

## D3 DIRECT DRIVE SPINDLE SPINDLE REBUILD INSTRUCTIONS

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DOC #15-2017

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**WARRANTY + SERVICE** 888.960.0364  
**PARTS** 888.960.0361



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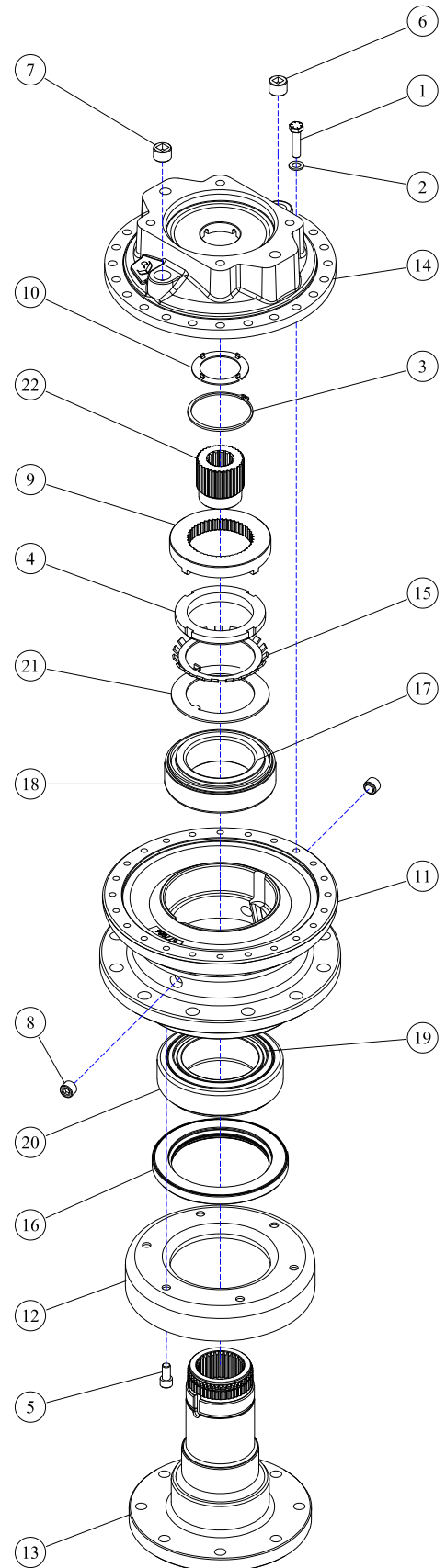
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# SPINDLE REBUILD INSTRUCTIONS

## D3 SPINDLE PARTS BREAKOUT

REF#	PARTS DESCRIPTION	REQ	PART #
1	BOLT-HEX HEAD	24	11-1611
2	WASHER-FLAT	24	11-1612
3	RING-RETAINING	1	11-1613
4	NUT-LOCK	1	11-1614
5	SCREW-SKT HD CAP	6	11-1616
6	PIPE PLUG (TO COVER) (MAGNETIC)	1	21-1609
7	PIPE PLUG (TO COVER) (NON-MAGNETIC)	1	21-1610
8	PIPE PLUG (TO HUB) (MAGNETIC)	2	21-1611
9	PLATE-KEEPER	1	35-0098
10	WASHER-THRUST (BOTTOM)	1	35-0099
11	HUB	1	35-0100
12	GUARD	1	35-0102
13	SHAFT-OUTPUT	1	35-0103
14	<b>COVER</b>		
	C BASE (STANDARD)	1	35-0094
	D BASE (OPTIONAL)	1	35-0095
	<b>SEAL KIT</b>		<b>33-0078</b>
15	WASHER-LOCK	1	
16	SEAL-OIL SEALANT	1	
	<b>BEARING AND SEAL KIT</b>		<b>33-0079</b>
17	BEARING-CONE (TOP)	1	
18	BEARING-CUP (TOP)	1	
19	BEARING-CONE (BOTTOM)	1	
20	BEARING-CUP (BOTTOM)	1	
15	WASHER-LOCK	1	
16	OIL SEAL SEALANT	1	
	<b>D3 SPINDLE REPLACEMENT INSERT KIT</b>		<b>33-0080</b>
21	WASHER-THRUST (TOP)	1	
22	COUPLING SEALANT	1	

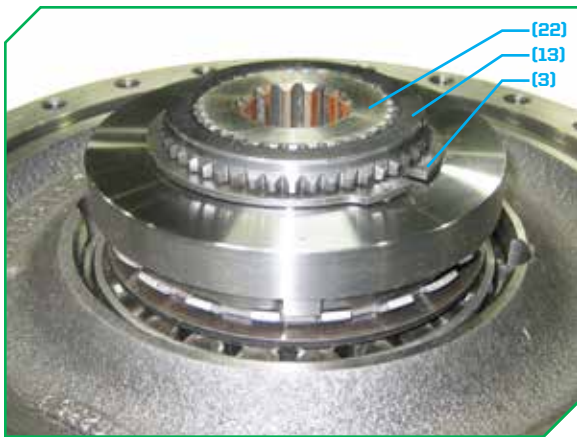


# SPINDLE REBUILD INSTRUCTIONS

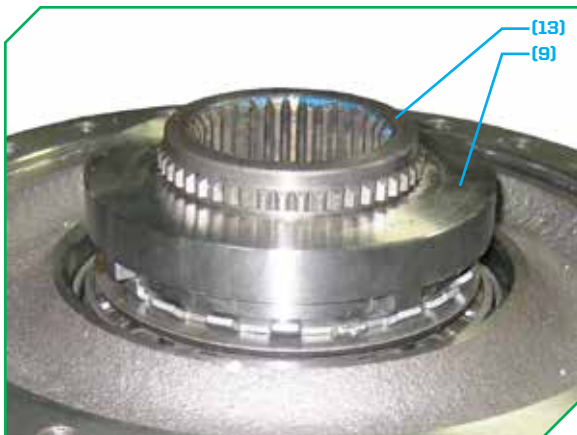


## SPINDLE DISASSEMBLY

- Set the spindle assembly on a flat work surface with the cover <sup>(14)</sup> facing up, and make a witness mark <sup>(14a)</sup> on the cover <sup>(14)</sup> and hub <sup>(11)</sup> so the cover <sup>(14)</sup> may be reassembled in the exact orientation.
- Remove the hardware <sup>(1)(2)</sup> securing the cover <sup>(14)</sup> to the hub <sup>(11)</sup>.



- Thread a 3/4" NF bolt (3" or longer) into the splined insert <sup>(22)</sup> to lift it out and remove it from the output shaft <sup>(13)</sup>; set it aside.
- Remove the retaining ring <sup>(3)</sup> from the output shaft <sup>(13)</sup>; set it aside.



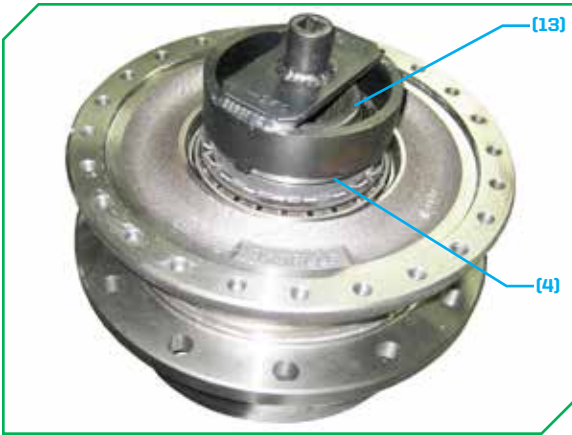
- Lift up the keeper plate <sup>(9)</sup> from the output shaft <sup>(13)</sup>; set it aside.



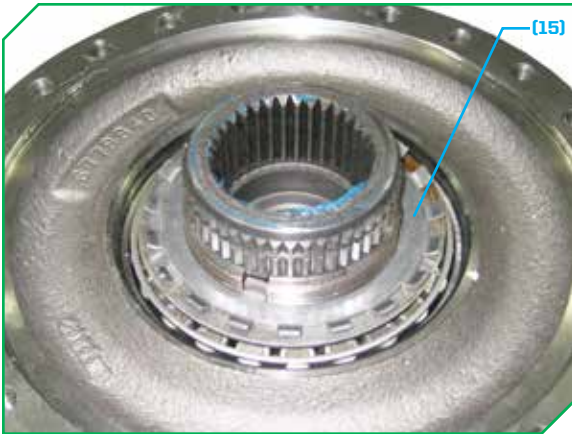
- Bend out the tab(s) of the lock washer <sup>(15)</sup> that are in the notch(s) of the lock nut <sup>(4)</sup> to allow the lock nut <sup>(4)</sup> to be spun off its threads.

# SPINDLE REBUILD INSTRUCTIONS

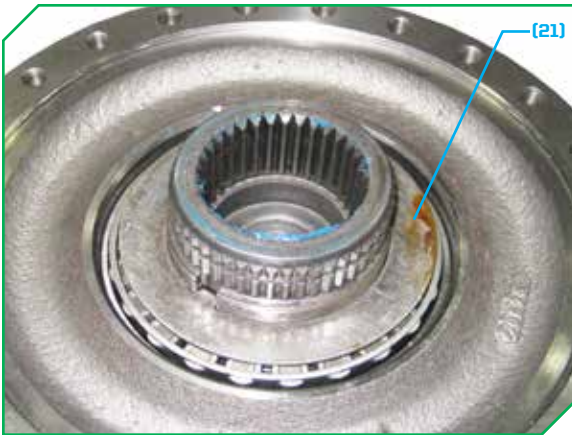
## SPINDLE DISASSEMBLY



- Place a spanner socket (part #24-0316) onto the lock nut<sub>(4)</sub>, and using a driver and/or wrench, remove the lock nut<sub>(4)</sub> from the output shaft<sub>(13)</sub>; set it aside.



- Lift the lock washer<sub>(15)</sub> off of the output shaft<sub>(13)</sub> and discard.



- Lift the thrust washer<sub>(21)</sub> off of the output shaft<sub>(13)</sub> and set it aside.



- **Puller Tool:**
  - Place a spacer / shim over the top of the output shaft<sub>(13)</sub>.
  - Bolt puller tool (part #24-0314) to the hub<sub>(11)</sub>.
  - Turn the center bolt down until it contacts the spacer / shim.
  - Tighten the center bolt with a wrench until the hub<sub>(11)</sub> is "free" of the output shaft<sub>(13)</sub>.
  - Remove the puller tool and spacer / shim; lift the hub<sub>(11)</sub> off of the output shaft<sub>(13)</sub>; set it aside.

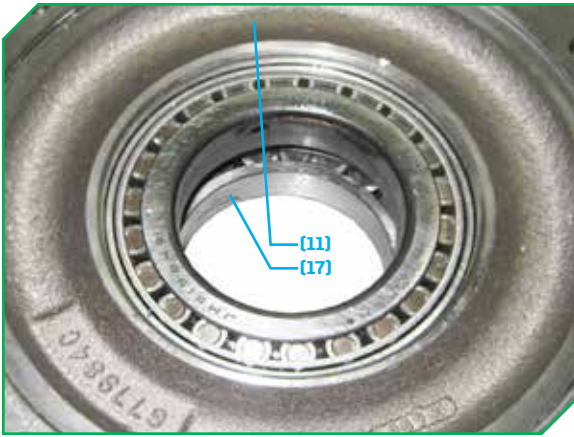
### Hydraulic Press:

- Place the spindle assembly into a press so the output shaft<sub>(13)</sub> may be pressed out of the hub<sub>(11)</sub>.

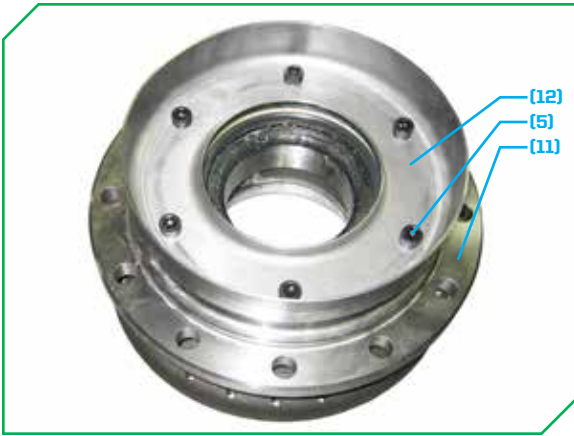


# SPINDLE REBUILD INSTRUCTIONS

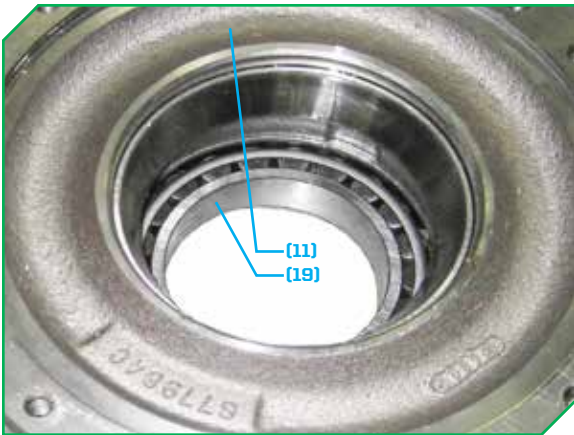
## SPINDLE DISASSEMBLY



- Place a spacer / shim on the output shaft (13) and press down until the hub (11) is “free” of the output shaft (13); lift the hub (11) off of the output shaft (13); set it aside.
- Remove the top bearing cone (17) and discard.
  - Use a plastic mallet and a block of wood to gently tap it out.
  - Use caution; do not scratch or scar the interior of the hub (11).



- Place the hub (11) on the work surface with the guard (12) facing up.
- Remove the cap screws (5) securing the guard (12) to the hub (11); set the guard (12) and cap screws (5) aside.

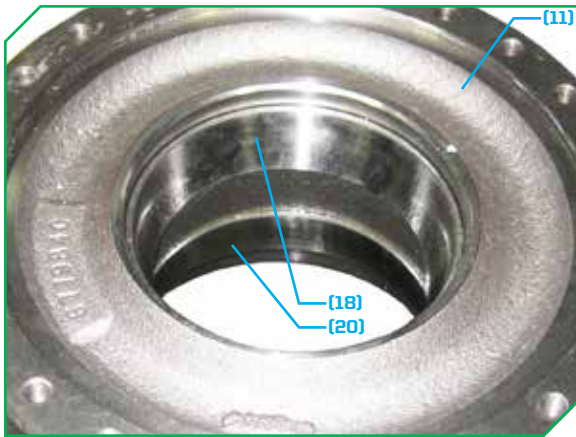


- Place the hub (11) on blocks and tap out the bottom bearing cone (19), along with the oil seal (16) from the hub (11); discard them both.
  - Use a plastic mallet and a block of wood to gently tap it out.
  - Use caution; do not scratch or scar the interior of the hub (11).



# SPINDLE REBUILD INSTRUCTIONS

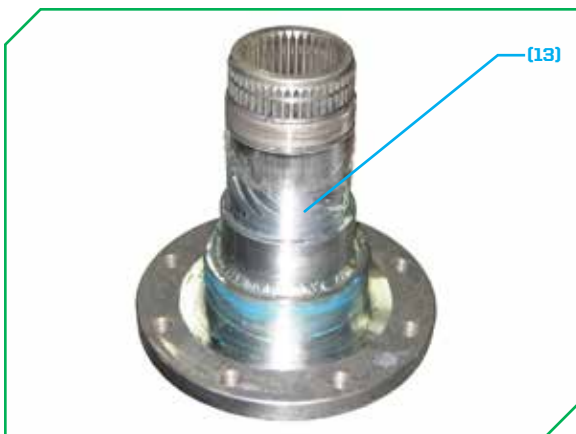
## SPINDLE DISASSEMBLY



- Inspect the bearing cups <sup>(18)(20)</sup> for scratches, gouges, burrs, etc.
  - If one or both of the bearing cups <sup>(18)(20)</sup> need to be replaced:
    - Gently tap them out using a plastic mallet and a block of wood, etc.
    - The bearing cups <sup>(18)(20)</sup> have a removal notch <sup>(11a)</sup> so leverage may be obtained behind the rear lip of the bearing cups <sup>(18)(20)</sup>.
    - Gently / evenly tap in the new bearing cups <sup>(18)(20)</sup> until fully seated in the hub <sup>(11)</sup>.



- Grease the interior lip / ring of the new oil seal <sup>(16)</sup> liberally with #2 lithium base grease as illustrated.



- Grease the center bearing surfaces of the output shaft <sup>(13)</sup> liberally with #2 lithium base grease as illustrated.

# SPINDLE REBUILD INSTRUCTIONS

## SPINDLE RESASSEMBLY



- Make sure the hub <sup>(11)</sup> is orientated on the work surface as illustrated.
- Place a new bottom bearing cone <sup>(19)</sup> into the hub <sup>(11)</sup> until it is fully seated into its bearing cup <sup>(20)</sup>.



- Place the new oil seal <sup>(6)</sup> into its recess in the hub <sup>(11)</sup>.
  - Gently / evenly tap all around the oil seal <sup>(6)</sup> to fully seat it.
  - Confirm the black, inner double lip of the oil seal <sup>(6)</sup> is facing up.



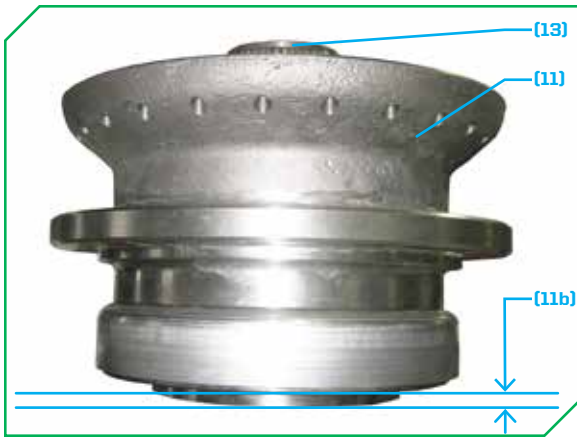
- Reassemble the guard <sup>(12)</sup> to the hub <sup>(11)</sup> with the cap screws <sup>(5)</sup>.
  - Use Loctite 262 on the cap screw <sup>(5)</sup> threads.
  - Torque the cap screws <sup>(5)</sup> to 20ft-lbs (27Nm).



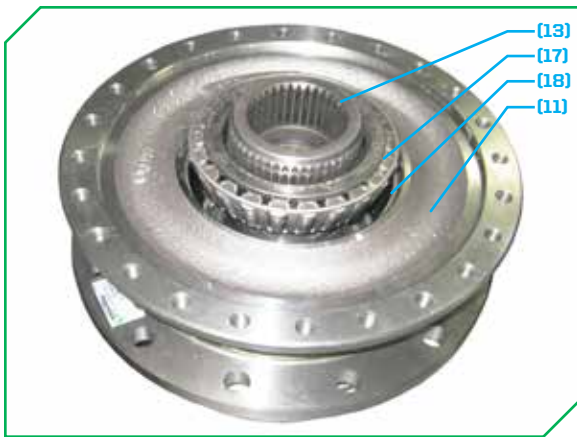
- Turn the hub <sup>(11)</sup> over, and place it down over the output shaft <sup>(13)</sup>.

# SPINDLE REBUILD INSTRUCTIONS

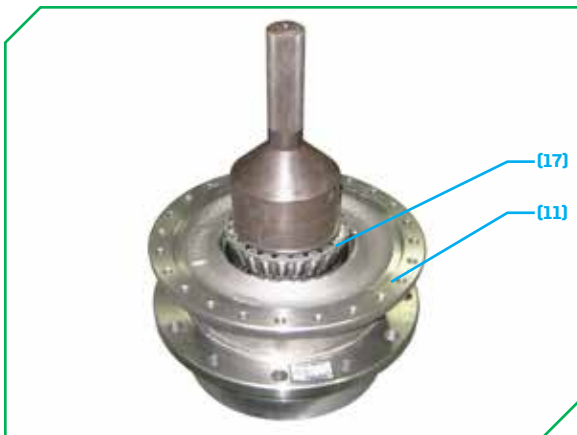
## SPINDLE RESASSEMBLY



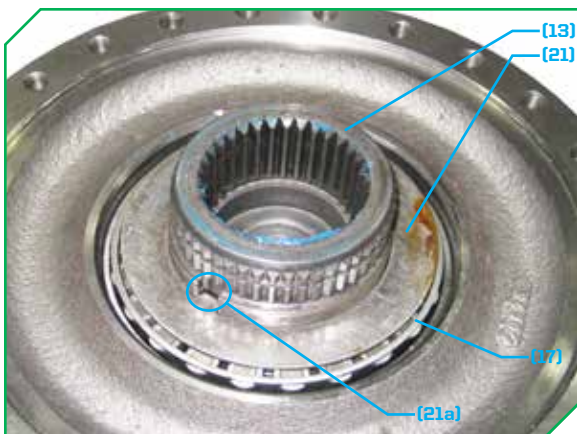
- While lowering the hub (11) down onto the output shaft (13), confirm it is fully seated with a marginal gap (11b) between the edge of the hub (11) and the base of the output shaft (13).



- Place a new top bearing cone (17) around the output shaft (13), and gently / evenly press it down into its bearing cup (18) on the hub (11) as much as possible by hand.



- Place a driver tool (part #24-0317) or large spacer onto the new top bearing cone (17), and gently / evenly press or tap the new top bearing cone (17) down until it is seated approximately even with the hub (11) edge, as illustrated.
  - **NOTE:** a hydraulic press may be used, but **DO NOT** fully press new top bearing cone (17) down even with the hub (11) edge; instead, finish by evenly tapping it down and periodically checking (with a pick) if the roller bearings can move / rotate.

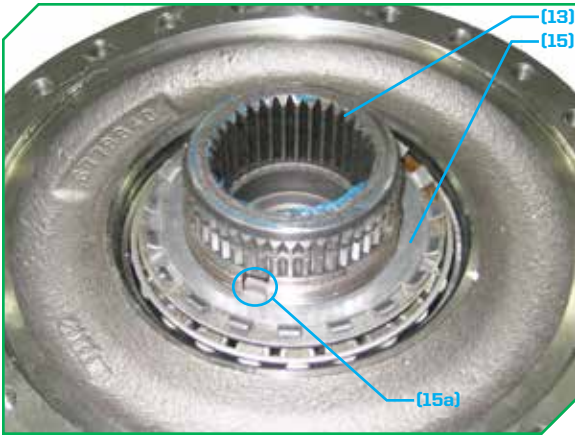


- Place the thrust washer (21) around the output shaft (13) and on top of the new top bearing cone (17).
  - Confirm the thrust washer (21) locating tab is within the notch (21a) on the output shaft (13) as illustrated.



# SPINDLE REBUILD INSTRUCTIONS

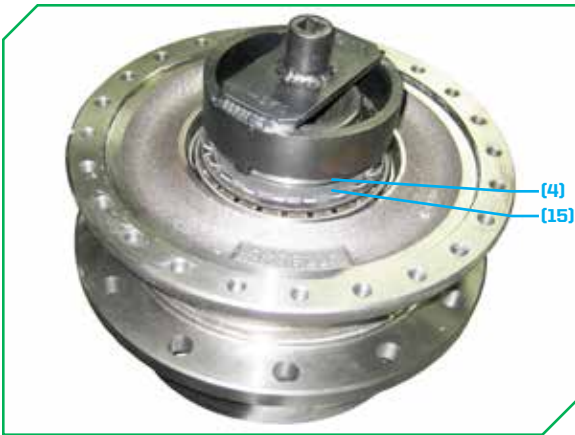
## SPINDLE RESASSEMBLY



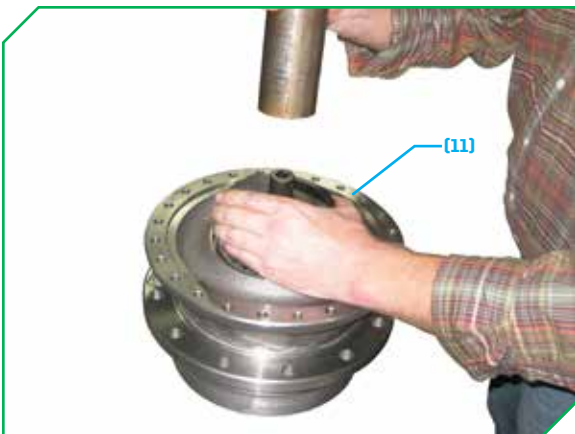
- Place a new lock washer (15) around the output shaft (13) and on top of the thrust washer (21), confirming its locating tab is within the notch (15a) on the output shaft (13) threads as illustrated.



- Thread the lock nut (4) onto the output shaft (13) threads (conical / tapered side down) until it contacts the lock washer (15) underneath.



- Place a spanner socket (part #24-0316) on top of the lock nut (4), and use a wrench to tighten it against the lock washer (15) approximately 1/2 turn.



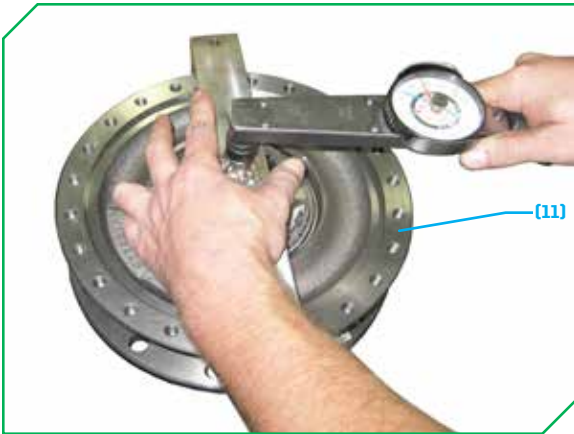
- Give the spanner socket (part #24-0316) a few firm taps with a hammer or steel weight while simultaneously rotating the hub (11).
- Using a wrench, turn the spanner socket another 1/2 turn.

# SPINDLE REBUILD INSTRUCTIONS

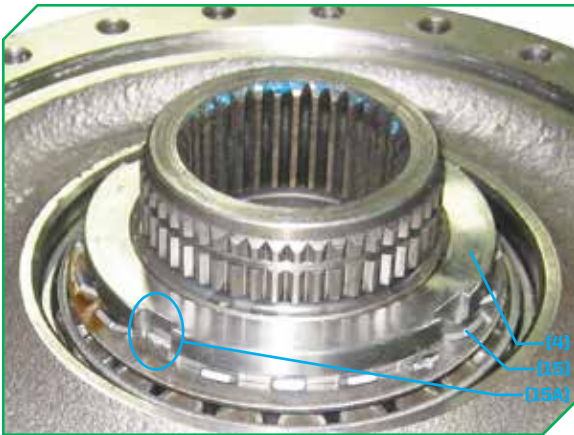
## SPINDLE RESASSEMBLY



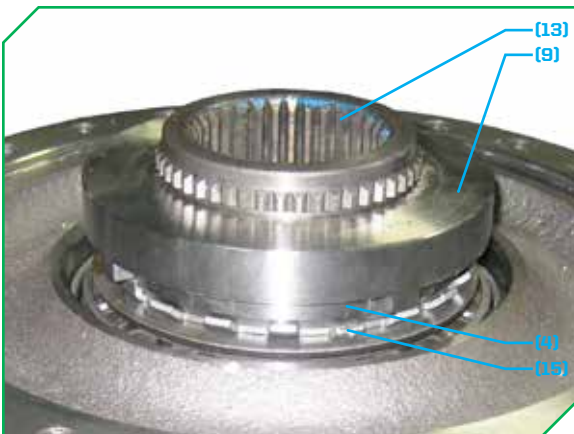
- Remove the spanner socket, and check (with a pick) each individual roller in the new top bearing cone (17) and confirm they can move or spin.
  - If none of the rollers can be moved with the pick, proceed to the next step.
  - If one or more of the rollers can be rotated or moved about in the new top bearing cone (17), repeat this and the previous two steps until none of the rollers have movement.



- Assemble a torque spanner tool (part #24-0315) to the hub (11), and then attach a torque wrench to the torque spanner tool.
- Rotate the hub (11) with the torque wrench.
  - The torque to rotate range should be between 40-60in-lbs (4.6-6.7Nm). If the torque to rotate result is **LESS** than 40in-lbs (4.6Nm), repeat the last two steps on page 9 and this step. Continue doing this until the target range of 40-60in/lbs (4.6-6.7Nm) of torque to rotate is achieved.
  - If the torque to rotate is **HIGHER** than 60in-lbs (6.7Nm), you will need to repeat the last step on page 3, all steps on page 4, the last step on page 8 and the following steps thru this step.



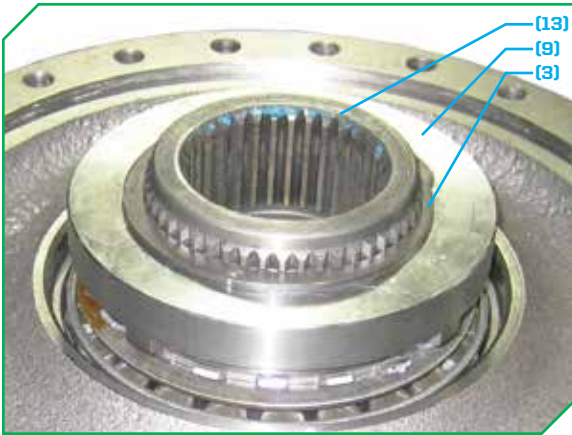
- Bend one or more tabs of the lock washer (15) into its recess (15a) on the lock nut (4) as illustrated.
  - If none of the recesses (15a) on the lock nut (4) are aligned with the tabs on the lock washer (15), the lock nut (4) can be slightly tightened until at least one notch on the lock nut (4) lines up with a tab on the lock washer (15).



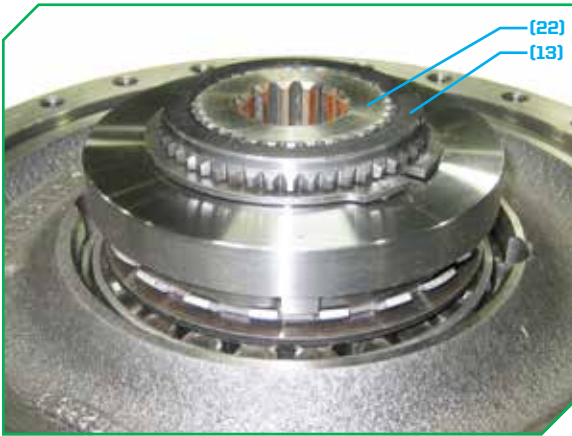
- Slide the keeper plate (9) down onto the splines of the output shaft (13), making sure its tabs lock into the recesses of the lock nut (4) the same as the lock washer (15) did in the previous step.
  - If the keeper plate (9) tabs do not line up with the lock nut (4) tab recesses, re-index the keeper plate (9) until its tabs line up with the tab recesses in the lock nut (4).

# SPINDLE REBUILD INSTRUCTIONS

## SPINDLE RESASSEMBLY



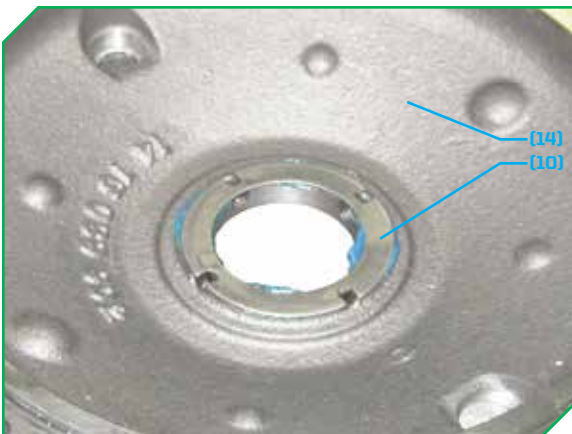
- Assemble the retaining ring<sup>(13)</sup> into the notch in the splines on the outside of the output shaft<sup>(13)</sup>, securing the keeper plate<sup>(9)</sup>.



- Slide the splined insert<sup>(22)</sup> into the splines on the inside of the output shaft<sup>(13)</sup> as illustrated.



- Rest the cover<sup>(14)</sup> on the work surface as illustrated.
  - Clean the mounting surface of the cover<sup>(14)</sup> of any debris, residual silicone sealant, etc.
- Place a large drop of #2 lithium base grease on the flats where the thrust washer<sup>(10)</sup> will rest.



- Place the thrust washer<sup>(10)</sup> down on top of the grease drops on the cover<sup>(14)</sup>.
  - Confirm the notches on the thrust washer<sup>(10)</sup> are lined up with the corresponding notches on the cover<sup>(14)</sup> as illustrated.



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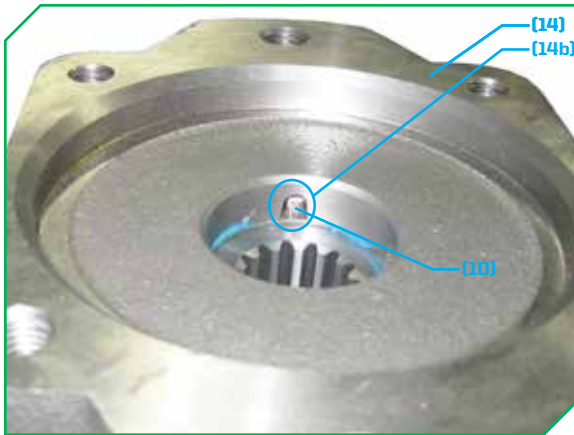
## SPINDLE RESASSEMBLY



- Place a heavy bead of silicone sealant around the perimeter of the hub<sub>(11)</sub> as illustrated.



- Reassemble the cover<sub>(14)</sub> to the hub<sub>(11)</sub>, confirming the witness marks<sub>(14a)</sub> on the cover<sub>(14)</sub> and hub<sub>(11)</sub> are lined up as illustrated.
- Secure the cover<sub>(14)</sub> to the hub<sub>(11)</sub> with its hardware<sub>(1)(2)</sub> in an alternating criss cross pattern.
  - Torque the hardware<sub>(1)(2)</sub> to 45ft-lbs (61Nm).



- Once the cover<sub>(14)</sub> has been fully secured, look inside of the hole in the top of the cover<sub>(14)</sub> for the small notch / opening<sub>(14b)</sub>. Confirm the small thrust washer<sub>(10)</sub> on the inside of the cover<sub>(14)</sub> did not move during the reassembly process. It should look as illustrated.
  - If the thrust washer<sub>(10)</sub> moved, disassemble the cover<sub>(14)</sub> from the hub<sub>(11)</sub> and repeat the last two steps on page 11, and all but the last step on this page.



- In the event information on the spindle (serial numbers, model numbers, etc). are needed, the locations of that information are illustrated at left.
- Once all work is complete, fill the spindle with 40oz of 75w90 synthetic gear oil.
  - Reference your operator's manual for specific instructions on filling and draining oil from the spindle.