Document Title:	Function Group:	Information Type:	Date:
Power transmission, description	**400**	**Service Information**	**2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

Power transmission, description

The excavator's power transmission is a generic name of all components that transmit motive force to perform the various functions of the excavator. The mechanical power from the engine transmitted via the pump coupling is converted to hydraulic power by the main pumps. Hydraulic power from the main pump goes to the travel motors, slew motor and hydraulic cylinders via the main control valve, where it is converted back to mechanical power, that actuates the travel action, slew action and attachments. The reduction gears of the planetary mechanisms convert the high speed rotation of the hydraulic motor into low speed, high torque rotating force, at the track unit / sprocket for travel, and at the slew unit / ring gear for slewing. The center passage 360° rotating unit allows high pressure hydraulic flow from the main control valve to the track motors. The unit rotates with the superstructure without twisting hoses therefore oil flow is not obstructed by slewing.

VOLVO
Construction Equipment

Service Information

Document Title: **Track gearbox, description**	Function Group:	Information Type: **Service Information**	Date: **2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

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Track gearbox, description

Track gearbox consists of three stage planetary mechanism that converts the high speed rotation of the hydraulic motor, into low speed, high torque rotating force at the sprocket hub.

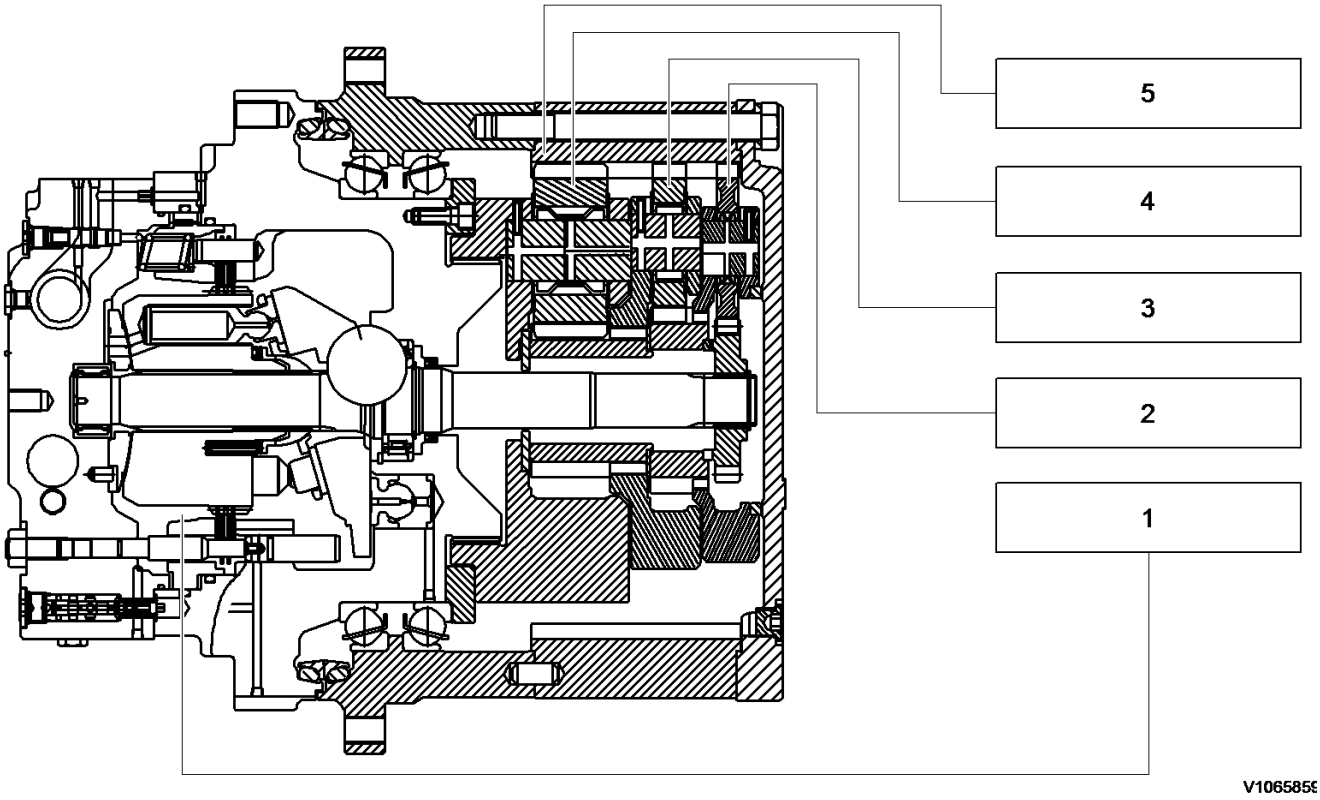

Figure 1
2 stage planetary gearbox

1. Track motor
2. No.1 planetary gear assembly
3. No.2 planetary gear assembly
4. No.3 planetary gear assembly
5. Ring gear

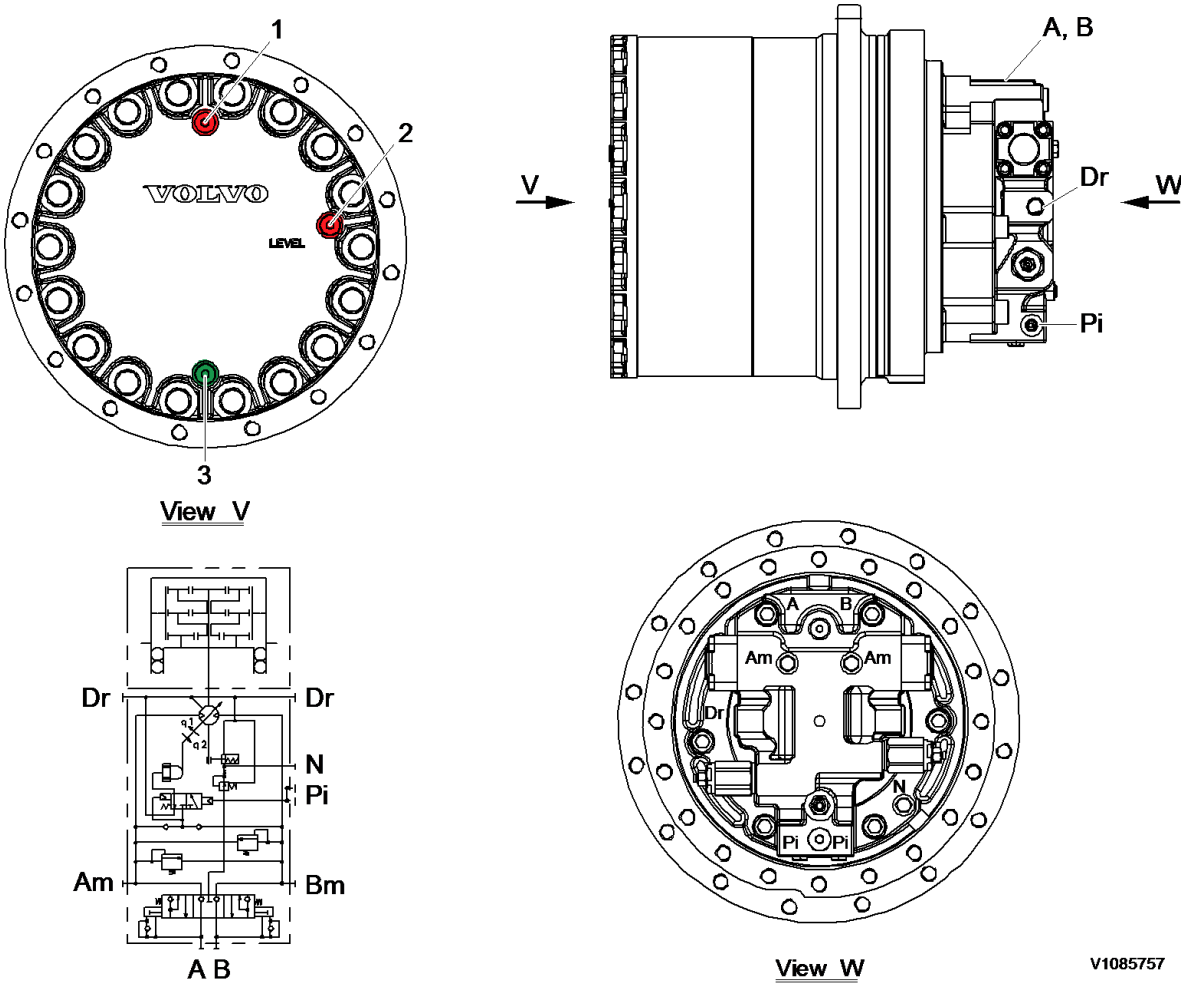

Figure 2
Port connections

1. Oil filling port (PF 1/2)
2. Oil level port (PF 1/2)
3. Oil drain port (PF 1/2)

Port connections

Port symbol	Port size	Port
A, B	ø25	Oil supply (Return)
Am, Bm	9/16–18 UNF-2B	Pressure measurement port
Pi	9/16–18 UNF-2B	Displacement change pilot port
N	9/16–18 UNF-2B	Port for manual release of brake
Dr	7/8-14 UNF-2B	Motor drain

Rotational direction

View from Vaxis	Inlet	Outlet
Clockwise	B	A
Counterclockwise	A	B

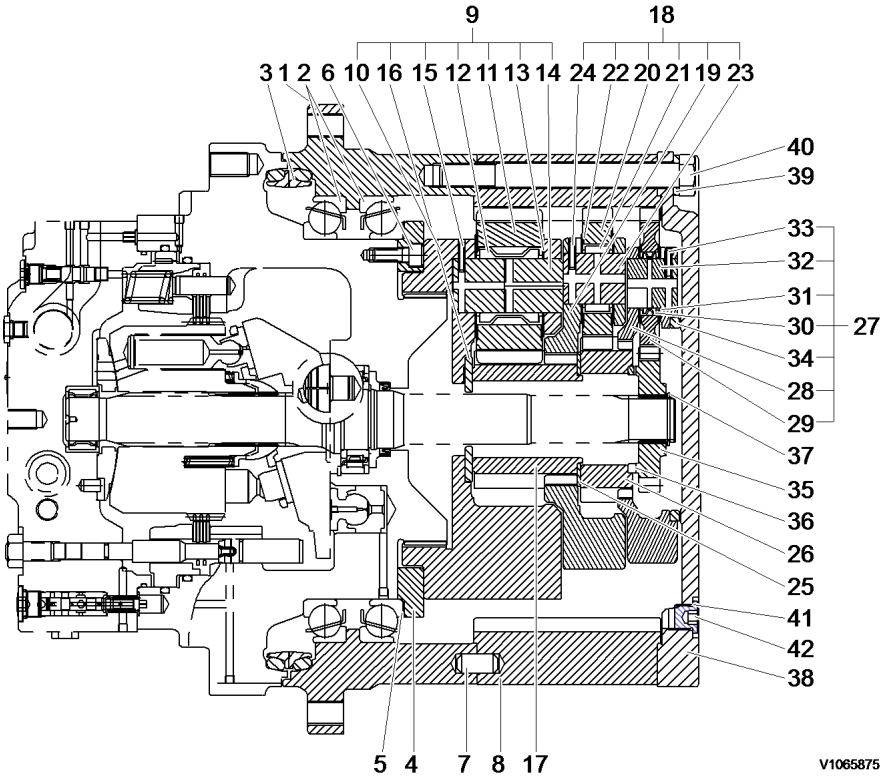

Figure 3
Track gearbox, sectional view

1	Housing	15	Spring pin	29	Planetary gear No. 1
2	Bearing main	16	Ring thrust	30	Needle Bearing
3	Seal floating	17	Gear sun No. 3	31	Washer thrust
4	Retainer	18	Carrier assy No. 2	32	Pin No. 1
5	Shim	19	Carrier No. 2	33	Spring pin
6	Screw M12 x 30	20	Planetary gear No. 2	34	Ring thrust
7	Pin parallel	21	Needle Bearing	35	Gear sun No. 1
8	Gear ring	22	Washer thrust	36	Ring thrust
9	Carrier assy No. 3	23	Pin No. 2	37	Ring retaining C type
10	Carrier No. 3	24	Spring pin	38	Cover
11	Planetary gear No. 3	25	Thrust plate	39	Washer spring
12	Needle Bearing	26	Gear sun No .2	40	Bolt hex HD
13	Washer thrust	27	Carrier assy No. 1	41	O-ring
14	Pin No. 3	28	Carrier No. 1	42	Plug hydraulic

The power transmitted from the hydraulic motor output shaft is transmitted to the gear sun No. 1 → carrier No. 1 → gear sun No. 2 → planetary gear No. 2 → carrier No. 2 → gear sun No. 3 → planetary gear No. 3 → gear ring.

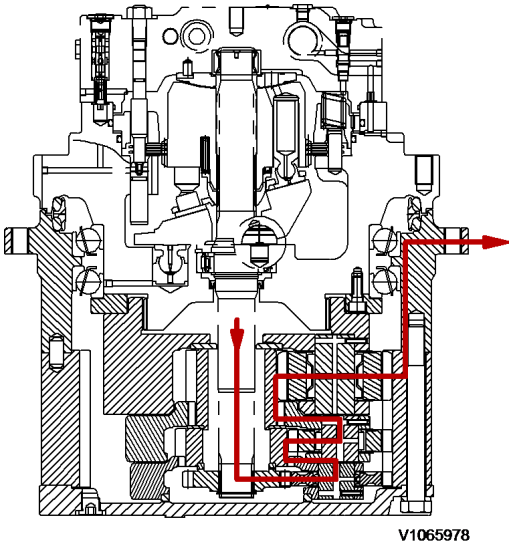

Figure 4
Track gearbox, torque flow

At this time, the reduction ratio of reduction gear is as follows:

(1) Reduction ratio

$i = [(Zs1 + Zr) \cdot (Zs2 + Zr) \cdot (Zs3 + Zr) / (Zs1 \cdot Zs2 \cdot Zs3)] - 1$

- Zs1 = No. of 1st sun gear tooth
- Zs2 = No. of 2nd sun gear tooth
- Zs3 = No. of 3rd sun gear tooth
- Zr = No. of ring gear tooth

VOLVO
Construction Equipment

Service Information

Document Title: **Track gearbox, description**	Function Group:	Information Type: **Service Information**	Date: **2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

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Track gearbox, description

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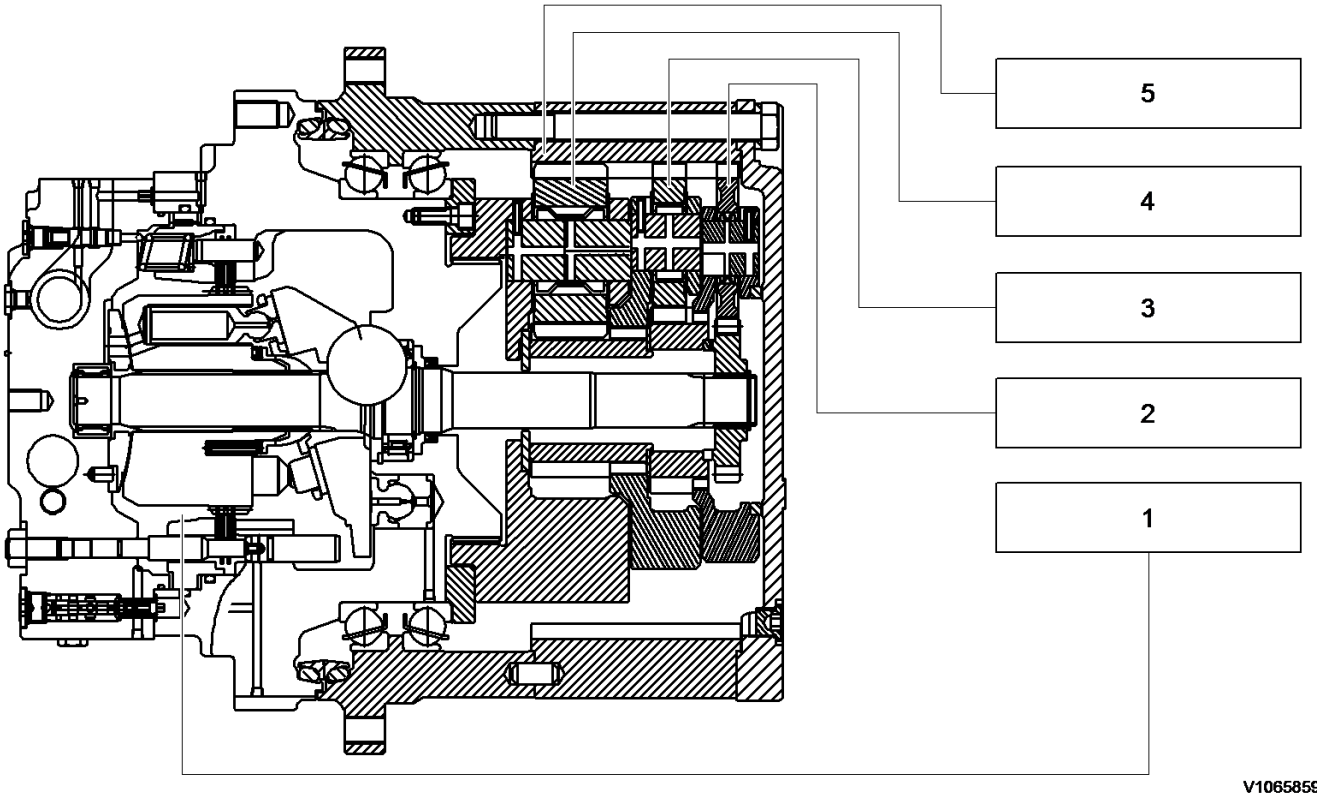

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3. No.2 planetary gear assembly
4. No.3 planetary gear assembly
5. Ring gear

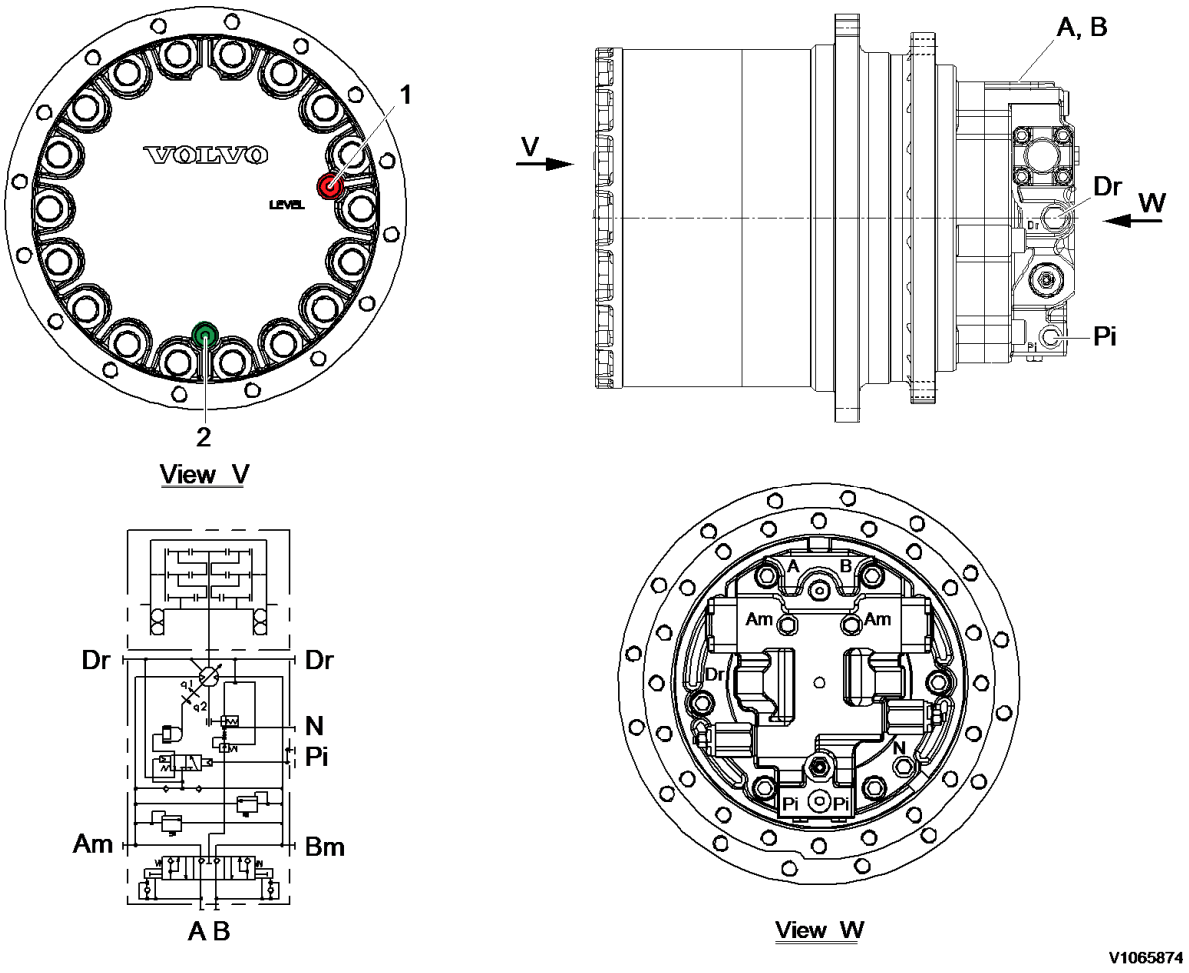

Figure 2
Port connections

1. Oil filling port (PF 1/2)
2. Oil drain port (PF 1/2)

Port connections

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Rotational direction

View from Vaxis	Inlet	Outlet
Clockwise	B	A
Counterclockwise	A	B

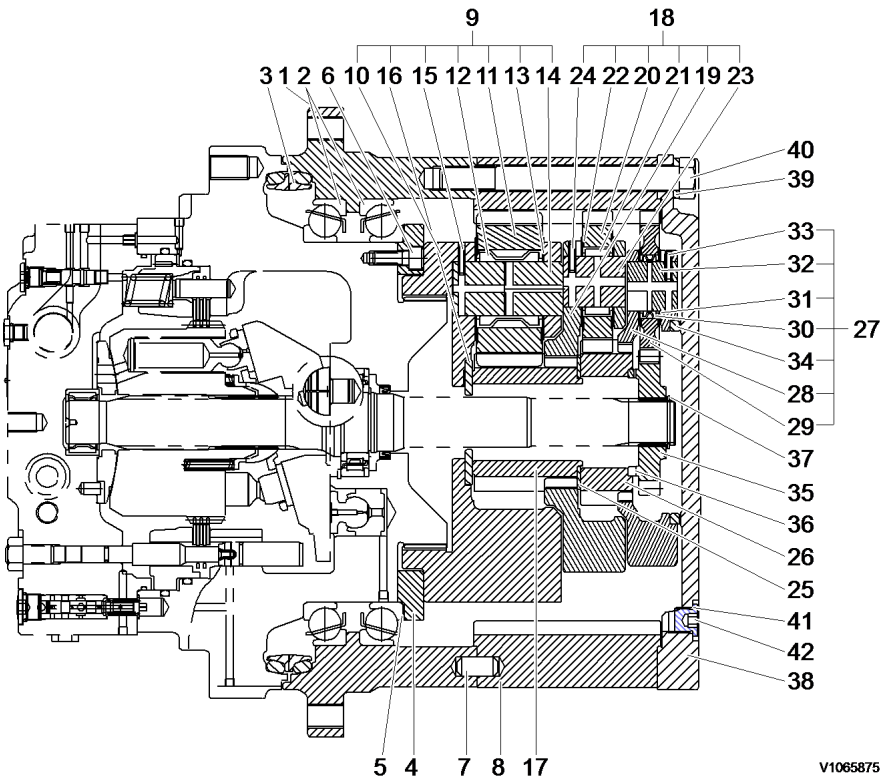
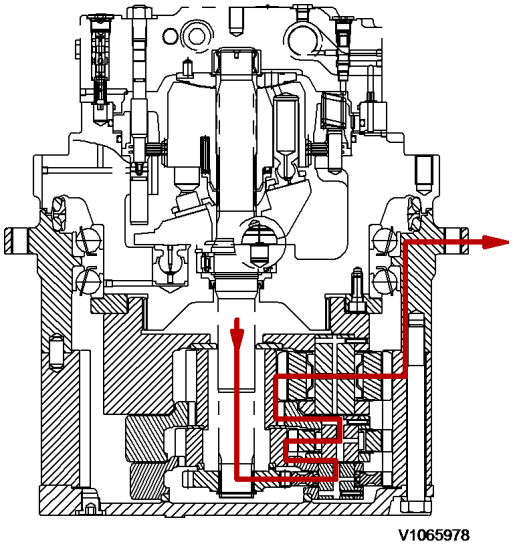


Figure 3
Track gearbox, sectional view

1	Housing	15	Spring pin	29	Planetary gear_no.1
2	Bearing_main	16	Ring_thrust	30	Needle Bearing
3	Seal_floating	17	Gear_sun no.3	31	Washer_thrust
4	Retainer	18	Carrier_assy no.2	32	Pin_No.1
5	Shim	19	Carrier_no.2	33	Spring pin
6	Screw_M12X30	20	Planetary gear_no.2	34	Ring_thrust
7	Pin_parallel	21	Needle Bearing	35	Gear_sun no.1
8	Gear_ring	22	Washer_thrust	36	Ring_thrust
9	Carrier_assy no.3	23	Pin_No.2	37	Ring_retaining C type
10	Carrier_no.3	24	Spring pin	38	Cover
11	Planetary gear_no.3	25	Thrust plate	39	Washer_spring
12	Needle Bearing	26	Gear_sun no.2	40	Bolt_hex HD
13	Washer_thrust	27	Carrier_assy no.1	41	O-ring
14	Pin_No.3	28	Carrier_no.1	42	Plug_hydraulic

The power transmitted from the hydraulic motor output shaft is transmitted to the gear_sun no.1 → carrier_no.1 → gear_sun no.2 → planetary gear_no.2 → carrier_no. 2 → gear_sun no.3 → planetary gear_no.3 → gear_ring.



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Track gearbox, torque flow

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- Zs1 = No. of 1st sun gear tooth
- Zs2 = No. of 2nd sun gear tooth
- Zs3 = No. of 3rd sun gear tooth
- Zr = No. of ring gear tooth

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Construction Equipment

Service Information

Document Title: **Track gearbox, precautions for operation**	Function Group:	Information Type: **Service Information**	Date: **2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

Track gearbox, precautions for operation

Installation

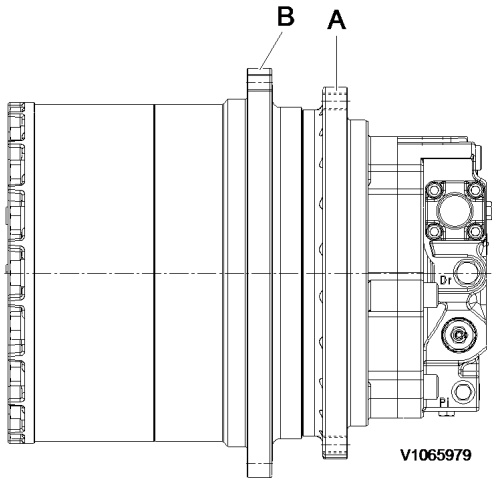

Figure 1
Mounting location

A. Main body mounted area
B. Sprocket mounted area

- Check that the mating mount surfaces are clean.
- Check that the motor is positioned correctly in the frame.
- If the gearbox to frame fit is tight, draw the assembly into the frame evenly with the mounting screws.
- Tighten the screws in a crisscross pattern in several stages to the specified torque.
- Apply these same precautions when mounting the sprocket.

Tightening torque

Tightening torque

	Quantity	Thread size	Tightening torque
Reduction screw (A)	26	M20	52.2 kgf m (512 Nm) (377 lbf ft)
Sprocket screw (B)	24	M20 (P2.5)	46.5 ± 2.5 kgf m (456 ± 25 Nm) (336 ± 18 lbf ft)

NOTE!
The screws must be 10.9 KS strength classification or above.

Lubricating oil

NOTICE

Prior to operating the travel function, fill the gearbox with the specified oil to the correct level.

NOTE!
Gear oil specification

Use a gear oil equivalent to one of the following two criteria. API classification GL–4 or GL–5, SAE 90.

Gear oil replacement period

- First (initial) oil replacement: 500 operating hours
- Subsequent oil replacement: 2000 operating hours
- After maintenance (initial): 500 operating hours

NOTE!
Regardless of the operating hours the gear oil must be replaced at least once per year.

NOTE!
Do not mix different types, classifications or brands of oil.

NOTE!
Drain the gear oil while it is still warm to flush out any contaminants.

Gear oil replacement procedure

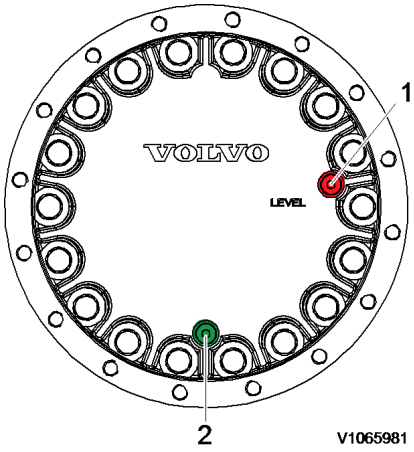

Figure 2
Oil replacement location

1. Oil filling port
2. Oil drain port

- Rotate the gearbox until the drain plug is the lowest position on the ground.
- Remove the 2 plugs and drain the oil into a suitable container.
- Ensure that the drain plug O-ring is not damaged, then install the plug with specified tightening torque.
- Refill the 6.8 liter gear oil through the fill port.
- Ensure that the O-ring on each plug is not damaged, then install the plugs with specified tightening torque.

NOTE!
Oil capacity: 6.8 liters (1.8 US gal)

Operating checks

- Check the oil level prior to operating the travel function.
- Check for oil leakage on the gearbox assembly.
- Check for loose mounting screws.
- Check for abnormal sound or vibration while rotating.
- Check for any abnormal temperature increase after operating for a short time.

WARNING

The temperature of the case is high just after running. Use a thermometer to measure. Do not touch directly by hand to prevent a burn injury.

NOTE!

The temperature of the case must be lower than 90 °C, during continuous operation.

Document Title: **Track gearbox, maintenance standard**	Function Group:	Information Type: **Service Information**	Date: **2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

Track gearbox, maintenance standard

The parts are precision finished and must be handled carefully.
Keep the parts of carrier ass'y together, do not mix the bearings, gears, pins and thrust washers.

Seals

Replace the seals and O-rings, although they appear not damaged.

Part replacement criteria

Replace all parts that appear damaged or are not within the allowable value.
Replace some parts in sets, i.e. gears, bearings, pins and thrust washers.

Part replacement criteria

Item No.	Part	Condition	Allowable value
8 11 17 20 26 29 35	Ring gear No.3 planetary gear No.3 sun gear No.2 planetary gear No.2 sun gear No.1 planetary gear No.1 sun gear	The tooth surface is pitted or non uniformly worn. The gear is cracked.	Area rate: within 5%
12 21 30	No.1 Needle bearing No.2 Needle bearing No.3 Needle bearing Angular bearing	Pitting/flaking of the balls, rollers or races. Hard to rotate by hand.	
3	Floating Seal	Rust or damage on sliding face. O-ring distorted or damaged.	
32 23 14	No.3 pin No.2 pin No.1 pin	The pin is cracked, galled or pitted.	
22 25	Thrust washer Thrust plate	Excessively worn on the face area.	

Remove air in the track motor before operating.

1. Check that the gearbox axis is horizontal. Rotate the gearbox housing until the drain plug is on the bottom of the vertical axis of the end cover.
   The gearbox is supplied with oil plugs (draining, filling and level) equipped with an hole that allows the air to bleed.
   NOTE!
   Remove the oil plugs with care. When the gearbox is warm, the air inside can be pressurized and this can cause their strongly expulsion towards the worker.
2. Loose with caution the plugs (2~3 rounds) counterclockwise.
3. Clean the plug to be sure that the air bleed hole is not obstructed.
4. Wait a few seconds to allow the pressurized air to bleed from the gearbox.
5. Remove the plugs and let the oil flow in a large enough container; in order to facilitate the draining must be oil still warm.

6. Wait a few minutes until all the oil is drained and then proceed to screw on the plugs.
7. Proceed with the oil fill-up following the procedures given.

NOTE!
Never mix mineral oils with synthetic oils and vice versa.

Do not dispose of the oil in the natural environment but be careful to eliminate it in compliance with the relative rules and regulations that govern locally.

Tightening torque plug. See track gearbox, description.

General tools
General tools

No.	Description	Size	Quantity
1	Socket wrench	30 mm (1.18 in)	1
2	L wrench & Hexagon wrench socket	10 mm (0.39 in)	1
3	Torque wrench	Torque wrench with a tightening torque range containing 60N m, 125N m and 530N m	1
4	Eye bolt	M10 (For carrier) M12 (For ring gear) M20 (For housing) PF1/2 (For cover)	2 2 2 2
5	Plastic hammer	Approximately L = 300 ~ 500 mm (11.8 ~ 19.7 in)	1
6	Depth gauge (Vernier calliper)	Range approximately 300 mm (11.8 in) Minimum scale 0.01 mm (0.00039 in)	1

Special tool
Special tool

No.	Description	Part number	Quantity
1	Shim thickness measuring gage	14599546	1
2	Floating seal assembly jig	14599545	1

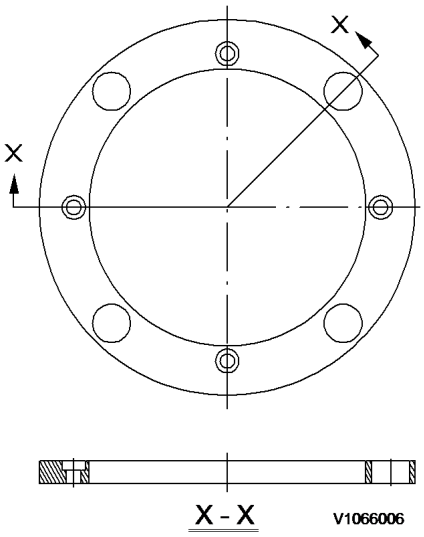

Figure 2
Shim thickness measuring tool

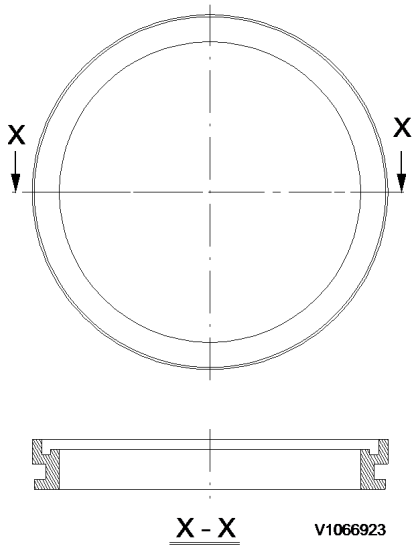

Figure 3
Floating seal assembly jig

Document Title: **Track unit, replacing**	Function Group:	Information Type: **Service Information**	Date: **2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

Track unit, replacing

Op nbr 431-127

1. Remove the track shoes over the master pin and remove the pin to split the track chain. Insert a bar into the track link to guide the track assembly. Rotate the track backward to remove the track chain from the drive sprocket. See7753 Track chain assembly, removing to remove the master pin and the track chain.

2. Lift up the track frame (2) and insert block (3) between track frame (2) and link (1) to support the undercarriage.

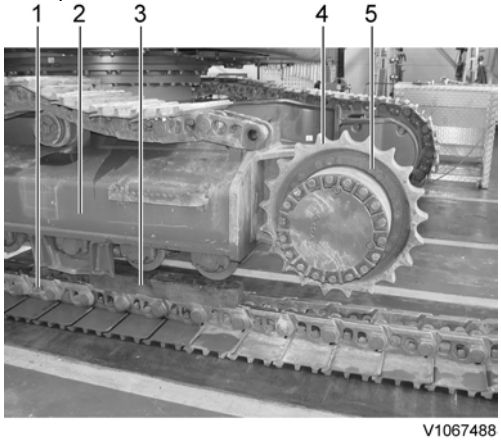

Figure 1
Removal, sprocket

3. Remove screws (5) from sprocket (4).

4. Hold sprocket (4) with the hoist and remove sprocket (4) from the track unit carefully.

   - When the engine is running, the hydraulic line is under high pressure. Stop the engine, and remove the residual pressure inside the hydraulic line by operating the control lever smoothly for 3 ~ 4 times with ignition switch at "ON" position.

   NOTE!
   Remove the residual pressure inside the hydraulic tank by pressing the air breather on the hydraulic tank.

   NOTE!
   After disconnecting the hose, install a plug to prevent oil leakage and contamination.

5. Remove screws (1) and track motor cover (2).

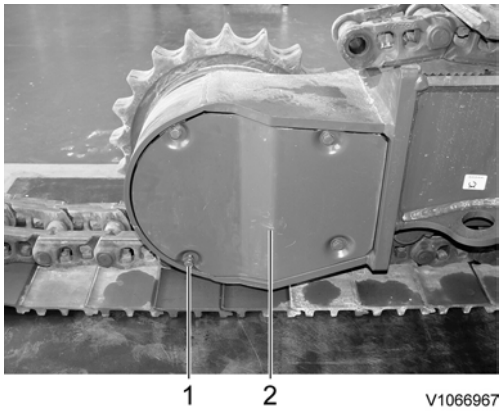

Figure 2
Removal, motor cover

6. Remove track motor high pressure hoses (2).

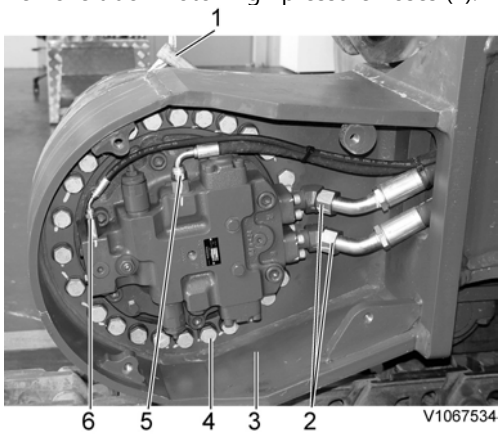

Figure 3
Removal, hoses

7. Remove track motor drain hose (5).
8. Remove track motor 2nd speed hose (6).
9. Remove fittings.
10. Hold the track unit with hoist (1) and remove mounting screws (4) from track frame (3).
11. Remove the track unit (2) with hoist (1), and lower to the workbench safely.

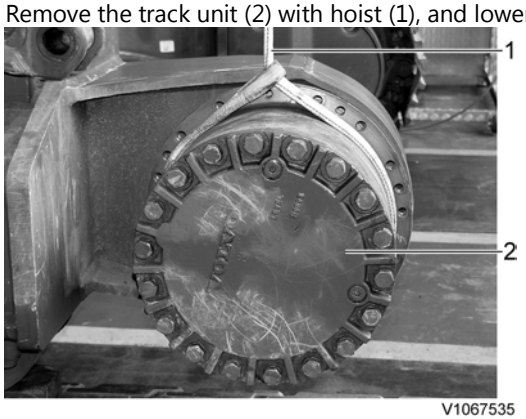

Figure 4
Removal, track unit

12. Install a new track unit in reverse order of the removal procedure.

13. Install the track chain over the drive sprocket, insert a bar into the track link to guide the track assembly. Rotate the track forward until the master pin link is at the idler. Install the master pin and the track shoes.
    See 7753 Track chain assembly, installing to install the master pin and the track chain.

Document Title: **Track gearbox, replacing cover**	Function Group:	Information Type: **Service Information**	Date: **2014/9/24**
Profile: **EXC, ECR305C L [GB]**			

Track gearbox, replacing cover

Op nbr 431-117

1. Park the machine in the service position B, see 091 Service positions
   Rotate the gearbox until the drain plug is at the bottom.

2. Remove the 2 plugs on the cover and drain the oil into a suitable container.
   NOTE!
   Oil capacity: 6.8 liters (1.8 US gal)

Figure 1
Removal, plugs

1. Oil filling port
2. Oil drain port

3. Remove screws (1) and cover (2).
   NOTE!
   Be careful falling cover.

   NOTE!
   Thoroughly clean the mounting surface.

WARNING
The parts are heavy. Take appropriate safety precautions.

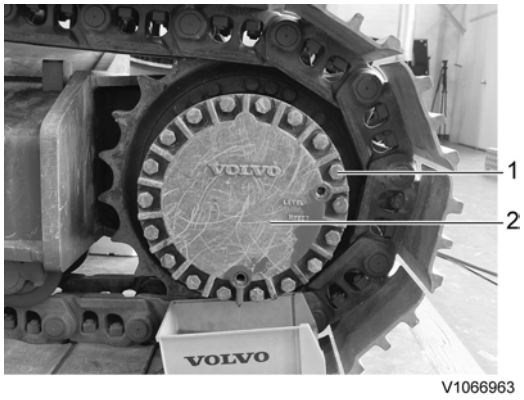

Figure 2
Removal, screws

1. Screw
2. Cover

4. Install the new gearbox cover to the track gearbox.
   NOTE!
   Before replacing cover (1), apply sealing compound (2) to the mounting surface.

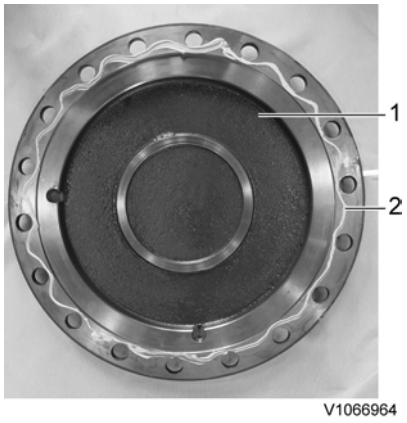

Figure 3
Applying, sealing compound

1. Track gearbox cover
2. Sealing compound

5. Install the drain plug (2).
   Fill the oil (6.8 liter) through the filling port.

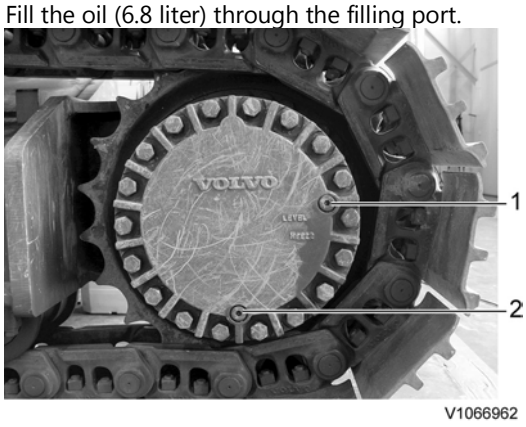

Figure 4
Filling, oil

1. Oil filling port
2. Oil drain plug

6. Install the filling plug and tighten them to the specified torque.

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