

## 03-3180 Checking and servicing crankshaft

Operation no. of operation texts and work units or standard texts and flat rates

### Data in mm

Crankshaft standard size and repair sizes	Crankshaft bearing journal $\varnothing$	Conrod bearing journal $\varnothing$	Conrod bearing journal width
Standard size	<u>57.950</u> 57.965	<u>47.955</u> 47.965	<u>27.958</u> 28.042
Standard size I	<u>57.935</u> 57.950	<u>47.935</u> 47.955	
1st repair size	<u>57.705</u> 57.715	<u>47.705</u> 47.715	up to 28.30
2nd repair size	<u>57.455</u> 57.465	<u>47.455</u> 47.465	
3rd repair size	<u>57.205</u> 57.215	<u>47.205</u> 47.215	
4th repair size	<u>56.955</u> 56.965	<u>46.955</u> 46.965	

1) Crankshaft journal width except at fit bearing 23.95 – 24.04

### Data in mm

Permissible out-of-roundness of crankshaft and conrod bearing journals		0.002
Permissible conicity	Conrod bearing journals	0.01
	Crankshaft bearing journals	0.01
Permissible axial runout of fit bearing		0.02
Fillet radii at the	Crankshaft bearing journals	1.9 – 2.1
	Conrod bearing journals	2.5 – 2.8
Bearing journals ground and precision-lapped, max. peak-to-valley height $R_z$ ( $\mu\text{m}$ )		0.15
Front crankshaft journal $\varnothing$		31.98 – 32.00
Permissible difference in concentricity of front crankshaft journal <sup>2)</sup> <sup>3)</sup>		0.03
Contact surface $\varnothing$ for rear radial seal		92.874 – 92.928
Permissible difference of rear crankshaft flange	radial <sup>2)</sup>	0.03
	axial <sup>2)</sup>	0.012

<sup>2)</sup> When crankshaft mounted on crankshaft bearing journals 1 and 7 and one full revolution

<sup>3)</sup> If measurement performed with crankshaft installed, the radial bearing play should be eliminated by applying pressure to crankshaft bearing journal.

Permissible difference in concentricity of crankshaft bearing journals <sup>2)</sup>	Journals 2, 6	0.07
	Journals 3, 4, 5	0.10
Scleroscopic hardness of crankshaft and conrod bearing journals	New	74 – 84
	Limit value	60 <sup>4)</sup>
Permissible imbalance of crankshaft when mounted in journals 2 and 6		100 gmm <sup>5)</sup>

2) When crankshaft mounted on crankshaft bearing journals 1 and 7 and one full revolution

3) If measurement performed with crankshaft installed, the radial bearing play should be eliminated by applying pressure to crankshaft bearing journal.

4) The limit value must exist at at least 2/3 of the circumference of the journal

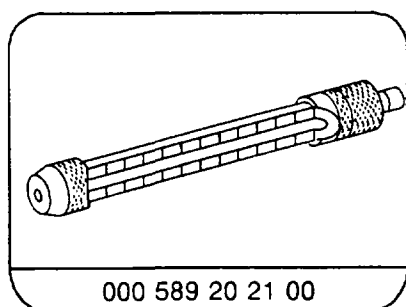
5) Related to 1st and 12th balancing weight at 550 rpm

### Note

Maximum wear limit of crankshaft and conrod bearing journals 0.02 mm. The repair sizes listed in the table should be adhered to exactly. When performing regrinding work, it is essential to adhere to the fillet radii at the crankshaft and conrod bearing journals. All the radii of the conrod and crankshaft bearings are inductively hardened at the boundary layer, except on crankshafts up to 08/1992 without radii hardening (identification with end number 0601 at 2nd throw of crankshaft) at 2nd, 3rd, 4th, 5th and 6th crankshaft bearings.

The contact surface for the rear radial seal is inductively hardened to a depth of about 1 – 2 mm.

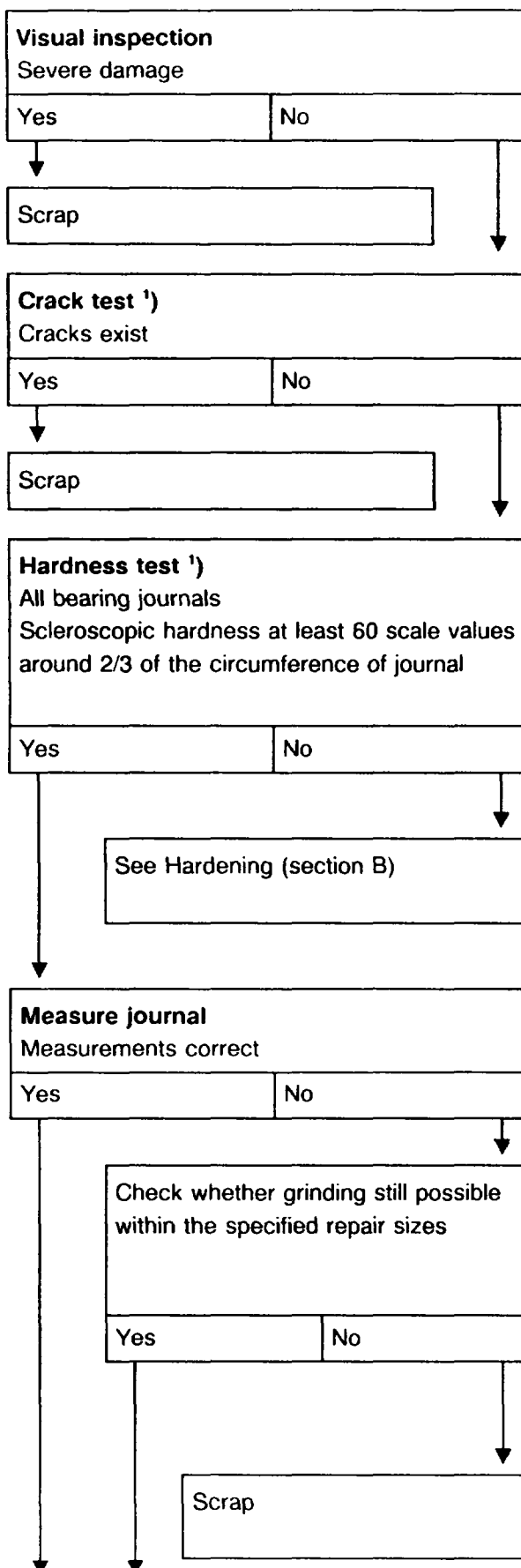
### Special tool

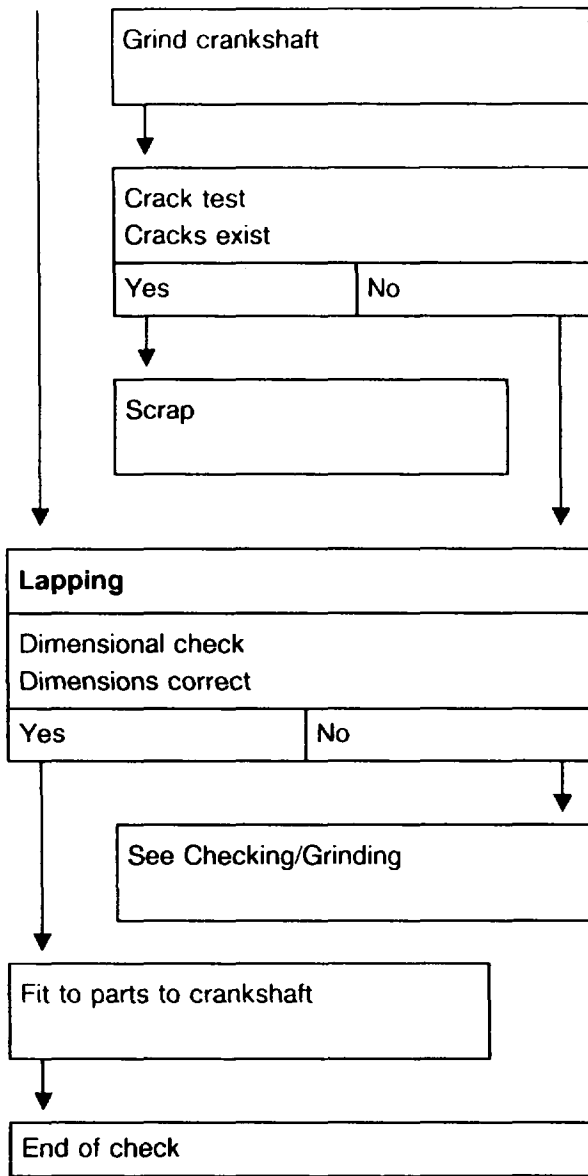


### Note

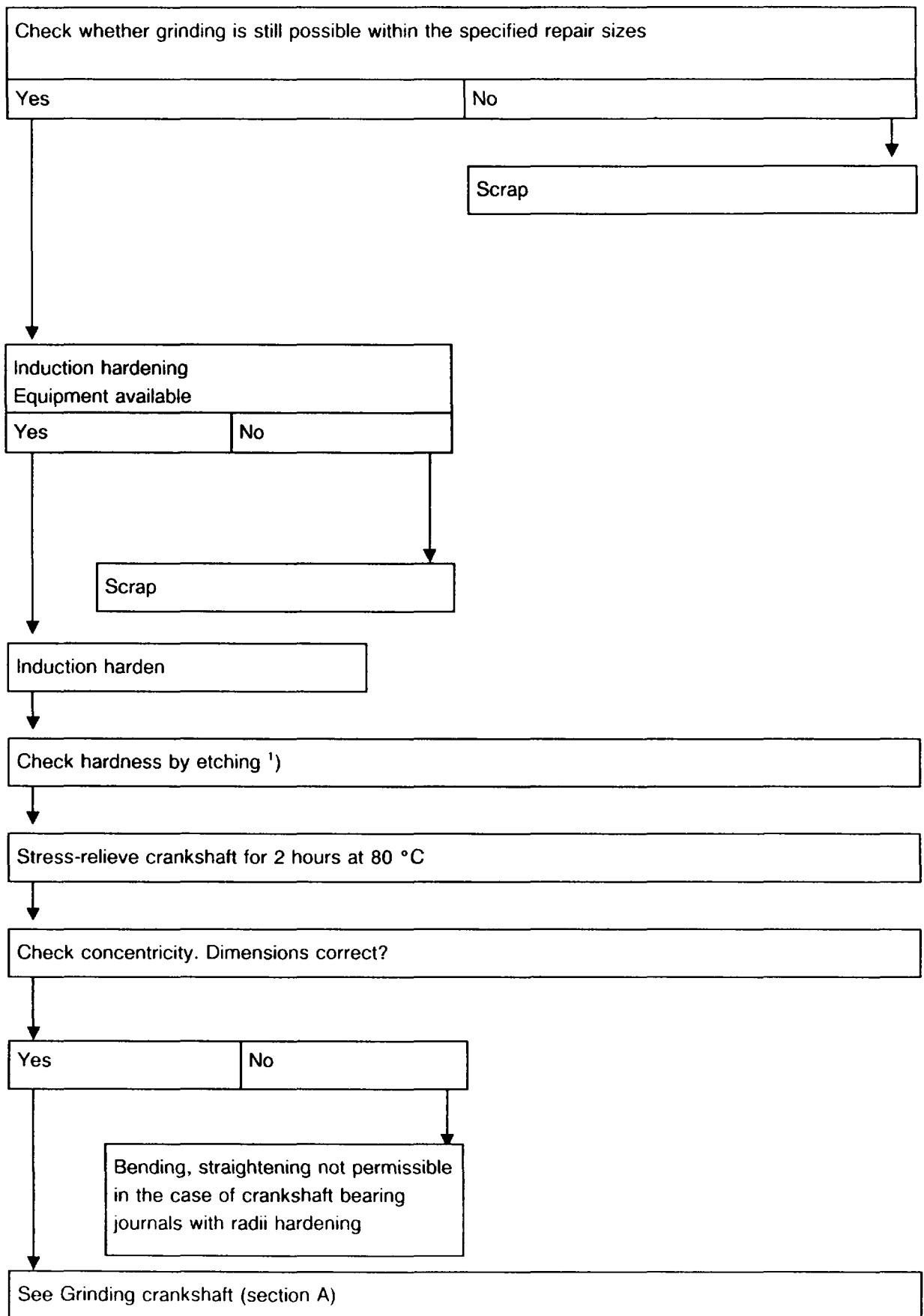
Proceed in the order of the diagram overleaf when checking and servicing crankshafts.

## A. Checking, grinding





## B. Hardening



## Explanations of diagram

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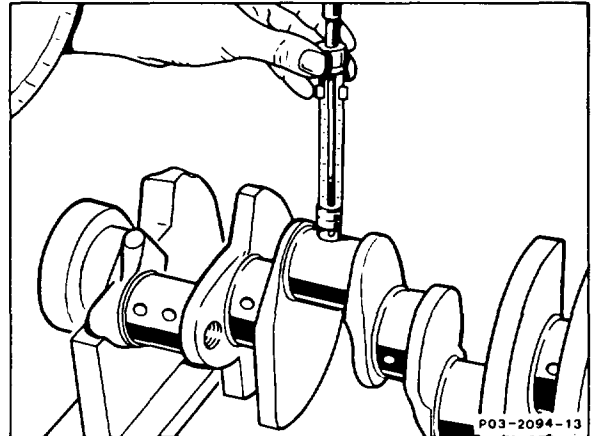
### Crack testing

Clean crankshaft. The bearing journals must be free of oil and grease. Magnetize crankshaft and apply fluorescent powder (flux). It is also possible to use a dye penetration method (immersing in bath or with a spray can).

Aids: dye, UV oil or fluorescent powder,  
cleaner,  
developer

### Hardness test

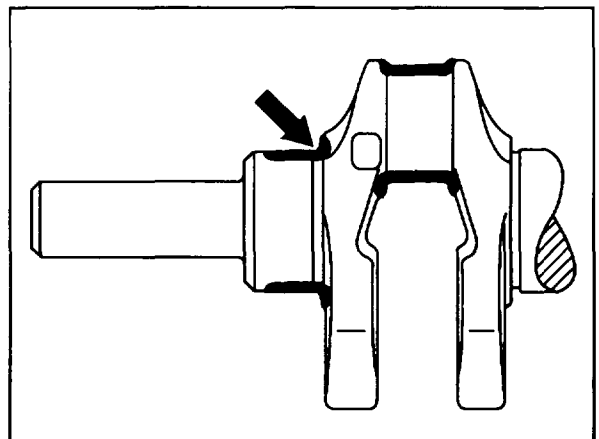
Check hardness with drop-hardness tester (scleroscopic hardness). The minimum hardness of 60 scale values must exist around 2/3 of the circumference of the journal.



### Hardening

Always inductive-harden journals with hardened radii (arrows).

If this is not possible, scrap crankshaft.



### **Checking hardening**

The setting of the hardening equipment must be checked by metallographic sections in order to achieve proper hardening.

These specimens can be taken from trial hardenings on scrapped crankshafts.

Check hardening by etching the surface of the journal with a 2 % alcoholic nitric acid ( $\text{HNO}_3$ ).

No dark patches must appear on the surface of the journal.

The hardened radii must be just as light in color as the surface of the journal.

The non-hardened radii darken in color.

As a comparison, it is recommended to perform etching on a metallographically checked journal.

Following this, carefully wash off the nitric acid with alcohol.

### **Corrosion protection**

If the crankshaft is not installed again immediately, it must be treated with anti-corrosion oil.