

Document Title: Power transmission, description	Function Group: 400	Information Type: Service Information	Date: 2014/10/8
Profile: EXC, ECR145C L [GB]			

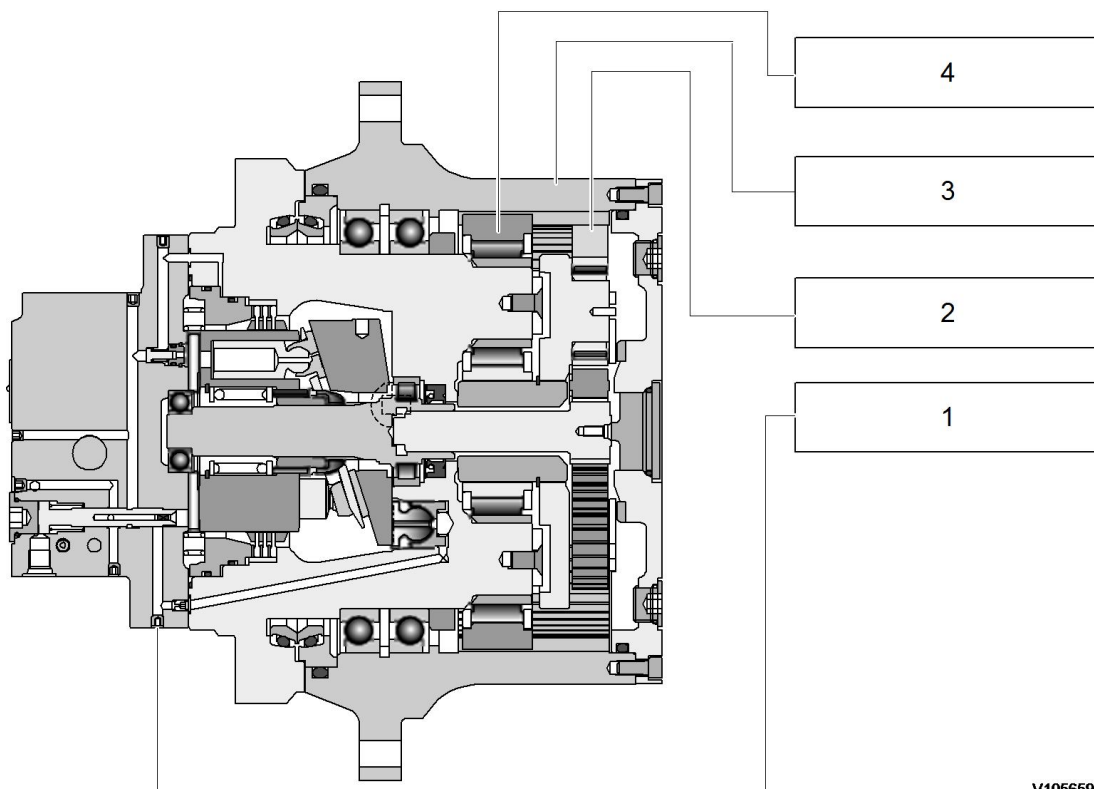
Power transmission, description

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.

Document Title: Track gearbox, description	Function Group:	Information Type: Service Information	Date: 2014/10/8
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Track gearbox, description

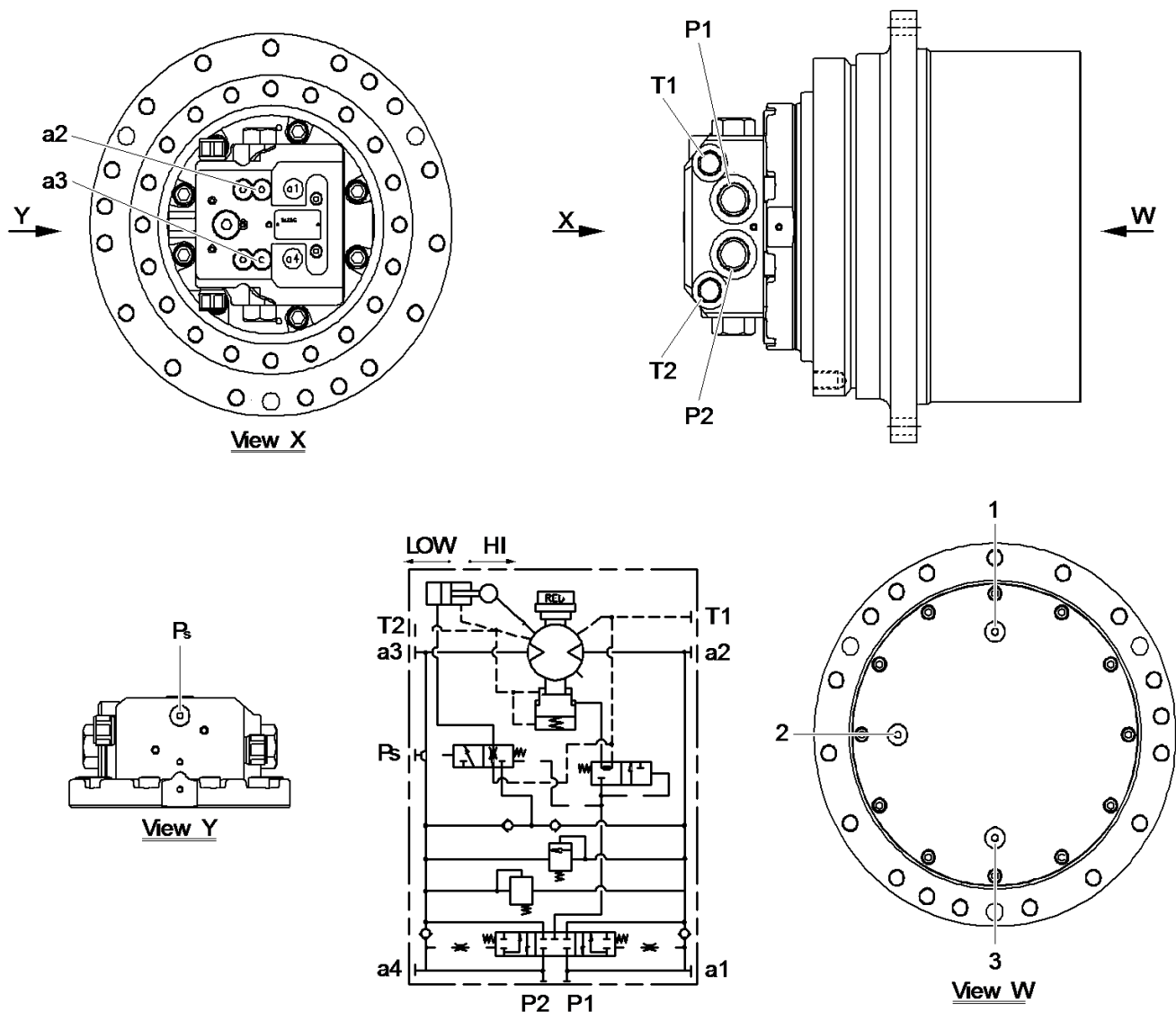
Track gearbox consists of a two stage planetary mechanism that converts the high speed rotation of the hydraulic motor, into low speed, high torque rotating force at the sprocket hub.



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Figure 1
2 stage planetary gearbox

1. Track motor
2. Planetary gear (R)
3. Ring gear
4. Planetary gear (F)



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Figure 2
Port connections

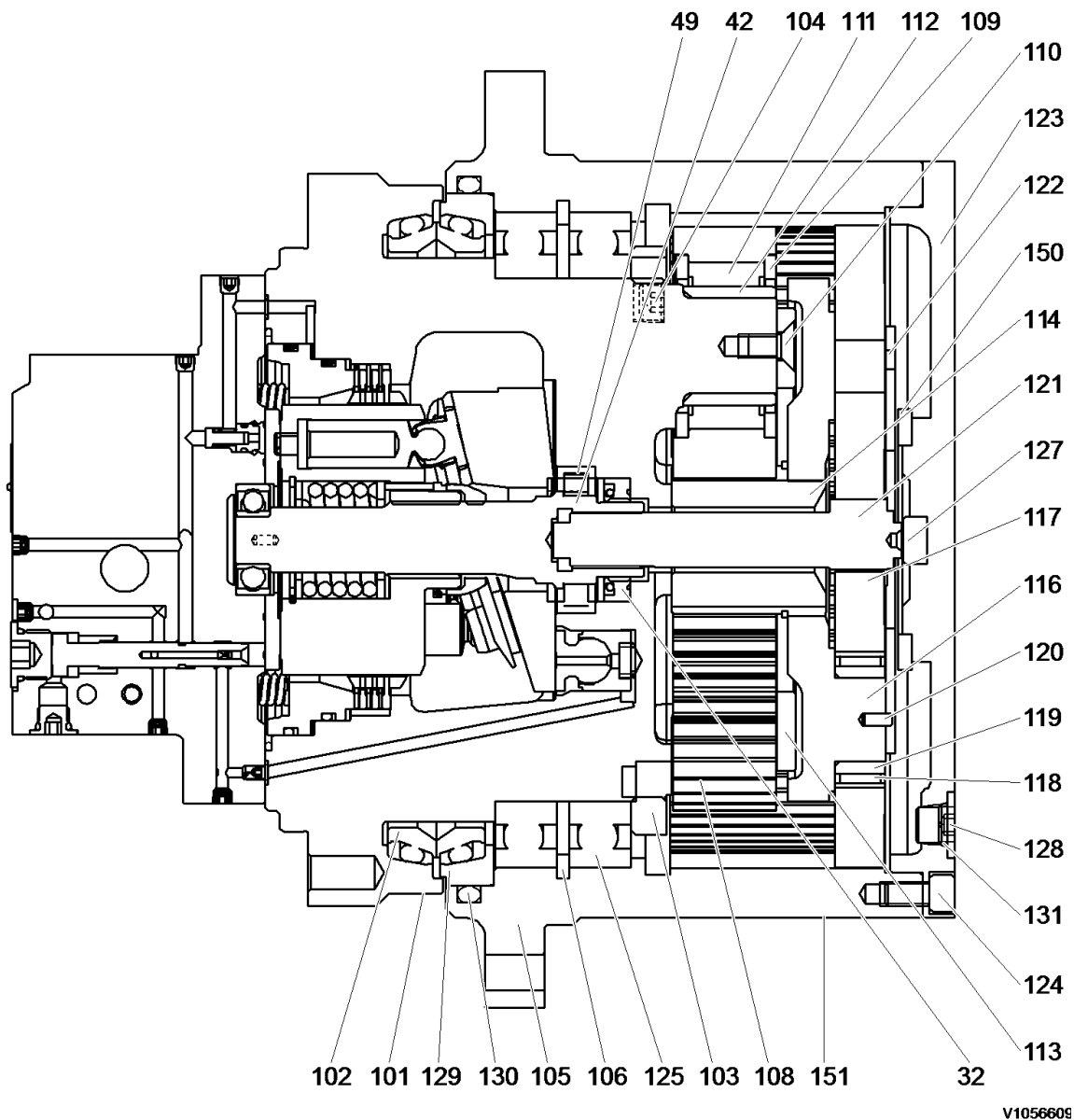
1. Oil inlet port (PF 3/8)
2. Oil level check port (PF 3/8)
3. Oil drain port (PF 3/8)

Rotational direction

View from E axis	Inlet	Outlet
Clockwise	P1	P2
Counterclockwise	P2	P1

Port connections

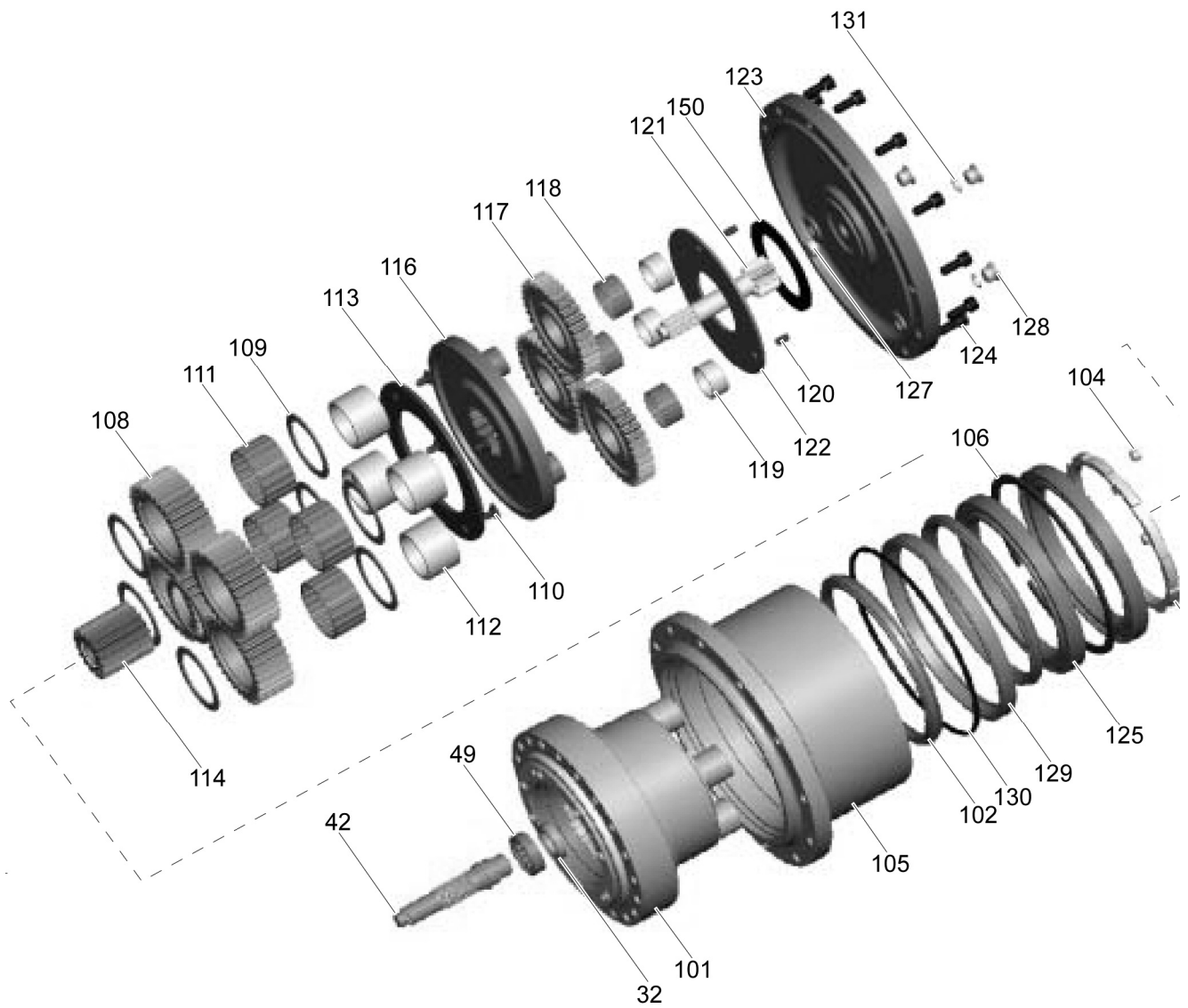
Port symbol	Port size	Port
P1, P2	1-1/16-12UN-2B	Oil supply (Return)
a2, a3	7/8-14UNF-2B	Pressure gauge
Ps	9/16-18UNF-2B	Displacement changeover valve oil supply
T1, T2	7/8-14UNF-2B	Motor drain
a1, a4	—	Pressure gauge (Proto type)



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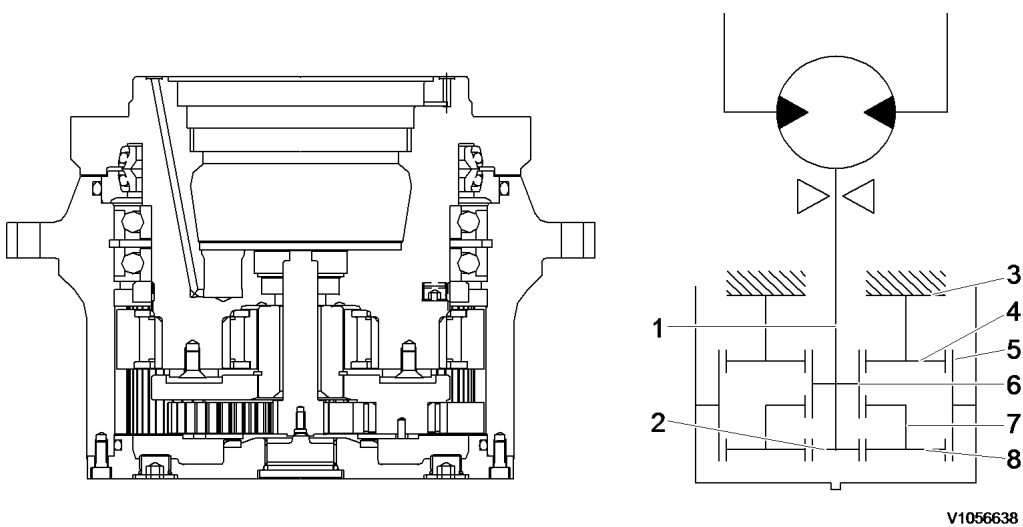
Figure 3
Track gearbox, sectional view

32	Oil seal	110	Screw	122	Thrust plate(R)
42	Parallel pin	111	Needle bearing	123	Cover
49	Roller bearing	112	Collar	124	Socket bolt
101	Spindle	113	Thrust plate(F)	125	Angular bearing
102	Floating seal	114	Sun gear	127	Thrust washer(M)
103	Nut ring	116	Holder	128	RO plug
104	PT plug	117	Planetary gear(R)	129	Seal ring
105	Hub	118	Needle bearing	130	O-ring
106	Snap ring	119	Inner race	131	O-ring
108	Planetary gear(F)	120	Spring pin	150	Thrust plate
109	Thrust washer	121	Drive gear	151	Ring gear



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Figure 4
Track gearbox, exploded view



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Figure 5

Operating principle

1. Shaft
2. Drive gear
3. Holder
4. Planetary gear (F)
5. Hub
6. Sun gear
7. Holder
8. Planetary gear (R)

Operating principle is shaft (1) → Drive gears (2) → Planetary gear R (8) → HUB (5) → Holder (7) → Sun gear (6) → Planetary gear F (4) → Rotation of hub.

The gear reduction ratio is as follows:

The reduction ratio

Reduction ratio(I) = $(\text{Hub Teeth} / \text{Drive gear Teeth} + 1) \times (\text{Hub Teeth} / \text{Sun Gear Teeth} + 1) - 1$

Document Title: Track gearbox, precautions for operation	Function Group:	Information Type: Service Information	Date: 2014/10/8
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Track gearbox, precautions for operation

Installation

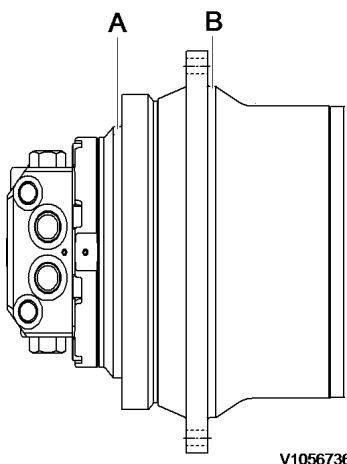


Figure 1
Mounting Method

- A. The fit of the main frame
 - B. The fit of the sprocket
- 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	Torque, kgf-m (lbf-ft)
Reduction screw (A)	20	M16 (P2.0)	25.7 ± 4(186 ± 29)
Sprocket screw (B)	18	M16 (P2.0)	25.7 ± 4(186 ± 29)

NOTE!

Material of the bolts should be equivalent to SCM435 (JIS 10.9T).

Lubricating oil

NOTICE

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

NOTE!

Gear specification

Viscosity of the gear oil is equivalent to SAE 90.

Use a gear oil recommend API service classification GL4 / GL5 with EP (Extreme Pressure) additives.

Gear oil replacement period

- First (initial) oil replacement: 500 operating hours
- Subsequent oil replacement: 1000 operating hour or one year
- After maintenance (initial): 250 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

- Rotate the gearbox until the drain plug and the fill plug are on the vertical axis.
- Remove the 3 plugs in the end cover and drain the oil into a suitable container.
- Ensure that the drain plug o-ring is not damaged, then install the plug and torque to specification.
- Refill the gearbox through the fill port until oil overflows from the level check port.
- Ensure that the o-ring on each plug is not damaged, then install the plugs and torque to specification.

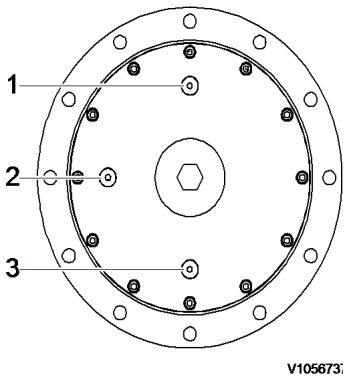


Figure 2

Oil replacement location

1. Fill port
2. Level check port
3. Drain port

NOTE!

Oil capacity: See [4311 Track gearbox specifications](#).

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.



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: Swing gearbox, description	Function Group:	Information Type: Service Information	Date: 2014/10/8
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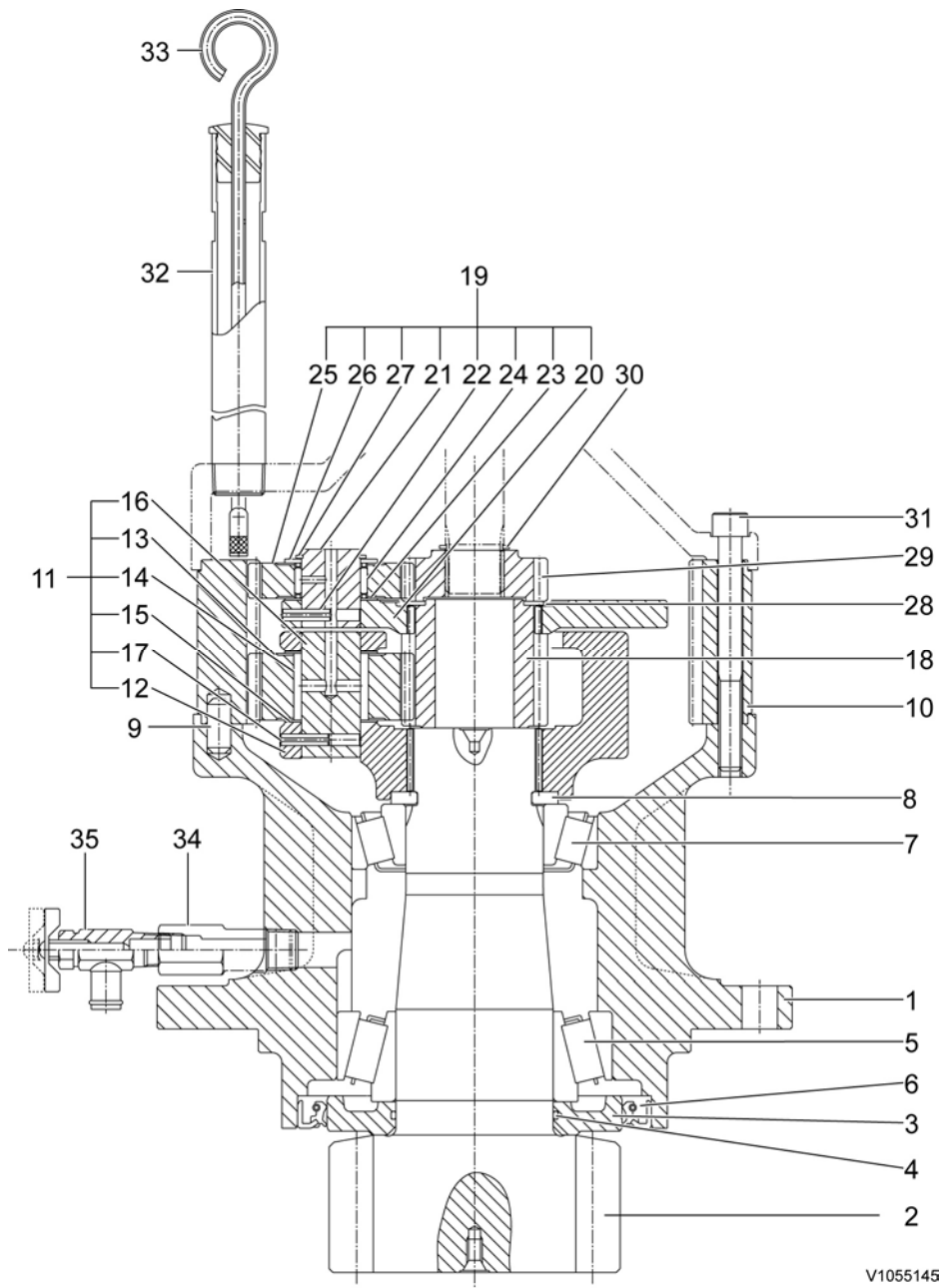
Swing gearbox, description

Swing gearbox consists of the driving shaft as a group including the 1st planetary gear assembly, the 2nd planetary gear assembly and the 1st and 2nd sun gear pinions, the housing supporting the driving shaft, and the ring gear including the planetary gear.

Model code (RGS 050/19-C)

Symbol	Description
RGS	Type number (ex. S = swing gearbox)
050	Size number (Theoretical output, ex. 050 = 500 kgf·m)
19	Reduction ratio code
C	Serial number

Swing gearbox, sectional view

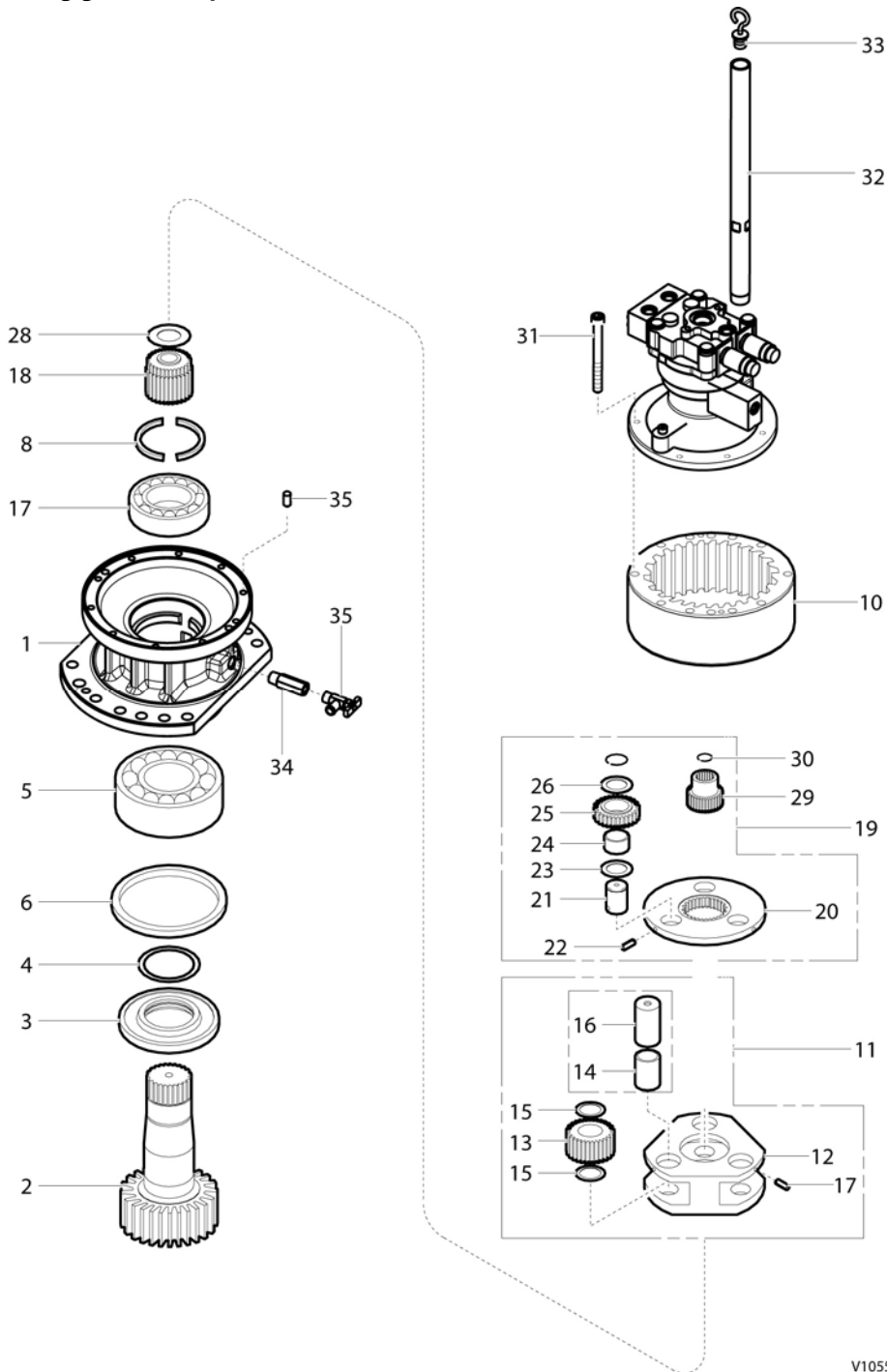


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Figure 1
Swing gearbox, sectional view

- | | | |
|----------------------------------|----------------------------------|-------------------|
| 1 Case | 14 Bushing | 27 Snap ring |
| 2 Shaft | 15 Thrust washer | 28 Thrust washer |
| 3 Collar | 16 No. 2 pin | 29 No. 1 sun gear |
| 4 O-ring | 17 Spring pin | 30 Snap ring |
| 5 Taper roller bearing | 18 No. 2 sun gear | 31 Screw |
| 6 Seal | 19 No. 1 planetary gear assembly | 32 Pipe |
| 7 Taper roller bearing | 20 No. 1 carrier | 33 Level gauge |
| 8 Split collar | 21 No. 1 pin | 34 Adapter |
| 9 Parallel pin | 22 Spring pin | 35 Drain valve |
| 10 Ring gear | 23 Thrust washer | |
| 11 No. 2 planetary gear assembly | 24 Needle bearing | |
| 12 No. 2 carrier | 25 No.1 planetary gear | |
| 13 No. 2 planetary gear | 26 Thrust washer | |

Swing gearbox, exploded view



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Figure 2
Swing gearbox, exploded view

NOTE!

There is no necessity for filling grease to grease port or change grease. (But, when disassembling the gear box, change the grease).

Function

The 2-stage planetary gear reduction assembly converts the high speed / low torque output of the hydraulic motor to low speed / high torque output, which is transmitted via the reduction drive shaft pinion gear to the swing ring inner circumference gear to rotate the superstructure.

Operation

Power supplied to the output shaft of the hydraulic motor is transmitted to the 2nd sun gear (26) through the splines of the 1st sun gear (37), 1st planetary gear (30), 1st pin (31) and the 1st carrier (29). In the same way, power is transmitted to

output shaft (10) through the splines of the 2nd planetary gear (3), 2nd pin (5) and the 2nd carrier (2).

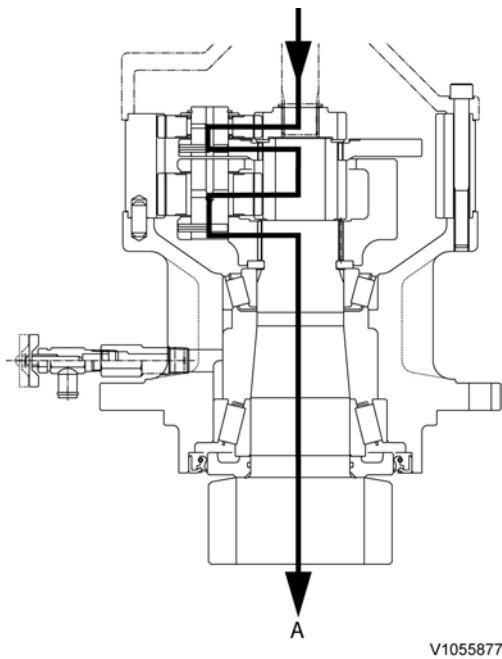


Figure 3
Swing gearbox

A. Torque flow

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

- 1st reduction ratio
 $i1 = (Zr / ZS1) + 1$
 $i1$ = 1st reduction ratio
 $ZS1$ = No. of gear teeth of the 1st sun gear
 Zr = No. of tooth of ring gear
 - 2nd reduction ratio
 $i2 = (Zr / ZS2) + 1$
 $i2$ = 2nd reduction ratio
 $ZS2$ = No. of gear teeth of the 2nd sun gear
- Accordingly the total reduction ratio of gearbox is as follows:
 $i = i1 \times i2$
 $= (Zr / ZS1 + 1) \times (Zr / ZS2 + 1)$
 i = Total reduction ratio

Document Title: Swing gearbox, replacing	Function Group:	Information Type: Service Information	Date: 2014/10/8
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Swing gearbox, replacing

Op nbr 431-021

1. Park the machine in the service position C. See [091 Service positions](#).
2.
 - 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 3-4 times with the ignition switch at "ON" position. Turn the ignition switch to "OFF" position.
 - Remove the residual pressure inside the hydraulic tank by pressing the air breather on the hydraulic tank.
 - Mount the vacuum pump on hydraulic tank, and maintain a vacuum.
 - After disconnecting the hose, install a plug to prevent oil leakage and contamination.
3. Remove the screws and swing motor cover.

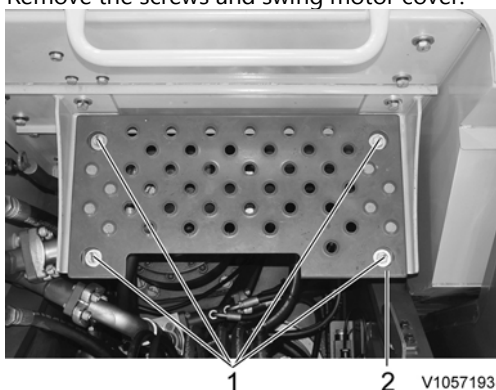


Figure 1
Removal, swing motor cover

1. Screws
 2. Swing motor cover
4. Remove the under cover.
 5. Open oil drain plug cap and install oil drain hose. Drain the gearbox oil into a suitable container.
- NOTE!**
Oil capacity. See [4312 Swing gearbox, specifications](#).

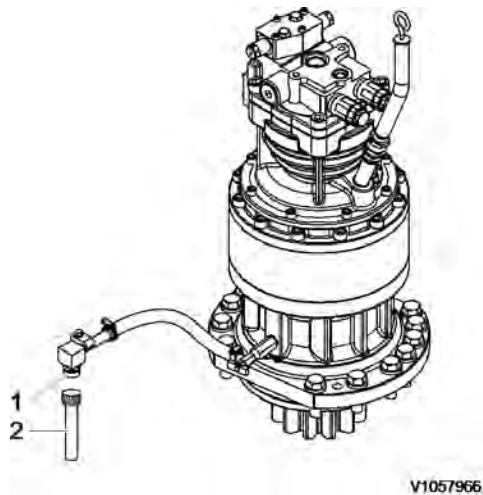


Figure 2
Draining, gearbox oil

1. Oil drain plug cap
 2. Oil drain hose
6. Remove the anti-cavitation hose.
 7. Remove the swing motor drain hose.
 8. Remove the swing motor feed line hoses.
 9. Remove the delay valve sub hoses.

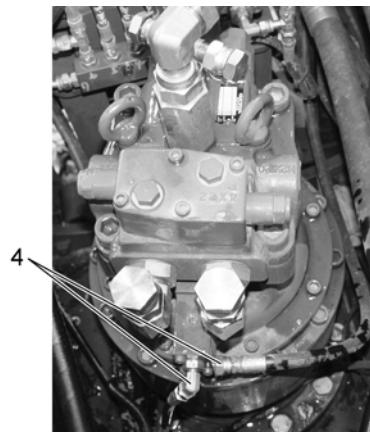
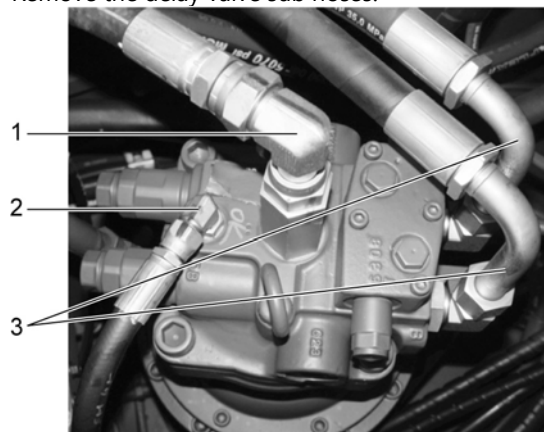


Figure 3
Removal, hoses

1. Anti-cavitation hose
 2. Drain hose
 3. Feed line hoses
 4. Delay valve sub hoses
10. Remove the swing gearbox mounting screws and remove the silicone from both back step holes.

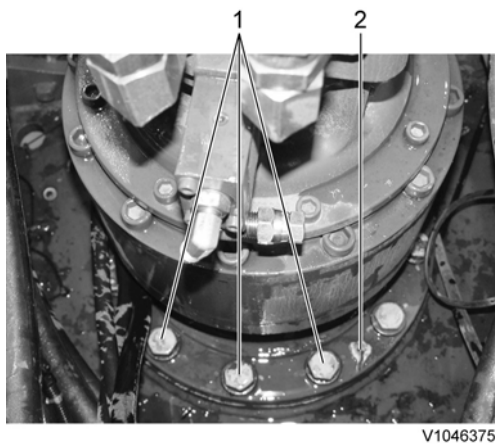


Figure 4
Removal, mounting screws

1. Screws
2. Silicone

11. Install the back step screws to separate the swing gearbox from the superstructure.

NOTE!

The gearbox housing is not removed easily because of the dowel pin.

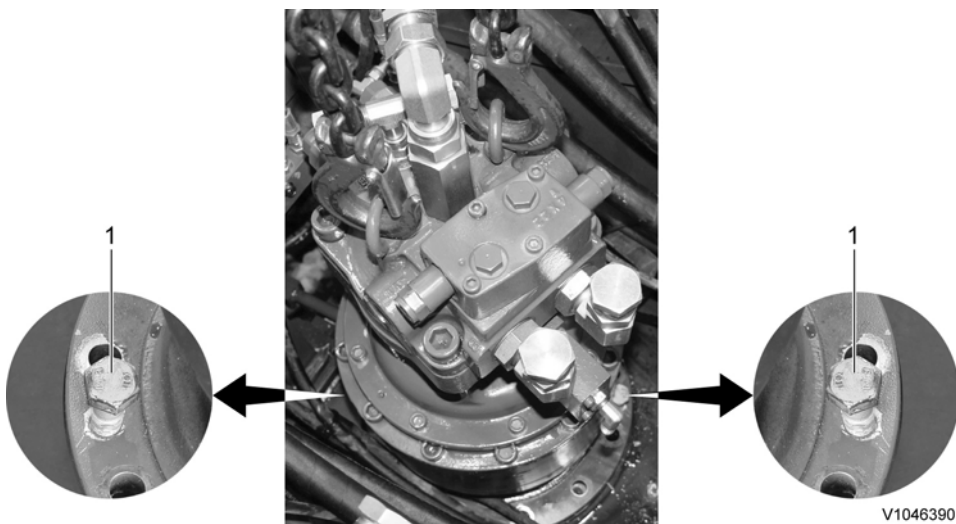


Figure 5
Installation, back step screw

1. Back step screw

12. Lift the swing unit with the sling, and lower to the workbench safely.

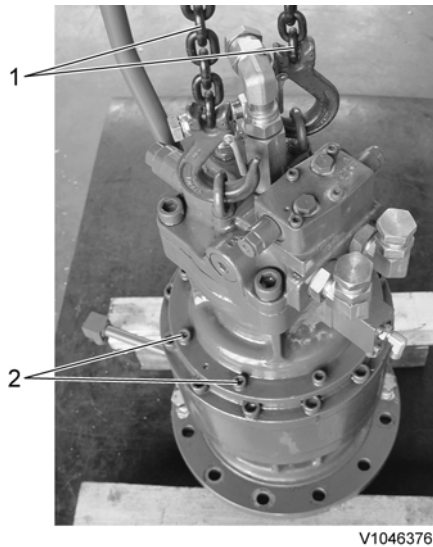


Figure 6
Removal, swing unit

1. Sling
2. Screws

13. Remove the screws, lift the swing motor with sling, and install it to a new swing gearbox.

NOTE!

Before installing the swing motor, thoroughly remove the sealing compound on the mounting surface.

NOTE!

Apply sealing compound to the mounting surface of the new swing gearbox and then install the swing motor.

14. Transfer valve assembly and dowel pin to the new swing gearbox.
15. Lift the swing unit with the hoist, and install it to the machine.

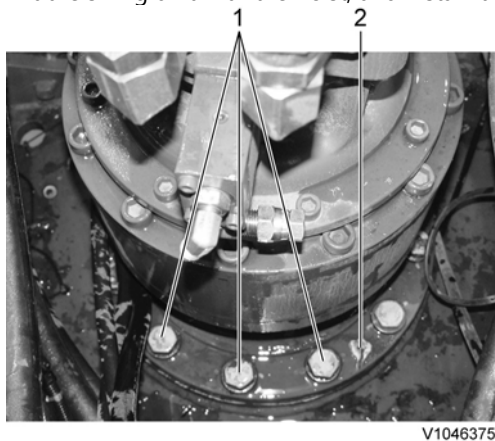


Figure 7
Installation, swing unit

1. Screws
2. Silicone

NOTE!

Before installing the swing unit, thoroughly remove the sealing compound on the seat surface of the superstructure.

NOTE!

Apply sealing compound to the seat surface of the superstructure, and then install the swing unit.

NOTE!

Apply the loctite #277 to the mounting screws (1), and tighten them to the specified torque.

16. Fill the both back step holes, and cover the dowel pin with silicone (2).
17. Install the swing motor feed line hoses.
18. Install the delay valve sub hoses.
19. Install the swing motor drain hose.
20. Install the anti-cavitation hose.

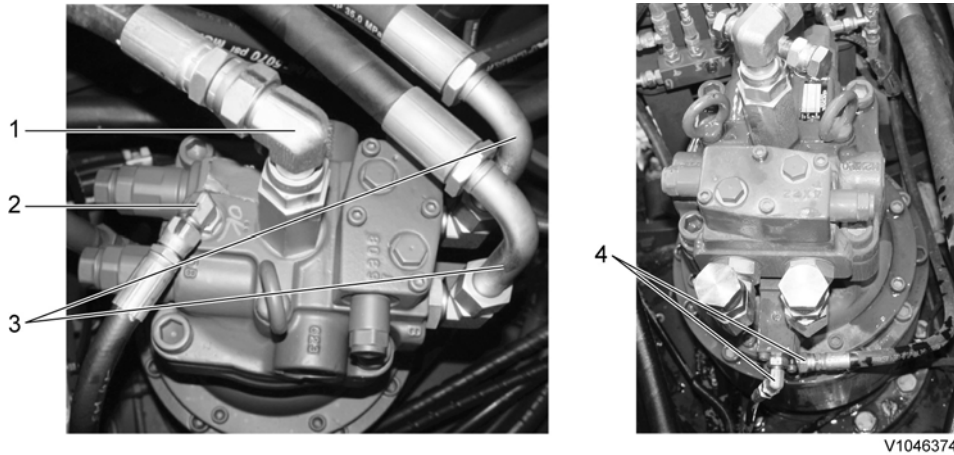


Figure 8
Installation, hoses

1. Anti-cavitation hose
 2. Drain hose
 3. Feed line hoses
 4. Delay valve sub hoses
21. Remove the vacuum pump mounted on the hydraulic tank.
 22. Fill the gearbox oil through the oil filling pipe.
NOTE!
Oil capacity. See [4312 Swing gearbox specifications](#).
 23. Bleed air from the hydraulic circuit at the swing motor before operating.
 24. After completion of the work, start the engine and check for leaks.

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