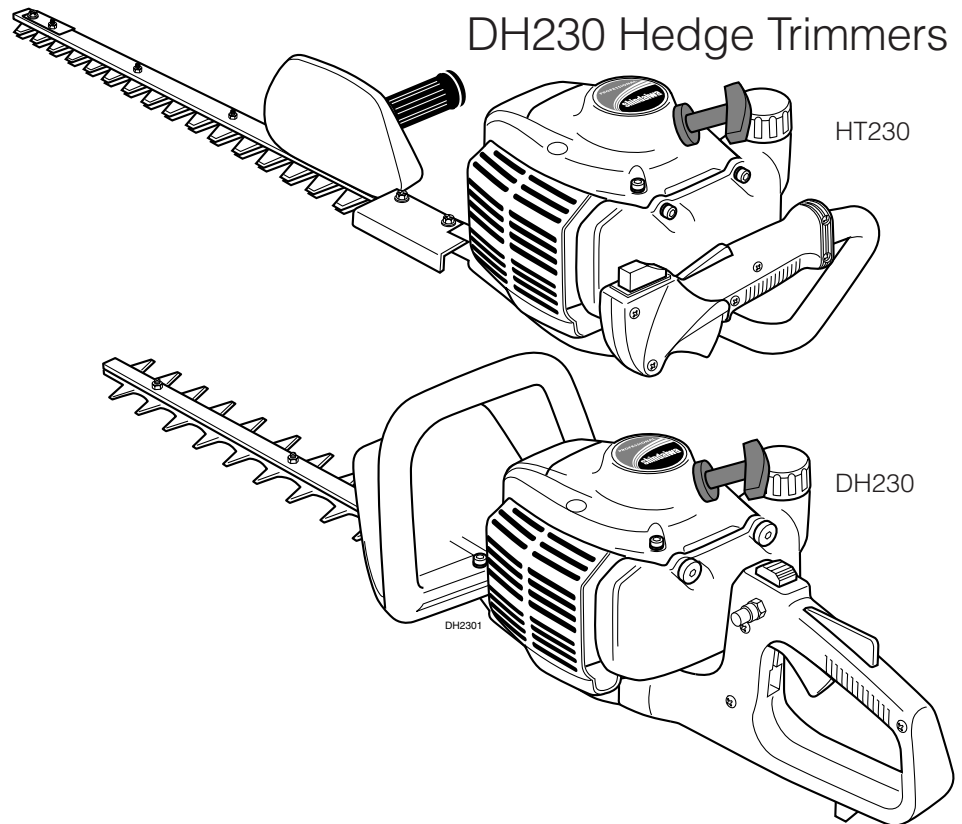


SERVICE MANUAL

GEARCASE AND CUTTERS
Shindaiwa HT230 and
DH230 Hedge Trimmers



WARNING!

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

shindaiwa

Service Manual

Shindaiwa HT230 and DH230 Hedge Trimmers Gearcase and Cutters

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Attention Statements



WARNING!

A statement preceded by the triangle Attention Symbol and the word WARNING contains information that should be acted upon to prevent serious bodily injury.

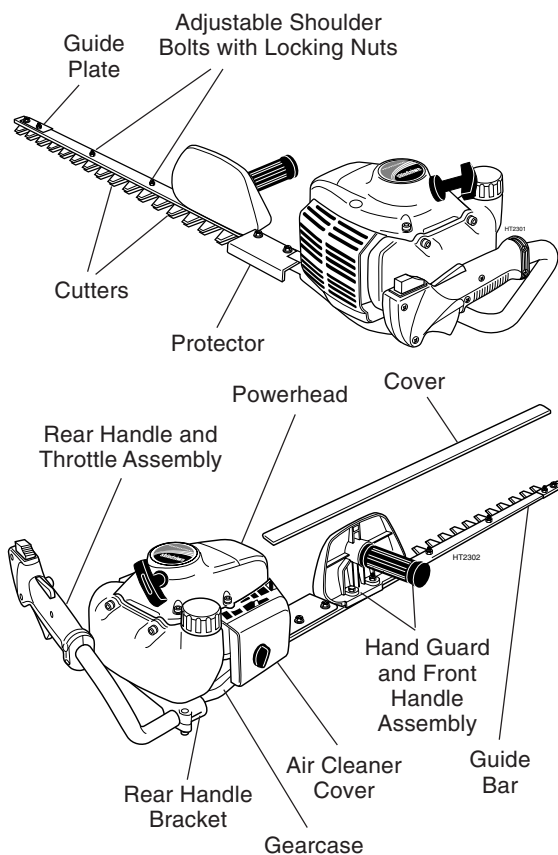
CAUTION!

A statement preceded by the word CAUTION contains information that should be acted upon to avoid damaging your machine.

IMPORTANT!

A statement preceded by the word IMPORTANT is one that possesses special significance.

HT230



DH230

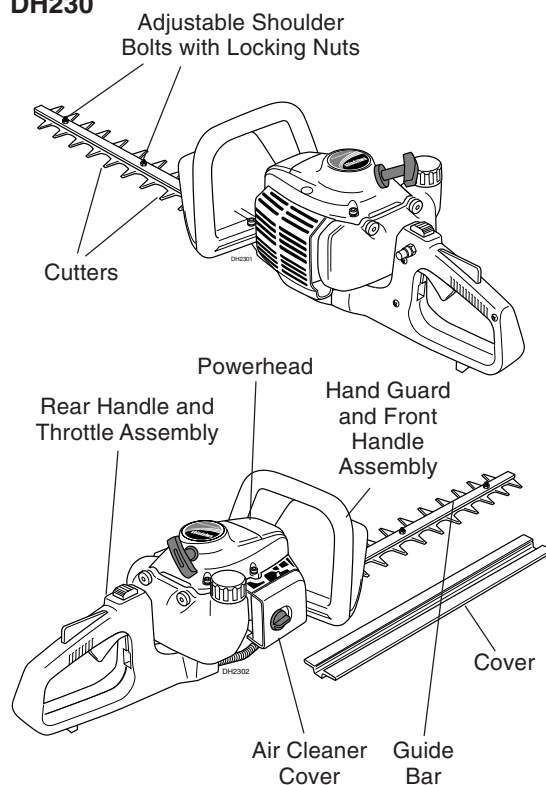


Figure 1. Major Component Identification

Section 1 Specifications

General Specifications HT230 & DH230

Dimensions (L x W x H)

HT230-30	990 x 210 x 210 mm
HT230-40	1330 x 210 x 210 mm
DH230-24	1080 x 250 x 210 mm
DH230-30	1220 x 250 x 210 mm

Weight; engine and Cutter (less fuel)

HT230-30	5.5 kg (12.2 pounds)
HT230-40	6.0 kg (13.2 pounds)
DH230-24	5.7 kg (12.5 pounds)
DH230-30	5.9 kg (13.9 pounds)

Engine Specifications

Engine Model SHT230

Type 2-cycle, horizontal cylinder, air cooled

Bore x Stroke 32 mm x 28 mm

Displacement 22.5 cc

Dry Weight 2.6 kg (5.73 pounds)

Max. Output 1.1 hp (0.81 kW) @ 8000 rpm

Fuel Gasoline-oil Mixture–
40:1 with Shindaiwa
Premium 2-cycle Engine Oil

Fuel Tank Cap., (HT230) 0.7 liter/24 ounces

Fuel Tank Cap., (DH230) 0.6 liter/21 ounces

Carburetor Walbro WYJ (diaphragm type)

Ignition Fully electronic, transistor controlled

Spark Plug Champion CJ8

Air Cleaner Semi-wet type, silenced

Starting Method Recoil type

Drive and Cutters Specifications

HT230 Blade Double-action, single edge

DH230 Blade Double-action, double edge

Blade Length

HT230-30	740 mm
HT230-40	1080 mm
DH230-24	605 mm
DH230-30	745 mm

Clutch Type Fully automatic centrifugal
clutch, dry type

Gear Type Spur gears

Gear Reduction 1:4.98

Gear Lubrication Lithium-based grease

Standard Equipment

Rear handle with integral controls, anti-vibe
mountings.

Front handle with guard.

Tool set and blade cover (scabbard).

Options

Deflector shield (HT230 only)

Specifications are subject to change without notice.

Nomenclature

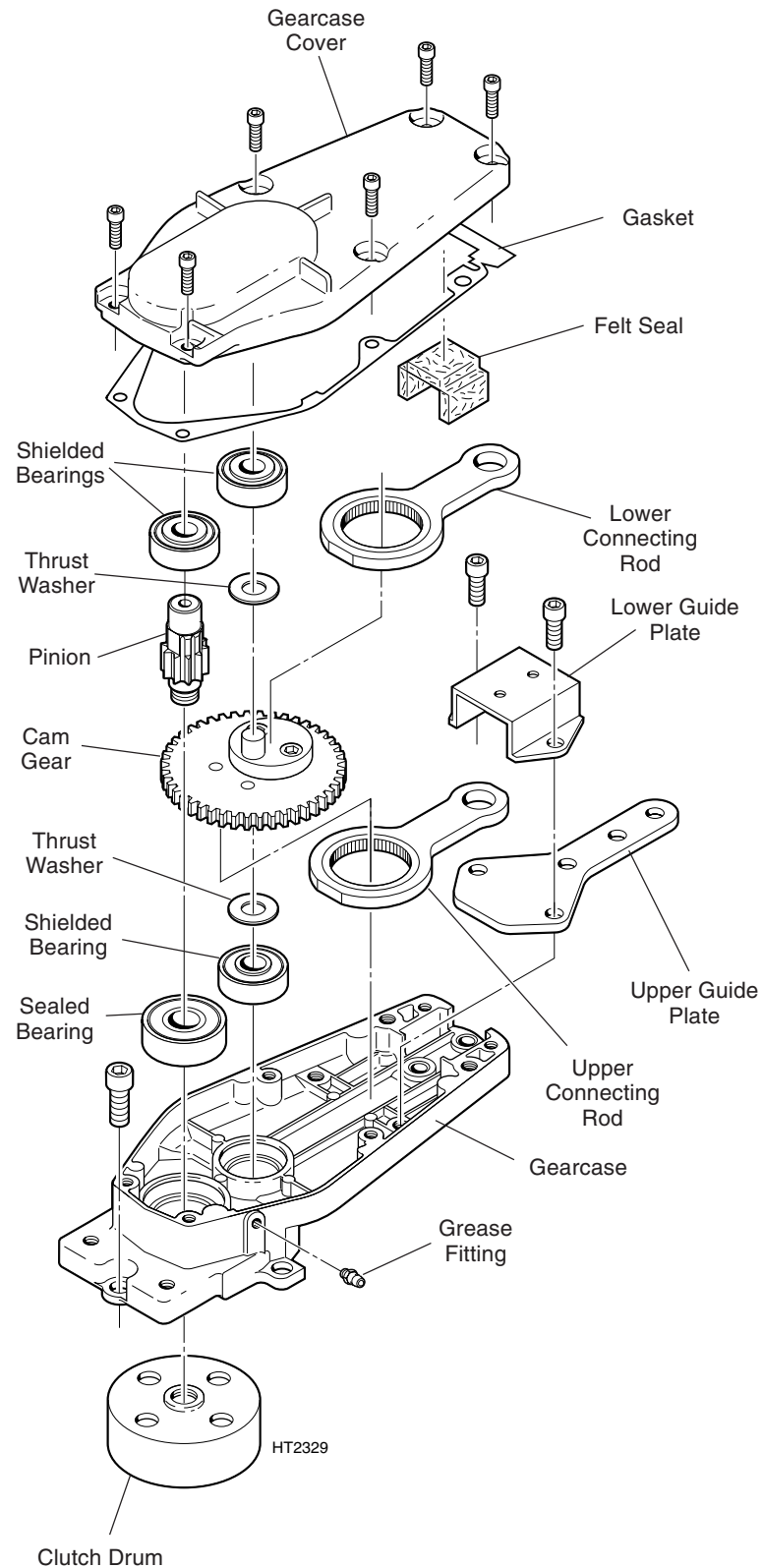


Figure 2. Internal Gearcase Components (shown inverted).

Section 3 Theory of Operation

Clutch Figure 3

Crankshaft rotation is transferred to the gearcase through a bonded-shoe centrifugal clutch threaded to the engine crankshaft. Increasing engine rpm causes the clutch shoes to swing outward under centrifugal force, engaging with and turning the clutch drum on the gearcase.

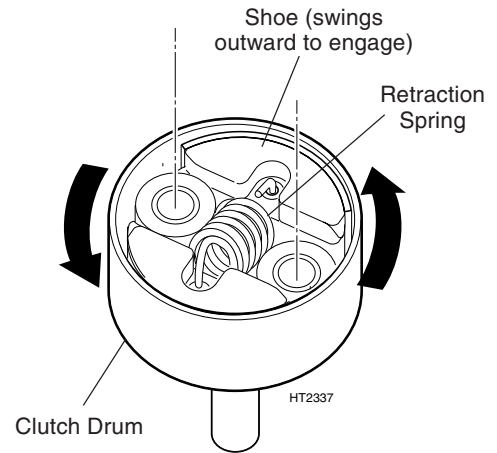


Figure 3. Clutch Operation.

Gearcase Figure 4

Clutch drum rotation is transferred directly to the input pinion gear, which is in constant engagement with the cam gear. The pinion-to-cam gear combination reduces engine rpm by a ratio of 1:4.98.

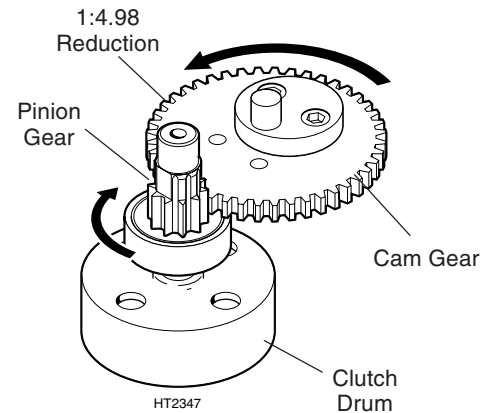


Figure 4. Reduction Gearing.

Cutter Drive

Figure 5

Each side of the cam gear is fitted with an eccentric lobe, and the two eccentrics are installed 180° opposite one another.

Each eccentric is also fitted with a connecting rod mounted on roller bearings, allowing cam gear rotation to be converted to a reciprocating action at the opposing or small end of each connecting rod.

Connecting rod thrust is in turn controlled by close-tolerances between the cam gear faces and a set of hardened guide plates that surround the small ends of the connecting rods, held between a set of hardened guide plates.

Via the connecting rods, cam rotation is converted into reciprocating motion to drive the cutting attachment.

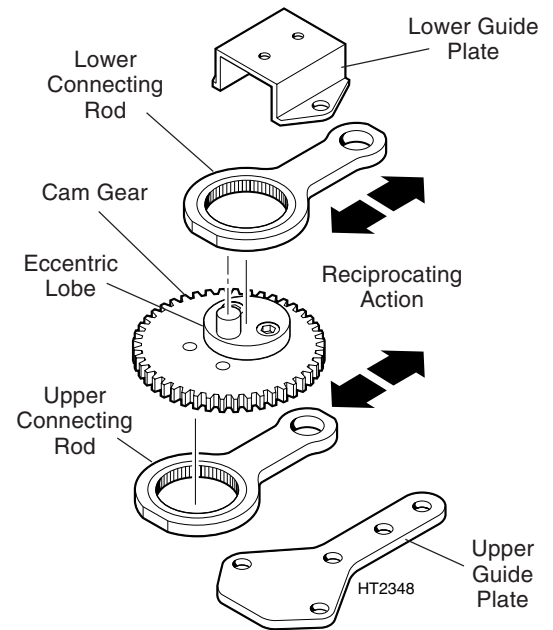


Figure 5. Cam Gear and Connecting Rods

Cutting Attachment

Figure 6

The reciprocating end of each connecting rod is bored to mate with a hardened drive stud at the inner end of each of the two parallel cutters, providing true "double action" performance.

To allow independent cutter movement, the individual cutters are slot-mounted over special shoulder bolts threaded into a stationary guide bar attached to the gearcase assembly.

Cutters are identified as "upper" and "lower", and are available with appropriate length guide bars to provide cutting swaths of varying widths.

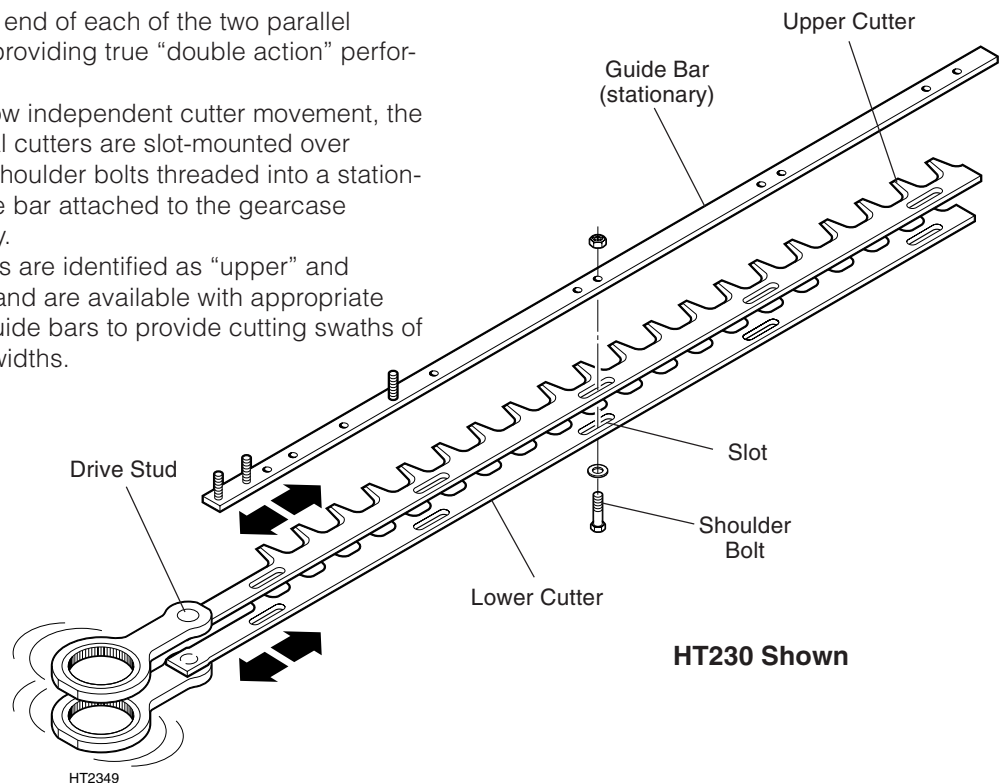


Figure 6. Cutter Drive Operation.

Section 4 Troubleshooting

Performance and durability are highly dependent upon cutter condition, adjustment, and lubrication.

For a truly “clean” cut, all cutters must be sharp, undistorted, and in otherwise good condition.

For consistent cutting action over the length of the cutter, all shoulder bolts must be in good condition and properly adjusted to maintain cutter-to-cutter contact.

IMPORTANT!

Beyond outright abuse, gearcase life and cutting performance are directly related to both maintenance and adjustment.

Problem	Possible Cause	Remedy
Poor cutting performance	Shoulder bolts too loose	Adjust bolts per Section 8
	Cutter teeth dull	Sharpen teeth per Section 8
Cutters not “tracking” (non-parallel operation)	Shoulder bolts loose or worn	Adjust or replace per Section 8
	Worn shoulder bolt slots	
Cutters not moving, or move very slowly (engine revs)	Clutch failure	Replace clutch shoe assembly
	Internal gear failure	Overhaul gearcase
Cutters will not disengage	Engine idle set too high.	Reset idle speed to 3000 ±250 rpm
	Clutch retraction spring is broken	Replace clutch assembly
One cutter not moving	Drive stud is broken	Replace cutter per Section 8
	Connecting rod failure	Replace connecting rod: inspect for internal gearcase damage
Cutters/engine revs slow; engine may overheat	Shoulder bolt(s) adjusted too tight	Readjust per Section 8
	Internal gearcase damage	Inspect/overhaul gearcase
Excessive noise from gearcase	Gear or connecting rod failure	Inspect/overhaul gearcase
Grease leaking from gearcase at guide bar	Gearcase too full	Section 9
	Felt seal damaged	Replace seal
	Cover gasket damaged	Replace gasket
Gearcase lube has white “milky” appearance	Water in gearcase (possible outside storage)	Drain and refill per Section 9

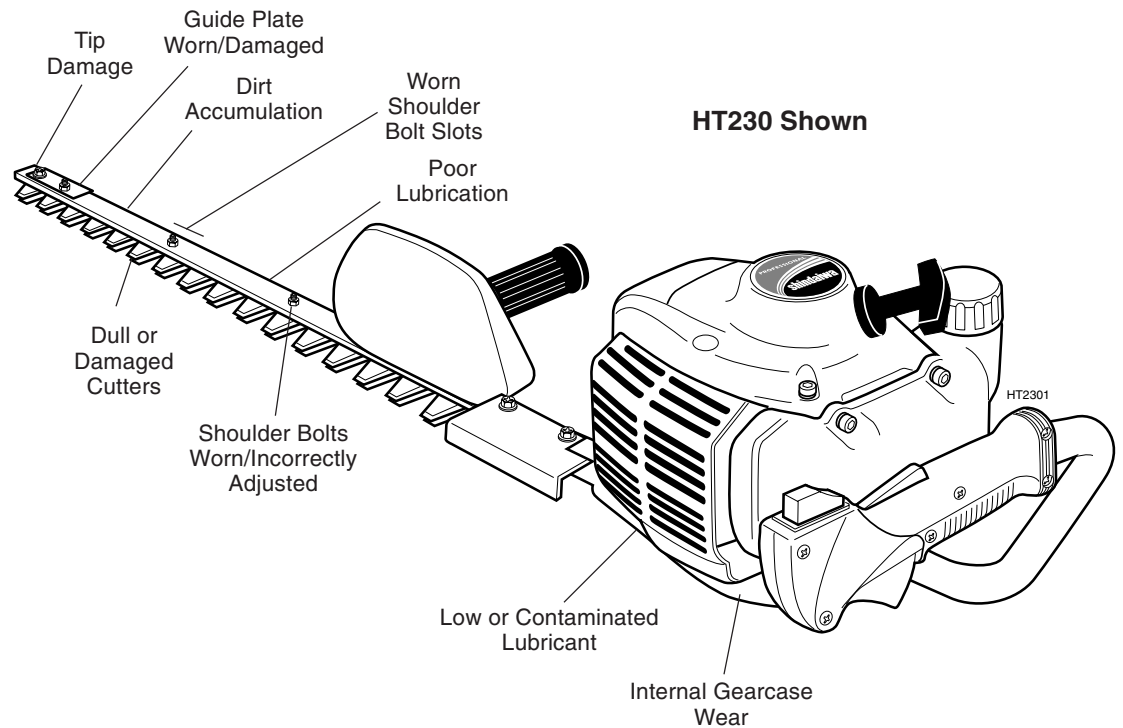


Figure 7. Common Causes of Cutter or Gearcase Problems

Section 5 Powerhead Removal

Powerhead Removal—HT230

IMPORTANT!

Service procedures for the HT230 DH230 powerhead are similar to those for the T230 trimmer and are described in *Shindaiwa Grass Trimmers, Brushcutters and Lawn Edgers Service Manual*, Form 60506.

CAUTION!

Impact-type power tools can damage the hedge trimmer drive assembly.

- STEP 1.** Disconnect the throttle cable end from the throttle lever on the carburetor (Figure 8).
- STEP 2.** Unplug the red ignition wire from the ignition wire connector, and then temporarily remove the gearcase mounting bolt to disconnect the black grounding wire (Figure 8).
- STEP 3.** Remove the three 6 mm x 16 mm gearcase mounting screws, and separate the gearcase assembly from the powerhead (Figure 9).
- STEP 4.** Remove the two 6mm x 35mm rear handle bracket mounting screws, and lift the rear handle assembly from the gearcase (Figure 9).

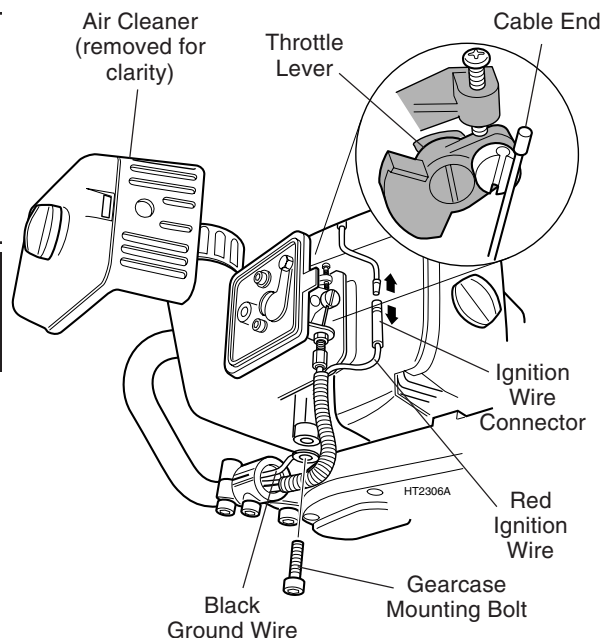


Figure 8. Disconnecting the throttle cable and ignition wiring

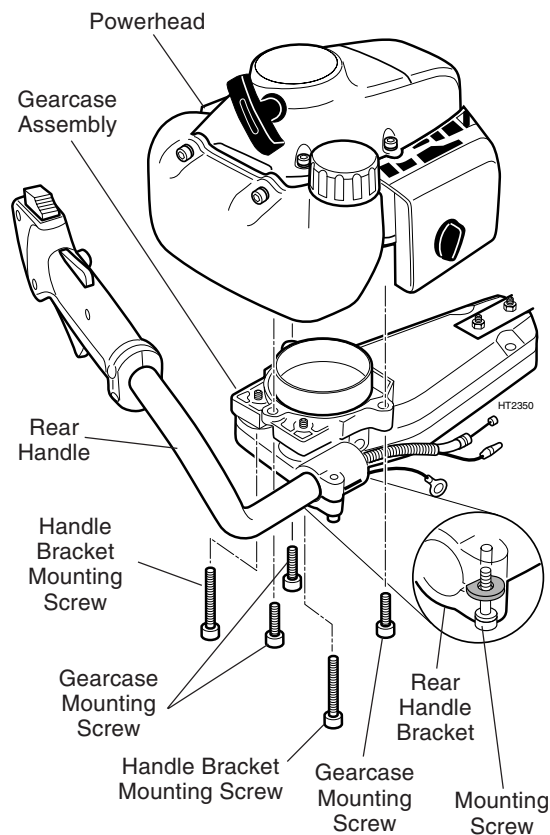


Figure 9. Removing the Gearcase Assembly and Rear Handle Bracket

Powerhead Removal—DH230

- STEP 1.** Disconnect the throttle cable end from the throttle lever on the carburetor (Figure 10).
- STEP 2.** Unplug the red ignition wire from the ignition wire connector (Figure 10).
- STEP 3.** Remove the three 6 mm x 16 mm gearcase mounting screws, and lift off the powerhead assembly from the gearcase (Figure 11).

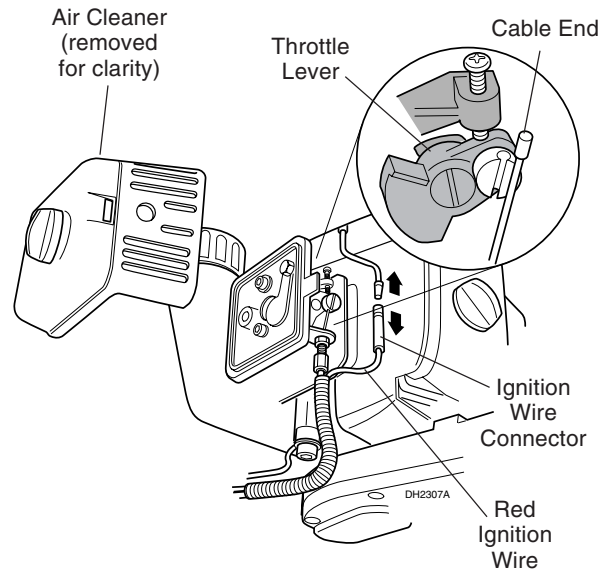


Figure 10. Disconnecting the Throttle Cable.

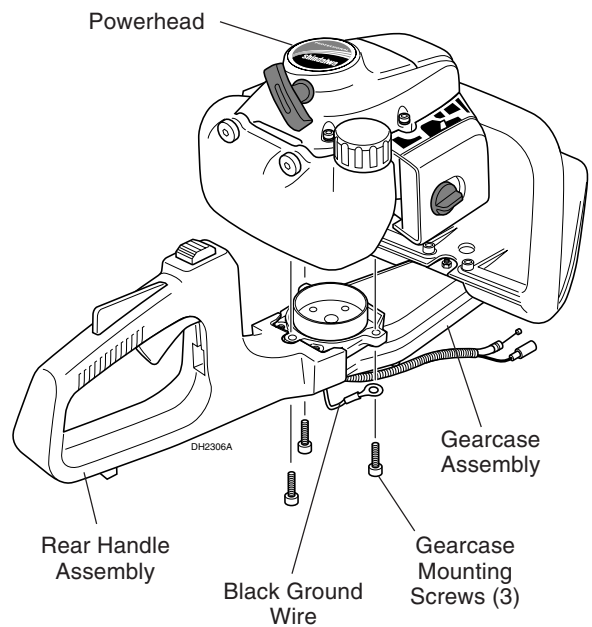


Figure 11. Removing the Powerhead Assembly from the Gearcase Assembly

Section 6 Gearcase Disassembly

Cutter Removal

STEP 1. With the gearcase oriented right-side up, remove the cutter support bracket (Figure 12):

- Remove the two 6mm bracket retaining nuts from where the guide bar studs emerge from the gearcase.

- Remove the single 6mm nut and washer from the shoulder bolt at the outer end of the holder bracket, and then lift the bracket from over the guide bar studs.

STEP 2. Working from the bottom of the gearcase, remove the six 4mm x 15mm gearcase cover screws and then remove the gearcase cover from the gearcase assembly (Figure 13).

STEP 3. Lift out the felt grease seal. Unscrew the two 6mm x 12mm guide plate retaining screws, and then remove the lower guide plate (Figure 14).

STEP 4. Remove and retain the thrust washer from the cam gear (Figure 14).

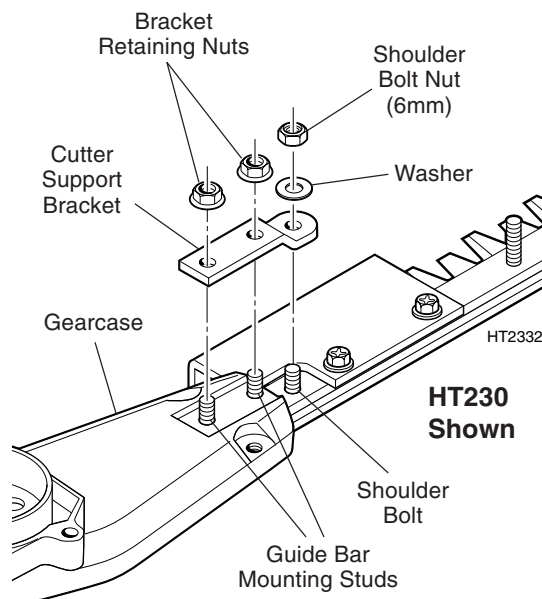


Figure 12. Removing the cutter support bracket.

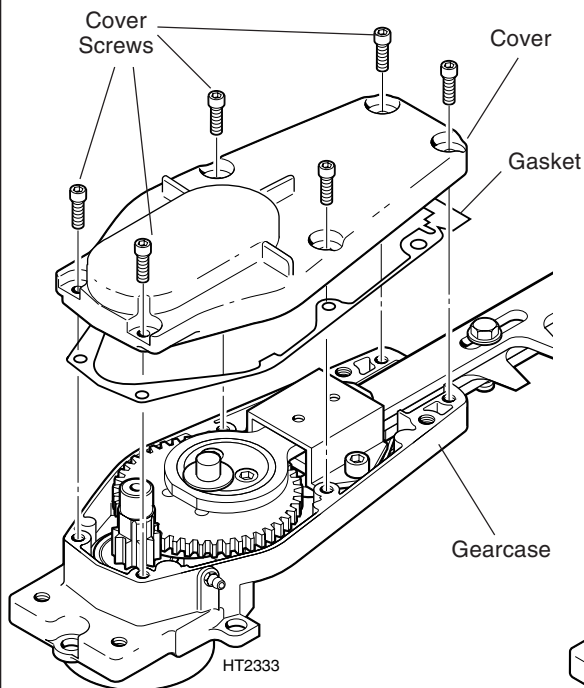


Figure 13. Removing the gearcase cover.

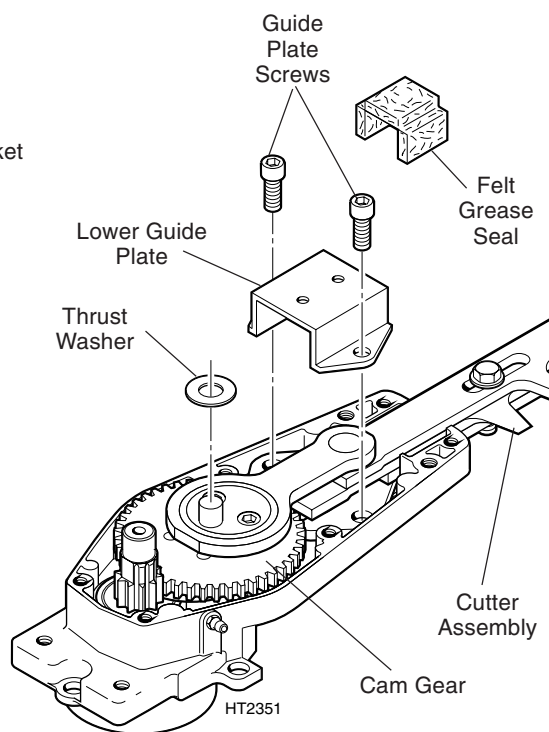


Figure 14. Grease seal and lower guide plate removal.

Cutter Removal continued

STEP 5. Gently lift the lower con-rod from the cam gear. **Be extremely careful not to dislodge the roller bearings from the large end of the connecting rod.** All 52 bearing rollers must be accounted for! (Figure 15)

IMPORTANT!

If the connecting rod is to be reused, mark it now for correct orientation on reassembly.

STEP 6. Remove the cutters and guide bar as an assembly (Figure 15).

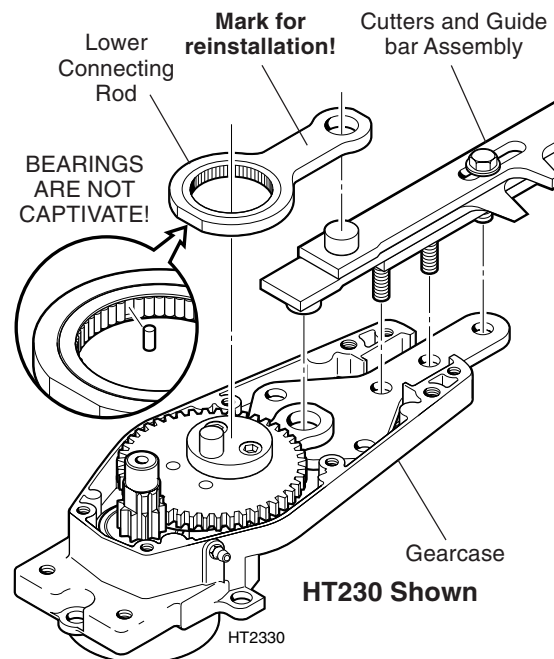


Figure 15. Removing the upper con-rod and cutters and guide bar assembly.

Removing the Clutch Drum and Pinion Shaft

Figure 16

STEP 1. Temporarily lock the pinion shaft by placing a 10mm open-end wrench over the two flats at the inboard end of the shaft.

STEP 2. Insert tool p/n 99909-20230 into the clutch drum bore, and engage the two pins on the tool with the matching holes in the clutch drum.

STEP 3. While using a firm grip to hold the 10 mm wrench, loosen and remove the clutch drum in a clockwise rotation. If necessary, use a heat gun to soften the ThreeBond™ thread adhesive on the clutch drum threads.

CAUTION!

Do not overheat the clutch drum and pinion shaft. Excessive heat can damage the pinion shaft bearings.

STEP 4. Use a plastic or wooden mallet to remove the pinion shaft from the gearcase casting.

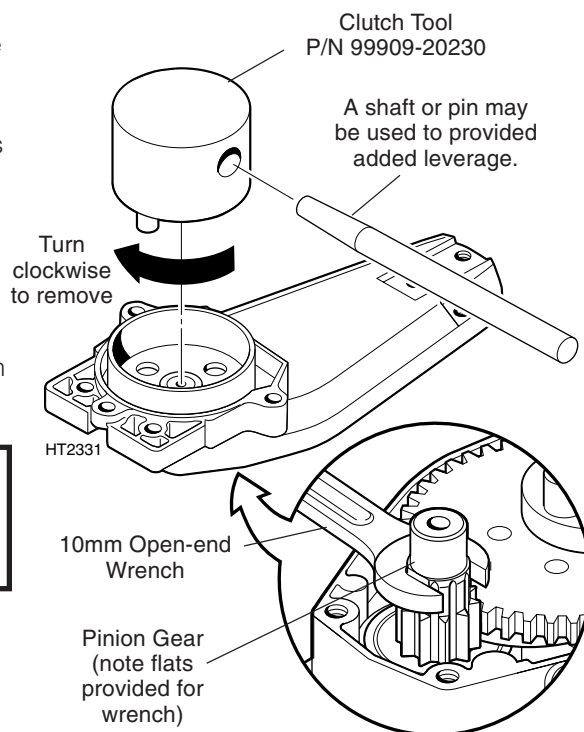


Figure 16. Removing the clutch drum.

Section 6 Gearcase Disassembly

Removing the Cam Gear and Upper Con-rod

Figure 17

STEP 1. Gently lift the cam gear and upper connecting rod from the gearcase. If the connecting rod is to be reused, mark it now for correct orientation on reassembly.

STEP 2. Remove the upper connecting rod thrust washer from the gearcase.

IMPORTANT!

Careless handling will dislodge the connecting rod bearings. The connecting rod roller bearings are loose in the connecting rod large end, and are easily lost.

STEP 3. Remove the upper guide plate from the gearcase.

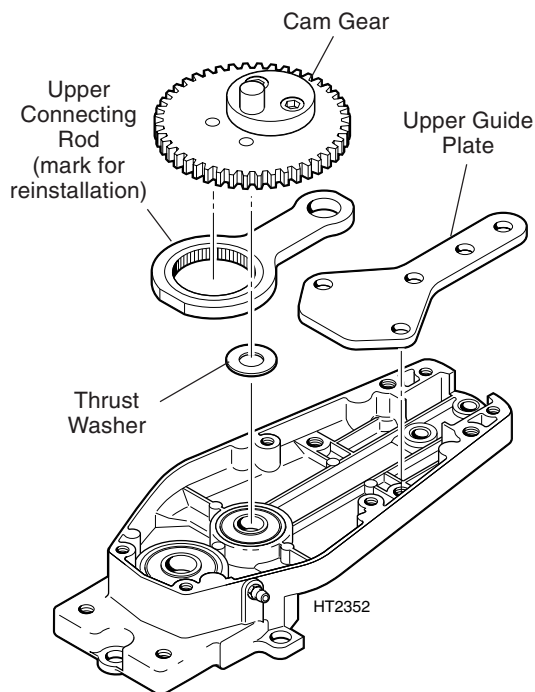


Figure 17. Removing the cam gear and upper con-rod

Bearing Removal

IMPORTANT!

Gearcase bearing bores can be damaged by improper bearing removal techniques. If a bearing puller must be used, be extremely careful not to “cock” bearings during removal.

STEP 1. Use a heat gun or similar appliance to warm the gearcase cover bearing bores to approximately 212°F (100°C), and then remove the two cover bearings by tapping the cover face down sharply against a flat wooden surface (Figure 18).

STEP 2. Use a bearing puller equipped with reversible jaws and a slide-hammer to remove the cam bearing and the clutch drum bearing from the gearcase housing (Figure 19).

The gearcase should now be completely disassembled

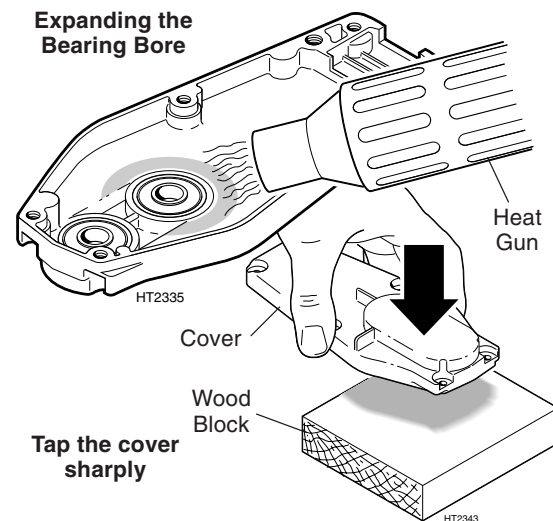


Figure 18. Removing gearcase-cover bearings.

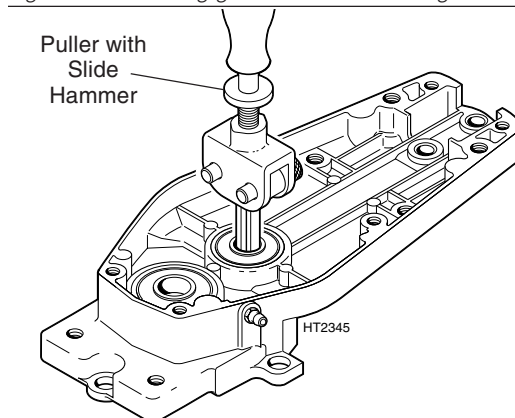


Figure 19. Using a bearing puller.

Cleanup and Inspection

Figure 20

Prior to inspection, use a solvent bath to thoroughly clean all components except the connecting rods, and then wipe or blow dry with compressed air. Connecting rods can also be cleaned with solvent, provided that all big-end bearing rollers (52 rollers per connecting rod) are accounted for after cleaning.

1. Inspect the gearcase housing and cover castings for obvious cracks, distortion, or damage to the bearing bores or cover sealing flanges, and discard if noted. Check the gearcase casting for stripped or otherwise damaged threaded areas, and discard if unrepairable.
2. Visually inspect all bearings for physical damage, especially to protective covers on sealed or shielded bearings, and discard if found. Spin all bearings by hand, and discard any bearing that feels rough, loose, or is otherwise difficult to spin.
3. Examine both the pinion and cam gears for excessive wear or obvious damage such as chipped or missing teeth, and replace if

found. Be especially alert for damage to the threaded end on the pinion gear, and also to any pitting or other damage to the connecting rod drive lobes on the cam gear.

4. Inspect the clutch drum for cracks, distortion, or damage to the hub area, and replace if noted.
5. Use a strong lens to inspect the connecting rod roller bearings for damage such as chipping or pitting. Inspect the connecting rod small-end bore for damage or out-of-round; and the sides for signs of excessive friction. Any damage or excessive wear to either the connecting rod or roller bearings requires connecting rod replacement as a complete assembly.
6. Inspect the working surfaces of both guide plates, and replace if any damage or measurable wear is noted.

Cutter inspection is described in Section 8, *Cutters*.

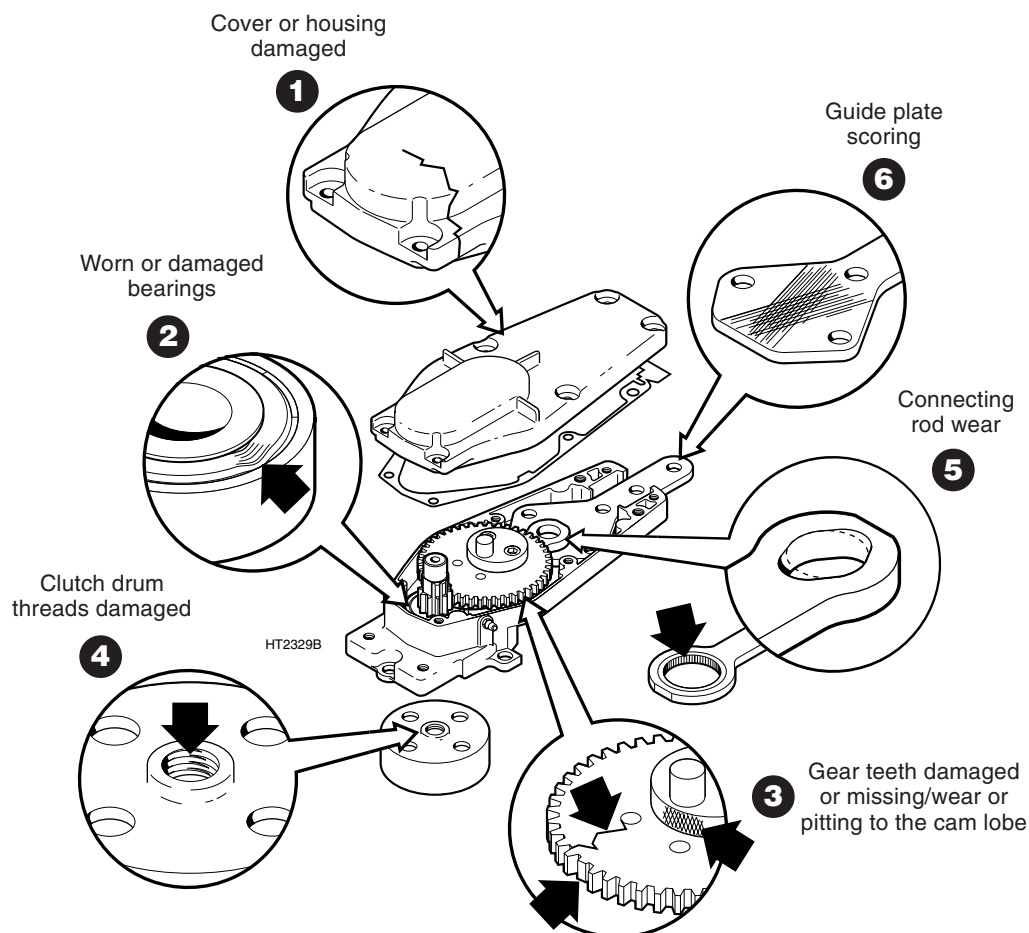


Figure 20. Inspecting gearcase components.

Section 7 Gearcase Reassembly

Reassembly

Reassembly is basically the reverse of assembly, with the additions or exceptions as noted below. Note also that torque specifications have been listed for several key areas.

CAUTION!

The hedge trimmer can be damaged by overtightening of fasteners. For a complete listing of recommended torque specifications, see the Appendix.

Bearing Installations (Figure 21)

Shindaiwa recommends expanding each bearing bore with a heat gun or other appliance set to preheat the bore to approx. 100°C (212°F). Individual bearings can then be easily positioned by hand without the risk of damage to the bearing bore. Note that hammering or pounding bearings in place can damage both bearings and bearing bores, and is not recommended.

Connecting Rods (Figure 22)

- During connecting rod installation, be extremely careful not to dislodge the individual rollers from their bearing races.
- If the original connecting rods are being reused, be sure to reinstall each connecting rod in the same location and orientation as removed.
- Install the upper and lower thrust washers in the reverse order of removal.

Guide Bar

Install the guide bar assembly in the reverse order of removal, and firmly tighten all fasteners. If a torque wrench is available, torque both of the guide bar mounting stud nuts and also the two guide plate screws to 50-70kgf-cm.

- Install a new felt seal p/n 20870-61630 during assembly (Figure 23).
- Lubricate and adjust all shoulder bolts as described in Section 9 of this manual.

IMPORTANT!

The gearcase assembly contains both shielded and sealed bearings! The clutch-side bearing on the pinion shaft must be a sealed-type bearing, or grease may enter the clutch area.

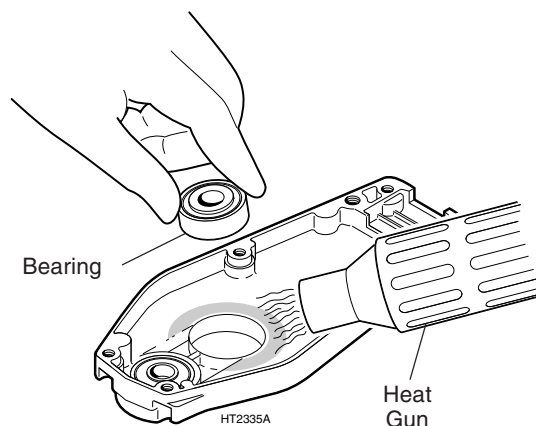
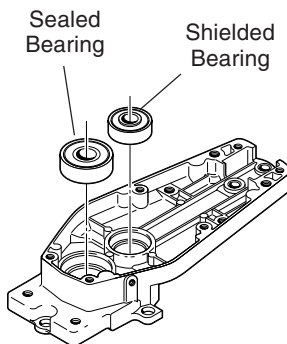


Figure 21. Bearing Installation.

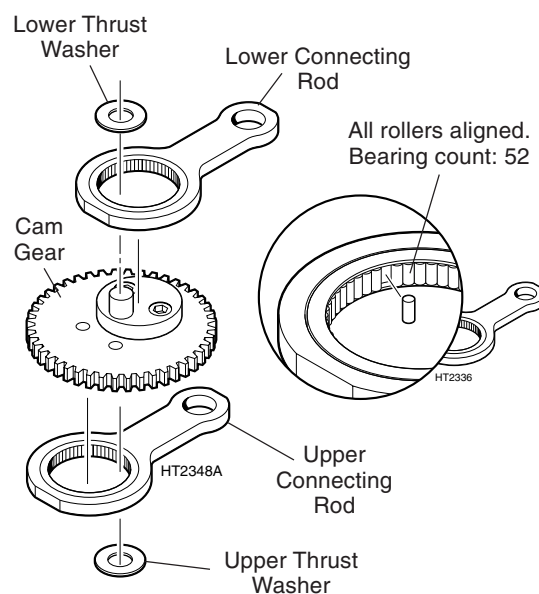


Figure 22. Reinstall connecting rods in original location and orientation.

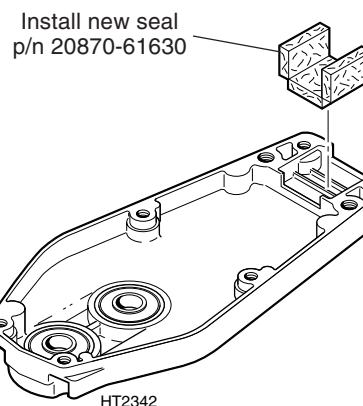


Figure 23. Install a new felt grease seal.

Reassembly Procedures

Clutch Drum Installation

STEP 1. Apply several drops of ThreeBond™ p/n 13-60 thread adhesive to the pinion gear threads, and then install the clutch drum in a counter-clockwise rotation (Figure 24).

STEP 2. Temporarily lock the pinion shaft by placing a 10mm open-end wrench over the two flats at the inboard end of the shaft.

STEP 3. Use tool p/n 99909-20230 to tighten the drum firmly on the shaft (Figure 25).

STEP 4. If a torque wrench is available, final-tighten the clutch drum to 170-190kgf-cm.

Lubrication and Inspection (Figure 26)

Prior to gearcase cover installation, hand-pack the gearcase to approx. 50-70% capacity with Shindaiwa p/n 37-57 Gearcase Lube or equivalent high quality lithium-based grease (see Section 9).

Install the gearcase cover, and rotate the clutch drum by hand to check for internal binding. If noted, any binding or other such problems must be corrected before the gearcase can be returned to service.

Installation and Adjustments

- Install the gearcase and rear handle on the powerhead in the reverse order of removal, and firmly tighten the three gearcase-to-powerhead mounting screws. If a torque wrench is available, final-tighten the gearcase mounting screws to 70-100 kgf-cm.
- Confirm correct throttle cable adjustment by measuring throttle lever "free-play" of 0.010-0.020". If necessary, turn the cable adjustment fitting on the carburetor in or out until throttle free-play is within the above specifications.

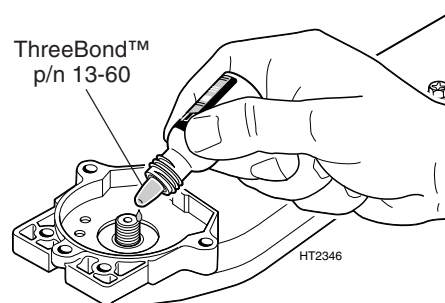


Figure 24. Applying thread adhesive to the pinion gear threads.

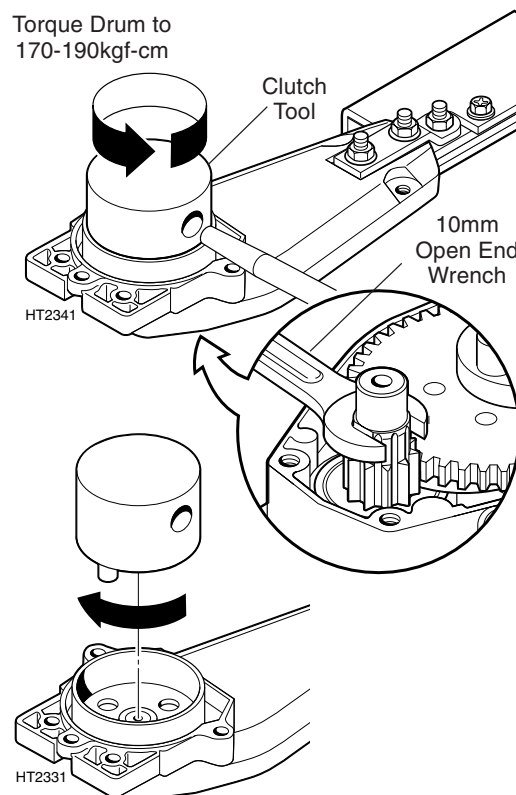


Figure 25. Tightening the clutch drum.

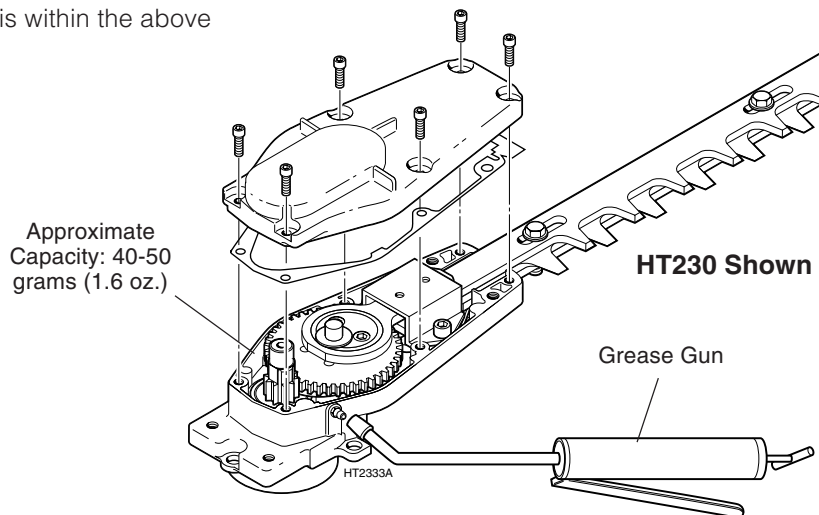


Figure 26. Lubricating the gearcase.

Section 8 Cutter Service

Cutter Disassembly—HT230

Remove the cutter assembly from the gear-case as described in Section 5.

Removing the Front Handle

STEP 1. Remove the 6mm nut and washer from the hand guard stud, remove the shoulder-bolt nut and washer, and then lift the hand guard assembly from the guide bar (Figure 27).

STEP 2. If the hand grip is to be replaced, use a sharp knife to cut the grip lengthwise before peeling it from the guard.

STEP 3. Remove the two protector mounting screws and washers, and then lift the protector from the guide bar (Figure 28).

Removing the Guide Plate (Figure 29)

STEP 1. Remove the 5 mm x 8 mm screw at the outboard end of the guide plate.

STEP 2. Working at the inboard end of the guide plate, remove the shoulder bolt lock nut and then unscrew and remove the shoulder bolt.

STEP 3. Slide the guide plate from the end of the cutter assembly.

Removing the Cutters (Figure 30)

STEP 1. Loosen and remove each of the remaining shoulder bolt lock nuts.

STEP 2. Unscrew all remaining shoulder bolts from the guide bar, and remove the single flat washer from beneath each shoulder bolt head. Note the use and location of three different shoulder bolt lengths on the HT230.

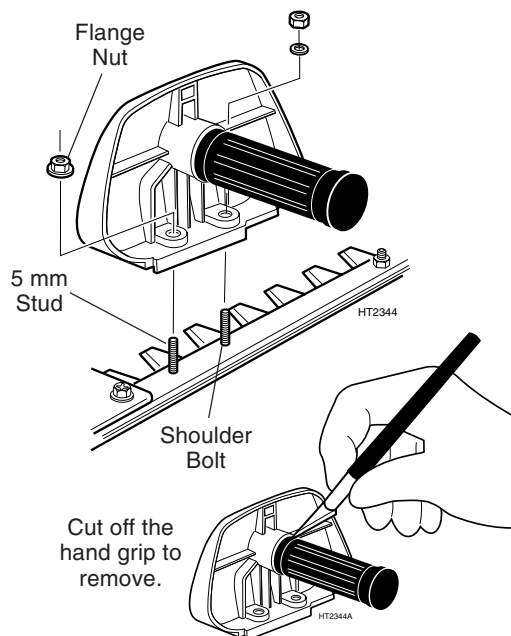


Figure 27. Removing the Front Handle and Shield.

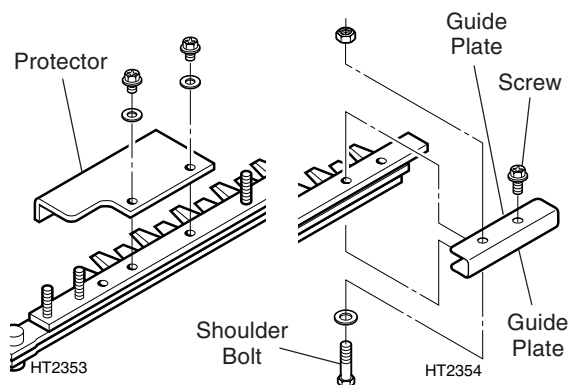


Figure 28. Removing the Protector.

Figure 29. Removing the Guide Plate.

The cutter assembly should now be completely disassembled.

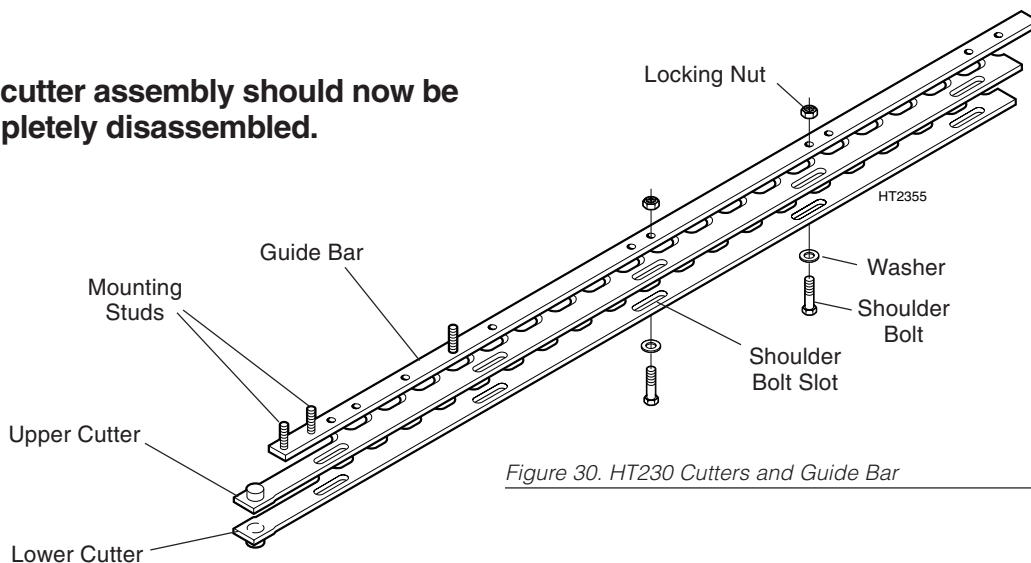


Figure 30. HT230 Cutters and Guide Bar

Cutter Disassembly— HT230

Remove the cutter assembly from the gear-case as described in Section 5.

Removing the Front Handle

STEP 1. Remove the two 6 mm x 35 mm socket head capscrews securing the front handle (Figure 31).

STEP 2. Remove the front handle.

Removing the Cutters (Figure 32)

STEP 1. Loosen and remove each of the shoulder bolt lock nuts.

STEP 2. Unscrew all shoulder bolts from the guide bar, and remove the single flat washer from beneath each shoulder bolt head (Figure 32).

The cutter assembly should now be completely disassembled.

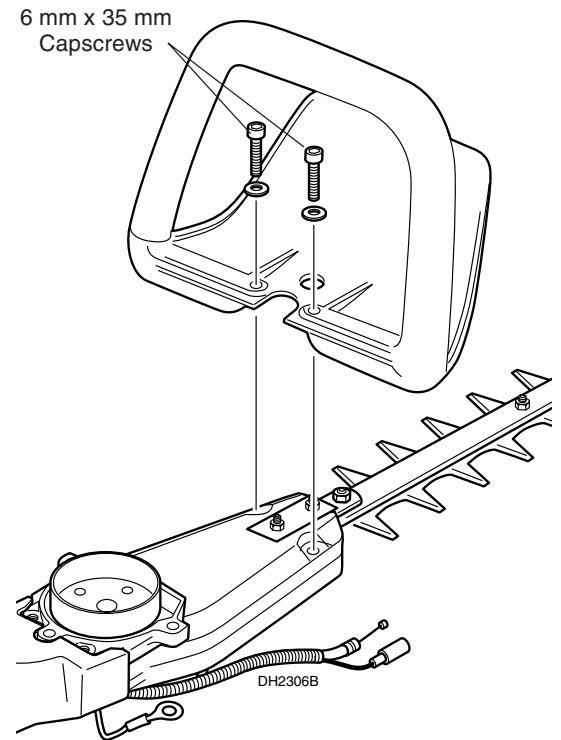


Figure 31. Removing the Front Handle and Shield.

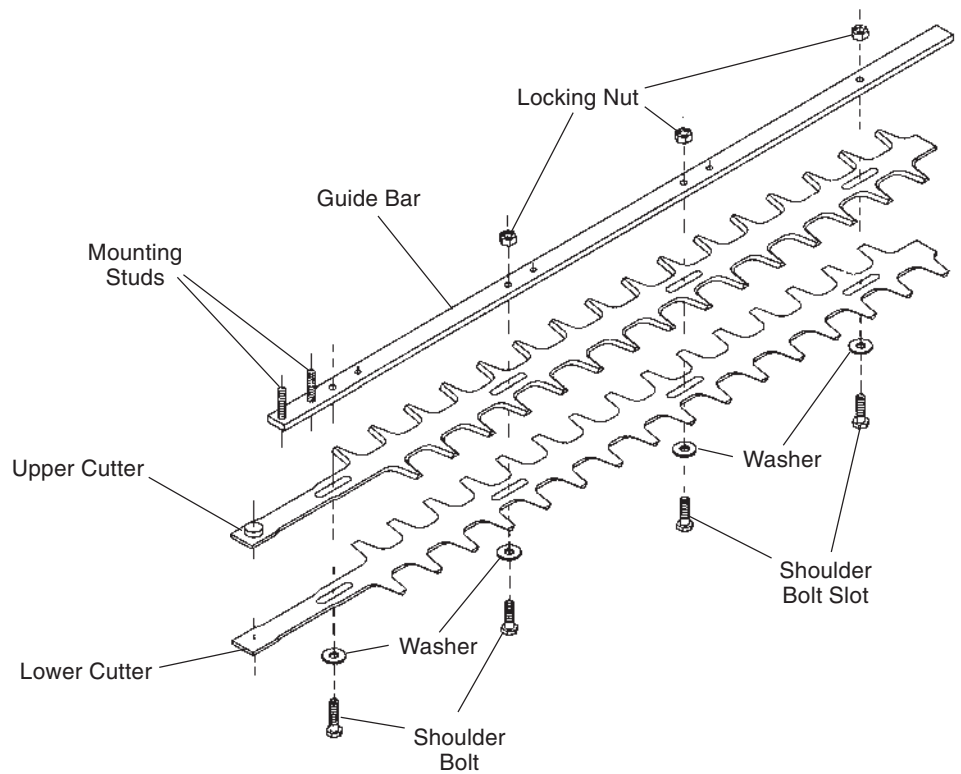


Figure 32. DH230 Cutters and Guide Bar

Section 8 Cutter Service

Inspecting the Cutter and Guide Bar

Figure 33

STEP 1. Check the drive pin at the inboard end of each cutter. A loose, missing, or otherwise damaged drive pin cannot be repaired. Where noted, such damage requires cutter replacement.

- Damaged drive pins are most often the result of allowing the moving blade tips to impact against a wall or sidewalk during operation, but can also be caused by incorrect shoulder bolt adjustment.

STEP 2. Visually inspect the blade slots for signs of damage or unusual wear, and then test-fit a new shoulder bolt in each slot. Any of the following are cause for rejecting a cutter:

- Slot sides are irregular (nonparallel), indicating operation with worn shoulder bolts.
- Galling between blade and shoulder bolt head. Usually indicates poor lubrication, possibly combined with overtightening shoulder bolts.
- Loss of blade thickness; blade slot appears "dished" when viewed from edge. Indicates poor lubrication, dirty operating conditions.

STEP 3. Visually inspect the inner working surfaces of the guide plate. If evidence of galling or grooving are noted, the plate must be replaced.

STEP 4. Inspect individual cutter teeth for signs of damage, distortion, or unusual wear. Any cutter showing wear or damage such that repairs would require significant reshaping of the cutter is cause for rejection.

STEP 5. Examine the shoulder bolts, and reject any bolt with visible body wear or damage to its head or threaded areas.

IMPORTANT!

Cutter performance and service life are directly related to shoulder bolt lubrication and adjustment.

STEP 6. Visually inspect the guide bar for damage, unusual wear, or distortion. Any of the following are cause for rejection:

- Bending or twisting (check against straightedge).
- Damage to the mounting stud shanks or threads.
- Stripped or otherwise damaged shoulder bolt mounting threads.

STEP 7. Inspect the front hand grip and guard assembly. The rubber hand grip can be serviced as a separate part number; damage to the guard requires replacing both components as an assembly.

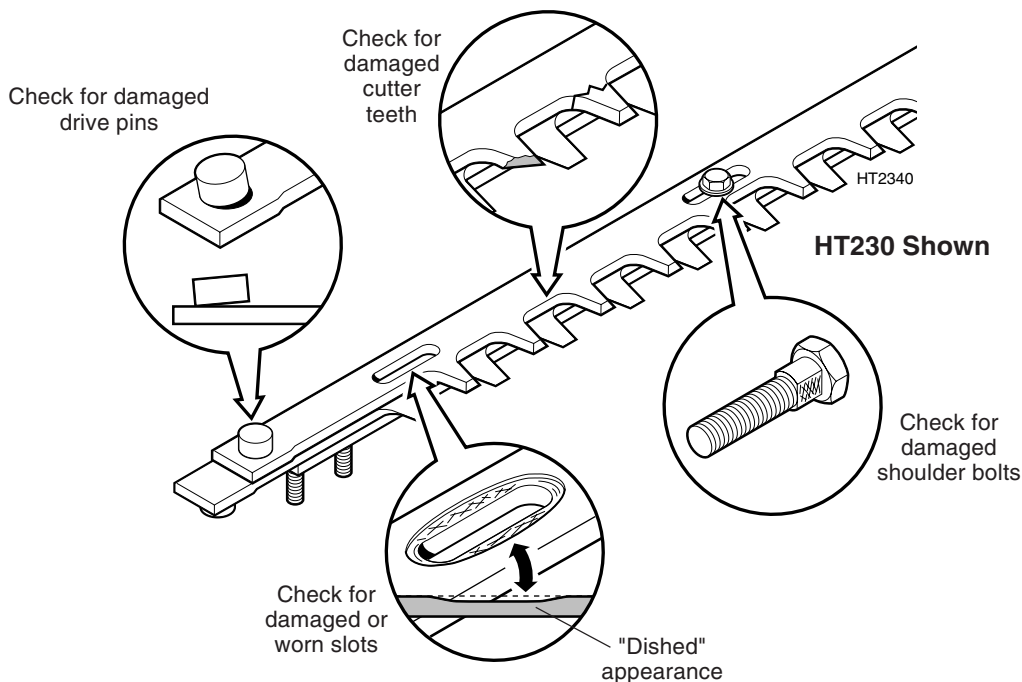


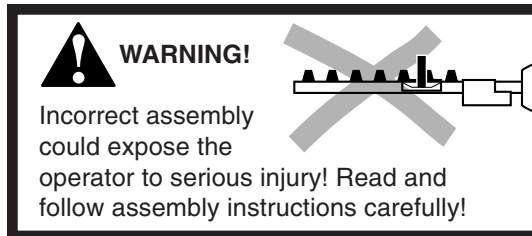
Figure 33. Inspecting the cutter and guide bar (shown inverted).

Reassembling the Cutter and Guide Bar—HT230

Figure 34

IMPORTANT!

Unless the cutters are being replaced with new or reconditioned components, all cutting teeth should be sharpened before reassembly. For recommended sharpening procedures, please see Section 9.



STEP 1. Lightly lubricate both the cutters and the guide bar with clean oil, and then assemble all three components as shown. Install—but do not tighten—a flat washer and the appropriate length shoulder bolt in each guide bar slot except the slot beneath the guide plate. The 6 mm x 20 mm guide plate shoulder bolt should now be loosely installed, but without a washer. Finally, install and firmly tighten the 5 x 8mm hex bolt through the remaining hole in the guide plate.

STEP 2. Install the front handle assembly over its mounting stud and shoulder bolt.

■ Install a flat washer and nut over the front handle mounting stud, and tighten the nut securely.

■ Install a flat washer and a new shoulder bolt locknut over the shoulder bolt at the hand grip, but do not tighten the nut at this time.

STEP 3. Install the protector and holder support bracket over the innermost shoulder bolt, and loosely secure the assembly with a spring washer and shoulder bolt locknut. Install and firmly tighten the 5 mm x 8 mm screw through the remaining protector mounting hole.

STEP 4. Loosely install a new locknut over each of the remaining shoulder bolts.

STEP 5. Install the guide bar and cutter assembly on the hedge trimmer in the reverse order of removal.

STEP 6. Adjust all shoulder bolts as described in Section 9, "Gearcase and Cutter Maintenance".

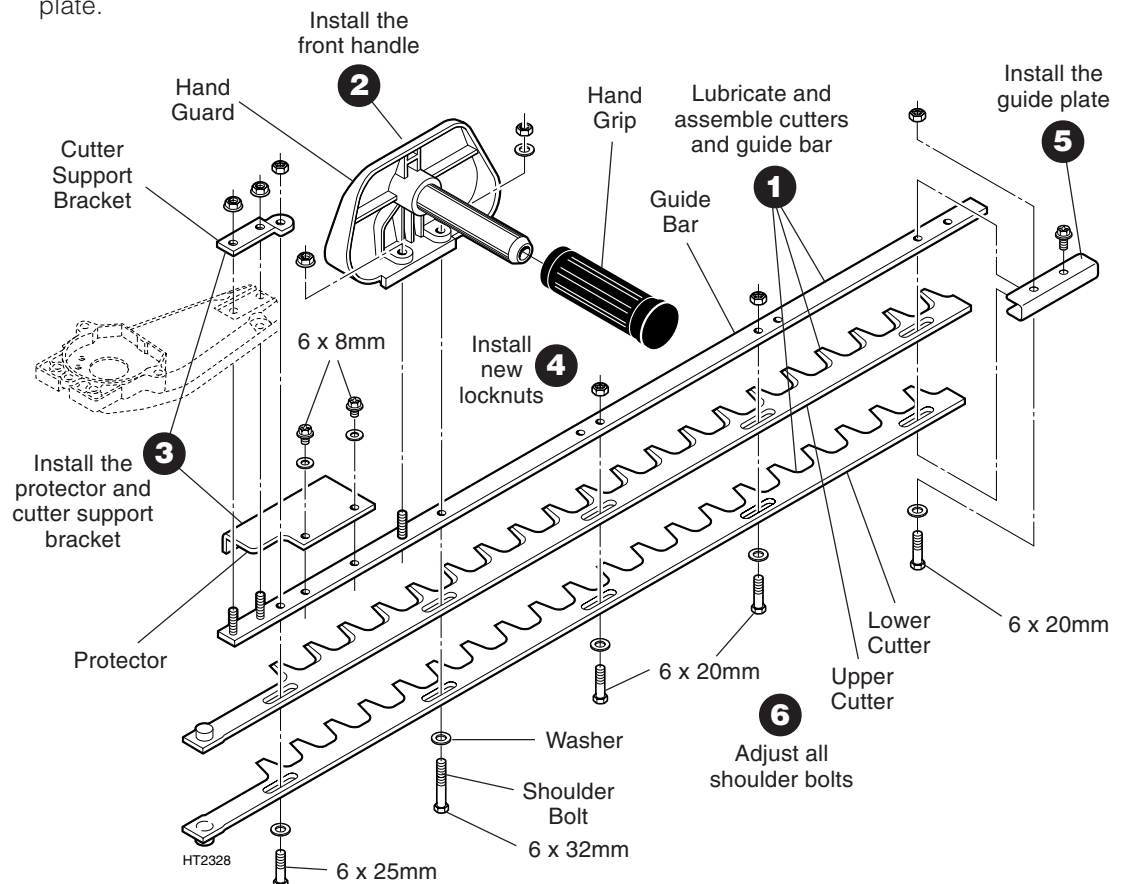


Figure 34. Reassembling the HT230 Cutter and Guide Bar.

Section 8 Cutter Service

Reassembling the Cutter and Guide Bar—HT230

Figure 34

IMPORTANT!

Unless the cutters are being replaced with new or reconditioned components, all cutting teeth should be sharpened before reassembly. For recommended sharpening procedures, please see Section 9.



WARNING!

Incorrect assembly could expose the operator to serious injury! Read and follow assembly instructions carefully!

STEP 1. Lightly lubricate both the cutters and the guide bar with clean oil, and then assemble all three components as shown. Install—but do not tighten—a flat washer and the appropriate length shoulder bolt in each guide bar slots.

STEP 2. Install the holder support bracket over the innermost shoulder bolt, and loosely secure the assembly with a spring washer and shoulder bolt locknut.

STEP 3. Loosely install a new locknut over each of the remaining shoulder bolts.

STEP 4. Install the guide bar and cutter assembly on the hedge trimmer in the reverse order of removal.

STEP 5. Adjust all shoulder bolts as described in Section 9, "Gearcase and Cutter Maintenance".

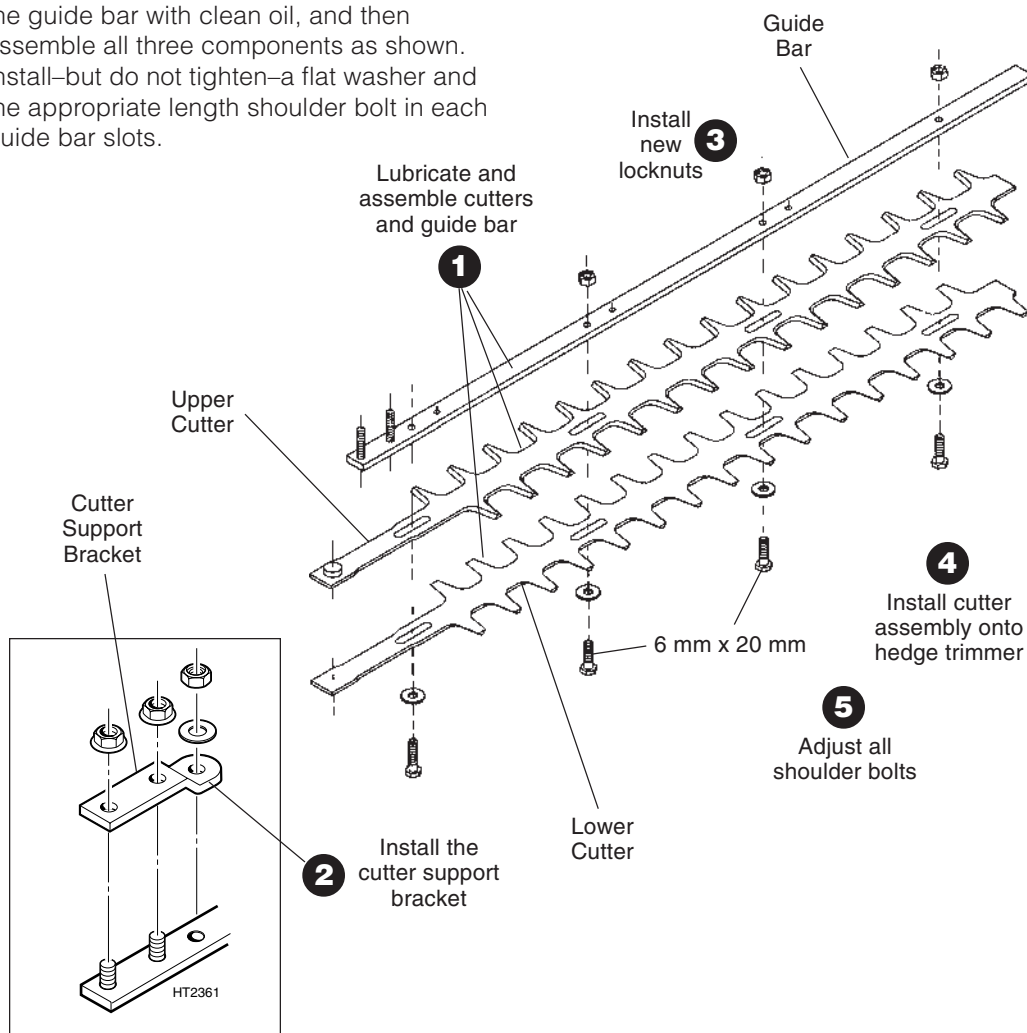


Figure 35. Reassembling the DH230 Cutter and Guide Bar.

Sharpening the Cutters

Figure 36

A sharp and properly adjusted cutting assembly should produce a clean, chisel-like cut. A dull or improperly adjusted assembly tends to produce a rougher, shredding-type cut, and also places additional demands on both the operator and the machine.

Frequent touch-up of the cutter edges can be accomplished without disassembling the machine, and requires the use of grinding stones to dress the cutter edges as described in Steps 3 and 4 (below). Where one or more cutter teeth have suffered repairable damage, however, Shindaiwa recommends the following procedure for resharpener the cutter assembly:

STEP 1. Remove the guide bar and cutter assembly from the trimmer (Section 5).

STEP 2. Remove the upper and lower cutters from the guide bar (Section 8). Repair or replace any worn or damaged components as described in "Cutter and Guide Bar Inspection."

STEP 3. Use a rough grinding stone held at the angle shown (45°, HT230; 43°, DH230) to remove damage and restore the original bevel to the cutter edges. Use care to maintain the original shape and angle of the cutter teeth (Figure 37).

STEP 4. HT230 ONLY. Use a rough grinding stone held at a 35° angle to restore the original bevel to the cutter tips (Figure 38).

STEP 5. Use a fine oil stone to smooth the edges produced in Steps 3 and 4.

STEP 6. Turn the cutter over, and use a fine oil stone held flat to remove any burrs from the bottom faces of the individual cutter teeth (Figure 39).

STEP 7. Lightly oil the upper cutters and guide bar. Reassemble the guide bar and cutters (Section 8), but do not tighten the shoulder bolts or locknuts at this time.

STEP 8. Reinstall the cutter assembly on the hedge trimmer (Section 5).

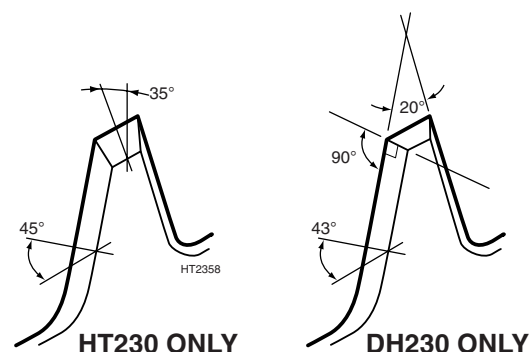


Figure 36. Sharpening angles.

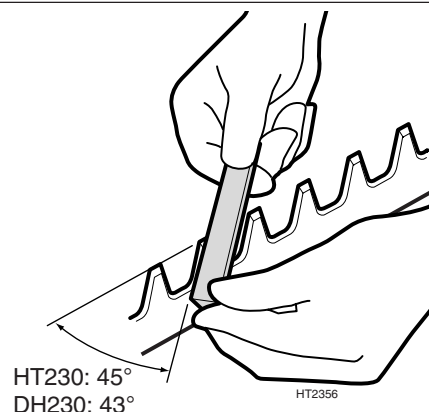


Figure 37. Grinding and sharpening the cutter bevels.

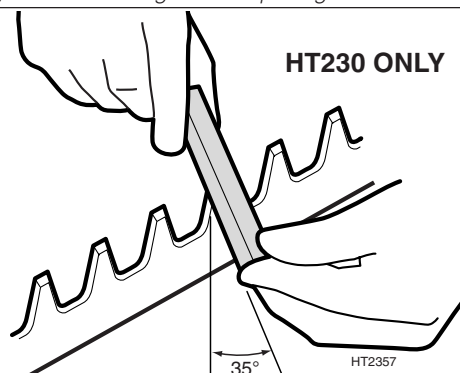


Figure 38. Beveling the cutter tips.

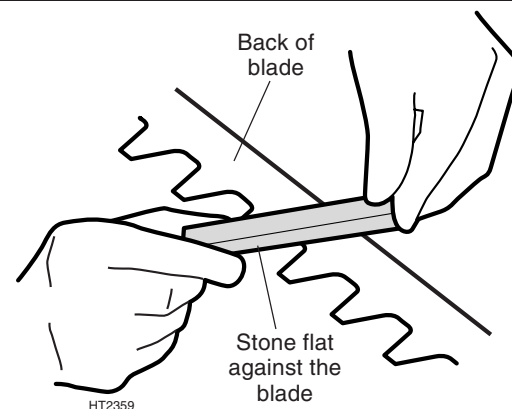


Figure 39. Removing burrs.

Section 9 Cutter and Gearcase Maintenance

Shoulder Bolt Adjustment

Figure 40

STEP 1. Loosen all shoulder bolt locknuts (at least one full turn each).

STEP 2. Tighten all shoulder bolts firmly, and then loosen each shoulder bolt approximately 1/4-1/2 turn.

STEP 3. Working from the powerhead, lock each shoulder bolt in place by firmly tightening its locknut while preventing the shoulder bolt from turning.

STEP 4. Shoulder bolt adjustment is correct when there is (approximately) a 0.025–0.050mm gap between the cutter faces and the shoulder bolt washer can be freely rotated by hand.

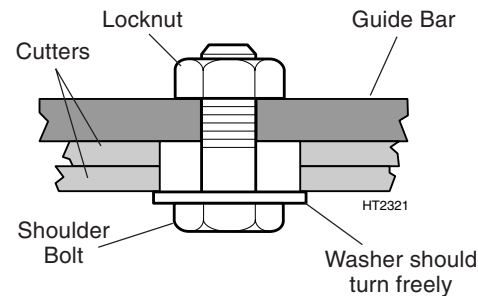


Figure 40. Adjusting Shoulder Bolts.

Daily Cutter Maintenance

Figure 41

Daily Maintenance (cutters only)

A dull or poorly adjusted cutting assembly requires additional operator effort, and places additional demands on the hedge trimmer gearcase and powerhead. For maximum cutter performance and service life:

STEP 1. Adjust shoulder bolts daily, and replace when visible wear is detected.

STEP 2. Lubricate cutters and guide bar frequently during operation.

- Clean 30-weight oil is recommended
- Some biodegradable oils can help reduce “brownout” caused by excess lubricant on delicate shrubbery.

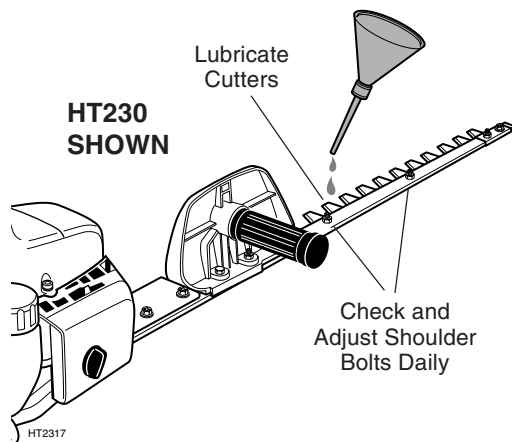


Figure 41. Lubricating the Cutters and Guide Bar.

Gearcase Maintenance

Every 20 Operating Hours (Figure 42)

- Top off gearcase grease level by using a lever-type grease gun to force 1-2 strokes of high quality lithium-based grease through the gearcase grease fitting.

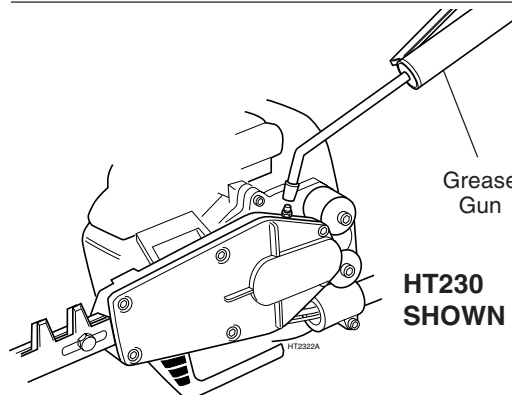


Figure 42. Adding Grease with a Grease Gun.

Every 100 operating hours/before long-term storage (Figure 43)

STEP 1. Remove the gearcase cover, and use solvent and a soft brush to remove all old grease from the gearcase.

STEP 2. Hand-pack the gearcase with approx. 40-50 grams (about 1.6 oz.) of high quality lithium-based grease to about 50-70% of capacity. DO NOT OVERFILL!

IMPORTANT!

Over-lubrication could cause the gearcase to run slower (and hotter) than normal. In addition, over-lubrication could cause excess grease to leak past the felt seal in the gearcase.

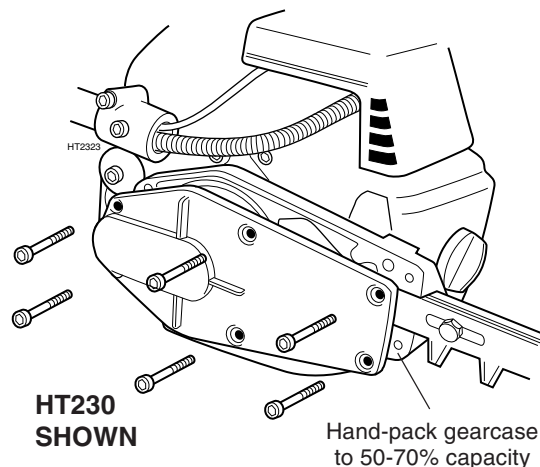
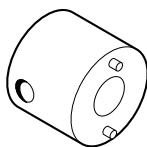
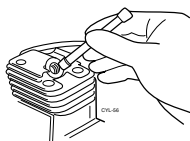


Figure 43. Hand-packing the gearcase.

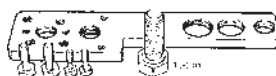
Special and Recommended Tools



Clutch Drum Spanner
p/n 99909-20230



Piston Stop (nylon)
p/n 22155-96240



Puller Assembly
p/n 20000-96104



T-Wrench (allen type)
p/n 22155-96521 (3mm)
p/n 22155-96531 (4mm)
p/n 22155-96540 (5mm)

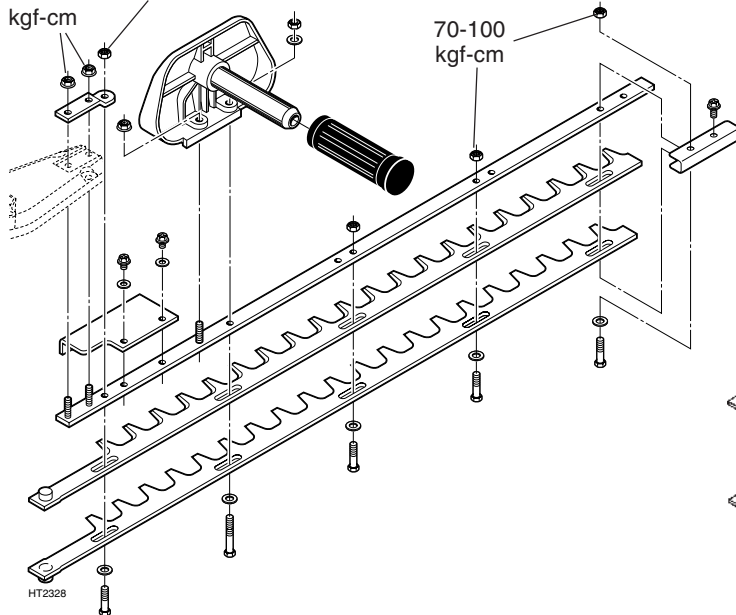


ThreeBond™ Thread Sealant
p/n 13-60

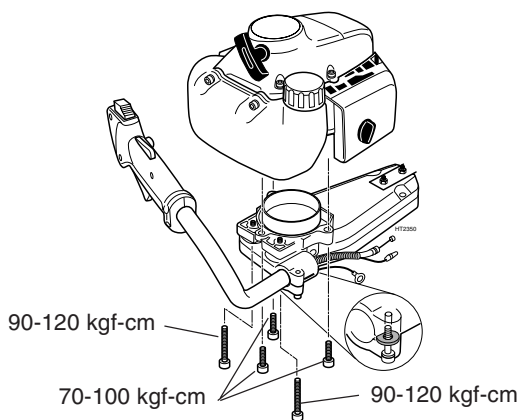
Figure 44. Special tools recommended for servicing the Shindaiwa HT230 and DH230 Hedge Trimmer.

Torque Values

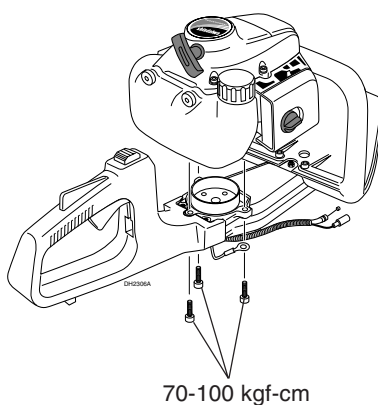
50-70 kgf-cm



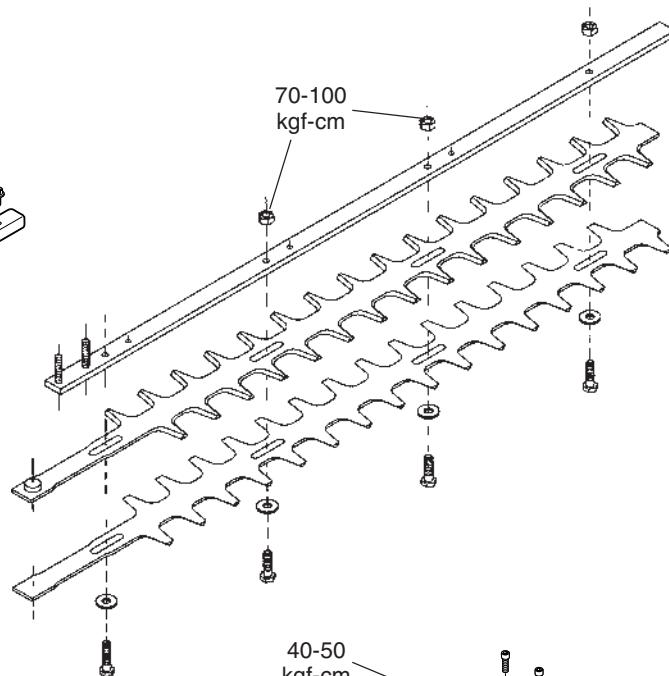
HT230



DH230



70-100 kgf-cm



40-50 kgf-cm

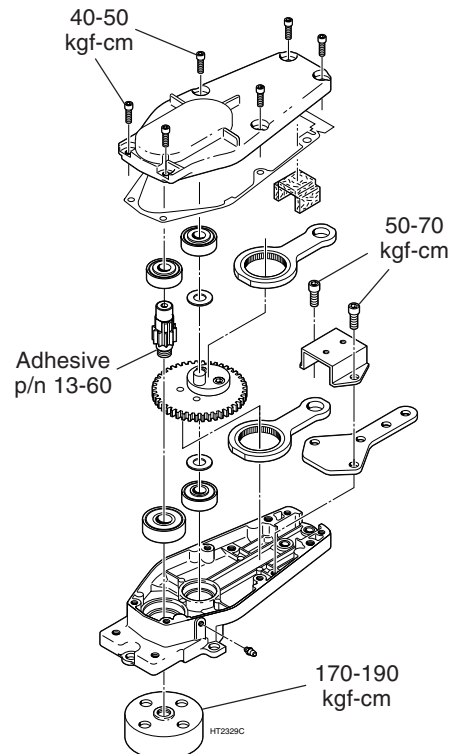


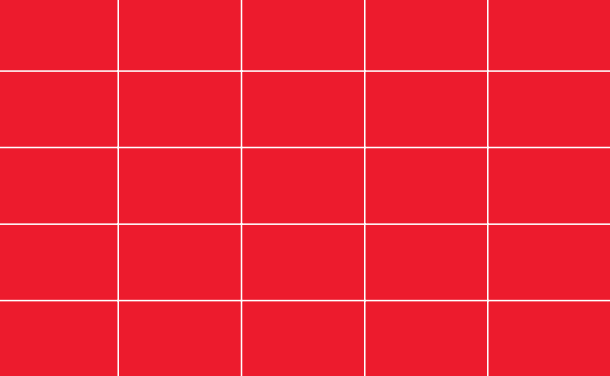
Figure 45. Shindaiwa Hedge Trimmer Torque Values.

Section 10 Appendix

Metric Conversions

Length	1 in. = 25.4 mm	1 mm = .03937 in.
	1 in. = 2.54 cm	1 cm = .3937 in.
	1 ft. = 30.48 cm	1 cm = .0328 ft.
	1 ft. = .304 meter	1 meter = 3.28 ft.
	1 mile = 1.609 km	1 km = .621 mile
Volume	1 cu. in. = 16.39 cc	1 cc = .061 cu. in.
	1 cu. in. = .061 liter	1 liter = 61.02 cu. in.
	1 fl. oz. = 29.574 ml	1 ml = .0338 fl. oz.
	1 fl. oz. = .02957 liter	1 liter = 33.81 fl. oz.
	1 gal. = 3.785 liter	1 liter = .264 gal.
Weight	1 oz. = 28.35 gm	1 gm = .0353 oz.
	1 lb. = .4536 kg	1 kg = 2.2 lb.
Force	1 in. lb. = 1.152 kg/cm	1 kg/cm = .868 in. lb.
	1 in. lb. = .112 n/m	1 n/m = 8.844 lb.
	1 ft. lb. = .138 kg/m	1 kg/m = 7.23 ft. lb.
	1 ft. lb. = 1.36 n/m	1 n/m = .737 ft. lb.
Power	1 hp (SAE) = .746 kw	1 kw = 1.34 hp (SAE)
	1 hp (SAE) = .9861 hp (DIN)	1 hp (DIN) = 1.104 hp (SAE)
	1 hp (SAE) = 1.017 psi	1 psi = .9836 hp (SAE)
Pressure	1 psi = .0689 bar	1 bar = 14.5 psi
	1 psi = 6.89 kpa	1 kpa = .145 psi
	1 psi = .07031 kg/sq cm	1 kg/sq cm = 14.22 psi
Temperature	°F to °C = Temperature in F - 32 x 5/9 (.555)	°C to °F = Temperature in C x 9/5 (1.8) + 32
Miscellaneous	1 mph = 1.6 km/hr	1 km/hr = .625 mph
	1 mpg = .425 km/liter	1 km/liter = 2.35 mpg





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