fins.

- A. Prepare a solution of filter cleaner and water and soak filter element about 15 minutes. Refer to directions on filter cleaner carton for complete information.
- B. After soaking filter for 15 minutes, rinse it with clear water. Maximum water pressure must not exceed 40 psi (276 kPa) to prevent damage to the filter element.
- C. Dry filter element using warm, flowing air (160°F (71°C) max). or allow element to air-dry. Do not use compressed air or a light bulb to dry the filter element because damage could result.

Compressed Air Method

IMPORTANT: Do not remove plastic fin assembly because back-blowing with compressed air removes dust from beneath fins.

AIR CLEANER MAINTENANCE

- A. Blow compressed air from inside to the outside of dry filter element. Do not exceed 100 psi (689 kPa) to prevent damage to the element.
 - B. Keep air hose nozzle at least one inch (25 mm) from pleated paper, and move nozzle up and down while rotating the filter element. Inspect element when dust and dirt are removed; refer to Inspecting Filter Element.
4. Wipe inside of air cleaner body with a damp cloth to remove excess dust. Slide filter into air cleaner body and secure it in place with wing nut and gasket.

5. Reinstall dust cup and baffle. Move thumb screw behind air cleaner body and tighten it securely.

INSPECTING FILTER ELEMENT

1. Place bright light inside filter.
2. Rotate filter slowly while checking for cleanliness, ruptures, holes and tears. Replace defective filter element.
3. Check fin assembly, gasket and screen for damage. Replace filter if damage is evident.

ENGINE MAINTENANCE

CLEANING RADIATOR AND SCREEN

The screen and front of the radiator must be kept clean to prevent the engine from overheating. Normally, check the screen and front of radiator daily and, if necessary, clean any debris off these parts. However, it will be necessary to check and to clean the screen and radiator frequently in extremely dusty and dirty conditions.

Note: If engine shuts off because of overheating, check radiator and screen.

Note: The front of the radiator can be cleaned thoroughly by spraying with a water hose or blowing with compressed air from the fan side of the radiator. Make sure to clean out any debris that settles to the bottom of the radiator before the screen is lifted out of the channel. Then remove debris from the channel.

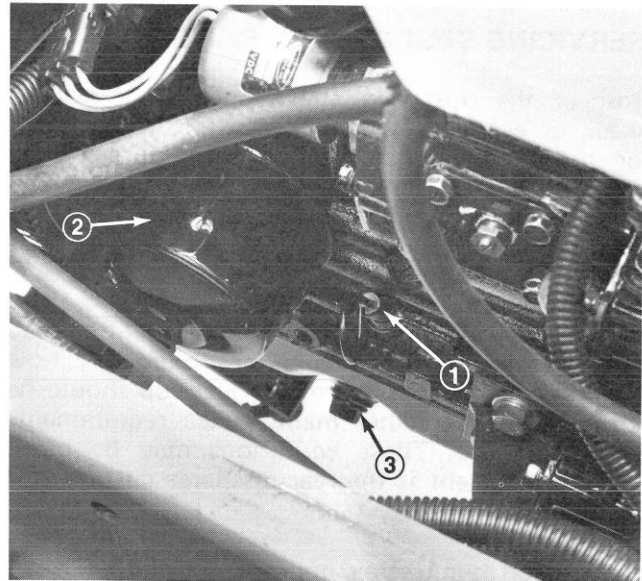


Figure 34

1. Engine oil dipstick
2. Engine oil filter
3. Oil drain plug

CHANGING CRANKCASE OIL AND FILTER

Check oil level after each days operation or each time machine is used. Change oil after every 50 hours of operation; change oil filter after first 50 hours and every 100 hours operation thereafter. If possible, run engine just before changing oil because warm oil flows better and carries more contaminants than cold oil.

1. Position machine on a level surface.
2. Open the hood. Set drain pan under the housing and in line with drain plug (Fig. 34).
3. Clean area around drain plug.

4. Remove oil drain plug and allow oil to flow into drain pan. Remove and replace oil filter (Fig. 34); refer to parts catalog for part number.

5. After oil is drained, reinstall drain plug and wipe up any oil that is spilled.

6. Fill crankcase with oil; refer to Check Crankcase Oil.

SERVICING FUEL SYSTEM

Note: Refer to Fill Fuel Tank With Diesel Fuel for proper fuel recommendations.

ENGINE MAINTENANCE

Fuel Tank

Drain and clean fuel tank every 400 hours operation or yearly, whichever comes first. Also, drain and clean tank if fuel system becomes contaminated or if machine is to be stored for an extended period. Use clean diesel fuel to flush out the tank.

Fuel Lines and Connections

Check lines and connections every 400 hours or yearly, whichever comes first. Inspect for deterioration, damage or loose connections.

Fuel Filter/Water Separator

Drain water or other contaminants from fuel filter/water separator (Fig. 35) daily by loosening drain plug on filter canister. Tighten plug after draining. Replace filter canister after every 400 hours of operation.

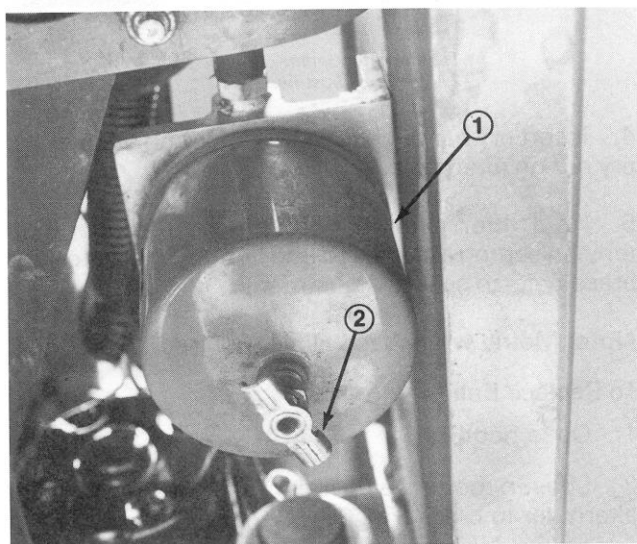


Figure 35

1. Fuel filter canister
2. Water drain

1. Clean area where filter canister mounts.
2. Remove filter canister and clean mounting surface.
3. Lubricate gasket on filter canister with 10W-40 SF-CC oil.
4. Install filter canister by hand until gasket contacts mounting surface, then an additional 1/2 turn.

Fuel Pump Filter

Remove and replace the filter after every 400 hours operation.

1. Fuel pump is located on inner frame at right rear of engine (Fig. 36).

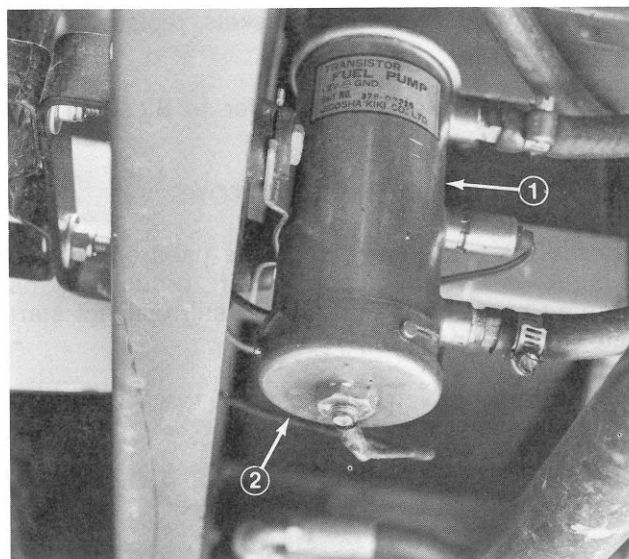


Figure 36

1. Fuel pump assembly
2. Fuel pump cover — unscrew

2. Thoroughly clean outside of assembly.
3. Place a drain pan under fuel pump and remove cover from fuel pump with 17 mm wrench (Fig. 37). Take care not to damage wire while removing cover.
4. Pull filter out of pump body (Fig. 37).



Figure 37

1. Filter
2. Magnet

5. If filter is to be cleaned, wash thoroughly in cleaning solvent and blow compressed air from inside toward outside of element. Hold air nozzle at least one inch (25 mm) from filter and move up and down while rotating filter. Do not exceed 100 psi (689 kPa) to avoid filter damage.

Note: Replace the filter if there is any visible dirt which cannot be washed out.

6. Clean magnet of any residue (Fig. 37), insert filter into body and install cover.

ENGINE MAINTENANCE

7. Inspect the two rubber gaskets; replace them if damaged.

8. Bleed the fuel system; refer to Bleeding Fuel System.

BLEEDING AIR FROM INJECTORS

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

1. Loosen the pipe connection to the No. 1 nozzle and holder assembly (Fig. 38).

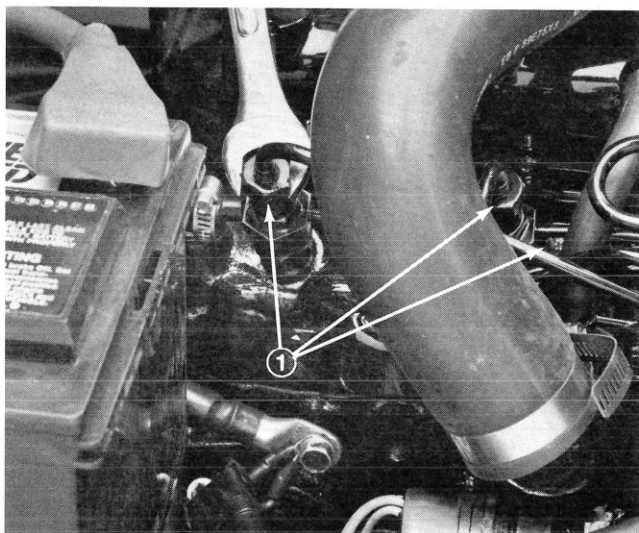


Figure 38

1. Fuel injectors (3)

2. Move throttle control to full FAST position.

3. Turn key in key switch to START position and watch fuel flow around connector. Turn key to OFF position when solid flow is observed.

4. Tighten pipe connector securely.

5. Repeat steps 1-4 on No. 2 and 3 nozzles.

SERVICING ENGINE BELTS

Check tension of all belts initially after the first day of operation and every 100 hours thereafter.

Alternator Belt

To Check Tension:

1. Open hood.

2. Check tension by depressing belt midway between alternator and crankshaft pulleys with 10Kg of force. Belt should deflect 7/16 in. (9 to 11 mm). If deflection is incorrect, proceed to step 3. If correct, continue operation.

3. Loosen bolt securing brace to engine and bolt securing alternator to brace (Fig. 39).

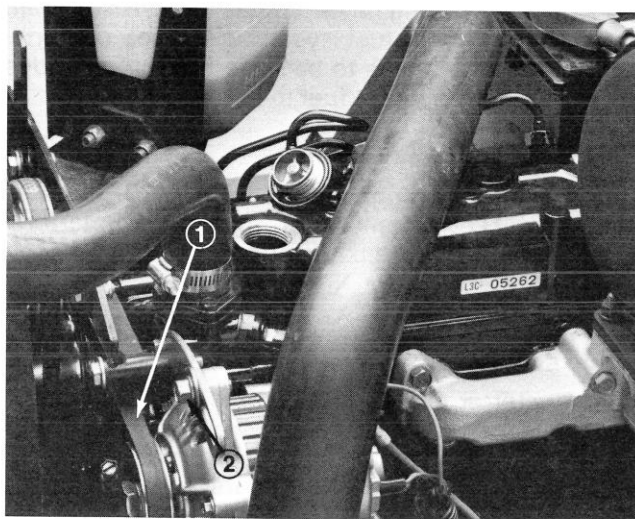


Figure 39

1. Alternator/water pump belt
2. Tension adjustment bolt

4. Insert pry bar between alternator and engine and pry out on alternator.

5. Hold alternator in position after proper belt tension setting is achieved and tighten alternator and brace bolts to secure adjustment.

Note: Metric wrenches will be required.

To Replace Belt:

1. Open hood.

2. Loosen bolts securing brace to engine and alternator to brace (Fig. 39).

3. Remove two capscrews holding the transmission drive shaft coupler to the engine pulley (Fig. 40). Do not remove the drive shaft from the transmission.

4. Bend the drive shaft out of the way so that the fan belt can be removed and a new belt installed. Install the new belt around the fan before positioning it around the drive pulley.

5. Reinstall the drive shaft. Tension the new belt. Close the hood.

6. Check the belt tension after one day's use.

Cooling Fan Belt

To Check Tension:

1. Open hood.

2. Loosen idler pulley bolts (Fig. 40). Put 10 lbs. of force on the top of idler pulley bracket and tighten the bolts.

3. Close hood.

ENGINE MAINTENANCE

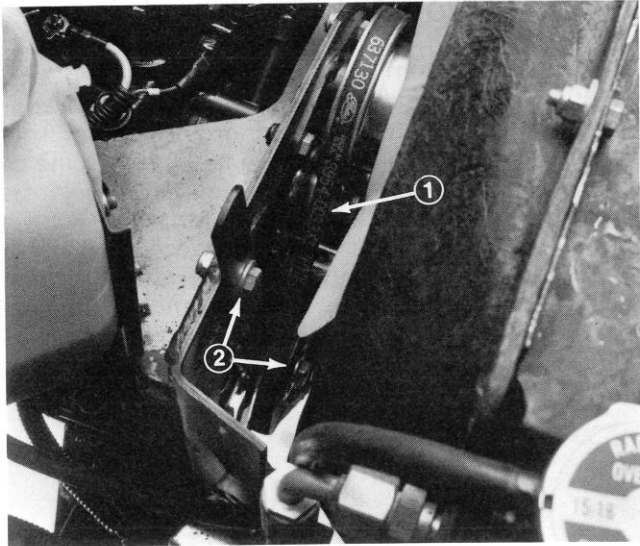


Figure 40

1. Fan belt
2. Belt tensioning bolts (2)

To replace belt:

1. Open hood. Loosen two flange nuts securing idler pulley bracket, slide pulley away from belt and remove belt from top and bottom pulleys (Fig. 40).
2. Install new belt and adjust for proper tension. Tighten flange nuts to secure idler pulley adjustment bracket (Fig. 40).
3. Close hood.

Note: Check fan belt tension after first day of operation. Readjust tension, if necessary. Follow regular maintenance check procedures thereafter.

PTO BELT

To Check Tension:

1. Turn engine off and remove the key. Set the parking brake. Raise the engine hood and allow the engine to cool.
2. Loosen the tensioning rod jam nut (Fig. 41).
3. Use a 1/2" wrench to tighten or loosen the belt tensioning spring (Fig. 41) to a length of 1-1/2" (38 mm).
4. Tighten jam nut.

To Replace Belt:

1. Turn off the engine and remove the key. Set the parking brake. Raise the hood and allow the engine to cool.
2. Loosen the tensioning rod jam nut (Fig. 41).
3. Using a 1/2" wrench, loosen the belt tensioning spring (Fig. 41) all the way.

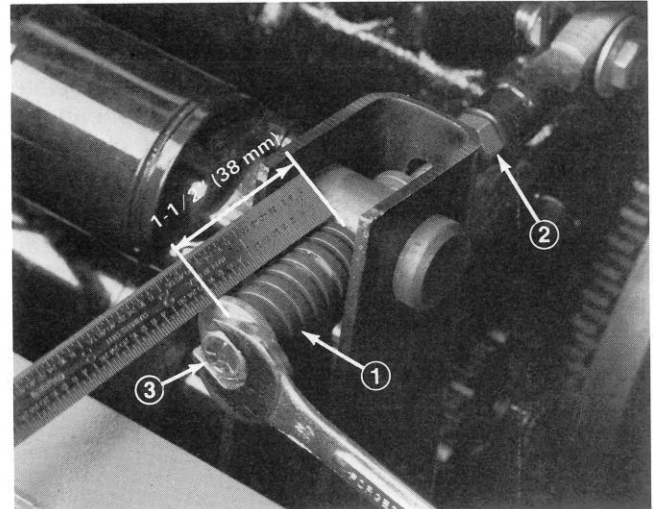


Figure 41

1. Tensioning spring
2. Tensioning rod jam nut
3. Tension adjusting bolt

4. Rotate PTO pulley toward the engine and remove the belt (Fig. 42).

5. Install the new PTO belt and retension the pulley spring to 1-1/2" (38 mm) (Fig. 41).

6. Tighten the jam nut (Fig. 41) and close the hood.

PTO CLUTCH ADJUSTMENT

The power take off electric clutch can be adjusted by following the following procedure:

1. Turn engine off and remove the key. Set the parking brake. Raise the engine hood and allow the engine to cool.
2. Remove the left hand clutch retainer bracket nut and bolt so that the retainer bracket rubber bumper can be removed (Fig. 42).

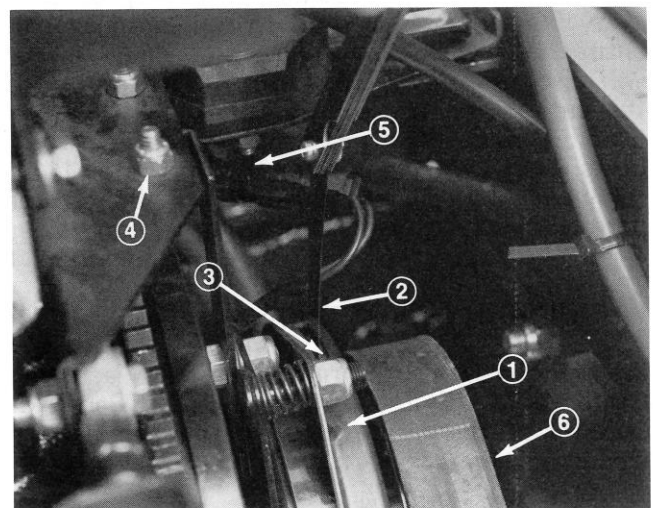


Figure 42

1. Clutch
2. .015" air gap (3)
3. Adjusting nut (3)
4. Left retainer bracket nut & bolt
5. Electrical connector
6. PTO belt

ENGINE MAINTENANCE

3. Unplug clutch electric connector (Fig. 42).
4. Adjust the air gap so that a .015 inch feeler gauge slides in between the clutch lining and friction plate with light pressure (Fig. 42). The gap can be decreased by turning the adjusting nut clockwise (Fig. 41).
5. Rotate the clutch by hand and adjust all three air gaps. After all three gaps have been set, check all three again. Adjusting one gap can alter the other gaps.
6. Reinstall the bracket and retaining nut and bolt. Reconnect the clutch electrical connector.

CHANGING COOLANT IN COOLING SYSTEM

The cooling system must be filled with a 50/50 solution of water and permanent ethylene glycol anti-freeze. After every two years, drain the coolant from the radiator, reservoir expansion tank and engine by opening the drain cock and block plug. After coolant is drained, flush the entire system and refill it with a 50/50 solution of water and anti-freeze. Capacity of cooling system is approximately 7 quarts (6.4 l). When filling, fill the radiator completely and fill the expansion tank to between the marks. **DO NOT OVERFILL.** Always install radiator cap securely.

ELECTRICAL MAINTENANCE

SERVICING BATTERY

IMPORTANT: Before welding on the machine, disconnect ground cable from the battery to prevent damage to the electrical system.

Note: Check battery condition weekly or after every 50 hours of operation. Keep terminals and entire battery case clean because a dirty battery will discharge slowly. To clean the battery, wash the entire case with solution of baking soda and water. Rinse with clear water. Coat the battery posts and cable connectors with Grafo 112X (Skin-over) grease, Toro Part No. 505-47 or petroleum jelly to prevent corrosion.

WIRING HARNESS SERVICE

Prevent corrosion of wiring terminals by applying Grafo 112X (Skin-over) grease, Toro Part No. 505-47, to the inside of all harness connectors whenever the harness is replaced.

Always disconnect battery cables, ground cable (—) first, to prevent possible wiring damage from short-outs whenever working with the electrical system.

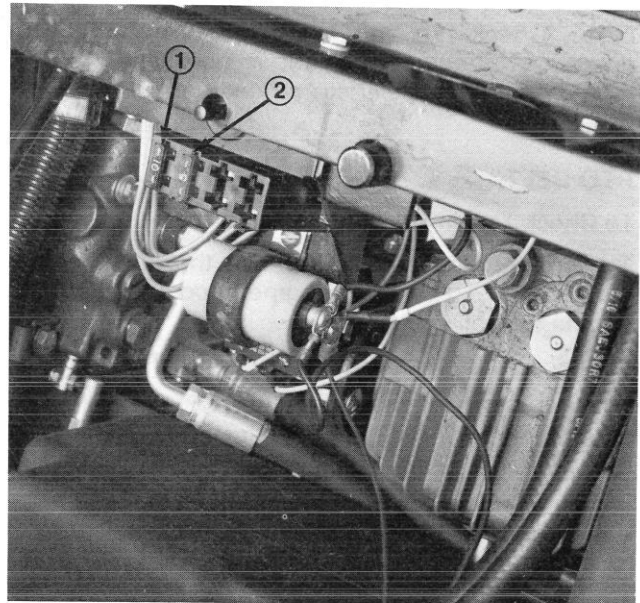


Figure 43

1. Safety switches and operations fuse
2. Accessories fuse

FUSES

Fuses are accessible under the seat plate (Fig. 43).

HYDRAULIC SYSTEM MAINTENANCE

ADJUSTING TRANSMISSION FOR NEUTRAL

The machine must not creep when traction pedal is released. If it does creep, an adjustment is required.

1. Park machine on a level surface and shut engine off. Depress only the right brake pedal and engage the parking brake.
2. Jack up left front side of machine until tire is off shop floor. Support machine with jack stands to prevent it from falling accidentally.
3. Visually inspect traction linkage for possible binding condition, correct if necessary and check machine operation. If condition still exists, repeat steps 1 and 2 and proceed to step 4.
4. Loosen two locknuts securing pump plate so plate is free to move (Fig. 44).
5. Start engine and rotate pump plate (Fig. 44) in either direction until wheel ceases rotation.

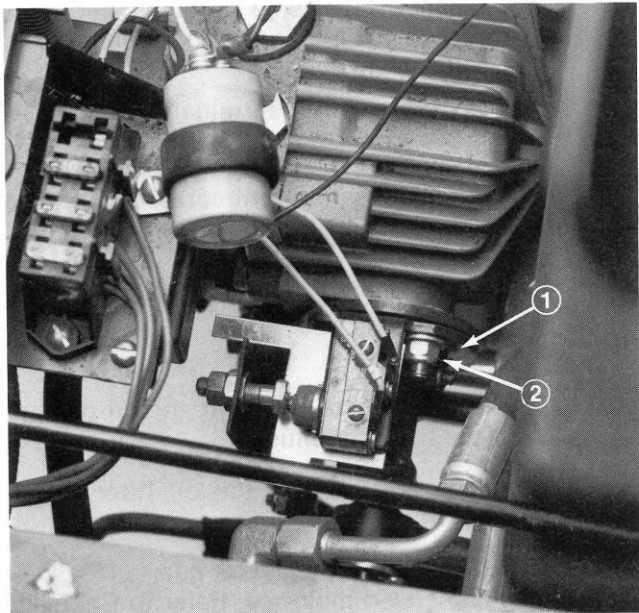


Figure 44

1. Safety switches and operations fuse
2. Accessories fuse

6. Stop engine and tighten locknuts to secure pump plate (Fig. 44).
7. Start engine and check adjustment. Repeat adjustment, if necessary.
8. Stop the engine and release right brake. Remove jack stands and lower machine to the shop floor. Test drive the machine to be sure it does not creep.

CHANGING HYDRAULIC OIL AND FILTER

The hydraulic system oil and filter must be changed after the first five hours and every 250 hours of operation or yearly, whichever comes first.

1. Lower cutting unit to shop floor, set parking brake, and turn engine OFF. Block the two rear wheels.
2. Jack up both sides of the front axle and support it with jackstands.
3. Clean the area around the hydraulic oil filter and remove the filter (Fig. 45).

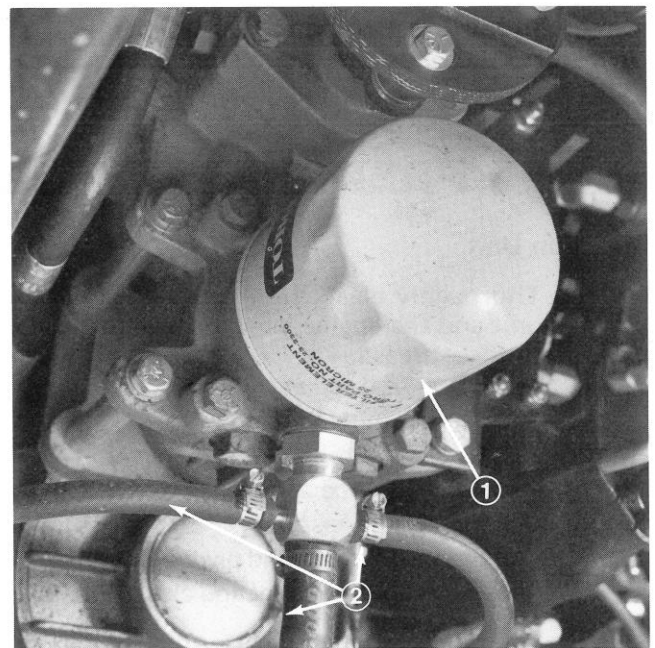


Figure 45

1. Hydraulic system filter
2. Hydraulic return lines

4. Remove the tube that connects the axle housing to the transmission and allow the oil to flow into a drain pan. Remove the jack stands.
5. Install new hydraulic oil filter and connect the tube between axle housing and transmission. Fill axle (reservoir) to proper level (approx. 5 qt); refer to Check Hydraulic System Fluid.
6. Start engine, cycle steering and lift cylinders, and check for oil leaks. Allow engine to run for about five minutes. Then shut engine off.
7. After two minutes, check level of transmission fluid; refer to Check Hydraulic System Fluid.

PRODUCT IDENTIFICATION

The traction unit has two identification numbers: a model number and a serial number that are stamped into a plate. The identification plate is located near the left brake pedal on the frame (Fig. 46). In any correspondence concerning the traction unit, supply the model and serial numbers to ensure 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 traction unit.
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.

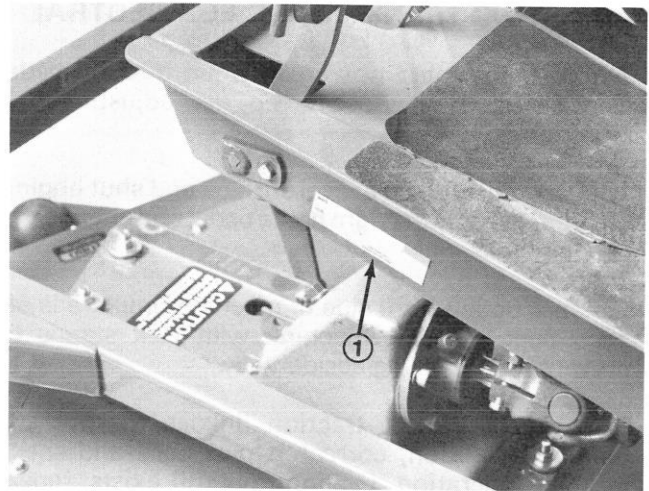


Figure 46

1. Model and serial ID plate

PREPARATION FOR SEASONAL STORAGE

Traction Unit

1. Thoroughly clean the traction unit, cutting unit and the engine, paying special attention to these areas:
 - radiator and radiator screen
 - underneath the cutting unit
 - under the cutting unit belt covers
 - counterbalance springs
 - P.T.O. Shaft Assembly
 - all grease fittings and pivot points
 - remove control panel and clean out inside of the control box
 - beneath seat plate and top of transmission
2. Check the tire pressure. Inflate all traction unit tires to 10 to 15 psi (69 to 103 kPa).
3. Remove, sharpen and balance the cutting unit's blades. Reinstall the blades and torque the blade fasteners to 75-100 ft-lb (102-136 N·m).
4. Check all fasteners for looseness; tighten as necessary.
5. Grease or oil all grease fittings, pivot points, and transmission by-pass valve pins. Wipe off any excess lubricant.
6. Lightly sand and use touch up paint on painted areas that are scratched, chipped or rusted. Repair any dents in the metal body.
7. Service the battery and cables as follows:
 - a. Remove the battery terminals from the battery posts.

- b. Clean the battery, terminals and posts with a wire brush and baking soda solution.
- c. Coat the cable terminals and battery posts with Grafo 112X skin-over grease (Toro Part Number 505-47), or petroleum jelly to prevent corrosion.
- d. Slowly recharge the battery every 60 days for 24 hours to prevent lead sulfation of the battery.

Engine

1. Drain the engine oil from the oil pan and replace the drain plug.
2. Remove and discard the oil filter. Install a new filter.
3. Refill the engine with 3.8 quarts (3.6 L) of recommended motor oil. Refer to Changing Crankcase Oil.
4. Start the engine and run at idle speed for two minutes.
5. Drain diesel fuel from the fuel tank, fuel lines, pump, filter and separator. Flush fuel tank with clean fuel and connect all fuel lines.
6. Thoroughly clean and service the air cleaner assembly.
7. Seal the air cleaner inlet and the exhaust outlet with weatherproof masking tape.
8. Check the oil filler cap and fuel tank cap to ensure they are all securely in place.

SERVICE INTERVAL CHART

Date								
Hour Meter Reading								
Service Interval	↓	Daily	5	10	25	50	75	100
Clean Radiator Screen	Daily							
Check Interlock System	Daily							
Check Engine Oil Level	Daily							
Check Transmission Oil Level	Daily							
Check Radiator and Coolant (more often when conditions are dirty)	Daily							
Check Water Separator	Daily							
Replace Hydraulic Oil Filter (Initial)	5							
Tighten Front Wheel Nuts (Initial)	2 & 10							
Check Brakes and Lubricate Cables	25							
Check Hoses, Lines, Fittings & Pump for Leaks	25							
Check Tire Pressure (12 psi - 83 kPa)	25							
Lubricate Grease Fittings & Oil	25							
Change Engine Oil Filter (Initial)	50							
Change Engine Oil	50							
Service Air Cleaner (Dust Cup & Baffle) (more often when conditions are dirty)	50							
Check Battery	50							
Check and Adjust PTO Drive Belt	50							
Change Engine Oil Filter (Regular)	100							
Check Engine Fan and Alternator Belt	100							
Check and Adjust Electric Clutch Gap	100							
Tighten Front Wheel Nuts	250							
Service Air Cleaner (Filter)	250							
Change Transmission Oil and Filter	250							
Check Steering	250							
Check Rear Wheel Toe-In	250							
Replace Fuel Filter	400							
Replace Fuel Pump Filter	400							
Check Fuel Lines and Connections	400							
Drain and Clean Fuel Tank	400							
Pack Rear Wheel Bearings	500							
Grease Transmission By-Pass Pins	500							
Replace all Interlock Switches (2 years)	1000							
Drain and Flush Cooling System (2 years)	1000							

Engine Oil: Use 10W-30 CD

Hydraulic System Fluid — 5 quarts (4.73 L) of SAE 10W-30 engine oil

Hydraulic Oil Filter — Toro part no. 23-2300

SERVICE INTERVAL CHART

Date								
Hour Meter Reading								
Service Interval	↓	Daily	5	10	25	50	75	100
Clean Radiator Screen	Daily							
Check Interlock System	Daily							
Check Engine Oil Level	Daily							
Check Transmission Oil Level	Daily							
Check Radiator and Coolant (more often when conditions are dirty)	Daily							
Check Water Separator	Daily							
Replace Hydraulic Oil Filter (Initial)	5							
Tighten Front Wheel Nuts (Initial)	2 & 10							
Check Brakes and Lubricate Cables	25							
Check Hoses, Lines, Fittings & Pump for Leaks	25							
Check Tire Pressure (12 psi - 83 kPa)	25							
Lubricate Grease Fittings & Oil	25							
Change Engine Oil Filter (Initial)	50							
Change Engine Oil	50							
Service Air Cleaner (Dust Cup & Baffle) (more often when conditions are dirty)	50							
Check Battery	50							
Check and Adjust PTO Drive Belt	50							
Change Engine Oil Filter (Regular)	100							
Check Engine Fan and Alternator Belt	100							
Check and Adjust Electric Clutch Gap	100							
Tighten Front Wheel Nuts	250							
Service Air Cleaner (Filter)	250							
Change Transmission Oil and Filter	250							
Check Steering	250							
Check Rear Wheel Toe-In	250							
Replace Fuel Filter	400							
Replace Fuel Pump Filter	400							
Check Fuel Lines and Connections	400							
Drain and Clean Fuel Tank	400							
Pack Rear Wheel Bearings	500							
Grease Transmission By-Pass Pins	500							
Replace all Interlock Switches (2 years)	1000							
Drain and Flush Cooling System (2 years)	1000							

Engine Oil: Use 10W-30 CD

Hydraulic System Fluid — 5 quarts (4.73 L) of SAE 10W-30 engine oil

Hydraulic Oil Filter — Toro part no. 23-2300

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Date								
Hour Meter Reading								
Service Interval	↓	Daily	5	10	25	50	75	100
Clean Radiator Screen	Daily							
Check Interlock System	Daily							
Check Engine Oil Level	Daily							
Check Transmission Oil Level	Daily							
Check Radiator and Coolant (more often when conditions are dirty)	Daily							
Check Water Separator	Daily							
Replace Hydraulic Oil Filter (Initial)	5							
Tighten Front Wheel Nuts (Initial)	2 & 10							
Check Brakes and Lubricate Cables	25							
Check Hoses, Lines, Fittings & Pump for Leaks	25							
Check Tire Pressure (12 psi - 83 kPa)	25							
Lubricate Grease Fittings & Oil	25							
Change Engine Oil Filter (Initial)	50							
Change Engine Oil	50							
Service Air Cleaner (Dust Cup & Baffle) (more often when conditions are dirty)	50							
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Change Engine Oil Filter (Regular)	100							
Check Engine Fan and Alternator Belt	100							
Check and Adjust Electric Clutch Gap	100							
Tighten Front Wheel Nuts	250							
Service Air Cleaner (Filter)	250							
Change Transmission Oil and Filter	250							
Check Steering	250							
Check Rear Wheel Toe-In	250							
Replace Fuel Filter	400							
Replace Fuel Pump Filter	400							
Check Fuel Lines and Connections	400							
Drain and Clean Fuel Tank	400							
Pack Rear Wheel Bearings	500							
Grease Transmission By-Pass Pins	500							
Replace all Interlock Switches (2 years)	1000							
Drain and Flush Cooling System (2 years)	1000							

Engine Oil: Use 10W-30 CD

Hydraulic System Fluid — 5 quarts (4.73 L) of SAE 10W-30 engine oil

Hydraulic Oil Filter — Toro part no. 23-2300

The Toro Promise

A LIMITED WARRANTY

The Toro Company promises to repair your Model 30794 TORO GROUNDMASTER® MOWER, and its originally purchased cutting unit, if defective in materials or workmanship. The following time periods from the date of purchase apply:

Model 30794 Two Years or 1500 operational hours,
whichever comes first.

The costs 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, Minnesota 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 MERCHANTABILITY AND FITNESS FOR USE ARE LIMITED TO THE DURATION OF THE EXPRESS WARRANTY.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

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. Regular, routine maintenance of the unit to keep it in proper 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. This warranty shall be declared void if the owner removes, disconnects, or in any way alters the operation of the products hour meter.

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.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion 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.

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.