

P/N 77147  
#A – 8/05

# ***HR61 Gearbox Service Notes***

### Applicable Models

These Service Notes are applicable to the HR61 Gearbox as fitted to HR60, HR61, HR65 and RC2000 model Rotavators. They supersede all previous Service Notes in relation to the primary gearbox in machine model specific Service Notes.

### Oil Strainer (on inlet to pump) & Oil Filter

Check for debris & clean at regular intervals.

### Dipstick

Check dipstick is latest - oil level increased approximately 25mm at 6/2002.

(Dipstick level mark should be 115mm from underside of plug cut off at 138 from underside.)

### Checking Gearbox.

Remove selector lock / cover assembly and rear cover to examine inside gearbox. Check:

- Gears - markings indicate correct mesh and no pitting is evident.  
Pick Off Gears, Crownwheel & Pinion, Final Drive gears.
- Shafts - for excessive bearing endfloat, indicating wear or damage.  
Input Shaft, Pinion Shaft, Final Drive Shaft.

### Spare Gears

Remove cover to spare gears and inspect. Clean & apply grease to gears if required.

Note: Air from the gearbox breather passes through the spare gear cavity and moisture will often condense on spare gears causing them to rust if unprotected.

Ensure also gears sit off bottom of cavity (use a suitable washer or other packing) as they otherwise will seal the gearbox preventing air escaping via the breather - this can cause overheating, high pressures inside the gearbox and some oils to foam excessively. (Gears can be removed and stored elsewhere if preferred.)

### Greases and Lubricants

For recommended grease and oil lubricants refer to Service Bulletins 32 and 40.

### Contacts

Please contact Howard Australia if assistance is required:

Phone (02) 9674 2133  
Fax (02) 9674 6263  
Email [Engineering@howard-australia.com](mailto:Engineering@howard-australia.com)  
Post Private Bag 5, Post Office, SEVEN HILLS NSW 1730.

Comments and requests for changes are appreciated.

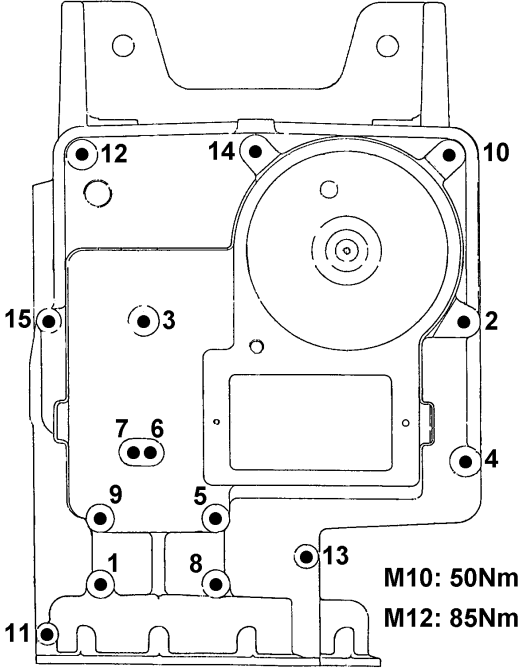
**HR61 Gearbox Special Nuts - Tightening Torques & Tools**

<b>Location</b>	<b>Nut P/N</b>	<b>Details</b>	<b>Tightening Torque</b>	<b>Locking</b>	<b>Tools</b>
Clutch Fixing	307622145	M22 Castle Nut	375 - 520 Nm (280 - 390 ftlb)	Split Pin	32 AF Socket Max OD = 45mm
Input Shaft / Front brg	255070111	C Nut M50	N/A Adjusts Brgs	Tab Washer	C Nut spanner to suit 70 dia.
Pinion Shaft / POG	TBA	M42 Castle Nut	300Nm (220 ftlb)	Split Pin	65 AF Socket or Open End
Crown-wheel Nut	110297	M55 Hex Nut	450 Nm (340 ftlb)	Locking Washer	70 AF Open End Spanner (2.3/4")

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Area	Details	Notes
<b>Clutch</b>	<p>Sintered bronze plates: Minimum thickness 1.4mm.</p> <p>Tighten castle nut to 375-520 Nm (280-390ftlb)</p> <p><b>Fit Split Pin</b></p> <p>Note: Check clutch hub does not contact nut securing front input shaft bearings. The clutch hub should seat on the tapered section of the input shaft.</p>	0.2mm of sintered bronze each side of 1.0mm plate.
<b>Input Shaft</b>	<p>Tighten nut to 270Nm (300ftlb) to seat bearings then back off approx 1/8 turn. Tap shaft to back off bearing, measure end-float, then adjust to 0.025 - 0.05 (0.001 - 2") preload.</p> <p><b>Secure nut with thread locking compound (low – med. strength) in addition to tab washer locking.</b></p>	Thread pitch = 1.5mm (0.060") per turn.
<b>Pinion &amp; Crown-wheel</b>	<p>Pinion and shaft are now one piece and are supplied complete with preset bearings and matched crown-wheel. Set is P/N 110585.</p> <p>Fit Pick Off Gear to PRE-ASSEMBLED Pinion, Shaft and Bearings then tighten Castle Nut to approximately 200Nm (150 ftlb) to ensure bearings on pinion shaft are pre-loaded correctly.</p> <p>Pinion shaft assembly can then be positioned in gear-case to check gear mesh and backlash in subsequent steps.</p>	<p>Refer also to documentation accompanying components for setup 110585.doc.</p> <p>Pick Off Gear, Spacers and Bearing inner races all clamp solid – nut tension does not govern bearing pre-load adjustment.</p> <p>Rear Cover (109943) requires modification to provide space for the nut at the rear of the pinion shaft.</p>
<b>Crown-wheel Shaft Bearings</b>	<p><b>Fit crown-wheel shaft bearings with bearing mount.</b></p> <p><b>Check Pump Hsg does not foul bearing – refer to 'Pump Housing' below.</b></p> <p>Affix pump housing to lower half of gear-case and check / adjust crown-wheel shaft bearing shims to give slight preload.</p> <p>Aim for 0.05 (0.002") preload.</p> <p>Accept 0.05 -0.1 (0.002 - 4") preload.</p>	<p>Use Loctite 641.</p> <p>Measure end-float with dial gauge, then add shims required to produce the required preload.</p> <p><b>Allow .025mm (.001") extra shims to compensate for gear-case joint compound applied when final assembling pump housing later.</b></p>
<b>Pump Housing</b>	<p>Check roller bearing cage does not foul pump housing. Machine pump housing recess deeper if required to clear bearing cage. (Dia 110 x 5 deep)</p>	Will only be a problem if there are few shims and bearing has a particularly wide cage.

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<b>Crown-wheel Mesh &amp; Backlash Adjustment</b>	<p>Select crown-wheel spacer to provide correct backlash and gear mesh. Backlash: 0.15- 0.3mm (.006 - .012").</p> <p>NOTE: Crown-wheel location is by single piece spacer surface ground to thickness. Do not final assemble with thin shims as these crush and fail due to the load being repeatedly applied and removed during rotation.</p> <p>Tighten nut to 450Nm (340 ftlb) and secure. <b>Deform crown-wheel nut collar into groove or use tab washer with internal splines.</b></p>	<p>Check crown-wheel &amp; pinion mesh with bearing blue.</p> <p>Nut securing methods vary depending which crown-wheel shaft is fitted. Use threadloc additionally if in doubt.</p>
<b>Final or Output Shaft</b>	<p>Fit output shaft bearings with bearing mount. Adjust bearing shims to give slight preload. Aim for 0.05 (0.002") preload. Accept 0.05 - 0.1 (0.002 - 4") preload.</p>	<p>Use Loctite 641.</p> <p><b>Allow .025mm (.001") extra shims to compensate for gear-case joint compound applied when final assembling pump housing later.</b></p>
<b>Gearbox Reassembly</b>	<p>Clean and reassemble case with jointing compound. Loctite (antisieze) long socket head set screws into gear-case to prevent corrosion.</p>	<p>Loctite 515 or 518 Loctite 511 (Hyd pipe sealant)</p>
<b>Gear-case Bolt Tightening Sequence</b>	 <p style="text-align: right;">M10: 50Nm M12: 85Nm</p>	<p>Gear-case bolt tightening sequence.</p>
<b>Frame Cooling Tube</b>	<p>Drain frame member of oil and check for sludge / dirt with rod. Hot water pressure clean out if necessary.</p>	