

03—318 Checking and reconditioning of crankshaft

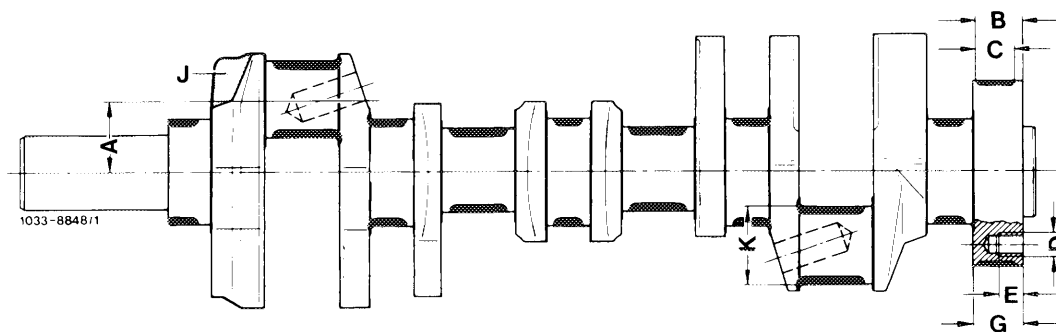
Data

Crankshaft standard dimension and repair stages	Crankshaft bearing journal dia.	Width of journal at fitted bearing	Crankpin dia.	Width of pins
Standard dimension	$\frac{63.96}{63.95}$	$\frac{27.00}{27.02}$	$\frac{51.96}{51.95}$	$\frac{50.00}{50.12}$
1st repair stage	$\frac{63.71}{63.70}$	up to 27.50	$\frac{51.71}{51.70}$	up to 50.30
2nd repair stage	$\frac{63.46}{63.45}$		$\frac{51.46}{51.45}$	
3rd repair stage	$\frac{63.21}{63.20}$		$\frac{51.21}{51.20}$	
4th repair stage	$\frac{62.96}{62.95}$		$\frac{50.96}{50.95}$	
Permissible radial runout of crankshaft journals and crankpins				0.0025
Permissible deviation of surface line of crankpins in relation to reference axis of crankshaft journals I and V, from parallel				0.01
Permissible radial runout of rear crankshaft flange ³⁾				0.02
Permissible axial runout of rear crankshaft flange ³⁾				0.012
Permissible radial runout of crankshaft journals ³⁾			journal II, IV	0.07
			journal III	0.10
Permissible deviation of front crankshaft journal ²⁾			from cylindrical shape	0.05
			radial runout ³⁾	0.03
Permissible deviation of running surfaces of thrust bearing			axial runout ³⁾	0.02
Fillets on crankshaft journals and crankpins				2.5—3
Crankshaft journal dia. front				31.984—32.000
Running surface dia. for radial sealing ring rear, ground free of twist				$\frac{99.928}{99.874}$
Scleroscope hardness of crankshaft journals and crankpins			value when new	71—81
			limit value	61 ¹⁾

¹⁾ The limit value should be available at least at 2/3 of journal and crankpin circumference.

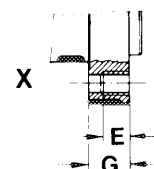
²⁾ When measuring in installed condition, eliminate radial bearing play by pushing against crankshaft journal.

³⁾ With crankshaft resting on outer crankshaft bearing journal I and V and at one full turn.



The differentiating characteristics of crankshafts of engines 116 and 117 are shown on drawing and in table.

Starting with installation of transmission 722.3 (W 4 A 040) into model 107.026 the crankshaft of engine 117.960 is standardized with that of engine 117.961.



Crankshafts engines 116 and 117

Engine	A (stroke)	C	E	G	J	K	Part no. of crankshaft	Interchange- able with
116.960/961	35,9 (71,8)	13	13 ¹⁾	19	with- out	52	116 031 16 01	--
116.960 116.961 116.962/963	39,45 (78,9)					48	116 031 22 01	--
116.98 1st version	32,9 (65,8)					21	13 ²⁾	26
116.98 2nd version		52	116 031 20 10	116 031 14 01				
117.960 1st version ³⁾	42,5 (85)	13	13 ¹⁾	19	with- out	52	117 031 12 01 ³⁾	--
117.960 2nd version 117.961						48	117 031 14 01	--
117.962 117.963						52	117 031 21 01	--
117.98 1st version		21	13 ²⁾	26	with	52	117 031 10 01	117 031 18 01
117.98 2nd version		13					117 031 18 01	117 031 10 01

¹⁾ Throughbore.

²⁾ Blind hole bore.

³⁾ In the event of repairs, the shorter crankshaft 117 031 14 01 can be installed instead of crankshaft 117 031 13 01, together with a length compensating washer, part no. 116 032 03 76, (10.5 mm thick) and the longer (29 mm, up to now 23 mm) necked-down screws, part no. 116 032 04 71.

Special tool

Hardness tester (Scleroscope)



000 589 20 21 00

Note

Following repairs, no balancing of crankshaft is required.

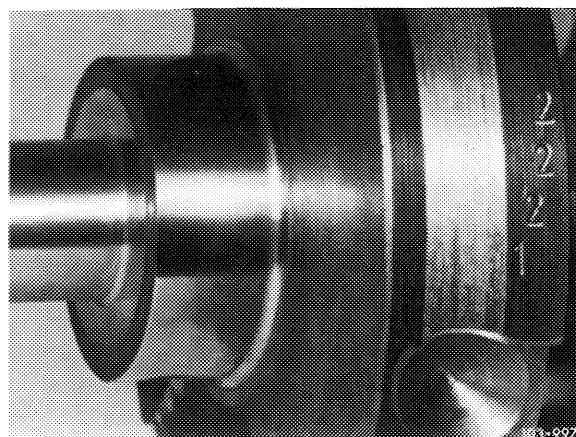
When checking and reconditioning crankshaft, proceed in sequence of diagram below.

Group number for crankpin dia. (standard dimension)

1 = 51.945–51.954 mm or 47.945–47.954 mm

2 = 51.995–51.965 mm or 47.955–47.965 mm

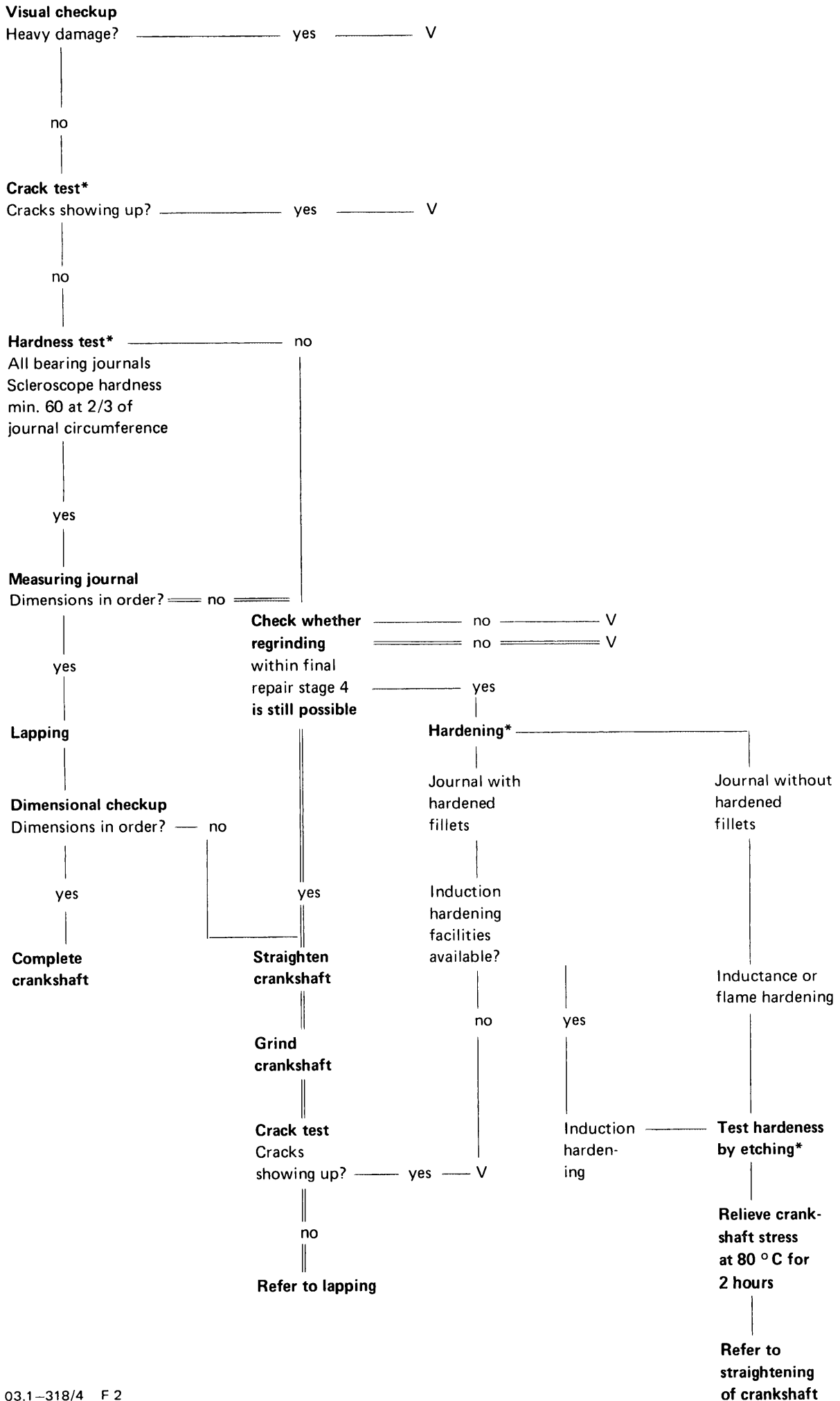
The number punched in at bottom applies to 1st crankpin.



Diagram

* Refer to section "Explanations concerning diagram".

V = scrap.



Explanations concerning diagram

Crack test

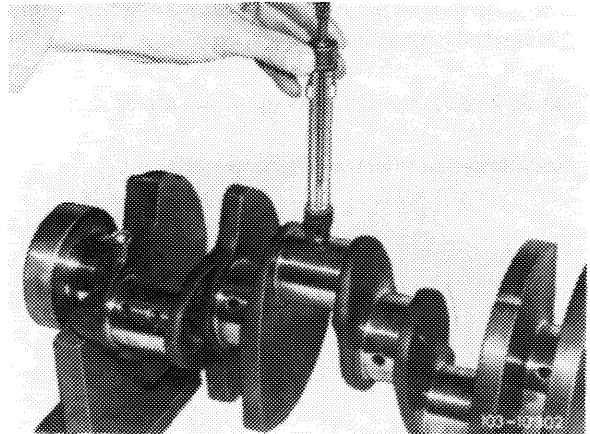
Clean crankshaft. Journals should be free of oil and grease. Magnetize crankshaft and apply fluorescent powder (fluxing). A color penetration test (immersion in bath or using spray can) can also be applied.

Aids: Paint or UV-oil,
cleaning agent,
developer

Hardness test

Check hardness with Scleroscope.

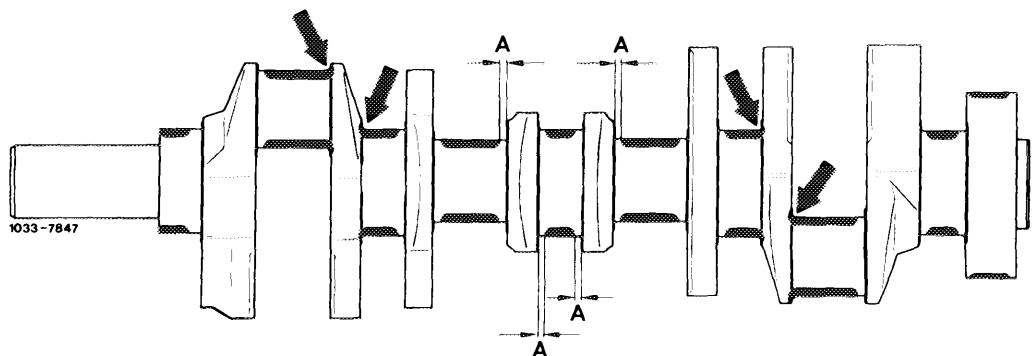
The minimum hardness should prevail at 2/3 of journal circumference.



Hardening

Journals without hardened fillets can be induction-hardened or flame-hardened. Journals with hardened fillets (arrow) should be induction-hardened on principle. If this is not possible, scrap crankshaft.

When hardening journals without hardened fillets, the distance A between runout of hardened surface and fillet (4–5 mm) must be maintained.



Checking the hardening

For perfect hardening, check adjustment of hardening equipment by metallographic grinding.

Pertinent tests can be made on scrapped crankshafts.

Check hardening by etching the journal surface with a 2% alcoholic nitric acid (HNO_3) solution.

No dark spots should show up at surface of journal.

Non-hardened fillets will become dark.

The hardened fillets, on the other hand, should be as bright as the journal surface.

For comparison, we recommend an etching test on a metallographically inspected journal.

Then, carefully wash off nitric acid by means of alcohol.

Corrosion protection

Coat crankshafts which are not immediately installed again with engine initial operation oil (SAE 30).