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TIME LIMITS / MAINTENANCE CHECKS

Manuel référence :
BRG-ALTP-02

Référence document :
MC-STC-011


			Statut (à compléter, terminé, approuvé)	Signature du responsable conception
Référence équipement: STC-011 LAK17A				
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1 GENERAL

Substitution of parts by other than originally certified parts may cause failure of brake system. BERINGER quality process assures that replacement parts are produced and controlled with the same quality level as originally certified.

1.1 Cleaning

The aluminium parts are protected from corrosion with an anodizing coating. This thin coating does not protect against basic agent with pH > 9.

CAUTION: Cleaning the wheel and brake parts with basic agent may remove totally the anodizing coating

Acid agent may also attack the anodizing.

For cleaning the wheel and brake parts we recommend using only water and soap or dry clothes.



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1.2 Specifications for quick reference

Tires:

Wheel	Tire Size	Type	Inflation pressure
RF-002(B)- RF-019	5.00-5	Tubeless	5 bars / 72 PSI

5.00-5 Main wheel assembly - RF-019 : RF-002(B):

Wheel screw:

Torque 10 N.m 87 in-lb
 Threadlocker medium strength (Loctite 243 recommended)

Clip screw

Torque 1.5 N.m 13 in-lb
 Threadlocker high strength (Loctite 271 recommended)

Clip – disc maximum play 0.4mm 0.016 in

Disc safety wire 1.01mm (0.040”) stainless steel grade 302

Brake caliper assembly - EA-006E :

Assembly screw:

Torque 25 N.m 220 in-lb
 Threadlocker medium strength (Loctite 243 recommended)

Hydraulic fluid DOT4 and only DOT4

Lubrication *

Piston and piston seal Thick silicone grease (-50°C to 200°C) compliant with FDA CFR art. 178.3570 (liquid grease in spray is not allowed)

Piston seal Thick silicone grease (-50°C to 200°C) compliant with FDA CFR art. 178.3570 (liquid grease in spray is not allowed)

* Lubricate cylinder, seal groove, piston seal, and piston with a coat of silicone grease at each time of assembly.

Brake Disc - DSC-006:

Max. coning 0.3mm 0.012 in

Max. groove or bump 0.2mm 0.008 in

DSC-008 Minimum thickness 3.0mm 0.118 in

Brake Pad - PQT-003 / PQT-004 :

Minimum thickness of friction material 1.0mm 0.040 in



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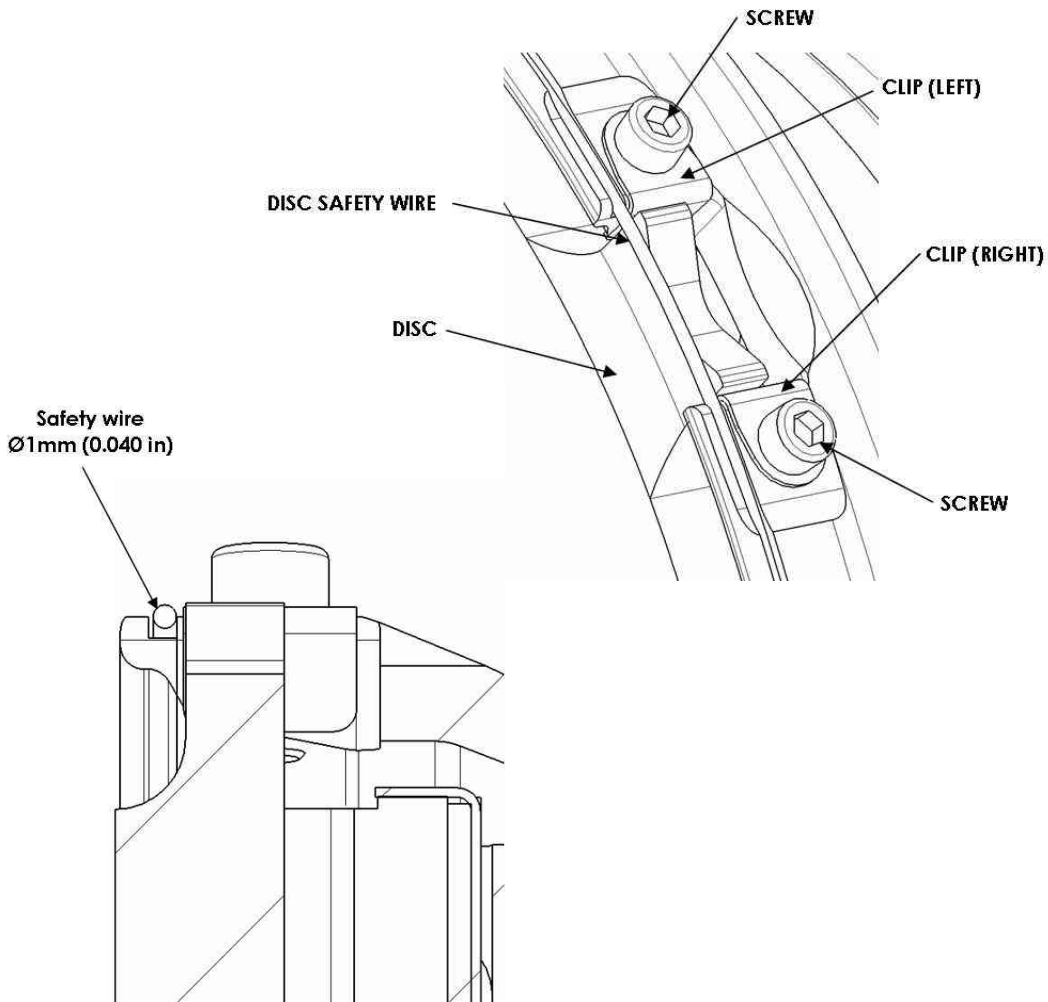
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2 SCHEDULED MAINTENANCE CHECKS

2.1 Safety checks at the beginning of each flying day

1. Functioning of brake
2. Tire pressure
3. Safety wire in place



CAUTION: Safety wire must be in place to prevent the disc from going out the slots



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2.2 Replacement schedule of wear parts

Inspection		Operation	
Component	Wear limit	100h	Annual inspection
Brake assembly	-	Apply brakes, examine system for leaks	
Brake assembly	-	Visual inspection	Check pistons retraction, check bolt torque
Brake Pads	1mm 0.040 in	Check brake pad wear	
Brake Disc - DSC-006	3.0 mm 0.118 in	Check disc wear	Examine for cracks or corrosion Check disc wear
Wheel - Brake Disc	0.4 mm 0.016 in	Visual inspection	Check play between disc and wheel Clips
Main wheels	-	Visual inspection	Examine bearings, valve, axles and wheel flanges
Main wheel tires	-	Visual inspection Check inflation pressure and wear	
Hydraulic Hoses and fittings	-	Examine for damage, leak and corrosion	

Component - item	Note	Replacement schedule
Wheel assembly bolts	a	On condition Immediate replacement if corroded
Main wheel bearings	b	On condition Immediate replacement if corroded or damaged
Bearing retaining ring	-	On condition 10 years
Main Wheel O-ring seals	-	At each tire change 5 years
Main wheel disc clips	a	On condition If found worn, all key disc must be replaced
Brake caliper seals and pistons	b	10 years
Brake assembly screws	b	On condition 10 years
Brake pads	c	On condition After each brake disc change 5 years
Brake discs	b	On condition 10 years



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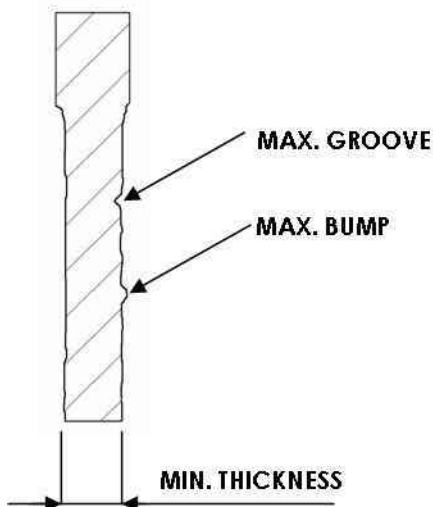
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NOTE:

- a All screws of the assembly must be changed at the same time. It is not allowed to change only few of them.
- b Parts must be changed by pair on both left and right sides at the same time. When new brake discs are installed brake pads must be changed to new ones even if not worn out.
- c Brake pads must be changed at the same time even if not worn out

Limites d'usure du disque:

DSC-006 Min. Thickness	3.0mm	0.118 in
Max. Coning	0.3mm	0.012 in
Max. Groove	0.2mm	0.008 in
Max. Bump	0.2mm	0.008 in



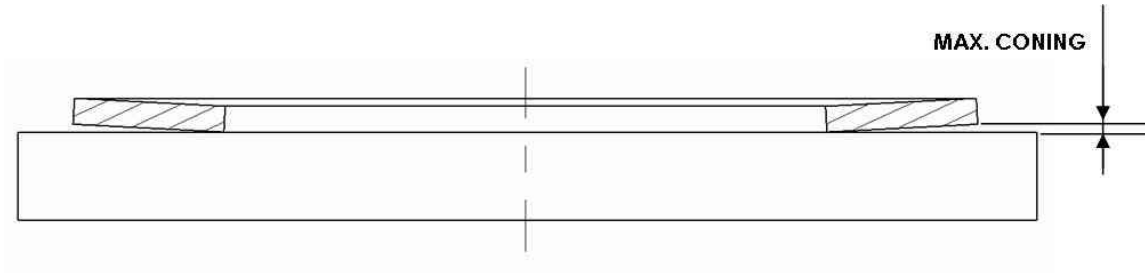


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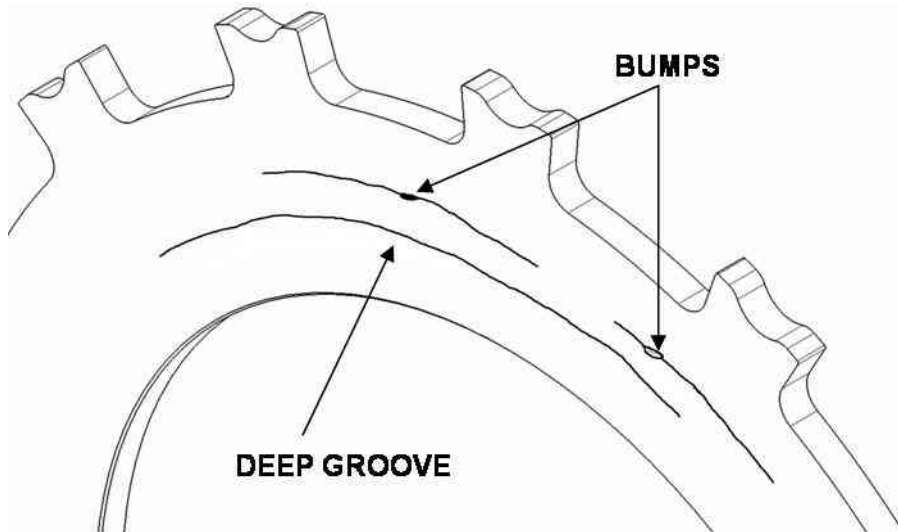


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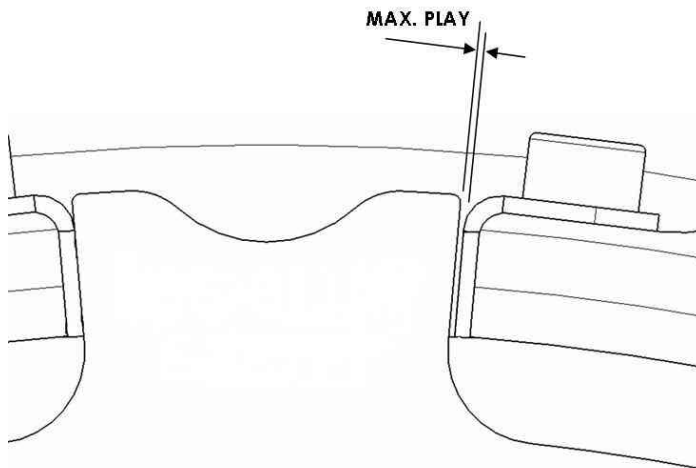
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CLIP WEAR LIMITS:

Max. Play 0.4mm 0.016 in



PAD WEAR LIMITS:

Min. Thickness groove nearly invisible
Friction material min. thickness 1.0mm (0.040 in)



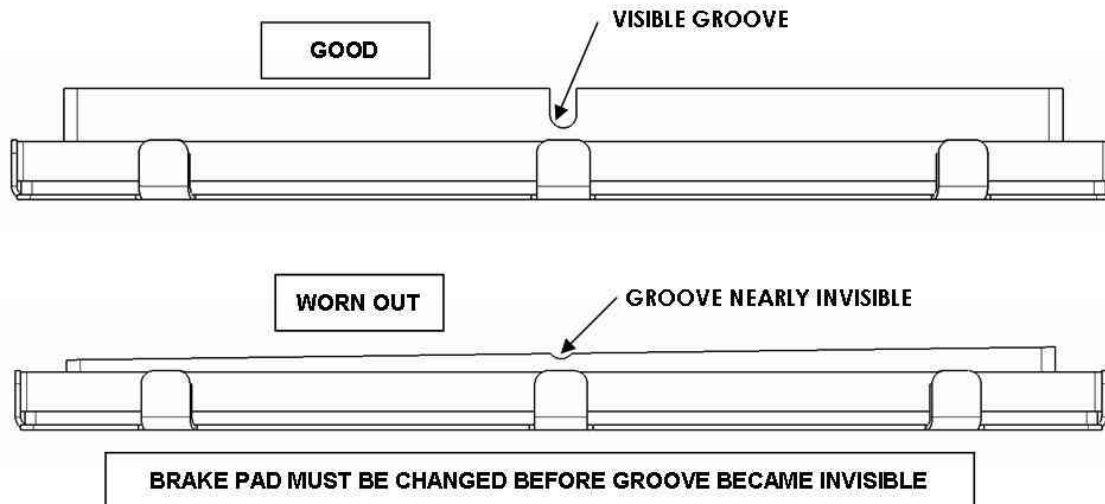
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3 CONDITIONNING PROCEDURE

When new brake pads have been installed, it is important to condition them properly to obtain the service life designed into them. Rated brake torque value is reached only after a full conditioning of brake pads and disc.

CAUTION: Brake torque value can be only 50% of rated brake torque before the conditioning. It means that even with full brake effort the aircraft will not stop as usual. Pilot must take into consideration this parameter to avoid loose of aircraft control during the conditioning procedure.

CONDITIONNING PROCEDURE:

1. Perform two landings with light brake effort
2. Perform two landings with standard brake effort

CAUTION: Check that the wheel is turning freely when the brake is released.

NOTE: The brakes will be fully conditioned after around 20 landings

CAUTION: Do not tow the glider on ground while braking it will overheat



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4 AIRWORTHINESS LIMITATION SECTION

GENERAL:

This airworthiness limitations Section (ALS) is FAA approved and specifies maintenance required under § 43.16 and 91.403 of the FAR unless an alternate program has been FAA approved.

LIFE LIMITED PARTS:

The replacement time of life limited components listed next must be accomplished not later than the specified period of operation for that component.

Component	Time limit	Maintenance interval	Complete overhaul interval
Brake assembly	-	10 years	20 years
Wheel assembly	-	10 years	20 years

For replacement schedule of components please report to §2.2



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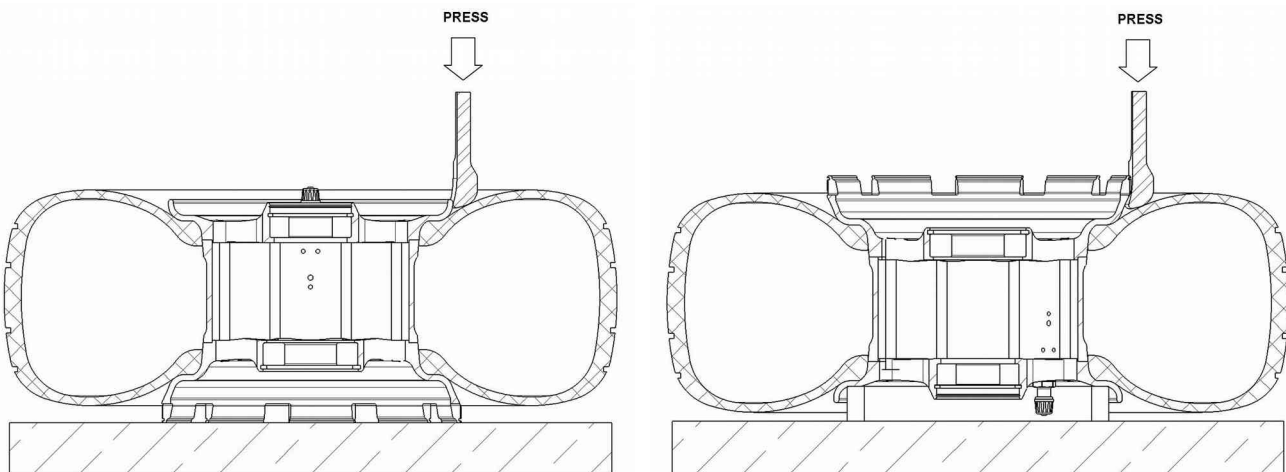
5 Disassembly – Reassembly – Tire change

DISASSEMBLY:

WARNING: Do not attempt to disassemble wheel until tire has been completely deflated. Otherwise, serious injury to personnel or damage to equipment can result.

WARNING: Do not attempt to remove valve core until tire has been completely deflated. Valve core will be ejected at high velocities if unscrewed before air pressure has been released.

- a) remove wheel from aircraft
- b) remove valve cap and apply a tire deflator to release tire pressure completely. Then remove the valve core.
- c) break the beads away from the wheel flanges by applying pressure by hand or using a wood or plastic tool as close to the tire bead as possible. Tire lubricant may be used to help. Repeat the operation every 90° on both sides, see pictures next:



CAUTION: Do not pry between tire bead and wheel flange, this may destroy the structural and sealing properties of the wheel and tire.

- d) Remove all screws holding wheel halves together.

CAUTION: Do not use impact or power wrenches
Do not remove assembly screws before the tire beads are fully free from the wheel

- e) Separate wheel flanges and central spacer, remove the tire and o-rings



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- f) Carefully lay the wheel flanges and central spacer on a flat clean bench.

CLEANING:

- a) Clean all metal parts using water and soap, then wipe dry with a clean cloth. Valve core and central spacer must not be cleaned with solvent.

CAUTION: Do not use basic or acid agent on wheel halves. Anodizing can be totally removed within few minutes in contact with basic agent. Make sure that cleaning soap is not basic.

CAUTION: Sealing of ball bearings must not be damaged or cleaned with solvent.

- b) Clean wheel bead seat with dry-cleaning solvent and wipe dry with a clean cloth.

CAUTION: oily solvent must not be used on wheel bead seat because tire will not stick properly on the wheel.

WARNING: Dry-cleaning solvents are toxic and volatile. Use a well-ventilated room. Avoid contact with skin or clothing. Do not inhale the vapor.

- c) Apply air pressure to dry internal threads

CAUTION: oily solvent or oily air pressure must not be used on internal thread because threadlocker will not properly lock the screws.

REASSEMBLY:

Tools and lubricants required:

- Plywood tool with conical bushing P/N: OPA01
- Threadlocker medium strength Loctite 243
- Tire lubricant
- Dry-cleaning solvent
- Torque wrench

- a) Check ball bearings and seals, replace them if required

- b) Make sure that the inside of tire is clean and dry. Clean tire bead seat with a cloth impregnated with dry-cleaning solvent as to remove residual grease or wax

CAUTION: oily solvent must not be used on tire bead seat because tire will not stick properly on the wheel.



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- c) Place the outer wheel half on the plywood tool.
- d) Insert the conical bushing made from polished aluminium on the central spacer.
- e) Spray tire lubricant on the tire beads and on the conical bushing
- f) Insert the tire on the assembly with red spot in front of the valve
- g) Place the second part of the plywood tool on the assembly and screw the 3 butterfly nuts. Press the tire till the conical bushing can be removed.



- h) Place the inner wheel flange on the table and position the large o-ring in the groove.
- i) Return the plywood tool with assembly onto the inner wheel flange. Position the assembly so that bolt holes are aligned.

CAUTION: Care should be taken to ensure that the o-ring is in place

- j) Put a drop of threadlocker at the end of each screw. Then insert the 8 screws and align the bolt holes so that no force is required to screw them.
- k) Screw to contact with torque 2 to 4 N.m (17 to 35 in-lbs)

CAUTION: using a wrong threadlocker or not from recommended type may cause loose of screws or removal problem.



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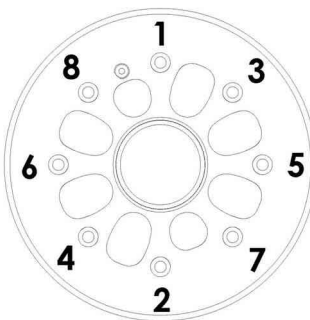


l) Then torque tighten with a torque wrench to 10 N.m (87 in-lbs)

NOTE: Respect the order when torque tightening

m) Torque tighten a second time each screw

CAUTION: Do not use impact or power wrenches



n) Screw the valve core

o) Place the wheel in a protective enclosure and inflate to maximum tire rated pressure

p) Measure the inflation pressure 24h later and check that the pressure drop is not more than 10%.

CAUTION: If the pressure drop is higher than 10% it means there is a leakage, the wheel must be disassembled to check for eventual defect.

q) Then adjust the pressure to the one recommended by the aircraft manufacturer.



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Maintenance of wheel assembly

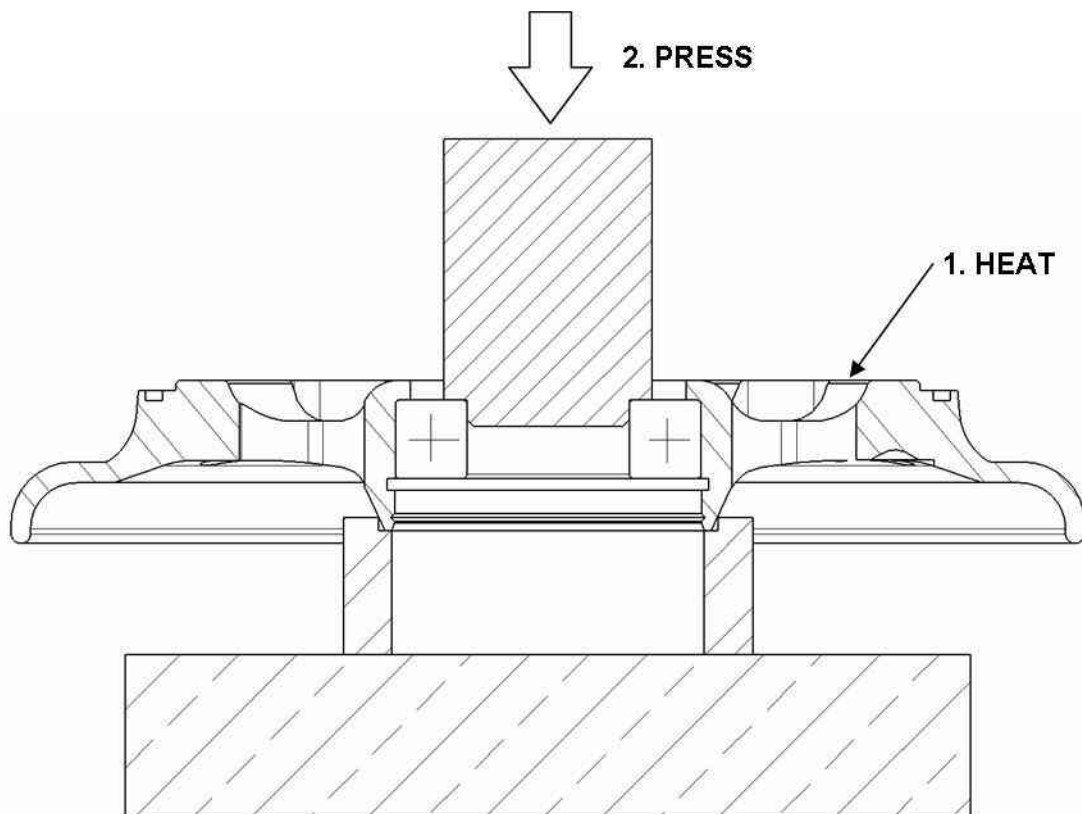
The maintenance consists in the inspection of the wheel parts and if required the replacement of next parts:

- sealed ball bearings
- circlips
- assembly screws
- clips (main wheel only)

NOTE: Maintenance can be performed by service center or at BERINGER factory.

- a) Disassemble the wheel respecting procedure §5.1.3
- b) Remove circlips on wheel half with a lock ring pliers
- c) Place wheel flange in an oven at 110°C to 120°C for 30 minutes (never exceed 150°C)
- d) Remove wheel half from heat source and immediately remove bearing. If the bearing does not fall out by himself: tap it evenly with a fiber drift pin or use a suitable arbor press.

CAUTION: Do not reuse a ball bearing that has already been mounted, even if in new condition.





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e) For main Wheel only: remove screws and clips if they are out of tolerance.

CAUTION: Clip screws have been mounted with threadlocker: do not force while screwing out the small screws otherwise you may break the screw.

CLEANING:

Clean all metal parts using water with soap or cleaning solvent and wipe dry with a clean cloth.

CAUTION: Do not use basic or acid agent on wheel halves. Anodizing can be totally removed within few minutes in contact with basic agent. Make sure that cleaning soap is not basic.

Apply air pressure to dry internal threads

CAUTION: oily solvent or oily air pressure must not be used on internal thread because threadlocker will not properly lock the screws.

INSPECTION:

Visually inspect wheel flanges for cracks, nicks, corrosion, or other damage.

Causes for replacement of wheel flanges:

1. Signs of deep corrosion in critical areas
2. Anodizing color removed on more than 15% of external surface
3. Heavy nicks
4. Deformed flanges
5. Damaged bearing bore

CAUTION: Anodizing coating must not be painted.
Do not use sandpaper on any parts. Sandpaper will remove anodizing coating.

Visually inspect wheel central spacer for scratches, nicks, corrosion, or other damage.

Causes for replacement of central spacer:

1. Signs of deep corrosion in critical areas
2. Anodizing color removed on more than 15% of external surface
3. Heavy nicks
4. Scratches on sealing surfaces in contact with o-rings



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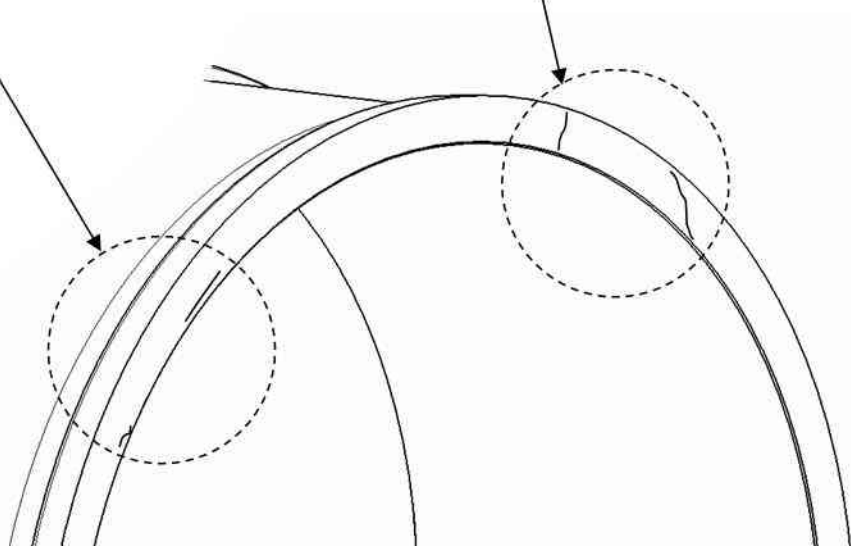
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Not cause for replacement

Cause for replacement



REASSEMBLY:

- a) Place wheel flange in an oven at 110°C to 120°C for 30 minutes (never exceed 150°C)

CAUTION: Do not attempt to install bearing without heating the wheel flange, it will damage bearing bore.

- b) Use a new sealed ball bearing

CAUTION: Do not reuse a ball bearing that has already been mounted, even if in new condition.

CAUTION: Use only a ball bearing approved by BERINGER. There are many different qualities in ball bearings and most of them are not compliant with BERINGER requirements.

- c) Install the ball bearing into bearing bore of heated wheel flange using appropriate tool. Tap gently into place with a fiber drift making sure cup is evenly seated against shoulder of wheel half.

CAUTION: Do not use a hammer to press bearing, it will damage balls and cause failure of ball bearing

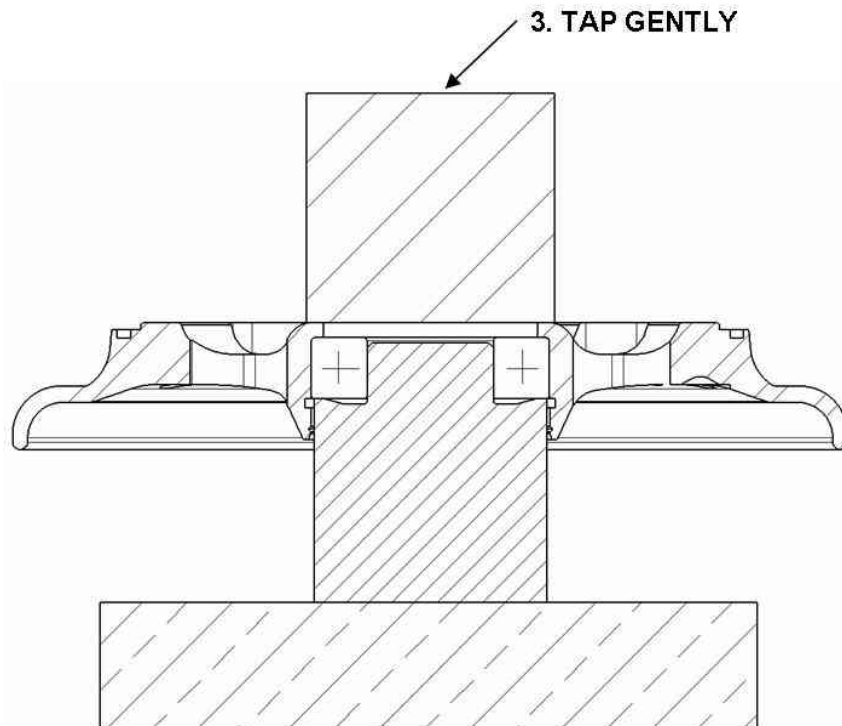
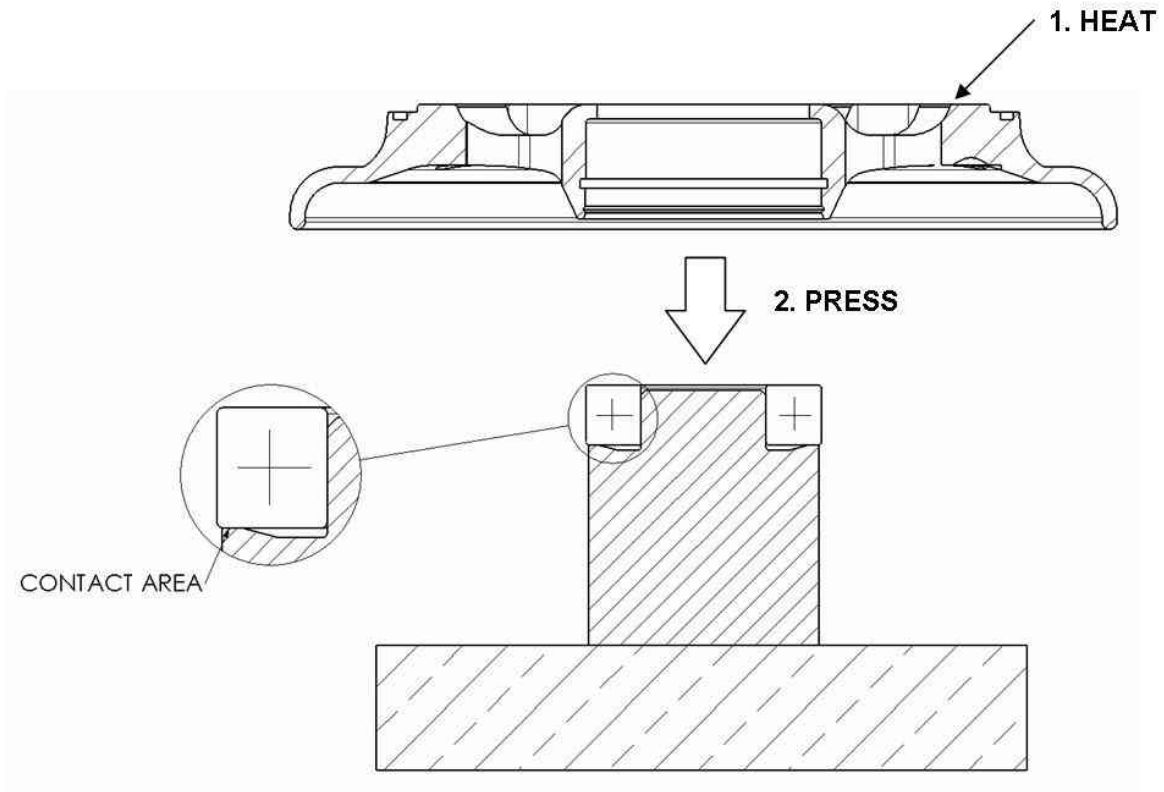


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d) After cooling down period, install new circlips

e) Check that circlips are in place

CAUTION: Circlips maintain ball bearings, if circlips are not in place bearing can slide out and cause the blocking of the wheel.

f) If clips (drive keys) have been removed then install new clips and new screws

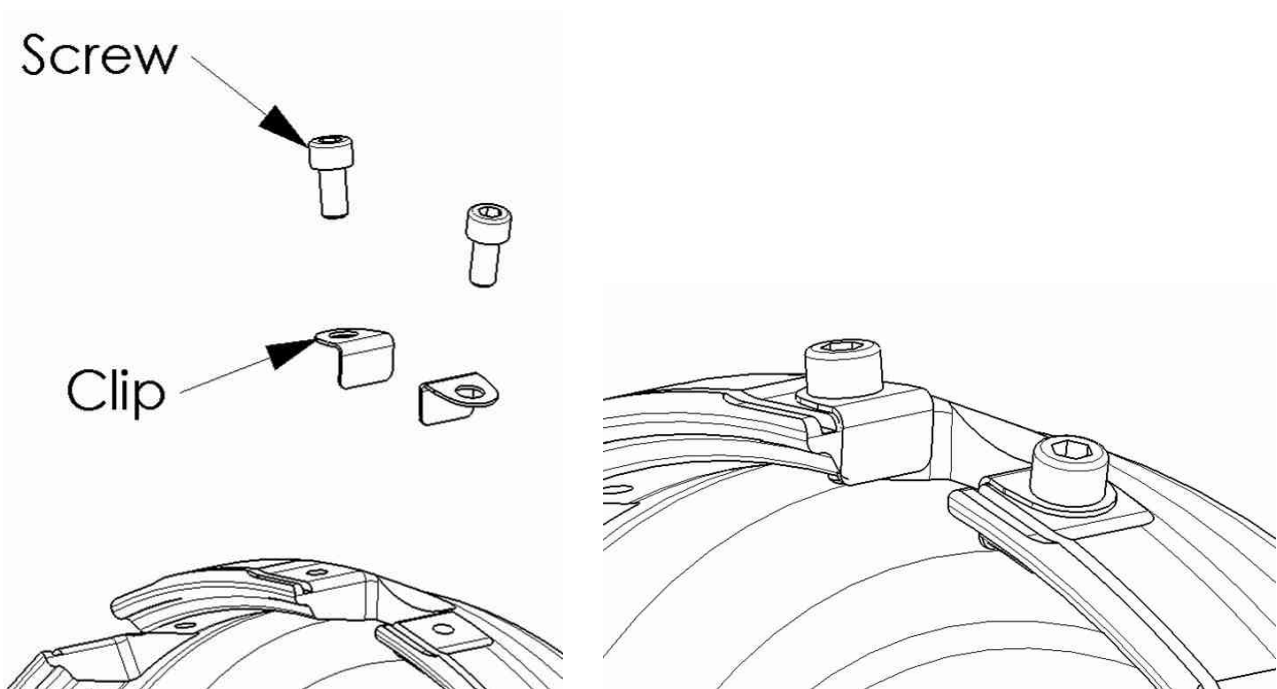
g) Put a drop of threadlocker high strength (Loctite 271 recommended) on each end of the clip screw

CAUTION: using a wrong threadlocker or not from recommended type may cause loose of screws or removal problem. Do not leave threadlocker more than few minutes on the screw.

h) Torque tighten to 1.5 N.m (13 in-lb) while pressing the clip onto the rim with a grip

i) Check that disc slides without effort in wheel slots.

NOTE: if disc cannot slide in the slots, remove concerning clip and install again.





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6 TROUBLESHOOTING

This paragraph provides information necessary to identify, diagnose and correct potential problems which may occur with the wheel or brake assemblies.

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Brakes won't hold	Improper conditioning of brake pads and disc	See the conditioning procedure
	Brake fluid or grease on disc and pads	Clean the disc and change the pads
	Wrong brake fluid has caused blocking of pistons	Change all seals of the system, put the right fluid
	Pads worn below minimum wear limits	Change brake pads
	Insufficient hydraulic pressure Improper master cylinder bore	Check the master cylinder type and geometry
2. Excessive toe pedal travel, spongy pedal or lever	Air in hydraulic system	Bleed the hydraulic system
	Leak in the system	Locate leak and repair
	Caliper assembly bolts are not tighten	Torque bolts to proper value
	Defective seal in master cylinder	Replace
3. Brake drag	Residual brake pressure due to excessive pressure in the reservoir	Open and close the reservoir to release the pressure
	Wrong brake fluid has caused blocking of pistons	Change all seals of the system, put the right fluid
	Improper brake assembly fixing	Inspect and repair
	Pistons do not retract	Inspect for damage, change seals and pistons
	Pads are blocked and do not release	Inspect and repair
4. Rapid disc and pads wear	Improper conditioning of pads and disc	See the conditioning procedure
	Excessive rusting, scoring or pitting of brake disc	Repair or replace the disc and pads
5. Cracked or distorted wheel flanges	Improper tire inflation pressure	Replace wheel flange, check tire inflation pressure
6. Rapid decrease of tire pressure (0.7 bar per day)	Improper tire mounting, damaged seal	Disassemble and replace seals
	Leak at valve core	Replace valve core
	Improper tire	Use only tubeless tires



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7. Medium decrease of tire pressure (0.7 bar per week)	Scratches on sealing faces	Replace the part by a new one
	Defective valve core	Replace valve core
8. Slow decrease of tire pressure (0.7 bar per month)	Standard decrease of pressure with some tubeless tires	Inflate tire to the appropriate pressure. Check inflation pressure every month.