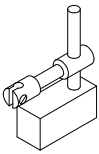
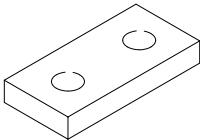
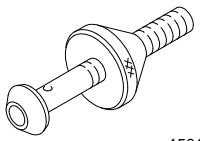
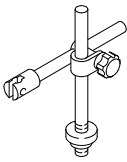
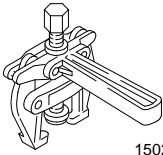
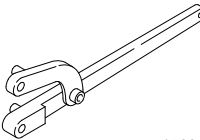
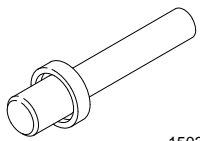
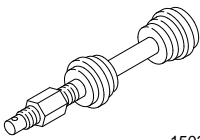
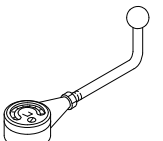
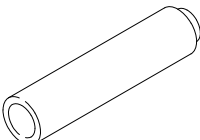
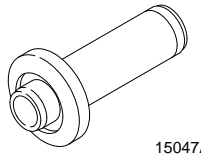
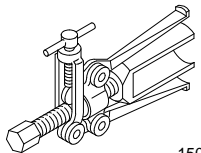
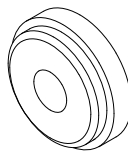
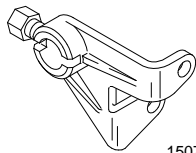
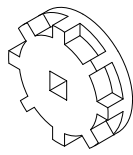
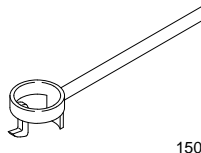
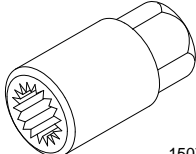
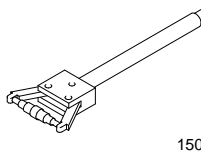
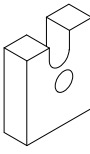
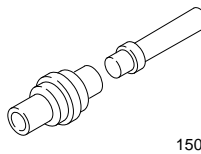
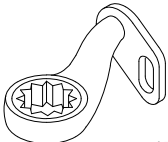
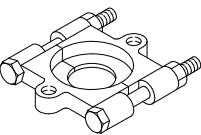
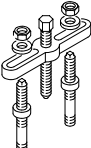


## Differential Assembly – Overhaul (assembly removed) (15 254 6)

### Special Tools

 15008	<b>15-008</b> Dial indicator fixture
 1500801	<b>15-008-01</b> Adaptor for dial indicator fixture
 15019	<b>15-019</b> Gauge bar
 15022A	<b>15-022A</b> Dial indicator fixture
 15026A	<b>15-026A</b> Differential bearing remover
 15030A	<b>15-030A</b> Universal flange-holding wrench
 15032	<b>15-032</b> Differential bearing installer
 15033	<b>15-033</b> Bearing ring installer
 15041	<b>15-041</b> Torque gauge
 15042	<b>15-042</b> Pinion bearing installer

 15047A	<b>15-047A</b> Pinion oil seal installer
 15048	<b>15-048</b> Driveshaft oil seal remover
 15068	<b>15-068</b> Adaptor
 15070	<b>15-070</b> Rear axle mounting bracket
 15071	<b>15-071</b> Differential bearing adjusting wrench
 15072	<b>15-072</b> Oil seal remover
 15073	<b>15-073</b> Pinion socket wrench
 15074	<b>15-074</b> Bearing ring remover
 15075	<b>15-075</b> Step gauge
 15076	<b>15-076</b> Driveshaft oil seal installer

 <p>15090</p>	<p><b>15-090</b> Holding wrench, drive pinion nut</p>
 <p>15091</p>	<p><b>15-091</b> Separator</p>
 <p>15092</p>	<p><b>15-092</b> Bridge, drive pinion bearing remover</p>

**Workshop Equipment**

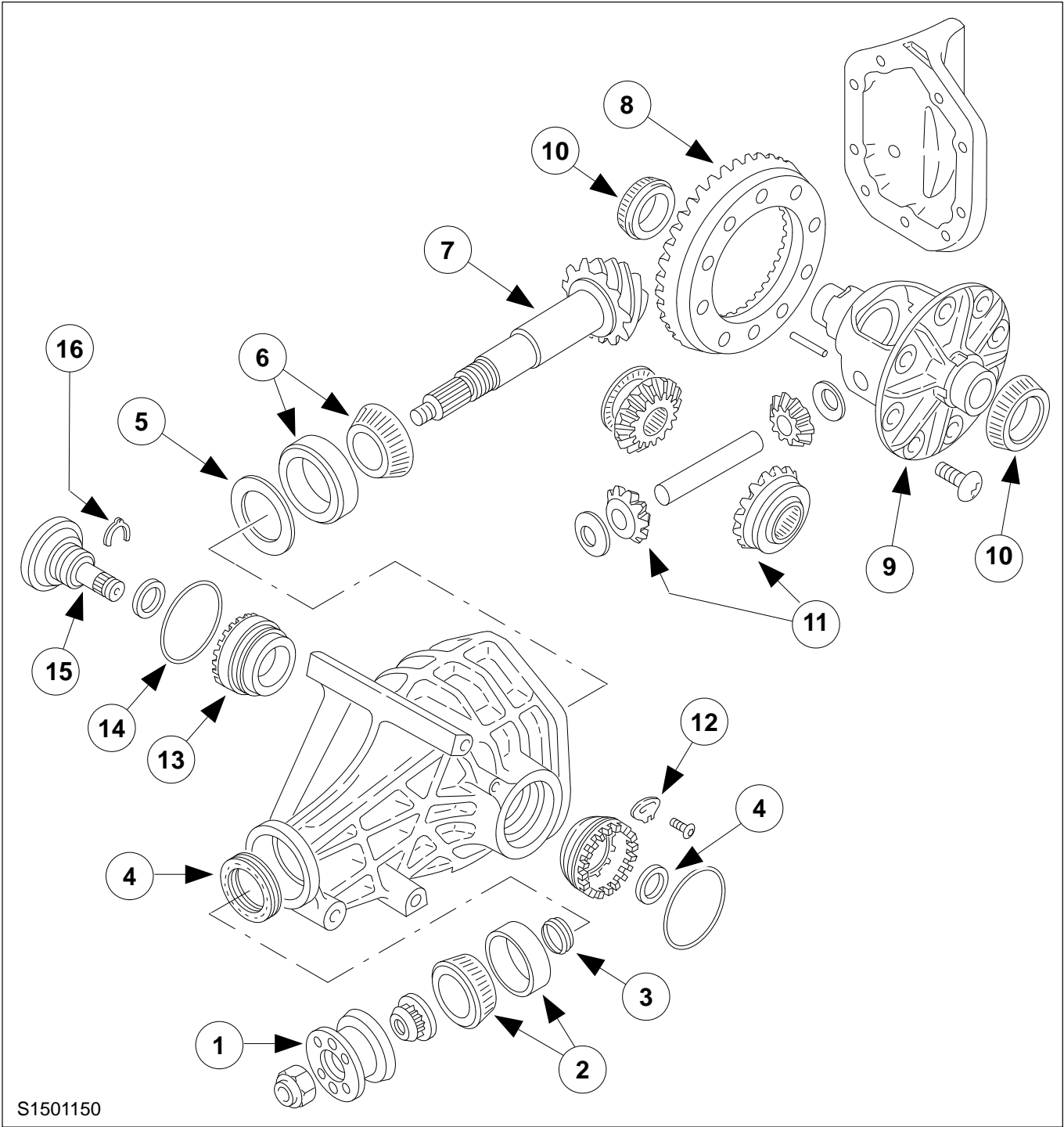
Assembly stand	
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**Lubricants and Sealers**

Sealer	SQM-4G9523-A
Bearing housing grease	ESEAM-1C1014-A
Hypoid oil	SQM-2C9002-AA

**Proprietary Tools**

Two-legged puller
-------------------

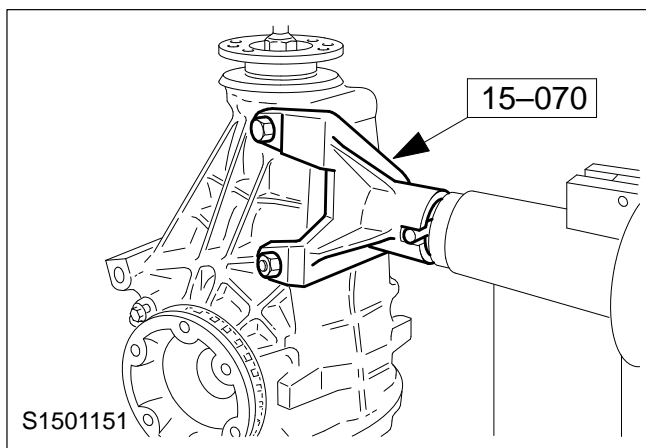


S1501150

**Exploded view of differential assembly.**

Item	Description
1	Drive flange
2	Outer taper roller bearing
3	Collapsible spacer
4	Radial oil seal
5	Shim (production type)
6	Inner taper roller bearing
7	Drive pinion

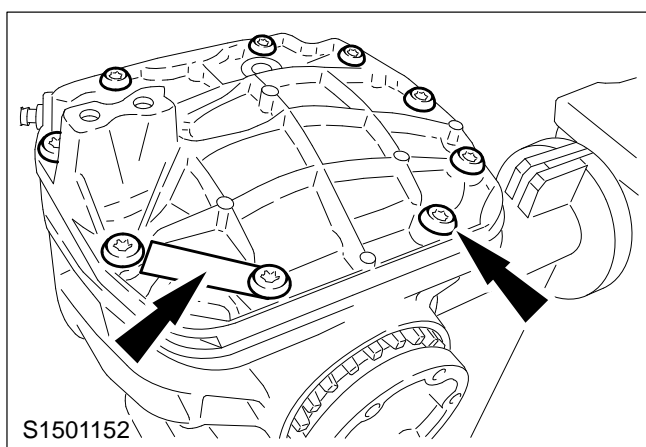
8	Crown wheel
9	Differential housing
10	Differential taper roller bearings
11	Differential gears
12	Bearing housing retainer
13	Bearing housing
14	O-ring
15	Drive flange
16	Drive flange circlip



## Dismantle

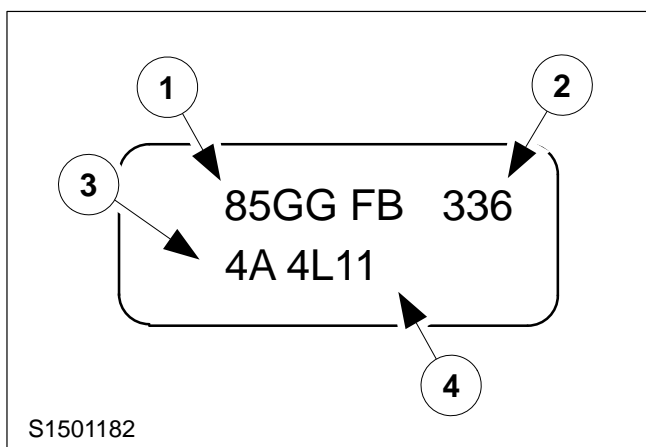
### 1. Mount the differential assembly on a stand.

Drain off the oil by unscrewing the oil level check plug.



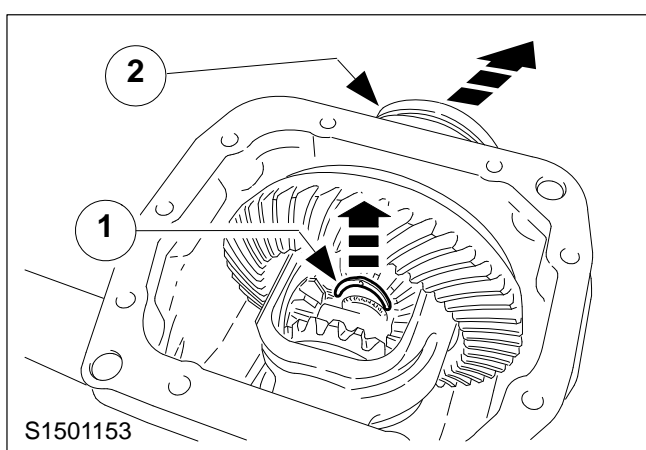
### 2. Detach the housing cover.

Remove the identification tag from the differential (see step 3.).



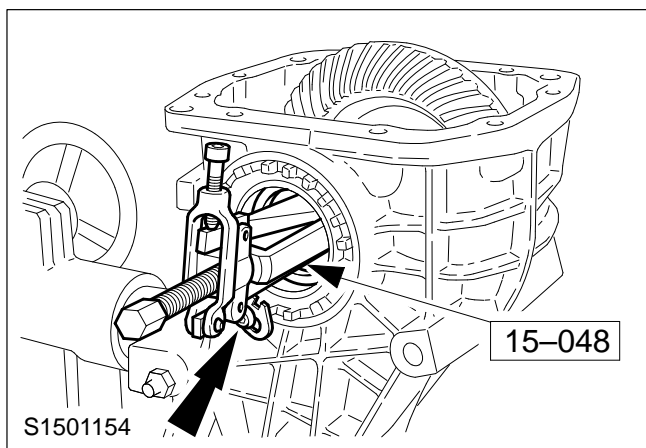
### 3. Information on identification tag.

- 1 Part number
- 2 Axle ratio = 3,36:1
- 3 Assembly plant
- 4 Build date
  - 4 = build year
  - L = build month (November)
  - 11 = build day

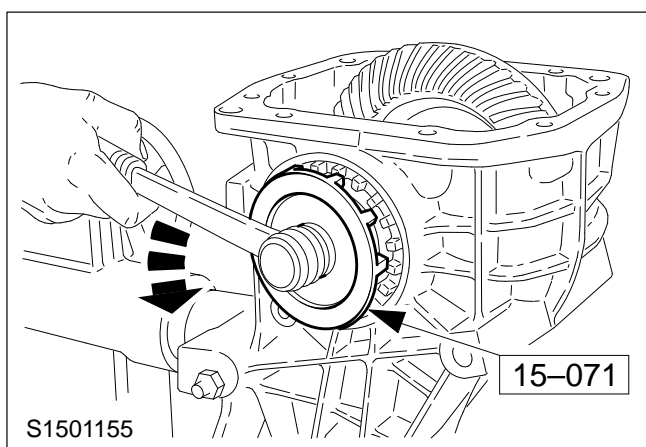


### 4. Remove the left and right-hand driveshaft flanges.

- 1 Pull out the circlips.
- 2 Prise out the drive flanges.

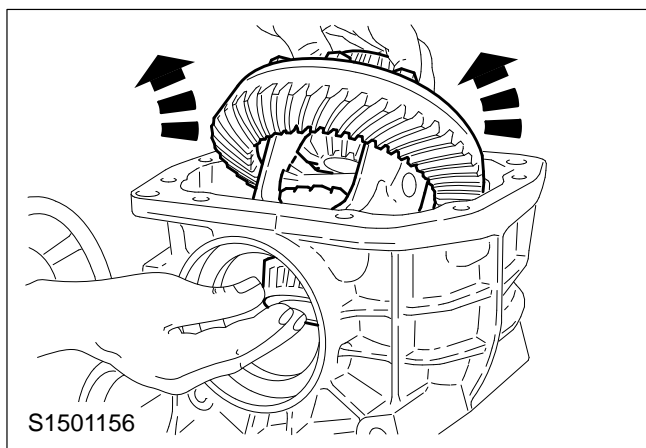


5. Remove the radial oil seals, unlock the bearing housings.



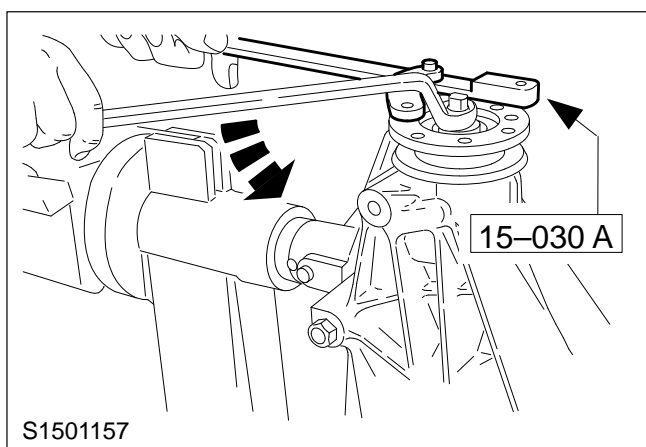
**NOTE:** Mark the positions of the bearing housings for refitment.

6. Unscrew the two bearing housings.



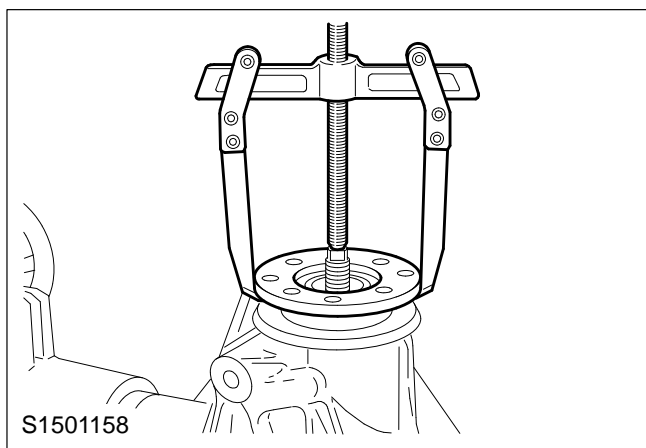
**NOTE:** Lift out the crown wheel side first.

7. Remove the differential.



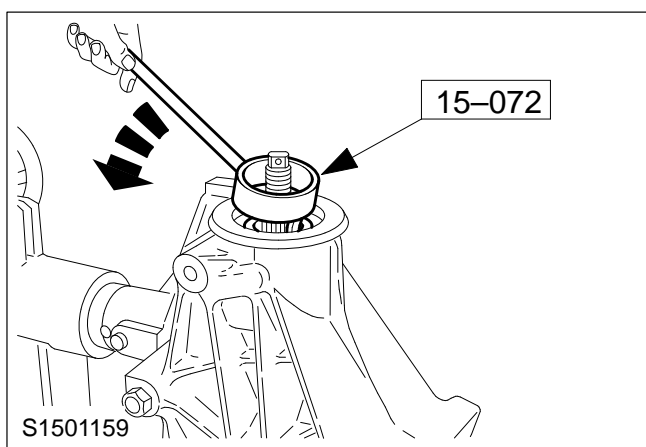
8. Unscrew the flange nut.

Hold the flange with the special tool.



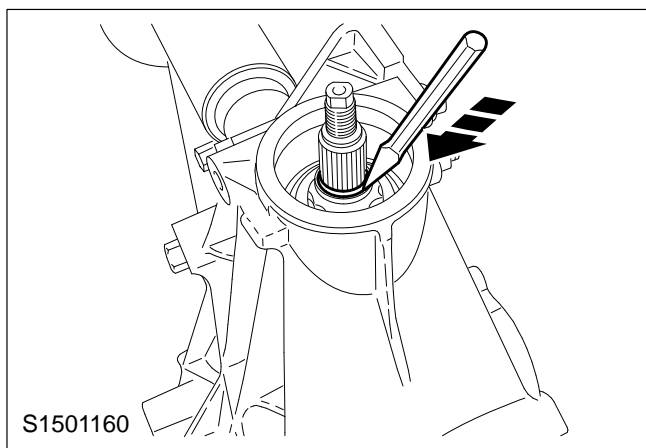
### 9. Pull off the drive pinion flange.

Pull off the flange using a two-legged puller.



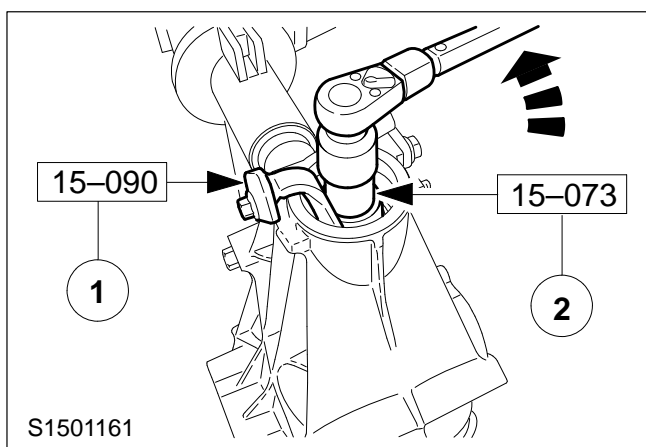
**CAUTION:** Take care not to damage the housing.

### 10. Remove the drive pinion oil seal.



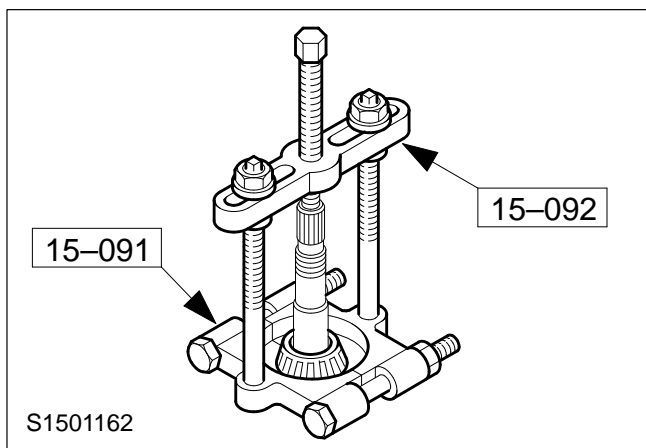
**NOTE:** Insert a chisel in the circlip groove.

### 11. Unlock the drive pinion nut.

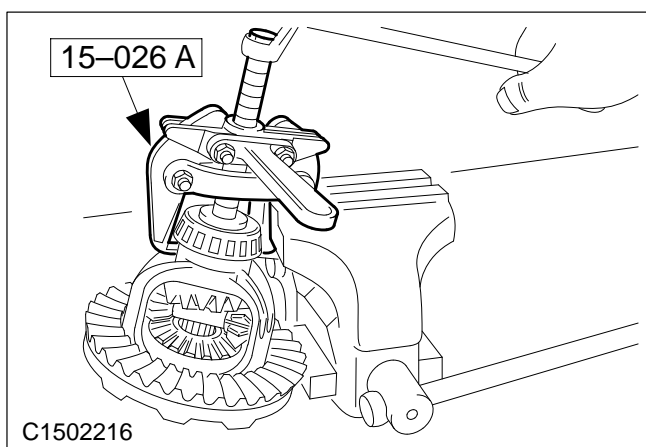


### 12. Remove the drive pinion.

- 1 Fit the holding tool.
  - 2 Turn the drive pinion anti-clockwise using the special wrench.
- Remove the holding tool.
  - Drive out the pinion through the bottom.
  - Remove the outer taper roller bearing.



**13. Pull the taper roller bearing off the drive pinion.**

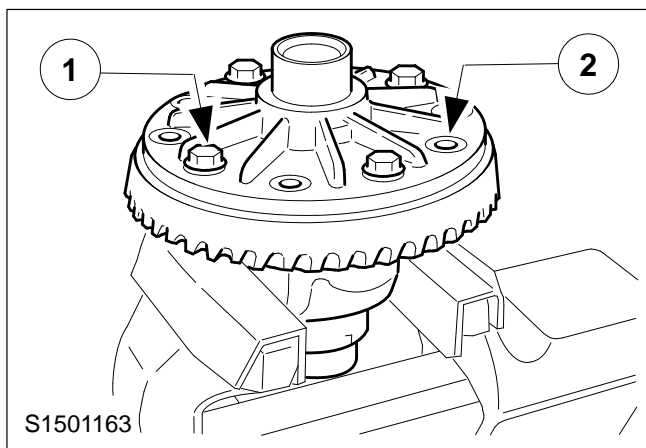


**Dismantle differential**

**NOTE:** New taper roller bearings are only available complete with the bearing housing.

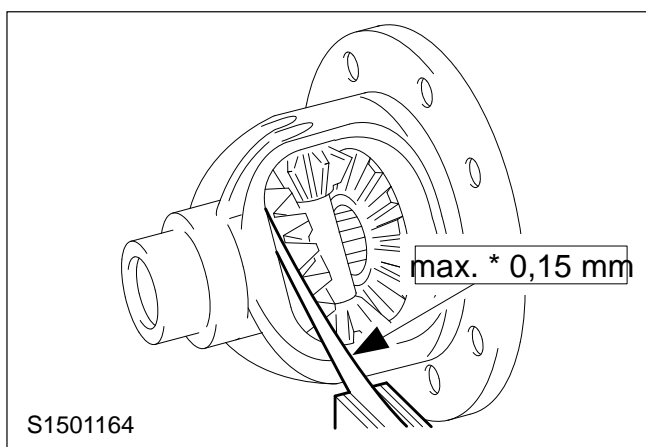
**14. Pull the bearing off the differential.**

- Mark the position.
- Locate the puller arms in the recesses on the housing.



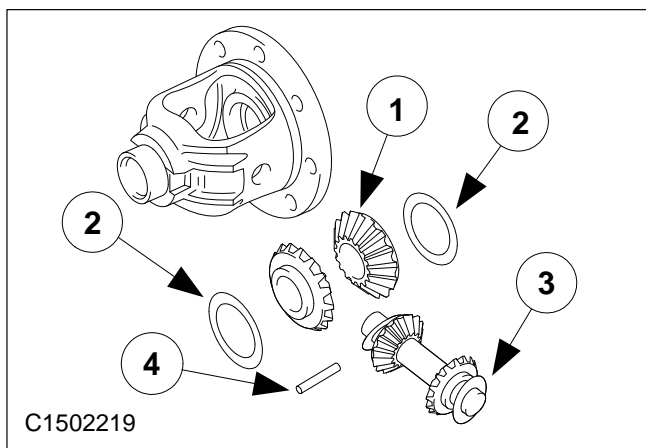
**15. Remove the crown wheel.**

- 1 Working diagonally, slacken four bolts five turns.
  - 2 Unscrew the six bolts.
- Detach the crown wheel evenly from the differential housing by tapping the bolt heads.



**NOTE:** If the end float is outside the required range, adjust it by fitting new shims (see step 17.).

**16. Measure the end float of the drive pinions.**



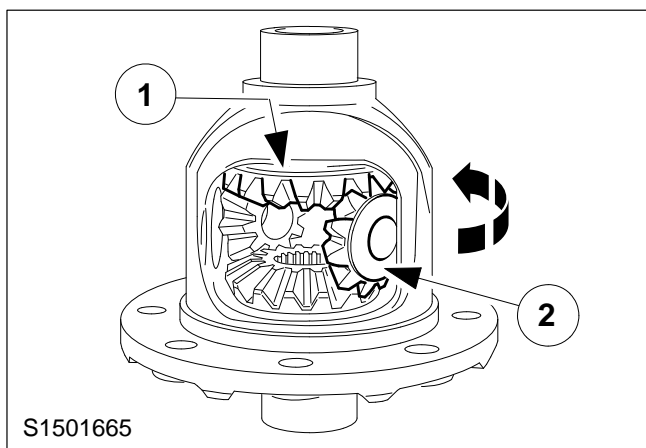
### 17. Exploded view of differential.

- 1 Side gear
- 2 Shims
  - Available shims: From  $1,05 \pm 0,03$  mm up to  $1,96 \pm 0,03$  mm in increments of 0,07 mm.
- 3 Shaft with differential pinions and thrust washers
- 4 Roll pin

### Assemble

### 18. Preparatory operations.

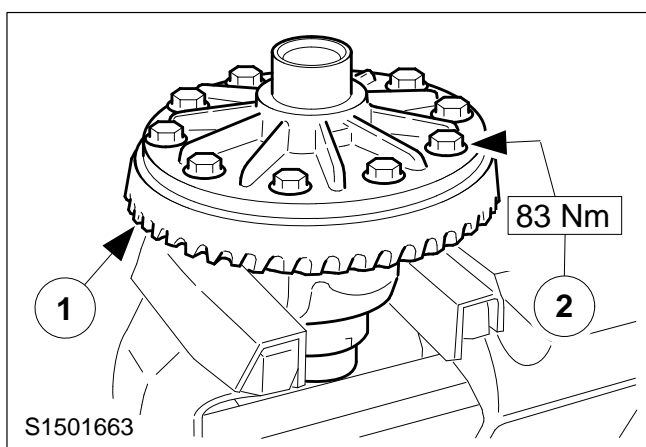
- Renew components that are visibly damaged.



### Assemble differential

### 19. Fit the differential pinions.

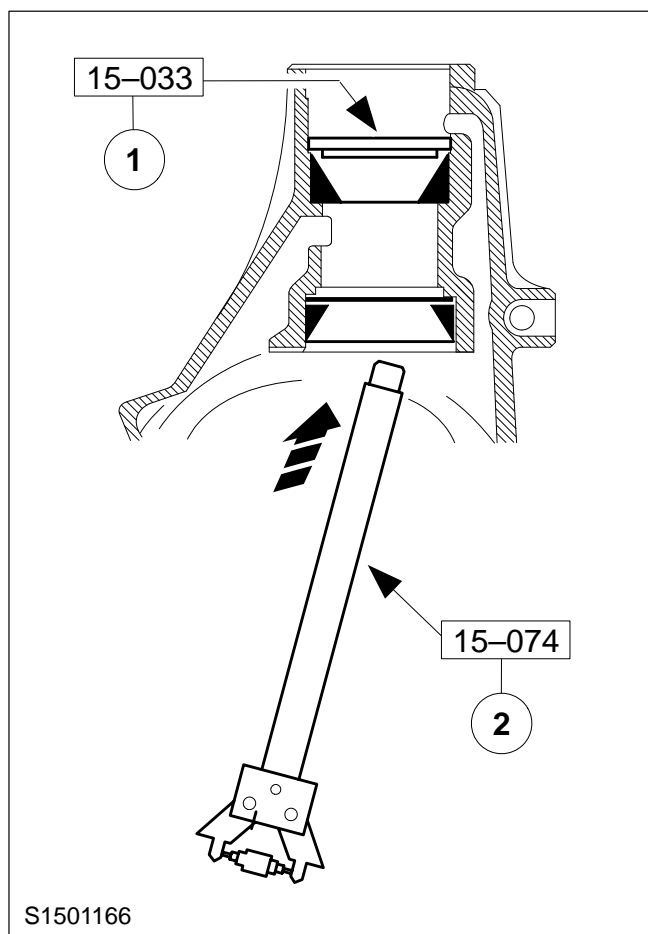
- 1 Insert the side gears with the shims.
- 2 Insert the pinion gears and thrust washers into the housing and evenly turn them into position.
  - Insert the differential pinion shaft and secure it with the roll pin.



### 20. Fit the crown wheel.

- 1 Heat the crown wheel to approx.  $100^{\circ}\text{C}$  and pull it on evenly using four of the old bolts.
- 2 Insert new bolts and tighten them.

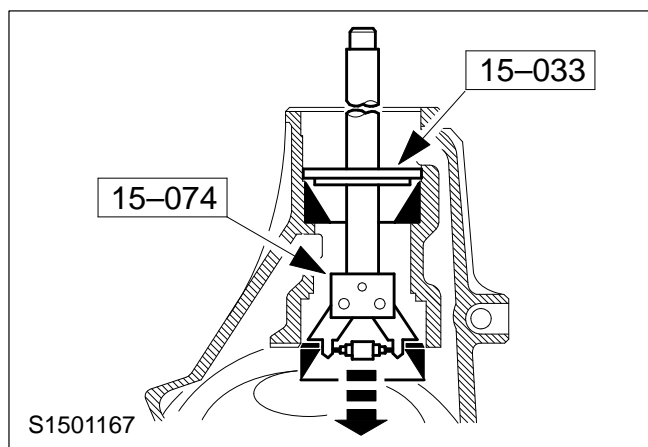




## Renew drive pinion bearing rings

### 21. Insert the remover.

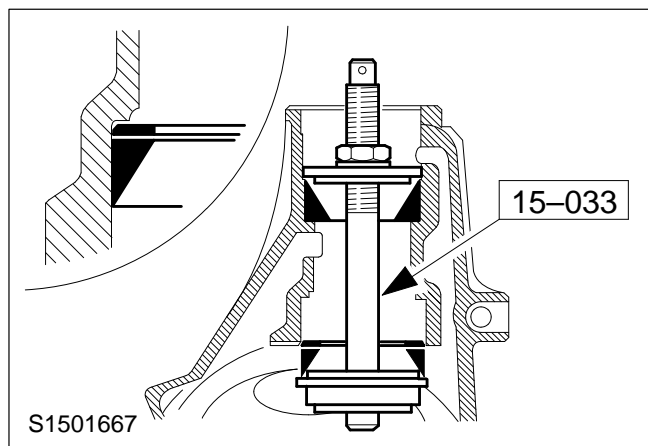
- 1 Fit a stepped washer as a guide.
- 2 Insert the remover from below.



**CAUTION:** Never remove both bearing rings. Continue with step 23.

### 22. Remove the drive pinion inner bearing ring.

- Drive out the bearing ring with the shim.
- Discard the shim.

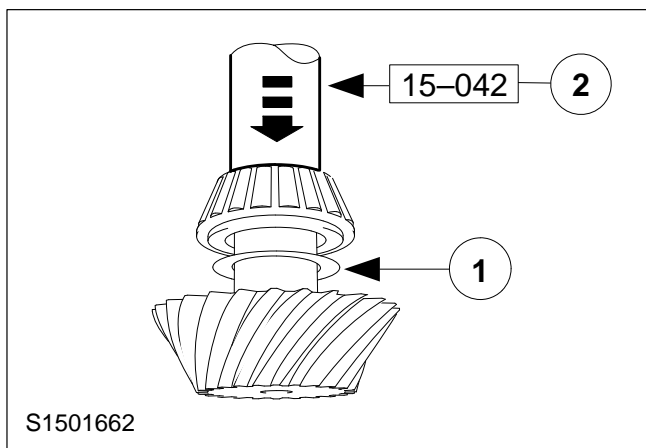


**NOTE:** Fit the shim with the chamfered side facing towards the housing.

### 23. Fit the inner bearing ring.

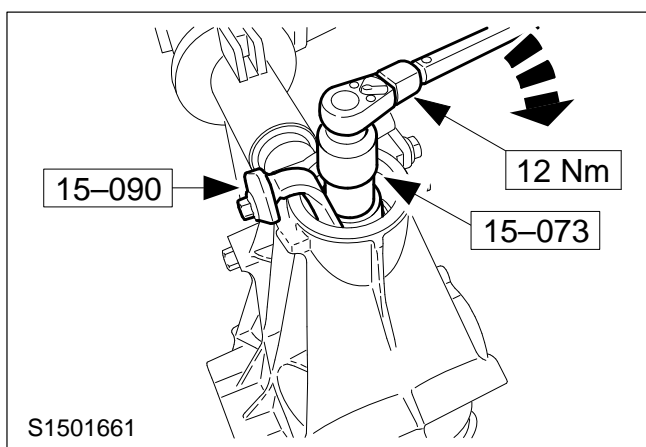
Fit the bearing ring with a standard shim (2 mm thick).

### 24. Change the outer bearing ring in the same way.



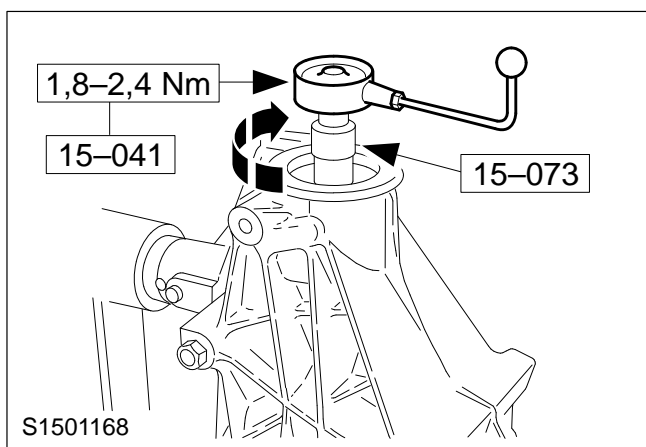
## 25. Fit a new taper roller bearing.

- 1 Fit a shim (1 mm thick).
- 2 Press on the bearing.



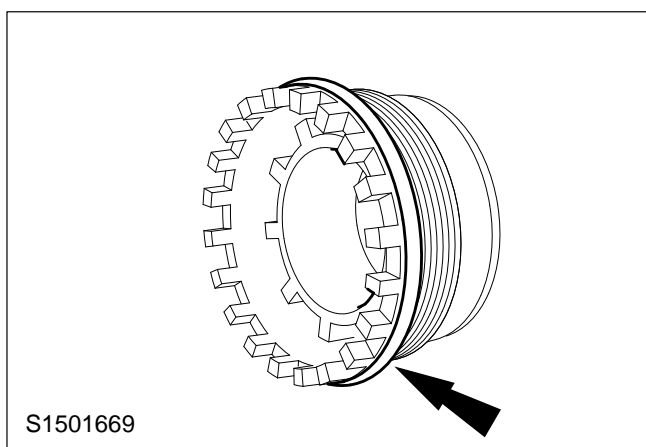
## 26. Fit the drive pinion without the collapsible spacer.

- Lubricate both taper roller bearings with oil.
- Fit the pinion, fit the bearing and nut.
- Tighten the nut and tighten the pinion to a maximum of 12 Nm.



**NOTE:** Tighten or slacken the nut further until the specified turning torque is obtained.

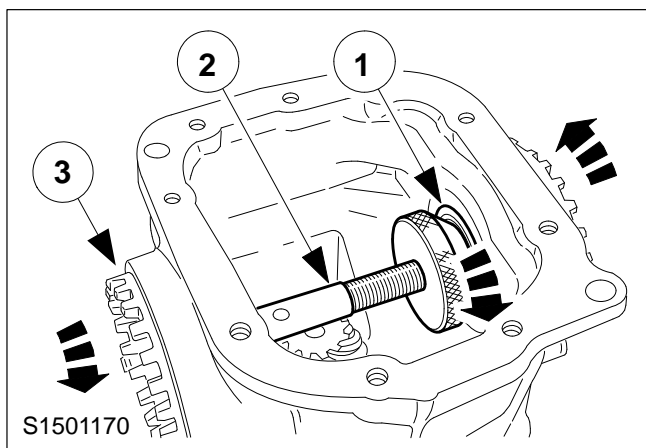
## 27. Measure the drive pinion turning torque.



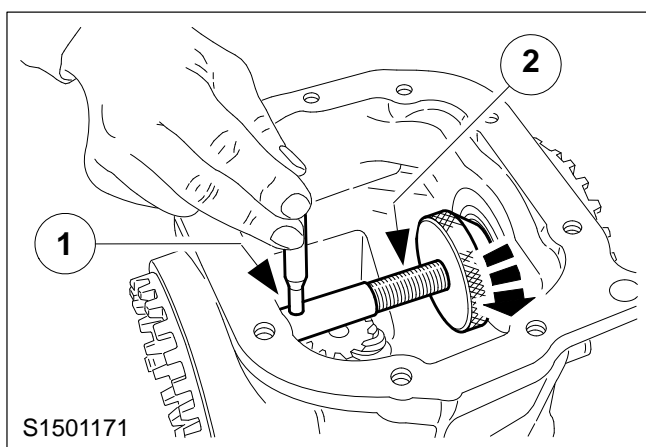
## 28. Fit the two bearing housings.

**CAUTION:** Do not mix up the taper roller bearings

- 1 Remove the O-ring.
  - 2 Lubricate the thread with bearing housing grease (ESEAM-1C1014-A).
- Screw in the bearing housings to approx. the required depth.

**29. Fit the gauge bar.**

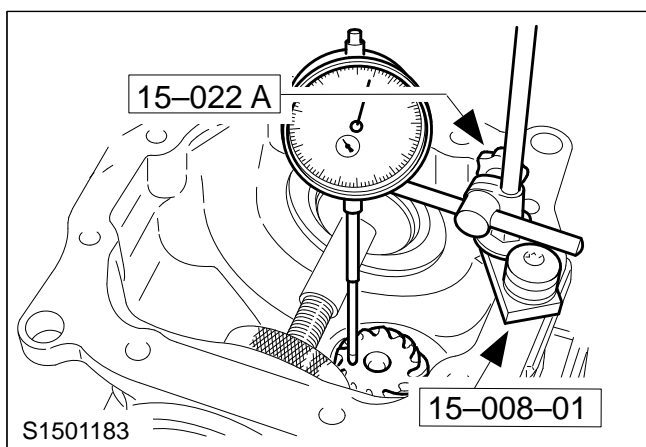
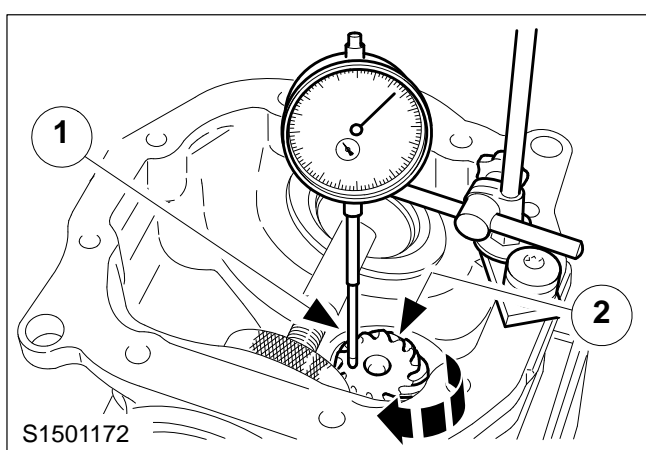
- 1 Lubricate the bearing with hypoid oil and insert it in the bearing housings.
  - 2 Insert the gauge bar.
  - 3 Screw in the bearing housings to the required depth.
- Turn the adjusting nut until the bearings make contact with the gauge bar.



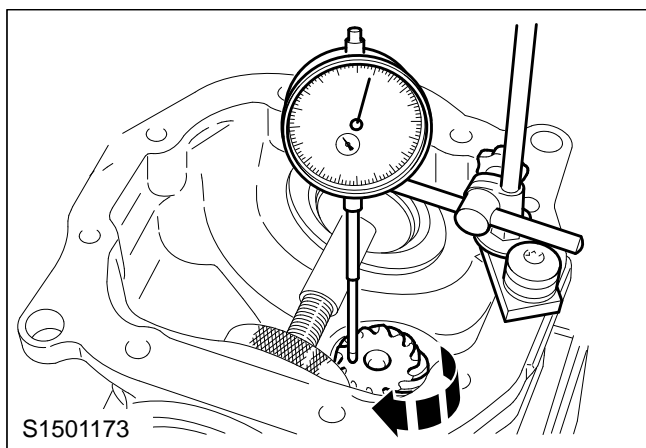
**NOTE:** Repeat sub-operations 1 and 2 until the adjusting nut can just be turned without holding the bar.

**30. Set up the gauge bar.**

- 1 Hold the gauge bar and screw in the adjusting nut.
- 2 Turn the gauge bar several times to settle the bearings.

**31. Set up a dial indicator.****32. Measure the run out of the drive pinion.**

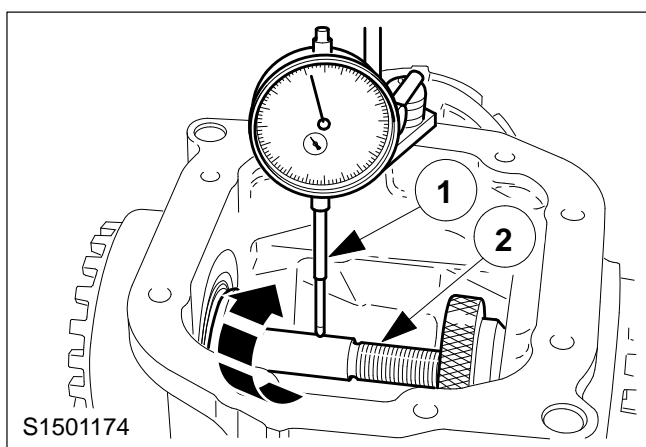
- 1 Position the plunger on the outer edge of the drive pinion near the gauge bar.
- 2 Turn the pinion one revolution and note the total deflection.



**NOTE:** The pinion must not be turned any more after this.

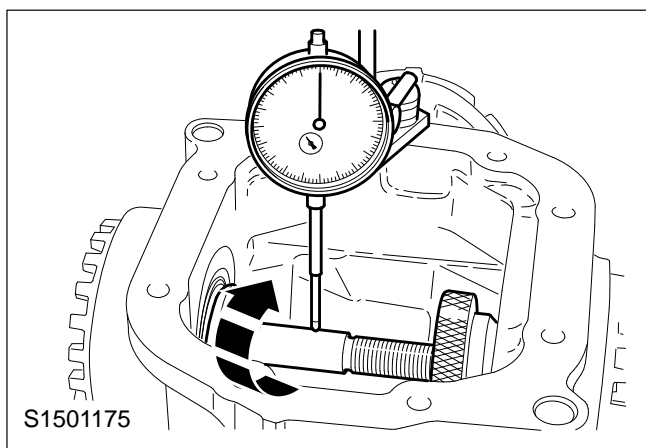
### 33. Centre the drive pinion.

Turn the drive pinion until the dial indicator reads half the total deflection (from step 32.).



### 34. Measure the run out of the gauge bar.

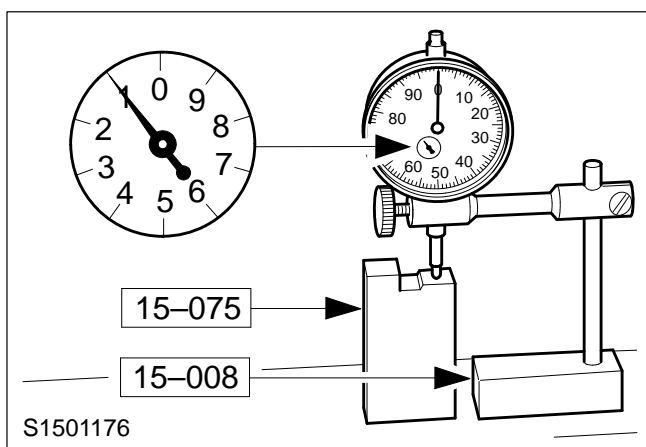
- 1 Position the plunger centrally on the gauge bar.
- 2 Turn the gauge bar one revolution and note the total deflection.



**NOTE:** The gauge bar must not be turned any more after this.

### 35. Centre the gauge bar.

Turn the gauge bar until the dial indicator reads half the total deflection (from sub-operation 34.).

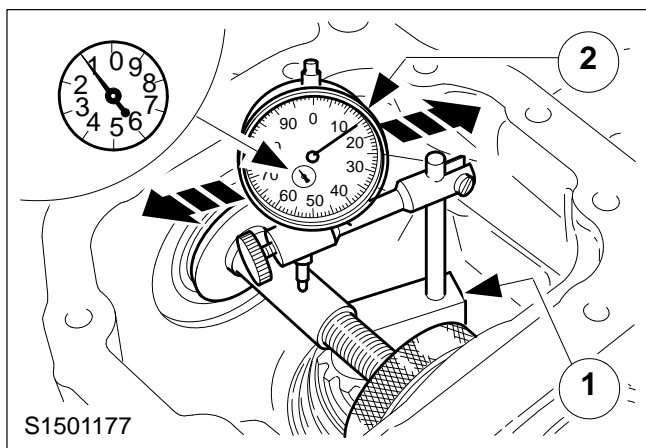


**CAUTION:** The pre-load is essential as otherwise the measurements will be incorrect.

**NOTE:** Use the bottom step for 7,5" axles.

### 36. Adjust the dial indicator.

Set the dial indicator to "0" on a gauge plate with a "1 mm pre-load".



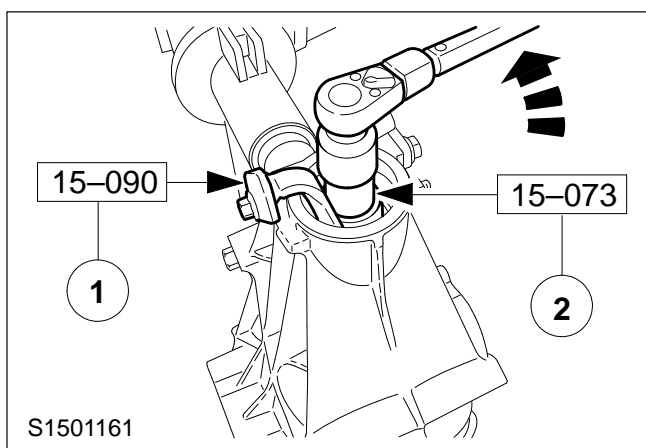
**NOTE:** Carry out the measurement accurately several times

### 37. Establish the thickness of shim required for the drive pinion.

- 1 Set up the dial indicator fixture centrally on the drive pinion with the plunger positioned centrally on the gauge bar.
- 2 Slide the dial indicator transversely across the gauge bar and note the maximum deflection.

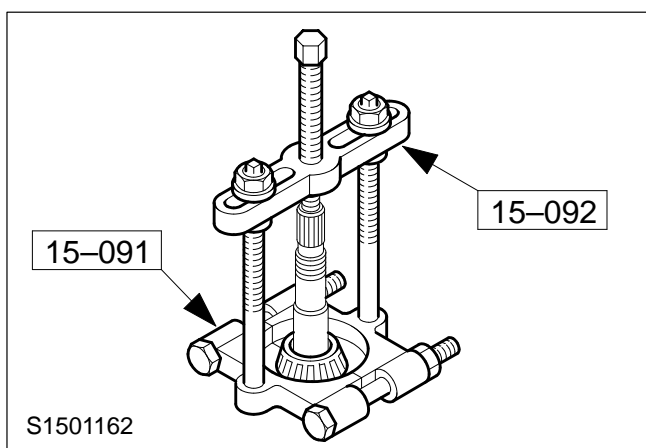
- Example: Dial indicator reading at maximum deflection = 1,15 mm, required shim = 1,15 mm.

- Available shims: From  $0,99 \pm 0,01$  mm up to  $1,24 \pm 0,01$  mm in increments of 0,01 mm.



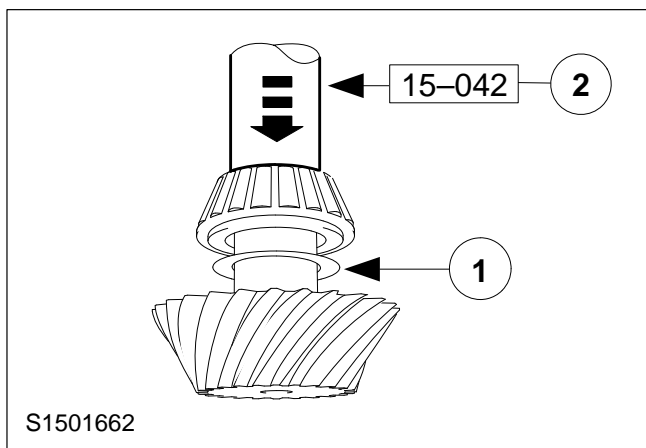
### 38. Remove the drive pinion again.

- 1 Fit the holding tool.
- 2 Turn the drive pinion anti-clockwise using the special socket wrench.



### 39. Pull the taper roller bearing off the drive pinion.

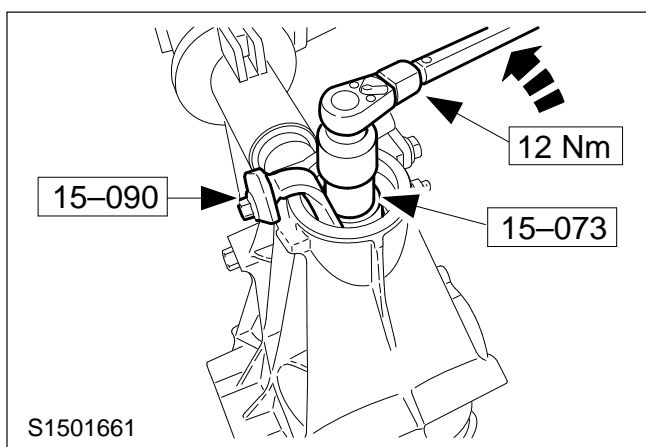
Remove the shim (1 mm thick).



**NOTE:** See step 37.

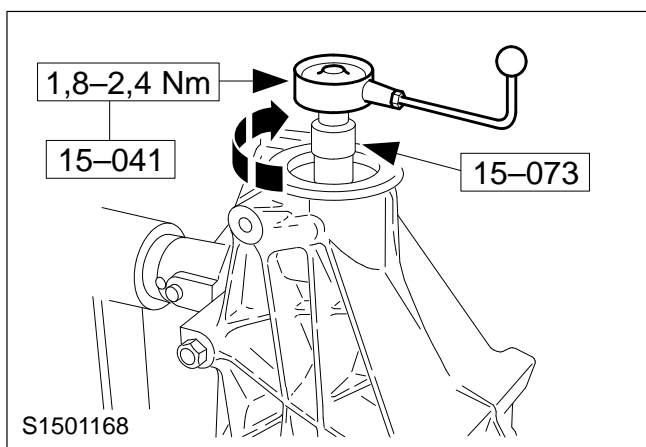
**40. Fit the required shim.**

- 1 Shim
- 2 Press on the bearing.



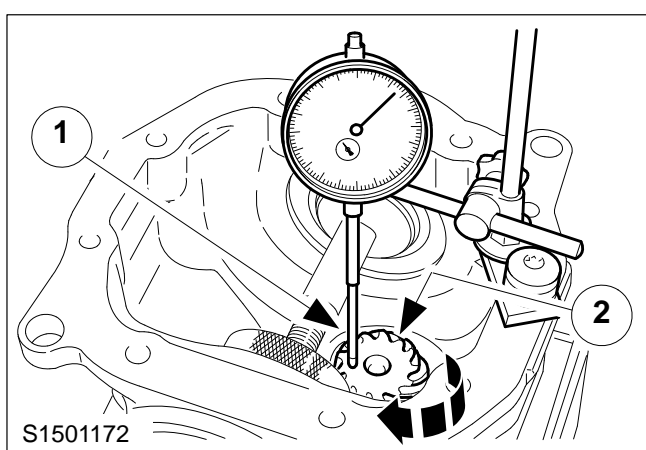
**41. Fit the drive pinion without the collapsible spacer.**

- Oil the two taper roller bearings.
- Insert the pinion and fit the bearing and nut.
- Hold the nut and tighten the pinion to 12 Nm.



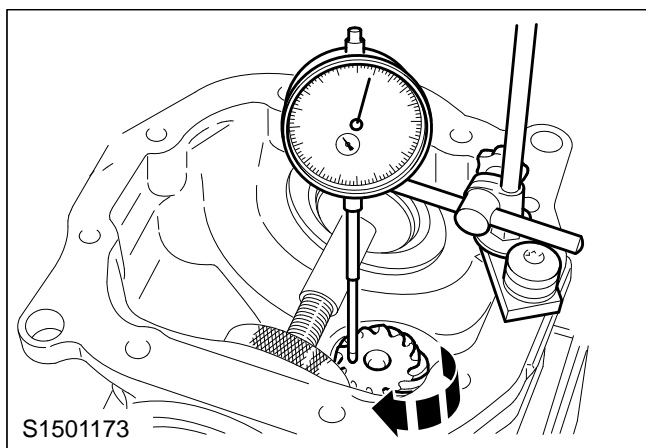
**NOTE:** Tighten or slacken the nut until the specified turning torque is obtained.

**42. Measure the turning torque of the drive pinion.**



**43. Measure the run out of the drive pinion.**

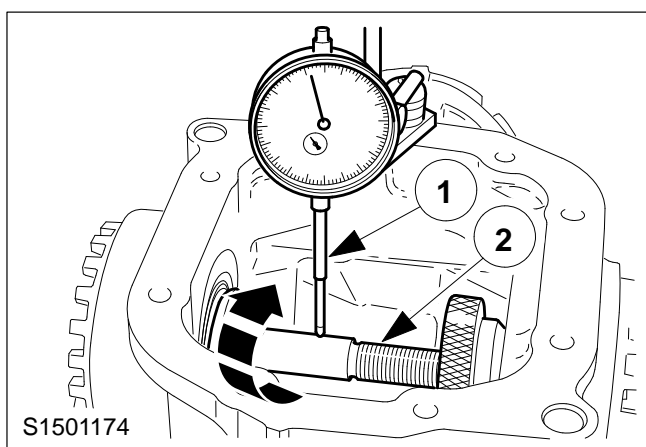
- 1 Set up the plunger on the outer edge of the drive pinion near the gauge bar.
- 2 Turn the pinion one revolution and note the total deflection.



**NOTE:** The pinion must not be turned any more after this.

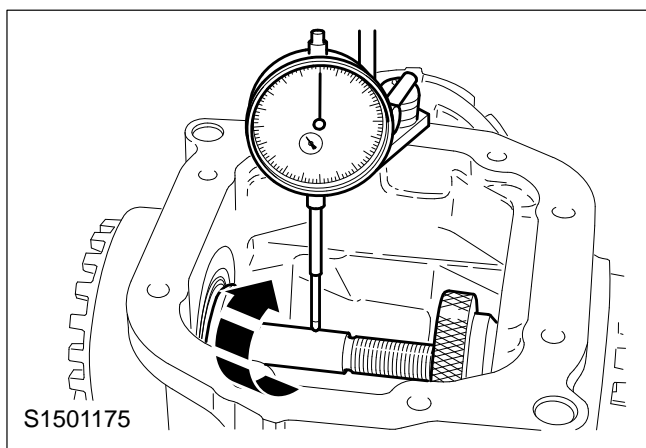
#### 44. Centre the drive pinion.

Turn the pinion until the dial indicator reading is half the total deflection (from step 43.).



#### 45. Measure the run out of the gauge bar.

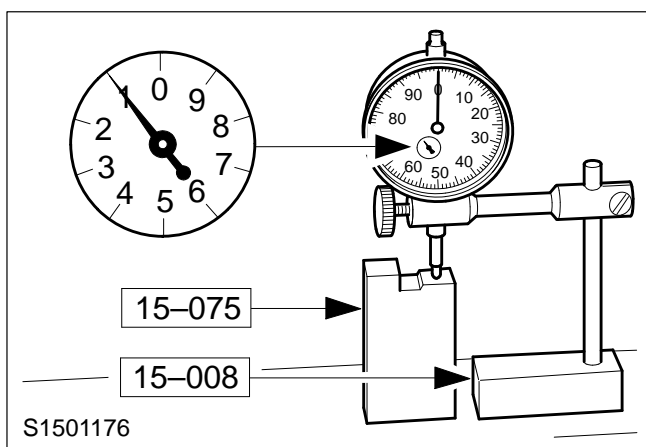
- 1 Position the plunger on the middle of the gauge bar.
- 2 Turn the gauge bar one revolution and note the total deflection.



**NOTE:** The gauge bar must not be turned any more after this.

#### 46. Centre the gauge bar.

Turn the gauge bar until the dial indicator reading is half the total deflection (from step 45.).

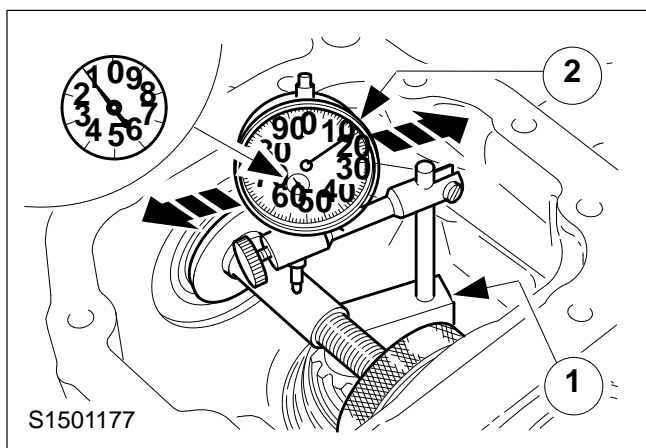


**CAUTION:** The pre-load is essential as otherwise the measurements will be incorrect.

**NOTE:** Use the bottom step for 7,5" axles.

#### 47. Adjust the dial indicator.

Set the dial indicator to "0" on a gauge plate with a "1 mm pre-load".



**NOTE:** Carry out the measurement accurately several times.

#### 48. Check the drive pinion shim.

**NOTE:** The dial indicator reading must now be  $1,00 \pm 0,01$  mm.

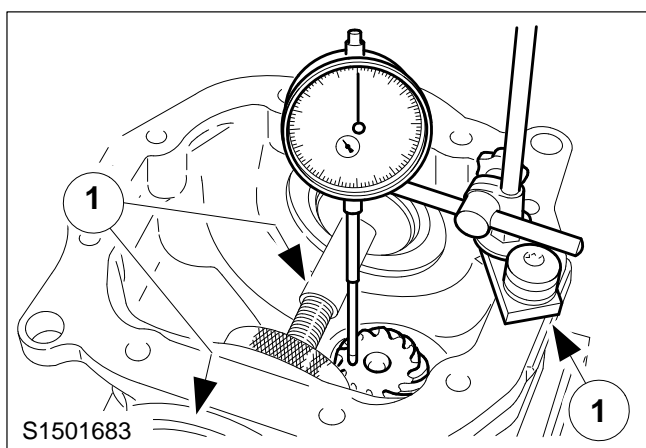
- 1 Set up the dial indicator fixture centrally on the drive pinion with the plunger positioned centrally on the gauge bar.
- 2 Slide the dial indicator transversely across the gauge bar and note the maximum deflection.

- Should the reading be more or less than the specified value, repeat the entire operation from step 38. to 48.

Example:

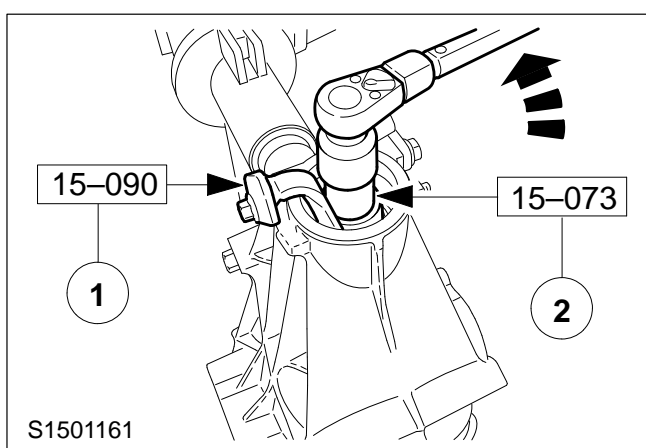
Measurement 1,08 mm = shim 0,08 mm too thin.

Measurement 0,92 mm = shim 0,08 mm too thick.



#### 49. Detach the measuring equipment.

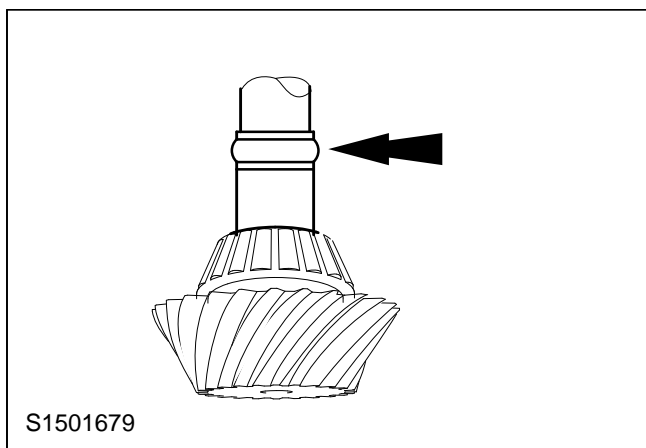
- 1 Dial indicator with fixture.
- 2 Bearing housings and gauge bar



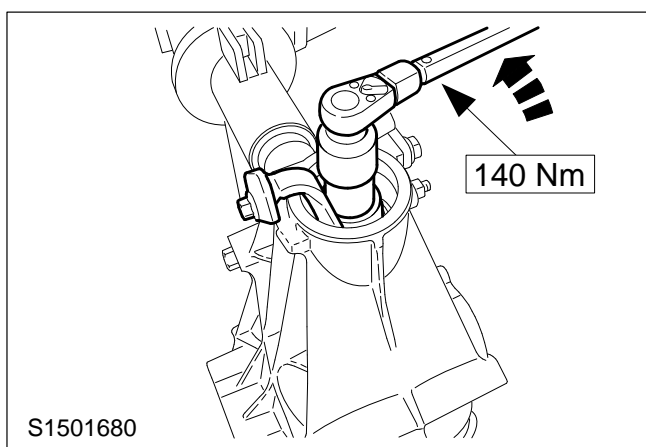
#### 50. Remove the drive pinion again.

- 1 Fit the holding tool.
- 2 Turn the drive pinion anti-clockwise using the special socket wrench.



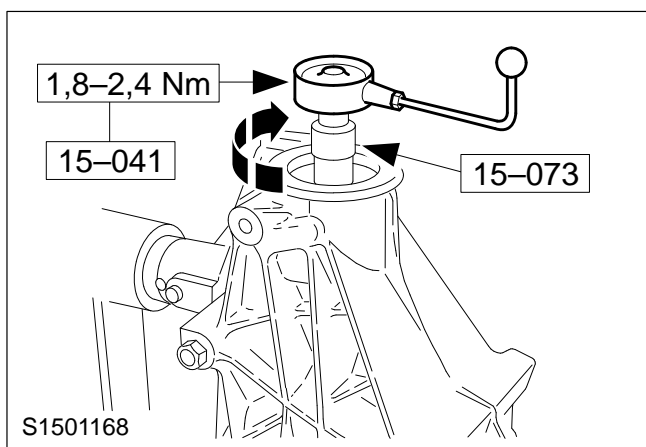


### 51. Fit a new collapsible spacer.



### 52. Fit the drive pinion

- Insert the pinion, fit the bearing and nut.
- Hold the nut and tighten the pinion to a maximum of 140 Nm.

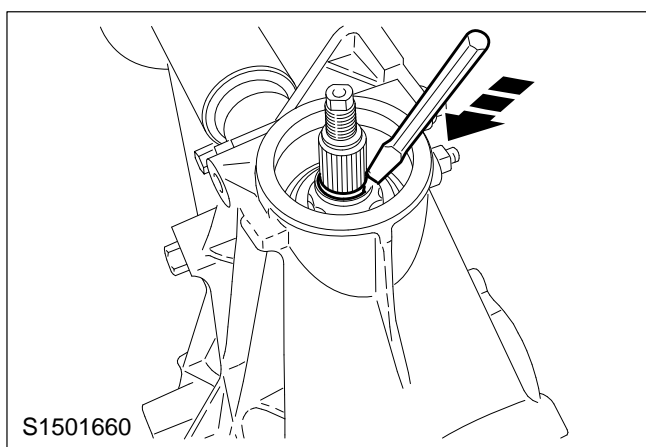


**⚠ CAUTION:** If the specified turning torque is exceeded, renew the collapsible spacer. Correction by slackening the pinion nut is not permitted.

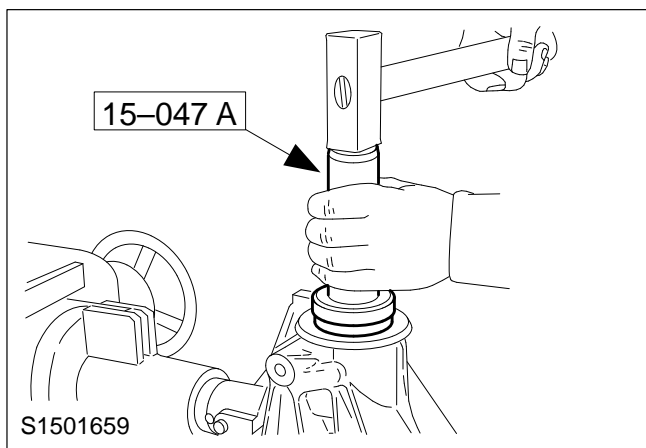
**NOTE:** Aim for the lower turning torque when re-using bearings and for the upper turning torque when fitting new bearings.

**NOTE:** Tighten the nut further until the specified turning torque is obtained.

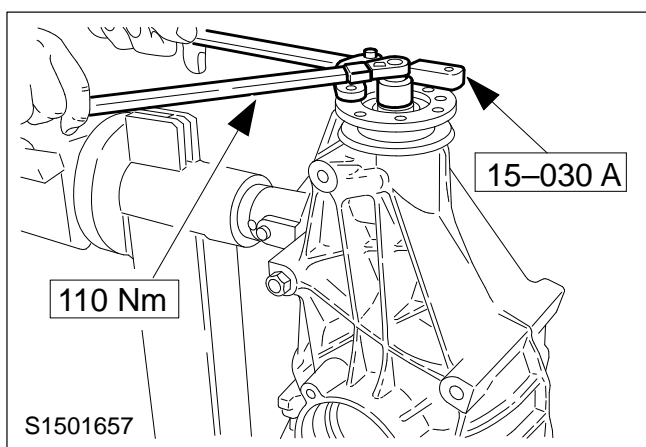
### 53. Measure the turning torque of the drive pinion.



### 54. Secure the drive pinion nut.

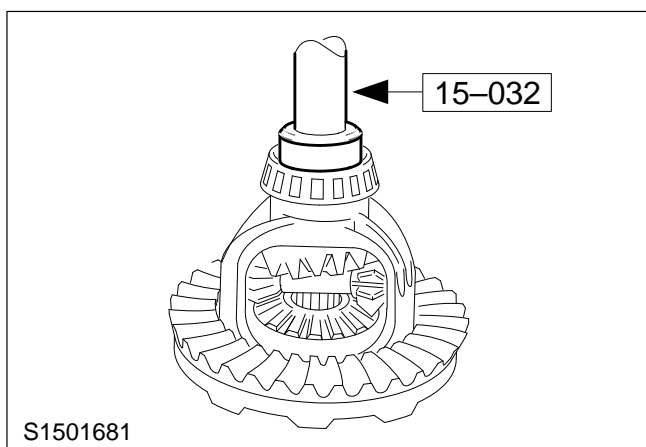


**55. Drive the drive pinion oil seal home.**



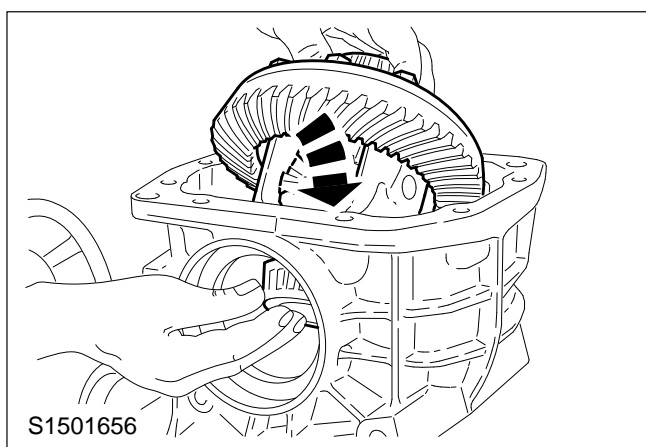
**56. Fit the drive flange using a new self-locking nut.**

- Hold using the special tool.
- Turn the transmission through 180°.



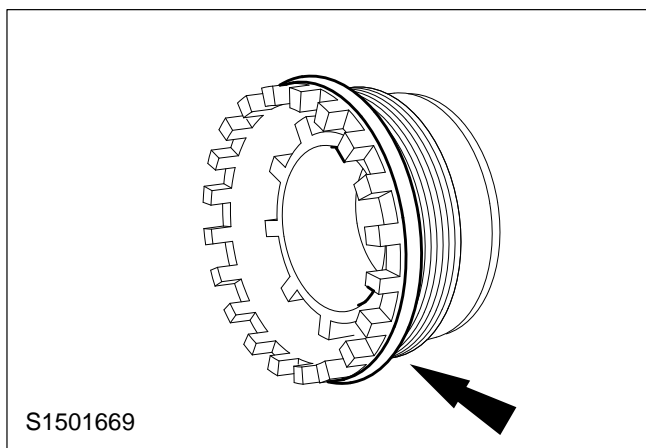
**NOTE:** Do not mix up the bearings.

**57. Fit the taper roller bearings.**



**NOTE:** Oil the taper roller bearings.

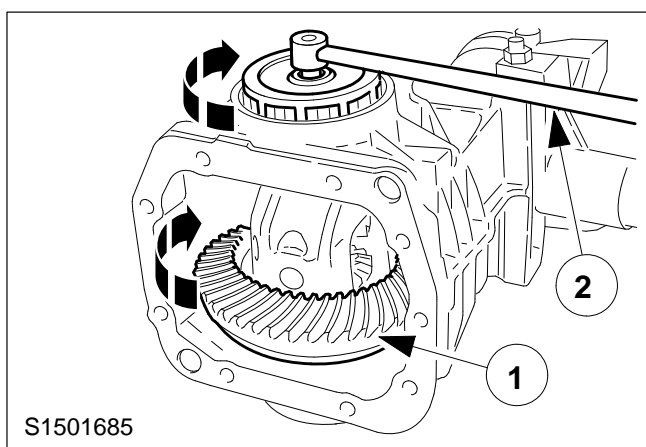
**58. Fit the differential.**



**NOTE:** Do not mix up the bearing housings.

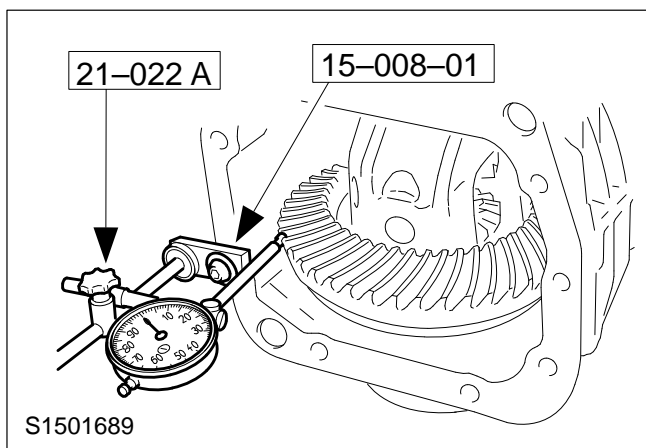
**59. Fit both bearing housings.**

- Fit the O-rings.
- Screw up the bearing housings uniformly until they make contact with the taper roller bearings. There must be appreciable backlash.
- Turn the housing through 90°.



**60. Adjust the bearings.**

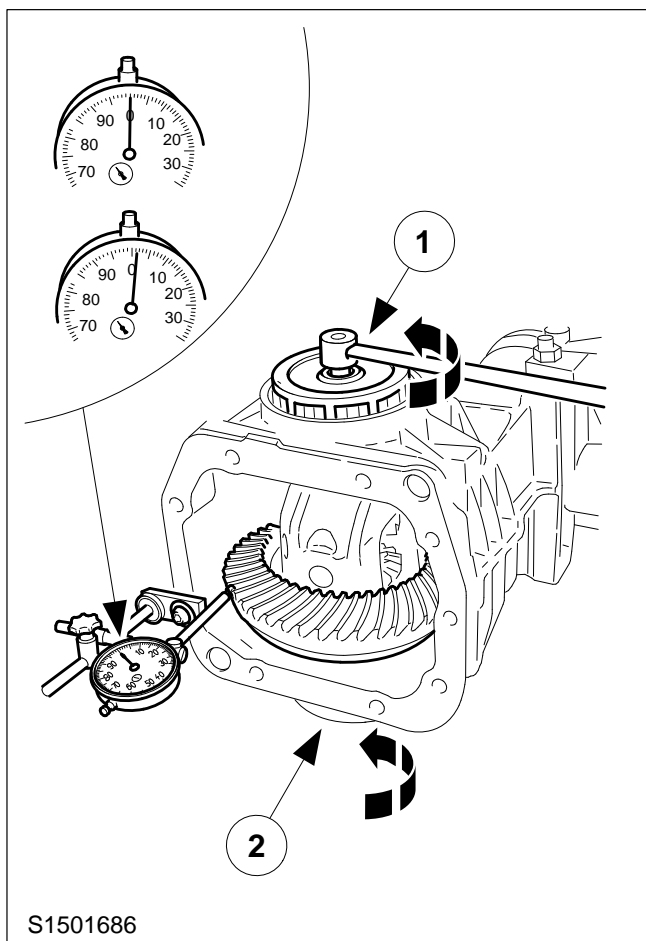
- 1 Turn the differential several times to settle the bearings.
- 2 Adjust the bearing housings until they make contact with the taper roller bearings; there must be appreciable backlash.



**Adjust backlash**

**NOTE:** Set up the dial indicator so that the plunger is at 90° to the flank of a tooth.

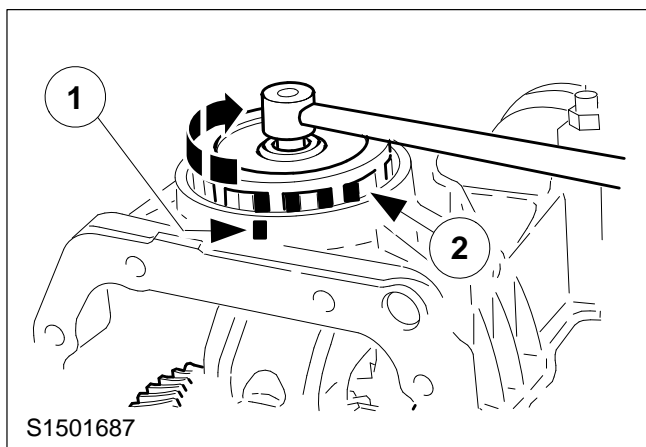
**61. Fit and set up a dial indicator.**



**NOTE:** Repeat sub-operations 1 and 2 until a backlash of 0,01 mm is obtained. One castellation tooth + gap = 0,04 mm change in backlash.

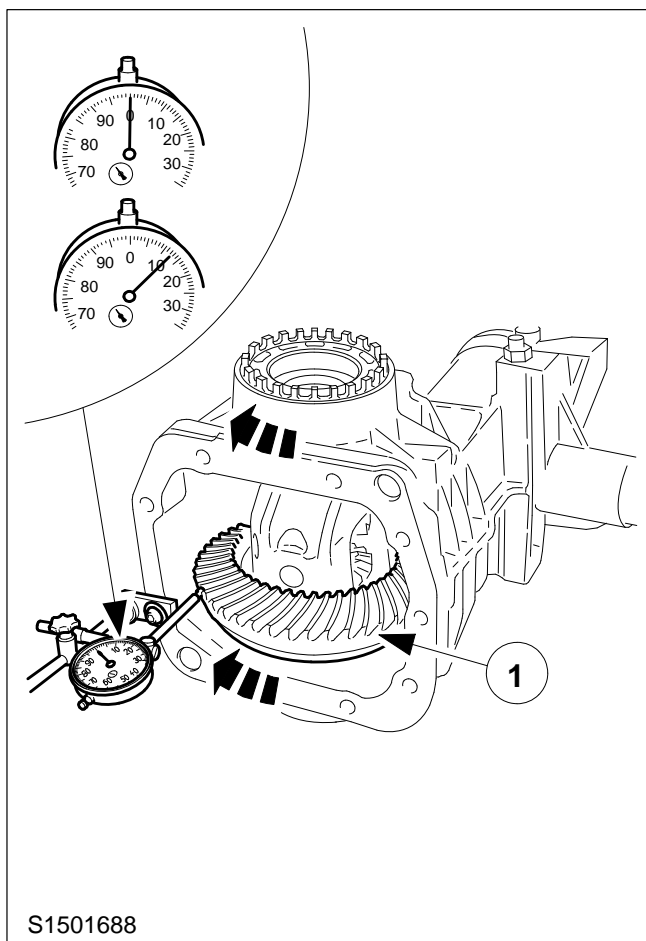
### 62. Set the backlash to 0,01 mm.

- 1 Slacken the bearing housings.
- 2 Adjust the bearing housings until they make contact with the taper roller bearings.



### 63. Adjust the bearing pre-load.

- 1 Mark the position of the bearing housing in relation to the differential housing.
- 2 Turn the bearing housing exactly 4 castellation teeth further.



**NOTE:** The specified backlash should be achieved if the preceding operations have been carried out correctly.

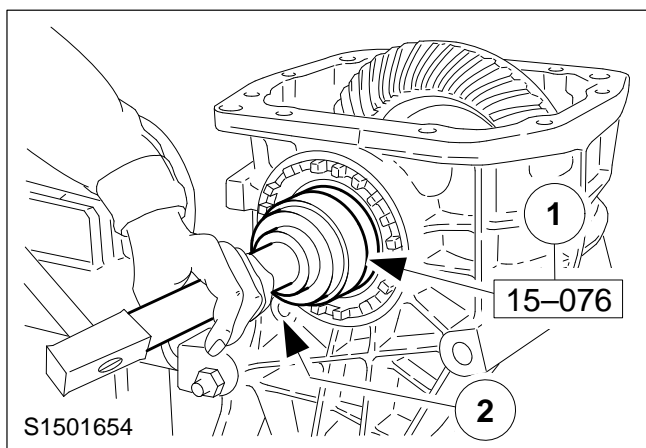
**NOTE:** Differences in backlash must not exceed 0,03 mm.

#### 64. Check the backlash.

- Turn the differential several revolutions.
- Recheck the backlash at three points.

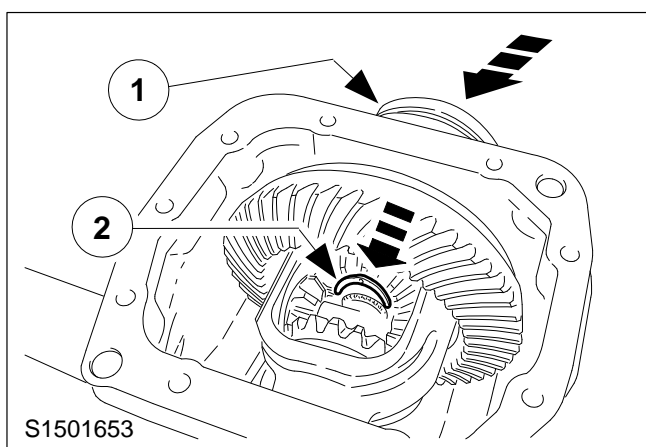
#### 65. Check the crown wheel run out.

Should not exceed 0,05 mm.



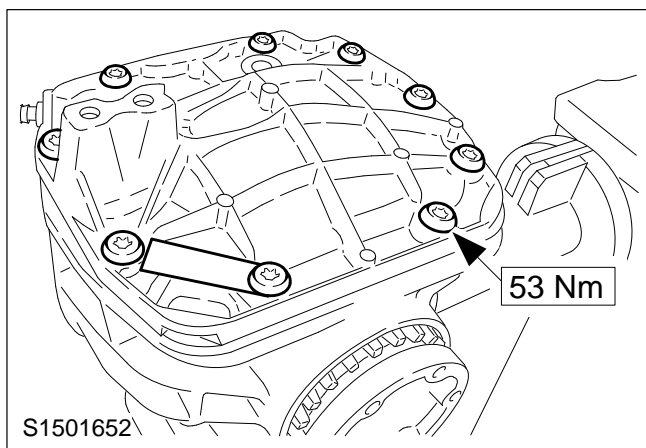
#### 66. Fit the radial oil seals.

- 1 Drive the oil seals home.
- 2 Fit the bearing housing retainer.



#### 67. Install the rear axle driveshaft flanges.

- 1 Insert the left and right-hand rear axle driveshafts.
- 2 Fit the circlips.



**NOTE:** The mating face must be dry.

**68. Fit the differential cover.**

Apply sealer (SQM-4G9523-A) to the mating face.