

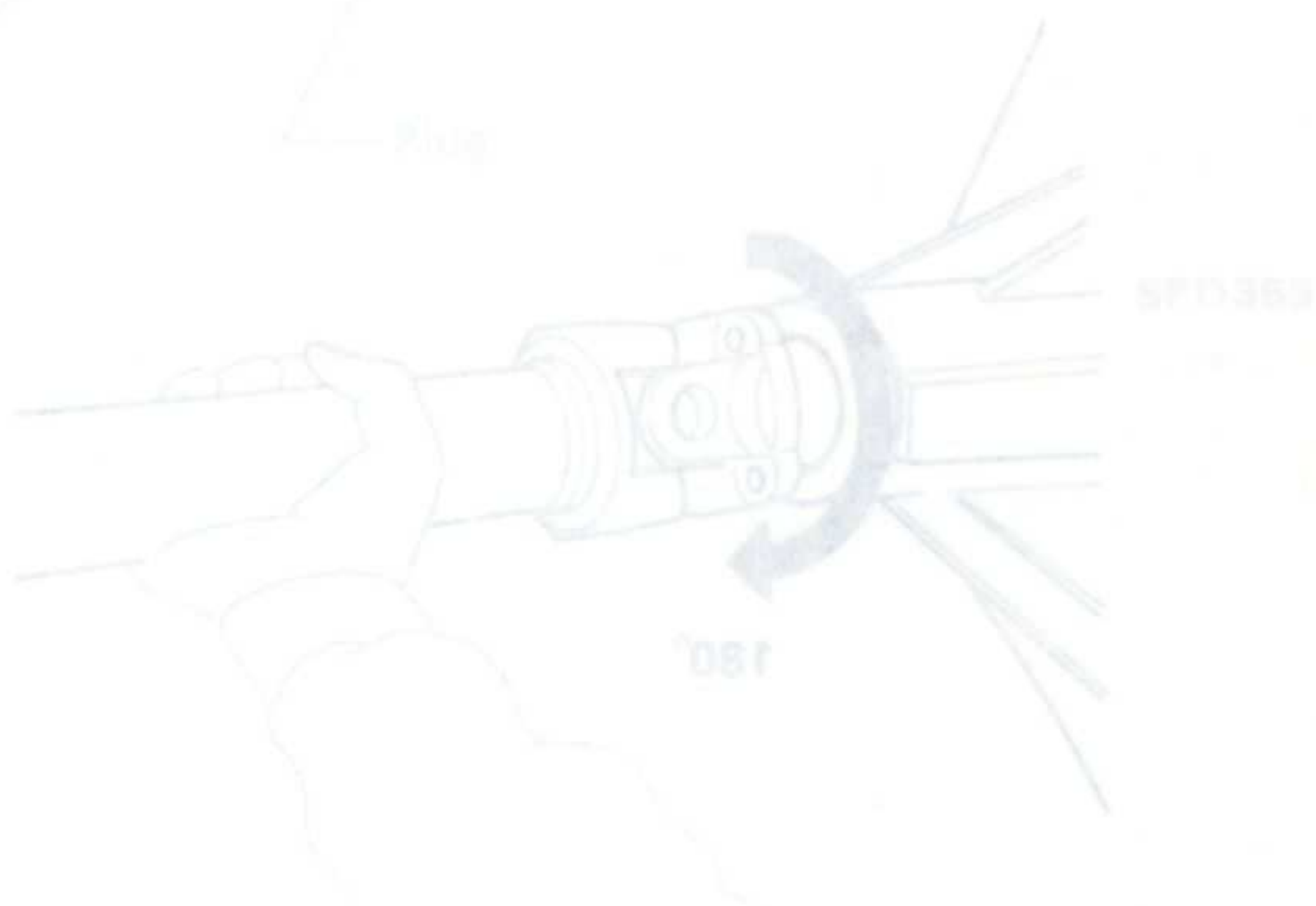
PROPELLER SHAFT & DIFFERENTIAL CARRIER

SECTION PD

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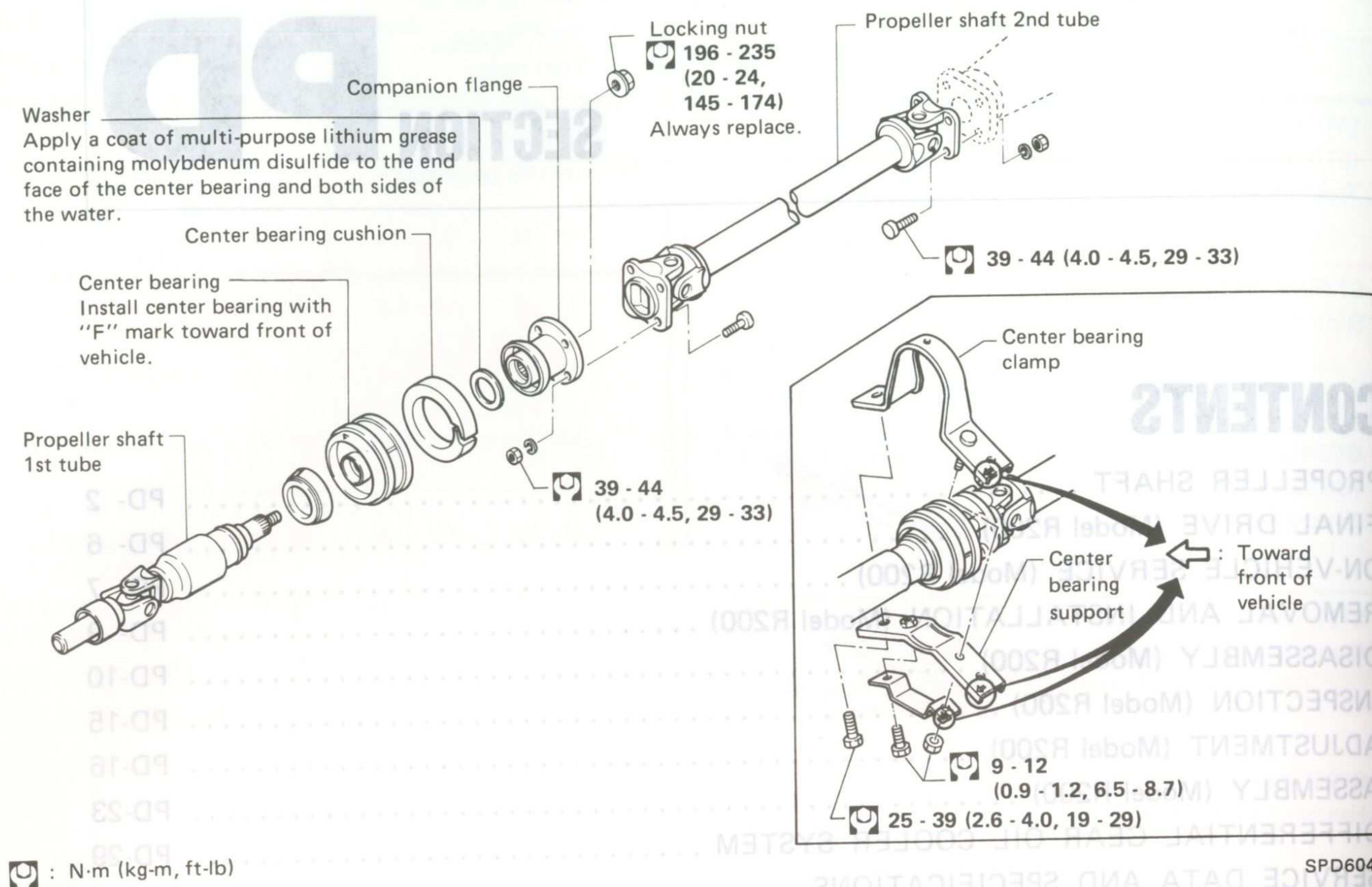
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PD



- Inspect propeller shaft tube surface for dents or cracks.
 - If damaged, replace propeller shaft assembly.
 - If center bearing is noisy or damaged, replace center bearing.
- PROPELLER SHAFT VIBRATION**
- To check and correct an unbalanced propeller shaft, proceed as follows:
1. Remove undercoating and other foreign material which could upset shaft balance, and check shaft vibration by road test.
 2. If shaft vibration is noted during road test, disconnect propeller shaft at differential carrier companion flange, rotate companion flange 180 degrees and reconnect propeller shaft.

PROPELLER SHAFT



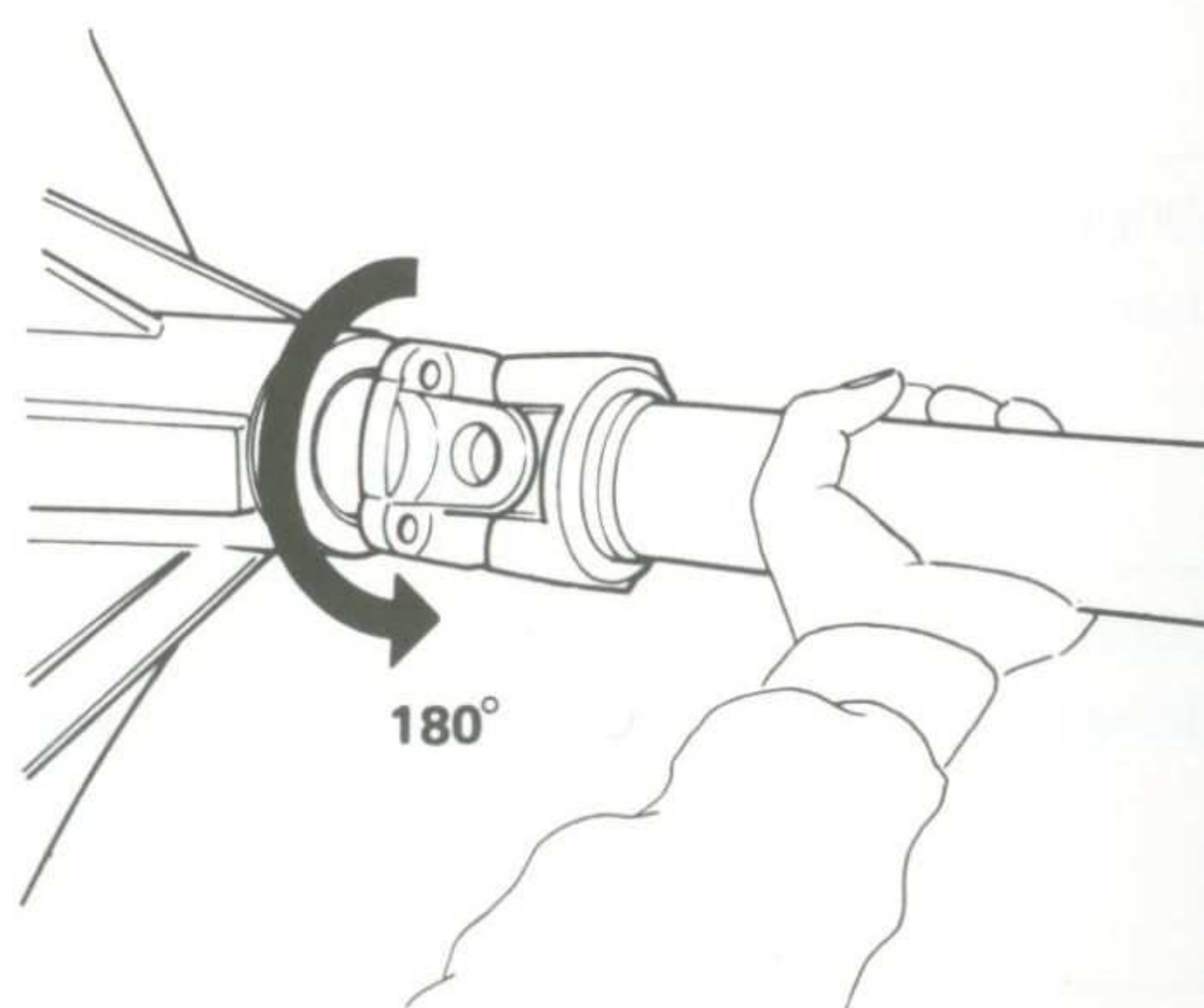
General Inspection

- Inspect propeller shaft tube surface for dents or cracks.
If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace center bearing.

PROPELLER SHAFT VIBRATION

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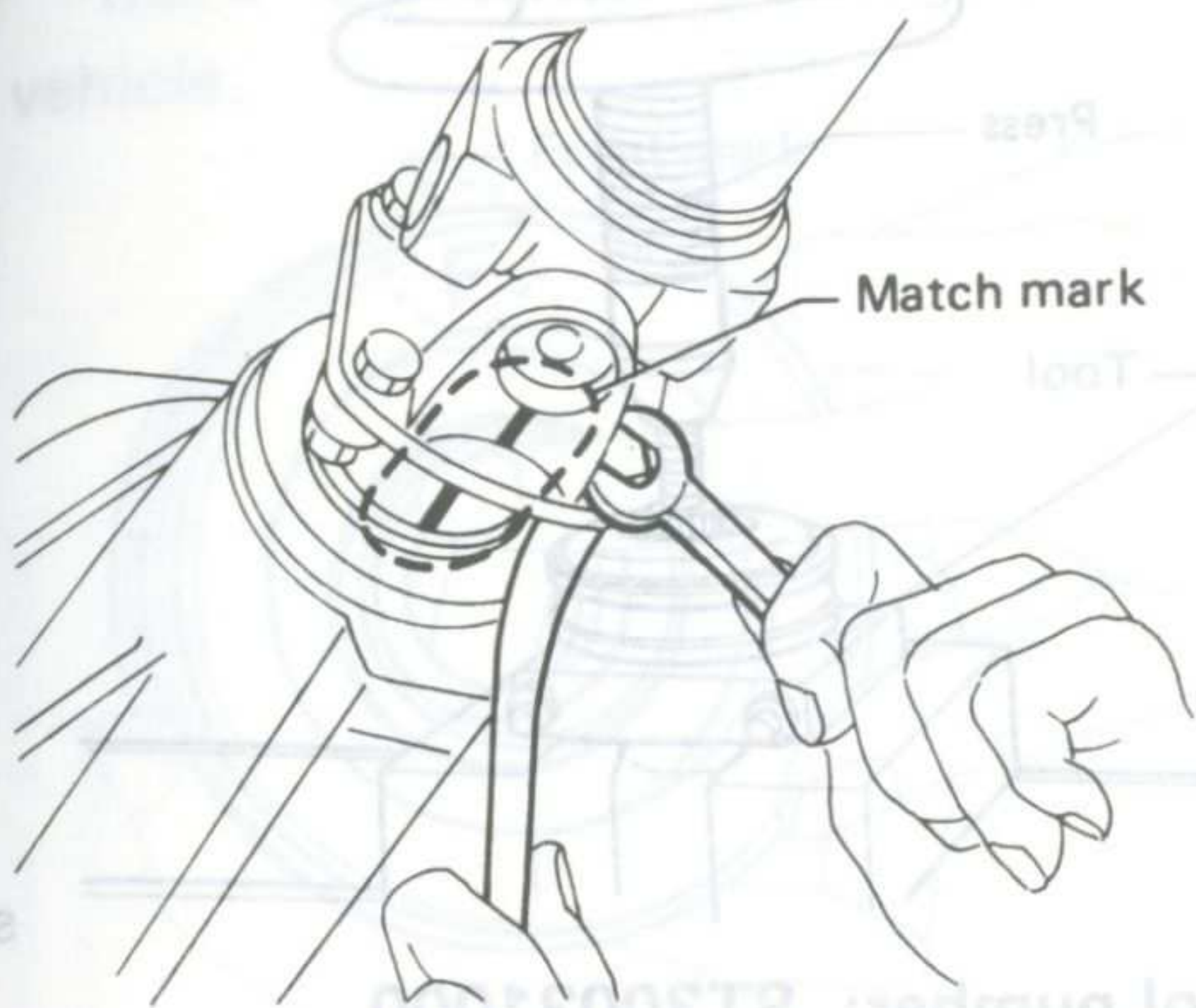


3. Again check shaft vibration. If vibration still persists, replace propeller shaft assembly.

PROPELLER SHAFT

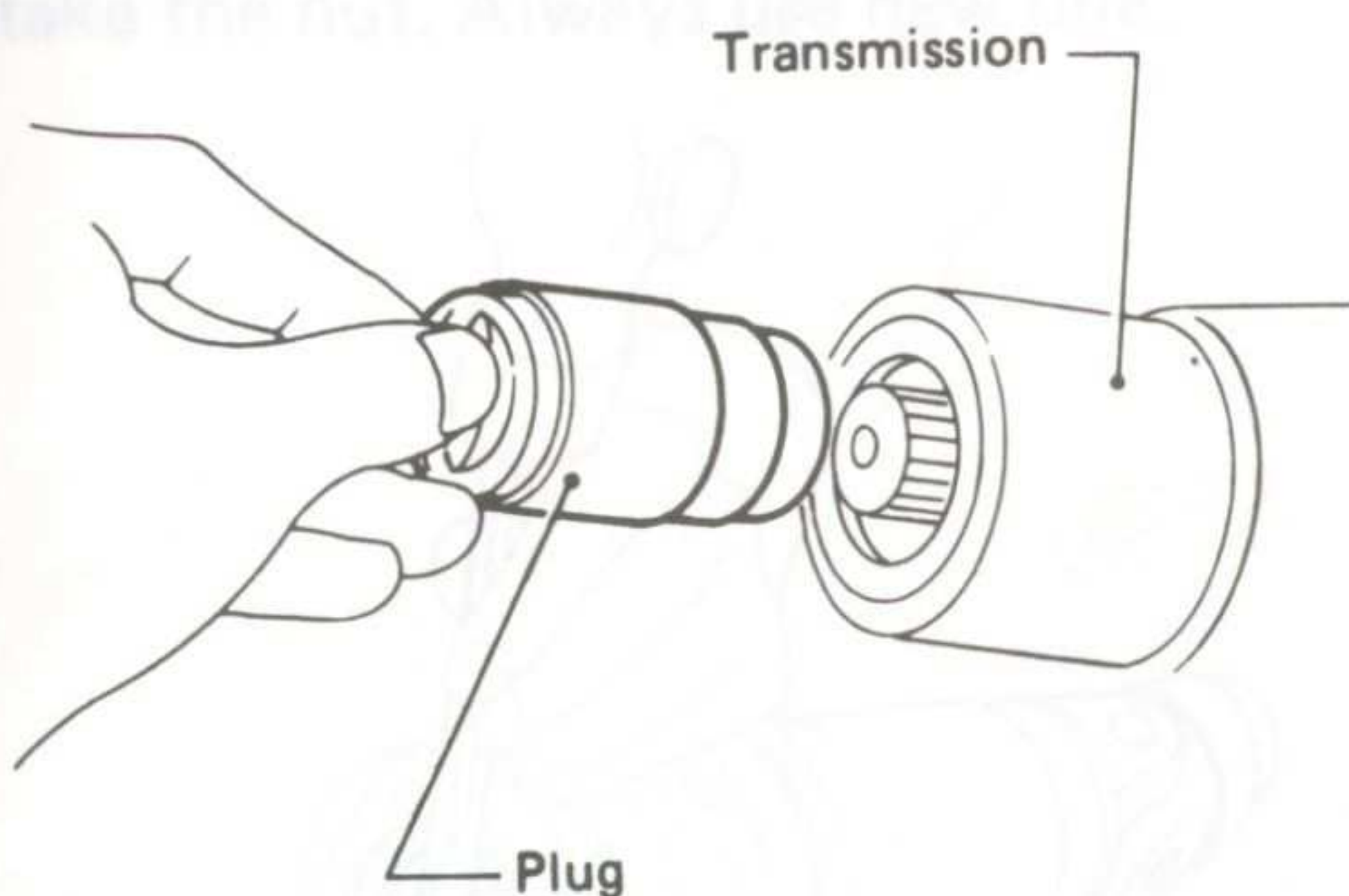
Removal and Installation

- Put match marks on flanges and separate propeller shaft from differential carrier.



SPD103

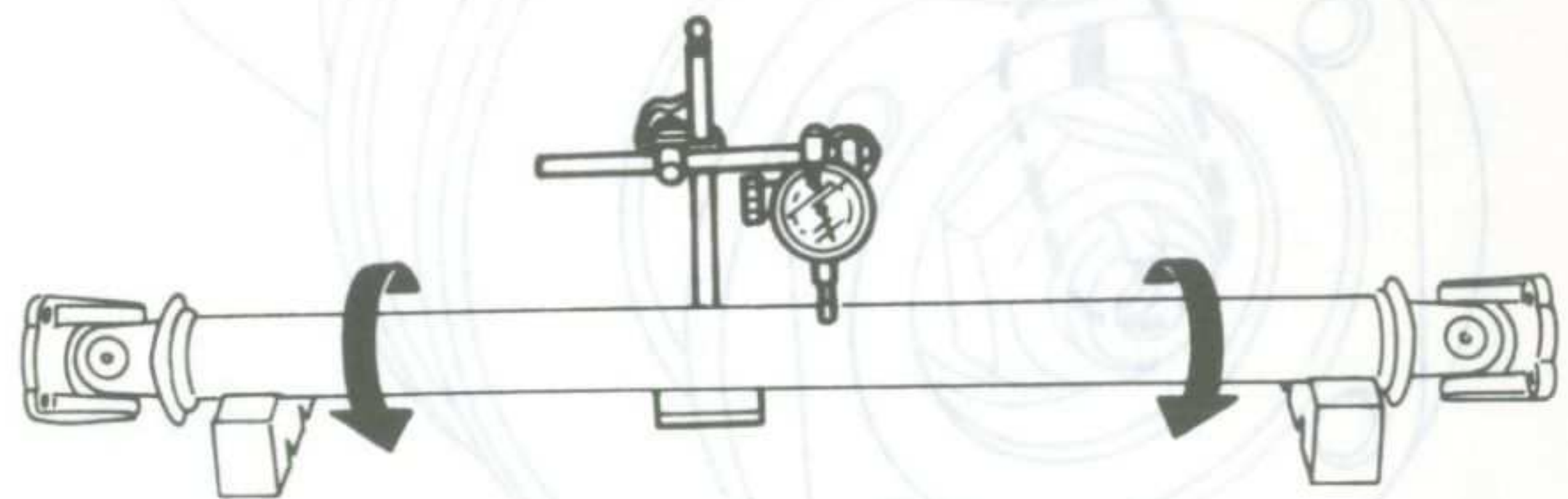
- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.



SPD359

Inspection

- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.



SPD106

Runout limit: 0.6 mm (0.024 in)

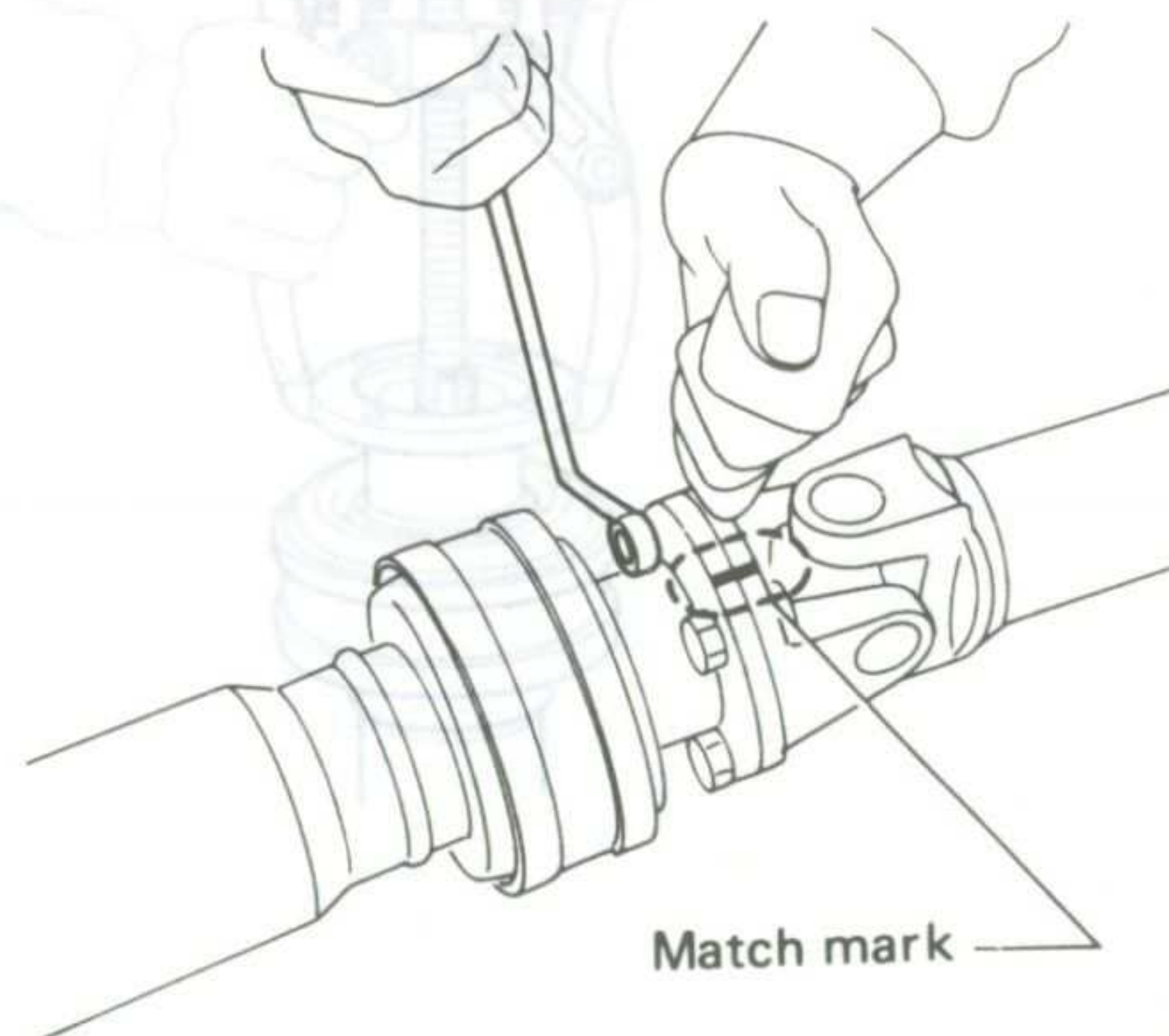
- Inspect journal axial play. If the play exceeds specifications, replace propeller shaft assembly.

Journal axial play:
0 mm (0 in)

Disassembly

CENTER BEARING

- Put match marks on flanges, and separate 2nd tube from 1st tube.

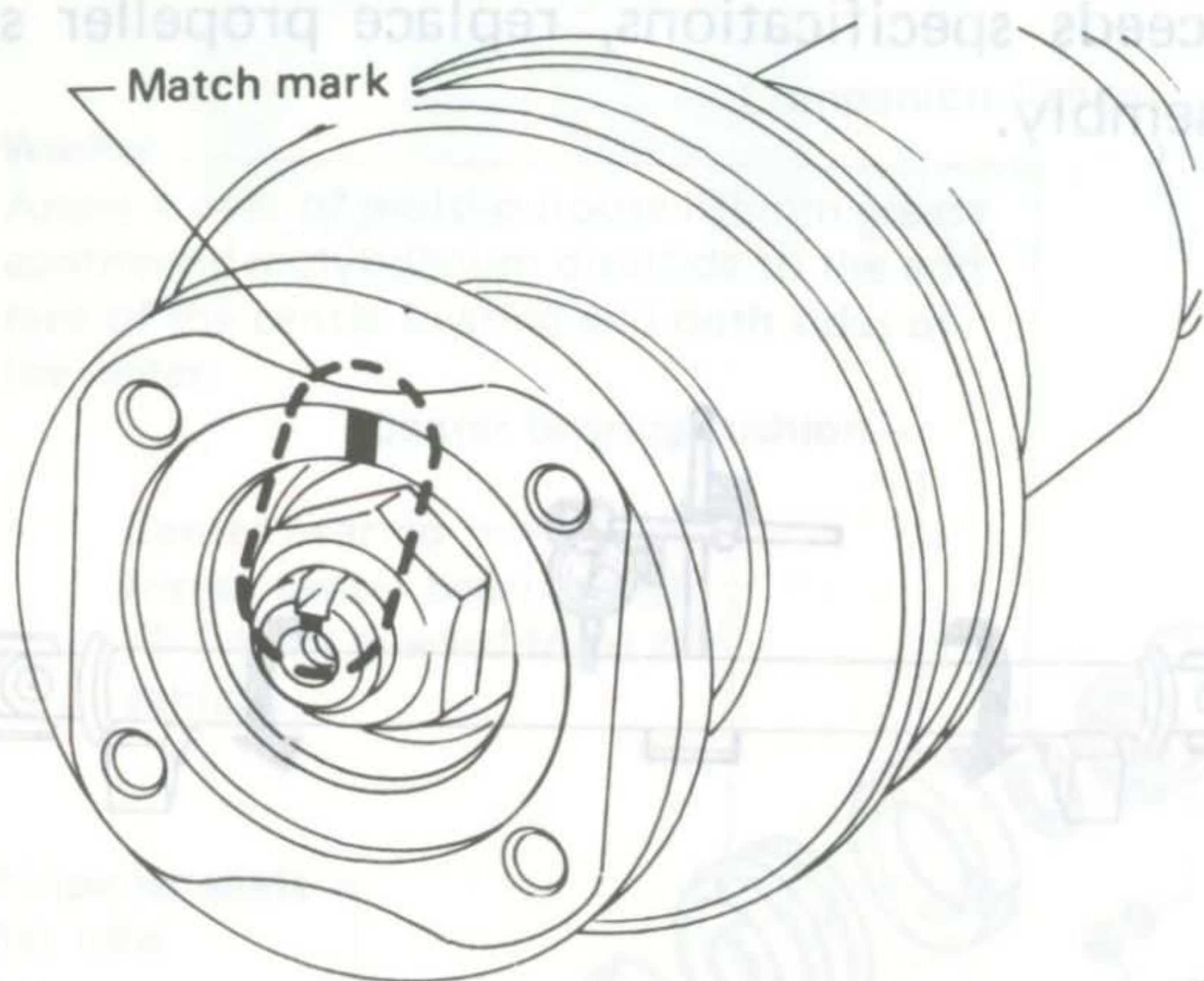


SPD109

PROPELLER SHAFT

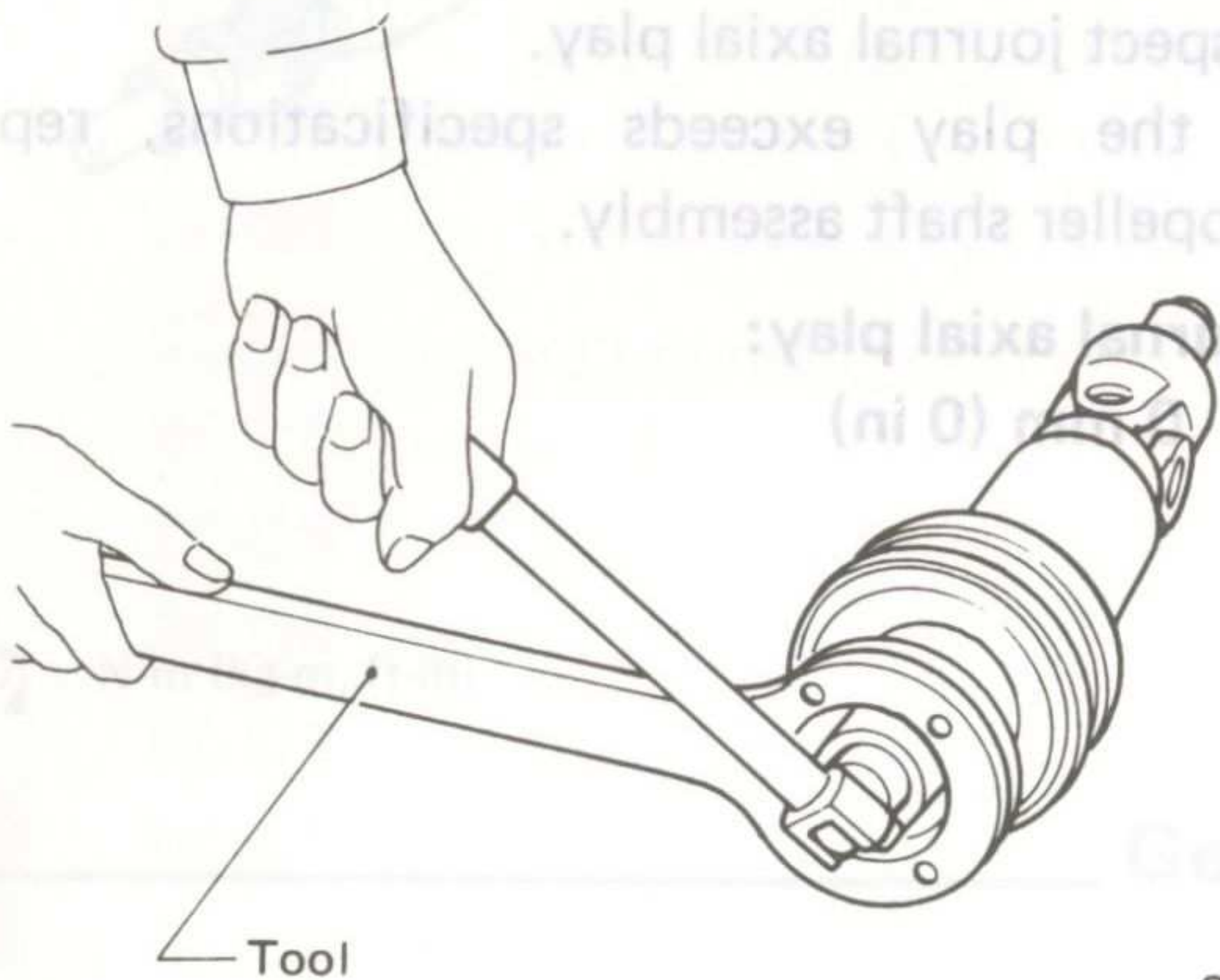
Disassembly (Cont'd)

- Put match marks on the flange and shaft.



SPD110

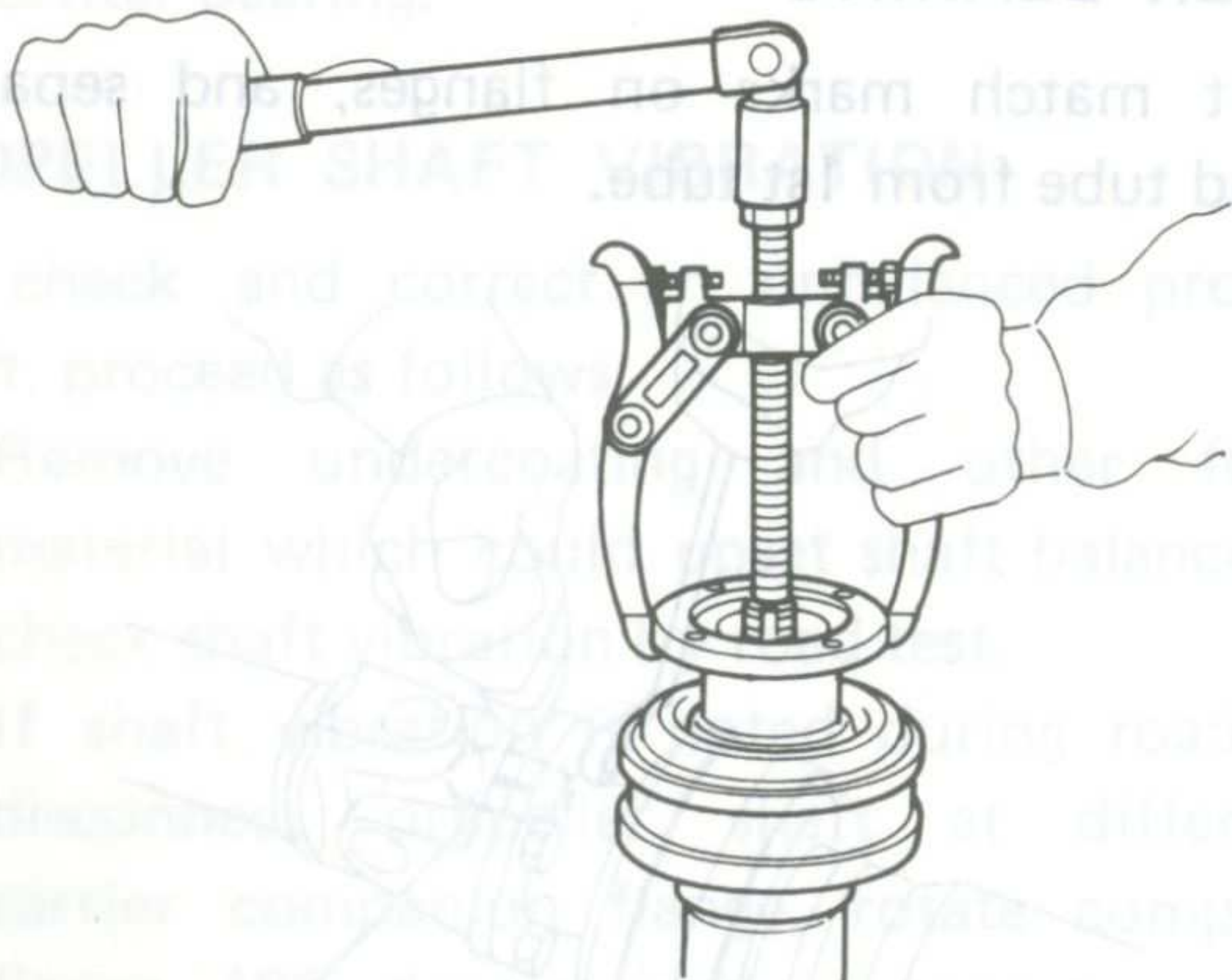
- Remove locking nut with Tool.



SPD111

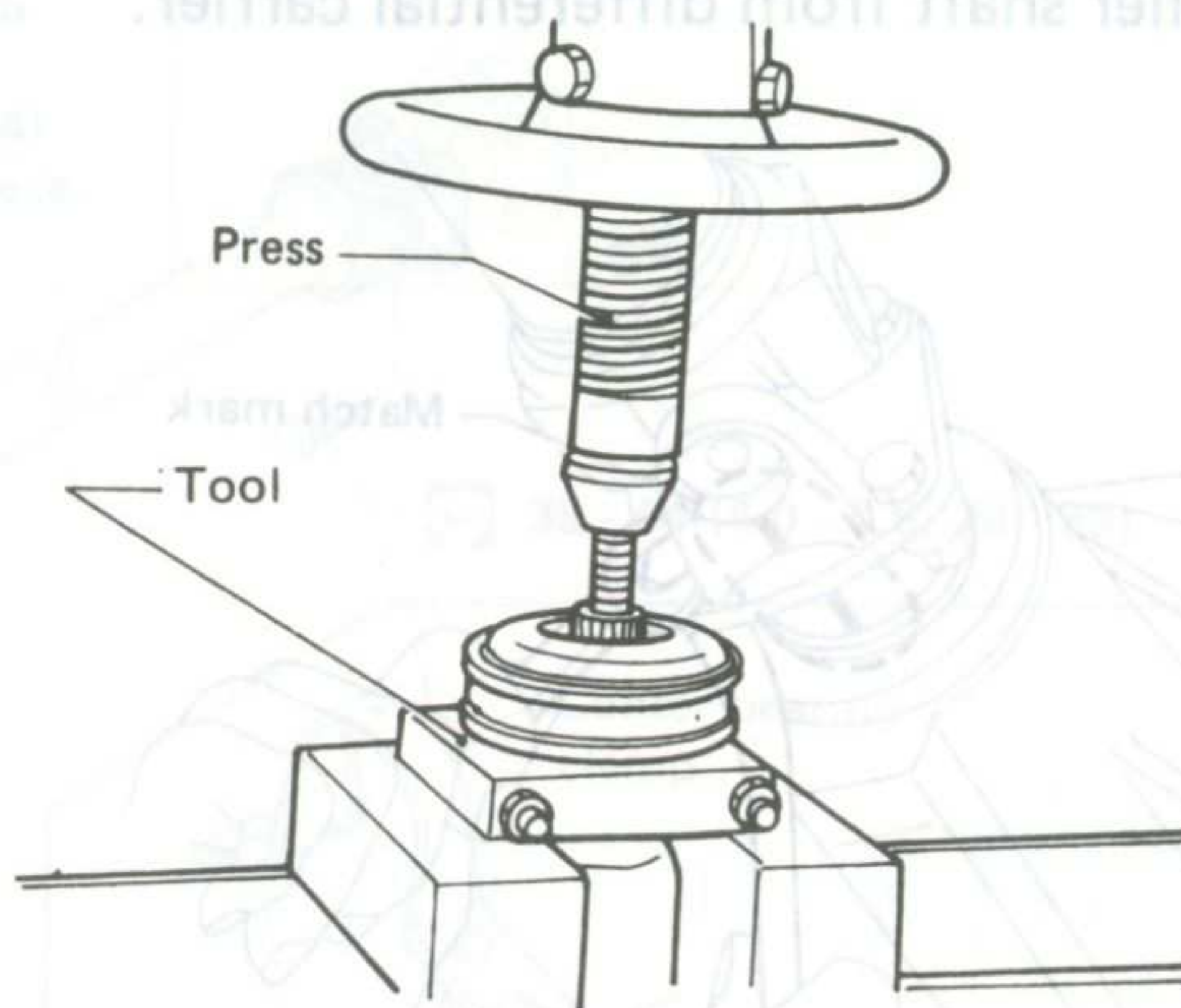
Tool number: ST31520000

- Remove companion flange with puller.



SPD112

- Remove center bearing with Tool and press.



SPD113

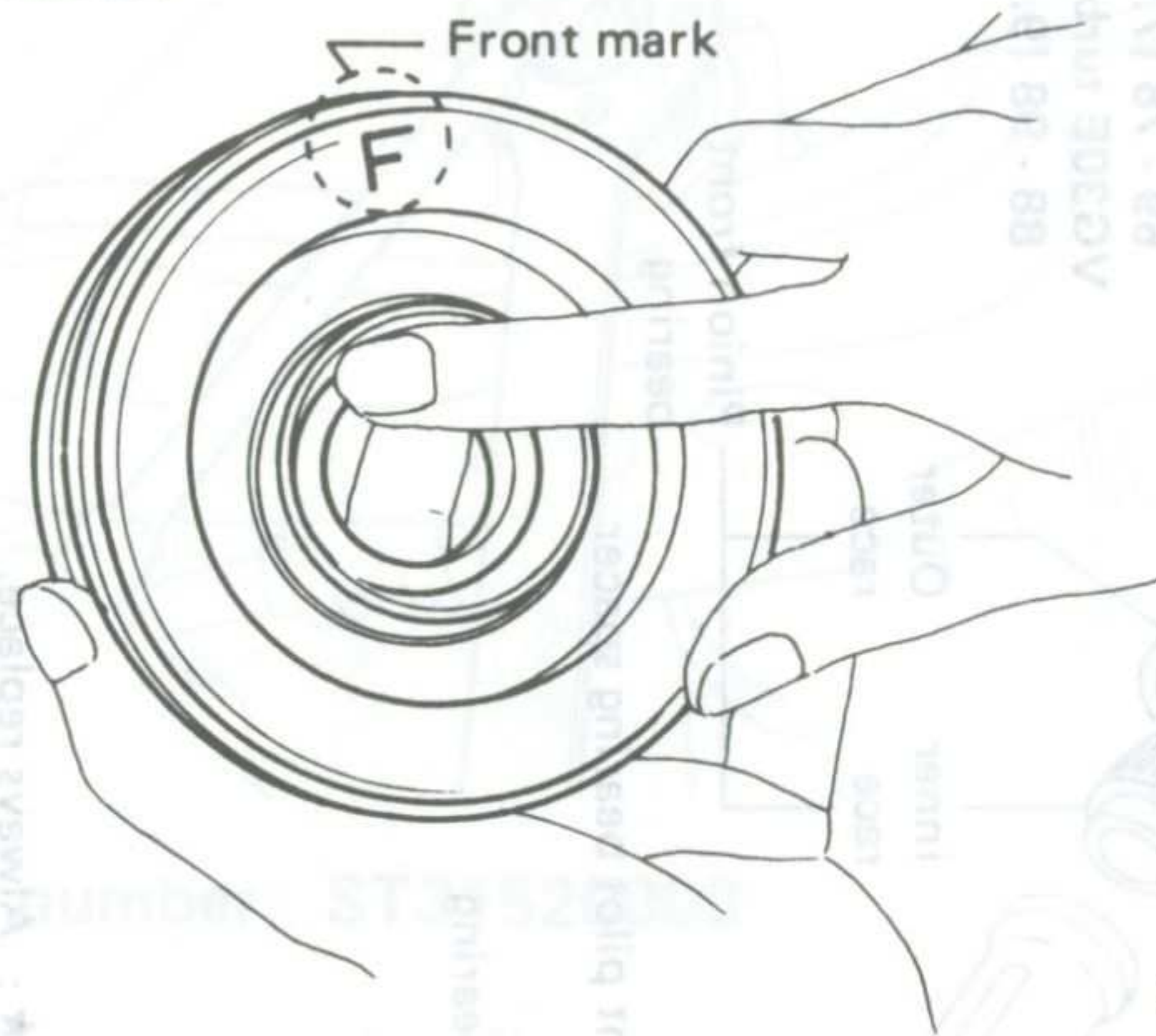
Tool number: ST30031000

PROPELLER SHAFT

Assembly

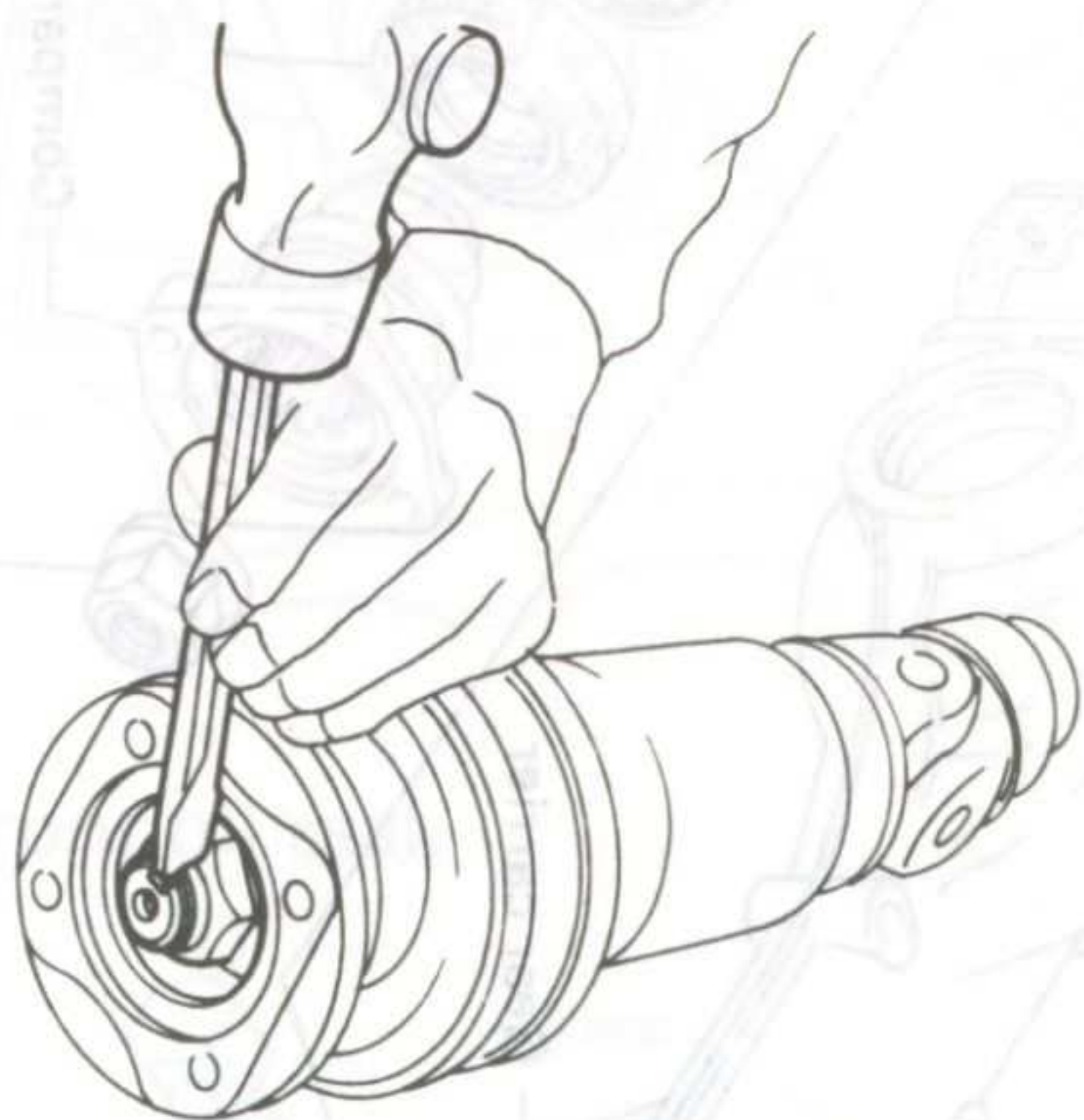
CENTER BEARING

- When installing center bearing, position the "F" mark on center bearing toward front of vehicle.



SPD114

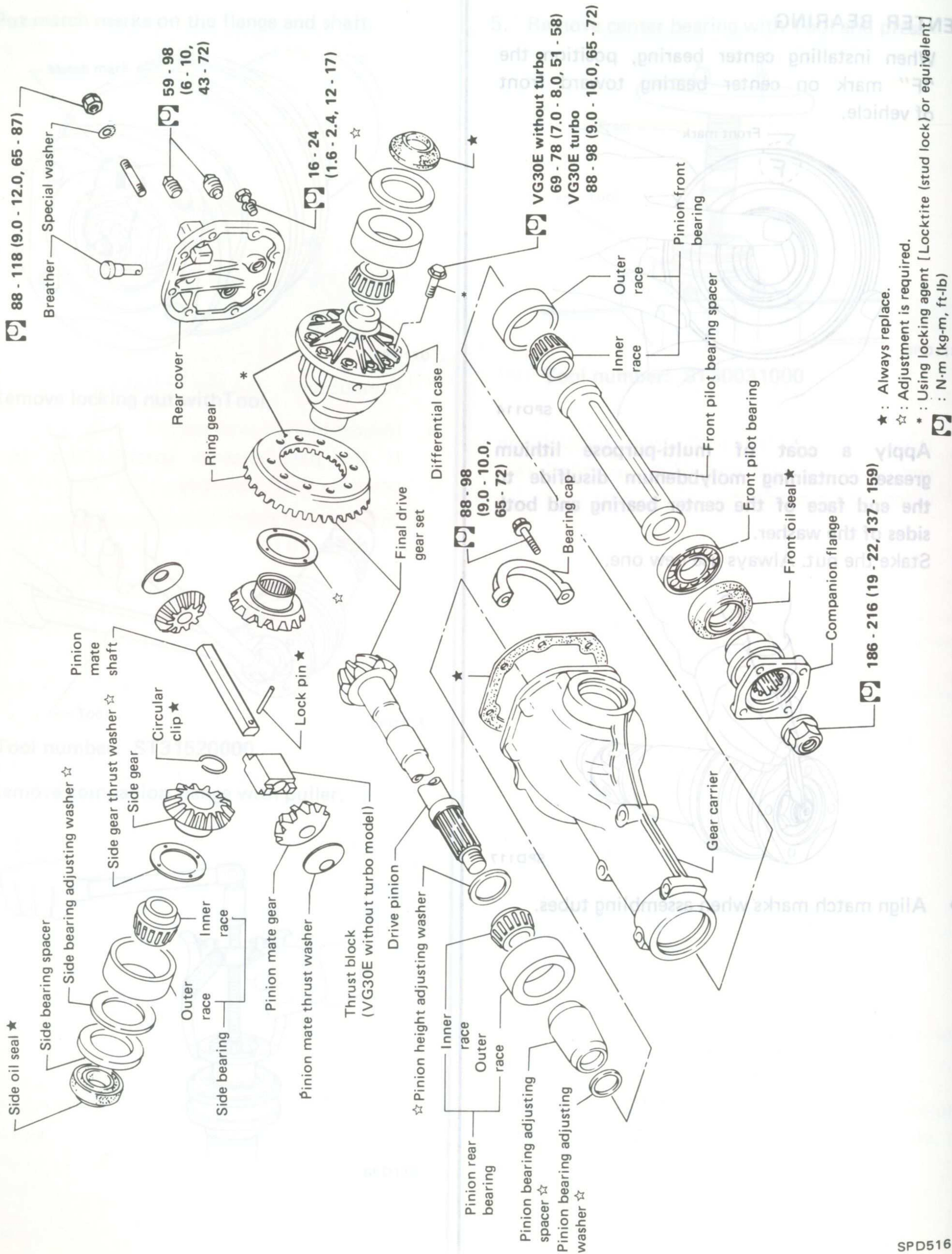
- Apply a coat of multi-purpose lithium grease containing molybdenum disulfide to the end face of the center bearing and both sides of the washer.
- Stake the nut. Always use new one.



SPD117

- Align match marks when assembling tubes.

FINAL DRIVE (Model R200)

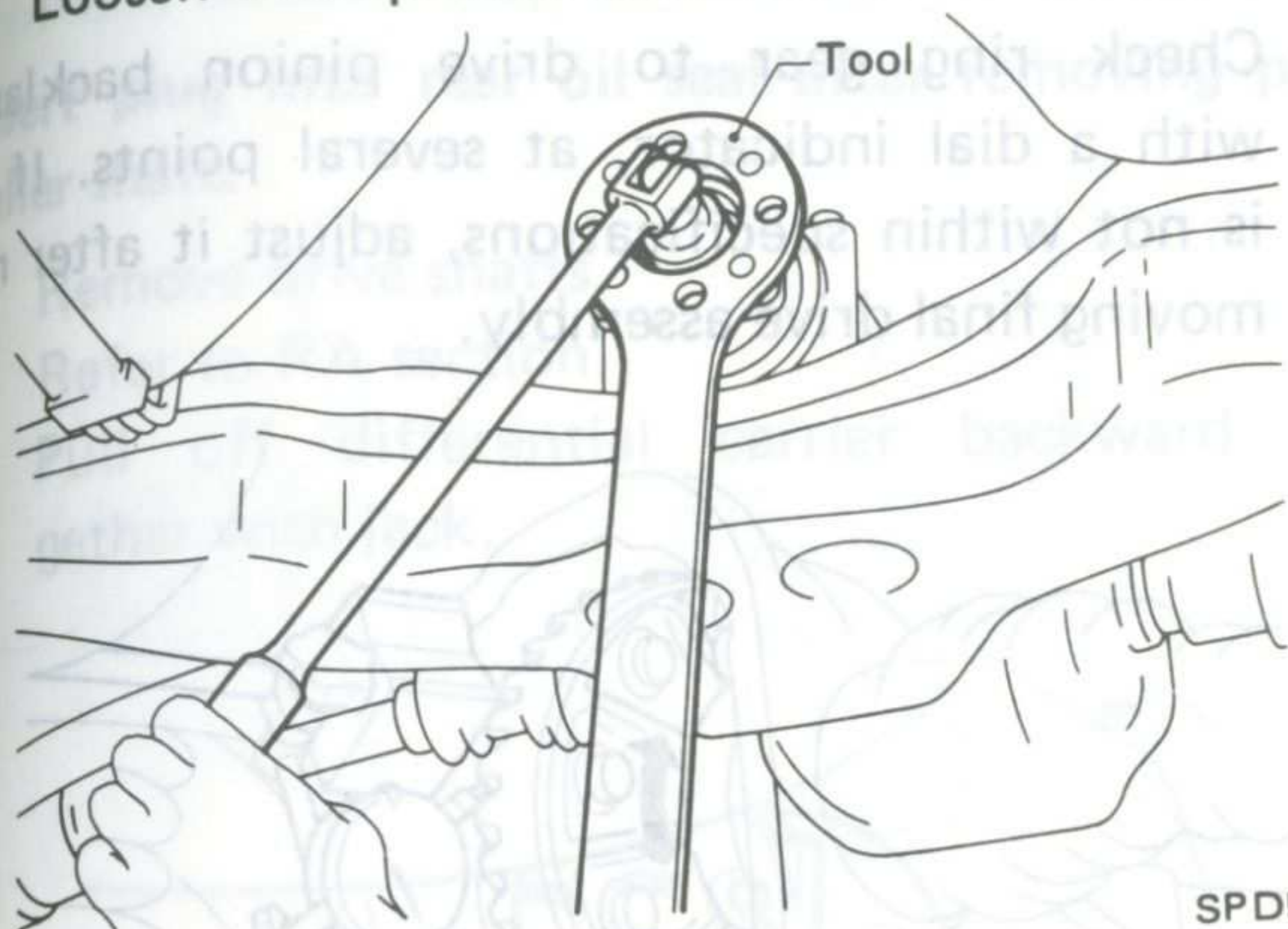


SPD516

ON-VEHICLE SERVICE (Model R200)

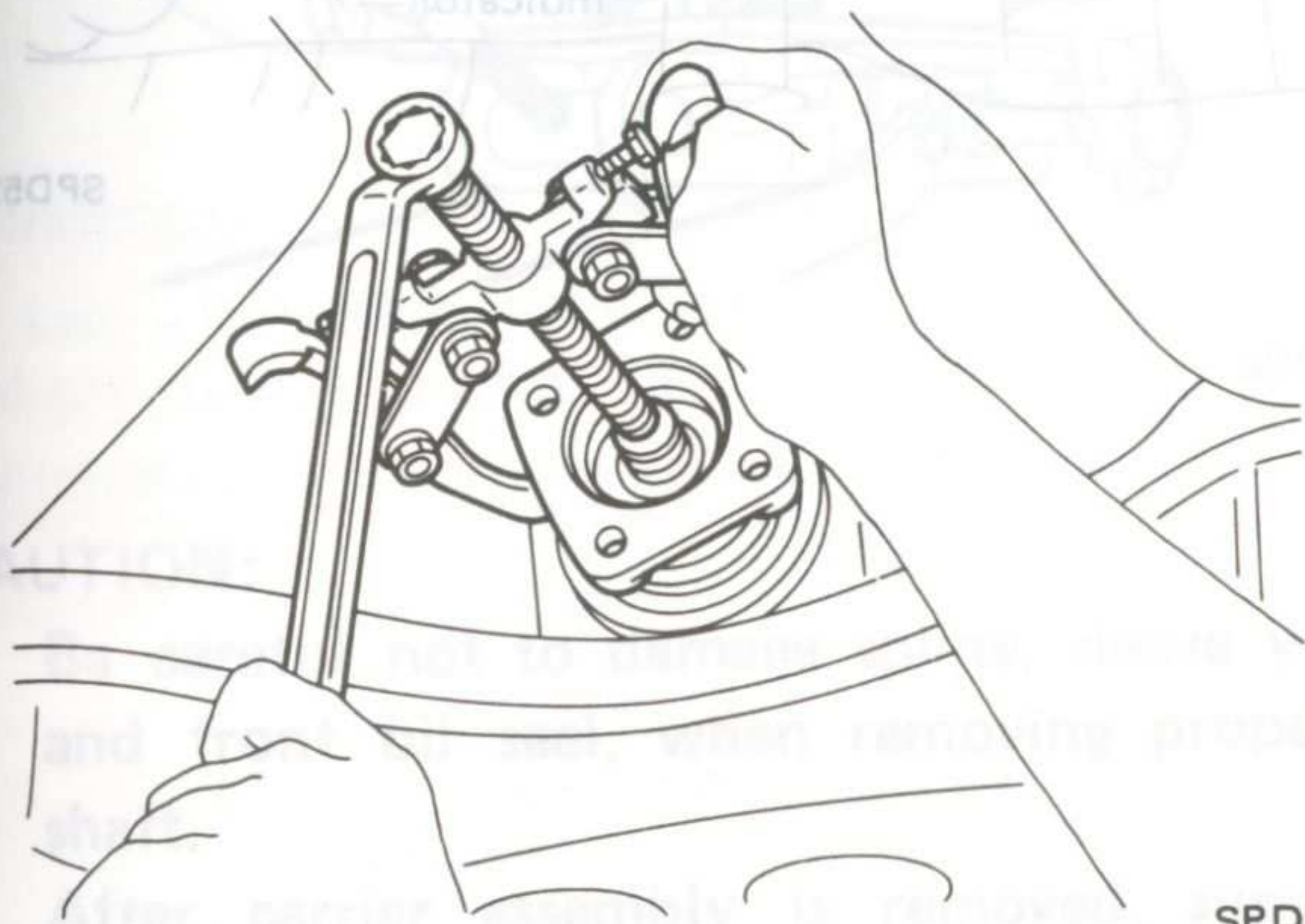
Front Oil Seal Replacement

1. Remove propeller shaft.
2. Loosen drive pinion nut.

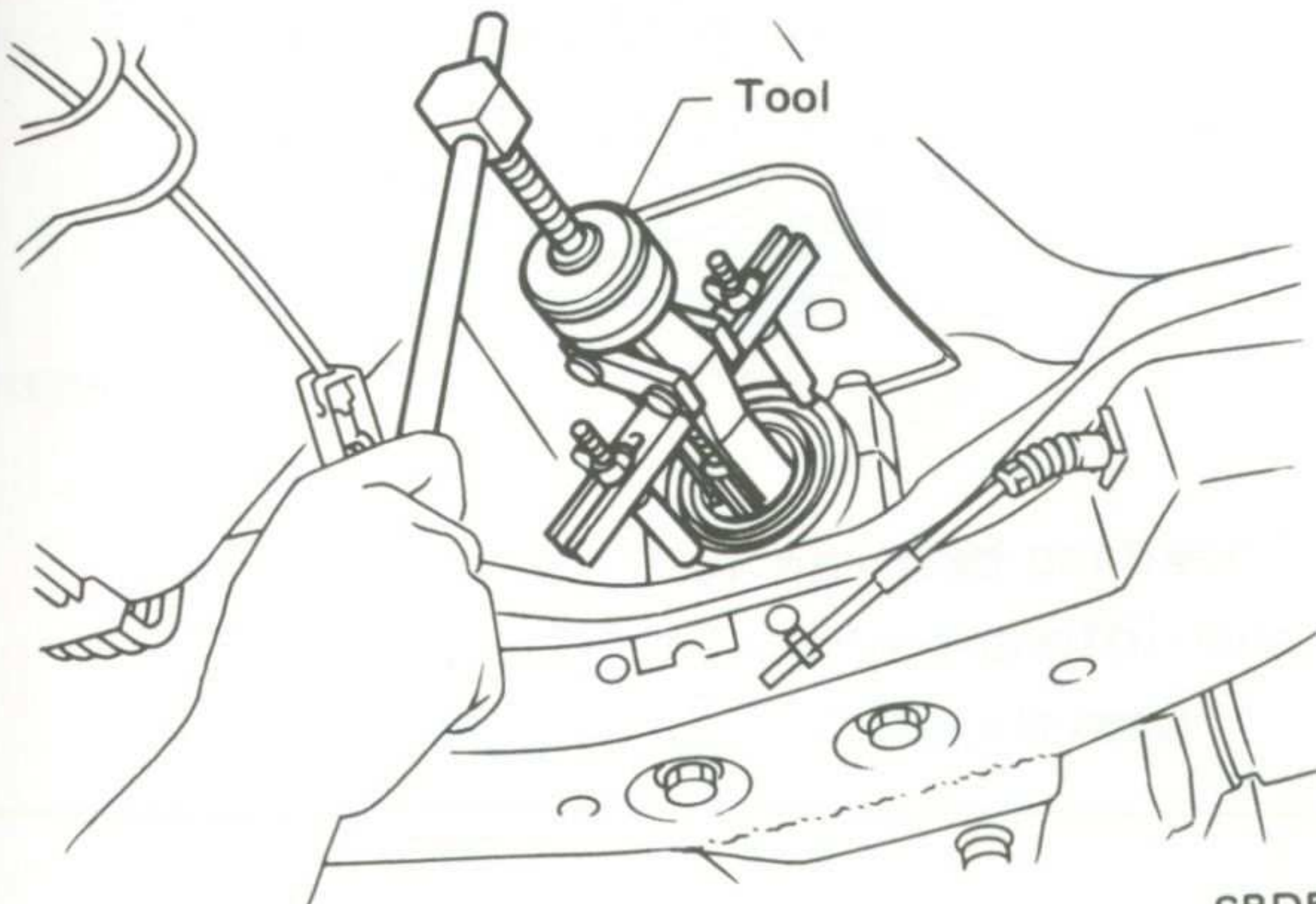


Tool number: ST31520000

3. Remove companion flange.



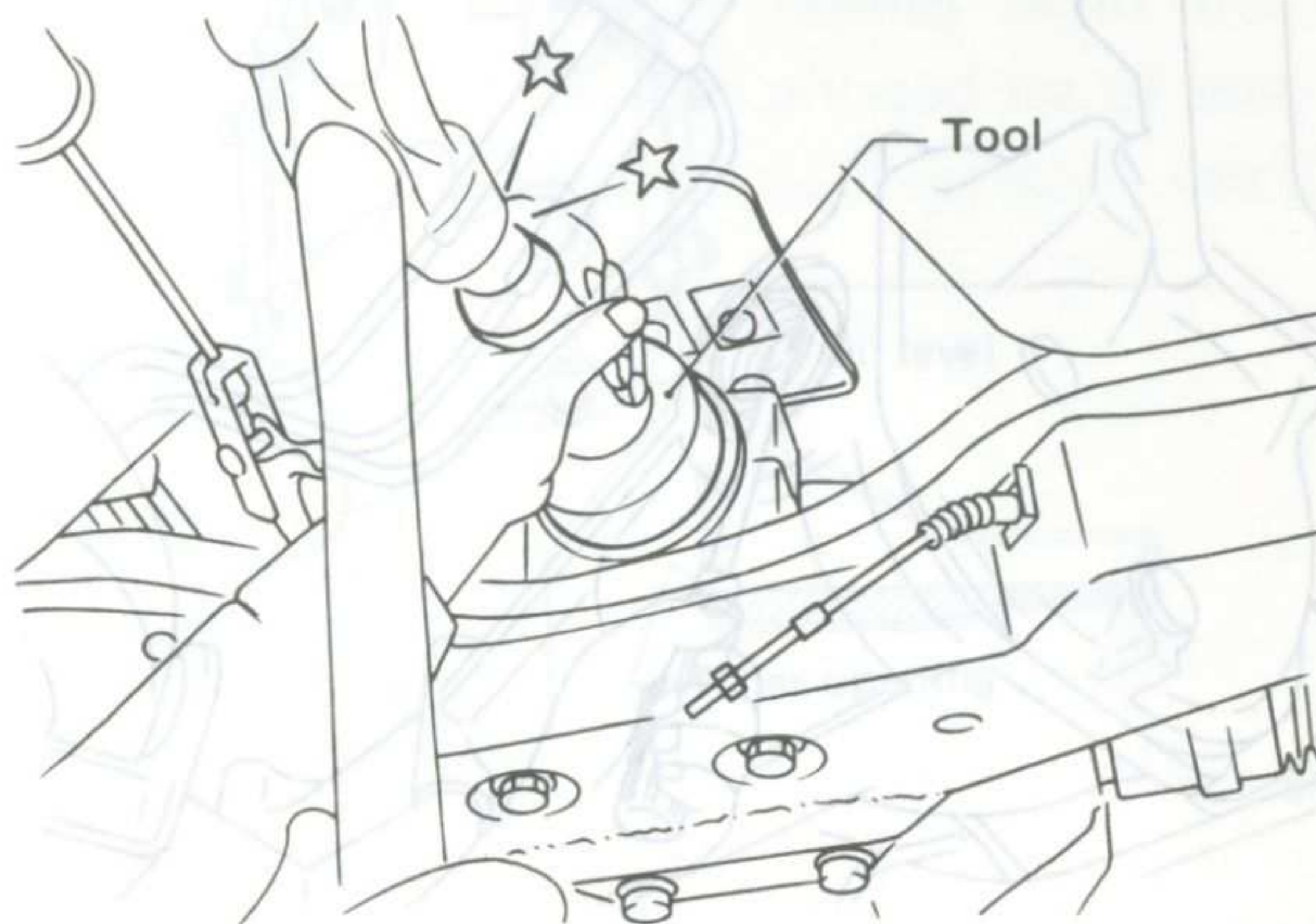
4. Remove front oil seal.



Tool number: ST33290001

5. Apply multi-purpose grease to cavity at sealing lips of oil seal.

Press front oil seal into carrier.



Tool number: KV38100500

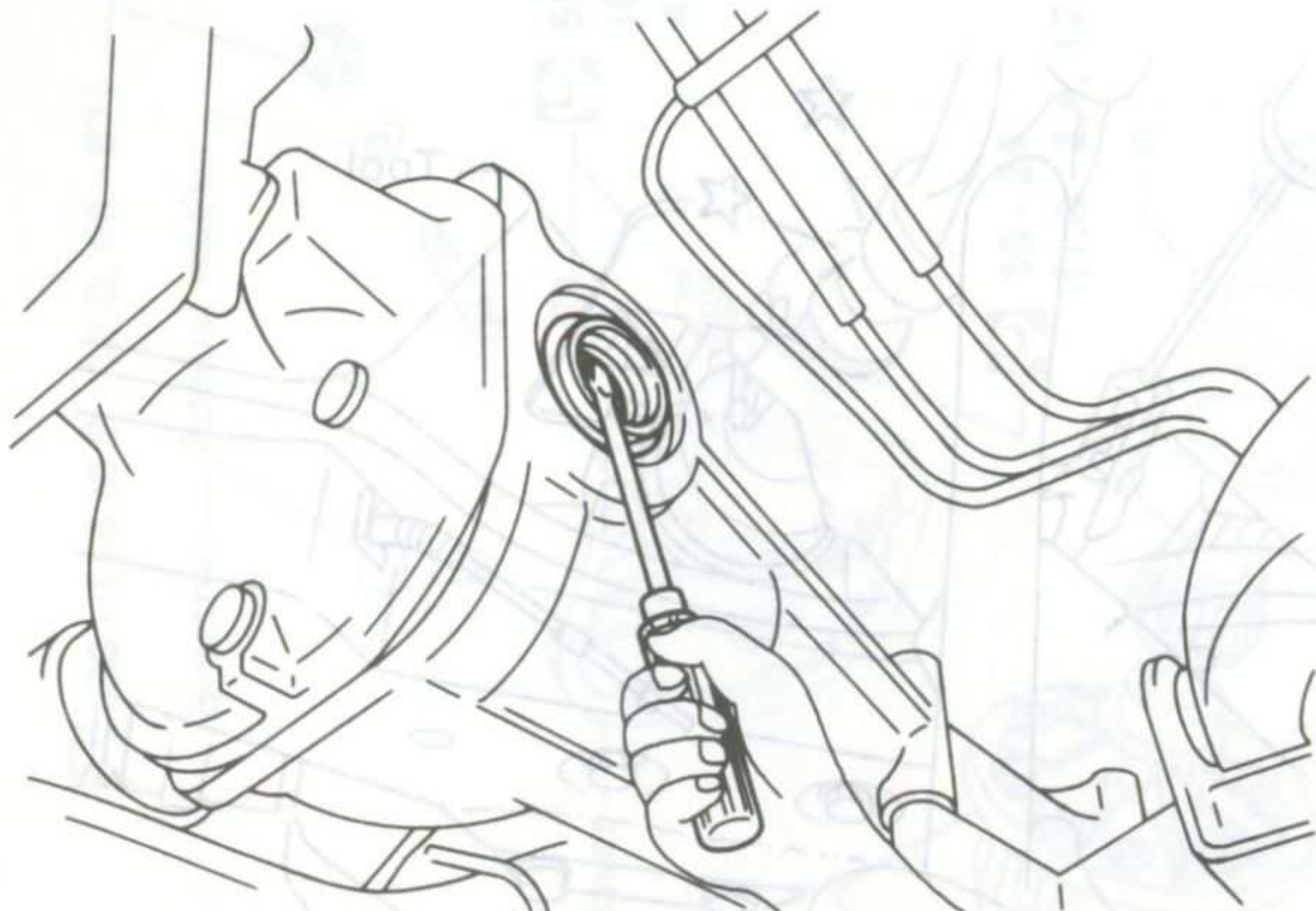
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.

ON-VEHICLE SERVICE (Model R200)

Side Oil Seal Replacement

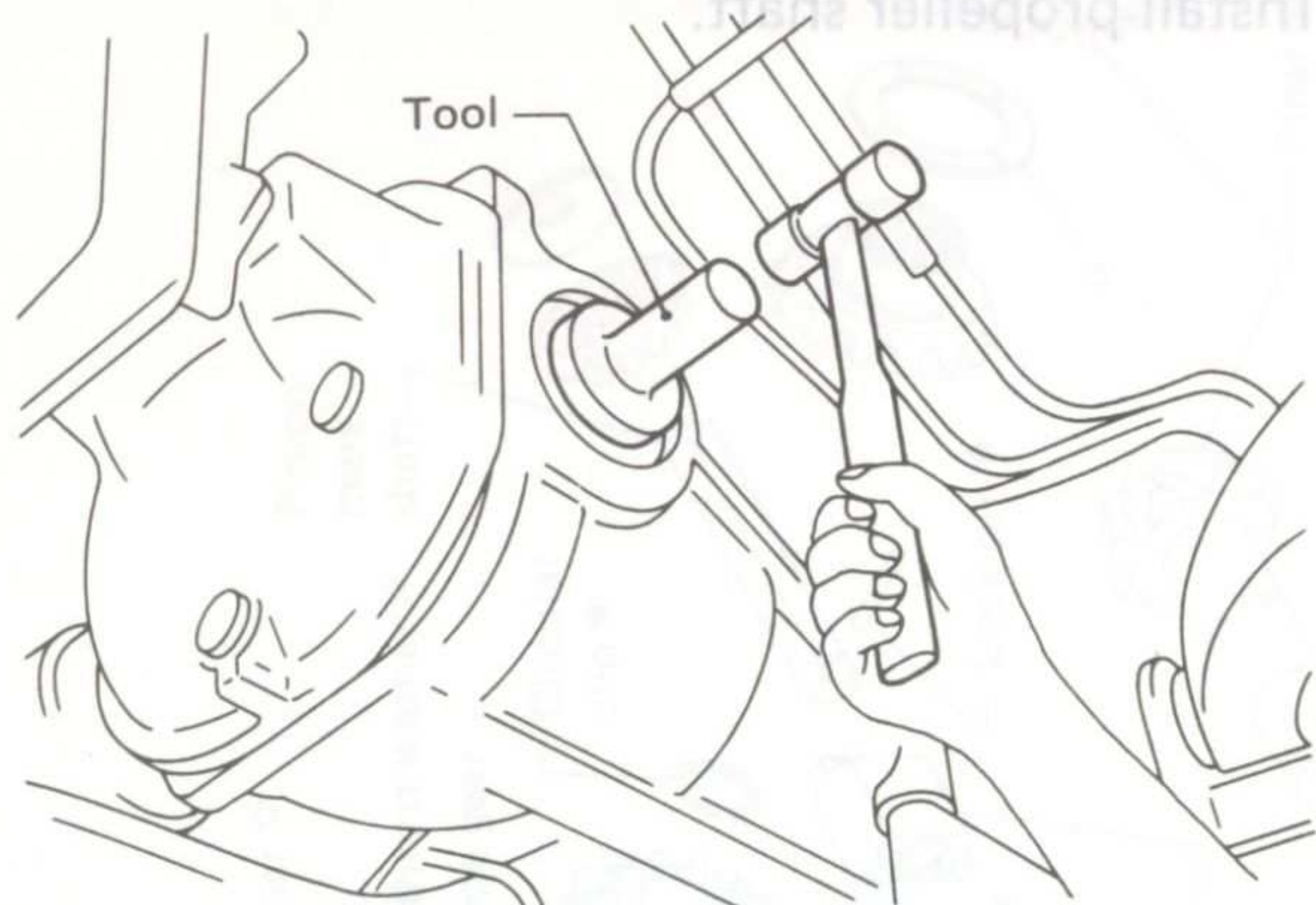
1. Remove drive shafts.
Refer to RA section.

2. Remove oil seal.



SPD521

3. Apply multi-purpose grease to cavity at sealing lips of oil seal.
Press-fit oil seal into carrier.



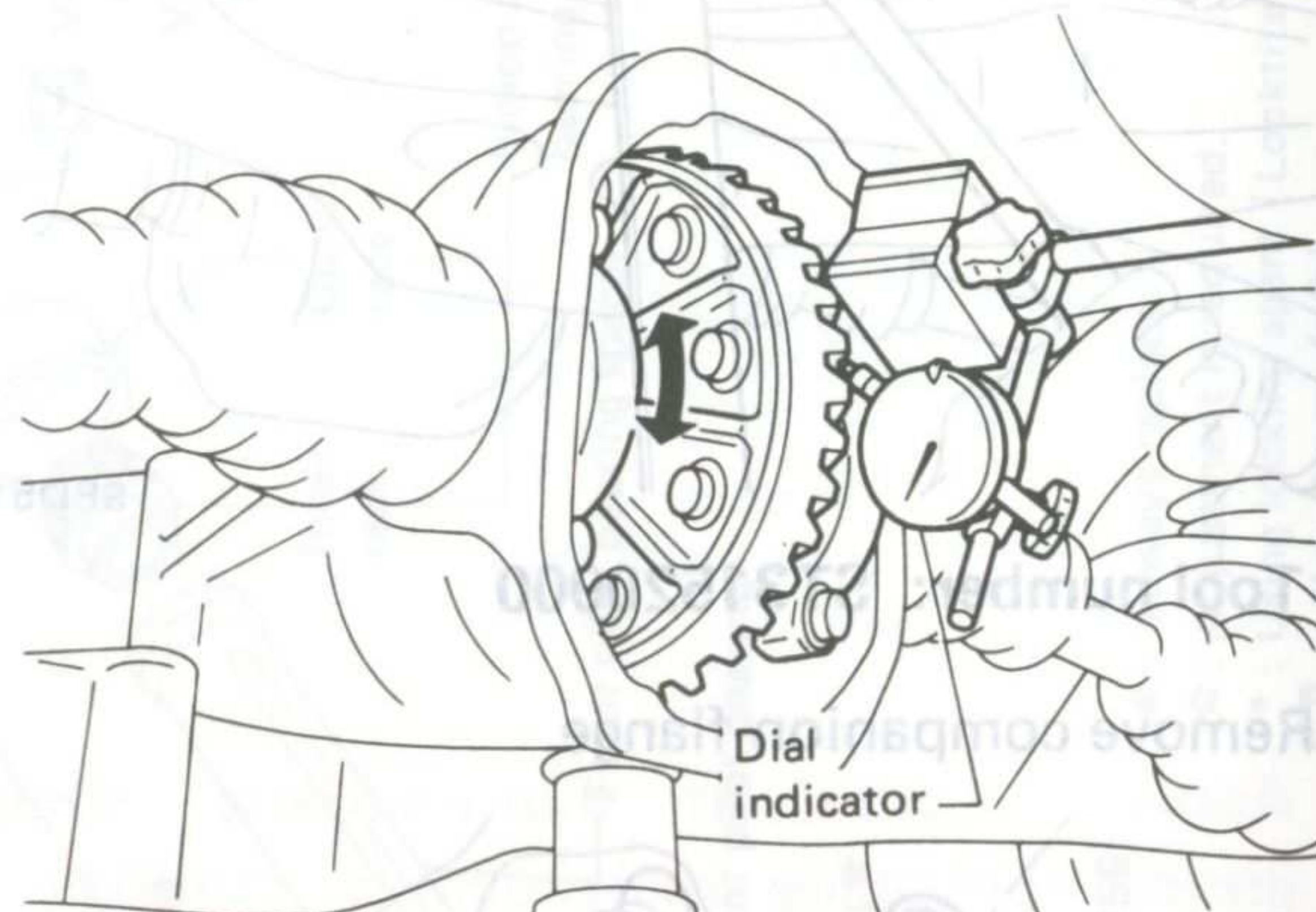
SPD522

Tool number: KV38100200

4. Install drive shafts.

Ring Gear to Drive Pinion Backlash

1. Support carrier with a jack.
2. Remove rear cover.
3. Check ring gear to drive pinion backlash with a dial indicator, at several points. If it is not within specifications, adjust it after removing final drive assembly.

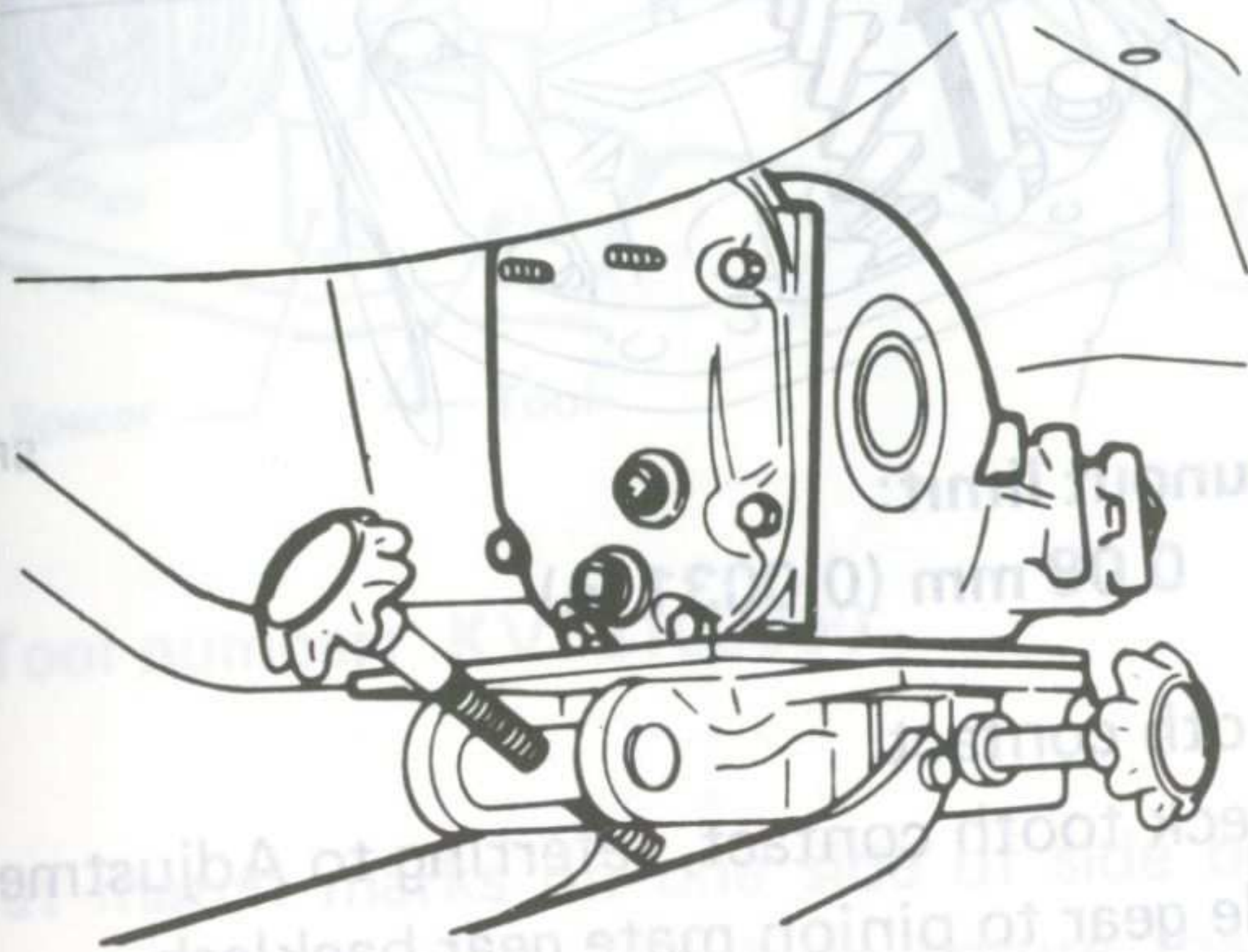


SPD523

REMOVAL AND INSTALLATION (Model R200)

Removal

- Remove propeller shaft.
Refer to PD section.
- Insert plug into rear oil seal after removing propeller shaft.
- Remove drive shafts.
Refer to RA section.
- Pull off differential carrier backward together with jack.



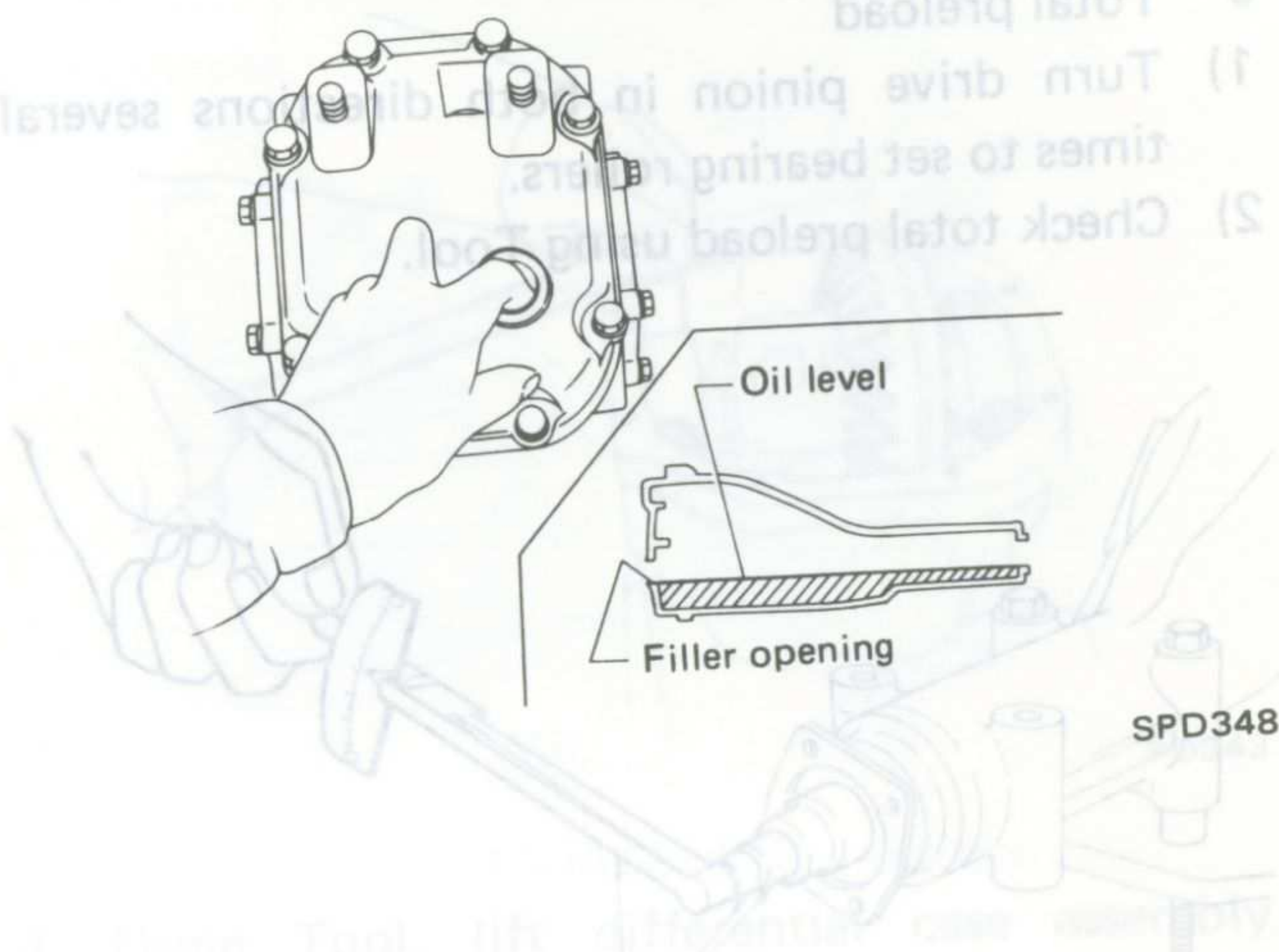
SPD511

CAUTION:

- Be careful not to damage spline, sleeve yoke and front oil seal, when removing propeller shaft.
- After carrier assembly is removed, support suspension member on a stand to prevent its insulators being twisted or damaged.

Installation

- Fill final drive with recommended gear oil.



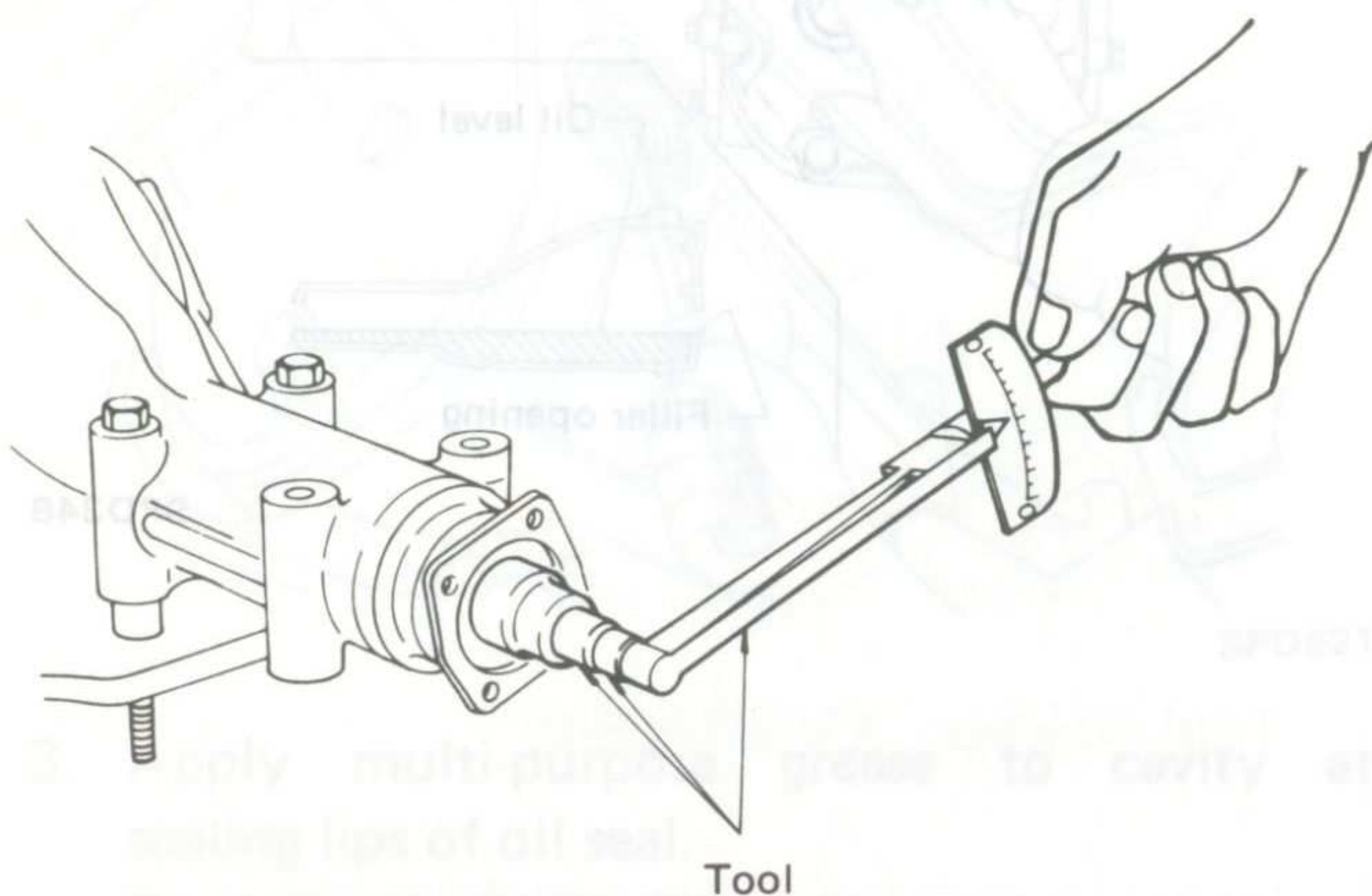
SPD348

DISASSEMBLY (Model R200)

Pre-inspection

Before disassembling final drive, perform the following inspection.

- Total preload
 - 1) Turn drive pinion in both directions several times to set bearing rollers.
 - 2) Check total preload using Tool.



Tool number: ST3127S000

Total preload:

1.23 - 2.30 N·m

(12.5 - 23.5 kg-cm, 10.9 - 20.4 in-lb)

- Ring gear to drive pinion backlash.
Check backlash of ring gear with a dial indicator at several points.



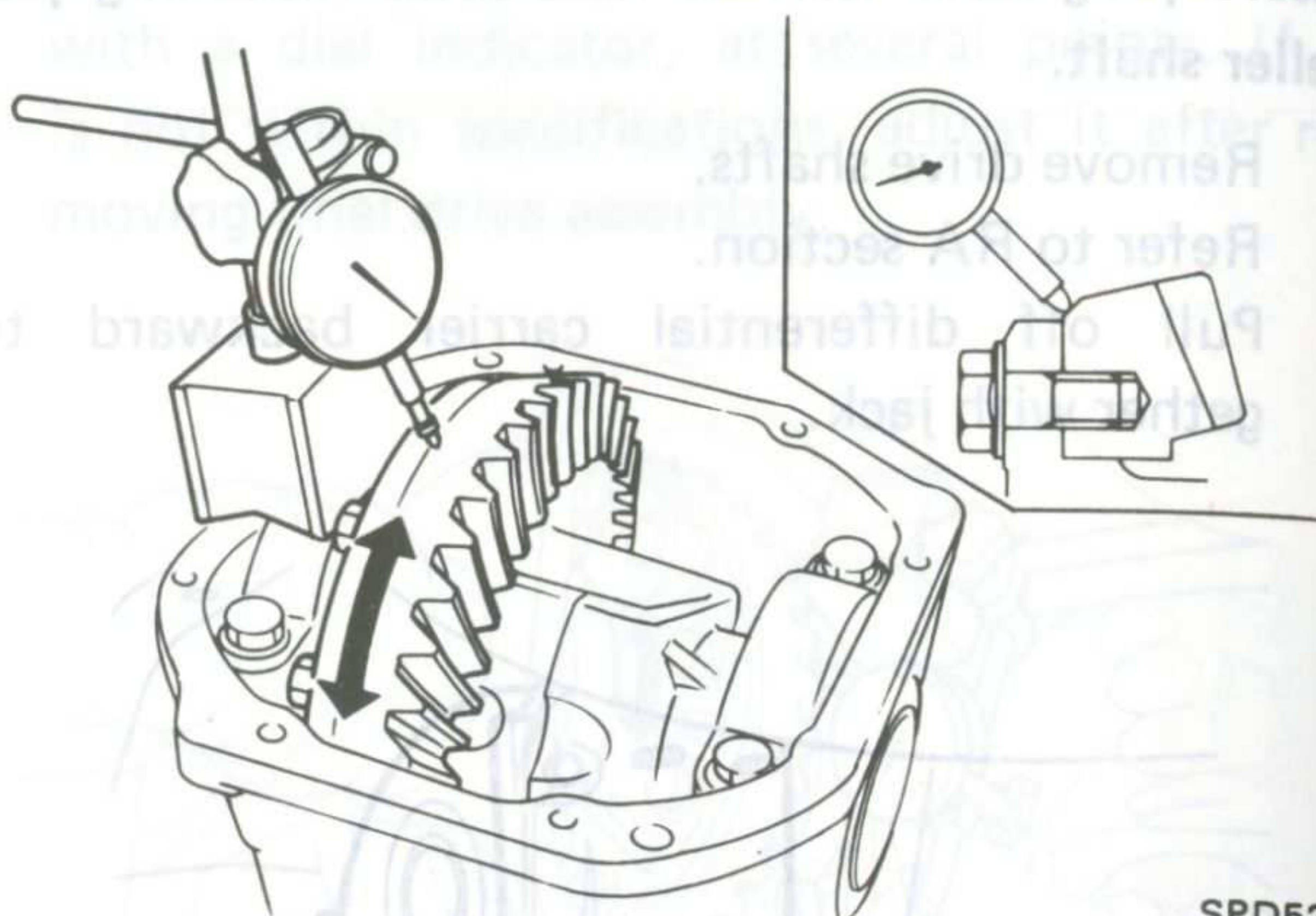
SPD513

Ring gear-to-drive pinion backlash:

0.13 - 0.18 mm

(0.0051 - 0.0071 in)

- Ring gear runout
Check runout of ring gear with a dial indicator.

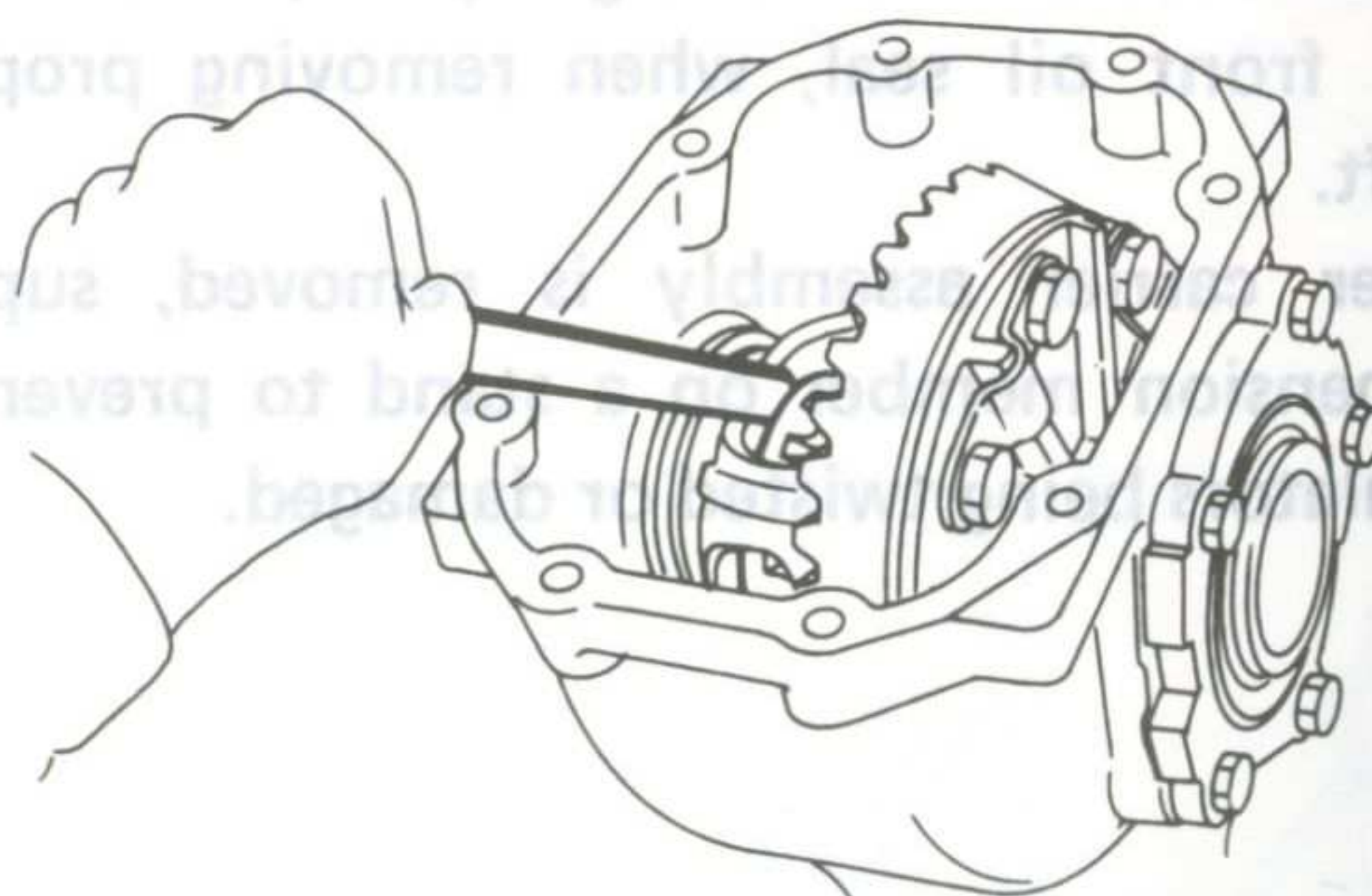


SPD524

Runout limit:

0.08 mm (0.0031 in)

- Tooth contact
Check tooth contact, referring to Adjustment.
- Side gear to pinion mate gear backlash
Using a thickness gauge, measure clearance between side gear thrust washer and differential case.



SPD370

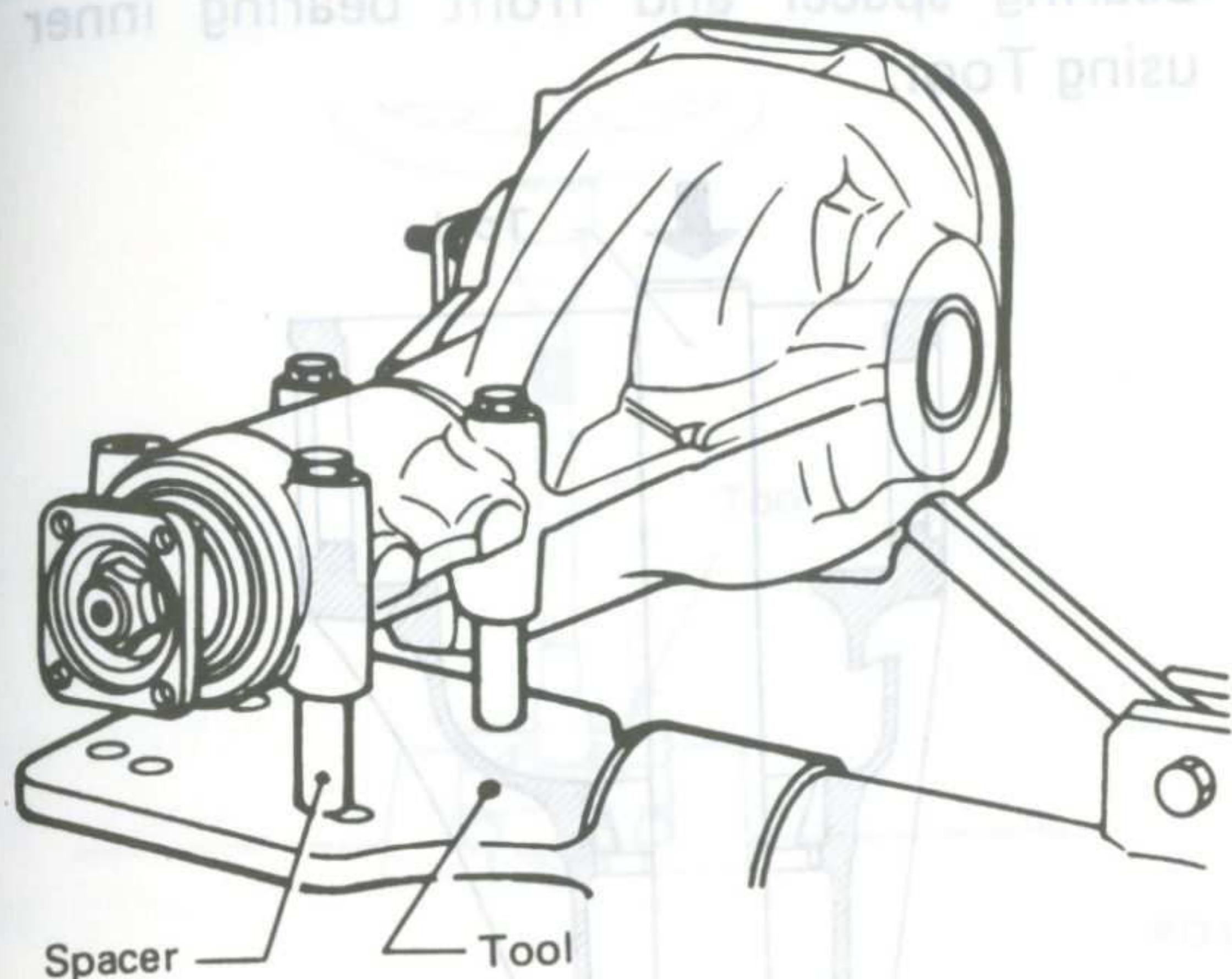
Clearance between side gear thrust washer and differential case:

Less than 0.15 mm (0.0059 in)

DISASSEMBLY (Model R200)

Differential Carrier

1. Using three 45 mm (1.77 in) spacers, mount carrier on Tool.

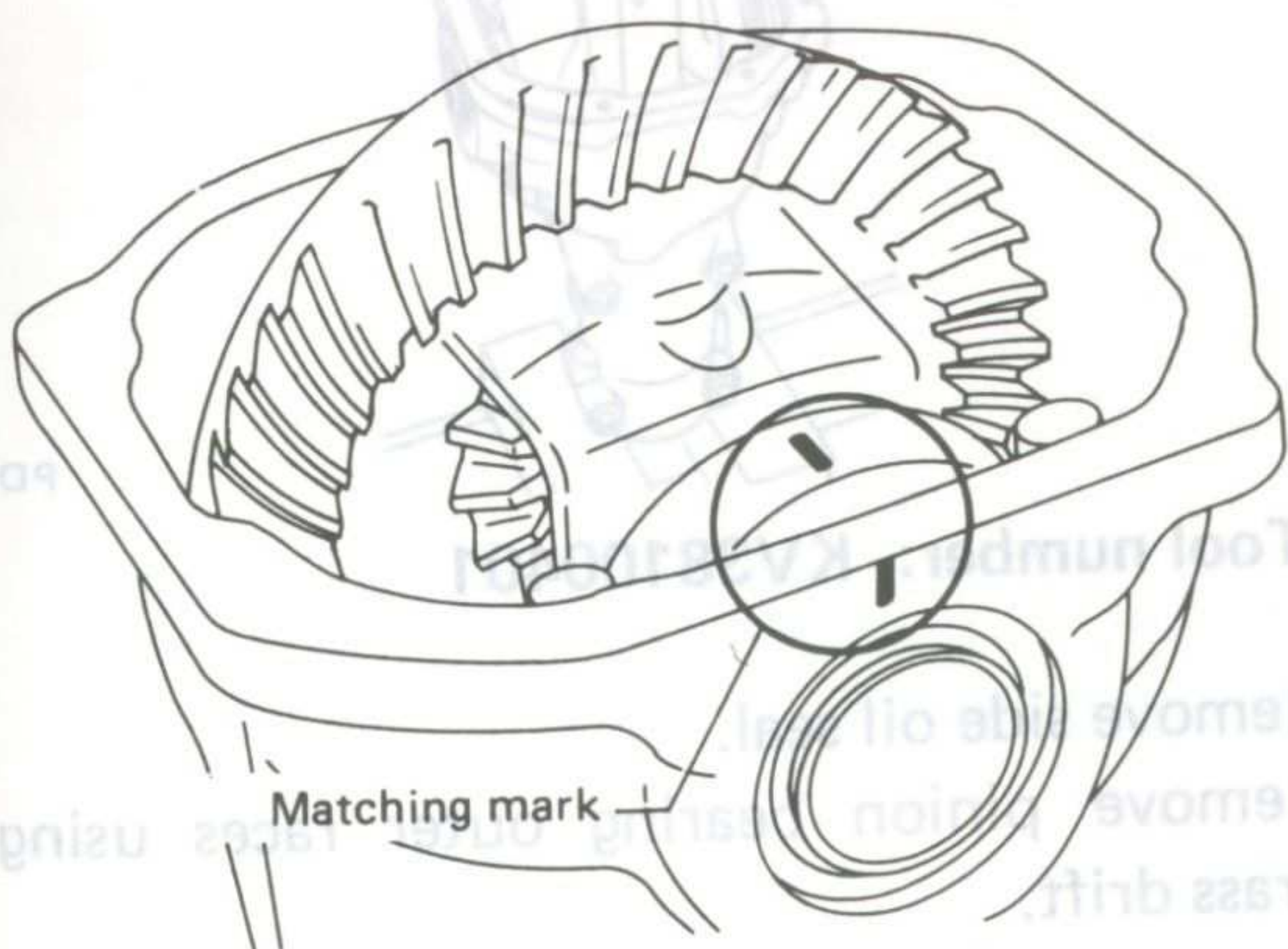


SPD525

Tool number: KV38100800

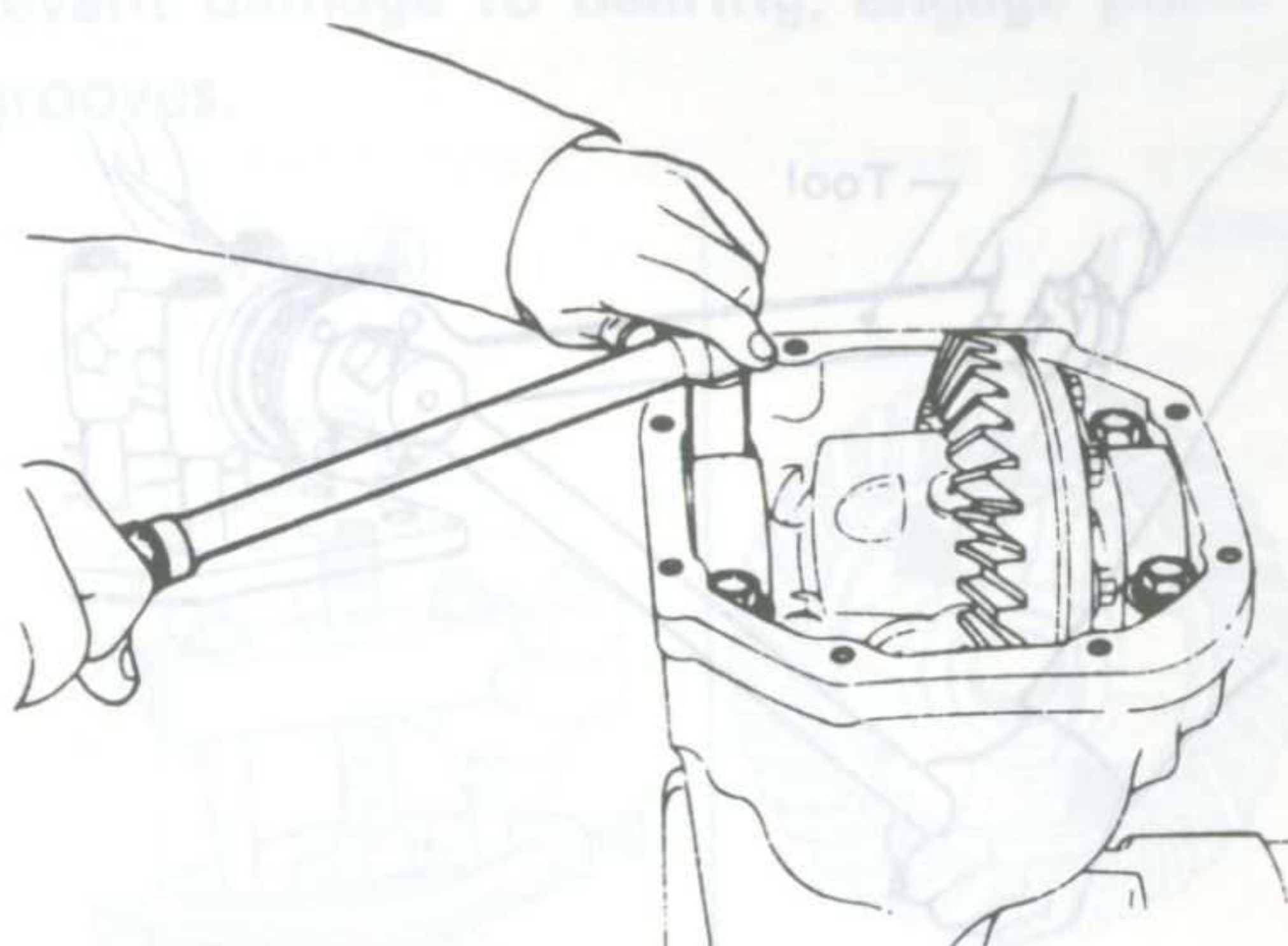
2. Put match marks on one side of side bearing cap with paint or punch to ensure that it is replaced in proper position during reassembly.

Bearing caps are line-board during manufacture and should be put back in their original places.



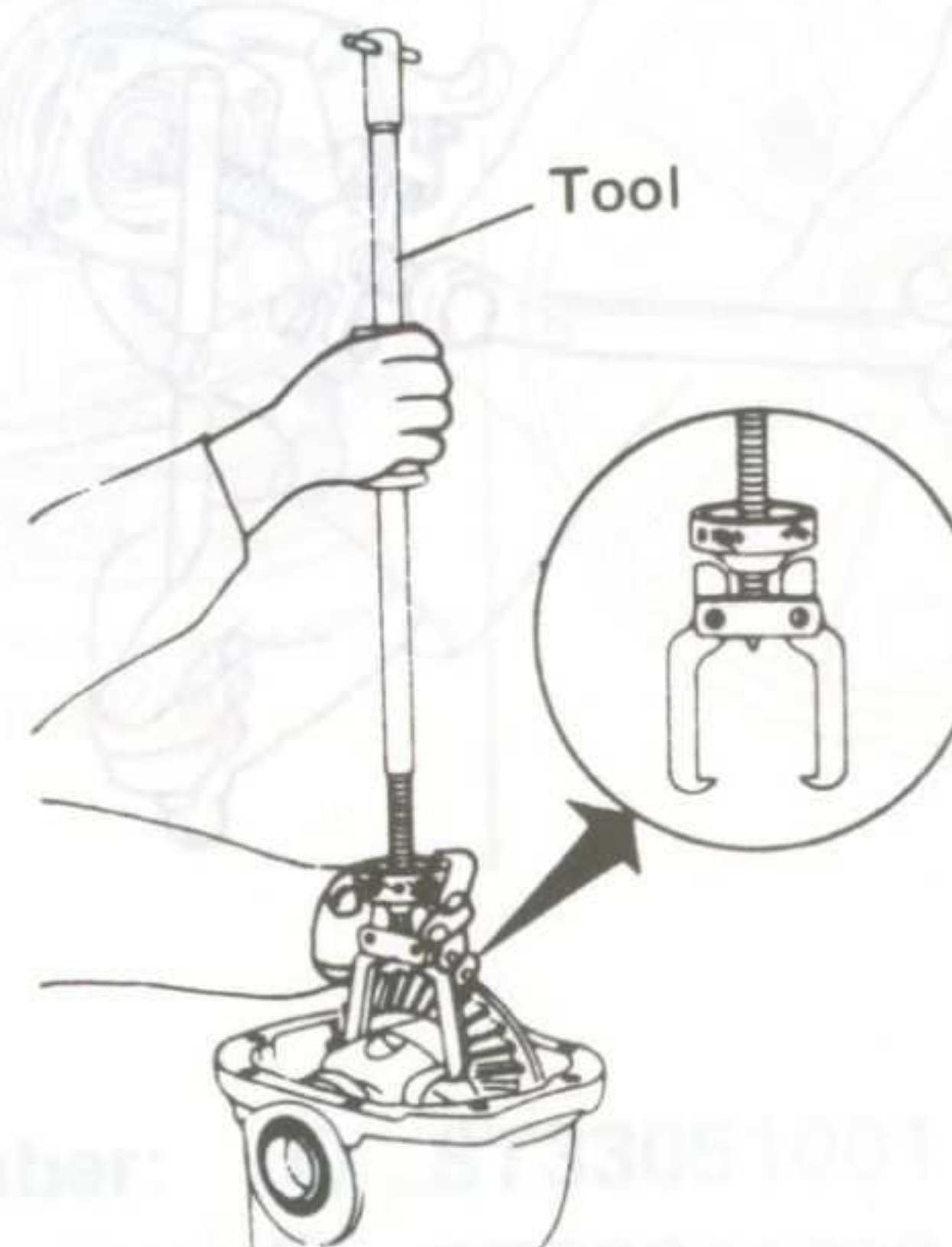
SPD526

3. Remove side bearing caps.



PD343

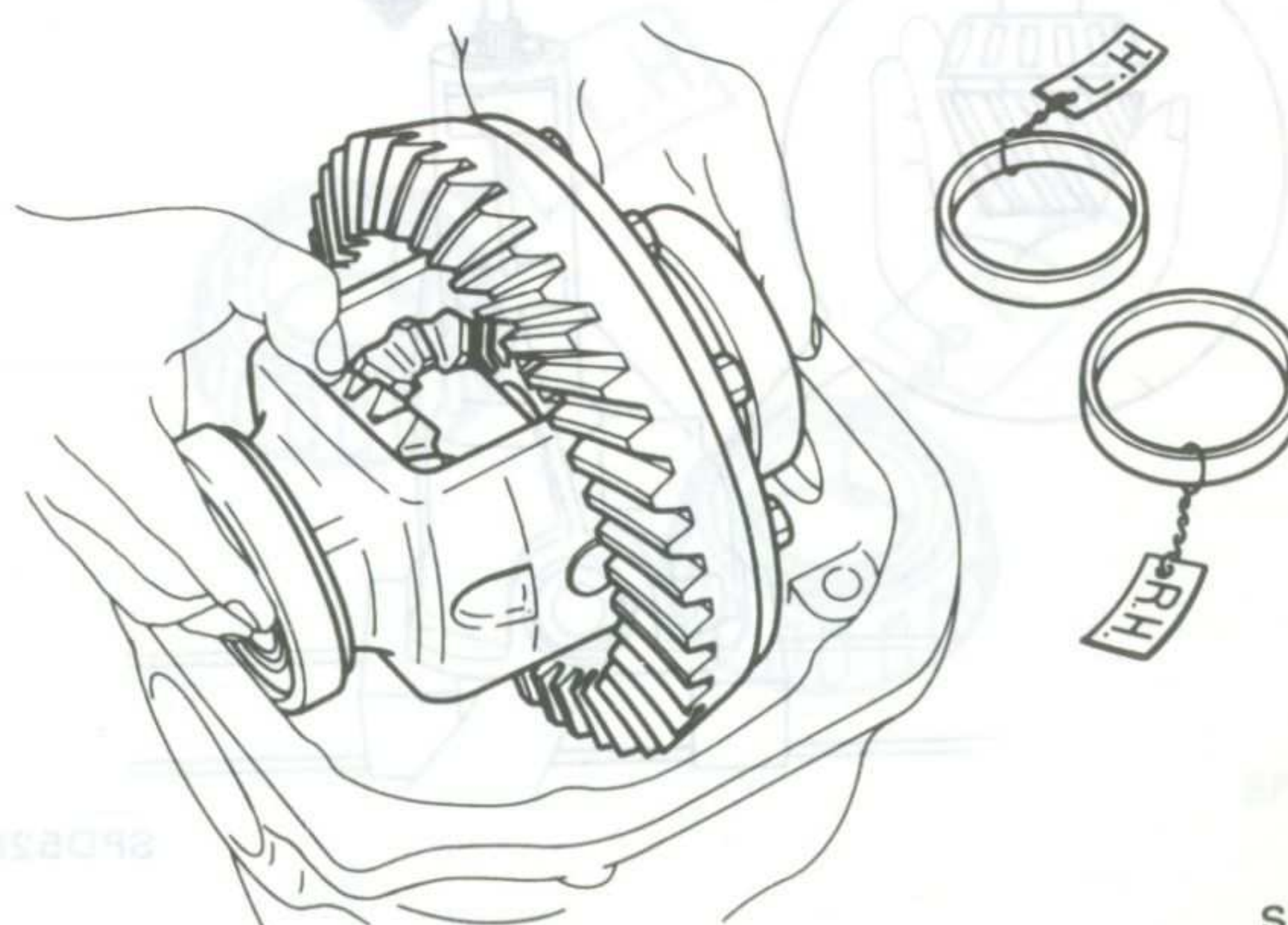
4. Using Tool, lift differential case assembly out.



PD344

Tool number: HT72400000

Be careful to keep the side bearing outer races together with inner race — do not mix them up.

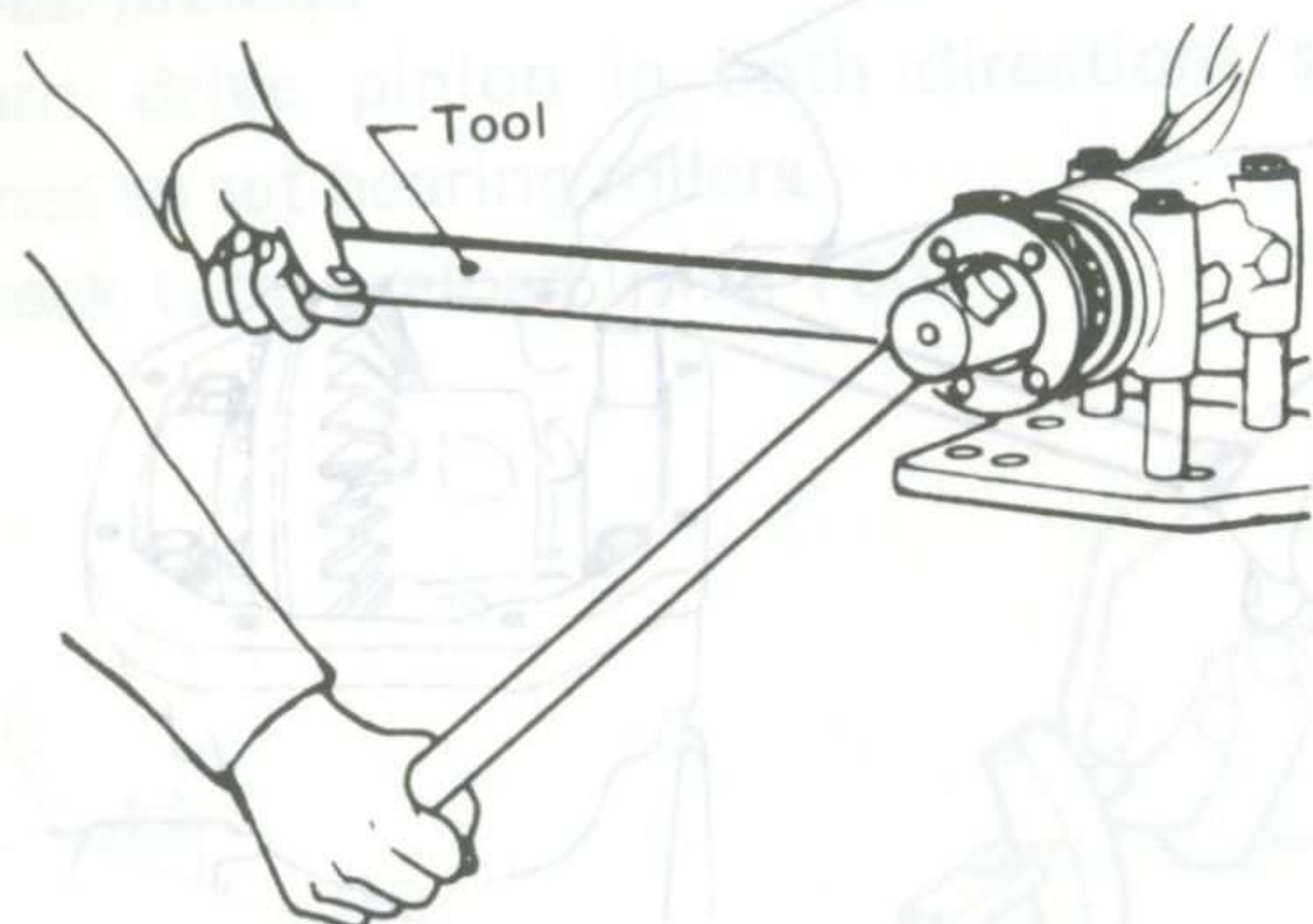


SPD527

DISASSEMBLY (Model R200)

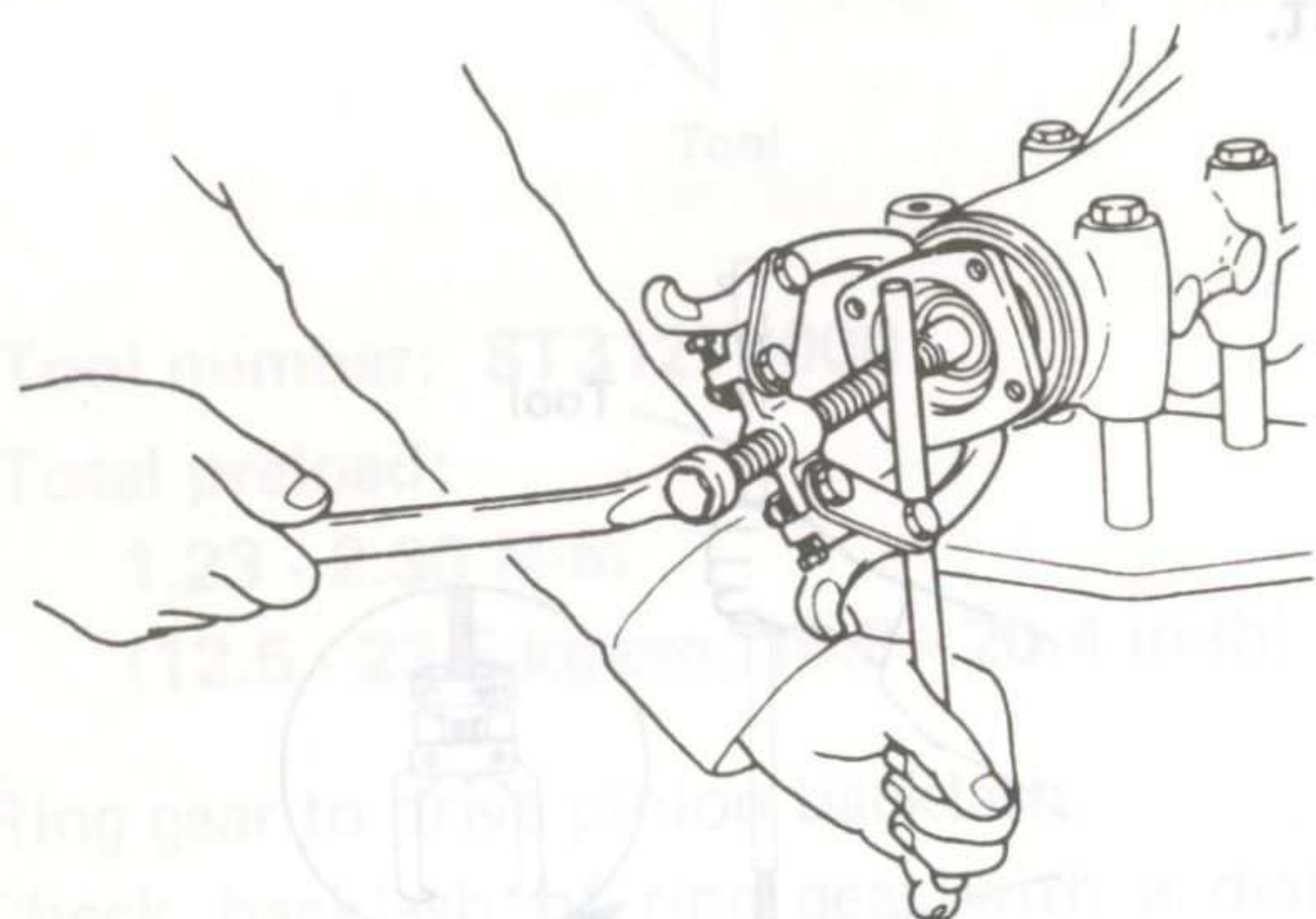
Differential Carrier (Cont'd)

5. Loosen drive pinion nut and pull off companion flange.



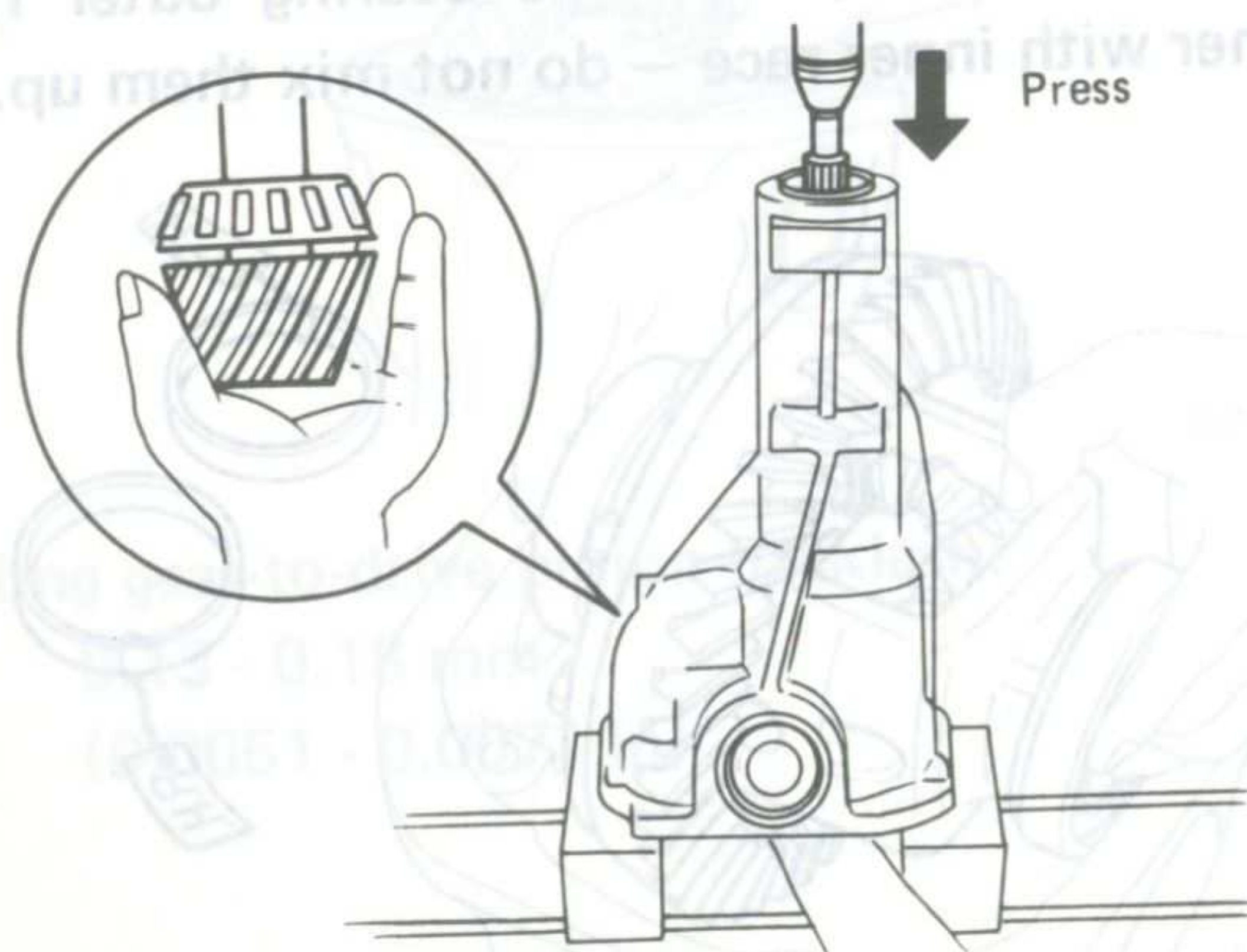
PD345

Tool number: ST31520000



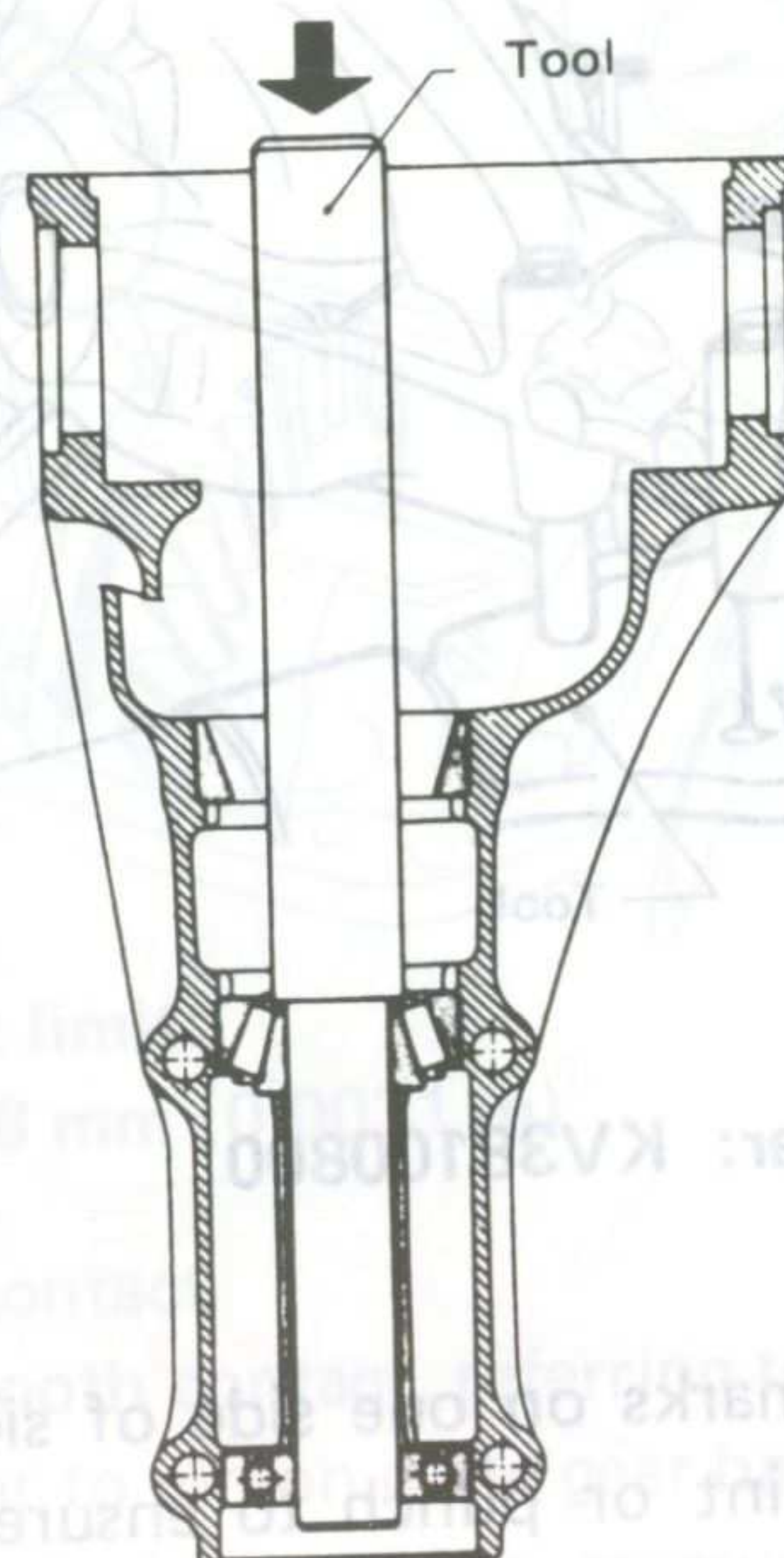
PD346

6. Take out drive pinion together with rear bearing inner race, bearing spacer and adjusting washer.



SPD528

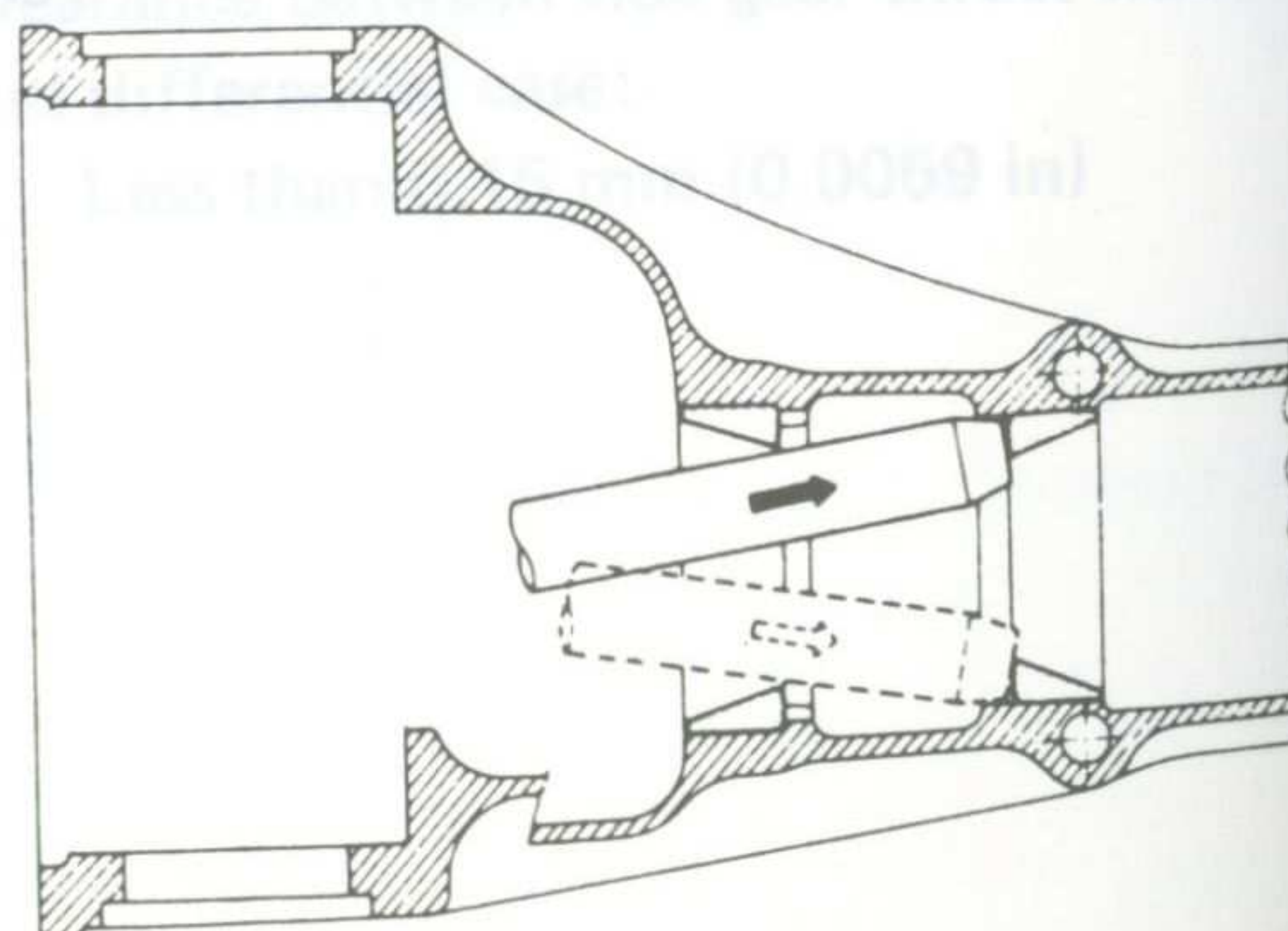
7. Remove oil seal.
8. Remove pilot bearing together with pilot bearing spacer and front bearing inner race using Tool.



PD348

Tool number: KV38100401

9. Remove side oil seal.
10. Remove pinion bearing outer races using a brass drift.

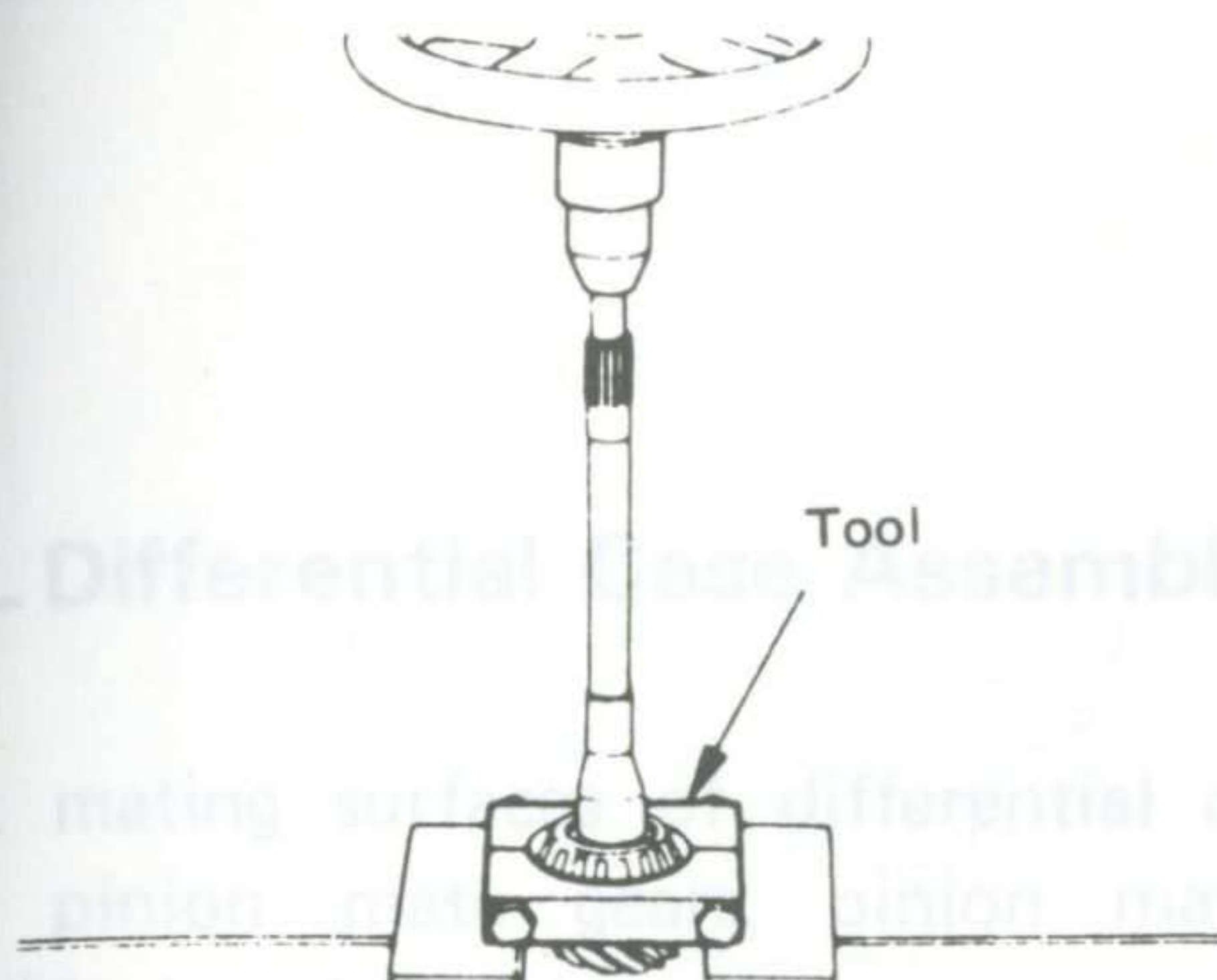


PD349

DISASSEMBLY (Model R200)

Differential Carrier (Cont'd)

11. Remove pinion rear bearing inner race and pinion height adjusting washer.

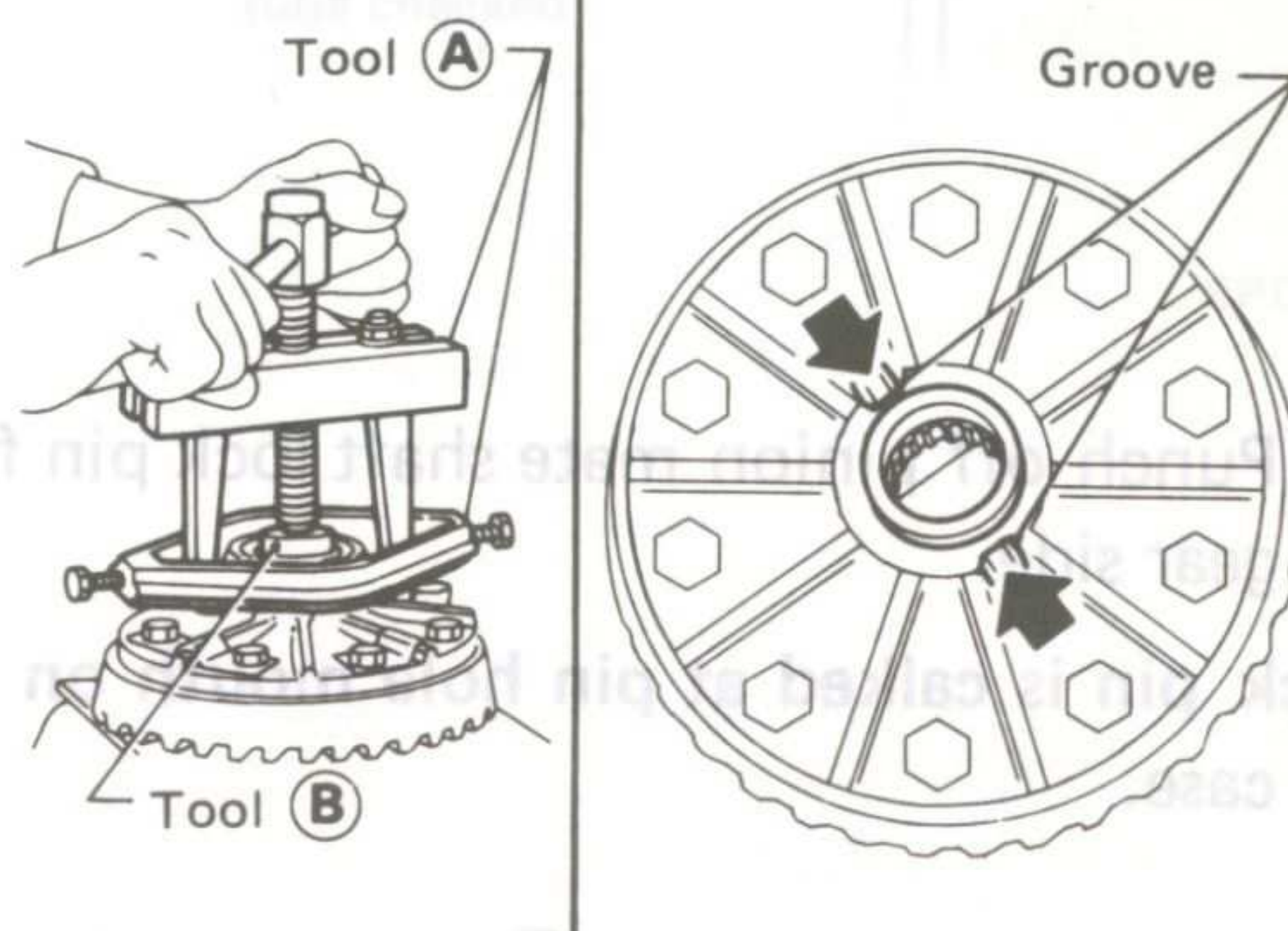
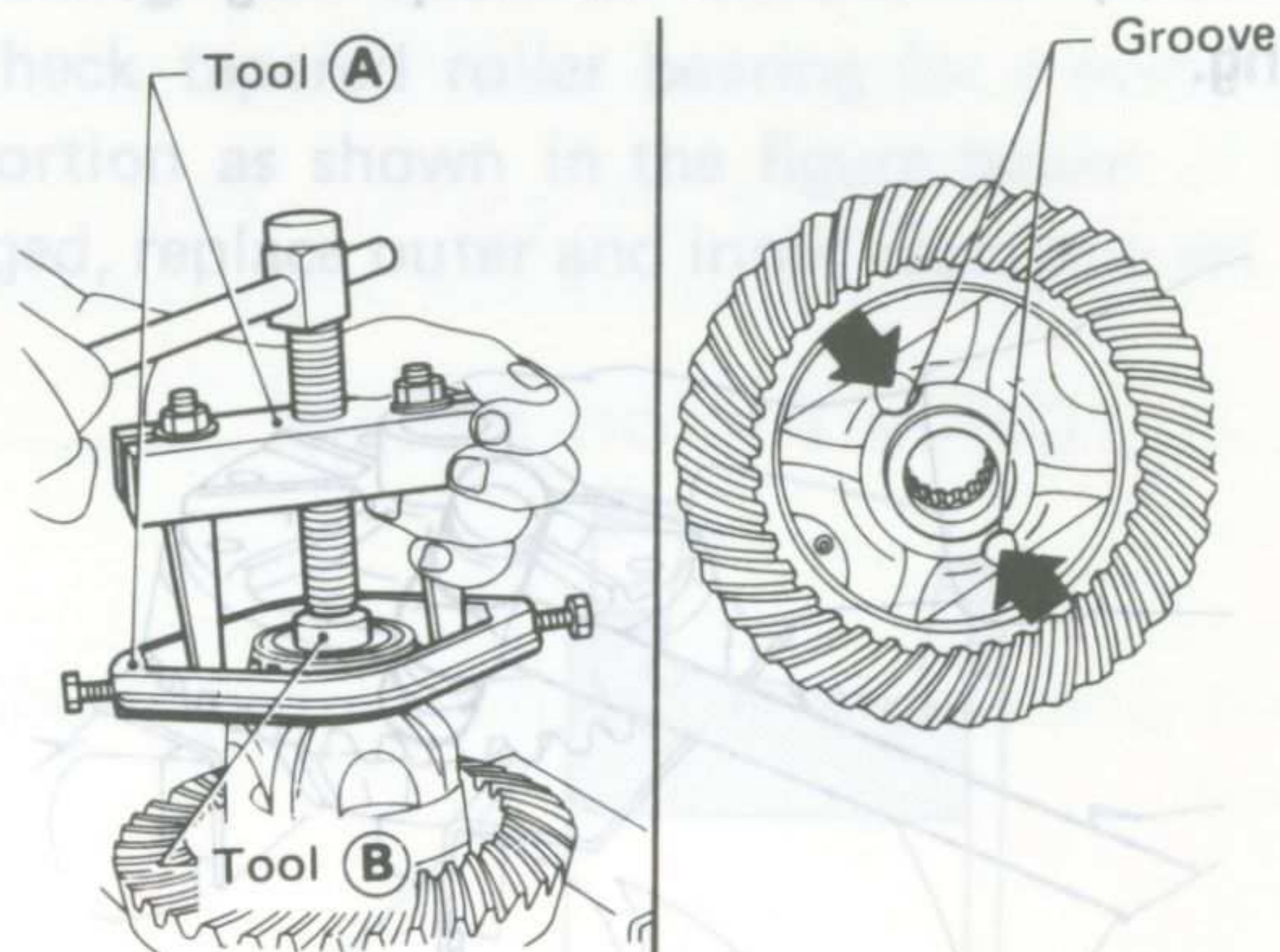


PD179

Tool number: ST30031000

Differential Case

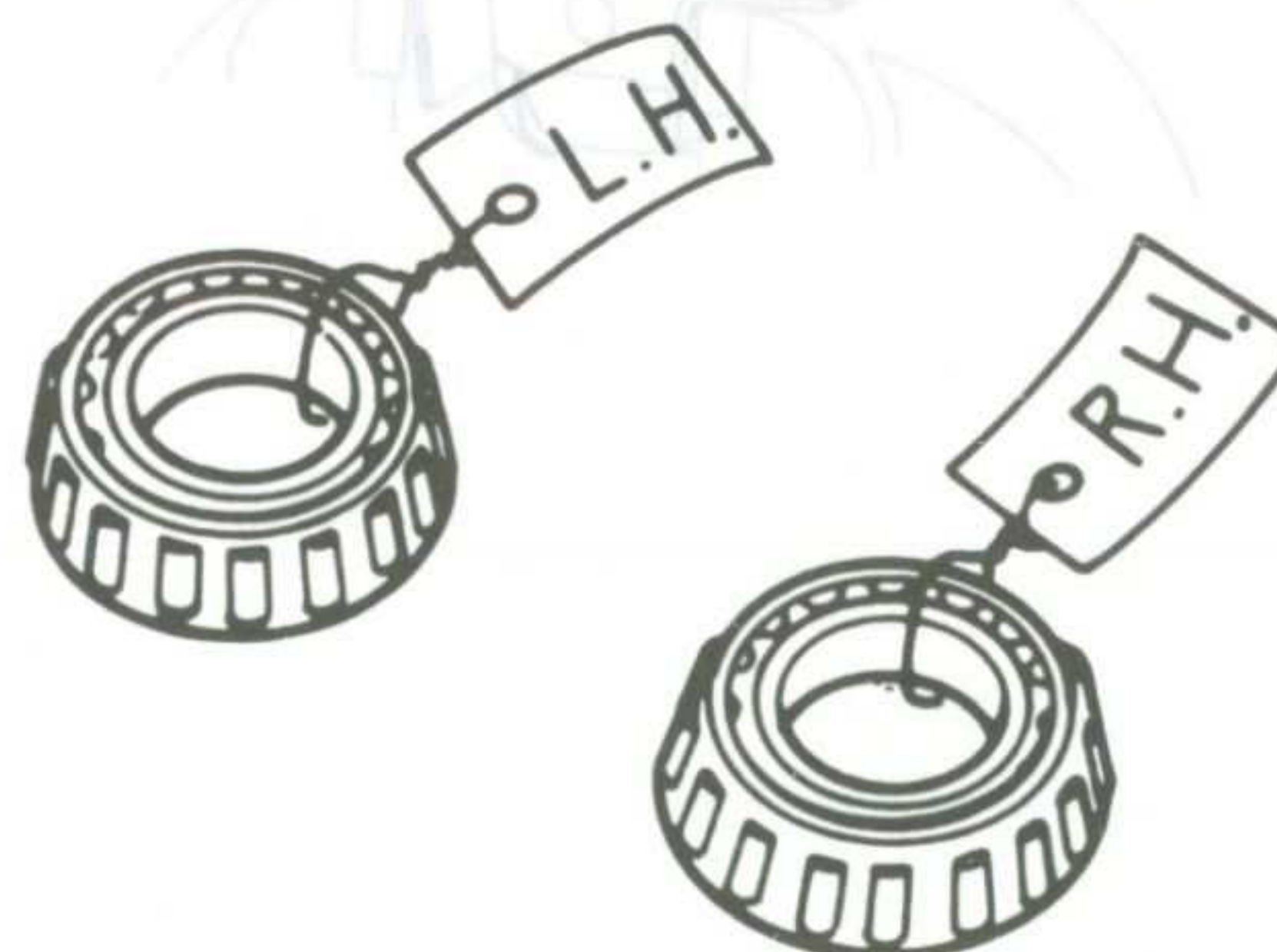
1. Remove side bearing inner races. To prevent damage to bearing, engage puller paws with grooves.



SPD529

Tool number: (A) ST33051001
(B) ST33061000

Be careful not to confuse the right and left hand parts.



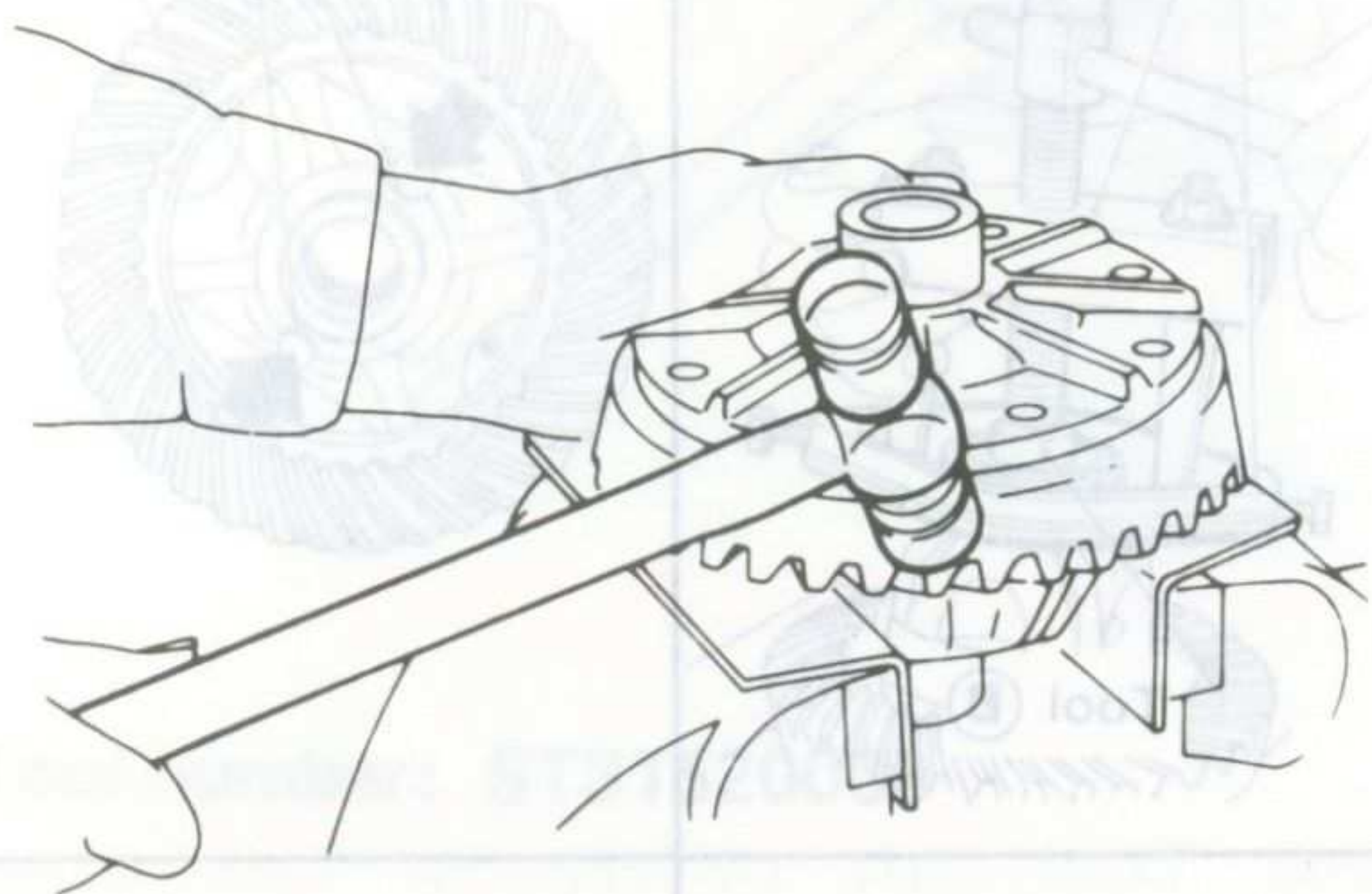
SPD022

DISASSEMBLY (Model R200)

Differential Case (Cont'd)

2. Loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off the gear case using a soft hammer.

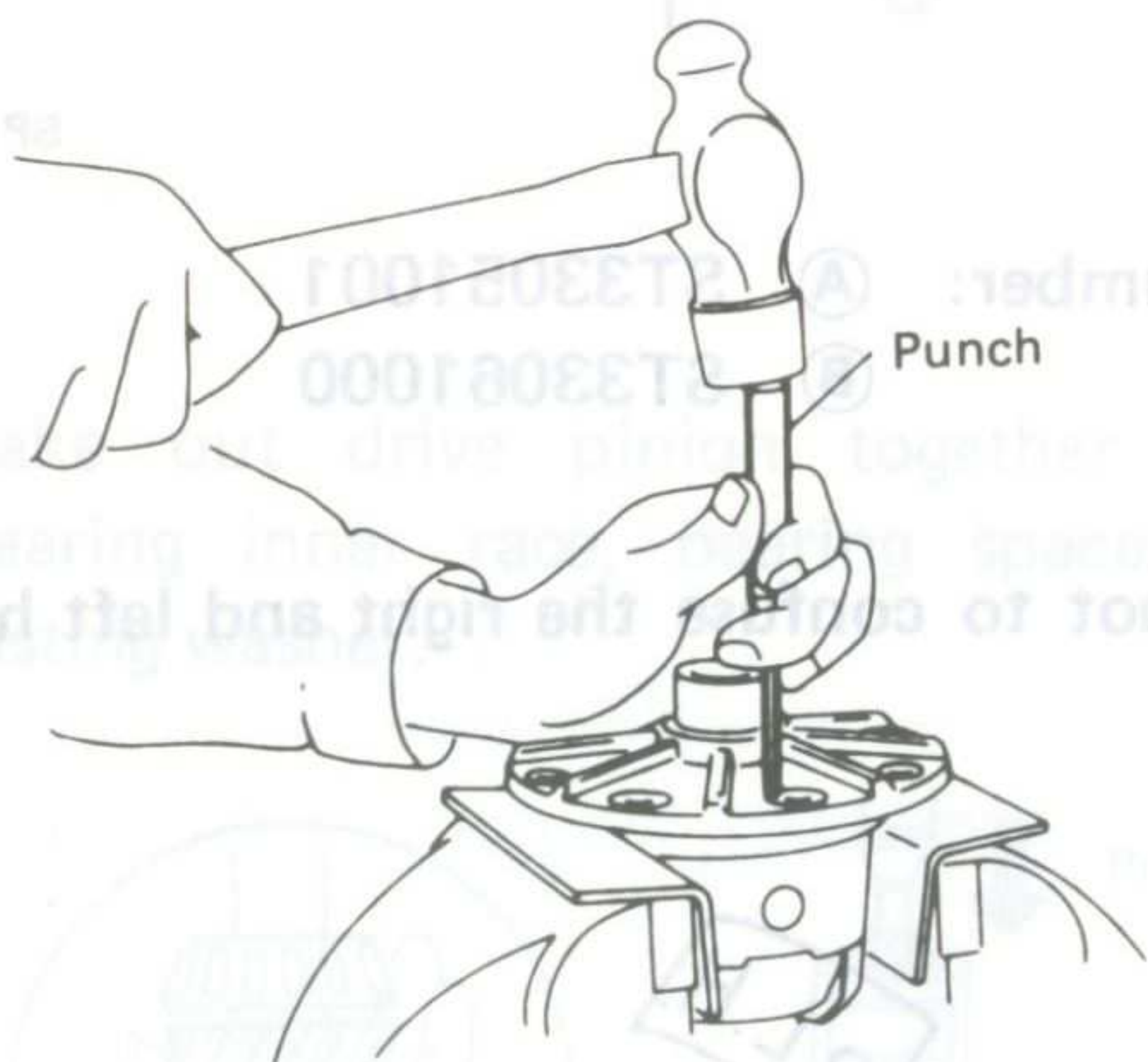
Tap evenly all around to keep ring gear from binding.



SPD024

4. Punch off pinion mate shaft lock pin from ring gear side.

Lock pin is calked at pin hole mouth on differential case.



SPD025

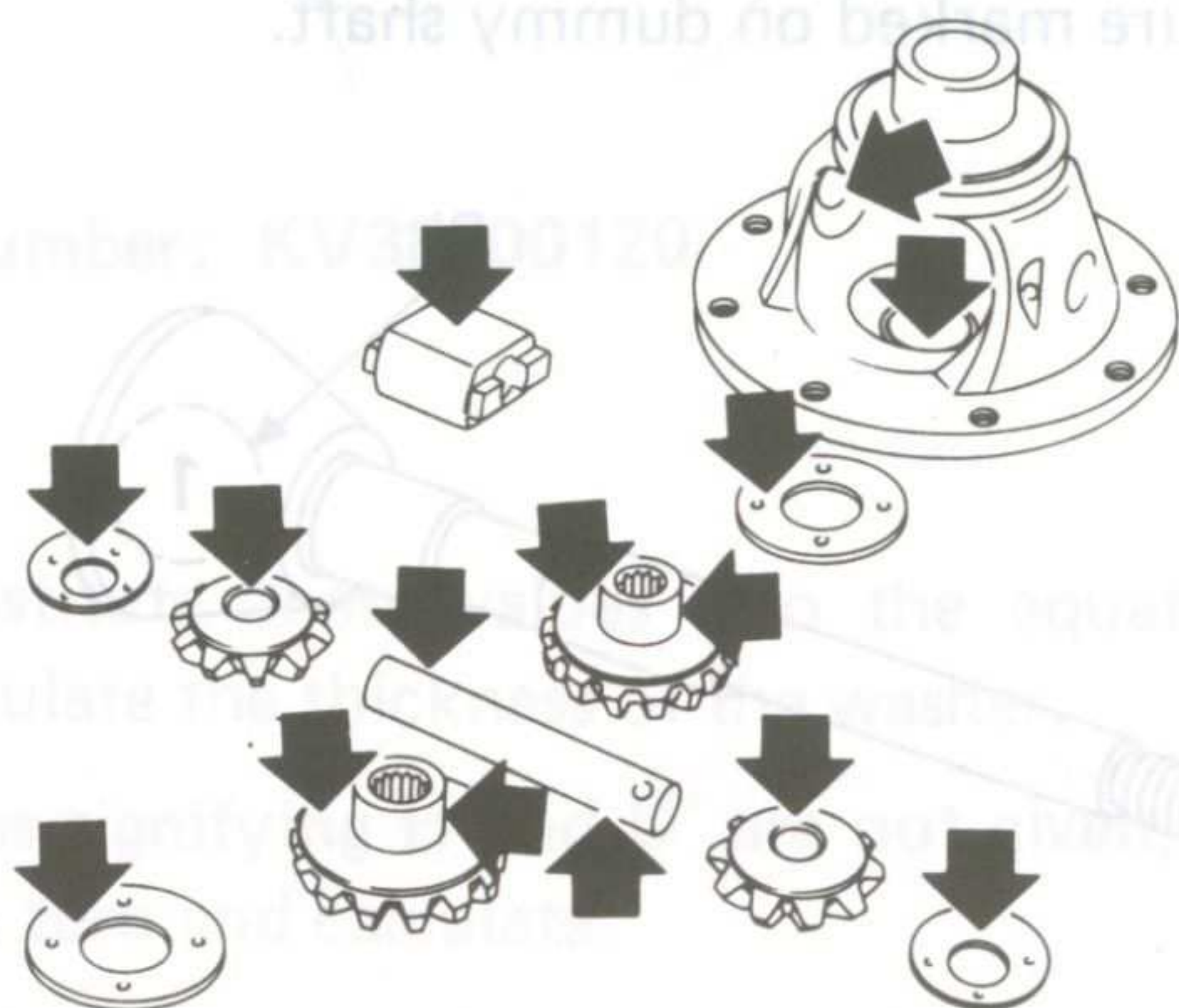
INSPECTION (Model R200)

Ring Gear and Drive Pinion

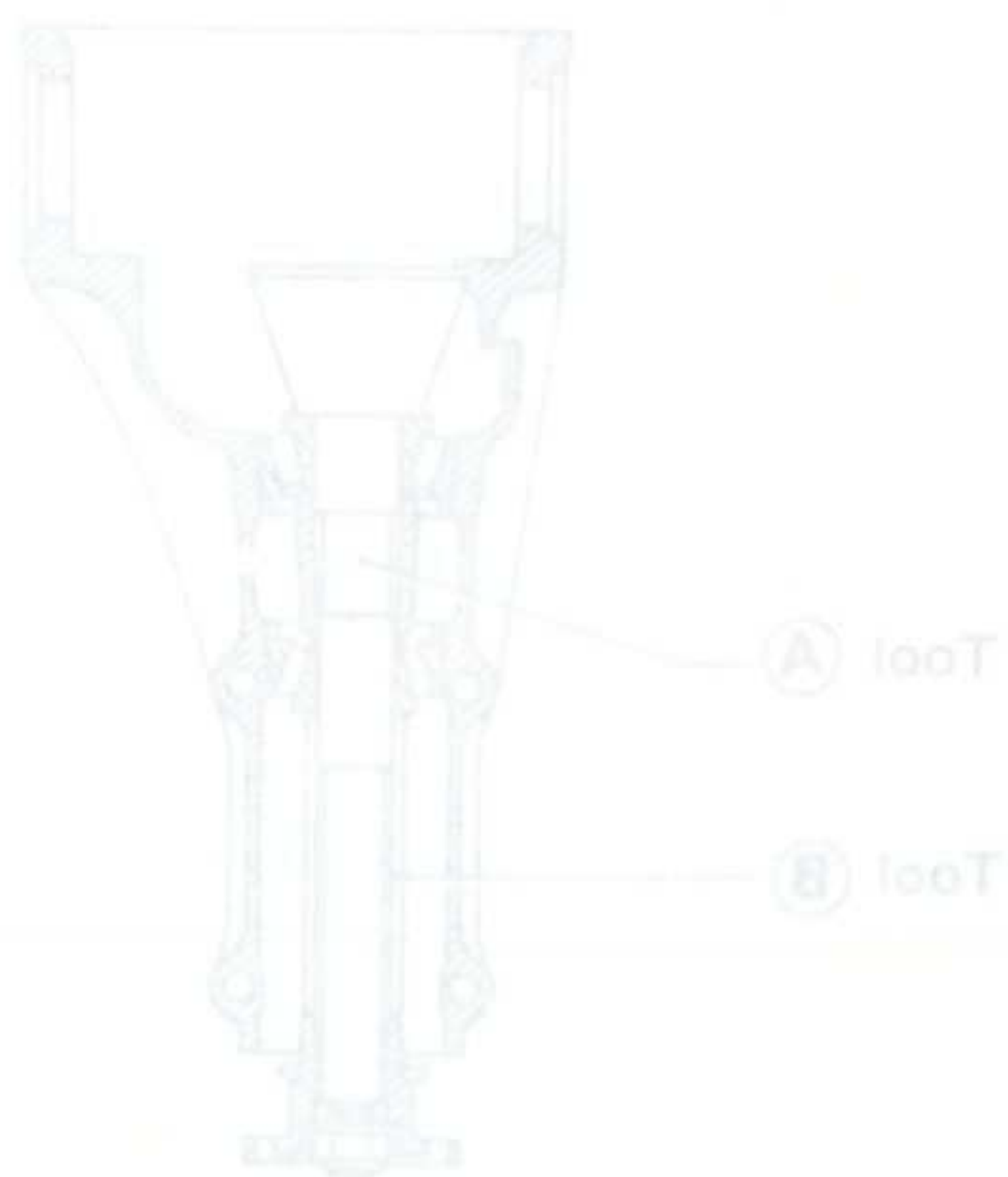
Check gear teeth for scoring, cracking or chipping. If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).

Differential Case Assembly

Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, thrust block and thrust washers.



SPD584



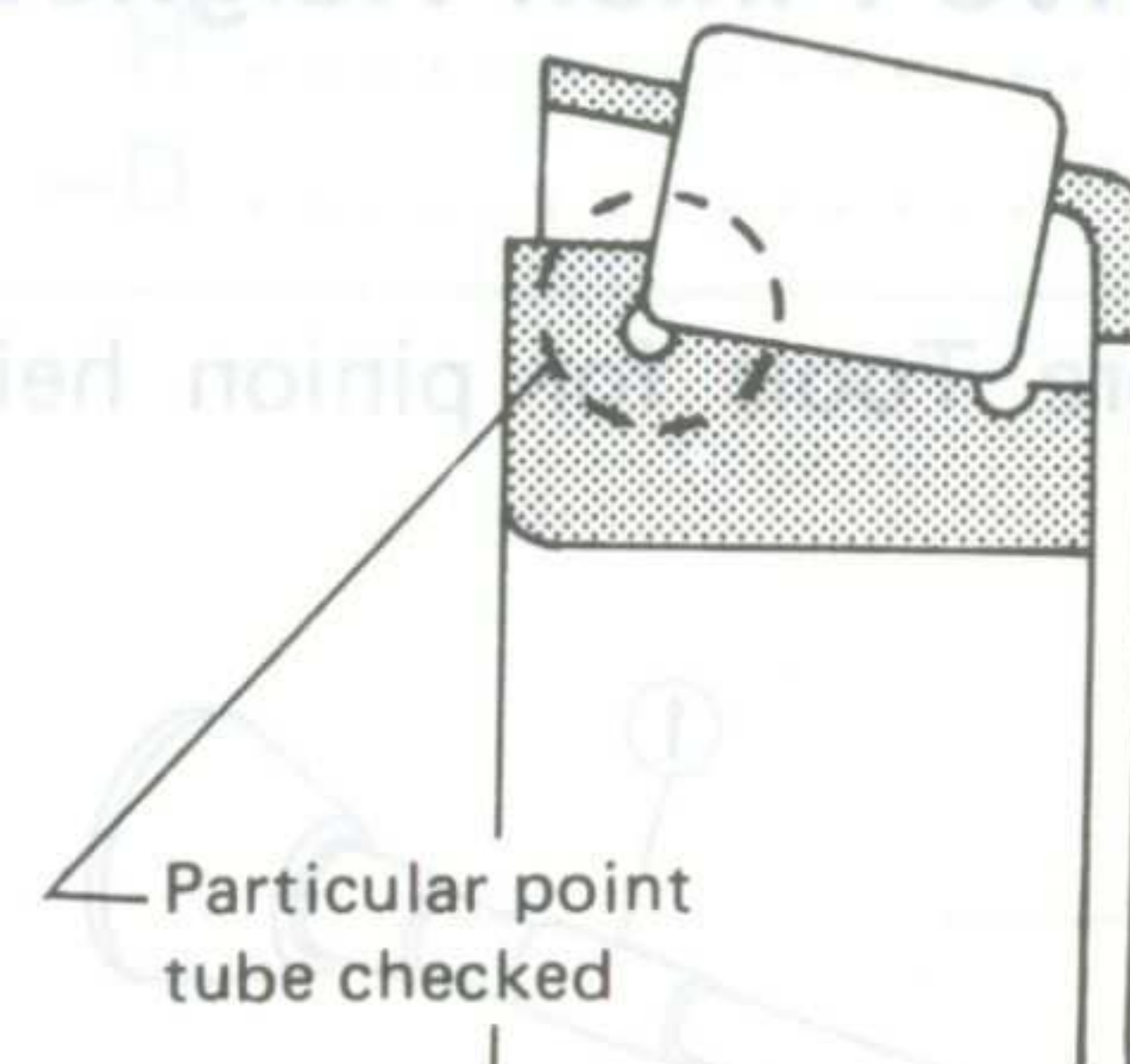
Tool (A)

Tool (B)

Tool number:
 (A) Dummy shaft (KV38100110)
 (B) Collar (KV38100130)

Bearing

1. Thoroughly clean bearing and dry with compressed air.
2. Check bearings for wear, scratches, pitching or flaking.
 Check tapered roller bearing for a burned out portion as shown in the figure below. If damaged, replace outer and inner races as a set.



SPD458

7. To simplify the job, make a chart like the one below to organize your calculations.

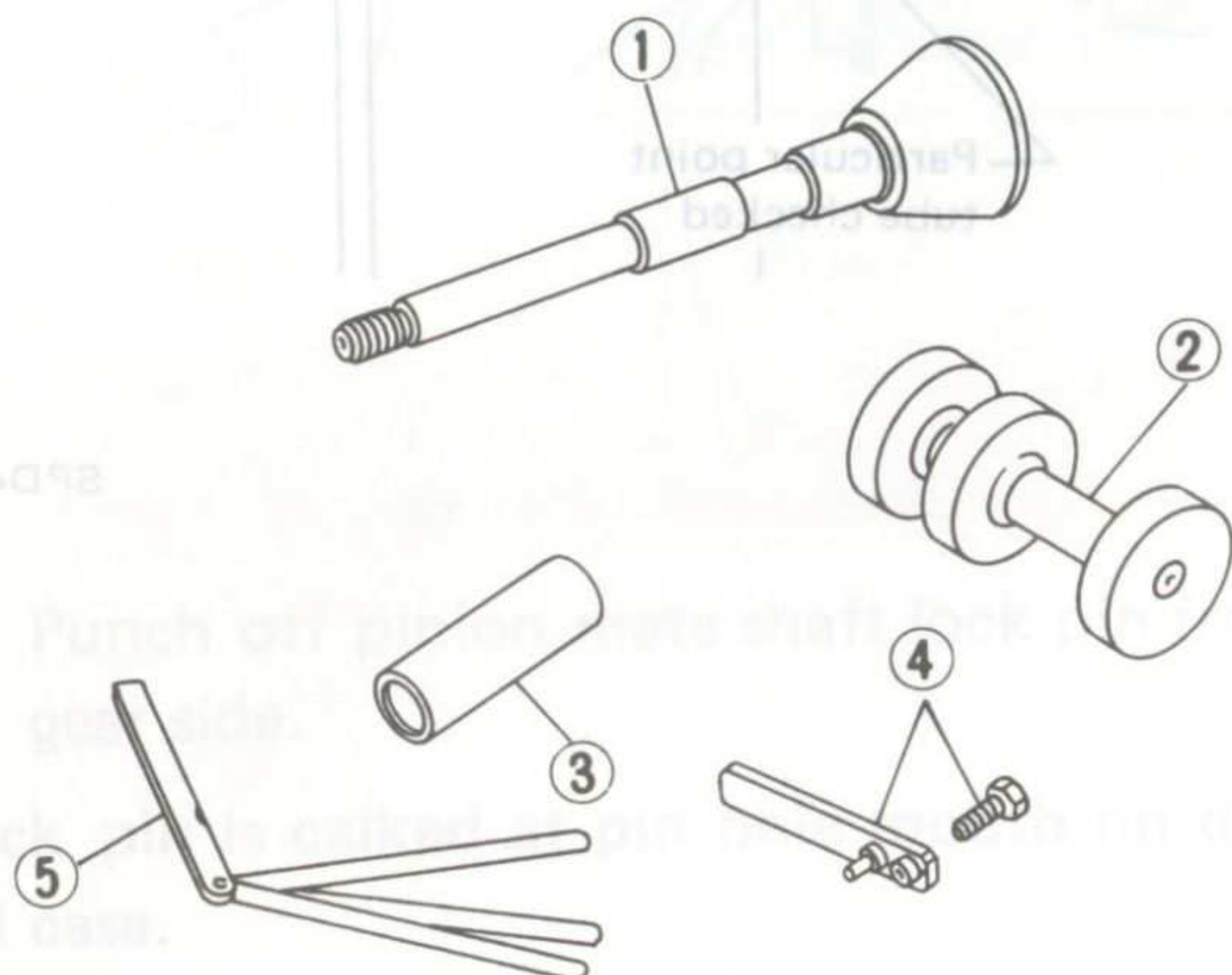
LETTERS	HUNDRETHS OF A MILLIMETER
H: Head number	
D: Figure marked on dummy shaft	
N: Measuring clearance	

ADJUSTMENT (Model R200)

To avoid any confusion while calculating bearing shims, it is absolutely necessary to stay with the metric system. If you measure anything in inches, the results **MUST** be converted to the metric system.

Drive Pinion Height

1. First prepare Tools for pinion height adjustment.



- ① Height Gauge (KV38100120)
- ② Dummy Shaft (KV38100110)
- ③ Collar (KV38100130)
- ④ Stopper (KV38100140)
- ⑤ Feeler Gauge

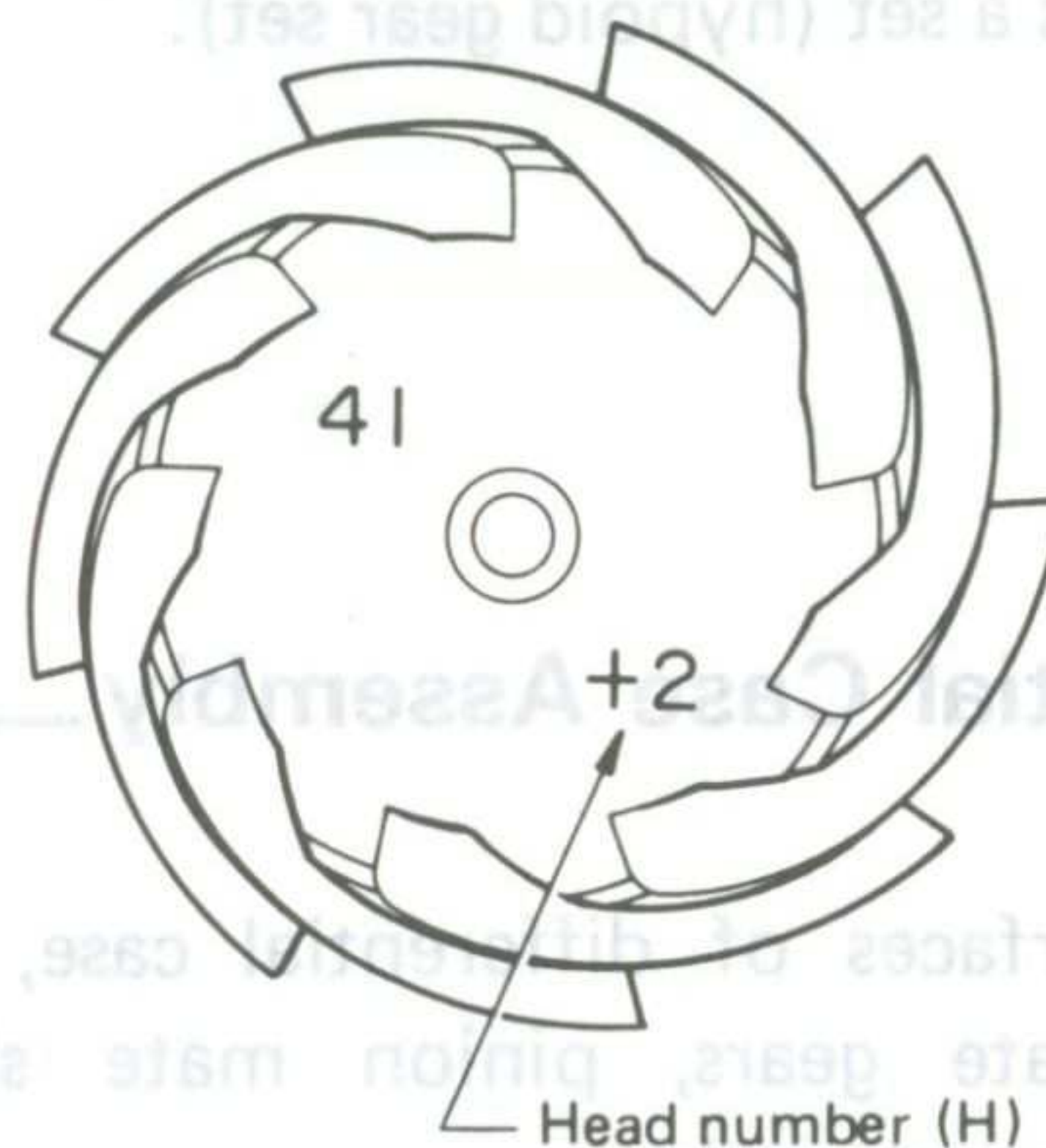
SPD595

2. To simplify the job, make a chart, like the one below, to organize your calculations.

LETTERS	HUNDREDTHS OF A MILLIMETER
H: Head number	
D': Figure marked on dummy shaft	
N: Measuring clearance	

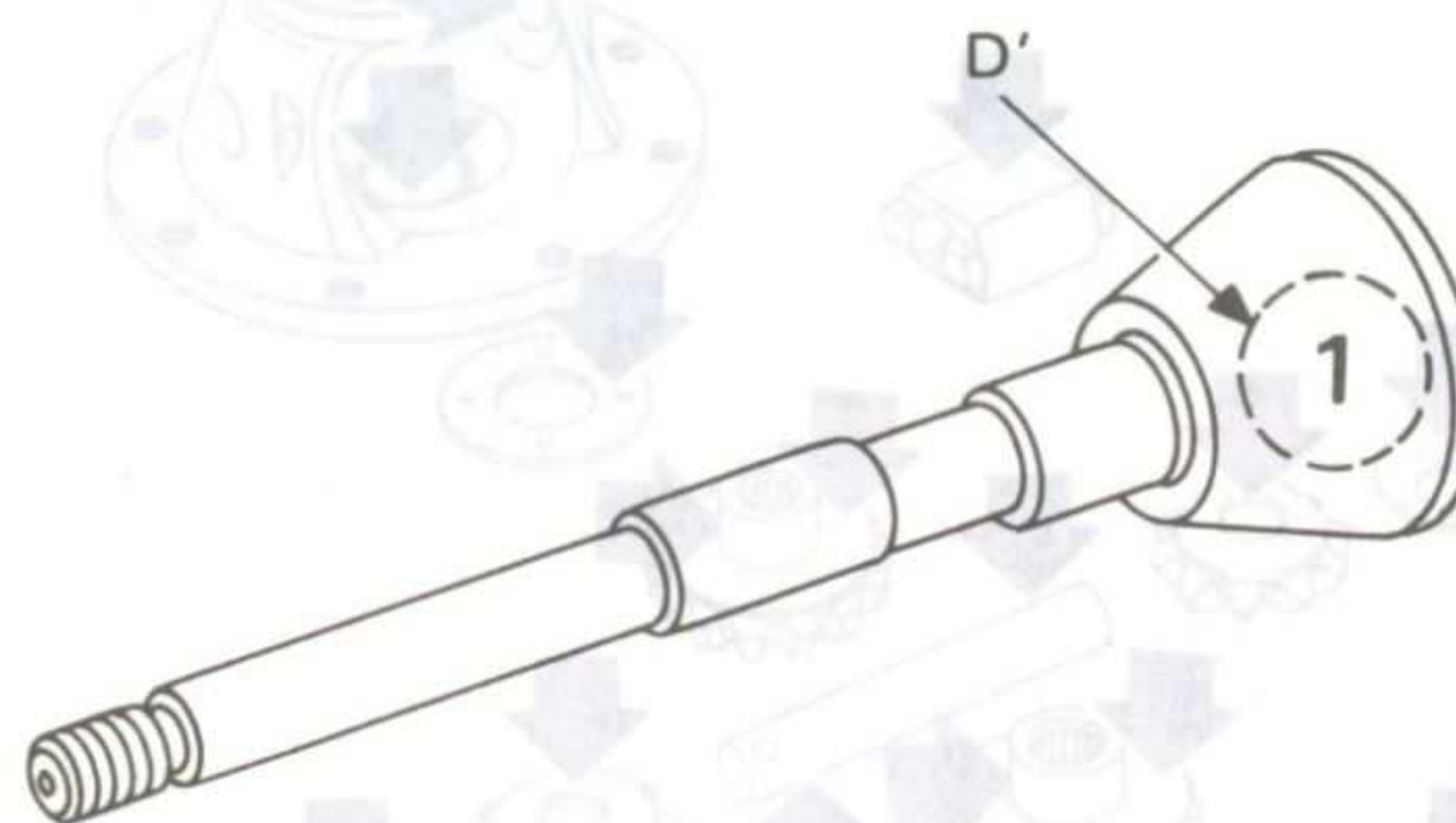
3. Write the following numbers down the chart.

H: Head number



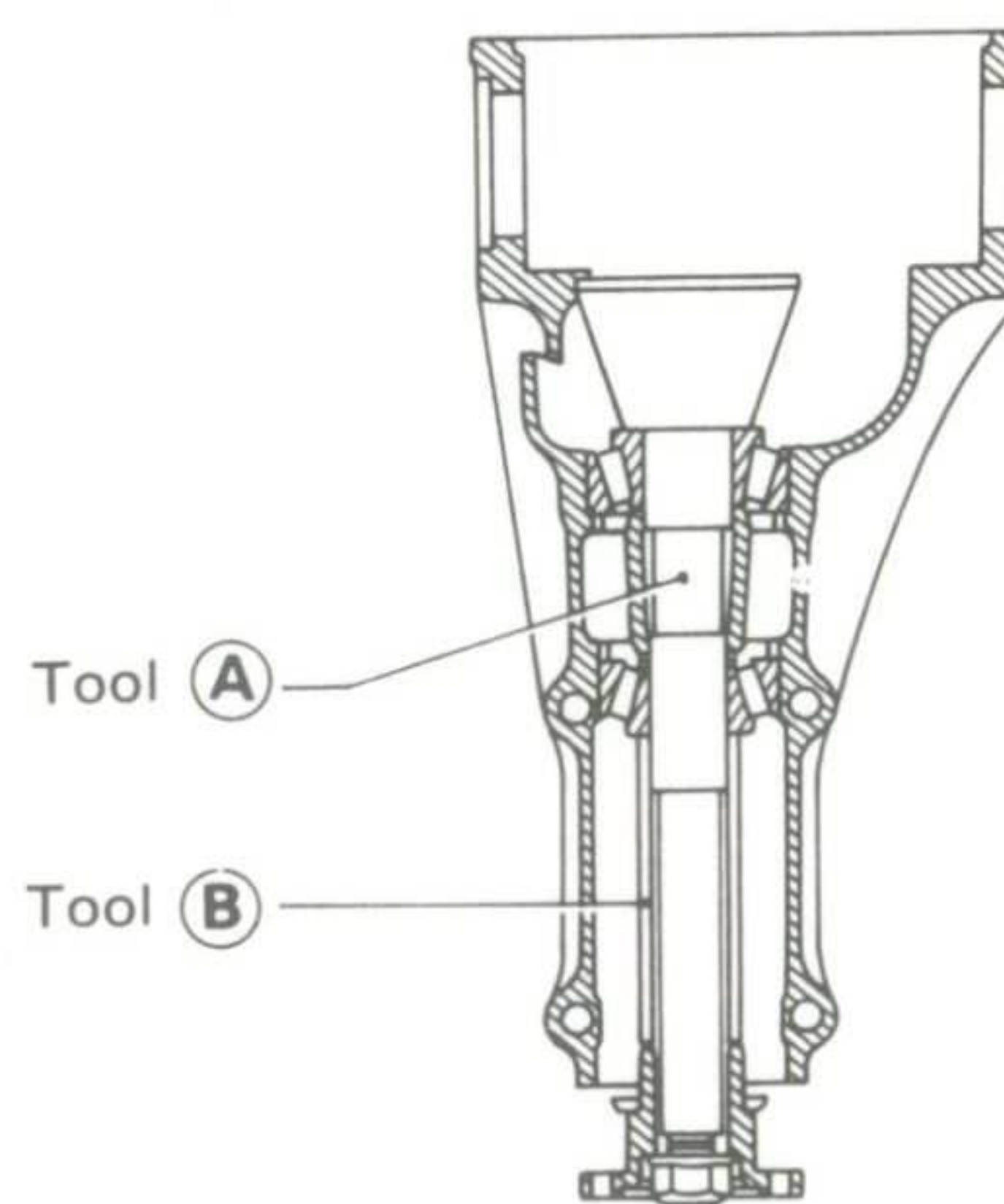
SPD542

D': Figure marked on dummy shaft.



SPD596

4. Set Tool (Dummy shaft) as shown below and tighten drive pinion nut carefully to correct preload of 1.0 to 1.3 N·m (10 to 13 kg-cm, 8.7 to 11.3 in-lb).



SPD597

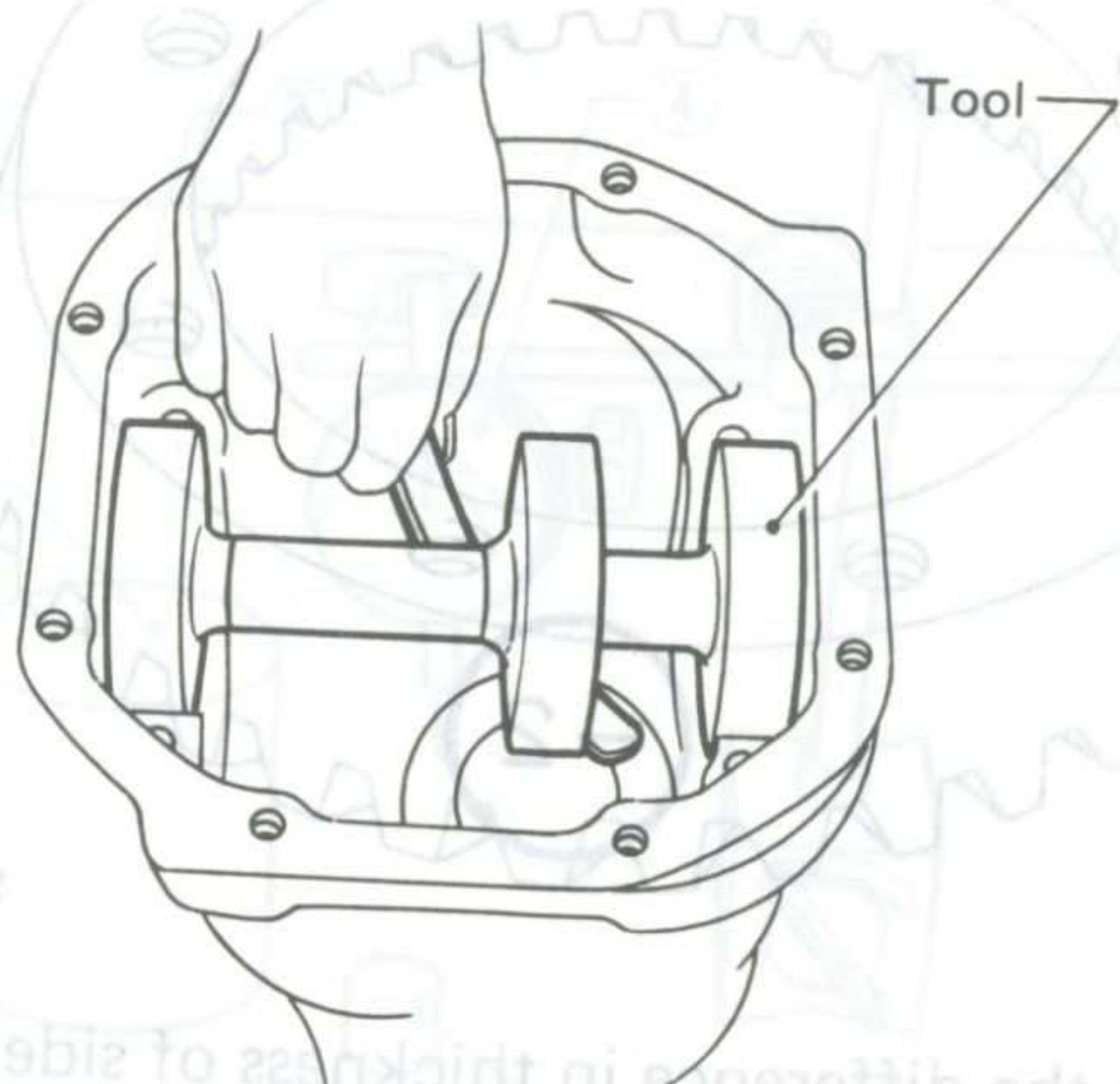
Tool number:

- Ⓐ Dummy shaft (KV38100110)
- Ⓑ Collar (KV38100130)

ADJUSTMENT (Model R200)

Drive Pinion Height (Cont'd)

- Attach Tool (Height gauge) to gear carrier, and measure the clearance between the height gauge and the dummy shaft face.



SPD598

Tool number: KV38100120

- Substitute these values into the equation to calculate the thickness of the washer.

If values signifying H and D' are not given, regard them as zero and calculate.

T (Thickness of washer)

$$= N - [(H - D') \times 0.01] + 3.00$$

Example:

$$N = 0.23$$

$$H = 2$$

$$D' = 1$$

$$T = N - [(H - D') \times 0.01] + 3.00$$

$$= 0.23 - [(2 - 1) \times 0.01] + 3.00$$

(1)	H	2
	-D	-1

(2)		+1
		x 0.01
		+0.01

(3)	N	0.23
		-(+0.01)
		0.22

(4)		0.22
		+3.00
		3.22
		∴ T = 3.22

- Select the proper washer (Refer to S.D.S.).

If you cannot find the desired thickness of washer, use washer so that thickness is the closest to the calculated value.

Example:

Calculated value ... T = 3.22 mm

Used washer ... T = 3.21 mm

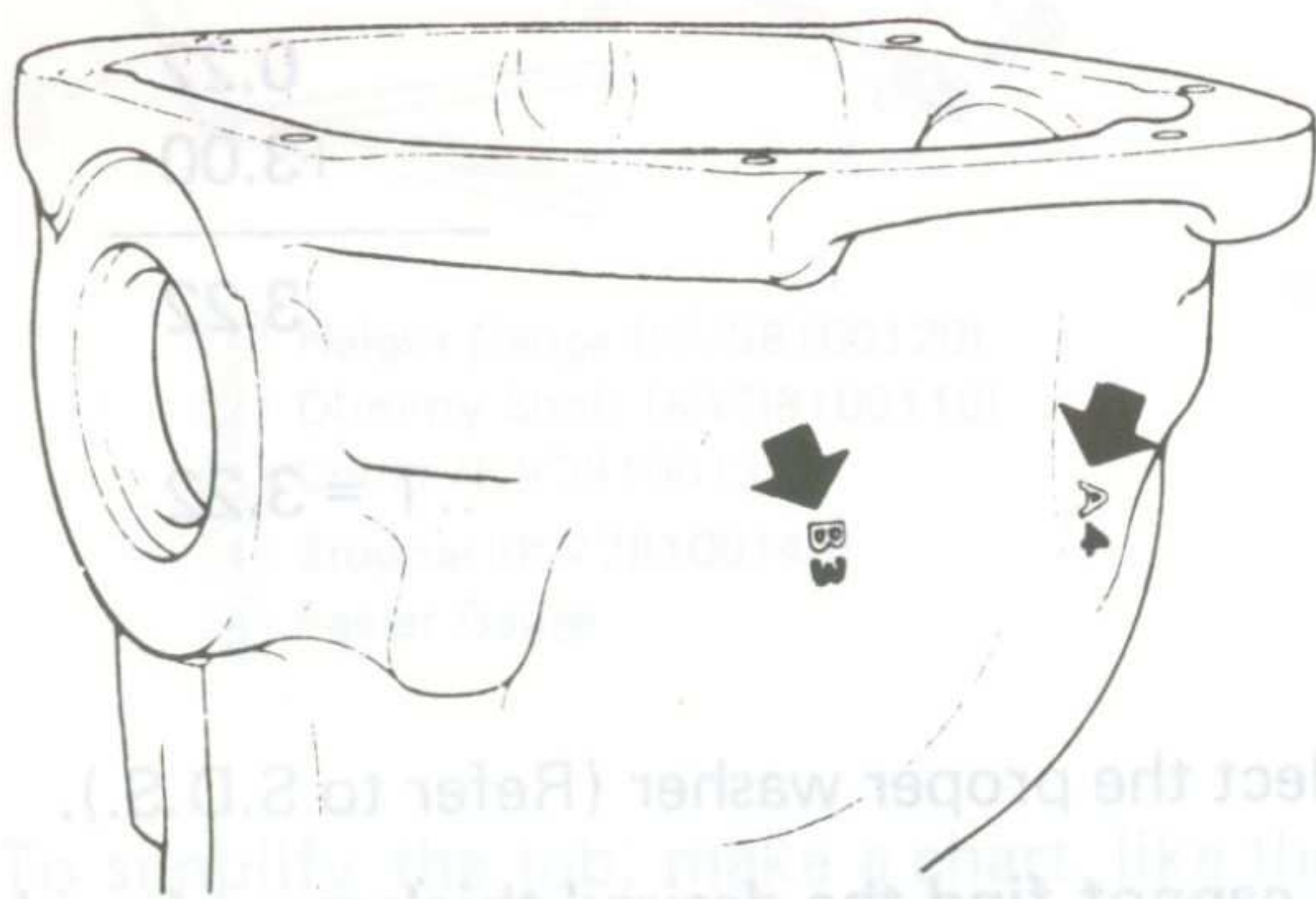
ADJUSTMENT (Model R200)

Side Bearing Preload

- To simplify the job, make a chart like the one below to organize your calculations.

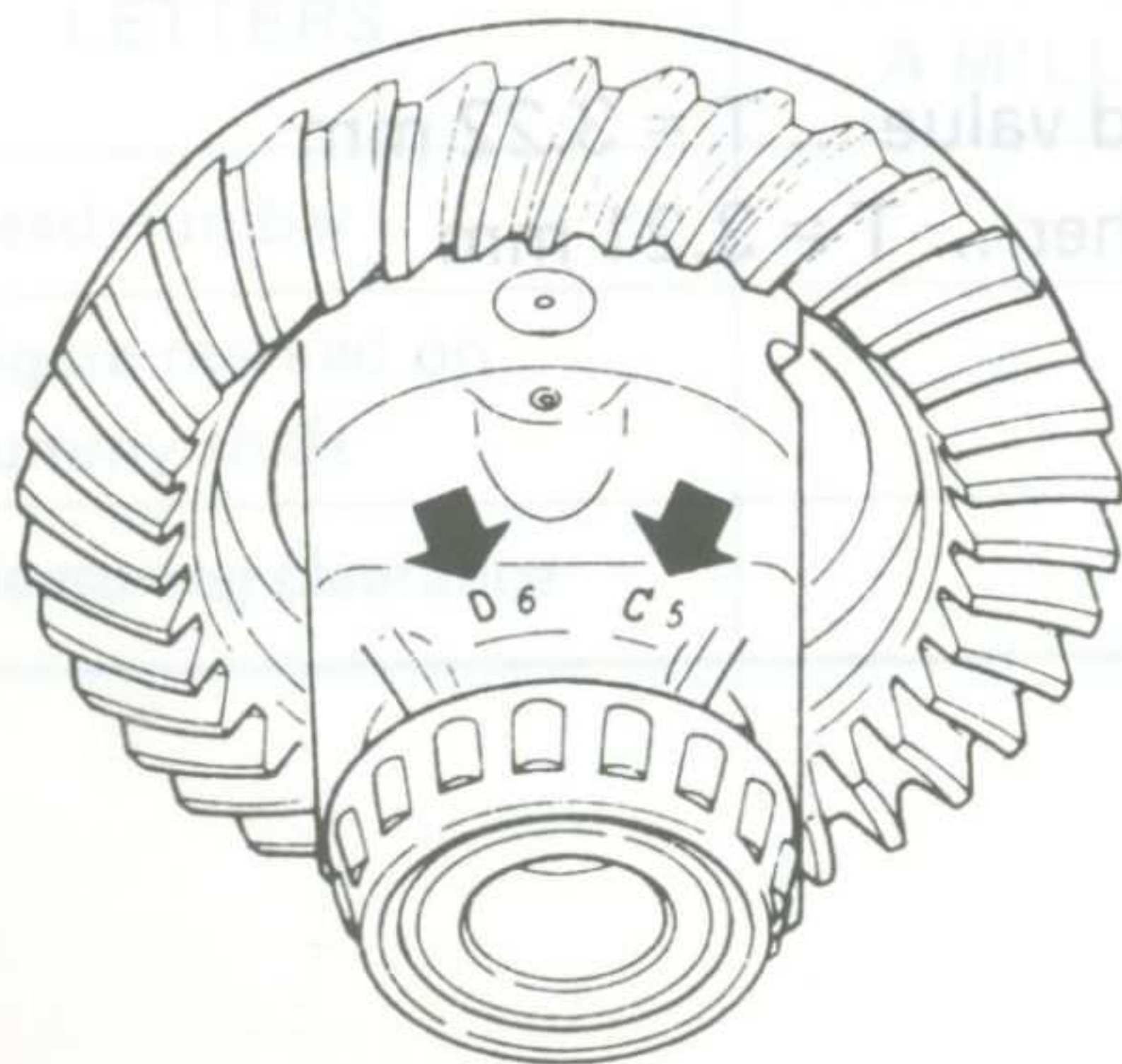
LETTERS	HUNDREDTHS OF A MILLIMETER
A - Left housing	
B - Right housing	
C - Differential case	
D - Differential case	
E - Left side bearing	
F - Right side bearing	
H - (+) or (-): ring gear	
G - Spacer measurement	

- Write the following numbers down in the chart.
A & B: Figures marked on gear carrier.



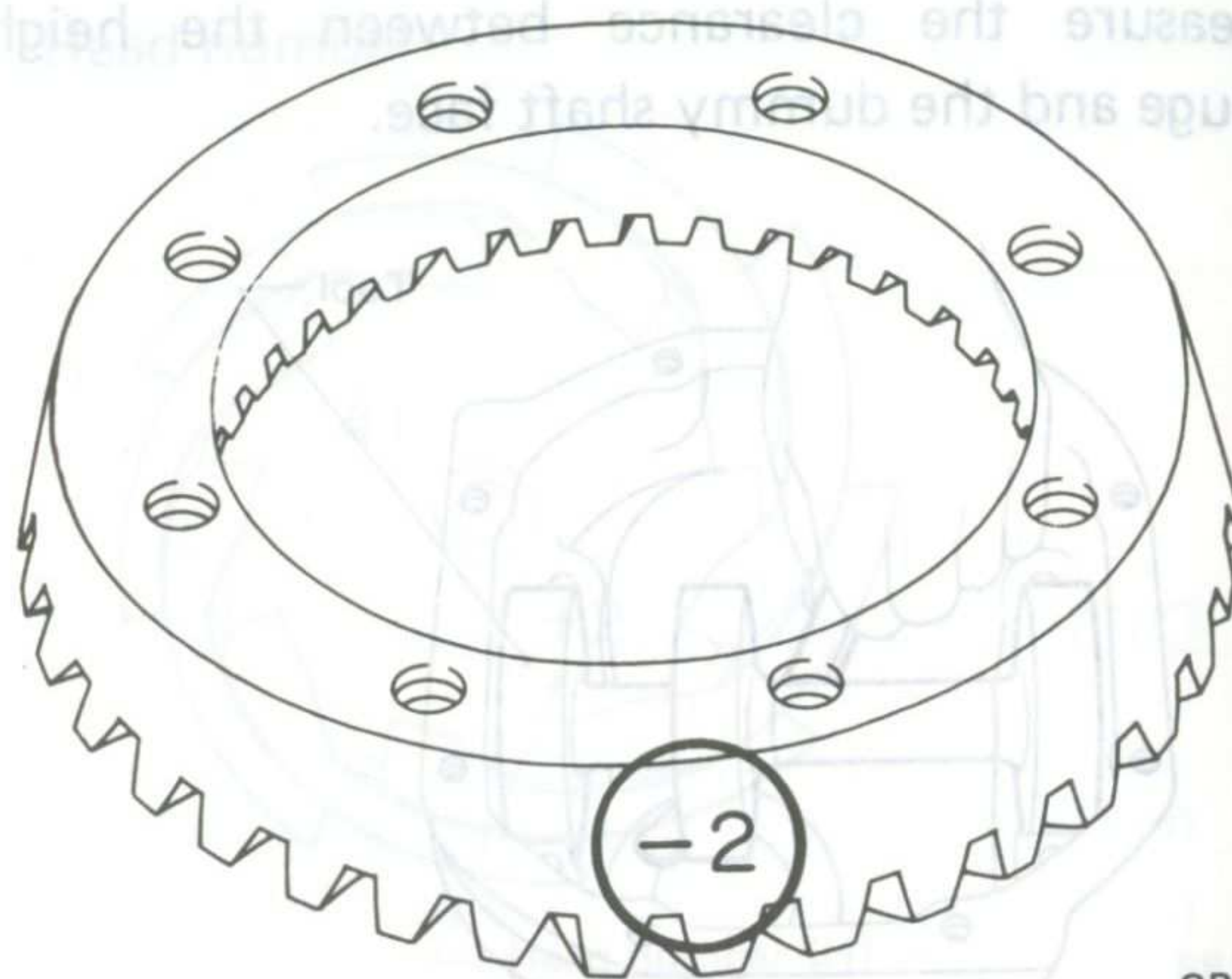
PD358

- C & D: Figures marked on differential case



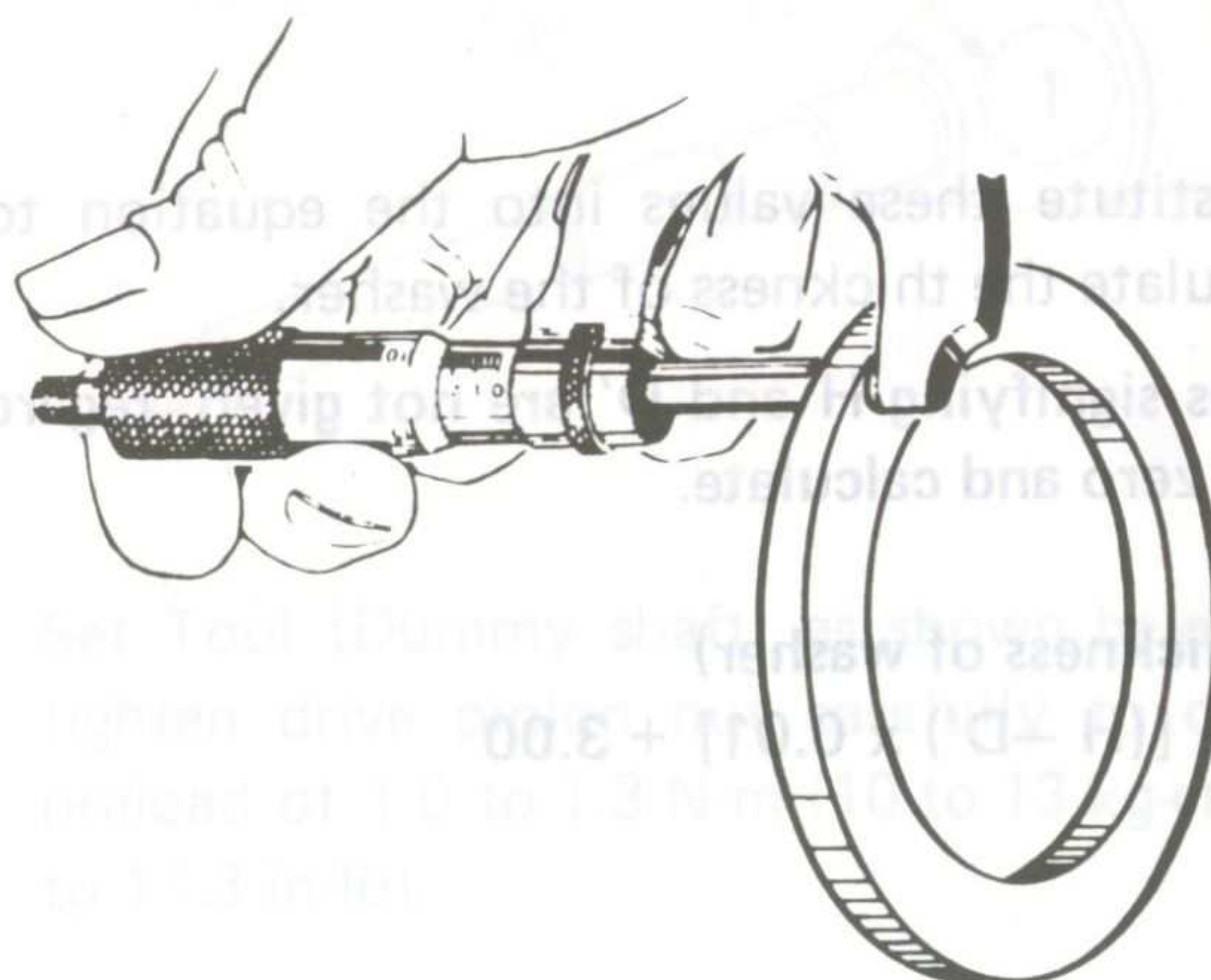
PD359

- H: Figures marked on ring gear



SPD576

- G: This is the difference in thickness of side spacer against standard width [8.10 mm (0.3189 in)]
(G = Standard spacer - Measured spacer).

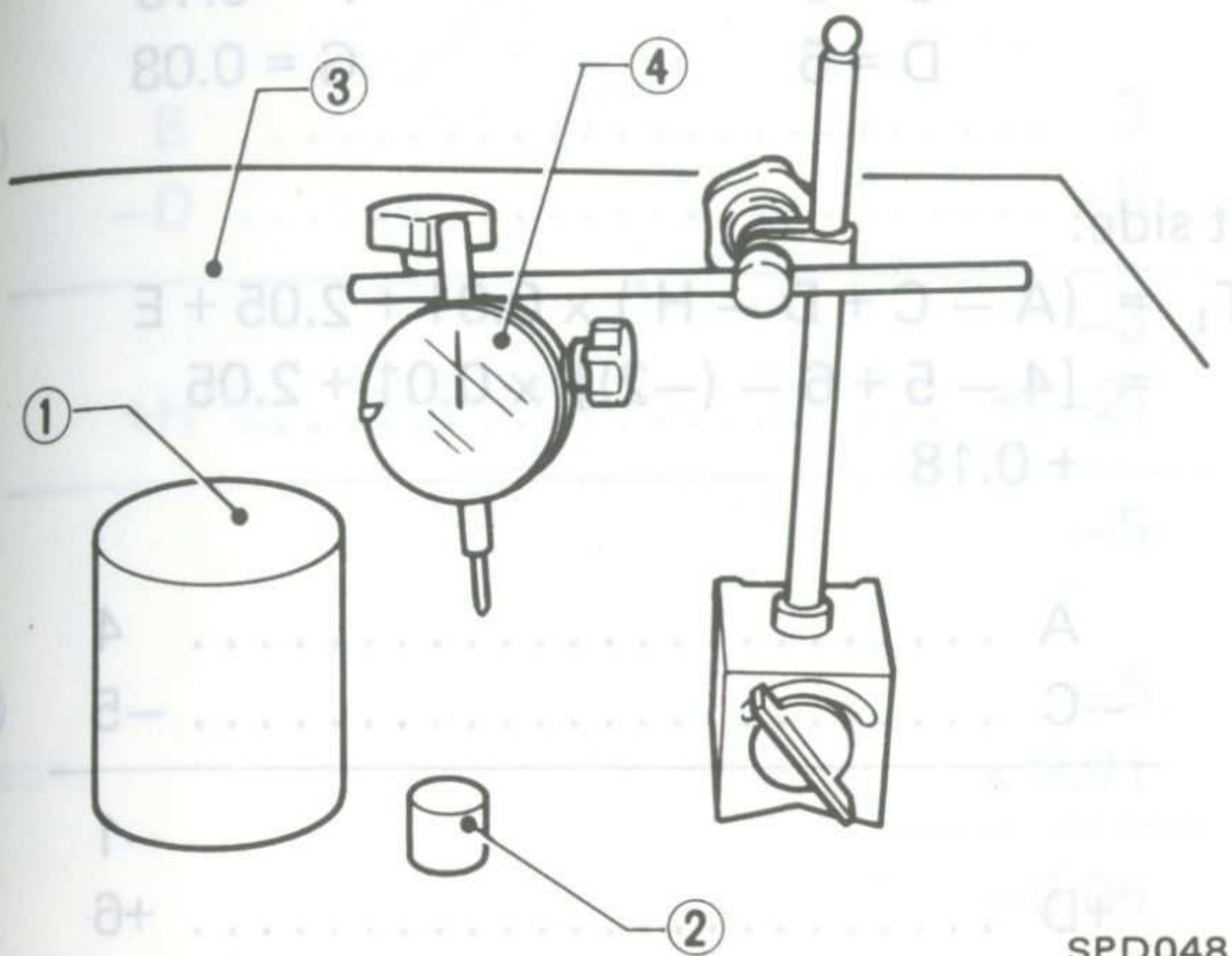


SPD544

ADJUSTMENT (Model R200)

Side Bearing Preload (Cont'd)

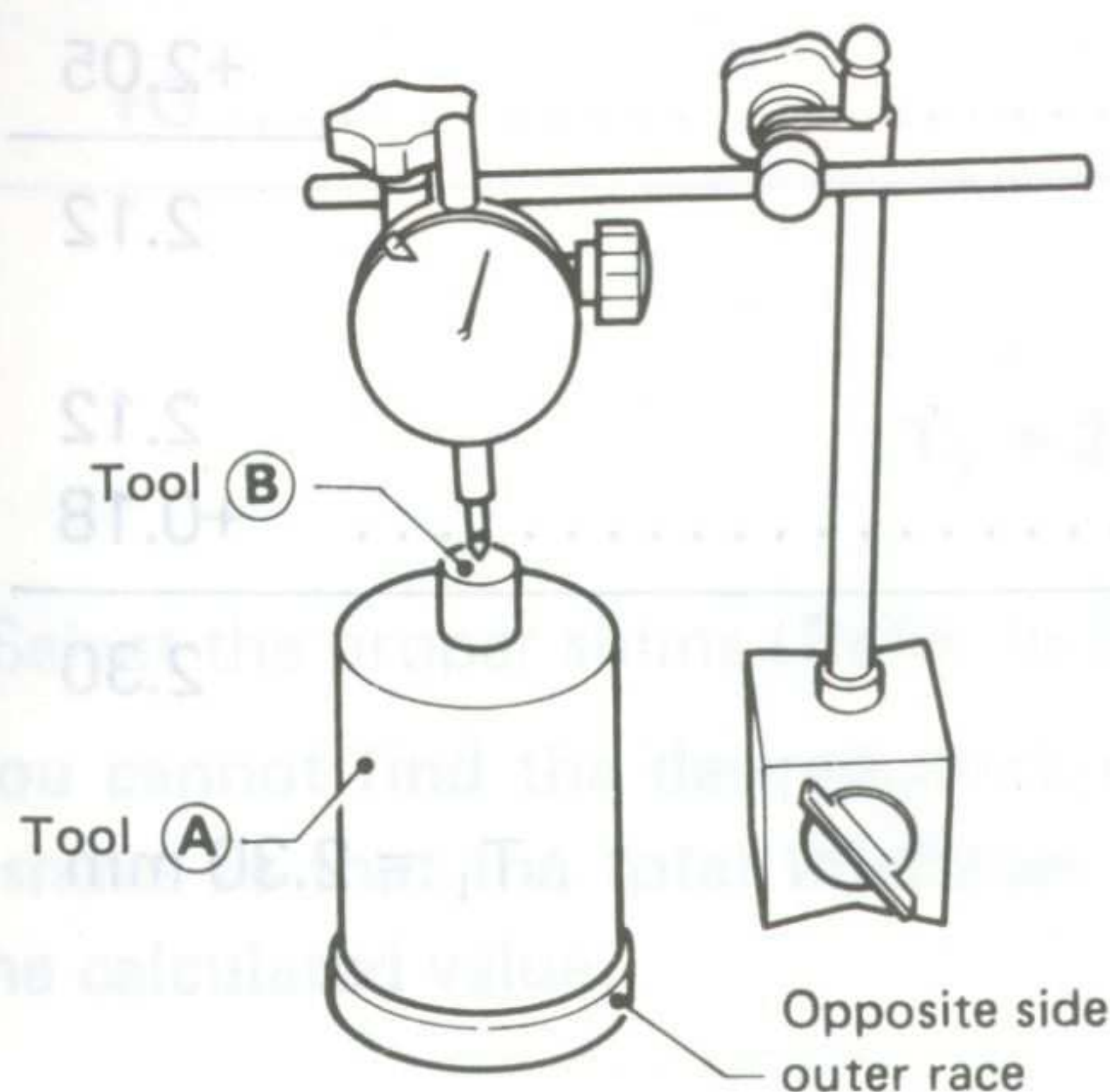
3. Measure how far under the standard thickness [21 mm (0.83 in)] the side bearings are. It will require tools shown below.



SPD048

- ① Weight Block (ST32501000)
- ② Master Gauge (KV38102000)
- ③ Base Plate
- ④ Dial Indicator

4. Place the outer race of the opposite side bearing to be measured.
5. Place a weight block on that outer race, and a master gauge on that block.



SPD150

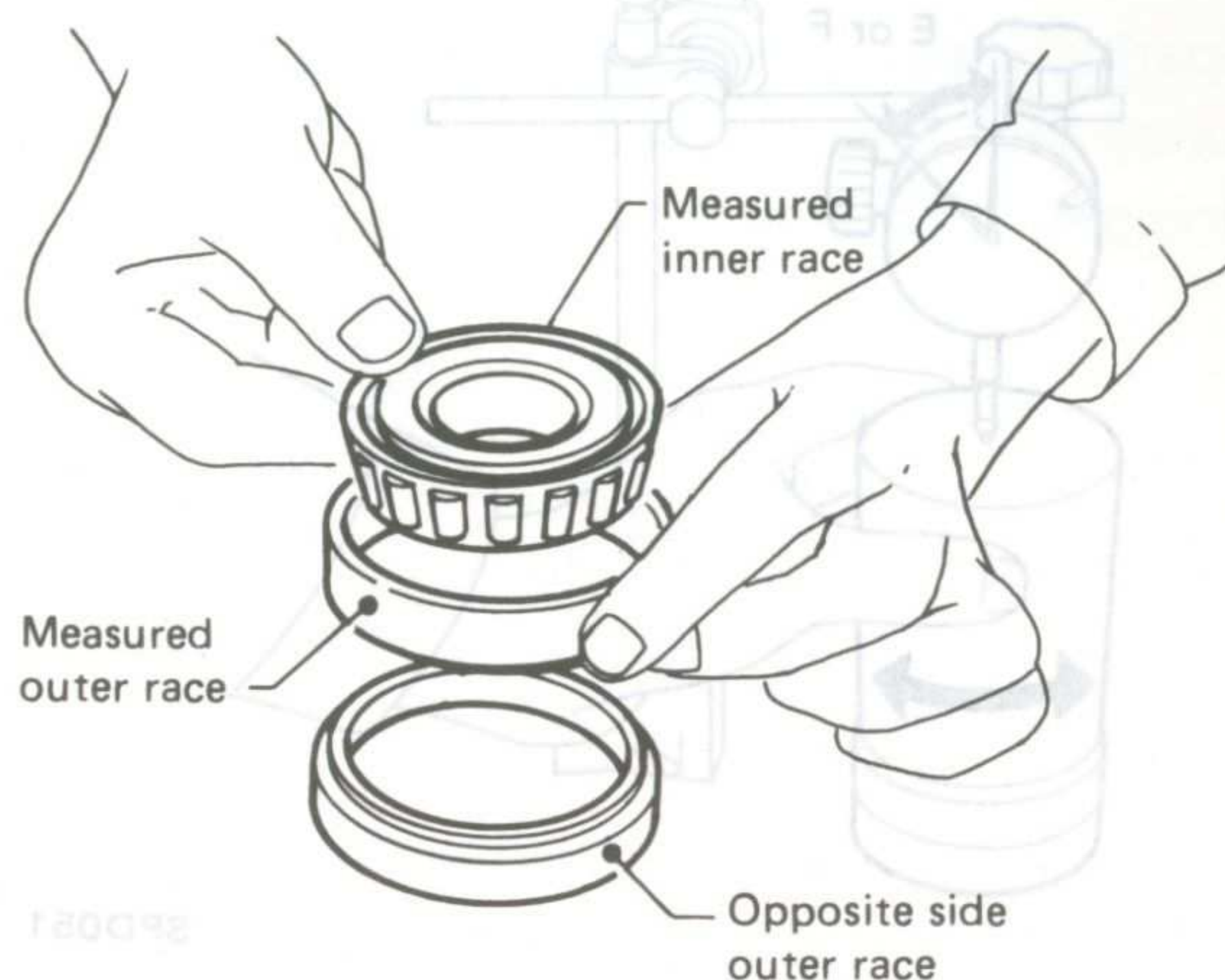
Tool number:

- Ⓐ ST32501000
- Ⓑ KV38102000

6. Adjust dial indicator scale to zero.

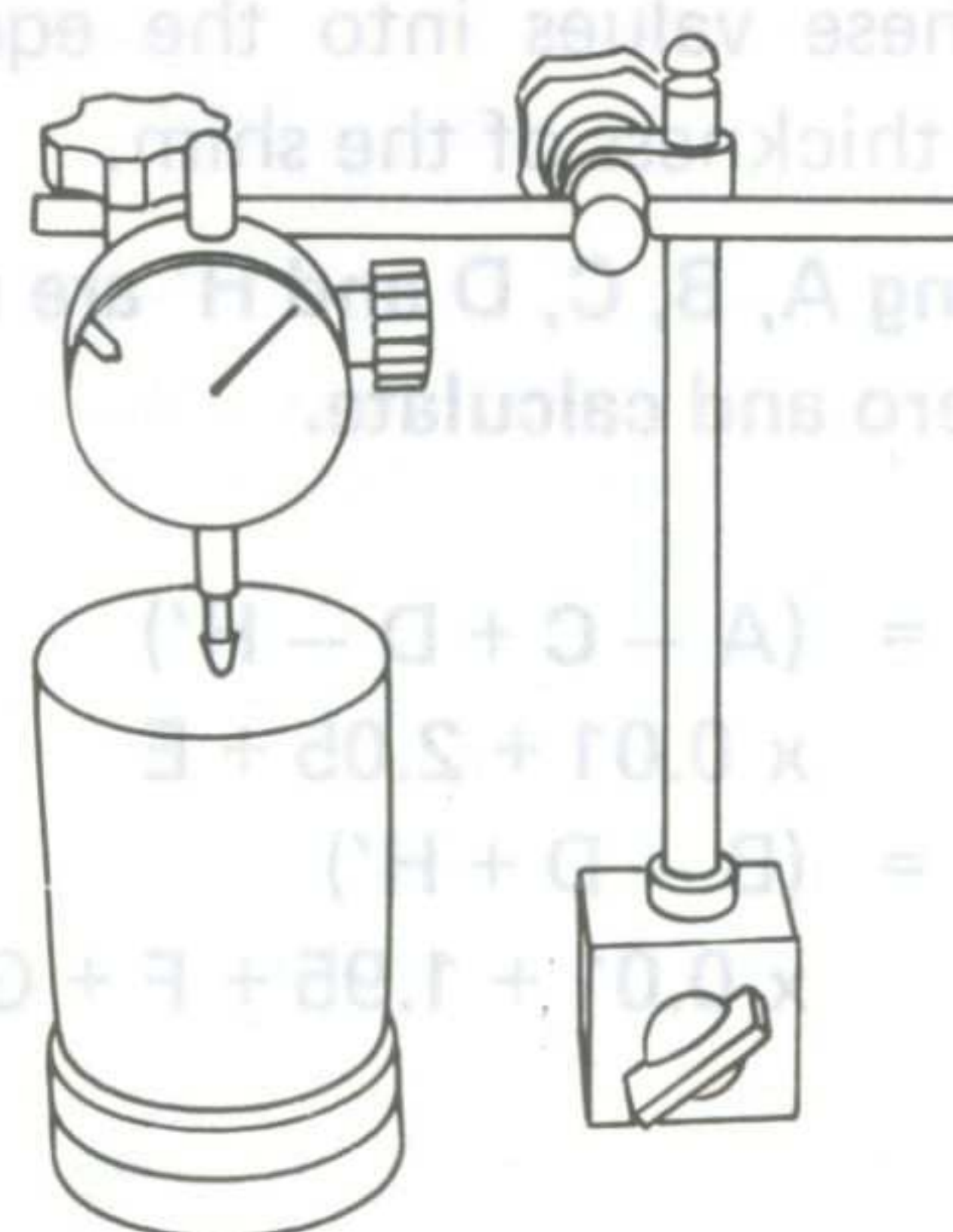
7. Carefully slide 4-step gauge block and weight block out from under dial indicator.
8. Lubricate side bearing and place the bearing outer race and inner race to be measured on the opposite side outer race.

If the bearing assembly is placed on the base plate, the bearing width cannot be accurately determined due to its cage being in contact with the base plate.



SPD050

9. Place weight block on side bearing.
10. Slide dial indicator on weight block.



SPD591

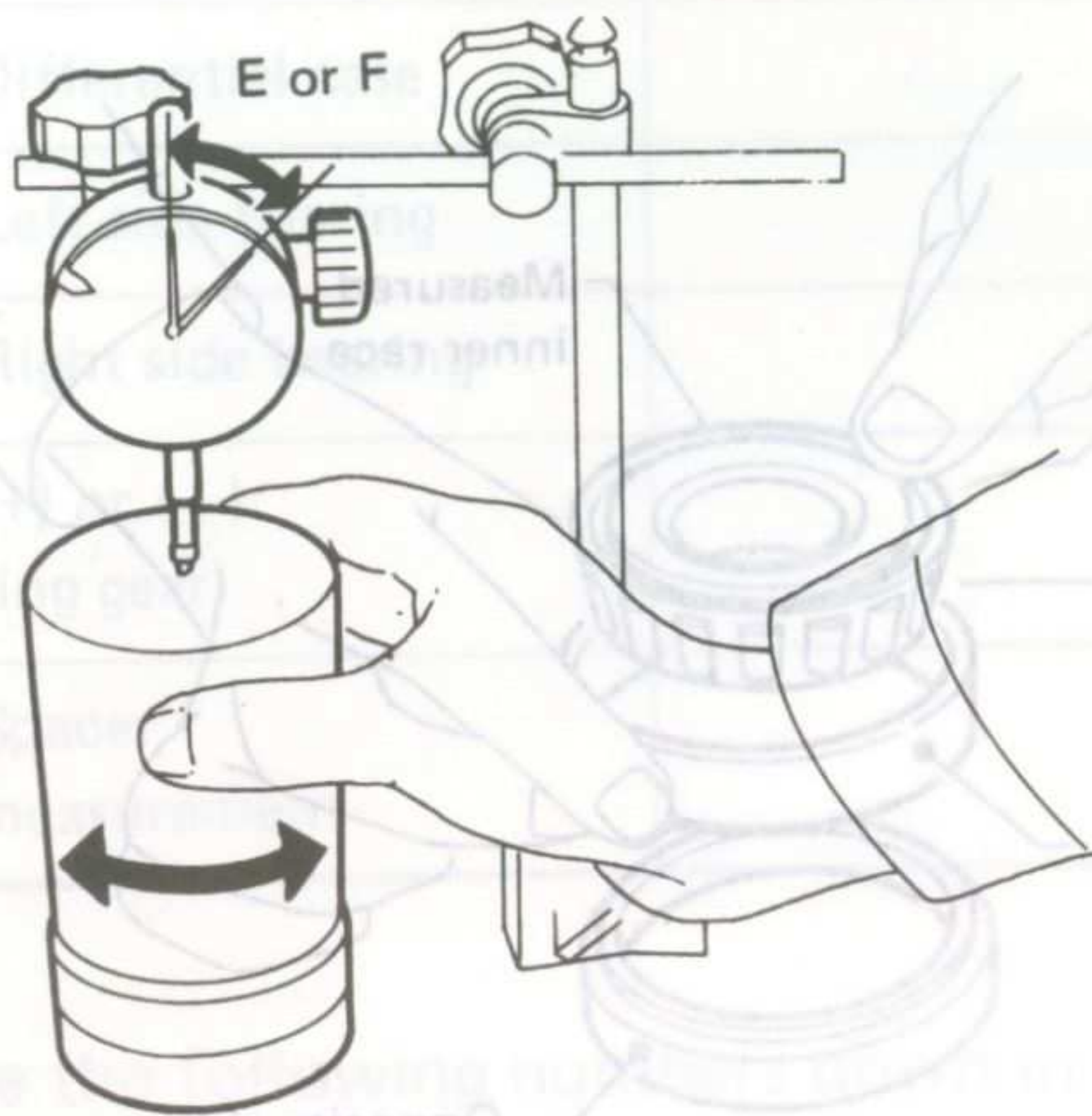
ADJUSTMENT (Model R200)

Side Bearing Preload (Cont'd)

11. Turn weight block a few times to ensure that bearing is properly seated.

12. Read dial indicator.

- Normal indication:
0.10 - 0.30 mm (0.0039 - 0.0118 in)
- If the needle fluctuates erratically then bearing is either dirty or defective and should be cleaned or replaced.



13. Measure both bearings in the same way and write the left side bearing measurement next to "E" and the right side bearing measurement next to "F".

14. Substitute these values into the equation to calculate the thickness of the shim.

If values signifying A, B, C, D and H' are not given, regard them as zero and calculate.

$$\text{Left side: } T_1 = (A - C + D - H') \times 0.01 + 2.05 + E$$

$$\text{Right side: } T_2 = (B - D + H') \times 0.01 + 1.95 + F + G$$

Example:

$$\begin{aligned} A &= 4 & H' &= -2 \\ B &= 3 & E &= 0.18 \\ C &= 5 & F &= 0.15 \\ D &= 6 & G &= 0.08 \end{aligned}$$

Left side:

$$\begin{aligned} T_1 &= (A - C + D - H') \times 0.01 + 2.05 + E \\ &= [4 - 5 + 6 - (-2)] \times 0.01 + 2.05 + 0.18 \end{aligned}$$

(1)	A	4
	-C	-5
		-1
	+D	+6
		5
	-H'	-(-2)
		7

(2)		7
		x 0.01
		0.07

(3)		0.07
		+2.05
		2.12

(4)		2.12
	+E	+0.18
		2.30

$$\therefore T_1 = 2.30 \text{ mm}$$

ADJUSTMENT (Model R200)

Side Bearing Preload (Cont'd)

Right side:

$$T_2 = (B - D + H') \times 0.01 + 1.95 + F + G$$

$$= [3 - 6 + (-2)] \times 0.01 + 1.95 + 0.15 + 0.08$$

(1)	B		3
	-D		-6

			-3
	+H'		+(-2)

			-5

(2)			-5
		x 0.01	-----
			-0.05

(3)			-0.05
			+1.95

			1.90

(4)			1.90
	+F		+0.15

			2.05

			2.05
	+G		+0.08

			2.13

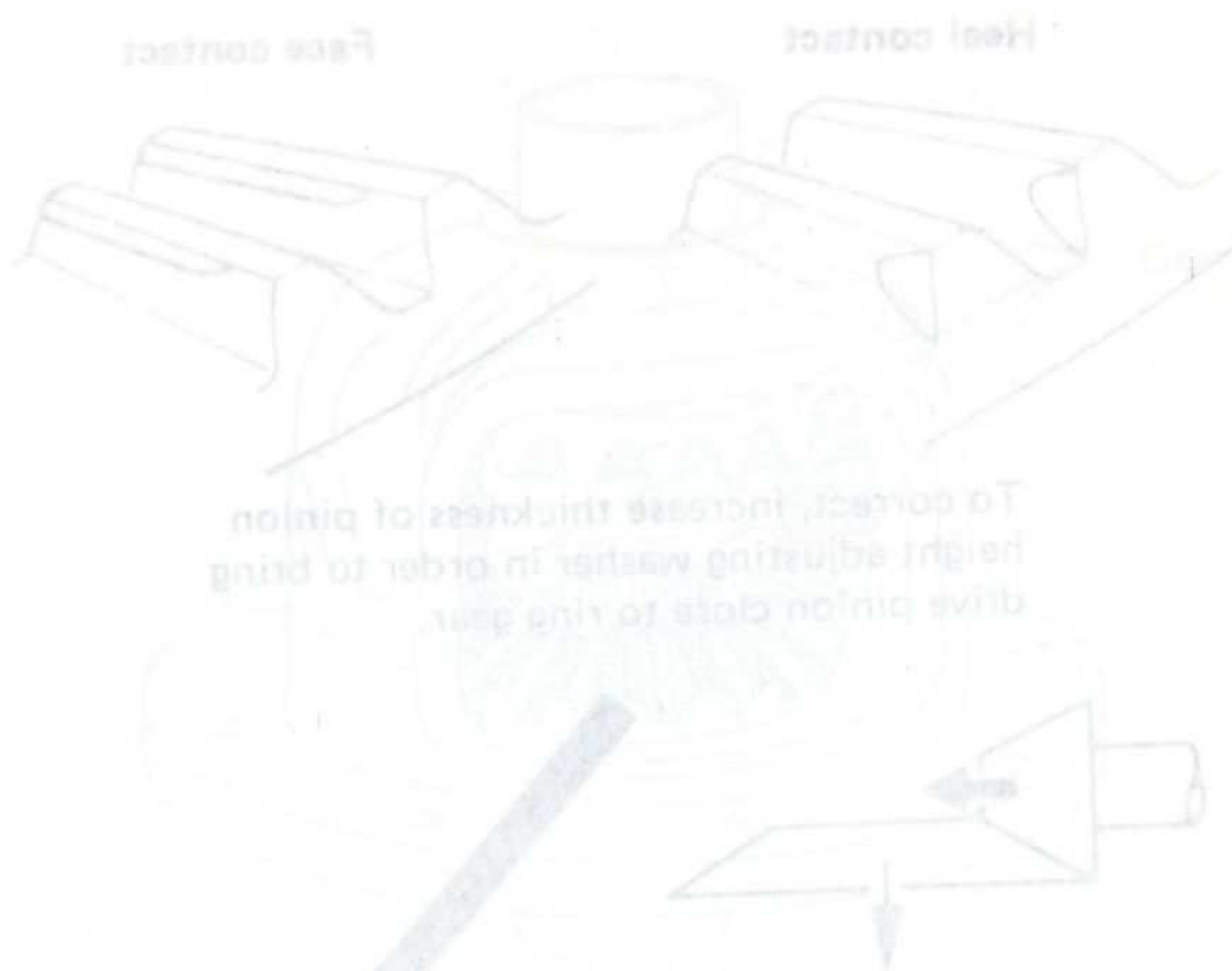
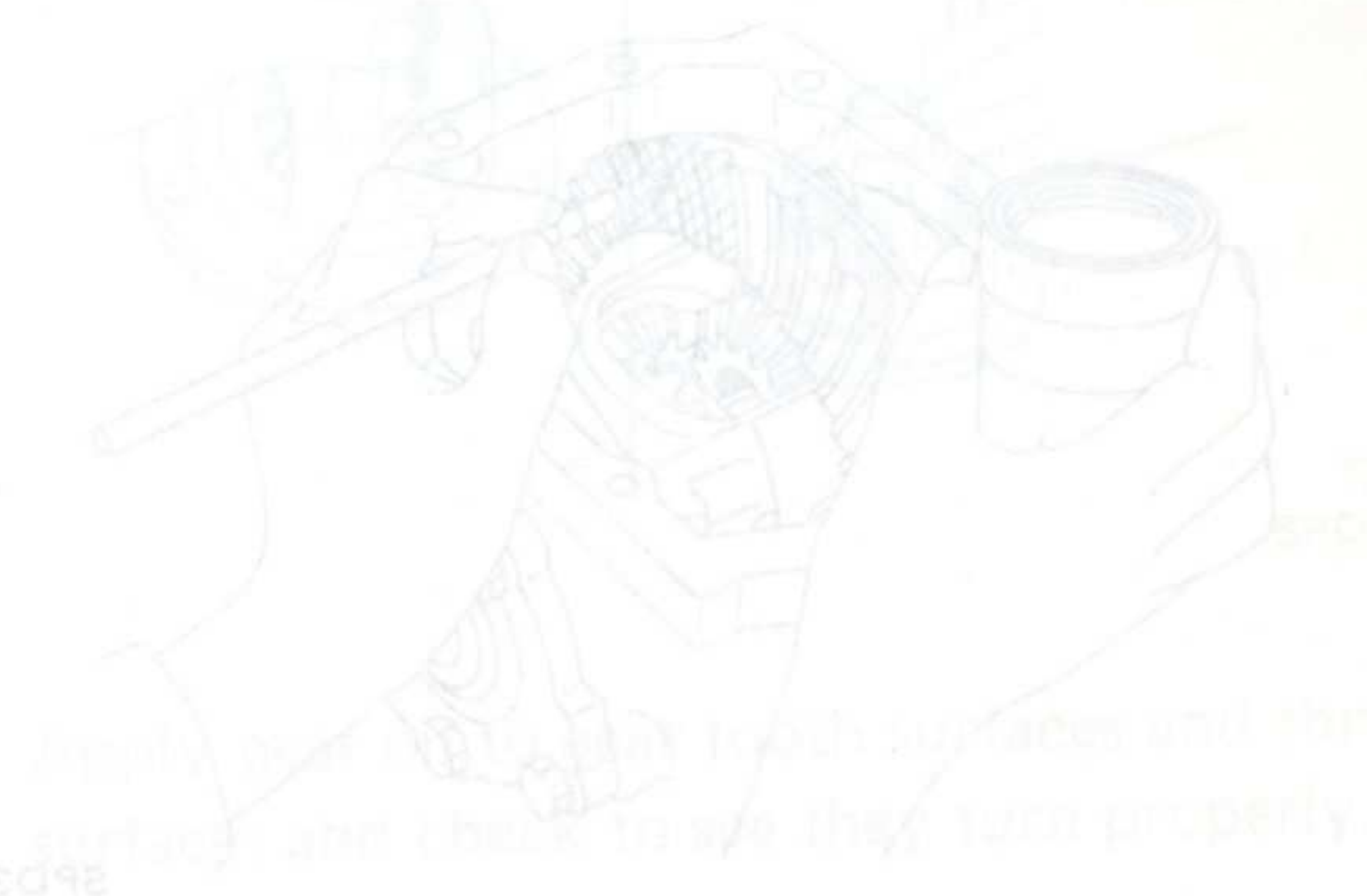
$$\therefore T_2 = 2.13 \text{ mm}$$

15. Select the proper shims (Refer to S.D.S.).

If you cannot find the desired thickness of shims, use shims so that the total thickness is the closest to the calculated value.

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion. (in 0.0050 in. 0.127 mm) Hypoid gear set which are not positioned properly may be noisy, or have short life or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.



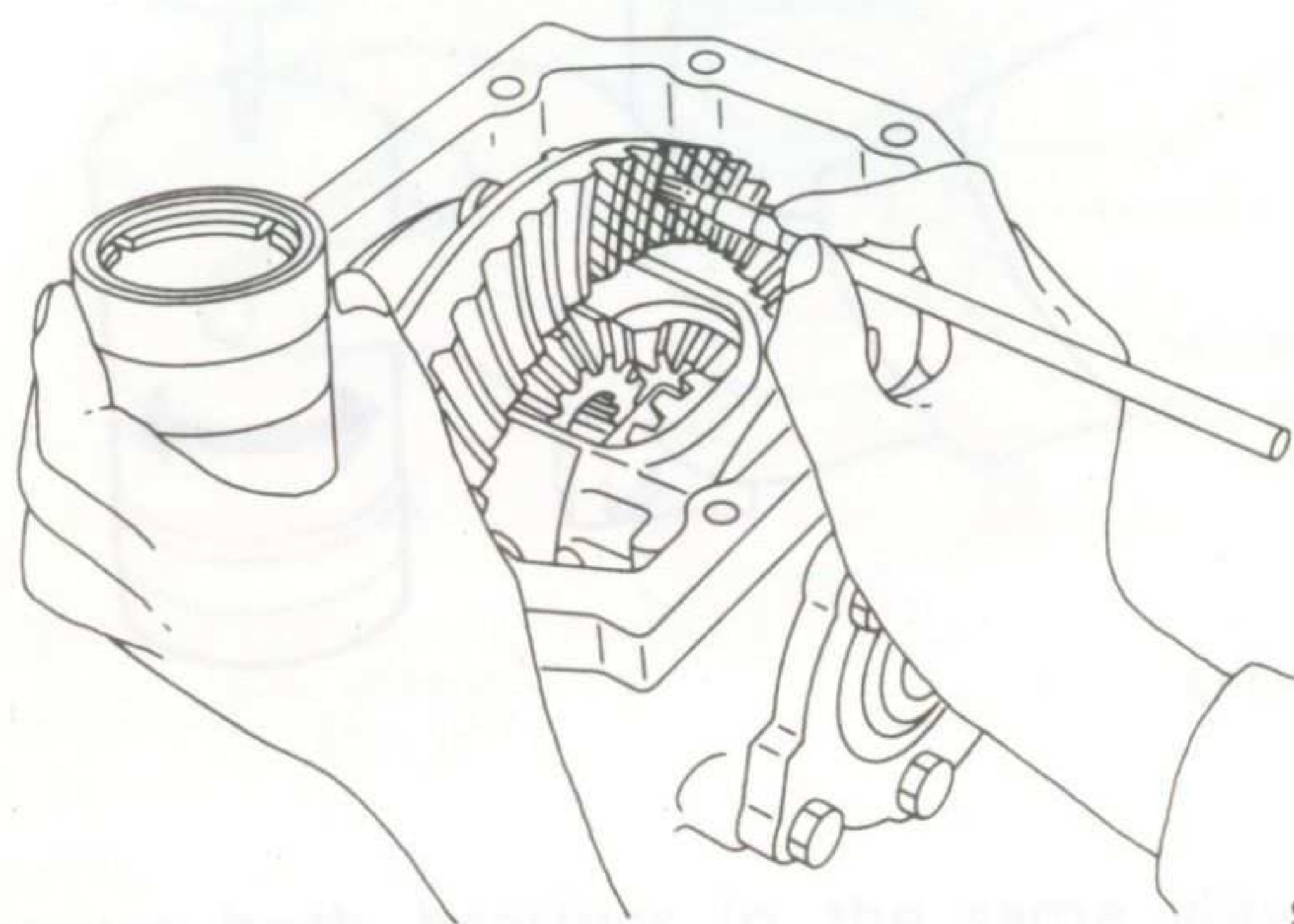
ADJUSTMENT (Model R200)

Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.

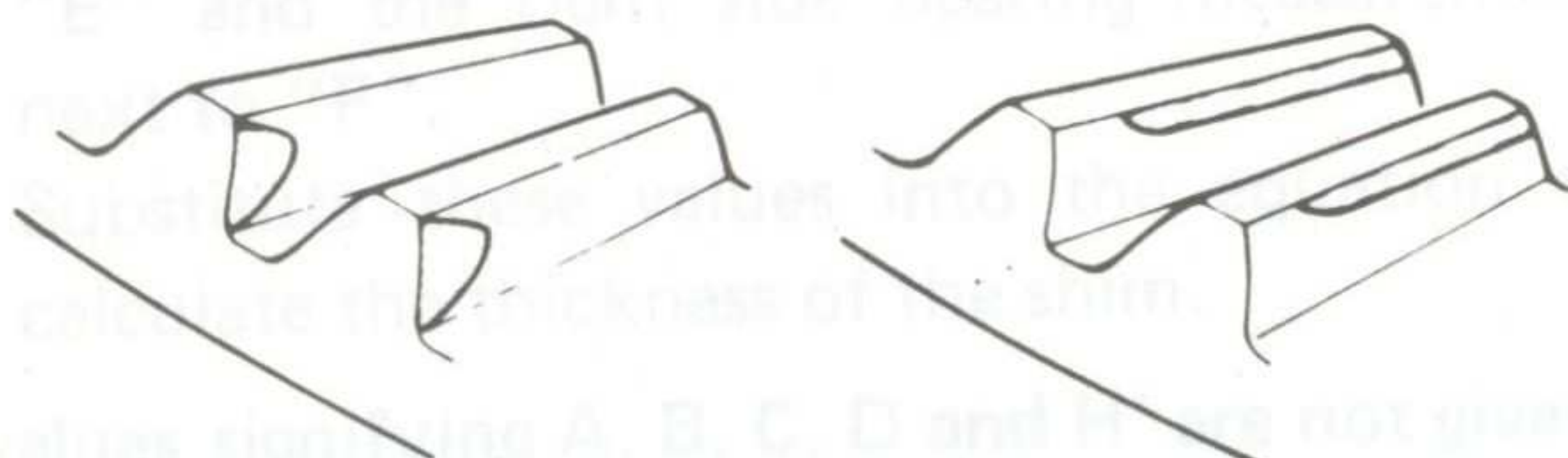
Hypoid gear set which are not positioned properly may be noisy, or have short life or both. With a pattern check, the most desirable contact for low noise level and long life can be assured.

1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.

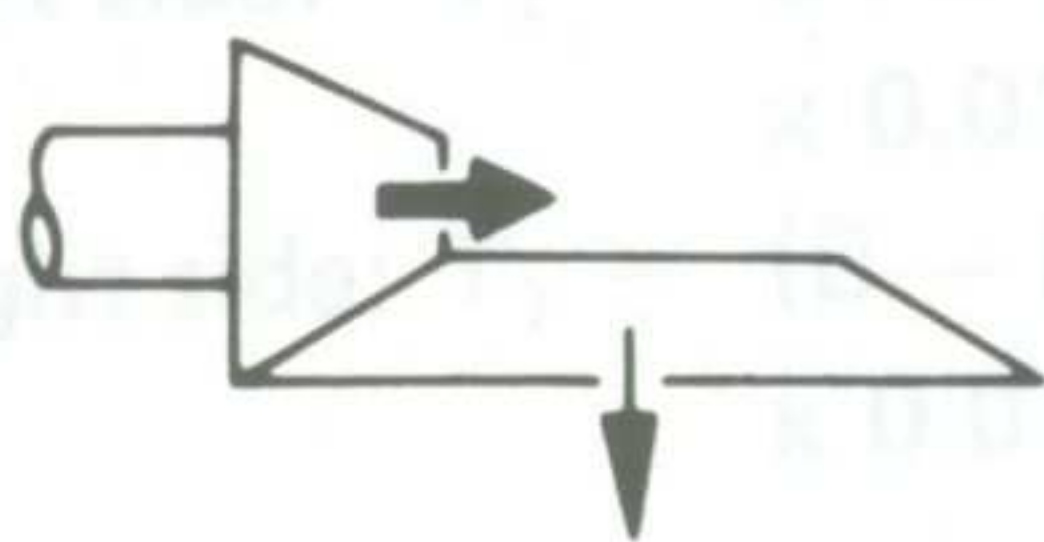


Heel contact

Face contact

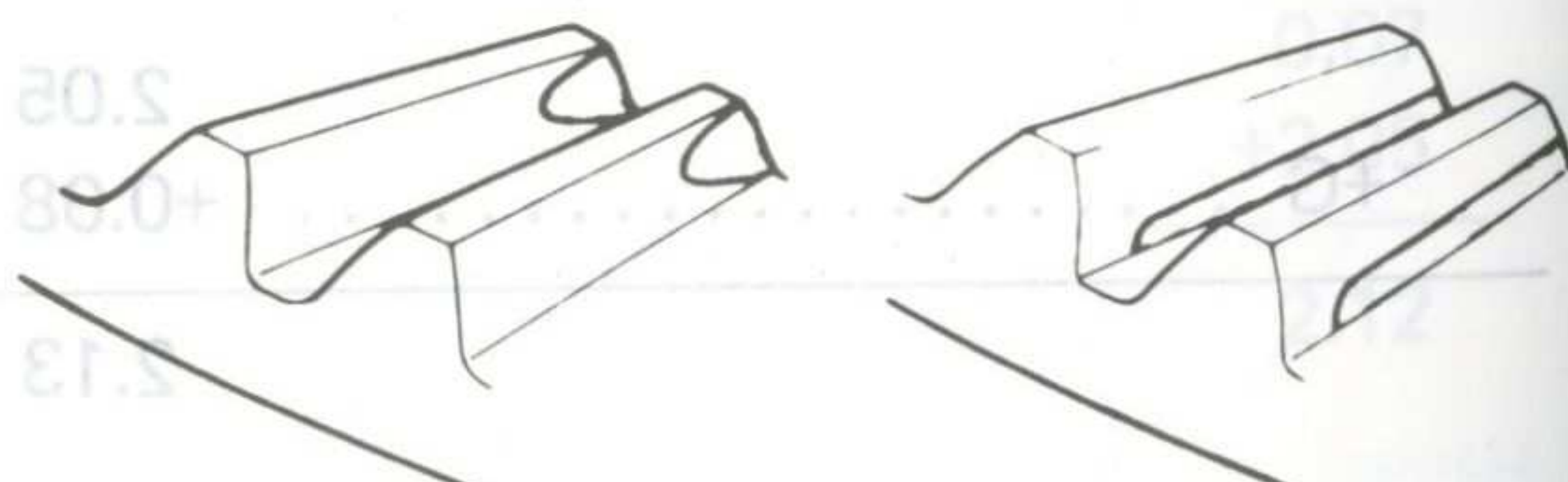


To correct, increase thickness of pinion height adjusting washer in order to bring drive pinion close to ring gear.

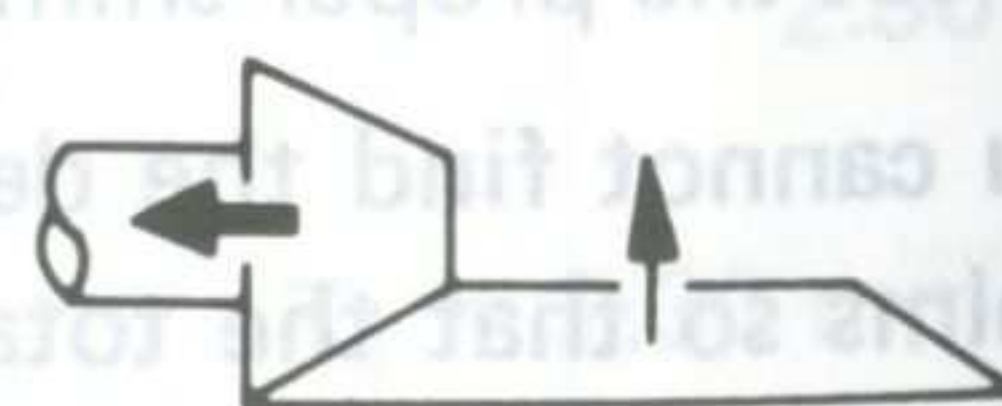


Toe contact

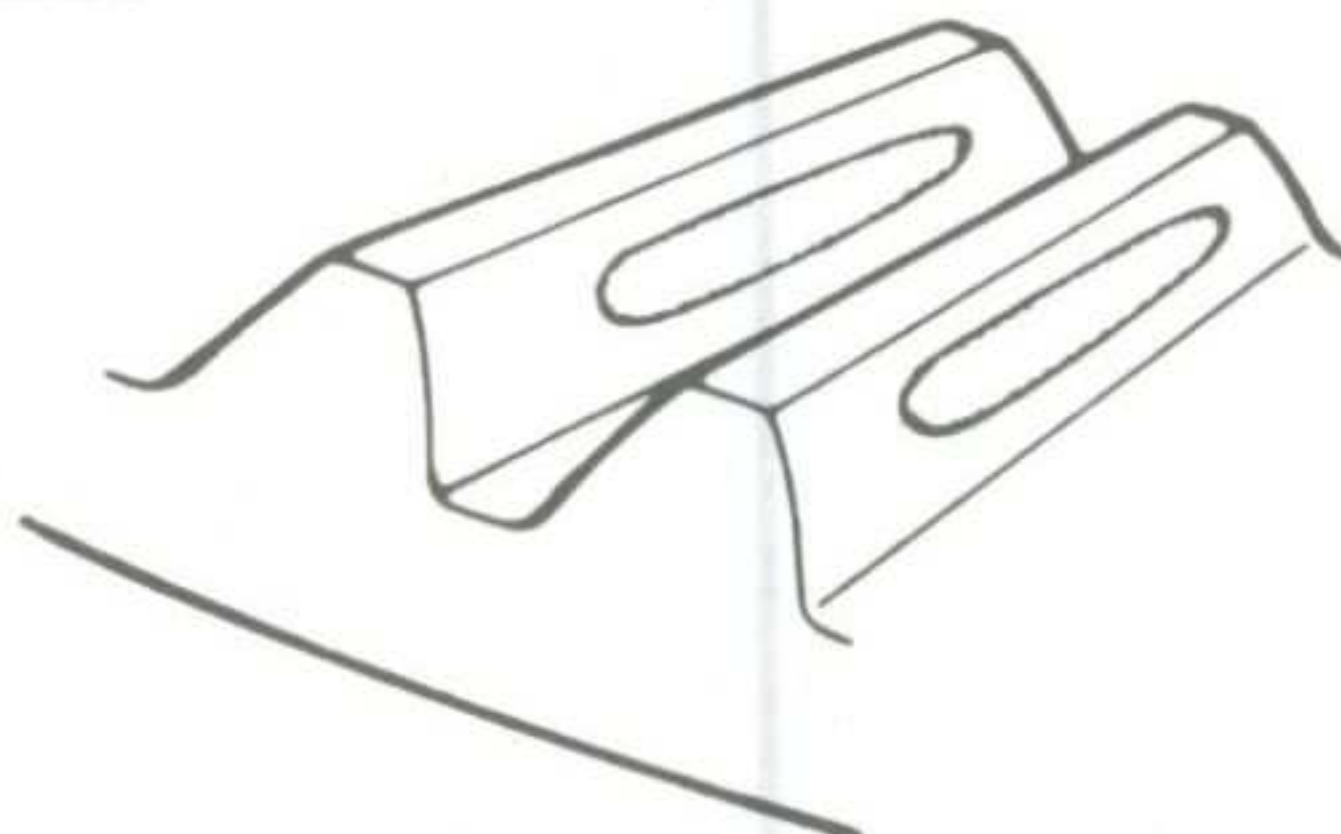
Flank contact



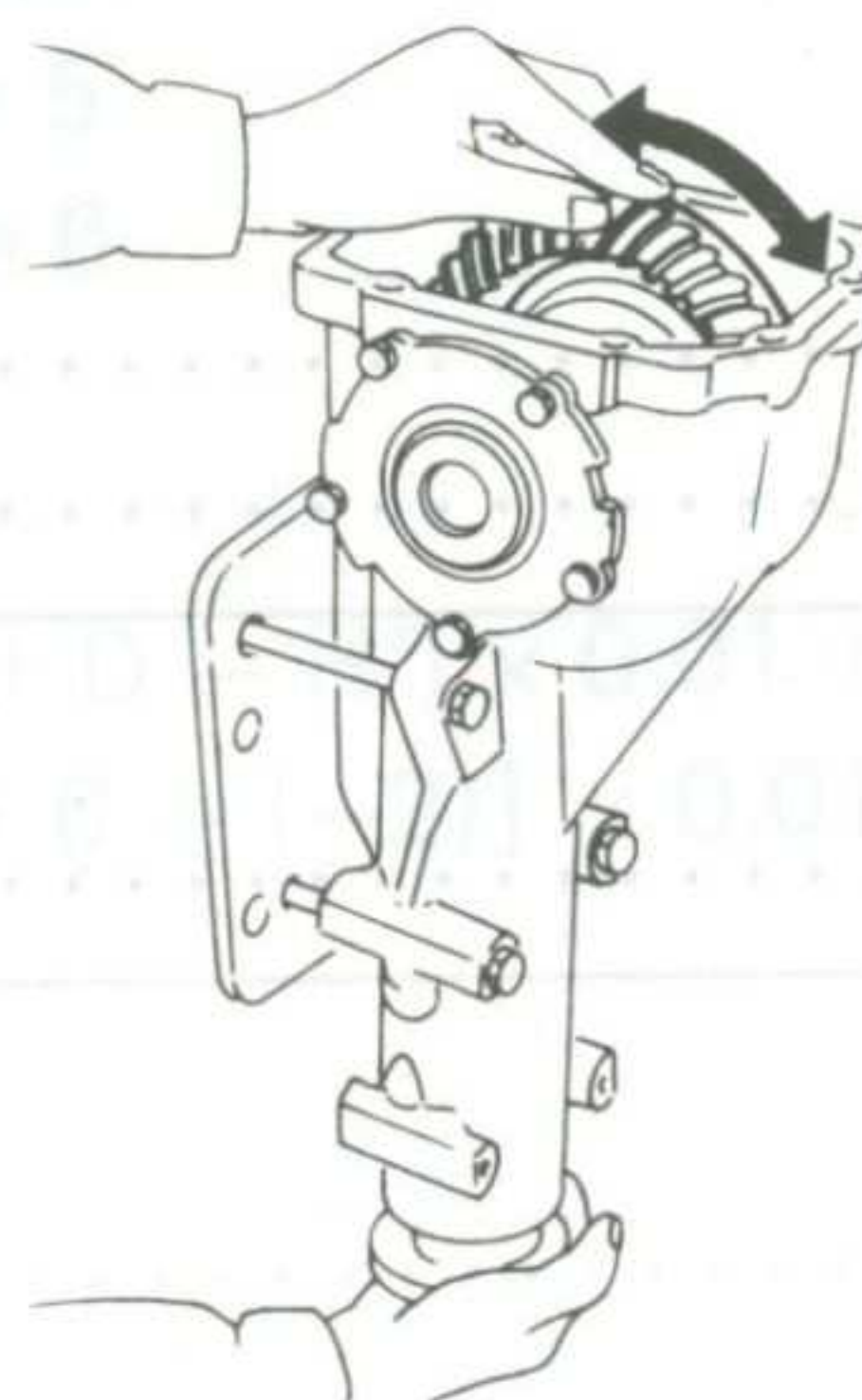
To correct, reduce thickness of pinion height adjusting washer in order to make drive pinion go away from ring gear.



Correct tooth contact



3. Hold companion flange steady by hand and rotate the ring gear in both directions.



SPD308

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct.

However, in extremely rare cases you will have to use trial-and-error processes until you get a good tooth contact pattern.

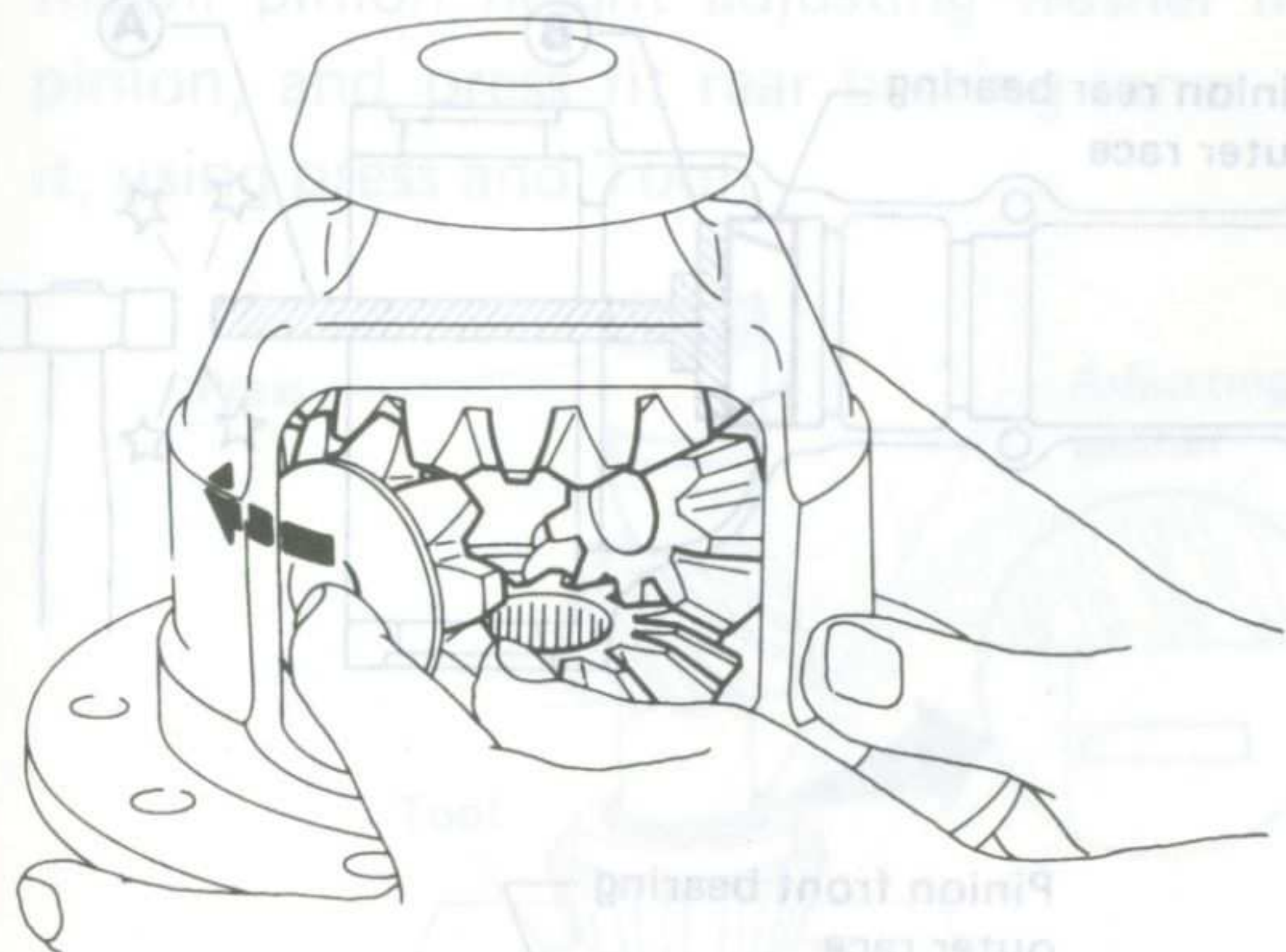
The tooth pattern is the best indication of how well a differential has been set up.

SPD007

ASSEMBLY (Model R200)

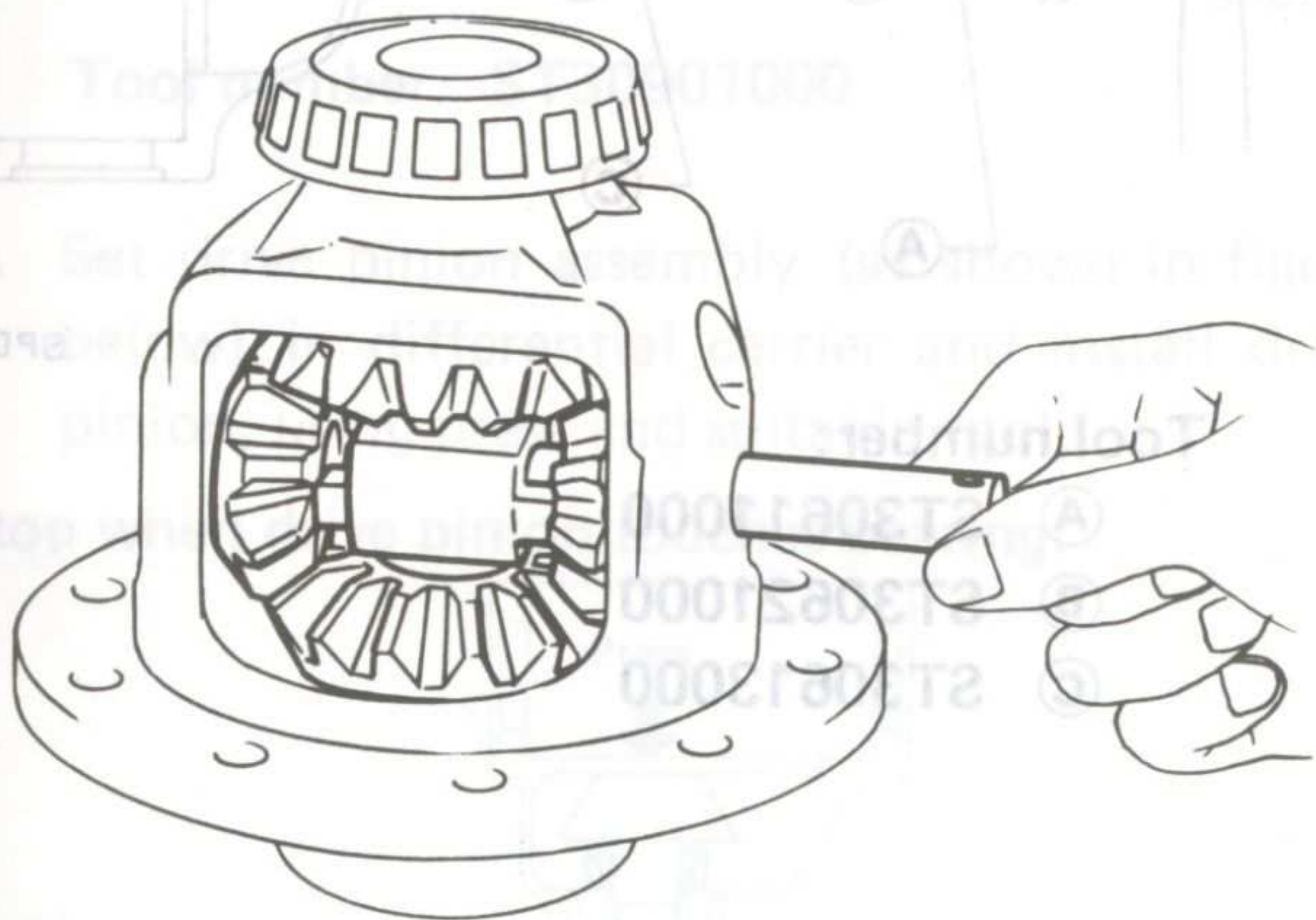
Differential Case

1. Install side gears, pinion mate gears, thrust washers and thrust block into differential case.



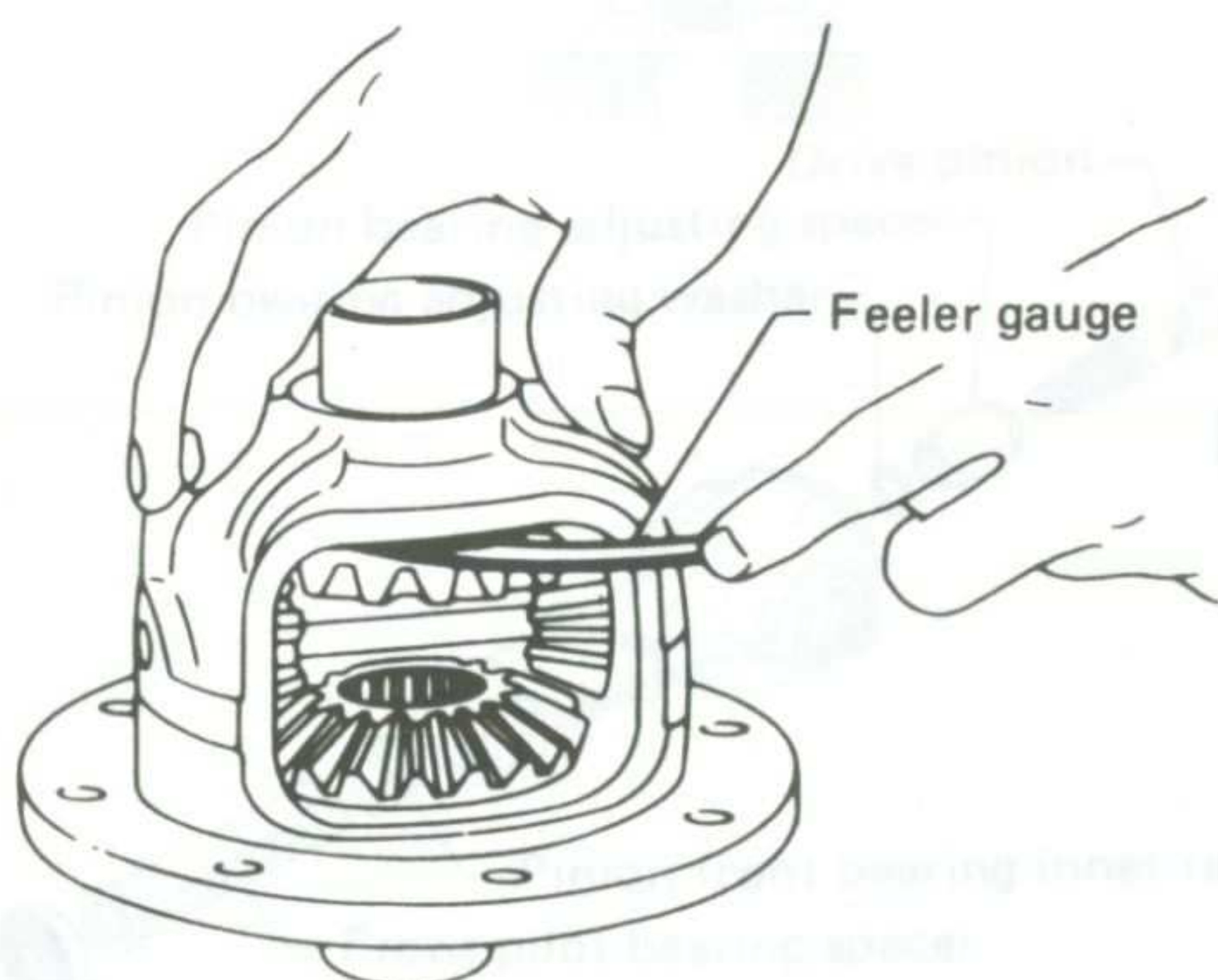
SPD552

2. Fit pinion mate shaft to differential case so that it meets lock pin holes.



SPD553

3. Adjust clearance between rear face of side gear and thrust washer by selecting side gear thrust washer (Refer to S.D.S.).



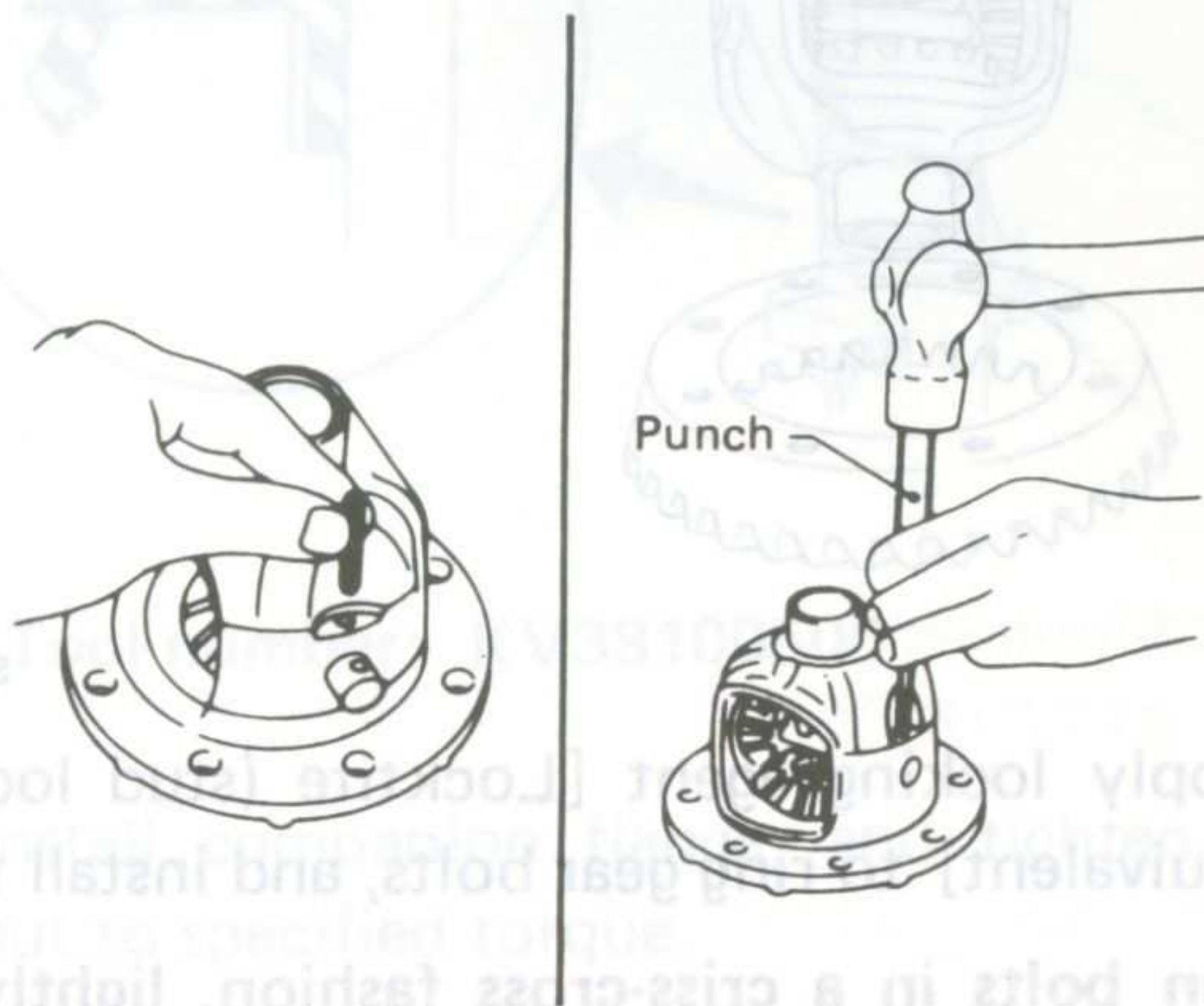
SPD029

Clearance between side gear thrust washer and differential case:

Less than 0.15 mm (0.0059 in)

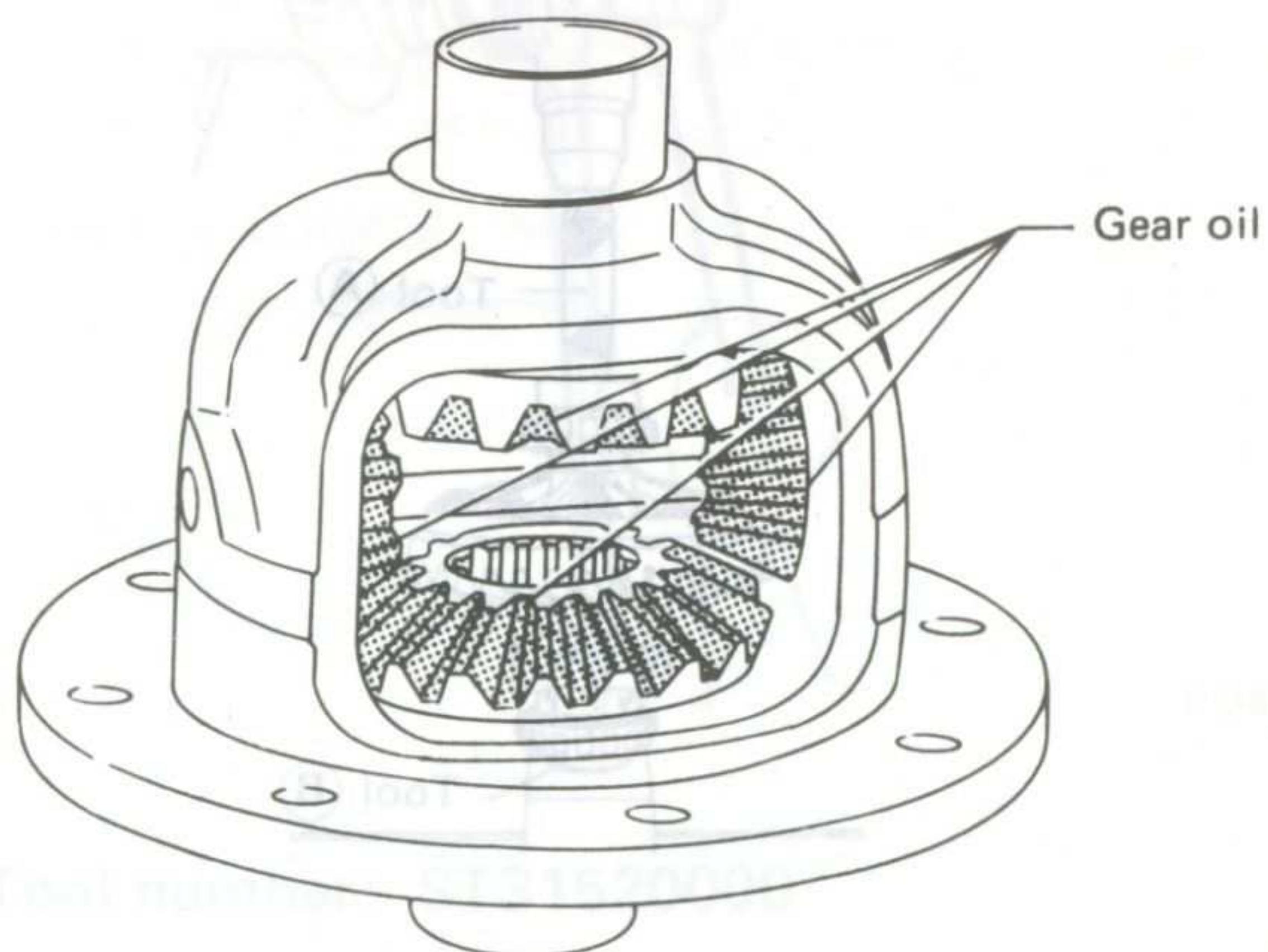
4. Install pinion mate shaft lock pin using a punch.

Make sure lock pin is flush with case.



SPD030

5. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.

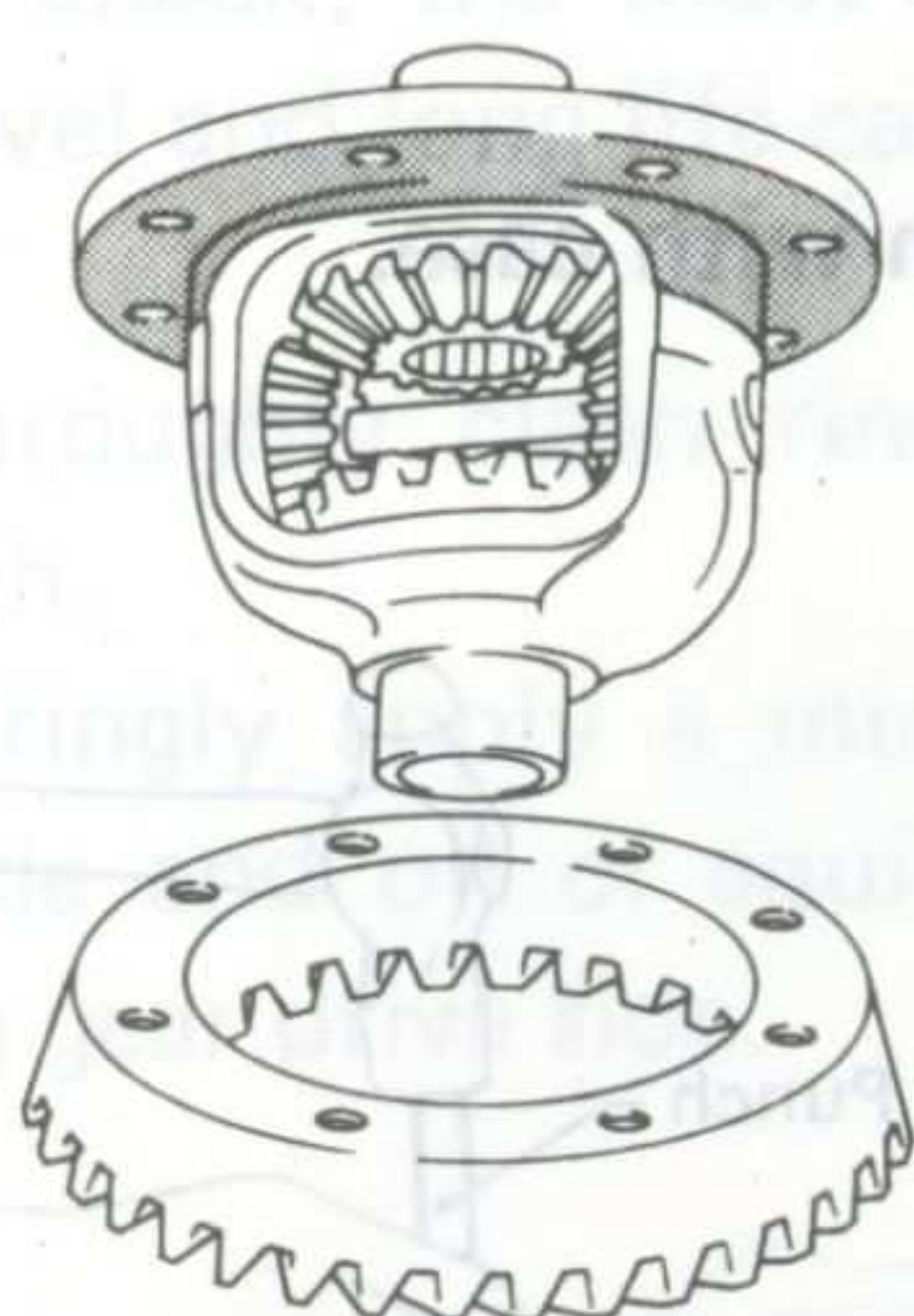


SPD322

ASSEMBLY (Model R200)

Differential Case (Cont'd)

6. Apply locking agent [Locktite (stud lock) or equivalent] to contacting surfaces of ring gear and differential case, then place differential case on ring gear.



SPD600

7. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.

8. Press fit side bearing inner races on differential case with Tool.



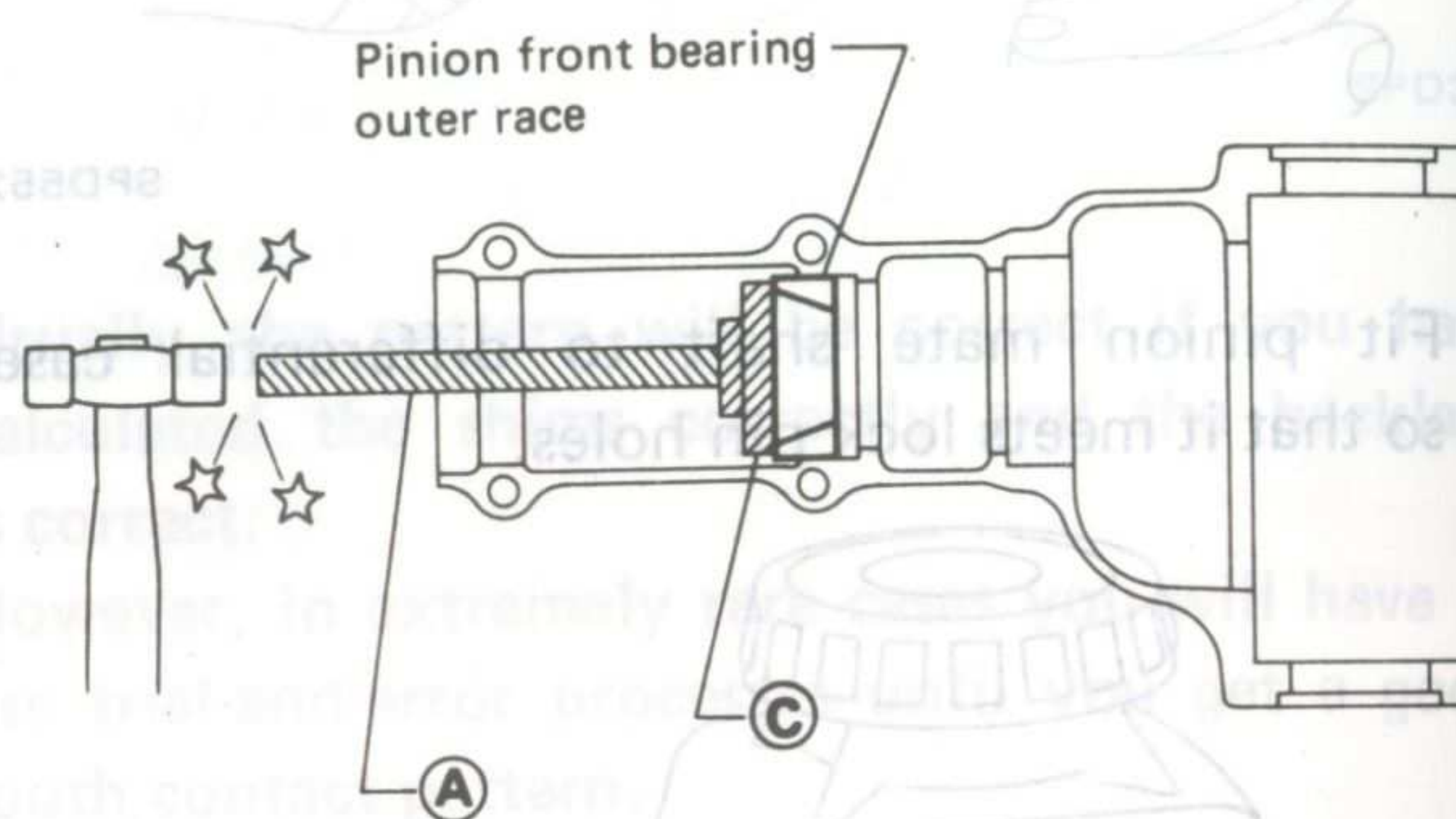
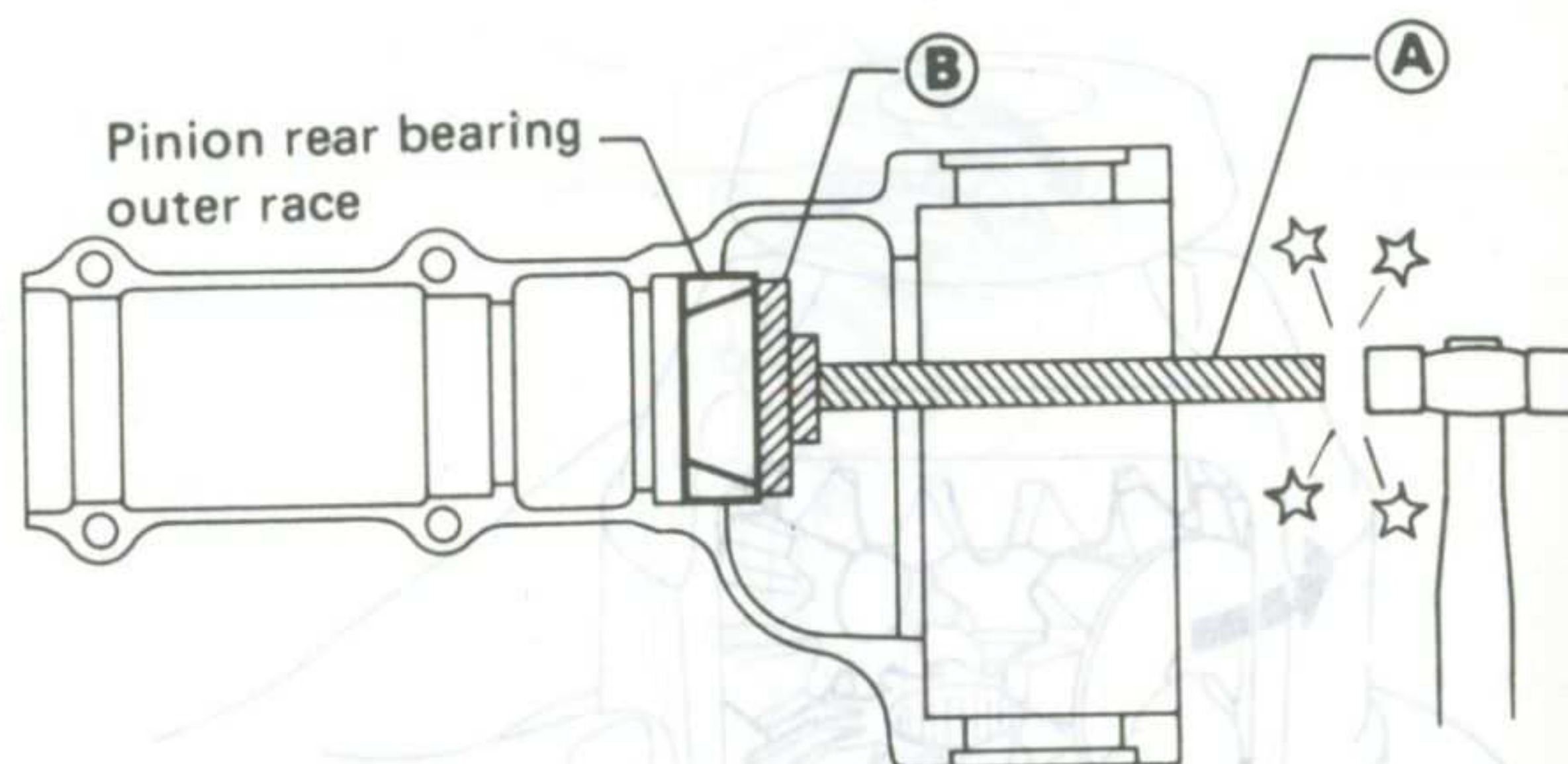
PD353

Tool number:

- (A) KV38100300
- (B) ST33061000

Differential Carrier

1. Press-fit front and rear bearing outer races using Tools.



SPD555

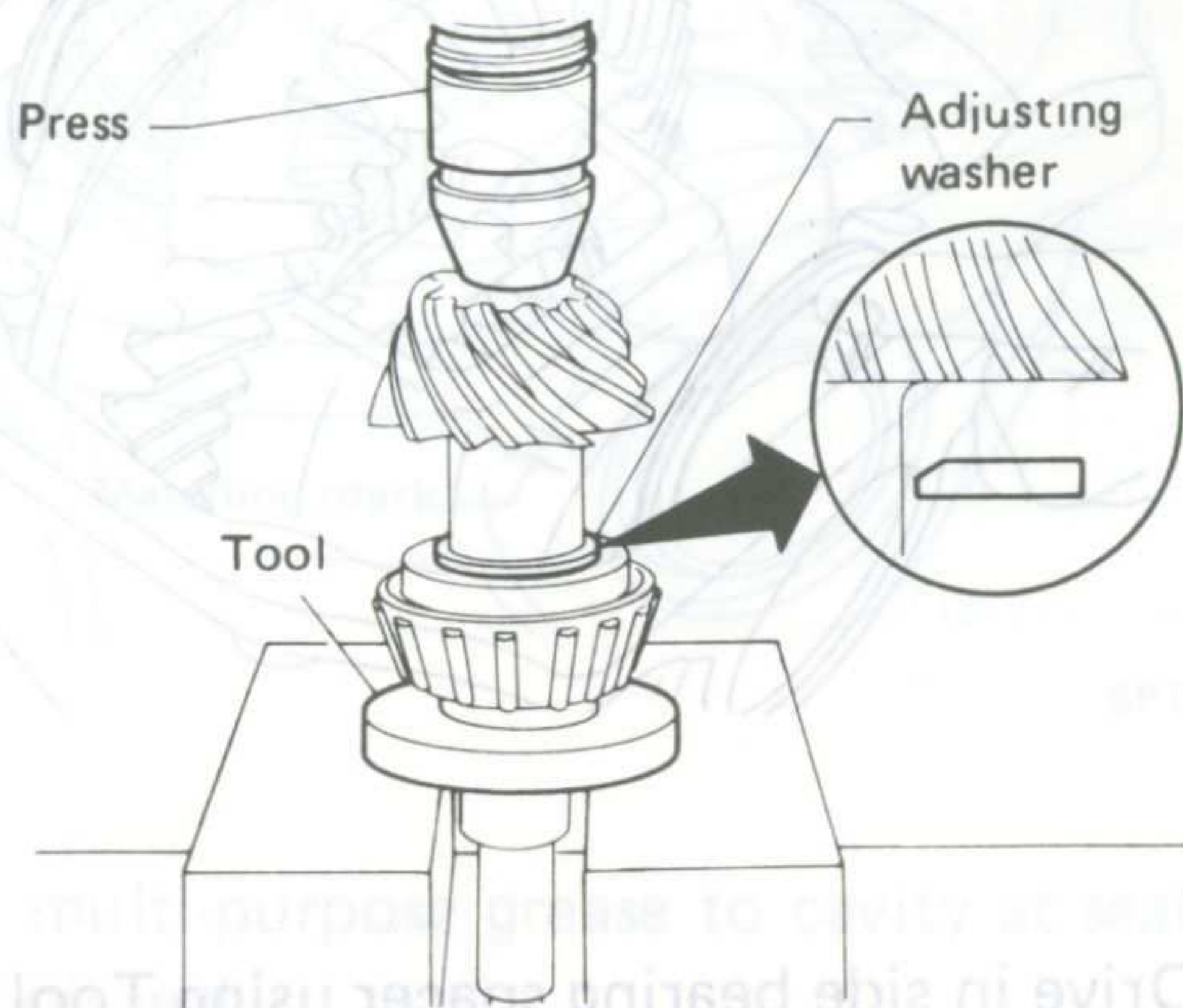
Tool number:

- (A) ST30611000
- (B) ST30621000
- (C) ST30613000

ASSEMBLY (Model R200)

Differential Carrier (Cont'd)

2. Select pinion height adjusting washer and pinion bearing adjusting washer spacer, referring to Adjustment.
3. Install pinion height adjusting washer in drive pinion, and press fit rear bearing inner race in it, using press and Tool.

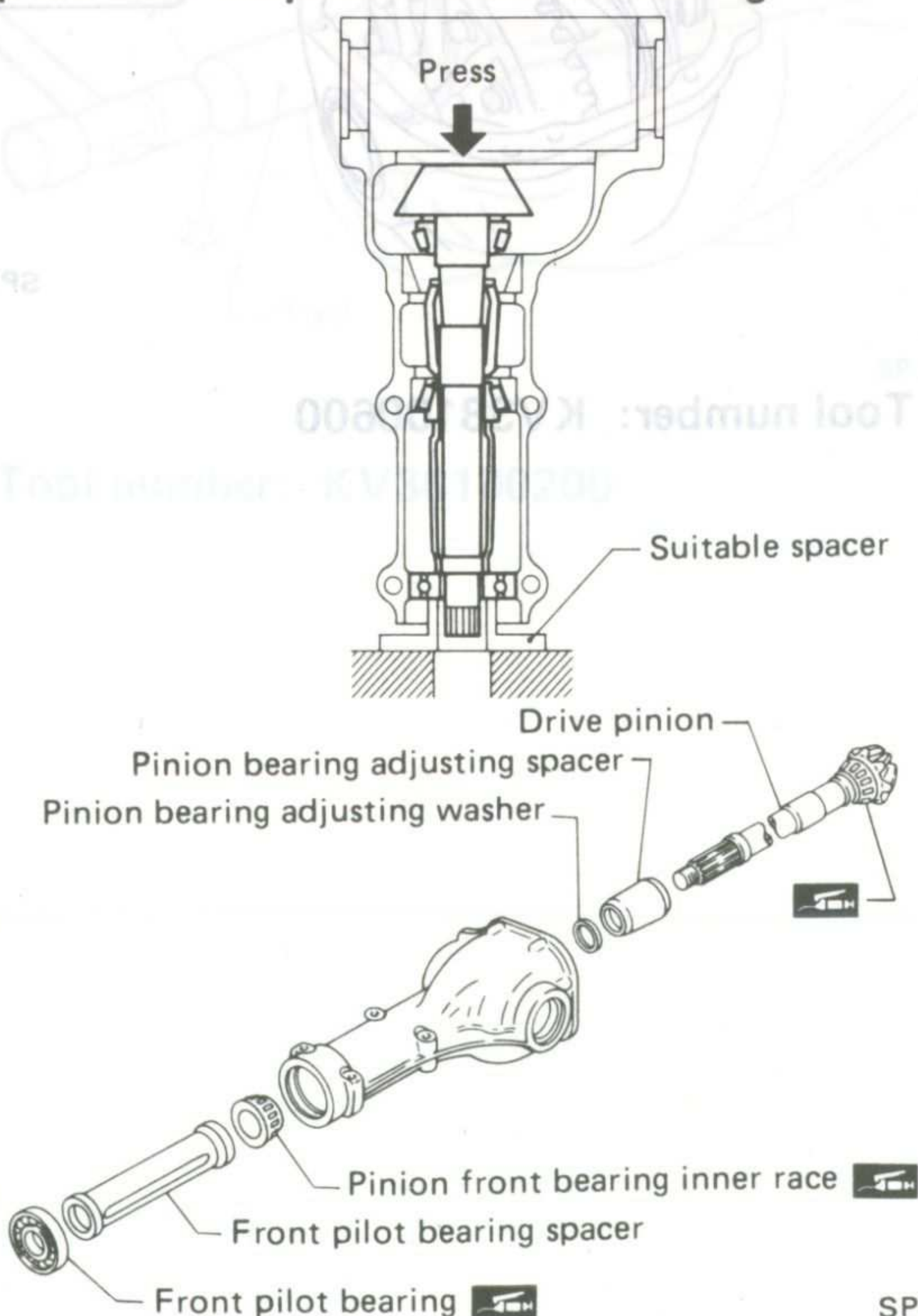


SPD377

Tool number: ST30901000

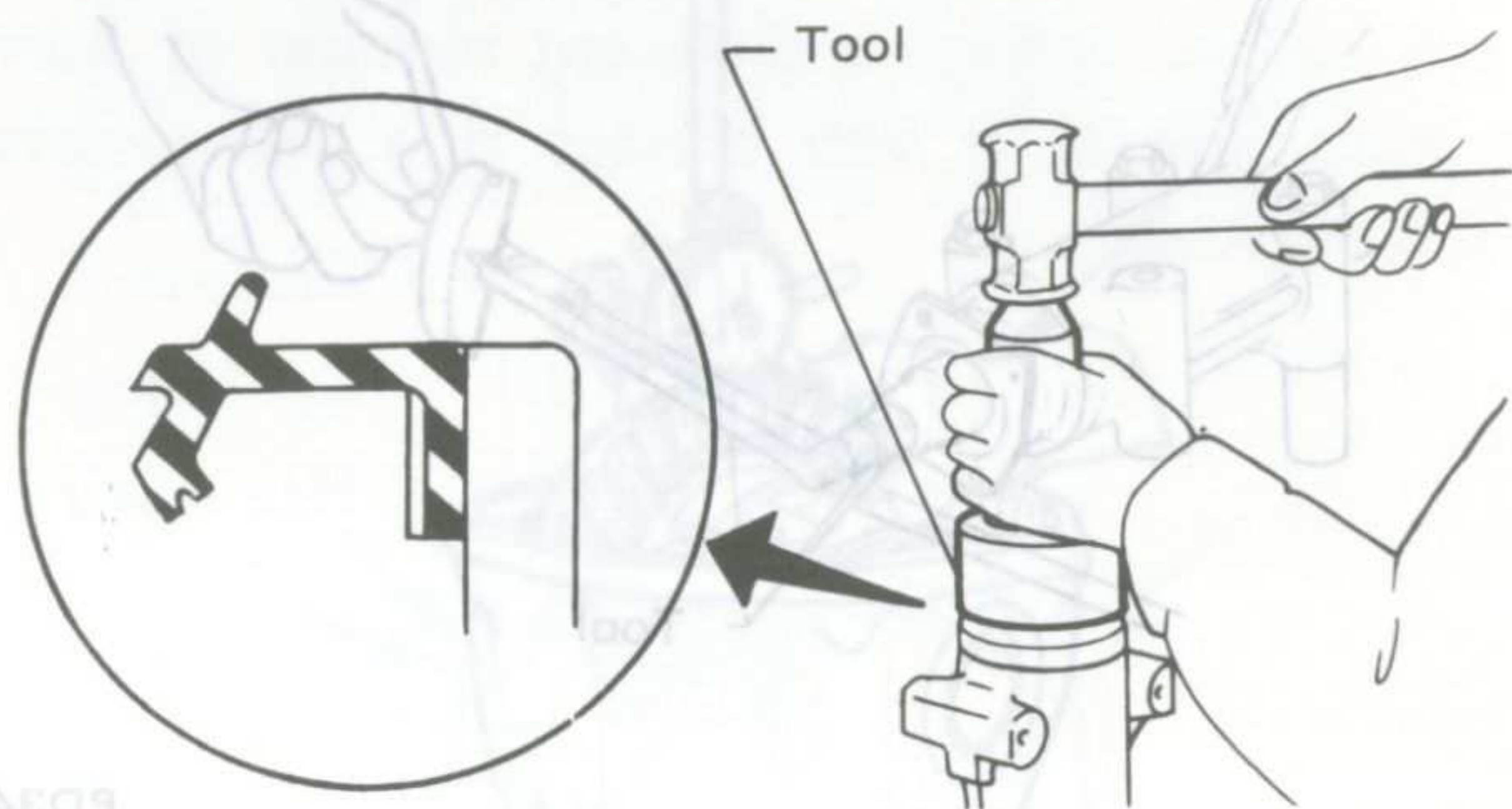
4. Set drive pinion assembly (as shown in figure below) in differential carrier and install drive pinion, using press and suitable tool.

Stop when drive pinion touches bearing.



SPD556

5. Apply multi-purpose grease to cavity at sealing lips of oil seal. Install front oil seal.

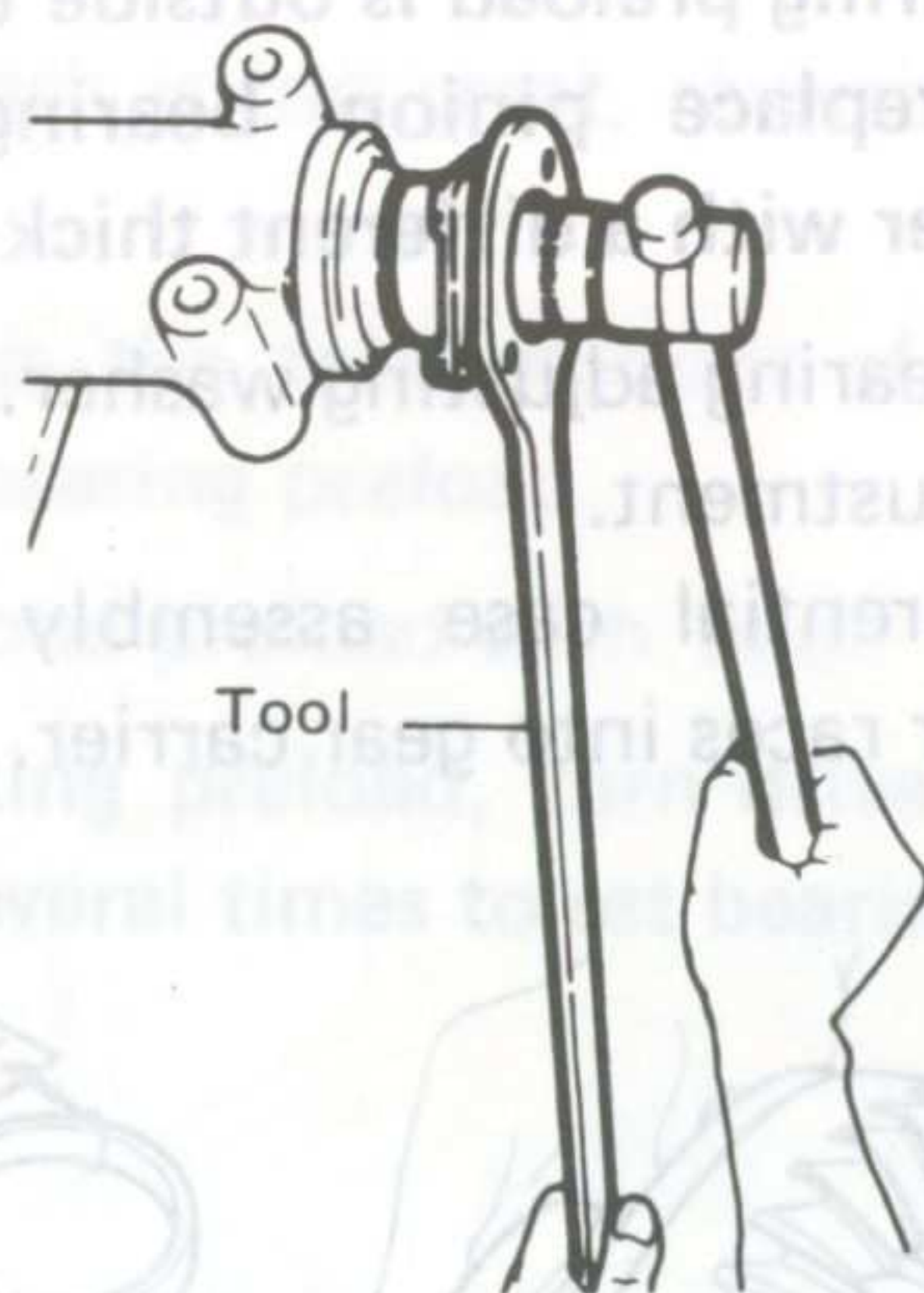


SPD557

Tool number: KV38100500

6. Install companion flange, and tighten pinion nut to specified torque.

Ascertain that threaded portion of drive pinion and pinion nut are free from oil or grease.



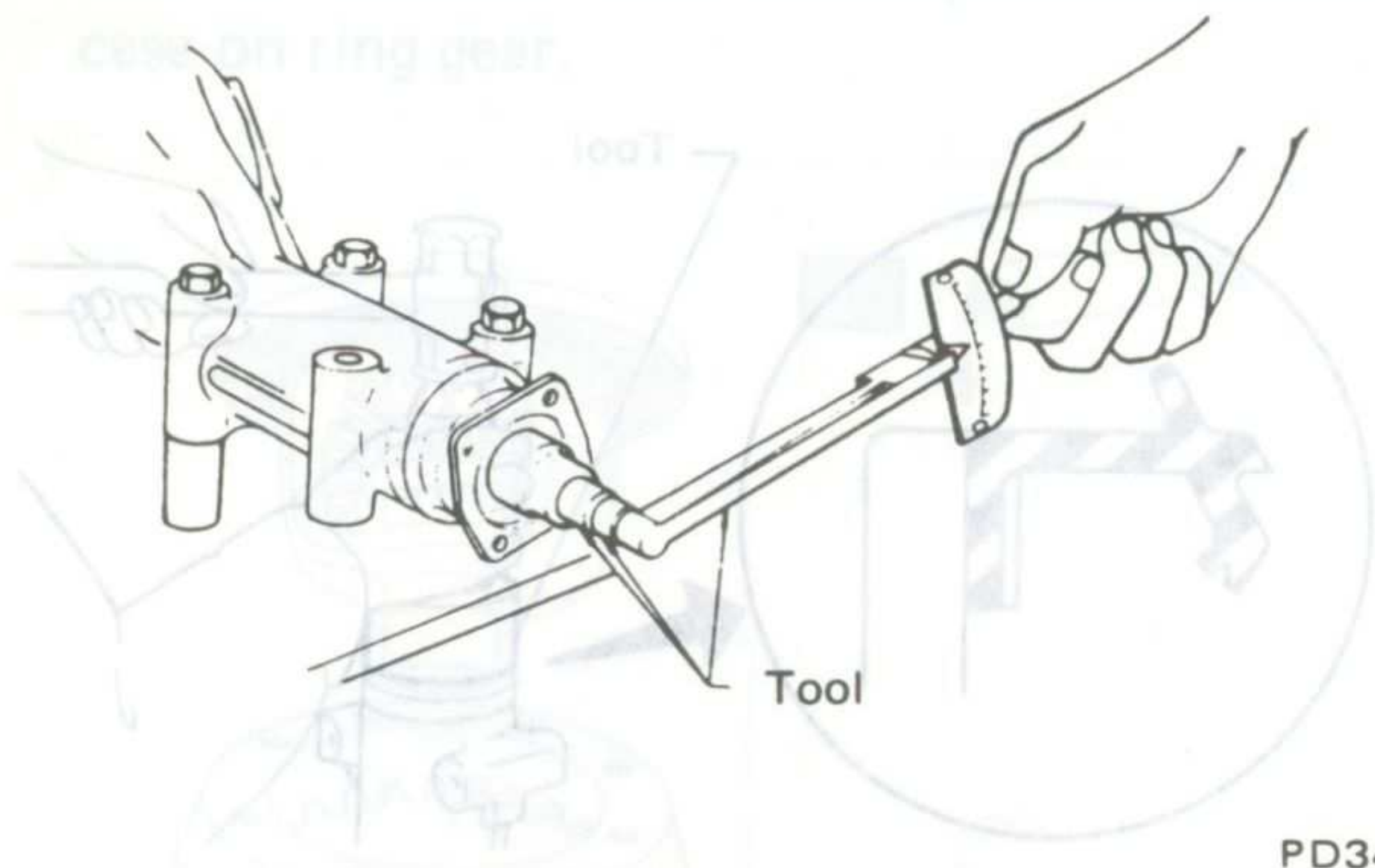
PD466

Tool number: ST31520000

ASSEMBLY (Model R200)

Differential Carrier (Cont'd)

7. Turn drive pinion in both directions several times, and measure pinion bearing preload.



PD340

Tool number: ST3127S000

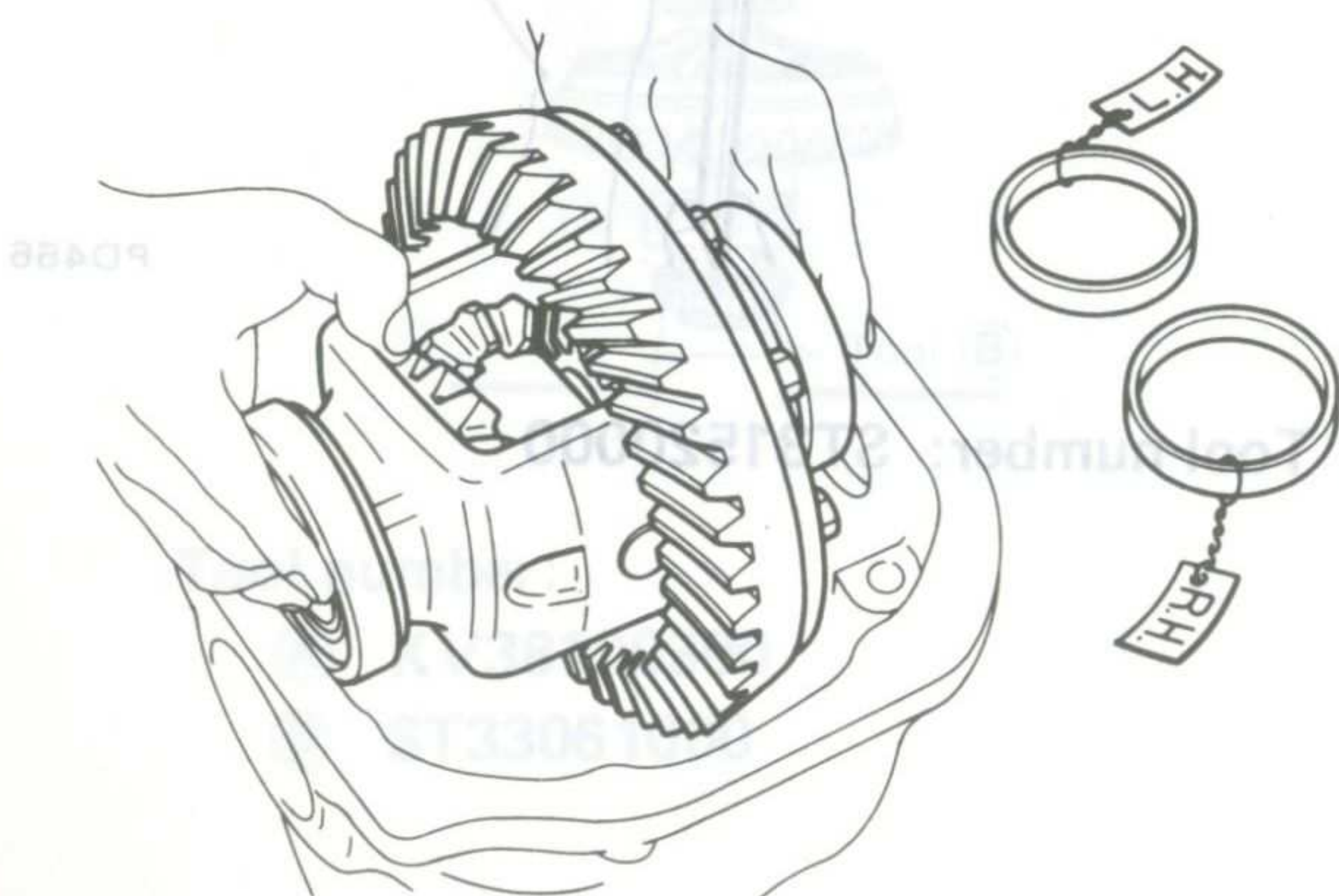
Pinion bearing preload:

1.13 - 1.72 N·m

(11.5 - 17.5 kg-cm, 10.0 - 15.2 in-lb)

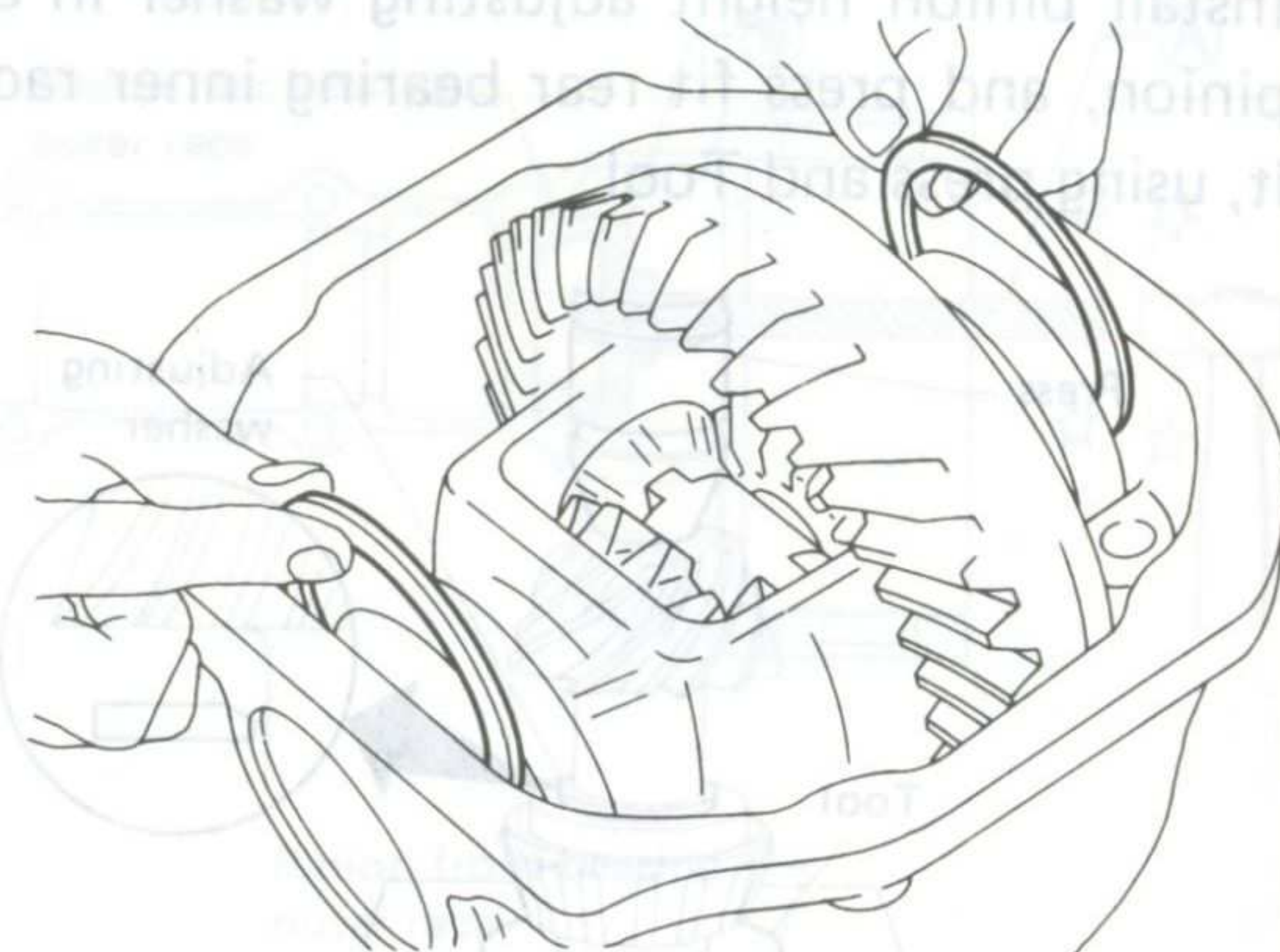
When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.

8. Select side bearing adjusting washer.
Refer to Adjustment.
9. Install differential case assembly with side bearing outer races into gear carrier.



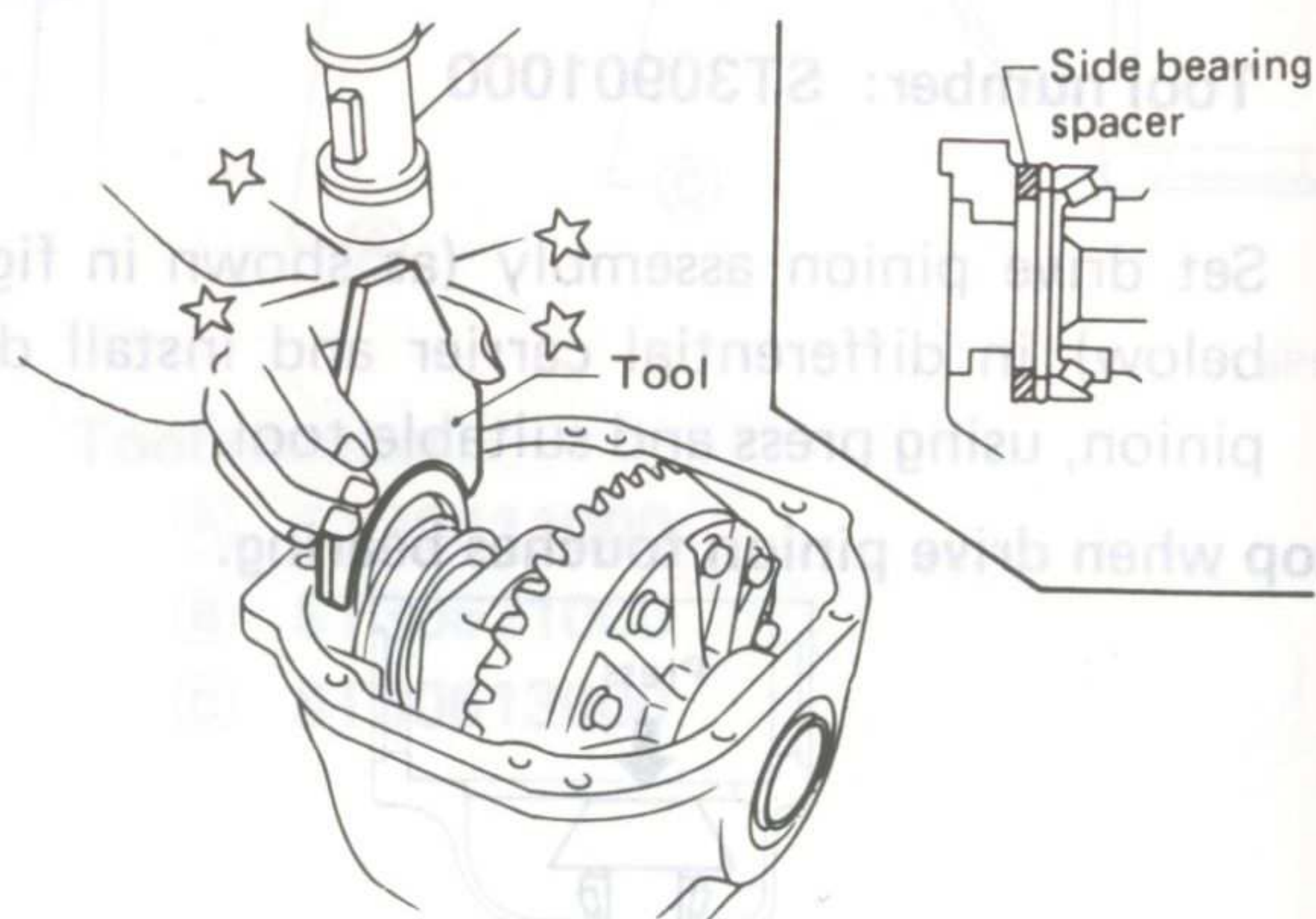
SPD527

10. Insert left and right side bearing adjusting washers in place between side bearings and carrier.



SPD558

11. Drive in side bearing spacer using Tool.



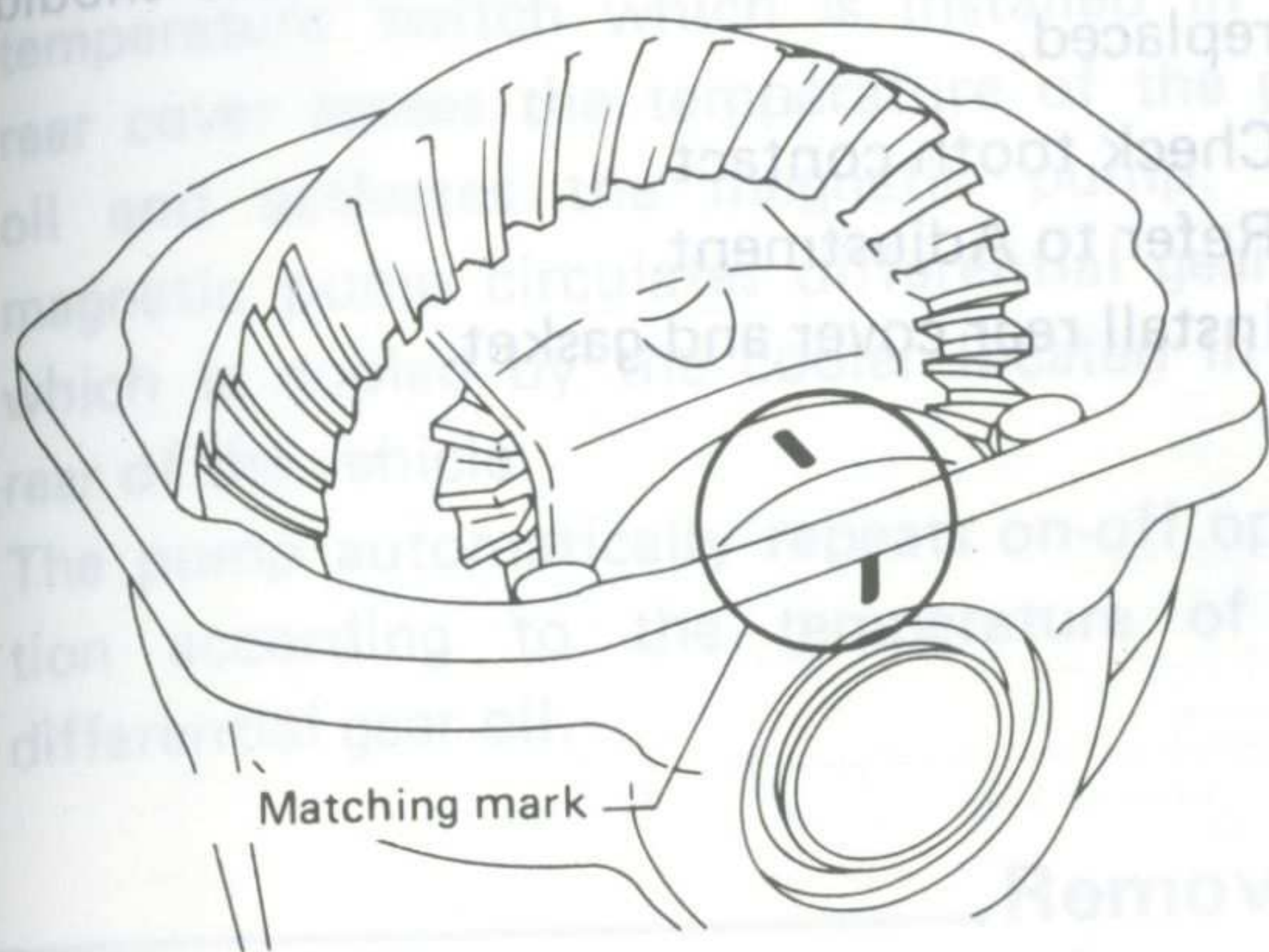
SPD559

Tool number: KV38100600

ASSEMBLY (Model R200)

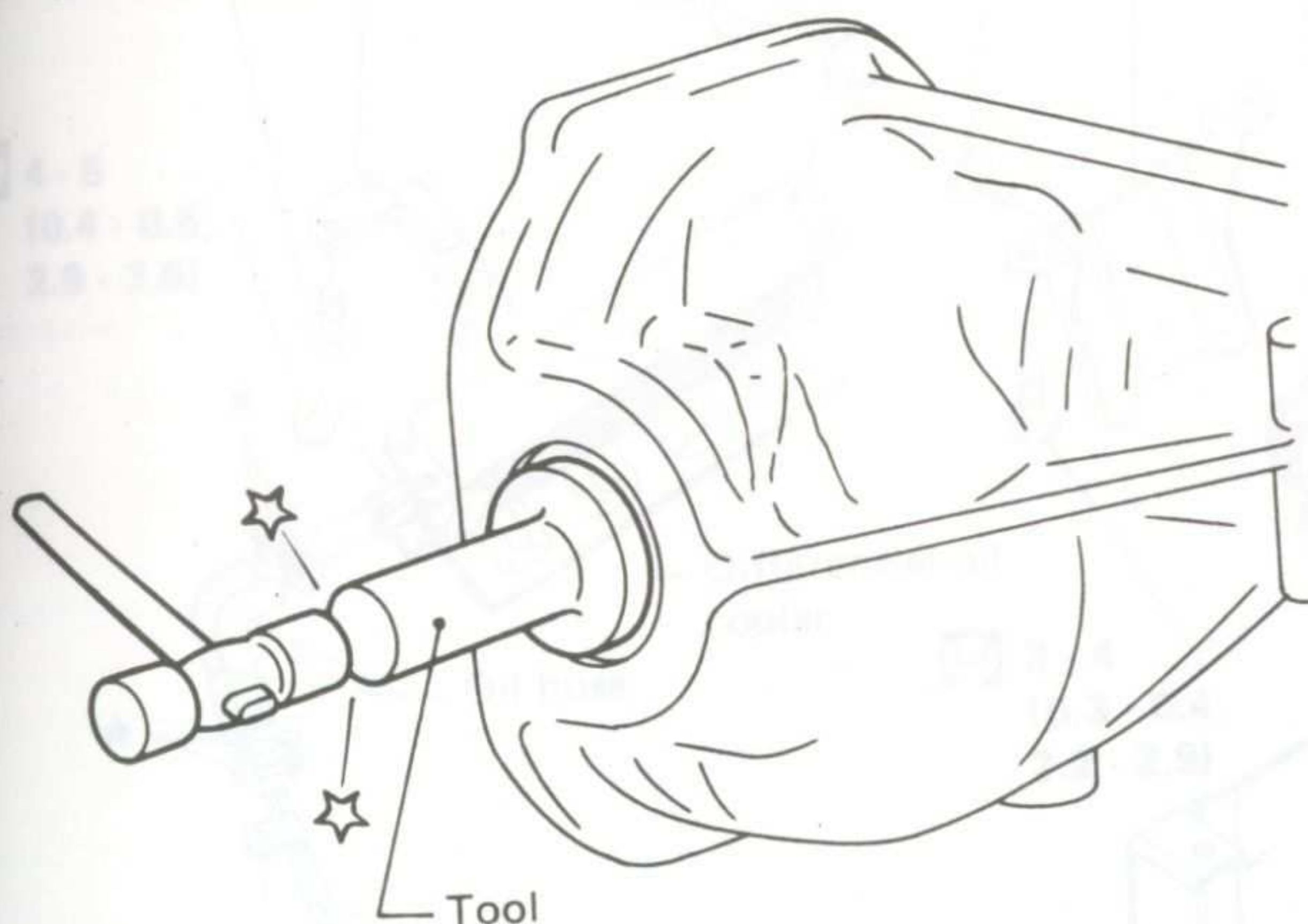
Differential Carrier (Cont'd)

12. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.



SPD526

13. Apply multi-purpose grease to cavity at sealing lips of oil seal.
Install side oil seal.



SPD560

Tool number: KV38100200

14. Measure ring gear-to-drive pinion backlash with a dial indicator.



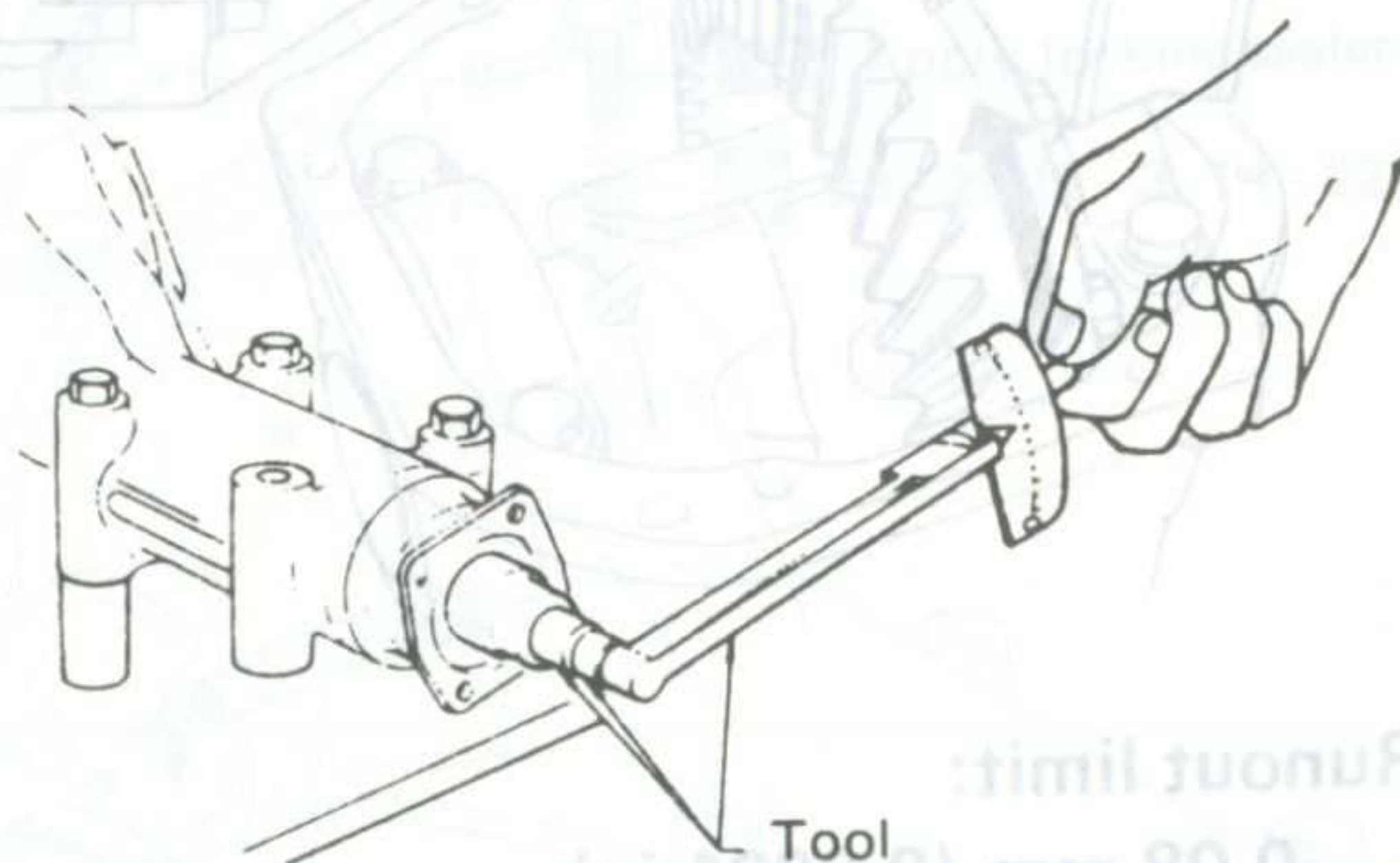
SPD513

Ring gear-to-drive pinion backlash:
0.13 - 0.18 mm
(0.0051 - 0.0071 in)

- If backlash is too small, decrease thickness of right shim and increase thickness of left shim by the same amount.
- If backlash is too great, reverse the above procedure.

Never change the total amount of shims as it will change the bearing preload.

15. Check total preload with Tool.
When checking preload, turn drive pinion in both directions several times to set bearing rollers.



PD340

Tool number: ST3127S000

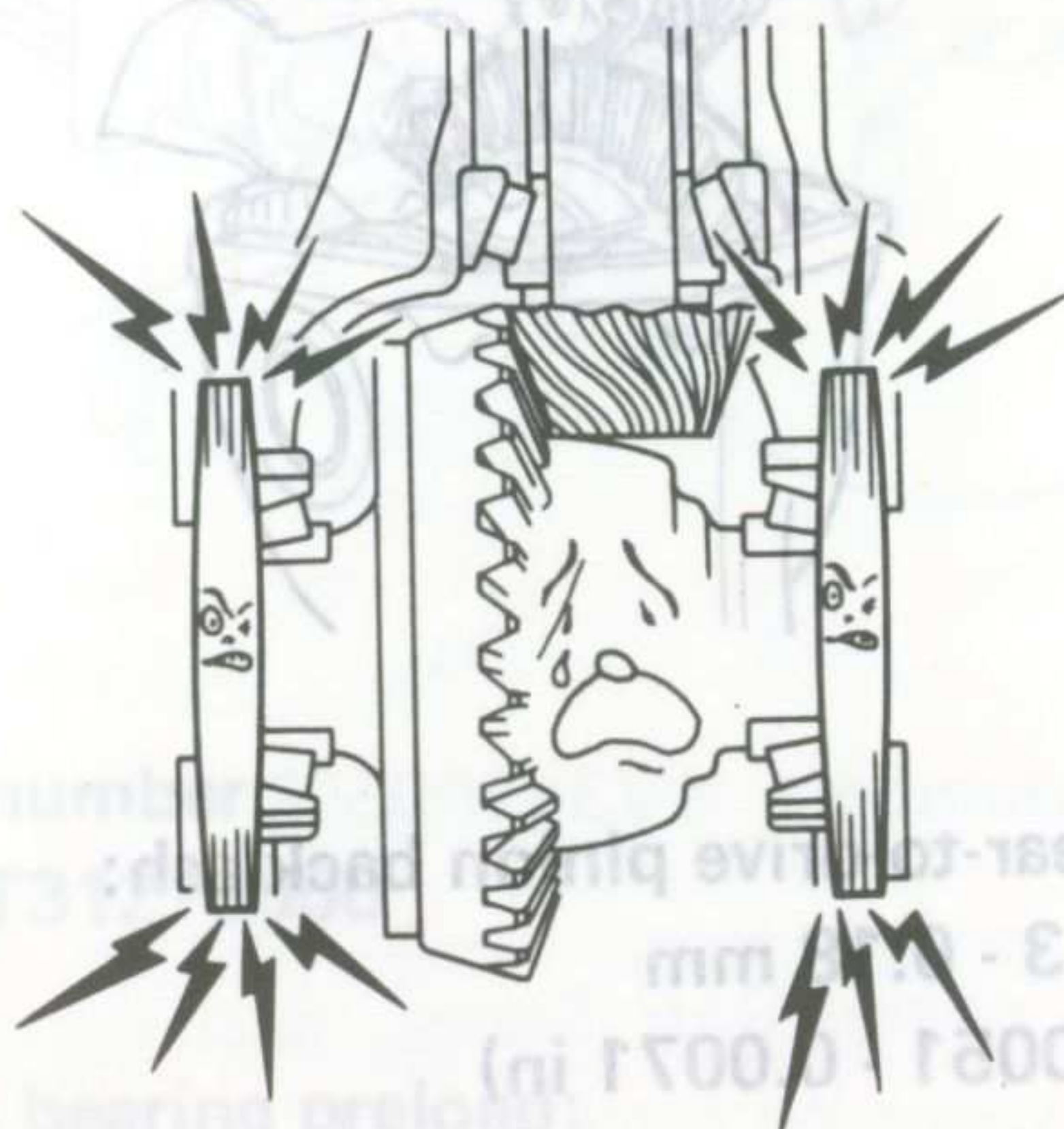
Total preload:
1.23 - 2.30 N·m
(12.5 - 23.5 kg-cm, 10.9 - 20.4 in-lb)

ASSEMBLY (Model R200)

Differential Carrier (Cont'd)

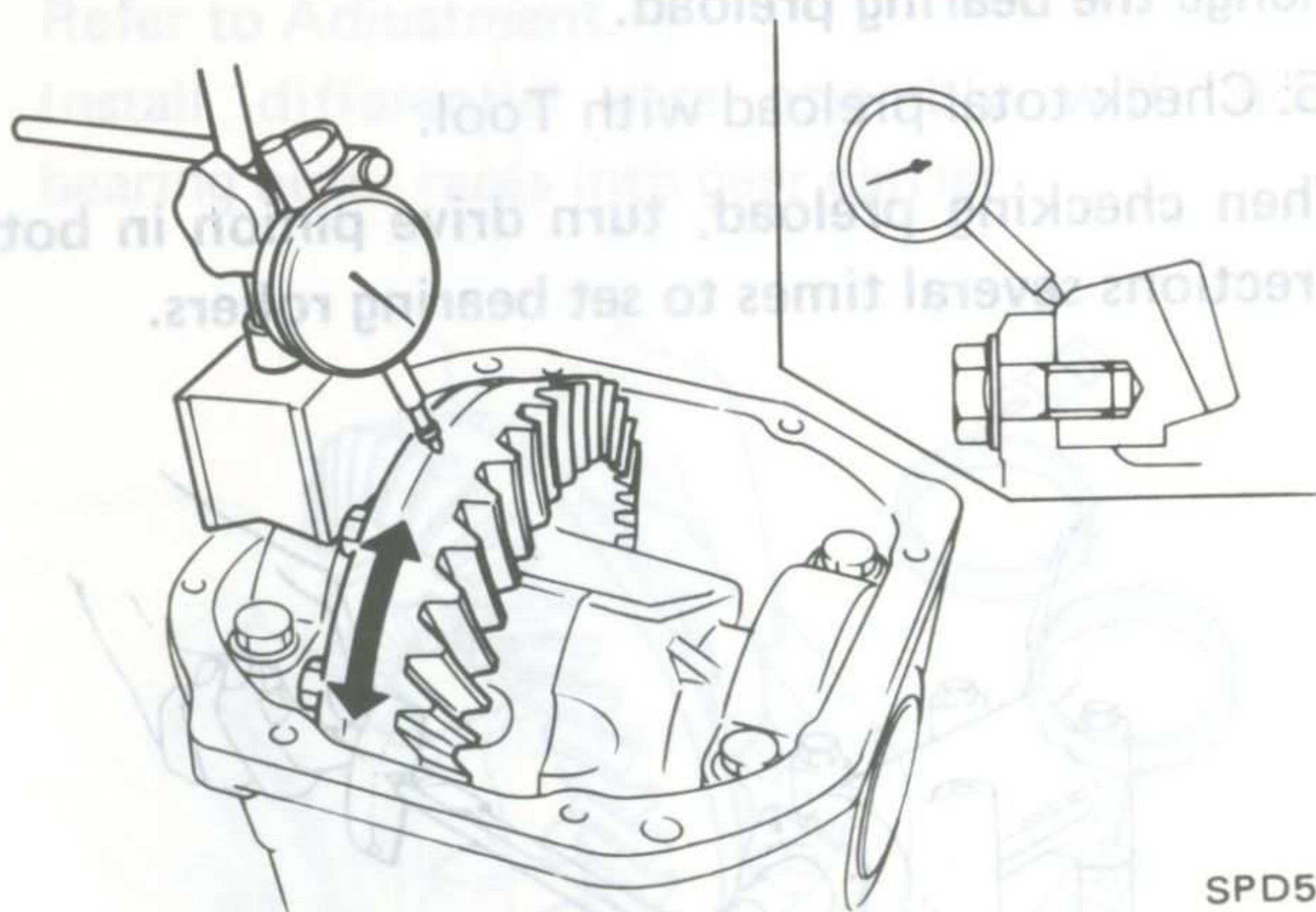
- If preload is too great, add the same amount of shim to each side.
- If preload is too small, remove the same amount of shim to each side.

Never add or remove a different number of shims for each side as it will change ring gear-to-drive pinion backlash.



SPD561

16. Recheck ring gear-to-drive pinion backlash because increase or decrease in thickness of shims will cause change of ring gear-to-pinion backlash.
17. Check runout of ring gear with a dial indicator.



SPD524

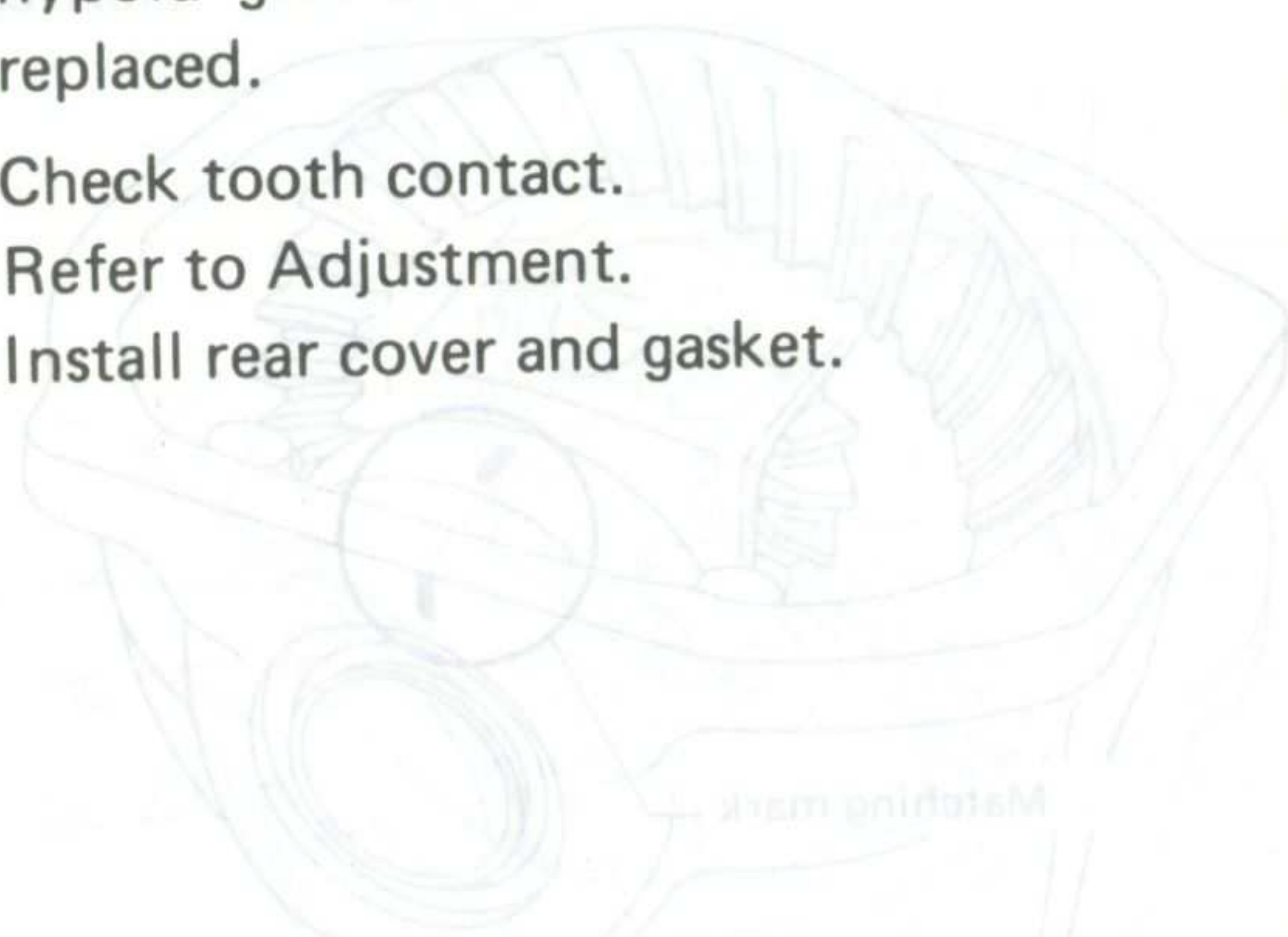
Runout limit:

0.08 mm (0.0031 in)

- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.

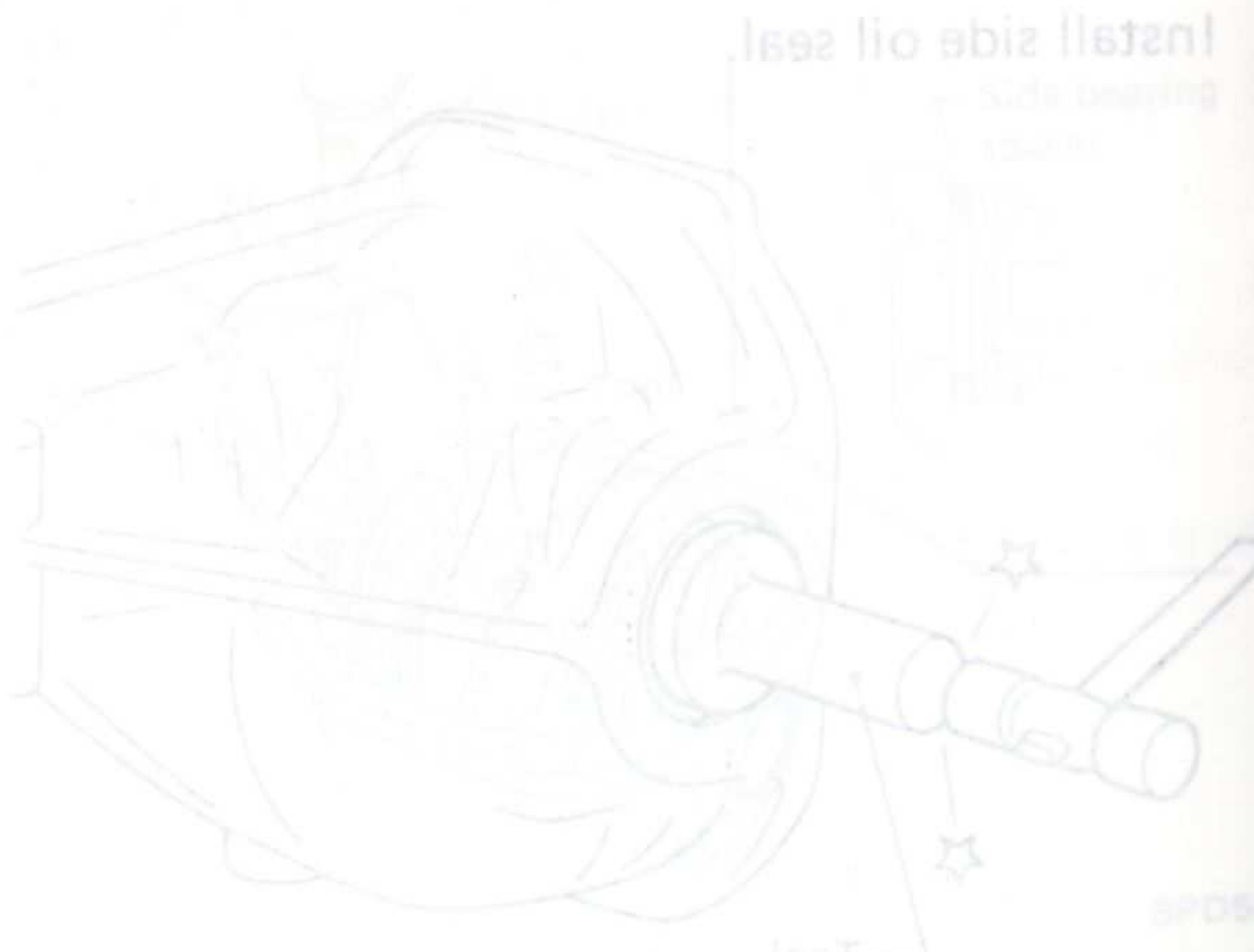
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

18. Check tooth contact.
Refer to Adjustment.
19. Install rear cover and gasket.



SPD528

13. Apply multi-purpose grease to cavity at sealing lips of oil seal. (See page 10 for oil seal.)



SPD529

Tool number: KV38100200

DIFFERENTIAL GEAR OIL COOLER SYSTEM

Description

- In this system, when the differential gear oil temperature exceeds the specified value, the temperature switch which is installed in the rear cover senses the temperature of the gear oil and activates the magnetic pump. The magnetic pump circulates differential gear oil which is cooled by the cooler located in the rear of the vehicle.
- The pump automatically repeats on-off operation according to the temperature of the differential gear oil.

Off → On 130°C (266°F)

On → Off 125°C (257°F)

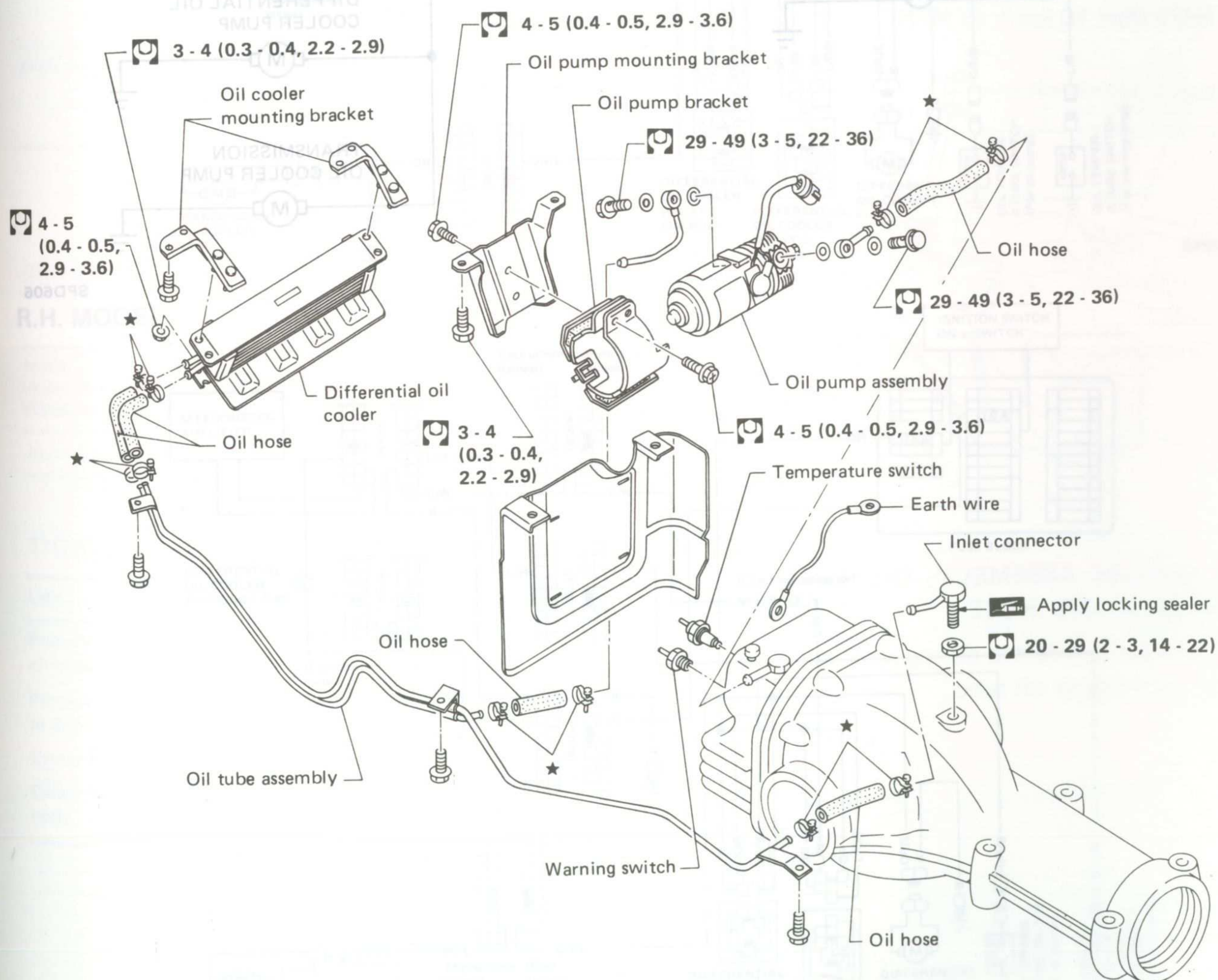
However, the pump will not operate when the vehicle speed is less than 10 km/h (6 MPH).

- When the oil temperature becomes excessively high, the warning lamp in the combination meter will illuminate.

Off → On 180°C (356°F)

On → Off 155°C (311°F)

Removal and Installation

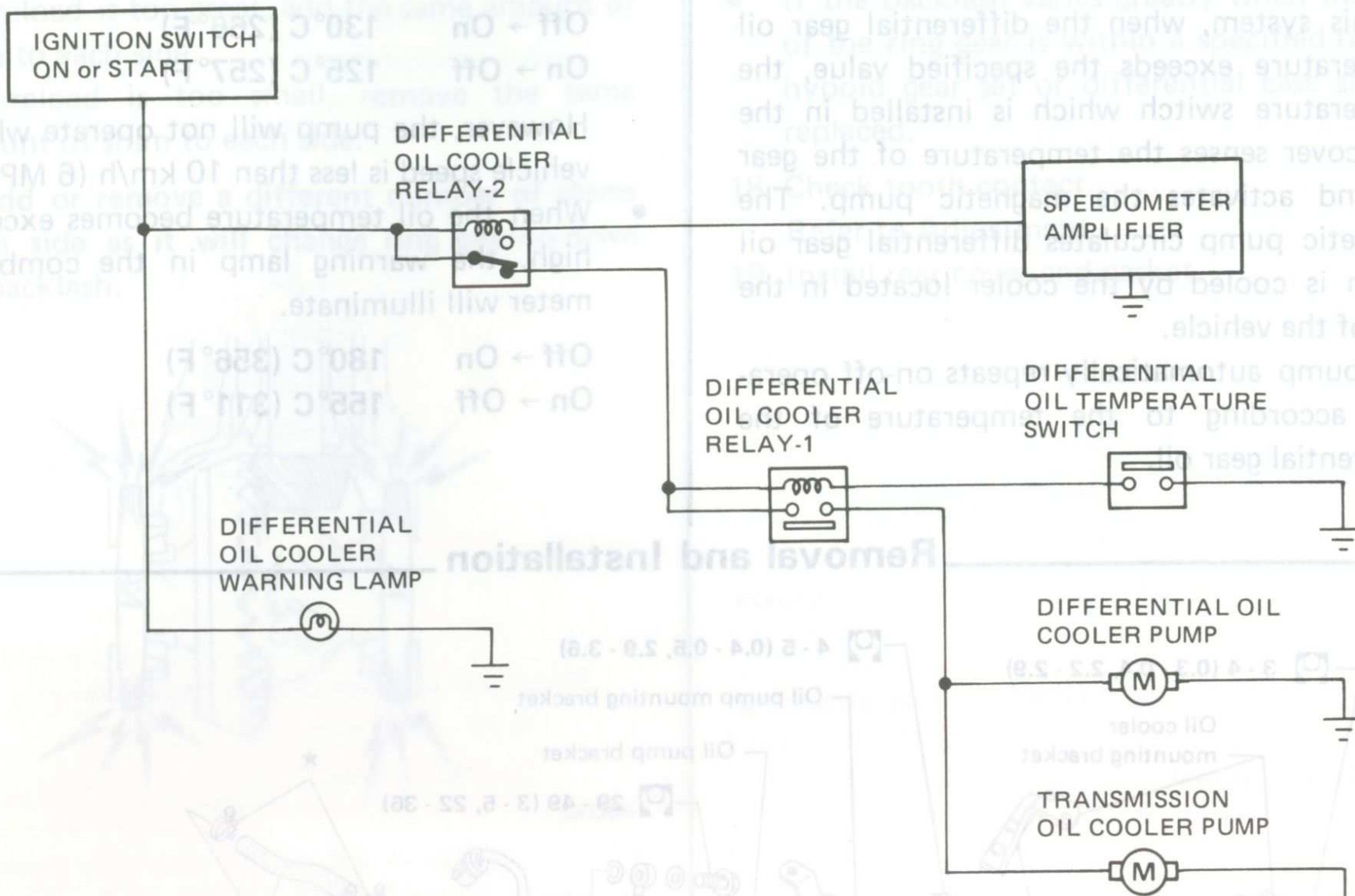


★ : Always replace
 [Symbol] : N·m (kg-m, ft-lb)

SPD605

DIFFERENTIAL GEAR OIL COOLER SYSTEM

Schematic/Differential Oil Cooler System



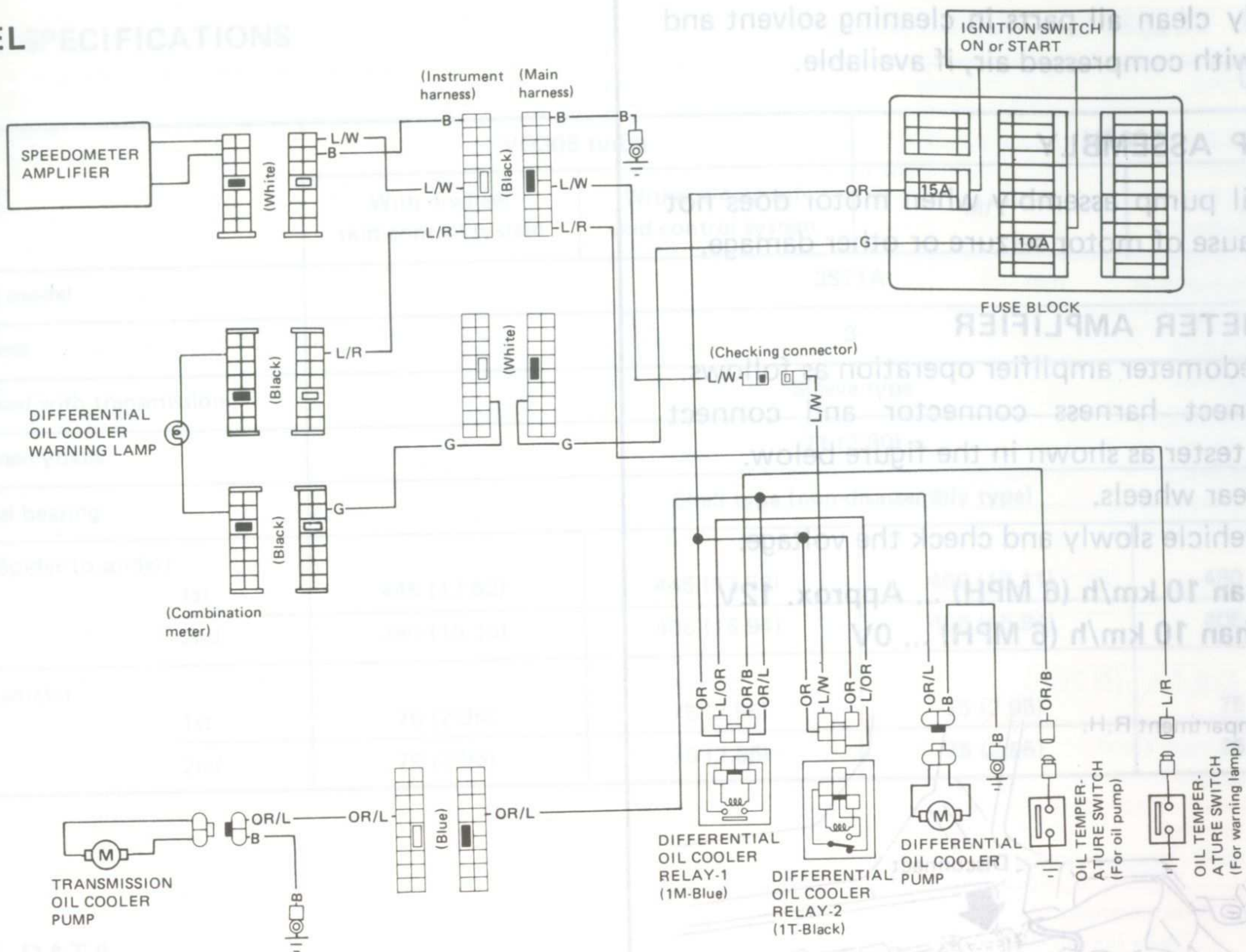
SPD606

* Always replace
N-m (kg-m, ft-lb)

DIFFERENTIAL GEAR OIL COOLER SYSTEM

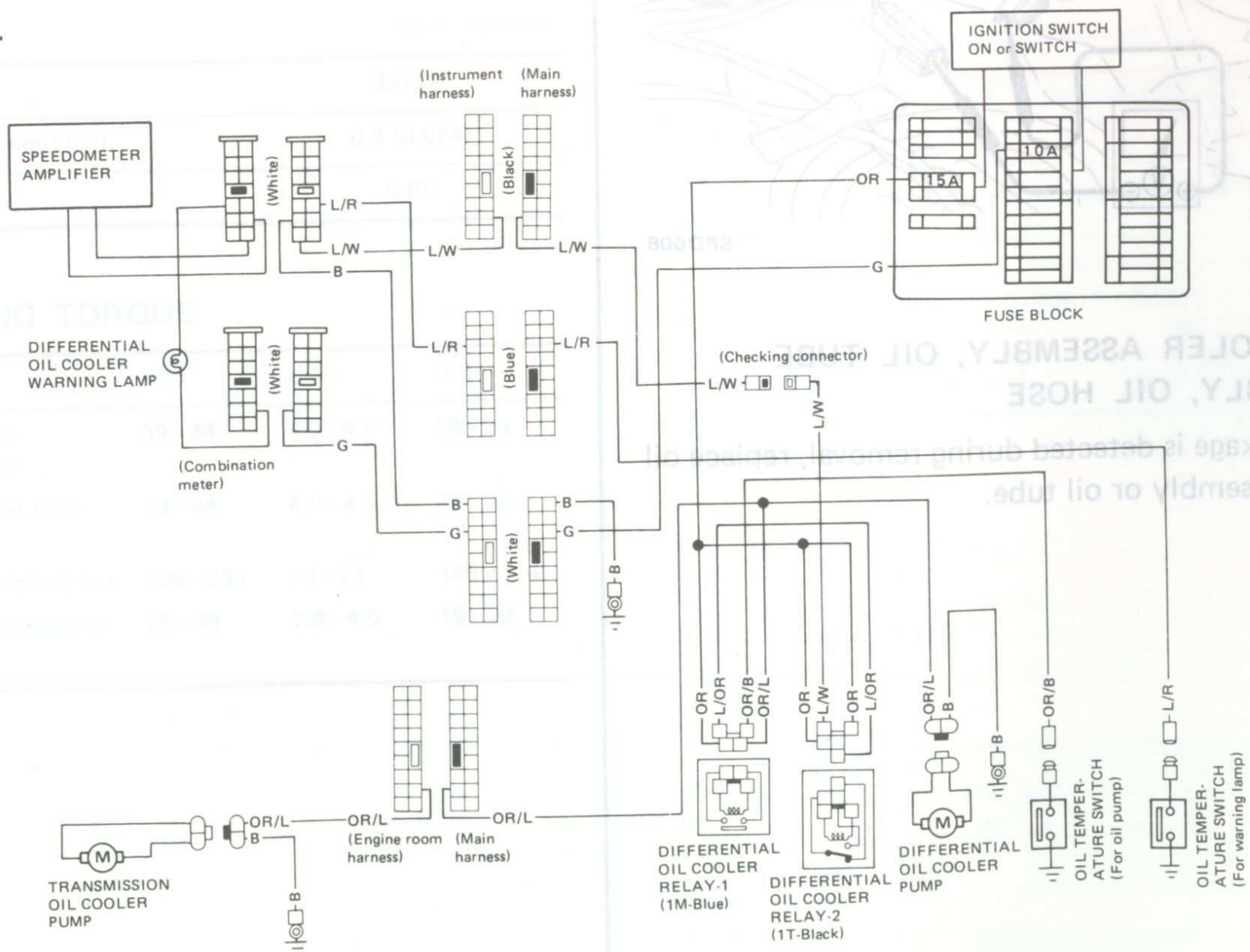
Wiring Diagram/Differential Oil Cooler System

L.H. MODEL



SPD607

R.H. MODEL



SPD609

DIFFERENTIAL GEAR OIL COOLER SYSTEM

Inspection

Thoroughly clean all parts in cleaning solvent and blow dry with compressed air, if available.

OIL PUMP ASSEMBLY

Replace oil pump assembly when motor does not rotate because of motor seizure or other damage.

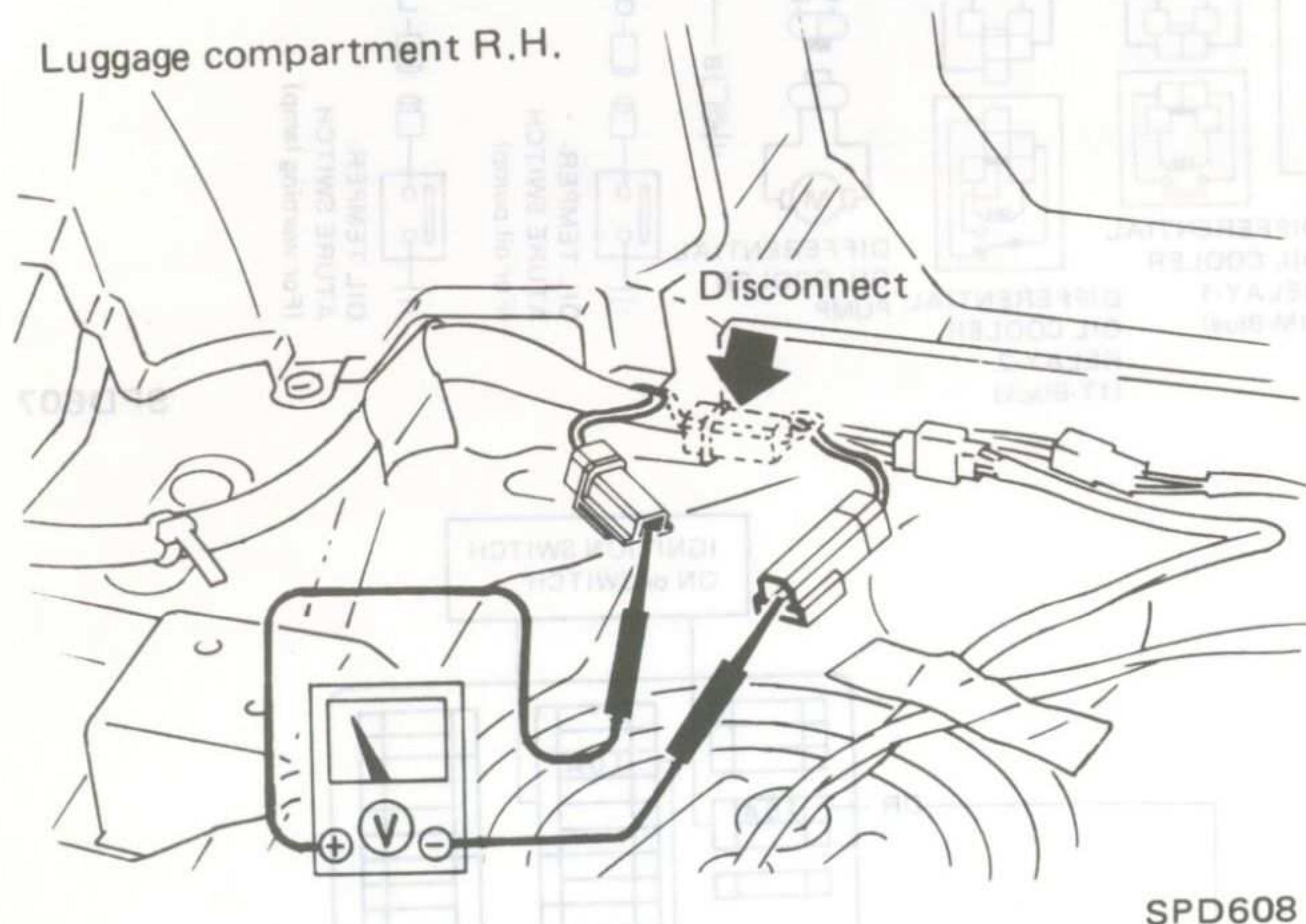
SPEEDOMETER AMPLIFIER

Check speedometer amplifier operation as follows.

1. Disconnect harness connector and connect circuit tester as shown in the figure below.
2. Raise rear wheels.
3. Drive vehicle slowly and check the voltage.

Less than 10 km/h (6 MPH) ... Approx. 12V

More than 10 km/h (6 MPH) ... 0V



OIL COOLER ASSEMBLY, OIL TUBE ASSEMBLY, OIL HOSE

If oil leakage is detected during removal, replace oil cooler assembly or oil tube.

SERVICE DATA AND SPECIFICATIONS

Propeller Shaft

GENERAL SPECIFICATIONS

		VG30E turbo		VG30E	
Applied model		With 4-wheel skid control system	Without 4-wheel skid control system	M/T	A/T
Propeller shaft model		3S71A			
Number of joints		3			
Coupling method with transmission		Sleeve type			
Distance between yokes		71 (2.80)			
Type of journal bearing		Shell type (non-disassembly type)			
Shaft length (Spider to spider)					
1st		445 (17.52)	445 (17.52)	460 (18.11)	480 (18.90)
2nd		390 (15.35)	405 (15.94)	405 (15.94)	405 (15.94)
Shaft outer diameter					
1st		75 (2.95)	75 (2.95)	75 (2.95)	75 (2.95)
2nd		75 (2.95)	75 (2.95)	75 (2.95)	75 (2.95)

SERVICE DATA

Unit: mm (in)

Model	3S71A
Propeller shaft runout limit	0.6 (0.024)
Journal axial play	0 (0)

TIGHTENING TORQUE

Unit	N·m	kg·m	ft·lb
Propeller shaft to differential carrier	39 - 44	4.0 - 4.5	29 - 33
Propeller shaft 1st tube to 2nd tube	39 - 44	4.0 - 4.5	29 - 33
Center bearing locking nut	196 - 235	20 - 24	145 - 174
Center bearing bracket to body	25 - 39	2.6 - 4.0	19 - 29

SERVICE DATA AND SPECIFICATIONS

Differential Carrier

GENERAL SPECIFICATIONS

Destination	For Europe		For Middle East		Except for Europe and Middle East	
Applied model	VG30E turbo	VG30E	VG30E turbo	VG30E	VG30E turbo	VG30E
Final drive model	R200					
Ring gear pitch diameter mm (in)	200 (7.87)					
Gear ratio	3.364	3.700	3.545	3.700	3.545	3.700
Number of teeth (Ring gear/Drive pinion)	37/11	37/10	39/11	37/10	39/11	37/10
Oil capacity (approx.) ℓ (Imp pt)	2.1 (3-3/4)		1.8 (3-1/8)		1.3 (2-1/4)	

SERVICE DATA (R200)

Drive pinion bearing preload adjusting method	Adjusting spacer and washer
Pinion bearing preload (With front oil seal) N·m (kg-cm, in-lb)	1.13 - 1.72 (11.5 - 17.5, 10.0 - 15.2)
Pinion bearing preload (Without front oil seal) N·m (kg-cm, in-lb)	1.0 - 1.3 (10 - 13, 8.7 - 11.3)
Total preload N·m (kg-cm, in-lb)	1.23 - 2.30 (12.5 - 23.5, 10.9 - 20.4)
Side bearing adjusting method	Shim
Backlash	
Drive pinion to ring gear mm (in)	0.13 - 0.18 (0.0051 - 0.0071)
Side gear to pinion mate gear (Clearance between side gear to differential case) mm (in)	Less than 0.15 (0.0059)
Ring gear runout limit mm (in)	0.08 (0.0031)

SERVICE DATA AND SPECIFICATIONS

Differential Carrier (Cont'd)

Pinion height adjusting washer (R200)

Thickness mm (in)	Part No.
3.09 (0.1217)	38154-P6017
3.12 (0.1228)	38154-P6018
3.15 (0.1240)	38154-P6019
3.18 (0.1252)	38154-P6020
3.21 (0.1264)	38154-P6021
3.24 (0.1276)	38154-P6022
3.27 (0.1287)	38154-P6023
3.30 (0.1299)	38154-P6024
3.33 (0.1311)	38154-P6025
3.36 (0.1323)	38154-P6026
3.39 (0.1335)	38154-P6027
3.42 (0.1346)	38154-P6028
3.45 (0.1358)	38154-P6029
3.48 (0.1370)	38154-P6030
3.51 (0.1382)	38154-P6031
3.54 (0.1394)	38154-P6032
3.57 (0.1406)	38154-P6033
3.60 (0.1417)	38154-P6034
3.63 (0.1429)	38154-P6035
3.66 (0.1441)	38154-P6036
0.05 (0.0020)	38453-28500
0.07 (0.0028)	38454-28500

Drive pinion bearing preload adjusting washer (R200)

Thickness mm (in)	Part No.
3.80 - 3.82 (0.1496 - 0.1504)	38125-61001
3.82 - 3.84 (0.1504 - 0.1512)	38126-61001
3.84 - 3.86 (0.1512 - 0.1520)	38127-61001
3.86 - 3.88 (0.1520 - 0.1528)	38128-61001
3.88 - 3.90 (0.1528 - 0.1535)	38129-61001
3.90 - 3.92 (0.1535 - 0.1543)	38130-61001
3.92 - 3.94 (0.1543 - 0.1551)	38131-61001
3.94 - 3.96 (0.1551 - 0.1559)	38132-61001
3.96 - 3.98 (0.1559 - 0.1567)	38133-61001
3.98 - 4.00 (0.1567 - 0.1575)	38134-61001
4.00 - 4.02 (0.1575 - 0.1583)	38135-61001
4.02 - 4.04 (0.1583 - 0.1591)	38136-61001
4.04 - 4.06 (0.1591 - 0.1598)	38137-61001
4.06 - 4.08 (0.1598 - 0.1606)	38138-61001
4.08 - 4.10 (0.1606 - 0.1614)	38139-61001

Drive pinion bearing preload adjusting spacer (R200)

Length mm (in)	Part No.
55.10 (2.1693)	38165-B4002
55.40 (2.1811)	38165-B4003
55.70 (2.1929)	38165-B4004
56.00 (2.2047)	38165-61001
56.25 (2.2146)	38166-61001

Side bearing adjusting washer (R200)

Thickness mm (in)	Part No.
2.00 (0.0787)	38453-N3100
2.05 (0.0807)	38453-N3101
2.10 (0.0827)	38453-N3102
2.15 (0.0846)	38453-N3103
2.20 (0.0866)	38453-N3104
2.25 (0.0886)	38453-N3105
2.30 (0.0906)	38453-N3106
2.35 (0.0925)	38453-N3107
2.40 (0.0945)	38453-N3108
2.45 (0.0965)	38453-N3109
2.50 (0.0984)	38453-N3110
2.55 (0.1004)	38453-N3111
2.60 (0.1024)	38453-N3112

Side gear thrust washer (R200)

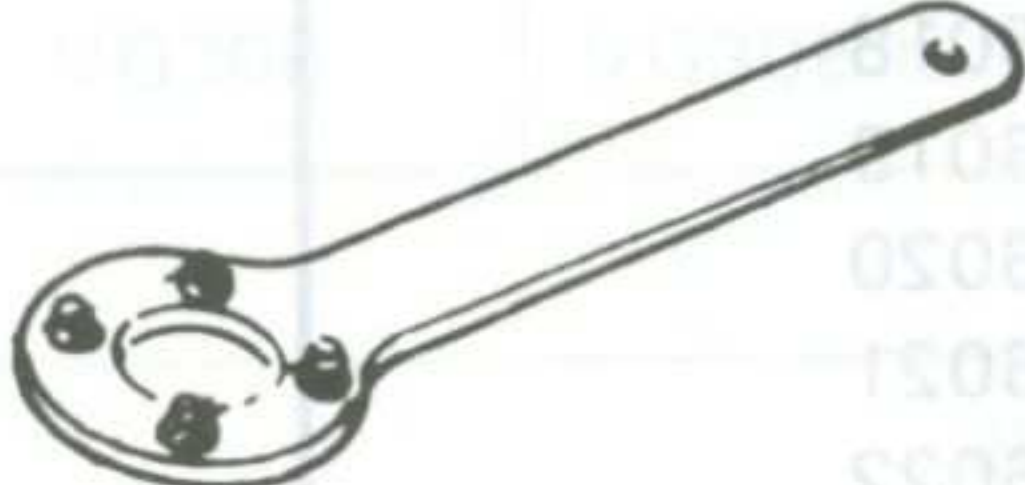
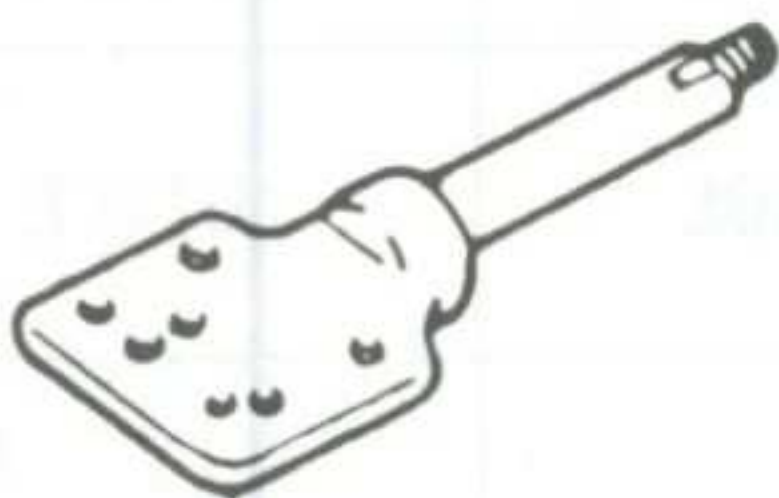
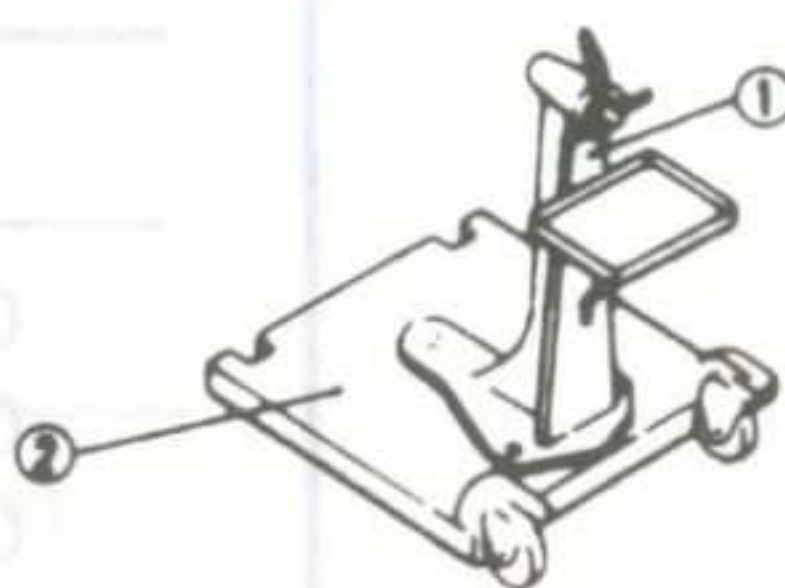
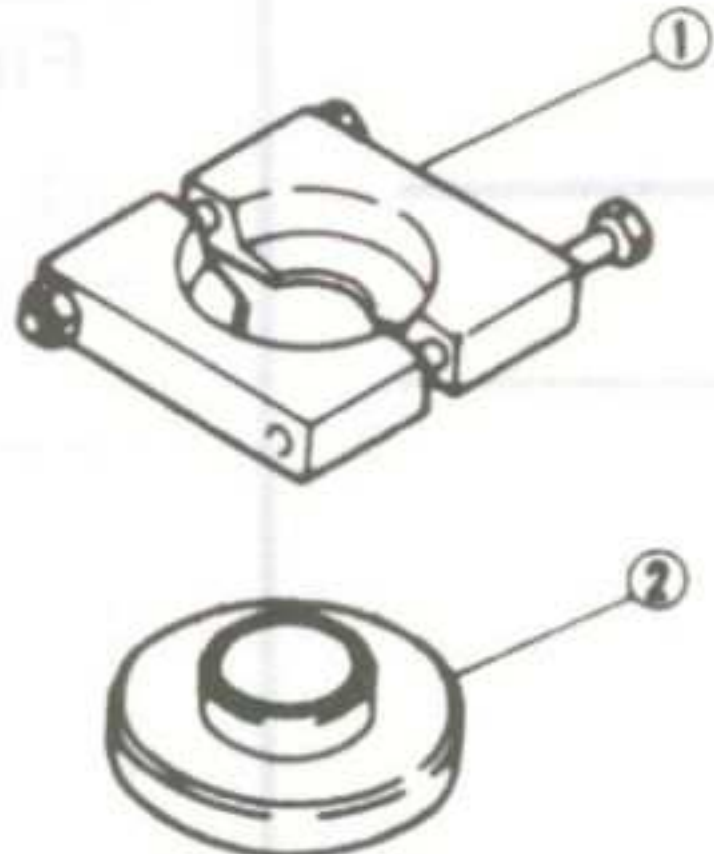
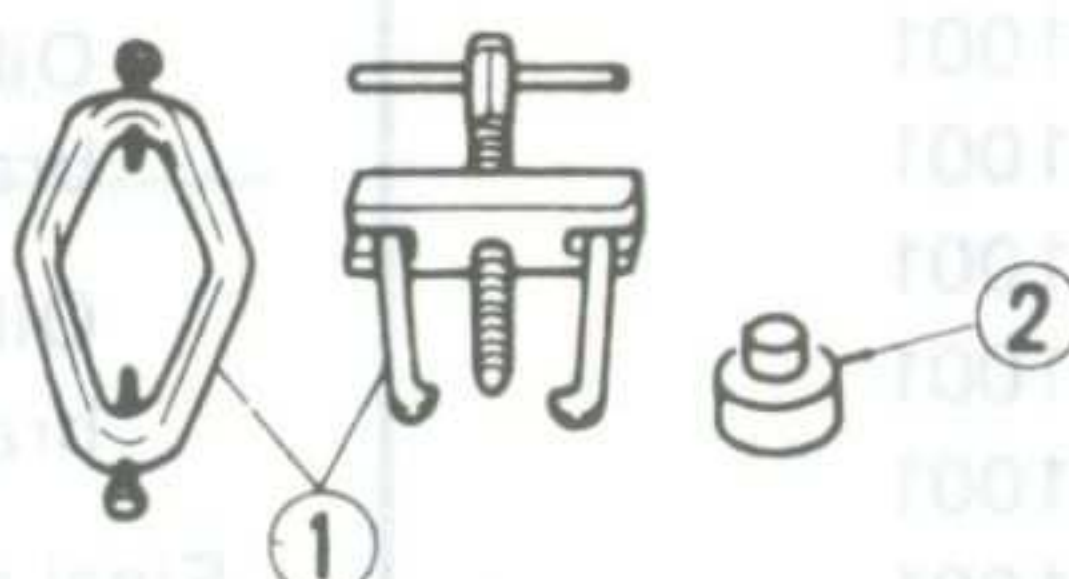
Thickness mm (in)	Part No.
0.75 - 0.80 (0.0295 - 0.0315)	38424-N3100
0.80 - 0.85 (0.0315 - 0.0335)	38424-N3101
0.85 - 0.90 (0.0335 - 0.0354)	38424-N3102
0.90 - 0.95 (0.0354 - 0.0374)	38424-N3103

TIGHTENING TORQUE (R200)

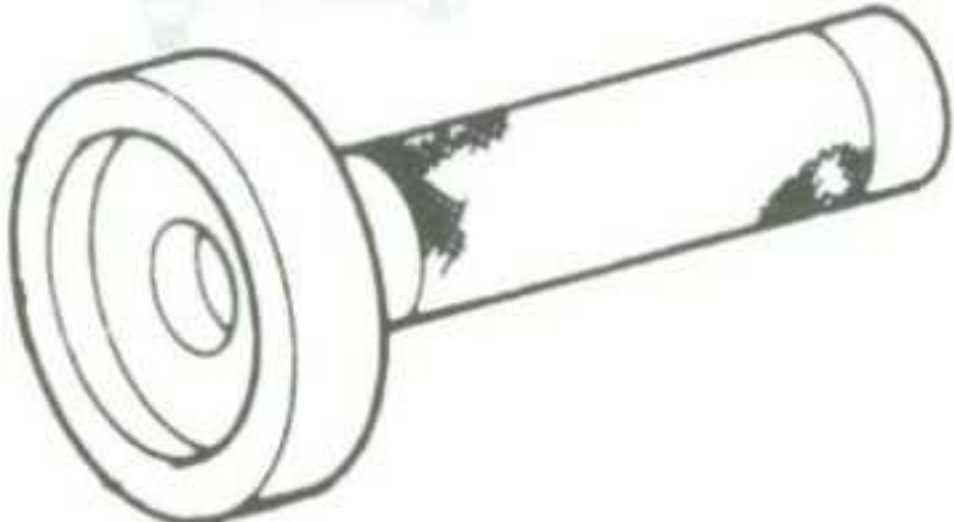
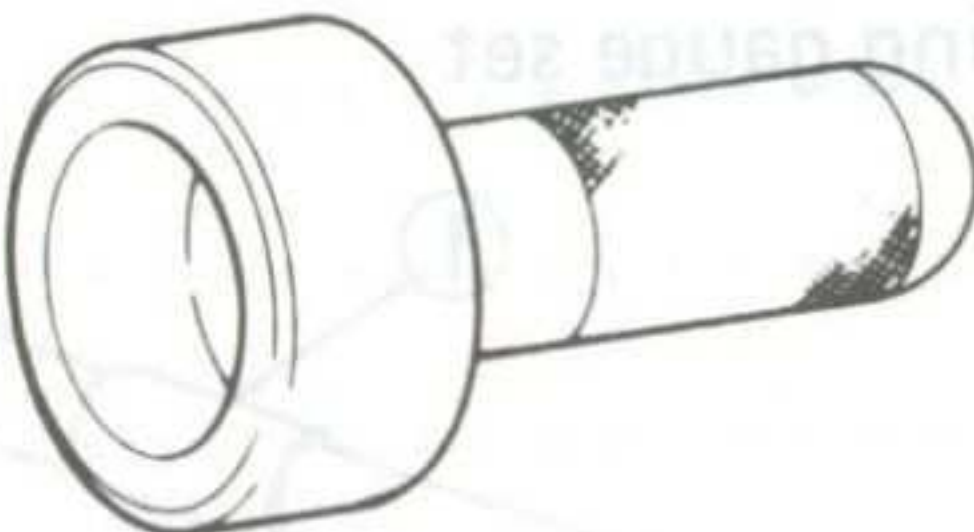
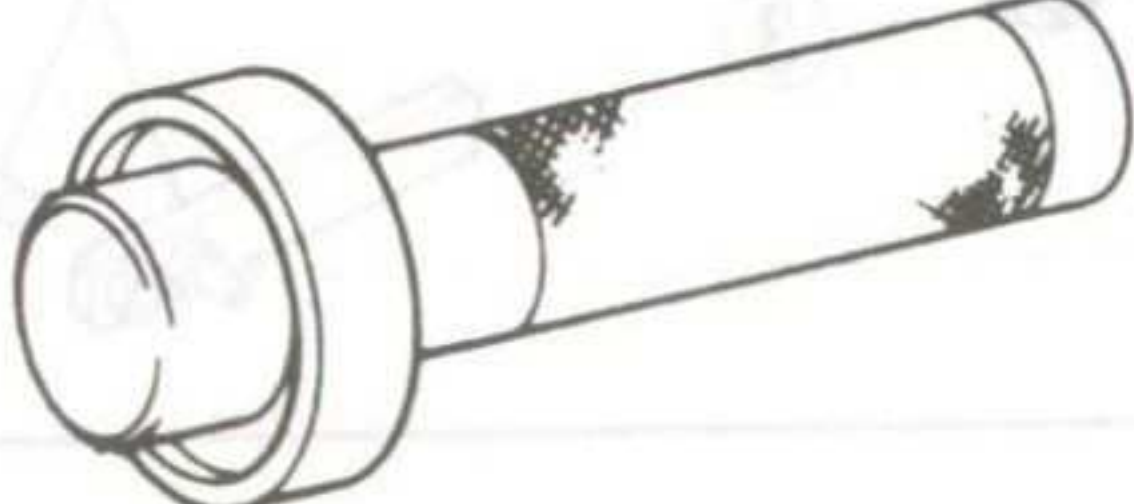
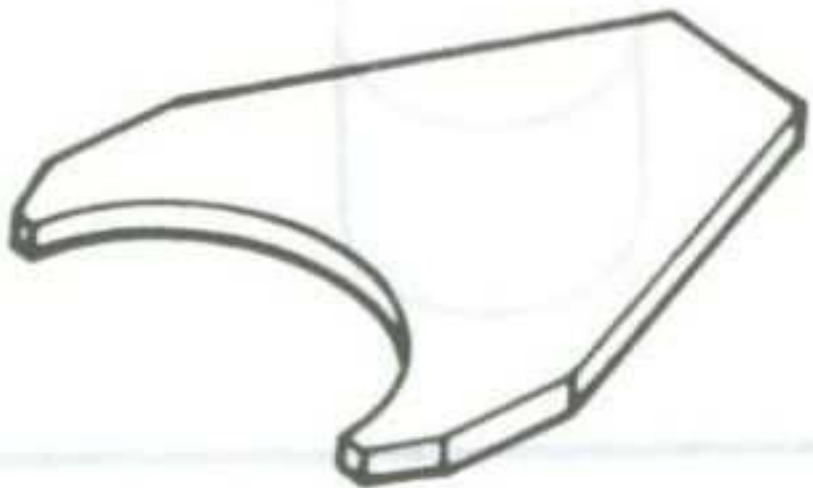
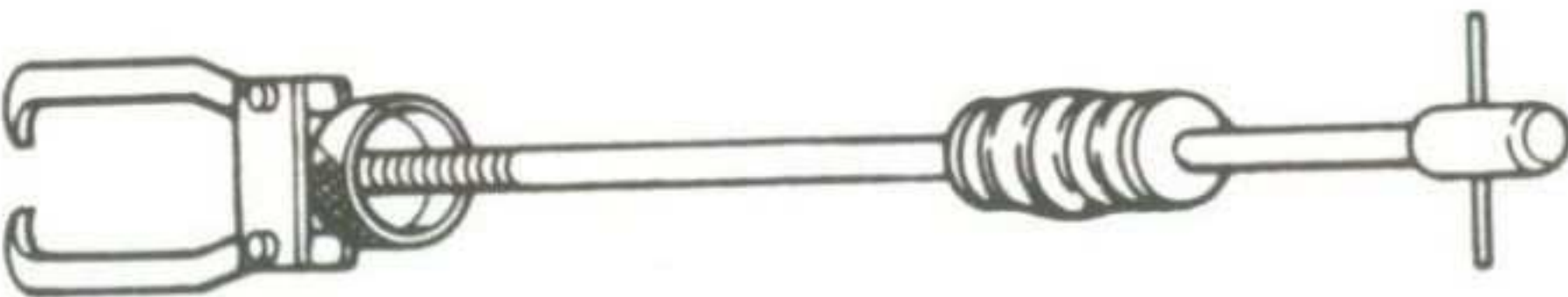
Unit	N·m	kg-m	ft-lb
Final drive installation			
Drive shaft to rear axle	27 - 37	2.8 - 3.8	20 - 27
Rear cover to mounting insulator	88 - 118	9.0 - 12.0	65 - 87
Mounting insulator to body	59 - 78	6 - 8	43 - 58
Differential carrier to suspension member	59 - 78	6 - 8	43 - 58
Companion flange to propeller shaft bolt	34 - 44	3.5 - 4.5	25 - 33
Oil cooler mounting bracket to body	3 - 4	0.3 - 0.4	2.2 - 2.9
Oil pump mounting bracket to body	3 - 4	0.3 - 0.4	2.2 - 2.9
Final drive assembly			
Drive pinion nut	186 - 216	19 - 22	137 - 159
Ring gear bolt (VG30E without turbo)	69 - 78	7.0 - 8.0	51 - 58
Ring gear bolt (VG30E turbo)	88 - 98	9.0 - 10.0	65 - 72
Side bearing cap bolt	88 - 98	9.0 - 10.0	65 - 72
Rear cover fixing bolt	16 - 24	1.6 - 2.4	12 - 17
Companion flange to propeller shaft fixing bolt	39 - 44	4.0 - 4.5	29 - 33
Filler and drain plugs	59 - 98	6 - 10	43 - 72

SPECIAL SERVICE TOOLS

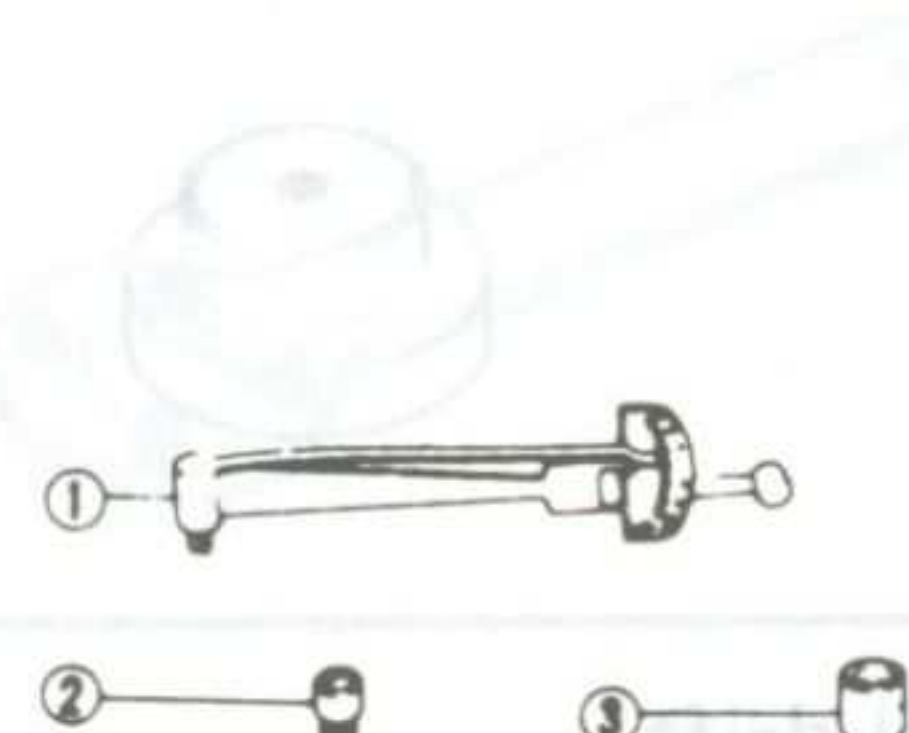
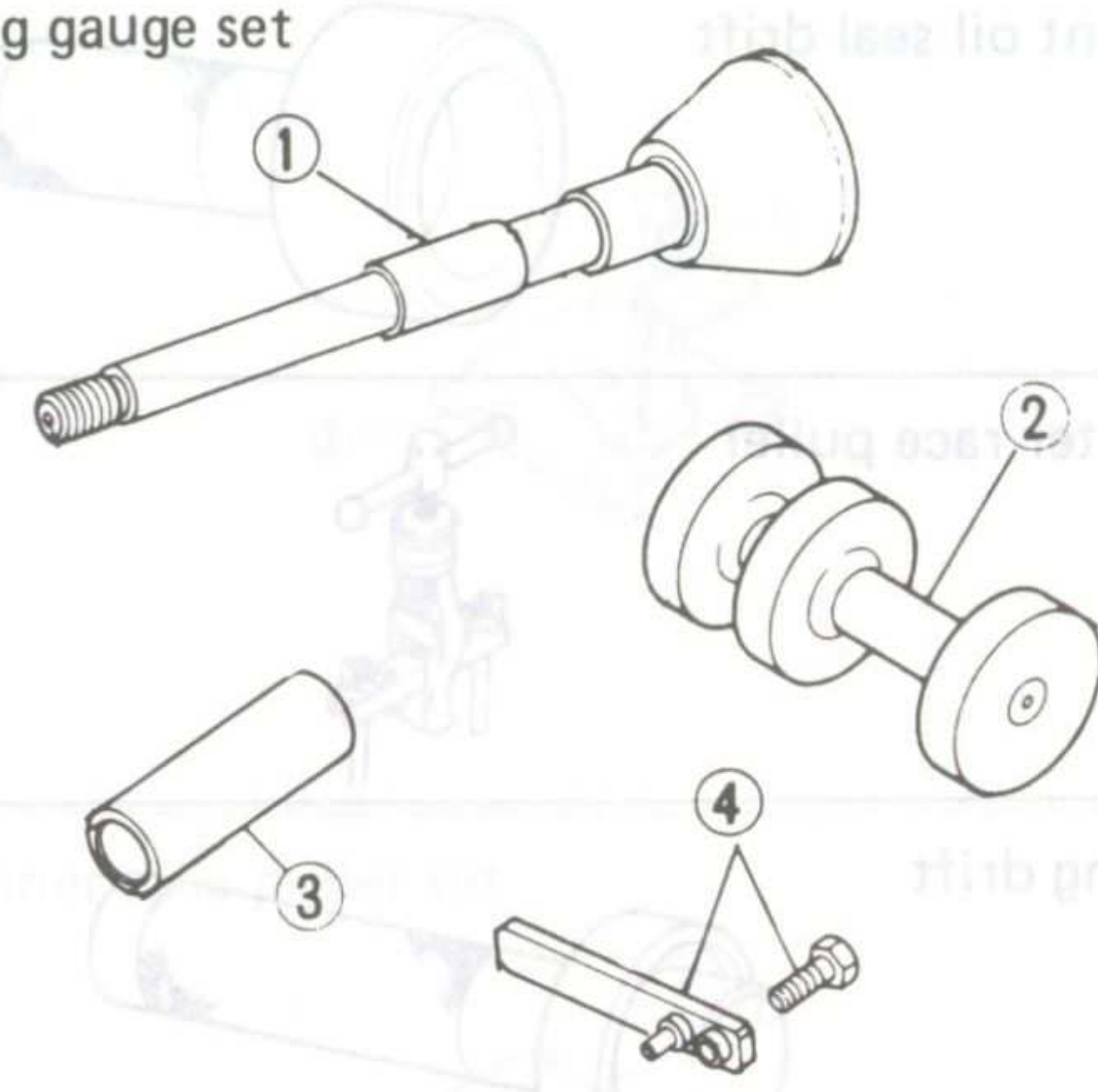
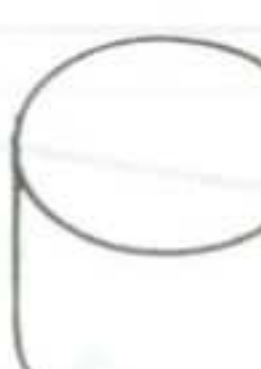
*: Special tool or a commercial equivalent

Tool number	Tool name	
ST31520000*	Drive pinion flange wrench	
KV38100800*	Differential attachment	
ST0501S000* ① ST05011000 ② ST05012000	Engine stand Engine stand Base	
ST3090S000* ① ST30031000 ② ST30901000	Drive pinion rear inner race puller set Puller Base	
ST3306S001* ① ST33051001 ② ST33061000	Diff. side bearing puller set Body Adapter	
ST30611000*	Drift	
ST30613000*	Drift	

SPECIAL SERVICE TOOLS

Tool number	Tool name		
ST30621000*	Drift		
KV38100200*	Gear carrier side oil seal drift		
KV38100500*	Gear carrier front oil seal drift		
ST33290001*	Side bearing outer race puller		
KV38100300*	Diff. side bearing drift		
KV38100401*	Pilot bearing drift		
KV38100600*	Side bearing spacer drift		
HT72400000*	Slide hammer		

SPECIAL SERVICE TOOLS

Tool number	Tool name		Tool number
ST3127S000*	Preload gauge		ST30621000*
① GG91030000	Torque wrench		
② HT62940000	Socket adapter		
③ HT62900000	Socket adapter		KV38100200*
KV381001S0	Drive pinion setting gauge set		KV38100200*
① KV38100110	Dummy shaft		
② KV38100120	Height gauge		
③ KV38100130	Collar		
④ KV38100140	Stopper		
KV38102000	Master gauge [21.0 mm (0.827 in)]		KV38100401*
ST32501000	Weight block		KV38100600*
			HT32400000*