

Service Letter

No.:

SL88-229/OES
January 1988

Dear Sirs,

MAN B&W Turbochargers NR20, NR26,
NR15/R, NR20/R, NR24/R, NR26R

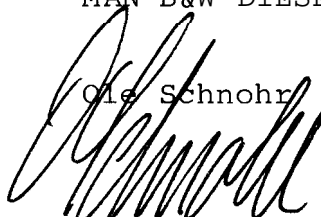
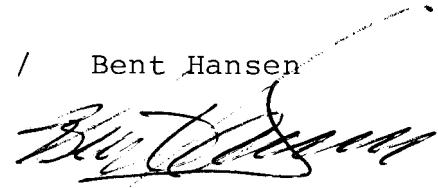
Transverse play of rotor

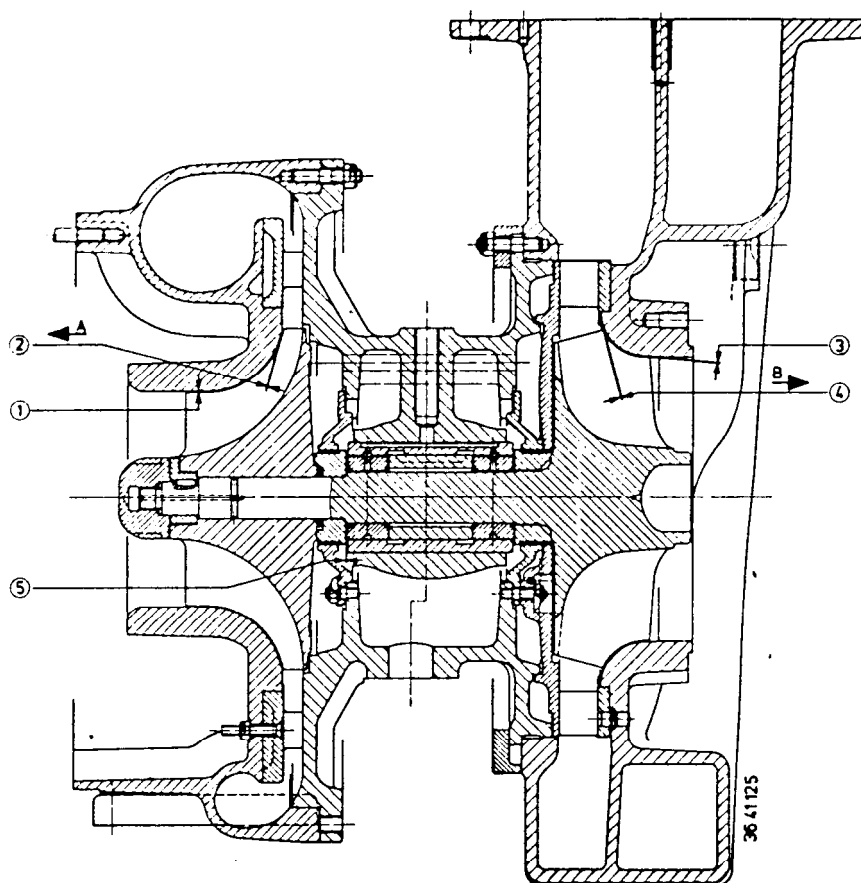
Since experience shows that the instruction for checking rotor for transverse play (bearing clearance) can be misinterpreted, the following enclosed amendments to the OPERATING MANUAL FOR EXHAUST GAS TURBOCHARGERS have been prepared.

- Technical Data, Gaps and Clearances
(9.87 and 12.87 for NR24/R)
- Checking Rotor for Transverse Play (Bearing Clearances) Work Card No. 500.06 (9.87)

The recommended transverse play - in the amended instruction - is enlarged, i.e. longer periods between replacement of the resp. parts can be expected.

Best regards,
MAN B&W DIESEL A/S, HOLEBY

 /  Bent Hansen



Measure radial gaps ① and ② using feeler (thickness) gauge, and axial gaps ③ and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play[@] of rotor by vigorously moving the rotor in the directions A and B. Remove obstructive materials from the labyrinth seal boreholes beforehand, if any. However, do not remove wear tracks.

Posn. in Fig.	Designation of Parts	Part No.	When new		Clearance		Replace or re-machine parts	
			Gap min	max	min	max	min	max*
1	Compressor wheel - Compressor casing, radial	520.005 546.001	0.65	0.75	-	-	0.55	0.85
2	Compressor wheel - Compressor casing, axial *	520.005 546.001	0.50	1.15	-	-	0.40	1.25
3	Rotor - Gas admission casing, radial	520.001 501.001	0.50	0.57	-	-	0.40	0.70
4	Rotor - Gas admission casing, axial **	520.001 501.001	0.50	0.90	-	-	0.40	1.00
5	Bearing bush - Labyrinth ring		-	-	0.20	0.27	-	0.33

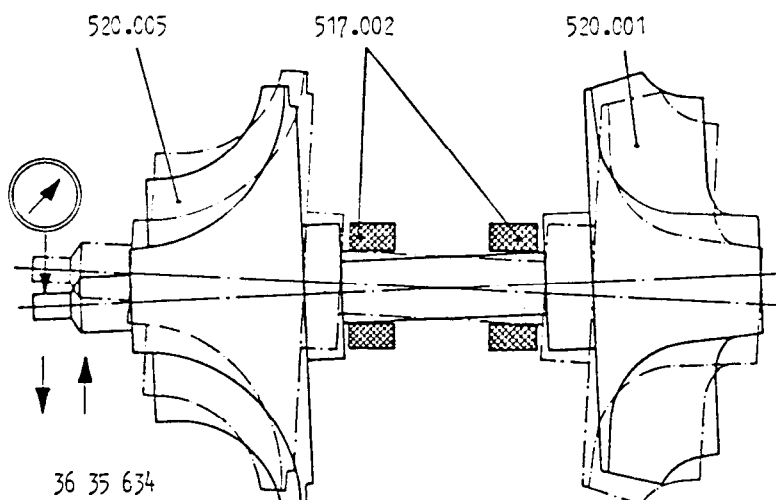
Admissible aberration from the plane of rotation of the compressor wheel (impeller)

(measured with dial gauge at largest radial distance) 0.06 mm

Admissible transverse movement of rotor in bearings: See Work Card 500.06 .

* measured with rotor pushed up in the direction A }
 ** measured with rotor pushed up in the direction B } *

* with the rotor pushed up in opposite direction, withdraw measured axial play ⑤.



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

- 517.002 Bearing bush
- 520.001 Turbine rotor
- 520.005 Compressor wheel.

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

STARTING POSITION

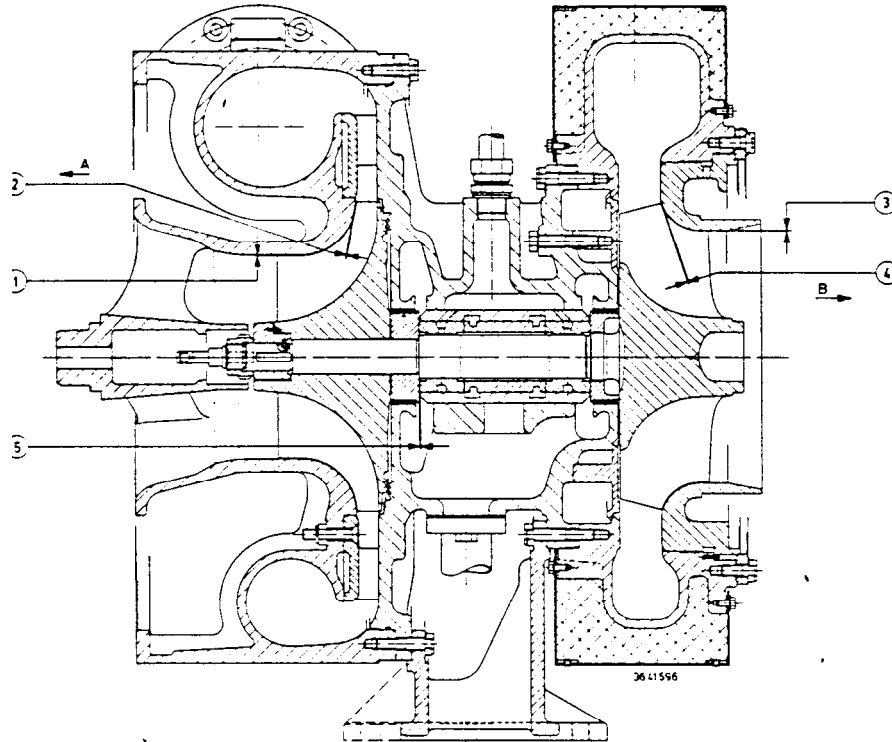
Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

1. Attach dial gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 1.00	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.00 to 1.30	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity, Checking: Quality and pressure of the lube oil.
above 1.30	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the Lube oil.

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.
Otherwise, shortened Life time of the bearings has to be expected.



Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play ⑤ of rotor by vigorously moving the rotor in the directions A and B. Remove obstructive materials from the labyrinth seal boreholes beforehand, if any. However, do not remove wear tracks.

Pos. in dwg.	Description of Parts	Part No.	When New				Replace or remachine	
			Gaps	Clearances			min.	max.
			min.	max.	min.	max.		
1	Compressor wheel - compressor casing, radial	520.005 546.001	0.60	0.70	-	-	0.50	0.90
2	Compressor wheel - compressor casing, axial +	520.005 546.001	0.40	0.90	-	-	0.35	1.10
3	Turbine rotor - gas admission casing, radial	520.001 501.001	0.60	0.70	-	-	0.50	0.90
4	Turbine rotor - gas admission casing, axial ++	520.001 501.001	0.35	1.04	-	-	0.30	1.25
5	Bearing bush - labyrinth ring, axial				0.26	0.35	-	0.42

Admissible aberration from the plane of rotation of the compressor wheel (measured with a dial gauge at the largest radial distance) 0.06 mm

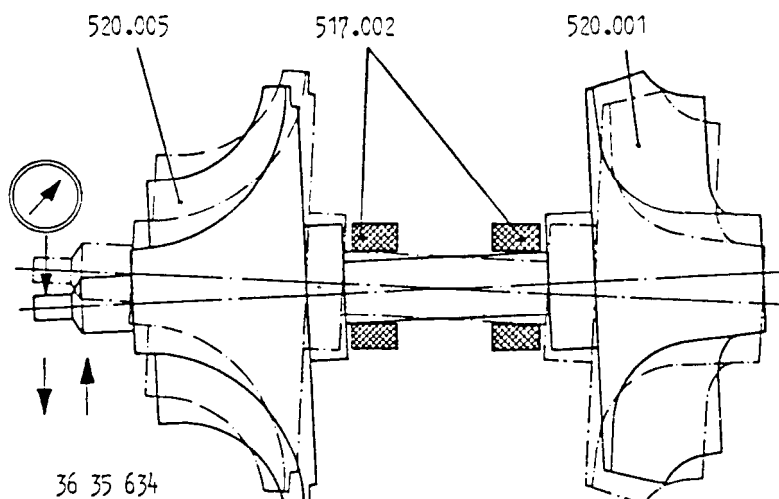
Transverse play of the rotor in tk bearings : See Work Card 500.06.

+ measured with the rotor pushed up in the direction A

++ measured with the rotor pushed up in the direction B

} *

* with the rotor pushed up in opposite direction, withdraw measured axial play ⑤.



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

- 517.002 Bearing bush
- 520.001 Turbine rotor
- 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours),

STARTING POSITION

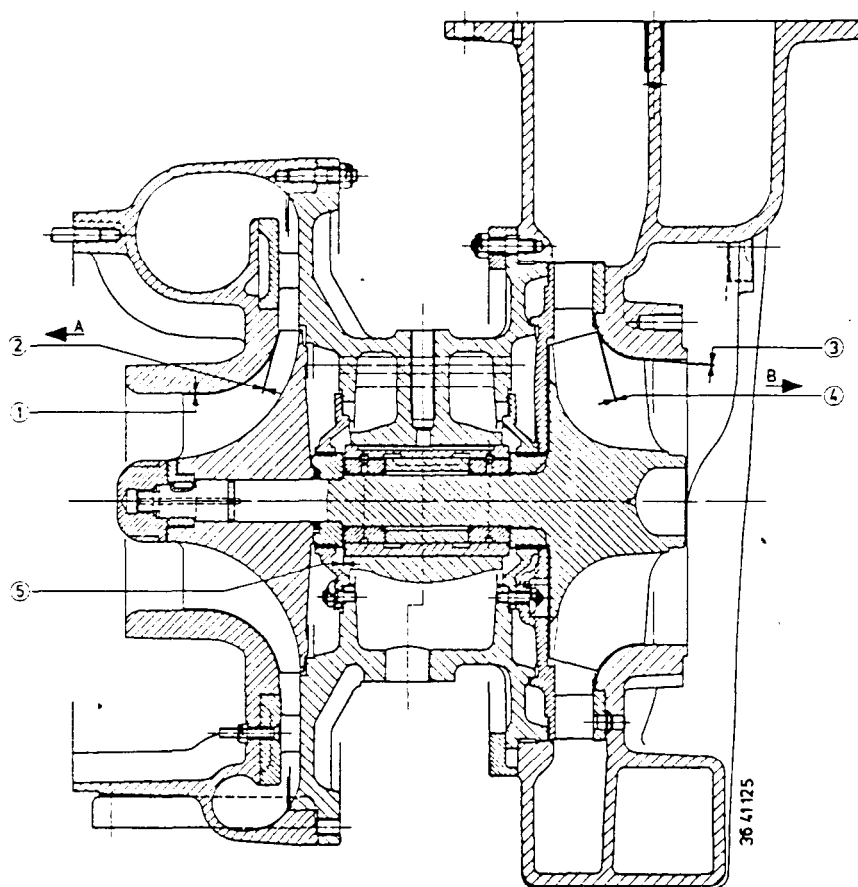
Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

1. Attach dial gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
3. Recommended measures, especially when close to the upper Limit:

Measuring range [mm]	Remarks
to 1.05	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.05 to 1.35	Inspection of single parts of the cartridge by specialized service personnel. during the next opportunity, Checking: Quality and pressure of the Lube oil.
above 1.35	Operating reliability endangered. Replace the respective parts through specialized service personnel. or exchange cartridge. Checking: Quality and pressure of the lube oil.

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.
Otherwise, shortened life time of the bearings has to be expected.



Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play⁺ of rotor by vigorously moving the rotor in the directions A and B. Remove obstructive materials from the labyrinth seal boreholes beforehand, if any. However, do not remove wear tracks.

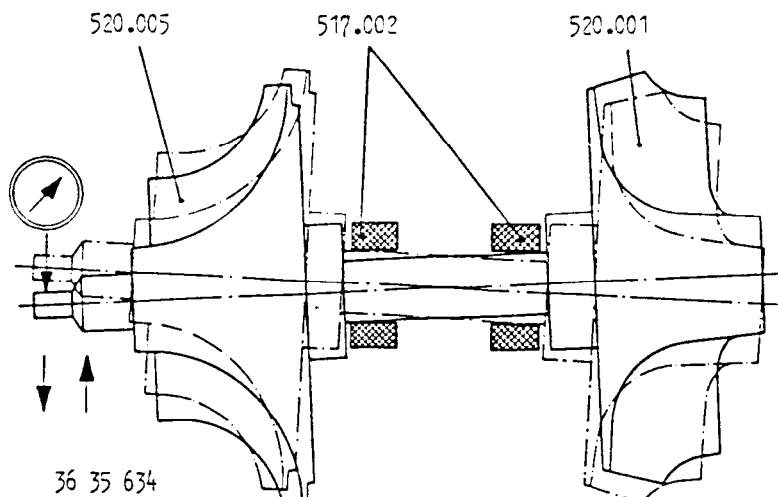
Position in list	Designation of Parts	Part No.	When New				Replace or re-machine parts	
			Gap		Clearance			
			min.	max.	min.	max.	min.	max.
1	Impeller - Compressor casing, radial	520.005 544.001	0.50	0.60	-	-	0.40	0.70
2	Impeller - Compressor casing, axial ⁺	520.005 546.001	0.30	0.90	-	-	0.25	1.00
3	Turbine rotor - Gas admission casing, radial	520.001 501.001	0.50	0.57	-	-	0.40	0.70
4	Turbine Gas admission casing, axial ⁺⁺	520.001 501.001	0.50	0.90	-	-	0.40	1.00
5	Bearing bush-Labyrinth Ring				0.20	0.27	-	0.33

Admissible aberration from the plane of rotation of the impeller (measured with dial gauge at largest radial distance) 0.06 mm

Admissible transverse play of rotor in bearings : See Work Card 500.06

+ measured with rotor pushed up in the direction A
++ measured with rotor pushed up in the direction B } *

* with the rotor pushed up in opposite direction, withdraw measured axial play ⑤.



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

- 517.002 Bearing bush
- 520.001 Turbine rotor
- 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in [after approx. 500 operating hours).

STARTING POSITION

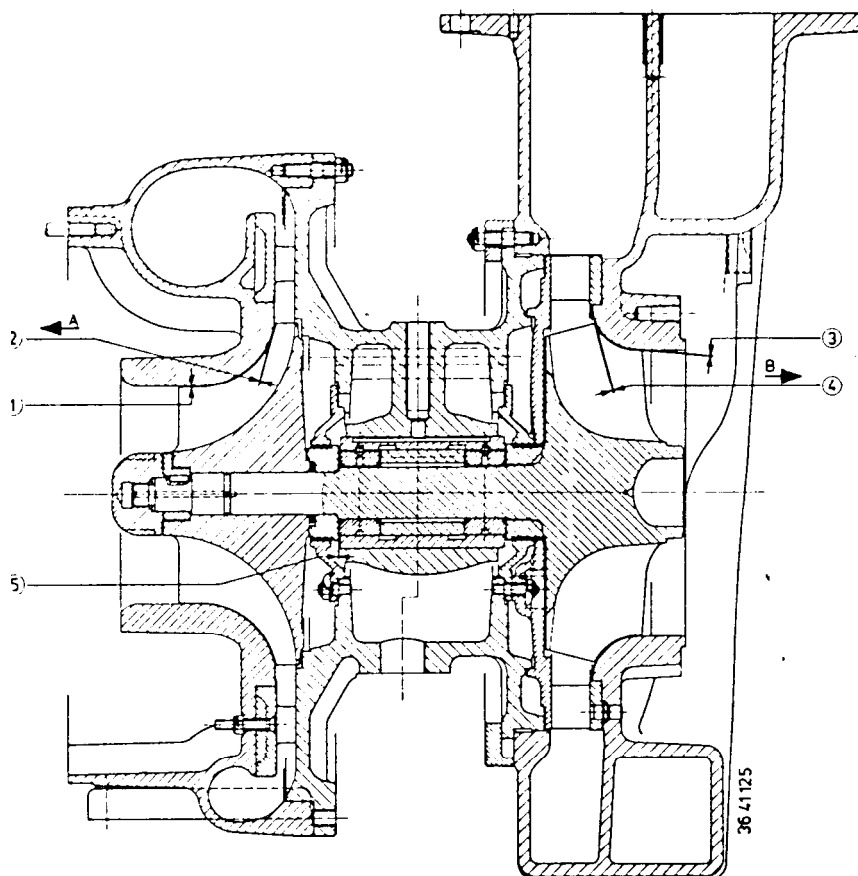
Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

1. Attach dial gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position,
2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 0.85	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
0.85 to 1.10	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity. Checking: Quality and pressure of the lube oil.
above 1.10	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the lube oil..

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.
Otherwise, shortened life time of the bearings has to be expected.



Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play^⑤ of rotor by vigorously moving the rotor in the directions A and B. Remove obstructive materials from the labyrinth seal boreholes beforehand, if any. However, do not remove wear tracks.

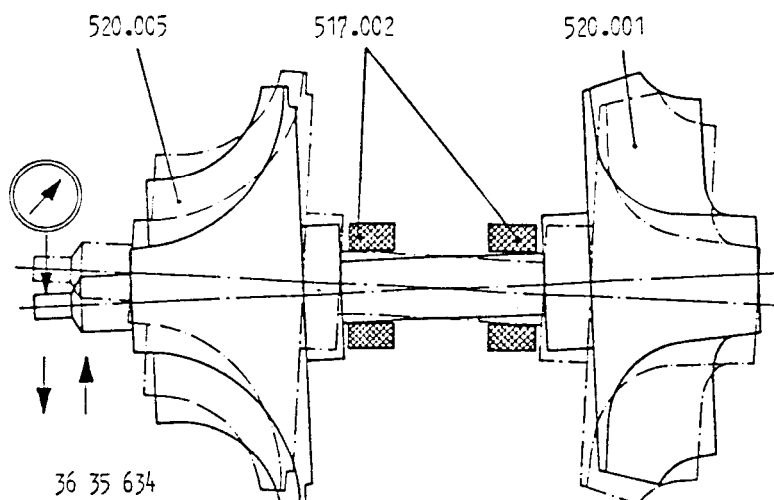
Position in fig.	Designation of Parts	Part No.	When New				Replace or re-machine parts	
			Gap		Clearance			
			min.	max.	min.	max.	min.	max.
1	Impeller - Compressor casing, radial	520.005 546.001	0.50	0.60		-	0.40	0.70
2	Impeller - Compressor casing, axial ⁺	520.005 546.001	0.30	0.80		-	0.25	0.90
3	Turbine rotor - Gas admission casing, radial	520.001 501.001	0.50	0.57		-	0.40	0.70
4	Turbine casing, axial ⁺⁺	520.001 501.001	0.65	1.15		-	0.55	1.25
5	Bearing bush-Labyrinth Ring				0.22	0.30	-	0.36

Admissible aberration from the plane of rotation of the impeller (measured with dial gauge at largest radial distance) 0.06 mm

Admissible transverse play of rotor in bearings : See Work Card 500.06.

+ measured with rotor pushed up in the direction A
++ measured with rotor pushed up in the direction B } *

* with the rotor pushed up in opposite direction, withdraw measured axial play ⑤.



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

- 517.002 Bearing bush
- 520.001 Turbine rotor
- 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

STARTING POSITION

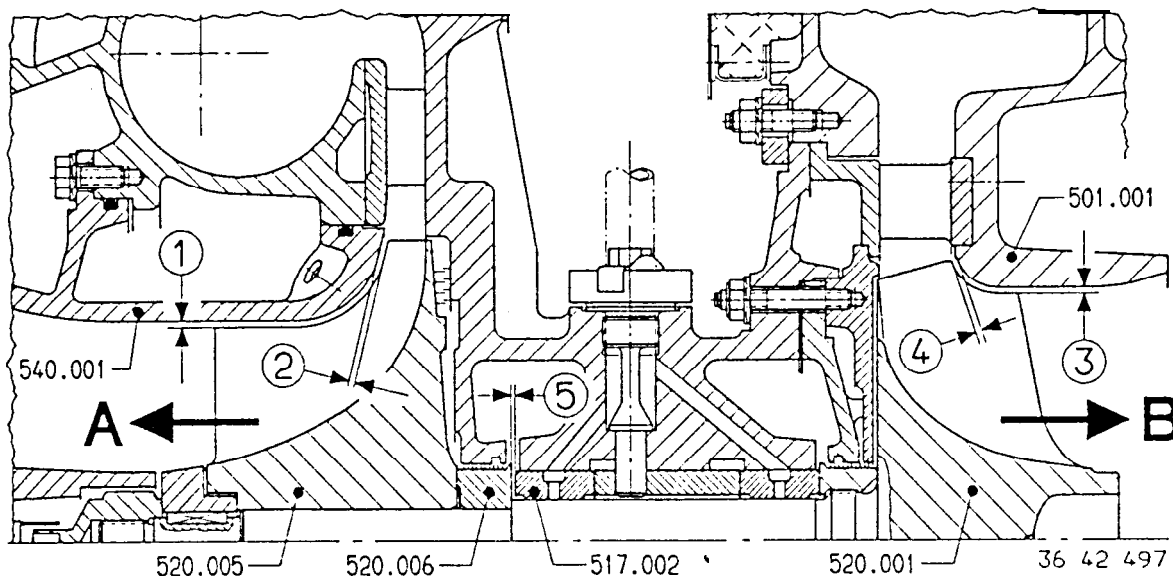
Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

1. Attach dial gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 1.00	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.00 to 1.25	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity. Checking: Quality and pressure of the lube oil.
above 1.25	Operating reliability endangered. Replace the respective parts through specialized service personnel. or exchange cartridge. Checking: Quality and pressure of the lube oil.

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.
Otherwise, shortened life time of the bearings has to be expected.



Posn.No. in Illustrat.	Gesignation of Parts (Part No.)		When new		Replace or remachine parts	
			min [mm]	max [mm]	min [mm]	max [mm]
3 1	Compressor wheel (520.005) Insert piece (540.001)	Radial gap	0.60	0.70	0.50	0.90
3 2 +	Compressor wheel. Insert piece (520.005) (540.001)	Axial gap	0.35	0.90	0.30	1.00
③ 3	Turbine rotor (520.001) Gas-admission casing (501.001)	Radial gap	0.60	0.70	0.50	0.90
④ 4 ++	Turbine rotor (520.001) Gas-admission casing (501.001)	Axial gap	0.60	1.15	0.50	1.25
⑤ 5	Bearing bush (517.002) Labyrinth ring (520.006)	Axial clearance	0.26	0.35	—	0.42

Admissible aberration from the plane of rotation of compressor wheel
(measured with dial gauge at largest radial distance).....max 0.06 mm

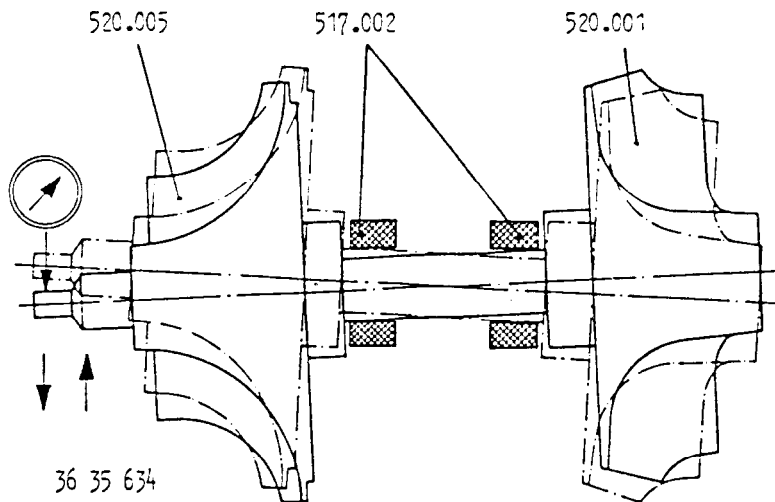
Admissible transverse play of rotor in bearings.....see work card 500.06

Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial clearance 5 of 0 rotor by vigorously moving the rotor in the directions A and B.

t Measured with rotor pushed up in the direction A
 t-t Measured with rotor pushed up in the direction B

* With the rotor pushed up in opposite direction, withdraw measured axial clearance 05



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

- 517.002 Bearing bush
- 520.001 Turbine rotor
- 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

STARTING POSITION

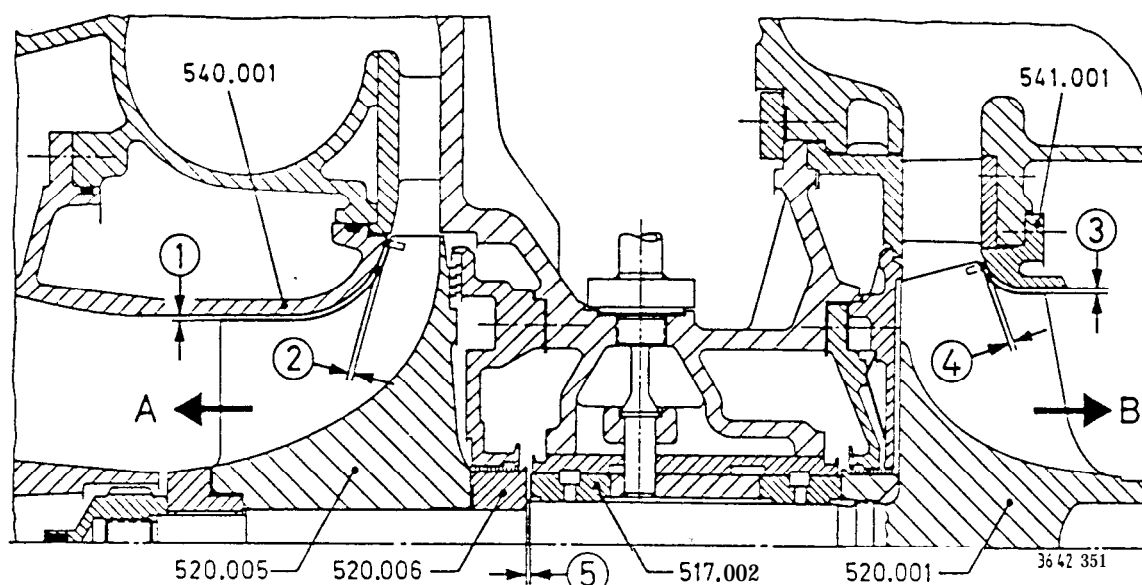
Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

1. Attach **dial gauge with holder** in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 1.05	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.05 to 1.35	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity. Checking: Quality and pressure of the lube oil.
above 1.35	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the Lube oil.

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.
Otherwise, shortened life time of the bearings has to be expected.



Posn.No. in Illustrat.	Designation of Parts (Part No.)	When new		Replace or re- machine parts	
		min (mm)	max (mm)	min (mm)	max (mm)
①	Compress.wheel (520.005) Radial Insert (540.001) gap	C. 65	0.70	0.50	0.90
② +	Compress.wheel (520.005) Axial Insert (540.001) gap	0.35	0.95	0.30	1.15
③	Turbine rotor (520.001) Radial Insert (541.001) gap	0.60	0.70	0.50	0.90
④ • +	Turbine rotor (520.001) Axial Insert (541.001) gap	0.35	C. 85	C. 33	1.03
⑤	Bearing bush (517.002) Axial Labyrinth ring (520.006) clearance	C. 27	0.35	---	0.42

Admissible aberration from the plane of rotation of compressor wheel (impeller) - (measured with dial gauge at largest radial distance) max. 0.06 mm

Admissible transverse play of rotor in bearings; see work card 500.06 .

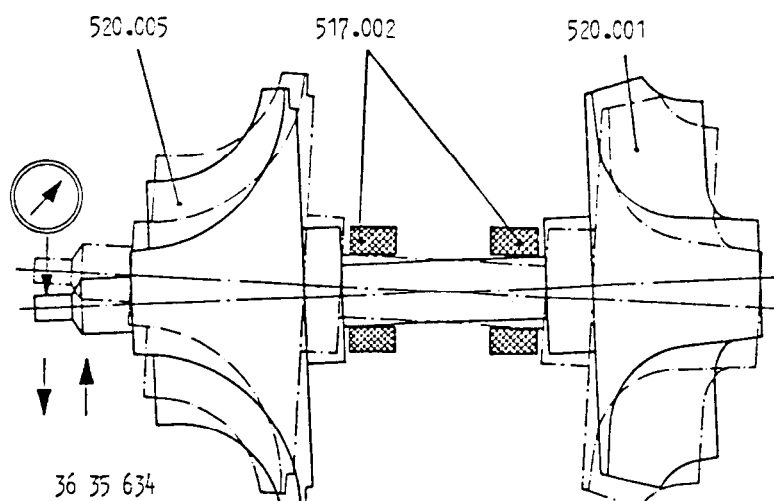
Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial clearance ⑤ of rotor by vigorously moving the rotor in the directions A and B. Remove obstructive materials from the labyrinth seal boreholes beforehand, if any. However, do not remove wear tracks.

+ Measured with rotor pushed up in the direction A) *

++ Measured with rotor pushed up in the direction B) *

* With the rotor pushed up in opposite direction, withdraw measured axial clearance ⑤ .



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

- 517.002 Bearing bush
- 520.001 Turbine rotor
- 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

STARTING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

1. Attach dial. gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 1.15	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.15 to 1.45	Inspection of single parts of the cartridge by specialized service personnel. during the next opportunity, Checking: Quality and pressure of the lube oil.
above 1.45	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the lube oil.

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station, Otherwise, shortened life time of the bearings has to be expected.