

Document Title: Track gearbox, removal	Function Group: 4311	Information Type: Service Information	Date: 2015/11/3
Profile:			

Track gearbox, removal

1. Remove cover screw (2) of track gearbox, and remove cover (1).

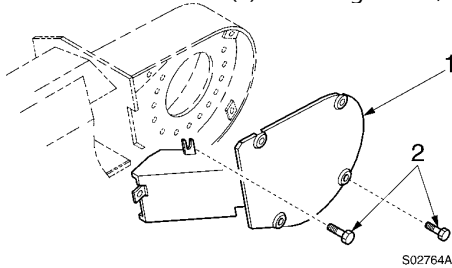


Figure 1
Removal, cover

2. Remove the track.
3. Place a wooden block on the track, and place the lower roller on the block to raise the sprocket off the track.
4. Disconnect the hydraulic hoses at the track motor. Plug the pipe ends and ports to prevent the outflow of oil and the entry of contamination.

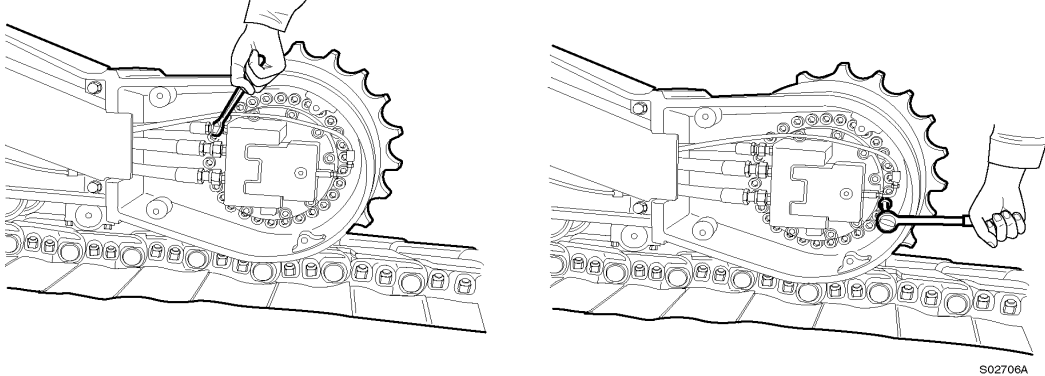


Figure 2
Removal, hydraulic hoses and screws

5. Remove the track motor mounting screws from the undercarriage.
6. Pass a wire rope around the gearbox, and lift it. Remove the track motor as an assembly. Then, using screws in the threaded holes of the undercarriage, force out the gearbox.

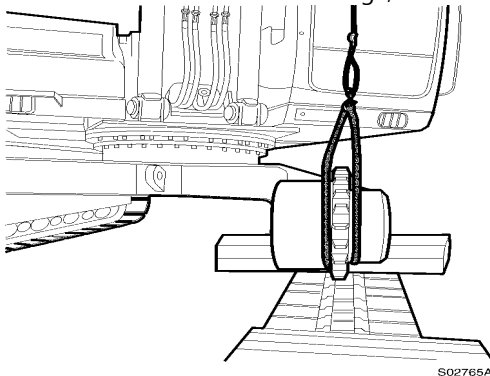


Figure 3
Removal, track gearbox

NOTE!

Lift the gearbox as close to the sprocket as possible to maintain balance.

NOTE!

The gearbox mounting screws may be used in the threaded frame holes.

NOTE!

Putting match-marks on the track frame and track gearbox will facilitate reassembly.

Document Title: Track gearbox (EC210), assembly	Function Group: 4311	Information Type: Service Information	Date: 2015/11/3
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Track gearbox (EC210), assembly

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, oil seal and seals.
- Replace screws (6). **DO NOT REUSE THESE SCREWS !**
- Use a torque wrench to tighten the screws and plugs to the specified torque.

Tightening torque

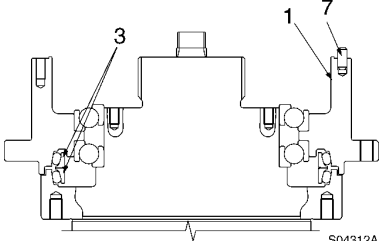
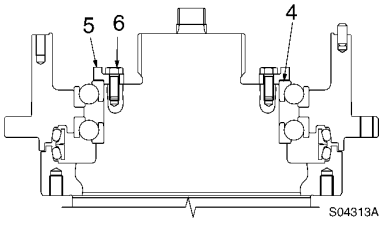
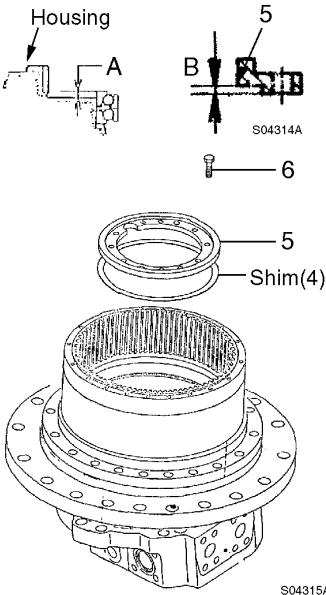
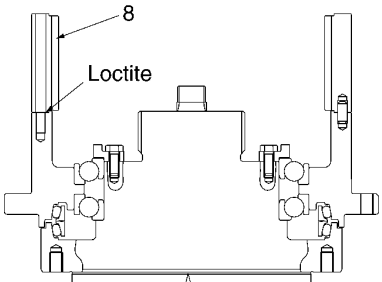
Item No.	Condition	Standard value	Allowable value, kgf-m (lbf-ft)
6	Screw	M12	11.5 (83)
30	Screw	M12	13.5 (98)
31	Screw	M10	
32	Plug	PT 1/2	6.6 (48)

NOTE!

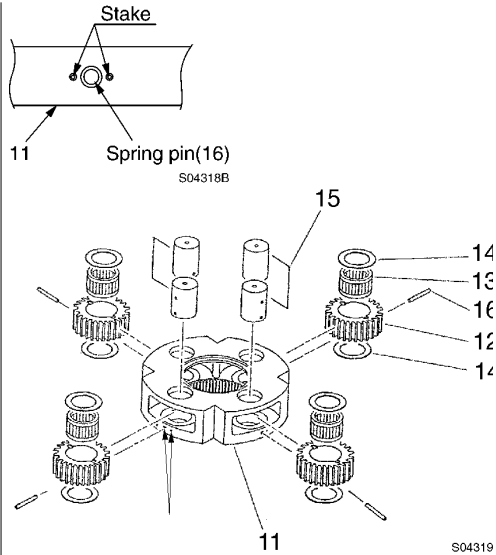
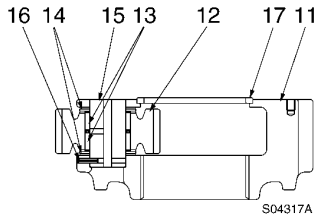
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Assembly procedure

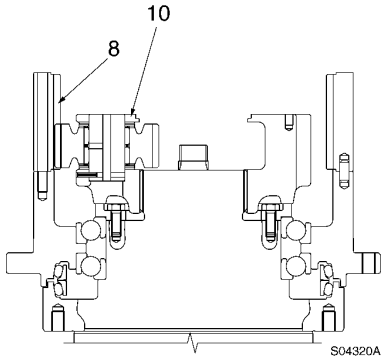
No.	Procedure	Remark	Tool
1	Press-fit angular bearing (2) into housing (1). 	<ul style="list-style-type: none"> • The outer races of the angular bearing must be properly aligned and fully seated. • Press-fit using a press or hammer. 	Plastic hammer Bench press

<p>2</p>	<ul style="list-style-type: none"> • Press-fit seal (3) lightly into housing (1). • Press-fit lightly seal (3) onto the motor casing (spindle 302). • Assemble housing (1) onto the motor aligning the angular bearing inner race to the motor housing.  <p style="text-align: right;">S04312A</p>	<ul style="list-style-type: none"> • After assembling the seal, check if the o-ring is properly seated on the motor housing. • Apply a thin coat of grease (NLGI #2) to the o-ring. • Take care not to damage the mating surface of the seal. 	
<p>3</p>	<p>Shim adjusting method :</p> <ul style="list-style-type: none"> • Measure the step on retainer (5) as shown. Dimension "B" • Install retainer (5) with four screws (6), and tighten to the specified torque. • Remove retainer (5) and measure from the top of the outer bearing race to the motor as shown. Dimension "A" • Shim thickness $S = A - B - 0.05$ mm • Select a shim (4) of the appropriate thickness, align the retainer (5) correctly, and tighten screws (6) to the specified torque.  <p style="text-align: right;">S04313A</p>	<ul style="list-style-type: none"> • Shim : 0.1, 0.9, 1.0, and 1.2 mm • Torque : 0.8 kgf·m (6 lbf·ft)  <p style="text-align: right;">S04314A S04315A</p> <p>Apply loctite #277 onto the thread of screws (6).</p>	<p>19 mm socket (M12) Torque wrench Depth gauge</p>
<p>4</p>	<p>Mount parallel pin (7) into housing (1), align ring gear (8) correctly, and screws.</p>  <p style="text-align: right;">S04316A</p>	<ul style="list-style-type: none"> • Coat the mating surface of ring gear (8) with liquid gasket, loctite #5699. • Install 4 screws (30) temporarily. 	<p>Plastic hammer</p>
<p>5</p>	<ul style="list-style-type: none"> • No. 2 planetary gear assembly. Place No. 2 carrier (11) with its spline downward. • Install thrust washers (14), No. 2 planetary gear (12) and needle bearing (13) into No. 2 carrier. • Insert No. 2 pin (15). • Tap spring pin (16) into the pin holes of the 	<ul style="list-style-type: none"> • Check if No. 2 planetary gears rotate smoothly. • Align the spring pin holes of the carrier and No. 2 pins. • Staking method • Plastic hammer 	

No. 2 carrier (11), and pin (15), then stake two points on No. 2 carrier (11).



6 Fit No. 2 planetary gear assembly (10) into the spline of the motor correctly.

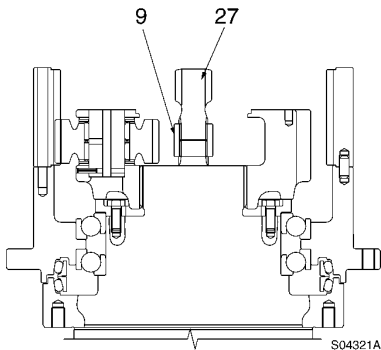


WARNING

The parts are heavy. Take appropriate safety precautions.

Eye bolt(M10)

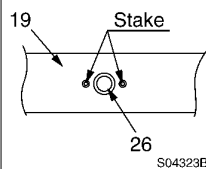
7 Insert coupling(9), and then No.1 sun gear(27) onto the motor shaft.



8 No. 1 planetary gear assembly.

- Install thrust ring (17) into No. 1 carrier(19).
- Install assembled No. 1 carrier onto No. 2 sun gear (20), and mount retaining ring (21).
- Install thrust washers (24), No. 1 planetary gear (22) and needle bearing (23) into No. 1 carrier (19).
- Insert No. 1 pin (25). Tap spring pin (26) into the pin holes of the No. 1 carrier (17) and pin (25), then stake two points on No. 1

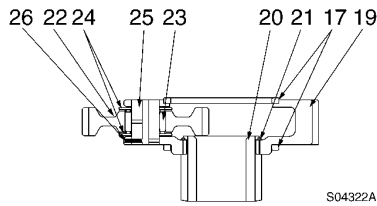
- Align the spring pin holes of the carrier and No. 1 pins.
- Staking method



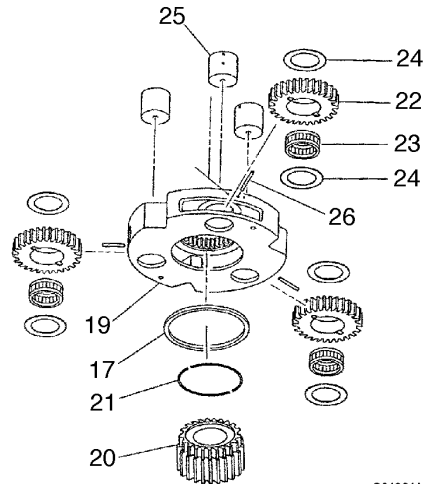
Plastic hammer

carrier (19).

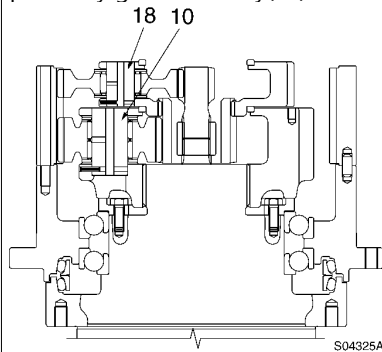
- Insert thrust ring (17) into No. 1 carrier (19).



- Check if No. 1 planetary gears rotate smoothly.

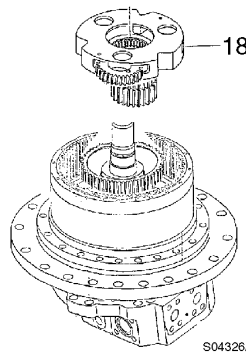


- 9 Insert No. 1 planetary gear assembly (18) into No. 2 planetary gear assembly (10).



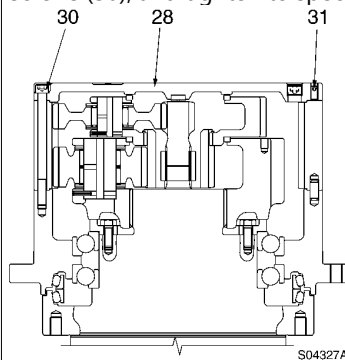
WARNING

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Eye bolt (M10)

- 10 Screw an eye bolt into the oil level port and install cover (28) on ring gear (8). Install screw (31), screws (30), and tighten to specified torque.



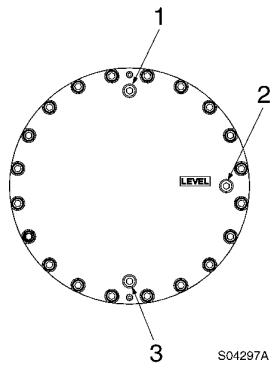
- Coat the mating surface of ring gear (8) with liquid gasket, loctite #5699.
- Apply loctite #277 onto the threads of screws (30).

Eye bolt (PT 1/2)
L wrench 10 mm (M12)
Torque wrench
Plastic hammer

- 11 Install plugs (32) into cover (28) and tighten to specified torque.

Apply loctite #577 onto the threads of plugs (32).

Torque wrench
L wrench 10 mm (PT1/2)



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

Document Title: Track gearbox (EC210), description	Function Group: 4311	Information Type: Service Information	Date: 2015/11/3
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Track gearbox (EC210), 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.

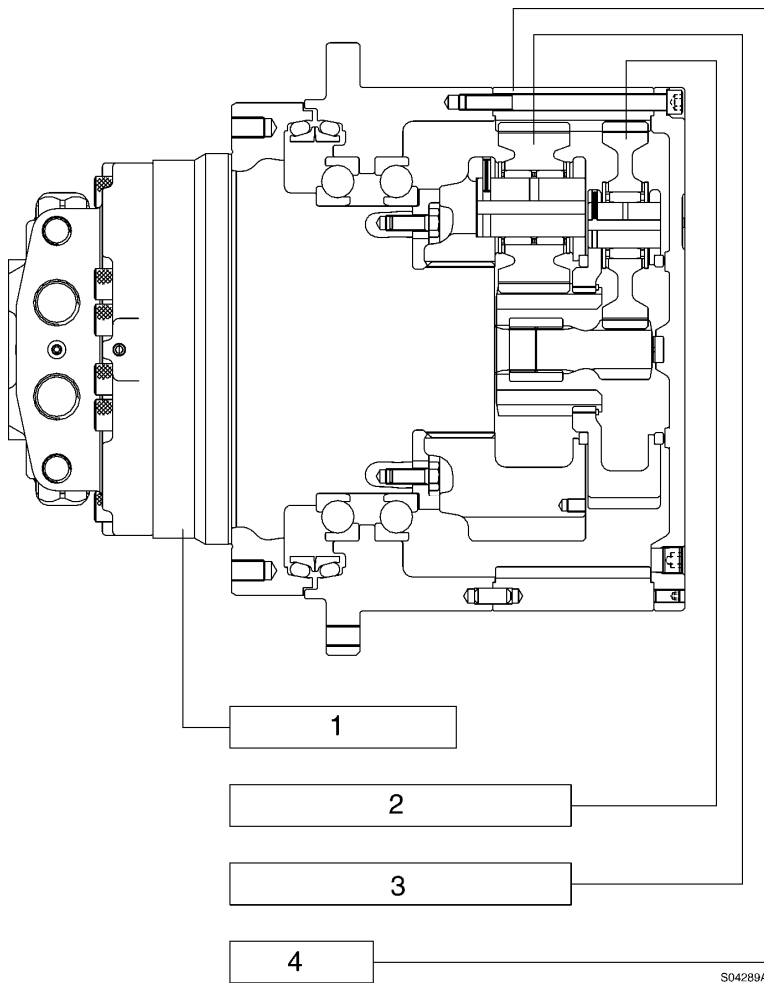


Figure 1
2 stage planetary gearbox

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

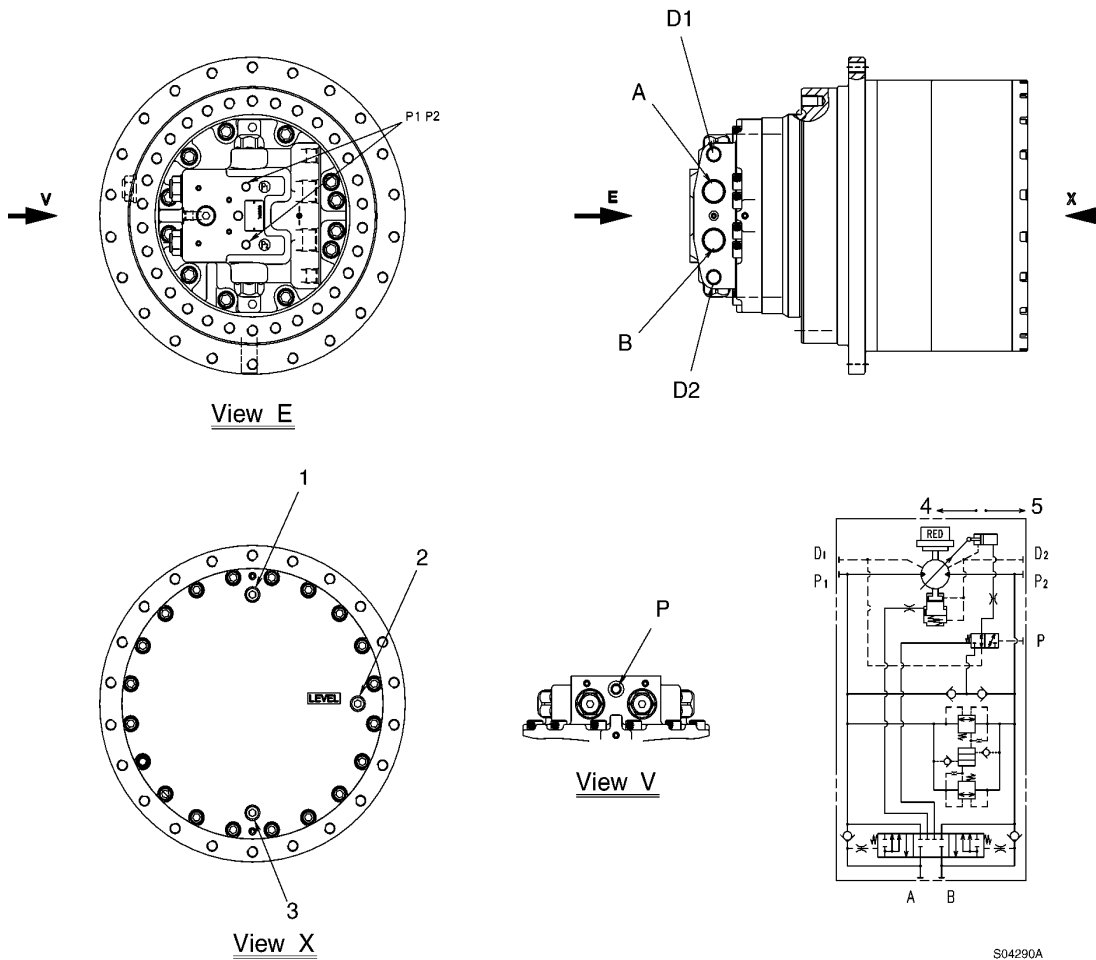


Figure 2
Port connections

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

Rotational direction

View from E axis	Inlet	Outlet
Clockwise	A	B
Counterclockwise	B	A

Port connections

Port symbol	Port size	Port
(A) (B)	PF 1	Oil supply (Return)
(P1) (P2)	PT1/4	Pressure check
(P)	PF1/4	Displacement changeover valve oil supply
(D1) (D2)	PF1/4	Drain

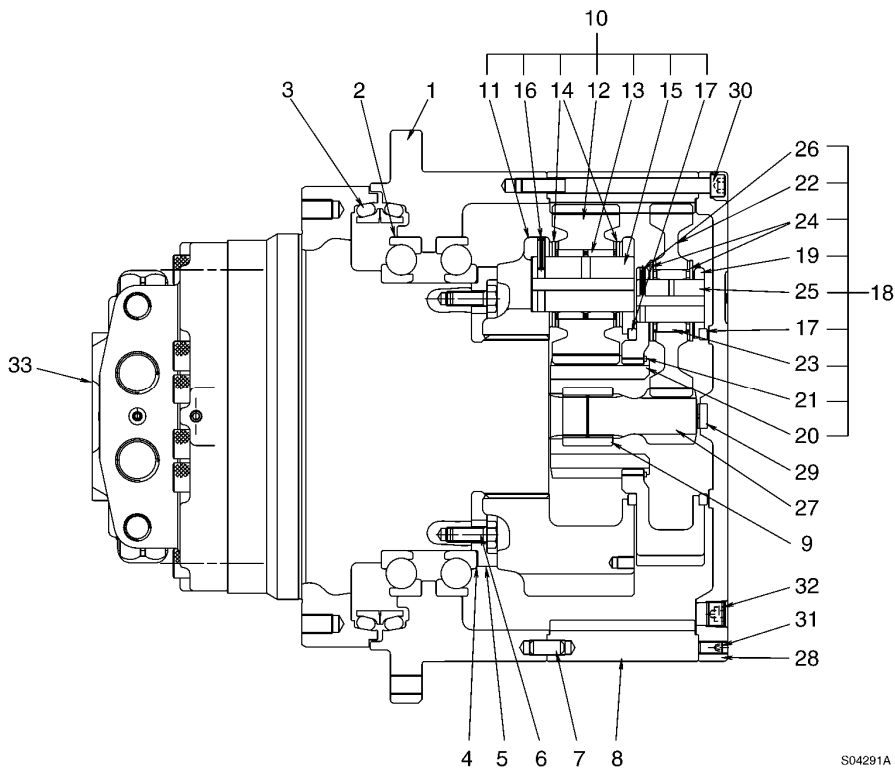
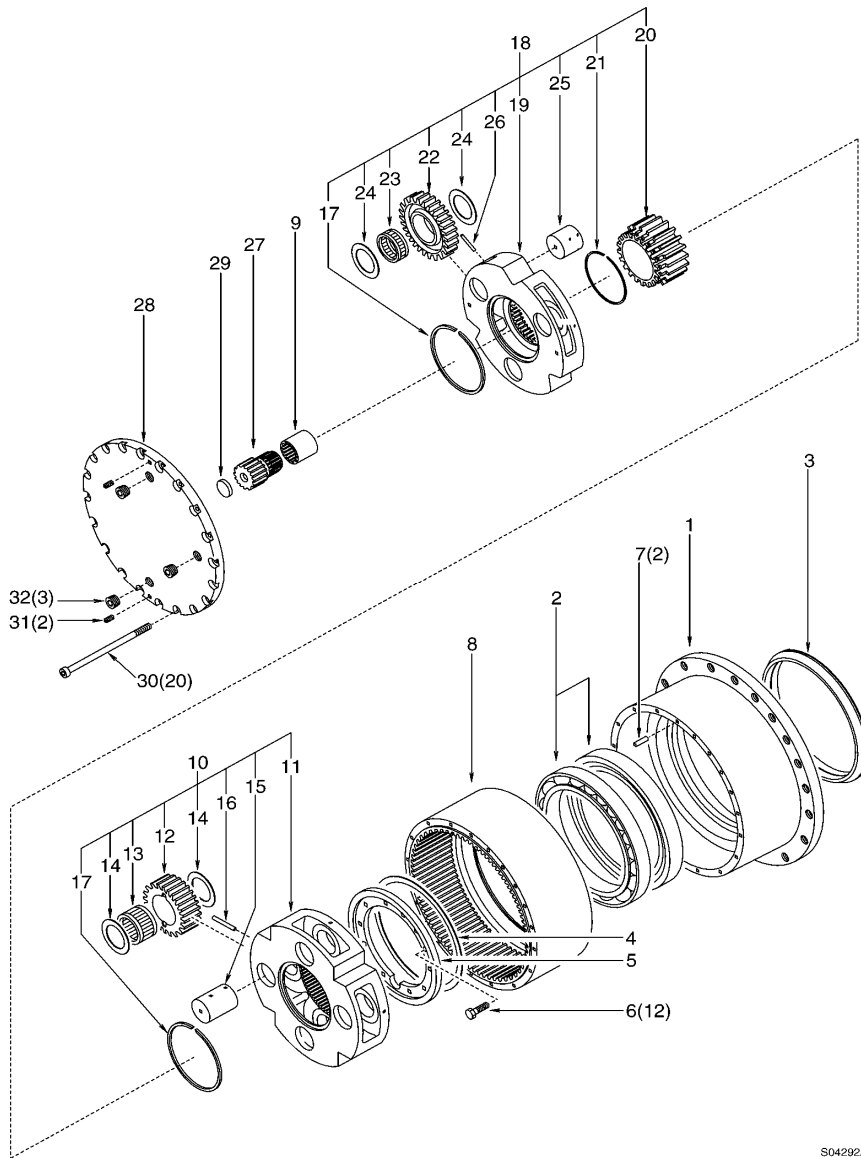


Figure 3
Track gearbox (EC210), sectional view

1	Housing	18	No.1 planetary gear assembly
2	Angular bearing	19	No.1 carrier
3	Seal	20	No.2 sun gear
4	Shim	21	Retaining ring gear
5	Retainer	22	No.1 planetary gear
6	Screw	23	No.1 needle bearing
7	Parallel pin	24	Thrust washer
8	Ring gear	25	No.1 pin
9	Coupling	26	Spring pin
10	No.2 planetary gear assembly	27	No.1 sun gear
11	No.2 carrier	28	Cover
12	No.2 planetary gear	29	Pad (thrust)
13	No.2 needle bearing	30	Screw
14	Thrust washer	31	Screw
15	No.2 pin	32	Plug
16	Spring pin	33	Name plate
17	Thrust ring		



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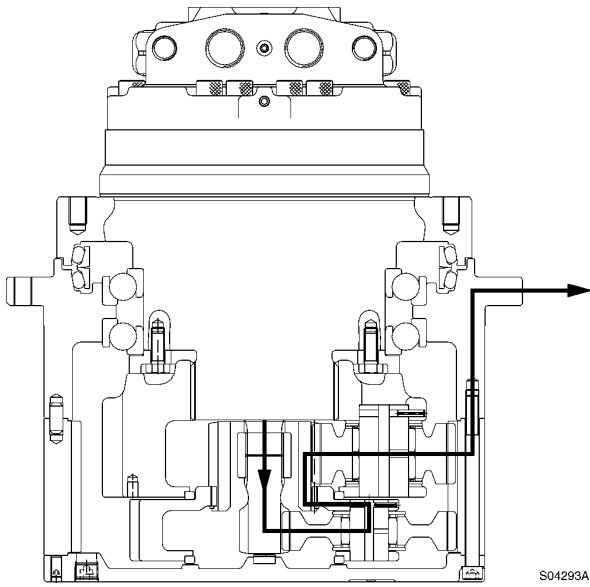
Figure 4
Track gearbox (EC210), exploded view

The power transmitted from the hydraulic motor output shaft is transmitted to the 1st stage sun gear (27) → spline of 1st carrier (19) → 2nd sun gear (20) → 2nd planetary gear (12) → ring gear (8).
At this time, the reduction ratio of reduction gear is as follows :

(1) 1st reduction ratio

$$i_1 = \frac{(Z_{s1} + Z_r) \cdot (Z_{s2} + Z_r)}{(Z_{s1} \cdot Z_{s2}) - 1}$$

- Z_{s1} = No. of tooth of 1st sun gear
- Z_{s2} = No. of tooth of 2nd sun gear
- Z_r = No. of tooth of ring gear



S04293A

Figure 5
Track gearbox, torque flow

Document Title: Track gearbox (EC210), disassembly	Function Group: 4311	Information Type: Service Information	Date: 2015/11/3
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Track gearbox (EC210), disassembly

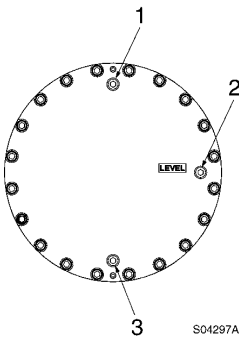
Disassembly, precautions

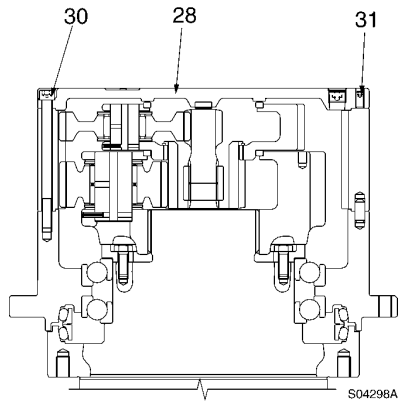
- Thoroughly clean the gearbox assembly prior to disassembly.
- Select a clean work area.
- Match mark attached components to indicate proper positioning during reassembly.
- Take care not to mix parts of sub assemblies i.e. planetary bearings, gears and thrust washers.
- Thoroughly clean all parts and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

NOTE!

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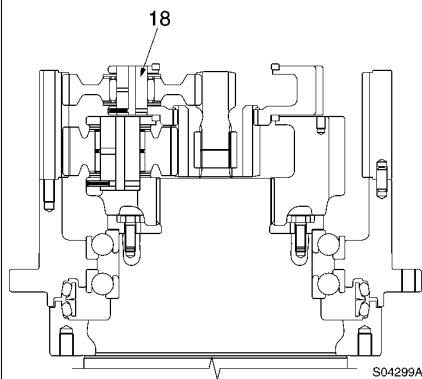
Disassembly procedure

No.	Procedure	Remark	Tool
1	<ul style="list-style-type: none"> • Place the oil fill port and the oil drain port on the vertical axis. • Remove plug (32) and drain the gear oil.  <p>1. Fill port 2. Level check port 3. Drain port</p>	Drain oil into a clean container and check thoroughly for contamination.	L wrench 10 mm (PT 1/2) 8 liter pan
2	Remove screws (30) and remove cover (28).	Install a screw (31) and carefully lift the cover off.	L wrench 10 mm, 5 mm

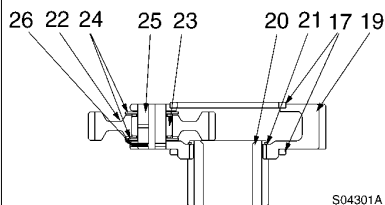


3

- Remove No. 1 planetary gear assembly (18) from No. 2 planetary gear assembly (10).



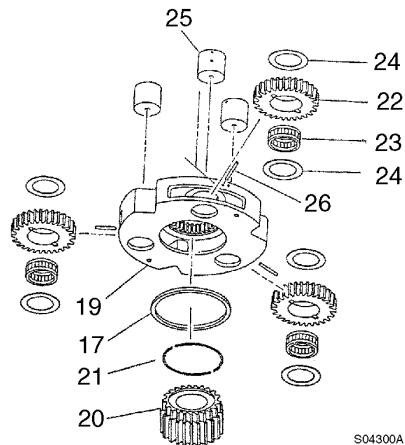
- Disassemble No. 1 planetary gear assembly.
 - Tap spring pin (26) into No. 1 pin (25).
 - Remove thrust washer (24), No. 1 planetary gear (22) and needle bearing (23) from No. 1 carrier (19).
 - Remove thrust ring (17).
 - Remove retaining ring (21), then No. 2 sun gear (20).
 - Remove thrust ring (17).



WARNING

The parts are heavy. Take appropriate safety precautions.

- Match mark gears (22), pins (25) and carrier (19).
- Do not mix the gears, bearings, thrust washers, and pin assemblies.
- Do not reuse spring pins (26).

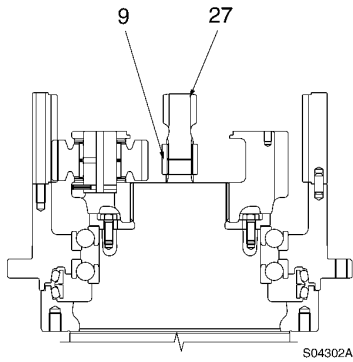


Eye bolt (M10)
Plastic hammer

4

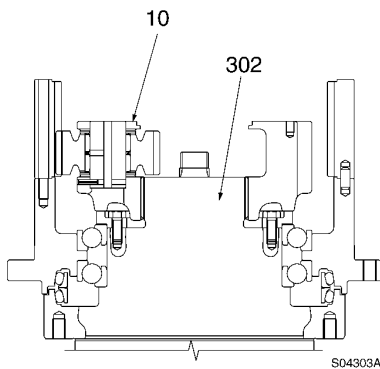
Remove No. 1 sun gear (27) and coupling (9).

Remove No. 1 carrier (19) and then remove No. 2, No. 1 sun gear (20, 27).

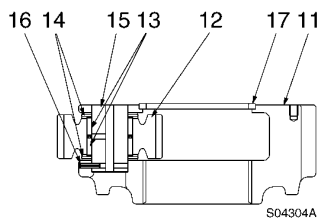


5

- Remove No. 2 planetary gear assembly (10) from spindle (302).



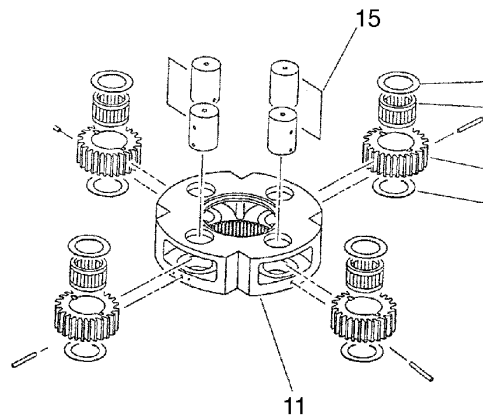
- Disassembling No. 2 planetary gear assembly
- Tap spring pin (16) into No. 2 pin (15).
 - Remove thrust washer (14), No. 2 planetary gear (12) and needle bearing (13) from No. 2 carrier (11).



WARNING

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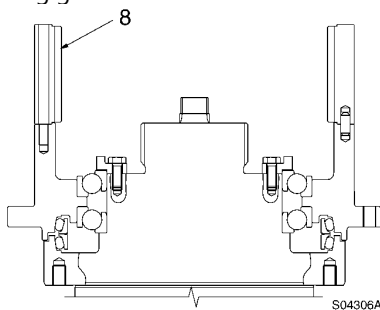
- Match mark gears (12), pins (15) and carrier (11).
- Do not mix the gears, bearing, thrust washers, and pin assemblies.
- Do not reuse spring pins (16).



Eye bolt (M10)
Plastic hammer

6

Screw the eye bolts into ring gear (8), and remove ring gear.



Eye bolt (M12)
Plastic hammer

7

Remove screw (6), retainer (5) and shim (4).

Do not reuse the screws.

19mm socket (M12)



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