SECTION 3 POWER TRAIN SYSTEM

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(Option, 16B-9 : #1202-, 18B-9 : #0406-, 20B-9 : #2350-)
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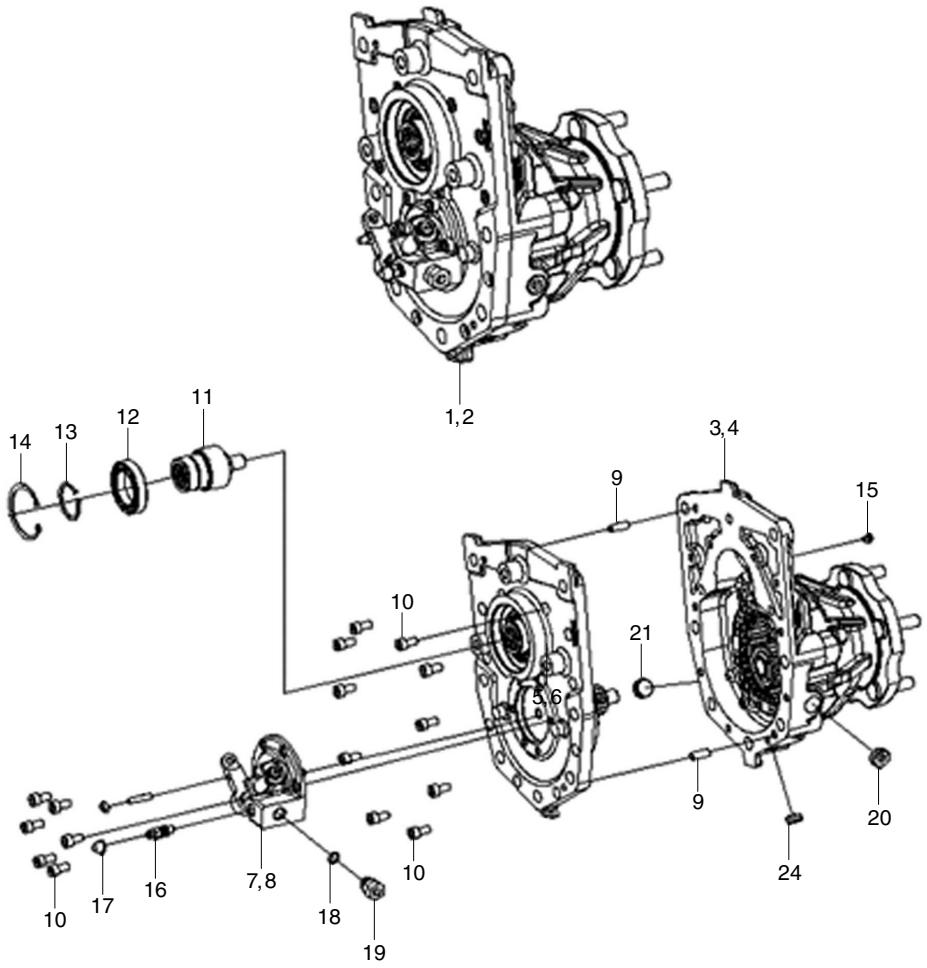
GROUP 1 STRUCTURE AND OPERATION

1. DRIVE UNIT

1) STRUCTURE

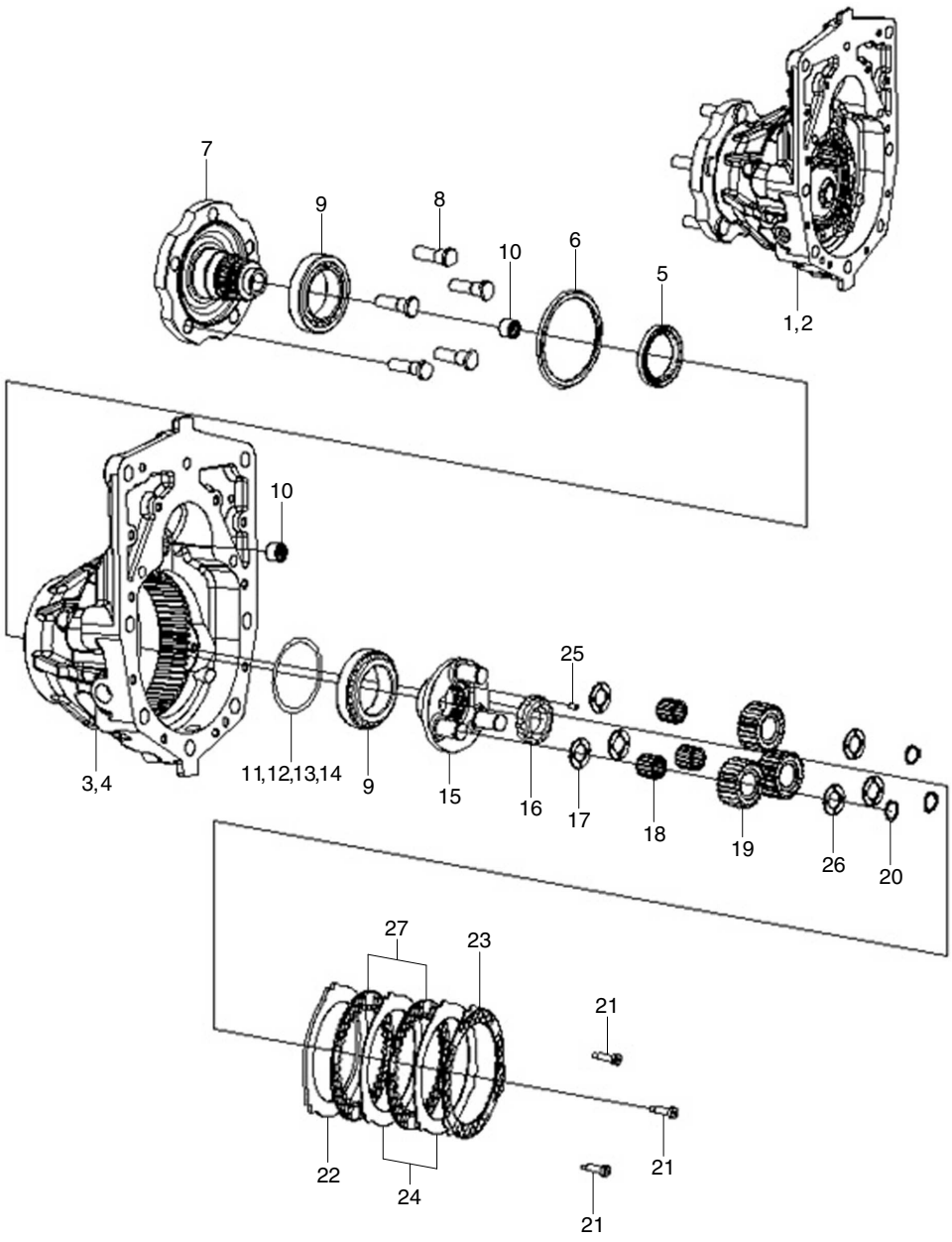
(1) Drive unit assembly



15BT9PT01

1	Dirve unit assembly (LH)	13	Snap ring (for shaft)
2	Dirve unit assembly (RH)	14	Snap ring (for hole)
3	Housing sub assembly (LH)	15	Air breather
4	Housing sub assembly (RH)	16	Breather
5	Cover out sub assembly (LH)	17	Rubber cap
6	Cover out sub assembly (RH)	18	O-ring
7	Parking sub assembly (LH)	19	Brake plug
8	Parking sub assembly (RH)	20	Plug
9	Dowel pin	21	Magnetic plug
10	Socket bolt	22	Set screw
11	Input pinion	23	Hex nut
12	Ball bearing	24	Plug

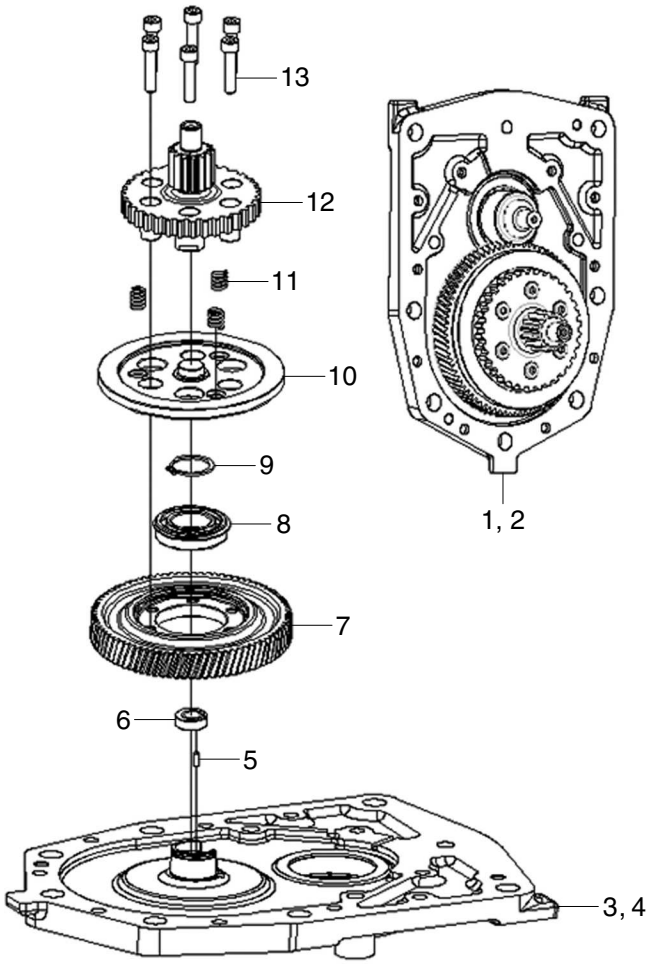
(2) Housing sub assembly



15BT9PT02

1	Housing sub assembly (LH)	15	Planetary carrier
2	Housing sub assembly (RH)	16	Lock nut
3	Housing carrier (LH)	17	Thrust washer
4	Housing carrier (RH)	18	Needle bearing
5	Oil seal	19	Planetary gear
6	Gamma seal	20	Snap ring
7	Wheel hub	21	Special bolt
8	Hub bolt	22	Back plate
9	Taper roller bearing	23	Friction disc 1
10	Needle bearing	24	Plate
11	Shim	25	Set screw
12	Shim	26	Thrust washer
13	Shim	27	Friction disc 2
14	Shim		

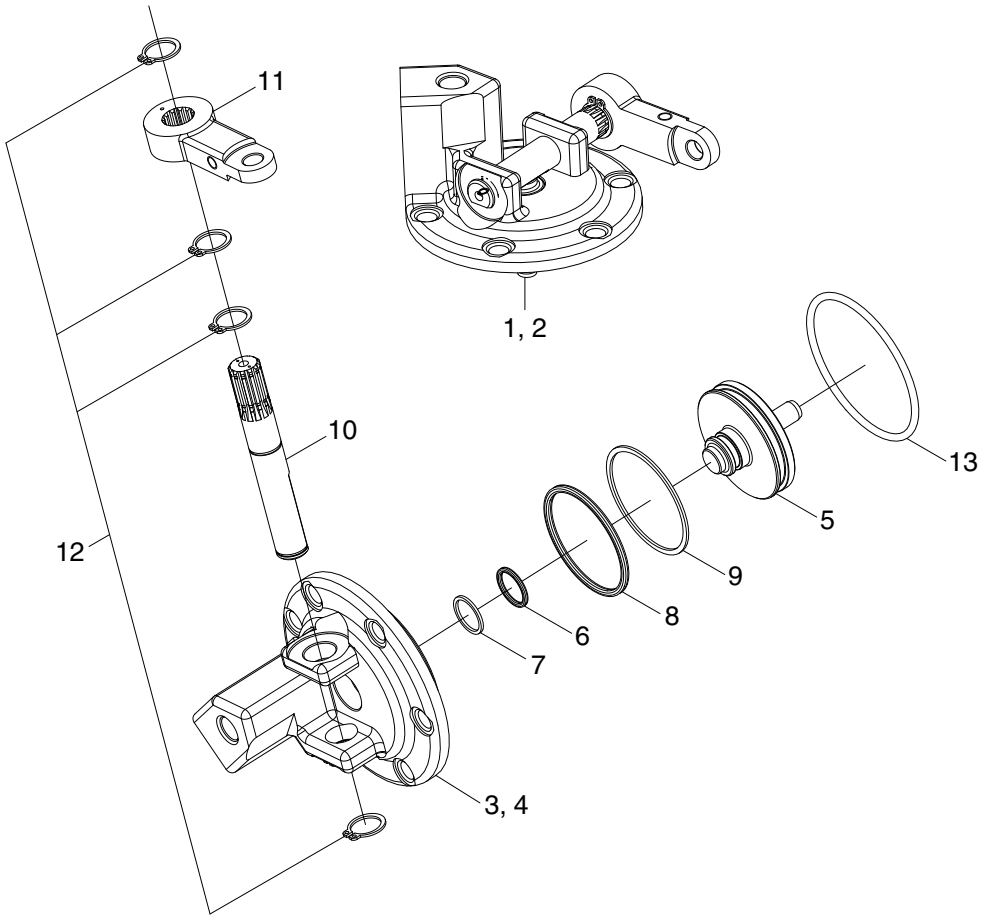
(3) Cover out sub assembly



15BT9PT03

1	Cover out assembly (LH)	8	Ball bearing
2	Cover out assembly (RH)	9	Snap ring
3	Cover out (LH)	10	Actuator
4	Cover out (RH)	11	Return spring
5	Parallel pin	12	Sun pinion
6	Friction block	13	Socket bolt
7	Ring gear (83T)		

(4) Parking sub assembly



15BT9PT04

1	Parking sub assembly (LH)	8	Quad ring
2	Parking sub assembly (RH)	9	Backup ring
3	Parking cover (LH)	10	Shaft
4	Parking cover (RH)	11	Lever
5	Piston	12	Snap ring
6	Quad ring	13	O-ring
7	Backup ring		

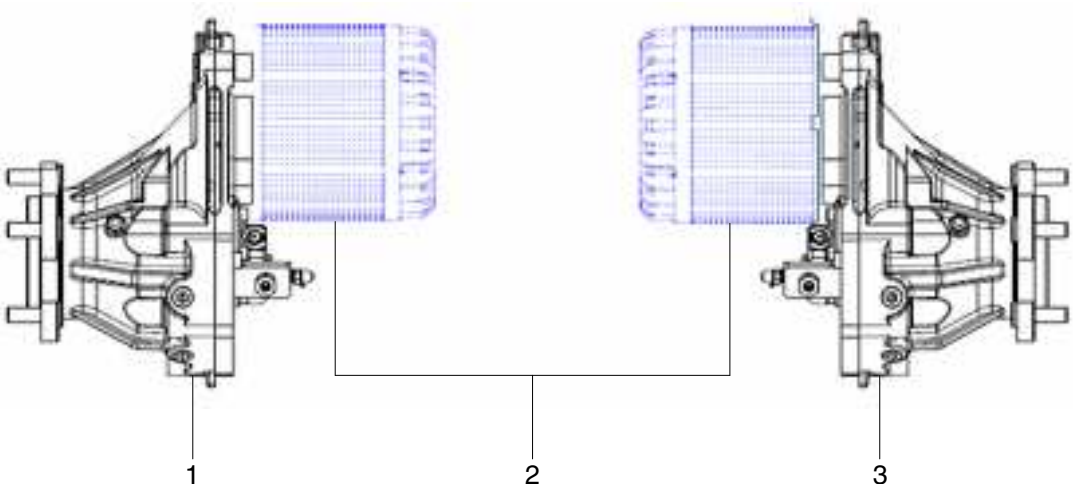
2) SPECIFICATION

Item	Unit	Specification
Max. output torque (wheel)	N · m	2260
Max. axle load	kg/lb	2700/5953
Max. input speed	rpm	5000
Gear ratio	-	20
Weight without fluid	kg/lb	35/77
Oil quantity(ATF)	ℓ /U.S. · qt	0.67/0.71

3) PRINCLPLE OF OPERATION

(1) Outline of the power transmission system

The drive units are composed of the drive unit (LH) and the drive unit (RH) which are connected with the motor as a power transmission system to assemble the drive wheel for the battery type fork lift.



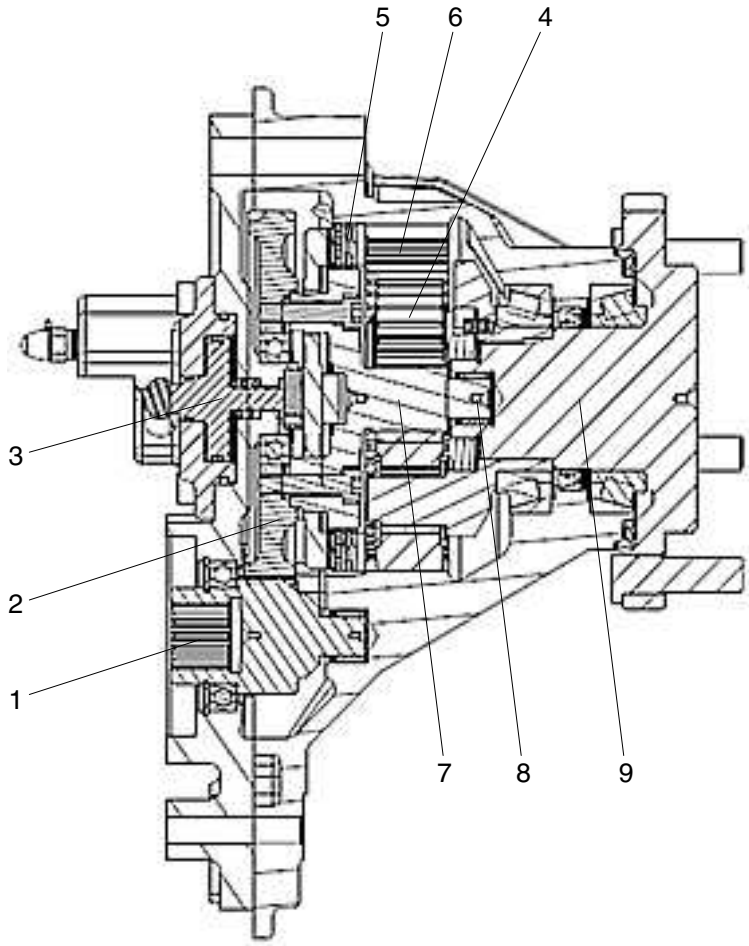
15BT9PT05

1 Drive unit (LH)
2 Motor
3 Drive unit (RH)

The power of the drive motor which is received from signal of the controller transmits to the dirve gear and the power transfered from the drive gear transmits to the drive wheel via the planetary gear and wheel hub. As a result, it is able to drive to forward and reverse of the fork lift.

(2) Principle of the operation

① Structure of the drive unit



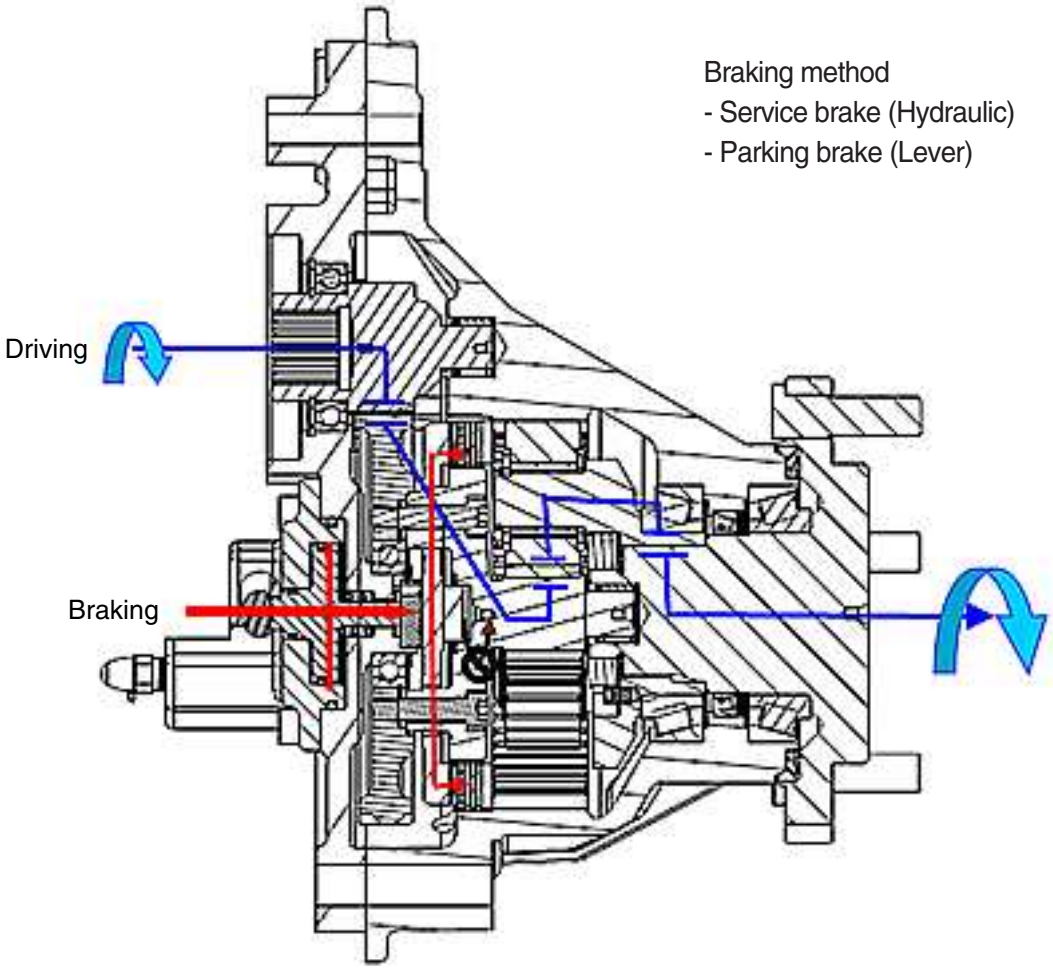
15BT9PT06

1	Input pinion	6	Housing (Ring gear)
2	Ring gear	7	Sun pinion
3	Brake piston	8	Planetary carrier
4	Planetary gear	9	Wheel hub
5	Brake pack		

② **The path of the power transmission**

Driving : Motor → Input pinion → Ring gear → Sun pinion → Planetary gear → Wheel hub → Dirve wheel

Braking : Pressurization of hydraulic power through the brake port
Forwarding of the brake piston → Forwarding of the actuator
→ Contact between plate and friction disc
→ Holding back the revolution of the planetary carrier
→ Holding back the revolution of the wheel hub → Holding back of the driving



15BT9PT07

GROUP 2 TROUBLESHOOTING

Problem	Cause	Remedy
1. Consecutive noise in the housing	· Lack of oil	· Refill the oil
	· Incorrect contact between planetary gear and driving gear	· Disassemble, check and readjusting
	· Damage, wear planetary gear and driving gear	· Replace damaged or wear gear
	· Loosened or worn wheel hub bearing	· Disassemble, check and readjusting or replace the components
2. Abnormal noise during rotation	· Excessive back lash the driving gear and planetary gear	· Replace the driving gear and the planetary gear
	· Damage, worn of the gear	· Replace the gear
	· Damage, worn of the bearing	· Disassemble, check and readjusting or replace the bearing
3. Oil leakage	· Overfill to the specified level	· Readjust oil level
	· Pluged air breather	· Clean or replace the air breather
	· Damage, worn, poor assembly for oil seal of wheel hub	· Replace oil seal
	· Poor assembly of the drain plug	· Disassemble, check and readjusting
	· Damage O-ring for motor connection	· Replace the O-ring
4. No rotation of the drive wheel	· Breakage, deformation the shaft	· Replace the shaft
	· Damage, breakgae the gear	· Replace the gear
	· Damage, breakgae the bearing	· Replace the bearing
5. Brake No operation the brake	· Damage, deformation the friction disc or plate	· Disassemble, check, replace
No smooth operation the brake pedal	· Damage, deformation the friction disc of the brake	· Disassemble, check, replace
No release the brake	· Defect the brake disc assembly	· Disassemble, check, replace
Frequent refilling the brake oil	· Leakage from the piston seal	· Disassemble the piston seal and replace it
Available braking when depressing the brake pedal with maximum	· Excessive clearance of the discs due to wear of the friction disc for operation	· Adjust the stroke of the brake pedal · Disassemble the brake pack, check and replace it · Readjust the stroke of the piston

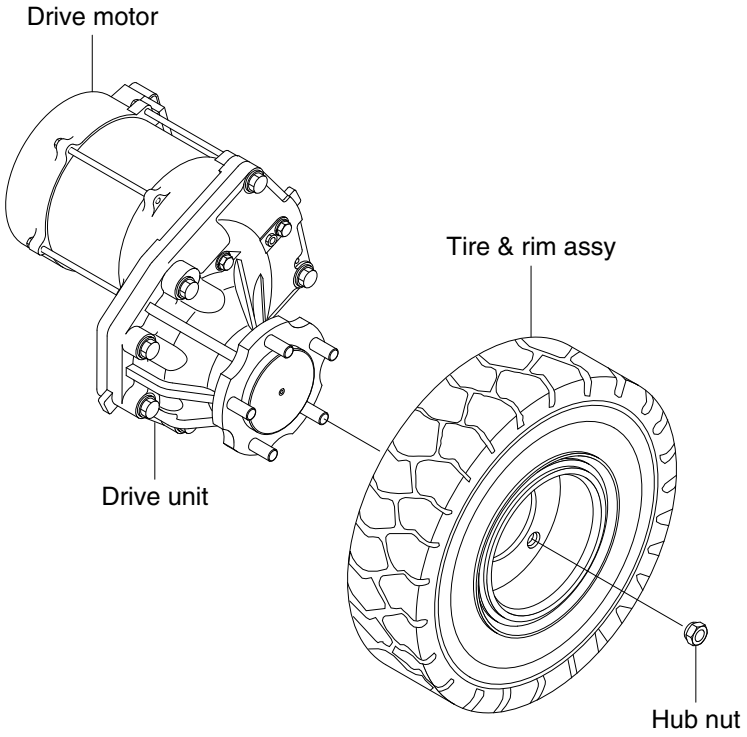
GROUP 3 DISASSEMBLY AND ASSEMBLY

1. Disassembly

Drain oil from transmission before removal of the drive unit. Loosen and remove the wheel nuts as well as take off the drive wheel. For further work on the drive motor of the drive unit see chapter.

1) REMOVAL OF THE DRIVE UNIT

(1) Removal of Drive unit. (refer to see page 2-8)



15BT9PT10

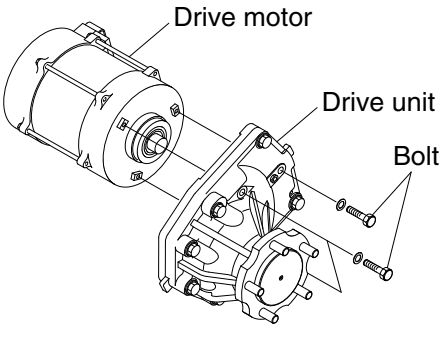
2) REMOVAL OF THE DRIVE MOTOR

(1) Drive motor and accessories mounted to the drive motor have to be disconnected.

(2) Take off cautiously the drive motor from the drive unit.

⚠ Do not damage the teeth of the motor pinion and the spur gear.
Damages can cause louder running noises.

※ In case of an inadequate removal of the drive motor from the drive unit there is danger to damage the sealing surface for the O-ring in the housing.
If only the drive motor is removed, the released drive unit opening is to be sealed in order to avoid that dirt can get inside the drive unit.



15BT9RE17

2. GENERAL INSTRUCTIONS FOR CORRECT DISASSEMBLY AND REASSEMBLY

Cleanliness is essential for a correct work.
Drive unit removed from the vehicle have to be cleaned prior to opening.
Special care and cleanliness are essential for a correct disassembly and reassembly of the unit as well as for the installation of each spare part. A fault during installation can result in an early wear and chips as well as foreign particles in the unit could cause fatal damage in the drive unit.
Prior to reassembly all parts must be cleaned and inspected for wear and other defects.
It would be a false economy to reinstall parts which are not in a perfect condition.
All parts have to be oiled carefully during reassembly. Apply a sealing compound onto housing-and cover faces, which must be tight towards the outside.

For heating of bearings etc. use heating plates, heating elements or heating furnaces.
Never heat directly with an open flame.
This avoids damage to the bearings.

If not otherwise indicated heat ball bearings, gears, flanges etc. to approx. 90-100℃.

Parts which have been mounted in a warm condition must be subsequently installed after cooling down to ensure a perfect contact.
Lubricate both parts before shafts, bearings etc. are pressed into position.

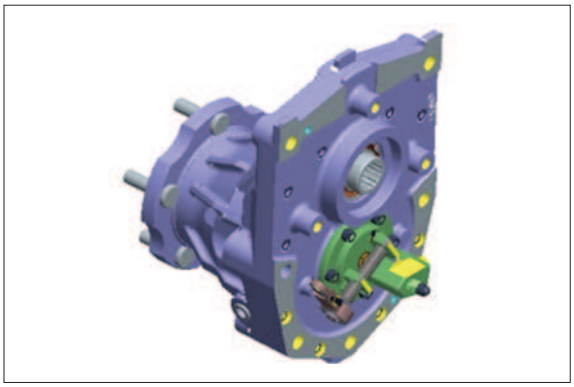
For reassembly all of the indicated setting values, test data and tightening torques must be observed.
HYUNDAI-units will be filled with oil after repair work.

※ The following description of disassembly and reassembly serves to inform both the after-sales service centers of HYUNDAI and of the vehicle manufacturer, where adequate workshop facilities and trained specialists are present.

3. DISASSEMBLY OF THE DRIVE UNIT

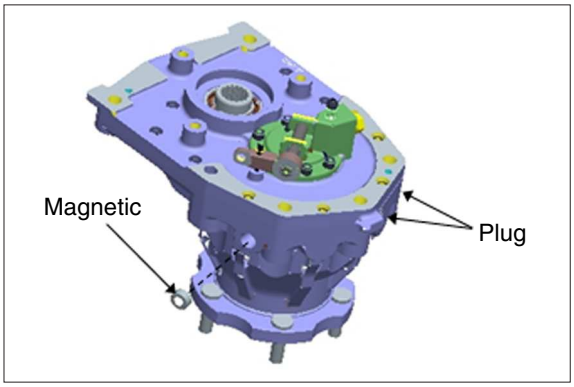
1) Disassembly of the drive unit assy.

※ Always keeps clean working area when disassebling the drive unit.



15BT9DU001

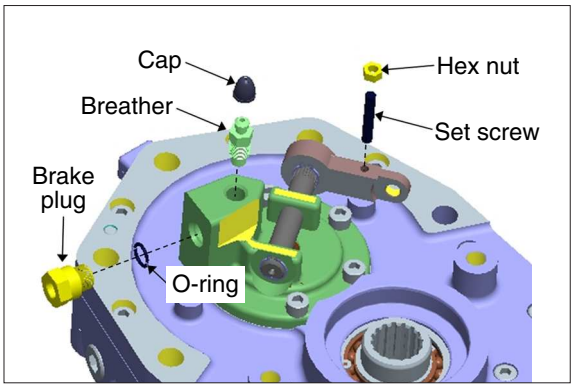
2) Drain out oil in the drive unit assy by removing the magnetic plug.



15BT9DU002

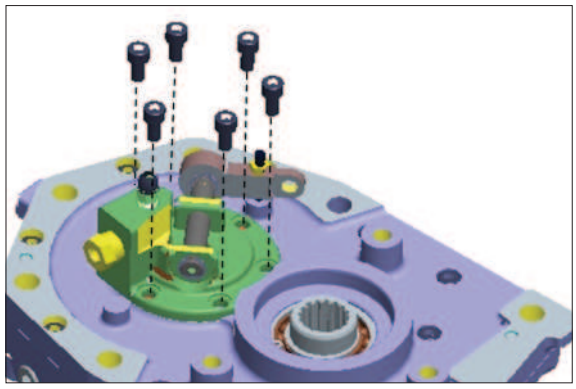
3) Disassemble the external components of the drive unit assy.
Disassemble brake plug, breather, cap, set screw and nut form the drive unit assy.

※ The components stock to the proper place and they should be replaced with new O-ring when reassembling.



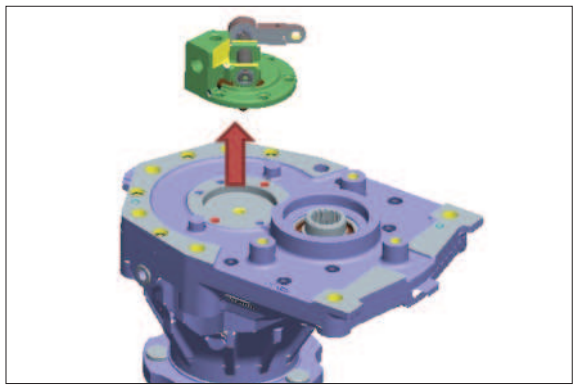
15BT9DU003

4) Loosen 6-socket bolts which are fixing for the parking sub assy.



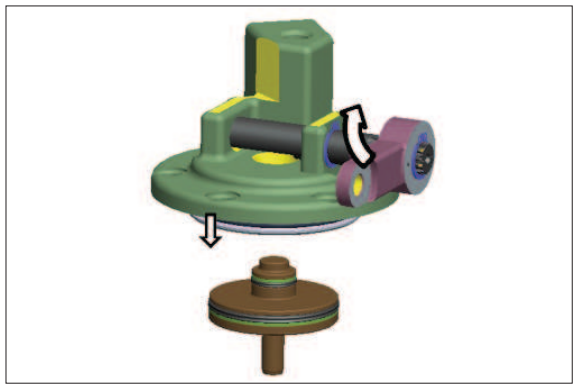
15BT9DU004

5) Disassemble the parking sub assy.



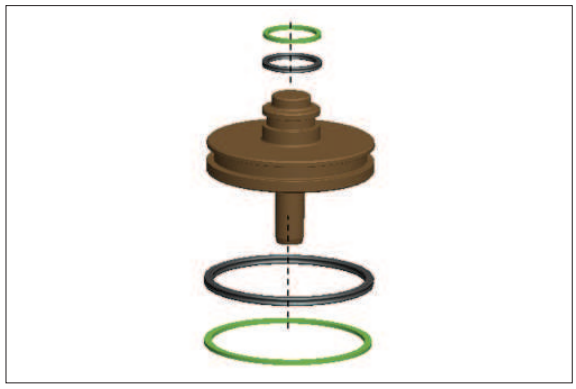
15BT9DU005

6) Disassemble the piston sub assy after pushing away the lever of the parking sub assy.



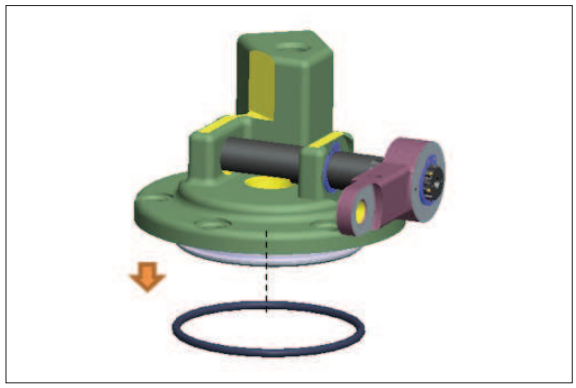
15BT9DU006

7) Remove the quad ring and back up ring from the piston sub assy.



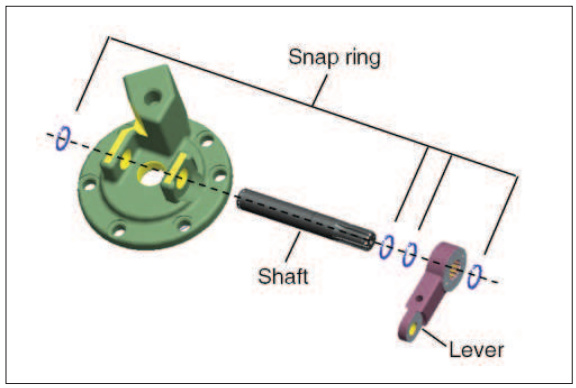
15BT9DU007

8) Remove the O-ring from the parking sub assy.



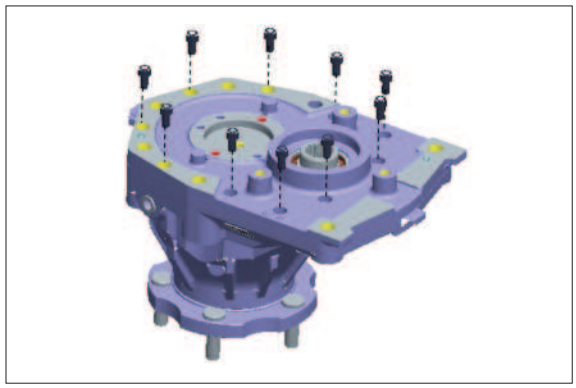
15BT9DU008

9) Disassemble the snap rings, lever, and shaft from the parking sub assy.



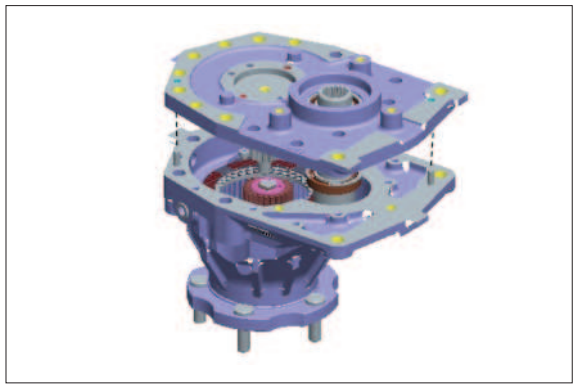
15BT9DU009

10) Loosen the socket bolts (10EA) from the dirve unit assy.



15BT9DU010

11) Disassemble the cover out sub assy from the housing sub assy.

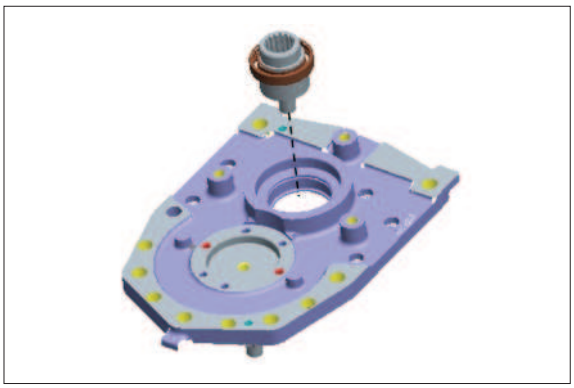


15BT9DU011

12) Remove the snap ring from the housing sub assy.

15BT9DU012

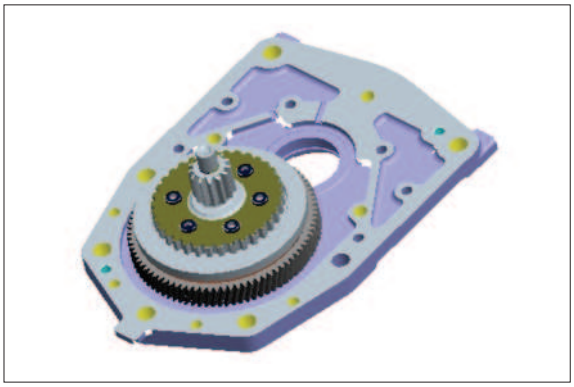
13) Disassemble the input pinion assembly from the housing sub assembly.



15BT9DU013

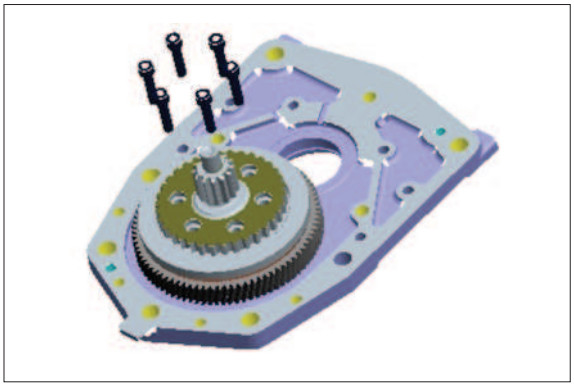
DISASSEMBLY OF THE COVER OUT SUB ASSY

14) Cover out sub assy.



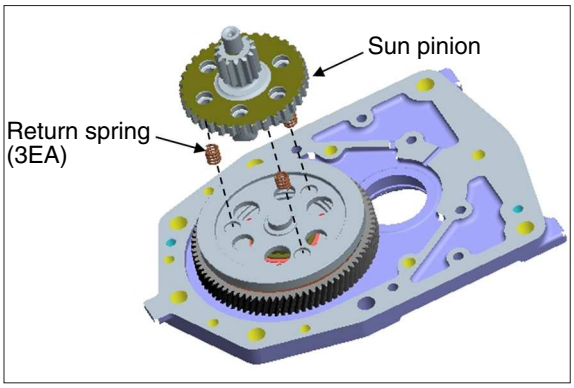
15BT9DU014

15) Loosen the socket bolts (6EA) from the cover out sub assy.



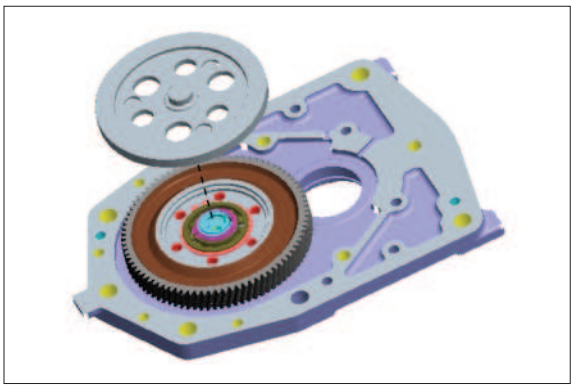
15BT9DU015

16) Disassemble the sun pinion and return springs (3EA) from the cover out sub assy.

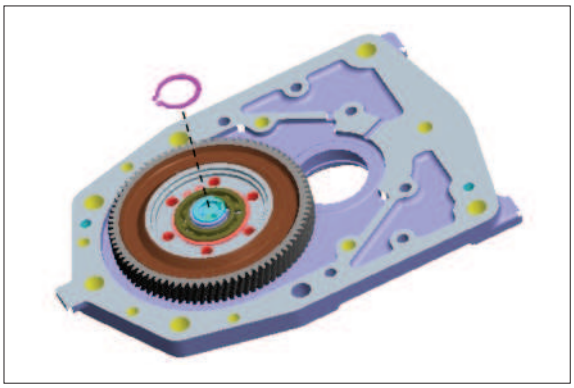


15BT9DU016

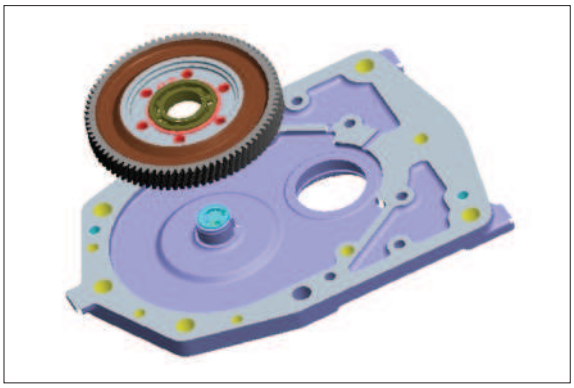
17) Disassemble the actuator from the cover out sub assy.


15BT9DU017

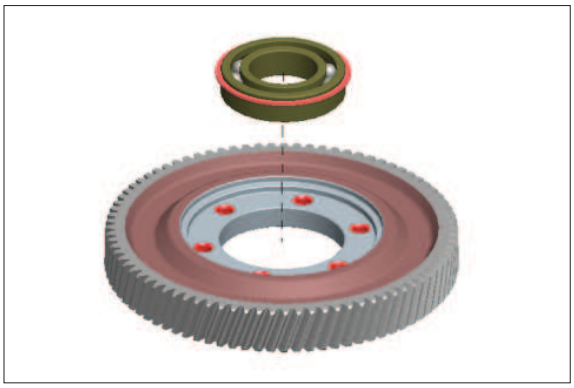
18) Remove the snap ring from the cover out sub assy.


15BT9DU018

19) Disassemble the ring gear from the cover out sub assy.

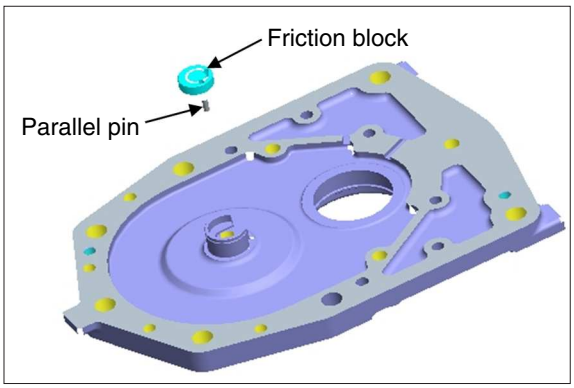

15BT9DU019

20) Remove the bearing form the ring gear.



15BT9DU020

21) Remove the friction block and the parallel pin from the cover out sub assy.



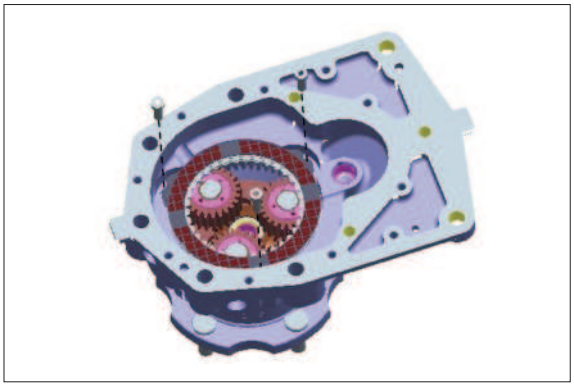
15BT9DU021

DISASSEMBLY OF THE HOUSING SUB ASSY

22) Housing sub assy.

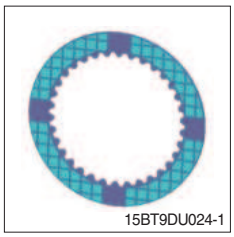
15BT9DU022

23) Loosen the special bolts (3EA) from the housing sub assy.

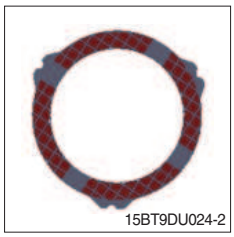


15BT9DU023

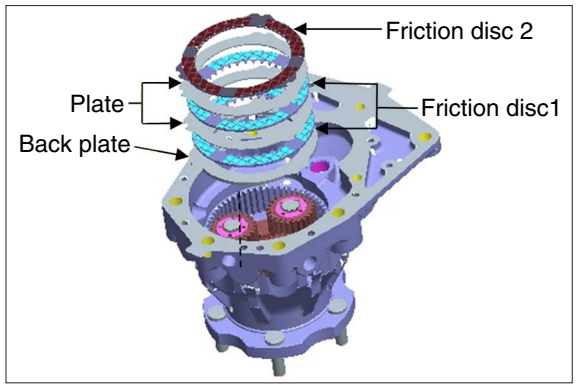
24) Disassemble the friction disc 1 (2EA), friction disc 2 (1EA), plates (2EA), back plate (1EA).



Friction disc 1

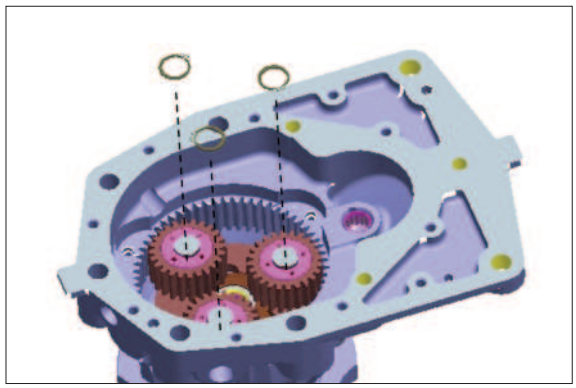


Friction disc 2



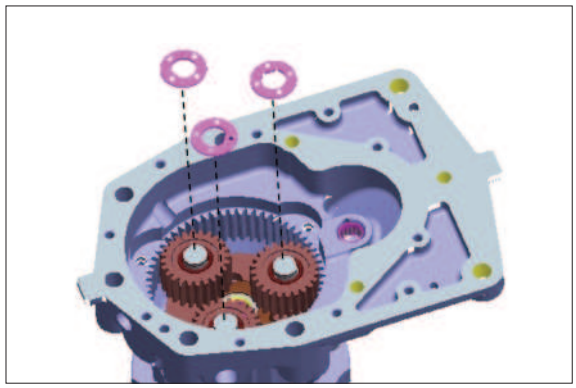
15BT9DU024

25) Remove the snap rings (3EA) from the housing sub assy.



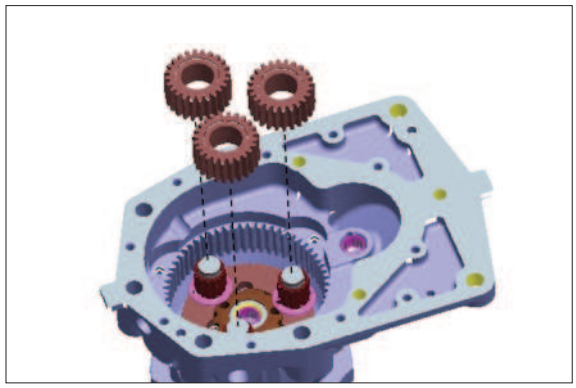
15BT9DU025

26) Remove the thrust washers (3EA) from the housing sub assy.



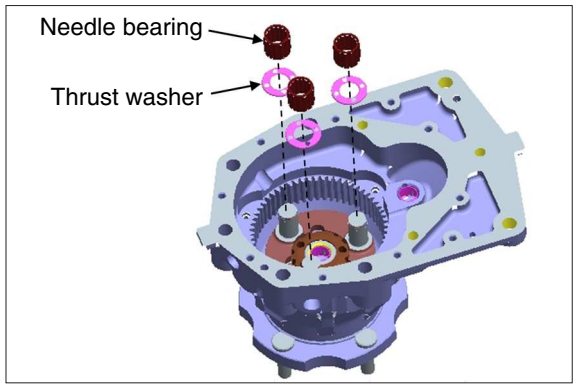
15BT9DU026

27) Disassemble the planetary gears (3EA) from the housing sub assy.



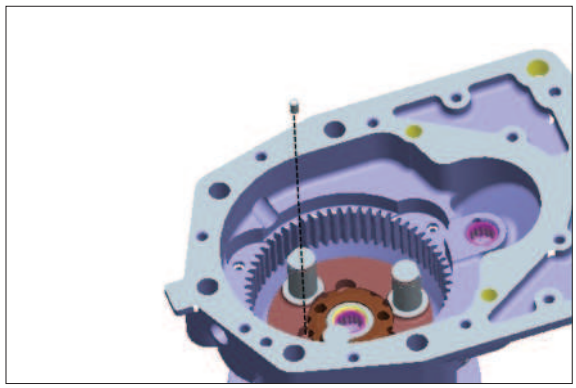
15BT9DU027

28) Remove the thrust washers (3EA), the needle bearings (3EA) from the housing sub assy.



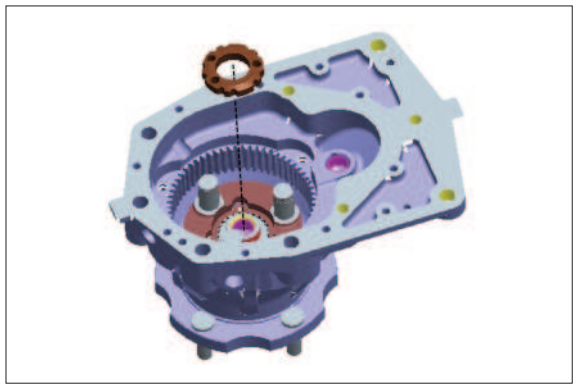
15BT9DU028

29) Remove the set screw from the housing sub assy.

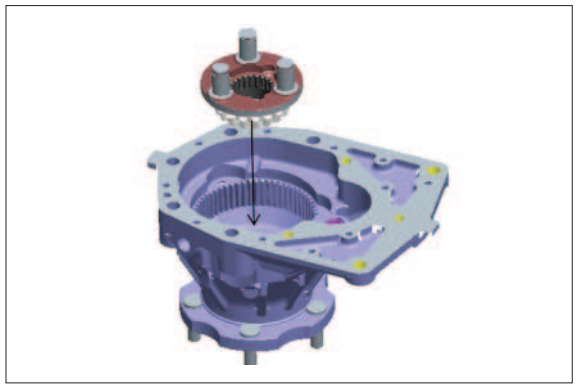

15BT9DU029

30) Remove the lock nut from the housing sub assy.

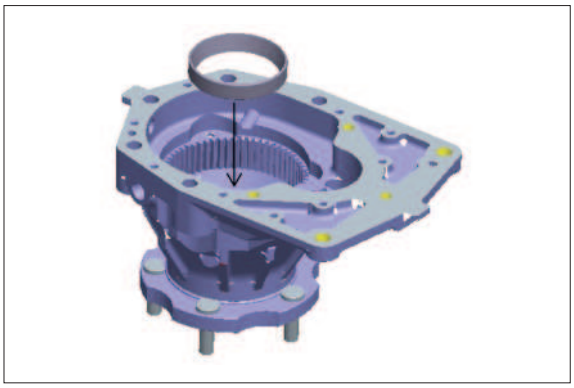
※ When removing the lock nut from the housing sub assy, it should be used the special tool.


15BT9DU030

31) Disassemble the planetary carrier and bearing cone from the housing sub assy.


15BT9DU031

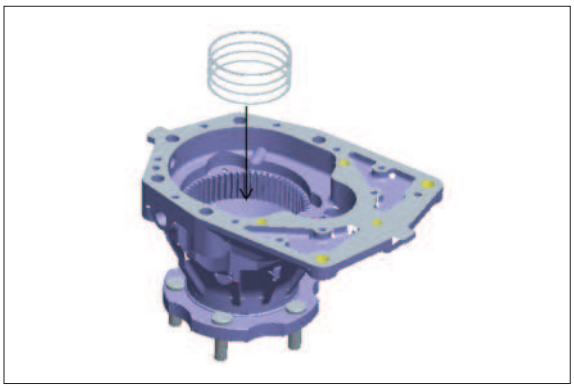
32) Remove the bearing cap from the housing sub assy.



15BT9DU032

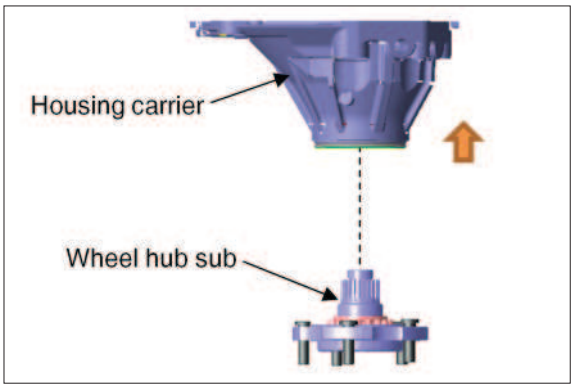
33) Remove the shims from the housing sub assy.

※ If the bearings are not replaced with new one, take care to safe keep the shims to the proper place.



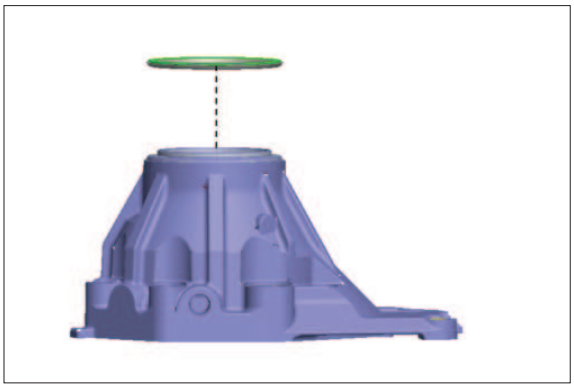
15BT9DU033

34) Disassemble the wheel hub sub assy from the housing sub assy.



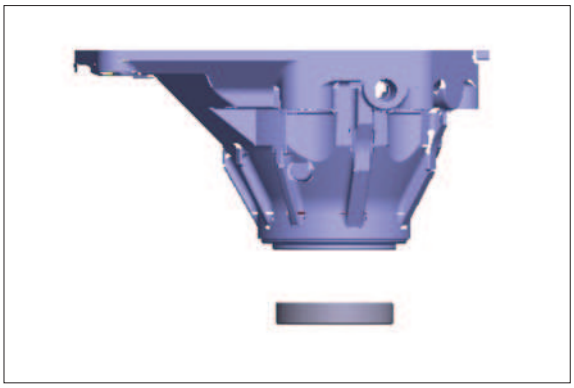
15BT9DU034

35) Remove the Gamma seal from the housing carrier.



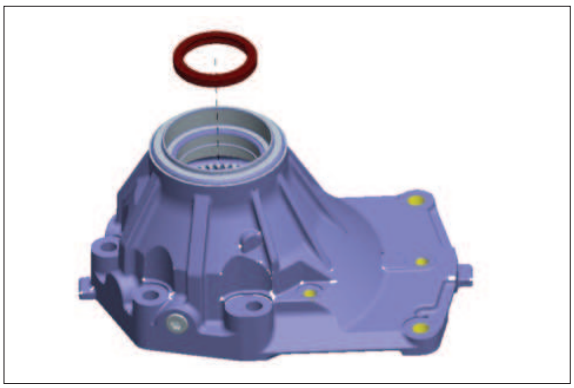
15BT9DU035

36) Remove the bearing cup from the housing carrier.



15BT9DU036

37) Remove the oil seal from the housing carrier.

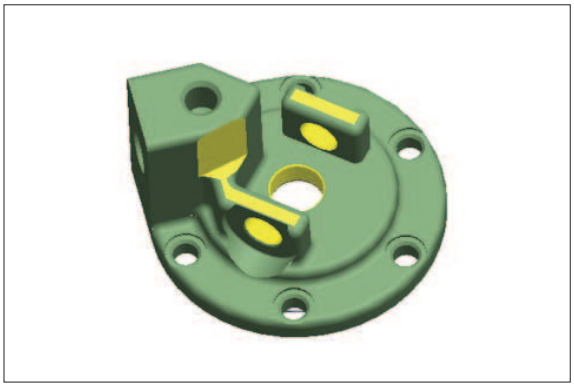


15BT9DU037

4. ASSEMBLY OF THE DRIVE UNIT

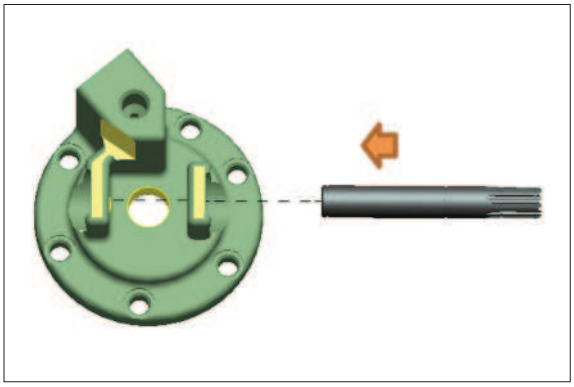
1) ASSEMBLY OF THE HOUSING SUB ASSY

(1) Assembly of the parking sub assy.



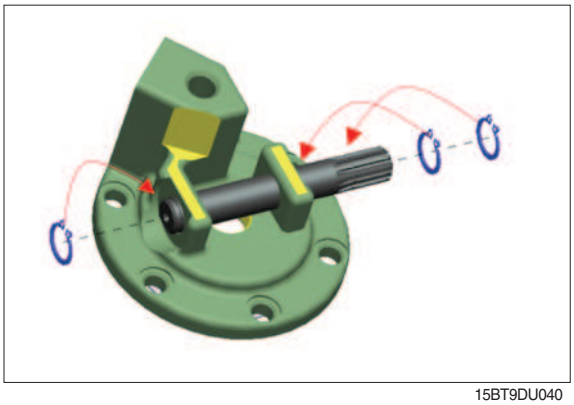
15BT9DU038

(2) Assemble the shaft to the parking cover.



15BT9DU039

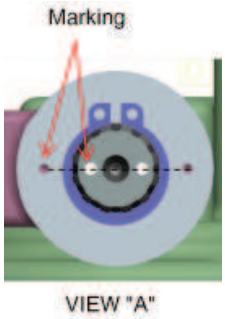
(3) Assemble the snap rings (3EA) to the shaft.



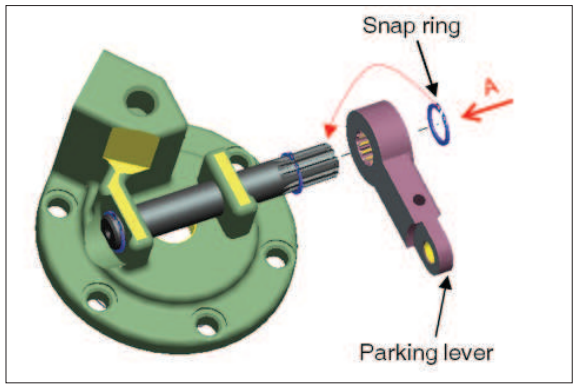
15BT9DU040

(4) Assemble the parking lever to the shaft and fix with snap ring.

※ Be sure that the marking on the parking lever gets into inline to the marking on the shaft (Refer to VIEW "A")



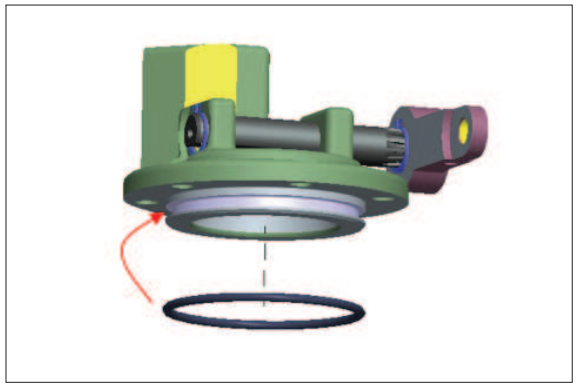
VIEW "A"



15BT9DU041

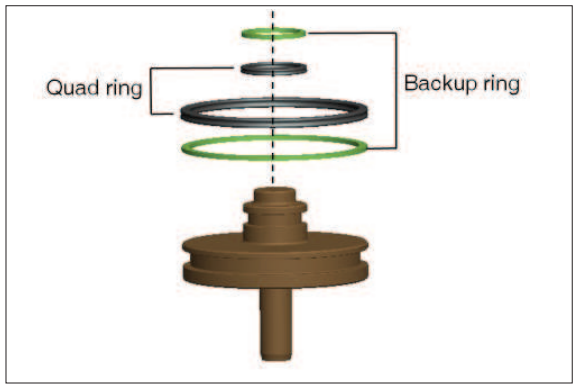
(5) Assemble the O-ring to the parking cover.

※ Apply oil on the O-ring surface prior to assembling.


15BT9DU043

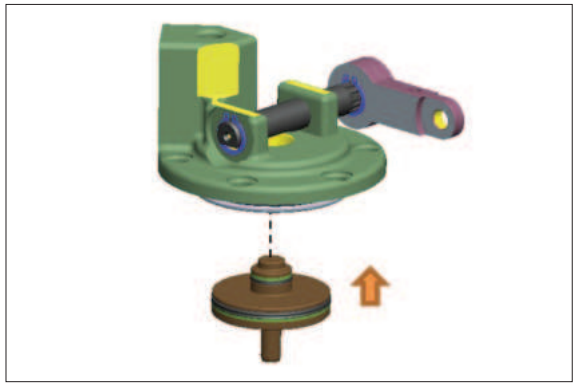
(6) Assemble the backup ring and the quad ring.

※ Apply oil on the quad ring surface before assembling and check the twisting for quad ring after assembling.

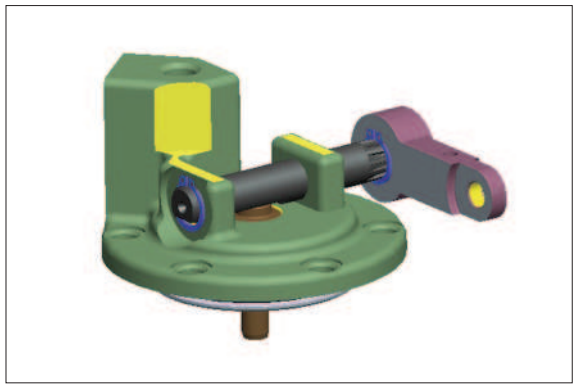


15BT9DU044

(7) Assemble the piston to the parking sub assy.


15BT9DU045

(8) Completion of assembly of the parking sub assy.

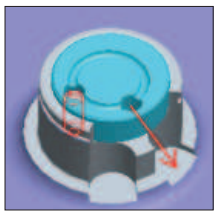


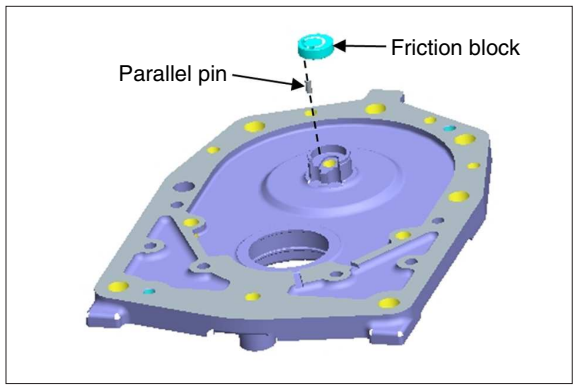
15BT9DU046

2) ASSEMBLY OF THE COVER OUT SUB ASSY

(1) Assemble the friction block after inserting the parallel pin.

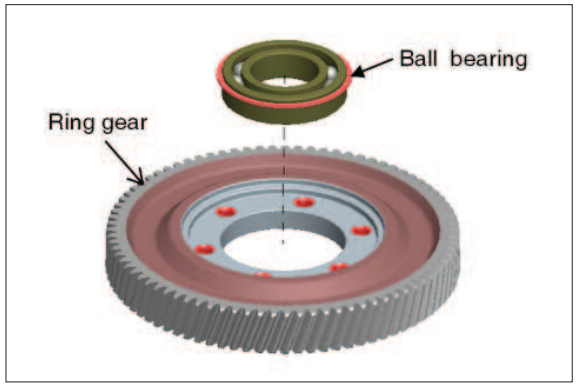
※ When assembling the friction block, take care to the direction of assembling of it. Refer to the follwing figure for the location of the lubrication hole.





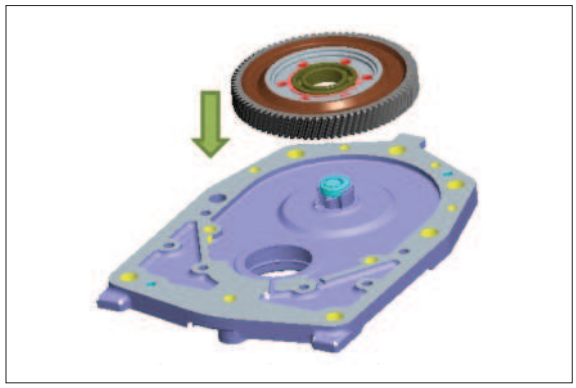
15BT9DU047

(2) Assemble the ball bearing to the ring gear.



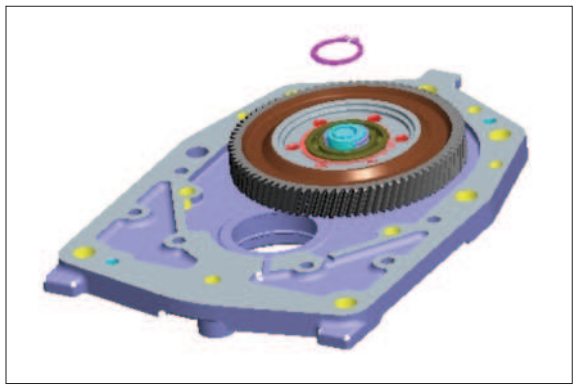
15BT9DU049

(3) Assemble the ring gear to the cover out assy.



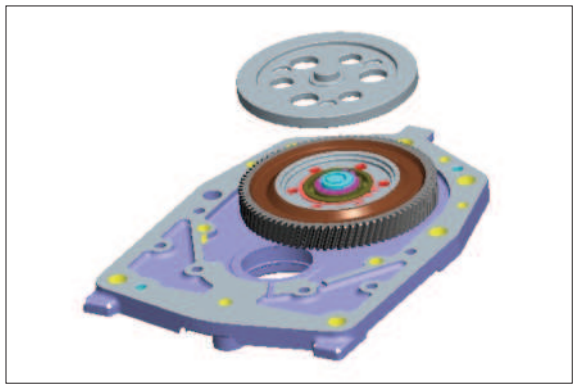
15BT9DU050

(4) Assemble the snap ring to the cover out assy.



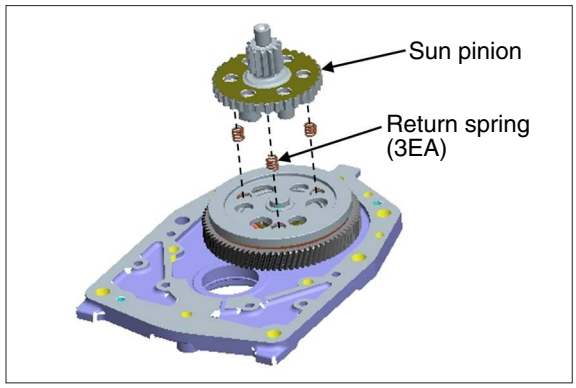
15BT9DU051

(5) Assemble the actuator to the cover out assy.



15BT9DU052

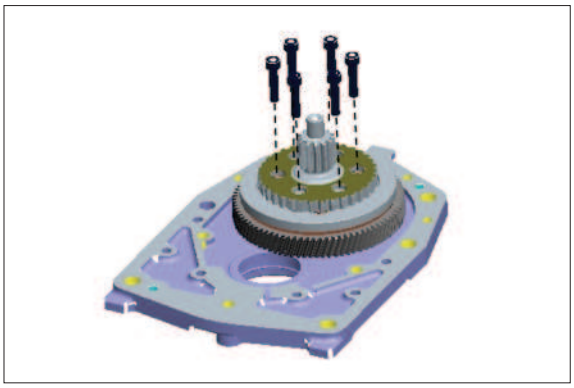
(6) Assemble the sun pinion after assembling the return springs (3EA).



15BT9DU053

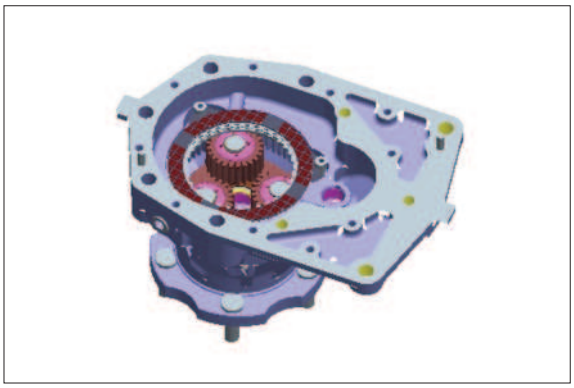
(7) Assemble the bolts (6EA) to the sun pinion.
- Tightening torque : 3.5~3.8 kgf · m

※ Apply the Loctite #277 on the thread of the bolts.
When assembling the bolts, it should be fixed the ring gear using the filter wrench.



15BT9DU054

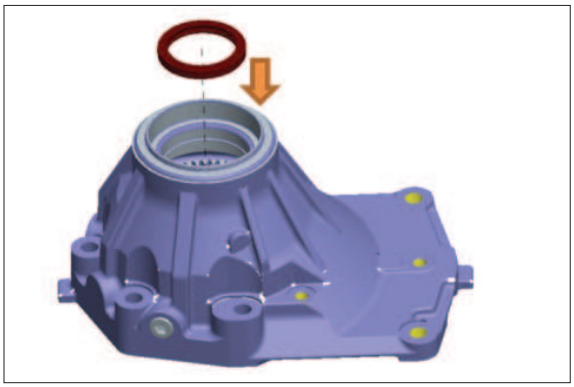
3) ASSEMBLY OF THE HOUSING SUB ASSY



15BT9DU056

(1) Assemble the oil seal in the housing sub assy.

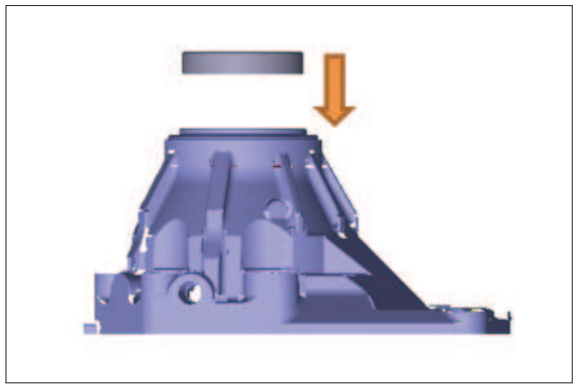
※ When assembling the oil seal to the housing sub assy, it should be used the special tool.
- Inner race : Apply with grease
- Outer race : Apply with Loctite #592



15BT9DU057

(2) Assemble the bearing cup in the housing sub assy.

※ When assembling the bearing cup, it should be used the special tool.

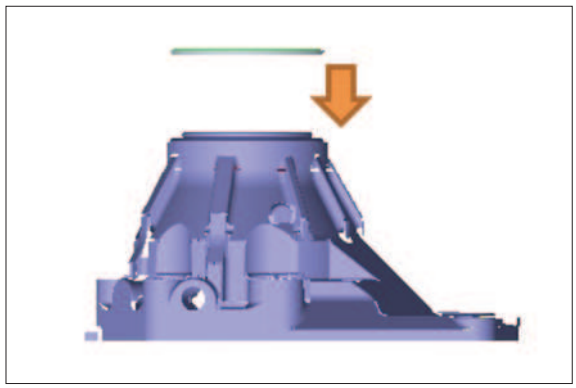


15BT9DU058

(3) Assemble the Gamma seal in the housing sub assy.

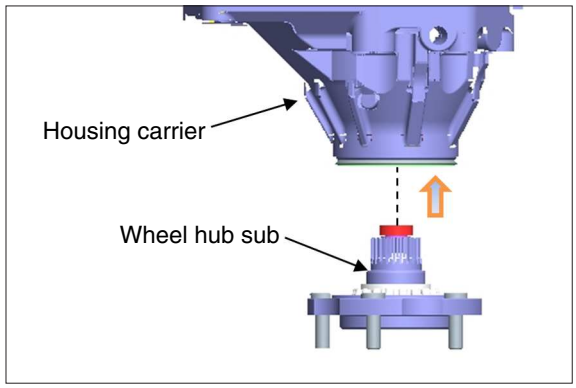
※ When assembling the Gamma seal in the housing sub assy, it should be used the special tool.

- Seal : Apply with grease
- Compression area (steel) : Apply with Loctite #609



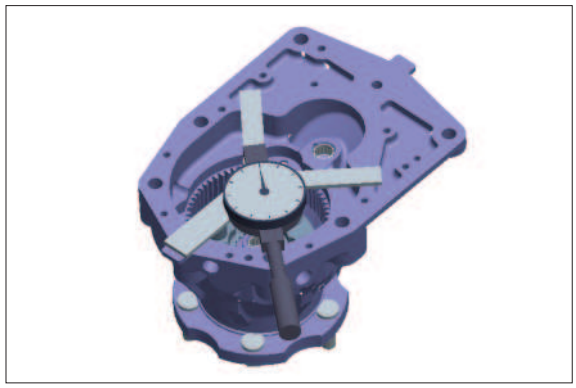
15BT9DU059

(4) Assemble the wheel hub sub to the housing carrier.



15BT9DU060

(5) Using the DB torque wrench before shim assembly 0.5 mm shim assembly after measure and record the resistance value.

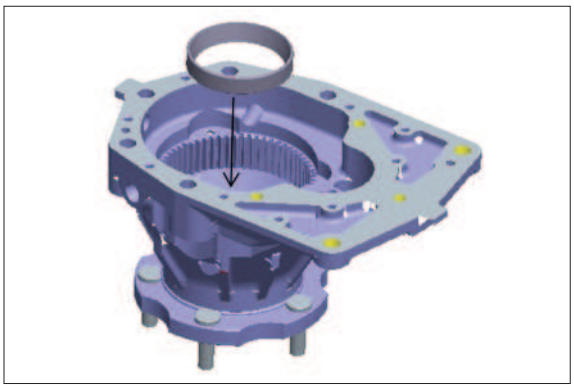


15BT9DU061

15BT9DU062

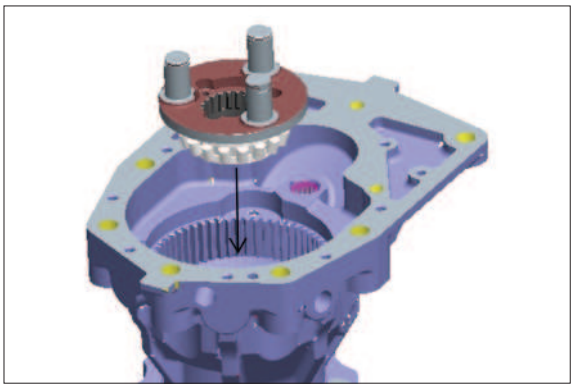
(6) Assemble the bearing cup in the housing carrier.

※ It should be used the special tool when assembling the bearing cup in the housing carrier.



15BT9DU063

(7) Assemble the planetary carrier and bearing cone in the housing carrier.

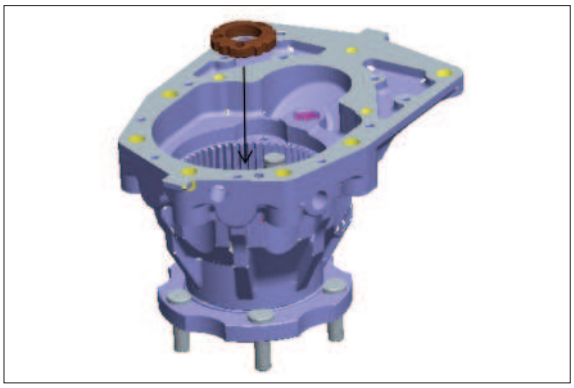


15BT9DU064

(8) Assemble the lock nut in the housing carrier.

※ Apply with Loctite #277 after removing the oil and the foreign material on the thread of the bolts.

- Tightening torque : 25~28 kgf · m
- Preload : 0.4~0.5 kgf · m

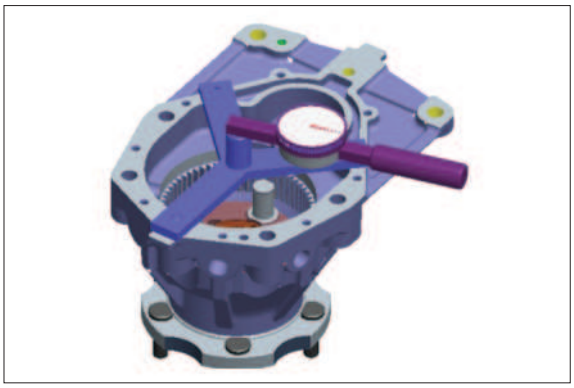


15BT9DU065

※ After the locknut tightening, the preload value is measure in the DB torque wrench, it must be value below. (Seal resistance value +0.45 kgf · m)

If it is not gotten the specified free load, rework repeatedly according as (5)~(8) procedure and it should be set with the specifed preload as an adding or removing the shims properly.

ex) Seal resistance value 0.25 kgf · m is measured at 5) final preload bearing is 0.25+(0.45±0.05)=0.65~0.75 kgf · m

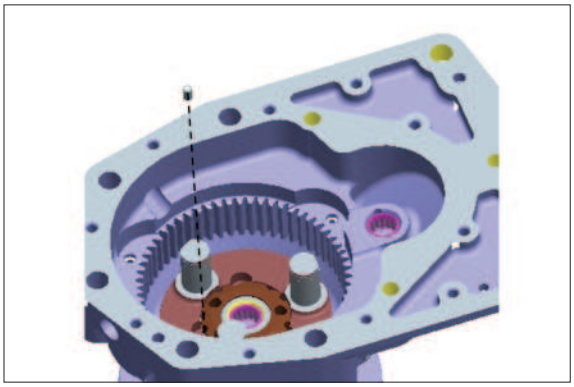


15BT9DU066

(9) Assemble the set screw to the housing carrier.

· Tightening torque : 1.5~1.8 kgf · m
· Apply with Loctite #242

※ Take care to confirm the assembly location. (Refer to the right figure)



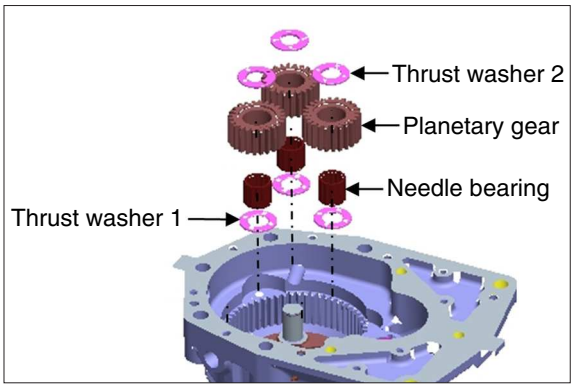
15BT9DU067

(10) Assemble the components according as the following sequence.

Thrust washer 1 → Needle bearing → Planetary gear → Thrust washer 2

※ Apply with oil to the roller area of the needle bearing

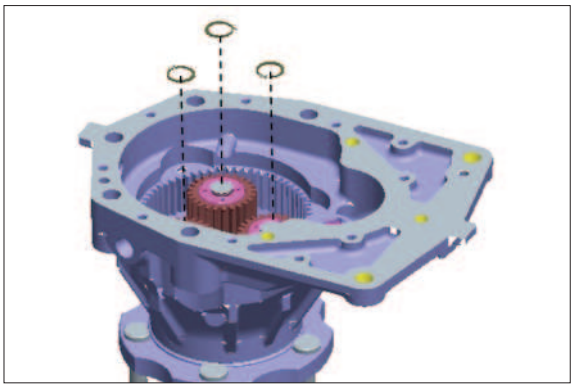
※ Take care to observe the assembly sequence of the thrust washers.



15BT9DU069

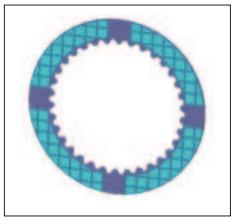
15BT9DU070

(11) Assemble the snap rings (3EA) in the housing carrier.



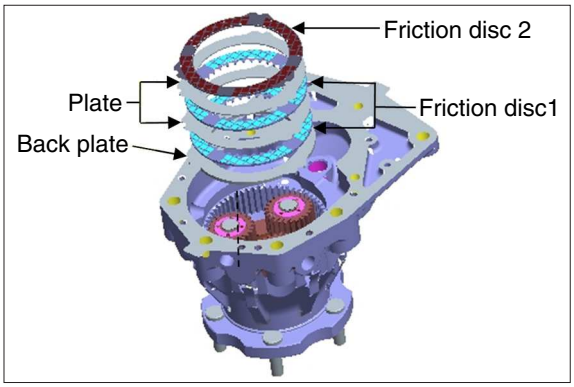
15BT9DU071

(12) Assemble the components according as the following sequence.
Back plate → (Friction disc 1 → plate) × 2 → Friction disc 2



Friction disc 1

Friction disc 2

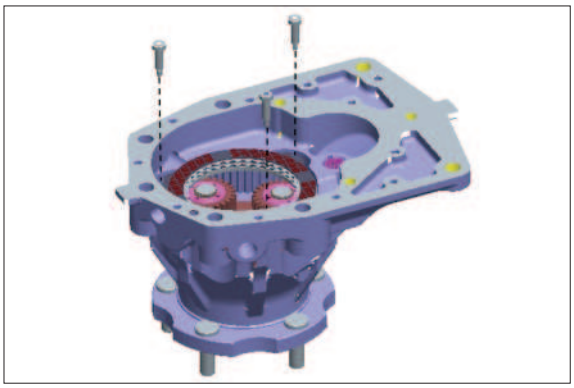


15BT9DU024

(13) Assemble the special bolts (3EA) to the housing carrier.

· Tightening torque : 1.5~1.8 kgf · m

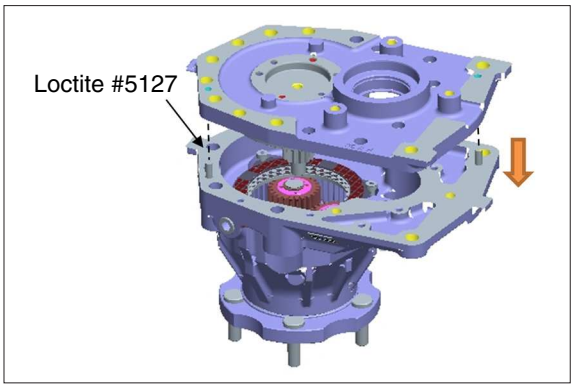
※ Apply with Loctite #242 on the thread of the special bolts.



15BT9DU073

(14) Assemble the cover out sub to the housing carrier.

※ Apply with Loctite #5127 on the surface of the assembly.

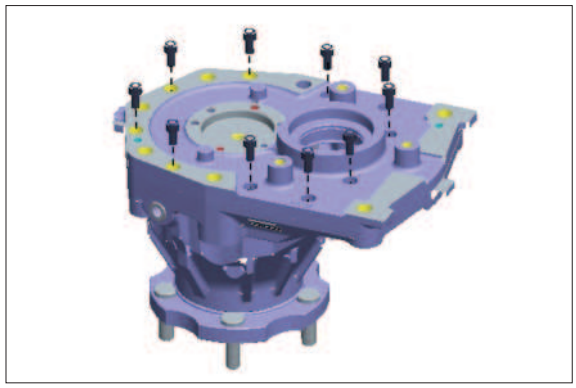


15BT9DU074

(15) Assemble the socket bolts (10EA) to the housing carrier.

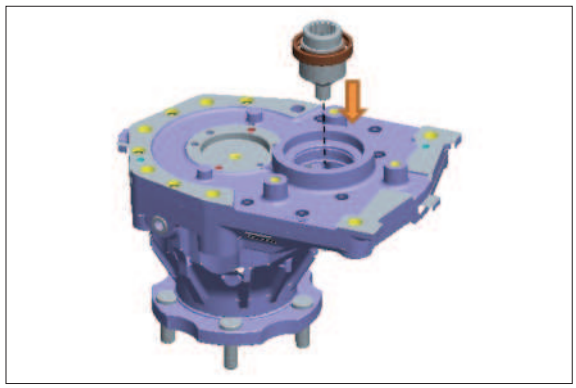
· Tightening torque : 3.5~3.8 kgf · m

※ Apply with Loctite #277 on the thread of the socket bolts.



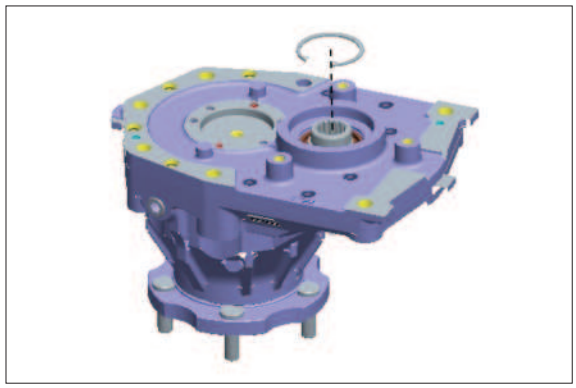
15BT9DU075

(16) Assemble the input pinion in the housing carrier.



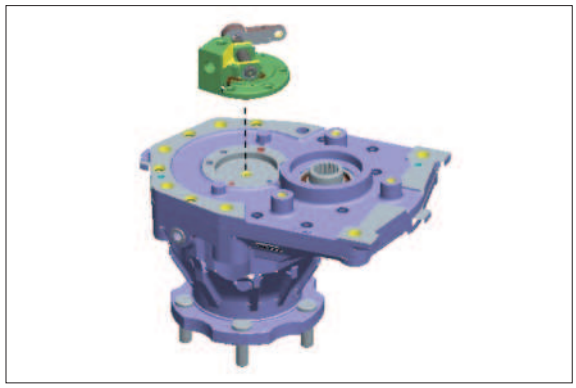
15BT9DU076

(17) Assemble the snap ring to the housing carrier.



15BT9DU077

(18) Assemble the parking cover sub to the housing carrier.

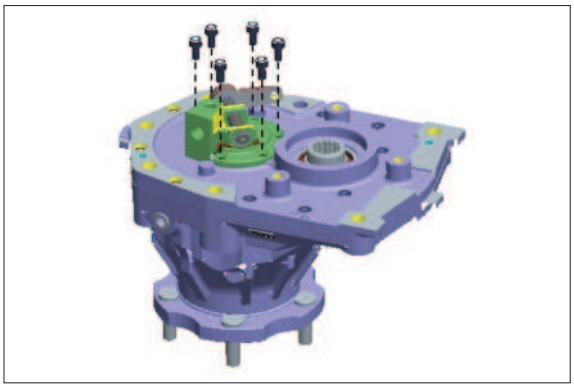


15BT9DU078

(19) Assemble the bolts (6EA) to the housing carrier.

· Tightening torque : 3.5~3.8 kgf · m

※ Apply with Loctite #277 on the thread of the bolts.

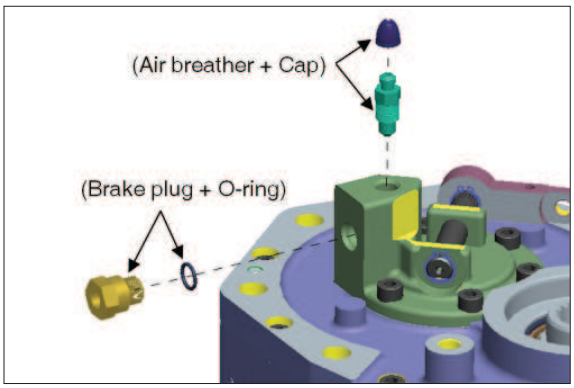


15BT9DU079

(20) Assemble the brake plug, O-ring, air breather, and cap to the housing carrier.

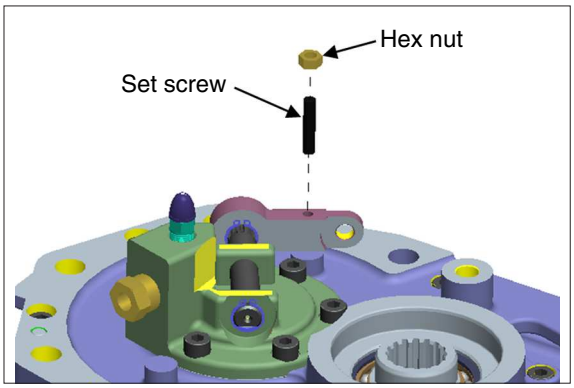
· Tightening torque : 1.5~2.0 kgf · m

※ Apply with oil on the O-ring surface.



15BT9DU080

(21) Assemble the set screw and hex nut to the housing carrier.



15BT9DU081

(22) SETTING OF THE PISTON STROKE (1 mm)

① Retain the space between the piston and the lever by pouring the hydraulic pressure or air pressure into the brake plug.

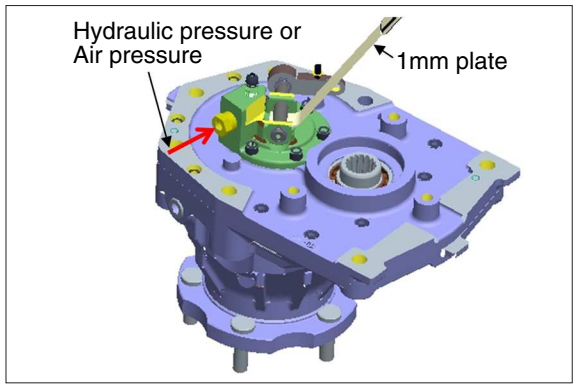
② Insert 1 mm thickness plate between lever and piston.

③ Tighten the set screw which is assembled to the lever with maximum.

④ After the set screw is rotated with 2 revolution to counterclockwise, remove 1mm thickness plate.

⑤ Tighten the set screw with 2 revolution to clockwise.

⑥ Assemble the hex nut after completion of the setting for the piston stroke.
· Tightening torque : 1.0~1.5 kgf · m

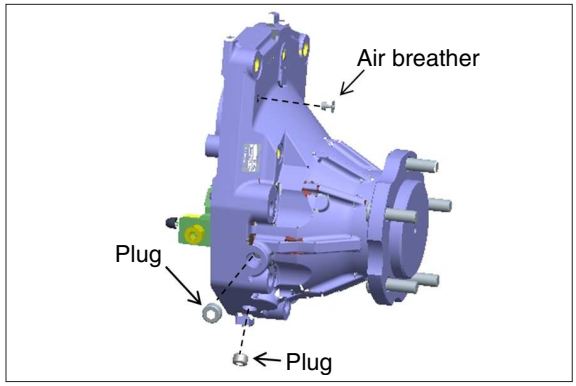


15BT9DU082

(23) Assemble the air breather and plug to the housing carrier.

- Air breather
Tightening torque : 3.0~4.1 kgf · m

- Plug
Tightening torque : 3.0~4.1 kgf · m
Apply with Loctite #577



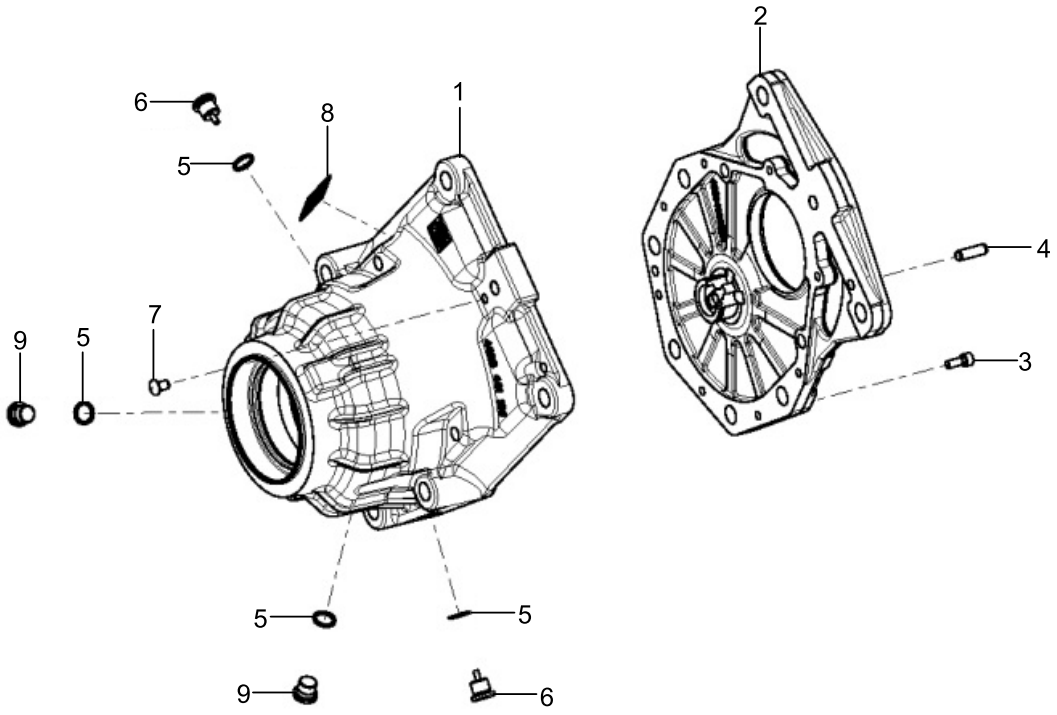
15BT9DU084

GROUP 1 STRUCTURE AND OPERATION

1. DRIVE UNIT

1) STRUCTURE

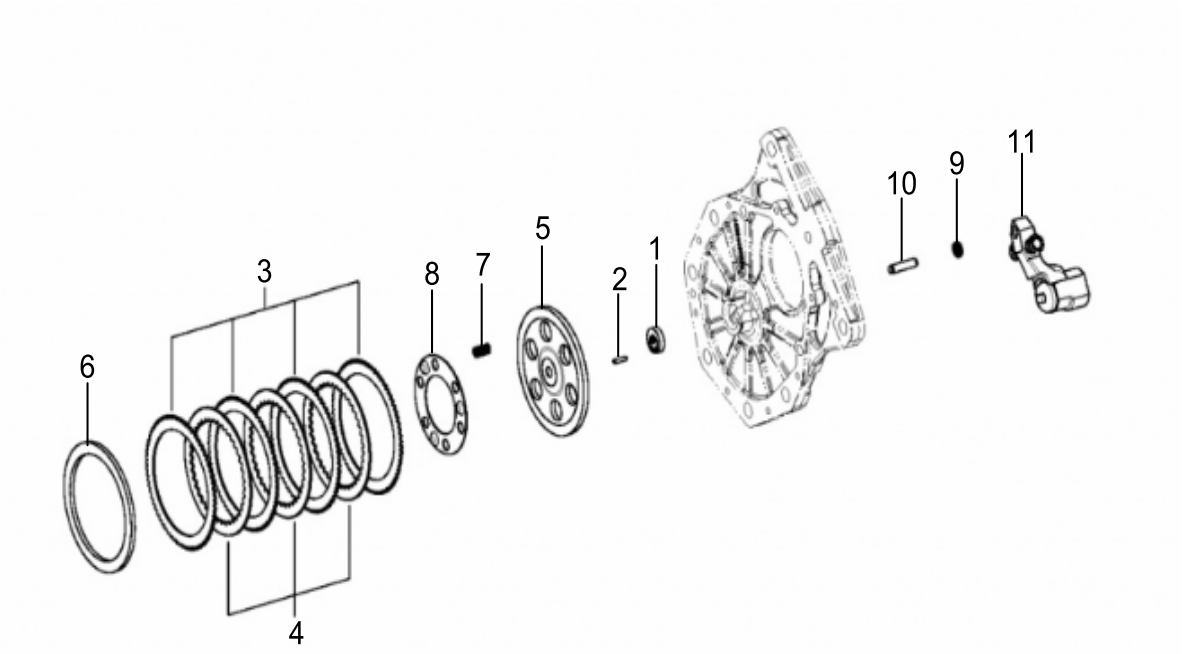
(1) Housing



15BT9USM01

1	Housing	4	Cylinderical Pin	7	Breather
2	Housing Cover	5	Sealing Ring	8	Type Plate
3	Cap Screw	6	Screw Plug	9	Screw Plug

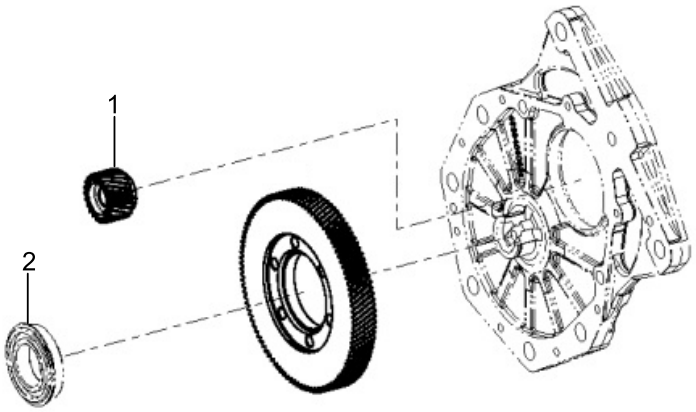
(2) Brake Parts



15BT9USM0302

1	Axial Bearing	5	Pressure Disc	9	Sealing Ring
2	Cylindrical Pin	6	Pressure Disc	10	Pin
3	Outer Clutch Disc	7	Compression Spring	11	Brake Lever
4	Inner Clutch Disc	8	Fixing Plate		

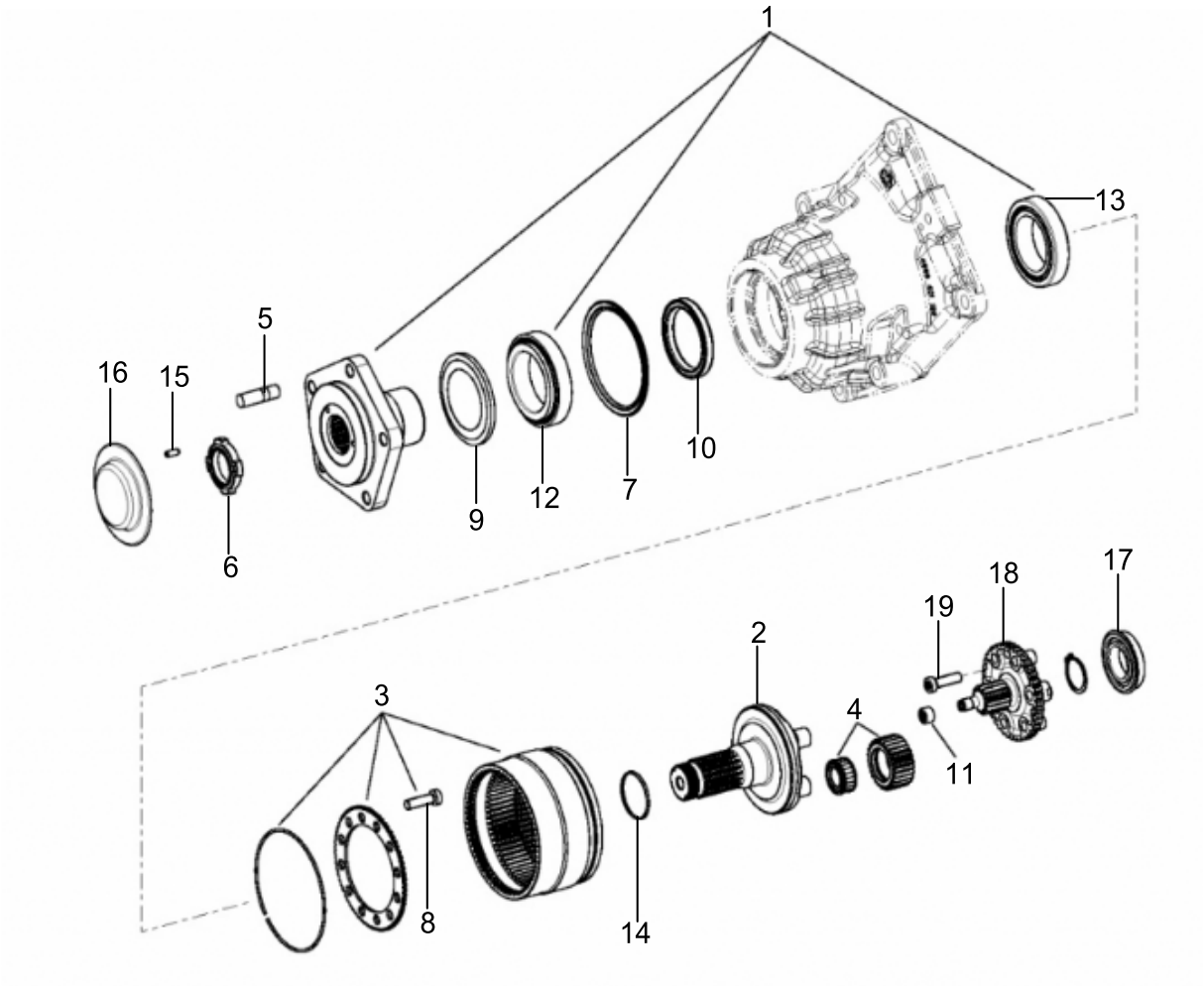
(3) Input



15BT9USM0303

1	Drive Pinion	2	Spur Gear

(4) Output



15BT9USM0304

1	Wheel Shaft	8	Torx Screw	15	Ball bearing
2	Planet Carrier	9	Nilos Ring	16	Protection Cap
3	Ring Gear	10	Shaft Seal	17	Ball Bearing
4	Planetary Gear	11	Needle Sleeve	18	Inner Disc Carrier
5	Wheel Stud	12	Tapered Roller Bearing	19	Torx Screw
6	Slotted Nut	13	Tapered Roller Bearing		
7	Sealing Ring	14	O-Ring		

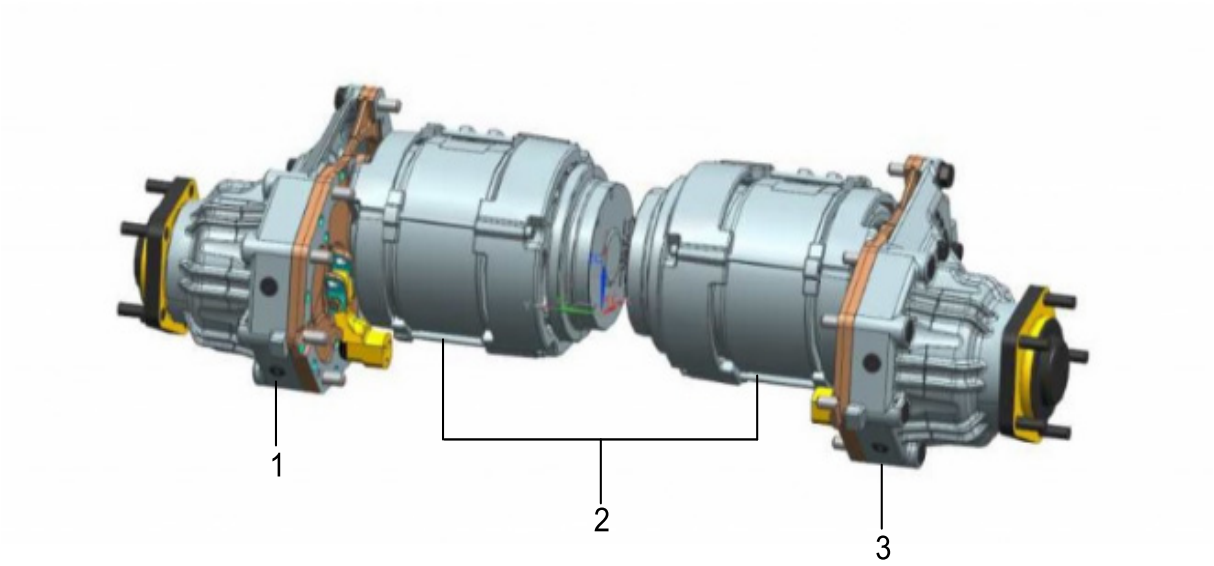
2) SPECIFICATION

Item	Unit	Specification
Max. output torque	N · m	1320
Max. static wheel load	kg/lb	2850/8818
Max. input speed	rpm	5000
Gear ratio available	–	14.0 to 26.6
Weight with oil	kg/lb	Up to 78/171
Oil quantity(ATF)	ℓ /U.S. · qt	0.35/0.36

3) PRINCLPLE OF OPERATION

(1) Outline of the power transmission system

The drive units are composed of the drive unit (LH) and the drive unit (RH) which are connected with the motor as a power transmission system to assemble the drive wheel for the battery type fork lift.



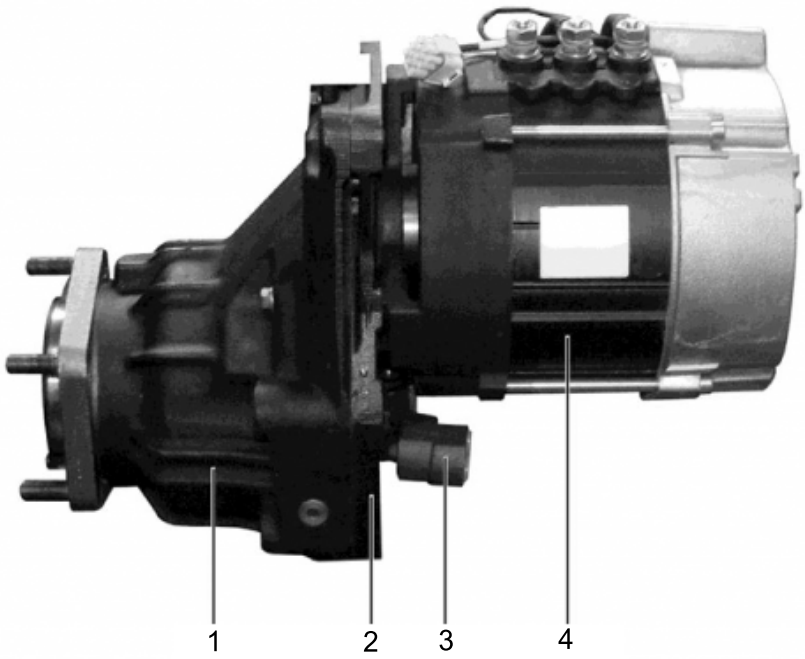
15BT9USM0305

1 Drive unit (LH) 2 Motor 3 Drive unit (RH)

The power of the drive motor which is received from signal of the controller transmits to the dirve gear and the power transfered from the drive gear transmits to the drive wheel via the planetary gear and wheel hub. As a result, it is able to drive to forward and reverse of the fork lift.

(2) Principle of the operation

① Structure of the drive unit



1 Housing
2 Cover
3 Brake lever
4 Motor

15BT9USM0306

② Technical description

The Drive Unit is only designed for use in fork-lift trucks (front-wheel drive concept for electric counter balanced lift trucks).

The Drive Unit is equipped with an integrated service and parking brake.

Depending on the application, The Drive Unit may be used in vehicles up to a maximum static wheel load of 2850 kg. The Drive Unit is attached to the vehicle chassis by fixtures mounted on the drive unit. The following optional accessories are always available to complete the Gearbox into a drive unit:

- Electric drive motor
- Wheel
- Fixing elements

GROUP 2 TROUBLESHOOTING

Problem	Cause	Remedy
1. High-pitch hitting noise(depending on rpm)	· Teeth of spur gear stage damaged when mounting motor	· Check gear teeth of input pinion and spur gear for damage (Replace a damaged input pinion; if the spur gear is damaged, you may carefully refile the gear teeth using a diamond file.)
2. High-pitch, singing noise	· Mechanical engine connection defective motor bearing defective	· Check motor dimensions and motor connection and if necessary retighten input pinion to hub. Inspect motor and replace if necessary
3. Dull, grinding noise	· Defective Wheel bearing	· Inspect wheel bearing, replace if necessaryl
	· Incorrect bearing pretension of wheel bearing	· Check bearing pretension, correct if necessary
	· Defective teeth in planetary gear	· Inspect planetary stage gear set and wheel bearing, replace if necessary
4. Bleeder	· Oil level too high	· Check oil level, correct if necessary
5. Housing cover	· Bolts not tightened to specified torque	· Check tightening torque, retighten bolts if necessary
6. Gear shaft	· Radial shaft sealing ring damaged or worn	· Check radial shaft sealing ring, replace if necessary
7. Brake Lever	· Defective sealing ring	· Check sealing ring, replace if necessary
8. Screw plugs	· Screw plugs not tightened to specified torque · Incorrect or defective sealing ring mounted	· Check tightening torque, if necessary retighten bolts · Remove screw plugs and use genuine sealing rings
9. Motor Connection	· Defective motor O-ring	· Remove motor and replce O-ring
10. Motor	· Worn radial shaft sealing ring on motor shaft · Defective connecting cable/loose · Carbon brushes(if fitted) fretted/worn · Insulation burned through	· If necessary replce motor · Replace/tighten connecting cable · Replace carbon brushes · Replace motor
11. Drive unit	· Blocked motor/gear box · Service brake blocked	· Replce motor/gear box · Carry out maintenance/repair to service brake

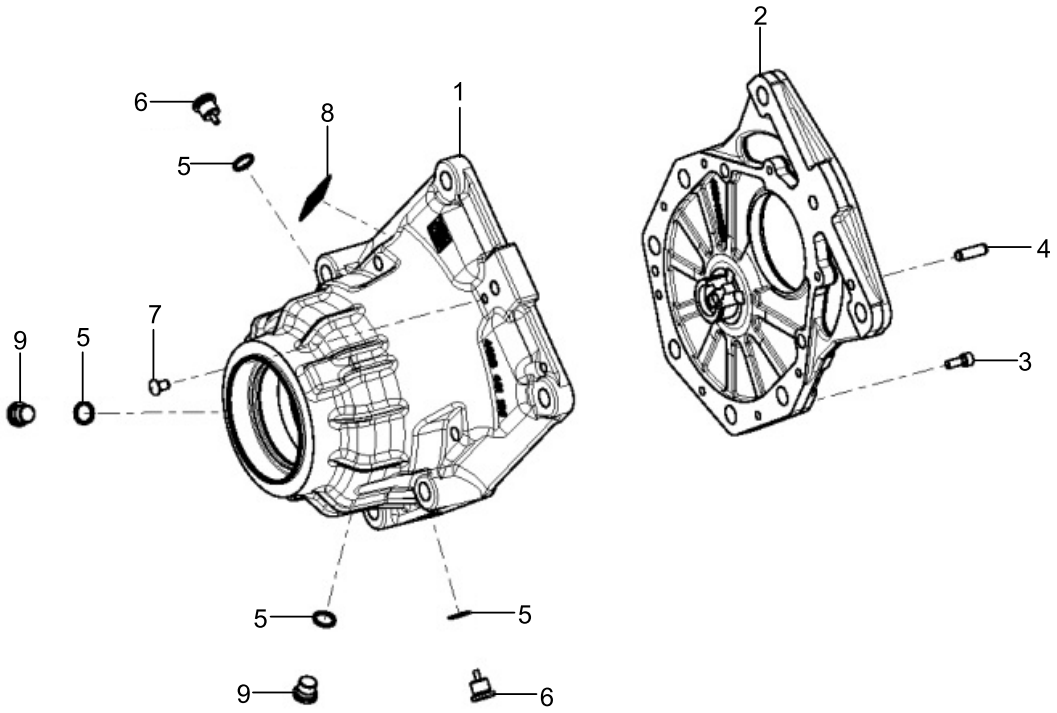
12. Foot brake	· Air in hydraulic system · Worn brake discs · Worn axial slide bearing · Ruptured brake cable	· Bleed or top up brake fluid · Replace brake discs · Replace axial slide bearing · Replace brake cable

GROUP 1 STRUCTURE AND OPERATION

1. DRIVE UNIT

1) STRUCTURE

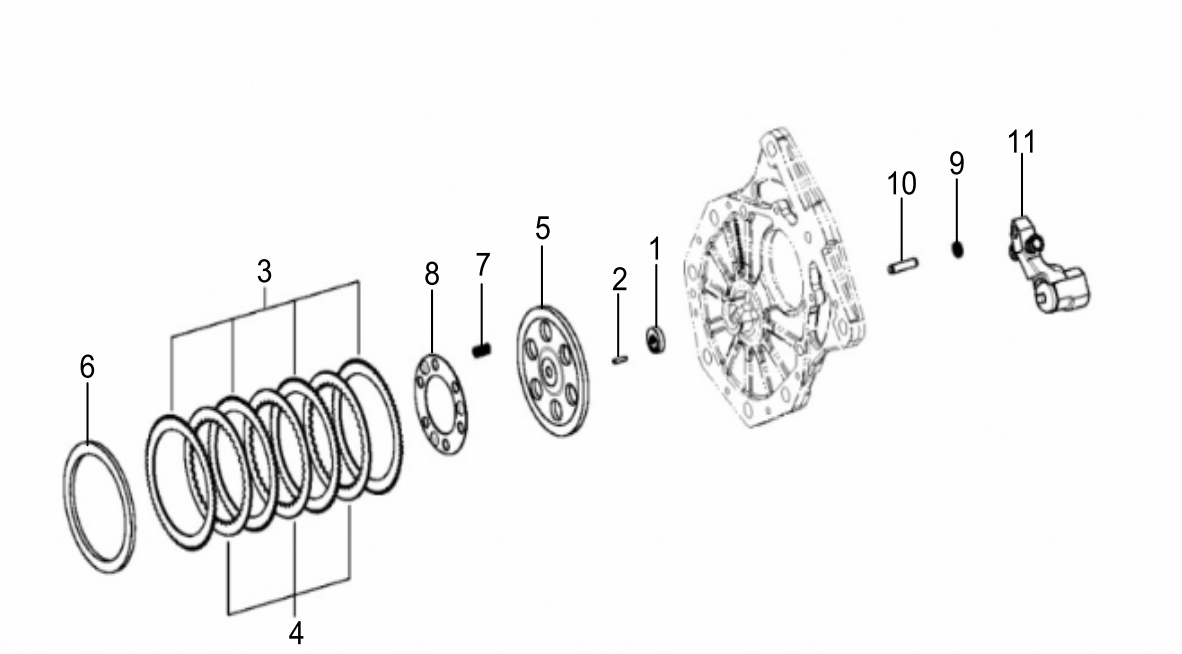
(1) Housing



15BT9USM01

1	Housing	4	Cylinderical Pin	7	Breather
2	Housing Cover	5	Sealing Ring	8	Type Plate
3	Cap Screw	6	Screw Plug	9	Screw Plug

(2) Brake Parts



15BT9USM0302

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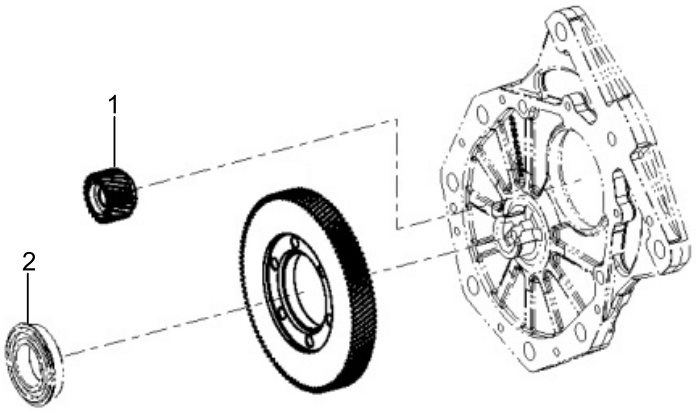
4	Inner Clutch Disc	8	Fixing Plate		

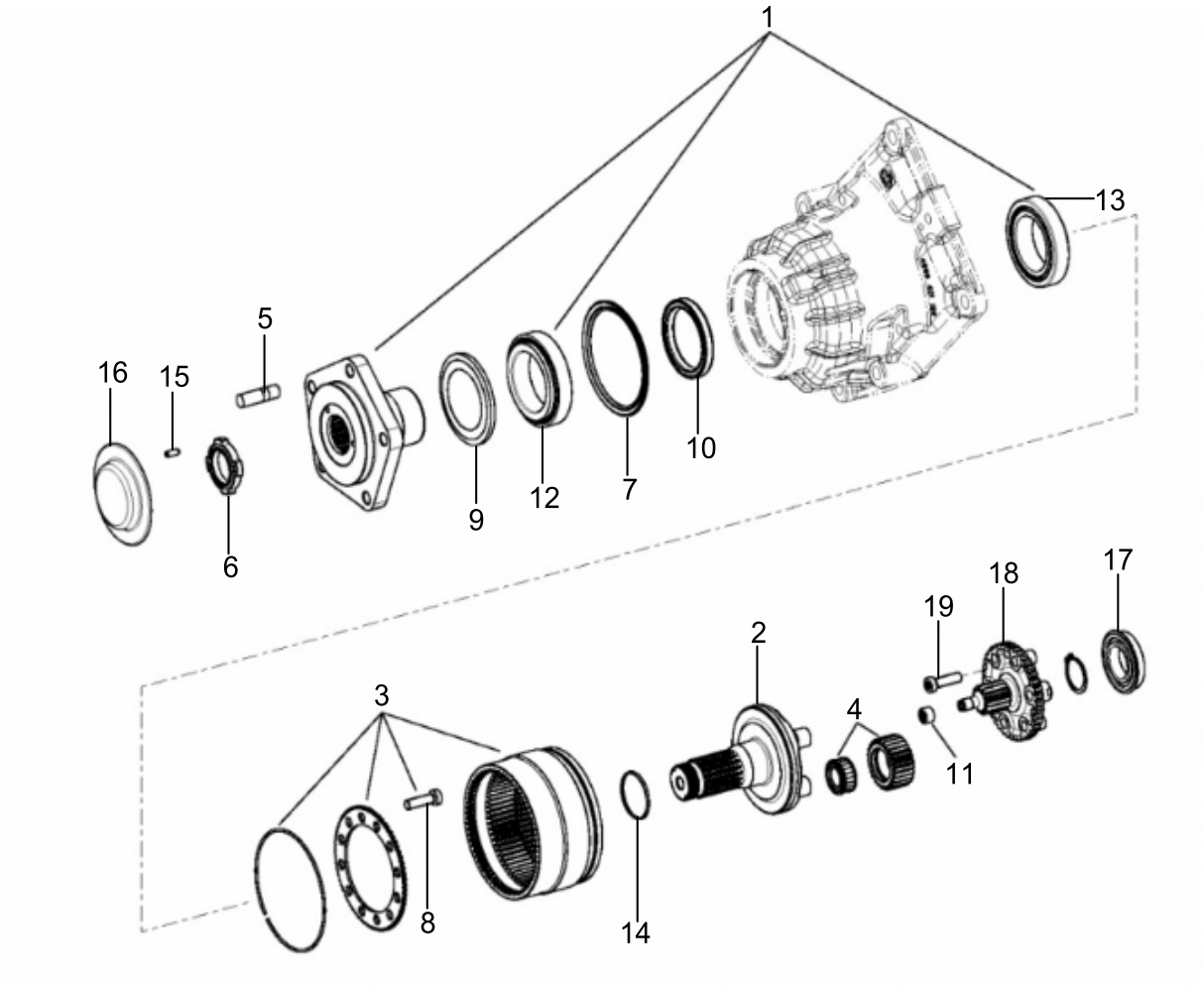
(3) Input



15BT9USM0303

1	Drive Pinion	2	Spur Gear

(4) Output



15BT9USM0304

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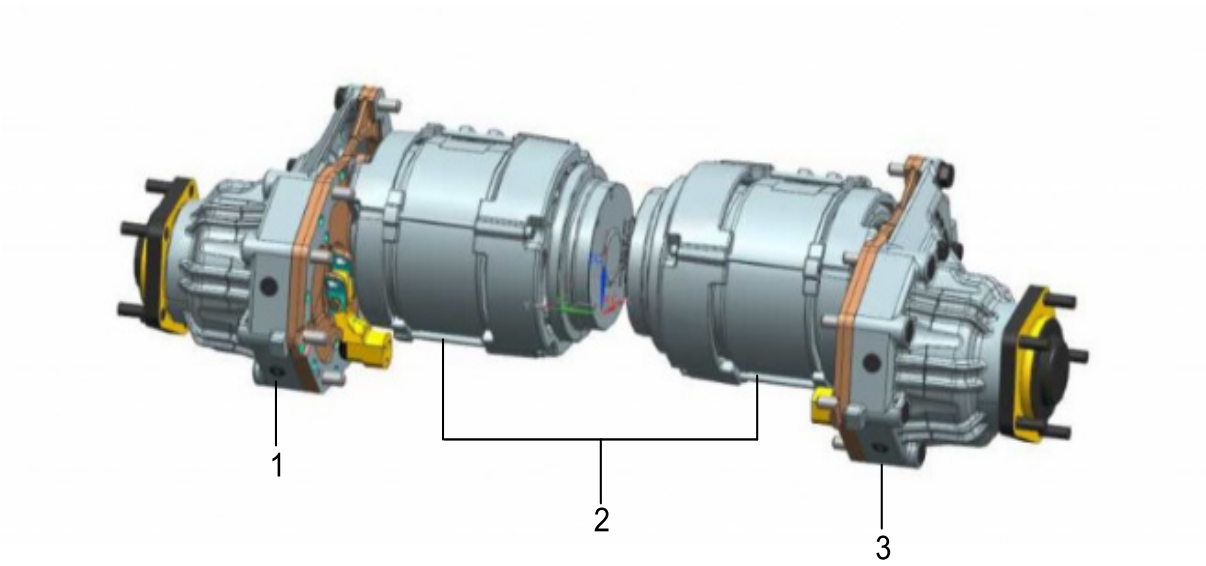

15BT9USM0305

1 Drive unit (LH) 2 Motor 3 Drive unit (RH)

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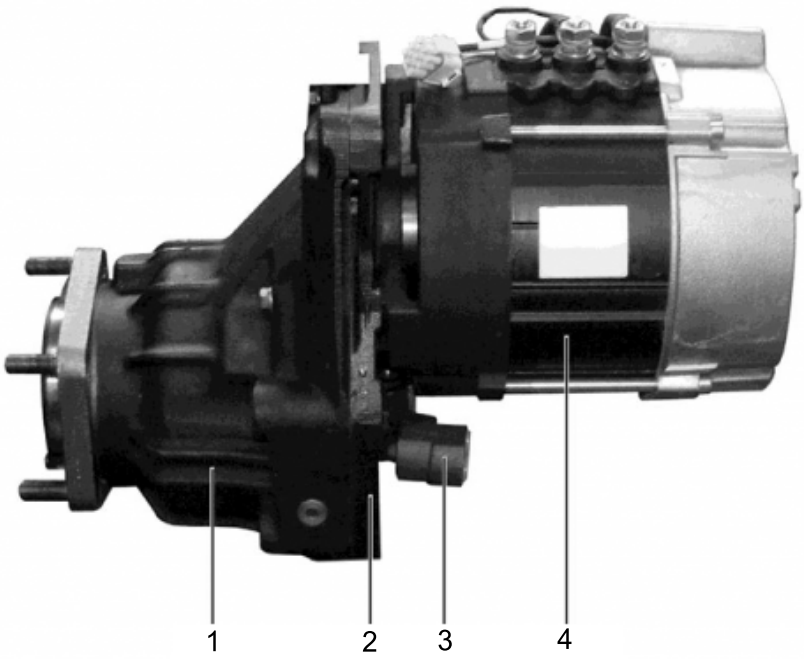
(2) Principle of the operation

① Structure of the drive unit



1 Housing
2 Cover
3 Brake lever
4 Motor

15BT9USM0306

② Technical description

The Drive Unit is only designed for use in fork-lift trucks (front-wheel drive concept for electric counter balanced lift trucks).

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- Wheel
- Fixing elements

GROUP 2 TROUBLESHOOTING

Problem	Cause	Remedy
1. High-pitch hitting noise(depending on rpm)	· Teeth of spur gear stage damaged when mounting motor	· Check gear teeth of input pinion and spur gear for damage (Replace a damaged input pinion; if the spur gear is damaged, you may carefully refile the gear teeth using a diamond file.)
2. High-pitch, singing noise	· Mechanical engine connection defective motor bearing defective	· Check motor dimensions and motor connection and if necessary retighten input pinion to hub. Inspect motor and replace if necessary
3. Dull, grinding noise	· Defective Wheel bearing	· Inspect wheel bearing, replace if necessaryl
	· Incorrect bearing pretension of wheel bearing	· Check bearing pretension, correct if necessary
	· Defective teeth in planetary gear	· Inspect planetary stage gear set and wheel bearing, replace if necessary
4. Bleeder	· Oil level too high	· Check oil level, correct if necessary
5. Housing cover	· Bolts not tightened to specified torque	· Check tightening torque, retighten bolts if necessary
6. Gear shaft	· Radial shaft sealing ring damaged or worn	· Check radial shaft sealing ring, replace if necessary
7. Brake Lever	· Defective sealing ring	· Check sealing ring, replace if necessary
8. Screw plugs	· Screw plugs not tightened to specified torque · Incorrect or defective sealing ring mounted	· Check tightening torque, if necessary retighten bolts · Remove screw plugs and use genuine sealing rings
9. Motor Connection	· Defective motor O-ring	· Remove motor and replce O-ring
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11. Drive unit	· Blocked motor/gear box · Service brake blocked	· Replce motor/gear box · Carry out maintenance/repair to service brake

12. Foot brake	· Air in hydraulic system · Worn brake discs · Worn axial slide bearing · Ruptured brake cable	· Bleed or top up brake fluid · Replace brake discs · Replace axial slide bearing · Replace brake cable

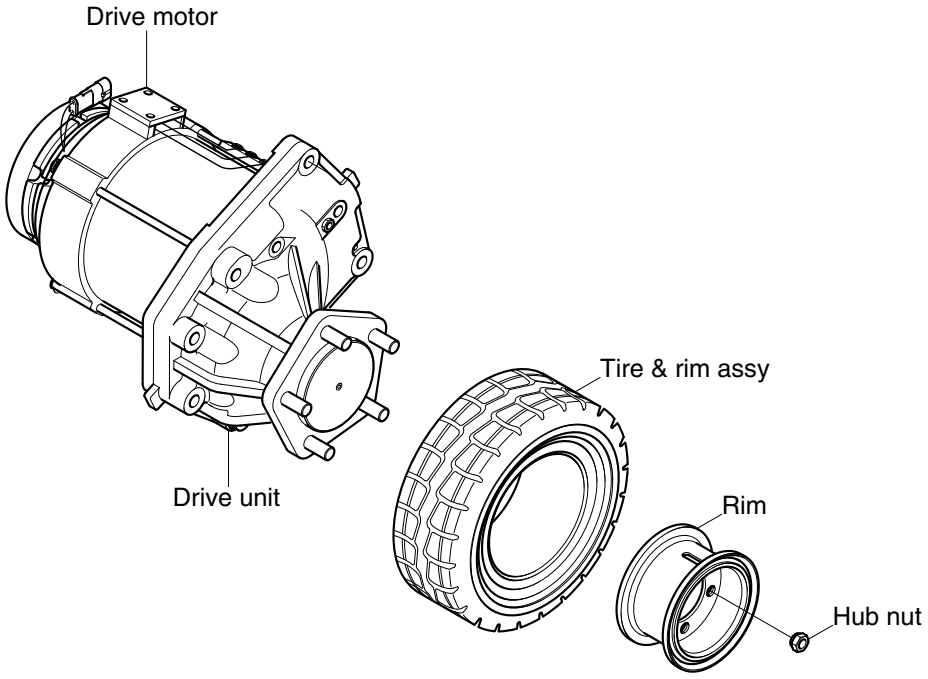
GROUP 3 DISASSEMBLY AND ASSEMBLY

1. Disassembly

Drain oil from transmission before removal of the drive unit. Loosen and remove the wheel nuts as well as take off the drive wheel. See the related chapter for further work on the drive motor of the drive unit.

1) REMOVAL OF THE DRIVE UNIT

(1) Removal of Drive unit. (refer to see page 2-8)



15BT9USM0307

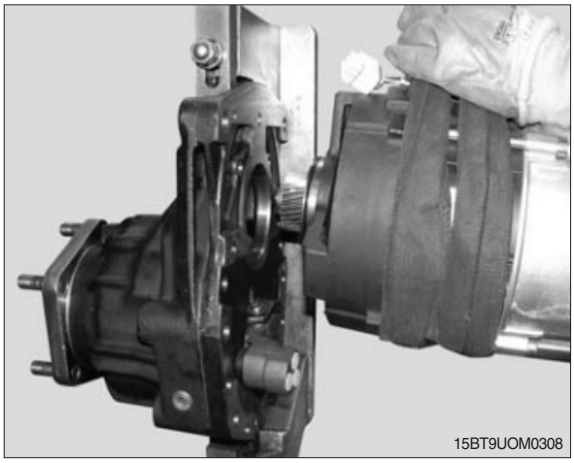
2) REMOVAL OF THE DRIVE MOTOR

(1) Drive motor and accessories mounted to the drive motor have to be disconnected.

(2) Take off cautiously the drive motor from the drive unit.

⚠ **Do not damage the teeth of the motor pinion and the spur gear.**
Damages can cause louder running noises.

※ In case of an inadequate removal of the drive motor from the drive unit there is danger to damage the sealing surface for the O-ring in the housing.
If only the drive motor is removed, the released drive unit opening is to be sealed in order to avoid that dirt can get inside the drive unit.



15BT9UOM0308

2. GENERAL INSTRUCTIONS FOR CORRECT DISASSEMBLY AND REASSEMBLY

Cleanliness is essential for a correct work.
Drive unit removed from the vehicle have to be cleaned prior to opening.
Special care and cleanliness are essential for a correct disassembly and reassembly of the unit as well as for the installation of each spare part. A fault during installation can result in an early wear and chips as well as foreign particles in the unit could cause fatal damage in the drive unit.
Prior to reassembly all parts must be cleaned and inspected for wear and other defects.
It would be a false economy to reinstall parts which are not in a perfect condition.
All parts have to be oiled carefully during reassembly. Apply a sealing compound onto housing-and cover faces, which must be tight towards the outside.

For heating of bearings etc. use heating plates, heating elements or heating furnaces.
Never heat directly with an open flame. This avoids damage to the bearings.

If not otherwise indicated heat ball bearings, gears, flanges etc. to approx. 90-100℃.

Parts which have been mounted in a warm condition must be subsequently installed after cooling down to ensure a perfect contact.
Lubricate both parts before shafts, bearings etc. are pressed into position.

For reassembly all of the indicated setting values, test data and tightening torques must be observed.
HYUNDAI-units will be filled with oil after repair work.

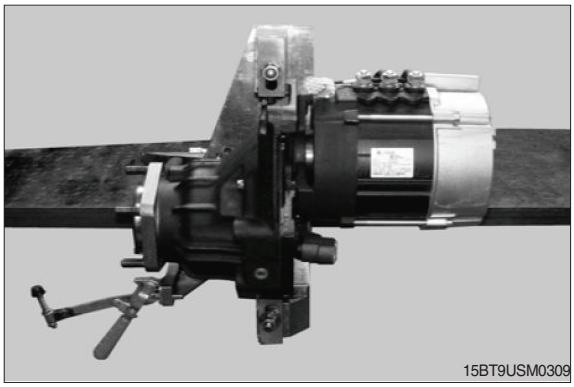
The following description of disassembly and reassembly serves to inform both the after-sales service.
※ Centers of HYUNDAI and of the vehicle manufacturer, where adequate workshop facilities and trained specialists are present.

3. DISASSEMBLY OF THE DRIVE UNIT

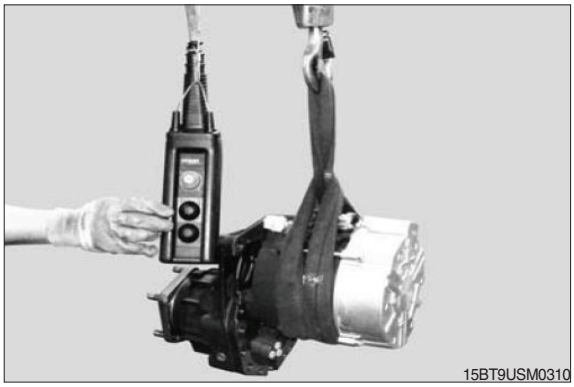
1) Motor Disassembly

※ Always keeps clean working area when disassebling the drive unit.

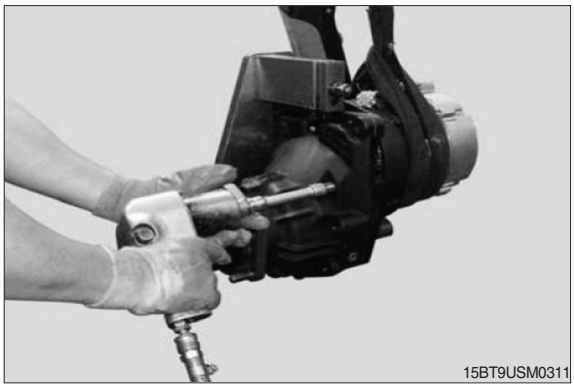
(1) Clamp the drive unit in the assembly fixture and turn the drive unit.



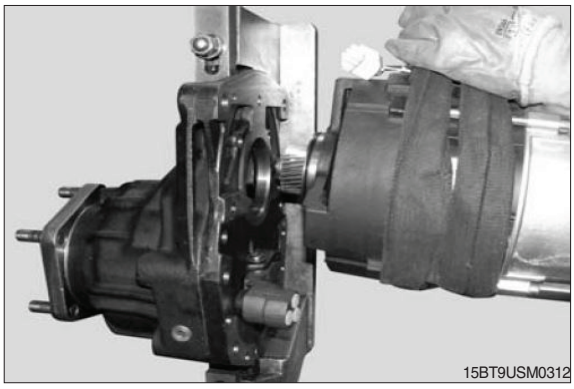
(2) Fasten the motor to suitable lifting gear using approved attachment equipment.



(3) Undo the 3 Allen bolts and remove.



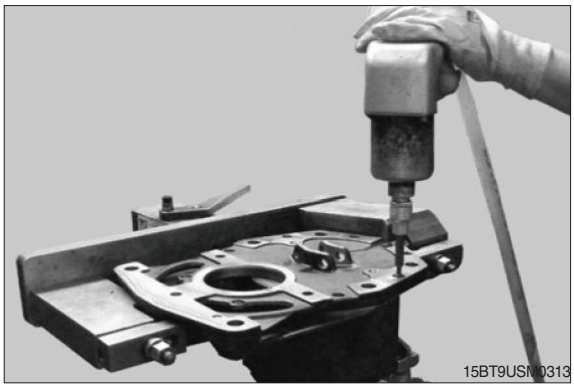
(4) Carefully remove the motor from the drive unit and set it down on a suitable support piece. Secure the motor against falling.



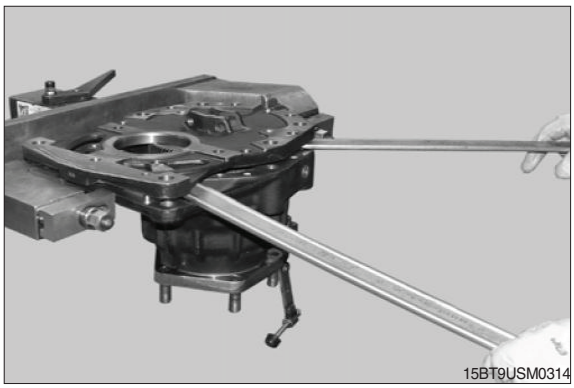
2) Removing the Housing cover

※ The brake lever shall be removed before removing the housing cover.

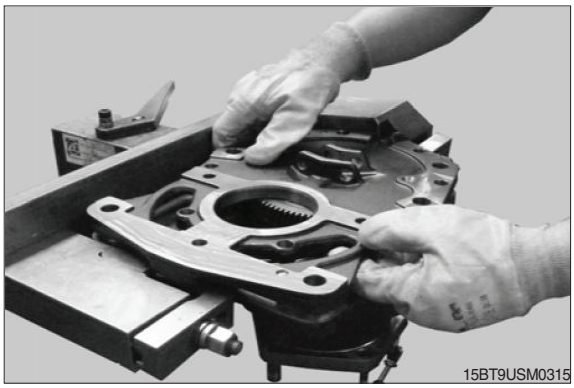
(1) Undo the 8 Allen bolts and remove from the housing cover.



(2) Release the housing cover using assembly levers and raise slightly and evenly.

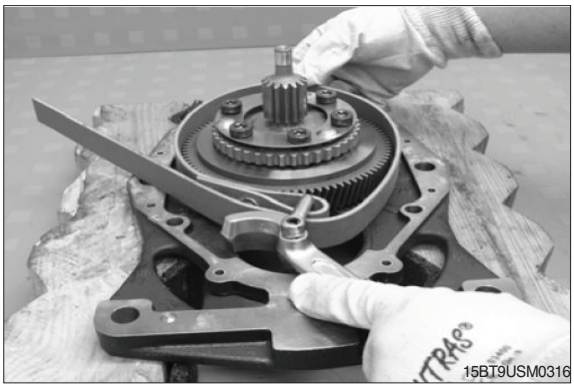


(3) Remove the housing cover from housing.

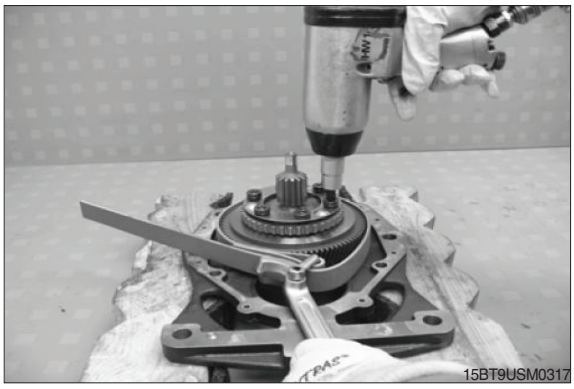


Inner disc carrier

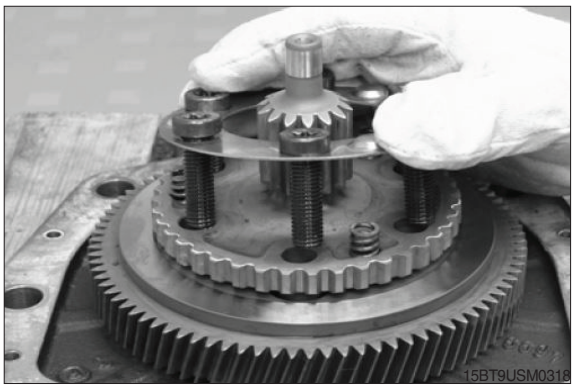
(4) Place the cover assembly onto a suitable support and assure an even and stable rest. Place the strap around the spur gear and tighten it by using the wrench lever.



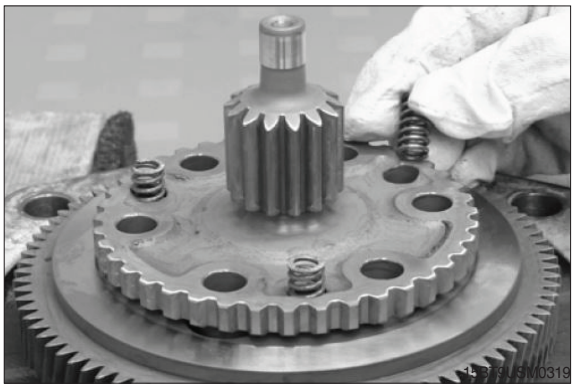
(5) Hold the spur gear tight using the strap wrench. Undo the 6 Torx bolts.



(6) Manually remove the retaining plate from the spur gear together with the 6 Torx bolts.

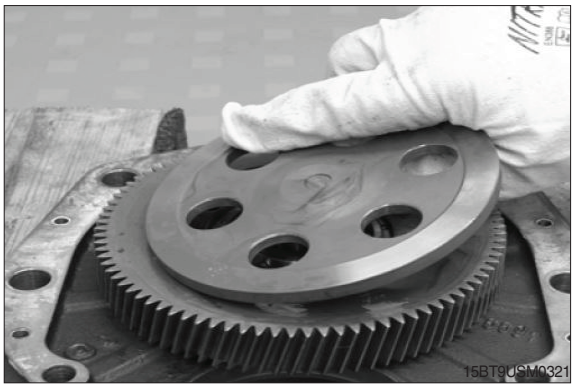


(7) Manually remove the 3 pressure springs 1.6x8.0x21.5 from the spur gear.



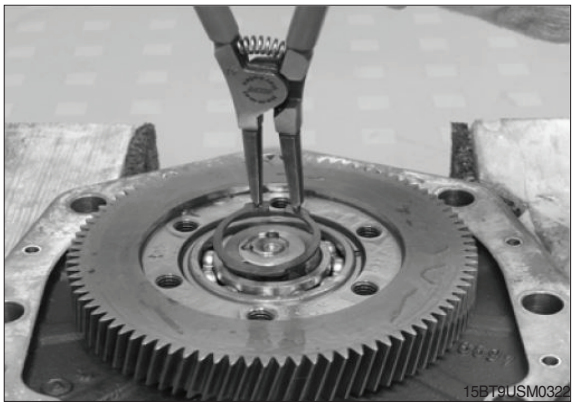
(8) Manually remove the inner disc carrier from the pressure disc.

(9) Manually remove the pressure disc from spur gear.



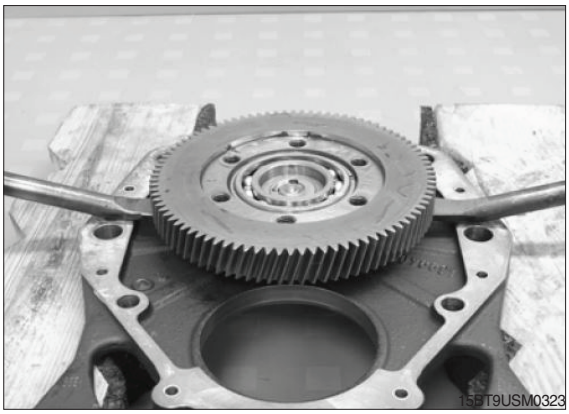
Spur gear

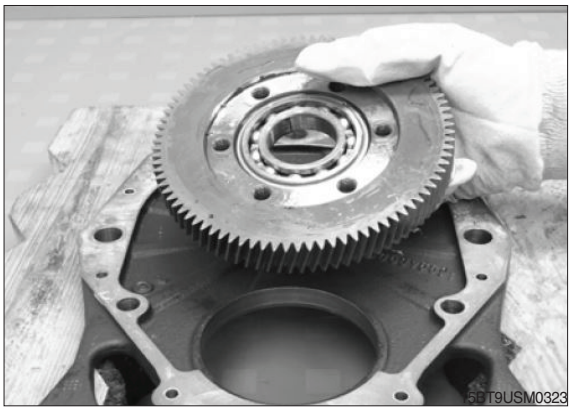
(10) Remove the spur gear retaining ring.



(11) By levering the spur gear alternately on both sides, manually remove it from the housing cover.

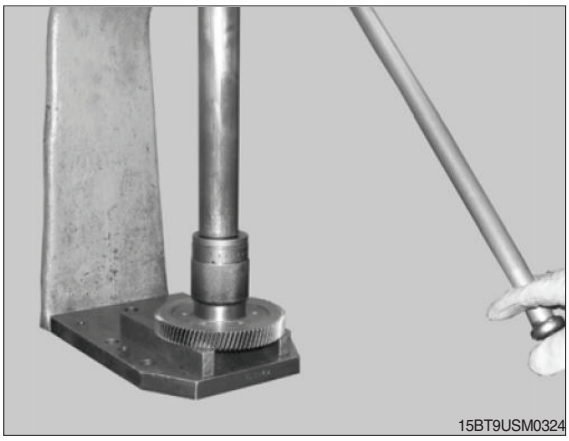
※ Be careful not to damage the toothing when levering.





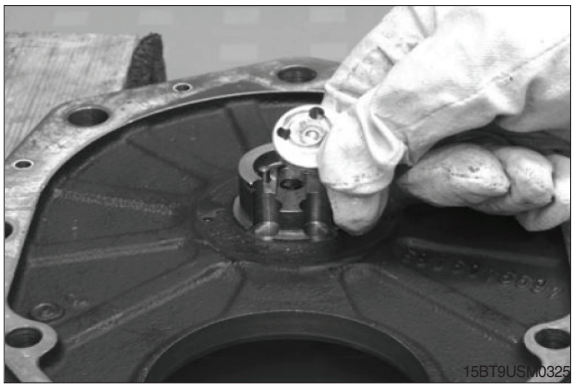
(12) Remove the grooved ball roller bearing from the spur gear using tool and the hand lever press.

※ Risk of accident and injury from crushing. When pressing out the grooved ball roller bearing, do not place hands between the punch and the tool.



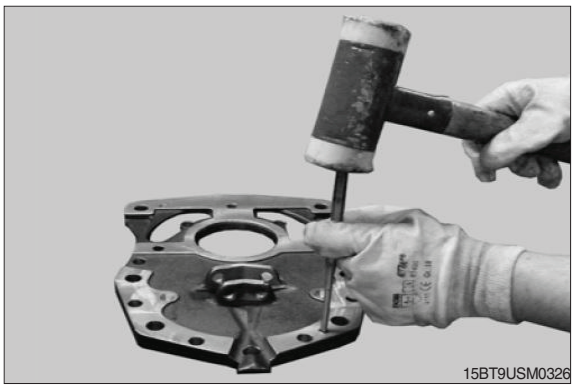
Axial bearing

(13) Lever the axial bearing out of the housing cover using a screw driver and remove.



Cylinderical pin

(14) Remove the 2 cylindrical pins from the housing cover. If one or both of the cylindrical pins remain in the housing during disassembly, they shall be removed using pliers. The pins will be destroyed in the process and shall be replaced during reassembly.

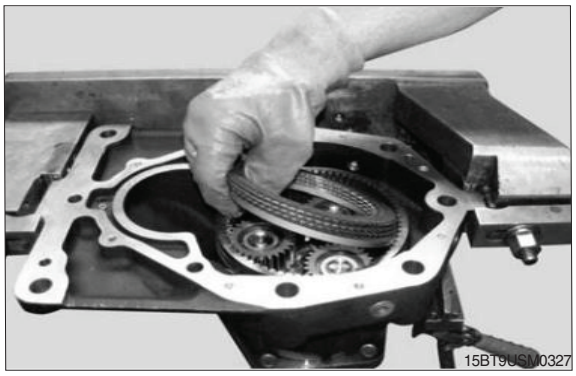


3) Housing disassembly

※ When changing the disc set in one gearbox, the disc set of the gearbox on the other side of the vehicle shall also be changed. If this is disregarded, there may be a pronounced difference in braking effect between the left-hand and right-hand gearbox. The difference in braking effect may lead to longer braking distances or to the vehicle breaking out to the side. Iways keeps clean working area when disassebling the drive unit.

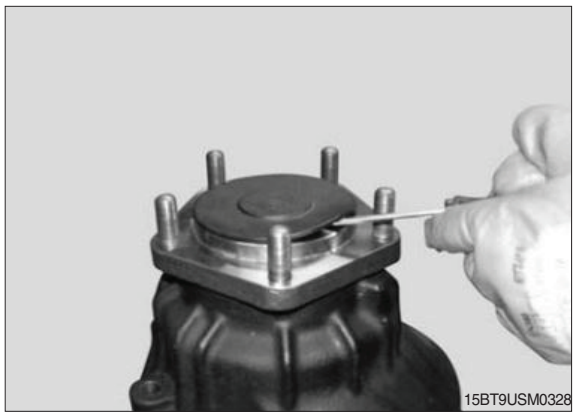
Brake disc set

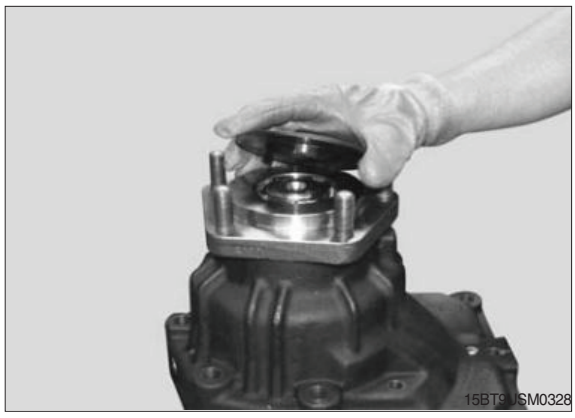
(1) Remove the brake disc from the internal gear.



Protective cap

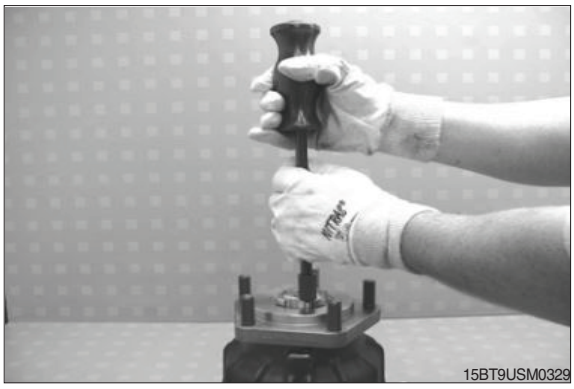
(2) Release the protective cap from the wheel shaft and remove manually.





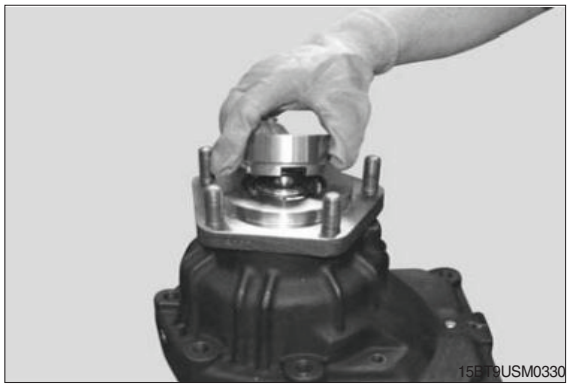
Cylindrical pin

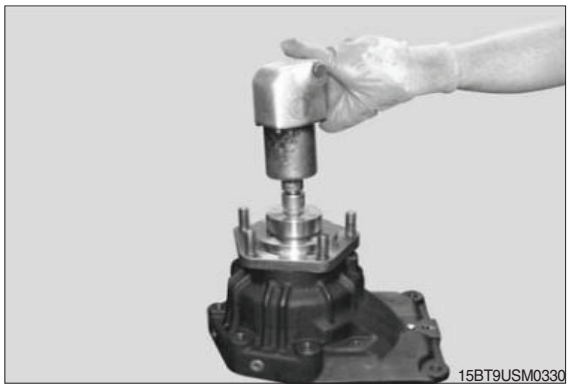
(3) Remove the cylindrical pin which secures the grooved nut from the wheel shaft.
To do this, screw the thread of Pinion extractor with hammer stroke fully into the cylindrical pin. Slide the hammer upwards several times with enough drive to pull out the cylindrical pin.



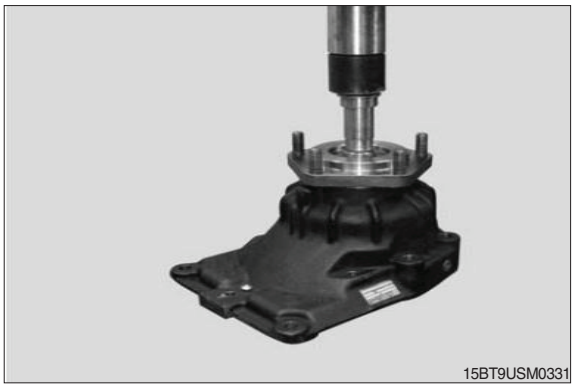
Grooved nut

(4) Undo the grooved nut from the wheel shaft and remove manually.





(5) Place the housing on the press table with the mating surface facing downwards.

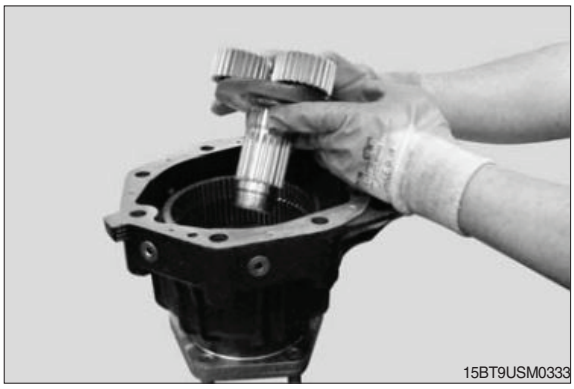


Planet carrier

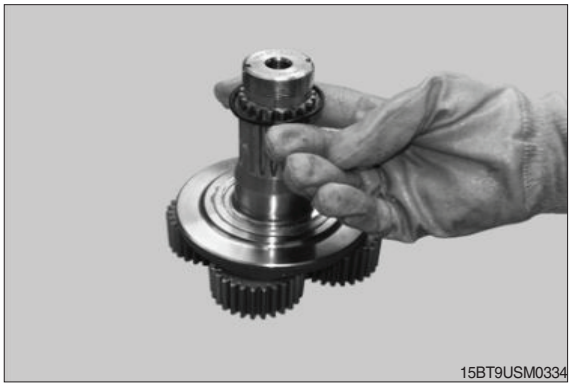
(6) Press the planet carrier out of the housingousing sub assy.

※ Risk of accident and injury from crushing. When pressing out the planet carrier, do not place hands between the punch and the tool.

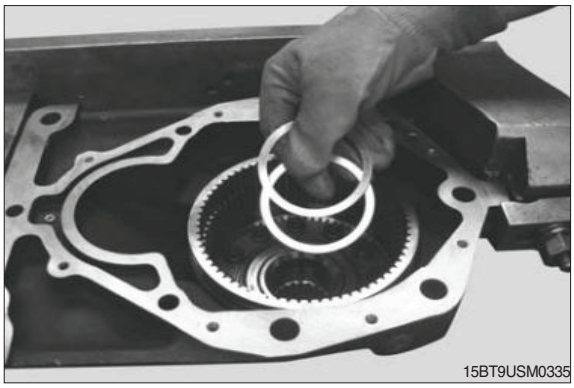
(7) Remove the planet carrier from the housing.



(8) Remove O-ring from planet carrier by hand.

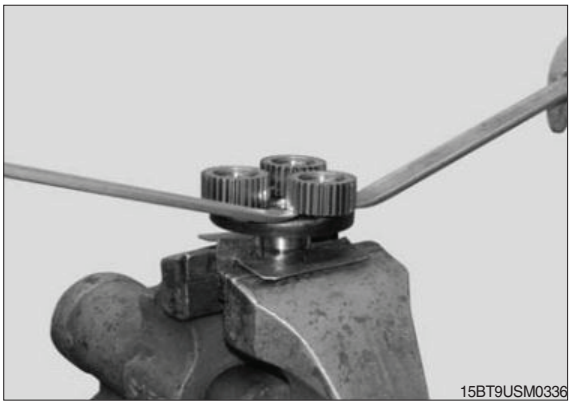


(9) Clamp the housing in the assembly fixtures. Remove the spacers from the housing.

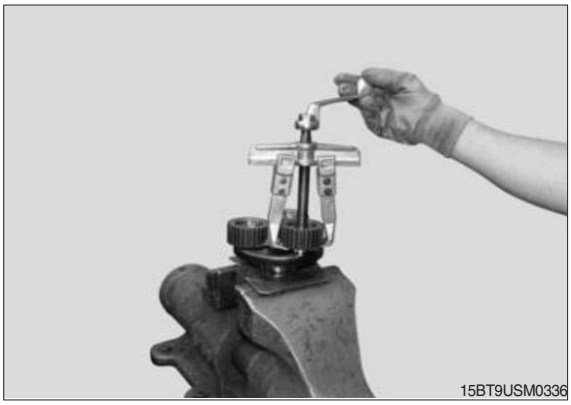


Planetary gears

(10) Version with 3 planet gears
Clamp the planet carrier in a vice.
Fit the jaws of the vice with protective jaws (e.g. copper, aluminium or brass) to prevent the surfaces from being damaged.



Remove the 3 planetary gears from the planet gear.

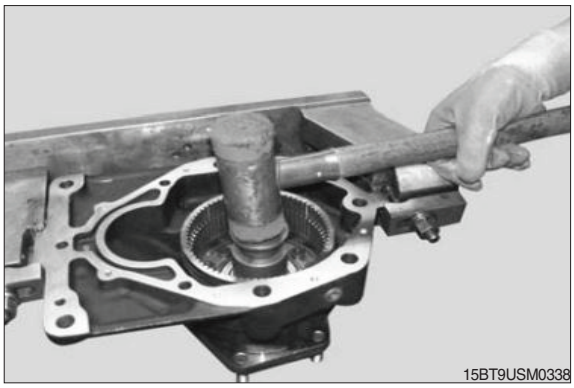


(11) Version with 4 planet gears
Clamp the planet carrier in a vice.
Fit the jaws of the vice with protective jaws (e.g. copper, aluminium or brass) to prevent the surfaces from being damaged.

Remove the 4 planetary gears from the planet gear.

Gear shaft

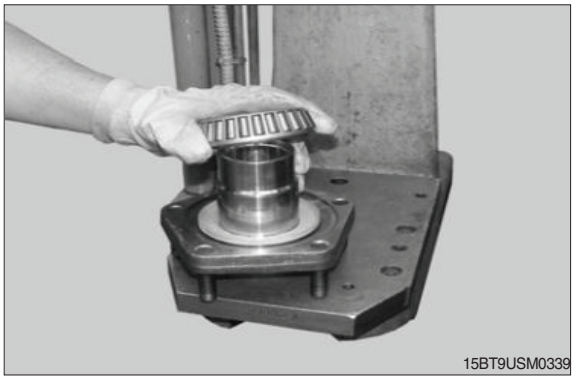
(12) Drive the wheel shaft out of the housing. Secure the drive against falling from below with your hand.



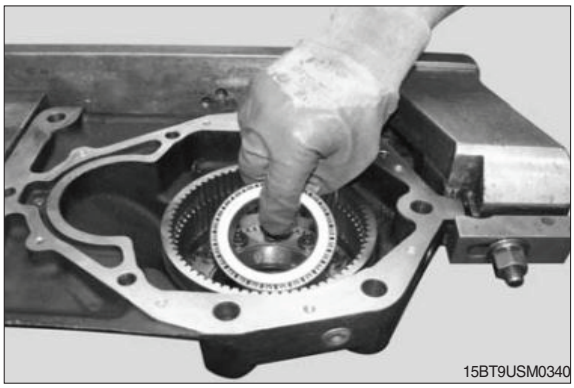
Wheel shaft taper roller bearing

(13) If necessary, heat the taper roller bearing to facilitate removal. Wear prescribed protective equipment and use appropriate tools.
Remove the wheel shaft side taper roller bearing from the wheel shaft. If necessary, heat the taper roller bearing.

※ Risk of accident and injury caused by hot surface.

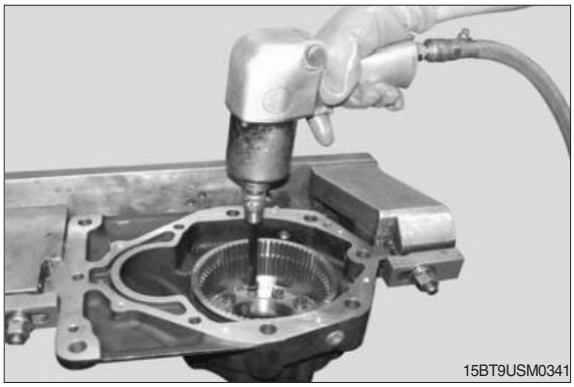


(14) Remove the planet carrier side taper roller bearing.



Internal gear

(15) Remove the 12 Torx bolts from the internal gear.

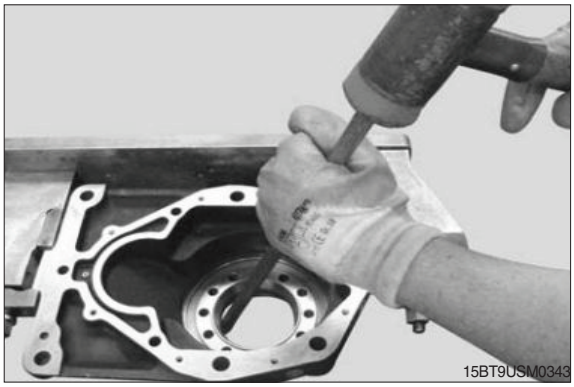


(16) Remove the internal gear from the housing.

If the internal gear is damaged, it shall be replaced as a complete unit.

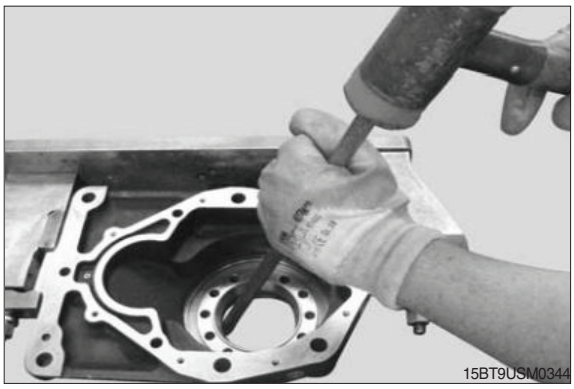
Wheel shaft sealing ring

(17) Drive the sealing ring downwards and out of the housing by impacting it alternately on opposite sides.
The shaft sealing ring is destroyed in the process. During reassembly, a new shaft sealing ring shall be used.



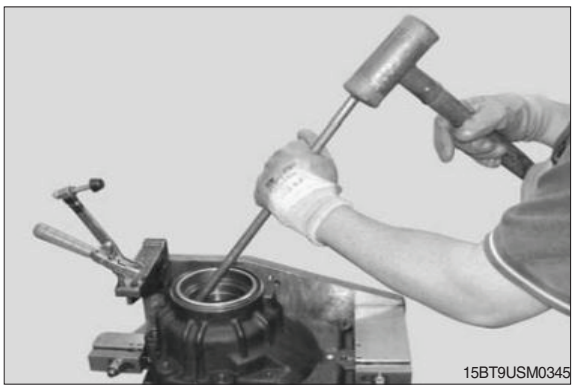
Wheel shaft side bearing cup

(18) Drive the wheel shaft side bearing cup of the taper roller bearing downwards and out of the housing by impacting it alternately on opposite sides.



Planet carrier side wheel shaft

(19) Drive the planet carrier side bearing cup of the taper roller bearing downwards and out of the housing by impacting it alternately on opposite sides.



Wheel shaft sided sealing

(20) Disassemble the sealing ring by using a chisel.
The sealing ring is destroyed in the process. During reassembly, a new sealing ring shall be used.

3. ASSEMBLY OF THE DRIVE UNIT

1) Housing reassembly

Wheel shaft sided sealing ring

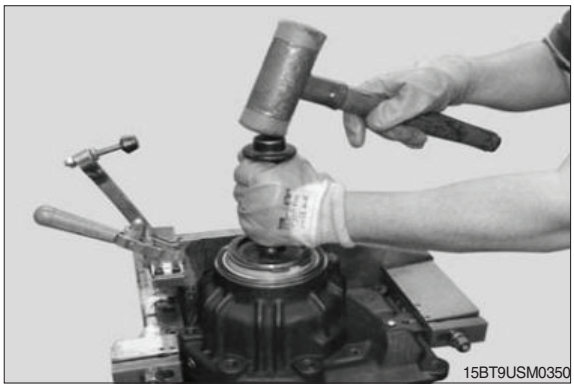
(1) Place the wheel shaft sided sealing ring onto the transmission housing
Make sure that the sealing lip is facing upwards.

(2) Drive up the sealing ring into the transmission housing against the block.

Shaft sealing ring

(3) Place the shaft sealing ring into the tool (Assembly mandrel).
The closed side of the shaft sealing ring shall be facing the flange connection for the wheel.

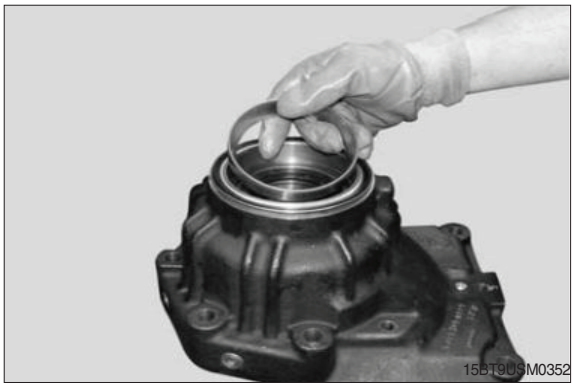
(4) Drive the shaft seal into the bore by using an assembly mandrel.
The shaft seal has reached its correct position as soon as its upper surface has reached at least the lower end of the bore's chamfer.

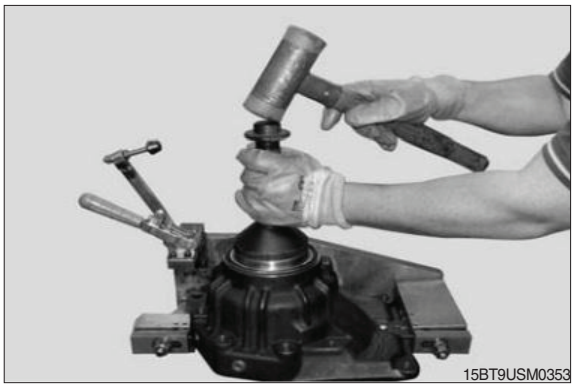


Wheel shaft side bearing seat

(5) Clean the wheel shaft side bearing seat of the taper roller bearing in the housing .

(6) Drive the wheel shaft side bearing cup of the taper roller bearing into the bearing seat.
The inside of the bearing cup shall narrow to a taper towards the bearing seat and the wide edge of the bearing cup shall be positioned at the bottom.



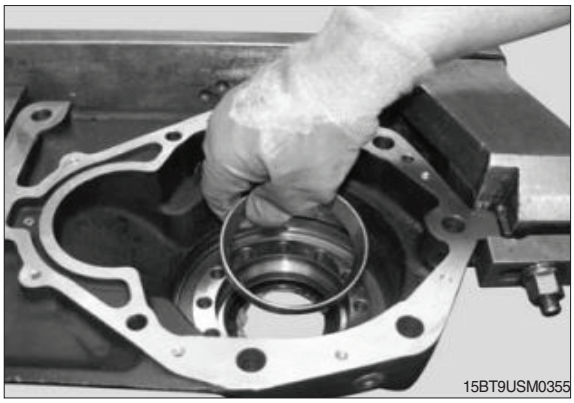


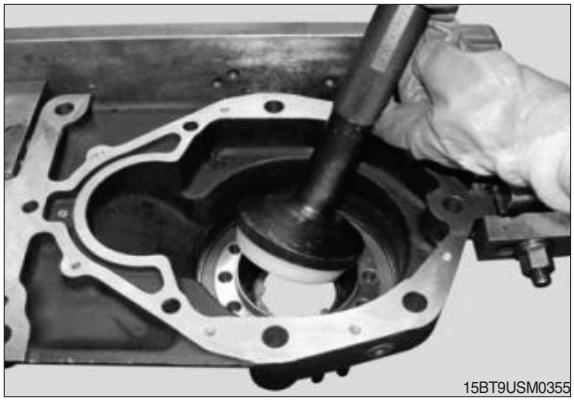
(7) Coat the inner lip of the shaft sealing ring with multipurpose

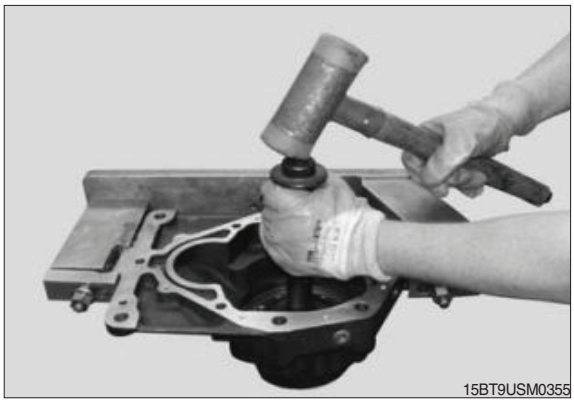
Planet carrier side bearing seat

(8) Drive the planet carrier side bearing cup of the taper roller bearing into the bearing seat.

The inside of the bearing cup shall narrow to a taper towards the bearing seat and the wide edge of the bearing cup shall be positioned at the bottom. Drive in the bearing cup until a dull metallic sound signals that the bearing cup is resting against the bearing seat.

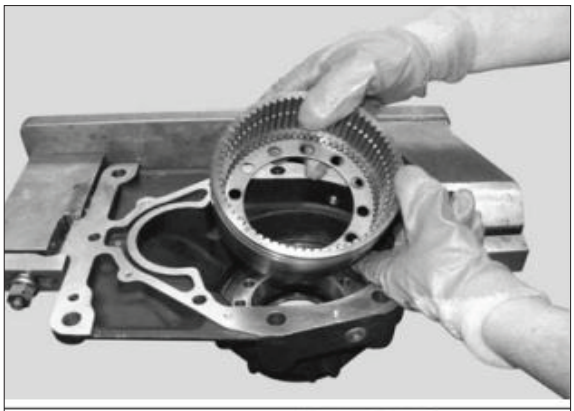






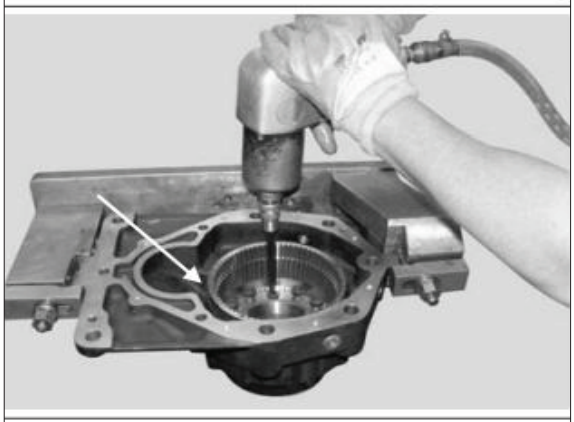
Internal gear

(9) Manually slot the toothed disc into the internal gear.
Lay the ring into the groove of the internal gear.
Place the internal gear into the housing by hand.



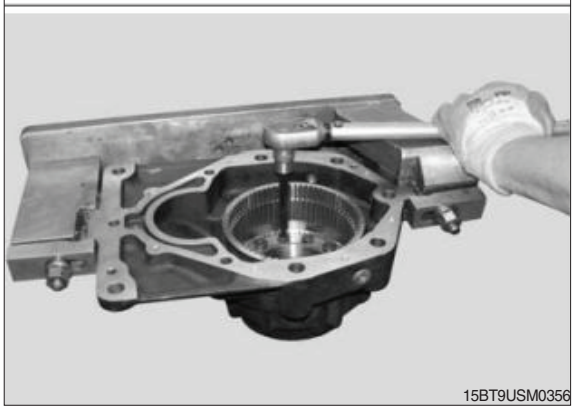
The opening of the ringshall be visible (see arrow). Bolt on the internal gear with 12 Torx bolts .

① Pretighten the bolts with a compressed-air screw driver in a cross wise pattern.
② Firmly tighten the bolts using a torque wrench.



When tightening the bolts, note the tightening torque of 79 Nm.

Check whether it is still possible to move the internal gear in a rocking motion after tightening the bolts. If it is possible, continue with work. If it is not: Remove the internal gear again and replace it.
Remove from the housing all the parts which have so far been installed and replace the housing.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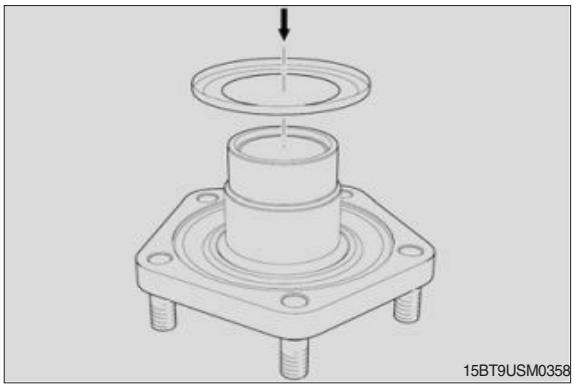
Gear shaft

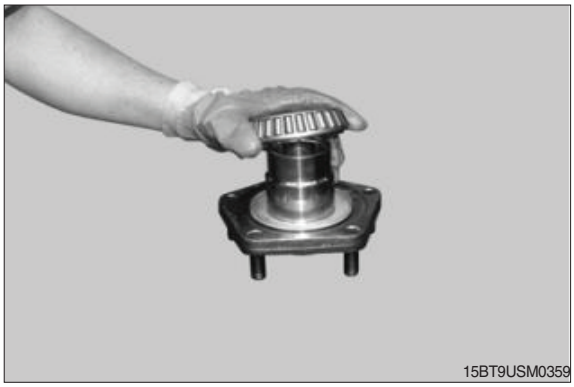
(10) Coat the Nilos ring with multipurpose grease.


15BT9USM0357

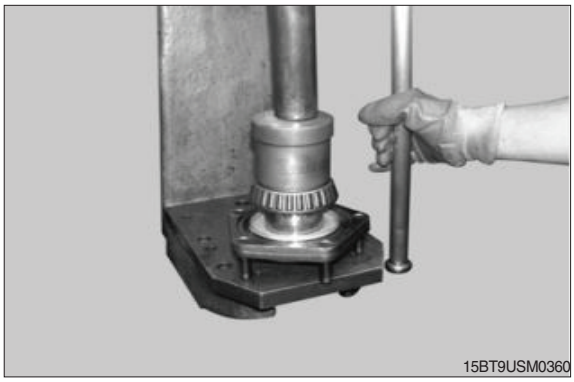
(11) Slide the Nilos ring onto the wheel shaft.



(12) Fit taper roller bearing on gear wheel side to gear shaft by hand.

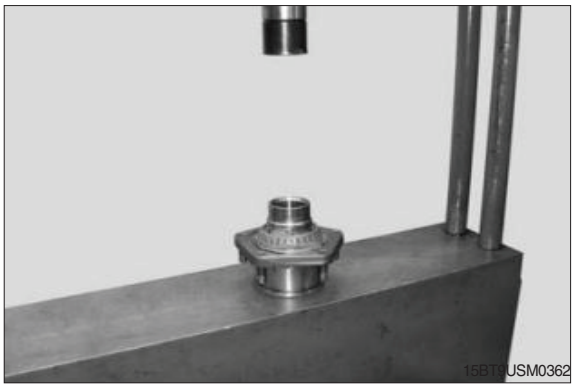


(13) Press taper roller bearing on gear wheel side onto gear shaft using lever press and tool.
Plunger of lever press, tool and gear shaft must align vertically with no offset.

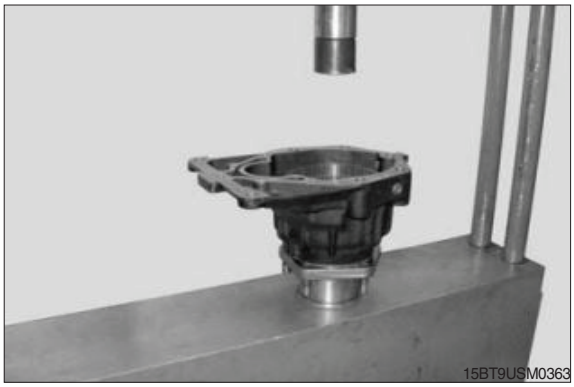


(14) Grease the taper roller bearing.

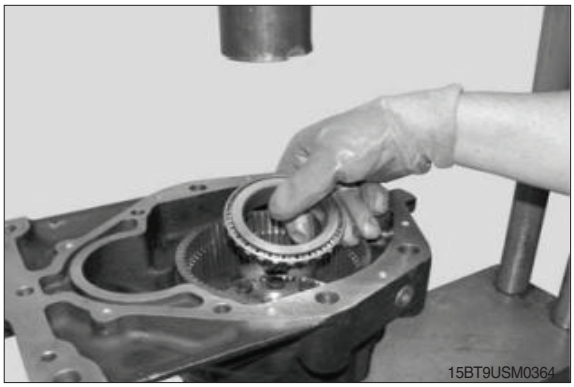
(15) Place the wheel shaft on the press table so that the wheel studs point downwards. The wheel shaft shall stand on a suitable sleeve and the wheel studs shall be clear of the table.



(16) Fit the housing perpendicularly onto the wheel shaft.
The mating surface of the housing shall face upwards.



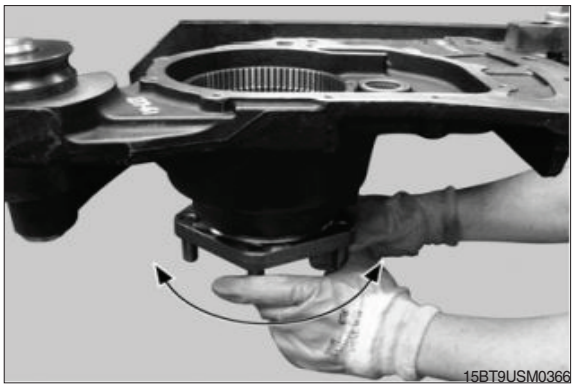
(17) Place the taper roller bearing onto the seat of the wheel shaft.



(18) Press the planet carrier side taper roller bearing onto the wheel shaft.

The punch of the hand lever press, tool and taper roller bearing shall be positioned vertically to each other without deflection.

(19) Check the wheel shaft for smooth running. It shall be possible to move the wheel shaft easily by hand. In order that the taper rollers can align themselves correctly in the bearing races, a soft head hammer should be used to tap at various points around the wheel shaft. If the taper rollers are correctly aligned, continue with the work. If they are not: Remove the wheel shaft again. Check both bearings (wheel shaft side and planet carrier side) for any damage which may have occurred during the press fitting procedure. If damage is found, remove the bearings and replace with new ones.

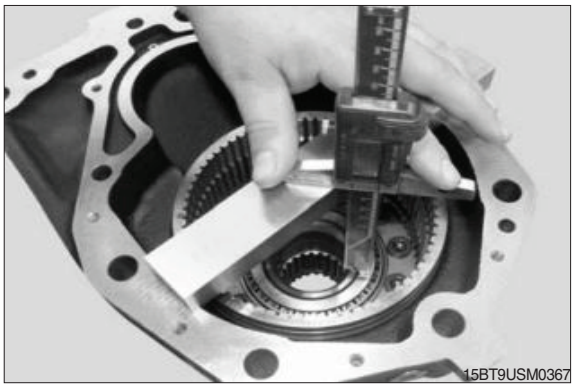

15BT9USM0366

Measuring and adjusting

(20) Measuring the distance between the bearing surface of the taper roller bearing and the surface of the wheel shaft.

① Rest spacer on the mating surface of the housing.

② Set the depth gauge onto spacer.


15BT9USM0367

It shall be ensured that the greatest possible contact area of the depth gauge is resting on spacer.

③ Adjust the depth gauge to the surface of the wheel shaft.

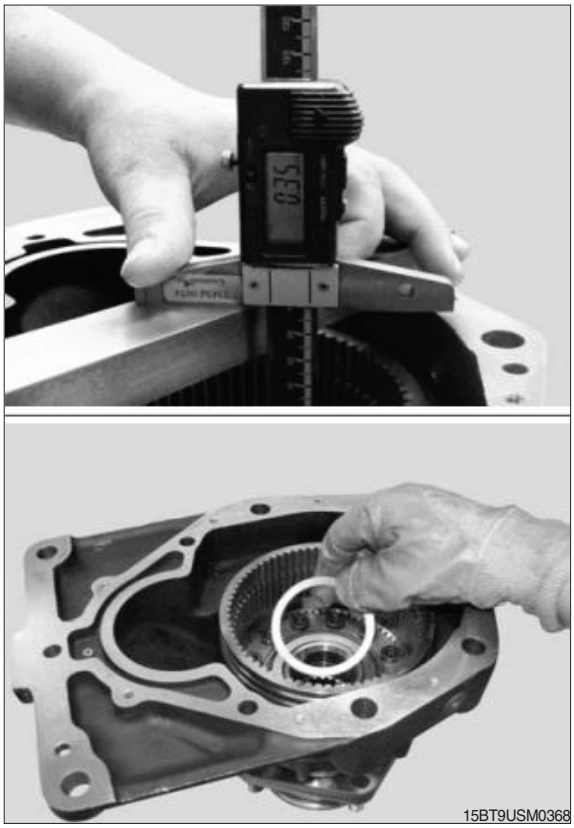
④ In the position, zero the depth gauge.

⑤ Adjust the depth gauge to the surface of the taper roller bearing

⑥ Read off the difference between the two settings.

⑦ Repeat the measurement on the opposite side. The difference in measurement may not exceed 0.5 mm.

⑧ Select spacers. The thickness of the spacer set shall be the same as the difference between the measurements. A preloading on the wheel shaft is then achieved. The preloading on the wheel shaft shall be between 3 and 7 Nm.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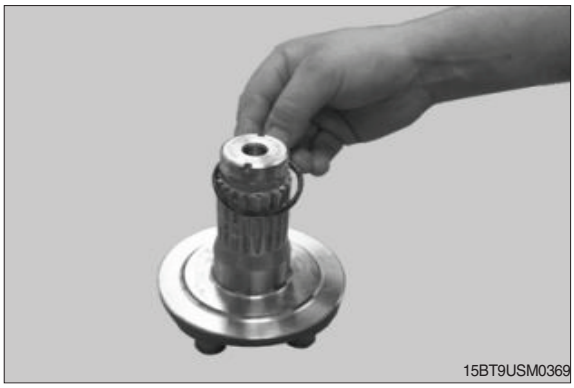
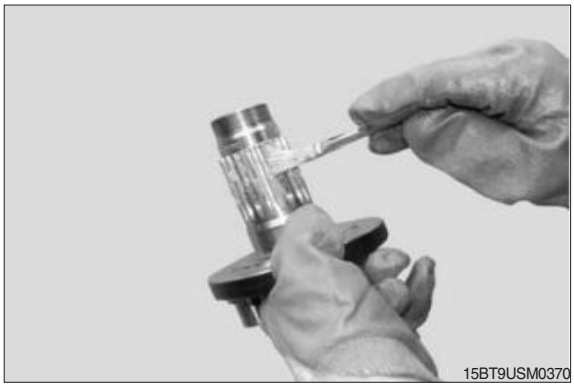
Planet carrier

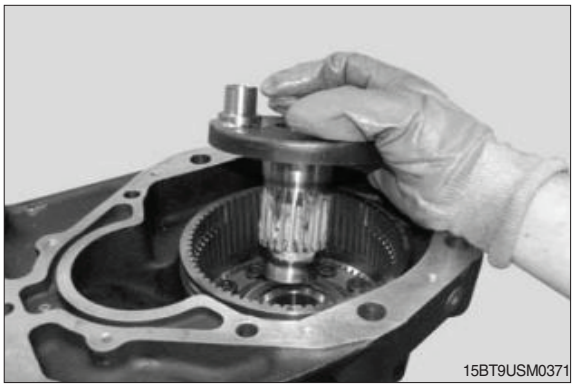
(21) O-ring and press on planet carrier by hand.



(22) Coat the toothing of the planet carrier and the o-ring with Klüberplex BEM 34-132 (Klüber Lubrication) or Optimol White Paste T.



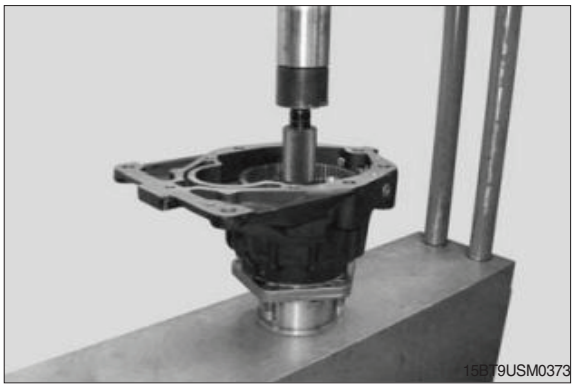
(23) Blow out the seating of the planet carrier in the housing with compressed air and fit the planet carrier.



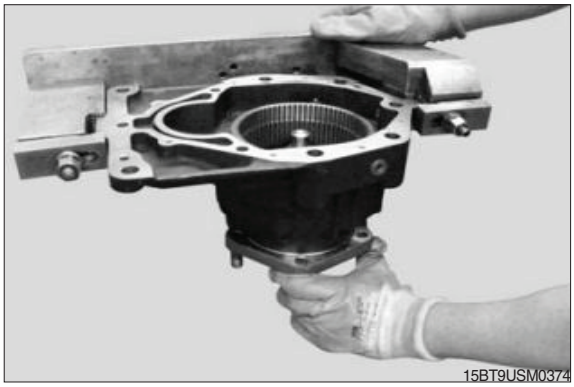
(24) Place the housing on the press table so that the wheel shaft is facing downwards. The wheel shaft shall stand on a suitable sleeve and the wheel studs shall be clear of the table.

(25) Press the planet carrier into the wheel shaft.
Make sure that the outer toothing of the planet carrier and the inner toothing of the wheel shaft mesh together correctly.
The punch of the hand lever press, tool and wheel shaft shall be positioned vertically to each other without deflection.

※ Risk of accident and injury from crushing. When pressing in the planet carrier, do not place hands between the punch and the tool.

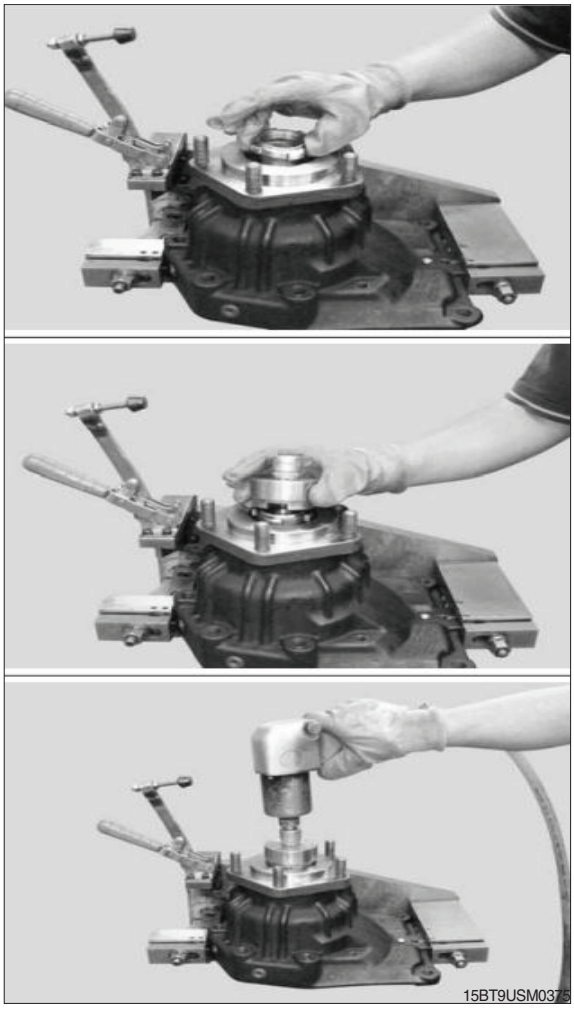


(26) Manually check the wheel shaft for ease of movement in the housing.
It shall be possible to turn the wheel shaft easily by hand.

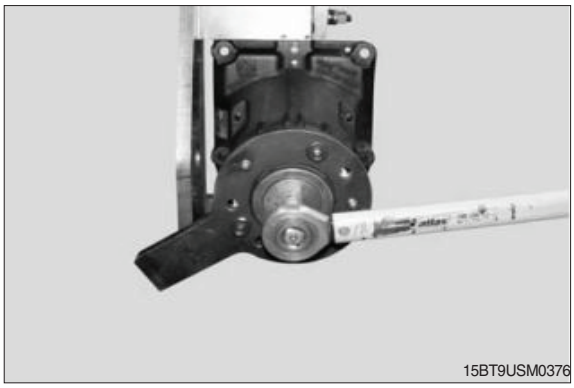


Grooved nut

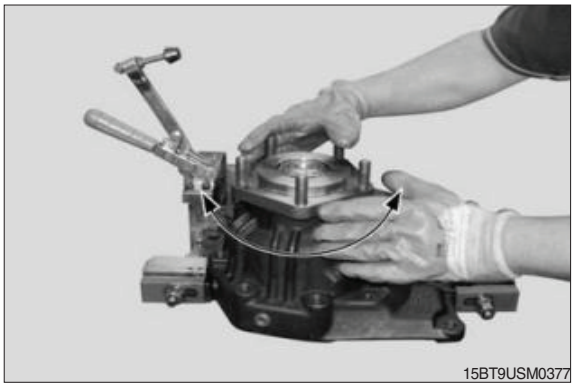
(27) Fit the grooved nut to the wheel shaft.
Fit tool to the grooved nut.
Slightly tighten the grooved nut with compressed-air screwdriver.



(28) Fit tool to the wheel shaft and lock in place with the screws Tighten the grooved nut to a tightening torque of 535 Nm.

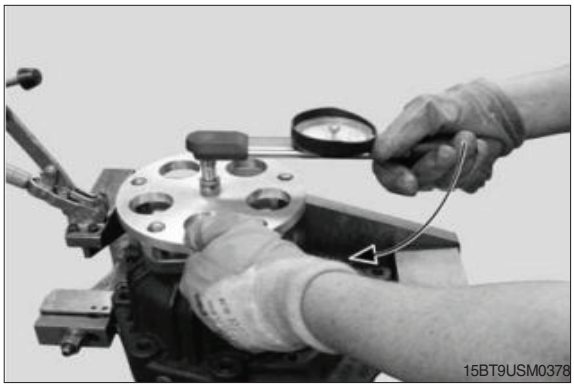


(29) Remove tool from the wheel shaft and check the wheel shaft for freedom of movement.
The wheel shaft shall be easy to turn in the housing.



Wheel shaft drag torque

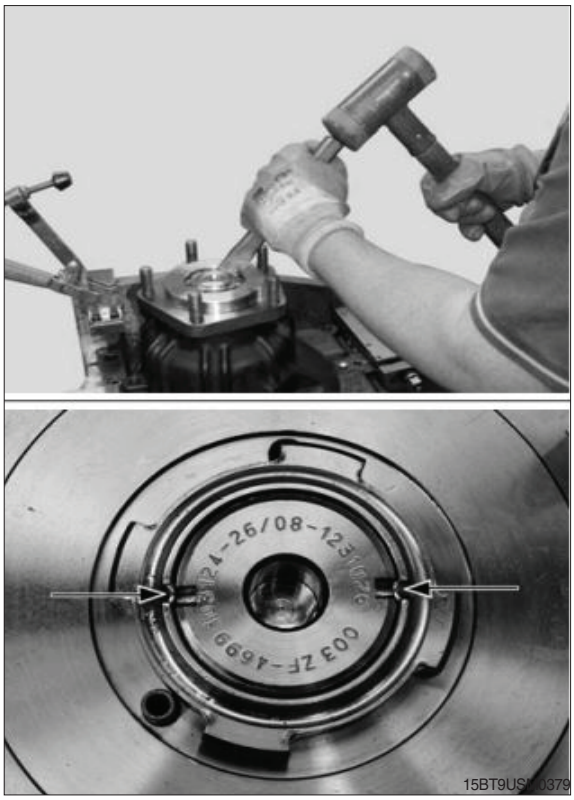
(30) Check the drag torque on the wheel shaft.
① Attach tool 11 to the wheel shaft.
② Attach the torque wrench with transition piece.
③ Turn the wheel shaft with the torque wrench.
④ Read off the drag torque from the torque wrench.



The drag torque shall be between 3 and 7 Nm. If it is, continue with the work.
If it is not: Correct the spacers as follows:
Drag torque too high : The spacers chosen are too thick→Remove parts back to the work and redetermine the correct spacer thicknesses.
Drag torque too low : The spacers chosen are too thin → Remove parts back to work step 5 and redetermine the correct spacer thicknesses.

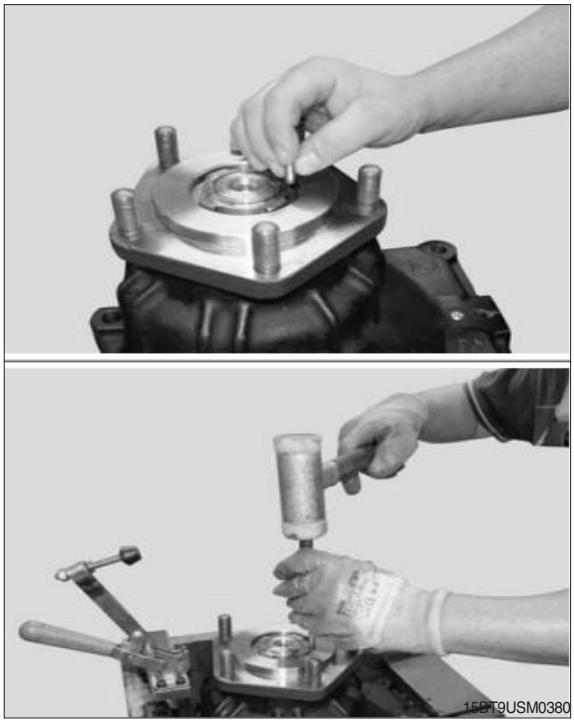
(31) Drive the collar of the grooved nut by means of a chisel (edge of the chisel must be a radius of approx. 2.0 mm) into the recesses of the planet carrier.

※ Use a chisel with a rounded edge only. A sharp edge may can damage the shoulder of the slotted nut.



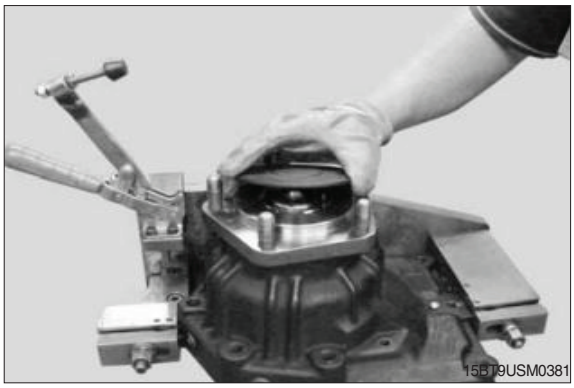
Cylinderical pin

(32) Insert the cylindrical pin into the wheel shaft and drive it in.
The taper on the cylindrical pin shall point downwards.



Protective cap

(33) Fit the protective cap to the wheel shaft and tap it lightly until it snaps into place.

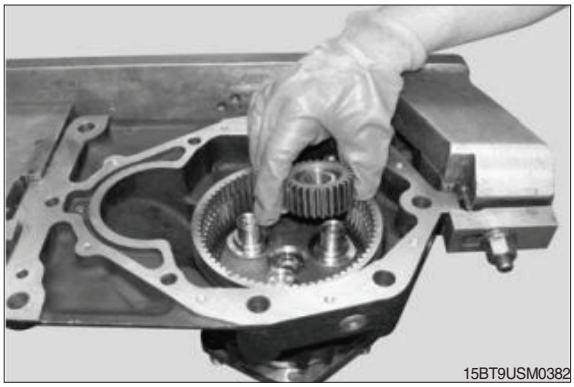


Planetary gears

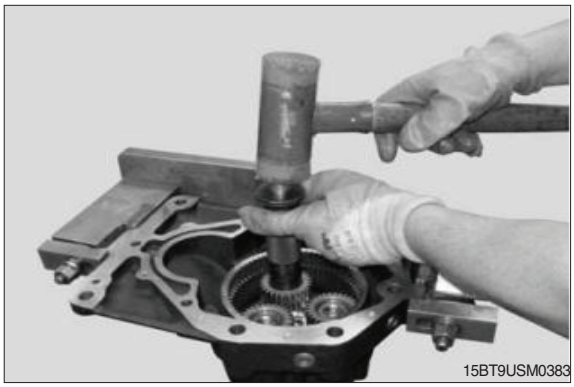
(34) Version with 3 planet gears

Place a planet gear with pre-assembled cylindrical roller bearing straight onto one of the pins of the planet carrier.

Do not tilt the planet gear. Face upwards the identification mark of the planet gear.

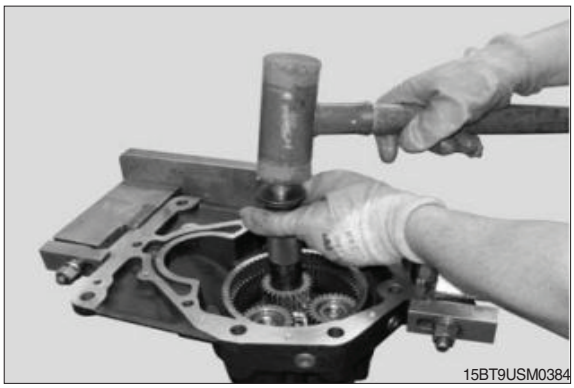


(35) Drive in the planet gear including the cylindrical roller bearing until reaching the limit stop. Use a hammer and a striking mandrel. Drive in the remaining two pre-assembled planet gears by using the same method. Note the correct meshing of the teeth of both planet gears and ring gear.



(36) Apply a pining by using tool to lock the planet gears.

The pining is done correcly as soon as the axial play of the planet gear's cylindrical roller bearings on the bolts has dissappeared completely.



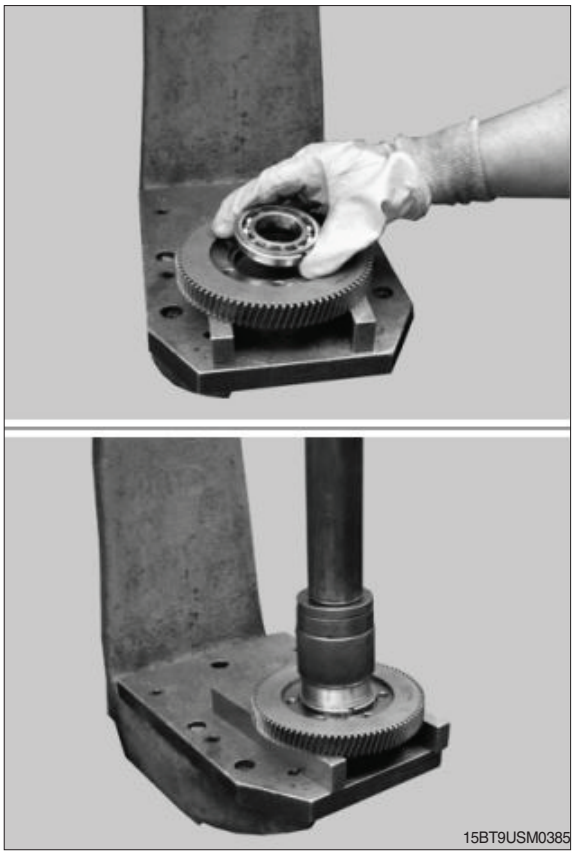
2) Housing cover reassembly

Grooved ball roller bearing

(1) Press the grooved ball roller bearing into the spur gear using the hand lever press.
The punch of the hand lever press, tool and brake piston shall be positioned vertically to each other without deflection.

Manually check the grooved ball roller bearing ment in the spur gear.
It shall be possible to turn the grooved ball roller bearing easily by hand.

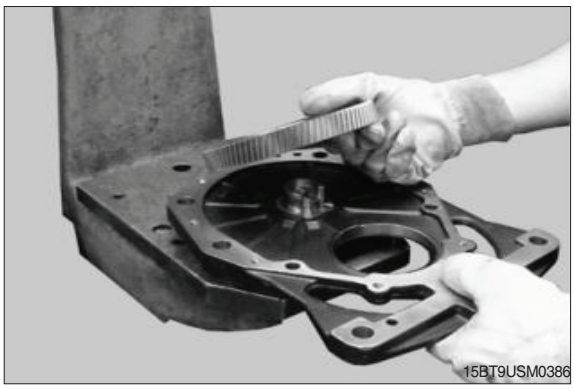
if it is easy to turn, continue with the work.
If it is not: Check the bearing for any damage which may have occurred during the press fitting procedure. If damage is found, remove the bearing and replace with a new one.



Spur gear

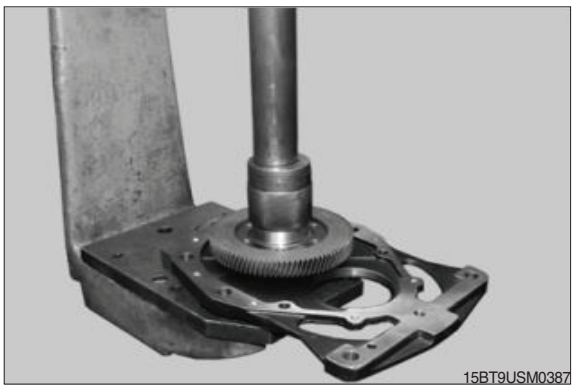
(2) Place the housing cover on a suitable support piece on the hand lever press, with the mating surface facing upwards.

The housing cover shall be empty.

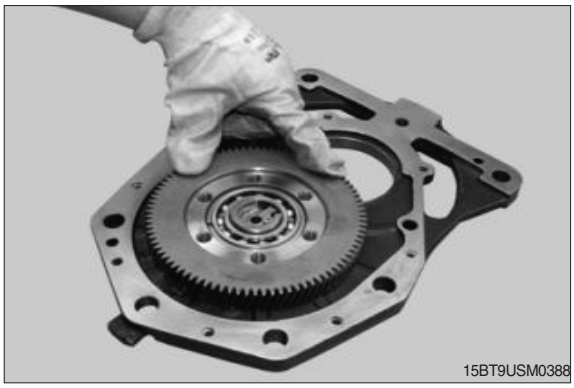


(3) Press the spur gear onto the housing cover.

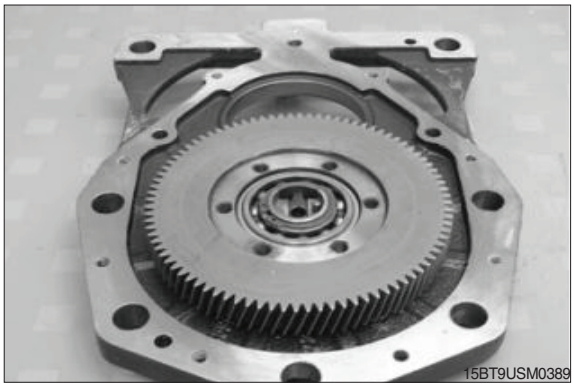
The side of the spur being worked on shall face upwards.
The punch of the hand lever press and input pinion shall be positioned vertically to each other without deflection.



(4) Manually check the spur gear for smooth running
The input pinion shall be easy to turn.
If it is, continue with the work.
If it is not : Check the bearing for any damage which may have occurred during the press fitting procedure.
If damage is found, remove the bearing and replace with a new one.

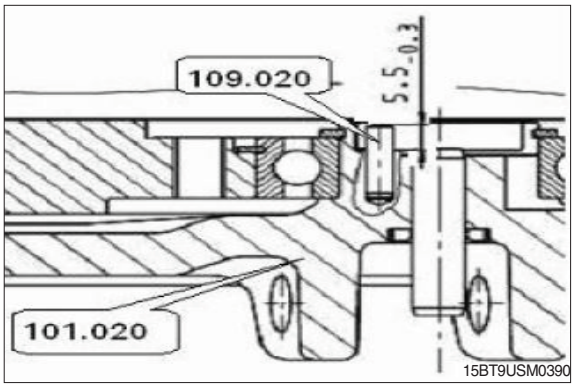


(5) Remove the housing cover from the hand lever press and place it in the assembly fixture with the mating surface facing upwards.



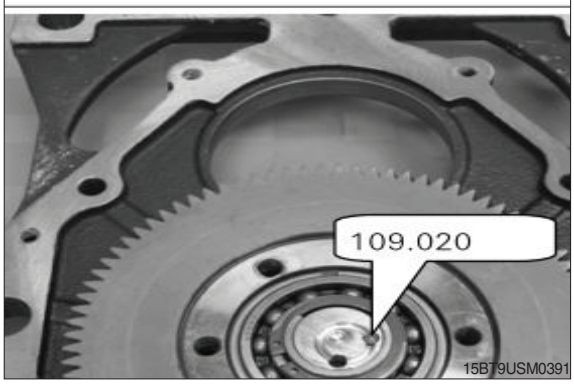
Axial bearing

(6) Check the heigh of the cylindrical pin (109.020) for a value of 5,5mm -0.3. If the measured value is found different from the given specification please remove the cylindrical pin (109.020) by using pliers and replace it by a new one installed at the correct mounting height.

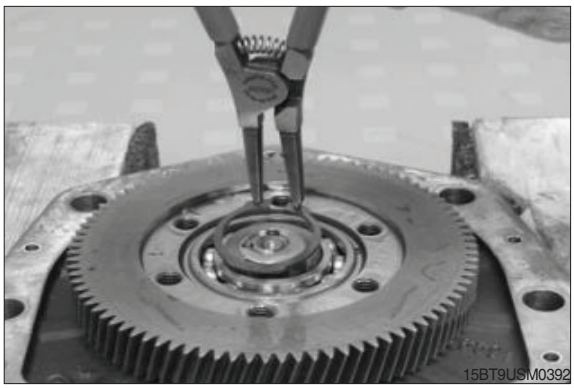


(7) Insert the axial bearing in the housing cover by hand.
The lubrication groove of the axial bearing shall face upwards.

Please assure proper position of the axial bearing related to the cylindrical pin.



(8) Insert the spur gear retaining ring.

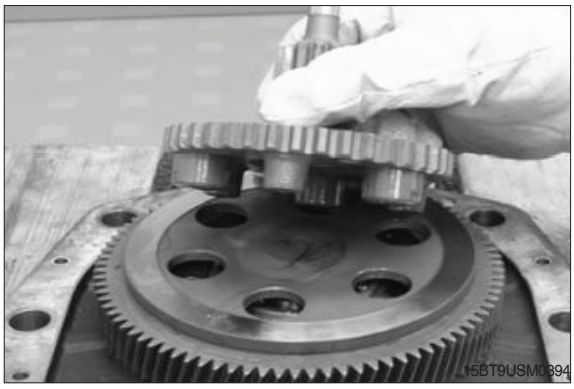


Inner disc carrier

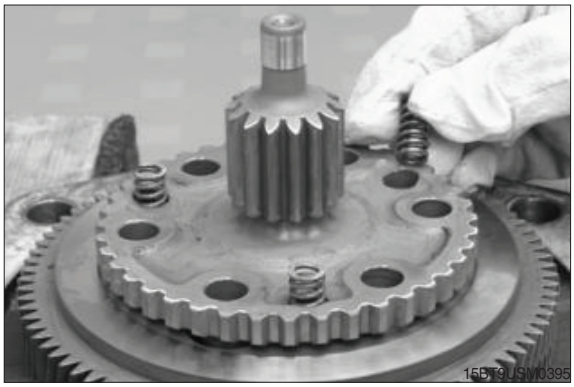
(9) Place the pressure plate on the spur gear by hand.

The bulge in the pressure plate shall be at the top. The holes in the pressure plate and the spur gear shall be positioned on top of each other.

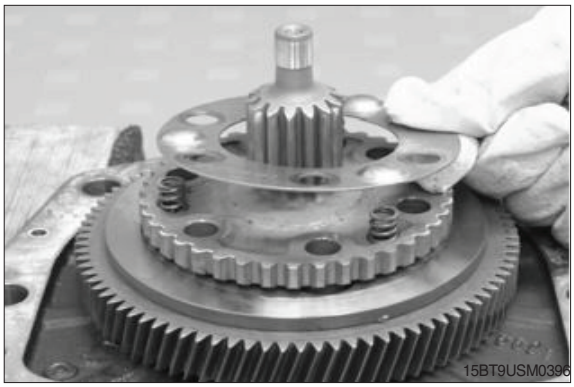
(10) Fit the inner disc carrier onto the spur gear) by hand.
The inner disc carrier fits onto the spur gear in one position only. Find out by trial and error the position in which the inner disc carrier needs to be set in relation to the spur gear.



(11) Insert the 3 pressure springs 1.6 x 8.0 x 21.5 into the inner disc carrier by hand.

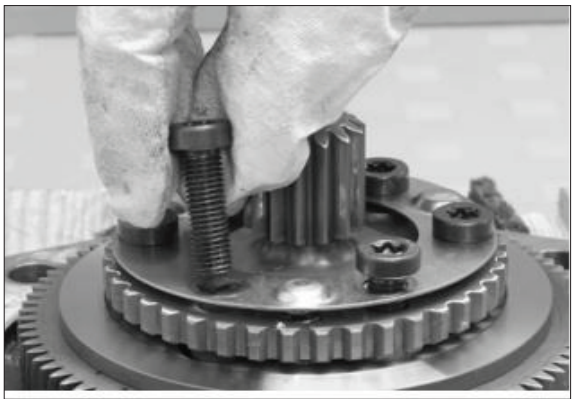


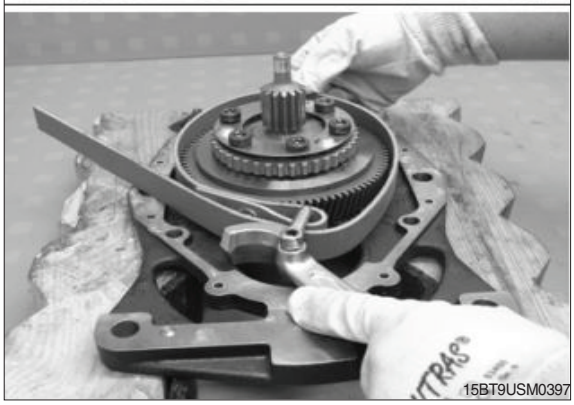
(12) Place the fixing plate over the pressure spring by hand. The springs shall be firmly seated in the recesses in the retaining ring.



(13) Insert the 6 Torx bolts into the fixing plate and screw them down into the spur gear tighten them by hand.

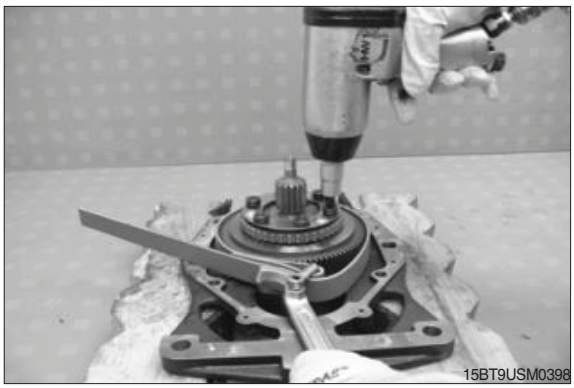
Place the cover assembly onto a suitable support (e.g. 2 pcs. of wooden strips) and assure an even and stable rest. Place the strap around the spur gear and tighten it by using the wrench lever. Spur gear must be free from grease and oil residue.





(14) Hold the spur gear tight using the strap wrench. Tighten the 6 Torx bolts to a tightening torque of 70Nm using an adjustable compressed-air screwdriver.

The bolts shall be tightened in a crosswise pattern.



Disc set

(15) Place the disc set – consisting of 3 driven discs, 4 drive discs and 1 pressure disc– into the internal gear.

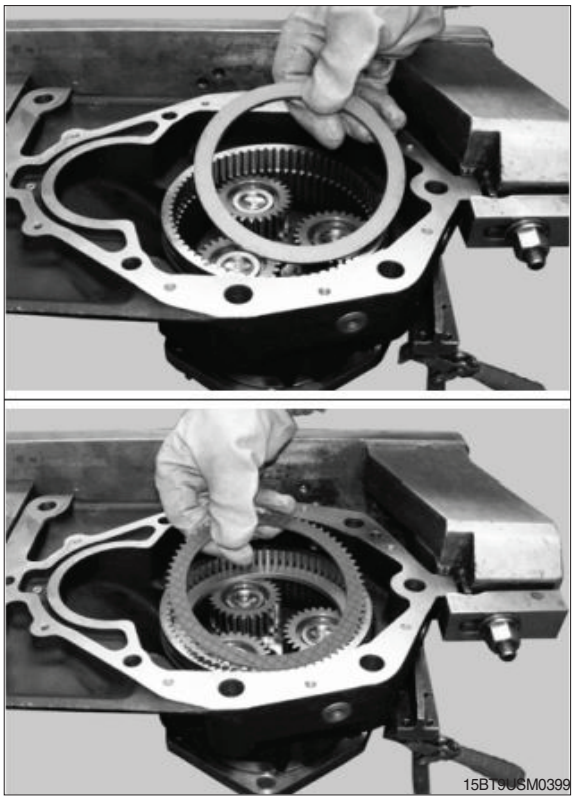
① Insert the pressure disc.

② Insert a drive disc.

③ Insert a driven disc.

④ Insert drive and driven discs alternately.

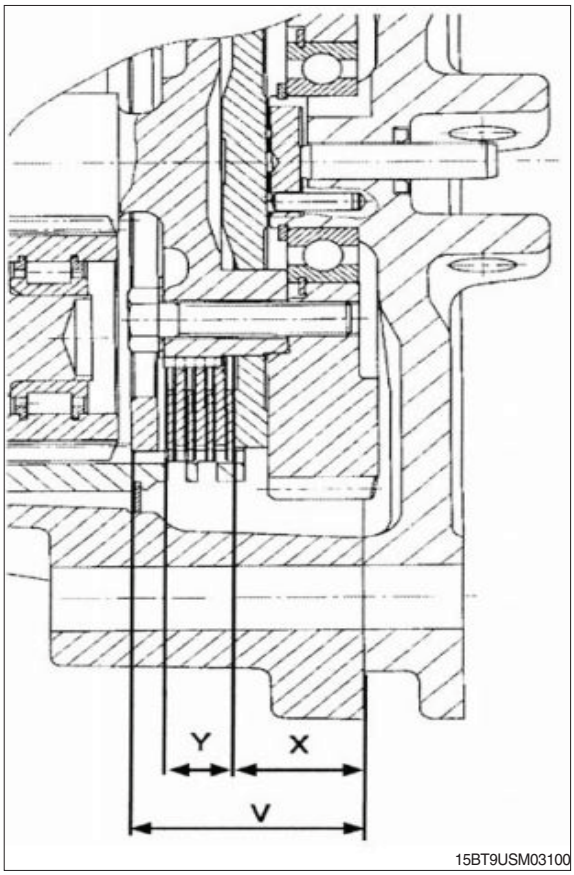
Insert the driven discs so that the side on which the teeth are rounded off faces upwards. The driven discs are completely even in circumference direction. They are non-sinusoidal. You do not need to bring them in a specific order prior installation.



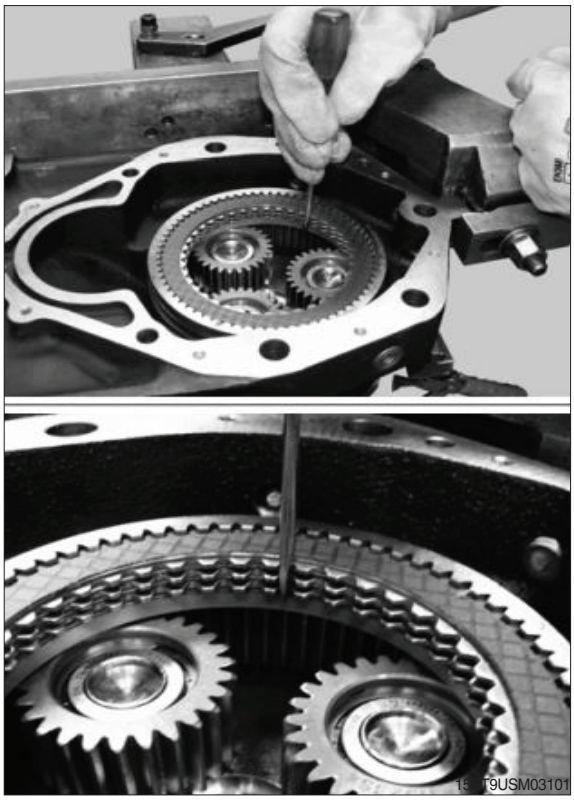
(16) Determining the thickness of the pressure disc
W=X+Y, Z=V-W

Z [mm] Pressure disc thickness
5.58 to 6.10 4.8 mm thick
6.11 to 6.70 5.3 mm thick
6.71 to 7.22 5.8 mm thick

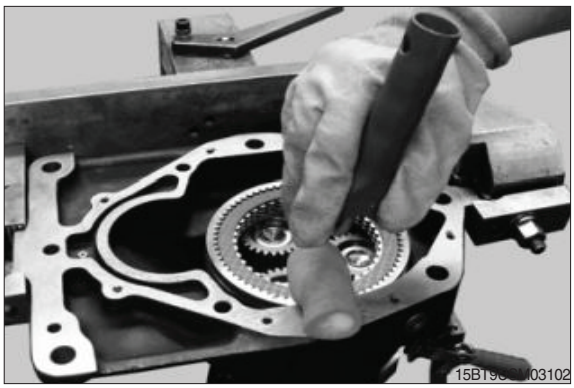
"X" is the distance between the plane face of the cover and plane face of the pressure disc.
"Y" is the thickness of the disc set when it is compressed.
"W" is a reference dimension calculated by adding X and Y.
"V" is the distance between the plane face of the housing and the contact surface of the pressure disc in the internal gear.
"Z" is a reference dimension calculated by subtracting V and W.



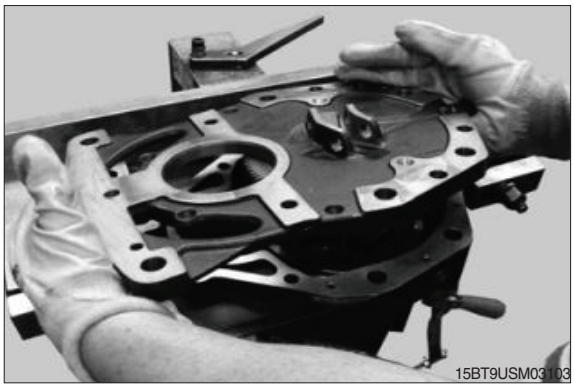
(17) Arrange the driven discs.
The teeth on all driven discs shall be positioned precisely in line with each other.



(18) Coat the mating surface of the housing and the housing cover with Loctite 574.



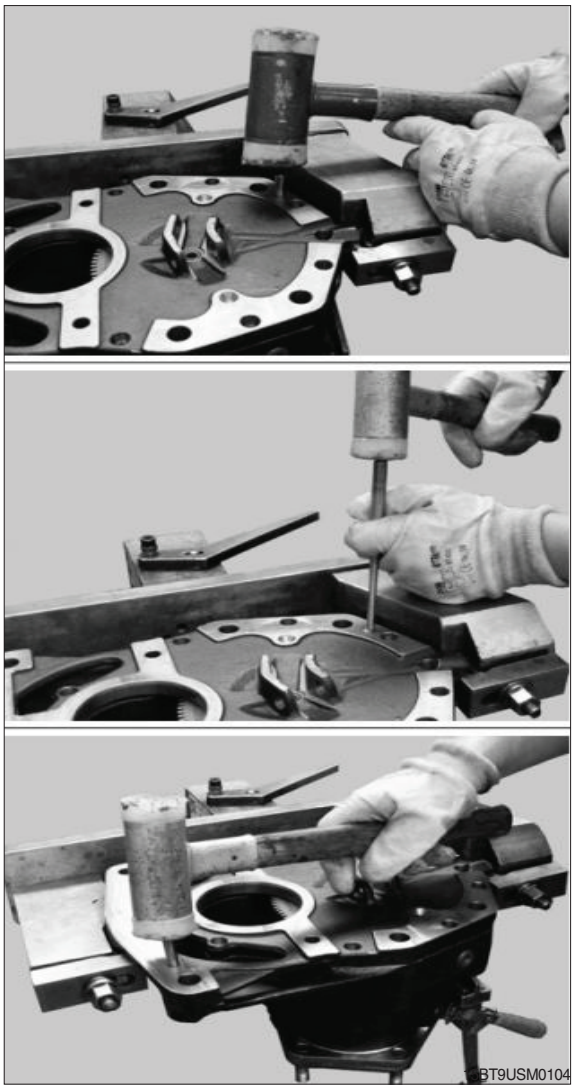
(19) Fit the housing cover to the housing by hand.
Care shall be taken to ensure that the guide of the inner disc carrier comes to rest in the needle sleeve.



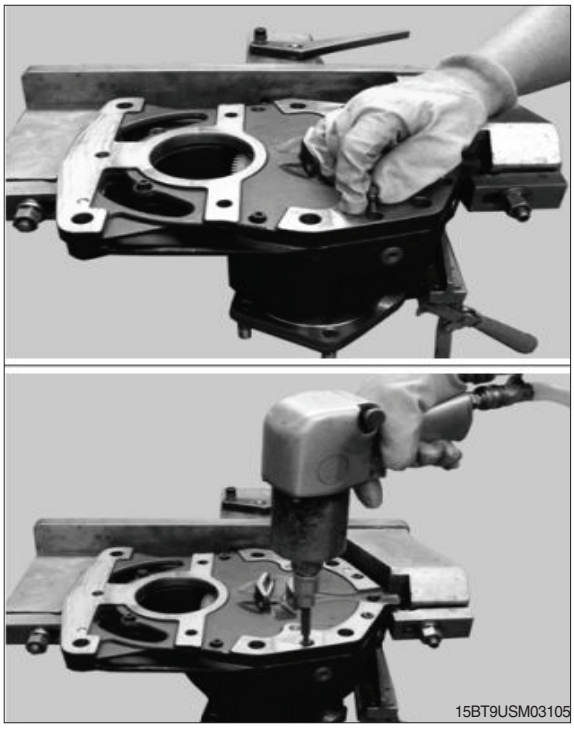
Cylinder pin

(20) Drive the cylindrical pin into the housing.

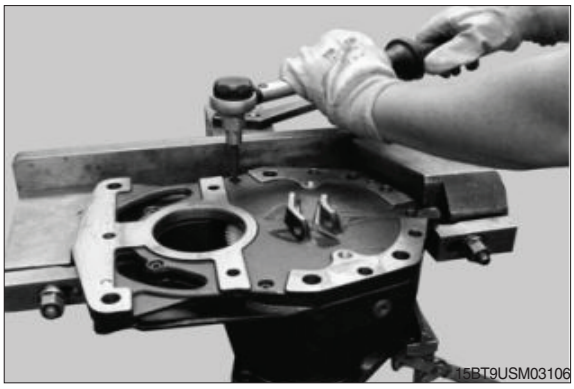
The cylindrical pins shall be driven in so that they are flush with the surface.



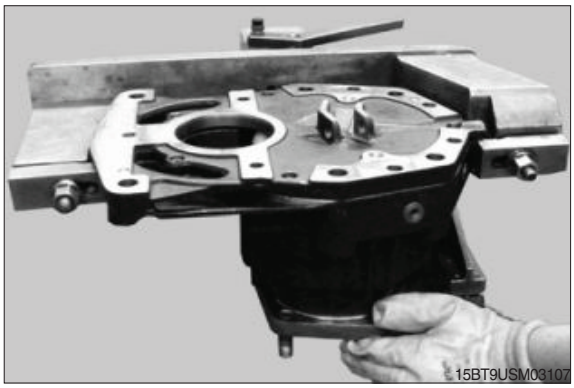
(21) Screw the 8 Allen bolts into the housing cover by hand and slightly tighten with a compressed air screwdriver.



(22) Tighten the 8 Allen bolts to a tightening torque of 9.5 Nm.



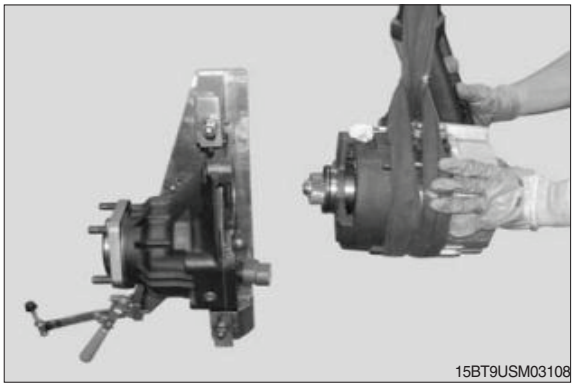
(23) Manually check the wheel shaft for smooth running.
It shall be possible to move the wheel shaft easily by hand.



3) Motor reassembly

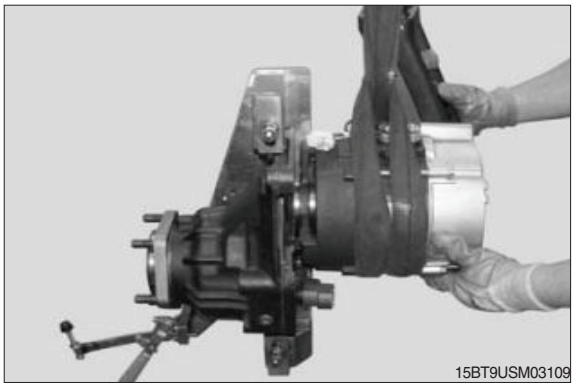
Motor

(1) Fasten the motor to suitable lifting gear using approved attachment equipment.



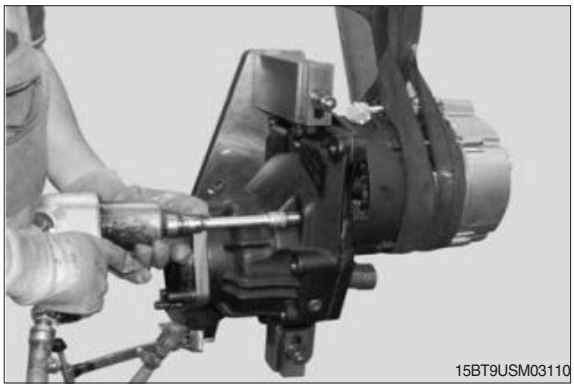
(2) Position the motor in front of the drive unit and manually mesh the motor pinion with the spur gear pinion.

When meshing the motor pinion with the spur gear, make sure that both sets of teeth are not tilted or damaged.
The motor connections shall be at the top in the installation position.



(3) Fasten the motor to the drive unit with the 3 Allen bolts.

Screw in the shorter Allen bolt at the top of the drive unit and each of the two other bolts into the right hand and left-hand side of the drive unit.



(4) Firmly tighten the 3 Allen bolts to a tightening torque of 23Nm.