

## Bevel Pinion Assembly

# BEVEL PINION ASSEMBLY

## To Remove

The bevel pinion complete, with its two taper roller bearings, distance piece, oil seal, oil seal housing and driver coupling may be removed as a complete sub-assembly as follows:

Disconnect the propeller shaft from the driver coupling and support the shaft.

Free the bevel pinion from engagement with the crown wheel by removing the differential and drive gear assembly (refer to sub-section H130).

Remove the setbolts securing the bearing sleeve and oil seal housing to the gear carrier. Withdraw

the assembly, tapping the rear of the driver coupling flange with a hide-faced hammer if necessary.

**Note:** The thickness of the shims fitted between the gear carrier and bearing sleeve should be noted so the same thickness is used on reassembly.

The bevel pinion pilot bearing cone will come away with the pinion leaving the bearing cup, rollers and cage in the gear carrier. Removal of the bearing cup, rollers and cage will require the removal of the crown wheel assembly to gain access to the bearing cup securing nut and bolt.

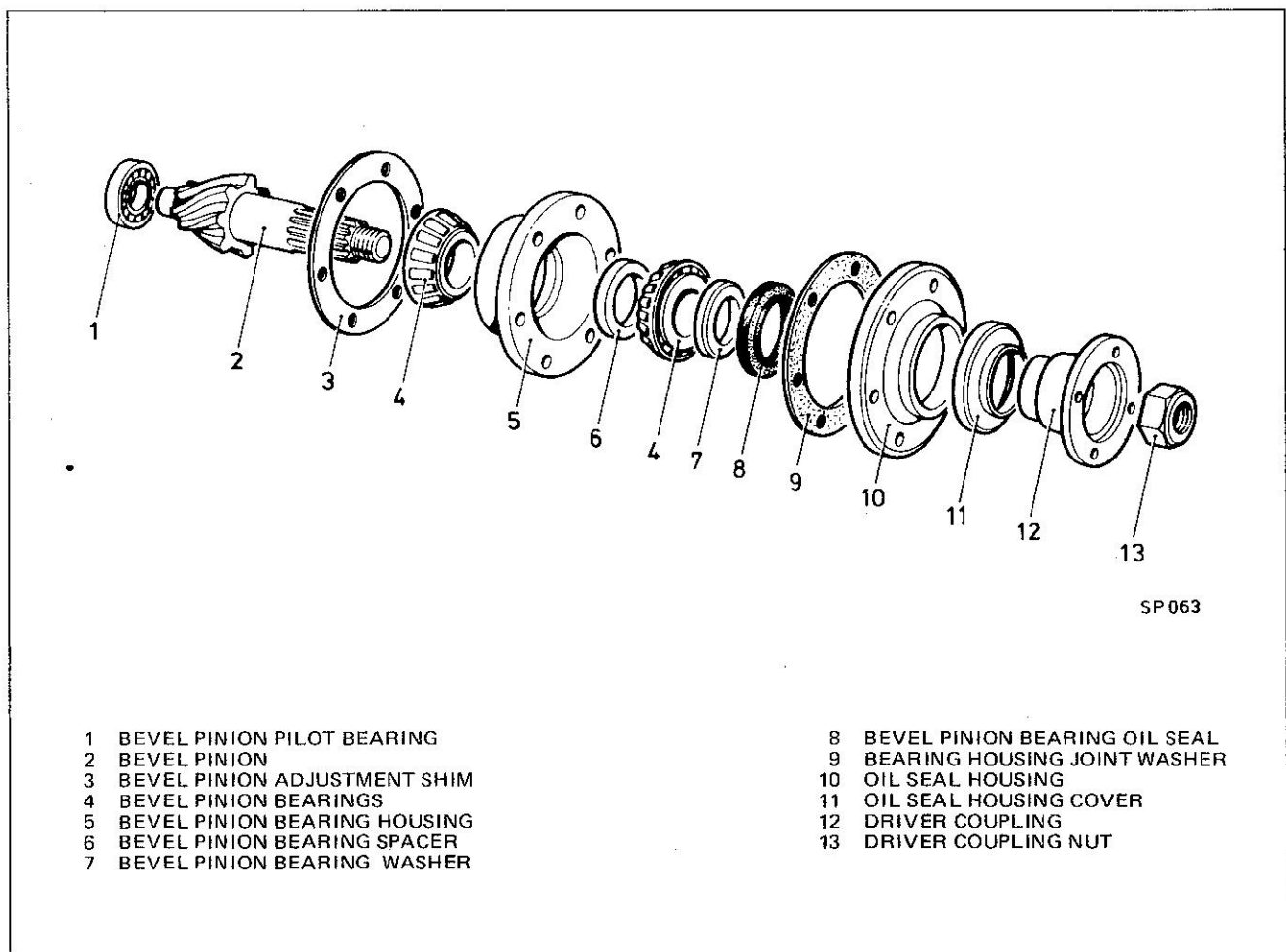


Fig. 4 Bevel Pinion General Assembly

#### To Dismantle

Remove the nut securing the driver coupling and tap the coupling free using a soft metal or hide-faced hammer. If necessary, removal of the driver coupling can be achieved using an adjustable flange wrench.

Remove the oil seal housing and bearing washer.

To remove the bevel pinion, complete with inner bearing, support the bearing housing whilst pressing out the pinion ensuring the threads on the end of the shaft are suitably protected from damage. This will also free the outer bearing and distance piece.

Separation of the bevel pinion and inner bearing can be effected by using Churchill Tool, MS 47 and Adaptor Set, RG 4221B-13. Alternatively, removal by tapping a drift placed between the bevel pinion teeth onto the bearing cone at alternately opposite points can be used. Care must be taken not to damage the roller cage.

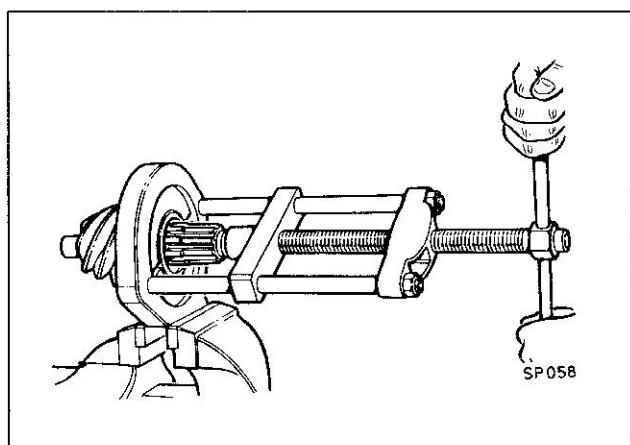


Fig. 5 Bevel Pinion Inner Bearing Removal

#### Inspection and Overhaul

The bearings should be washed in white spirit then blown out using clean dry air ensuring the rollers and cage are not allowed to spin but are rotated slowly by hand. Immediately after cleaning, the complete bearings must be lubricated with thin oil to prevent corrosion if being retained for subsequent re-assembly.

Examine the bevel pinion support bearing rollers, cone tracks and bearing surface of the bevel pinion assembly for pitting and wear and the roller cage for damage. Any damage will necessitate renewal of the complete bearing assembly.

Examine the bevel pinion pilot bearing for slackness, wear or damage, which, if found, will necessitate replacement of the complete bearing assembly.

Fit the driver coupling onto the bevel pinion splines and check for backlash and elongation of the coupling bolt holes. Replace the coupling as necessary.

Examine the bevel pinion and crown wheel for damage and pitting.

**Note:** In the event of any damage the bevel pinion and crown wheel must be renewed as a matched pair. Replacement assemblies are supplied complete with the pilot bearing.

A damaged or inefficient oil seal will require replacement. The new seal should be pressed into the housing, sealing lip uppermost, taking care not to damage the seal in any way.

#### To Reassemble

If a new bevel pinion pilot bearing is to be fitted, press the new bearing cone onto the pinion until flush against its shoulder and stake over the pinion spigot in four places using a steel ball and press.

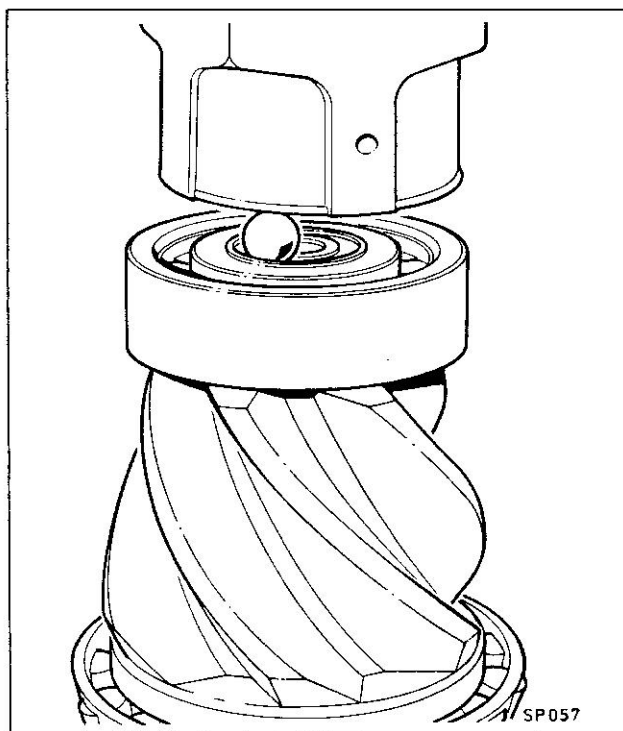


Fig. 6 Checking Bevel Pinion Pre-load

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**Note:** If the bearing is to be fitted to a bevel pinion from which a faulty race has been previously removed, it will first be necessary to remove the old peening burrs from the bevel pinion spigot. Care will be necessary during this operation to ensure the minimum amount of metal is removed so the spigot face can be peened following the fitment of the replacement cone.

To fit the inner bearing place the bevel pinion in an upright position and using a hollow drift or tube tap the cone of the inner bearing into position against the gear teeth. Churchill Tool MS 47 and Adaptor Set RG 4221B-13 may also be used for this operation. Position the inner bearing race onto the inner cone.

Place the bearing sleeve over the pinion shaft followed by the distance piece and outer bearing using the hollow drift or tube. Finally, position the bearing washer and adjust the bevel pinion bearings before fitting the oil seal.

Adjust the pinion bearings as follows:

Fit the drive coupling to the pinion shaft and torque load the securing nut to 271 Nm (200 lbf. ft) whilst rotating the bearing sleeve.

**Note:** A slave nut should be used during adjustment of the pinion bearings since locknuts with fabric or nylon inserts become ineffective after repeated fitting and removal.

Check the pinion bearing pre-load by ensuring a torque of 2.82 to 4.52 (25 to 40 lbf. in) is required to turn the bearing sleeve with the pinion held stationary. This can be checked as follows:

- Wrap a length of cord around the sleeve anchoring the end of the cord in a setbolt hole. Using a spring balance attached to the other end pull tangentially to the outer diameter of the sleeve (Fig. 7).
- With the sleeve turning (ie the static friction load being overcome) a reading of 5.1 to 8.2 Kg (11.5 to 18 lbf) should be obtained when the pinion bearing pre-load is correct.

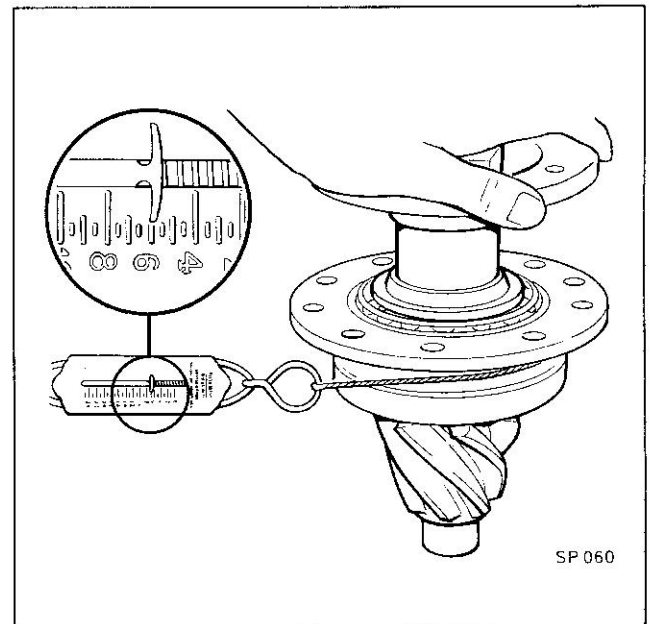


Fig. 7 Bevel Pinion Pilot Bearing

When an incorrect reading is obtained adjustment should be made as follows:

- Separate the bearing sleeve and bevel pinion as described under 'To Dismantle' above.
- Reassemble using a larger distance piece when the spring balance reading is high or a smaller distance piece when the reading is low.
- Repeat the pinion bearing adjustment procedure until a correct spring balance reading is obtained, ensuring the coupling nut is correctly torque loaded on each reassembly.

When a correct bearing pre-load has been obtained remove the drive coupling and fit the oil seal complete with housing onto the coupling boss. Loctite 270 should be used on the faces between the bearing sleeve and oil seal housing.

Reassemble the bevel pinion assembly and drive coupling using a serviceable nylon insert nut torque loaded to 271 Nm (200 lbf. ft).

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#### To Refit

Where a new bevel pinion pilot bearing is to be fitted, position the new bearing cup complete with rollers and cage in the gear carrier and retain in position using bolt, washer, nut and split pin.

Assemble the bevel pinion assembly to the gear carrier ensuring:

- a) The same thickness of shims are fitted as on removal.

- b) The drain holes in the bearing sleeve flange, shims and gear carrier are aligned.
- c) The semi-circular recess in the oil seal housing mates to the gear carrier.
- d) Secure the assembly temporarily with 3 set-bolts torque loaded to 74,5 Nm (55 lbf. ft).

Check the crown wheel to bevel pinion tooth contact and backlash, adjusting as required in accordance with the procedures detailed in the 'Differential and Drive Assembly' sub-section H130.