

SECTION 3 POWER TRAIN SYSTEM

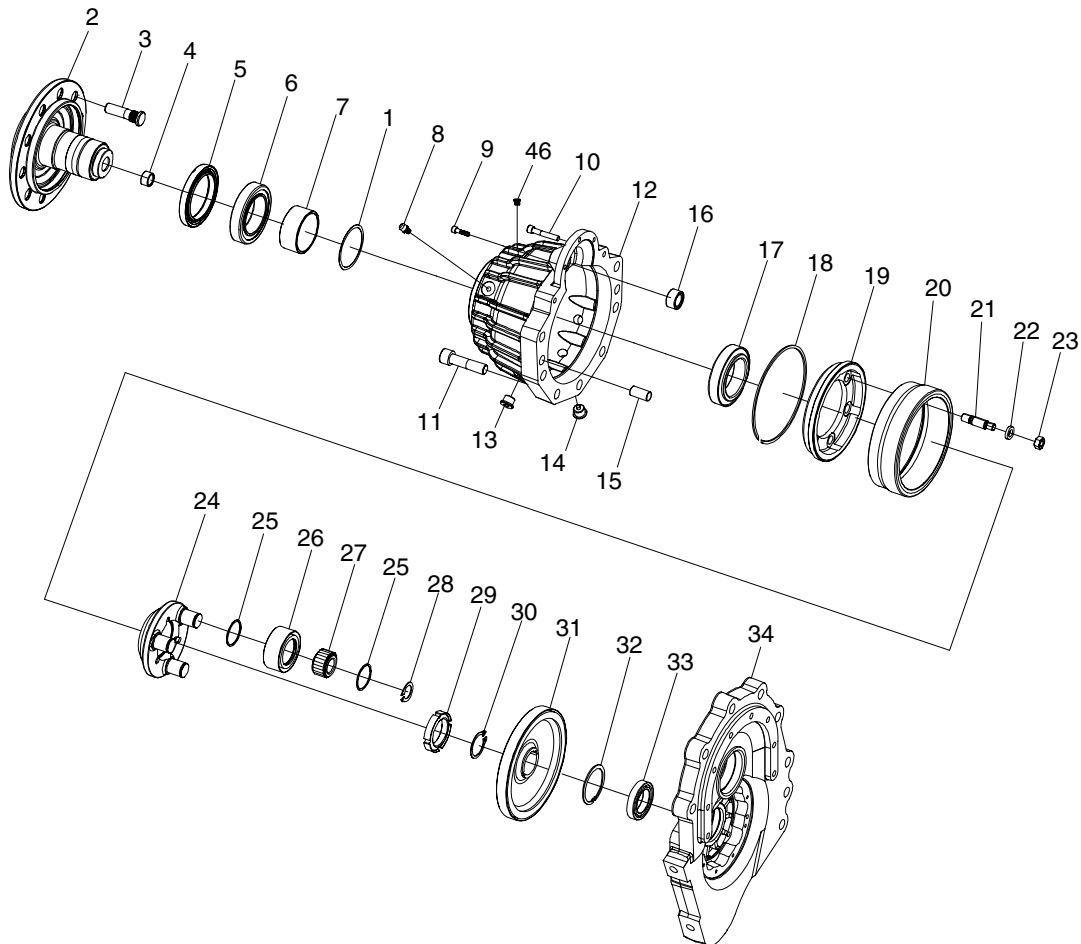
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SECTION 3 POWER TRAIN SYSTEM

GROUP 1 STRUCTURE AND OPERATION

1. DRIVE UNIT

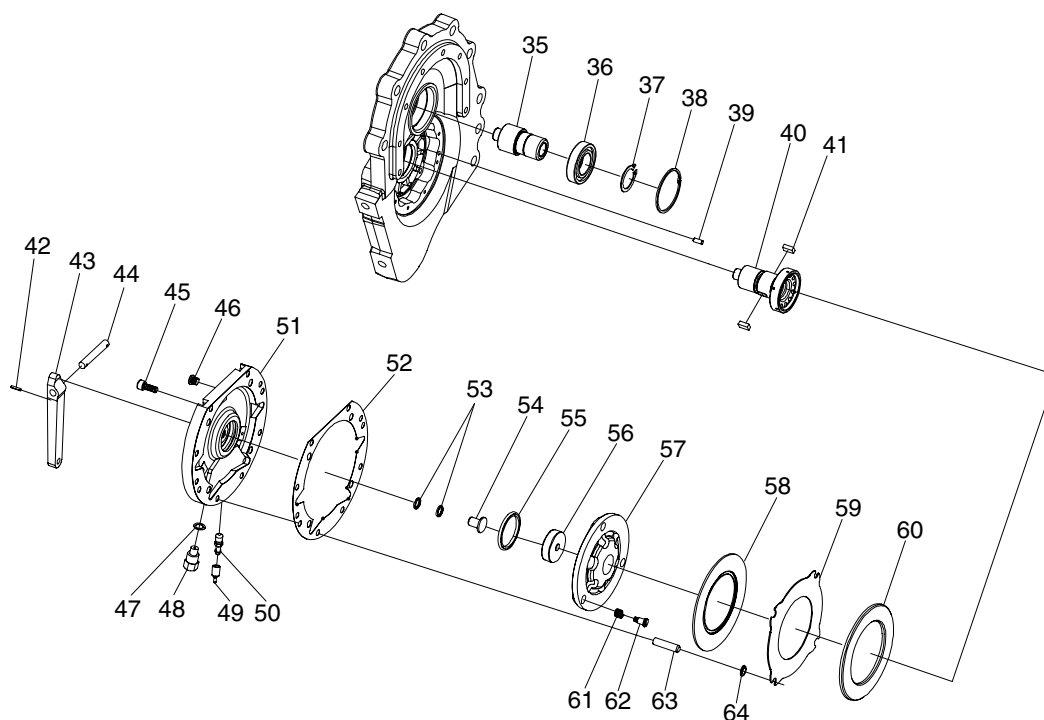
1) STRUCTURE (1/2)



35B7PT01

1	Spacer	13	Screw plug	25	Retaining ring
2	Wheel hub	14	Magnetic screw plug	26	Planet gear
3	Wheel fixing screw	15	Locking pin	27	Roller bearing
4	Needle cage	16	Needle cage	28	Retaining ring
5	Shaft seal	17	Taper roller bearing	29	Lock nut
6	Taper roller bearing	18	Retaining ring	30	Retaining ring
7	Spacer	19	Ring gear carrier disc	31	Helix gear
8	Breather plug	20	Ring gear	32	Retaining ring
9	Cap screw	21	Stud	33	Ball bearing
10	Cap screw	22	Washer	34	Cover
11	Cap screw	23	Hexagon nut		
12	Housing	24	Planet carrier		

STRUCTURE (2/2)



35B7PT02

35	Helix pinion	45	Cap screw	55	Step seal
36	Ball bearing	46	Screw plug	56	Piston
37	Retaining ring	47	Washer	57	Disk pusher
38	Retaining ring	48	Connection	58	Friction disk
39	Locking pin	49	Bleeder nipple cap	59	Steel disk
40	Sun pinion	50	Bleeder nipple	60	Support disk
41	Feather key	51	Brake housing	61	Spring
42	Elastic pin	52	Seal	62	Fixing screw
43	Lever	53	Piston seal	63	Locking pin
44	Pin	54	Piston	64	Spring

2) SPECIFICATION

Item	Unit	Specification
Max wheel load	kg/lb	6200/13670
Max input rpm	rpm	5000
Gear ratio	-	29.0
Weight without fluid(EA)	kg/lb	125/276
Oil quantity	l /U.S. · qt	1.5/1.6

GROUP 2 TROUBLESHOOTING

Problem	Cause	Remedy
1. Noise 1) Knocking conditional on speed 2) Singing noise 3) Muffled grinding noise	<ul style="list-style-type: none"> • Gearing of helical gear steep has been damaged when mounting motor. • Motor connection is not correct. • Motor bearing is faulty. • Wheel bearings faulty. <ul style="list-style-type: none"> - Due to insufficient fluid level. - Inadmissibly high prestress of bearings. • Gearing of planetary step is damaged <ul style="list-style-type: none"> - Due to insufficient fluid level. - Due to excessive bearing clearance of wheel. 	<ul style="list-style-type: none"> - Dismount electric motor. Check drive pinion and helical gear for damage. - Check motor connection. - Check motor bearing. - Have bearings checked in a workshop. - Have gear set of planetary step and wheel bearings checked in a workshop.
2. Leakage 1) Breather valve 2) Motor 3) Wheel shaft 4) Brake lever 5) Transmission warms up	<ul style="list-style-type: none"> • Excessive fluid level. • O-ring seal faulty. Bearing seal of electric motor faulty. • Sealing ring of wheel shaft faulty. • Sealing ring of brake lever faulty. • Fluid level is either too high or too low. • Wheel bearings with an excessive pretension. 	<ul style="list-style-type: none"> - Check fluid level. - Dismount electric motor, check O-ring and sealing surfaces for damages. - Check sealing ring and wheel shaft for damages in the sealing area. - Check sealing ring and straight pin for damages in the sealing area. Consult workshop. - Check fluid level. - Check clearance of wheel shaft.

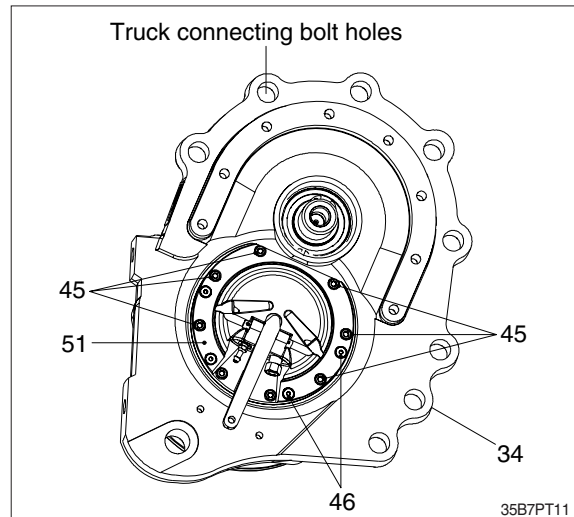
GROUP 3 DISASSEMBLY AND ASSEMBLY

※ During maintenance, assembly and disassembly activities use caution and proper safety equipment, in observance of the rules provided by safety laws.

1. BRAKE DISASSEMBLY PROCEDURE

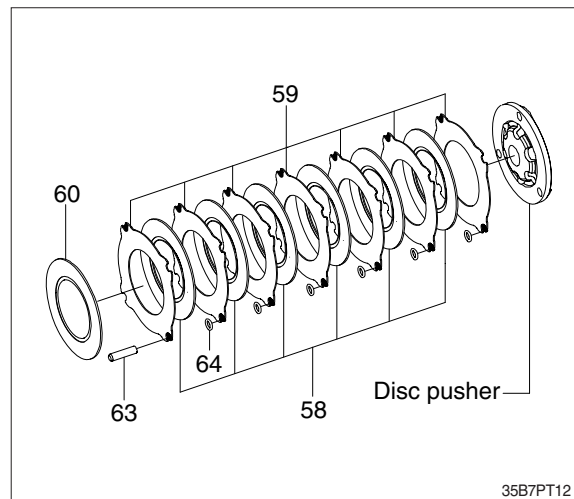
1) GENERAL DESCRIPTION

- (1) Remove the two plugs (46) and drain the oil off, at least partially; unscrew the 8 screws (45).
- (2) Two of the holes where the screws are located have a M10 thread: drive two M8 grubs in, in order to save the thread of the flange (34), then drive two M10 screws in until the brake housing (51) is extracted.



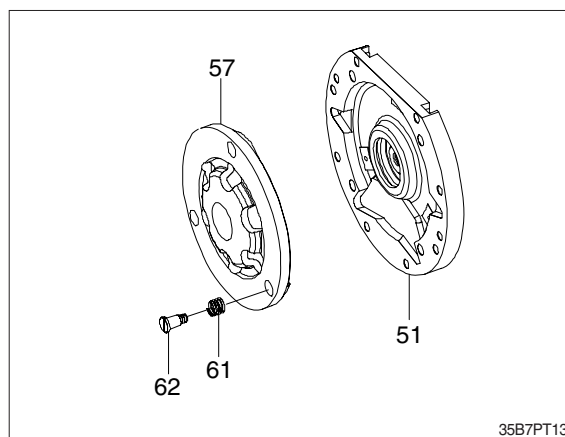
2) REPLACE OF THE BRAKE DISCS

- (1) The brake discs unit is made of 7 steel discs (59) and 6 friction discs (58), ordered in an alternate way (the first one and the last one must be steel disc).
- (2) Between every couple of steel discs four elastic springs are inserted (64), one spring on each locking pin (63).
- (3) Remove the 13 discs of the brake units and the springs (64). Remove finally the support disc (60).
- (4) Wash down the housing thoroughly, then to assemble the parts again follow next steps:
 - ① step1: Insert the support disc (60).
 - ② step2: Insert steel disc (59), 4 elastic springs (64) one spring on each locking pin (63), friction discs (58).
 - ③ step3: Repeat step2 for other 5 times.
 - ④ step4: Place last steel disc.

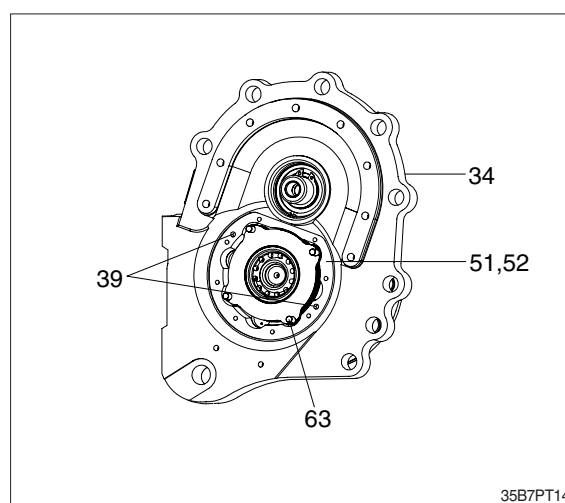


3) REPLACING DISCS PUSHER

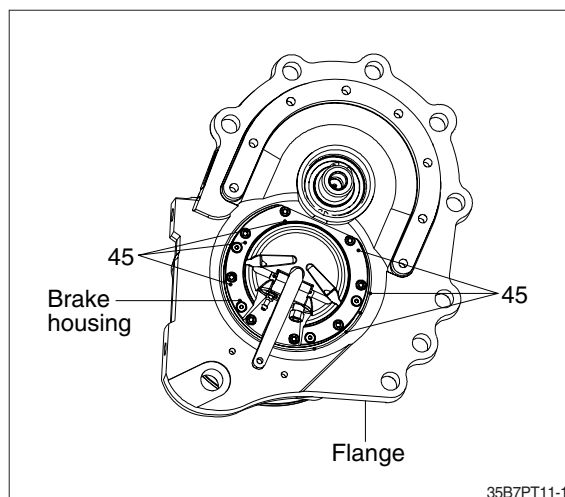
- (1) The disc pusher device (57) is seated on the brake housing (51).
- (2) Unscrew first the 3 screws (62) with their springs (61), then remove the discs pusher device (57).



- (3) Place the spacer-seal (52) on the flange (34) contact surface. Insert the brake housing (51), center on its 2 pins (39) and on the 4 brake locking pins (63) and, using a rubber hammer, fine-tune the cartridge position until it is completely inserted.



- (4) Now, insert the 8 screws (45) in their own holes and set them with the following torque wrenches:
 - Screw M8 ; 4.08 kgf · m (29.5 lbf · ft)

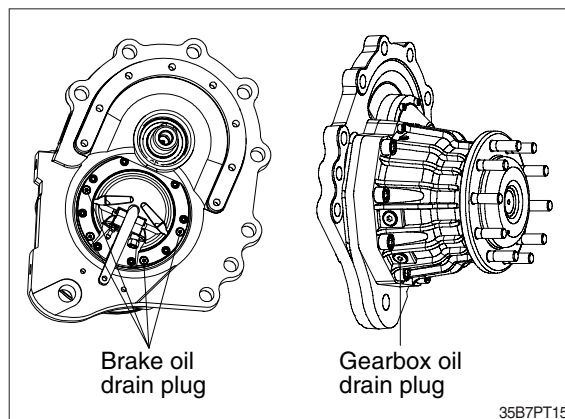


2. GEARBOX DISASSEMBLY

※ The gearbox is made with heavy parts, secure the parts and use proper lifting equipment.

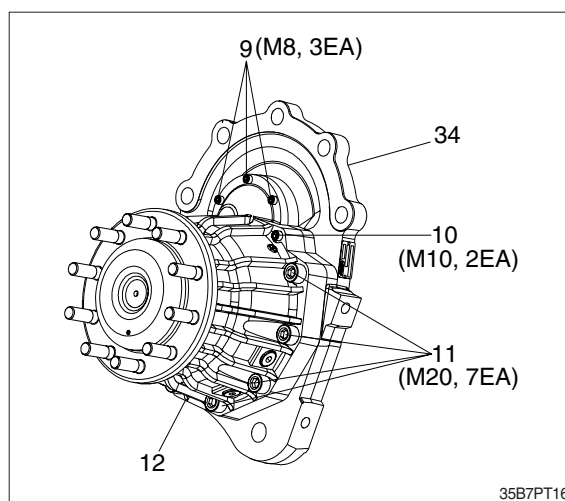
1) GENERAL DESCRIPTION

- (1) It's possible to open the gearbox without disassembling it from the truck.
- (2) You have to drain the oil from both chambers, the reduction gearbox and the brake, removing the plugs from the bottom side and removing the brake oil plugs too.



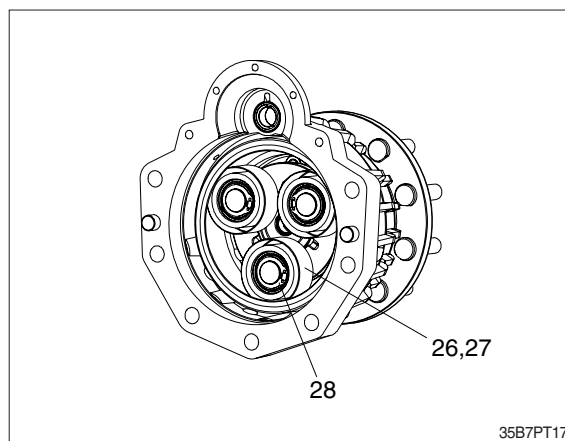
2) HOUSING REMOVAL

- (1) Secure the gearbox housing (12) and unscrew the screws (11), the screws (10) and the screws (9) which connect the casing to the cover (34).
 - (2) Remove the casing pulling it along the wheel axis.
- ※ Pay attention: the casing is heavy!

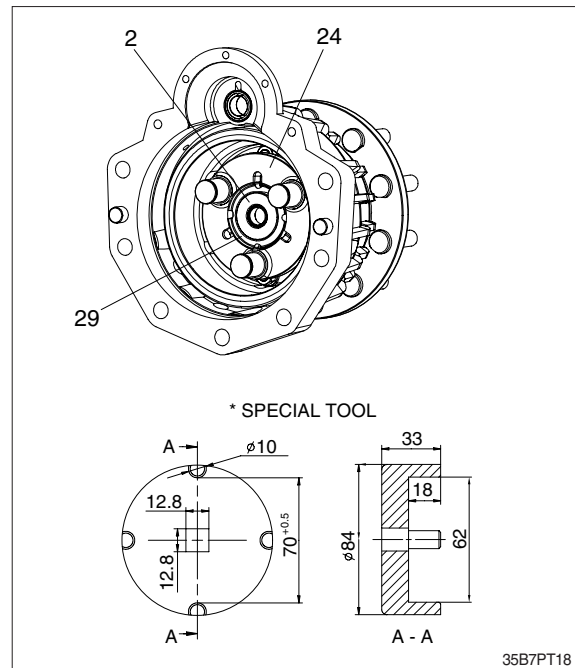


3) DISASSEMBLY OF THE RING GEAR AND OF THE WHEEL HUB

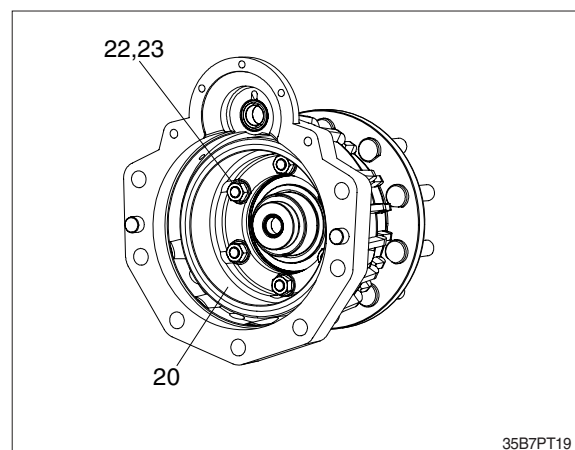
- (1) In order to pull out the planet gears (26) and their bearings (27), remove the retaining ring (28) and use a special extractor.



- (2) To unscrew the lock nut (29) a special tool is required. To remove the wheel hub (2) place a special tool on the center of the M60 thread of the hub, and carefully press it out. At this point slip off the planet carrier (24) too.



- (3) Unscrew the 6 nuts (23), remove the washers (22) and pull out the ring gear (20).

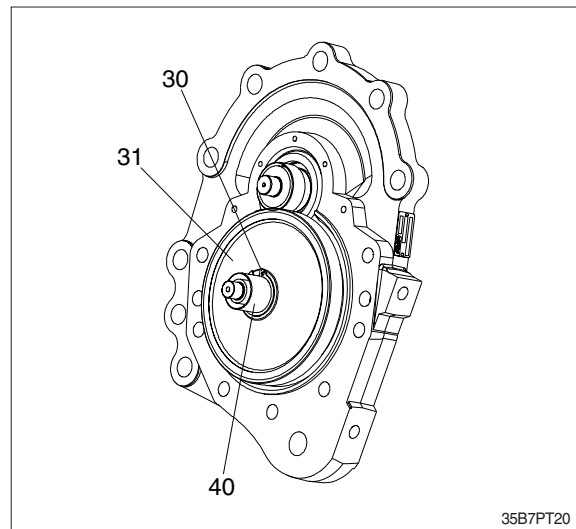


4) DISASSEMBLY OF THE SUN PINION

- (1) To disassembly the sun pinion and the input shaft you have to remove the flange and the connected motor from the truck. Secure the motor, then unscrew the frame connecting screws (M24, 8EA). Place the flange and the motor on a surface. Unscrew the motor connecting screws (M14, 8EA) and separate it from the flange.

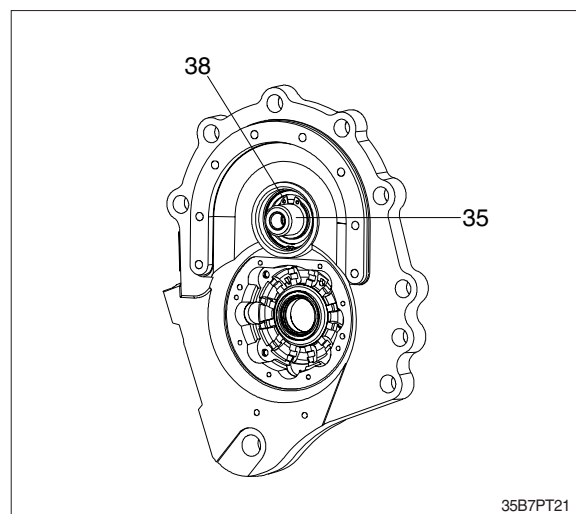
※ Prior to this operation you have to drain the brake oil and to remove the cartridge and the brake disc unit.

- (2) Remove the retaining ring (30). To remove the helix gear (31) put a disc ($\varnothing_i = 96$ mm, $\varnothing_e = 130$ mm) on the cover (looking from the brake side) and carefully press on a pipe ($\varnothing_i = 24$ mm, $\varnothing_e = 45$ mm) placed on the sun pinion (40) (looking from the gearbox side).



5) DISASSEMBLY OF THE HELIX PINION

- (1) Remove first the retaining ring (38) and helping yourself with a rubber hammer take out the helix pinion (35) beating it from the gears side.

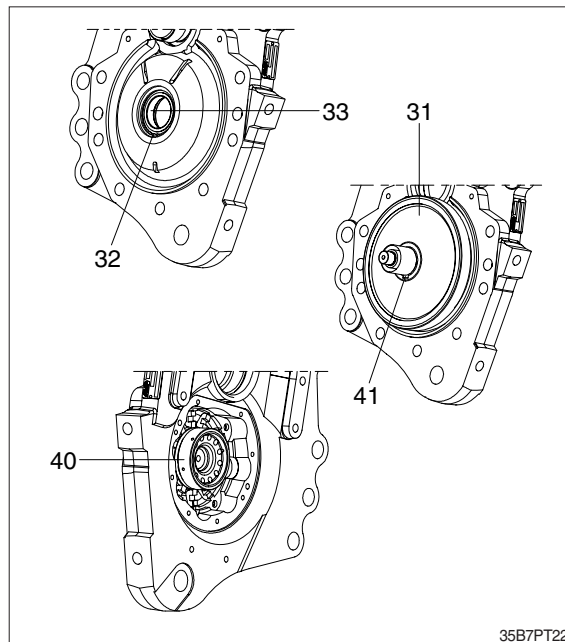


3. ASSEMBLY OF THE REDUCTION GEAR

※ After the worn out parts have been replaced, to assemble the unit again follow the disassembling process steps in reverse order.

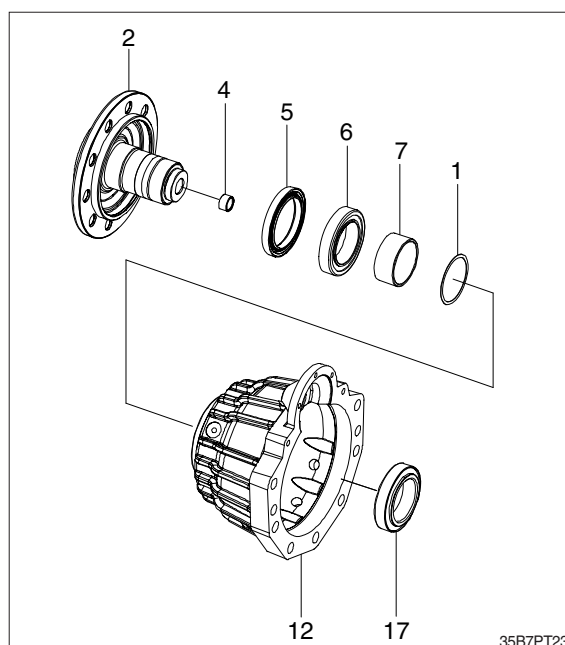
1) ASSEMBLY OF THE SUN PINION

(1) Key the bearing (33) in its own slot on the flange (34), locking it with the retaining ring (32), insert the sun pinion (40) using a press and pushing on the inner ring of the bearing (33); place the feather key (41) into its own slot and insert the helix gear (31) on the sun pinion (40). To easy keying operations, you may heat the helix gear (31) to maximum 100~120°C. Insert the retaining ring (30).

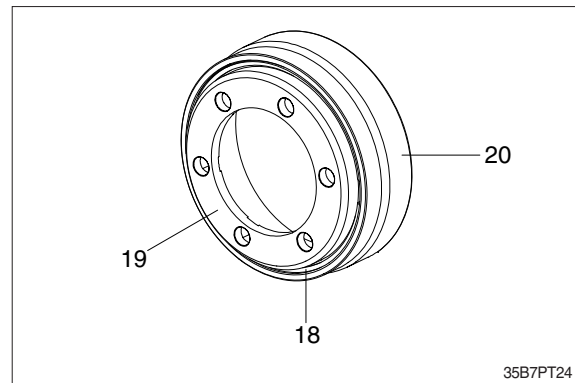


2) ASSEMBLING THE RING GEAR AND THE WHEEL HUB

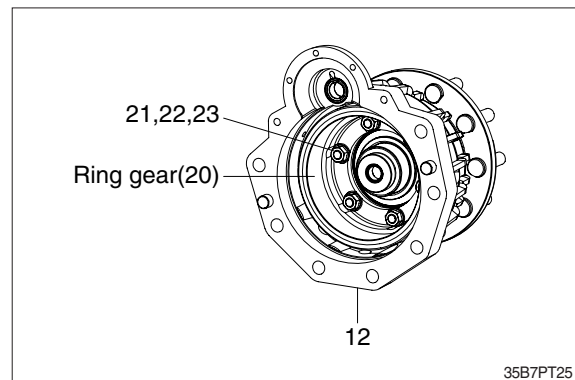
- (1) Insert the cup (outer ring) of the tapered bearings (6, 17) in their front and rear housings on the housing (12).
- (2) Insert the seal ring (5) onto the wheel hub (2).
- (3) Insert the cone (inner ring) of bearing (6) onto the hub (2) possibly heating it up to 100~120°C. Insert the needle cage (4) in its own slot in the hub (2).
- (4) Introduce the pre-assembled hub into the casing.
- (5) Insert the set-right spacer (7) and the spacers (1) into the shaft and then place the cone of the bearing (17), pressure-keying it in.



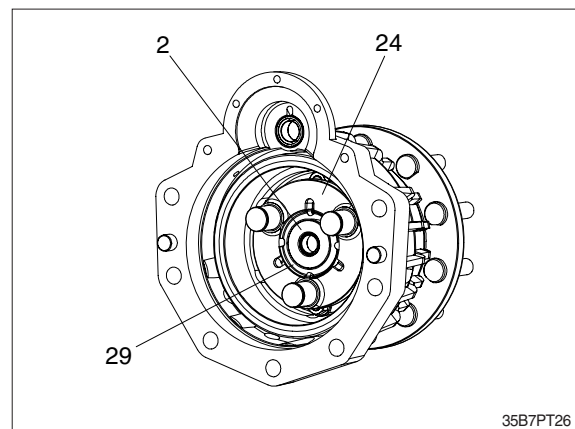
- (6) Insert the ring gear carrier disc (19) into the ring gear (20) and fix it introducing the retaining ring (18) in its housing.



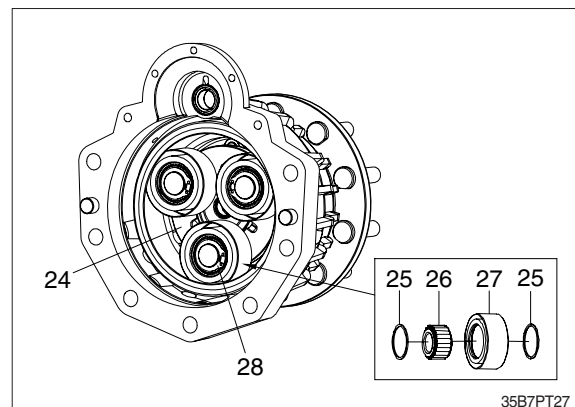
- (7) Place the disc in the housing (12) centering it on the six studs (21). If the studs (21) need to be replaced, insert the new ones into the housing (12) with high-strength thread locker. Place the washers (22), spread locking compound (strong) on the nuts (23, 6EA) and tighten them with a 10.2 kgf · m (73.8 lbf · ft) torque wrench setting.



- (8) Heat the planet carrier (24) up to 120°C, then place it onto the wheel hub spline (2) and press it down until the group is pack-closed; Tighten the ring nut (29) with an dynamometric key set at 51 kgf · m (369 lbf · ft) torque wrench, then lay the outer edge low.

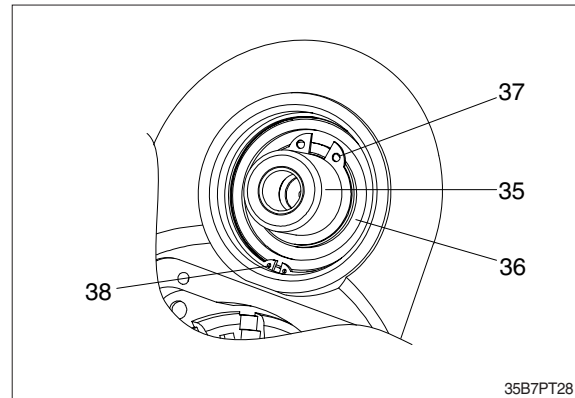


- (9) Insert the planet gears pre-mounted with their bearings (25+26+27+25) on the 3 axes of the planet carrier (24), then lock them with the retaining rings (28), one for each planet gear.



3) ASSEMBLING THE HELIX PINION

- (1) Key the bearing (36) onto the helix pinion (35) and lock it with the retaining ring (37), then insert it into the housing in the flange and lock all with the retaining ring (38).



4) ASSEMBLY OF THE COVER

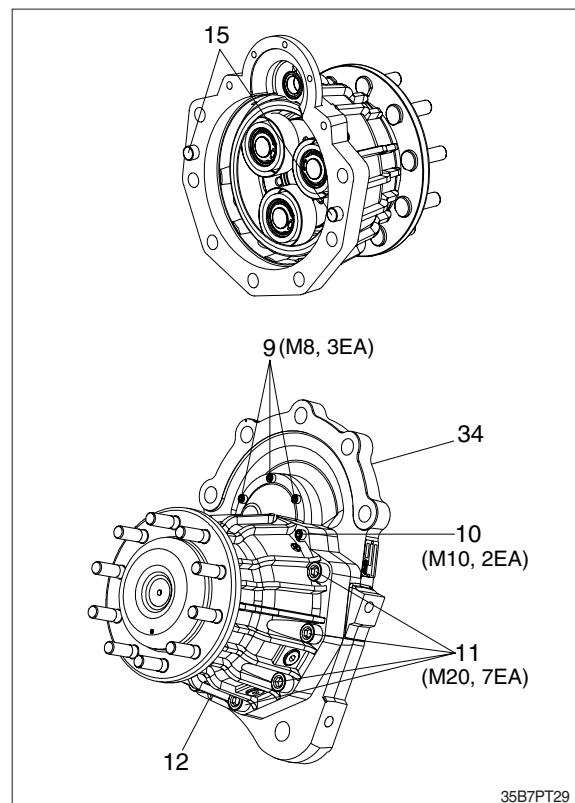
- (1) Lay a coat of sealant on the housing (12) contact surface and key the pre-mounted cover (34) onto the housing centering it on the 2 pins (15) and, using a rubber hammer, seal it all.

- (2) Insert the screws into their own seats and tighten them at:

- Screw (11), M20 × 80 :
40.8 kgf · m (295 lbf · ft)
- Screw (10), M10 × 60 :
4.59kgf · m (33.2 lbf · ft)
- Screw (9), M 8 × 30 :
4.08kgf · m (29.5 lbf · ft)

torque wrench setting.

- (3) Now is possible to assemble the brake disc unit paying attention to respect the steps on page 3-5.



- (4) Place the seal (52) on the cover (34) contact surface. Insert the brake housing (51), centering it on the 2 pins (39) and, using a rubber hammer, fine-tune the housing position until it is completely inserted.

- (5) Now, insert the screws (53, 8EA) in their own holes and set them with the following torque wrench:

- Screw (M8) : 4.08 kgf · m (29.5 lbf · ft)

