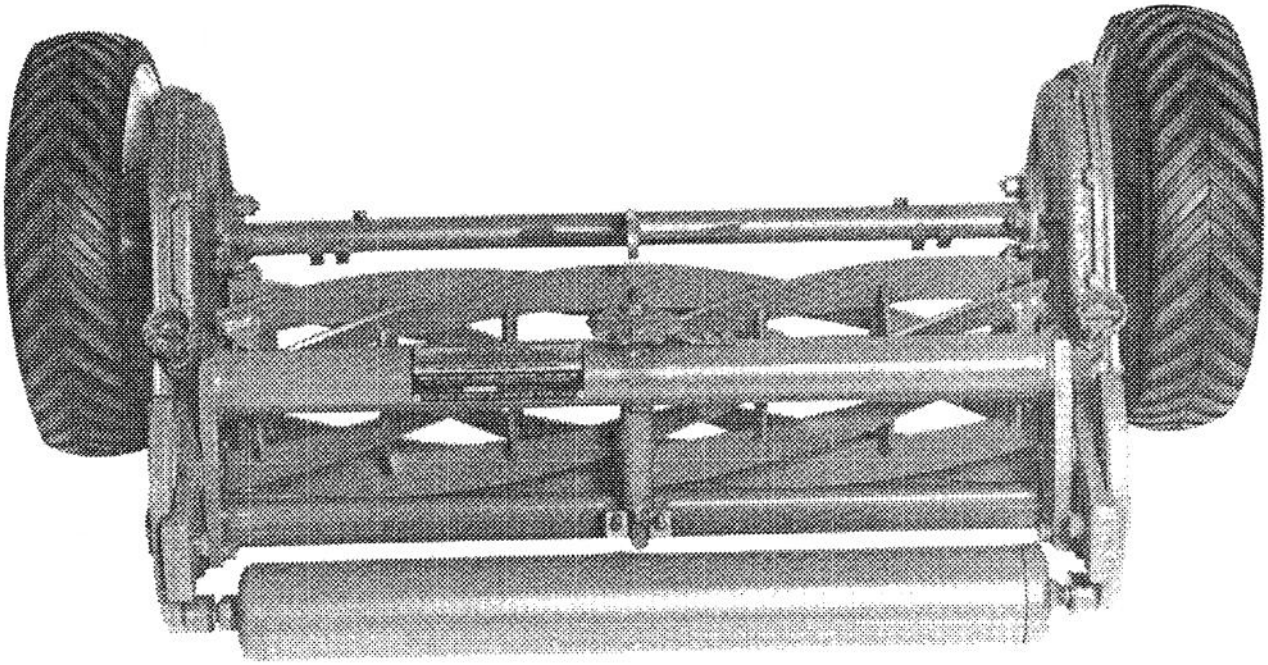
FORM NO. 3311-130 Rev. D

TORO®

5 BLADE WELDED MODEL: 01075 – 80001 THRU 10001 & UP
7 BLADE WELDED MODEL: 01077 – 80001 THRU 10001 & UP

OPERATOR'S MANUAL

SPARTAN® 5 and 7



FOREWORD

The SPARTAN mower has advanced concepts in engineering, design, and safety; and if adjusted and maintained properly the mower will be reliable.

Since the SPARTAN is a high-quality product, TORO is concerned about the future use of the mower and the safety of the user. Therefore, read this manual to familiarize yourself with the safety instructions and the product before operating the mower. The four major sections of the manual are:

1. Setting Up Instructions
2. Critical Adjustments Before Operating
3. Operating Instructions
4. Maintenance

Note that safety, mechanical, and some general information in the manual is emphasized. WARNING and CAUTION identify safety related information, IMPORTANT identifies special mechanical information, and NOTE identifies general information worthy of special attention.

If help — concerning set-up, critical adjustments, operation, maintenance, or safety of the mower — is ever needed, contact the local authorized TORO Distributor. Refer to the "Yellow Pages" for assistance. In addition to skilled factory-trained service technicians, the distributor has other TORO Products, approved accessories, and genuine replacement parts. Keep your TORO all TORO. Buy genuine TORO replacement parts and accessories.

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SPECIFICATIONS

Reel Drive: Reel driven by wheels 75T ring gear to 10T pinion through 14T disengaging idler gear.

Reduction, Reel to Wheels: 7.5:1

Welded Reel: Medium carbon steel, induction hardened blades are welded to seven steel spiders which are mounted on a 1-1/2" (38 mm) diameter shaft. Tapered roller bearings support reel shaft, and an adjusting nut compensates for bearing wear. Diameter of reel is 8-3/16 inches (20.8 cm).

Bedknife & Bar: Double edge high carbon steel knife attached to a fabricated steel bar; single screw adjustment on adjustable rod ends.

Bedknife To Reel Adjustment: Bedknife adjusts against reel, with positive adjustment control knob located at center of rear cross tube. Adjustment knob contains detent with .001 inch (0.0254 mm) movement of bedknife for each indexed position. All pivot points are relubricatable.

Wheels And Tires: 16" (0.406 m) diameter pneumatic wheels with tire and tube, studded tread, stamped steel wheel and cast iron hubs; 16" (0.406 m) diameter semipneumatic tires with stamped steel wheels and cast iron hubs; 16" (0.406 m) diameter cast iron wheels – one-piece construction; 14" (0.356 m) diameter cast iron wheels – one-piece construction; 16" (0.406 m) diameter low profile semi-pneumatic tires with stamped steel wheels and cast iron hubs.

Differential: Disengaging over-running idler gear in gear train.

Width of Cut: 29-1/2" (0.749 m)

Height Of Cut: .75 inches (19.05 mm) to 2.25 inches (60 mm) with 16" (0.406 m) dia. wheel. .50 inch to 2.18 inches (12.7 to 55.4 m) with 14" (0.356 m) dia. wheel.

Clip:	Average Clip	Wheel Diameter (Inches)	Number of Blades
	.95 (24.13 mm)	16 (0.406 m)	7
	.84 (21.34 mm)	14 (0.356 m)	7
	1.34 (34.04 mm)	16 (0.406 m)	5
	1.17 (29.72 mm)	14 (0.356 m)	5

Chassis: Ribbed cast iron gear cases with tubular cross members. Front cross member provides easy attachment for the Spartan to all Toro frames. Rear cross member provides frame rigidity.

Roller: 3-1/2" (88.9 mm) O.D. Iron pipe running on taper bearings double lip oil seal with wear sleeves. Grease fittings provided.

Dimensions:

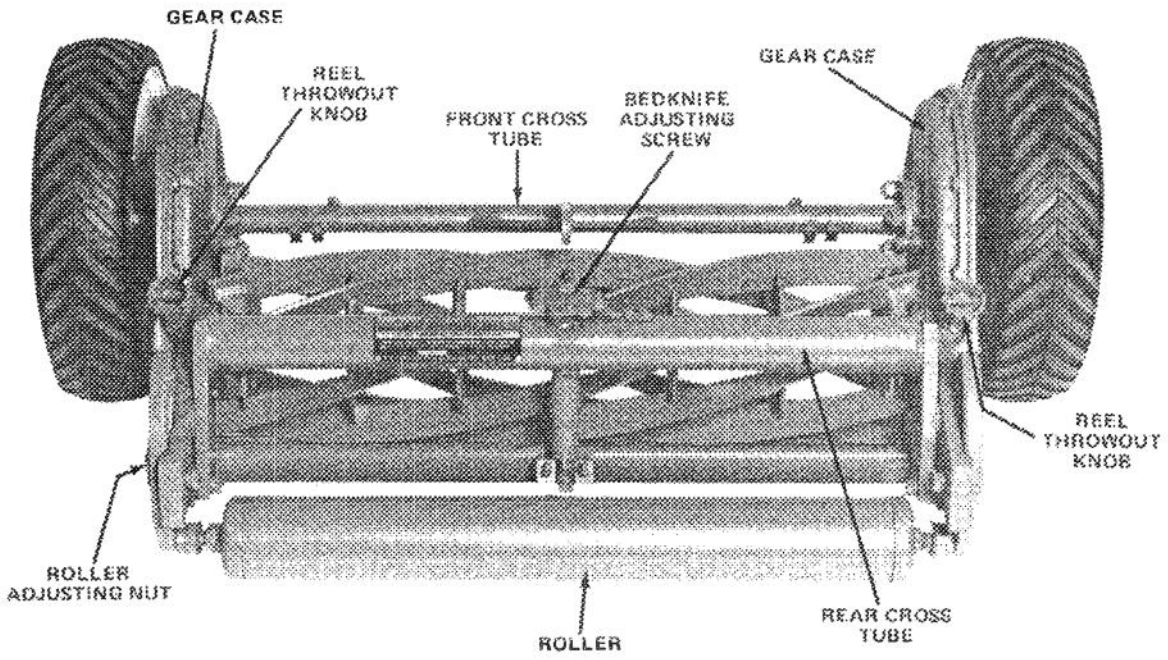
Width: 40-3/8" (1.026 m) with iron wheels
44" (1.118 m) with pneumatic tires

Height: 16-1/2" (0.419 m)

Weight: 205 lb (92.99 kg) without drawbars & wheels.

Optional Equipment:

14" (0.356 m) cast iron wheel Model #01343
16" (0.406 m) cast iron wheel Model #01336
16" (0.356 m) pneumatic tires Model #03123
16" (0.406 m) semi-pneumatic low profile Model #01304



SETTING UP INSTRUCTIONS

Remove Mower From Carton

1. Slit four corners of carton so sides lie flat.

2. Remove shipping caps from wheel hubs.

NOTE: Keep the shipping caps. They can be installed on wheel hubs to prevent grinding dust from entering wheel bearing whenever reel is ground.

Check Wheel Hubs and Install Wheels

Tools Required: 5/8-Inch Socket

1. Rotate wheel hub (Fig. 1) to check bearing adjustment. A slight drag must be felt when hub is rotated. If drag is not evident, remove cotter pin and tighten wheel hub nut (Fig. 1) until slight drag is felt when hub is rotated. Reinstall cotter pin through nut. If cotter pin cannot be installed, loosen nut slightly until holes line up.

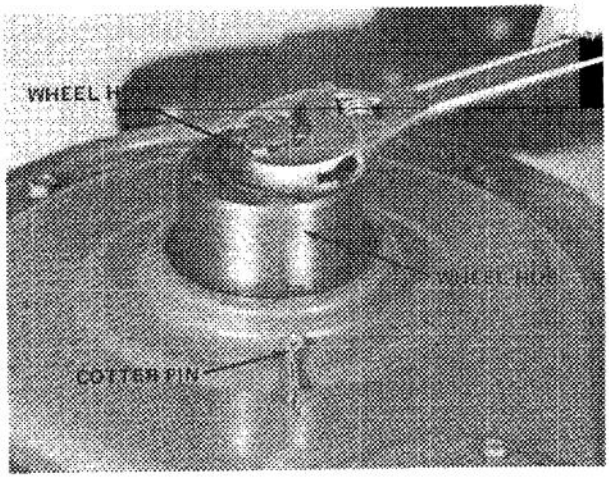


Figure 1

IMPORTANT: Do not over-tighten wheel hub nut because the bearing will wear rapidly.

2. Check O-ring to assure it is not damaged, and make sure it is seated in inside diameter of wheel hub (Fig. 1).

IMPORTANT: An O-ring that is damaged or installed incorrectly will allow oil to leak out of the gear case. If enough oil leaks out, mechanical damage will likely result.

3. Install drive wheels with capscrews and lockwashers (Fig. 2). Do not try to install wheels over the shipping caps.

4. If pneumatic wheels are installed, set tire pressure at 35 psi (241.3 Kpa).

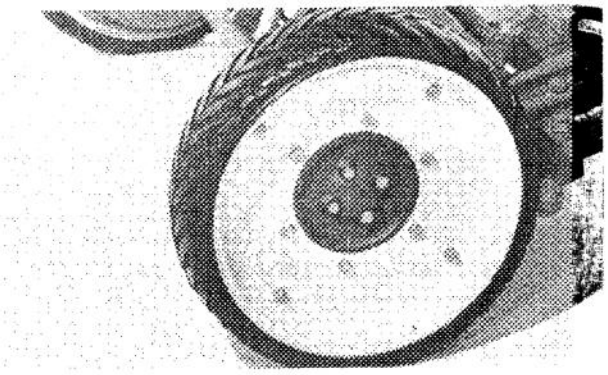


Figure 2

Gear Case Oil

Tools Required: 9/16-Inch Open End Wrench

1. Position mower on a level surface.

2. Raise and block back of mower until there is 8 to 8-1/2 inches (0.203 to 0.216 m) between bottom of gear case extending behind roller bracket and level surface (Fig. 3).

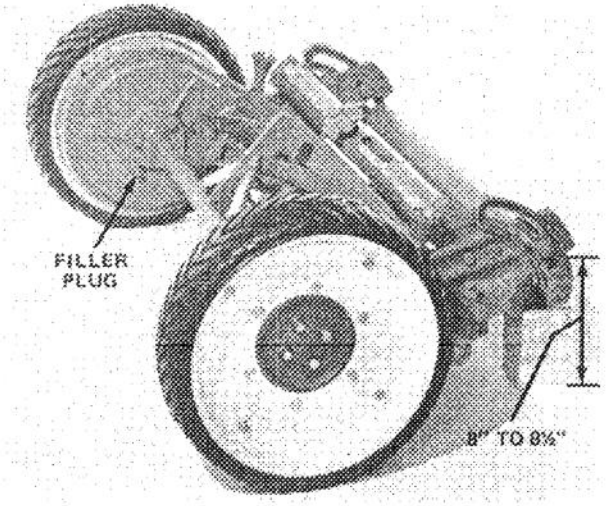


Figure 3

3. Remove filler plug from inside of each gear case (Fig. 3). Check oil level in gear case: it should be level with bottom of filler hole. If oil is level with bottom of hole, reinstall filler plug.

IMPORTANT: Check for oil leaks caused by a defective or improperly installed O-ring or gasket, and loose side plate bolts. Make all repairs before adding oil to gear cases.

4. If level of oil is low, fill gear case to point of overflowing with SAE 140 gear lube and reinstall filler plug.

CRITICAL ADJUSTMENTS BEFORE OPERATING

Level Rear Roller

Tools Required: 3/4-Inch Socket, 5/8-Inch Socket, and Torque Wrench

1. Set mower on a level surface. Make sure same number of notches show below bottom of roller adjusting nut (Fig. 5).

2. Stand behind the mower and check rear roller. Roller must be level with the flat surface (Fig. 4). If roller is level with flat surface, reel bearings should be checked; refer to Check Reel Bearings and Mower Fasteners, page 5. By contrast, use the instructions below if rear roller is not level with flat surface.

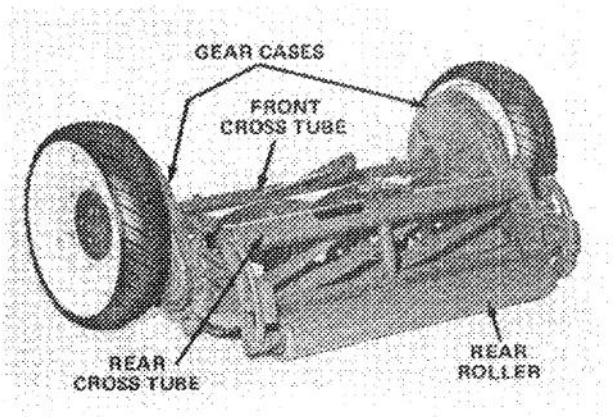


Figure 4

3. Loosen six nuts holding front cross tube to both gear cases (Fig. 4). Also loosen six cap screws holding rear cross tube to end of both gear cases (Fig. 4).

4. Press down simultaneously on both gear cases (Fig. 4) until a definite set is taken and roller touches – is level with – flat surface.

5. After rear roller is level, tighten front cross tube nuts to 60-65 ft-lb (81.3-88.4 N·m) and rear cross tube capscrews to 35-45 ft-lb (47.5 – 61 N·m). Make sure roller stays level with flat surface when nuts and capscrews are being tightened. If roller does not stay level, the above procedure must be repeated.

Check Reel Bearings and Mower Fasteners

1. Rotate center adjusting knob until bedknife does not contact reel. Try to spin the reel. If reel does not spin, adjust reel bearings; refer to Reel Bearing Adjustment, page 17. If reel spins freely, proceed to step 2.

2. Insert pry bars between gear cases and both ends of the reel. Try to move reel back and forth. If reel can be moved, reel bearings must be adjusted; refer to Reel Bearing Adjustment, page 17.

3. Check and tighten all nuts, bolts, and screws to assure all parts are secure.

Set Height-of-Cut

Tools Required: 5/8-Inch Socket

A new mower must have six or more notches showing below bottom edge of roller adjusting nut (Fig. 5). If less than six notches show, height-of-cut is too low. When height-of-cut is too low, the bedknife rather than the rear roller supports the mower. This causes the ground to push against bedknife and consequently, forces bedknife against the reel. The result is usually rapid wear of the bedknife and reel. An uneven wear pattern, commonly termed "rifling" could also result.

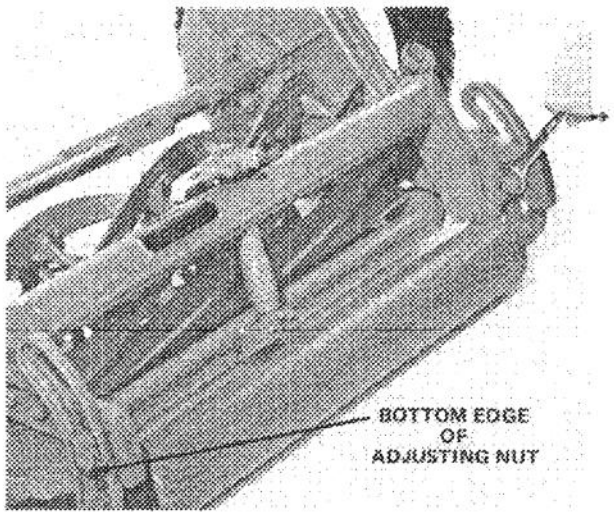


Figure 5

NOTE: Rifling is the uneven or wavy condition that develops on bedknife and reel when there is heavy contact between these two parts (Fig. 6). Streaks of uncut grass and an overall poor quality of cut are signs of rifling. Grinding the bedknife and reel is the only way to repair a rifled mower.

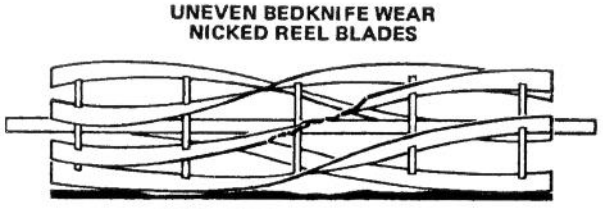


Figure 6

CRITICAL ADJUSTMENTS BEFORE OPERATING

When six notches show below roller adjusting nut and 16 inch (0.406 m) wheels are used, height-of-cut is approximately 3/4 of an inch (19 mm). By comparison, height-of-cut is 1/2 of an inch (13 mm) when 14 inch (0.356 m) wheels are used. However, these are bench settings, and the mower will cut different in the turf because of grass conditions and weight of the mower. If a higher height-of-cut is desired, every notch above the sixth notch showing adds approximately 3/32 of an inch (2.38 mm) to the cutting height.

1. Loosen capscrews retaining adjusting nuts in roller brackets (Fig. 5).

2. Depending on height-of-cut desired, set roller adjusting nuts so six or more notches show below bottom edge of nuts (Fig. 5).

3. Tighten capscrews (Fig. 5) to retain height-of-cut setting, and make sure same number of notches show below both adjusting nuts.

Check Bedknife Attitude

1. Position mower on a level surface. Rotate center adjusting knob until bedknife almost touches reel.

2. Check bedknife attitude. When viewed from the side, bottom of bedknife must be parallel with flat surface or raised at the rear (Fig. 7). If bedknife is not parallel with flat surface (Fig. 7), adjust rod ends; refer to Fig. 47, page 18.

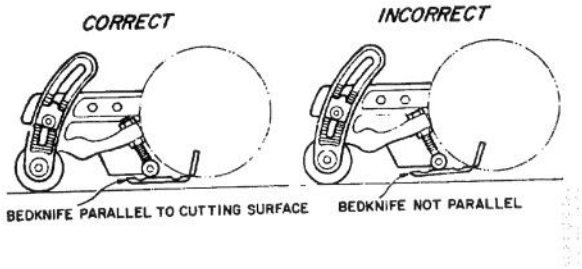


Figure 7

IMPORTANT: If rod ends must be adjusted to level the bedknife, back cutting edge of bedknife away from reel by rotating center adjusting knob. If bedknife is not backed off and rod ends are adjusted toward the reel, damage to the bedknife and reel will result.

3. When bedknife is parallel to flat surface or raised slightly at the rear, back cutting edge of bedknife away from reel by rotating bedknife adjusting knob counterclockwise.

Parallel Bedknife to Reel

Tools Required: 1-1/8-Inch Open End Wrench and Long Strips of Paper

1. Position mower on a level surface. Remove paint and grease from bedknife and reel cutting edges.

2. Insert a long strip of newspaper between reel blade and end of bedknife. While rotating reel backward, turn bedknife adjusting knob (Fig. 8) until paper is pinched lightly, which results in the paper being cut or a slight drag when paper is pulled.

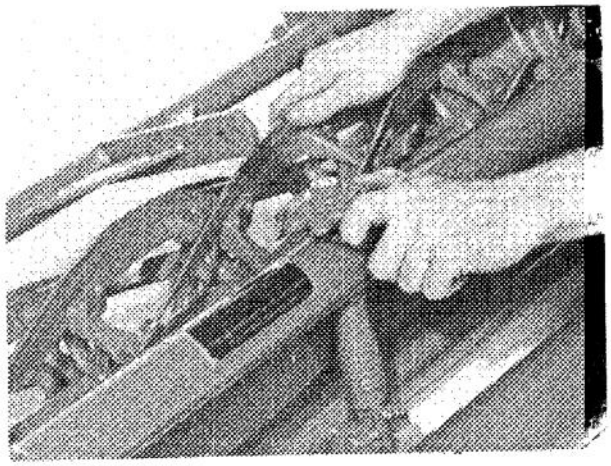


Figure 8

NOTE: Cutting paper or a slight drag when paper is pulled is usually possible at only one end of the bedknife.

3. Continue to check for light contact across full length of the bedknife. Adjust rod end upward at end of bedknife that does not have light contact (Fig. 9).

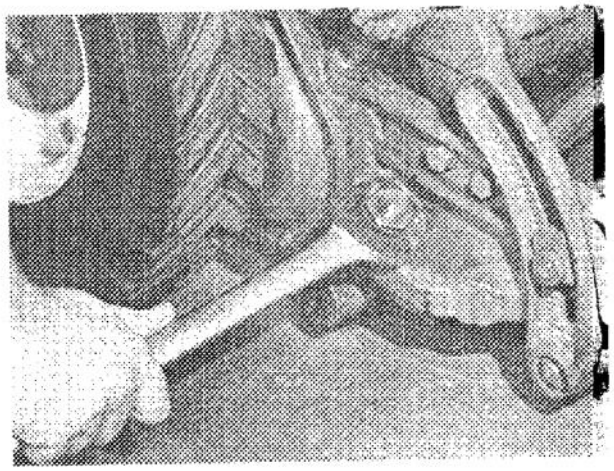


Figure 9

CRITICAL ADJUSTMENTS BEFORE OPERATING

4. When light contact is evident across full length of bedknife, tighten rod end jam nuts to 80 ft-lb (109 N·m) (Fig. 9). However, check for light contact again – steps 2 and 3 – because tightening jam nuts may affect the adjustment.

NOTE: Disengage reel throwout knobs and check light contact adjustment by spinning reel backward. A whispering cutting sound indicates proper adjustment.

5. Transport the mowers and install them on the towing frame to be used.

IMPORTANT: To make sure bedknife and reel are not damaged while mowers are transported to or installed on the towing frame, rotate bedknife adjusting knob counterclockwise until bedknife does not touch the reel.

OPERATING INSTRUCTIONS

Adjust Bedknife to Reel For Light Contact

Tools Required: None

IMPORTANT: After mower is set up and installed on the towing frame, the bedknife and reel must be adjusted for light contact. Adjust bedknife to reel while mower is setting on the grass to be cut because the force of turf against underside of bedknife during actual operation must be duplicated to ensure correct setting. To assure sharp cutting edges, bedknife and reel must have light contact.

1. Stand behind the mower.

2. Disengage reel throwout knobs by rotating them outward (Fig. 10). Carefully spin reel backward to insure free movement.

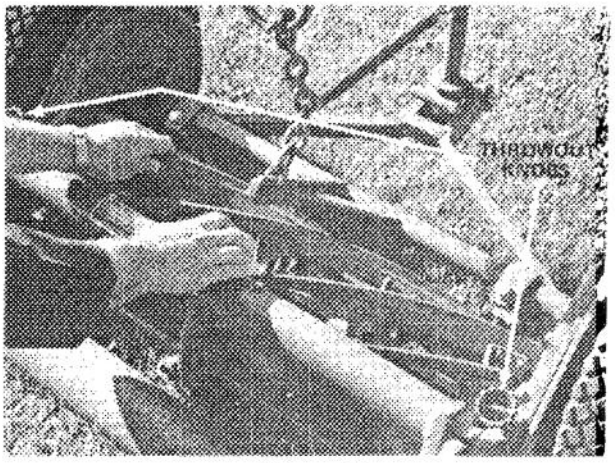


Figure 10

3. While spinning reel backward, rotate bedknife adjusting knob counterclockwise (Fig. 10) until bedknife does not touch reel blades.

4. While spinning reel backward, rotate adjusting knob clockwise (Fig. 10), one click at a time, until light contact of bedknife and reel is noticed or a whispering cutting sound is heard.

5. Check the reel "carry over" by spinning reel backward again. Reel should rotate one to two complete revolutions. Less than one revolution indicates heavy contact, which means the bedknife and reel must be readjusted for light contact; refer to steps 1, 3 and 4.

6. At the beginning of the cutting day, when reels are cold, engage the reel throwout knobs (Fig. 10). Operate mowers for 15 to 20 minutes so the bedknife and reel reach normal operating temperature; then stop operation. Next, disengage reel throwout knobs and spin reel backward. A whispering sound – not clicking – should be emitted, and this assures correct adjustment. If a whispering sound is not heard, bedknife and reel must be readjusted; refer to steps 3-5. By contrast, when reels are warm from being used, use only steps 1-5 to maintain light contact between bedknife and reel.

IMPORTANT: Never adjust bedknife to reel for light contact if mowers are cold because the increase in temperature during operation could cause the metal to expand and result in heavy contact. Heavy contact causes uneven bedknife wear and poor quality of cut. However, light contact between bedknife and reel, which is desirable, minimizes wear and keeps cutting edges sharp. Adjust for light contact every four hours or sooner, even though quality of cut is acceptable. When mowers are operated in sparse grass or temperature of air is high, the adjustment for light contact must be checked even more frequently to avoid heavy contact between the bedknife and reel. If mowers are not operated for a short time – one hour after any use – check for light contact after resuming operation for 15 to 20 minutes; refer to steps 1-6.

Mower Use

1. Mowing Speed – The mower is designed to cut grass well at any ground speed between 1 and 6 mph (1.6 and 9.66 km/hr) but for most turf conditions, ground speeds of 4-6 mph (6.4-9.66 km/hr) produce the best quality of cut. Ground speed, however, must be reduced when turning because

excessive speed will cause outside mowers to bounce and skip on the turf. Excessive heat, caused by the reel spinning too fast, can also damage the bedknife and reel. Since grass lubricates the bedknife and reel during operation, slow down when cutting sparse grass, extremely dry grass, or when trimming. Any lack or significant reduction of lubrication produces excessive heat build-up and subsequently, heavy contact between bedknife and reel, which results in uneven bedknife wear and poor quality of cut. Therefore, reels must be disengaged and stopped before mowers are transported across parking lots, roads, or whenever lubrication is minimal.

2. Height-of-Cut – To determine the effective height-of-cut, the length of the grass to be cut must be checked. Height-of-cut should be set and turf mowed frequently so no more than 1/3 of the leaf is cut off. If mower is equipped with pneumatic tires, pressure must be maintained at 35 psi (241.3 kpa) (Fig. 11). Low tire pressure can cause bedknife to dip into the grass and scalp the turf. An uneven cut will likely result.

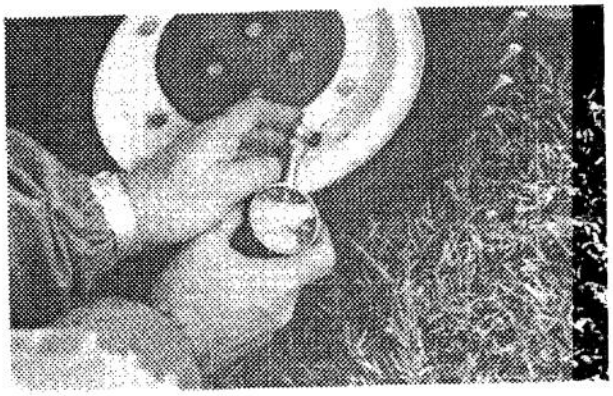


Figure 11

3. Operating Sound – A mower that is adjusted correctly gives off a whispering sound when operated. If there are buzzing, clicking, or metallic sounds, the mower has probably been operated with heavy contact between bedknife and reel. The reel or bedknife could also have hit a foreign object. A noisy mower must be stopped, repaired, and adjusted or severe damage will result.

4. Mowing Pattern – Reel mowers are usually most effective when cutting against the grain of grass or in opposite direction grass is lying. To prevent grass from lying down, alternate mowing direction if possible, each time an area is cut.

Causes of Poor Quality of Cut

1. Bedknife/Reel Contact (Fig. 12) – There must be light contact between bedknife and reel to keep cutting edges sharp and to produce an excellent quality of cut. By contrast, mowers operated without light contact allow abrasive materials and grass to pass between the bedknife and reel. This eroding action rounds off the bedknife and reel cutting edges, which results in a poor quality of cut. If cutting edges become round, bedknife and reel must be lapped. Excessive rounding off of cutting edges may require that bedknife and reel be ground and lapped. Never compensate for round cutting edges by tightening bedknife adjusting knob until there is heavy contact because the bedknife and reel will wear unevenly and cause "rifling".

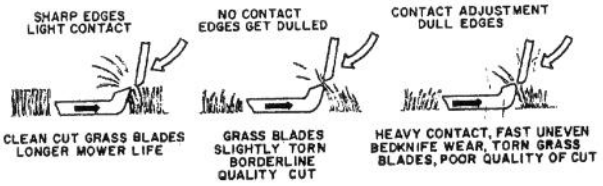


Figure 12

2. Low Height-of-Cut – If height-of-cut is set too low, the bedknife rather than the rear roller supports the mower. This causes the turf to push excessively against the bedknife. Consequently, the heavy contact between bedknife and reel causes rapid wear of both parts and a poor quality of cut. Therefore, always set height-of-cut so six or more notches show below bottom edge of roller adjusting nut (Fig. 13).

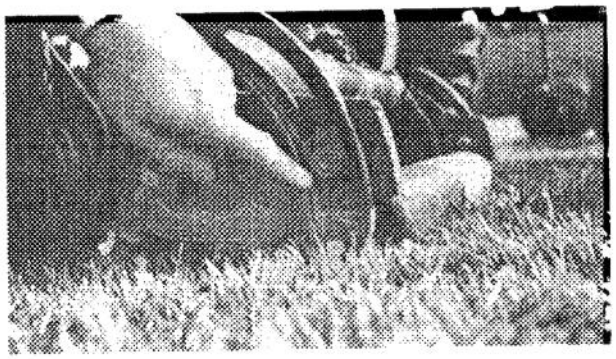


Figure 13

3. Noise – A mower that has sharp cutting edges and is adjusted with light contact will emit a desirable whispering sound when reel is spinning. By contrast, buzzing, clicking, or metallic sounds during operation indicate that mower is probably being operated with heavy contact between bed-

OPERATING INSTRUCTIONS

knife and reel. Heavy contact causes uneven or wavy wear on the bedknife and reel cutting edges. Grinding is required to repair a damaged bedknife and reel. Although the bedknife and reel are adjusted correctly for light contact, notches will eventually develop at both ends of the bedknife. These notches must be rounded off or filed flush with cutting edge of bedknife to assure smooth operation (Fig. 14).

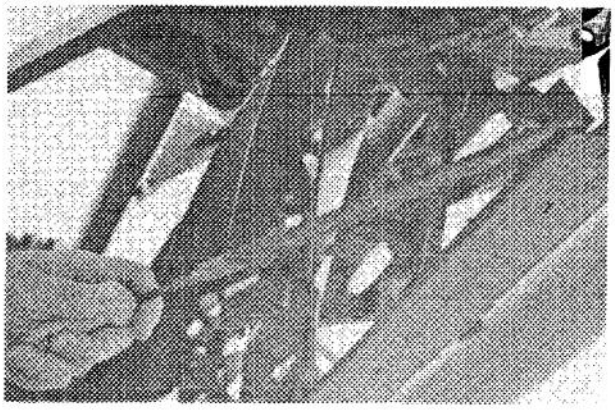


Figure 14

4. Loose Reel Bearings – If reel bearings are suspected to be loose, check them immediately or extensive damage may result; refer to Reel Bearing Adjustment, page 17.

5. Hitting a Foreign Object – The bedknife and reel cutting edges can be damaged if a foreign object is hit. The damage, if it is not too severe, can be repaired in the field. Start by filing down high spots on the bedknife and reel (Fig. 15). Use a ball peen hammer to straighten any reel blades that may be bent. Since bedknife usually springs away from the reel upon impact, bedknife must be adjusted; refer to Parallel Bedknife to Reel, page 6.

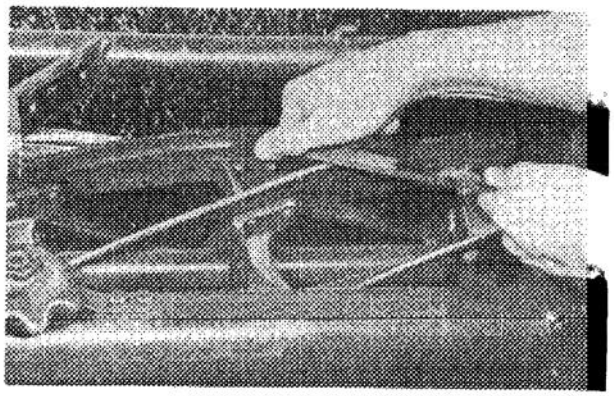


Figure 15

MAINTENANCE

Lubrication

1. The gear cases have been fully lubricated at the factory. Once each season drain and clean the right and left gear cases. When gear cases are clean, add SAE 140 gear lube; refer to Gear Case Oil, page 4.

2. The mowers should be greased every 8 hours of operation with Texaco Marfak Heavy Duty 2 wheel bearing grease or equivalent, to obtain maximum life. This grease can be used on all greasing points (Fig. 16) on the SPARTANS. When pressure is felt while greasing the roller, bearing cavity between seals is full. DO NOT CONTINUE TO GREASE BECAUSE INNER BEARING SEAL MAY BE DAMAGED.

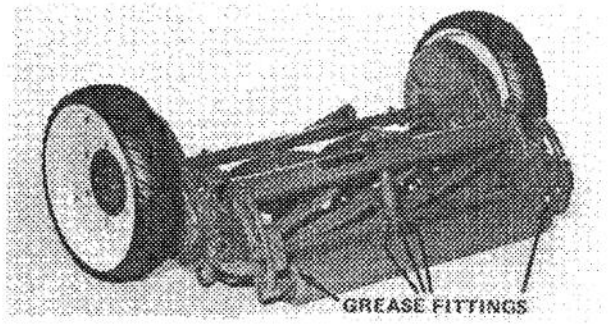


Figure 16

IMPORTANT: Do not use high pressure hose to clean areas where there are seals or bearings because foreign matter will likely be forced by the seal and into the bearing. The result will be rapid seal and bearing deterioration. Grease the mower immediately after cleaning. Failure to do so may cause damage to rod end bearings and other components.

Grinding

NOTE: For detailed sharpening information, order the TORO SHARPENING REEL and ROTARY MOWERS MANUAL, Form No. 80-300-PT from the Commercial Service Department.

New and old bedknives should be ground attached to the bedbar; this ensures rigidity during grinding and insures a true knife. Refer to figure 17 when grinding the knives and obtain as near as possible the relief angles indicated. Always grind the front face of the knife, then the top face. By following this procedure, grinding flash from the

cutting edge will be removed. In grinding, avoid a hard contact between knife and grinding wheel. If hard contact occurs, excessive heat buildup will take place, causing premature wearing of the grinding wheel and reduced life of the knife.

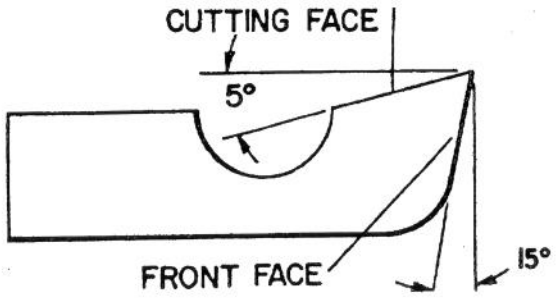


Figure 17

The land area and relief angle of reel blade are pointed out in figure 18. The land area is that part of the reel blade that actually comes in contact with the bedknife and cuts the grass in a scissors action. The relief or back grind angle is ground into reel blade to provide clearance or relief behind contacting edges to reduce drag or friction. Recommended relief angle for all Toro reel blades is 15 degrees. After reel and bedknife have been ground, perform the following adjustments:

1. Set Height-of-Cut, page 5.
2. Check Bedknife Attitude, page 6.
3. Parallel Bedknife to Reel, page 6.

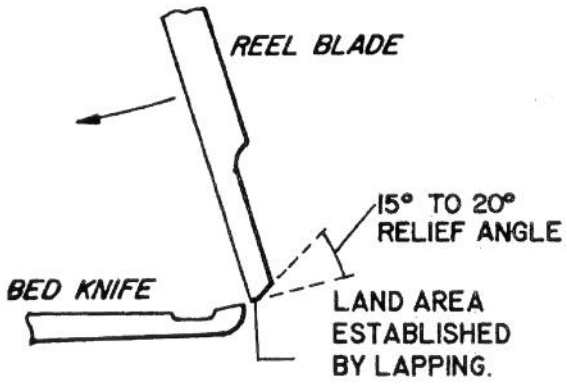


Figure 18

Lapping

Spartan mowers are set up as follows:

1. Remove the right hand wheel.
2. Place wheel under gear case for support.
3. Remove the reel pinion cover.
4. Disengage the reel.
5. Connect the lapping machine coupler to the nut on the end of the reel shaft.

When lapping, use a good grade of commercial lapping compound. A medium grit should be for initial lapping and a fine grit for finishing. A solution of one part liquid detergent and two parts lapping compound is recommended. The liquid detergent greatly eases washing away the compound when finished. Water soluble oil may also be used as a compound carrier.

NOTE: Lapping solution must be kept in free flowing condition to get even distribution on bedknife and reel.

The lapping procedure is as follows:

1. Adjust bedknife to reel so light contact is evident.
2. Operate the lapping machine so the reel turns in a reverse direction. Apply lapping solution continuously and maintain light bedknife to reel contact.
3. Stop lapping machine periodically to check cutting surfaces for sharpness. Continue lapping until sharp cutting edges have been restored.

NOTE: If the cutting edges are severely rounded, both sharpening and lapping may be required.

4. Wash off all lapping solution. Using paper, check for sharpness along entire length of each reel blade. If paper cannot be cut cleanly along entire length of each reel blade, continued lapping is necessary.

Bedknife Replacement or Reversing

A reversible bedknife is standard equipment which doubles the life of this part of the mower.

1. To replace or reverse the bedknife, remove the eleven (11) screws holding the knife to the bed bar; replace or reverse the knife and reinstall the screws. All screws should be lubricated with oil and tightened to 250-300 in.-lb (28.3 - 33.9 N·m) torque. The screws should be tightened by starting at center of the bedknife and alternating until all screws are secured.
2. True the bedknife attached to the bedbar by grinding. Refer to the TORO SHARPENING REEL and ROTARY MOWERS MANUAL, Form Number 80-300-PT.

3. After bedknife has been ground and is "true", perform the following adjustments:

1. Set Height-of-Cut, page 5.
2. Check Bedknife Attitude, page 6.
3. Parallel Bedknife to Reel, page 6.

Reel, Roller and Wheel Bearing Adjustment

After the initial 30 operating hours, check the reel bearing, roller bearing, and wheel bearing. Thereafter, check these parts every 200-250 operating hours. If necessary, adjust the reel bearing (See Reel Bearing Adjustment, page 17, No. 32 & 33). If necessary, adjust the roller bearing (See Roller Assembly, page 15, No. 12). If necessary, adjust the wheel bearing (See Check Wheel Hubs, page 4.)

IMPORTANT: If reel or bedknife is going to be ground, check reel diameter by putting end of square on bedknife and measure to top of reel (Fig. 19). Remember this dimension because it will be used when rod ends are adjusted, so they can be reinstalled in their original positions.

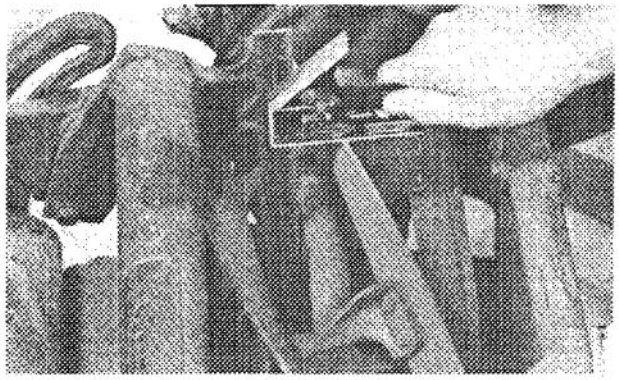


Figure 19

Mower Servicing Procedure Disassembly

1. Remove four (4) capscrews securing wheel to wheel hub. Remove wheel from hub.

2. Remove "O" ring from inside of hub (Fig. 20).

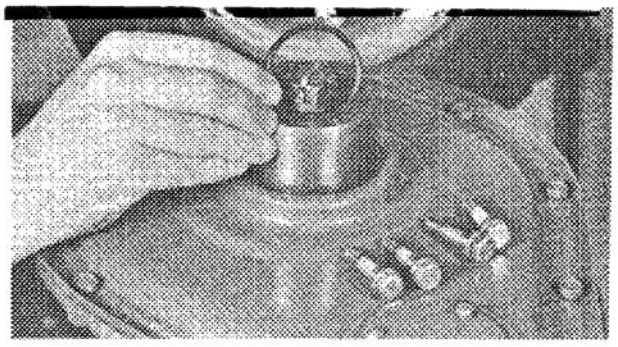


Figure 20

3. Remove cotter pin and slotted nut from axle shaft (Fig. 21).

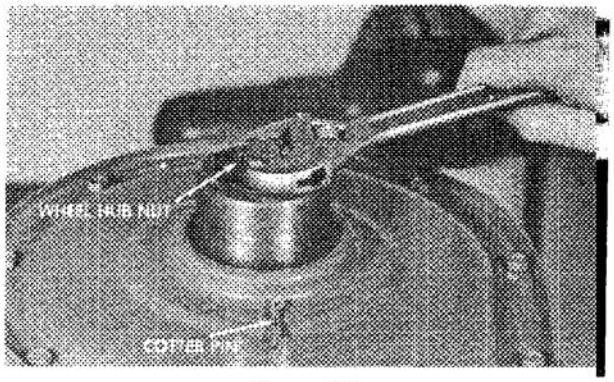


Figure 21

4. Place oil pan under gear case assembly. Loosen the ten (10) capscrews securing cover to gear case (Fig. 22).

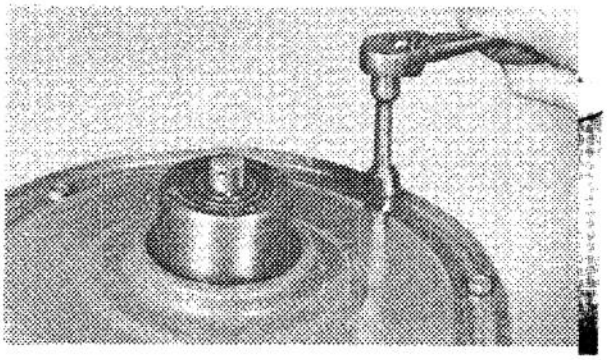


Figure 22

5. Separate cover from gearcase and allow oil to drain. Remove cover and discard gear case gasket (Fig. 23).

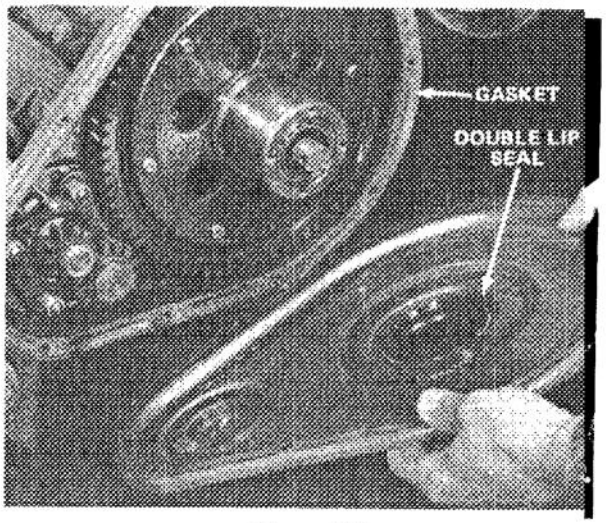


Figure 23

6. Remove double lip seal (Fig. 23) from cover if worn or damaged. The ring gear hub and gear assembly can be removed from axle shaft as soon as gear case cover is removed.

7. Use a drift pin punch to remove bearing cups from hub (Fig. 24). Note: Access is provided in the bore for drift pin punch.

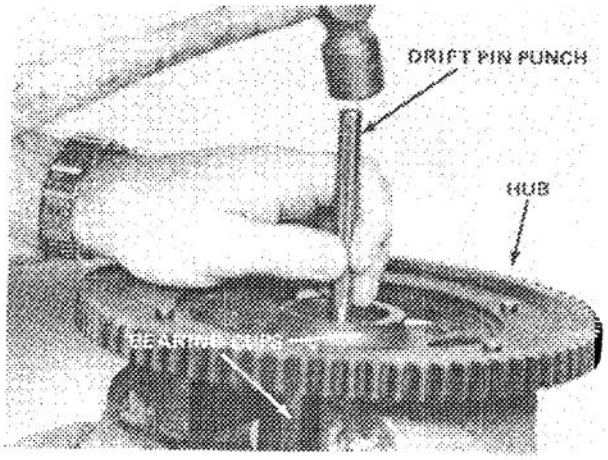


Figure 24

8. Remove inner cone and "O" ring from axle shaft (Fig. 25).

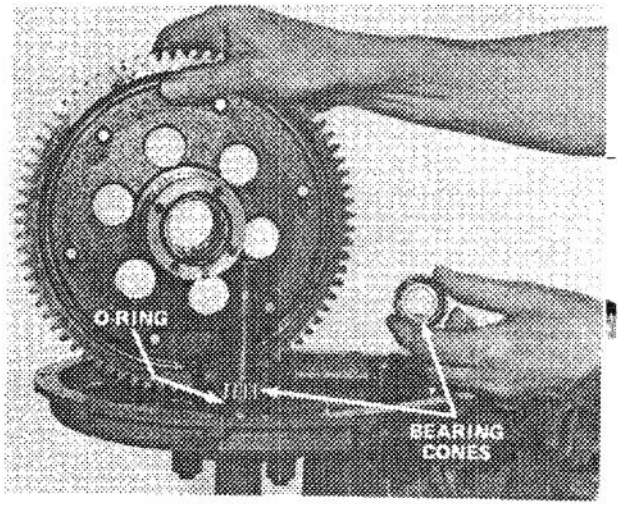


Figure 25

9. To prevent the reel from turning, place a wooden block between reel blades and axle shaft. Using a socket wrench, remove ratchet gear stud securing ratchet gear (Fig. 26). Remove left-hand ratchet gear stud by rotating it clockwise. Remove right-hand ratchet gear stud by rotating it counter-clockwise. Removal of the ratchet gear stud will free ratchet gear (Fig. 26).

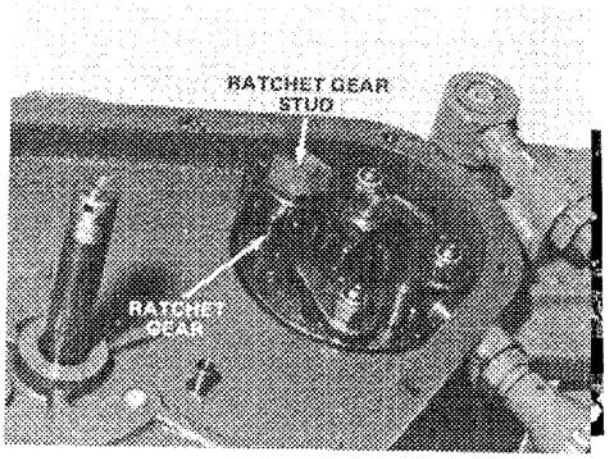


Figure 26

10. Remove needle bearing from ratchet gear using a sleeve and arbor press (Fig. 27).

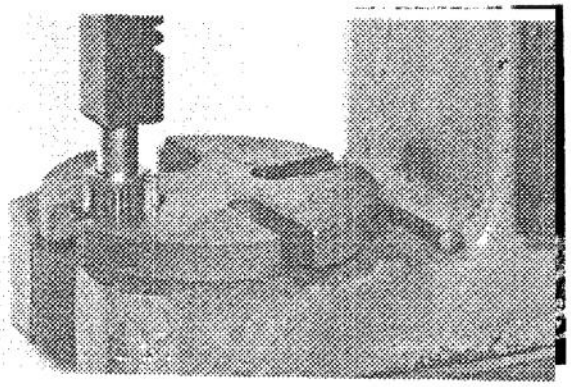


Figure 27

11. Remove nut securing pinion gear (Fig. 28). Insert a pry bar in groove provided and pry off reel drive gear. Remove Woodruff key from keyway in reel shaft.

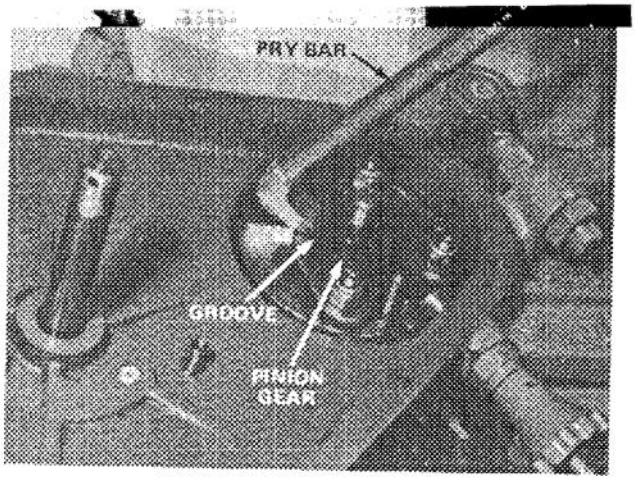


Figure 28

12. Remove the lower compression spring. Disassemble the ratchet ring from the ratchet gear ring by removing three (3) locknuts and prying equally around the ratchet ring (Fig. 29). Be extremely careful to prevent damage to the mating surfaces.

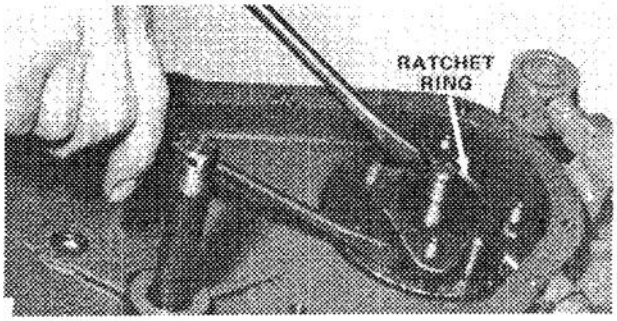


Figure 29

13. For removal of the throwout handle (Fig. 30), "O" ring and finger, drive pin from throwout handle. Remove throwout sleeve by turning counterclockwise.

Figure 30

NOTE: When replacing "O" ring, sleeve must be removed (Fig. 31). Throwout sleeve need only be loosened for removal of ratchet gear ring.

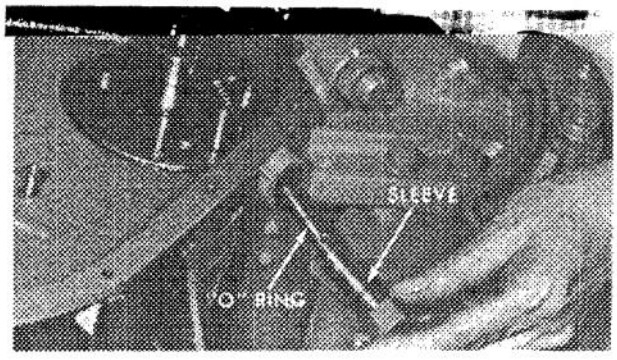


Figure 31

14. Lift out the upper compression spring (Fig. 32). Remove ratchet gear ring from gear case.

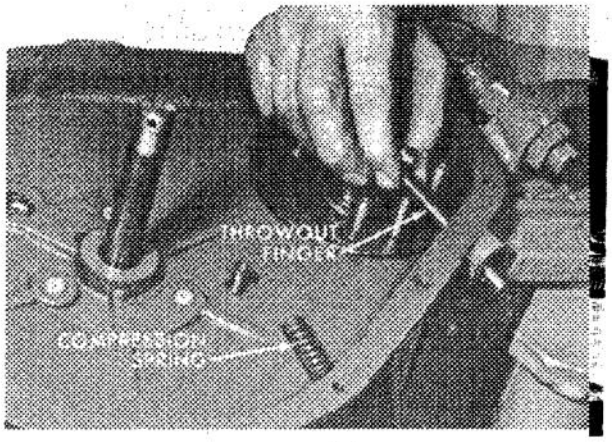


Figure 32

15. Remove roller adjustment bolts and nuts from each side of roller (Fig. 33). Slide complete roller assembly from the roller adjusting brackets.

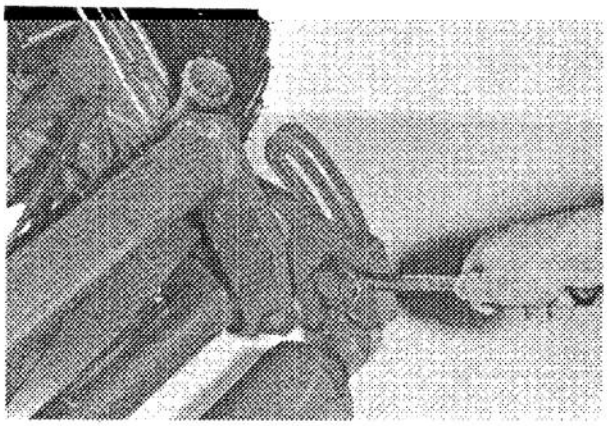


Figure 33

16. Loosen capscrew at bottom of center adjustment tube and tap out pivot rod (Fig. 34).

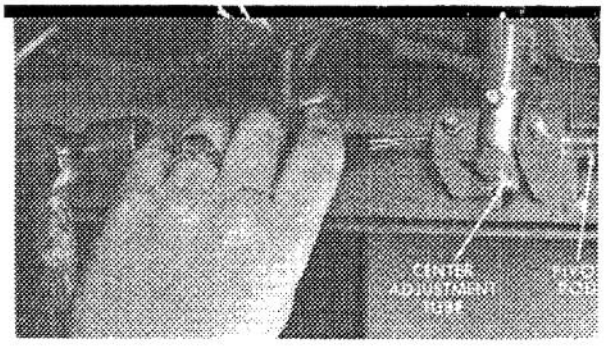


Figure 34

17. Remove upper jam nut from each rod end bearing (Fig. 35). Remove bedknife and bedbar assembly from gear case. If pivots are damaged, grind or burn off weld, and remove from bedbar.

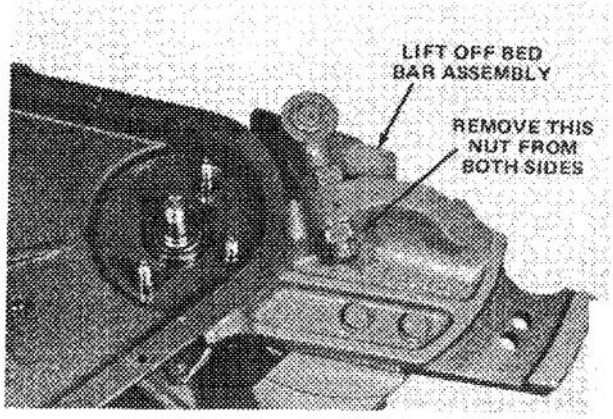


Figure 35

18. Remove capscrews, nuts, and lockwashers securing rear cross bar (Fig. 36).

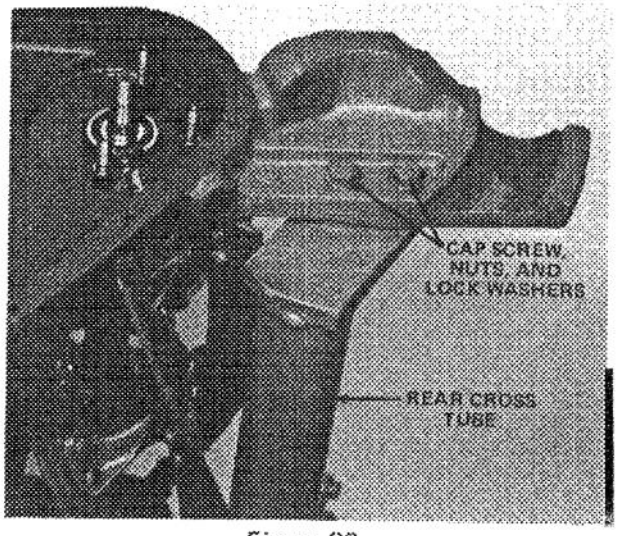


Figure 36

19. Remove three nuts holding gear case and front cross tube together. Using a soft head mallet, drive gear case off front cross tube shaft.

NOTE: Remove any rust from front cross tube shaft to prevent binding. Clean gear case with solvent. If studs have been removed, apply Permatex No. 2 to threads.

20. Using a bearing puller, remove bearing cone and seal from reel shaft (Fig. 37). Discard seal and "O" ring in the adjusting nut. Examine bearing cone carefully; discard if damaged.

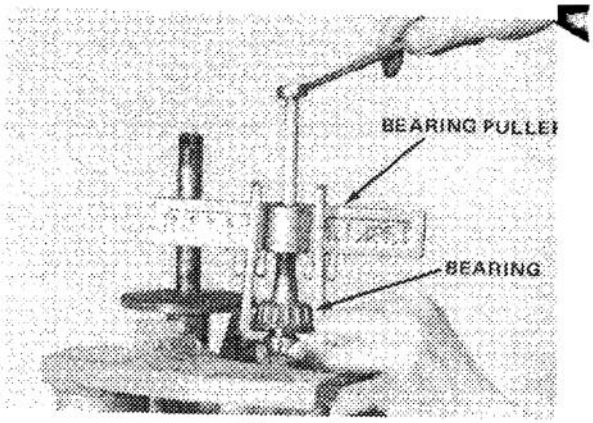


Figure 37

21. To remove axle shaft, use a drift punch and hammer and remove roll pin from cross tube and discard roll pin (Fig. 38). Remove axle shaft from cross tube. To replace bushings, use a long shaft, somewhat smaller in diameter than axle shaft, and drive bushings from opposite ends.

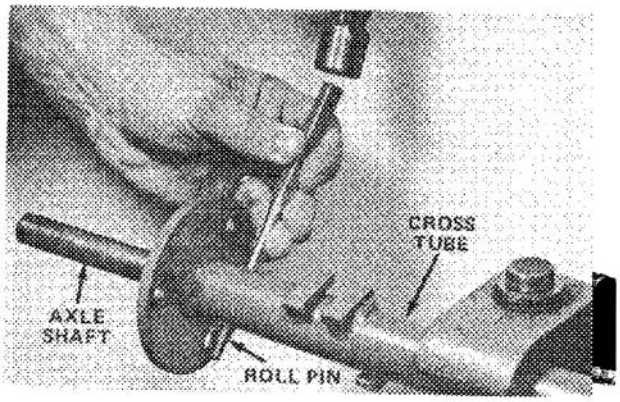


Figure 38

Reel Disassembly

22. If the reel assembly is being removed, remove the remaining components from right end (Fig. 39) and left end (Fig. 40) of the reel shaft. Inspect for damage and replace if necessary. Reassemble in reverse order of disassembly.

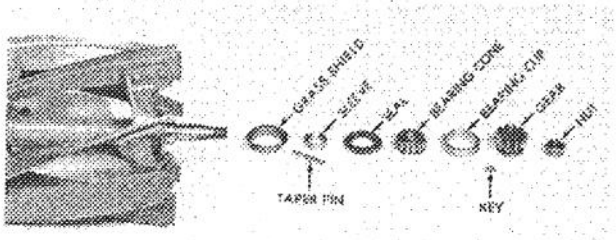


Figure 39

MAINTENANCE

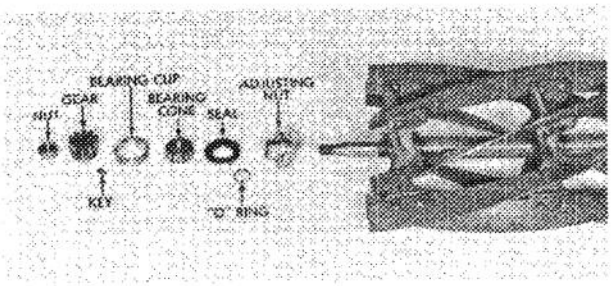


Figure 40

Roller Disassembly (Fig. 41)

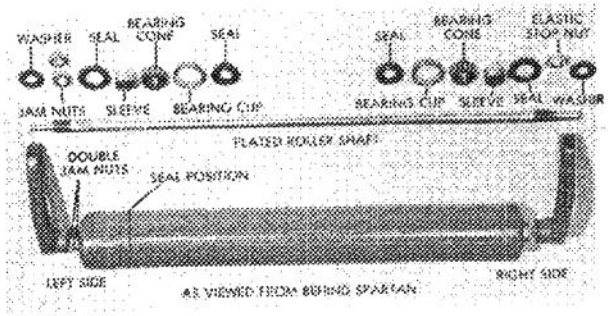


Figure 41

1. Remove brackets and washers from each end of roller and inspect bushings.

2. Remove elastic stop nut.

NOTE: After elastic stop nut has been removed, slide sleeve off roller shaft. Point end of roller downward into a container, at the same time pulling roller shaft out, allowing lubricant to drain from roller.

3. If roller shaft is to be replaced, remove double jam nuts.

4. Remove remaining sleeve and seals from both ends of roller.

5. Remove bearing cones from each end of roller.

6. Remove bearing cups with caution.

7. Remove inner seals by using a seal remover.

Roller Assembly (Fig. 42)

1. Lightly oil lips of inner seals. Install inner seals on each end of roller, making sure that garter springs face inboard.

2. Replace bearing cups and insert bearing cones into roller.

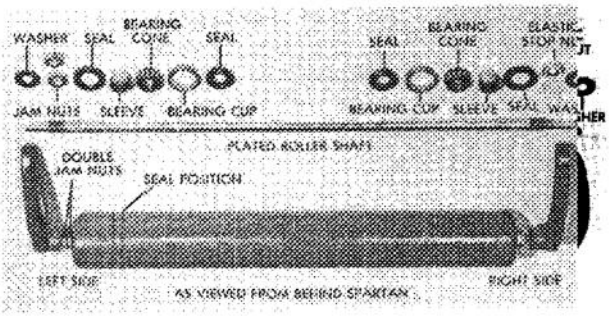


Figure 42

3. Lightly oil lips of outer seals. Install outer seals on each end of roller, making sure that garter springs face inboard.

4. Slide one (1) sleeve onto roller shaft against double jam nuts.

5. Wrap threaded area of roller shaft with cellophane tape to protect seals, and carefully slide shaft through right-hand side of the roller. Slide roller shaft into roller until it penetrates the innermost oil seal on the right-hand side.

6. Pour approximately one (1) pint (16 ounces [0.0296 l]) of SAE 90 or 140 gear oil into the roller housing.

7. After oil has been added, carefully push roller shaft through the entire roller assembly. Remove cellophane tape.

8. Install sleeve on roller shaft and slide up against bearing cone.

9. Install elastic stop nut and secure by holding double jam nuts. Tighten elastic stop nut (Fig. 43).

NOTE: Tighten elastic stop nut until all axial and radial motion has been removed from the roller shaft and bearings. Ensure that roller rotates freely on shaft.

10. Grease bearings with Texaco Marfak Heavy Duty 2 wheel bearing grease or equivalent.

11. Reinstall washers and install left and right-hand bracket and bushing assemblies.

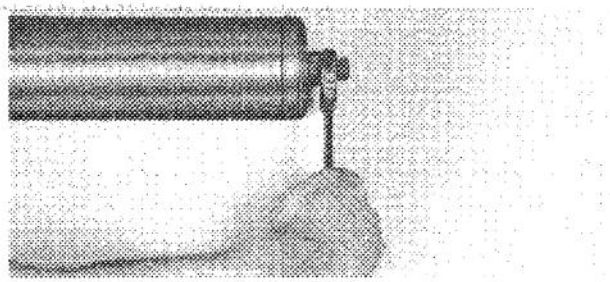


Figure 43

MAINTENANCE

IMPORTANT: Do not overtighten elastic stop nut because it will overload bearings. The roller is installed with the jam nuts on the left side (Fig. 42). If shaft turns while tightening stop nut, grip double nuts securely.

Gear Case and Frame Assembly

1. Insert a bushing into each end of spacer tube. Align hole in bushing with hole in tube. Slide axle shaft through spacer tube. Secure bushings and shaft to tube with roll pins.

2. Install seal in right-hand gear case. Mount right-hand gear case to the tube, securing with three (3) lockwashers and mounting nuts. Install "O" ring on axle shaft.

3. Mount rear cross bar to right-hand gear case, using one capscrew and lockwasher from the inside, and two (2) capscrews and lockwashers through outside of gear case.

4. Insert new "O" ring in groove inside adjusting nut. Coat "O" ring with heavy oil or grease. Thread adjusting nut onto left end of shaft.

5. Position right side of reel assembly into right-hand side plate.

6. Press seal into left-hand gear case. Mount gear case to spacer tube and reel shaft. Secure with three (3) lockwashers and nuts. Install "O" ring on axle shaft.

7. Secure rear cross bar to gear case using capscrews and lockwashers. Install capscrews and lockwashers through rear cross bar and into gear case.

8. At this time, ensure that all fasteners are secure on both sides.

9. Install bearing cone over left-hand reel shaft and seat with a driver and hammer.

10. Assemble Woodruff key to left-hand reel shaft.

11. On the left side, assemble ratchet gear ring over the reel shaft and insert two (2) compression springs.

12. Install bearing cup in left-hand ratchet ring and seat properly.

13. Assemble left-hand ratchet ring over the ratchet gear ring and seat with a driver and hammer. Secure entire assembly with three (3) stop nuts. Nuts should be drawn up evenly and gradually to 14-22 ft-lb (19.04-29.8 N·m) to prevent breakage of the rachet ring.

NOTE: Ensure that assembly will ratchet. If assembly does not ratchet, back nuts off slightly.

14. Place "O" ring into groove on left-hand throw-out finger, coat ring with heavy oil or grease, and slide through side plate, making sure that "O" ring does not get damaged. Install throw-out sleeve over throw-out finger and tighten securely in gear case.

15. Slide throw-out handle over finger and secure in place with a drive-lock pin.

16. Slide bearing cone over right-hand reel shaft and seat with a driver and a hammer.

17. Insert Woodruff key in keyway.

18. On the right side, assemble the ratchet gear ring over the reel shaft and insert two (2) compression springs.

19. Install bearing cup in right-hand ratchet ring and seat properly.

20. Assemble right-hand ratchet ring over ratchet gear ring and seat with a driver and hammer. Secure entire assembly with three (3) stop nuts. Nuts should be drawn up evenly and gradually to 14-22 ft-lb (19.04-29.8 N·m) to prevent breaking the rachet ring.

NOTE: Ensure that assembly will ratchet. If assembly does not ratchet, back nuts off slightly.

21. Place "O" ring into groove on right-hand throw-out finger, coat ring with heavy oil or grease, and slide through side plate, making sure that "O" ring does not get damaged. Install throw-out sleeve over throw-out finger and tighten securely in gear case.

22. Slide throw-out handle over finger and secure in place with a drive-lock pin.

23. Assemble reel pinion gear over right-hand reel shaft and seat over Woodruff key.

24. Secure nut (left-hand thread) on right-hand reel shaft.

25. Assemble the ratchet gear and bearing assembly to right-hand ratchet gear ring and secure with right-hand ratchet gear stud.

26. Assemble reel pinion gear over left-hand reel shaft and seat over Woodruff key.

27. Secure nut (right-hand thread) on left-hand reel shaft.

28. Assemble the ratchet gear and bearing assembly to the left-hand reel ratchet gear ring and secure with the left-hand ratchet gear stud.

29. Position roller bracket assembly in slots of gear case.

30. Position right-hand and left-hand roller adjusting nuts on roller bracket assemblies. Secure in place with capscrews and lockwashers.

Reel Bearing Adjustment

31. Loosen socket head set screws in reel bearing adjusting nuts with a 7/32" Allen wrench (Fig. 44). In small increments, rotate the adjusting nut (Fig. 45) in normal direction that reel turns to remove all end play from the reel. Make sure to hold reel so it cannot rotate (Fig. 45).

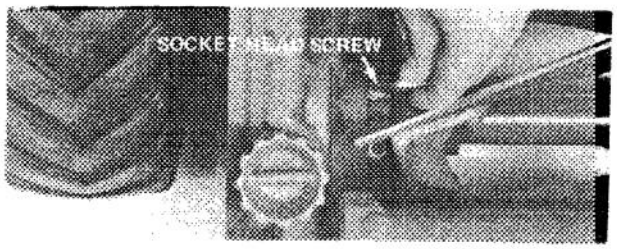


Figure 44

32. When end play is removed, rotate nut an additional 1/4 turn to pre-load the bearings.

33. Tighten the set screws in adjusting nut to 150 in.-lb (16.9 N·m).

NOTE: Insert punch and try to turn adjusting nut after set screws are tightened (Fig. 45). If nut can be turned, remove set screws, lubricate screws with oil, and reinstall them tightly – 150 in.-lb (16.9 N·m).

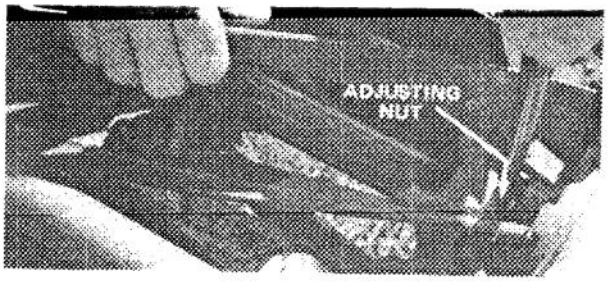


Figure 45

34. BEDKNIFE AND BED BAR Assembly

A. Inspect and clean all mounting surfaces on bedknife, bed bar, and spacer plate.

B. Replace bedknife screws if damaged. Oil screws prior to installation and secure center screws first. Work outboard in both directions until all screws are tightened securely. Proper installation torque is 250-300 in.-lb (28.25-33.9 N·m).

C. Grind bedknife if knife has been reversed, turned, or new knife has been installed. Both the front edge and top edge should be ground. Proper angle for front edge is 15 degrees and top edge is 5 degrees. Refer to GRINDING, page 9.

35. Thread bed bar pivots into bed bar. Tighten pivots to 100-150 ft-lb (136-204 N·m). Tack weld one (1) hex of each pivot to the bed bar to hold in place. Lubricate both bed bar pivots with McLube.

IMPORTANT: Use McLube 1725 every time rod ends are removed to insure rod ends will pivot on pins. McLube 1725 is available in 16 oz. (0.473 l) aerosol cans or one pint (0.473 l) non-pressurized cans from your local authorized TORO distributor. Order Part No. 505-35 (aerosol can) or Part No. 505-41 (non-pressurized can). Allow McLube to dry on pins for 10 minutes before installing rod ends.

36. Slide both rod ends w/lower jam nuts onto bed bar pivots. If rod ends do not slide onto pivots easily, ream inside of rod end. ROD ENDS AND PIVOTS MUST NOT BIND.

IMPORTANT: The offset rod ends must be installed with the short side toward the bed bar.

37. Install the bed bar between the gear cases and secure with jam nuts (Fig. 46). Do not tighten nuts.

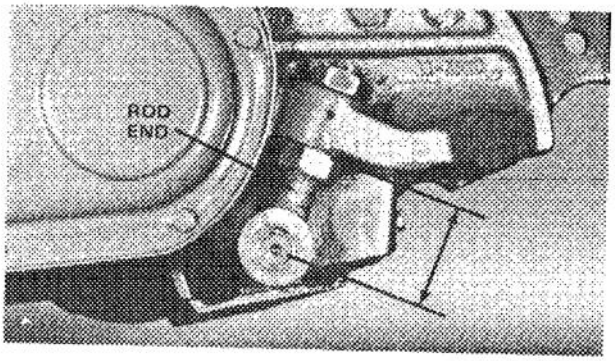


Figure 46

38. As a guide, adjust rod end ends (Fig. 46) using dimensions shown in Fig. 47. Do not tighten jam nuts at this time.

NOTE: As diameter of reel decreases (due to wear), distance between midpoint of rod end bearing and boss decreases.

MAINTENANCE

SPARTAN MOWERS

ADJUSTMENTS FOR REEL WEAR

REEL DIAMETER	ROD END ADJUSTMENT	ROLLER BRKT. ADJUST.*
New	2"	7th Notch From Bottom
7-7/8"	1-7/8"	6th Notch From Bottom
7-7/8"	1-13/16"	6th Notch From Bottom
7-3/4"	1-3/4"	5th Notch From Bottom
7-5/8"	1-11/16"	5th Notch From Bottom
7-1/2"	1-5/8"	5th Notch From Bottom
7-3/8"	1-9/16"	5th Notch From Bottom
7-1/4"	As close as possible	5th Notch From Bottom

Each rear roller notch equals approximately 3/32" (2.38 mm)

*Roller bracket adjustment for lowest height of cut

METRIC MEASUREMENT

REEL DIAMETER	ROD END ADJUSTMENT	ROLLER BRKT ADJUST.
NEW	51 mm	7
20.3 cm	48 mm	6
20	46 mm	6
19.7	44	5
19.4	42.9	5
19.1	41	5
18.7	39.7	5
18.4	As close as possible	5

Figure 47

39. Press bearing cups in ring gear hub. Assemble bearing cone to left side of axle shaft. Place large ring gear and hub assembly over axle shaft and bearing cone.

40. Place another bearing over axle shaft and into ring gear hub.

41. Position wheel hub nut on axle shaft and run down with an open-end wrench. Adjust bearing by tightening nut until slight drag is felt when wheel hub is rotated. Back off one slot and install cotter pin through slotted nut and axle shaft.

42. Press seal into gear case cover. Position gasket on gear case. Lightly lubricate wheel hub double lip seal in gear case cover.

43. Add sufficient amount (approximately 15 ounces [0.44 l]) of SAE 140 gear lubricant to gear case.

44. Position left-hand gear case cover and secure with ten (10) self-tapping screws. Torque screws to approximately 125 in.-lb (14.1 N·m). (Fig. 48).

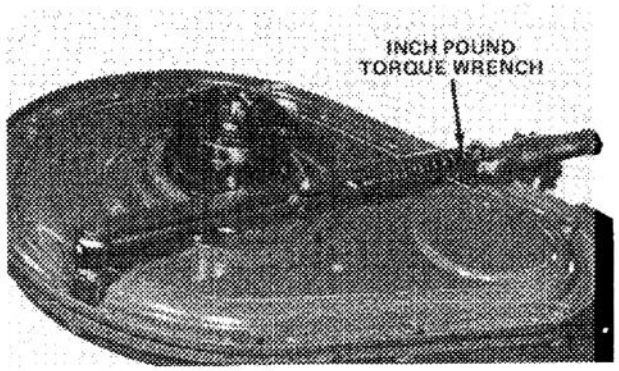


Figure 48

45. Place O-ring into recess in wheel hub.

46. Secure the wheel to the wheel hub with four (4) capscrews.

47. Repeat steps 40 through 46 on opposite side.

48. Install center adjusting screw assembly to bedknife assembly and secure in place with pivot pin. TIGHTEN CAPSCREW AT BOTTOM OF HEIGHT-OF-CUT ADJUSTMENT ROD.

IMPORTANT: After the Spartan has been completely assembled, perform the following critical adjustments:

1. **Level Rear Roller, page 5.**
2. **Check Reel Bearings and Mower Fasteners, page 5.**
3. **Set Height-of-Cut, page 5.**
4. **Check Bedknife Attitude, page 6.**
5. **Parallel Bedknife to Reel, page 6.**

When the adjustments have been completed, move the Spartan to a turf area and adjust the bedknife to reel (See Adjust Bedknife to Reel For Light Contact, page 7).

IDENTIFICATION AND ORDERING

Model and Serial Numbers

The Spartan has two identification numbers: a model number and a serial number. The two numbers are stamped on a plate that is located on the rear cross tube. In any correspondence concerning the mower, supply model and serial numbers to assure that correct information and replacement parts are obtained.

To order replacement parts from an Authorized TORO Distributor, supply the following information.

1. Model and serial number of the mower.
2. Part number, description, and quantity of part(s) desired.

NOTE: Do not order by reference number if a parts catalog is being used; use the PART NUMBER.

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 any 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.

International Group
Service Department
One Corporate Center
7401 Metro Boulevard
Minneapolis, Minnesota 55435 U.S.A.

Litho in U.S.A.

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