

AK2 FREEWHEEL SERVICE MANUAL





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REVISION HISTORY

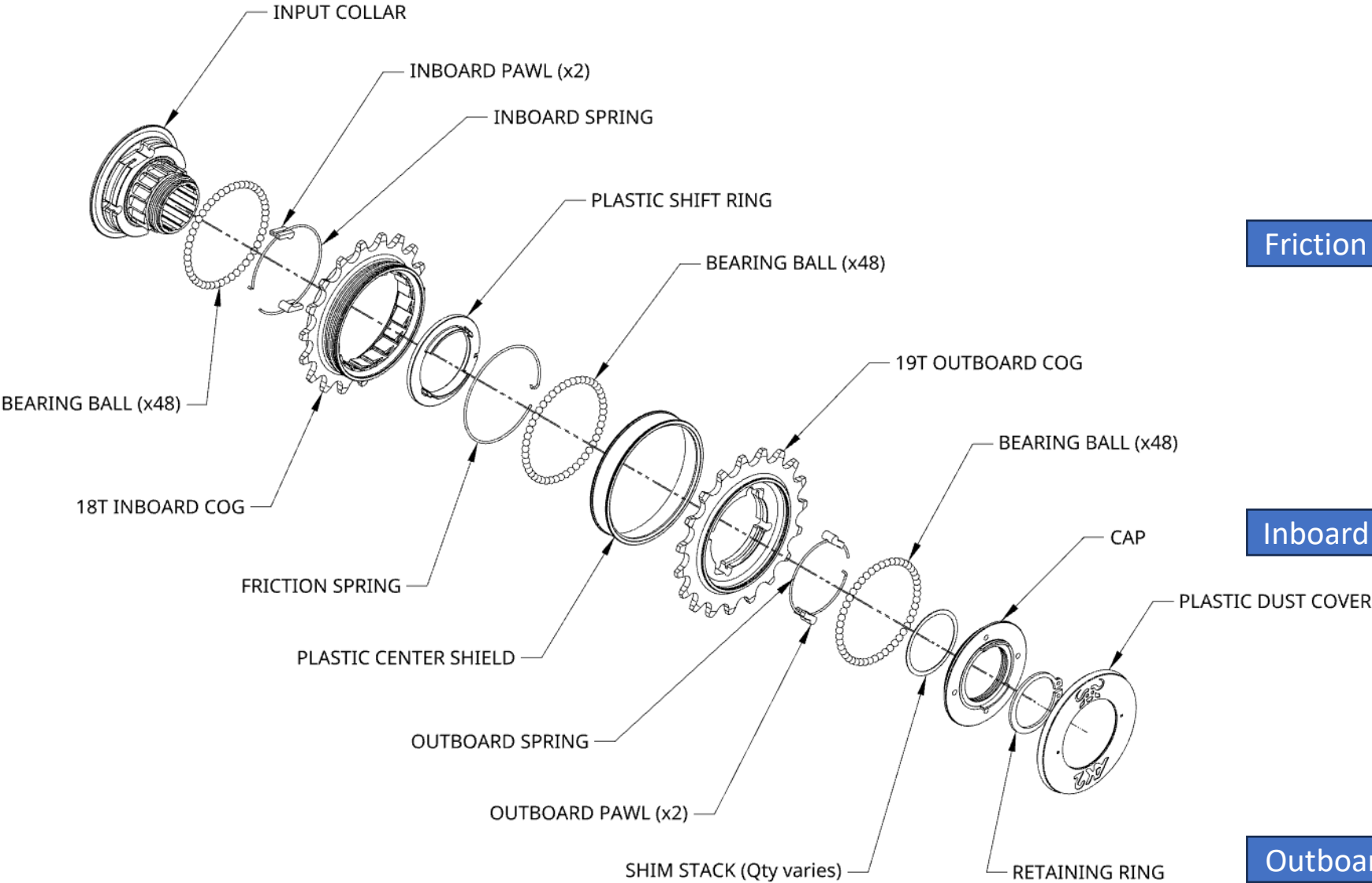
Page(s)	Title	Rev	Page(s)	Title	Rev	Page(s)	Title	Rev
2	Update service tool + 4 pin adapter + added details freewheel tool	B						
5	Update service tool + 4 pin adapter	B						
29	Update service tool + 4 pin adapter	B						
1	Update Friction, Inboard, Outboard spring images	C						
2	Update Screwdriver & Apply pressure symbol	C						
5	Update Screwdriver & Cap pressure info	C						
29	Update Cap pressure info	C						

Date	Author	Description
07/19/2024	M.Choef	Initial release (A)
02/20/2025	S.Horovitz	Updated graphics of service tool; details to TOL-00019 added (B)
09/24/2025	P.Mudhol	Updated pictures of springs and cap pressure info (C)



BILL OF MATERIAL (BOM)

REV	PAGE
C	1



Friction spring



Inboard spring



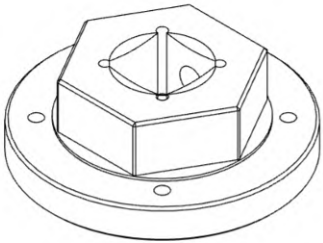
Outboard spring



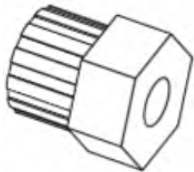


TOOLS, SUPPLIES, SYMBOLS

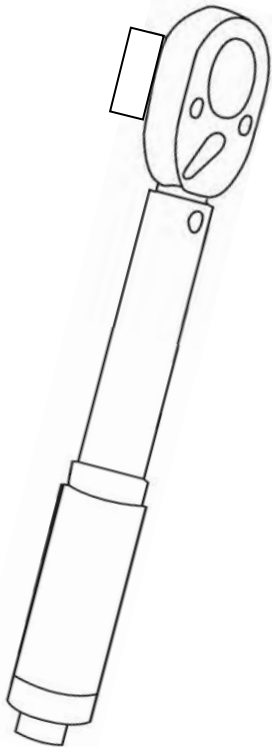
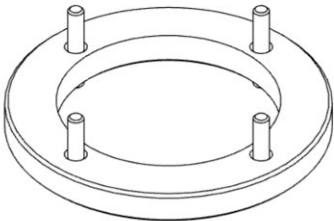
REV	PAGE
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Service tool AK2 + 4 pin adapter



Freewheel tool
(Outer diameter 22.6mm)
TOL-00019



1/2" (Torque) wrench

or



General purpose



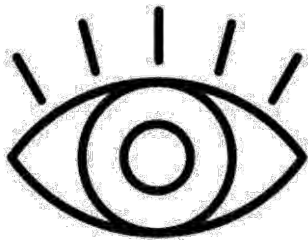
Incorrect



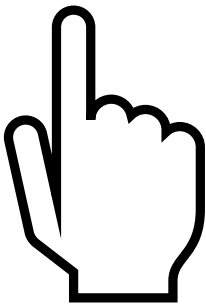
Correct



Warning



Visual control



Push here



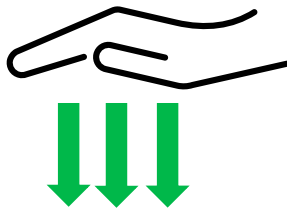
Clutched



Moving



Screwdriver



Apply Pressure



DISASSEMBLY FROM THE HUB

REV

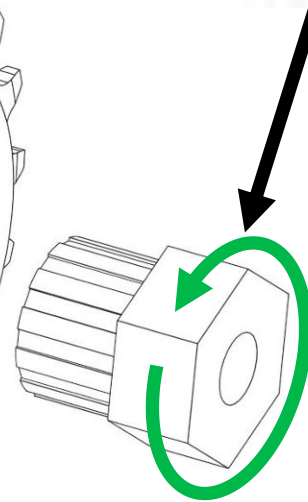
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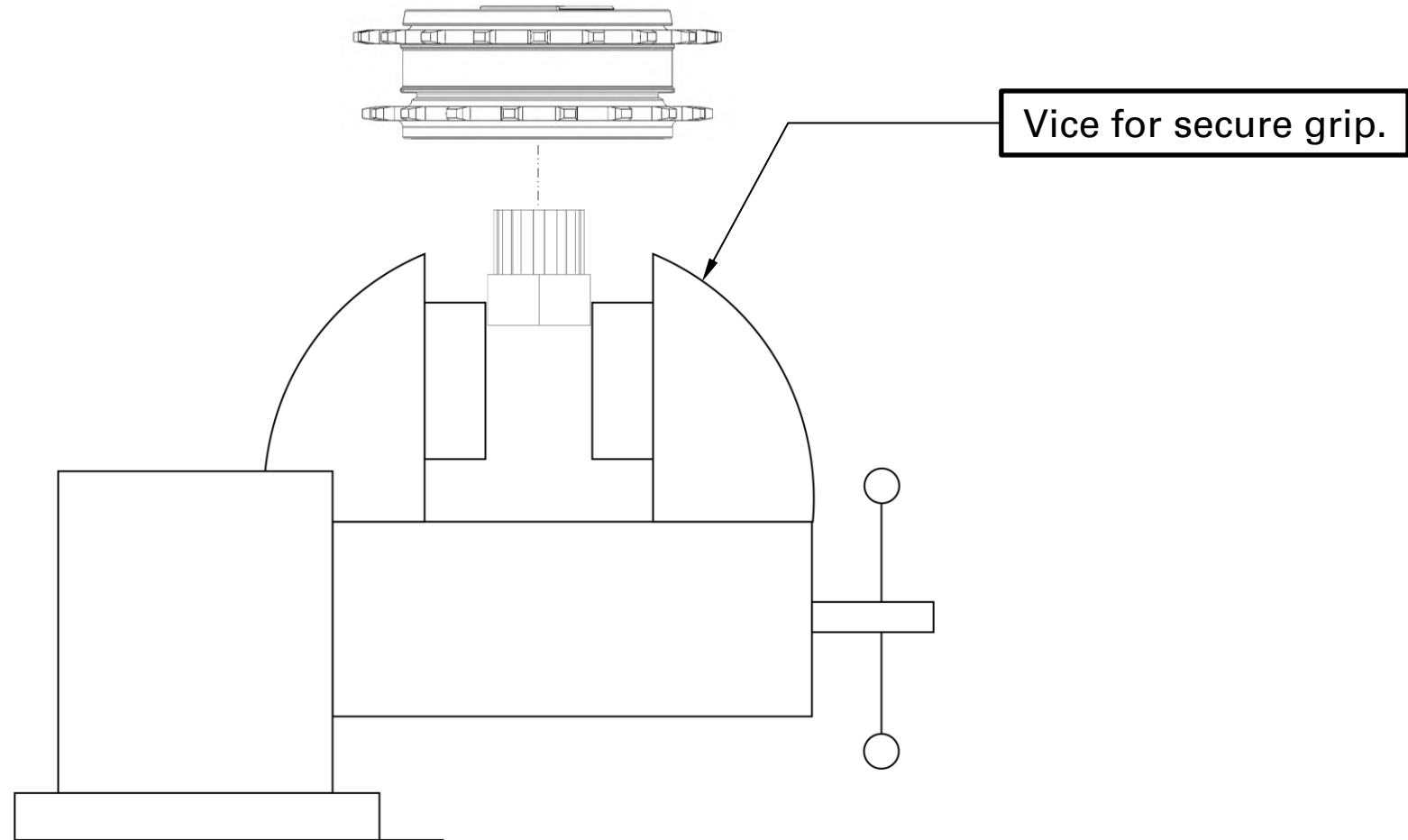
3



May require high force.



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CAP REMOVAL

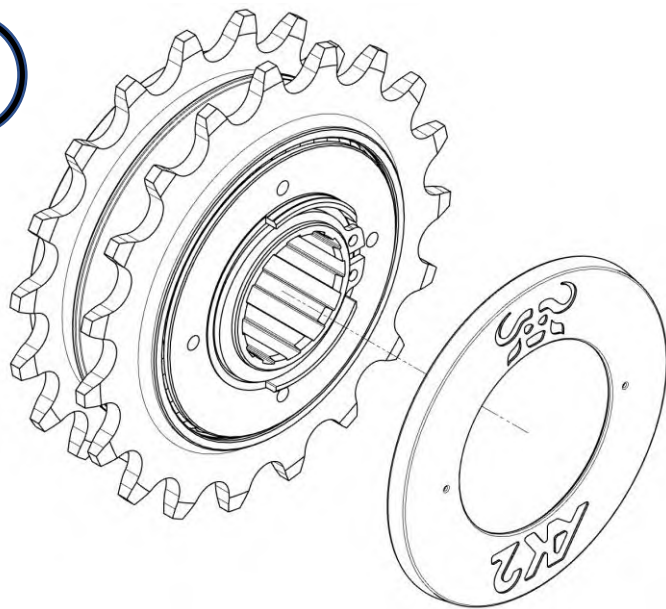
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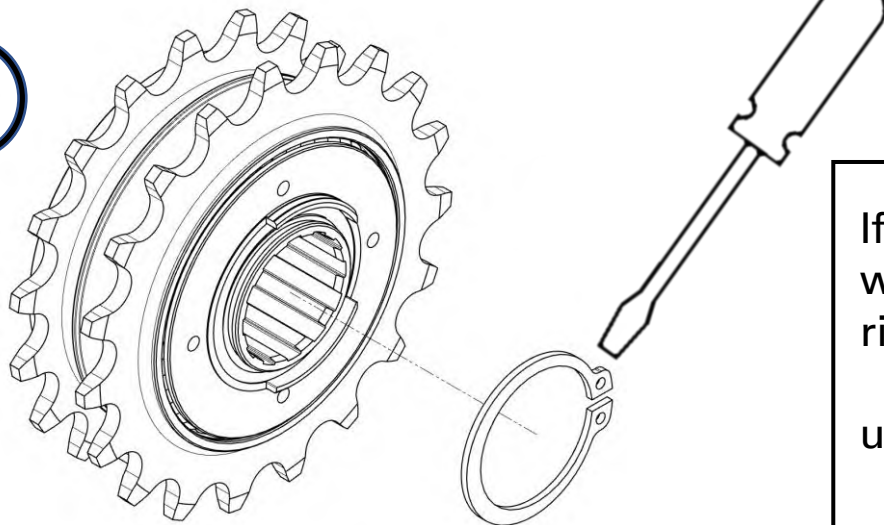
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5

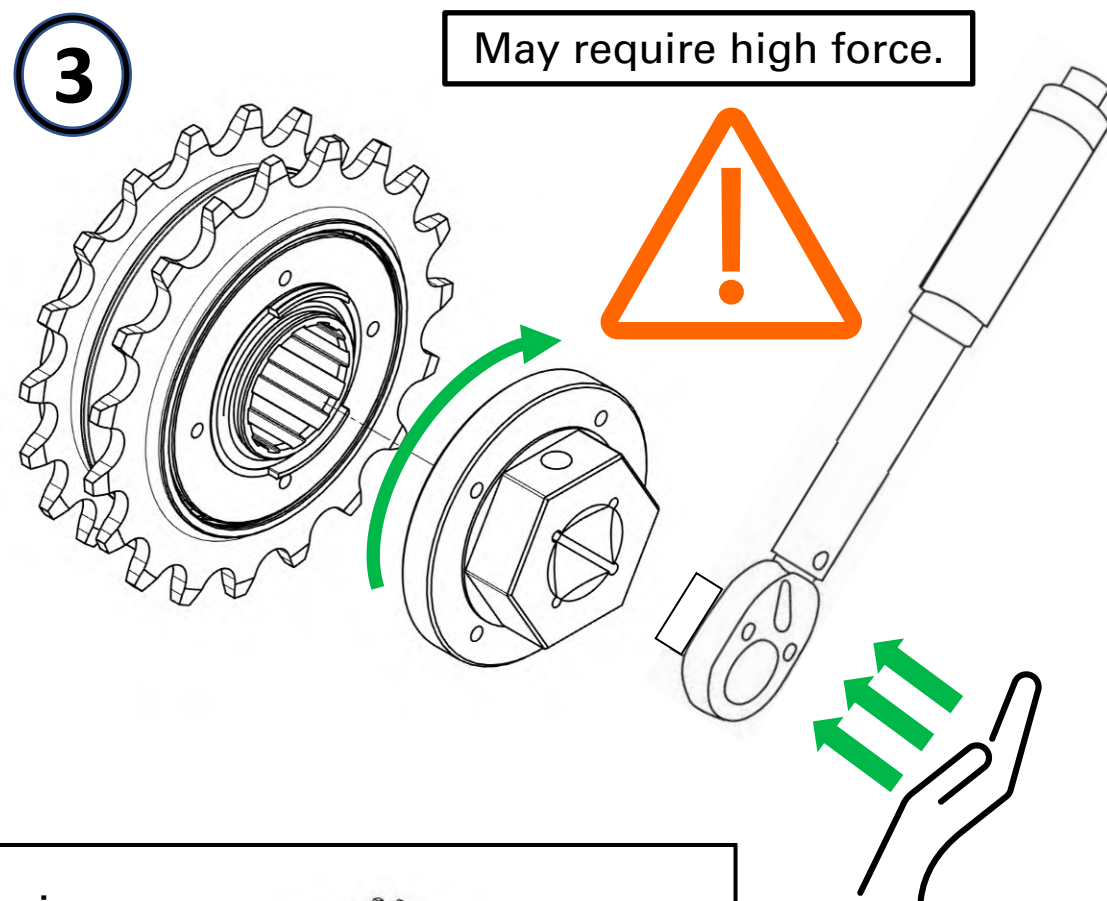
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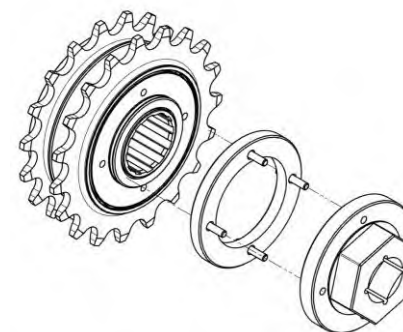
3



May require high force.

If mechanism
without retaining
ring:

use 4 pin adapter



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OUTBOARD PAWLS MOTION CHECK

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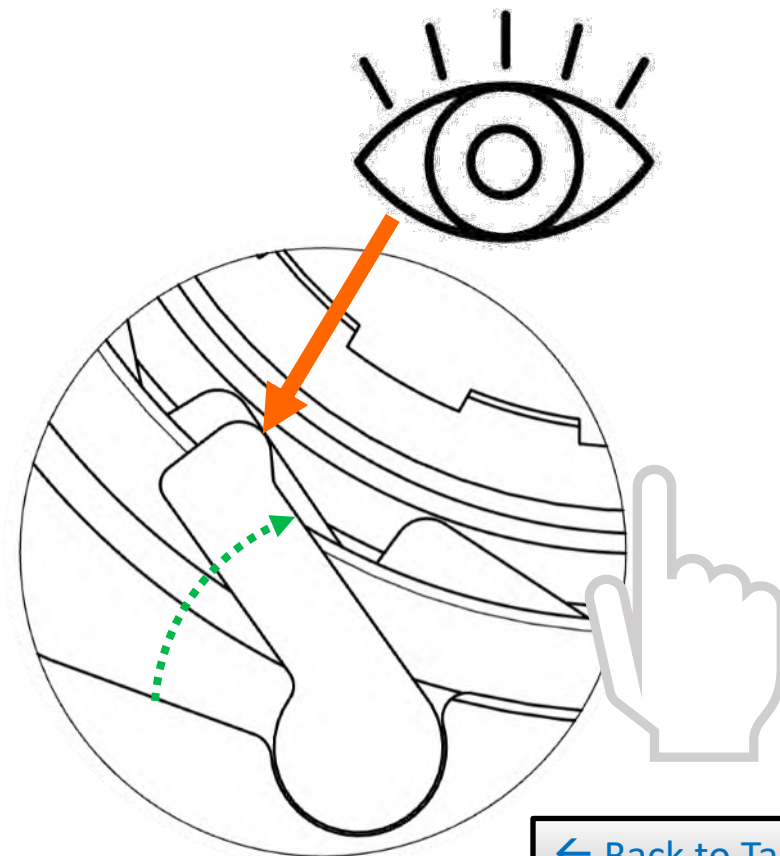
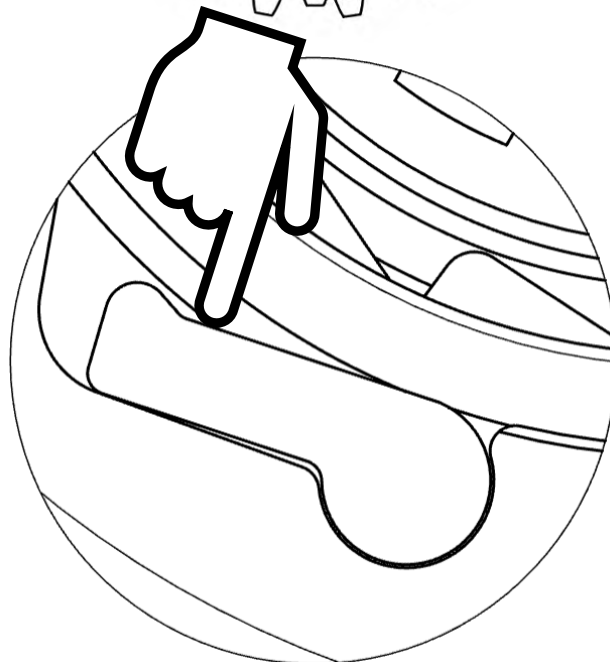
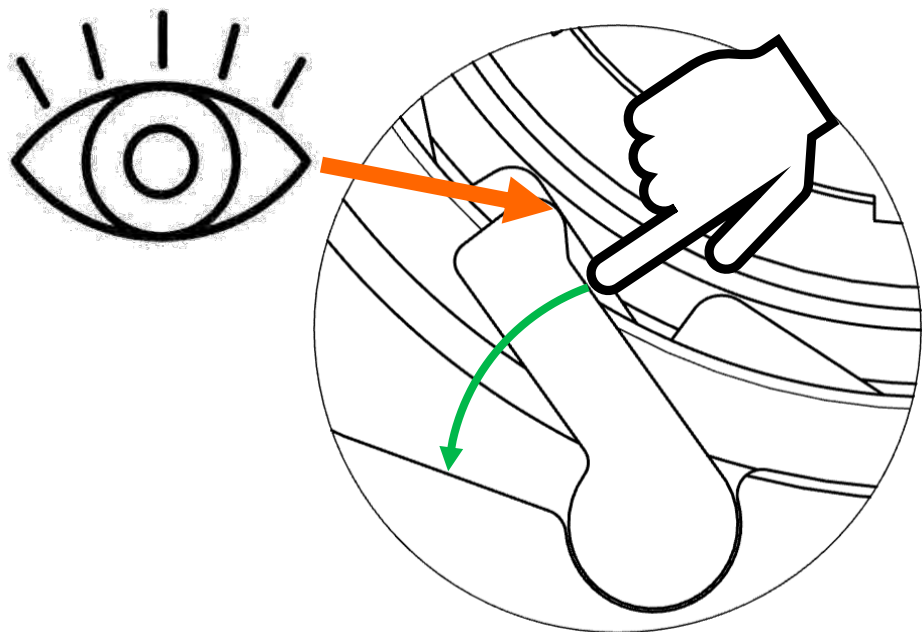
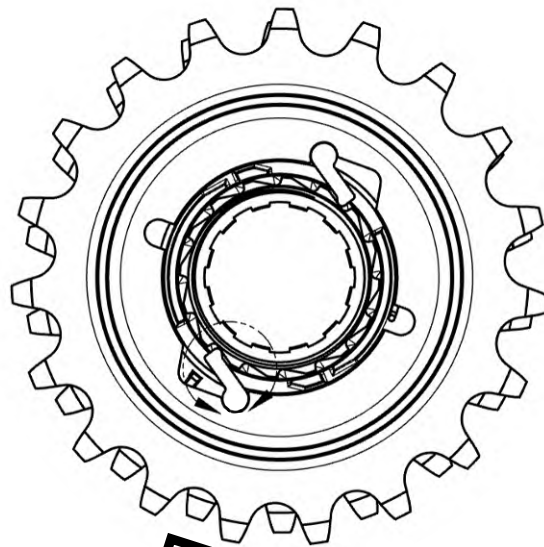
6



Look for contact between
PAWLS and INPUT COLLAR
before and after
pushing the pawls outwards.

If no contact, replace

- OUTBOARD PAWLS
- OUTBOARD SPRING



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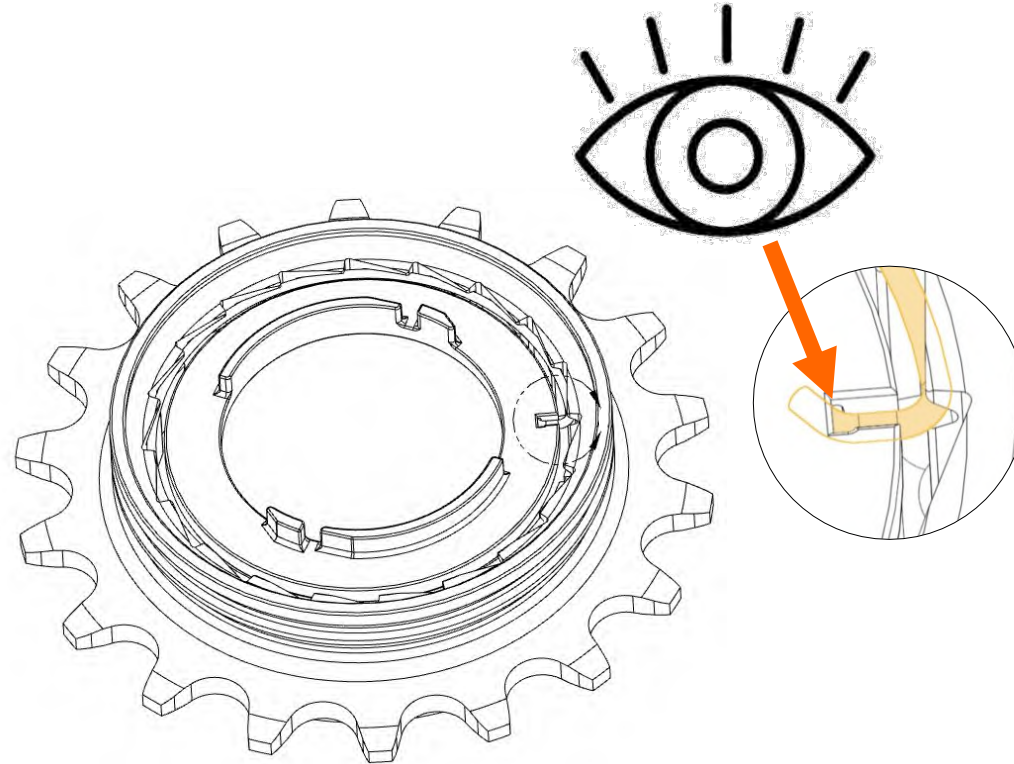
FRICTION SPRING CHECK

REV

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7



Look for secure assembly of the FRICTION SPRING in the PLASTIC SHIFT RING.



If damaged, replace

- FRICTION SPRING
- PLASTIC SHIFT RING



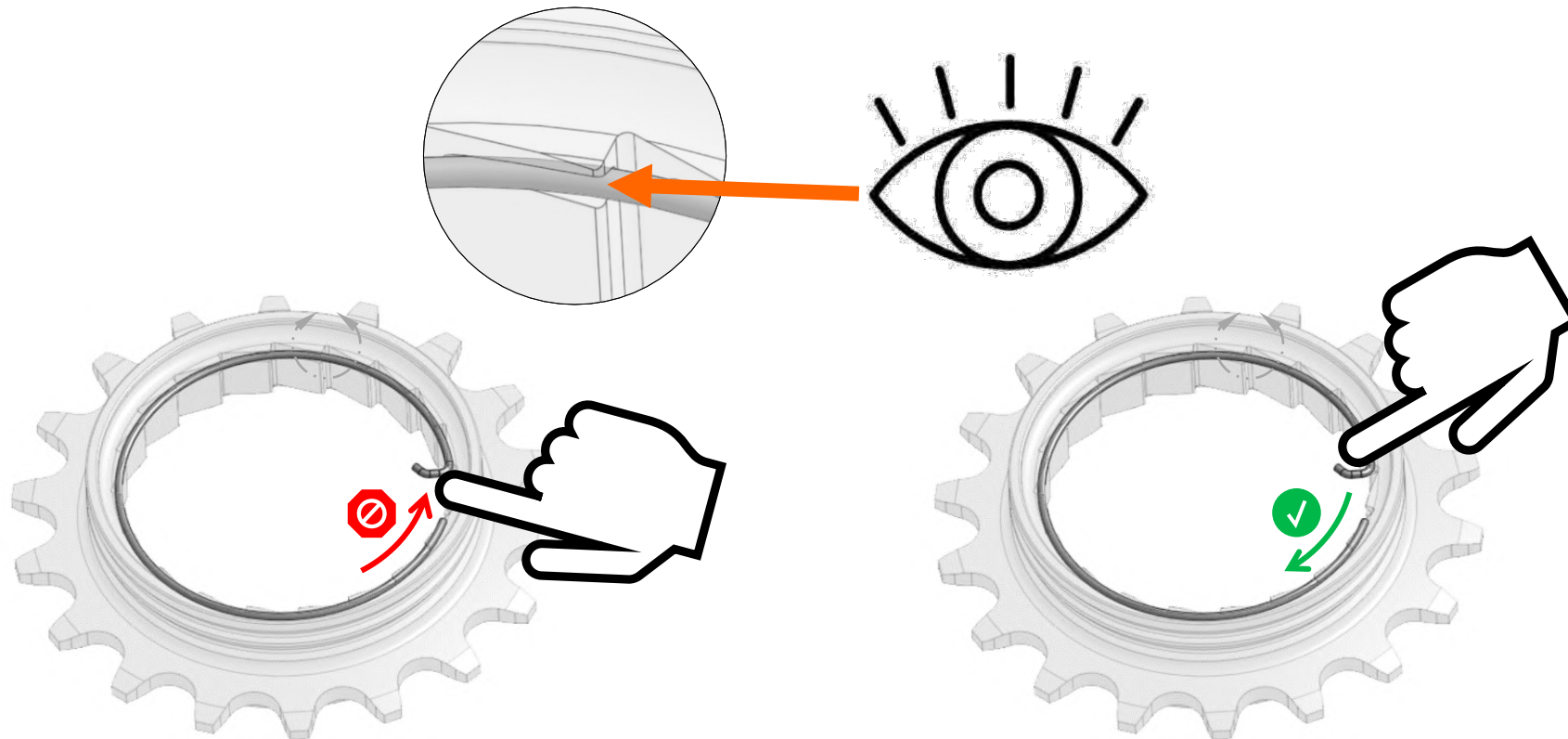
FRICTION SPRING CHECK

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8



Look for assembly of the
FRICTION SPRING in the
groove of the INBOARD
COG.



If slides in both direction,
replace

- FRICTION SPRING



INBOARD PAWLS MOTION CHECK

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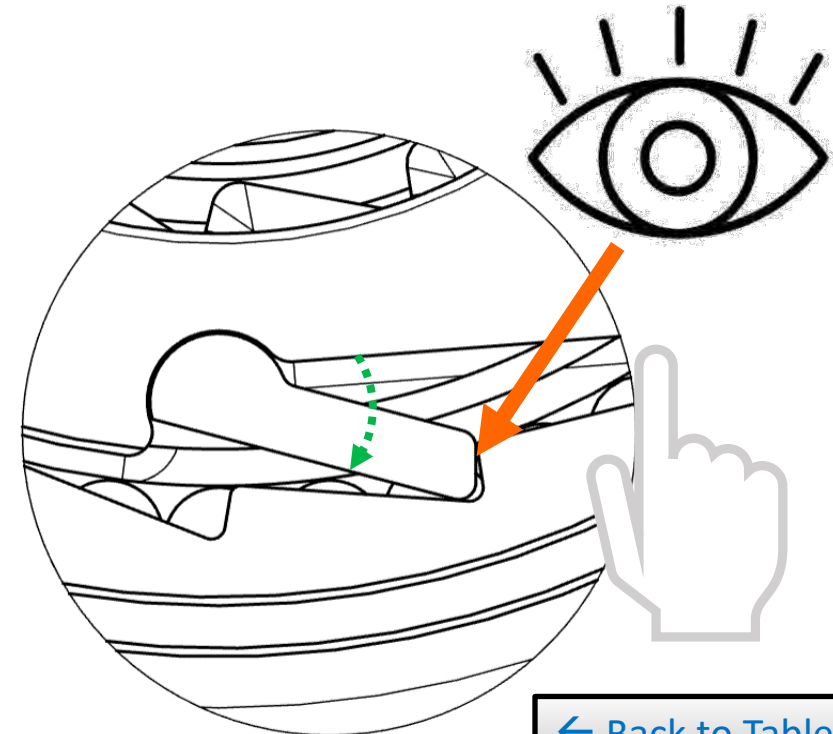
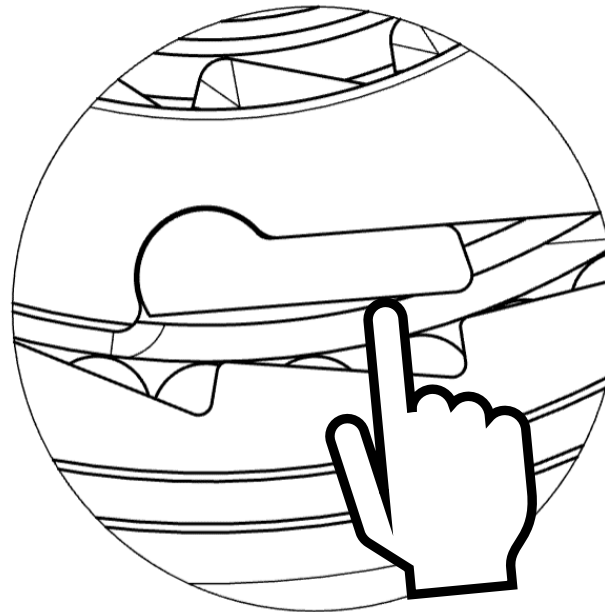
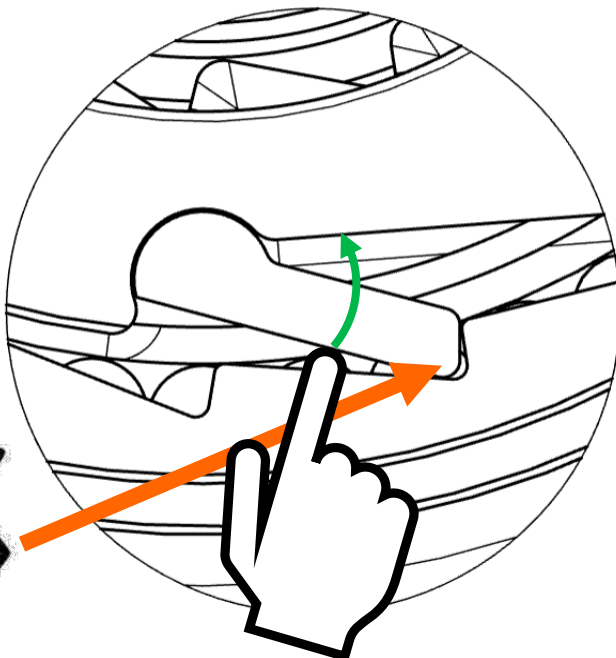
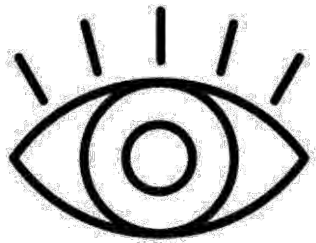
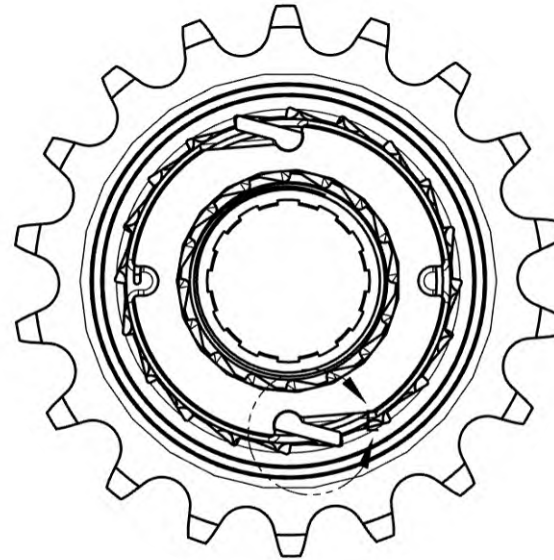
9



Look for contact between
PAWLS and INPUT COLLAR
before and after
pushing the pawls outwards.

If no contact, replace

- INBOARD PAWLS
- INBOARD SPRING



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CLEANING REMINDER

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Remove the old grease before to inspect the parts.



BEARING BALLS + BEARING RACE CHECK

REV

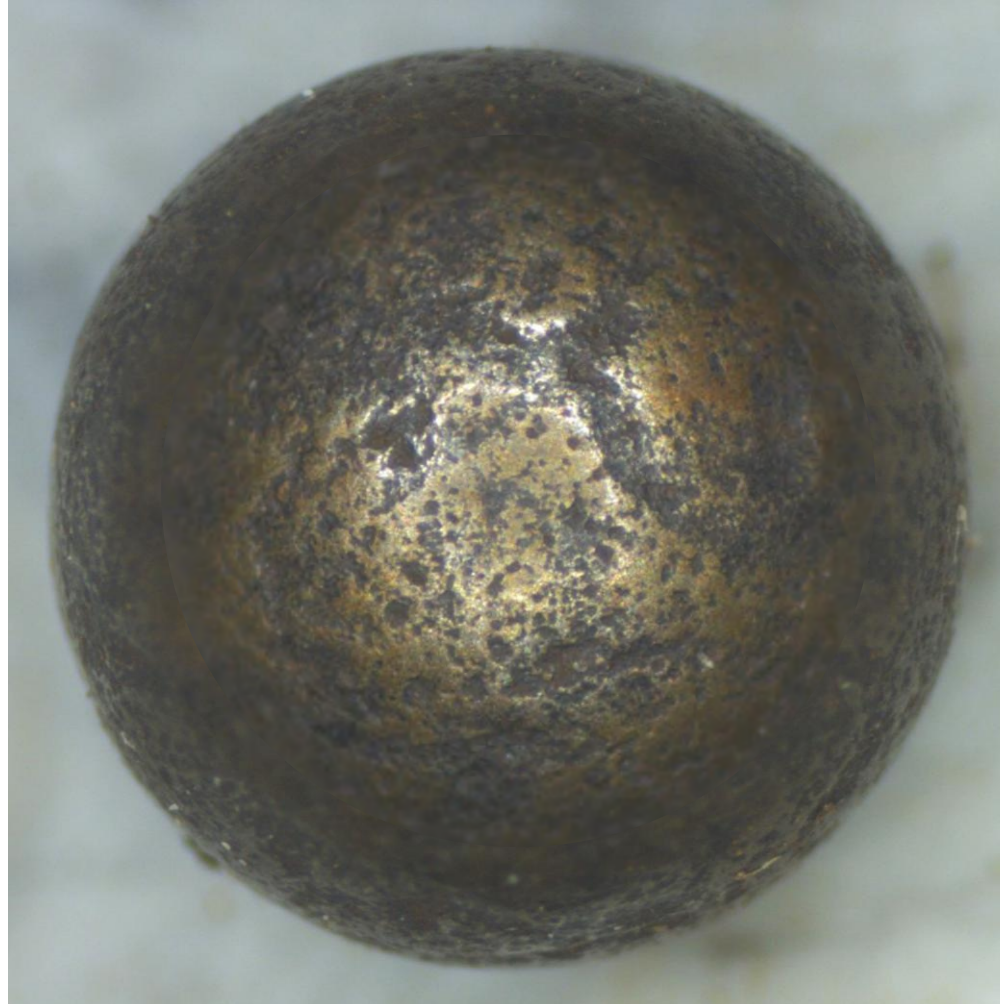
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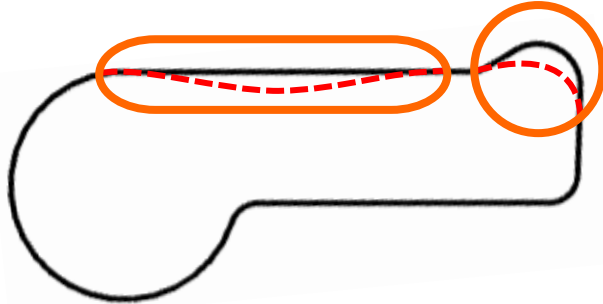
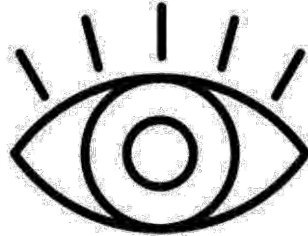
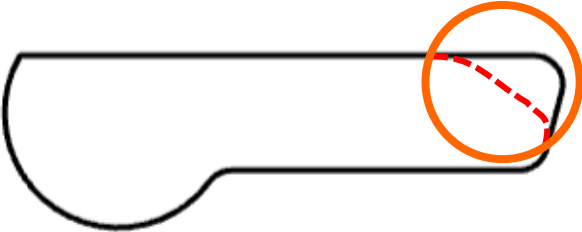
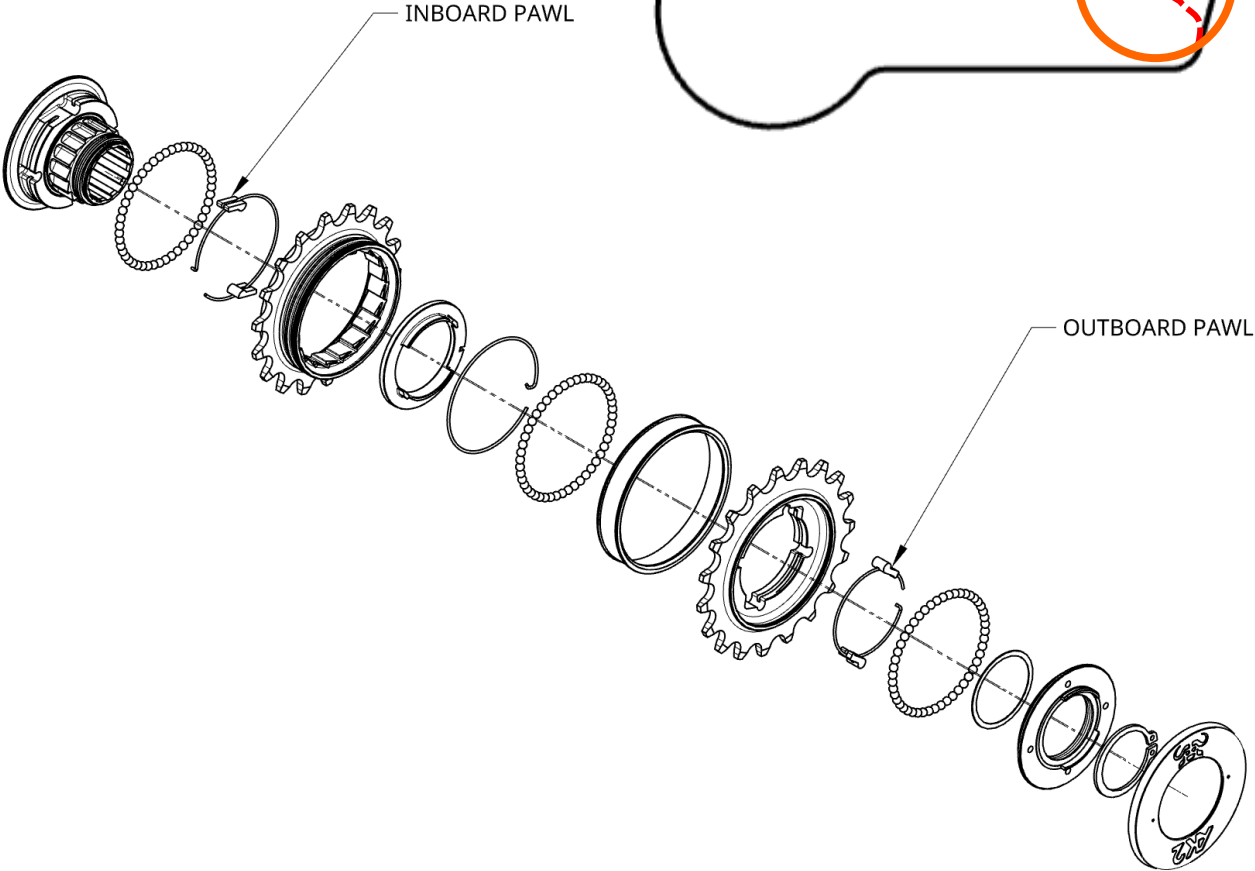
Look at the Bearing balls colour after cleaning. If brown, change all the Bearing balls.





PAWLS SHAPE CHECK

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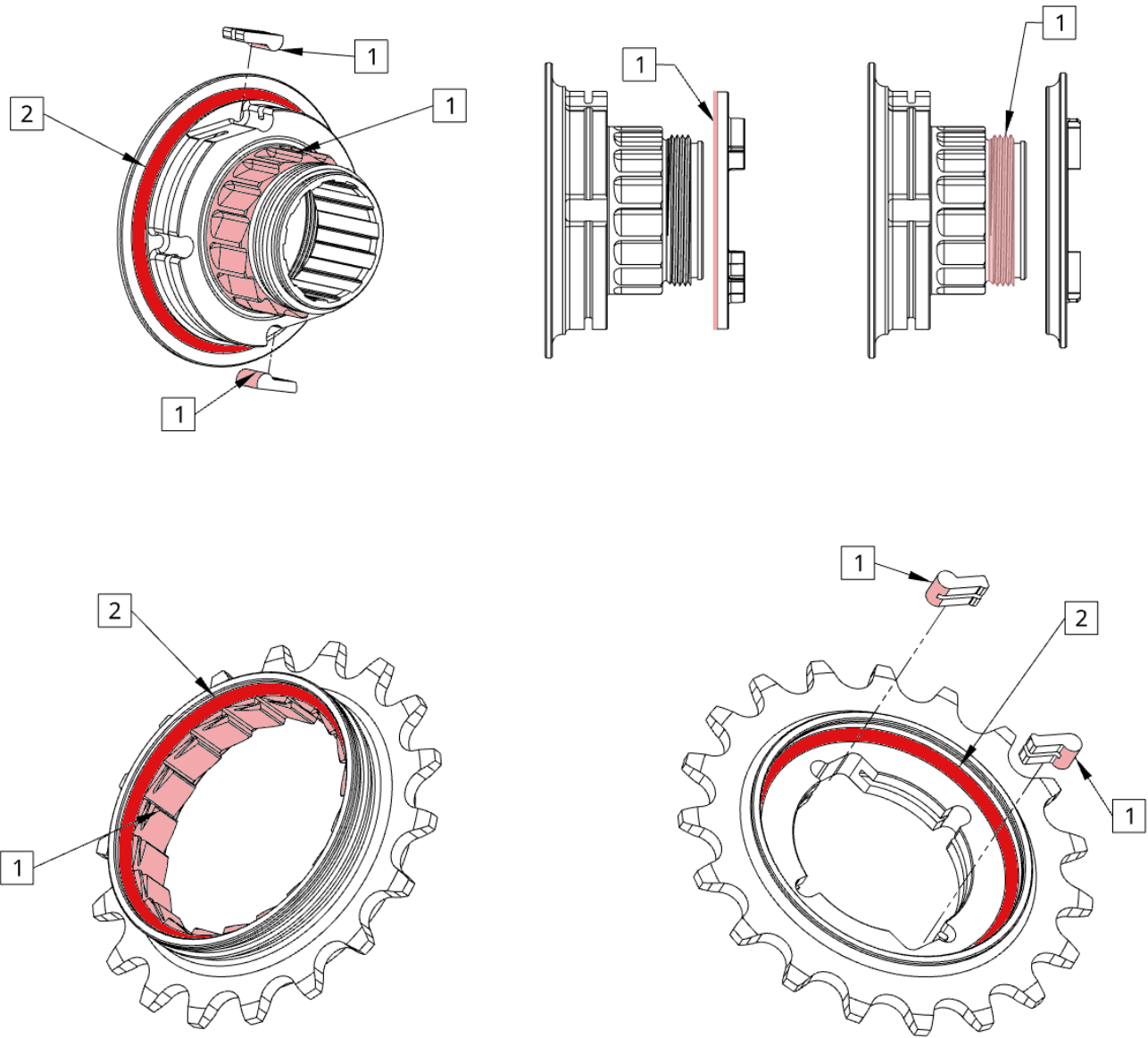


----- Worn surface
Replace the pawls and the corresponding spring if wear is visible.



LUBRICATION POINTS

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General purpose

1



Light film

2



Heavy film



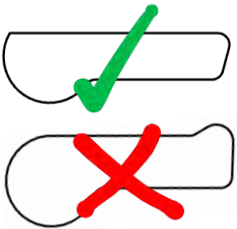
INBOARD PAWLS ASSEMBLY

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1

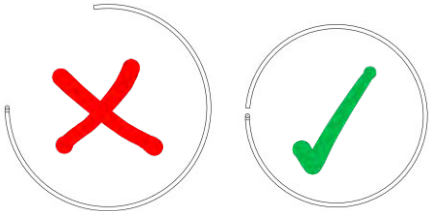


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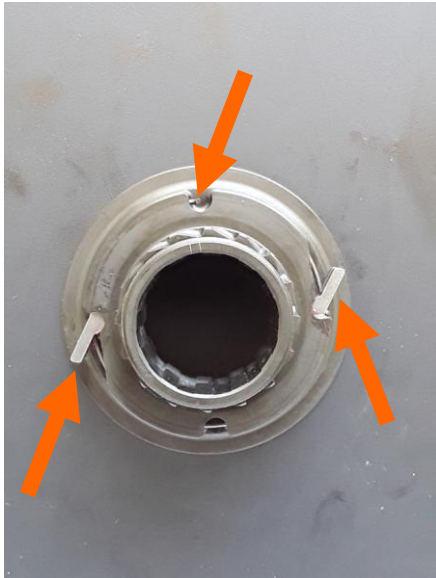
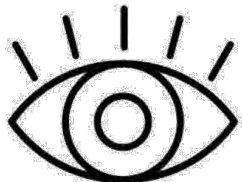
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3



4





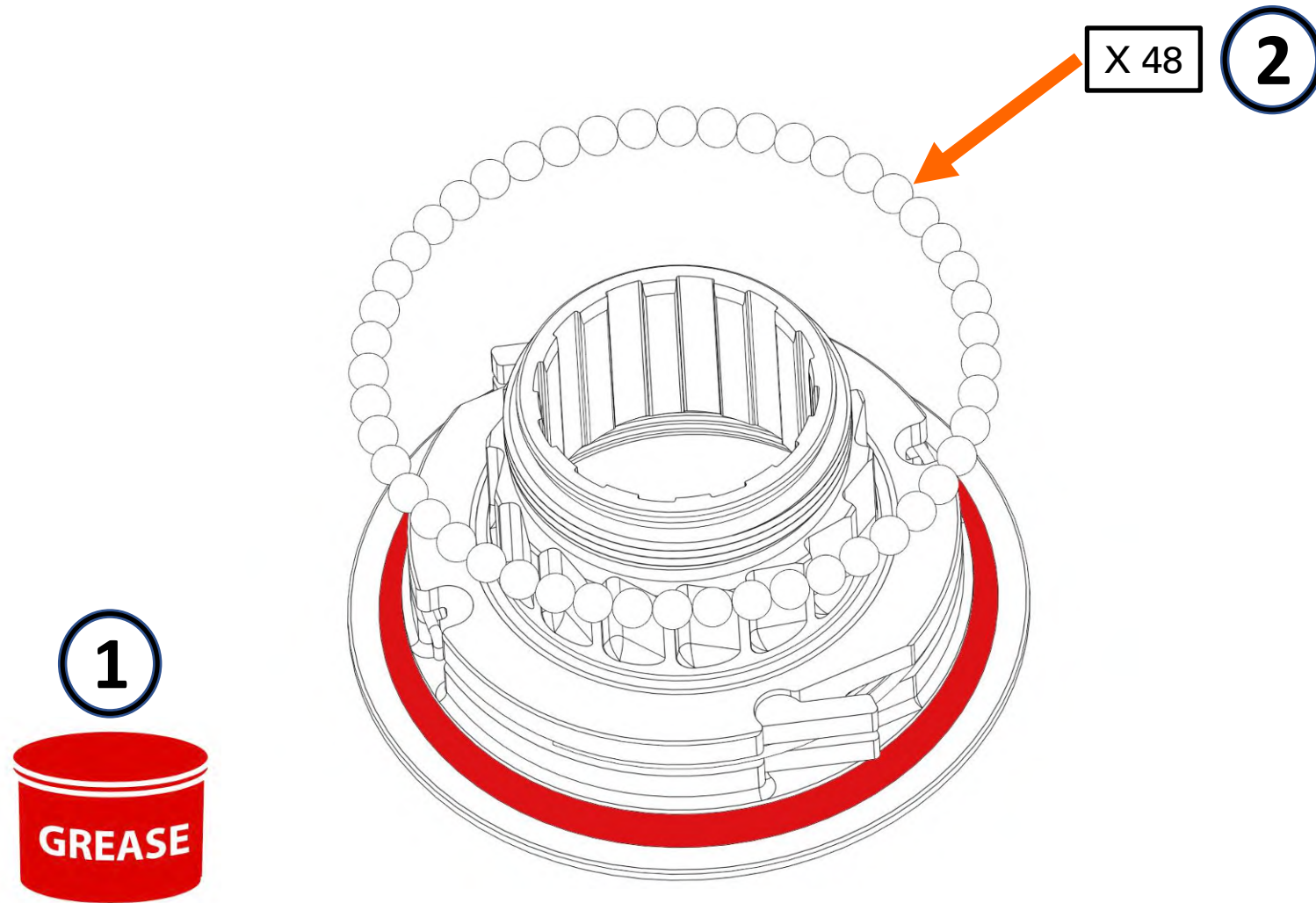
INBOARD BEARING ASSEMBLY

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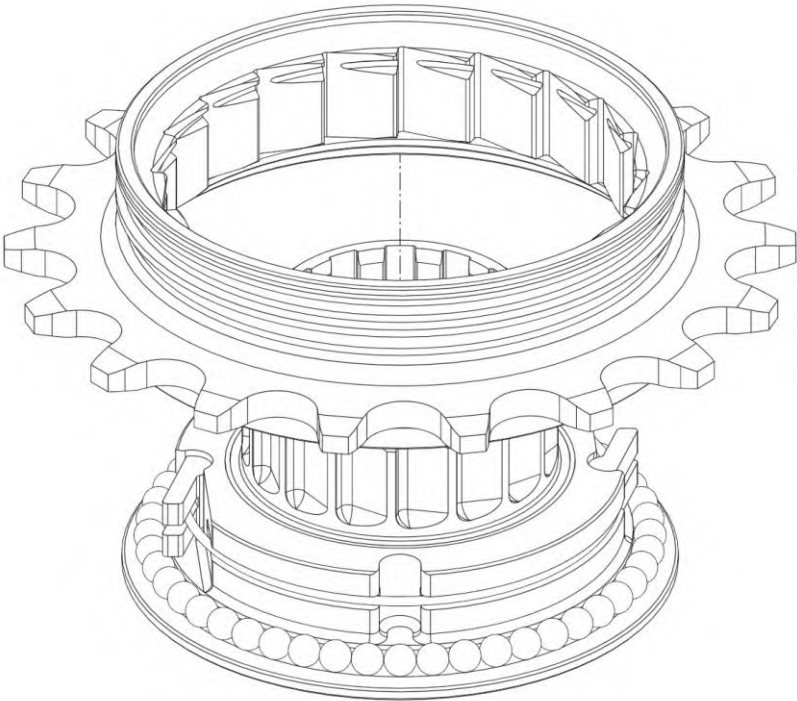
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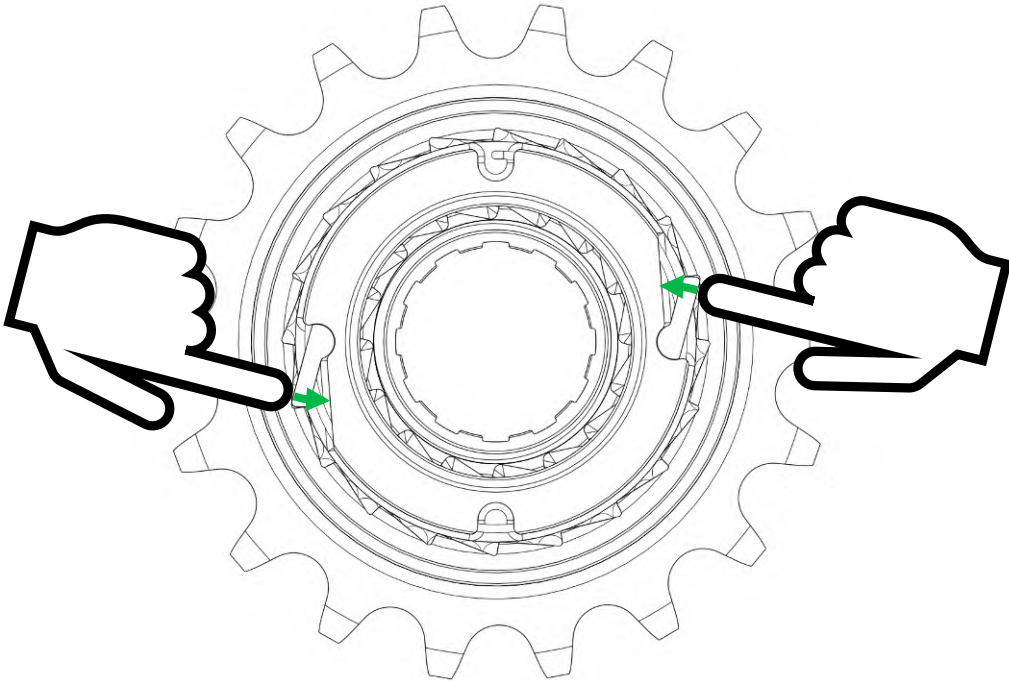
INBOARD COG ASSEMBLY

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1



2





OPTIONAL: INBOARD COG ASSEMBLY TOOL

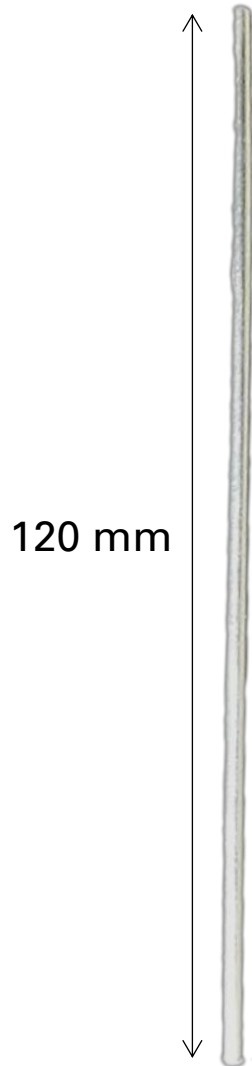
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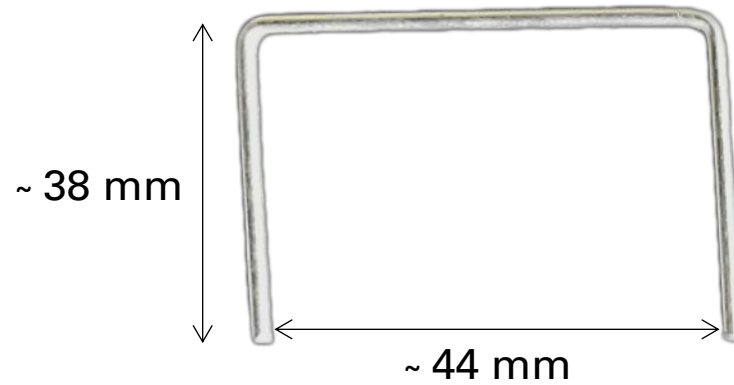
17

①

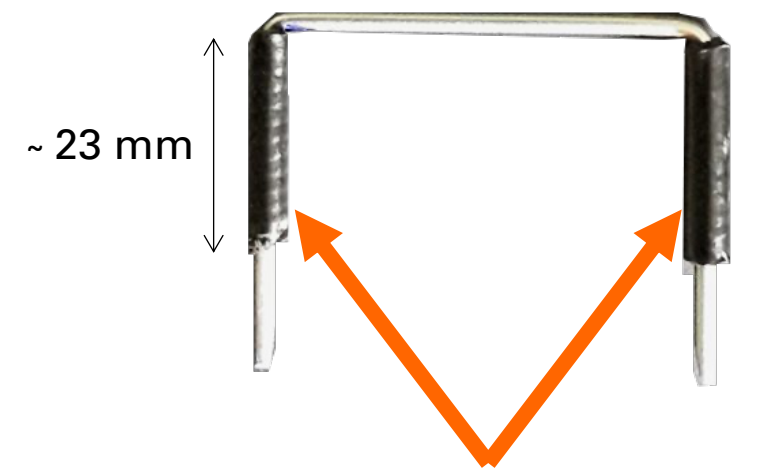


Spoke

②



③



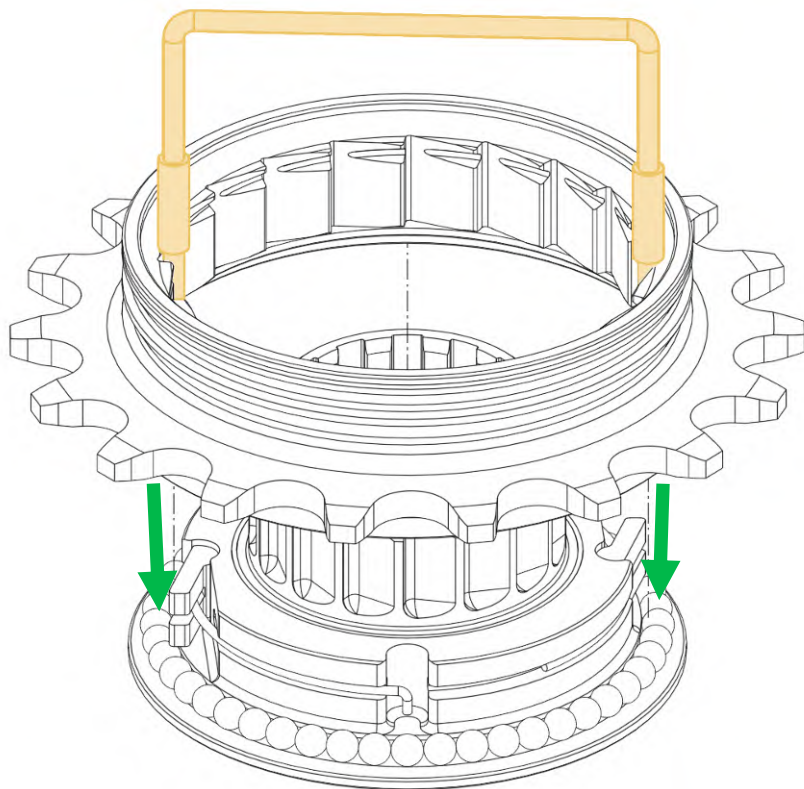
Brake cable outer casing



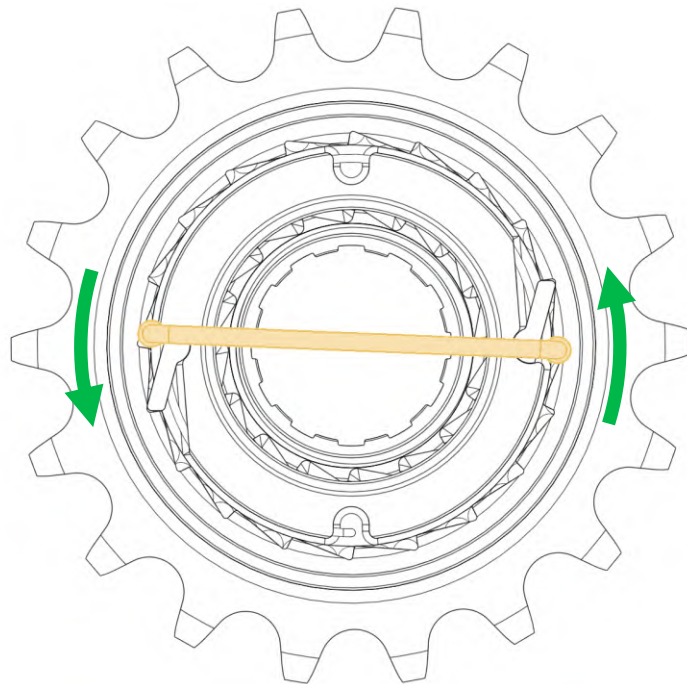
INBOARD COG ASSEMBLY – WITH TOOL

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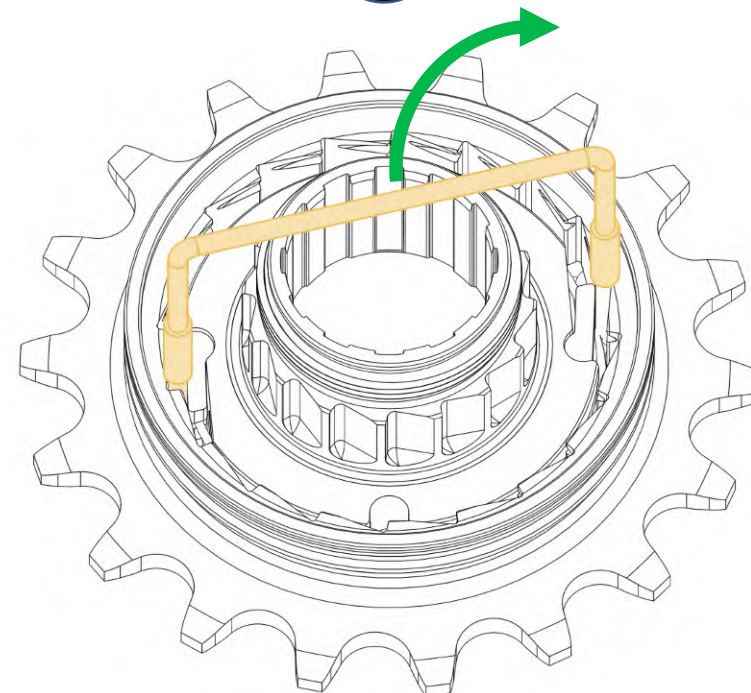
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2



3





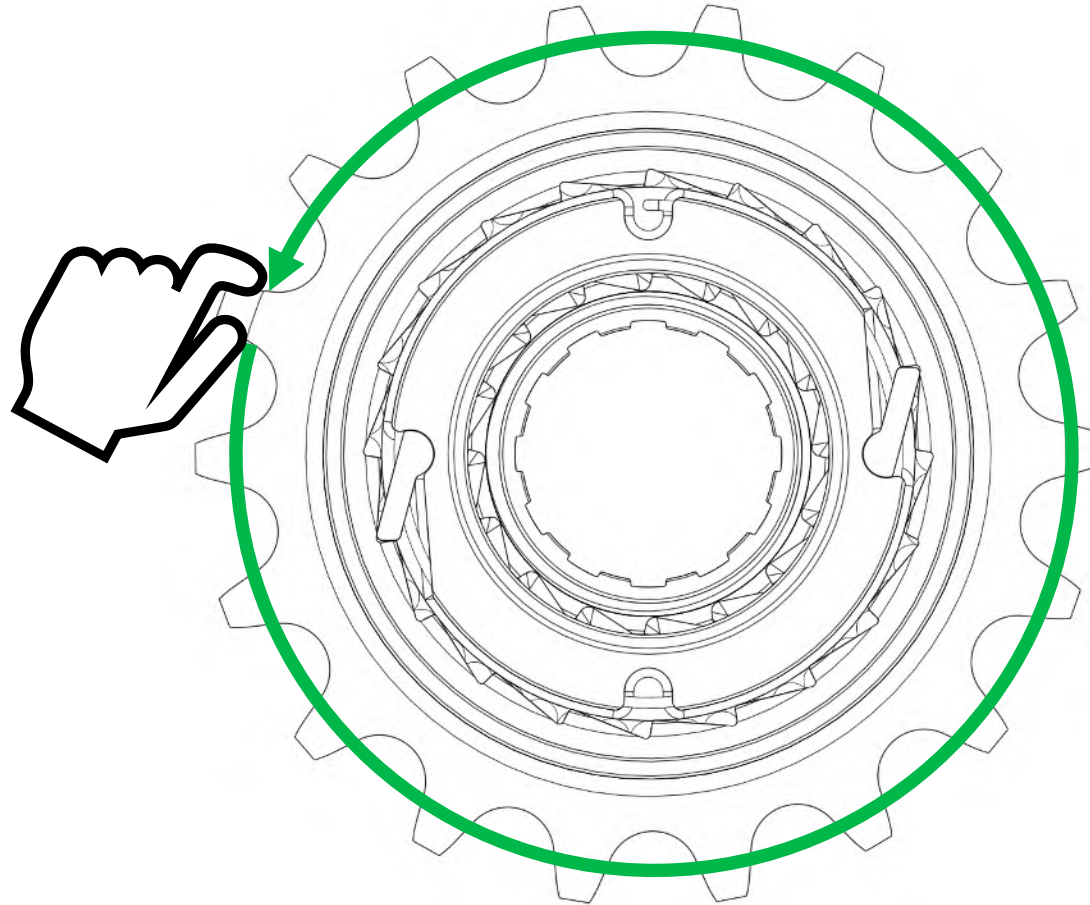
FUNCTION CHECK – INBOARD COG

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FRICTION SPRING & SHIFT RING ASSEMBLY

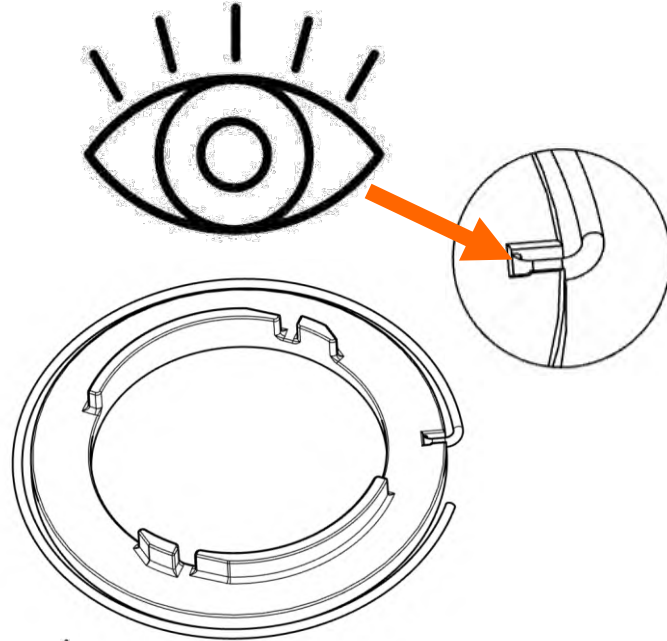
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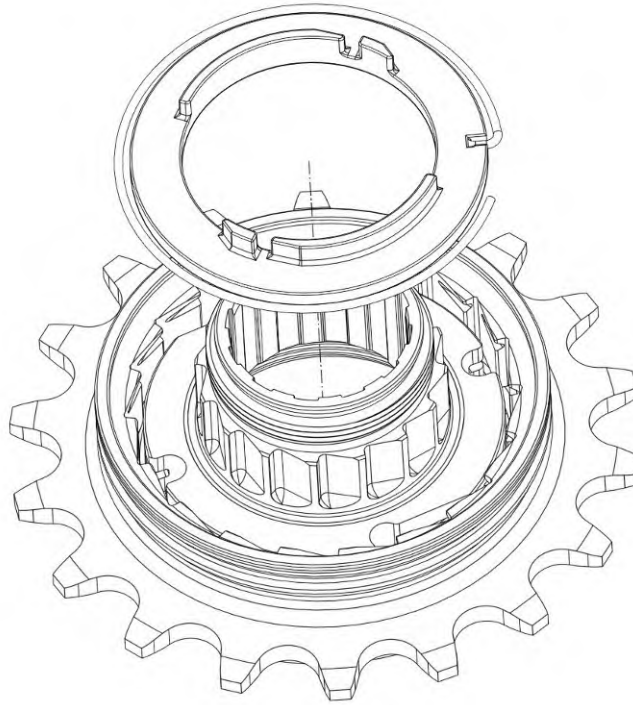
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1

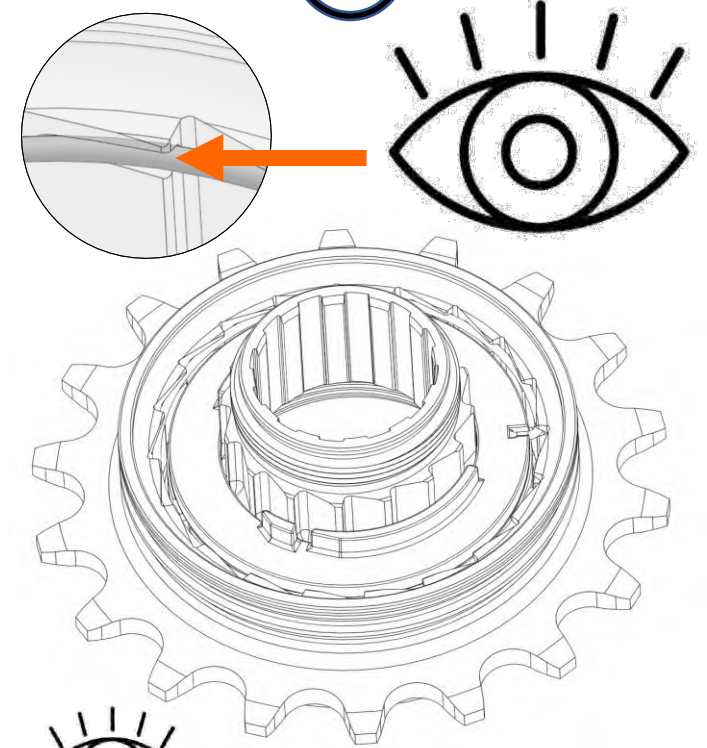


Assemble securely the
FRICTION SPRING in the
PLASTIC SHIFT RING.

2



3



Push the FRICTION SPRING
into the groove of the
INBOARD COG.



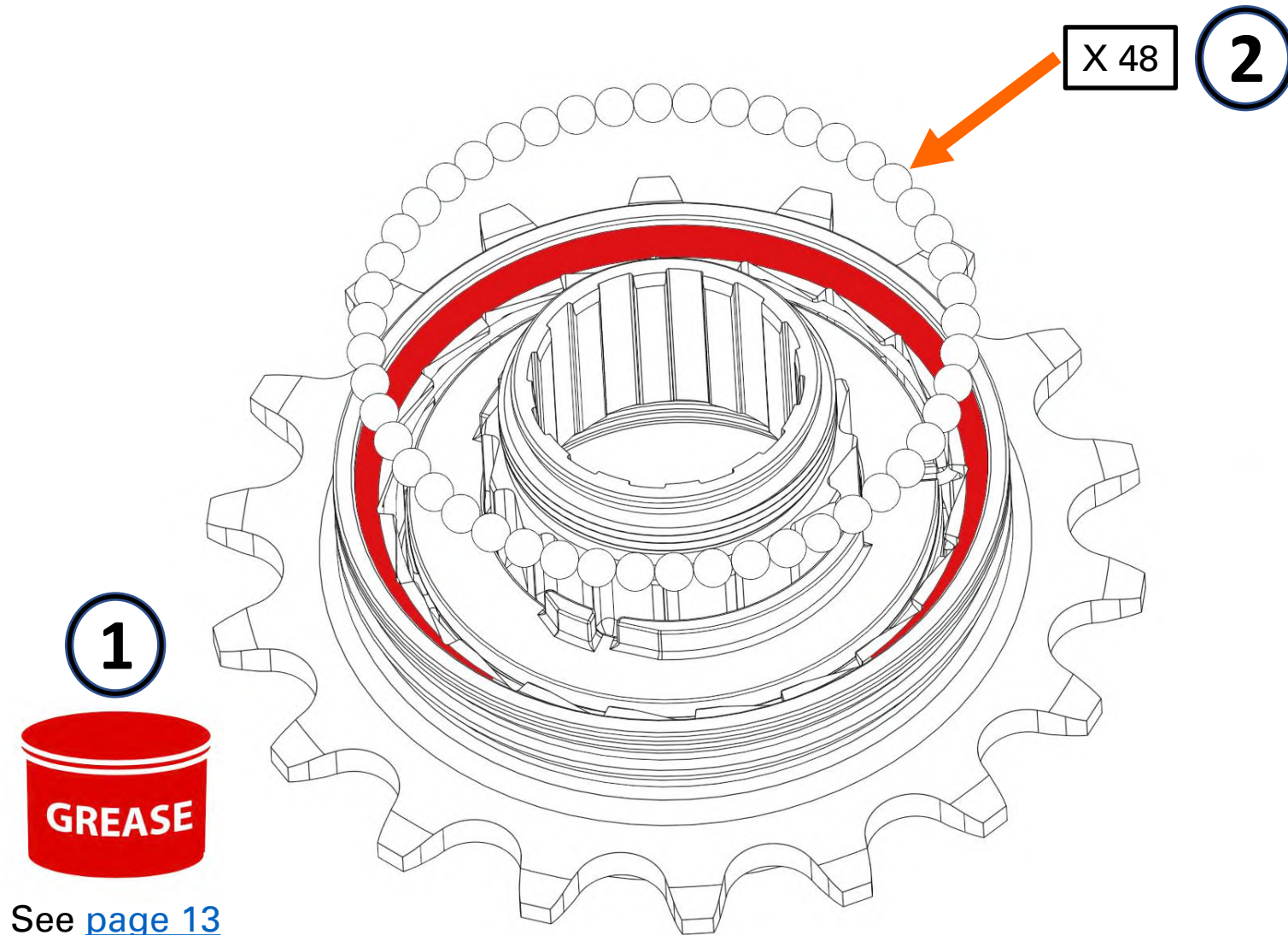
MIDDLE BEARING ASSEMBLY

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OUTBOARD PAWLS ASSEMBLY

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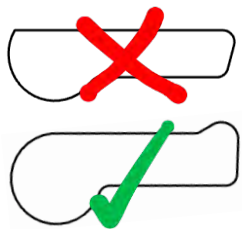
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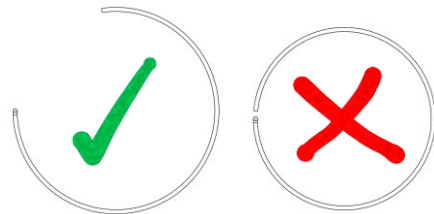


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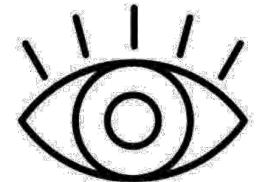
2



3



4



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PLASTIC CENTER SHIELD ASSEMBLY

REV

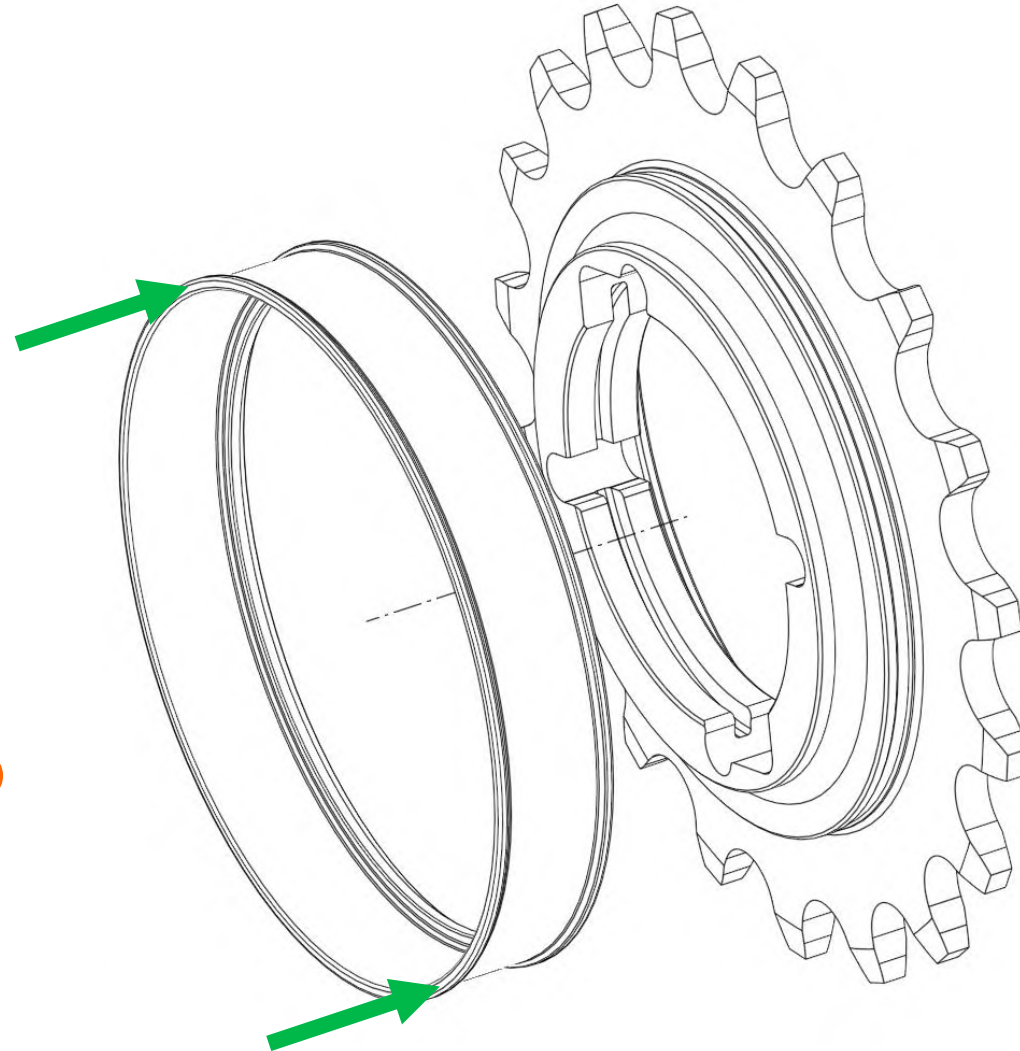
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Push until
hear
"Click!"



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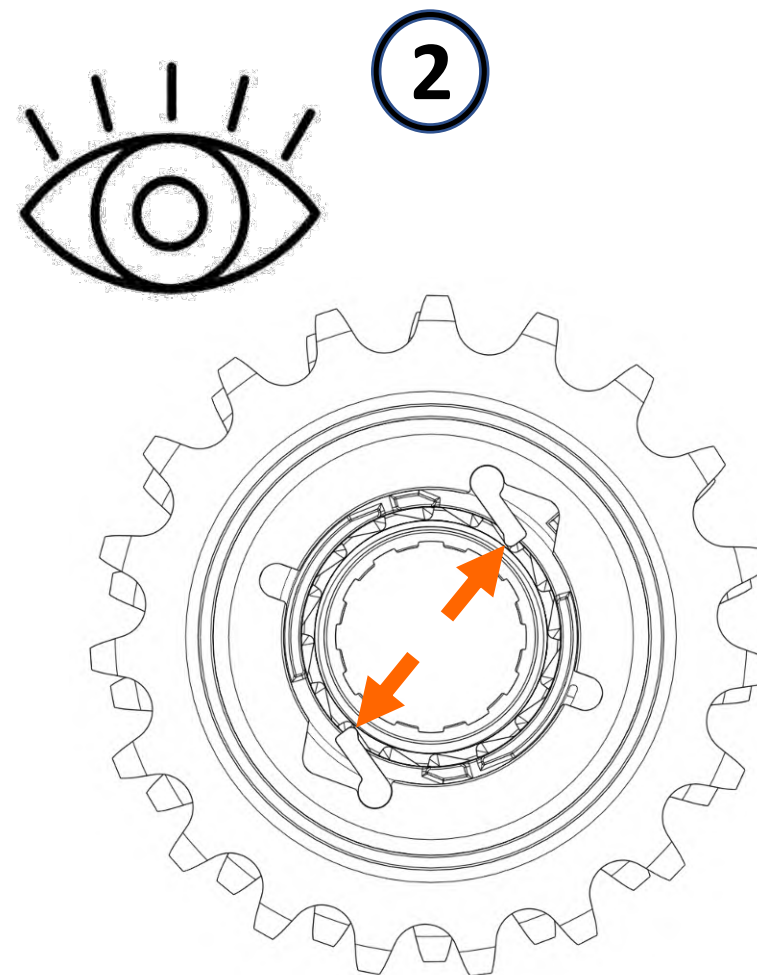
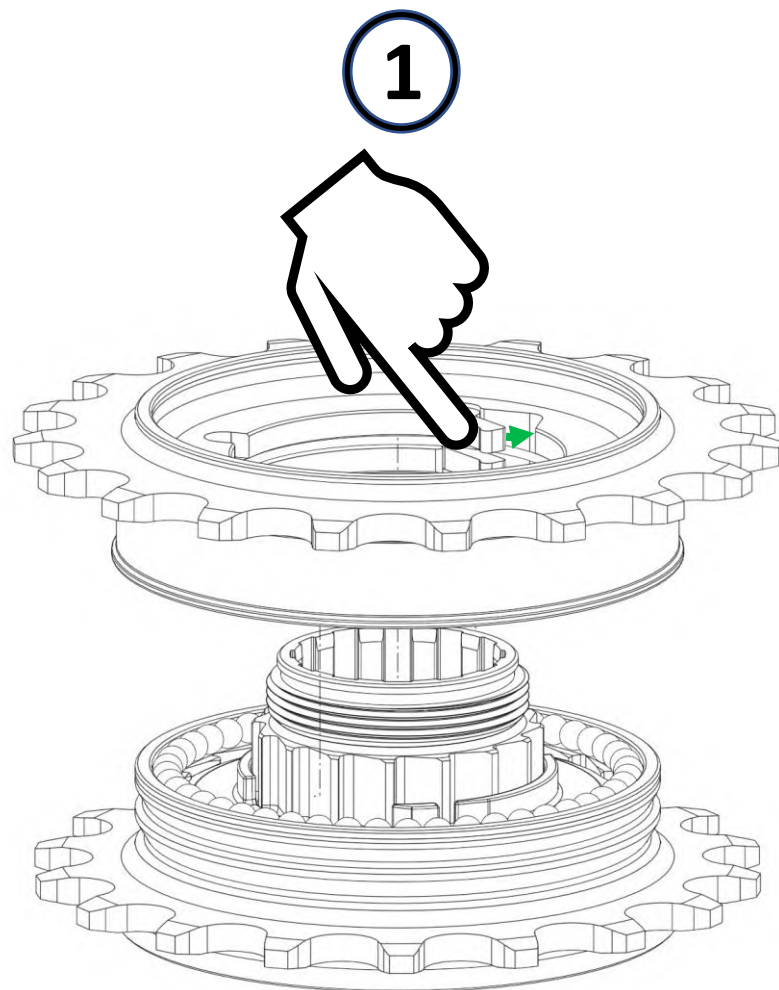
OUTBOARD COG ASSEMBLY

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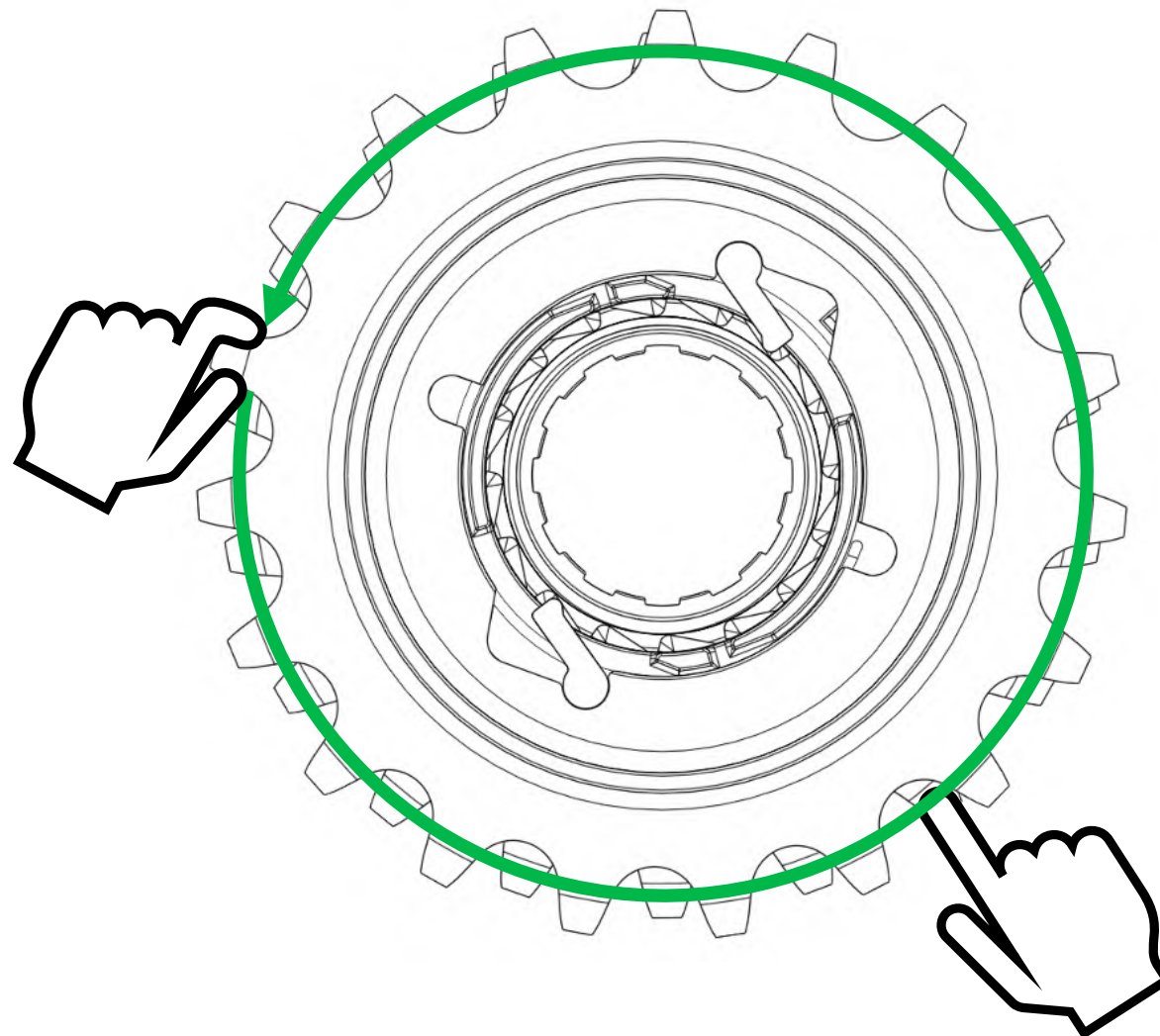
FUNCTION CHECK – OUTBOARD COG

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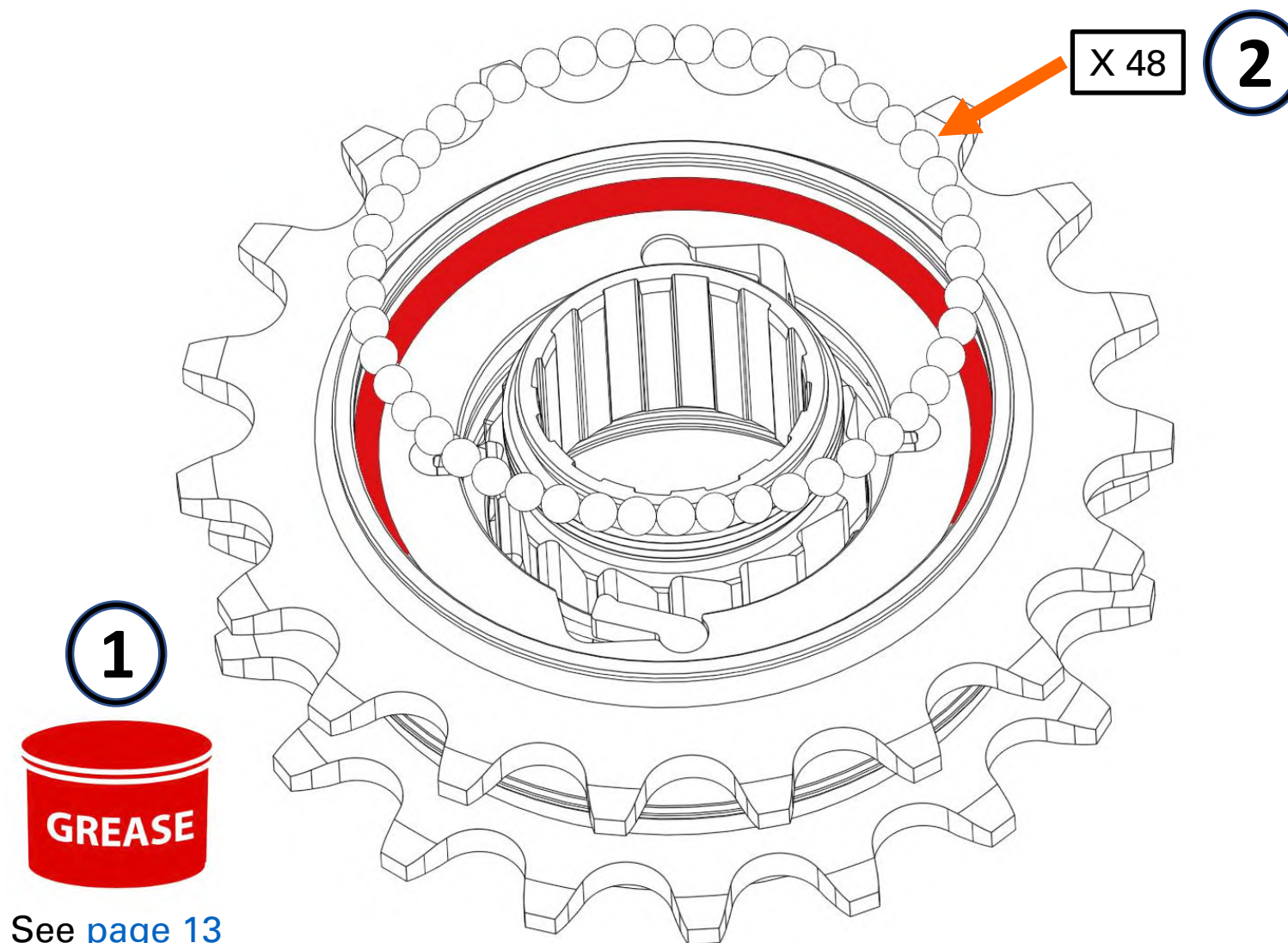
Hold the Inboard Cog.

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OUTBOARD BEARING ASSEMBLY

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SHIMS ASSEMBLY

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The number and thickness of the shims will vary between freewheels.

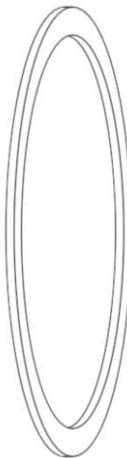
Thin
0.05 mm



Medium
0.1 mm



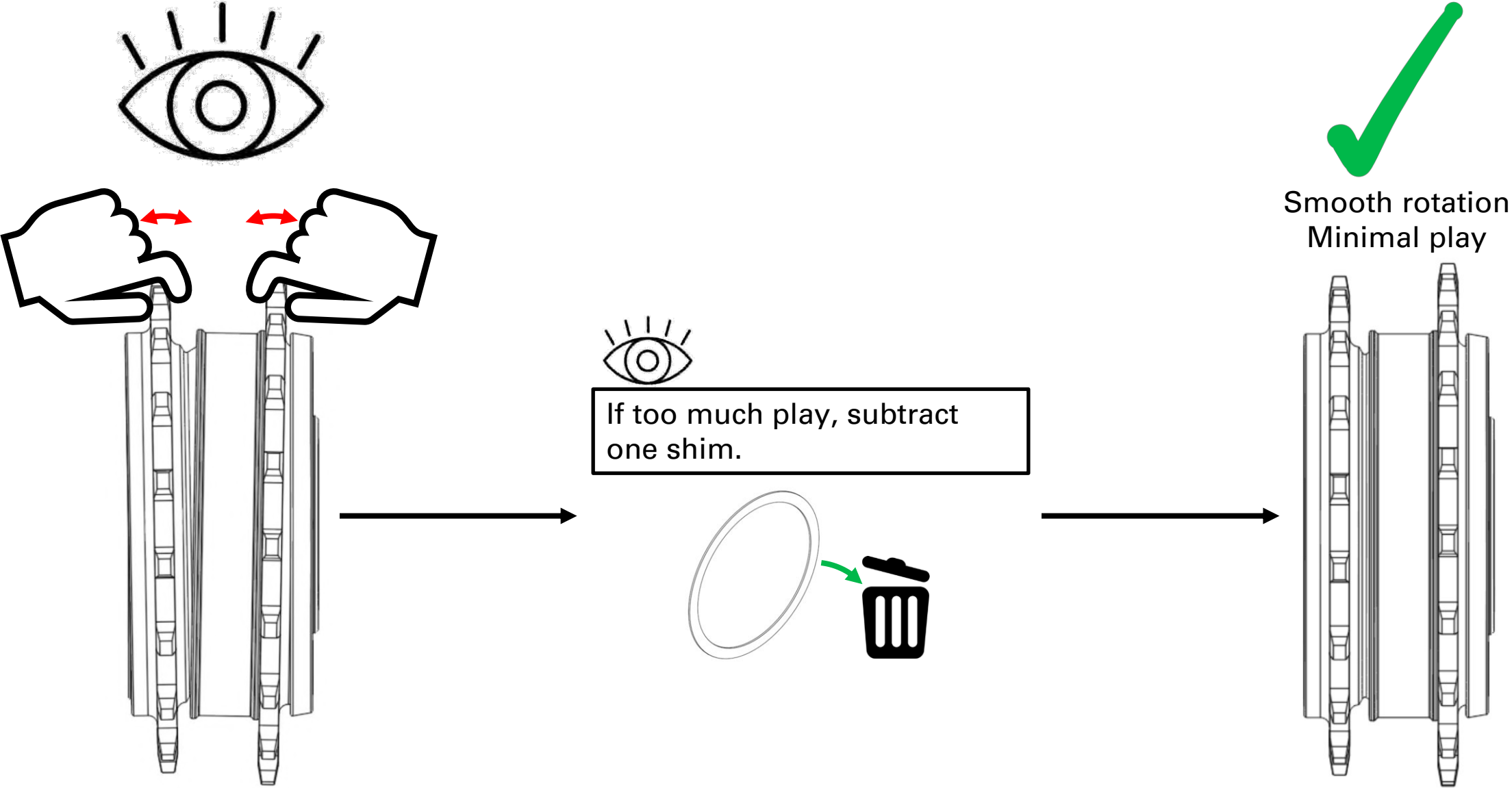
Thick
0.3 mm





SHIMS ASSEMBLY

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CAP ASSEMBLY

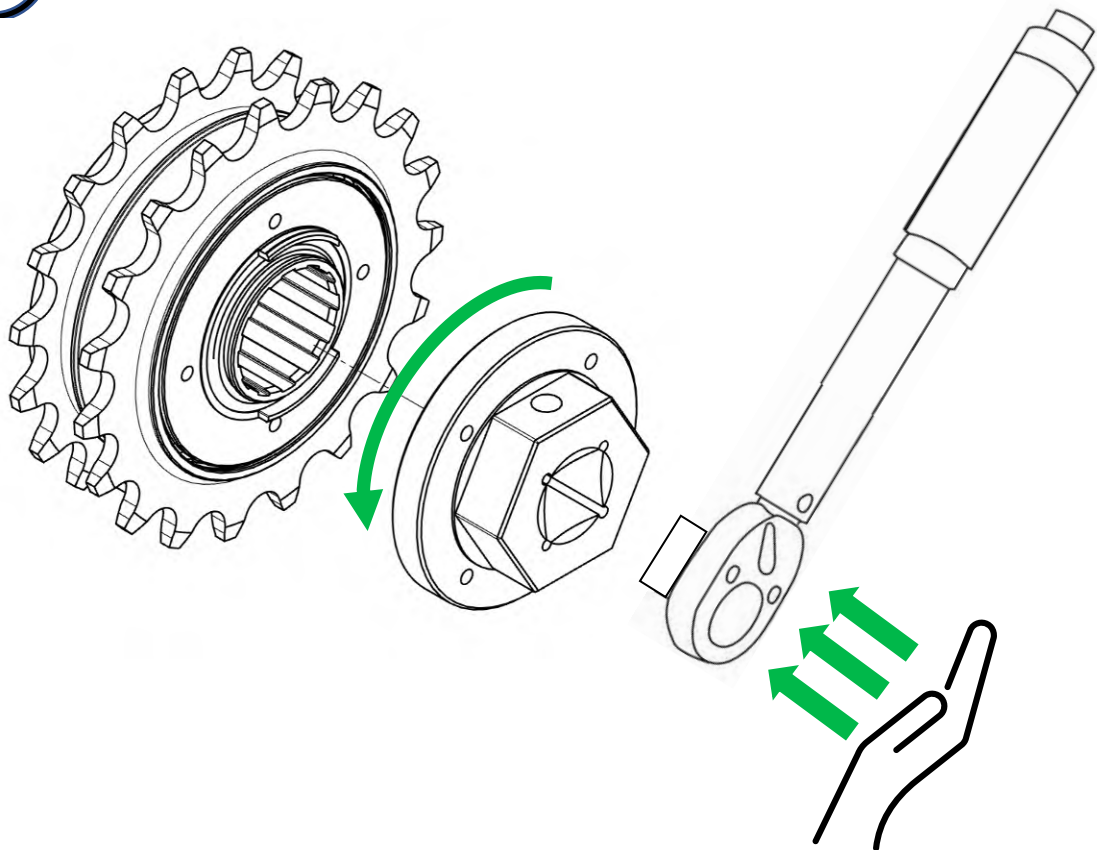
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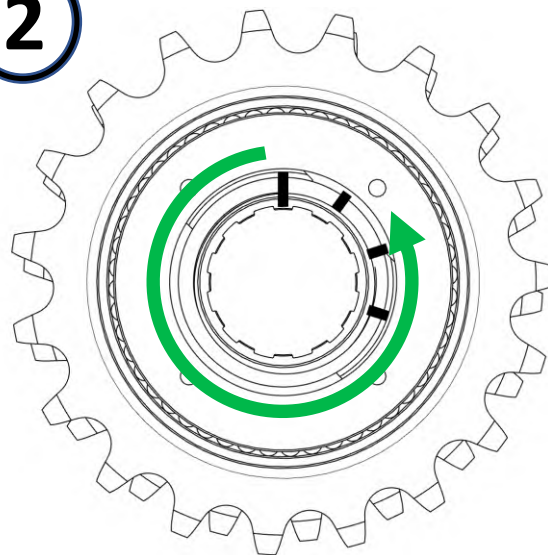
C

29

1



2



Require high force.

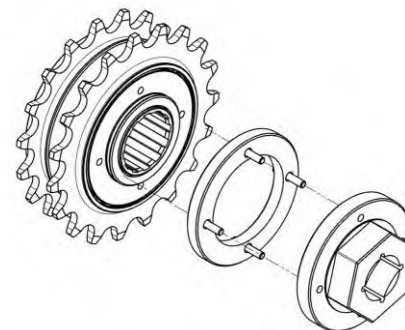


Tighten to **MAXIMUM torque.**

If torque wrench available, tighten to **45N.m.**

If mechanism without retaining ring:

use 4 pin adapter



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CAP ASSEMBLY

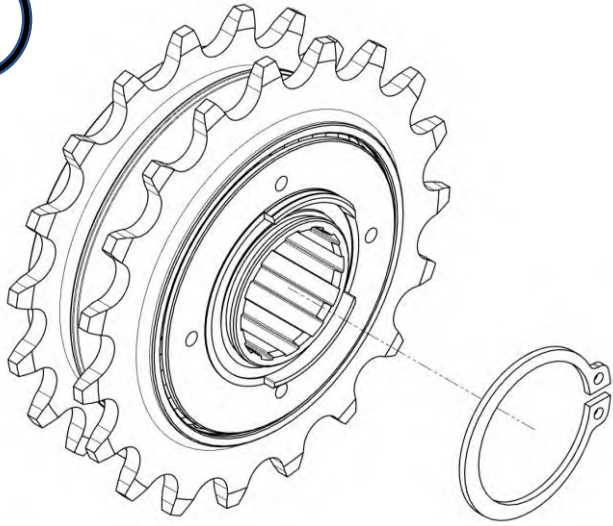
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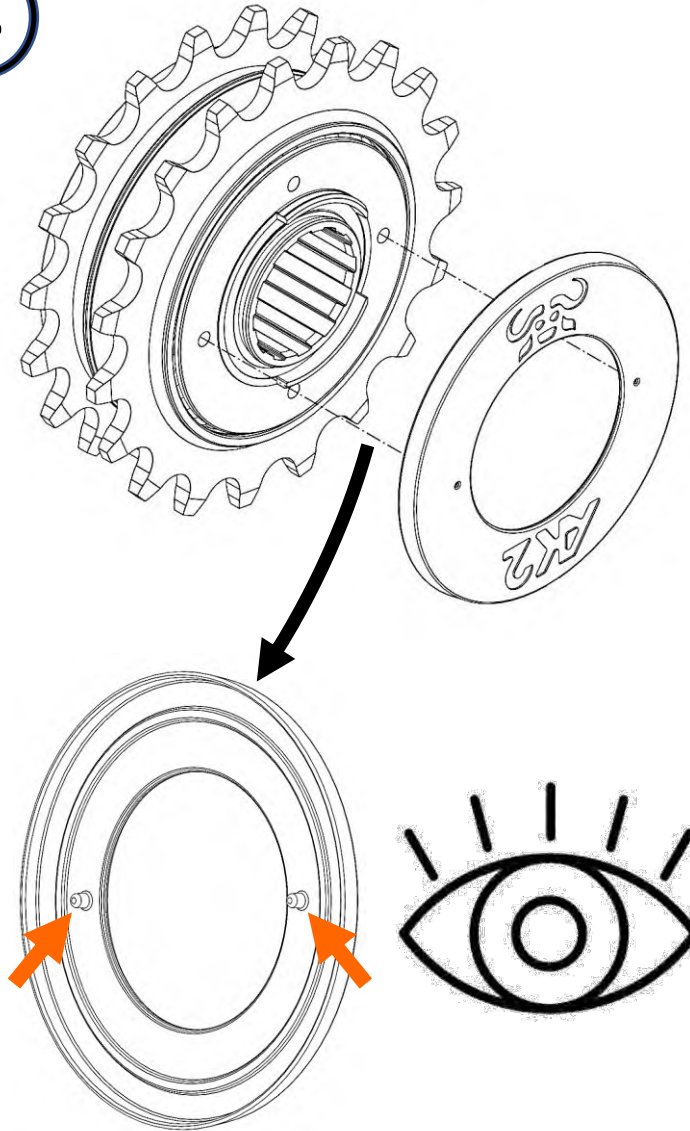
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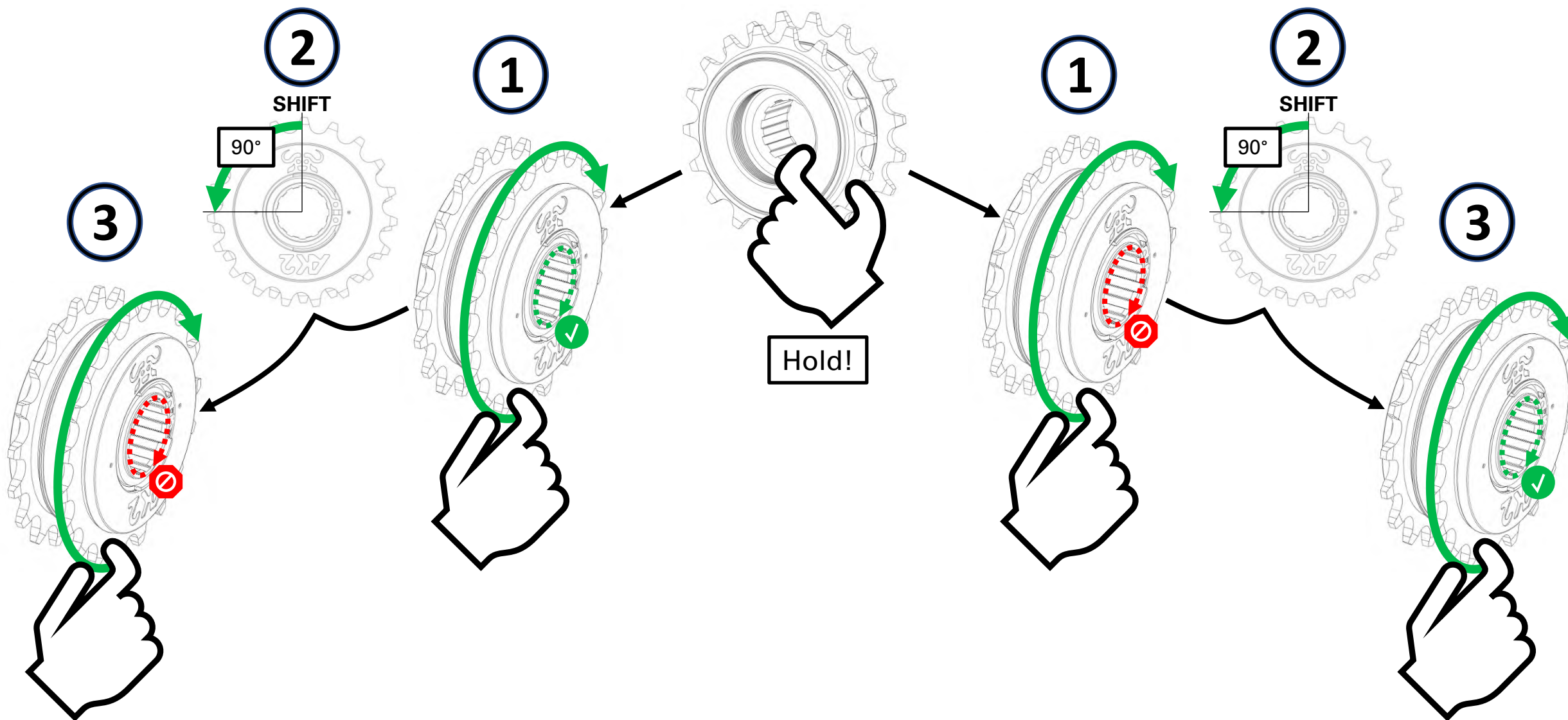
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FUNCTION CHECK

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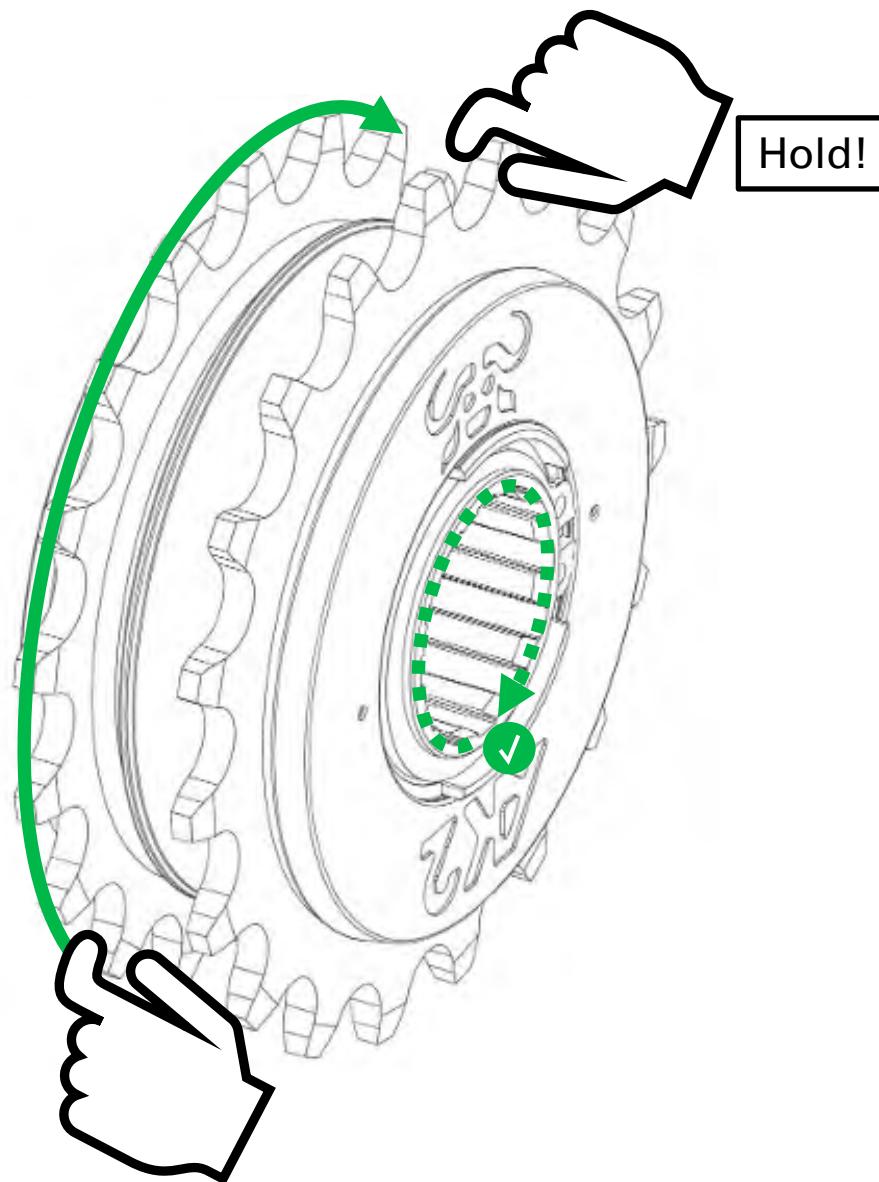
FUNCTION CHECK

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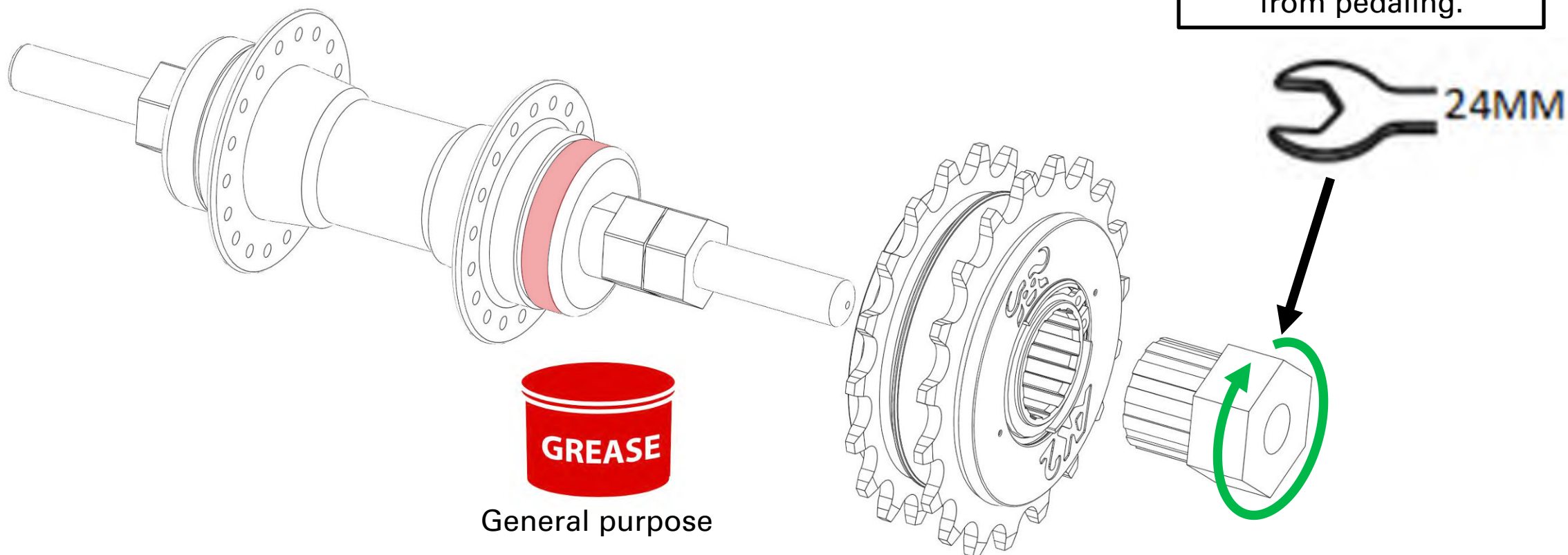
REASSEMBLY ON THE HUB

REV

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TROUBLE SHOOTING

Symptom	Root Cause	Repair
The freewheel rotates backward but does not shift.	The Outboard Pawls don't engage anymore with the Input Collar (see page 6).	Replace the Outboard Pawls and Outboard Spring (see page 22).
	The connection between the Friction Spring and the Plastic Shift Ring is not robust/stable (see page 7).	Replace the Friction Spring or Plastic Shift Ring if broken/bent/damage OR reassemble the Friction Spring in the Shift Ring (see page 20).
	The Friction Spring rotates in both direction into the groove of the Inboard Cog (see page 8).	Replace the Friction Spring (see page 20).
	The Inboard Pawls don't engage anymore with the Inboard Cog (see page 9).	Replace the Inboard Pawls and Inboard Spring (see page 14).
	The Plastic Shift Ring is damaged.	Replace the Plastic Shift Ring (see page 20).
The freewheel shifts unexpectedly.	The Outboard Pawls don't engage strongly with the Input Collar (see page 6).	Replace the Outboard Pawls and Outboard Spring (see page 22).
	The Friction Spring rotates in both direction into the groove of the Inboard Cog (see page 8).	Replace the Friction Spring (see page 20).
	The grease is heavily contaminated.	Proceed to a deep cleaning of the mechanism and use new grease.



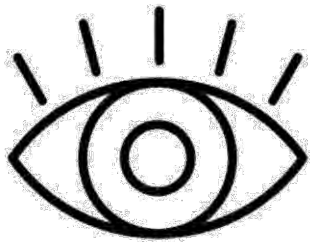
TROUBLE SHOOTING

Symptom	Root Cause	Repair
The freewheel does not rotate backward (user can't backpedal).	One or more loose bearing ball(s) or other debris are located under the Outboard Pawls or the Inboard Pawls, preventing the pawls from retracting (see page 6 and page 9).	Remove the blocking element(s) and replace any broken parts.
The freewheel does not rotate smoothly.	One or more of the bearing races are dry.	Add grease on the bearing races (see page 13) and changed the bearing balls if rusty (see page 11 , page 15 , page 21 and page 26).
	Oil had been used to lubricate the freewheel.	
	There are not enough shims.	Adjust shim stack for smooth rotation and minimal play.
	There is too much contamination in the grease.	Perform full steps of service for the freewheel.
There is excessive play in the freewheel.	The cap started to get loose.	Tighten the cap again (see page 29 and page 30), if the rotation is rough, perform full steps of service for the freewheel.
	There are too many shims in the freewheel.	Adjust shim stack for smooth rotation and minimal play (see page 27 and page 28).

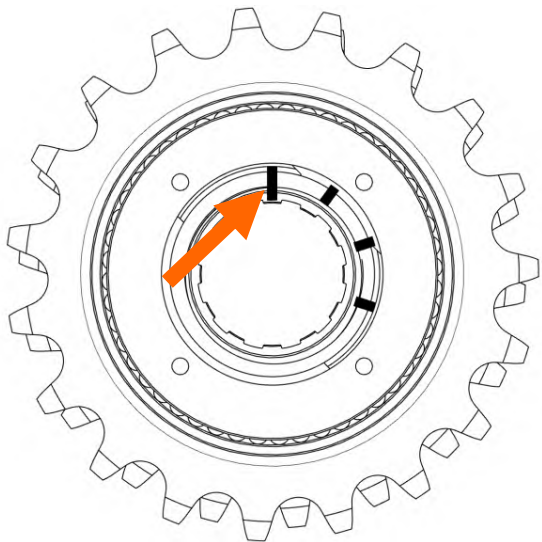


CAP ASSEMBLY - REFERENCE

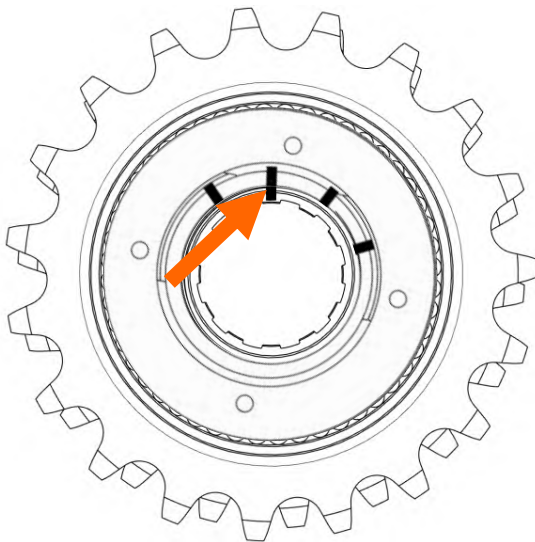
REV	PAGE
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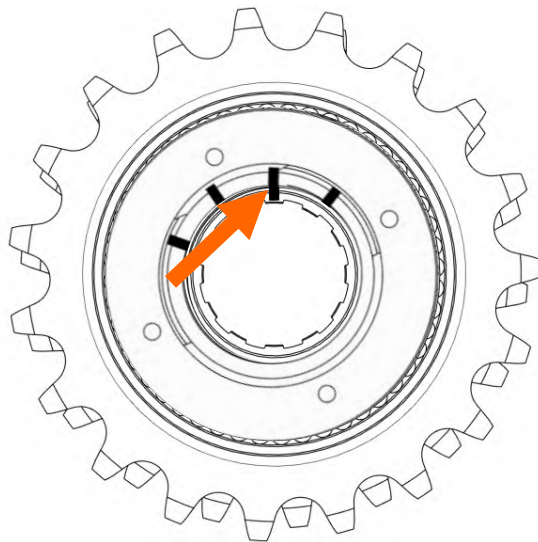
45 N.m
with initial shims stack.



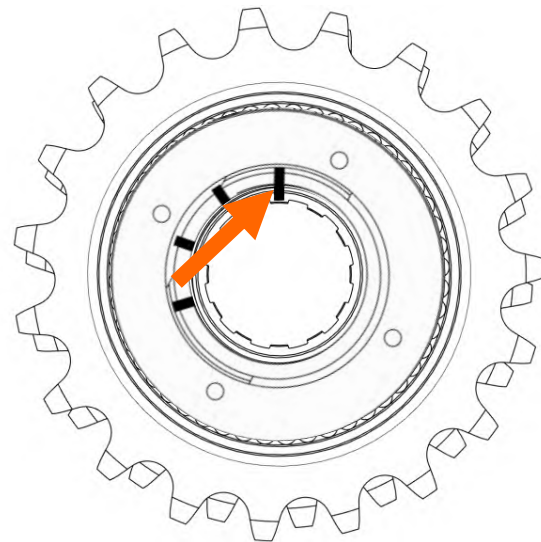
45 N.m
after removing
1 medium sized shim.



45 N.m
after removing
2 medium sized shims.



45 N.m
after removing
3 medium sized shims
or 1 thick sized shim.





OTHER INFORMATION

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- Utility S2 Assembly Manual
- Utility S2 Tips & Tricks