Disassembling and Assembling Crankshaft

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Special Tools:

VW 161a	Circlip pliers
VW 202	Puller
VW 202a	Puller jaws
VW 202f	Puller thrust pad
VW 310	Stand for crankshaft
VW 400	15 ton hydraulic press
VW 427	Guide tube for aligning timing gear spacer washer and distributor pinion
VW 428	Guide tube (tapered) for installing lock ring

Crankshaft dimensions:

Stroke	74 mm
Connecting rod journal diameter	53 mm
Main bearing journal diameter	No. 1: 50 No. 2: 50 No. 3: 50 No. 4: 40

The crankshaft may be reground only once.

Disassembly

1. Mount crankshaft in stand.
2. Remove connecting rods.
3. Remove distributor pinion lock ring using pliers VW 161a.

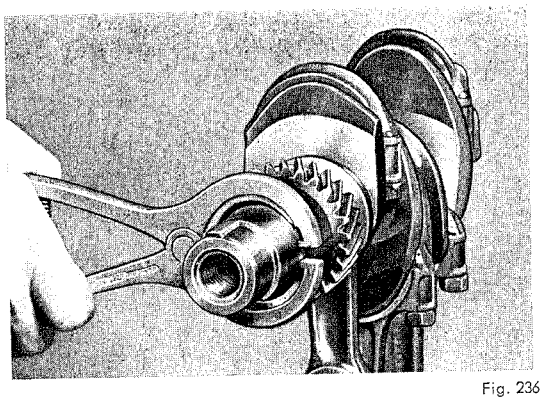

Fig. 236

4. Remove the distributor pinion, spacer ring, and timing gear using puller VW 202 with VW 202a and VW 202f. Or use press VW 400. Slight gouges on the seating surface may be removed but must not affect the press fit of these parts.

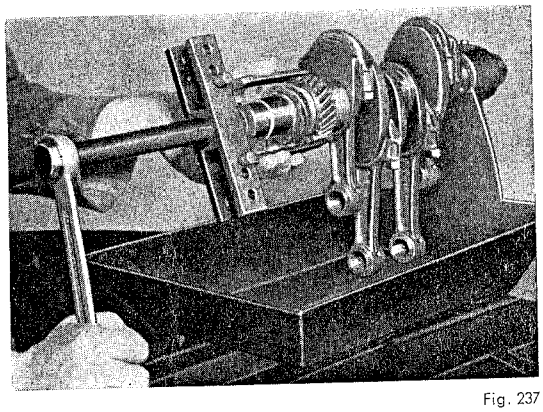

Fig. 237

5. Remove main bearing No. 3.
   Note! Do not store crankshaft without preservative grease.

Assembly

The assembly is accomplished in the reverse order of disassembly observing the following points:

1. Check the crankshaft for trueness, cracks (sound test) and surface wear. Exchange the crankshaft if necessary.

To insure proper bearing fit, insert bearings No. 1, No. 3, and No. 4 in the left crankcase section so that the dowel pins and oil passages are in line with their respective holes in the bearing shells. The oil hole of bearing No. 3 which is farthest from the dowel pin fits nearest the camshaft.

2. To simplify installation, mark bearing inserts with a pencil at the crankcase joint so that the dowel pins fit easily.

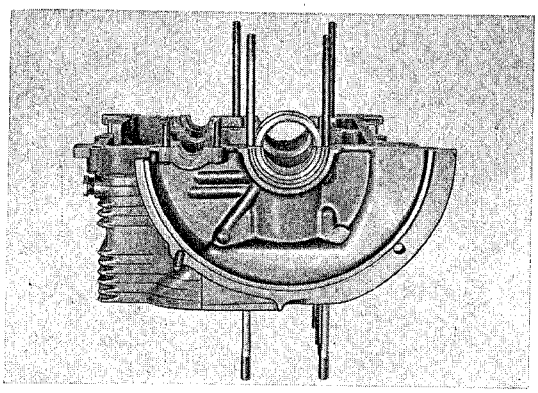

Fig. 238

3. Install bearing No. 3, and woodruff key for timing gear and distributor pinion on crankshaft.

4. Inspect timing gear for wear and tooth contact. Heat to 80° C (175° F) in an oil bath and press onto the crankshaft using sleeve VW 427. Install spacer.

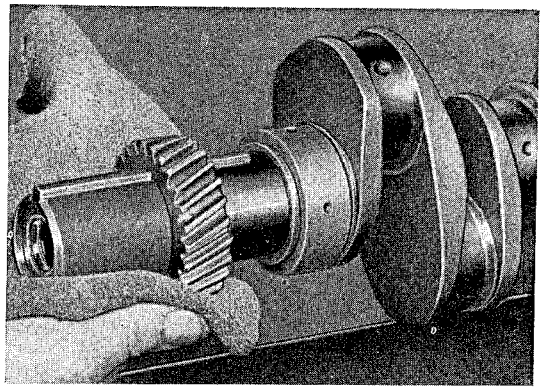

Fig. 239

5. Inspect distributor pinion for wear and replace if necessary. Heat to 80° C (175° F) and press onto crankshaft using sleeve VW 427.

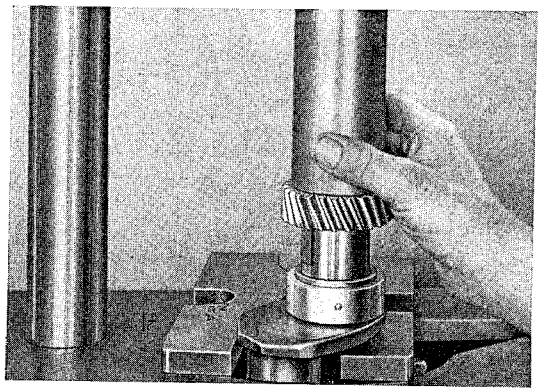

Fig. 240

6. Install the lock ring using sleeve VW 428. When the timing pinion cools on the crankshaft check whether it seats firmly.

7. Clean oil passages in crankshaft using compressed air and flush with oil.

8. Install connecting rods.

Measuring and Adjusting Crankshaft End Play

Special Tools: **P 16** **Dial gauge mount for measuring crankshaft end play**
P 17 **Dial gauge mount for measuring crankshaft end play of assembled engine.**

Checking end play

The end play for all engine types is 0.13 to 0.18 mm (.0051 to .0071 in.), wear limit 0.3 mm (.0118 in.). End play is adjusted before installing the crankshaft.

Adjustment

1. Mount main bearing No. 1 correctly on journal No. 1 of the crankshaft.

2. Install shim of calculated thickness.

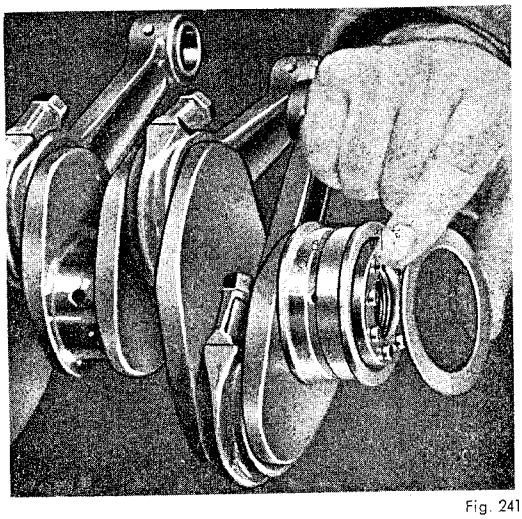

Fig. 241

3. Install flywheel and tighten gland nut to 35 to 37.5 mkg (354 to 272 ft. lb.) torque.

4. Check end play with a feeler gauge.

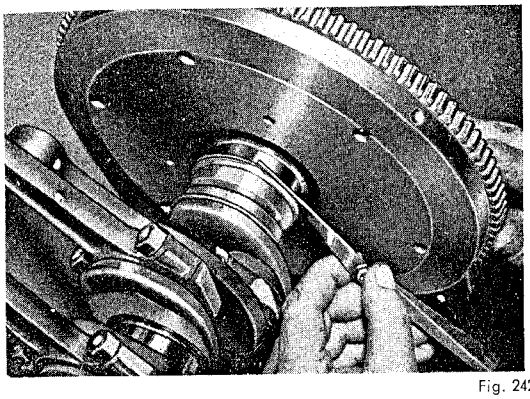

Fig. 242

End play on installed engines is measured at the V-belt pulley and on removed engines on the flywheel.

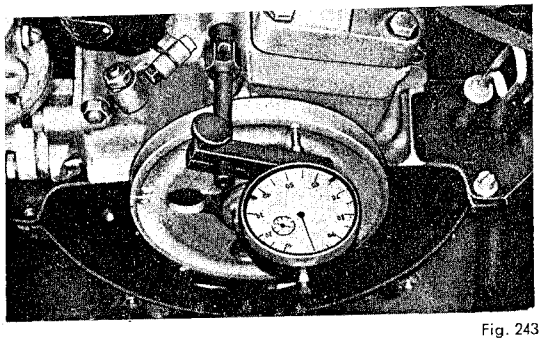

Fig. 243

For these cases use a dial gauge and holder (P 17). The holder is attached to the crankcase on one of the timing case cover studs (Fig. 243) or on the crankcase flange by an engine mount bolt (Fig. 244).

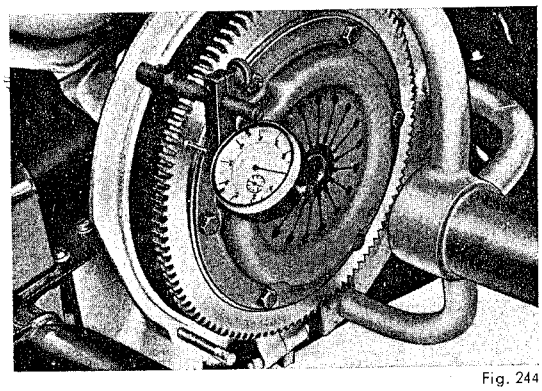

Fig. 244

Calculating end play

1. Use a dial gauge mounting P 16 on the end of the crankshaft and measure the distance between the end of the crankshaft and the thrust face of No. 1 main bearing.
   Note: Push the crankshaft firmly toward the flywheel end before measuring.

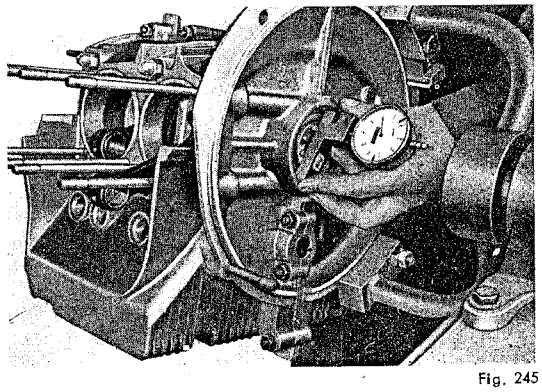

Fig. 245

2. Place the dial gauge and mount (P 16) on the flywheel hub and measure the depth of the seat.

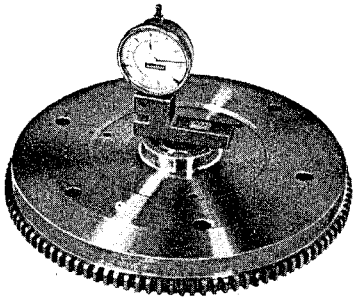

Fig. 246

3. The difference of these two measurements minus the required end play and the soft iron gasket give the thickness of the correct shim.

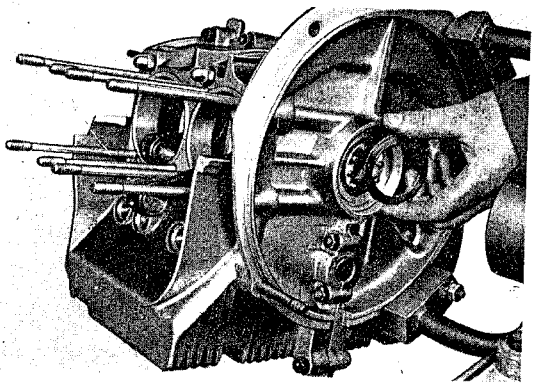

Fig. 247

The shims are available in sizes 0.80, 0.85, 0.90, 0.95, and 1.00 mm. The soft iron gasket is from 0.10 to 0.14 mm thick and must be included in the measurement.

Never use two or more soft iron gaskets to adjust end play.

Example

Crankshaft end to main bearing thrust face	4.015 mm
Thickness of soft iron gasket	+0.100 mm
	4.115 mm
Depth of seat in flywheel	−3.025 mm
	1.090 mm
Required end play	−0.140 mm
Thickness of required shim	=0.950 mm

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Grinding Crankshafts

Crankshafts may be sent to the factory for regrinding. Crankshafts are ground to three undersizes. Undersize bearings are available as spare parts. When ordering note whether the crankcase bores are standard or oversize.

Crankshaft and Bearing Dimensions

Main Bearings

Item	Type		No. 1-3 bearings mm	No. 4 bearing mm
Journal	standard	diameter	49.991-49.975	39.982-39.971
Bearing	int. dia. standard	wall thickness	(B 1) 5.096-5.108 (B2 a. 3) 5.087-5.099	4.977- 4.989
	ext. dia. standard	external diameter	60.29 + 0.02	50.050-50.034
Crankcase bore	standard	diameter	60.24 ± 0.005	50.000-50.024
Journal	standard	diameter	49.991-49.975	39.982-39.971
Bearing	int. dia. standard	wall thickness	(B 1) 5.221-5.233 (B2a.3) 5.212-5.224	4.975- 4.985
	ext. dia. oversize	external diameter	60.54 + 0.02	50.050-50.034
Crankcase bore	for oversize bearing	diameter	60.49 ± 0.005	No oversize available
Journal	1. undersize	diameter	49.741-49.725	39.732-39.721
Bearing	int. dia. undersize	wall thickness	(B1) 5.221-5.233 B2a.3) 5.212-5.224	5.102- 5.114
	ext. dia. standard	external diameter	60.29 + 0.02	50.050-50.034
Crankcase bore	standard	diameter	60.24 ± 0.005	50.000-50.024
Journal	1. undersize	diameter	49.741-49.725	39.723-39.721
Bearing	int. dia. undersize	wall thickness	(B1) 5.346-5.358 (B2a.3) 5.337-5.349	No oversize available
	ext. dia. oversize	external diameter	60.54 + 0.02	
Crankcase bore	for oversize bearing	diameter	60.49 ± 0.005	No oversize available
Journal	2. undersize	diameter	49.491-49.475	39.482-39.471
Bearing	int. dia. undersize	wall thickness	(B1) 5.346-5.358 (B2a.3) 5.337-5.349	5.227- 5.239
	ext. dia. standard	external diameter	60.29 + 0.02	50.050-50.034
Crankcase bore	standard	diameter	60.24 ± 0.005	50.000-50.024
Journal	2. undersize	diameter	49.491-49.475	39.482-39.471
Bearing	int. dia. undersize	wall thickness	(B1) 5.471-5.483 (B2a.3) 5.462-5.474	No oversize available
	ext. dia. oversize	external diameter	60.54 + 0.02	
Crankcase bore	for oversize bearing	diamter	60.49 ± 0.005	No oversize available

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Crankshaft and Bearing Dimension

Main Bearings

Item	Type		No. 1-3 bearings mm	No. 4 bearing mm
Journal	3. undersize	diameter	49.241-49.225	39.232-39.221
Bearing	int. dia. undersize	wall thickness	(B1) 5.471-5.483 (B2a.3) 5.462-5.474	5.352 - 5.364
	ext. dia. standard	external diameter	60.29 + 0.02	50.050-50.034
Crankcase bore	standard	diameter	60.24 ± 0.005	50.000-50.024
Journal	3. undersize	diameter	49.241-49.225	39.232-39.221
Bearing	int. dia. undersize	wall thickness	(B1) 5.596-5.608 (B2a.3) 5.587-5.599	No oversize available
	ext. dia. oversize	external diameter	60.54 + 0.02	
Crankcase bore	for oversize bearing	diameter	60.49 ± 0.005	No oversize available

Connecting Rod Bearings

Item	Type		All connecting rods mm
Journal	standard	diameter	53.000-52.987
Bearing Connecting rod bore	standard standard	wall thickness diameter	1.96 - 1.97 56.980-56.999
Journal	1. undersize	diameter	52.750-52.737
Bearing	ext. dia. standard int. dia. undersize	wall thickness con. rod bore	2.089- 2.099 56.980-56.999
Journal	2. undersize	diameter	52.500-52.487
Bearing	ext. dia. standard int. dia. undersize	wall thickness con. rod bore	2.215- 2.225 56.980-56.999
Journal	3. undersize	diameter	52.250-52.237
Bearing	ext. dia. standard int. dia. undersize	wall thickness con. rod bore	2.339- 2.349 56.980-56.999

Note: All bearing surfaces on crankshafts that have been reground must retain a hardness of at least 54 Rockwell c.