

Document Title: Track gearbox, disassembly	Function Group:	Information Type: Service Information	Date: 2014/8/14
Profile: EXC, EC240C NL [GB]			

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Track gearbox, disassembly

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WARNING

The parts are heavy. Take appropriate safety precautions.

Precautions

- Thoroughly clean the gearbox assembly prior to disassembly.
- Select a clean work area.
- Match mark attached components to indicate proper positioning during reassembly.
- Take care not to mix parts of sub assemblies i.e. planetary bearings, gears and thrust washers.
- Thoroughly clean all parts and the inside of the casings.
- Inspect and analyze all failures. – Determine the root cause!

1. Place the oil fill port and the oil drain port on the vertical axis.
Remove plug (C) and drain the gear oil.

NOTE!

Drain oil into a clean container and check thoroughly for contamination.

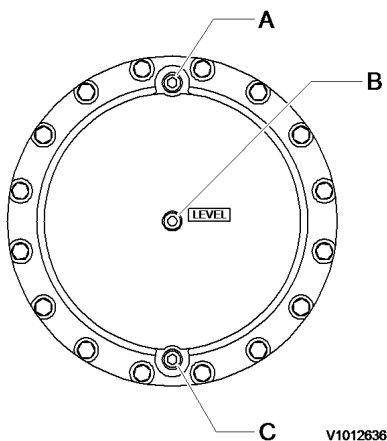


Figure 1
Oil ports

- A. Fill port
- B. Level port
- C. Drain port

2. Remove screws (43) and remove cover (40).

NOTE!

Install an eye bolt in the oil level port B (PF 3/4) and carefully lift the cover off.

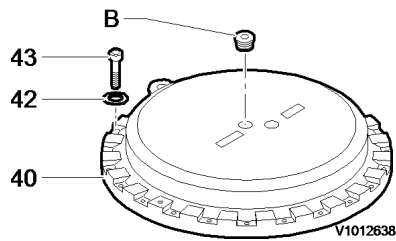


Figure 2
Cover, removal

3. Remove No. 1 sun gear (39).

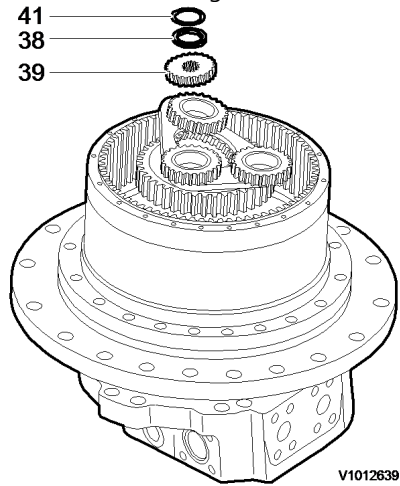


Figure 3
Sun gear, removal

4. No. 1 planetary gear assembly.

- Remove No. 1 planetary gear assembly (27) from No. 2 planetary gear assembly (16).

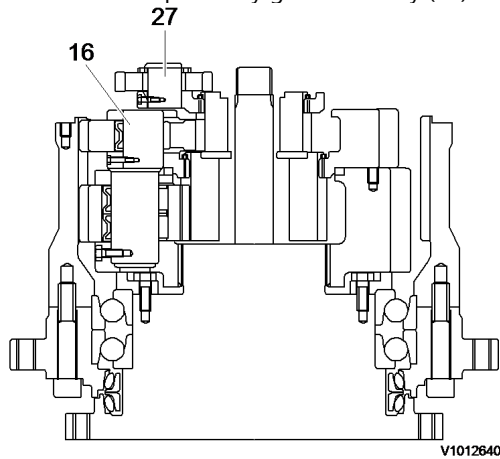


Figure 4
No.1 planetary gear assembly, dismantle

- Remove snap ring (37), then thrust washer (36), No. 1 planetary gear (33), needle bearing (34) and thrust washer (35).
- Remove retaining ring (32), and then No. 2 sun gear (31).
- Remove thrust ring (38).
- Remove spring pin (30) from No. 1 carrier (28), and then No. 1 pin (29).

NOTE!

Match mark gears (33), pins (29) and carrier (28).

NOTE!

Do not mix the gears, bearings, thrust washers, and pin assemblies.

NOTE!

Do not remove pins (29), if not worn or damaged.

NOTE!

Do not reuse spring pins (30).

NOTE!

If there are any flakes at the surface of No.1 pin, replace No.1 pin, No.1 carrier (28), No.1 planetary gear (33) and needle bearing (34) simultaneously.

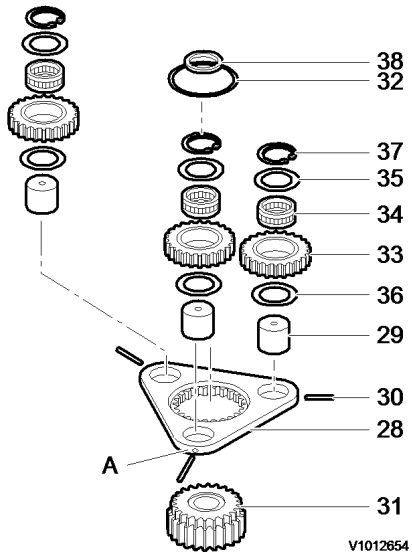


Figure 5
No.1 planetary gear assembly, removal

5. No. 2 planetary gear assembly.

- Remove No. 2 planetary gear assembly (16) from No. 3 planetary gear assembly (9).

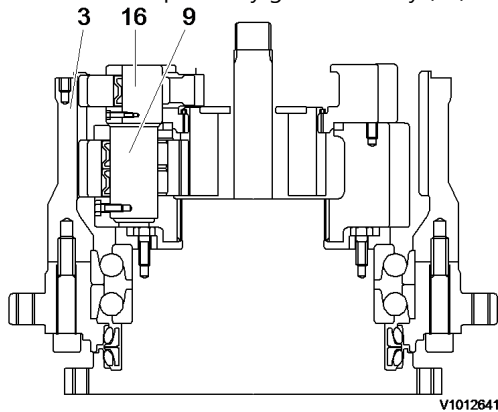


Figure 6
No.2 planetary gear assembly, dismantle

- Tap spring pin (26) into No. 2 pin (25).
- Remove thrust washer (24), No. 2 planetary gear (22) and needle bearing (23) from No. 2 carrier (17).
- Remove thrust ring (20).
- Remove retaining ring (21), then No. 3 sun gear (19).
- Remove thrust ring (18).

NOTE!

Match mark gears (22), pins (25) and carrier (17).

NOTE!

Do not mix the gears, bearings, thrust washers, and pin assemblies.

NOTE!

Do not reuse spring pins (26).

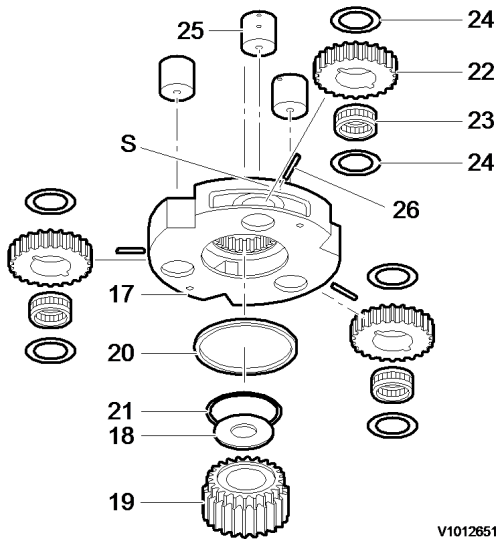


Figure 7

No.2 planetary gear assembly, removal

6. No. 3 planetary gear assembly.

- Remove No. 3 planetary gear assembly (9) from the motor.

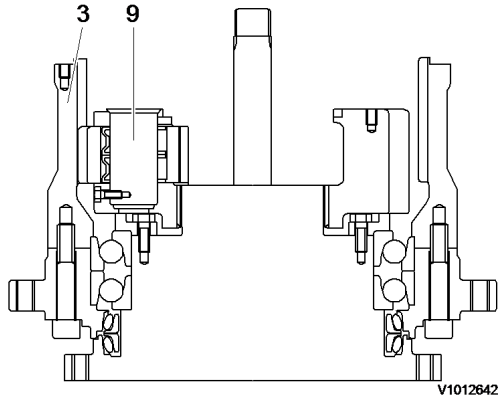


Figure 8

No.3 planetary gear assembly, dismantle

- Tap spring pin (15) into No. 3 pin (14).
- Remove thrust washer (13), No. 3 planetary gear (11) and needle bearing (12) from No. 3 carrier (10).

NOTE!

Match mark gears (11), pins (14) and carrier (10).

NOTE!

Do not mix the gears, bearing, thrust washers, and pin assemblies.

NOTE!

Do not reuse spring pins (15).

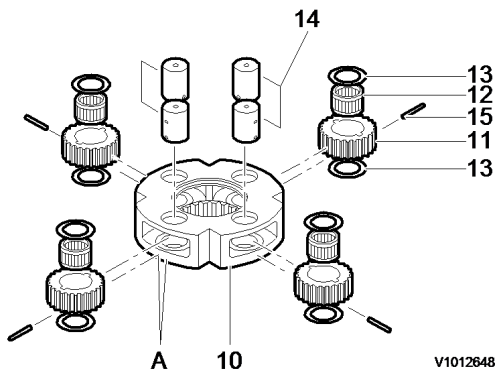


Figure 9
No.3 planetary gear assembly, removal

- Remove screws (8), retainer (7) and shim (6).

NOTE!

Do not reuse the screws.

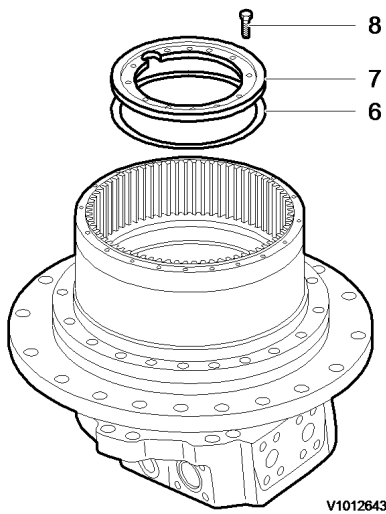


Figure 10
Retainer, removal

- Screw the eye bolts into ring gear (3), and remove ring gear (3), housing (1), screws (4), angular bearing (2) and seal (5) as an assembly.
After removal, place the entire assembly facing downward.

NOTE!

When difficult to remove, lift the body vertically and tap lightly with a plastic hammer.

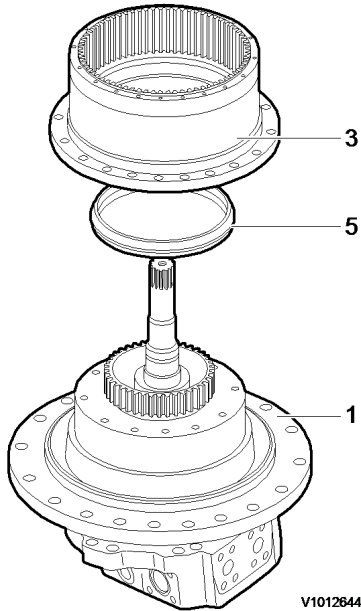


Figure 11
Ring gear, removal

9. Remove seal (5) from housing (1).
Remove seal (5) from motor.

NOTE!

Be careful not to damage the o-ring and seal surface.

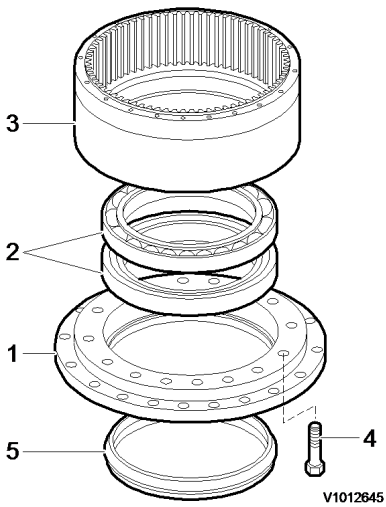


Figure 12
Ring gear, dismantle

10. Remove screws (4), screw the eye bolt into housing (1), lift the housing, tap lightly with a plastic hammer, and separate ring gear (3) and housing (1).
11. Remove the angular bearing (2) from housing (1).

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Track gearbox, disassembly

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- Take care not to mix parts of sub assemblies i.e. planetary bearings, gears and thrust washers.
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Remove the drain port plug and drain the gear oil.

NOTE!

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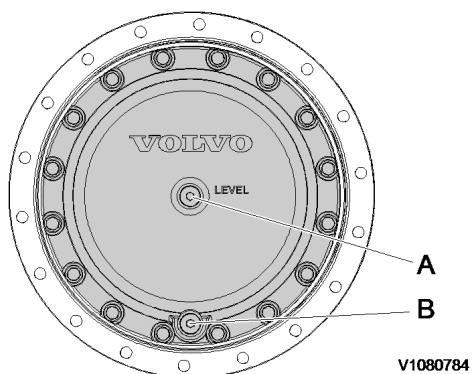


Figure 1
Oil ports

- A. Level port and fill port
- B. Drain port

2. Remove screws (43) and remove cover (40).

NOTE!

Install an eye bolt in the oil level port B (PF 3/4) and carefully lift the cover off.

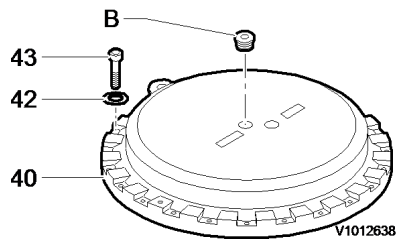


Figure 2
Cover, removal

3. Remove No. 1 sun gear (39).

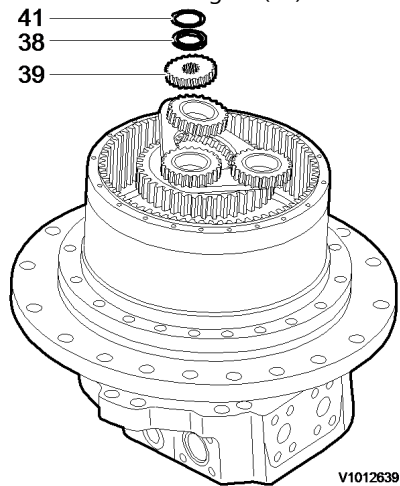


Figure 3
Sun gear, removal

4. No. 1 planetary gear assembly.

- Remove No. 1 planetary gear assembly (27) from No. 2 planetary gear assembly (16).

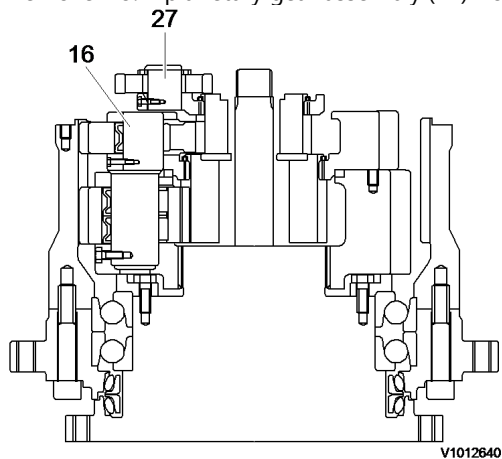


Figure 4
No.1 planetary gear assembly, dismantle

- Remove snap ring (37), then thrust washer (36), No. 1 planetary gear (33), needle bearing (34) and thrust washer (35).
- Remove retaining ring (32), and then No. 2 sun gear (31).
- Remove thrust ring (38).
- Remove spring pin (30) from No. 1 carrier (28), and then No. 1 pin (29).

NOTE!

Match mark gears (33), pins (29) and carrier (28).

NOTE!

Do not mix the gears, bearings, thrust washers, and pin assemblies.

NOTE!

Do not remove pins (29), if not worn or damaged.

NOTE!

Do not reuse spring pins (30).

NOTE!

If there are any flakes at the surface of No.1 pin, replace No.1 pin, No.1 carrier (28), No.1 planetary gear (33) and needle bearing (34) simultaneously.

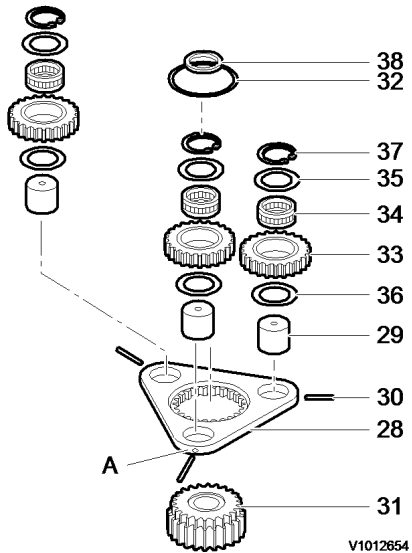


Figure 5
No.1 planetary gear assembly, removal

5. No. 2 planetary gear assembly.

- Remove No. 2 planetary gear assembly (16) from No. 3 planetary gear assembly (9).

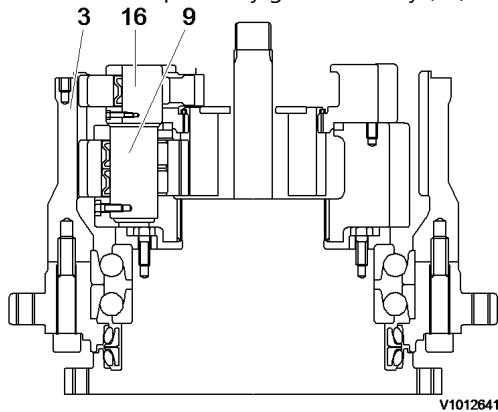


Figure 6
No.2 planetary gear assembly, dismantle

- Tap spring pin (26) into No. 2 pin (25).
- Remove thrust washer (24), No. 2 planetary gear (22) and needle bearing (23) from No. 2 carrier (17).
- Remove thrust ring (20).
- Remove retaining ring (21), then No. 3 sun gear (19).
- Remove thrust ring (18).

NOTE!

Match mark gears (22), pins (25) and carrier (17).

NOTE!

Do not mix the gears, bearings, thrust washers, and pin assemblies.

NOTE!

Do not reuse spring pins (26).

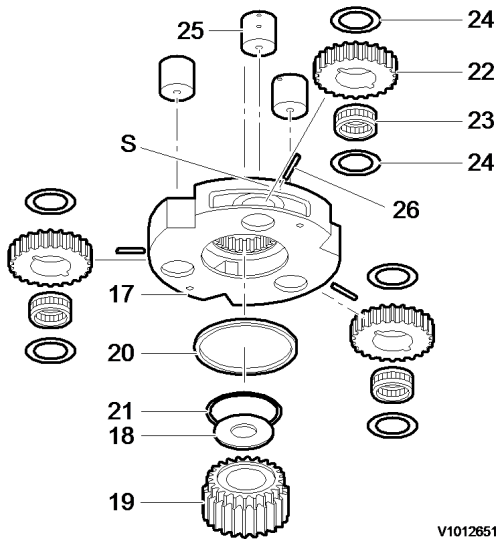


Figure 7

No.2 planetary gear assembly, removal

6. No. 3 planetary gear assembly.

- Remove No. 3 planetary gear assembly (9) from the motor.

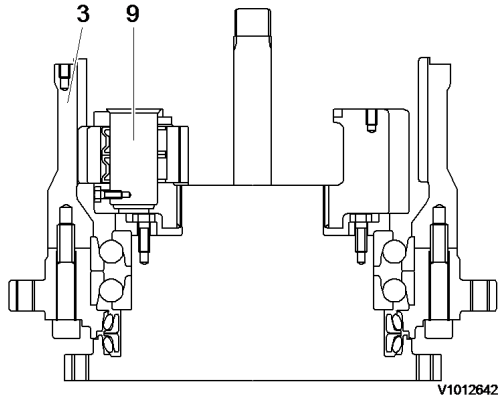


Figure 8

No.3 planetary gear assembly, dismantle

- Tap spring pin (15) into No. 3 pin (14).
- Remove thrust washer (13), No. 3 planetary gear (11) and needle bearing (12) from No. 3 carrier (10).

NOTE!

Match mark gears (11), pins (14) and carrier (10).

NOTE!

Do not mix the gears, bearing, thrust washers, and pin assemblies.

NOTE!

Do not reuse spring pins (15).

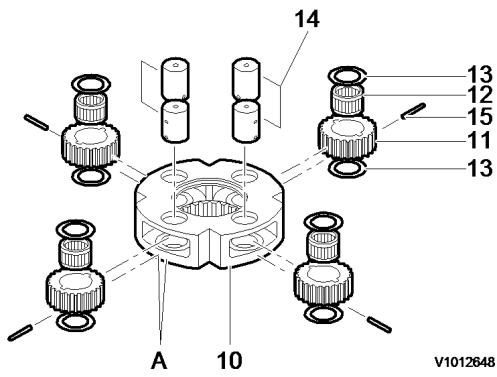


Figure 9
No.3 planetary gear assembly, removal

- Remove screws (8), retainer (7) and shim (6).

NOTE!

Do not reuse the screws.

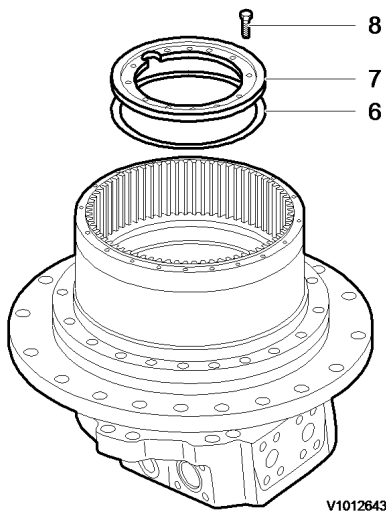


Figure 10
Retainer, removal

- Screw the eye bolts into ring gear (3), and remove ring gear (3), housing (1), screws (4), angular bearing (2) and seal (5) as an assembly.
After removal, place the entire assembly facing downward.

NOTE!

When difficult to remove, lift the body vertically and tap lightly with a plastic hammer.

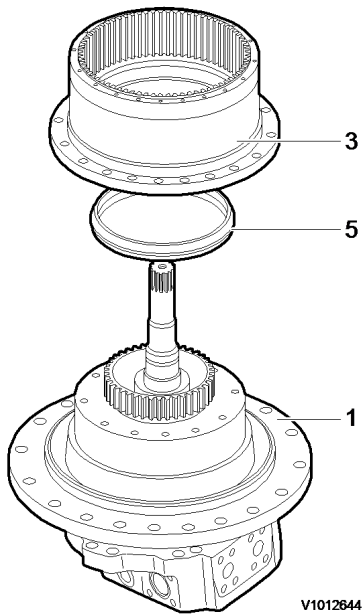


Figure 11
Ring gear, removal

9. Remove seal (5) from housing (1).
Remove seal (5) from motor.

NOTE!

Be careful not to damage the o-ring and seal surface.

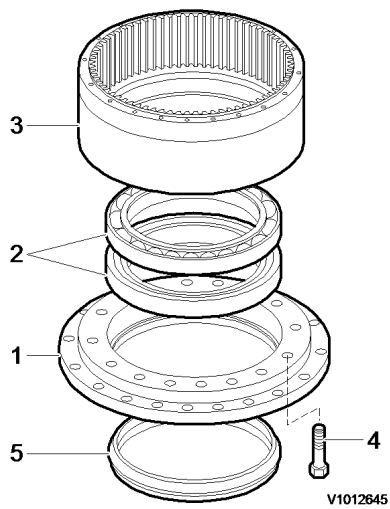


Figure 12
Ring gear, dismantle

10. Remove screws (4), screw the eye bolt into housing (1), lift the housing, tap lightly with a plastic hammer, and separate ring gear (3) and housing (1).
11. Remove the angular bearing (2) from housing (1).

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Track gearbox, assembly

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Preparation

- Clean all parts with cleaning solvent and dry with compressed air.
- Rework damaged parts and before assembling, prepare all replacement parts.
- Coat the sliding parts, bearings and gears with clean gear oil.
- Coat the motor assembly sliding parts and bearings with clean hydraulic oil.
- Replace the O-rings, and seals.
- Replace screws (8). **DO NOT REUSE THESE SCREWS!**
- Use a torque wrench to tighten the screws and plugs to the specified torque.

Tightening torque

Tightening torque, unit : kgf m (lbf ft)

Item	Description	Thread	Torque
4	Screw	M 18	38 (274)
8	Screw	M 12	11.5 (83)
43	Screw	M 10	6.5 (47)
44	Plug	PF 3/4	19 (137)

1. Press-fit the angular bearing (2) into housing (1).

NOTE!

The outer races of the angular bearing must be properly aligned and fully seated.

NOTE!

Press-fit using a press or hammer.

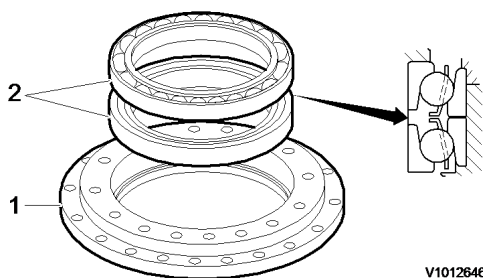


Figure 1
Angular bearing, install

2. Mount housing (2) on ring gear (1) and tighten screws (4).

NOTE!

Coat the mating surface of ring gear (3) with liquid gasket, loctite #5699.

NOTE!

Apply loctite #277 onto the threads of screws (4).

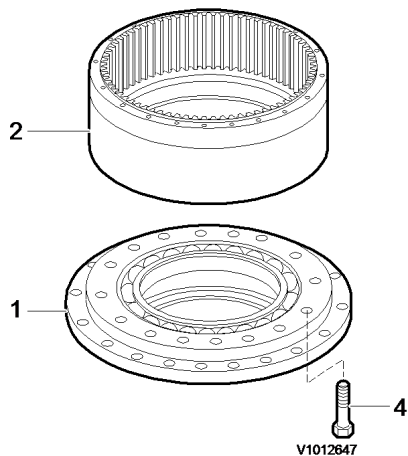


Figure 2
Ring gear, install

3. Press-fit seal (5) lightly into housing (1).
Press-fit lightly seal (5) onto the motor.

NOTE!

After assembling the seal, check if the O-ring is properly seated on the motor housing.

NOTE!

Apply thin coat of grease (NLG1#2) to the O-ring.

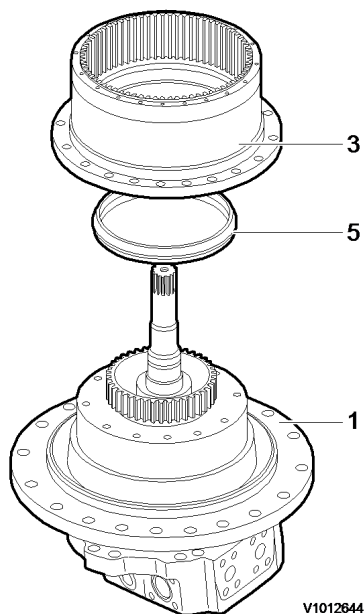


Figure 3
Seal, install

4. Rotate housing (1) with angular bearing (2) and seal (5) 180° so the seal faces downward.

NOTE!

Take care not to damage the mating surface of the seal.

5. Assemble housing (1) onto the motor aligning the angular bearing inner race to the motor housing.

Shim adjusting method

- Measure the step on retainer (7) as shown.
Dimension "B"
- Install retainer (7) with four screws (8), and tighten to the specified torque.

NOTE!

Tightening torque : 4.5 kgf m (32 lbf ft)

- Remove retainer (7) and measure from the top of the outer bearing race to the motor as shown.
Dimension "A"
Shim thickness $S = A - B + (0 \sim 0.05 \text{ mm})$

NOTE!

Shim is : 0.1, 0.3, 0.5, and 1.0 mm

- Select a shim (6) of the appropriate thickness, align the retainer (7) correctly, and tighten screws (8) to the specified torque.

NOTE!

Apply loctite #277 onto the thread of screws (8).

NOTE!

Tightening torque : 11.5 kgf m (83 lbf ft)

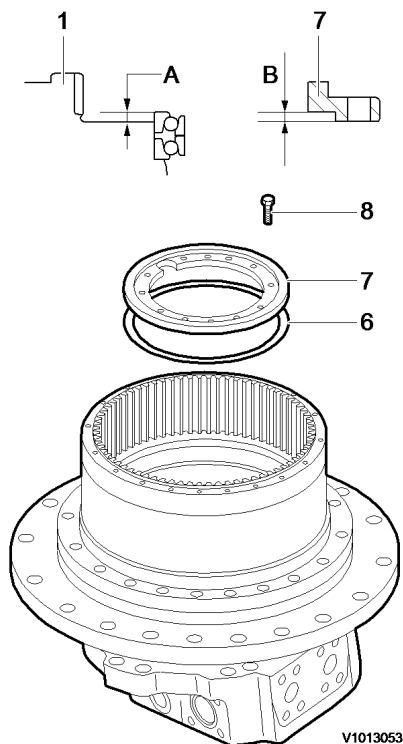


Figure 4
Retainer, install

6. No. 3 planetary gear assembly.

- Place No. 3 carrier (10) with its spline downward.
- Install thrust washers (13), No. 3 planetary gear (11) and needle bearing (12) into No. 3 carrier.
- Insert No. 3 pin (14).
- Tap spring pin (15) into the pin holes (26) of the No. 3 carrier (10), and pin (14), then stake two points (A) on No. 3 carrier (10).

NOTE!

Check if No. 3 planetary gears rotate smoothly.

NOTE!

Align the spring pin holes of the carrier and No. 3 pins.

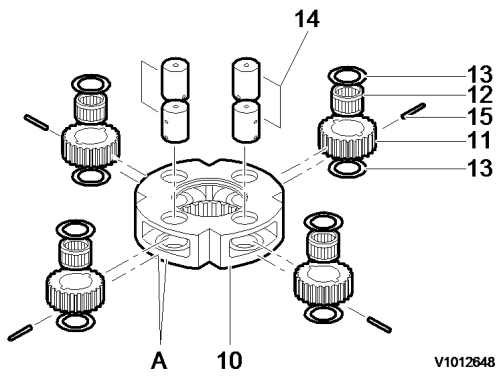


Figure 5
No. 3 planetary gear assembly

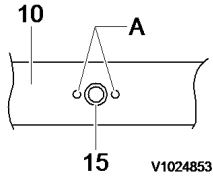


Figure 6
Staking position (A)

7. Fit No. 3 planetary gear assembly (9) into the spline of the motor (3) correctly.

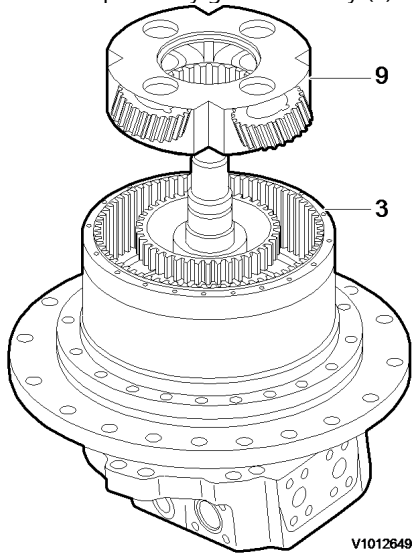


Figure 7
No. 3 planetary gear assembly, install

8. No. 2 planetary gear assembly.
 - Install thrust ring (18) into No. 3 sun gear (19).
 - Install thrust washers (24), No. 2 planetary gear (22) and needle bearing (23) into No. 2 carrier.
 - Insert No. 2 pin (25).
 - Tap spring pin (26) into the pin holes of the No. 2 carrier (17) and pin (25), then stake two points (A) on No. 2 carrier (17).
 - Insert thrust ring (20) into No. 2 carrier (17).
 - Install assembled No. 2 carrier onto No. 3 sun gear (19), and mount retaining ring (21).

NOTE!

Align the spring pin holes of the carrier and No. 2 pins.

NOTE!

Staking method

NOTE!

Check if No. 2 planetary gears rotate smoothly.

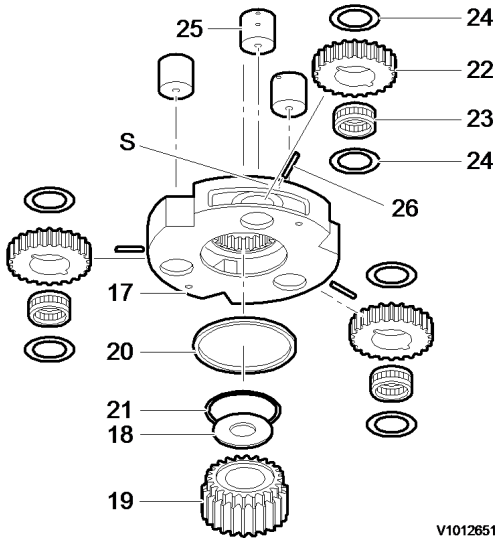


Figure 8
No. 2 planetary gear assembly

S	Stake
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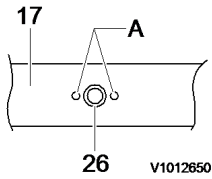


Figure 9
Staking position (A)

9. Insert No. 2 planetary gear assembly (16) into No. 3 planetary gear assembly.

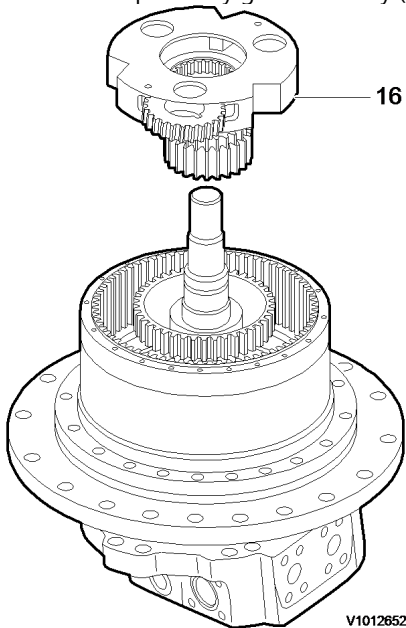


Figure 10
No. 2 planetary gear assembly, install

10. No. 1 planetary gear assembly.

- Press-fit No. 1 pin (29) into No. 1 carrier (28), and tap spring pin (30) into the pin holes of No. 1 carrier and pin (29), then stake two points on No. 1 carrier (28).
- Insert thrust washer (36), needle bearing (34), No. 1 planetary gear (33) and thrust washer (35) onto No. 1 pin (29). Mount snap ring (37).
- Install assembled No. 1 carrier onto No. 2 sun gear (31), and mount retaining ring (32).

NOTE!

Align the spring pin holes of the carrier and No. 1 pins.

NOTE!

Check if No. 1 planetary gears rotate smoothly.

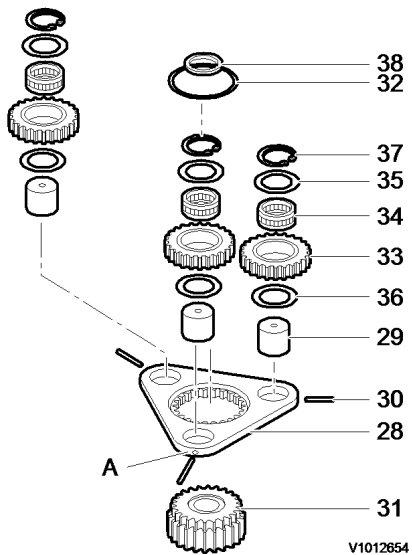


Figure 11
No. 1 planetary gear assembly

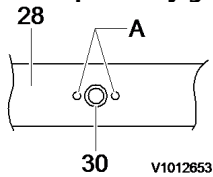


Figure 12
Staking position (A)

11. Insert No. 1 planetary gear assembly (27) into No. 2 planetary gear assembly.

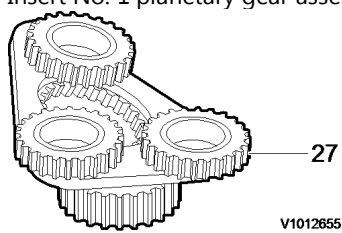


Figure 13
No. 1 planetary gear assembly, install

12. Insert thrust ring (38) into No. 2 sun gear (31), and then No. 1 sun gear (39) onto the motor shaft.

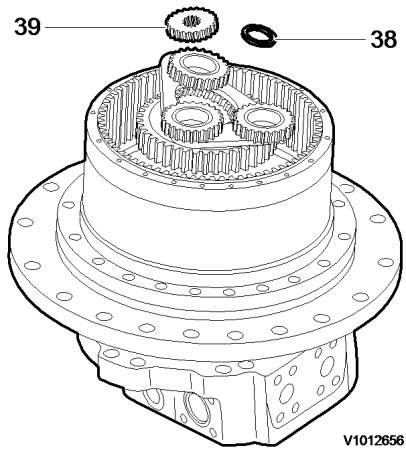


Figure 14
No. 1 sun gear, install

13. Select a shim of the appropriate thickness, and mount shim (41) and thrust ring (38) on cover (40).

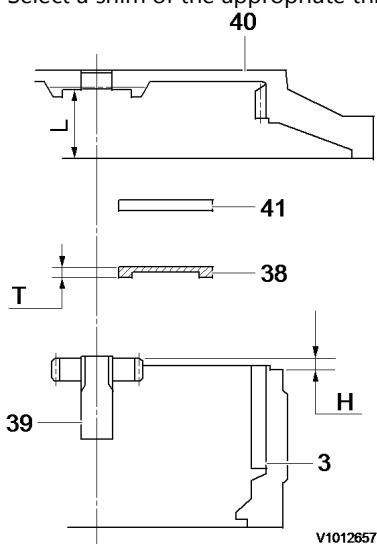


Figure 15
Shim adjusting
Shim adjusting method :

- a. Measure dimension "L" of cover (40).
- b. Measure dimension "H" from the end of No. 1 sun gear (39) to the contact surface of ring gear (3).
- c. Measure the thickness "T" of thrust ring (38).
- d. Shim (41) thickness $s = L - H - T - (1.0 \sim 2.0 \text{ mm})$

14. Screw an eye bolt (A) into the oil level port and install cover (40) on ring gear (3). Install spring washer (42), screws (43), and tighten to specified torque.

NOTE!

Coat the mating surface of ring gear (3) with liquid gasket, loctite #5699.

NOTE!

Apply loctite #277 onto the threads of screws (43).

NOTE!

Tightening torque : 6.5 kgf m (47 lbf ft)

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