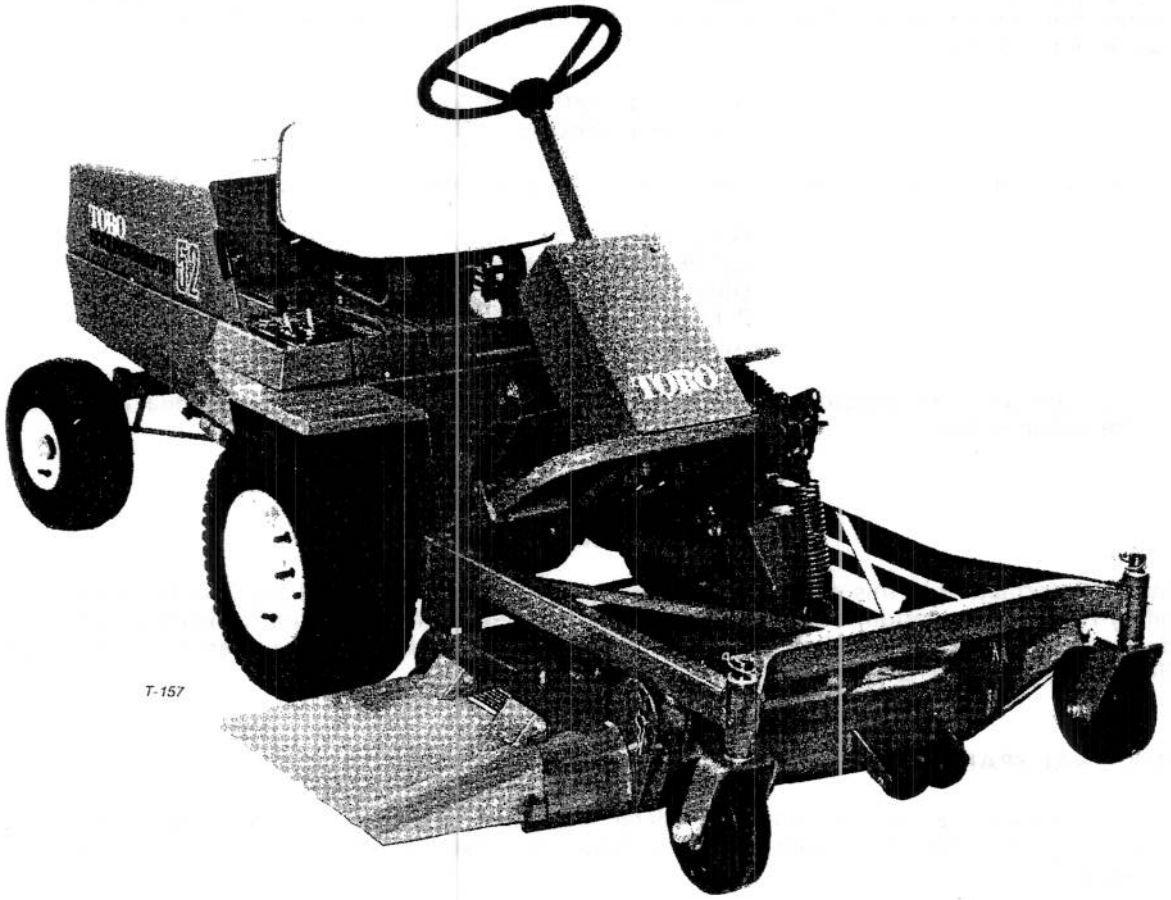
FORM NO. 3311-658 Rev. A

TORO®

TRACTION UNIT MODEL: 30775-10001 & UP
CUTTING UNIT MODEL: 30555-10001 & UP

OPERATOR'S MANUAL

GROUNDSMASTER 52®



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The GROUNDSMASTER 52 conforms to the American National Standards institute's safety standards for riding mowers; thus, Toro proudly displays the ANSI safety seal.

TORO
THIS UNIT CONFORMS TO ANSI B71.1b-1977

To assure maximum safety, optimum performance, and to gain knowledge of the machine, it is essential that you or any other operator of the machine read and understand the contents of this manual before the engine is started. Pay particular attention to the instructions highlighted by the triangular safety alert symbol. Failure to comply with the safety instructions may result in personal injury.

FOREWORD

The GROUNDSMASTER 52 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 GROUNDSMASTER 52 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. Operating Instructions
5. Maintenance

The engine, hydrostatic transmission and axle are not covered in great detail in this manual. However, service manuals are available from the respective manufacturers. An engine service manual (part no. 270962) can be obtained from:

Briggs and Stratton Corporation
Milwaukee, Wisconsin 53201

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

Dana Corporation
Spicer Clutch Division
Diversified Products
P. O. Box 191
Auburn, Indiana 46706

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

Sundstrand Corporation
2800 East 13th Street
Ames, Iowa 50010

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 possiblity of damaging a part or parts of the machine. NOTE identifies general information worthy of special attention.

OPTIONAL SPARK ARRESTER

In some areas there are local, state or federal regulations requiring that a spark arrester be used on the engine of this mower. If a spark arrester is required, order the following parts from your local Briggs-Stratton Dealer:

(1) 392390 Spark Arrester Assembly

These parts are approved by the United States Department of Agriculture and Forestry. The approval number for the exhaust system is 392154.

When mower is used or operated on any California forest, brush or grass covered land, a working order spark arrester must be attached to muffler. If not, the operator is violating state law, Section 4442 Public Resources Code.

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

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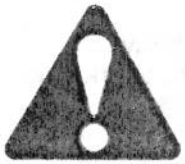
SAFETY INSTRUCTIONS



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 following instructions are comparable to the "Safe Operating Practices for Riding Vehicles" adopted by ANSI – American National Standards Institute B71.1b-1977. The GROUNDSMASTER 52 is designed and tested to offer reasonably safe service. Failure to operate the machine in accordance with these Safety Instructions MAY RESULT IN PERSONAL INJURY.

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, Minnestoa 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 lever is in DISENGAGE position.

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

   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. Install gasoline 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 is in disengage 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, disengage PTO 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, disengage PTO, move throttle to SLOW, set parking brake and shut engine off. Remove key from switch and disconnect high tension wire from spark plug 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 stop suddenly.

17. Do not touch engine, muffler or its adjacent shroud 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 disengage the PTO.

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 and disconnect high tension wire from spark plug 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. Ask about Mobile Service Maintenance.

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. 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 and other moving parts.

25. Do not overspeed the engine by changing governor settings. Maximum engine speed (with engine coupled to transmission) is 3200-3300 rpm. To ensure safety and accuracy, have an Authorized TORO Distributor check maximum engine speed with a tachometer.

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

27. At the time of manufacture, the GROUNDSMASTER 52 conformed to safety standards in effect for riding mowers. Therefore, to assure optimum performance and safety, always purchase genuine TORO replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous. Such use could void the product 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. DISENGAGE ATTACHMENT CLUTCH.**
   - **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

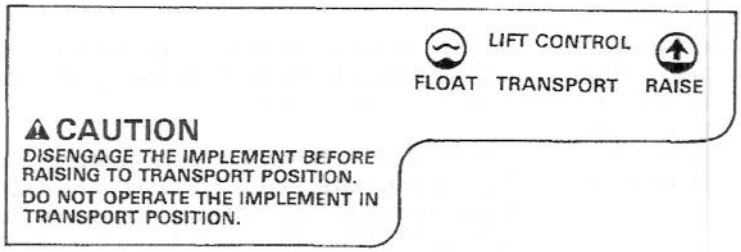
The following decals are installed on the machine. If any become damaged or illegible, replace it. The decal part number is listed below and in your parts catalog. Replacement can be ordered from your Authorized Toro Distributor.

⚠CAUTION
STOP ENGINE BEFORE ADDING FUEL OR LIFTING HOOD.
FOR SERVICE INFORMATION SEE OPERATORS MANUAL.
READ AND UNDERSTAND OPERATORS MANUAL BEFORE OPERATING THIS MACHINE.
REPLACEMENT MANUAL AVAILABLE BY SENDING COMPLETE MODEL NUMBER TO: THE TORO CO., 8111 LYNDALE AVE. MINNEAPOLIS, MINN. 55420

LEFT SIDE OF SEAT (Part No. 27-4620)



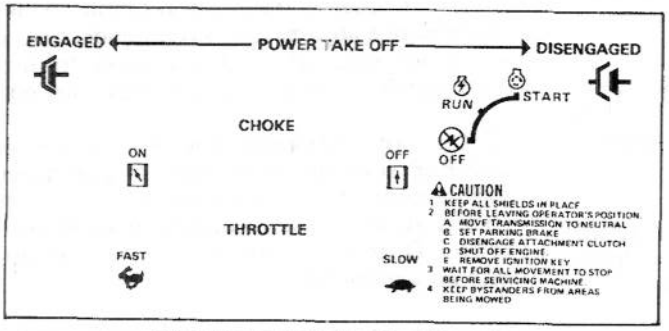
TOP ENGINE COVER
(Part No. 28-1530)



AROUND LIFT CONTROL LEVER (Part No. 27-4390)



ALONGSIDE FUEL TANK (Part No. 27-7310)



CONTROL PANEL (Part No. 27-4450)

DO NOT STEP
⚠CAUTION
ROTATING BLADES UNDER ENTIRE MOWER DECK. KEEP HANDS AND FEET AWAY. DO NOT REMOVE DEFLECTOR CHUTE.
BLADE LINE

ON RIGHT SIDE OF CUTTING UNIT
(Part No. 40-5730)

⚠CAUTION
BLADE RETAINING BOLTS MUST BE TORQUED TO 75-100 ft/lbs.
CHECK BLADE BOLT TORQUE AFTER STRIKING ANY SOLID OBJECT.

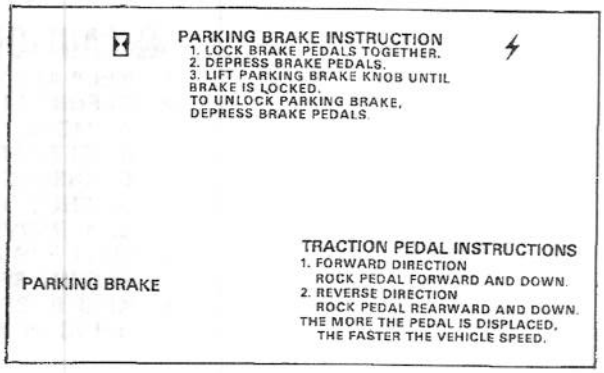
RIGHT FRONT OF CUTTING UNIT (Part No. 26-7960)

⚠CAUTION
ROTATING BLADES UNDER ENTIRE MOWER DECK.
KEEP HANDS AND FEET AWAY.

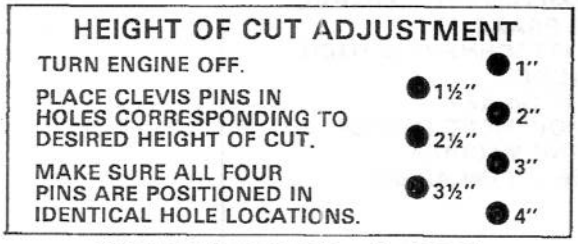
LEFT REAR CORNER OF CUTTER HOUSING
(Part No. 26-7970)

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

FORWARD OF LIFT LEVER (Part No. 28-3290)



AROUND STEERING COLUMN (Part No. 41-8910)



ON LEFT BELT COVER (Part No. 42-6860)

SPECIFICATIONS

Engine:
Manufacturer – Briggs & Stratton.
Model – 326437 Type – 0262 01
Horsepower – 16 (12 kw) @ 3600 RPM.
Torque – 25.8 lb-ft (35.1 N·m) @ 2700 RPM.
Displacement – 32.4 cu. in. (531 cc).
Crankcase Capacity – 2 qt (1.89 L).
Governor – Mechanical.
Governor Limit – 3200-3300 RPM.
Idle Speed – 1700-1800 RPM.
Spark Plug – Champion RCJ-8.
Air Gap – 0.030 in. (0.76 mm).

Air Cleaner: Donaldson heavy duty with pre-cleaner. Remote mounted.

Fuel Tank Capacity: 6 gal (22.7 L).

Electrical:
Battery – 12 volt, 66 plate, 61 amp. hr.
Alternator – 60 to 100 Watt AC lighting circuit.

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

Transmission:
Manufacturer & Type – Sundstrand hydrostatic, Type U.
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. Used as hydraulic reservoir with approx. 5 qt. (4.7 L) capacity. Mates directly with 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:
Wheels – demountable type.
Front Tires – 20 x 8.00 x 10.
Rear Tires – 15 x 6.00 x 6.
All tires 4 ply rating, tubeless type.
(Pressure – 10-15 psi (69-103 kPa).

Steering: 15 in. (38 cm) steering wheel. Saginaw Automotive steering gear assembly.

Main Frame: Frame is welded, formed steel, reinforced with square tubing.

Gauges: Hour meter and ammeter are mounted on steering tower console.

Controls: Throttle, choke, PTO lever, parking brake, implement lift and ignition switch are all hand-operated. Traction pedal and brakes are foot operated.

PTO Drive: 1 in. (25 mm) diameter, splined PTO shaft is driven by two tight-slack "A" section V-belts directly from engine output shaft. PTO shaft clutched by pivoting PTO shaft support with spring loaded, over-center hand operated lever. PTO speed – 2269 RPM @ 3300 RPM engine speed.

Implement connection – Weasler universal joint and telescoping shaft assembly.

Lift Cylinders: Two, with 1-1/2 in. (38 mm) bore, 4 in. (102 mm) stroke.

Control Valve: Equipped with load check valves to prevent settling of implement.

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

Cutting Unit (Model 30555):
Carrier Frame – 11 ga. (3 mm) high strength, low alloy channels provide strength and flexibility.

Cutting unit – Front mounted rotary with three 18 in. (45.7 cm) long, 3/16 in. (4.8 mm) thick blades providing 51-3/4 in. (131.5 cm) width of cut. Blade tip speed is 15,764 ft/min (81.081 m/s). Height-of-cut adjustable from 1-4 in. (25-102 mm) in 1/2 in. (13 mm) increments. WHIRLWIND ® housing, with right hand discharge, is 5 in. (12.7 cm) deep, 12 ga (2.64 mm) thick.

Castor Wheels -- Two 8 in. (20.3 cm) diameter wheels with greasable roller bearings.

Counterbalance Spring – Between cutting unit and prime mover. Provides better cutting unit flotation and more traction on prime mover. Adjustable for height-of-cut changes and ground conditions.

Cutting Unit Drive – PTO driven gear box with spiral bevel gears transmits drive through "AA" section belt to all spindles. 1 in. (25 mm) spindles turn in 1 in. (25 mm) two row, greasable tapered roller bearings. Belt idler with self-tensioning high compression rubber bushing maintains belt tension.

Cutting Unit Performance – At 5 mph (8 km/hr) can mow up to 18 acres (72 843.7 m^2) in an 8 hour day (2.2 acres or 8 903 m^2/hr). Cutting unit offset 10-1/4 in. (26 cm) on left side of traction unit; 12 in. (30.5 cm) circle of uncut grass left after a full left turn.

SPECIFICATIONS

Dimensions and Weight (approx):

Traction Unit	Length:	74 in. (1.88 m)
	Width:	42 in. (1.067 m)
	Height:	47 in. (1.194 m)
	Weight:	770 lb (349.3 kg)
Cutting Unit	Width:	65 in. (1.651 m)
	Weight:	220 lb (99.8 kg)
Traction Unit and Cutting Unit	Length:	97-1/2 in. (2.477 m)
	Width:	65 in. (1.651 m)
	Height:	47 in. (1.194 m)
	Weight:	980 lb (444.5 kg)

OPTIONAL EQUIPMENT:

Cutting Unit – Model No. 30555; See above.

V-Plow – Model No. 30750.

V-Plow Mounting Kit – Model No. 30755 (Required for mounting V-Plow). Consists of push arm, Attaching brackets and tire chains.

Wheel Weights – Model No. 30762. 100 lb (45.4 kg).

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

Tire Chains – Part No. 28-5470. 20 lb (9.07 kg).

Standard Seat Kit – Model No. 30765.

Deluxe Seat Kit – Model No. 30766.

48 in. (1.219 m) Snowthrower – Model No. 30570.

48 in. (1.219 m) Snowthrower Adapter Kit – Model No. 30572.

Note: The following parts are required to mount a snowthrower, V-Plow or broom to a Model 30775 traction unit. The lift arm is not required to install the V-Plow.

Part No.	Description	Qty
27-4270	Lift Arm	1
27-5270	Brake Spring Strap	2
3272-12	Cotter Pin	2

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
Dust Cover	1	Install on steering column.
Steering Wheel	1	Mount on steering shaft.
Cap-steering wheel	1	Install in wheel.
Roll Pin 1/4 x 2-1/2 in. (64 mm)	1	Secure steering wheel.
Universal Joint	1	Install on PTO shaft.
Roll Pin	2	Secure U-joint to PTO & implement shaft.
Castor Wheel Assembly	2	Install in frame.
Thrust Washer	8	Install on castor wheel shafts.
Lynch Pin	2	Install in top hole of castor shafts.
Frame	1	Install on traction unit.
Pivot Pin	2	Secure frame to traction unit.
Capscrew 1/4-20 x 1/2 in. (13 mm)	2	
Flatwasher 1/4 x 0.080 in. (2.03 mm)	2	Secure pivot pins
Lockwasher 1/4 x 0.062 in. (1.57 mm)	2	
Cylinder Pin	2	Secure frame to lift cylinders.
Cotter Pin 3/16 x 1-1/2 in. (38 mm)	4	Secure cylinder pins.
Spring Bracket	1	Mount to traction unit.
Capscrew 3/8-16 x 2 in. (51 mm)	2	Secure spring bracket to traction unit.
Lockwasher 3/8	2	
Nut 3/8-16	2	
Clevis Pin	1	Install in spring bracket.
Spacer	1	Install on clevis pin.
Hair Pin	1	
Extension spring	1	Install on clevis pin and cutting unit.
Operator's Manual	1	
Parts Catalog	1	
Registration Card	1	
Set-Up Report Card	1	

SET-UP INSTRUCTIONS

INSTALL STEERING WHEEL

1. Move rear wheels so they point straight ahead.

2. Slide steering wheel onto steering shaft and assure small cutout in hub, which accomodates the tab on the steering cap, points toward the seat.

3. Secure steering wheel in place with roll pin (Fig. 1).

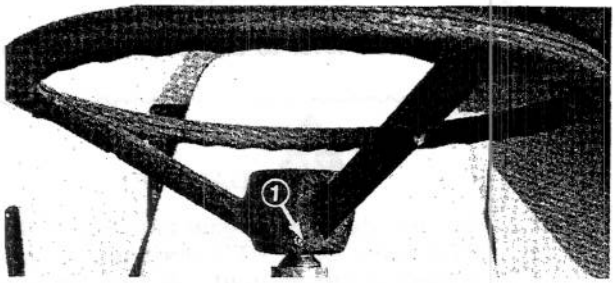


Figure 1

1. Roll pin

4. Insert tab of steering cap into cutout in steering wheel hub. Then continue to press cap into groove in the hub.

INSTALL STANDARD SEAT

1. Loosely secure seat springs to seat with (4) capscrews and lockwashers (Fig. 2).

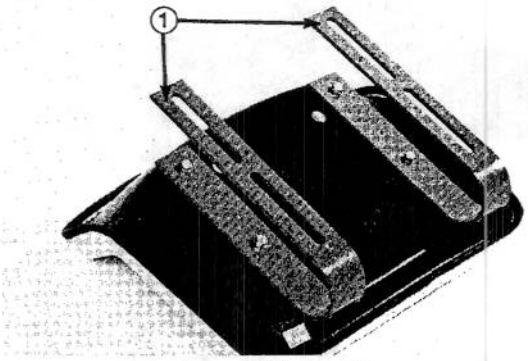


Figure 2

1. Seat springs

2. Mount seat and springs to rear holes in mount plate with (2) shoulder bolts, flatwashers and locknuts (Fig. 3).

3. Secure front slots of seat springs to mount plate with adjustment handles and flatwashers (Fig. 3).

4. When seat is adjusted to desirable position, tighten all fasteners.

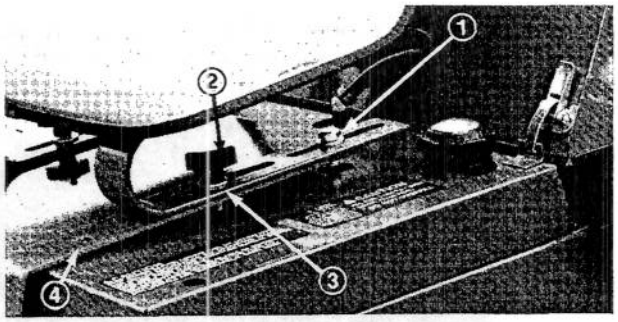


Figure 3

1. Shoulder bolt, flatwasher, locknut
2. Adjustment handle
3. Flatwasher
4. Mount plate

INSTALL SUSPENSION SEAT

1. Tip seat mount forward.

2. Disengage hood latches and open the hood.

3. Remove knob from lift lever.

4. Remove capscrews, lockwashers and flatwashers securing seat support cover to frame. Lift seat support cover off frame.

5. Unplug seat switch. Remove capscrews, lockwashers and flatwashers securing seat support to top of frame.

6. Insert plastic pin into end of seat pin (Fig. 4).

7. Secure spring and pin to seat support bracket by compressing spring and inserting roll pin through pin (Fig. 4).

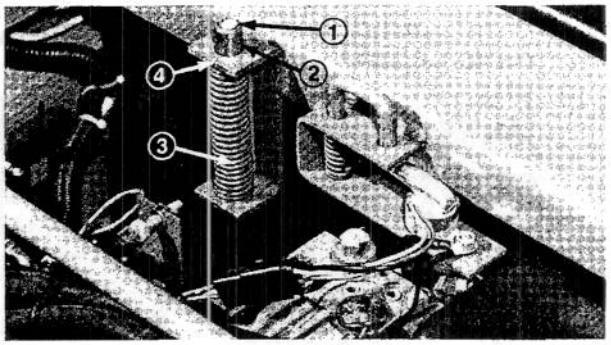


Figure 4

1. Plastic pin
2. Pin
3. Spring
4. Roll pin (not shown)

8. Reinstall seat support with capscrews, lockwashers and flatwashers. Connect seat switch.

9. Slide seat support cover onto the lift lever and position the cover on the frame. Secure seat support cover in place with capscrews, lockwashers and flatwashers.

10. Install knob onto lift lever.

11. Unsnap rubber bellows and mount seat suspension to seat mount with (4) capscrews, lockwashers and nuts (Fig. 5).

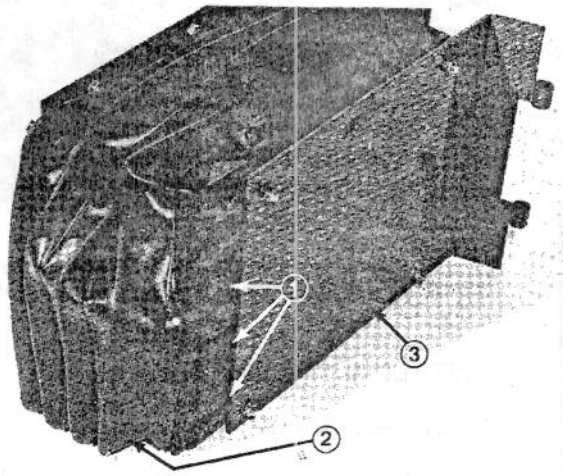


Figure 5

1. Snaps
2. Bellows
3. Seat mount

12. Resnap bellows in place.

13. Slide seat onto track of suspension by releasing track latch.

INSTALL UNIVERSAL JOINT

1. Jack left wheel up off shop floor. Support the axle with a jackstand to prevent machine from falling accidentally.

2. Remove five wheel nuts and slide left wheel off axle to expose access holes in chassis frame (Fig. 6).

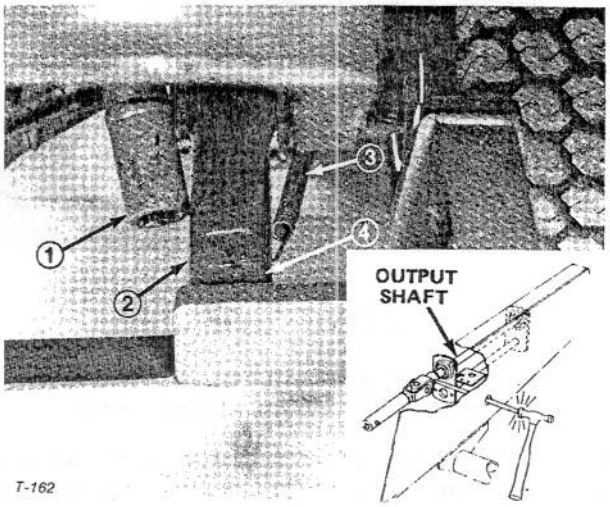


Figure 6

1. PTO shaft
2. Frame
3. Brake return spring
4. Slotted hole

3. Push PTO lever forward until pulley and brake disengage. Align hole in PTO shaft with hole in output shaft. Then slide PTO shaft onto output shaft (Fig. 6).

4. Through access hole in chassis, drive roll pin into PTO shaft and output shaft with pin punch and ball peen hammer (Fig. 6 Inset).

5. Install the left wheel with five wheel nuts. Tighten nuts to 60-80 ft-lb (81-109 N·m).

6. Return PTO lever to DISENGAGE position.

DANGER

Do not start the engine and engage the PTO lever when PTO shaft is not connected to cutting unit gear box because the PTO shaft will rotate with enough force to cause serious injury.

INSTALL CUTTING UNIT SUSPENSION FRAME

1. Remove Lynch Pins and two thrust washers from each castor wheel assembly. Leave two thrust washers on each shaft, insert shafts into frame, install thrust washers and Lynch pins (Fig. 7).

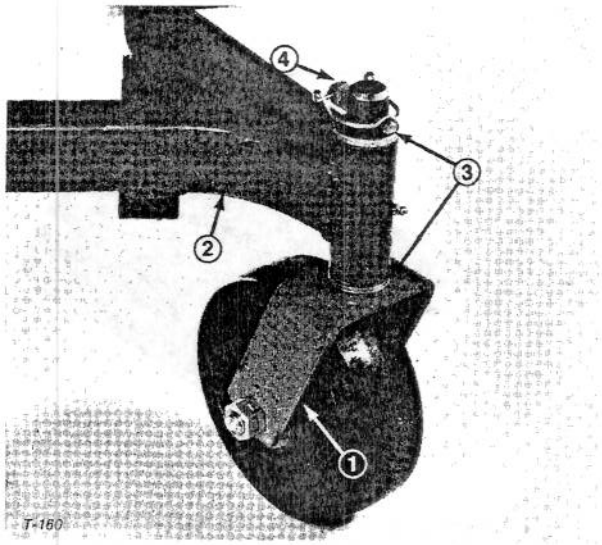


Figure 7

1. Castor wheel assembly
2. Frame
3. Thrust washers
4. Lynch pin

2. Slide frame under traction unit, align frame holes with axle bracket holes, insert pivot pins and secure with capscrews, flatwashers, and lockwashers (Fig. 8).

SET-UP INSTRUCTIONS

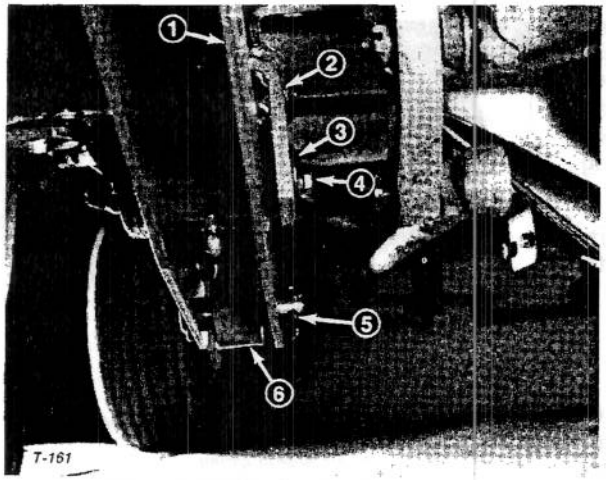


Figure 8

1. *Frame*
2. *Axle bracket*
3. *Pivot pin*
4. *Capscrew*
5. *Cylinder pin*
6. *Cylinder end*

3. Align frame holes with cylinder rod hole, insert pin and secure with cotter pin (Fig. 8).

4. Hook brake return springs into slotted holes in frame (Fig. 6).

INSTALL SPRING BRACKET TO TRACTION UNIT

1. Assemble bracket to frame and secure with capscrews, lockwashers and nuts (Fig. 9).

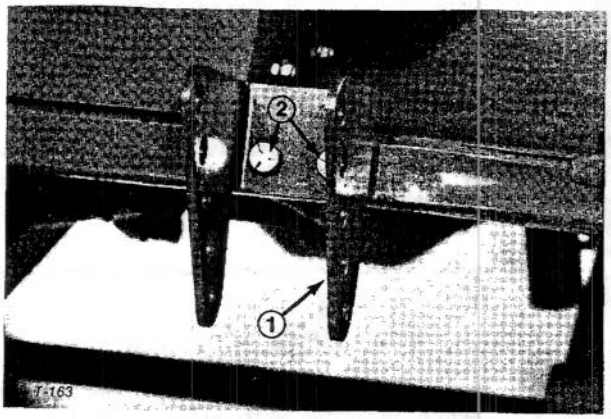


Figure 9

1. *Bracket*
2. *Capscrew, lockwashers and nuts*

INSTALL CUTTING UNIT

Note: Engine must be serviced, battery activated, hydraulic system checked, etc., so suspension frame can be raised. Follow procedures in Before Operating and Controls sections and Starting/ Stopping engine in Operating Instructions section before following steps below.

1. Make sure PTO shaft on traction unit clears cutting unit frame, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, start engine and raise frame (Fig. 6).

2. Stop engine, remove clevis pins and hairpins from forward and rear height-of-cut brackets (Fig. 12), install cutting unit under frame, align gearcase input shaft with PTO shaft and install shaft (Fig. 10).

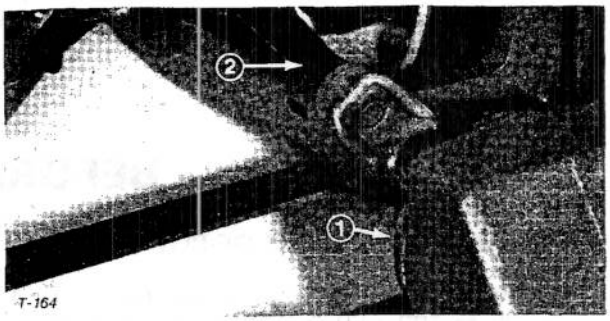


Figure 10

1. *Gearcase*
2. *PTO shaft*

3. Lower frame, align PTO shaft hole with gearcase input shaft hole and install roll pin (Fig. 11).

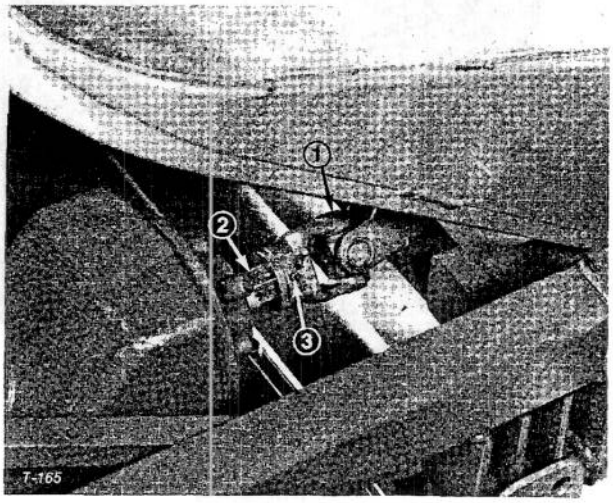


Figure 11

1. *PTO shaft*
2. *Gearcase input shaft*
3. *Roll pin*

4. Install clevis pin through forward center height-of-cut bracket holes and frame to secure cutting unit to frame (Fig. 12). Secure all four pins with hairpins (Fig. 12).

SET-UP INSTRUCTIONS

5. Start engine and raise cutting unit. Install rounded end of extension spring into hole in gear box base, insert long hook end of spring into center groove of spacer, align spacer and spring with center bracket holes and insert clevis pin through center bracket hole, spacer and spring (Fig. 12). Secure assembly with hairpin (Fig. 12).

6. Lower cutting unit. Grease all lubricating fittings and check level of oil in gearcase; refer to Lubrication Maintenance, page 19.

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).

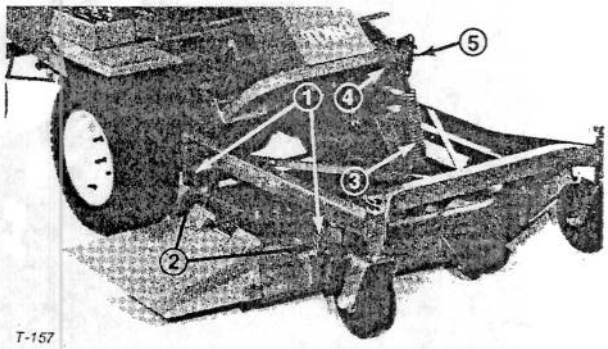


Figure 12

1. Forward center bracket holes
2. Clevis pins and hairpins
3. Extension spring
4. Clevis pin, spacer and hairpin
5. Center bracket hole

BEFORE OPERATING

ADJUSTING HEIGHT-OF-CUT

The height-of-cut is adjustable from 1 to 4 inches (25 to 102 mm) in 1/2 inch (13 mm) increments, by relocating four clevis pins in different hole locations in brackets at each corner of the cutting unit (Fig. 13).

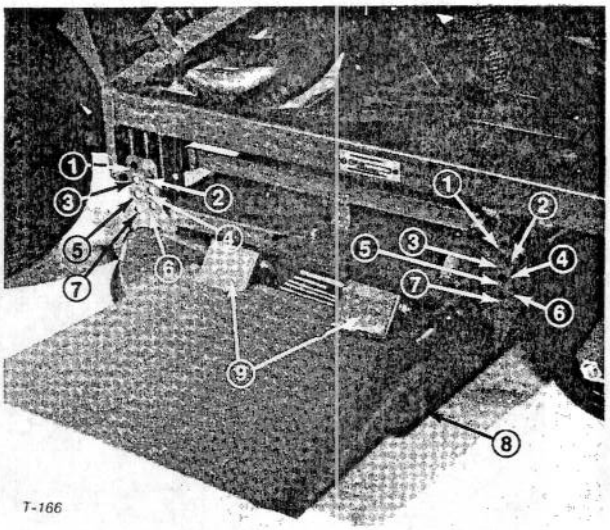


Figure 13

1. 1 in. (25 mm)
2. 1-1/2 in. (38 mm)
3. 2 in. (51 mm)
4. 2-1/2 in. (64 mm)
5. 3 in. (76 mm)
6. 3-1/2 in. (89 mm)
7. 4 in. (102 mm)
8. Grass deflector)
9. Spring hinges

Note: All four pins should be in identical hole locations to prevent any operating and cutting difficulties.

Note: If cutting unit is to be used in 1 in. (25 mm) or 1-1/2 in. (38 mm) height-of-cut setting, rear cutting unit rollers must be repositioned in the top bracket holes.

1. Remove cotter pins from roller shafts.

2. Slide shafts out of lower bracket holes, align rollers with top holes and install shafts.

3. Install cotter pins to secure assemblies.

ACTIVATE AND CHARGE BATTERY

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.

CAUTION

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

2. Remove battery from machine, remove filler caps from battery and slowly fill each cell until electrolyte is just above the plates.

3. 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.

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

5. 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.

INSTALL BATTERY

1. Mount battery on base plate (Fig. 14).

2. Install battery hold down clamp and secure with wing nuts.

Note: Position the positive battery cable between the battery case and the hold down bolt (Fig. 14).

3. Slip battery boot over positive battery cable.

4. Connect the positive battery cable (red) from the starter solenoid to the positive post (+) of the battery. Secure with wrench, coat terminal with petroleum jelly and slide boot over terminal. Be sure the cable will clear any other parts of the machine which could cause wear or damage to the cable.

5. Connect the black ground cable to the negative (–) post of battery. Secure with wrench, coat terminal with petroleum jelly.

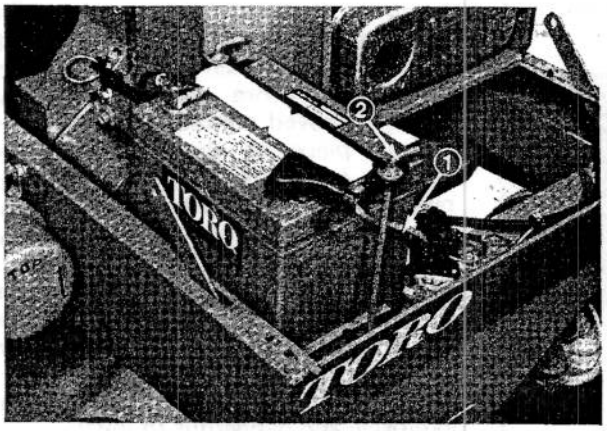


Figure 14

1. Positive battery cable 2. Hold down bolt

CHECK CRANKCASE OIL

The Briggs and Stratton engine is shipped with 4 pints (1.89 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. Disengage hood latches and open the hood.

3. Remove dipstick and wipe it with a clean rag. Push dipstick down into the filler neck and make sure it is seated fully. Pull dipstick out of filler neck and check level of oil (Fig. 15). If oil level is low, add enough oil to raise level to FULL mark on dipstick.

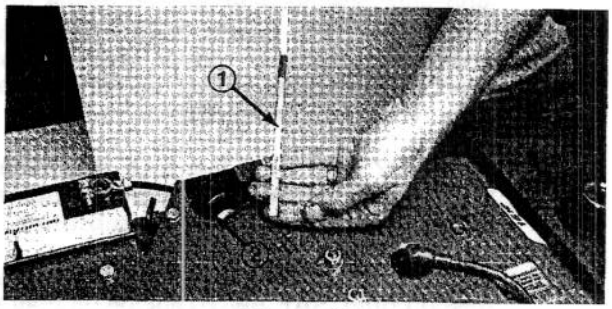


Figure 15

1. Dipstick 2. Filler neck

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

4. Pour oil into filler neck until level is at the FULL mark on dipstick. The Briggs and Stratton engine uses any high-quality detergent oil having the American Petroleum Institute – API – "service classification" MS, SC, SD, or SE. Oil viscosity – weight – must be selected according to anticipated ambient temperature. Temperature/viscosity recommendations are:

A. Above +40°F (4°C) – Use SAE 30, and if it is not available, 10W-30 and 10W-40 are acceptable substitutes.

B. From +40°F to 0°F (4°C to -18°C) – Use SAE 5W-20 or 5W-30, and if they are not available, SAE 10 and 10W-30 are acceptable substitutes.

C. Below 0°F (-18°C) – Use SAE 10 or 10W-30 diluted 10% with kerosene.

IMPORTANT: Check level of oil every 5 operating hours or daily. Initially, change oil after the first 5 hours of operation; thereafter, under normal conditions, change oil after every 25 hours of operation. However, change oil more frequently when engine is operated in extremely dusty or dirty conditions.

5. Since pressure in the crankcase operates the fuel pump, make sure dipstick is seated tightly in the filler neck. Apply a film of oil on the O-ring to ensure a good seal. If the dipstick and filler neck do not seal, the fuel pump may not function properly. Furthermore, the engine will use excessive amounts of oil. Therefore, be sure dipstick is seated in oil filler neck.

CHECK HYDRAULIC SYSTEM FLUID

The hydraulic system is designed to operate on SAE 10W-30 engine oil or, as a substitute, SAE 5W-20, SAE 10W-40 engine oil or type A automatic transmission 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 or 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.

1. Position machine on a level surface, raise the cutting unit and stop the engine.

2. Remove dipstick cap (Fig. 16) 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. 16), add SAE 10W-30 engine oil, or, if used, automatic transmission fluid to raise level to groove mark. Do not overfill.

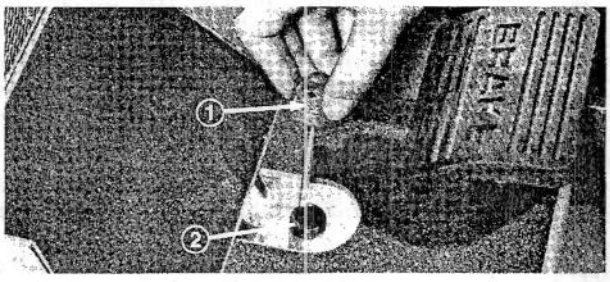


Figure 16

1. Dipstick 2. Filler neck

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.

CHECK GEAR BOX OIL

The gear box is designed to operate with SAE 10W-40 oil. Although the gear box is shipped with oil from the factory, check the level before operating the cutting unit; refer to Lubrication Maintenance, page 19.

FILL FUEL TANK WITH GASOLINE

The Briggs and Stratton engine runs on either leaded regular or low lead gasoline. Do not mix oil with gasoline because engine damage and poor performance will likely result. The use of premium gasoline, white gas and gasoline additives is not recommended.

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 filing 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 1 inch (25 mm) below the 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.

BEFORE OPERATING

1. Tip seat forward and prop it so it cannot fall accidentally. Using a clean rag, clean area around fuel tank cap (Fig. 17).

2. Remove cap from the fuel tank and fill the 6 gallon (22.7 L) tank to within 1 inch (25 mm) from the top with leaded regular or low lead gasoline. Install fuel tank cap tightly.

3. Wipe up gasoline that may have spilled to prevent a fire hazard. Remove support from under seat and allow seat to pivot back to its normal position.

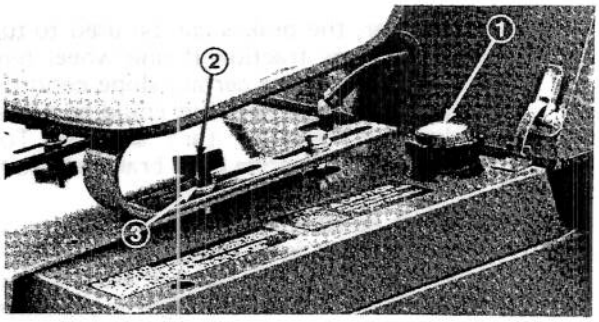


Figure 17

1. Fuel tank cap
2. Adjustment handle
3. Washer

CONTROLS

Parking Brake (Fig. 18) — 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. 19) on right brake pedal between the left brake and its lock tab. Next, push down fully on both pedals and pull parking brake knob out; 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.

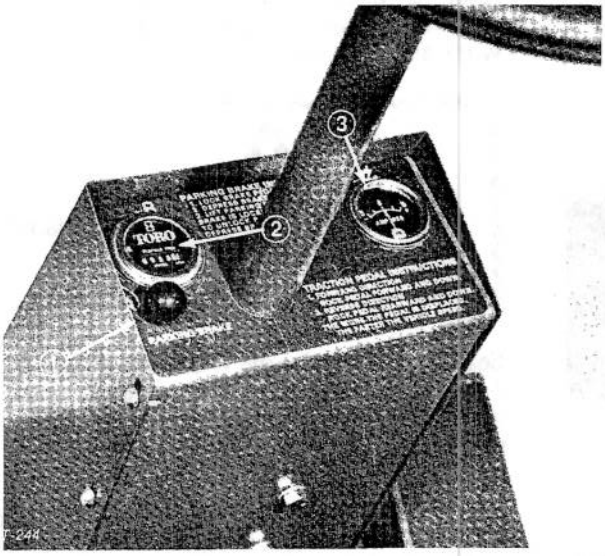


Figure 18

1. Parking brake
2. Hour meter
3. Ammeter

Hour Meter (Fig. 18) — The hourmeter registers accumulated hours of engine operation. Use the hourmeter to determine intervals for service maintenance and lubrication.

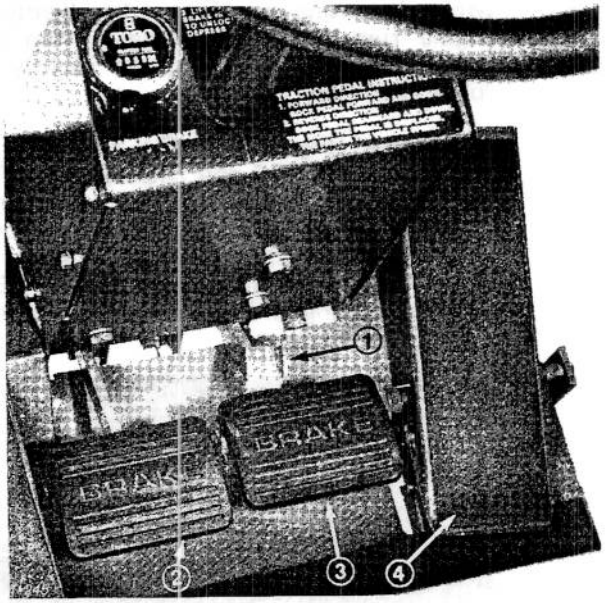


Figure 19

1. Lock arm
2. Left brake
3. Right brake
4. Traction pedal

Ammeter (Fig. 18) — Ammeter shows charge rate of the battery by the alternator. When engine is running, there must always be a slight charge, unless engine is idling slowly. Needle will point to 0 when battery is fully charged. By contrast, alternator is not charging the battery when needle points to (—) negative side of ammeter, and if this happens, repair the charging system to prevent discharge of the battery.

Service Brakes (Fig. 19) — 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.

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 8.5 mph (13.7 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.

PTO Lever (Fig. 20) – The PTO lever has two positions: ENGAGE and DISENGAGE. Push PTO lever fully forward to ENGAGE position to start the cutting unit blades. Pull lever rearward to DISENGAGE position to stop the blades. The only time PTO lever should be in the ENGAGE position is when cutting unit is on the turf and grass is actually being mowed.

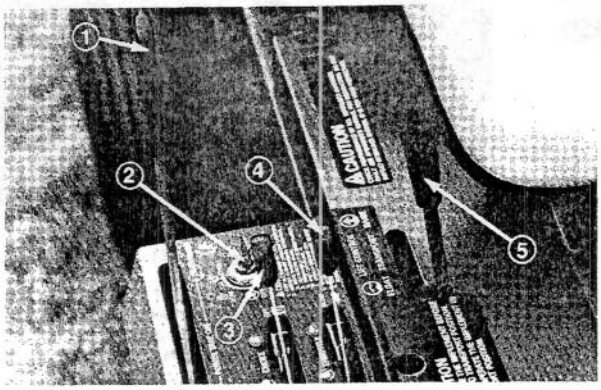


Figure 20

1. *PTO lever*
2. *Ignition switch*
3. *Choke*
4. *Throttle*
5. *Lift lever*

Ignition Switch (Fig. 20) – 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 motor. 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.

Choke (Fig. 20) – To start a cold engine, close carburetor choke by moving choke control forward to the ON position. After engine starts, regulate choke to keep engine running smoothly. As soon as possible, open the choke by pulling it rearward to the OFF position. A warm engine requires little or no choking.

Throttle (Fig. 20) – 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. 20) – 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 cover – 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.

Seat Adjusting Handle – Standard Seat (Fig. 17) – To adjust seat, loosen adjusting handle and slide seat to desired position. Tighten handle to lock seat in place.

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

OPERATING INSTRUCTIONS

STARTING/STOPPING ENGINE

1. Be sure parking brake is set, PTO lever is in DISENGAGE position and lift lever is in TRANSPORT position.

2. Remove foot from traction pedal and make sure pedal is in neutral position.

3. Move choke lever to ON position – when starting a cold engine – and throttle lever to half throttle position.

4. Insert key into ignition switch and rotate it clockwise to start the engine. Release key when engine starts. Regulate the choke to keep engine running smoothly.

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.

5. When engine is started for the first time, or after overhaul of the 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 be sure of proper operation of all parts.

Turn steering wheel to the left and right to check steering response. Then shut engine off and 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 the engine, move throttle control rearward to SLOW position, move PTO lever to DISENGAGE and rotate ignition key to OFF. Remove key from switch to prevent accidental starting.

CHECKING OPERATION OF INTERLOCK SWITCHES

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

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 once a year to be sure of maximum safety.

1. Move PTO lever to disengage 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; refer to Electrical Troubleshooting, page 38.

3. Raise off the seat and engage the PTO lever while the engine is running. The engine should stop. 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; refer to Electrical Troubleshooting, page 38.

4. Raise off the seat and depress the traction pedal while engine is running and PTO lever is disengaged. The engine should stop. If engine stops the switch is operating correctly; thus, continue operation. If engine does not stop, there is a defect in the interlock system; refer to Electrical Troubleshooting, page 38.

GRASS DEFLECTOR

CAUTION

The grass deflector (Fig. 21) is a safety device that diverts grass and other objects being discharged downward. Never operate cutting unit without deflector installed and bolted in place. Without the deflector mounted on the cutting unit, the blades could hurl grass and foreign objects directly out the discharge opening with enough force to cause property damage and personal injury. If grass deflector is ever damaged, repair or replace it; never operate cutting unit without deflector mounted in place.

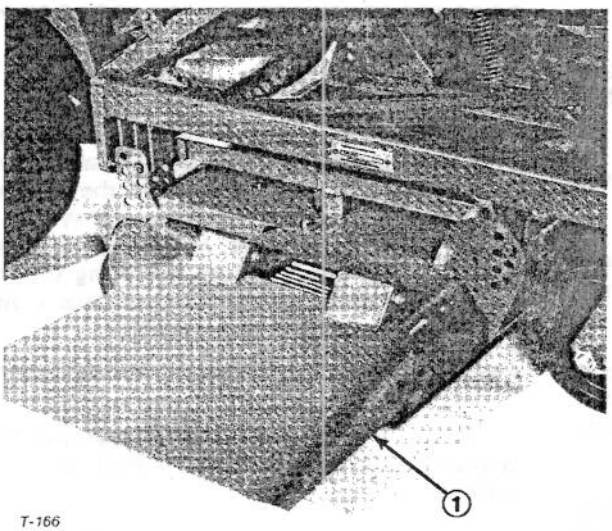


Figure 21

1. Grass deflector

OPERATING CHARACTERISTICS

Practice driving the GROUNDSMASTER 52 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 rpm decrease, and depress pedal slowly as rpm increase. 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.

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 also be used for control of the cutting unit. 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 traction. 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 rpm, noise, vibration and the possibility of backfiring by the engine. Turn key to OFF to stop engine.

TENSION SPRING ADJUSTMENT

The cutting unit performance is best when the spring tension is adjusted so the cutting unit does not ride heavily upon the turf, but is tensioned so that it can easily cover the terrain and still not bounce upward in uneven conditions. To adjust spring tension:

1. Leave the spring in the center bracket hole and operate the mower in the area it will normally be used (Fig. 22).

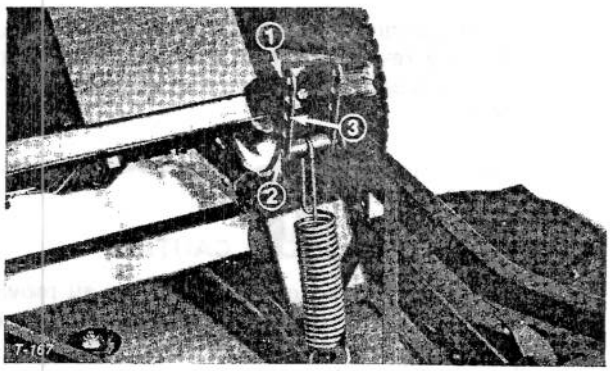


Figure 22

1. Bracket
2. Clevis pin
3. Center hole

2. If the cutting unit tends to raise off the turf or bounces severely, stop the machine, disengage PTO, engage parking brake, be sure traction pedal is in neutral, raise the cutting unit to the transport position and stop the engine.

3. Relieve spring tension by lowering the clevis pin one hole lower in the bracket (Fig. 22).

4. Check the units performance in the turf. If the unit still raises, stop machine and repeat steps 2 and 3. Repeat until unit operates satisfactorily. If cutting unit operates satisfactorily, continue normal operation.

OPERATING INSTRUCTIONS

5. If the cutting unit stays down and appears to operate acceptably during the initial operating check, it is still advisable to stop, disengage PTO, engage parking brake, be sure traction pedal is in neutral, raise the cutting unit, stop the engine and raise the clevis pin one hole to increase spring tension (Fig. 22).

6. Check performance in the turf. If the unit still stays down on the turf, repeat item 5. Repeat until unit raises during operation, then decrease spring tension by lowering the clevis pin one hole in the bracket (Fig. 22).

7. Resume normal operation.

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. Unlatch and raise hood, remove knob from lift lever.

2. Remove capscrews, lockwashers and flatwashers securing seat support cover to frame.

3. Pivot seat forward and support it to prevent it from falling accidentally. Lift seat support cover off frame.

4. Depress and hold the pins located in the center of the two (2) check valve assemblies in the top of the transmission (Fig. 23) while pushing or towing the machine.

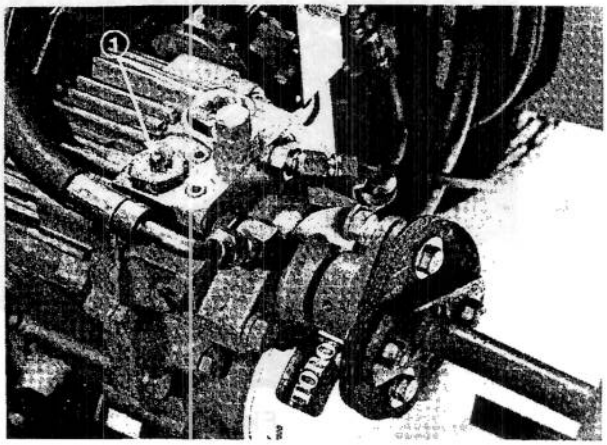


Figure 23

1. Check valve pins

5. 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 and cutting unit have grease fittings that must be lubricated regularly with No. 2 General Purpose Lithium Base Grease. If machine is operated under normal conditions, lubricate castor wheels and castor spindle bushings after every 8 hours of operation. Lubricate all other bearings and bushings after every 25 hours and cutting unit gear box after every 50 hours of operation (Fig. 32). Gear box should be full to bottom of filler plug hole with SAE 10W-40 engine oil. 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. 23). Also grease the bearings in the Dana axle every 500 hours, or yearly, whichever comes first (not shown). The cutting unit and traction unit have bearings and bushings that must be lubricated, and these lubrication points are: castor wheel bearings (Fig. 24), castor spindle bushings (Fig. 24), blade spindle bearings (Fig. 25); PTO shaft (Fig. 26); lift arm pivot bushings (Fig. 27); intermediate steering arm pivot bearings (Fig. 28); brake pivot bushings (Fig. 28); PTO shaft engaging lever bearings (Fig. 29); rear wheel spindle bushings (Fig. 30); steering plate bushings (Fig. 30); axle pin bushing (Fig. 30); and PTO idler assembly bearings (Fig. 31). Also apply grease to both brake cables at the drive wheel and brake pedal ends (Fig. 28).

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.

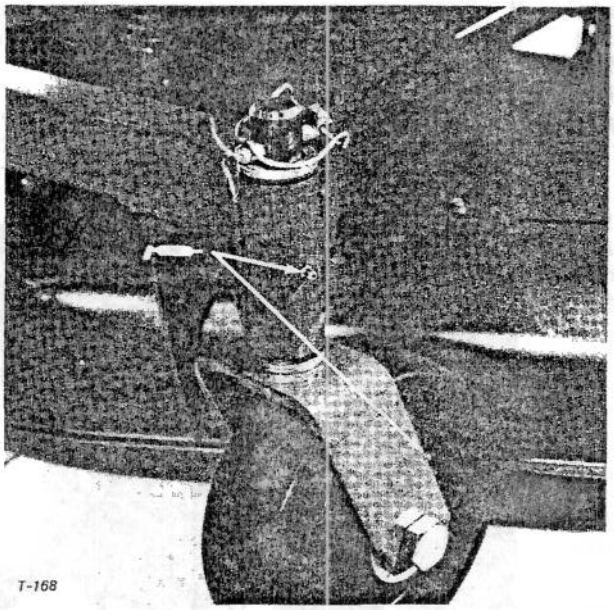


Figure 24

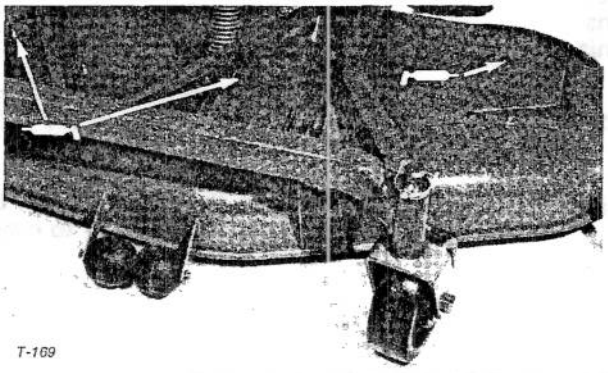


Figure 25

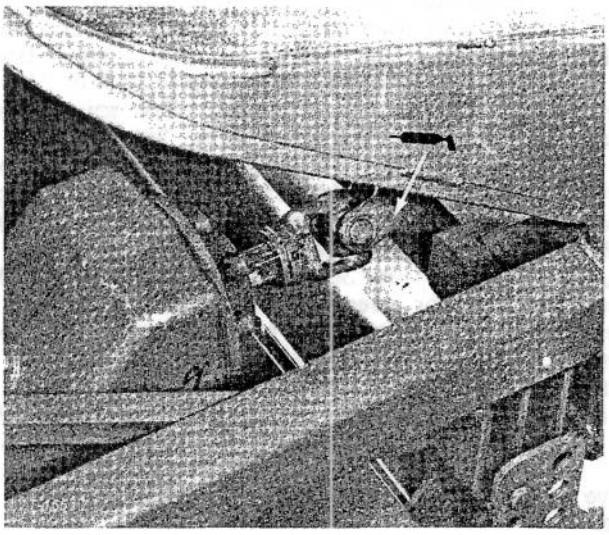


Figure 26

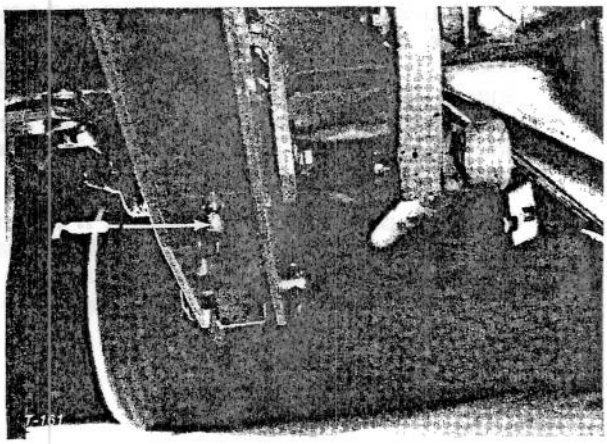


Figure 27

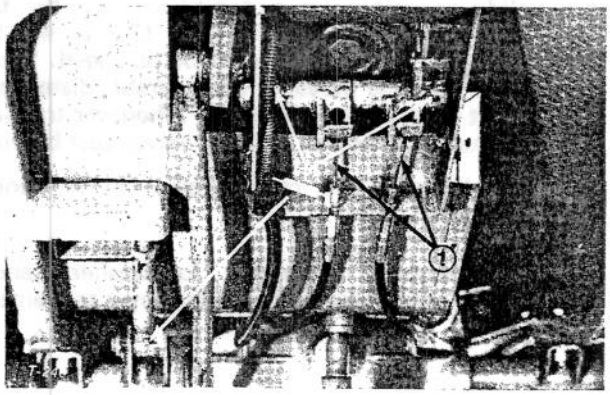


Figure 28

1. Apply grease to cable ends

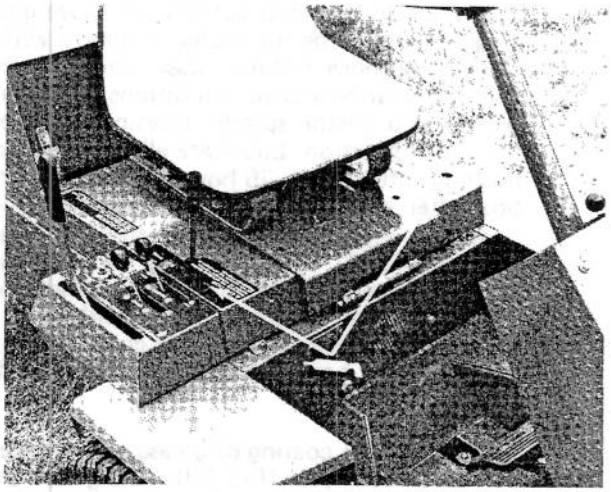


Figure 29

LUBRICATION MAINTENANCE

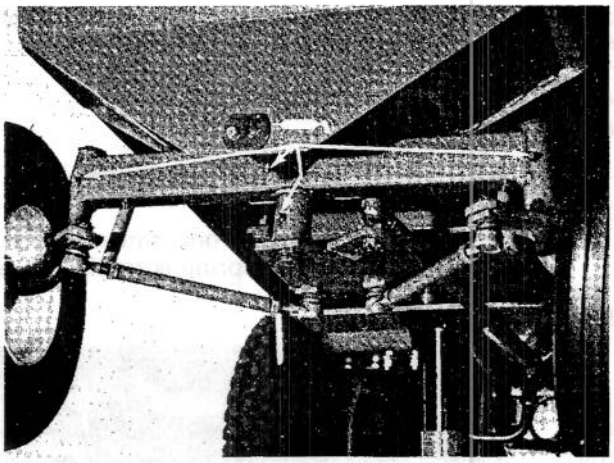


Figure 30

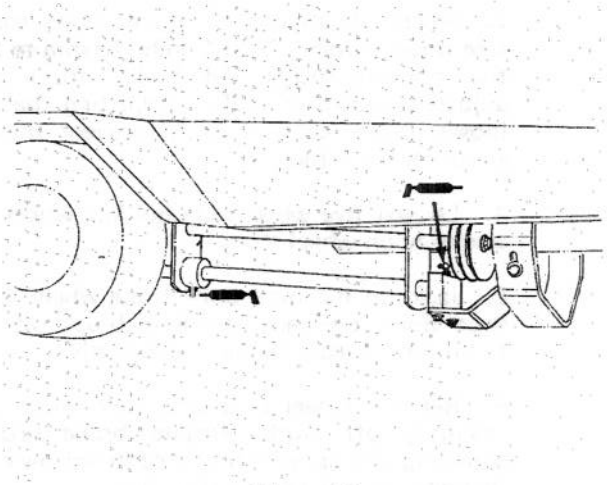


Figure 31

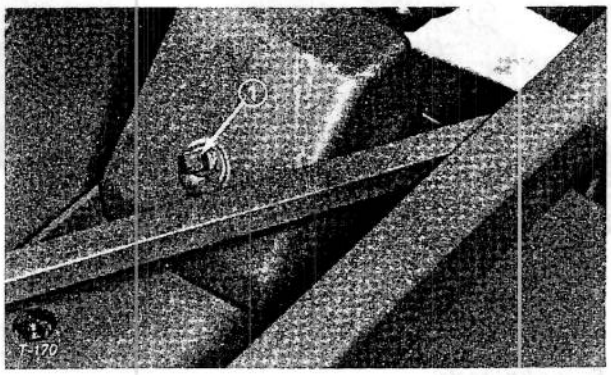


Figure 32

1. Filler plug

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 left brake pedal so both pedals work independently of each other.

2. Reduce free travel of brake pedals — tighten the brakes — loosen front nut on threaded end of brake cable (Fig. 33). 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.

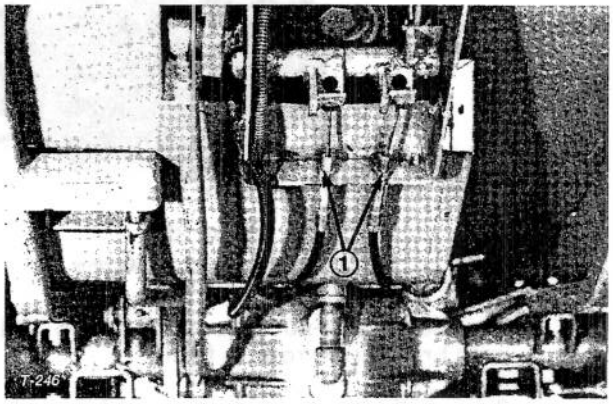


Figure 33

1. Jam nuts

BRAKE MAINTENANCE

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. 34).

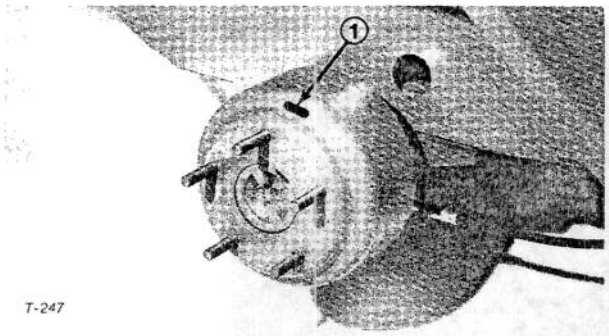


Figure 34

1. Brake adjusting slot

7. Using a brake adjusting tool or screwdriver rotate star-nut (Fig. 35) until brake drum (Fig. 34) locks because of outward pressure of brake shoes (Fig. 35).

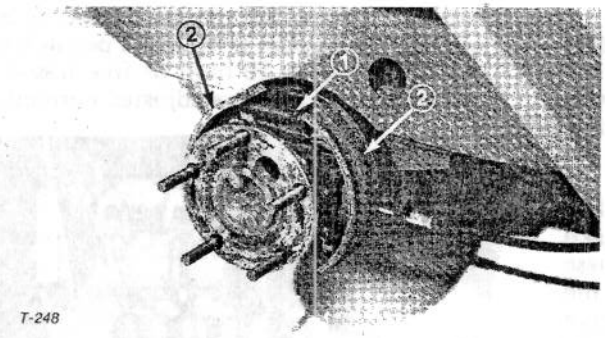


Figure 35

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 60-80 ft-lb (81-109N·m).

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

11. Adjust the brake cables; use step 2.

REPLACING BRAKE RETURN SPRING

1. Disengage spring from slotted hole on lift arm (Fig. 36). Since spring is tensioned, retract it carefully.

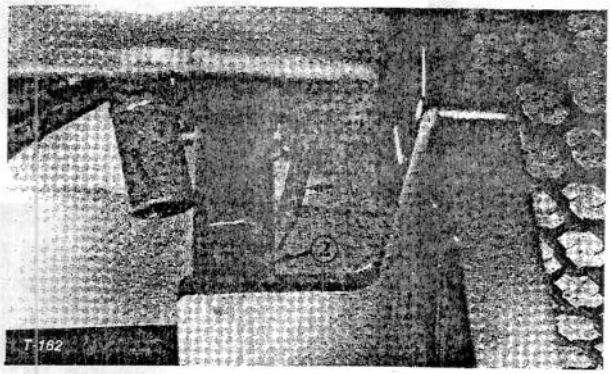


Figure 36

1. Brake return spring
2. Slotted hole

2. Remove end of spring from clevis pin retaining brake strut and brake cable yoke together (Fig. 36).

3. To install new spring, slide clevis pin through yoke and strut with hole end of clevis pin facing downward. Install short end of spring into hole in clevis pin.

4. Using a pliers, install long end of spring through slotted hole in cutting unit suspension frame (Fig. 36).

REPLACING PARKING BRAKE ROD SPRING

1. Remove the self tapping screws holding steering tower cover in place (Fig. 37) and remove cover.

2. Screw knob and locknut off top end of the parking brake rod (Fig. 38).

3. Remove capscrews securing steering gear to the tower.

4. Remove cotter pin and flatwasher from bottom end of parking brake rod (Fig. 39) and cotter pin and flatwasher holding rack (Fig. 40). Lift up on gear box and remove brake rod from rack. Remove the other flatwasher from the rod and slide rod out of hole in the steering tower.

BRAKE MAINTENANCE

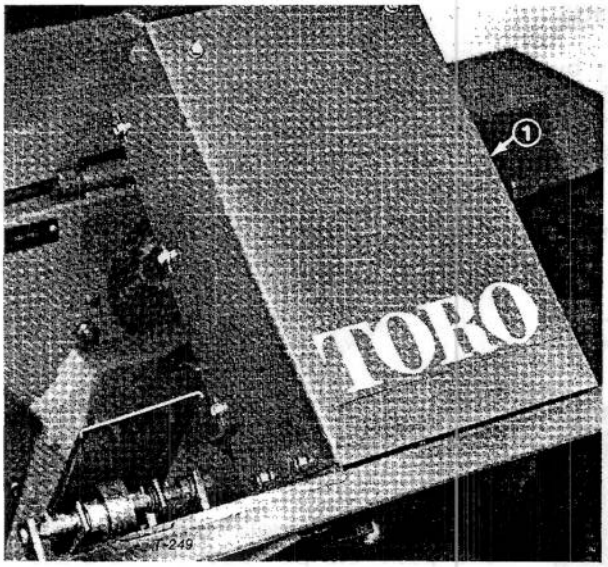


Figure 37

1. Cover

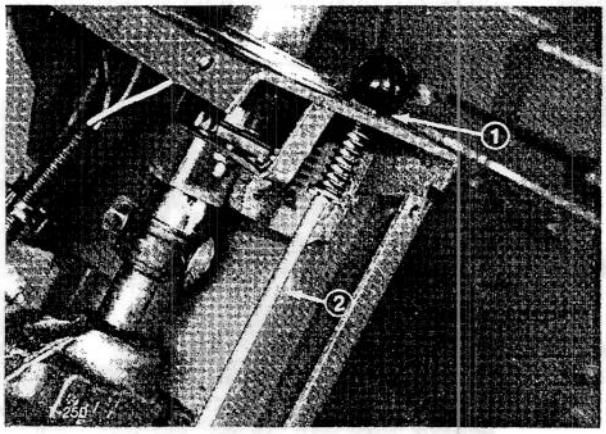


Figure 38

1. Locknut 2. Parking brake rod

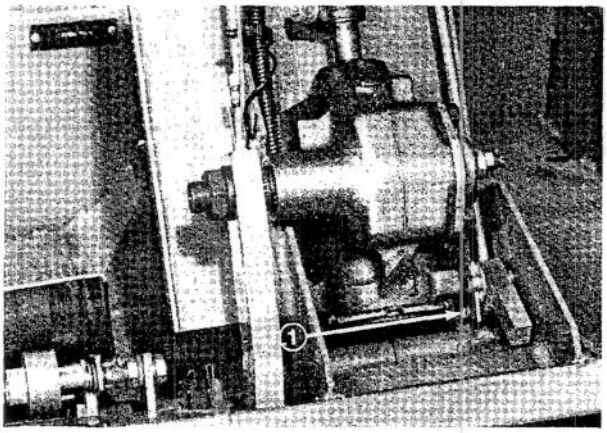


Figure 39

1. Cotter pin and flatwasher

5. Slide defective spring off top end of parking brake rod.

6. Install new spring on parking brake rod and make sure it seats against the flatwasher. Slide top end of rod through hole in steering tower and thread locknut onto rod until nut is fully installed.

7. Slide flatwasher on bottom end of rod, lift up on gear box, slide rack towards gear box and insert rod through parking brake rack. Secure rod and rack together with flatwasher and cotter pin. Secure rack with remaining cotter pin and flatwasher.

8. Secure steering gear box to tower and install steering tower cover with self tapping screws.

REPLACING PARKING BRAKE RACK

1. Remove self tapping screws holding steering tower cover in place and remove cover. Remove capscrews securing steering gear to the tower.

2. Remove cotter pin and flatwasher securing lower end of parking brake rod (Fig. 39) and cotter pin and flatwasher securing rack (Fig. 40). Lift up on gear box, slide rack outward towards gear box off the pivot pin (Fig. 40). Slide rod out of rack.

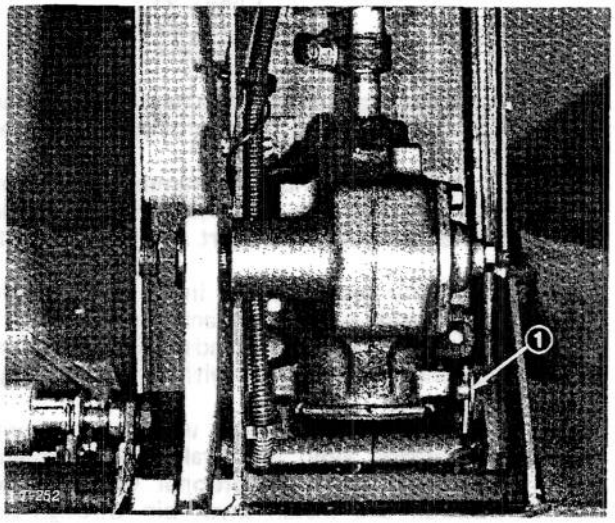


Figure 40

1. Cotter pin and flatwasher

3. Lift up on gear box, slide new rack onto pivot pin, slip lower end of brake rod with flatwasher into rack and secure rack and rod with flatwashers and cotter pins.

4. Secure steering gear box to tower and install steering tower cover with self tapping screws.

BRAKE MAINTENANCE

REPLACING BRAKE PEDAL PIVOT BUSHINGS

The brake pedals must be held in place snugly by the brake pivot pin. Excessive movement of the brake pedal, other than brake pedal free travel, usually indicates worn bushings. To correct problem, replace the bushings.

1. Loosen brake cable jam nuts and disengage brake cables from brake pedals (Fig. 41).

2. Remove locknut from brake pivot pin (Fig. 41). Slide pivot pin out to the side so pedal can be removed.

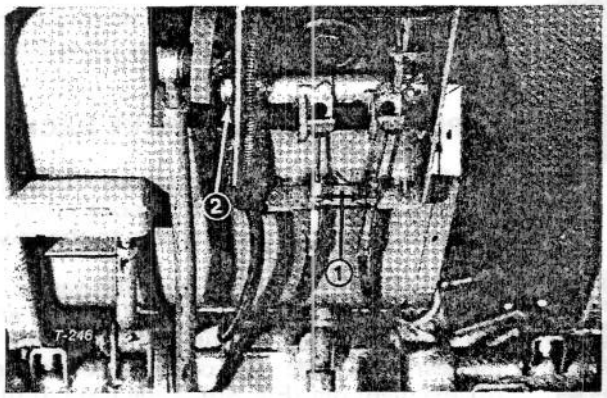


Figure 41

1. Jam nuts
2. Locknut

3. Slide brake pedals backward and remove them through the slot in bottom of steering tower.

4. Using pin punch and hammer, drive both bushings out of brake pivot (Fig. 42). Clean inside of brake pivot to remove dirt and foreign matter.

5. Apply grease to the inside and outside of the new bushings. Use an arbor press to drive new bushings into both ends of the brake pivot. Bushings must be flush with ends of brake pivot.

6. Wipe brake pivot pin with a rag to remove dirt and grease. Hold left brake pedal, which can be identified by an additional welded bracket, in position and install pivot pin through side plate

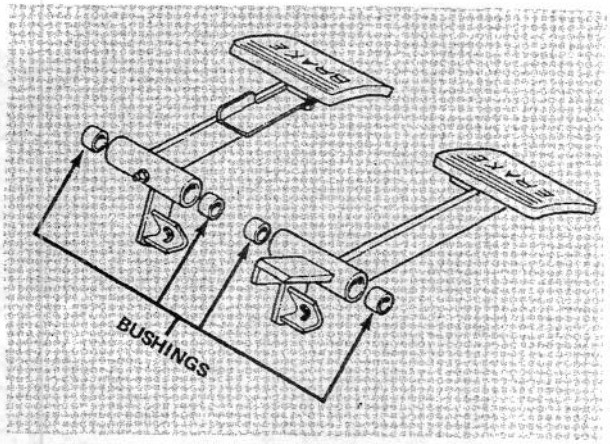


Figure 42

and brake pivot. Hold right brake pedal in position and push the pin through the brake pivot and opposite side plate. Tab end of pin (Fig. 43) must engage bottom edge of side plate to prevent pivot pin from rotating and causing wear. Install locknut on end of pivot pin to hold all parts in place.

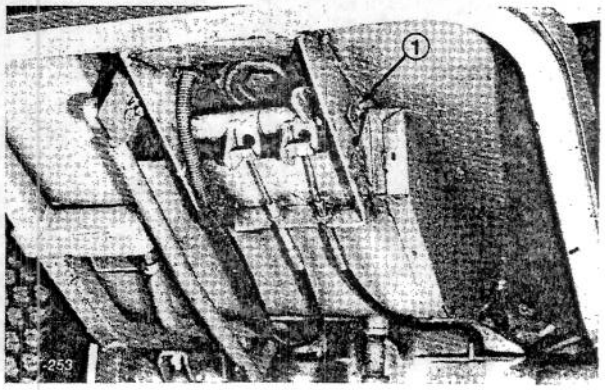


Figure 43

1. Tab end of pin

7. Connect brake cables to brake pedals. Adjust the brakes; refer to Adjusting Service Brakes, page 21.

8. Lubricate brake pivot bushings through the grease fittings, using no. 2 grease.

STEERING MAINTENANCE

REMOVING STEERING GEAR

1. Remove self tapping screws holding steering tower cover in place.

2. Mark steering arm and steering gear shaft (Fig. 44) so arm can be installed in the same place when parts are assembled.

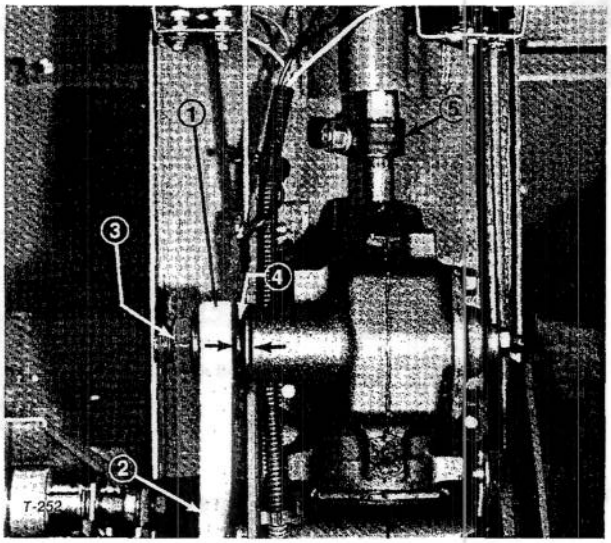


Figure 44

1. *Steering arm*
2. *Cotter pin and slotted nut (lower end of arm)*
3. *Nut and lockwasher*
4. *5/8 in. (16 mm)*
5. *Steering clamp*

3. Remove cotter pin and slotted nut holding steering control rod and steering arm together (Fig. 44). Separate ball socket at end of control rod from steering arm.

4. Remove large nut and lockwasher holding steering arm on gear box shaft (Fig. 44). Use a puller to remove the arm from the shaft.

5. Loosen steering-clamp carriage bolt and locknut (Fig. 44) until clamp can be moved.

6. Remove capscrews and lockwashers retaining steering gear against steering tower (Fig. 45). Slide steering gear down off steering tube and away from the tower.

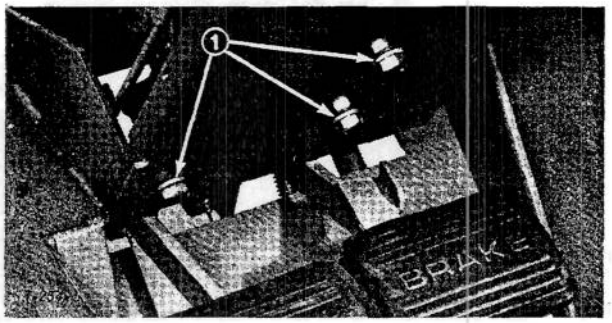


Figure 45

1. *Capscrews and lockwashers*

INSTALLING STEERING GEAR

1. Slide steering clamp onto input shaft of steering gear.

2. Insert input shaft of steering gear into steering tube and hold gear against steering tower. Secure gear in place with three capscrews and lockwashers (Fig. 45). Lock steering gear and tube together by tightening steering clamp locknut and carriage bolt.

3. Slide steering arm onto steering shaft and ensure the alignment marks – made when parts were removed – are in line. Secure arm on shaft with lockwasher and large nut (Fig. 44). Tighten nut until inside of arm is 5/8 in. (16 mm) from the steering gear, which should allow clearance for the steering linkage.

4. Slide ball socket at end of steering control rod through steering arm. Secure parts together with slotted nut and cotter pin (Fig. 44).

5. Install steering tower with self tapping screws.

ADJUSTING REAR WHEEL BEARINGS

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

2. Remove dust cap from end of wheel spindle. Also remove cotter pin retaining slotted nut in place (Fig. 46).

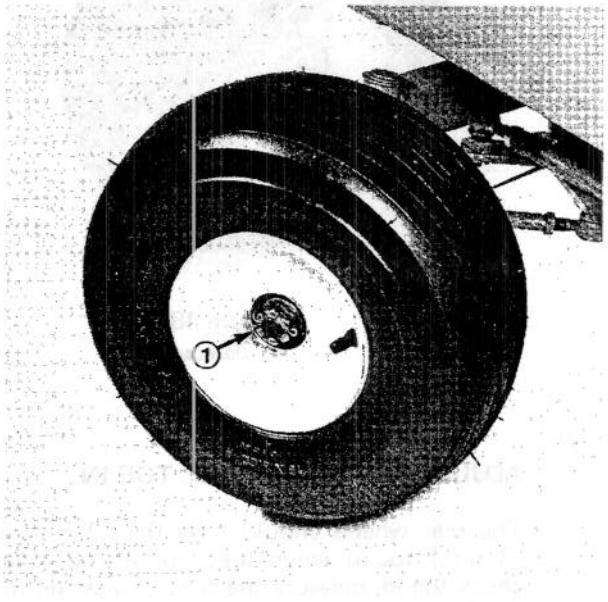


Figure 46

1. *Cotter pin*

3. Rotate the wheel by hand and tighten the slotted nut (Fig. 47) until the bearing binds slightly. Then, loosen nut until the nearest slot and hole in spindle line up. Reinstall the cotter pin to retain the slotted nut in place.

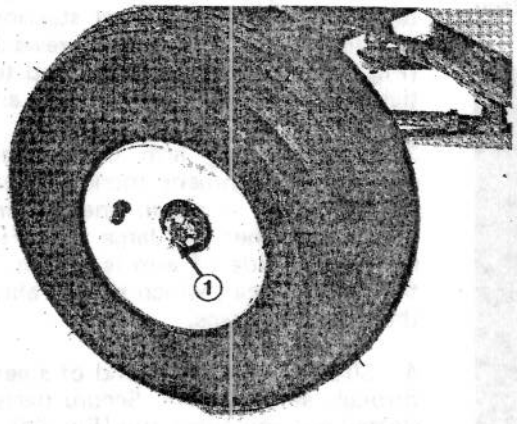


Figure 47
1. Slotted nut

4. Remove jack stands and lower machine to shop floor.

5. Install dust cap on end of the wheel spindle (Fig. 48).

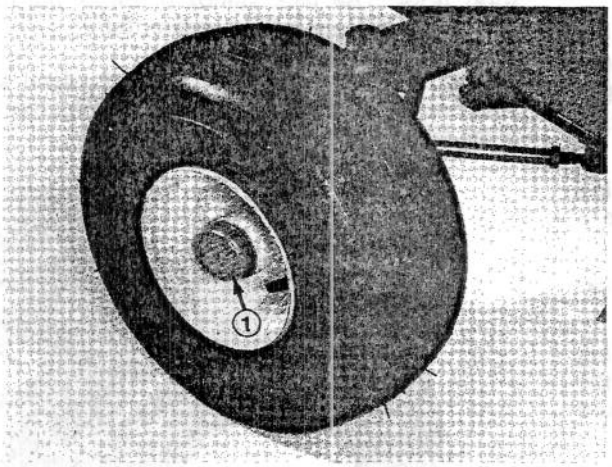


Figure 48
1. Dust cap

ADJUSTING REAR WHEEL TOE-IN

The rear wheels should have 0 to 1/8 of an inch (3 mm) toe-in when they are straight ahead. To check toe-in, measure the center-to-center distance, at wheel hub height, in front and in back of the rear tires. If toe-in is not 0 to 1/8 of an inch (3 mm), an adjustment is required.

1. Rotate the steering wheel so rear wheels are straight ahead.

2. Loosen the jam nuts on both tie rods (Fig. 49). Adjust both tie rods until center-to-center distance (Fig. 49) at front of rear wheel is 1/8 of an inch (3 mm) less than that at back of rear wheel.

3. When toe-in of rear wheels is set correctly, tighten jam nuts against tie rods (Fig. 49).

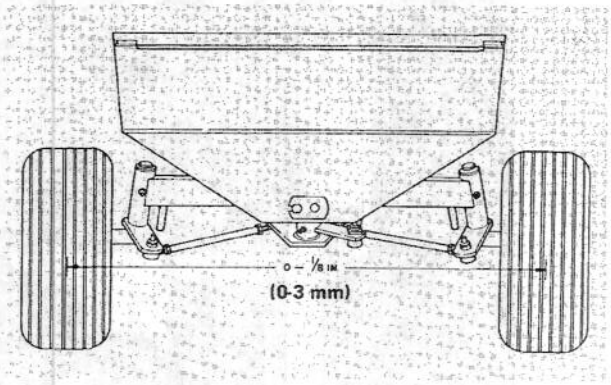


Figure 49

SERVICING AXLE BUSHINGS

The rear axle must be held in place snugly by the axle pin. Excessive movement of the axle, which is characterized by erratic steering, usually indicates worn bushings. To correct the problem, replace the bushings.

1. Remove cotter pin and slotted nut from tie rod end that connects steering tube to steering plate (Fig. 50). Separate tie rod end from plate.

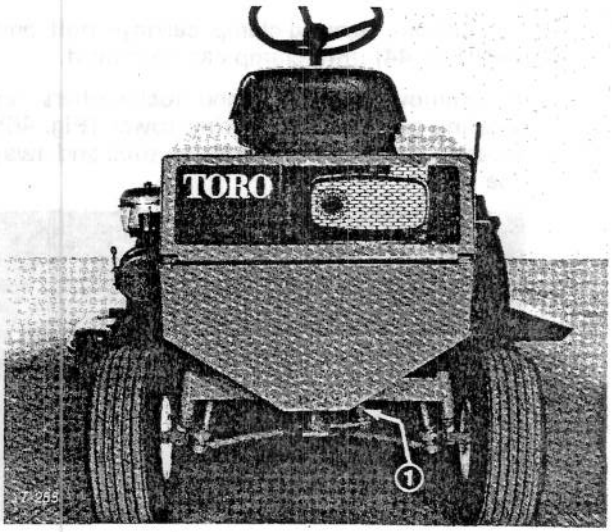


Figure 50
1. Steering tube

2. Raise engine hood. Remove large locknut from end of rear axle pin (Fig. 51).

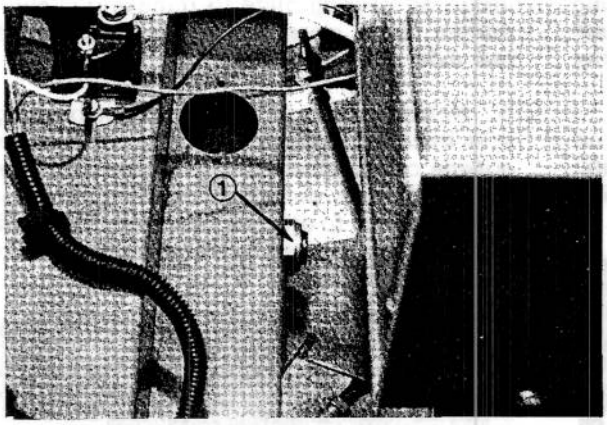


Figure 51

1. Locknut

3. Remove capscrew, lockwasher and flatwasher holding outside of axle pin to chassis (Fig. 52).

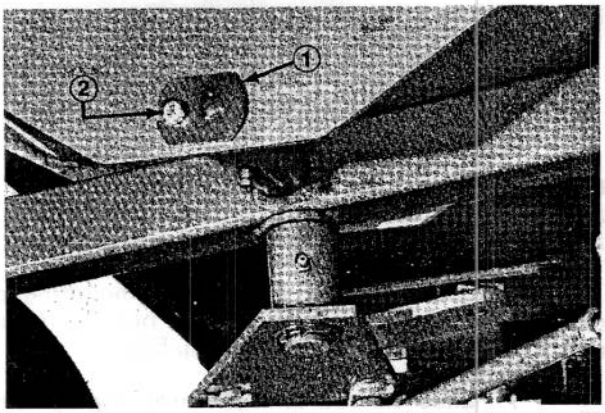


Figure 52

1. Rear axle pin
2. Capscrew, lockwasher and flatwasher

4. Jack up frame – just ahead of the rear wheels – until pressure is taken off the axle pin. Pull axle pin out which will release the rear axle and thrust washers from the frame.

5. Carefully roll the entire rear axle and wheel assembly out from under the machine. Set axle assembly onto the work bench.

6. Using pin punch and hammer, drive both bushings out of axle (Fig. 53). Clean inside of axle to remove dirt and foreign matter.

7. Notice groove on inside of new bushing. When it is installed, open end of groove must be to the outside of axle pivot tube. Apply grease to the inside and outside of the new bushings. Use an arbor press to drive bushings into the top and

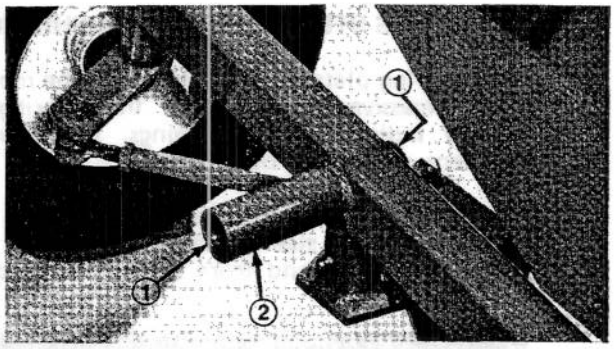


Figure 53

1. Bushing
2. Axle pivot tube

bottom of the axle pivot tube. Bushings must be flush with axle tube (Fig. 53).

8. Wipe rear axle pin with a rag to remove dirt and grease.

9. Move rear axle into position at rear of machine. Mount axle between two sections of frame with axle pin and two thrust washers (Fig. 54). The thrust washers must be positioned at ends of the axle pivot tube and between both sections of the frame. Secure axle pin in place with capscrew, lockwasher and flatwasher (Fig. 52).

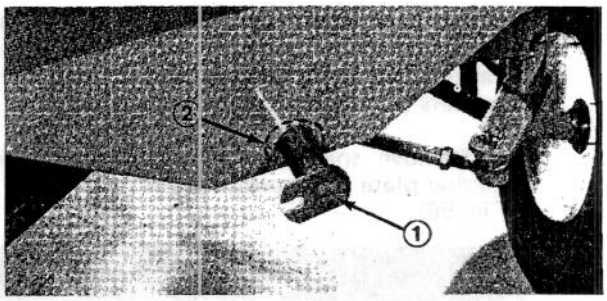


Figure 54

1. Rear axle pin
2. Washer

10. Install large locknut on end of axle pin (Fig. 51). Tighten locknut until all forward and backward movement of the axle is eliminated. However, the axle must still pivot freely.

11. Remove the jack stands and lower the machine to the shop floor.

12. Slide tie rod end at end of steering tube through steering plate, and secure parts together with slotted nut (Fig. 50). Tighten nut until it is tight and holes in nut and tie rod end line up. Then install cotter pin through nut and tie rod end.

13. Lubricate rear axle bushings through the grease fitting on rear axle (Fig. 30).

STEERING MAINTENANCE

SERVICING STEERING PLATE BUSHINGS

The steering plate must fit snugly on the mounting pin. Excessive movement of the steering plate usually indicates worn bushings. To correct the problem, replace the bushings.

1. Remove cotter pin and slotted nut from tie rod end connecting steering tube to steering plate. Separate tie rod end from steering plate bracket (Fig. 55).

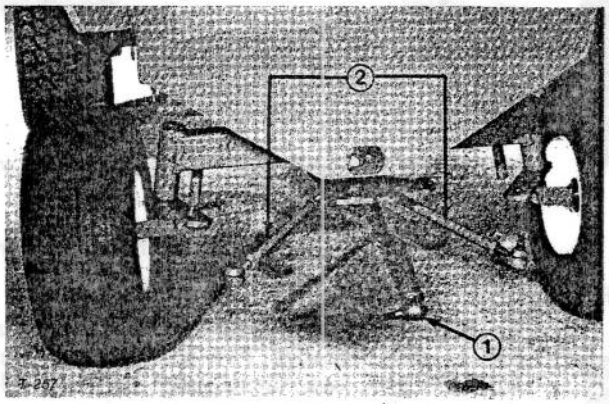


Figure 55

1. Steering tube
2. Wheel spindle tie rods

2. Remove cotter pins and slotted nuts from tie rod ends connecting tie rods to wheel spindle brackets. Separate tie rod ends from both spindle brackets (Fig. 55).

3. Remove snap ring and flatwasher and slide steering plate off mounting pin on bottom of axle (Fig. 56).

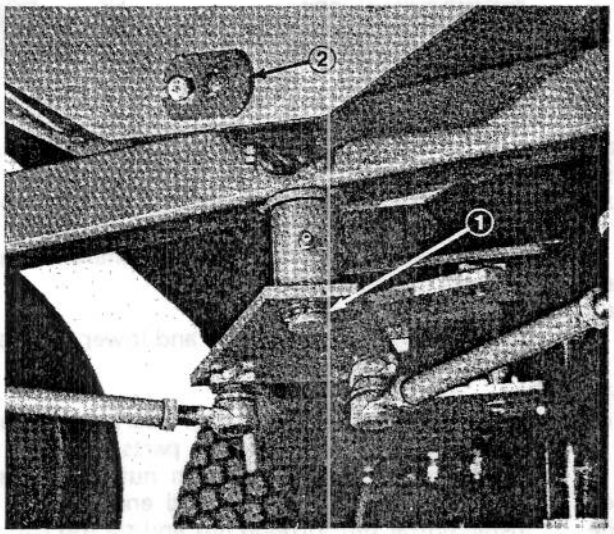


Figure 56

1. Snap ring and flatwasher
2. Rear axle pin

4. Using pin punch and hammer, drive both bushings out of steering plate (Fig. 57). Clean inside of steering plate to remove dirt and foreign matter. Also clean mounting pin on bottom of rear axle.

5. Notice groove on inside of new bushing. When it is installed, open end of groove must be to the outside of the steering plate tube. Apply grease to the inside and outside of the new bushings. Use an arbor press to drive bushings into top and bottom of the steering plate tube. Bushings must be flush with end of tube (Fig. 57).

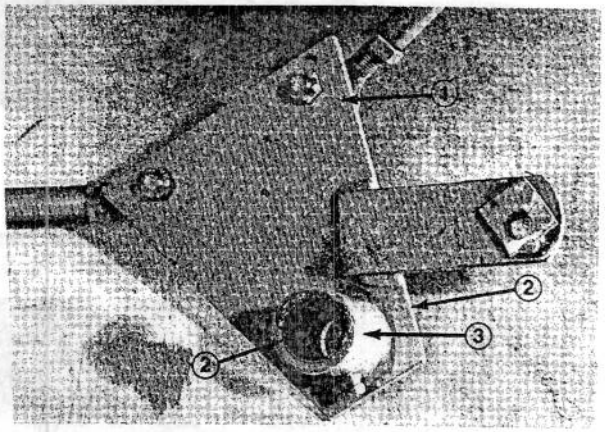


Figure 57

1. Steering plate
2. Bushing
3. Steering plate tube

6. Slide steering plate onto mounting pin on bottom of rear axle. Secure plate in place with flatwasher and snap ring (Fig. 56).

7. Slide tie rod ends through appropriate holes in the steering plate, and secure parts together with slotted nuts. Tighten nuts until they are tight and holes in nuts and tie rod ends line up. Install cotter pins through nuts and tie rod ends.

8. Lubricate bushings through the grease fitting on the steering plate.

SERVICING REAR WHEEL SPINDLE BUSHINGS

The rear wheel spindles must fit snugly in the rear axle. Excessive movement of the spindle in the axle indicates the bushings are probably worn and must be replaced.

1. Remove cotter pin and slotted nut from tie rod end that connects steering tube to steering plate (Fig. 57). Separate tie rod end from plate.

2. Raise hood and remove large locknut from end of rear axle pin (Fig. 51).

3. Remove capscrew, lockwasher and flatwasher holding outside of axle pin to chassis (Fig. 52).

4. Jack up frame – just ahead of the rear wheels – until pressure is taken off the axle pin. Support machine with jack stands to prevent it from falling. Pull axle pin out to release the rear axle and thrust washers from the frame.

5. Carefully roll the entire rear axle and wheel assembly out from under the machine. Set axle assembly onto the work bench.

6. Remove cotter pin and slotted nut connecting tie rod end to spindle bracket (Fig. 58). Separate tie rod end from spindle bracket.

7. Remove snap ring and thrust washer holding spindle in axle tube (Fig. 58). Slide spindle and wheel assembly out of the axle tube to expose the bushings. Make sure to account for the thrust washer on bottom of axle tube.

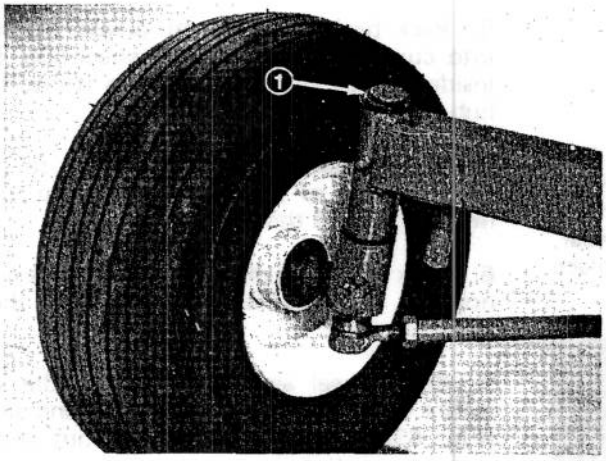


Figure 58

1. Snap ring and flatwasher

8. Using pin punch and hammer, drive both bushings out of axle tube (Fig. 59). Clean inside of axle tube to remove dirt and foreign matter.

9. Notice groove on inside of new bushing. When it is installed, open end of groove must face to the outside of rear axle tube. Apply grease to inside and outside of the new bushings. Using an arbor press, drive bushings into the top and bottom of the axle tube. Bushings must be flush with axle tube (Fig. 59).

10. Wipe spindle shaft with a rag to remove dirt and grease. Slide thrust washer onto shaft and push shaft through axle tube. Hold wheel and spindle shaft assembly in place and install thrust washer and snap ring onto end of spindle shaft.

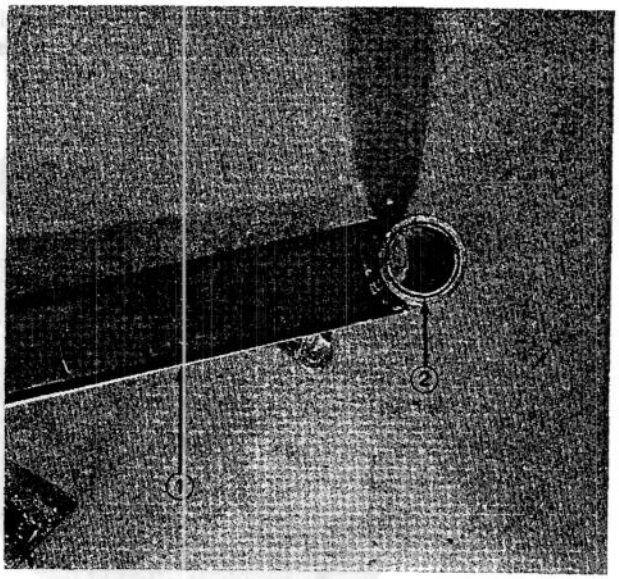


Figure 59

1. Rear axle
2. Bushing

11. Connect tie rod end to spindle bracket with slotted nut and cotter pin.

12. Move rear axle into position at rear of machine. Mount axle between two sections of frame with axle pin and two thrust washers (Fig. 54). The thrust washers must be positioned at ends of the axle pivot tube and between both sections of the frame. Secure axle pin in place with capscrew and lockwasher (Fig. 52).

13. Install large locknut on end of axle pin (Fig. 51). tighten locknut until all forward and backward movement of the axle is eliminated. However, the axle must still pivot freely.

14. Remove the jack stands and lower the machine to the shop floor.

15. Connect tie rod end at end of steering tube to steering plate with slotted nut and cotter pin.

16. Lubricate wheel spindle bushings through the grease fitting on axle tube (Fig. 30).

REPLACING AND PACKING REAR WHEEL BEARINGS

Pack the rear wheel bearings with no. 2 general purpose grease after every 500 hours of operation or once a year. If operating conditions are extremely dusty and dirty, it may be necessary to pack the bearings more often.

1. Jack up rear of machine until tire is off shop floor. Support machine with jack stands to prevent it from falling.

2. Remove dust cap from end of wheel spindle. Remove cotter pin, slotted nut, and washer, and slide wheel off spindle shaft. Pull seal out of wheel hub (Fig. 60).

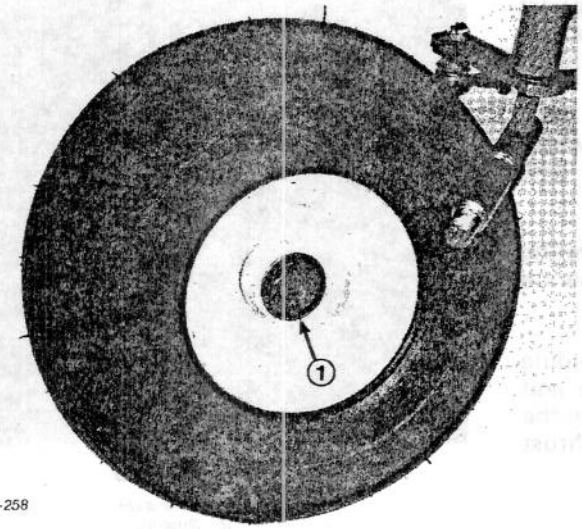


Figure 60

1. Seal and bearings

3. Remove bearings from wheel hub (Fig. 61). Clean the bearings in solvent and make sure they are in good operating condition. Also clean the inside of the wheel hub. Check the bearing cups for wear, pitting or other noticeable damage. Replace defective parts.

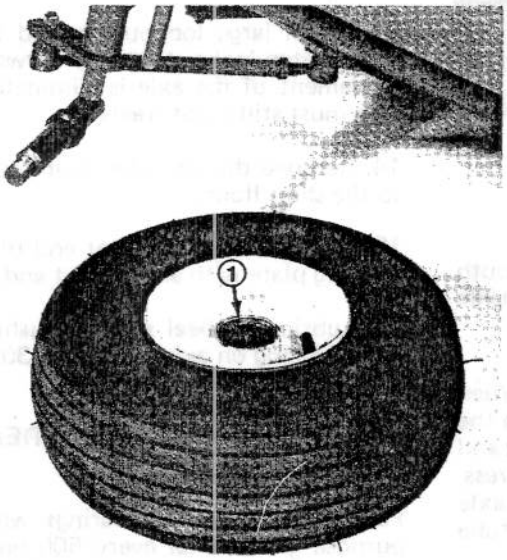


Figure 61

1. Seal and bearings

4. If bearing cups were removed from the wheel hub, press them into the hub until they seat against the shoulder (Fig. 62).

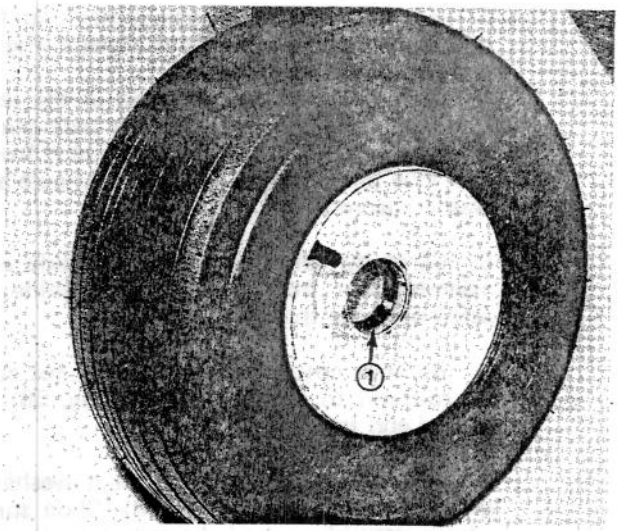


Figure 62

1. Bearing cup

5. Pack both bearings with grease. Install bearing into cup on inboard side of wheel hub. Lubricate inside of new lip seal and press it into the wheel hub (Fig. 60).

Note: Lip seal must be pressed in so it is flush with the end of the hub, and the lip of the seal must be toward the bearing.

6. Pack inside of wheel hub with some grease, but not full. Install remaining bearing into the bearing cup.

7. Slide wheel assembly onto spindle shaft and secure it in place with flatwasher and slotted nut (Fig. 63). Do not tighten the nut and do not install the cotter pin.

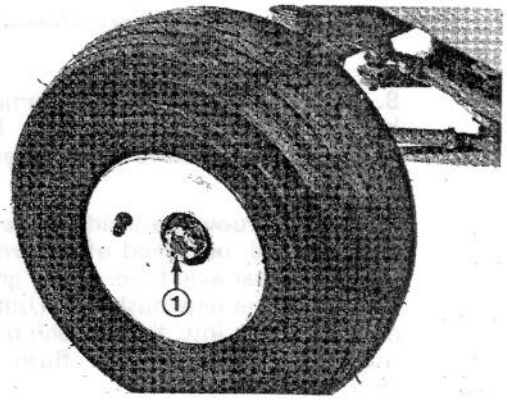


Figure 63

1. Slotted nut

8. Adjust preload on the wheel bearings; refer to Adjusting Rear Wheel Bearings, steps 3-5, page 26.

ENGINE MAINTENANCE

CHANGING CRANKCASE OIL

For new or rebuilt engines, change oil after first 5 operating hours. Thereafter, under normal conditions, change oil after every 25 hours of engine 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. Place an oil drain pan below the drain plug on right side of crankcase. Clean area around drain plug (Fig. 64).

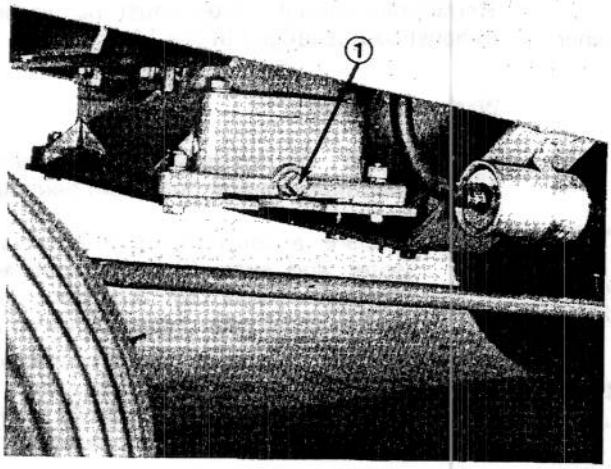


Figure 64

1. Drain plug

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

3. Pour two quarts (1.89 L) of oil having the API "service classification" MS, SC, SD or SE into the filler neck. Oil viscosity – weight – is selected according to anticipated ambient temperature. Temperature/viscosity recommendations are:

A. Above +40°F (4°C) – Use SAE 30, and if it is not available, 10W-30 and 10W-40 are acceptable substitutes.

B. From +40°F to 0°F (4°C to -18°C) – Use SAE 5W-20 or 5W-30, and if they are not available, SAE 10 and 10W-30 are acceptable substitutes.

C. Below -0°F (-18°C) – Use SAE 10 or 10W-30 diluted 10% with kerosene.

4. Check oil and make sure level is up to the FULL mark on dipstick. (Fig. 65). Add more oil if level is low; however, DO NOT OVERFILL.

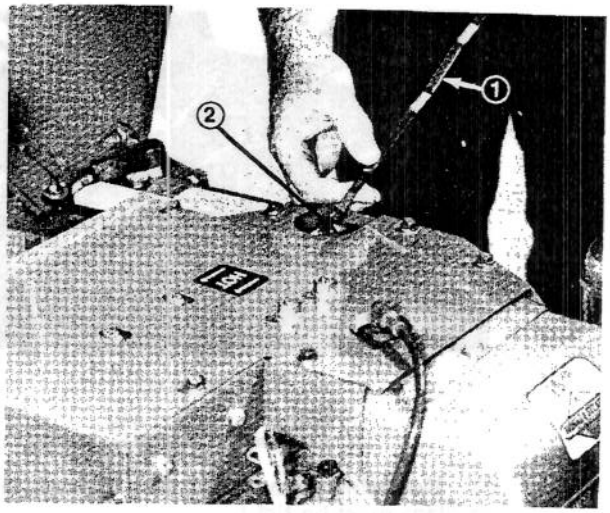


Figure 65

1. Dipstick
2. Filler neck

SERVICING AIR CLEANER ASSEMBLY

General Maintenance Practices

Inspect air cleaner filter element and hose monthly to maintain maximum engine protection and to be sure of maximum service life.

1. Make sure hose between air cleaner and carburetor is clamped securely in place. Replace the hose if it is cracked or punctured (Fig. 66).

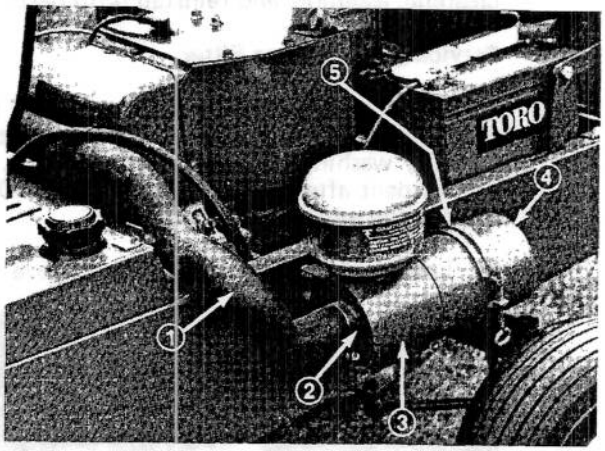


Figure 66

1. Hose
2. Hose clamp
3. Body
4. Cap
5. Mounting band

2. Check air cleaner body for dents and other damage which could possibly cause an air leak. Replace a damaged air cleaner body (Fig. 66).

3. Be sure bowl is sealing around bottom of sleeve assembly (Fig. 67).

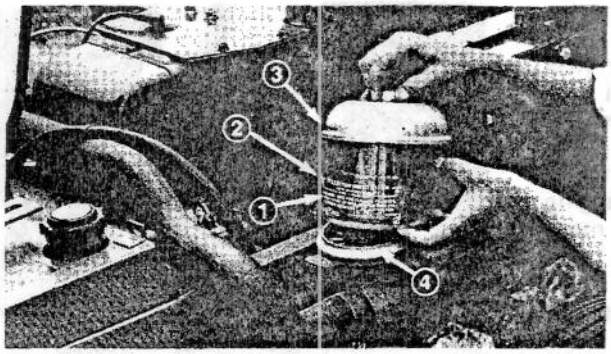


Figure 67

1. Bowl *3. Cover*
2. Level mark *4. Sleeve assembly*

4. Mounting screws and nuts holding air cleaner in place must be tight.

5. Inlet cover must be free of obstructions.

Servicing Bowl Assembly

Visually inspect the bowl once a week; however, daily inspection is required when operating conditions are extremely dusty and dirty. Never allow dust to build up above level marks on outside of bowl (Fig. 67).

1. Loosen thumb screw until cover and bowl can be removed (Fig. 67). Separate cover and bowl.

2. Dump dust out of bowl and clean bowl. After cleaning, 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. Loosen mounting band and remove cap and baffle (Fig. 66). Remove baffle from cap, clean dirt from cap and re-install baffle (Fig. 68).

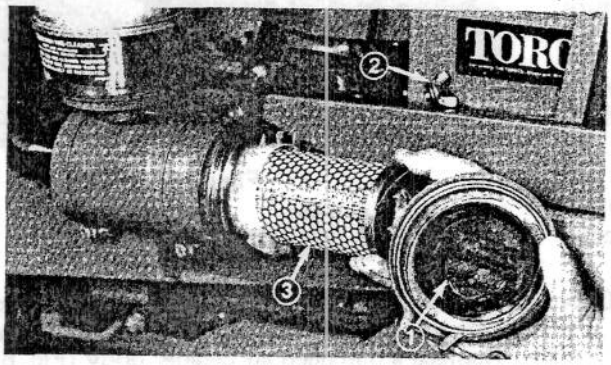


Figure 68

1. Baffle *3. Filter element*
2. Wing nut w/gasket

2. Remove wing nut w/gasket and slide filter element out of air cleaner body (Fig. 68).

3. Clean 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.

A. Blow compressed air from inside to the outside of dry filter 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 when dust and dirt are removed; refer to Inspecting Filter Element, page 33.

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 baffle and cap. Move mounting band behind air cleaner body and tighten it securely. Insure cap is correctly positioned (Fig. 69).

ENGINE MAINTENANCE

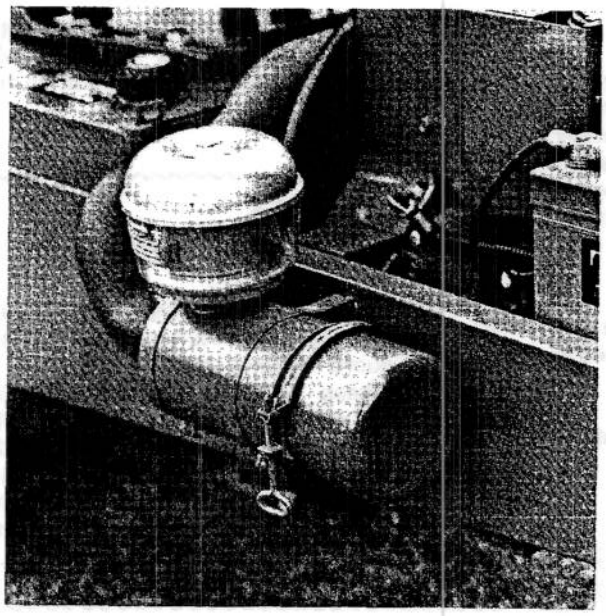


Figure 69

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.

CLEANING CYLINDER HEAD FINS

To avoid overheating and possible engine damage, clean cooling fins on cylinder head after every 10 hours of operation if necessary.

1. Open the hood. Pull high tension wire off spark plug.

2. Remove capscrews, nuts and lockwashers retaining upper engine shroud in place. Clean inside of shroud and set it aside.

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

4. Reinstall engine shroud with capscrews, lockwashers and nuts.

5. Push high tension wire onto spark plug and close the hood.

CLEANING COMBUSTION CHAMBER

Clean the combustion chamber after every 100 to 300 hours of operation. Since the engine uses regular gasoline, a gradual buildup of carbon and lead deposits will form in the combustion chamber. This causes the engine to lose power and prevents the valves from seating properly. However, periodic cleaning (100 to 300 hours) will prolong valve life and make sure the engine is reliable.

1. Open the hood. Pull high tension wire off spark plug.

2. Remove capscrews, nuts and lockwashers retaining upper engine shroud in place. Clean inside of shroud and set it aside.

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

4. Remove screws holding side covers so cylinder head can be removed.

5. Remove screws holding head on cylinder. Set head on workbench.

IMPORTANT: Remember the positions of the different cylinder head screws so they may be properly installed when parts are assembled at a later time. If a screw is used in the wrong position, it may be too short and not engage enough threads. Another may be too long and bottom on a fin; consequently, the fin may break or the cylinder head may remain loose.

6. Rotate crankshaft until piston is at top of cylinder and both valves are closed. Scrape and wire brush the lead and carbon deposits from cylinder head and combustion chamber. Inspect the cylinder head and scrape out only the heavy accumulations of lead and carbon. Also scrape deposits off top of piston.

7. Install a new head gasket and set cylinder head on top of cylinder. Secure parts together with screws. Install the screws in the proper holes and turn each screw until the head is seated lightly. Using the tightening sequence recommended in the engine service manual, tighten all screws to 190 in.-lb. (21.4 N·m).

8. Reinstall the side covers with capscrews and lockwashers. Set engine shroud in place and mount with capscrews, lockwashers and nuts.

9. Push high tension wire onto spark plug and close the hood.

FUEL SYSTEM MAINTENANCE

ADJUSTING CARBURETOR

Lack of power accompanied by black sooty exhaust smoke is usually caused by a rich carburetor setting. Since a dirty air cleaner element causes the same conditions, check it before adjusting carburetor. If needle valve is set too lean, engine may skip and backfire at high rpm. Therefore carburetor must be adjusted if it is either too rich or too lean.

IMPORTANT: Check fuel filter and make sure the choke is operating correctly before the carburetor is adjusted.

1. Needle Valve (Fig. 70) – Close needle valve by gently rotating it clockwise.

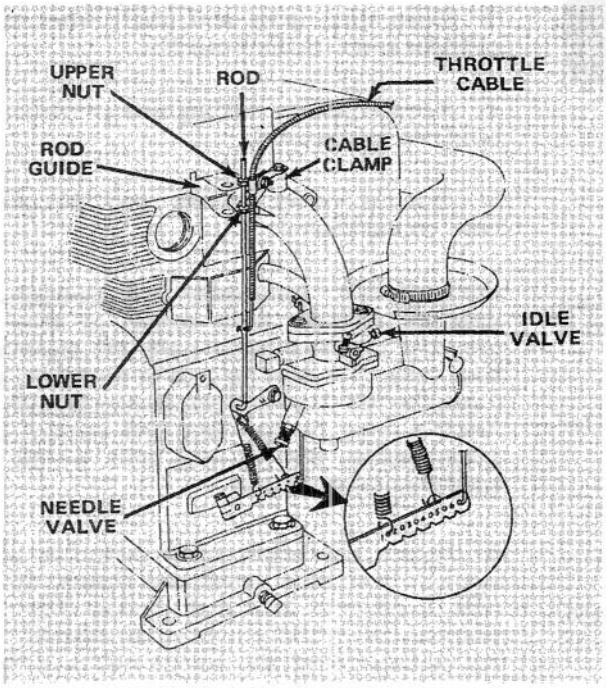


Figure 70

IMPORTANT: Do not close the needle valve too tight because the valve and seat in carburetor will likely be damaged.

2. Rotate – open – the needle valve 2 turns counterclockwise.

3. Idle Valve (Fig. 70) – Close idle valve by gently rotating it clockwise. Open idle valve by rotating it 3/4 turn counterclockwise.

IMPORTANT: Do not close the idle valve too tightly because the valve and seat in carburetor will likely be damaged.

Note: The needle valve and idle valve settings are approximate; however, the settings will allow engine to be started so carburetor can be fine tuned – steps 4-9.

WARNING

Engine must be running so final 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. Assure PTO lever is in DISENGAGE position and cutting unit is on the shop floor. Also engage parking brake.

4. Start engine and let it warm up for approximately two minutes. When engine is at normal operating temperature, move throttle to FAST position.

IMPORTANT: Air cleaner must be installed on the engine whenever carburetor is being adjusted. Fuel tank must be half full of gasoline to get best carburetor adjustment.

5. Slowly, rotate needle valve clockwise – in – until engine begins to miss and lose speed because of a lean mixture. Next, rotate needle valve counter-clockwise – out – until engine first begins to run unevenly because of a rich mixture. Then rotate needle valve back in, midway between the rich and lean mixture.

6. Move throttle control to SLOW and rotate upper nut on rod (Fig. 70) until engine idle is 1800 rpm. Then rotate idle valve in and out until engine idles smoothly.

7. Reset idle speed by adjusting upper nut on rod (Fig. 70) so engine speed is 1800 rpm.

8. Check carburetor adjustment by moving throttle control quickly from SLOW to FAST. Engine speed should increase without hesitation. If engine tends to stall or die out, rotate needle valve 1/8 turn counterclockwise until engine accelerates smoothly.

9. After carburetor is adjusted, shut engine off. If machine will not be used immediately, pull high tension wire off spark plug and remove key from ignition switch.

FUEL SYSTEM MAINTENANCE

ADJUSTING GOVERNOR SPEEDS

The governor controls slow and high speed operation of the engine. The minimum recommended slow speed setting is 1800 rpm and the maximum no load high speed setting should not exceed 3300 rpm.

The shortest spring (Fig. 70) keeps the engine governed, even at idle speed. Thus, when moderate loads are applied, the engine will not stop. However, the governor must be adjusted when the engine tends to stall under load.

1. Adjust the carburetor; refer to Adjusting Carburetor, page 34.

2. With throttle control in SLOW, adjust upper nut (Fig. 70) until engine idles at 1800 rpm.

3. Stop the engine and close the hood.

ADJUSTING THROTTLE CONTROL AND HIGH SPEED RPM

The throttle control regulates the speed of the engine. If throttle control is not adjusted correctly, maximum engine speed will not be attained.

1. Start the engine and move throttle control to FAST.

2. Loosen machine screw and nut securing throttle cable in the cable clamp (Fig. 70).

3. Pull throttle control rod up until lower nut (Fig. 70) contacts tab. At this time engine speed should be 3300 rpm. If engine speed is correct, proceed to step 5. Proceed to step 4 if speed is not correct.

4. Adjust bottom nut (Fig. 70) to increase or decrease high speed rpm. Rotate bottom nut downward to increase rpm and upward to decrease rpm.

5. Set the throttle control in full forward position. Pull throttle cable up until all slack is removed and bottom nut contacts the rod guide. Then tighten the round head machine screw and nut to secure throttle cable in place.

6. Stop the engine and close the hood.

REPLACING FUEL FILTER

Replace the fuel filter after every 250 hours or yearly, whichever comes first.

1. Clamp both fuel lines that connect to the fuel filter (Fig. 71) so gasoline cannot drain when lines are removed.

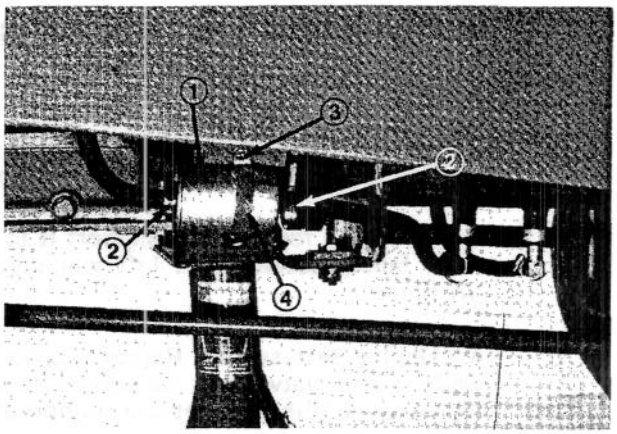


Figure 71

1. Fuel filter
2. Hose clamp
3. Capscrew, lockwasher and nut
4. Clamp

2. Loosen the hose clamps (Fig. 71) at both ends of the filter and pull fuel lines off filter.

3. Remove capscrew, lockwasher and nut holding filter clamp against frame (Fig. 71). Slide filter out of clamp.

4. Slide new filter into clamp and mount it in place with capscrew, lockwasher and nut. Be sure arrow on side of filter points toward the fuel pump.

5. Slide hose clamps onto ends of fuel lines. Push fuel lines onto fuel filter and secure them with hose clamps.

FUEL PUMP LINE SERVICING

If fuel pump pulse line is replaced, new line must be looped around engine dipstick tube or engine oil from crankcase will enter line and cause fuel pump to malfunction (Fig. 72). Line must loop smoothly around tube without any kinks.

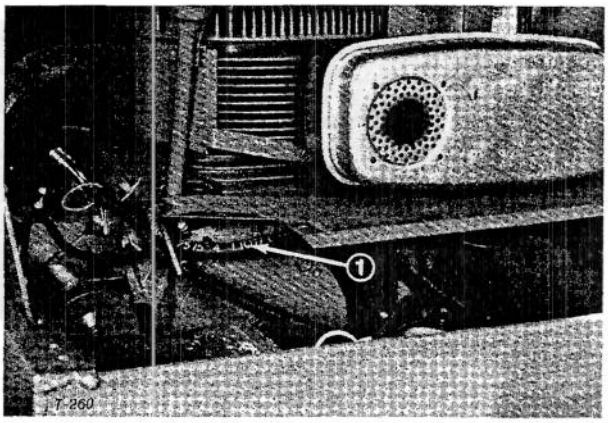


Figure 72

1. Fuel pump pulse line

FUEL SYSTEM MAINTENANCE

REMOVING FUEL TANK FROM CHASSIS

1. Remove knob from lift lever.

2. Remove capscrews, lockwashers and flatwashers securing seat support cover to frame.

3. Pivot seat forward and support it to prevent it from falling accidentally. Lift seat support cover off frame.

4. Unplug seat switch. Remove capscrews, lockwashers and flatwashers securing seat support to top of frame (Fig. 73). Set seat support aside.

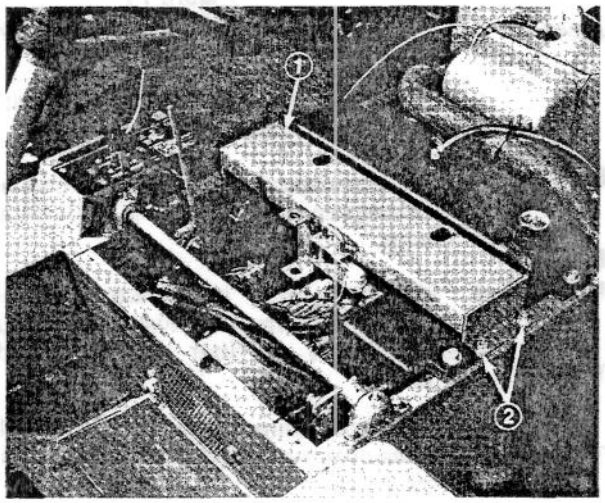


Figure 73

1. Seat support
2. Capscrew, lockwasher and flatwasher

5. Remove capscrews, lockwashers and flatwashers securing fuel tank to top of frame (Fig. 74). However, do not lift fuel tank out of chassis at this time.

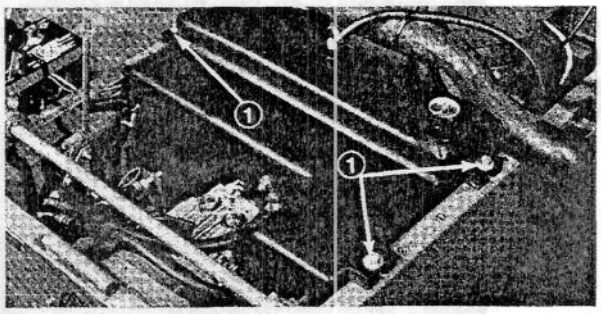


Figure 74

1. Capscrew, lockwasher and flatwasher

6. Place drain pan below fittings on bottom of fuel tank.

DANGER

Since gasoline is highly flammable, drain it outdoors and make sure engine is cool to prevent a potential fire hazard. Wipe up any gasoline that may have spilled. Do not drain gasoline near any open flame or where gasoline fumes may be ignited by a spark. Do not smoke a cigar, cigarette, or a pipe when handling gasoline.

7. Loosen clamps holding both fuel lines on fuel tank fittings. Pull lines off fittings and allow gasoline to flow into large gas can (Fig. 75).

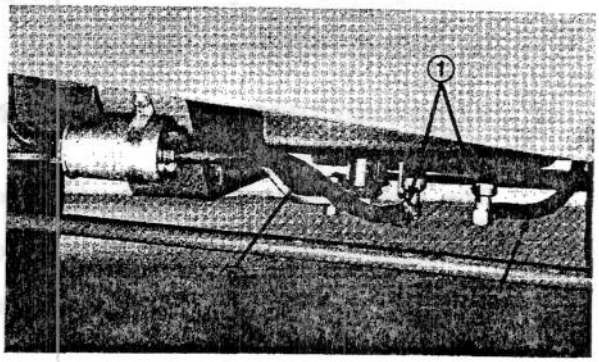


Figure 75

1. Fuel tank fittings
2. Fuel line

8. Lift fuel tank up and remove it from the chassis.

INSTALLING FUEL TANK

1. Set fuel tank into position and secure it in place with capscrews, lockwashers and flatwashers (Fig. 74).

2. Push fuel lines onto fuel tank fittings (Fig. 75). Tighten clamps to secure the lines on the fittings.

3. Install seat support with capscrews, lockwashers and flatwashers. Connect seat switch (Fig. 73).

4. Slide seat support cover onto the lift lever and position the cover on the frame. Secure seat support cover in place with capscrews, lockwashers and flatwashers.

5. Install knob onto lift lever.

6. Fill fuel tank with gasoline.

ELECTRICAL MAINTENANCE

CHECKING AND REPLACING SPARK PLUG

Since air gap between center and side electrodes increases gradually during normal engine operation, check condition of electrode at 100 hour intervals. The correct spark plug to use in the engine is a Champion RCJ-8 or equivalent. Set air gap at 0.030 in. (0.76 mm).

1. Clean area around spark plug so dirt does not fall into cylinder when plug is removed.

2. Pull high tension wire off spark plug and remove plug from cylinder head (Fig. 76).

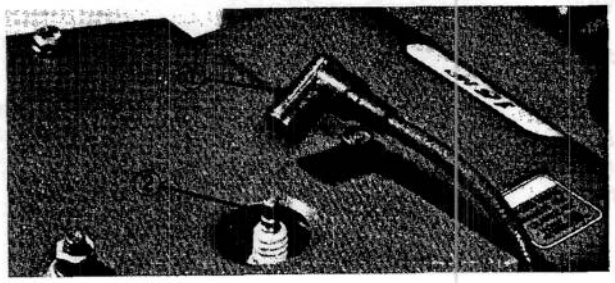


Figure 76

1. High tension wire 2. Spark plug

3. 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.

4. After setting air gap at 0.030 in. (0.76 mm), install spark plug in cylinder head. Tighten the plug to 22 ft-lb (30 N·m). Push high tension wire onto spark plug.

SERVICING BREAKER POINTS

Inspect and service breaker points after 100 hours of engine operation. Since breaker point gap governs ignition timing, set gap at 0.020 in. (0.508 mm) whenever points are replaced or serviced. Clean points with a carborundum contact point stone. Insert a hard finished card or piece of paper between the points. Close and open the points so paper absorbs any dirt or filings on the points. Replace points that are burned or excessively pitted. To clean or adjust the points:

1. Remove breaker box cover. (See engine manual for location).

2. Rotate crankshaft until points open to the widest gap. Using a feeler gauge, check gap between points. Gap must be 0.020 in. (0.508 mm). If an adjustment is required, loosen locknut and rotate point adjusting screw until gap is 0.020 in. (0.508 mm). Tighten point adjusting screw to increase the gap and loosen the screw to decrease the gap.

3. When point gap is correct, tighten locknut. Check gap again because tightening locknut may have changed the setting of the points.

4. Reinstall breaker box cover.

SERVICING BATTERY

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

Once a week, check electrolyte solution in battery to make sure level is above the plates (Fig. 77). If level is low, add distilled water to the affected cells. The electrolyte solution consists of sulfuric acid and distilled water. The "charge state" of the battery affects specific gravity — weight — of electrolyte solution. As the battery discharges, sulfuric acid is chemically withdrawn from electrolyte solution, resulting in lead sulfate build-up on the plates. This causes a decrease in specific gravity of electrolyte. A fully charged battery has an electrolyte solution of 1.260 to 1.280 specific gravity. By contrast, battery with a solution of less than 1.240 is in a discharged condition; therefore, charging is required.

Note: Keep terminals and top of battery clean. Wash battery with baking soda and rinse with clear water. Do not let soda solution enter battery cells because electrolyte solution will be neutralized.

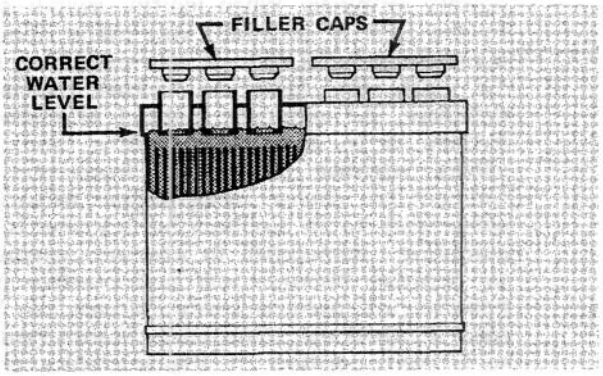


Figure 77

ELECTRICAL MAINTENANCE

CAUTION

Hydrogen gas is produced while battery is being charged and inhaling the fumes may cause nausea. Since fumes are explosive, keep open flame, electrical spark, cigars and cigarettes away from the battery to prevent an explosion.

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.

ELECTRICAL TROUBLESHOOTING

IMPORTANT: Before troubleshooting the electrical system, be sure all connectors are installed securely on switches and no moisture has collected on any switch terminals which will ground out the system. Check ground wires to be sure they are fastened securely. Also check for binding in traction pedal linkage. The fuel tank must have gasoline in it and the spark plug must be in good condition.

Problem: Engine Does Not Crank

1. Disengage PTO lever and remove foot from traction pedal. Rotate ignition switch to start position. If engine cranks, it is operating properly, but the operator did not disengage PTO lever or remove foot from traction pedal when attempting to start engine. If engine does not crank, proceed to step 2.

2. Connect volt meter to positive and negative battery terminals. When ignition switch is rotated to the START position, volt meter should read approximately 12 volts. If volt meter does not read 12 volts, the battery is either discharged or defective. An alternate method of checking the battery is to disconnect positive and negative cables, negative cable first, from the battery. Connect the cables, using jumper wires (positive cable first), to an auxiliary battery that is in good condition. Remember to connect negative cable to negative battery post and positive cable to positive post because wiring harness can be damaged if cables are transposed. Rotate ignition key to START position. If engine cranks, charge or replace the battery. If engine does not crank, the original battery is in good condition; therefore proceed to step 3.

3. Visually check PTO lever to be sure it deflects switch arm when lever is in the disengaged position (Fig. 78). Back surface of PTO lever must be within 1/2 to 3/4 in. (13 mm to 19 mm) from end of the slot (Fig. 78). If PTO lever deflects switch arm, proceed to step 5. If PTO lever does not deflect switch arm, proceed to step 4.

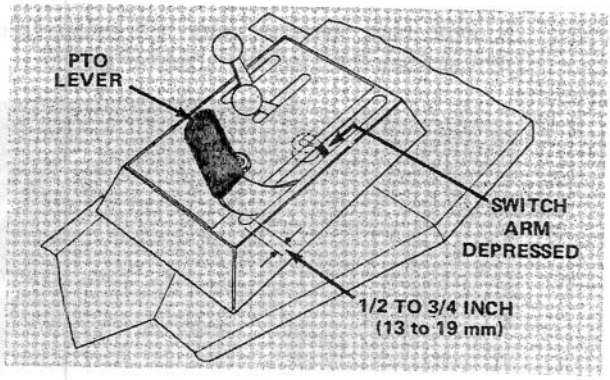


Figure 78

4. Pull high tension wire off spark plug. To adjust the PTO lever, remove the seat cover. Loosen jam nut from PTO engaging yoke (Fig. 79). Loosen adjusting screw until PTO lever is within 1/2 - 3/4 in. (13 - 19 mm) from end of the slot, when lever is in the disengage position (Fig. 78). This will deflect the switch arm. Tighten jam nut against yoke to lock the adjustment in place (Fig. 79). Move PTO lever to disengage position and rotate locknut at top of spring until the dimension of spring, between the top and bottom flatwasher, is 4 in. (10.2 cm) (Fig. 79). Repeat step 3.

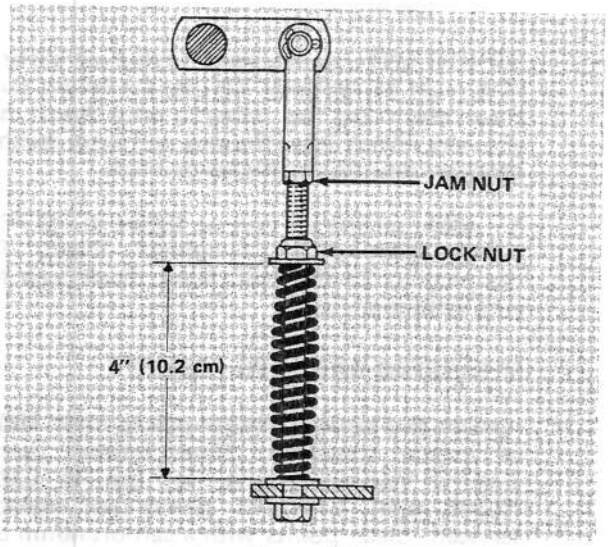


Figure 79

CAUTION

Disconnect the negative and positive cables from the battery, negative (–) cable first to prevent sparks from occurring. Disconnecting the battery de-energizes the electrical system so a continuity tester can be used for trouble shooting.

5. Rotate ignition key to START and check continuity across solenoid terminals where the thin white and red wires connect (Fig. 80). If there is no continuity, proceed to step 6. Proceed to step 8 if there is continuity.

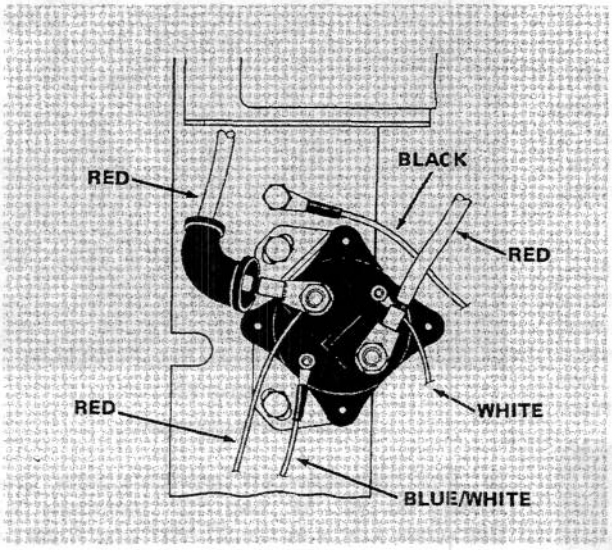


Figure 80

6. Remove connectors from ammeter terminals (Fig. 81). Check continuity across ammeter terminals. If the ammeter has continuity, proceed to step 7. Replace the ammeter if it does not have continuity.

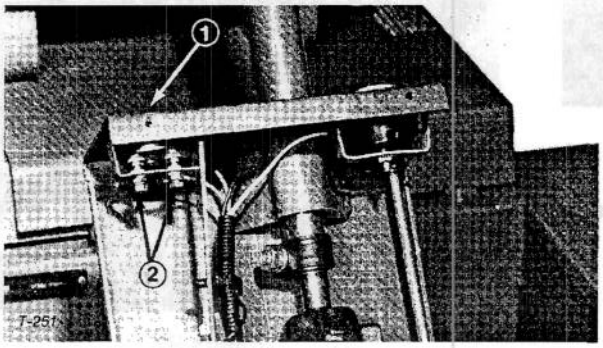


Figure 81

1. Ammeter 2. Terminals

7. Check continuity across "B" and "S" terminals on back of ignition switch while the switch is in the START position (Fig. 82). Replace the ignition switch if there is no continuity. If the switch has continuity, replace the wire harness. Repeat step 5.

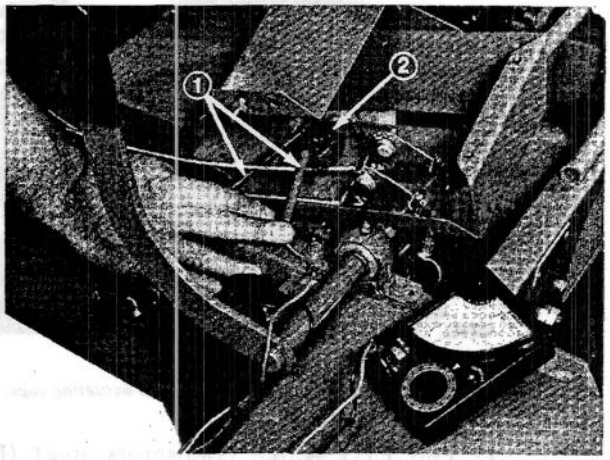


Figure 82

1. Probes onto "B" and "S" terminals
2. Switch key in START position

8. Check continuity across blue/white wire on solenoid terminal and the black ground wire mounting bolt (Fig. 80). If there is no continuity, proceed to step 9 or step 12, if step 9 has been completed. Proceed to step 13 if there is continuity.

9. Connect a test probe to each traction switch terminal. There should be continuity. If there is no continuity, check to be sure switch is actuated by pushing leaf spring causing it to actuate switch (Fig. 83). If there is continuity when switch is manually actuated, adjust switch. Proceed to step 10. If there is no continuity when switch is manually operated, replace switch and proceed to step 10 for adjustment procedures.

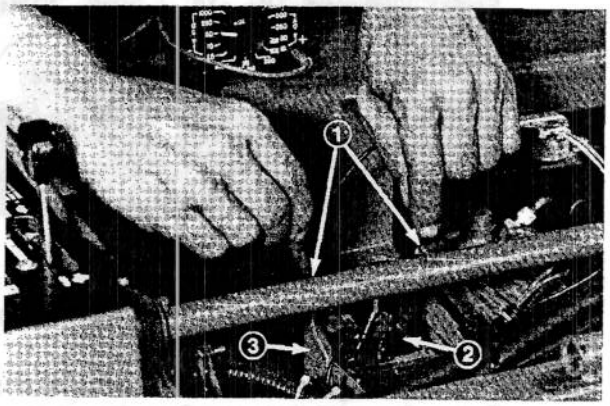


Figure 83

1. Probe to each terminal
2. Traction switch
3. Leaf spring

10. To adjust neutral switch, loosen jam nut, turn adjusting screw toward switch until continuity is attained, then turn adjusting screw one-half turn further and tighten jam nut (Fig. 84).

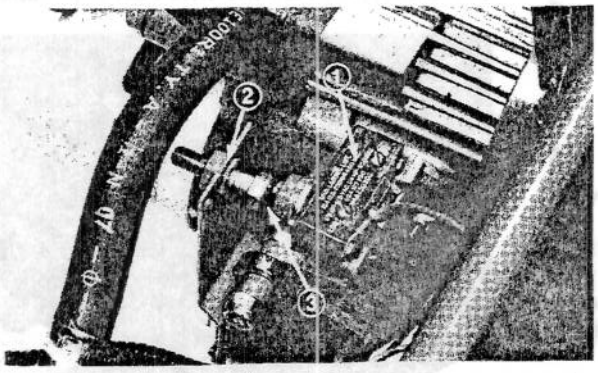


Figure 84

1. Neutral switch 3. Switch actuating capscrew
2. Jam nut

11. Pull PTO switch connectors apart (Fig. 85). Check continuity across the two bottom terminals of the PTO switch (Fig. 85) while the PTO lever is in the disengage position. If there is no continuity, install new PTO switch. Replace the wiring harness if the switch has continuity.

12. Push high tension wire onto spark plug. Connect positive and negative cables to the battery posts, but remove the white cable from the solenoid terminal. Touch the white cable to red terminal on the solenoid. If the engine does not crank, the starter is defective. Use a Briggs & Stratton Service

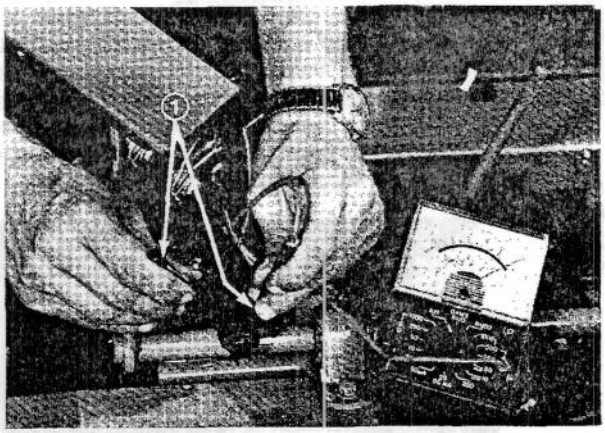


Figure 85

1. Probes onto two bottom terminals

Manual to trouble shoot the starter. Install a new solenoid if the engine cranks.

Problem: Engine Cranks But Does Not Start or Engine Stops While It Has Been Running

1. Pull high tension wire off spark plug. Hold metal end of the wire about 1/4 inch (6 mm) away from the engine head and crank the engine. If a bright, blue spark is noticed, install a new plug. Proceed to step 2 if spark is not evident.

2. Disconnect engine ground connectors at right side of frame (Fig. 86). Hold metal end of the high tension wire about 1/4 inch (6 mm) away from the engine head and crank the engine. If a bright, blue spark is noticed, proceed to step 3. If spark is not evident, the problem is in the engine ignition system. Push ground connectors back together.

Note: Use a Briggs and Stratton Service Manual to trouble shoot the ignition system.

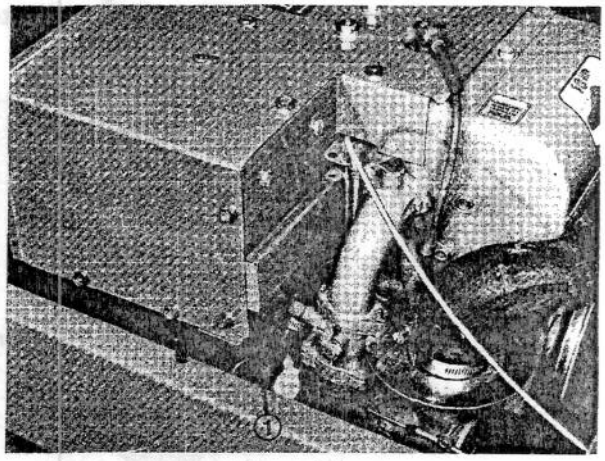


Figure 86

1. Ground connectors

3. Pull connector off ignition switch. Check continuity across "M" and "G" terminals (Fig. 87 & 88) while key is in the START and RUN positions. Replace the ignition switch if it has continuity. If the switch does not have continuity, proceed to step 4.

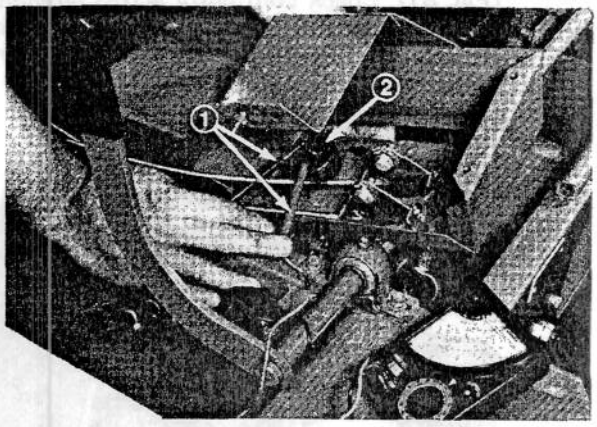


Figure 87

1. Probes onto "M" and "G" terminals
2. Turn switch key to START and RUN positions

4. Check continuity between a good ground and the blue wire terminal in the ignition switch connector. If there is continuity, replace the wire harness. Replace the seat switch if there is no continuity.

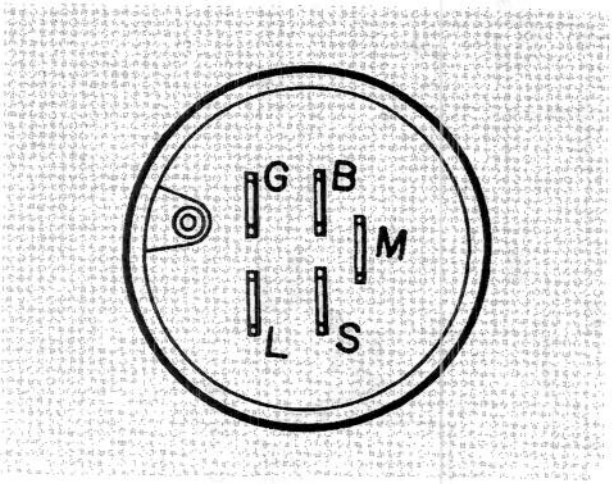


Figure 88

Problem: Alternator Does Not Charge Battery

CAUTION

Disconnect positive and negative cables from the battery. Disconnecting the battery de-energizes the electrical system so a continuity tester can be used for trouble shooting.

1. Check continuity between alternator output wire at side of engine (Fig. 89) and positive terminal on solenoid — where red battery cable and red wire connect (Fig. 80). If there is continuity, either the battery or the engine alternator may be defective. Proceed to step 2 if there is no continuity.

Note: Use a battery service manual to check the battery and a Briggs and Stratton Service Manual to trouble shoot the engine.

2. Check continuity between ammeter terminals (Fig. 81). If ammeter does not have continuity, replace the ammeter. Replace the wiring harness if the ammeter has continuity.

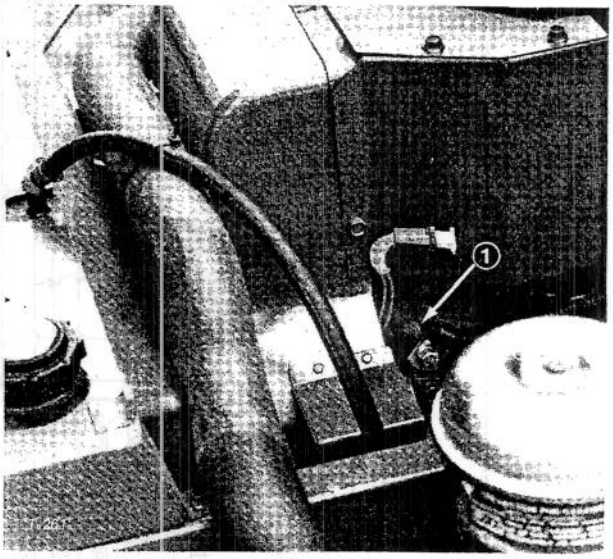
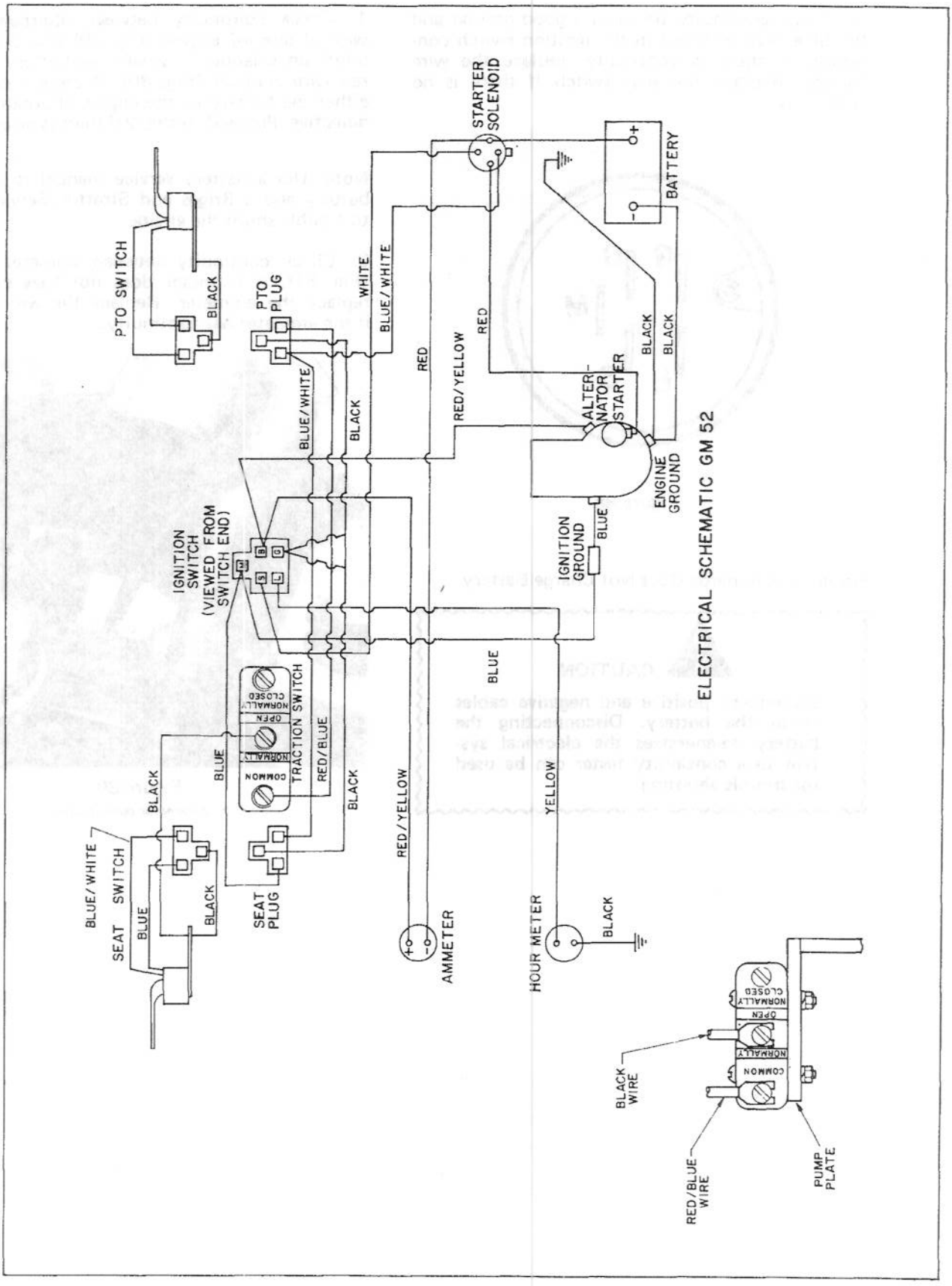


Figure 89

1. Alternator output wire

ELECTRICAL SCHEMATIC



CUTTING UNIT MAINTENANCE

SEPARATING CUTTING UNIT FROM TRACTION UNIT

1. Position machine on level surface, raise cutting unit, engage parking brake, be sure traction pedal is in neutral position, PTO lever is in DISENGAGE position, shut engine off and remove key from switch.

2. Remove clevis pin from bracket to separate spring from bracket (Fig. 90).

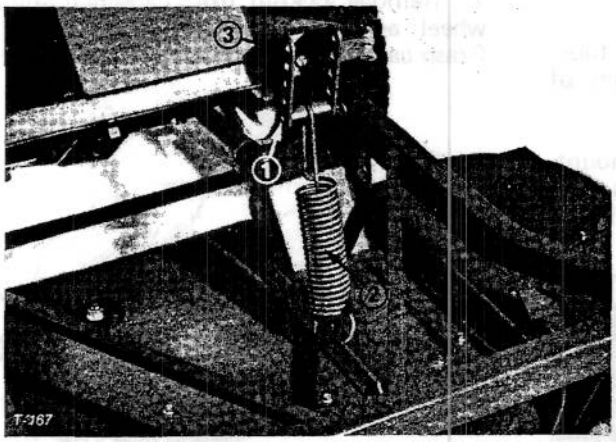


Figure 90

1. Clevis pin 2. Spring 3. Bracket

3. Lower cutting unit, remove pins from height-of cut brackets (4).

4. Drive roll pin out of yoke and input shaft of gear box (Fig. 91). Slide yoke off the input shaft. If traction unit will be used without the cutting unit, remove the PTO shaft from the traction unit; refer to PTO Shaft Removal, page 43.

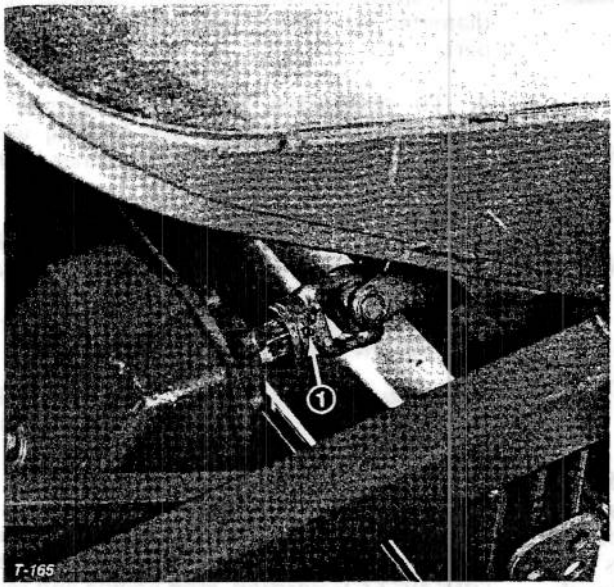


Figure 91

1. Roll pin

DANGER

Do not start the engine and engage the PTO lever when PTO shaft is not connected to gear box on cutting unit. If engine is started and PTO shaft is allowed to rotate, serious injury could result.

5. Start engine, raise cutting unit frame.

6. Stop engine and slide cutting unit away from traction unit and frame.

PTO SHAFT REMOVAL

1. Jack left wheel off shop floor. Support the axle with a jackstand to prevent machine from falling accidentally.

2. Remove five wheel nuts and slide left wheel off axle to expose access hole in side of chassis (Fig. 92).

3. Push PTO lever forward until pulley and brake disengage. Align hole in PTO shaft with hole in chassis (Fig. 92).

4. Through access hole in chassis, drive roll pin out of PTO shaft and output shaft with pin punch and ball peen hammer (Fig. 92). Remove PTO shaft.

5. Install the left wheel with five wheel nuts. Tighten nuts to 60-80 ft-lb (81-109 N·m)

6. Lower machine and remove jack.

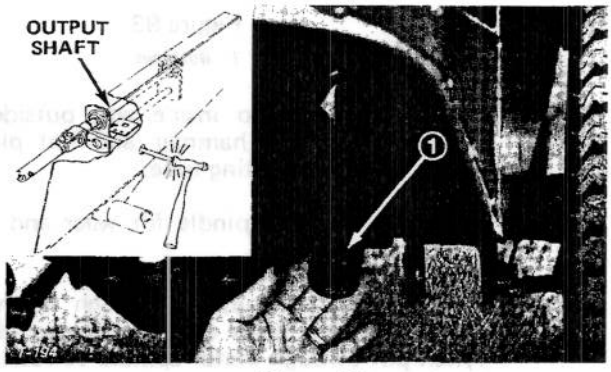


Figure 92

1. PTO shaft

SERVICING BUSHINGS IN CASTOR ARMS

The castor arms have bushings pressed into the top and bottom portion of the tube. After many

hours of operation, the bushings will wear. To check the bushings, move castor fork back and forth and from side-to-side. If castor spindle is loose inside the bushings, bushings are worn and must be replaced.

1. Raise cutting unit and block it so it cannot fall accidentally.

2. Remove lynch pin and thrust washers from top of castor spindle.

3. Pull castor spindle out of mounting tube. Allow thrust washers to remain on bottom of spindle.

4. Insert pin punch into top or bottom of mounting tube and drive bushing out of tube (Fig. 93). Also drive other bushings out of tube. Clean inside of tubes to remove dirt.

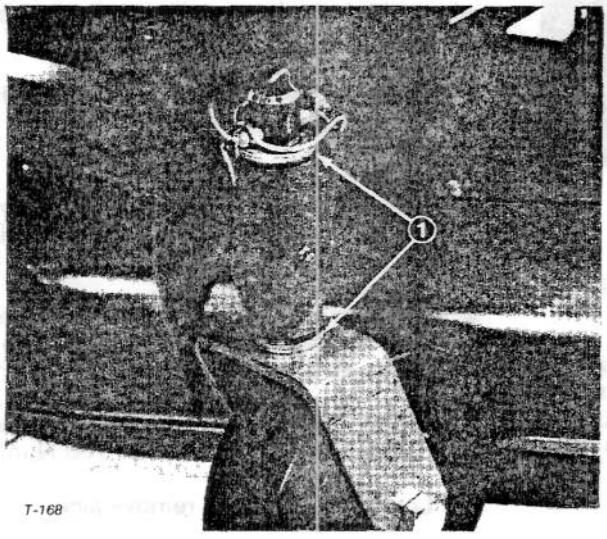


Figure 93

1. Bushings

5. Apply grease to inside and outside of new bushings. Using a hammer and flat plate, drive bushings into mounting tube.

6. Inspect castor spindle for wear and replace it if damaged.

7. Push castor spindle through bushings and mounting tube. Slide spacers onto spindle. Install lynch pin through castor spindle to retain all parts in place.

IMPORTANT: When bushings are installed, the inside diameter may collapse slightly, and this may not allow castor spindle to be installed. If castor spindle does not slide through new bushings and mounting tube, ream both bushings to inside diameter of 1.126 in. (28.6 mm).

SERVICING CASTOR WHEEL AND BEARING

The castor wheel rotates on a high-quality roller bearing and is supported by a spanner bushing. Even after many hours of use, provided that the bearing was kept well-lubricated, bearing wear will be minimal. However, failure to keep bearing lubricated will cause rapid wear. A wobbly castor wheel usually indicates a worn bearing.

1. Remove locknut from capscrew holding castor wheel assembly between castor fork (Fig. 94). Grasp castor wheel and slide capscrew out of fork.

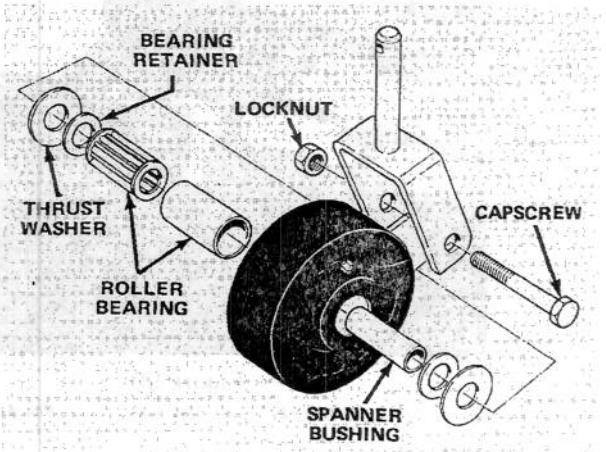


Figure 94

Note: Account for the two bearing retainers and thrust washers (Fig. 94).

2. Tip wheel to the side and allow roller bearing and spanner bushing to fall out (Fig. 94).

3. Inspect bearing, spanner bushing and inside diameter of wheel for wear. Replace defective parts.

4. To reassemble parts, slide spanner bushing through roller bearing. Pack bearing with no. 2 grease; then insert bearing w/spanner bushing into wheel.

5. Slide bearing retainer and thrust washer onto spanner bushing, and mount castor wheel assembly between the fork and capscrew and locknut. Tighten capscrew and locknut until spanner bushing bottoms against inside of castor fork.

6. Pump more grease through grease fitting on castor wheel (Fig. 94) until bearing is greased thoroughly.

CHECKING FOR BENT BLADE

1. Raise cutting unit, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, stop engine and remove key from switch.

CUTTING UNIT MAINTENANCE

Block cutting unit to prevent it from falling accidentally.

2. Rotate blade until the ends face forward and rearward (Fig. 95). Measure from inside of cutting unit to cutting edge at front of blade (Fig. 95), and remember this dimension.

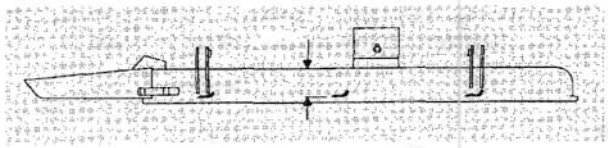


Figure 95

3. Rotate opposite end of blade forward. Measure between the cutting unit and cutting edge of blade at the same position as in step 2. The difference between dimensions obtained in steps 2 and 3 must not exceed 1/8 in. (3 mm). If dimension exceeds 1/8 in. (3 mm), replace the blade because it is bent; refer to Removing Cutter Blade, page 45.

REMOVING CUTTER BLADE

The blade must be replaced if a solid object is hit, the blade is out-of-balance or if the blade is bent. Always use genuine TORO replacement blades to be sure of safety and optimum performance. Never use replacement blades made by other manufacturers because they could be dangerous.

WARNING

Do not try to straighten a blade that is bent, and never weld a broken or cracked blade. Always use a new blade to assure safety.

1. Raise cutting unit to its highest position, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position and shut engine off. Block cutting unit to prevent it from falling accidentally.

2. Grasp end of blade using a rag or thickly padded glove. Remove capscrew, lockwasher, anti-scalp cup and blade from spindle shaft (Fig. 96).

3. In sequence, install blade – sail facing toward cutting unit – and anti-scalp cup. Secure parts in place with capscrew and lockwasher. Tighten capscrew to 75-100 ft-lb (102-136 N·m).

CHECKING SAIL AND SHARPENING CUTTER BLADE

Two areas must be considered when checking and

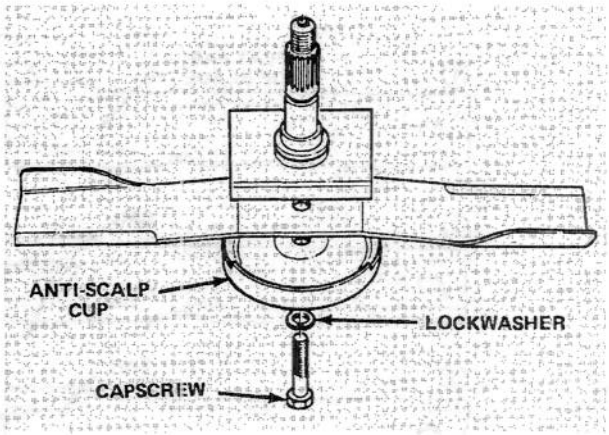


Figure 96

servicing the cutter blade: one area is the sail, the other is the cutting edge. Both cutting edges and the sail, which is the turned up metal opposite the cutting edge, contribute to a good quality-of-cut. The sail is important because it pulls grass up straight, thereby producing an even cut. However, the sail will gradually wear down during operation, and this condition is normal (Fig. 97). As the sail wears down, the quality-of-cut will degrade somewhat, although the cutting edges are sharp. The cutting edges of the blade must be sharp so the grass is cut rather than torn. A dull cutting edge is evident when tips of the grass appear brown and shredded. Sharpen the cutting edges to correct this condition.

1. Raise cutting unit to its highest position, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, stop engine and remove key from switch. Block cutting unit to prevent it from falling accidentally.

2. Examine cutting ends of the blade carefully, especially where the flat and curved parts of the blade meet (Fig. 97-1). Since sand and abrasive material can wear away the metal that connects the flat and curved parts of the blade, check the blade before using the mower. If wear is noticed (Fig. 97-2), replace the blade.

DANGER

If blade is allowed to wear, a slot will form between the sail and flat part of the blade. (Fig. 97-3). Eventually, a piece of the blade may break off and be thrown from under the housing, possibly resulting in serious injury to yourself or bystander.

CUTTING UNIT MAINTENANCE

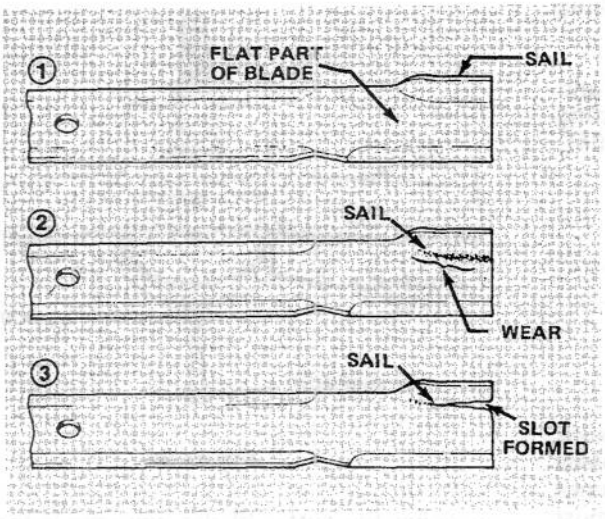


Figure 97

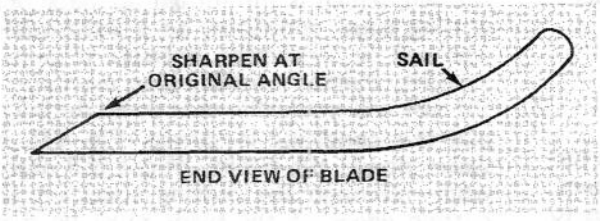


Figure 98

3. Inspect cutting edges of all blades. Sharpen the cutting edges if they are dull or nicked. Sharpen only the top side of the cutting edge and maintain the original cutting angle to make sure of sharpness (Fig. 98). The blade will remain balanced if same amount of metal is removed from both cutting edges.

Note: Remove the blades and sharpen them on a grinder; refer to Removing Cutter Blade, steps 1 and 2, page 45. After sharpening the cutting edges, reinstall blade and anti-scalp cup with capscrew and lockwasher. Blade sails must be on top of blade. Tighten capscrew to 75-100 ft-lb (102-136 N·m).

4. Remove blocking from cutting unit and lower it to the ground.

CORRECTING CUTTING UNIT MISMATCH

If one cutter blade cuts lower than the others, correct as follows:

1. Lower cutting unit onto level surface, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position and shut engine off.

2. Raise height-of-cut to 4 in. (102 mm) position (Fig. 101); refer to Adjusting Height-Of-Cut, page 12.

3. Rotate blades so tips line up with one another. Tips of the adjacent blades must be within 1/8 in. (3 mm) of each other. If tips are not within 1/8 in. (3 mm) of each other, proceed to step 8 and add shims between spindle housing and bottom of cutting unit.

4. Position all three blades in the "A" position (Fig. 99) and measure from level surface to the bottom of the tip end of each blade (Fig. 100).

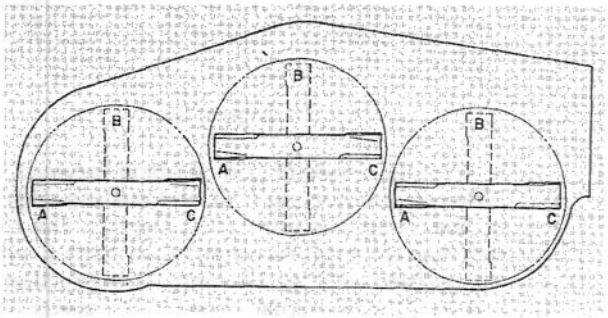


Figure 99

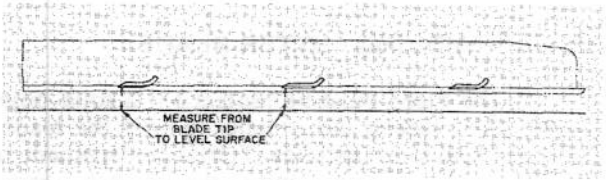


Figure 100

5. Note measurement attained at "A", rotate blades to "B" position (Fig. 99), measure distance of all blades to level surface and note dimensions (Fig. 100).

6. Rotate blades to "C" position, measure and note distance measured (Fig. 99, 100).

7. Compare measurements at various positions. All dimensions must be equal within 1/4 in. (6 mm) from one another. The difference between dimensions must not exceed 1/4 in. (6 mm). If difference exceeds 1/4 in. (6 mm), proceed to step 8 to correct front to rear mismatch. Proceed to step 9 to correct side to side mismatch.

8. Remove capscrews, flatwashers, lockwashers and nuts from outer spindle in the area where shims must be added. To raise or lower the blade, add a shim, Part No. 3256-24, between spindle housing and bottom of cutting unit. Continue checking alignment of blades and adding shims until tips of blades are within the required dimension.

9. Equalize side to side measurements as follows:

   A. Cutting units usually operated at 1 to 2 in. (25 to 51 mm) height-of-cut should have the low side of the cutting unit raised. Remove the lynch pin securing castor wheel on low end (Fig. 101) and remove castor assembly.

CUTTING UNIT MAINTENANCE

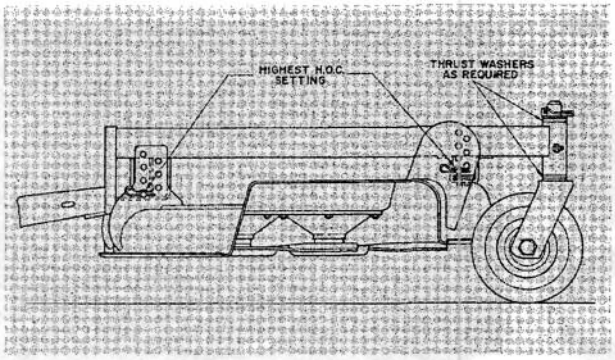


Figure 101

B. Transfer one thrust washer from top side of castor shaft to lower side, install castor assembly and compare blade height of all blades; refer to steps 3 through 6. Continue adding thrust washers if height still does not meet requirements.

C. If cutting unit is operated at 2 to 4 in. (51 to 102 mm) height-of-cut, lower the high side of cutting unit. Remove lynch pin of castor at high end of unit and remove castor assembly (Fig. 101).

D. Transfer one thrust washer from lower side of castor shaft to top side, install assembly and compare blade height of all blades; refer to steps 3 through 6. Repeat procedure if height still does not meet requirements.

E. If height is within specified dimension, install lynch pin, set height-of-cut to proper height and resume operation.

REPLACING GRASS DEFLECTOR

1. Raise cutting unit to its highest position, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, stop the engine and remove key from switch. Block cutting unit to prevent it from falling accidentally.

2. Remove two capscrews, locknuts and springs securing deflector mounts to pivot brackets (Fig. 102).

3. To remove the pivot brackets, remove carriage bolts, lockwashers and nuts (Fig. 102).

4. Reinstall pivot brackets on top of discharge opening with carriage bolts, lockwashers and nuts. Head of carriage bolts must be on inside of cutting unit.

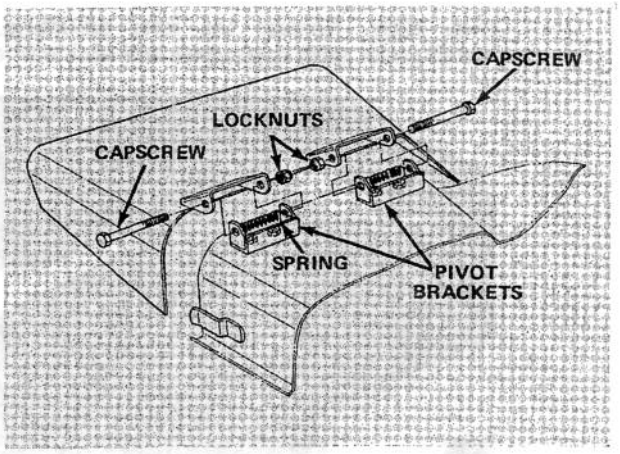


Figure 102

5. Position deflector mounts on outside of pivot brackets and secure parts together with capscrews, locknuts and springs. Both locknuts must face each other. Tighten locknuts until they are flush against deflector pivots. Lift deflector and allow it to drop to check spring tension. Deflector must be held firmly in full downward position by spring tension. Correct if necessary.

6. Remove blocking from cutting unit and lower it to the floor.

ADJUSTING IDLER PULLEY

The idler pulley applies force against the belt so power can be transmitted to the blade pulleys. If the idler is not tensioned against the belt with sufficient force, maximum power will not be transmitted to the pulleys. Initial tension on a new belt requires 25 to 30 ft-lb (34 to 41 N·m) or torque on the large nut, which applies force against the belt. As the belt wears and loosens, 20 to 25 ft-lb (27 to 34 N·m) of torque on the nut is required. If the idler is not adjusted to these specifications, adjustment is necessary.

1. Lower cutting unit, engage parking brake, be sure traction pedal is in neutral position, PTO lever is in DISENGAGE position, stop engine and remove key from switch.

2. Remove capscrews and lockwashers securing right hand cover to top of cutting unit. Remove cover from cutting unit.

3. Loosen two nuts securing idler plate in place (Fig. 103). Using a socket and torque wrench, tighten the idler adjusting nut (Fig. 103) until proper torque value is achieved.

4. Hold the torque against the belt and tighten the two nuts so idler plate is held securely in place

(Fig. 103). Release the idler adjusting nut and install cover with capscrews and lockwashers.

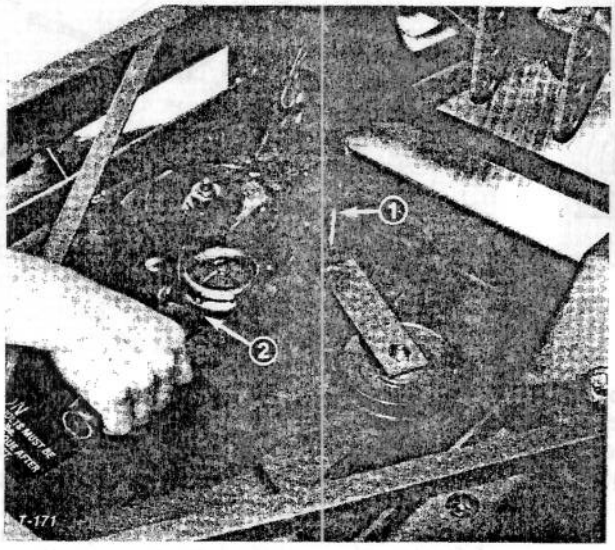


Figure 103

1. Nut 2. Torque wrench

REPLACING DRIVE BELT

The blade drive belt, tensioned by the adjustable idler, is very durable. However, after many hours of use, the belt will show signs of wear. Signs of a worn belt are: squealing when belt is rotating, blades slipping when cutting grass, frayed edges, burn marks and cracks. Replace the belt if any of these conditions are evident.

1. Lower cutting unit to the floor, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, stop the engine and remove key from switch.

2. Remove capscrews and lockwashers securing left and right covers to top of cutting unit (Fig. 104).

3. Loosen two nuts securing idler plate in place (Fig. 105) and remove old belt from pulleys.

4. To install new belt, the gear box base must be removed. To do this, remove four carriage bolts, lockwashers and nuts holding gear box base (Fig. 106).

5. Install new belt around gear box pulley, spindle pulleys and idler pulley (Fig. 107).

6. Install gear box base with carriage bolts, lockwashers and nuts (Fig. 106).

7. Using a torque wrench, adjust tension of idler pulley against the belt; refer to Adjusting Idler Pulley, page 47.

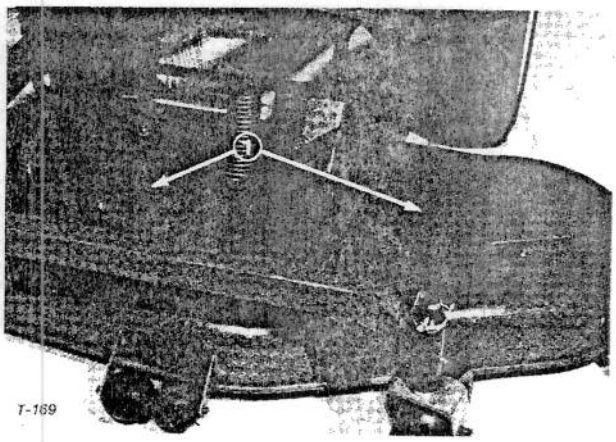


Figure 104

1. Covers

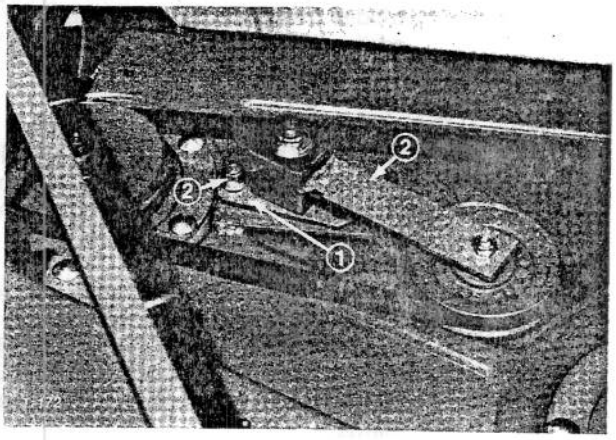


Figure 105

1. Idler plate 2. Nut, lockwasher and flatwasher

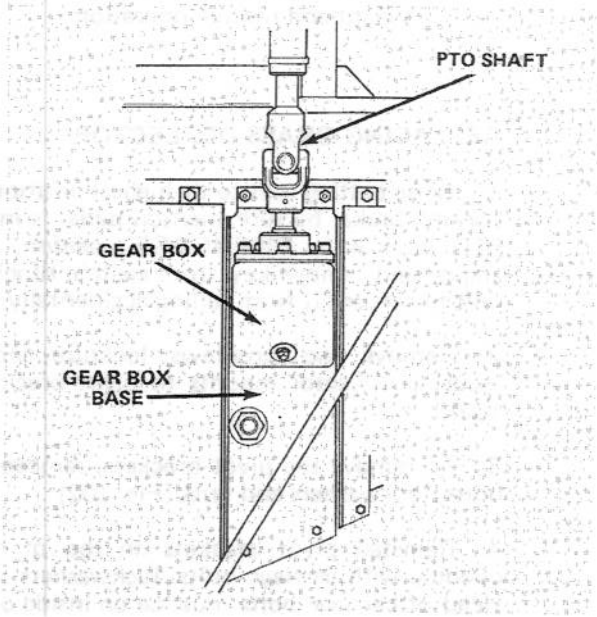


Figure 106

CUTTING UNIT MAINTENANCE

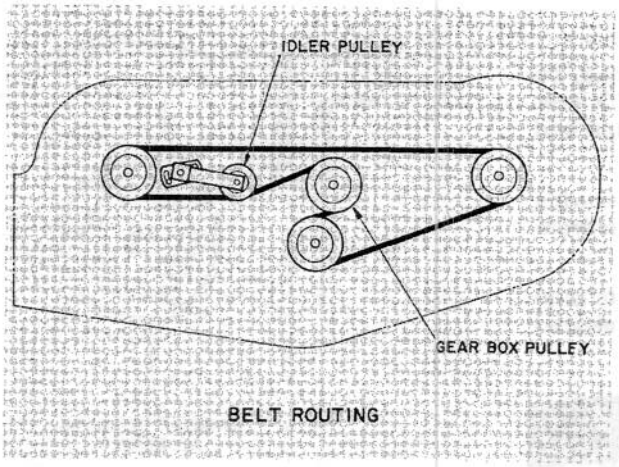


Figure 107

8. Reinstall covers with capscrews and lockwashers (Fig. 104).

9. Remove blocking and lower cutting unit to the ground.

REPLACING IDLER PULLEY AND ARM

1. Lower cutting unit, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position and stop the engine.

2. Remove capscrews and lockwashers securing right hand cover to top of cutting unit (Fig. 104).

3. Loosen two nuts securing idler plate in place (Fig. 105). Belt tension will be released when nuts are loosened.

4. Remove large nut and flatwasher retaining idler arm on idler plate shaft (Fig. 108). Slide arm off shaft and account for the square key.

5. Remove capscrew and locknut securing idler pulley and arm together (Fig. 108).

6. To reinstall idler pulley, mount pulley against bottom of idler arm with capscrew and nut. Tighten nut securely.

Note: Head of capscrew must be toward top of cutting unit when idler assembly is installed on idler plate shaft.

7. Install key into keyway in idler plate shaft. Slide idler arm socket onto shaft and retain it in place with large nut. Tighten nut to 30 ft-lb (41 N·m).

8. Adjust idler pulley tension against the belt; refer to Adjusting Idler Pulley, page 47.

9. Reinstall cover with capscrews and lockwashers.

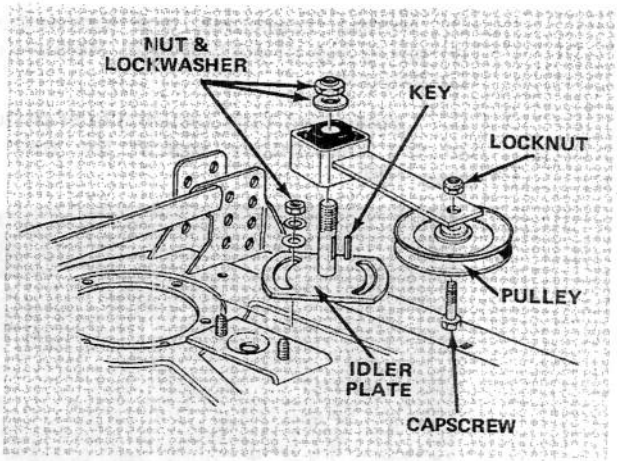


Figure 108

REPLACING IDLER PLATE

1. Lower cutting unit, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position and stop the engine.

2. Remove capscrews and lockwashers securing right hand cover to top of cutting unit (Fig. 104).

3. Loosen two nuts securing idler plate in place (Fig. 105). Belt tension will be released when nuts are loosened.

4. Remove large nut retaining idler arm on idler plate shaft. Slide arm of shaft and account for the square key.

5. Remove two nuts, lockwashers and flatwashers holding slotted idler plate in place (Fig. 108).

6. To install idler plate, slide plate, flatwashers and locknuts onto stud guides. Thread nuts onto stud guides, but do not tighten them.

7. Install key into keyway in idler plate shaft. Slide idler arm socket onto shaft and retain it in place with large nut. Tighten nut to 30 ft-lb (41 N·m).

8. Adjust idler pulley tension against the belt; refer to Adjusting Idler Pulley, page 47.

9. Reinstall cover with capscrews and lockwashers.

CUTTING UNIT MAINTENANCE

REPLACING SPINDLE PULLEY

1. Lower cutting unit, engage parking brake, be sure traction pedal is in neutral position, PTO lever is in DISENGAGE position, stop the engine and remove key from switch.

2. Remove capscrews and lockwashers securing covers to top of cutting unit. Remove covers from cutting unit.

3. Loosen two nuts securing idler plate so tension of the idler pulley against the belt is released (Fig. 109).

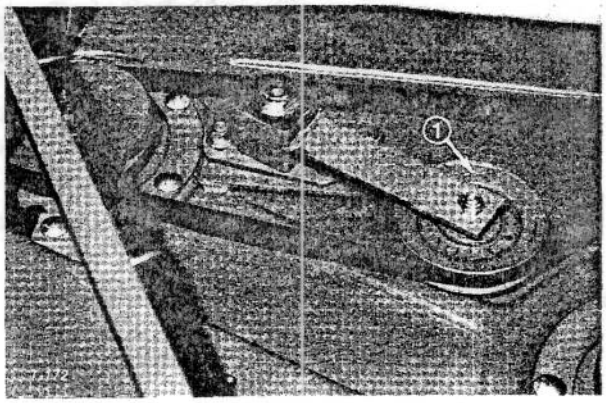


Figure 109

1. Idler pulley

4. Raise cutting unit to its highest position, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, stop the engine and remove key from switch. Block cutting unit to prevent it from falling accidentally.

5. Remove six carriage bolts and flange nuts holding spindle housing assembly and support ring against cutting unit (Fig. 110). Slide spindle housing assembly out bottom of cutting unit.

6. Remove nut and flatwasher retaining pulley on spindle shaft. Pull pulley off shaft.

7. Check splines on inside of pulley. If splines are damaged, replace the pulley. When installing a new pulley, check the splines on end of spindle shaft. Splines on the spindle shaft must not be damaged. If splines are damaged, the spindle shaft must be replaced before a new pulley is installed.

8. Install new pulley on spindle shaft with flatwasher and locknut. Tighten nut to 100 ft-lb (136 N·m).

9. Slide pulley end of spindle housing assembly through hole in cutting unit, and loop belt around pulley and idler. Mount spindle assembly in place with support ring and six carriage bolts and flange nuts.

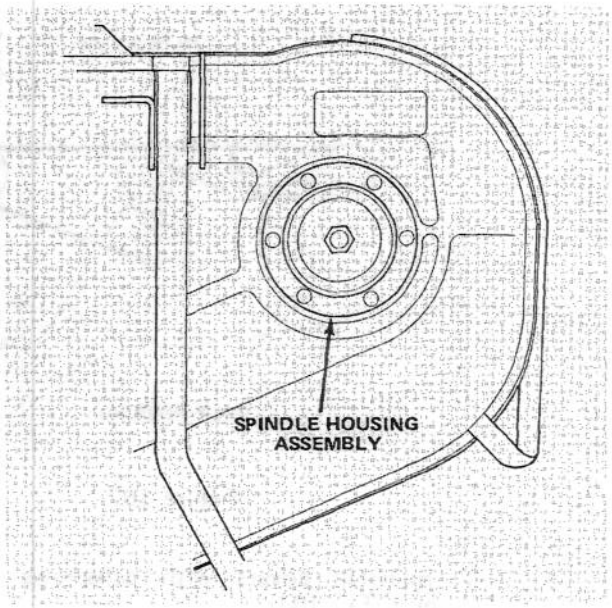


Figure 110

10. Remove blocking and lower cutting unit.

11. Adjust idler pulley tension against the belt; refer to Adjusting Idler Pulley, page 47.

12. Install covers with capscrews and lockwashers.

REMOVING GEAR BOX AND PULLEY ASSEMBLY

1. Lower cutting unit, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position and shut engine off.

2. Remove capscrews and lockwashers securing right hand cover to top of cutting unit. Remove cover from cutting unit.

3. Loosen two nuts securing idler plate so tension of idler pulley against the belt is released.

4. Remove four carriage bolts, lockwashers and nuts securing gear box base to top of cutting unit (Fig. 111). Slide gear box and base forward until PTO shaft separates. Place gear box base assembly on workbench.

DANGER

Do not start the engine and engage the PTO lever when PTO shaft is not connected to the gear box. If engine is started and PTO shaft is allowed to rotate, serious injury could result.

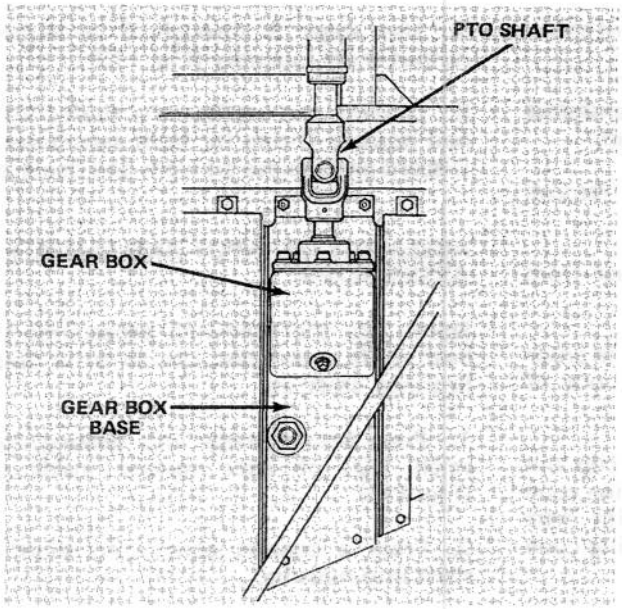


Figure 111

5. Remove set screws from taper lock bushing (Fig. 112). Install one set screw into hole that is threaded on side of taper lock (Fig. 112). Tighten set screw until taper lock is loose on inside of pulley hub.

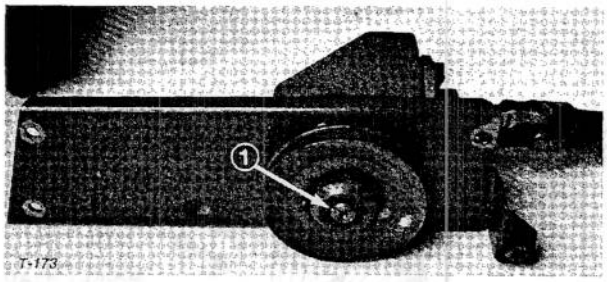


Figure 112

1. Taper lock bushing

Note: Only one set screw is used to loosen the taper lock.

6. Slide gear box pulley and taper lock off gear box output shaft. Account for the woodruff key that held pulley on shaft, and remove set screw from side of taper lock.

REPLACING PULLEY ASSEMBLY

1. To install new pulley, lay pulley on the workbench with the hub side up. Then slide taper lock – small end first – into the pulley hub.

2. Insert woodruff key into keyway in gear box shaft. Slide pulley w/taper lock onto gear box shaft and key (Fig. 112).

Note: Large hub on pulley must face away from gear box, and like the taper lock, pulley must contact shoulder on gear box shaft.

3. Rotate pulley to get non-threaded holes in taper lock to line up with two threaded holes in hub of gear box pulley. Start threading set screws into the two holes and tighten them alternately and evenly until both set screws are tight.

4. Using a brass dowel or sleeve and hammer, hit the taper lock firmly. Now tighten set screws to 55 in.-lb (6 N·m). Continue to hit the taper lock and tighten set screws until 55 in.-lb (6 N·m) of torque willl not turn the set screws.

5. Check alignment of gear box pulley with spindle pulley. Loosen and relocate taper lock to adjust, if necessary (Fig. 112).

6. Fill recessed socket head in set screws and the other taper lock holes with grease to prevent dirt from packing into the holes.

7. Slide PTO shaft into PTO tube. Loop belt around gear box pulley and mount gear box base on top of cutting unit with four carriage bolts, lockwashers and nuts (Fig. 111).

8. Lubricate PTO shaft; refer to Lubrication Maintenance, page 19.

9. Install belt around spindle pulleys and idler pulley. Adjust idler pulley tension against the belt; refer to Adjusting Idler Pulley, page 47.

GEAR BOX ASSEMBLY SERVICING

Disassembly:

1. Remove gear box and pulley from machine. Refer to Removing Gear Box and Pulley Assembly, page 50.

2. Remove pipe plug from gear box and drain oil out of gear box (Fig. 113).

3. Scribe a mark on the input and output shaft housings and gearbox to aid assembly operation.

INPUT AND OUTPUT SHAFT REMOVAL

1. Remove five (5) capscrews securing input housing assembly; tap input housing with soft-faced hammer and pull on input shaft to remove from gear box (Fig. 113).

2. Remove five (5) capscrews securing output bearing housing to gear box, tap housing with soft-faced hammer and pull on output shaft to remove assembly from gear box (Fig. 113).

Note: Remember position of vent plug to be sure input housing is in correct position during re-

assembly. Keep track of number and color of shims used in each assembly.

IMPORTANT: Input and output housing capscrews are of different lengths. Do not mix them up.

3. Mount input shaft in soft jawed vise, remove nut and thrust washer.

4. Use a bearing separator to remove gear from shaft. Remove square key (Fig. 113).

5. Support mount flange of input housing in arbor press and press shaft, threaded end up, out of housing (Fig. 113).

6. One complete bearing and one bearing cup will remain in housing. Remove remaining bearing cone and drive both cups out of housing with drift punch and hammer. Press the other bearing cone off the shaft.

7. Use steps 3 through 6 to disassemble the output shaft assembly (Fig. 113).

8. Discard and replace the shaft, nut, shaft seal and housing O-ring for both assemblies (Fig. 113). Discard and replace all worn and damaged parts.

ASSEMBLY OF INPUT AND OUTPUT SHAFT ASSEMBLIES:

Note: Use the following procedures to assemble both shaft assemblies. Use an arbor press to install bearings, seals, etc.

1. Press bearing cups into bearing housing with small I.D. of cups toward inside of housing (Fig. 113).

2. Press a bearing cone onto shaft and insert shaft into housing.

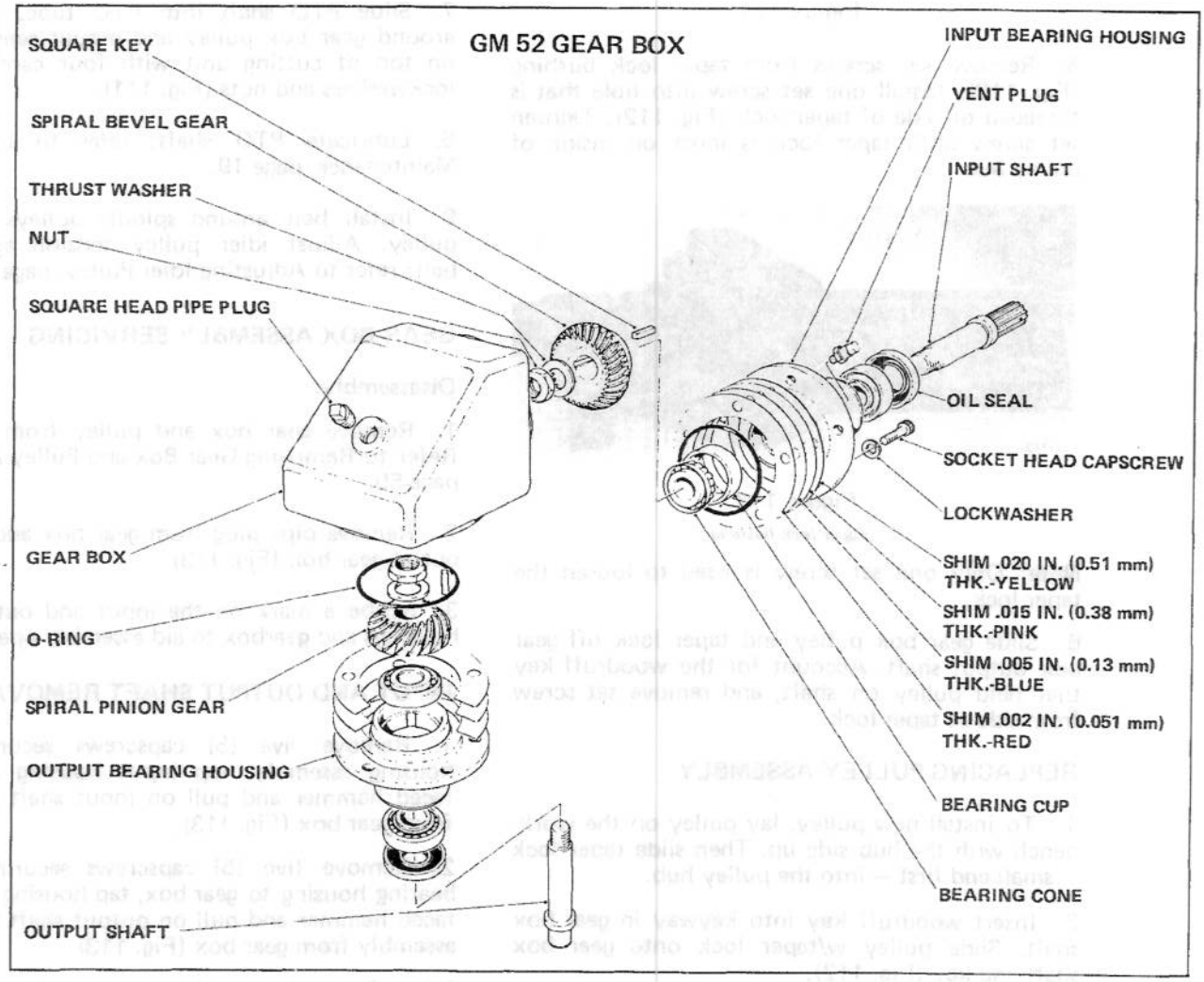


Figure 113

3. Press on the remaining bearing cone. Install square key and press on gear. Use Loc-tite 242 or 601 on shaft and gear. Install thrust washer and nut (Fig. 113).

4. Clamp the shaft end into a soft jawed vise and rotate the housing while tightening the nut to insure bearings are matched with races. Tighten until shaft has .001 to .005 inch (0.025 to 0.127 mm) end play.

5. Apply No. 2 Permatex to outer surface of seal, apply oil to seal lips and press new seal into housing with seal lips facing inward (Fig. 113).

ASSEMBLING INPUT AND OUTPUT SHAFT ASSEMBLIES TO GEAR BOX

IMPORTANT: It is recommended to replace the shims. However, if only the bearings, shafts or gears have been replaced, use the same number and size shims as were used originally. If gear box or bearing housing has been replaced, install a .020 inch (0.51 mm) shim as a beginning alignment dimension.

1. Install shims on housing (Fig. 113).

2. Oil O-rings, install on housing (Fig. 113) and insert both shaft assemblies into gear box (Fig. 113).

3. Install the mounting plate, insert the mounting capscrews and torque them to 20-25 ft-lb (27-35 N·m) in both assemblies.

4. Clamp the output shaft of gear box in a soft-jawed vise, lightly clamp a pair of vise-grip pliers to the input shaft, mount a dial indicator with magnetic base to the vise, move vise grips up and down and check input gear backlash (Fig. 114). Backlash should be .005-.010 inch (0.13-0.25 mm) with indicator positioned one and one-half inch (38 mm) from center of shaft (Fig. 115). If backlash is incorrect, remove input housing assembly and add or subtract shims as necessary. Repeat procedures until correct backlash is obtained. Shims are available in .002, .005, .015 and .020 inch (0.051, 0.13, 0.38 and 0.51 mm) sizes (Fig. 114).

5. Check the input and output gear pattern to assure proper gear mesh has been attained. Remove both shaft assemblies and coat the gear teeth with DyKem steel blue or an equivalent compound and re-install both assemblies into the gear box. Insure the same number shims are used as established in step 4.

6. Rotate the shafts to establish a wear pattern in the steel blue on the gear teeth and disassemble the input shaft and housing assembly from the gear box.

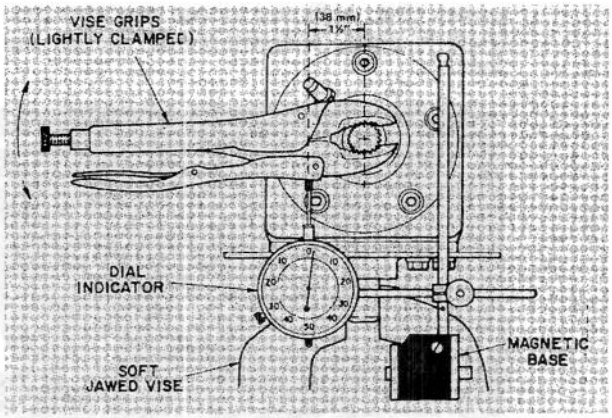


Figure 114

7. Inspect the wear pattern on the gear teeth, compare them to the patterns indicated (Fig. 115). Add or remove shims from output housing to correct any misalignment.

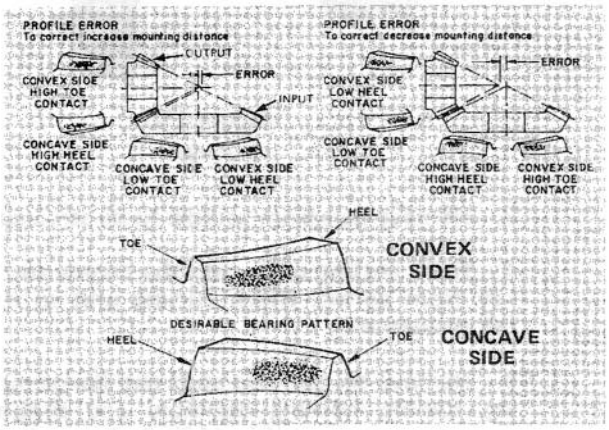


Figure 115

8. Repeat steps 1 through 6 until desirable wear pattern is established, re-assemble assembly into the gear box, torque the capscrews and fill the gear box to the bottom of the gear box plug with SAE 10W-40 engine oil.

9. Install gear box pulley. Refer to Replacing Pulley Assembly, page 51.

REMOVING SPINDLE AND BEARINGS FROM SPINDLE HOUSING

1. Lower cutting unit, engage parking brake, be sure traction pedal is in neutral, PTO lever is in DISENGAGE position, stop the engine and remove key from switch.

2. Remove capscrews and lockwashers securing pulley cover on top of spindle housing to be serviced (Fig. 116). Also remove cover over idler pulley (Fig. 116) and loosen two nuts securing idler plate in place. This will release tension on the drive belt.

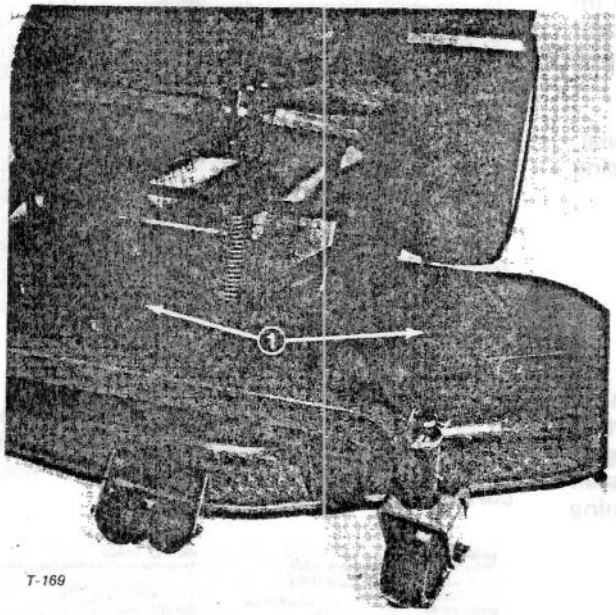


Figure 116

1. Covers

3. Remove belt from spindle to be serviced.

4. Raise cutting unit, stop the engine and remove key from switch. Block cutting unit so it cannot fall accidentally.

5. Remove six carriage bolts and flange nuts holding spindle housing assembly and support ring against cutting unit (Fig. 117). Slide spindle housing assembly out bottom of cutting unit.

6. Remove nut and flatwasher retaining spindle pulley on spindle shaft. Slide pulley off shaft.

7. If spindle shaft will be replaced, remove capscrew, lockwasher, anti-scalp cup and blade from spindle shaft (Fig. 118). Otherwise, the blade and its other associated parts may be left on the spindle shaft.

8. Press spindle shaft out of spindle housing (Fig. 118), using an arbor press. Bearing spacer (Fig. 118) remains on spindle shaft as shaft is being removed.

9. The seals (Fig. 118) will be removed next; however, notice the lip of the seal. The lip of the upper seal faces inward, and the lip of the lower seal faces outward. Therefore, new seals must always be installed with the lip facing in the proper direction. Now remove seals from spindle housing.

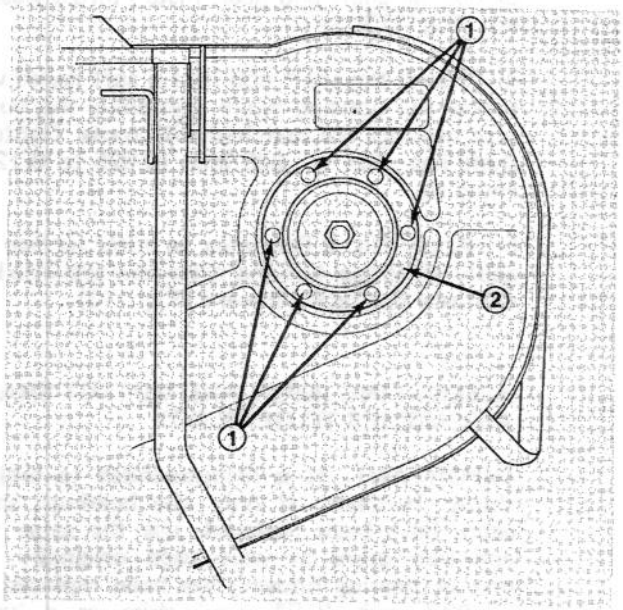


Figure 117

1. Carriage bolts 2. Support ring

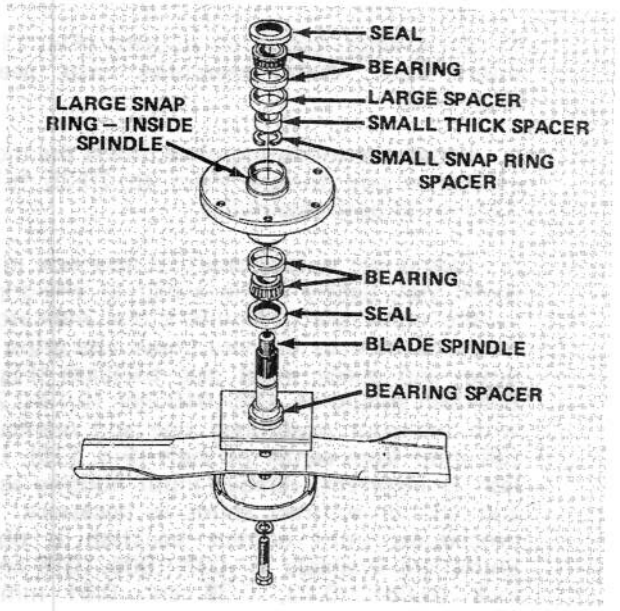


Figure 118

10. Allow bearings, small thick spacer and small snap ring spacer to fall out of spindle housing (Fig. 118).

11. Using a punch and hammer, drive both bearing cups (Fig. 118) out of spindle housing. Also drive large spacer (Fig. 118) out of housing.

12. A large snap ring is still inside the spindle

housing and it should remain there because it cannot be easily removed.

IMPORTANT: If new bearings will be installed into a used spindle housing that has original snap ring installed, discard the large snap ring that came with the bearings because it is not needed. However, new bearings with matched spacer and snap ring must always be installed when spindle housing is being replaced. Replacement bearings are sold only with a matched snap ring set. The parts cannot be purchased separately.

INSTALLING SPINDLE, BEARINGS AND SEALS INTO SPINDLE HOUSING

IMPORTANT: If a new spindle housing is being used, new bearings and the matched snap ring set must be installed; refer to step 1. Never use old bearings, spacer and snap ring with a new spindle housing. By contrast, use only new bearings w/cups and spacer — not large snap ring because it is not required — when installing bearings into a used spindle housing that still has snap ring installed; refer to step 2.

1. Install large snap ring into groove in bore of spindle housing (Fig. 119). Assure snap ring is seated in the groove.

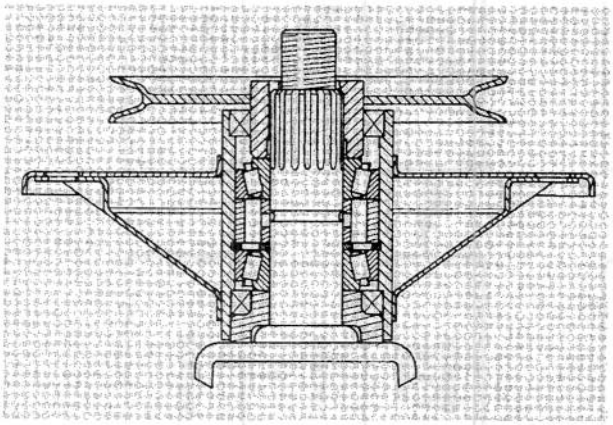


Figure 119

2. Using an arbor press, push the large spacer into top of spindle housing and tightly against the snap ring (Fig. 118). Spacer must contact snap ring to be sure of correct assembly of parts (Fig. 119).

3. Thoroughly oil cups and using an arbor press, push bearing cups — smallest ID first — into top and bottom of spindle housing (Fig. 118). Top bearing cup must contact spacer that was installed in step 2, and bottom bearing cup must contact snap ring to be sure of correct assembly of parts (Fig. 119). Insure assembly is correct by supporting the first cup and pressing the second against it (Fig. 120).

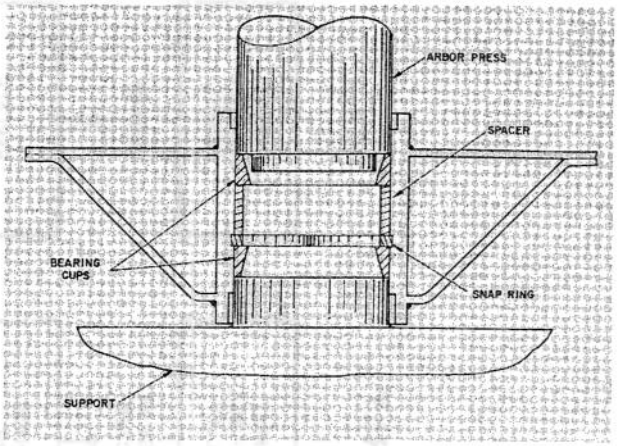


Figure 120

4. Apply a film of grease on lip of both seals; then install bearing and seal into bottom of spindle housing (Fig. 119). Remember, the bottom seal must have the lip facing outward (Fig. 118), not toward inside of spindle housing.

5. Slide small snap ring spacer and small, thick spacer into spindle housing (Fig. 118). Install bearing and seal into top of spindle housing. Lip of the seal must face inward.

6. Check spindle shaft, make sure it is free of burrs and nicks that could possibly cut the seals and thoroughly lubricate shaft and seal lips.

7. Slide bearing spacer onto spindle shaft. Carefully slide spindle shaft through spindle housing. Bottom seal and bearing spacer fit together when spindle is installed (Fig. 119).

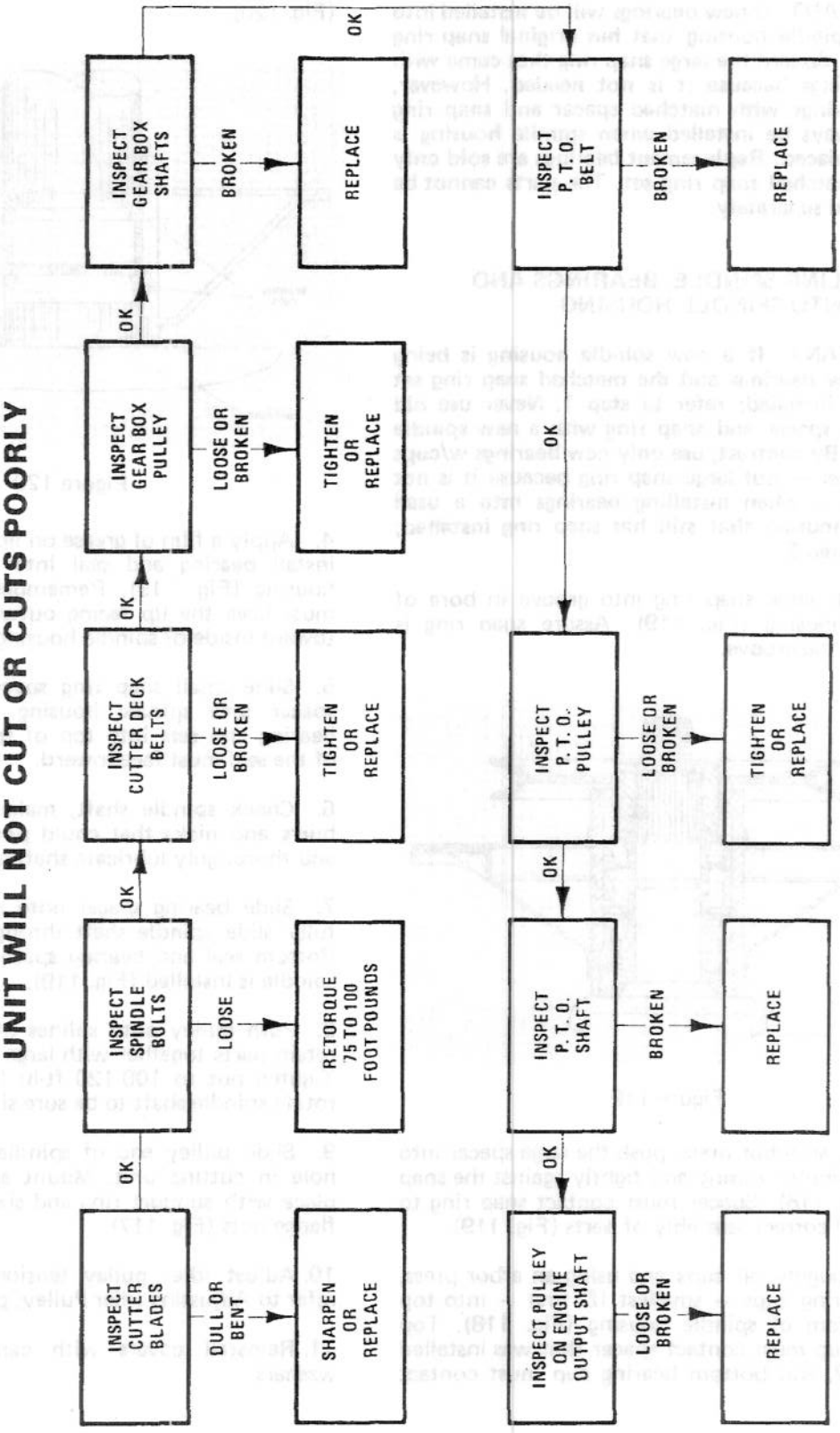
8. Push pulley onto splines of spindle shaft, and retain parts together with large flatwasher and nut. Tighten nut to 100-120 ft-lb (136-163 N·m) and rotate spindle shaft to be sure shaft rotates freely.

9. Slide pulley end of spindle assembly through hole in cutting unit. Mount spindle assembly in place with support ring and six carriage bolts and flange nuts (Fig. 117).

10. Adjust idler pulley tension against the belt; refer to Adjusting Idler Pulley, page 47.

11. Reinstall covers with capscrews and lockwashers.

CUTTING UNIT MAINTENANCE TROUBLESHOOTING



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 left brake pedal and engage the parking brake.

2. Jack up right 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. 121).

5. Start engine and rotate pump plate (Fig. 121) in either direction until wheel ceases rotation.

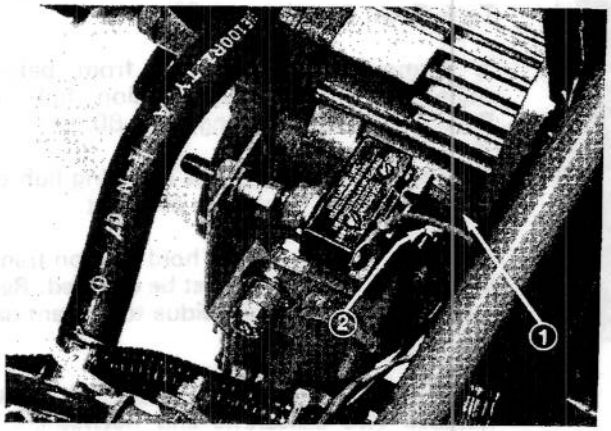


Figure 121

1. Pump plate 2. Locknut (2)

6. Stop engine and tighten locknuts to secure pump plate (Fig. 121).

7. Start engine and check adjustment. Repeat adjustment, if necessary.

8. Stop the engine and release left parking 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 FILTER

The hydraulic oil filter keeps the hydraulic system relatively free of contaminants. However, the hydraulic oil filter must be serviced at regular intervals. The intervals are: initially, after the first five hours of operation, and thereafter, every 250 hours of operation or yearly, whichever comes first. Use a genuine TORO oil filter for replacement.

1. Remove hydraulic oil filter from mounting head (Fig. 122). Dispose of the filter properly.

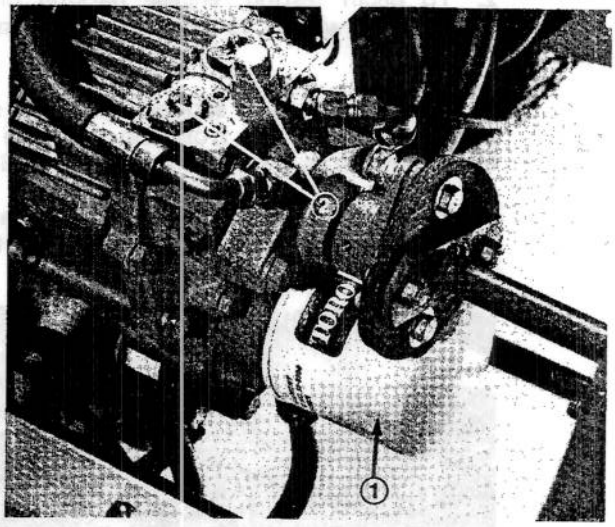


Figure 122

1. Filter 2. By-pass valve pins

2. Apply a film of fluid on the gasket. Install filter by hand until gasket contacts mounting head; then tighten filter an additional three-fourths turn.

3. Start engine and check for oil leaks. Allow engine to run for about two minutes so any air in the system is purged. Then shut engine off.

4. Check level of transmission fluid; refer to Check Hydraulic System Fluid, page 14.

TESTING CHARGE PUMP FLOW, IMPLEMENT RELIEF AND CHARGE RELIEF SETTING

An in-line hydraulic tester equipped with load valve, pressure gauge and flow gauge is required. Lines and fittings for tapping into the transmission to lift valve line will also be required.

1. Before testing, check and inspect the following:

   A. Check level of oil in axle housing; refer to Check Hydraulic System Fluid, page 14.

   B. Inspect control rod from traction pedal to control lever on side of transmission. Assure control rod and neutral assembly parts are not bent, binding, adjusted incorrectly or defective in any way. Repair, replace and adjust parts as conditions dictate.

C. Check hydraulic oil filter to be sure it is tight. A loose filter allows air to enter the system, resulting in foaming of the oil and excessively high operating temperature.

2. To begin testing, engage parking brake and block front wheels to prevent movement of the machine.

3. Remove seat, seat support cover and seat support and remove line from top of pump housing to lift valve from lift valve fitting (Fig. 123).

4. Install hydraulic inlet hose of test gauge into line from transmission and test gauge return line into lift valve fitting (Fig. 123).

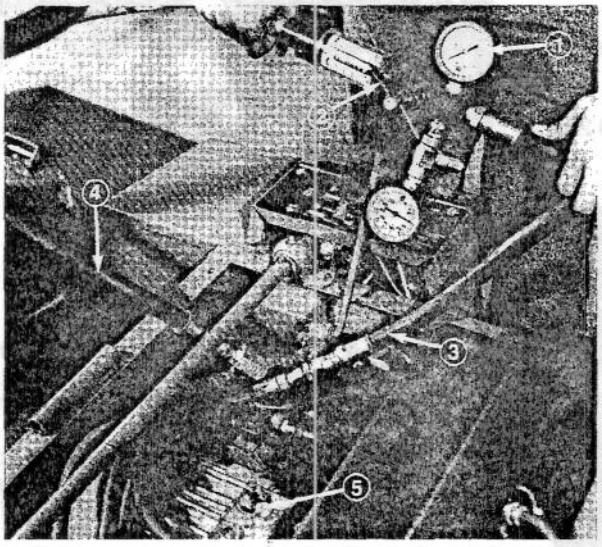


Figure 123

1. Tester
2. Load valve
3. Inlet line to tester
4. Return line from tester
5. Implement relief valve

5. Insure tester load valve is open, start engine and move throttle to SLOW so engine idles. Using a tachometer, verify engine is running at 1800 rpm. Adjust carburetor if engine is not idling at 1800 rpm.

6. Allow engine to idle for about 10 minutes so oil reaches normal operating temperature.

7. Increase engine speed to 3300 rpm - full throttle and watch flow and pressure gauges. Slowly close load valve until flow gauge reads one (1) GPM (0.063 L/s). Pressure reading at one (1) GPM (0.063 L/s) should not be lower that 500 psi (3447.5 kPa). If one (1) GPM or a minimum of 500 psi (3447.5 kPa) cannot be achieved, remove implement relief valve and examine for contamination or broken parts (Fig. 123). If no contamination or damage is evident, add one shim to assembly and repeat test.

If pressure and flow readings improve, add shims as necessary until reading meets specification. Add shims one at a time and check pressure after each shim is installed. Do not exceed 800 psi (5516 kPa).

If pressure remains unchanged, remove the shim and remove and inspect charge pump assembly. Refer to Servicing Charge Pump, Rotor, Bearing And Lip Seal, page 58.

8. If charge pump assembly is not defective, remove the transmission from the axle, disassemble it and repair it per instructions in the Sundstrand Service Manual. Refer to page 2 for Sundstrand Manual numbers and how to obtain them.

SERVICING CHARGE PUMP, ROTOR, BEARING AND LIP SEAL

1. Lower cutting unit to the shop floor, be sure engine is shut off and remove key from ignition switch.

2. Remove the fuel tank; refer to Removing Fuel Tank From Chassis, page 36.

3. Remove drive coupling from between the engine pulley and transmission hub; refer to Removing Drive Coupling, page 60.

4. Loosen two set screws retaining hub on pump shaft (Fig. 124). Slide hub off shaft.

5. Since two set screws hold hub on transmission pump shaft, the shaft must be checked. Remove all burrs, sharp edges and residue to prevent damage to the lip seal.

6. Set drain pan below front of transmission. Remove two capscrews and flatwashers securing charge pump housing to center section (Fig. 124). Using a seal protector, slide charge pump housing and rotor assembly off pump shaft. O-ring will probably stay in groove on inside of charge pump housing.

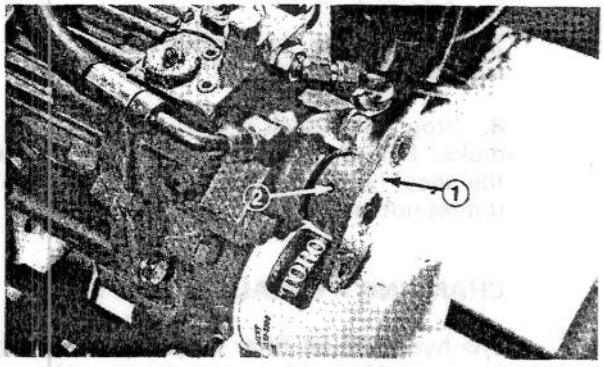


Figure 124

1. Transmission hub
2. Set screw

Note: If seal protector is not used, wrap pump shaft with wax paper or cellophane to protect the lip seal. When sliding housing and rotor assembly off pump shaft, drive pin may drop out of the pump shaft. Do not lose the pin because it is the only part that drives the rotor. Without the pin, the rotor will not rotate; thus, no "charge pressure".

7. Examine rotor assembly and inside of charge pump housing for excessive wear patterns, scratches or score marks. If a part is damaged, replace it. The two rotor parts are replaceable as an assembly only.

IMPORTANT: If the rotor assembly or charge pump housing is damaged, replace all parts. Never replace only one part because charge pump housing and rotor assembly have a definite wear-in characteristic.

8. Examine bearing in charge pump housing for damage and free rotation. If bearing is damaged, replace bearing and oil seal.

A. If bearing is defective, pull lip seal out of housing, using an oil seal puller.

B. Press needle bearing out of charge pump housing.

C. Lubricate new bearing and lip seal with transmission oil before installation. Press needle bearing and lip seal into charge pump housing.

9. Install new O-ring into groove in charge pump housing.

10. Apply transmission oil on rotor assembly, inside of charge pump housing and face of center section.

11. Slide rotor assembly into charge pump housing. Using a seal protector for the lip seal, slide charge pump housing onto the pump shaft. Insert drive pin through hole in shaft and slide rotor onto pin so positive engagement results. Align flat side of charge pump housing with flat side of center section.

Note: In place of a seal protector, use wax paper, cellophane or similar material to wrap pump shaft. This protects lip seal from possible damage when sliding it onto the shaft.

IMPORTANT: If rounded side of charge pump is lined up with flat side of center section, the charge pump will not generate charge pressure.

12. Secure charge pump housing to center section with two capscrews and flatwashers. Tighten capscrews to 12 to 15 ft-lb (16 to 20 N·m).

13. Slide hub onto transmission shaft and retain it in place by tightening two set screws.

14. Install drive coupling between the engine pulley and transmission hub; refer to Installing Drive Coupling, page 60.

15. Install fuel tank; refer to Installing Fuel Tank, page 36.

16. Start the engine and allow it to idle for one to two minutes. Then stop the engine and check level of transmission fluid; refer to Check Hydraulic System Fluid, page 14.

OFF SEASON STORAGE

Apply a liberal amount of No. 2 General Purpose Lithium Base Grease to the two by-pass valve pins located on top of the transmission to prevent corrosion build-up which could lock the pins into the by-pass position and cause internal transmission failure (Fig. 122).

DRIVE SYSTEM MAINTENANCE

REMOVING DRIVE COUPLING

The drive coupling must be removed whenever the transmission or the engine will be removed from the chassis.

1. Remove the fuel tank; refer to Removing Fuel Tank From Chassis, page 36.

2. Remove capscrews, locknuts and spacers securing drive coupling assembly between engine pulley and transmission hub (Fig. 125). Slide drive coupling assembly from between the hub and pulley.

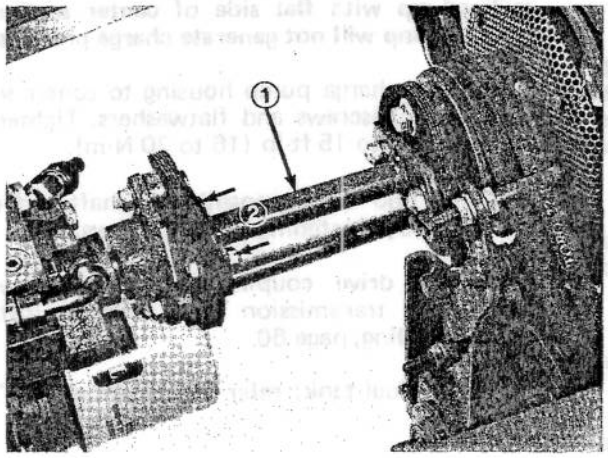


Figure 125

1. Drive coupling 2. Capscrews, locknuts and spacers

3. Examine the rubber coupling. Replace the coupling if it is defective.

INSTALLING DRIVE COUPLING

1. Insert small end of spacers into holes in rubber couplings. Slide two capscrews through one rubber coupling and spacer.

2. Slide two capscrews through transmission hub and install locknuts onto the capscrews (Fig. 125). Tighten capscrews and locknuts.

3. Secure other end of rubber coupling to engine pulley with capscrews, lockwashers and flatwashers (Fig. 125).

4. Install fuel tank; refer to Installing Fuel Tank, page 36.

REPLACING PTO DRIVE BELTS

1. Remove the fuel tank; refer to Removing Fuel Tank From Chassis, page 36.

2. Remove the drive coupling; refer to Removing Drive Coupling, page 60.

3. Remove three capscrews, flatwashers, lockwashers and nuts securing PTO brake bracket to mounting flange on engine plate (Fig. 126).

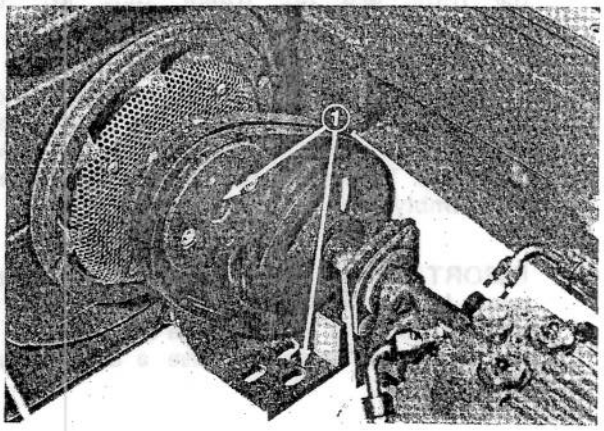


Figure 126

1. PTO brake bracket and drive coupling removed

4. Move the PTO assembly until the belts can be removed from the pulleys.

5. Install new belts around the PTO shaft pulley and engine pulley (Fig. 126), engage the PTO lever to tension belts and lay a straight edge along the bottom face of the engine and PTO pulleys to check alignment (Fig. 127). If pulleys are aligned within 1/16 inch (1.6 mm), proceed to step 6. If they are not aligned within 1/16 inch (1.6 mm) loosen locking collars on PTO shaft and shift shaft and pulley until proper alignment is achieved (Fig. 127). Relock collars.

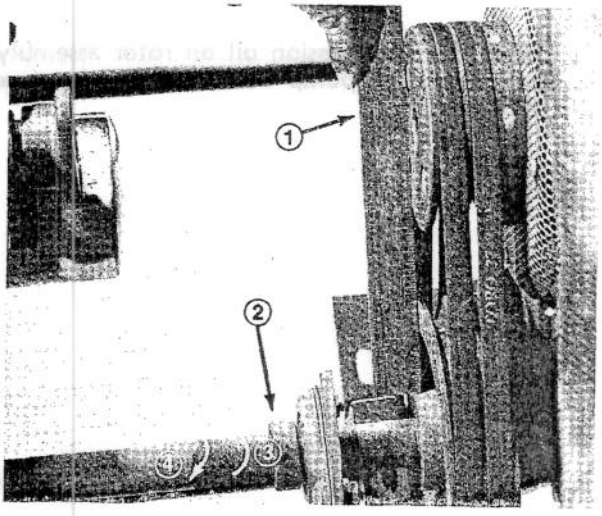


Figure 127

1. Straight edge 3. Loosen
2. Locking collar 4. Tighten

DRIVE SYSTEM MAINTENANCE

Note: The PTO drive belts are sold as a matched set. Therefore, both belts must be replaced, although only one of the belts may be defective.

6. Install drive coupling between the engine and transmission pulleys; refer to Installing Drive Coupling, page 60.

7. Install PTO brake assembly. Refer to servicing PTO Brake Assembly, page 61.

8. Install the fuel tank; refer to Installing Fuel Tank, page 36.

SERVICING PTO BRAKE ASSEMBLY

1. Remove capscrews, lockwashers, flatwashers, spacers and nuts securing assembly and remove assembly.

2. Inspect brake shoe and lining assembly for excessive wear or damage (Fig. 128) and replace if necessary. Remove assembly by removing locknut from mounting stud (Fig. 128).

3. Install brake shoe and lining and spring onto mount stud, secure with locknut and mount PTO brake assembly (Fig. 129). Install all mounting components in same location from which they were removed.

4. Align PTO brake assembly with pulleys and belts and tighten mounting fasteners. Visually inspect alignment of brake lining with pulley. Lining should be parallel to pulley and centered over pulley grooves. Loosen and remove PTO brake bracket fasteners and add or remove spacers between the bracket and mounting plate to achieve a parallel adjustment. Adjust the locknut to center the lining assembly (Fig. 128).

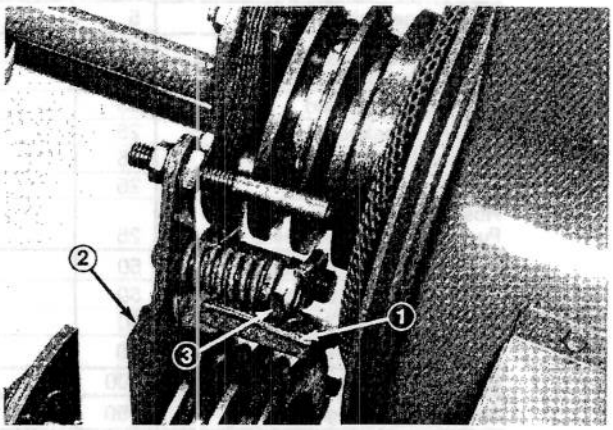


Figure 128

1. Brake shoe lining assembly
2. PTO brake assembly
3. Locknut

PRODUCT IDENTIFICATION

The traction unit and cutting unit have two identification numbers: a model number and a serial number that are stamped into a plate. The cutting unit identification plate is located on the right hand channel of the carrier frame (Fig. 129). The traction unit plate is located near the right end of the seat hinge (Fig. 130). In any correspondence concerning the cutting unit and 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:

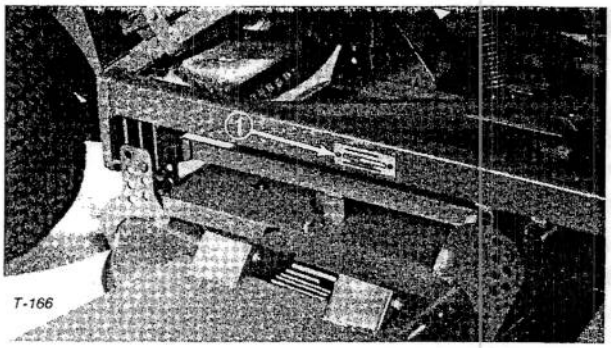


Figure 129

1. Model and serial number

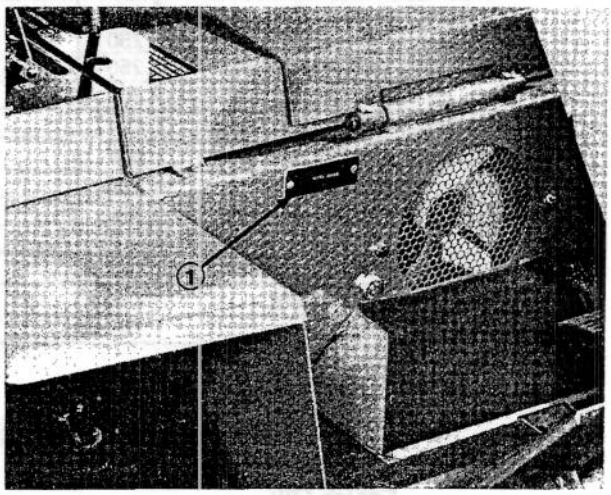


Figure 130

1. Model and serial number

1. Model and serial numbers of the cutting unit and 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.

SERVICE INTERVAL CHART

Date											
Hour Meter Reading											
Service Interval	▼	Daily	5	25	50	75	100	125	150	175	200
Oil Level Check, Engine	Daily										
Oil Level Check, Hyd.	Daily										
Safety Interlock Check	Daily										
Oil Change, Initial	5										
Oil Change, Routine	25										
Air Cleaner Precleaner Clean	25										
Air Cleaner Cleaned	25										
Battery Checked	25										
Lubrication, Grease/oil	25										
Tire Pressure Checked	25										
Hoses, Lines, Fittings & Pump Checked for Leaks	25										
PTO Belt Tension Check	50										
Cutting Unit Belt Tension Check	50										
Gear Box Lube Check	50										
Air Cleaner (Dust Cap & Baffle)	50										
Brakes Checked	100										
Spark Plug Changed	150										
Hydraulic Oil Filter, Changed	250										
Fuel System Checked	250										
Fuel Filter Change	250										
Points Changed	250										
Condenser Changed	250										
Timing Checked	250										
Valves Adjusted	250										
Cylinder Head Bolt Torque	250										
Engine rpm Checked	250										
Service Air Cleaner (Filter)	250										
Cooling Fins Cleaned	250										
Combustion Chamber Clean	250										
Hydraulic Oil, Changed	500										
Dana Axle Bearings, Grease	500										
Transmission By-Pass Pins, Grease	500										
Gear Box Lube Change	500										
Replace all Interlock Switches (2yrs)	1000										
Blade Sharpness, Check	Daily										
Blade Bolt, Check	Daily										

SERVICE SPECIFICATIONS

Engine Oil:

Above +40° F (4° C) — Use SAE 30, 10W-30 or 10W-40
From +40° F to 0° F (4° C to -18° C) — Use SAE 5W-20, 5W-30, 10W-30 or SAE 10
Below 0° F (-18° C) — SAE 10 or 10W-30 diluted 10% with kerosene

Spark Plug — RCJ 8: Gap is 0.030 of an inch (0.76 mm)

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

Hydraulic Oil Filter — Toro part no. 23-2300

Cutting Unit Gear Box Oil — SAE 10W-40

SERVICE INTERVAL CHART

Date										
Hour Meter Reading										
Service Interval ▼		225	250	275	300	325	350	375	400	425	450
Oil Level Check, Engine	Daily										
Oil Level Check, Hyd.	Daily										
Safety Interlock Check	Daily										
Oil Change, Initial	5										
Oil Change, Routine	25										
Air Cleaner Precleaner Clean	25										
Air Cleaner Cleaned	25										
Battery Checked	25										
Lubrication, Grease/oil	25										
Tire Pressure Checked	25										
Hoses, Lines, Fittings & Pump Checked for Leaks	25										
PTO Belt Tension Check	50										
Cutting Unit Belt Tension Check	50										
Gear Box Lube Check	50										
Air Cleaner (Dust Cap & Baffle)	50										
Brakes Checked	100										
Spark Plug Changed	150										
Hydraulic Oil Filter, Changed	250										
Fuel System Checked	250										
Fuel Filter Change	250										
Points Changed	250										
Condenser Changed	250										
Timing Checked	250										
Valves Adjusted	250										
Cylinder Head Bolt Torque	250										
Engine rpm Checked	250										
Service Air Cleaner (Filter)	250										
Cooling Fins Cleaned	250										
Combustion Chamber Clean	250										
Hydraulic Oil, Changed	500										
Dana Axle Bearings, Grease	500										
Transmission By-Pass Pins, Grease	500										
Gear Box Lube Change	500										
Replace all Interlock Switches(2yrs)	1000										
Blade Sharpness, Check	Daily										
Blade Bolt, Check	Daily										

SERVICE SPECIFICATIONS

Engine Oil:

Above +40° F (4° C) – Use SAE 30, 10W-30 or 10W-40
From +40° F to 0° F (4° C to -18° C) – Use SAE 5W-20, 5W-30, 10W-30 or SAE 10
Below 0° F (-18° C) – SAE 10 or 10W-30 diluted 10% with kerosene

Spark Plug – RCJ 8: Gap is 0.030 of an inch (0.76 mm)

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

Hydraulic Oil Filter – Toro part no. 23-2300

Cutting Unit Gear Box Oil – SAE 10W-40

The Toro Promise

A ONE YEAR LIMITED WARRANTY ON COMMERCIAL PRODUCTS OTHER THAN WALK ROTARY MOWERS, TRIMMERS AND BLOWERS.

The Toro Company promises to repair your TORO Product if defective in materials or workmanship. The following time periods from the date of purchase apply:

Commercial Products	1 Year
Hevi-Duty Walk Rotary Mowers	90 Days
Trimmers and Blowers	90 Days

The costs of parts and labor are included, but the customer pays the transportation costs on walk rotary mowers, trimmers and blowers.

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.

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.

Compliance with Radio Interference Regulations Certified.
Certifie Conforme au Reglement sur le Brouillage Radioelectrique.

Litho in U.S.A.