PARTS & SERVICE NEWS

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(C)

This PARTS & SERVICE NEWS supersedes the previous issue No. AH00511A which should be discarded.

SUBJECT: Installation procedure for the swing circle / **S**lew **R**ing (**SR**)

PURPOSE: Correct installation and adjustments

APPLICATION: From H185S (06078) up to PC8000

FAILURE CODE: 2500Z9

DESCRIPTION:

Content **Page**

1.

Type	Slew ring Weight [t]	Mounting cross P/N	Tooth back lash [mm]
H 185S	3,5	379 383 40	0.4 – 0.8
H 255S / PC3000	3,5	379 383 40	0.4 – 0.8
H 285S	6,0	379 128 40	0.6 –1.0
PC4000	6,7	379 128 40	0.6 – 1.0
H 455S / PC5500	9,0 / 10,0	477 577 40	0,6 – 1,0
H 485S	14,0	379 129 40	0.5 – 0.9
H 655S / PC8000 (- 12036)	14,0	379 129 40	0.5 – 0.9
PC8000 (12037 -)	16,3	864 187 40	0.5 – 2.5
H 685SP	14,0	379 129 40	0.5 – 0.9
H 685SX (12030)	16,3	864 187 40	0.5 – 2.5

2. Safety Instructions

- Assign trained or well-instructed personnel only, and clearly define the respective spheres of responsibility for the repair work.
- Inform the operating personnel prior to the commencing special and regular maintenance work.
- Secure the maintenance area amply enough, as far as required.
- Carry out repair and maintenance work only with the machine standing on firm and level ground and secured against rolling away and sinking in.
- During exchange action, fix and secure individual parts and assemblies carefully to the lifting devices so that they cannot become dangerous in any way. Use exclusively suitable lifting devices consistent with sound engineering and load-lifting elements with sufficient load-bearing capacity! Never stay or work beneath suspended loads!
- Entrust experienced personnel only with fastening and securing of loads and guiding crane operators! The guide has to be within the operator's visual range or have voice contact with him.
- In case of assembly work exceeding body height, use suitable and otherwise secure means of access and working platforms. Never step on machine parts as an access! For maintenance work at higher levels, use the appropriate safety devices! Keep all handles, steps, handrails, landings, working platforms, ladders, etc. free from dirt, snow and ice!
- Retighten immediately all bolted connections loosened during repair and maintenance work!
- If disassembly of safety devices is required for rigging, maintenance, and repair, reassembly and checking of such safety devices has to be carried out immediately after having finished the respective work.
- Strictly observe all safety instructions and warnings in the country of destination.

3. General

- Before removing swing circle mark location of both slew rings to superstructure and the carbody as well for further investigations.

- Shocks to the swing circle, especially radial ones, must be avoided.

- Transport and store exclusively with transport star fitted. It is strictly forbidden to hook up the SR (**S**lew **R**ing) at the transport star.

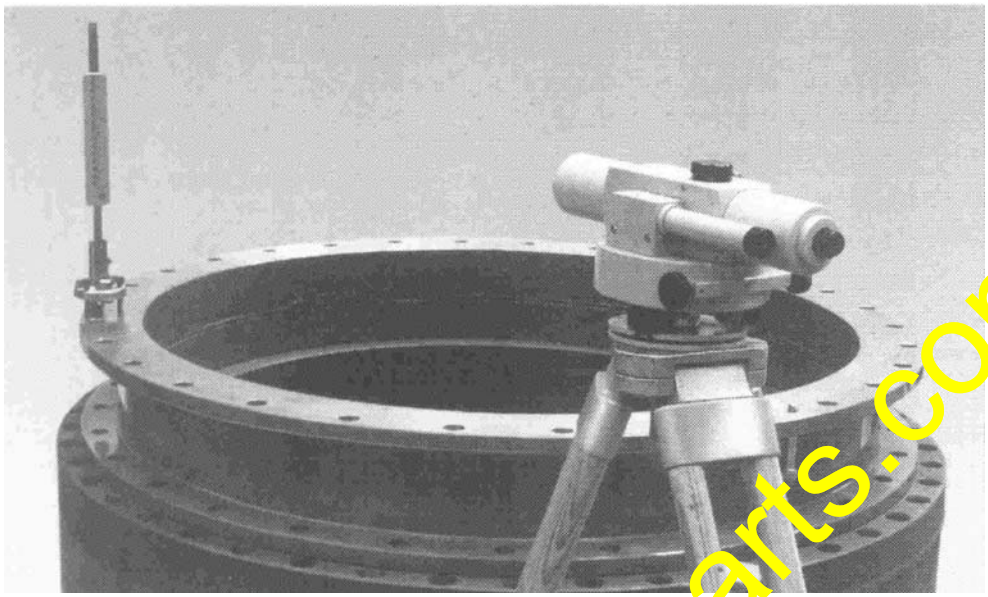
- Hang up and/or transport and store swing circle only horizontally. If a special attachment is available, the transportation and storage in oblique position may be carried out.

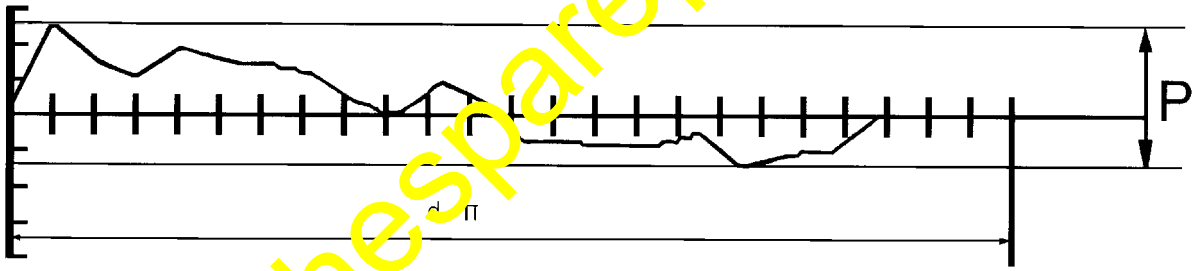
- Only hang SR at four/three eye bolts evenly distributed in screw circle of the upper ring.

- Prior to mounting the SR clean all supporting surfaces and the toothing, if necessary clean those areas with fat solvents, methylene chloride, cold cleaners. The cleaning agents must not enter the races. Hence, the swing circle has to be thoroughly lubricated before and after cleaning.

- With each replacement swing circle and each new machine, fastening bolts, measuring bolts, a measuring device and mounting compound P/N. 324 969 40 will be delivered. If this parts delivery is not complete, please get immediately in contact with **KOMATSU MINING GERMANY**, because a proper mounting may not be possible in case of missing items.

- Check the level of bearing area optically or with a laser device before installing a new slew ring.





Legend

d diameter of the slew ring

Π 3.14

P maximal plan variance (100 mm width of the connecting surface)

Type	Maximal plan variance P (mm)
H 185S; H 255S; PC3000	0.17
H 285S; PC4000; H 455S; PC5500; H 485S; H 655S; H 685S; PC8000	0.20

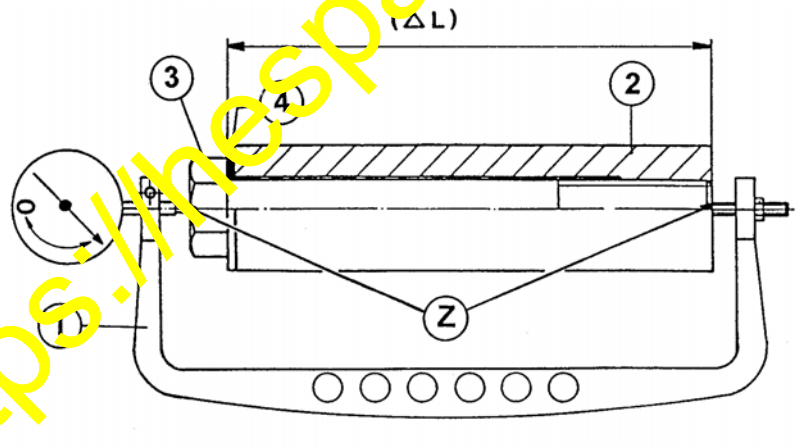
- **If the measured value exceeds the nominal value the surface has to be remachined.**

4. Determination of tightening torque

The required tightening torque for **all fastening bolts (inner and outer)** has to be determined with the measuring bolts, which dimension is analogous to the outer fastening bolts mounted to carbody / swing circle.

- The required axial tension force of the bolts is determined by means of the elongation of the fastening bolts, **carbody and swing circle**.
- The tightening torque must be determined each time the SR (**S**lew **R**ing) is replaced as well as at the first assembling of the excavator at the operation site and for the first and final inspection after 1000 operation hours.
- The required measuring device is delivered with the excavator or with the SR (**S**lew **R**ing)
  (see ill.).
- To determine the tightening torque, 8 specially prepared test bolts are supplied besides the normal fastening bolts. The test bolts can be recognized at the centering (Z) in the bolt head and in the end of the threads.

The measuring device is composed of the following items and will be delivered with each replacement swing circle and each new machine:



(1) Measuring jaw	1pce.	(3) Measuring bolt	8pcs.
(2) Test block	1pce.	(4) Washer	1pce.

For the determination of the tightening torque the 8 measuring bolts have to be mounted one by one to the measuring device as illustrated. Then the bolt has to be tightened in steps to the prescribed elongation (see table page 05). The **needed tightening torque** will be determined as a result of **average of 8 tightening torque's**. For the exactly procedure refer to the following pages.

For the determination of the torque / or pressure (hydr. torque multiplier) for the elongation of the test bolts proceed according to ill. on page 03 and the following description.

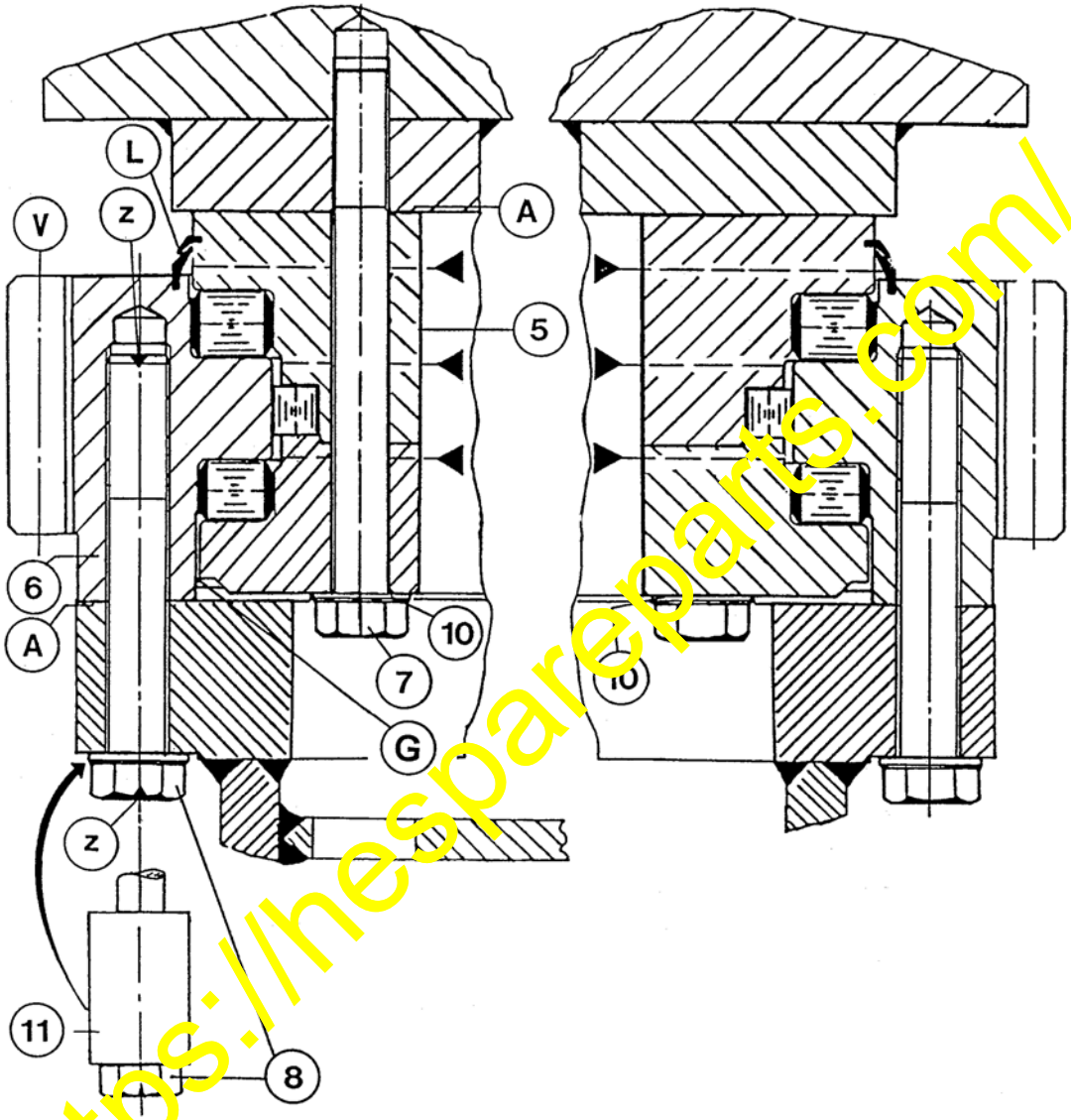
Before the mounting of the measuring bolts (3) to the jaw, the bearing surface of head, threads and washers have to be applied with compound P/N. 324 969 40.

- Screw test bolt (3) with washer (4) in test block (2) and tighten manually.
- Fit jaw (1) and micrometer gauge into the centering "Z" of the bolt and set gauge to zero.
- Increase tightening torque of test bolts by steps of app. 200 Nm until the required elongation of the bolt according to the table is reached.

Type	Measuring bolts			
	Analogous to the dimension of the outer fastening bolts (8)	Quality grade	Wrench size	Elongation [mm]
H 185S	M 30 x 230	10.9	46 mm	**0.55** ±0.015
H 255S / PC3000	M 30 x 230	10.9	46 mm	**0.55** ±0.015
H 285S	M 36 x 220	10.9	55 mm	**0.61** ±0.020
PC4000	M 36 x 220	10.9	55 mm	**0.61** ±0.020
H 455S / PC5500	M 36 x 230	10.9	55 mm	**0.58** ±0.020
H 485S (-12010)	M 36 x 230	10.9	55 mm	**0.58** ±0.020
H 485S (12011 -)	M 36 x 270	10.9	55 mm	**0.65** ±0.020
H 655S **PC8000 (- 12036)**	M 36 x 270	10.9	55 mm	**0.65** ±0.020
PC8000 (12037 -)	M 36 x 295	10.9	55 mm	**0.71** ±0.020
H 685SP	M 36 x 270	10.9	55 mm	**0.65** ±0.020
H 685SX (12030)	M 36 x 295	10.9	55 mm	**0.71** ±0.020

- Note down the tightening values in **Nm**, **ft. lbf**. resp. **bar**.
- Repeat this procedure with all 8 test bolts.
- Add all 8 tightening values and than devide by 8.
- Torque bolts to the calculated value.

5. Mounting of a Swing circle (refer to ill. pages 06/08)



Depending on the model, bushes (11) or washers (10) have to be mounted.

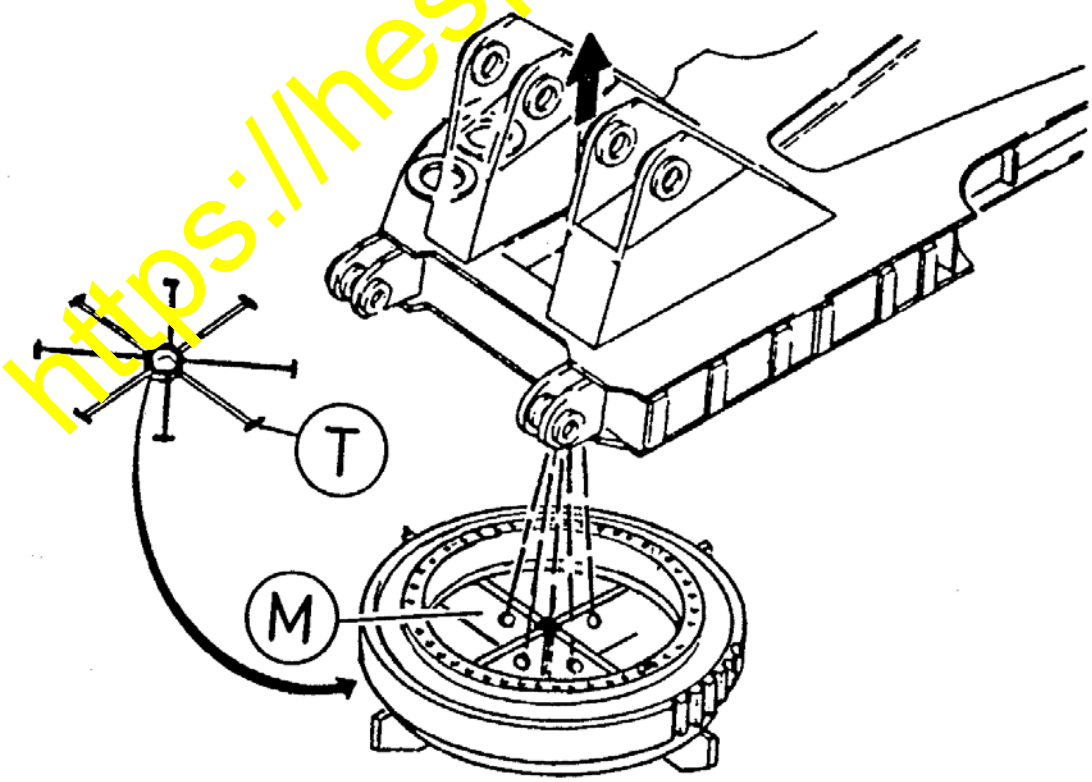
- **When replacing the swing circle all fastening bolts must also be replaced.**

The 8 measuring bolts have to be mounted equally distributed on the outer ring of the swing circle.
If scratches are found at supporting surfaces of washers or bushes they must be reworked or replaced.
Replacement swing circles has to be mounted **without dowel pins**.
If the mounted SR (**S**lew **R**ing) was fixed to the platform with dowel pins remove these ones.

- Clean fat-free supporting surfaces (A) carbody and platform.
- Supporting surfaces (A) must be absolutely fat-free. Even the solvent must be rinsed away before assembling.
- Check surface evenness (A).
- The swing circles (5/6) must have good contact to the carbody and superstructure platform.
- Check mating surfaces with feeler gauge.
- Check lube lines for correct condition and grease passage.
- Check accordance of tapped and through holes in SR (**S**lew **R**ing) with those in carbody and platform. Discordance's may easily cause distortions of SR.

- **For removal and assembly always use a mounting cross (M). Fabricate mounting cross (M) according to the drawing or order it under giving the corresponding P/N. The construction drawing of the mounting cross has to be ordered from the Parts Department if necessary.**

Type	Swing circle weight [t]	Mounting cross P/N
H 185S	3.5	379 383 40
H 255S / PC3000	3.5	379 383 40
H 285S	6.0	379 128 40
PC4000	6.7	379 128 40
H 455S / PC5500	9.0 / 10.0	477 57[illegible]40
H 485S	14.0	379 1[illegible]9 40
H 655S PC8000 (- 12036)	14.0	379 129 40
PC8000 (12037 -)	16.3	864 187 40
H685SX (12030)	16.3	864 187 40
H 685SP	14.0	379 129 40

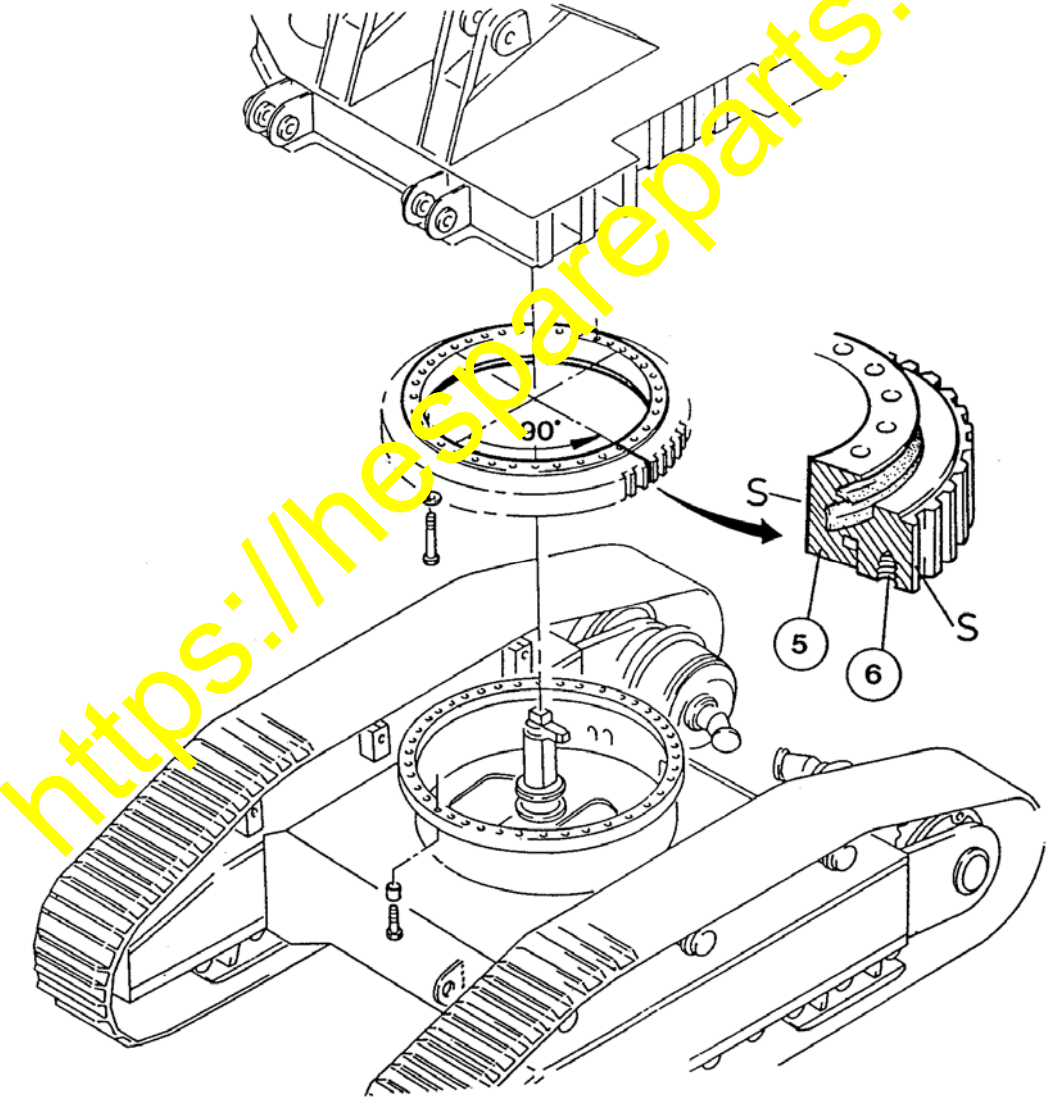


- Deposit and center SR with transport star (T, see page 07) on mounting cross (M).
- Check length of threads in platform and SR, if necessary retap.
- Place SR at its fastening position under the jacked-up platform.

Adjustment: Unhardened spot „S“

For the adjustment of the Unhardened spot "S" see illustration.

The Unhardened spot of race surfaces (changeover area between beginning and ending of hardening process) is punchmarked with a "S" at the inner resp. outer side of each race ring (5 and 6), see illustration.
These spots "S" must not be placed within the main load area of the swing circle. Hence, the unhardened spot "S" has to be turned in an angle of 90° to the main load area as illustrated.



- Lift SR until approx. 10 mm below the platform (observe unhardened spot "S").
- Screw fastening bolts (7) with washers (10) through swing circle into the platform. Slightly treat bolt heads, threads and washers with Compound, P/N 324 969 40.
- Lift SR to the supporting surface by screwing in the bolts crosswise.
- Lower mounting cross.
- Remove transport cross.

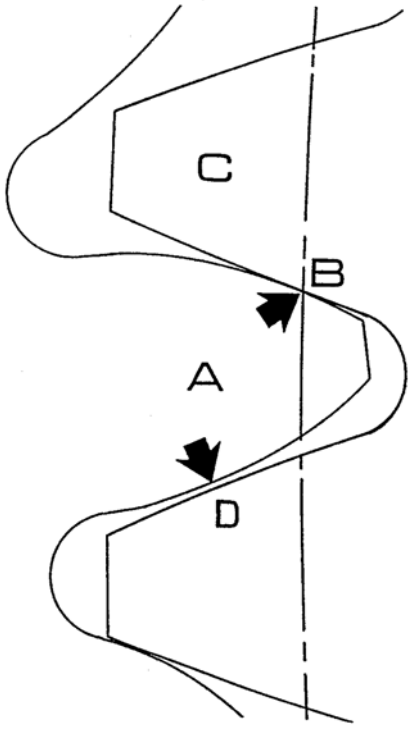
Tooth back lash

The tooth back lash is the play measured by a feeler gauge in point D if tooth A press on the reference circle (B) against tooth C.
On swing circle where you find a green color marking on 3 teeth, rotate the lower ring (6) until the 3 green marked teeth are mating with the teeth of a slew pinion.

Type	Tooth back lash [mm]
H 185S	0.4 – 0.8
H 255S/PC2000	0.4 – 0.8
H 285S	0.6 – 1.0
PC400	0.6 – 1.0
H 4[illegible]S/PC5500	0.6 – 1.0
H 485S	0.5 – 0.9
H 655S/PC8000 (-12036)	0.5 – 0.9
PC8000 (12037 -)	0.5 – 2.5
H685SX (12030)	0.5 – 2.5
H 685SP	0.5 – 0.9

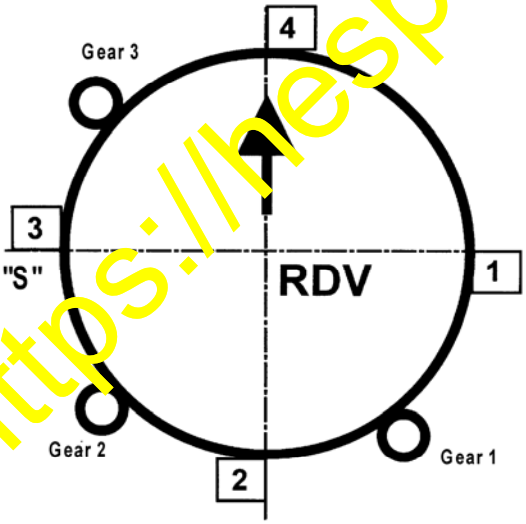
Note:
The green teeth indicate the point of the SR having the greatest circularity deviation of the reference circle (positive deviation).
At this narrowest spot a tooth back lash clearance according to the chart should be measured.

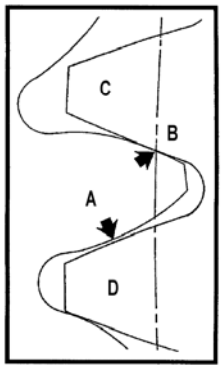
On machines without green color marking at the teeth adjust backlash at 4 points evenly distributed according to the following dimensions.



Before lowering the platform with SR on center section of the undercarriage:

1. Mark 4 teeth(1; 2; 3; 4 - refer to illustration) displaced by 90 °.
   The slew gears are marked gear 1, gear 2 and gear 3 (if so present).
2. Rotate the slew ring so far that tooth 1 is engaged at pinion of slew gear 1.
3. Measure play between A and D. Note value in the table below.
   C means tooth 1 and must have contact at point B.
4. Rotate superstructure further until tooth 1 is engaged at pinion of slew gear 2.
   Measure play as described under step 3.
5. Rotate superstructure further until tooth 1 is engaged at pinion of slew gear 3.
   Measure play as described under step 3.
6. Rotate superstructure further that tooth 2 is engaged at pinion of slew gear 1.
   Measure play and note value in table.
7. Carry out same measuring procedure as described for the other teeth.
   At the end for every slew gear 4 dimensions are noted in the table.
8. If necessary adjust the backlash by displacement of the SR. For the correct back lash refer to chart above.
9. **Hints for the 3 slew gear version:**
   Adjust an equal play at pinion of slew gear 1 and 3 by shifting the slew ring.
   For this use the installed adjusting bolts.
   Afterwards adjust play at slew gear 2 to the same value before adjusted at 1 and 3.





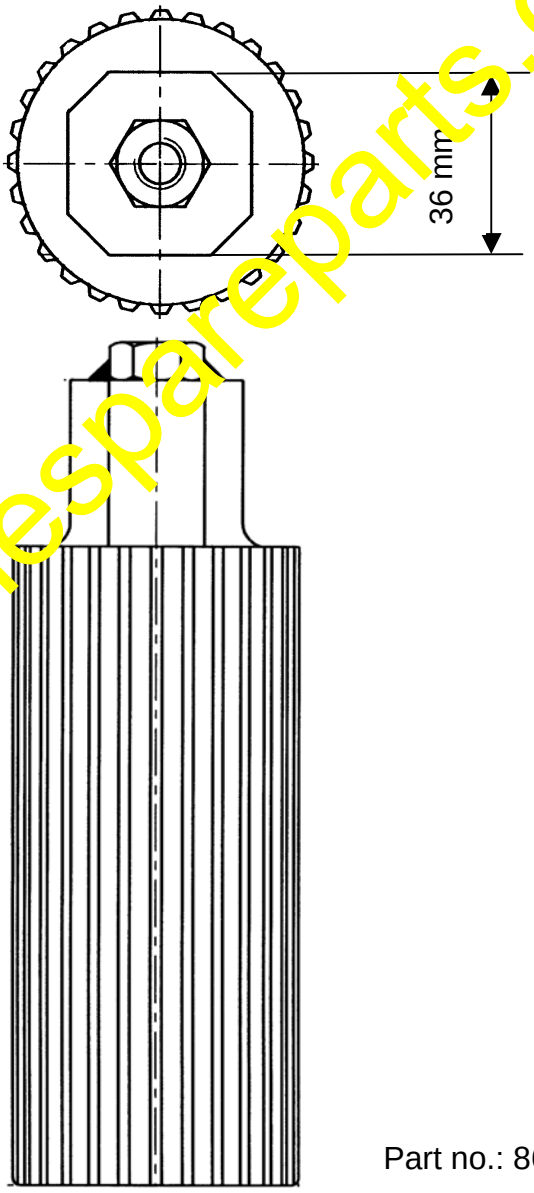
Tooth backlash

Slew gear	Play – nominal value	Tooth 1	Tooth 2	Tooth 3	Tooth 4
gear 1	refer to table				
gear 2	at page 10				
gear 3					

Hints for rotating the slew ring

1. Remove the slew motor.
2. If the excavator is equipped with more than one slew motor:
   Remove the hoses at the other slew motor(s).
3. Loosen the slew brake(s) by applying external pressure (25 - 60 bar).
4. Use the below shown tool in place of the removed slew motor for rotating the slew ring (drive: 36 mm).

- **The shown tool can be used for Series:**
  PC3000; PC4000; PC5500; PC8000.



Part no.: 864 501 40

Tighten all SR fastening bolts with the torque determined. Use the same torque multiplier you have used for the determination.

- **Before mounting the bearing surface of bolt head, threads and washers have to be applied with compound P/N 324 969 40.**

- Fasten crosswise fastening bolts (7) with the previously determined tightening torque (see page 05). This has to be performed twice or three times, to ensure a setting of the bolts.
  During tightening check permanently toothed outer ring (6) for easy running. For this purpose unscrew hydraulic lines of slew motor and loosen all slew brakes by applying external pressure (25 - 60 bar).
- Check for easy motion in all ranges by turning the outer ring (6).

- After tightening of all bolts (7) from SR to the superstructure the tooth back lash has to be checked once more at 4 points, if necessary adjust again.

- Lower platform with SR on center section of the undercarriage. Watch position of not hardened spot "S" of the ring (6) according to illustration on page 09. If necessary turn ring (6).

- Screw in 8 measuring bolts with washers resp. bushings (11) evenly distributed and the other fastening bolts (8) with washers (10), and bushings (11).

- Tighten crosswise all fastening bolts (7/8) with the previously determined tightening torque. This has to be performed twice or three times, to ensure a setting of the bolts.

6. Checking of bolts

To compensate settling between SR and parts connected to it the bolts must be checked after 1000 operation hours. If necessary retighten bolts with the determined torque (refer to page 05).

- Unscrew the 8 test bolts (4) of the connection SR / carbody.
- Determine the required torque with these 8 test bolts (4) in the test block (?). For the procedure refer to the pages 03 - 05.
- Retighten all bolts (4/7/8) with the same torque multiplier you have used for the determination.
- On the models H 285 - H 685 for the retightening of the bolts of the connection SR / platform you need an extension, Part-No. 232 511 40.

7. Lubrication and maintenance (RDV)

7.1. Races of roller bearings

Races must be lubricated regularly using high quality brands of lubricants.
This is particularly important before and after longer interruptions of operation (e.g. winter intermission).

The grease content in the race system is intended to avoid friction, to seal and to prevent corrosion. Greasing must be done abundantly until a continuous collar of grease pours out of the entire circumference of the upper seal "L" and the lower bearing gap "G".

When greasing check visually the upper bearing seal "L" and, if necessary, replace immediately in order to prevent dirt and/or water to penetrate into the race system.

- **Avoid cleaning agents to enter the race system when cleaning the excavator with high pressure water or with vapor blast apparatuses. Before and after each cleaning grease thoroughly. The even distribution of grease requires slewing of the superstructure during greasing.**

Lubricating by central lube systems use

With central lube systems the lubricating intervals are controlled by the time control unit and the grease quantity is controlled by the adjustable metering valves / distributor valves in order to meet the local requirements.

Manual greasing

The lubrication intervals can be found in the Lubrication and Maintenance Manual.
Before greasing clean grease nipples.
Shorter intervals must be selected in tropical climate, in high humidity, under important effects of dust and dirt, considerable changes of temperature and continuous slewing motions e.g. during material transfer.

Lubricants

For greasing only use high quality grease which meets the requirements of the KOMATSU MINING GERMANY Lubricant Specification 011 597 99 (published in July 1995) section **A**.
When choosing the grease consider the ambient temperature range.

Exchange of the lip type seal "L" (see ill., page 06)

If a damage of the seal is determined while greasing operation, it has to be exchanged immediately, to avoid damages, caused by contamination.
The exchange has to be performed as follows:

- Remove the complete lip type seal.
- Clean groove fat-free, remove lip remainder completely
- Insert new lip type seal (P/N, refer Parts Catalogue). **The seal must not be stretched during pushing in.**
- Finally the seal has to be cut to the needed length and the ends has to be glued together. The glue is available under P/N 989 965.

7.2. Outer toothing

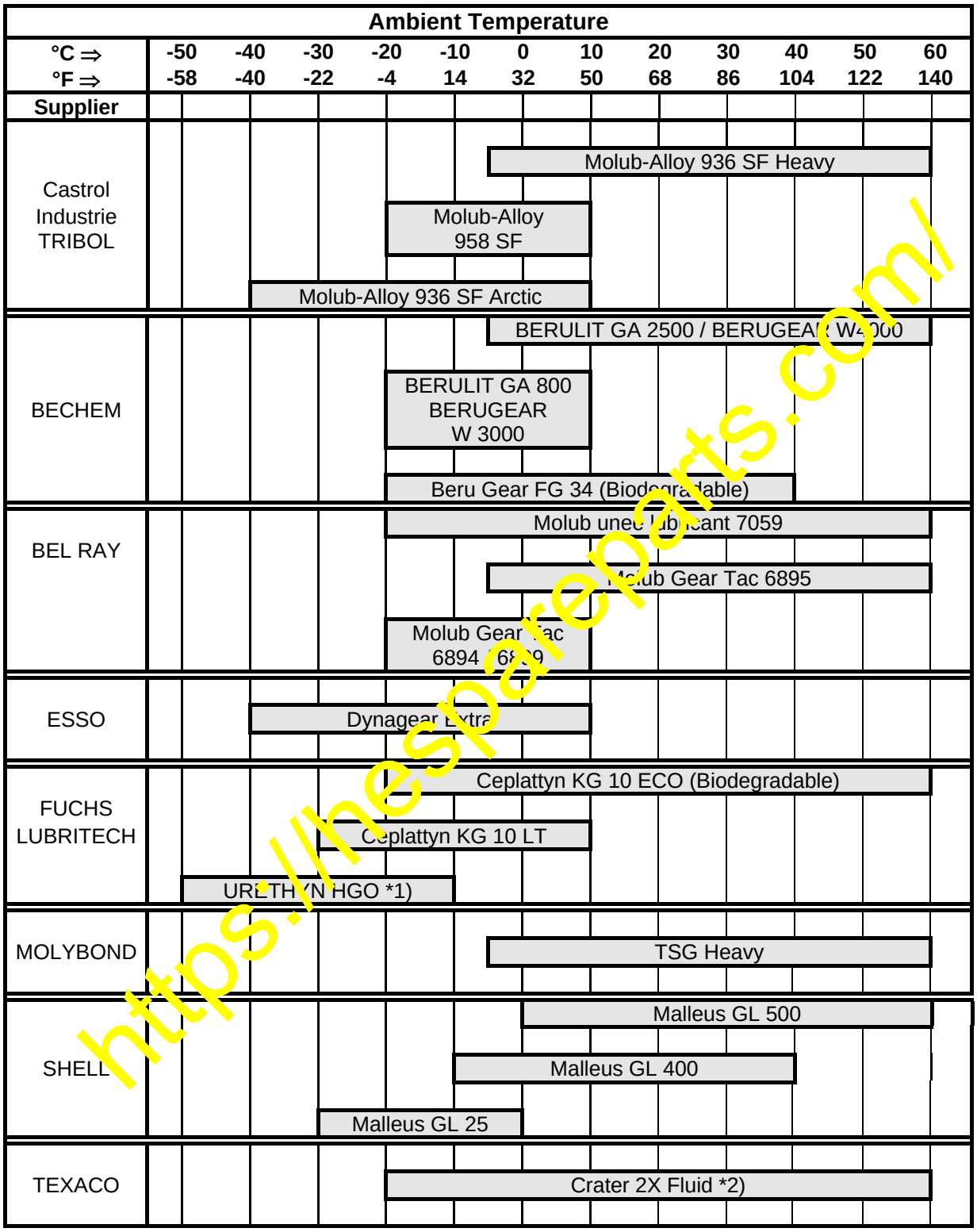
Adhesive lubricants may be applied by means of an automatic swing circle gear lubrication system or manually by a spatula, brush, spray tin.

Lubrication with automatic lubrication system

- Spray lube system
- Drop lube system
- Swing circle gear lubrication system

The most important requirement of a swing circle gear lubricant, besides the extreme pressure resistance, is its optimum adhesion to the tooth flanks, which can only be obtained by using the recommended lubricants in the prescribed temperature ranges. The following table includes several adhesive lubricants providing excellent results on several machines under different working conditions.

- **Use these Greases for Swing Circle open Gear Lubrication only!**



*1) The URETHYN HGO Grease should only be used in Arctic climates where the ambient temperatures fall to –50° C. In regions where the ambient temperatures do not fall below –40° C,
a grease of the temperature range to –40° C should be used.

*2) Use the Crater 2X Fluid for Spray systems only.

Lubrication: Manual
The manually lubrication has to be carried out with the following adhesive lubricants.
Those lubricants are suitable for all temperature ranges.

Company	Product	T1 -5°C ⇒ +60°C +23°F ⇒ +140°F	T2 -20°C ⇒ +10°C -4°F ⇒ +10°F	T3 -40°C ⇒ -10°C -40°F ⇒ +14°F
Komatsu Mining Germany	Voler Compound 2000 E Spray (0,625kg)	P/N 500 893 98		
Special grease	Voler Compound 2000 E Adhesive lub (indicate quantity in kg)	P/N 006 057 98		

7.3 General

The adhesive lubricants protect the tooth profile against rust, dirt, and damage resulting from driving or braking actions. However, this protection is effective only when the adhesive greases have been applied to clean surfaces where it can form a continuous coating.

When bright spots show up at the tooth profile the toothing must be sprayed or laid on immediately with the special adhesive grease.

When visiting customers, the service staff or dealers should also check the machine equipment and stock of lubricant and advise the exchange, if necessary, to prevent premature wear of the toothing.

- **The adhesive lubricants provide totally different features compared to the Bearing greases / MPG (e.g. used in the central lubrication system). Hence, those lubricants must not replaced against each other or mixed.**

  Example: This may happen when grease pressed out of the upper sealing system of the races forms too big collar at the swing circle and penetrates into the toothing. This eventuality must be avoided by removing the excess grease.

- **If tooth profiles of the slewing connection have been damaged due to one of the above mentioned reasons they do not fall under our warranty.**