

GROUP 5 SWING DEVICE (TYPE 2)

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

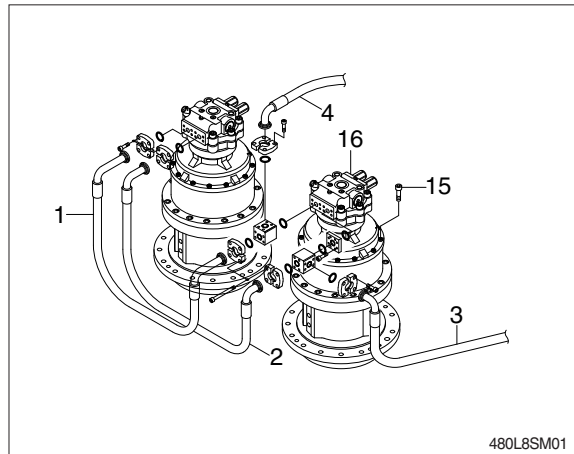
- (4) Disconnect hose assembly (1, 2, 3, 4).
- (5) Disconnect pilot line hoses (5, 6, 7, 8, 9, 10, 11, 12, 13, 14).
- (6) Sling the swing motor assembly (16) and remove the swing motor mounting socket bolts (15).

· Motor device weight : 61 kg (135 lb)

- (7) Remove the swing motor assembly.
※ When removing the swing motor assembly, check that all the piping have been disconnected.



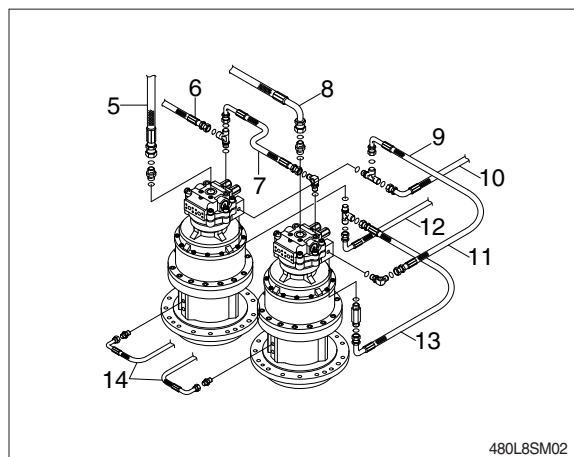
13031GE18



480L8SM01

2) INSTALL

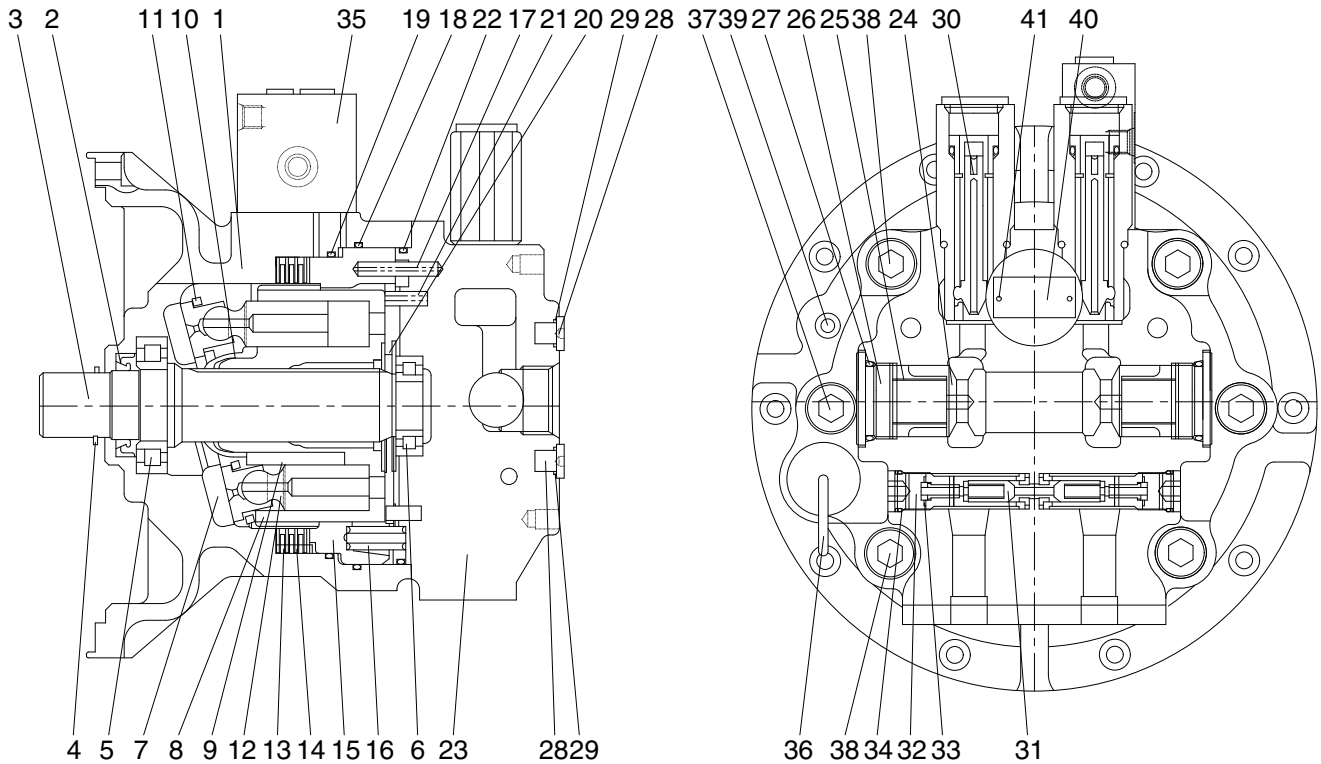
- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from the swing motor.
 - ① Remove the air vent plug.
 - ② Pour in hydraulic oil until it overflows from the port.
 - ③ Tighten plug lightly.
 - ④ Start the engine, run at low idling and check oil come out from plug.
 - ⑤ Tighten plug fully.
- (3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.



480L8SM02

2. DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

1) STRUCTURE



480F2SM02

1	Casing	15	Parking piston	29	O-ring
2	Oil seal	16	Spring	30	Relief valve assy
3	Shaft	17	Spring pin	31	Anti-rotating valve assy
4	Snap ring	18	O-ring	32	Plug
5	Cylinder roller bearing	19	O-ring	33	O-ring
6	Cylinder roller bearing	20	Valve plate	34	O-ring
7	Swash plate	21	Spring pin	35	Time delay valve assy
8	Cylinder block	22	O-ring	36	Level gauge assy
9	Spring	23	Valve casing	37	Hexagon socket head bolt
10	Ball guide	24	Check valve	38	Hexagon socket head bolt
11	Retainer plate	25	Spring	39	Plug
12	Piston assy	26	Plug	40	Name plate
13	Friction plate	27	O-ring	41	Rivet
14	Separate plate	28	Plug		

2) DISASSEMBLING

(1) Disassembly the sub of a turning axis

- ① Unloosing wrench bolt and disassemble time delay valve assy (35) from casing (1).



480L2SM10

- ② Disassemble level gauge (36) from casing (1).



480L2SM11

- ③ Hang buckles on valve casing (23) and unloose the bolt-hex (37, 38) from casing (1).



480L2SM12

- ④ Take springs (16) out of parking piston (15) and disassemble a parking piston (15) from casing (1) using a jig.



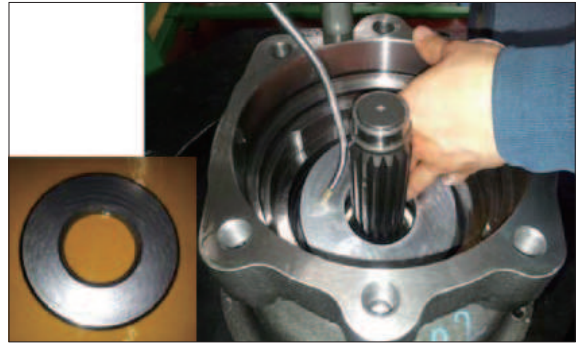
480L2SM13

- ⑤ Take cylinder block sub assy (8), friction plates (13), seperated plates (14) out of casing (1) in order.



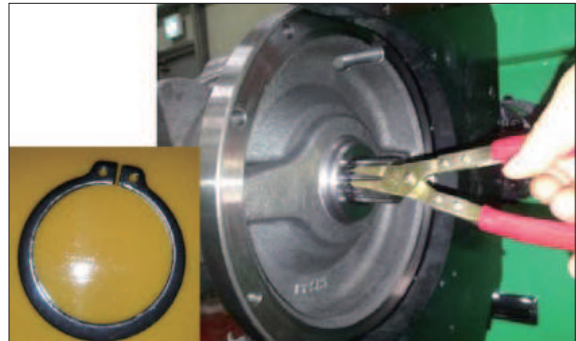
480L2SM14

- ⑥ Disassemble swash plate (7) from casing (1).



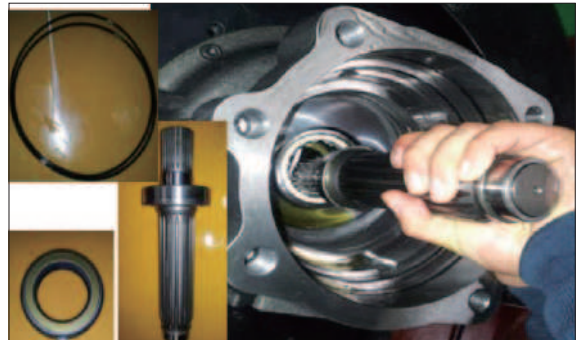
480L2SM15

- ⑦ Using a pair of pliers, take snap-ring out of casing (1).



480L2SM16

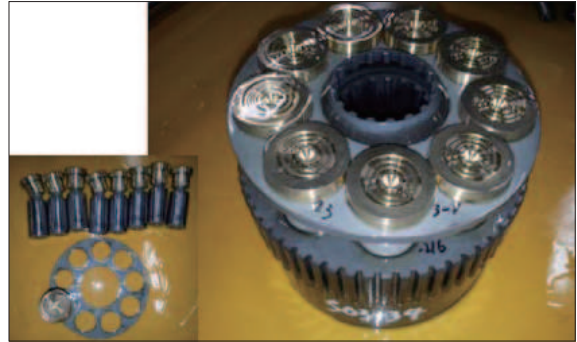
- ⑧ Disassemble shaft sub assy (3), oil seal (2), O-rings (18, 22) from casing (1).



480L2SM17

(2) Disassemble cylinder block assy

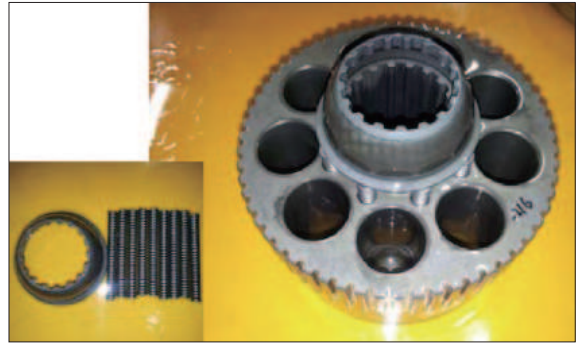
- ① Disassemble piston assy (12) from cylinder block assy (8).



480L2SM18

- ② Disassemble ball guide (10) and springs (9) (cylinder block) from cylinder block assy (8).

- Ball guide × 1EA
- Spring × 9EA



480L2SM19

(3) Disassemble valve casing assy

- ① Take pin spring (17, 21), valve plate (20), O-ring (22) out of valve casing (23) in order.



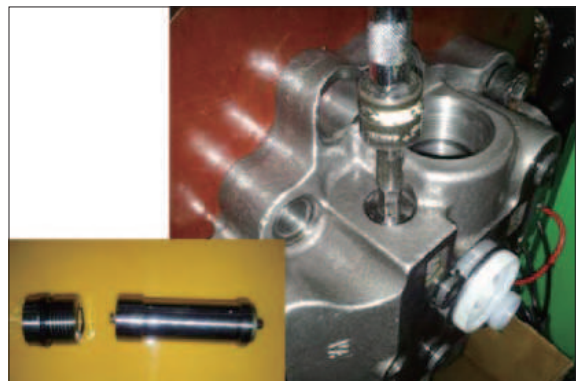
480L2SM20

- ② Using a torque wrench, disassemble relief valve (30) from valve casing (23).



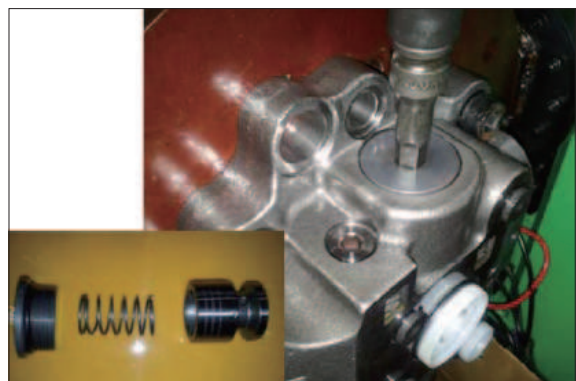
480L2SM21

- ③ Disassemble plug (32), O-rings (33, 34) and anti-rotating valves (31) from valve casing (23) in order with torque wrench.



480L2SM22

- ④ Disassemble plug (26), O-rings (27) and check valve (24) from casing in order with torque wrench.



480L2SM23

- ⑤ Disassemble plug (28), O-ring (29) from valve casing (23).



480L2SM24

3) ASSEMBLING

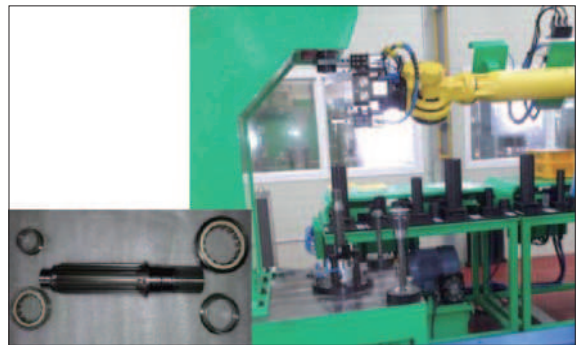
(1) Assemble the sub of a shaft assy

- ① Put bearing-cylinder roller on heating conveyor, inner bearings is being heated around 5 min (Temperature on conveyor : 120°C, 3~5 min)



480L2SM25

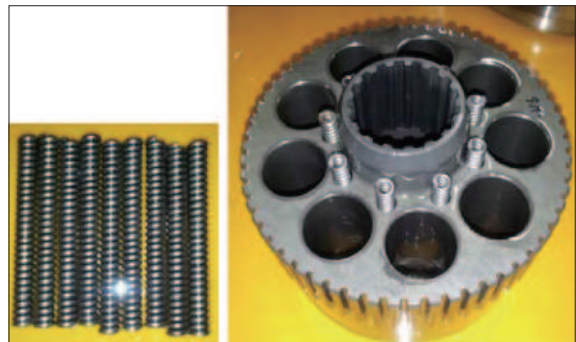
- ② Using robot M/C, heated inner bearing is assembled on shaft with pressure.



480L2SM26

(2) Assemble the sub of cylinder block assy

- ① Put springs (9, cylinder block) on holes of cylinder block.
 - Spring × 9EA



480L2SM27

- ② Put ball guide (10) on cylinder block (8).
 - Ball guide × 1EA



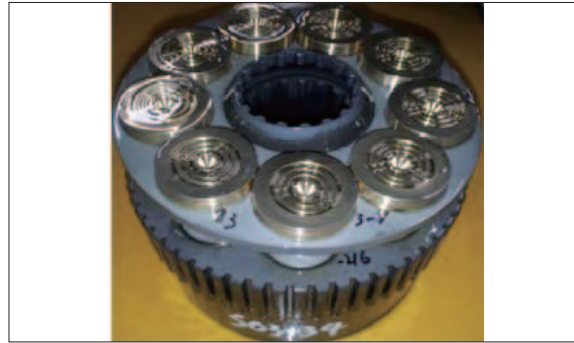
480L2SM28

- ③ Assemble piston assy (12) with retainer plate (11).
- Piston assy × 9EA
 - Retainer plate × 1EA



480L2SM29

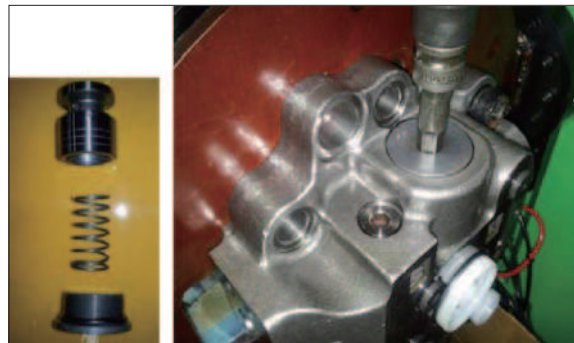
- ④ Put ② and ③ together as one.



480L2SM30

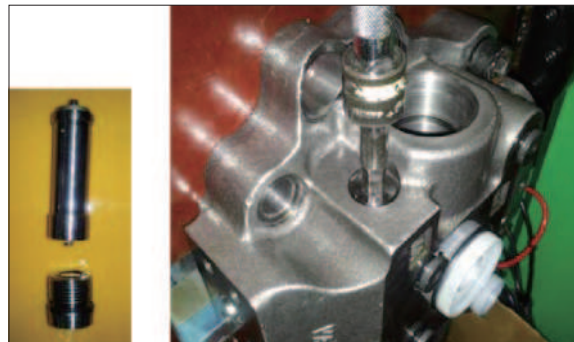
(3) Assemble the sub of valve casing assy

- ① Assemble the sub of check valve assy.
- Assemble check valve (24), spring (25), O-ring (27), and plug (26) into valve casing (23) in order.
- Check valve (24) × 2EA
 - Spring (25) × 2EA
 - Plug (26) × 2EA
 - O-ring (27) × 2EA



480L2SM31

- ② Assemble the sub of anti-rotating valve assy.
- Assemble anti-rotating valve (31), O-ring (33, 34), and plug (32) into valve casing (23) in order.
- Anti-rotating valve assy (31) × 2EA
 - Plug (32) × 2EA
 - O-ring (33, 34) × 2EA



480L2SM32

- ③ Assemble relief valve assy (30) 2set into valve casing (23) with torque wrench (bilateral symmetry assembling).
· Relief valve assy (30) × 2EA



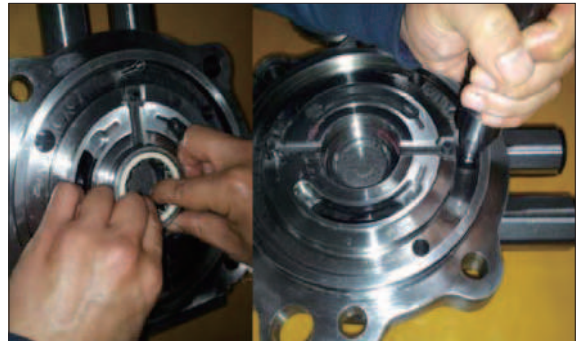
480L2SM33

- ④ Assemble plug (28) and O-ring (23) into valve casing with a torque wrench.
· Plug (28) × 3EA
· O-ring (27) × 3EA



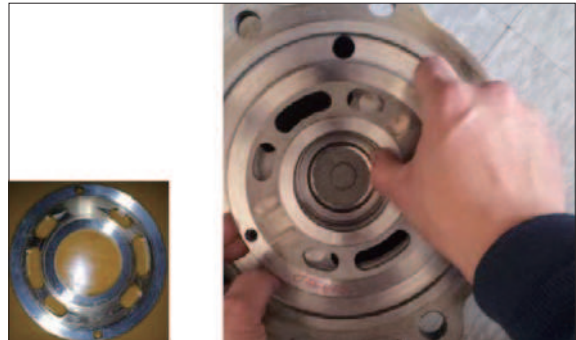
480L2SM34

- ⑤ After assembling needle bearing (6) into valve casing, assemble pin spring (17, 21).
· Needle bearing (6) × 1EA
· Pin spring (17, 21) × 1EA



480L2SM35

- ⑥ After applying grease on valve plate (20), attach it to valve casing (23).
· Valve plate (20) × 1EA



480L2SM36

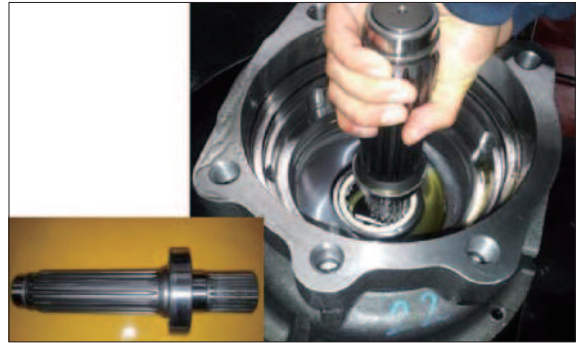
(4) Assemble the sub of moving axis

- ① Using jig and compressing tool, assemble oil seal into casing.
· Oil seal (2) × 1EA



480L2SM37

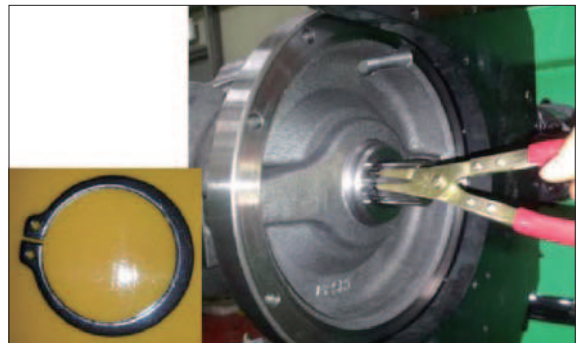
- ② Insert above shaft sub into casing (1) and assemble it with a jig.



480L2SM38

- ③ Fix snap ring (4) to shaft with a pair of plier jig.

- Snap ring × 1EA



480L2SM39

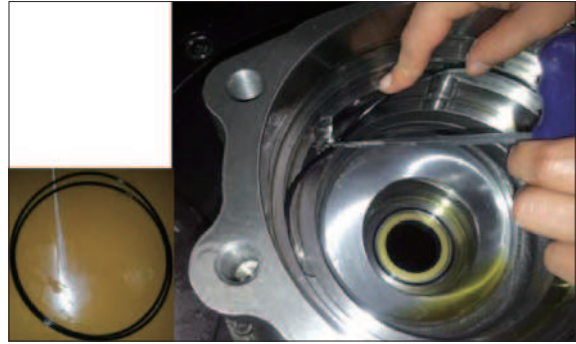
- ④ Apply grease on swash plate (7) and assemble it on the casing.

- Swash plate × 1EA



480L2SM40

- ⑤ Put O-ring (18, 19) into a casing.
- O-ring (18) × 1EA
 - O-ring (19) × 1EA



480L2SM41

- ⑥ Insert cylinder block assy (8) into casing (1).



480L2SM42

- ⑦ After assemble 4 set of seperated plates (14), friction plate (13) step by step into casing, put parking piston (15) with compressing tool.
- Seperated plate × 4EA
 - Friction plate × 4EA
 - Parking piston × 1EA



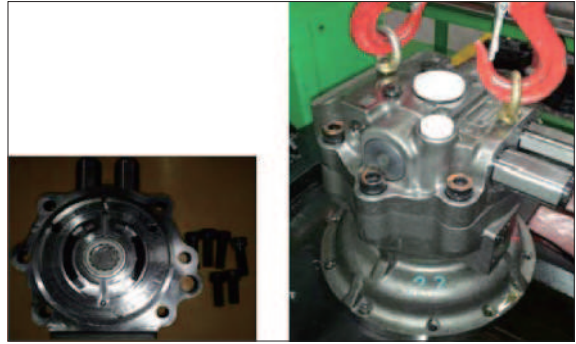
480L2SM43

- ⑧ After putting grease on contact surface of spring, assemble spring (16) into parking piston (15).
- Spring × 26EA



480L2SM44

- ⑨ After hang valve casing (23) on hook, assemble it on casing (1) gently, then , tighten hex bolt (37, 38) tightly.



480L2SM45

- ⑩ Assemble level gauge assy (36) and plug (39) into casing (1).



480L2SM46

- ⑪ After assembling time delay valve assy (35) into valve casing (23), tighten hex bolt (42).

- Time delay valve assy × 1EA
- Hex bolt × 3EA



480L2SM47

- ⑫ Air leak test

After putting assembled swing motor into test tank, excute the air leak test for 2 min at 2k.



480L2SM48

⑬ Leakage test

After putting assembled motor into bench tester, spraying the color check and be sure of leakage.



480L2SM49

⑭ Mount test bench

Mount assembled motor on bench tester, check the availability of each specified tests.



480L2SM50

3. REMOVAL AND INSTALL OF REDUCTION GEAR

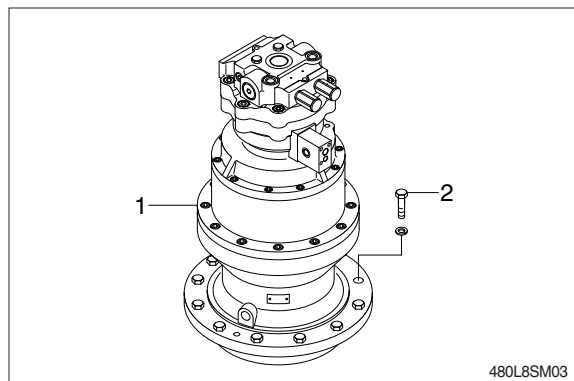
1) REMOVAL

- (1) Remove the swing motor assembly.
For details, see removal of swing motor assembly.
- (2) Sling reduction gear assembly (1) and remove mounting bolts (2).
- (3) Remove the reduction gear assembly.
 - Reduction gear device weight : 180 kgf · m
(396 lbf · ft)



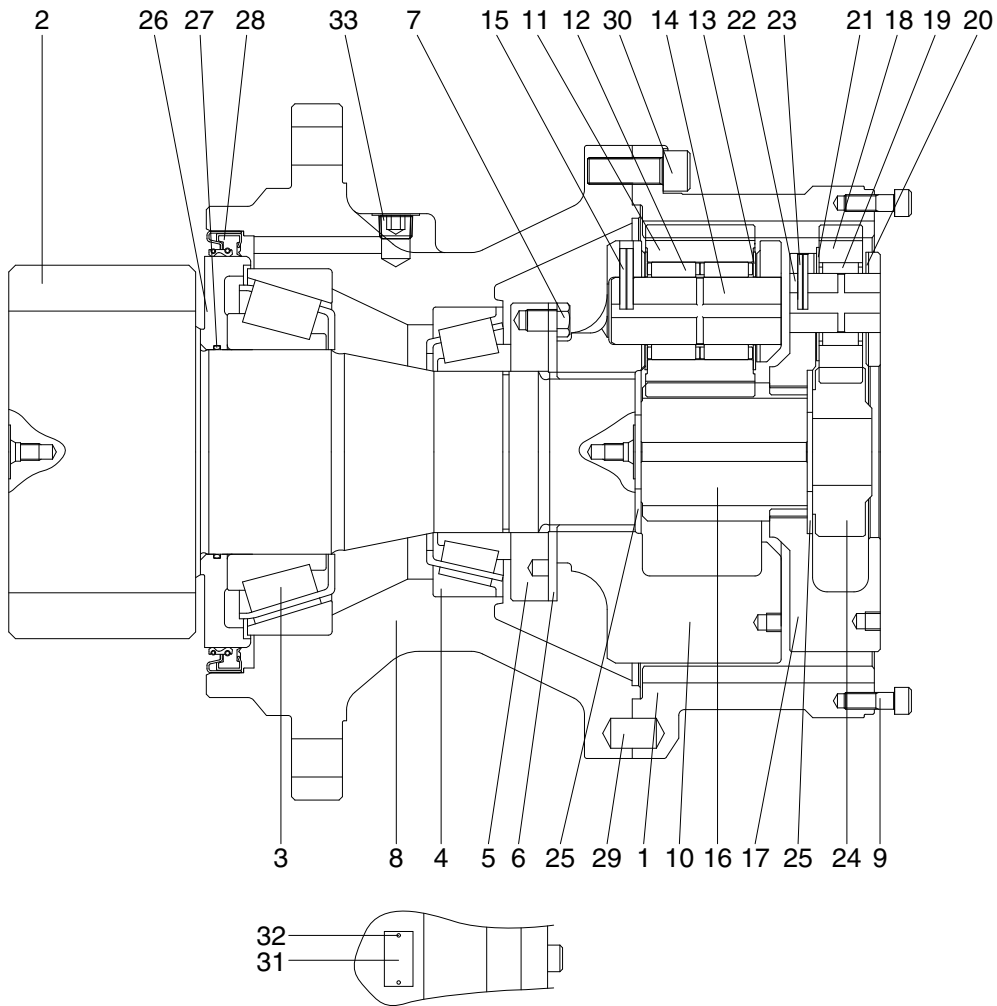
2) INSTALL

- (1) Carry out installation in the reverse order to removal.
 - Tightening torque : 57.9 ± 8.7 kgf · m
(419 ± 62.9 lbf · ft)



4. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) STRUCTURE



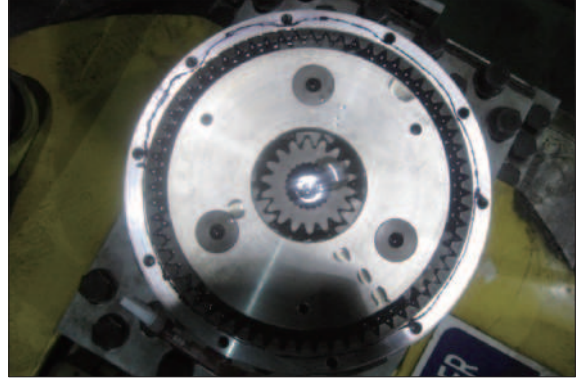
480F2SM03

1	Ring gear	12	Needle bearing No. 2	23	Spring pin No. 1
2	Drive shaft	13	Thrust washer No. 2	24	Sun gear No. 1
3	Taper bearing	14	Carrier pin No. 2	25	Thrust plate
4	Taper bearing	15	Spring pin No. 2	26	Sleeve
5	Ring nut	16	Sun gear No. 2	27	O-ring
6	Lock plate	17	Carrier No. 1	28	Oil seal
7	Hexagon head bolt	18	Planetary gear No. 1	29	Parallel pin
8	Casing	19	Needle bearing No. 1	30	Hexagon socket head bolt
9	Hexagon socket head bolt	20	Thrust washer No. 1-upper	31	Name plate
10	Carrier No. 2	21	Thrust washer No. 1-lower	32	Rivet
11	Planetary gear No. 2	22	Carrier pin No. 1	33	Plug

2) PREPARATION FOR DISASSEMBLING

- (1) The reduction units removed from excavator are usually covered with mud. Wash out side of unit and dry it.
- (2) Setting reduction unit on work stand for disassembling.
- (3) Mark for mating
Put marks on each mating parts when disassembling so as to reassemble correctly as before.

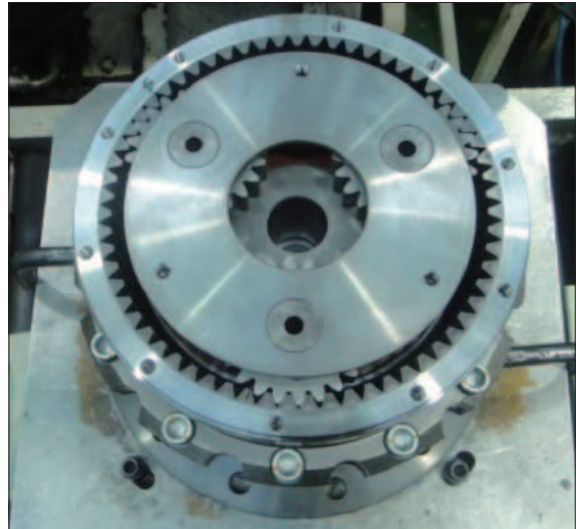
▲ Take great care not to pinch your hand between parts while disassembling not left fall parts on your foot while lifting them.



480L2SM51

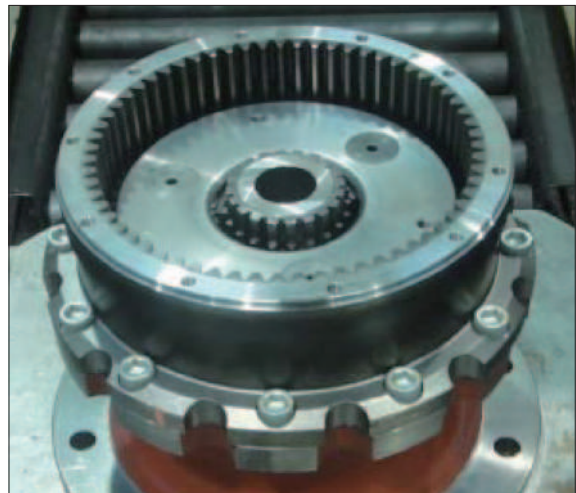
3) DISASSEMBLY

- (1) Remove every "socket bolt (M10)" that secure hydraulic motor and reduction gear.
- (2) Removing carrier sub assy & sun gear
 - ① Removing No.1 sun gear from No.1 carrier sub assy. (Be sure maintaining it vertical with ground when disassembling No.1 sun gear.)



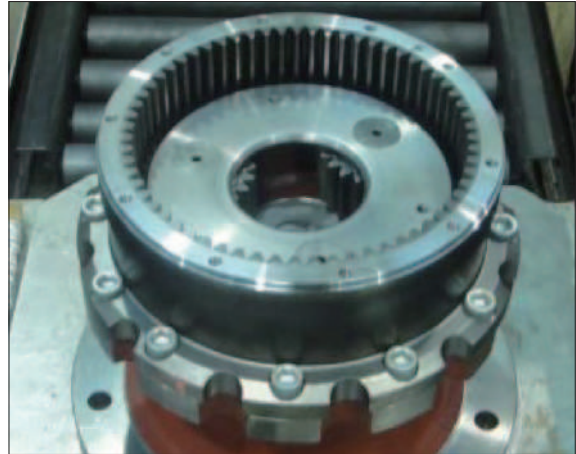
480L2SM52

- ② Removing No.1 carrier sub assy screwing I-bolt to tab hole (M10) in No.1 carrier. (Lifting it gradually maintaining it vertical with ground.)
- ※ It's impossible to disassemble No.1 pin spring. If No.1 pin spring has problem, change whole No.1 carrier sub assy .



480L2SM53

- ③ Removing No.2 sun gear from No.2 carrier sub assy. (Be sure maintaining it vertical with ground when disassembling No.2 sun gear.)



480L2SM54

- ④ Removing No.2 carrier sub assy screwing I-bolt to tab hole (M10) in No.2 carrier. (Lifting it gradually maintaining it vertical with ground.)
- ※ It's impossible to disassemble No.2 pin spring. If No.2 pin spring has problem, change whole No.2 carrier sub assy.



480L2SM55

(3) Removing ring gear

After unscrewing every socket bolt (M16),
remove ring gear from casing.

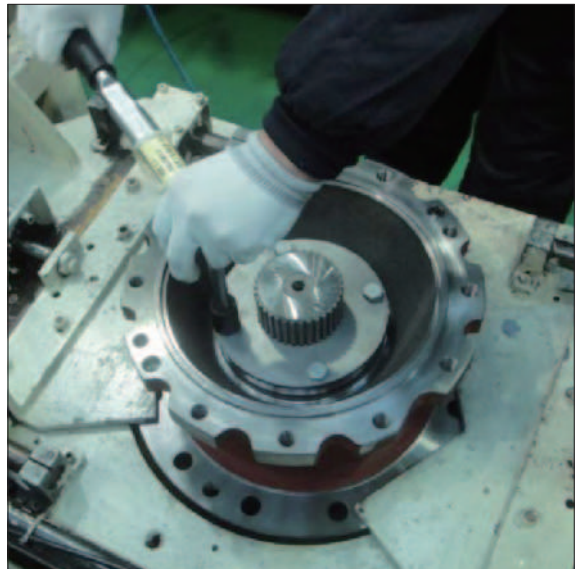
(Because of liquid gaskets between ring gear and casing, put sharp punch between ring gear and casing and tapping it to remove them.)



480L2SM56

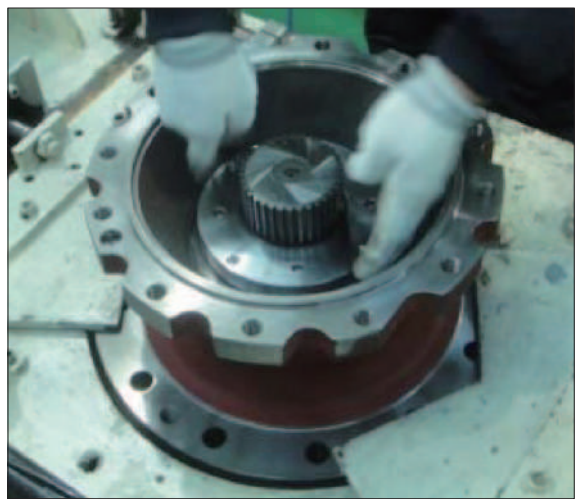
(4) Removing drive shaft sub assy

- ① Unscrew every hex head bolt (M12) to
remove lock plate.



480L2SM57

- ② Rolling nut ring for removing them from
drive shaft sub assy.
(Use special tool to roll nut ring to
counter clock wise.)



480L2SM58

- ③ Remove drive shaft sub assy from casing.
(Set a rack for flange of casing, and remove drive shaft sub assy from casing by using press.)

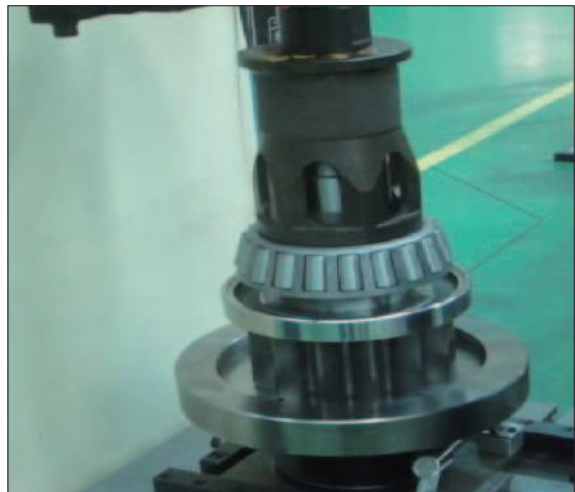


480L2SM59

- ④ Remove oil seal & bearing taper (small) from casing.
(Caution, do not re-use oil seal. It is impossible to disassemble drive shaft sub assy.)



480L2SM60



480L2SM61

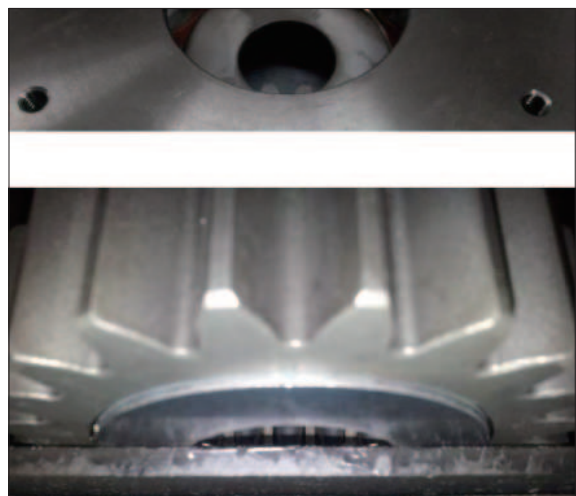
4) ASSEMBLY

(1) General notes

- ① Clean every part by kerosene and dry them in a cool and dry place.
- ② Loctite on surface must be removed by solvent.
- ③ Check every part for any abnormal.
- ④ Each hexagon socket head bolt should be used with loctite #242 applied on its threads.
- ⑤ Apply gear oil slightly on each part before assembling.
- ⑥ Take great care not to pinch your hand between parts or tools while assembling nor let fall parts on your foot while lifting them.
- ⑦ Inspection before assembling.
- ⑧ **Thrust washer**
 - Check the seizure, abnormal wear or uneven wear.
 - Check the unallowable wear.
- ⑨ **Gears**
 - Check the pitting or seizure on tooth surface.
 - Check the cracks on the root of tooth.
- ⑩ **Bearing**
 - Rotate it by hands to check such noise or uneven rotation.

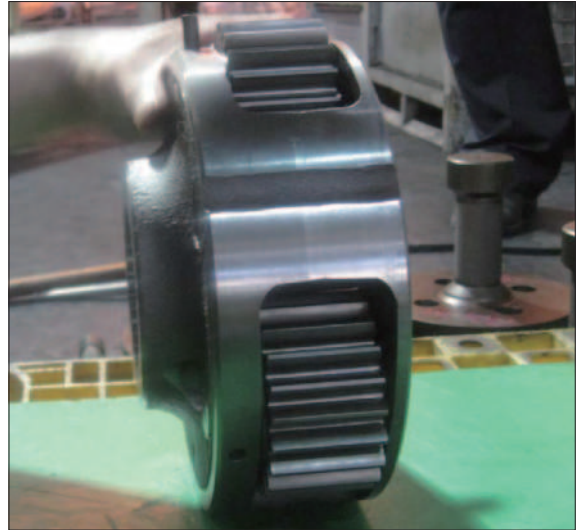
(2) Assembling No.1 carrier sub assy

- ① Put thrust plate firmly in No.1 carrier.
- ② After assembling No.1 needle bearing to No.1 planetary gear, put a pair of No.1 thrust washer on both sides of bearing and install them to No.1 carrier.



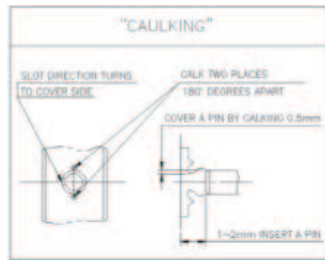
480L2SM62

- ③ Make No.1 pin spring pin hole and No.1 carrier's spring pin hole in line, press No.1 pin spring into the holes.
 (Make No.1 pin spring hole head for No.1 planetary gear.)

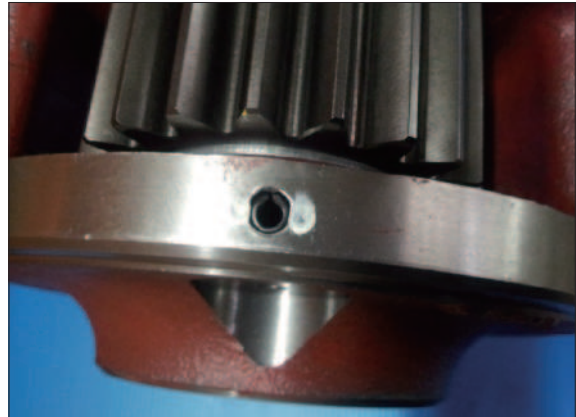


480L2SM63

- ④ Caulk carrier holes to make No.1 pin spring settle down stably.
 (Caution : Refer to “caulking details”)
 ※ Use paint marker for marking after caulking.



480L2SM64



480L2SM65

(3) Assembling No.2 carrier sub assy

- ① Put thrust plate in firmly No.2 carrier.



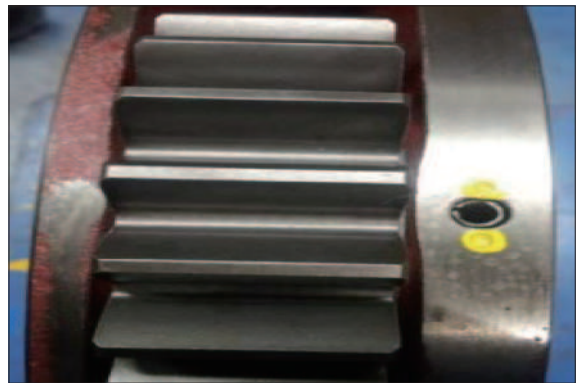
480L2SM66

- ② After assembling No.2 needle bearing to No.2 planetary gear, put 2 pieces of No.2 thrust washer on both sides of bearing and install them to No.2 carrier.



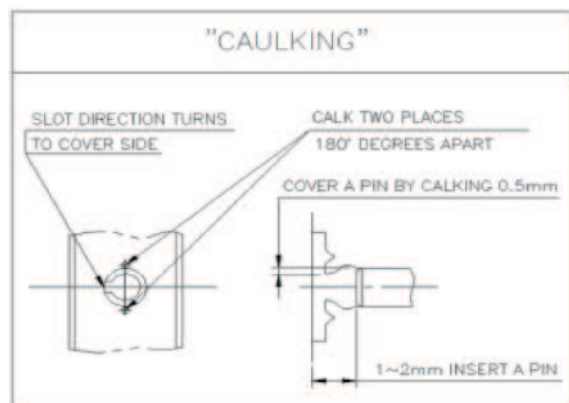
480L2SM67

- ③ Align No.2 pin spring hole and No.2 carrier spring pin hole, put No.2 pin spring into the holes.
(Make No.2 pin spring cutting line face to No.2 planetary gear.)



480L2SM68

- ④ Caulk carrier holes to make No.2 pin spring settle down stably.
(Caution : Refer to “caulking details”)
※ Use paint marker for marking after caulking.



480L2SM69

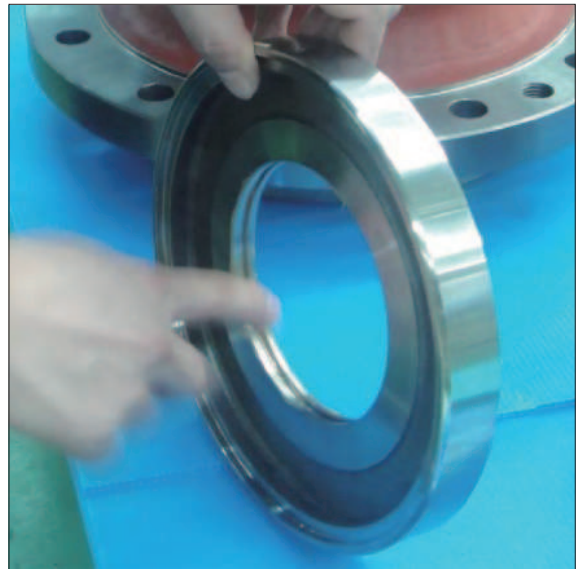
(4) Assembling pinion gear sub assy

- ① Prepare drive shaft pinion gear vertical with ground.



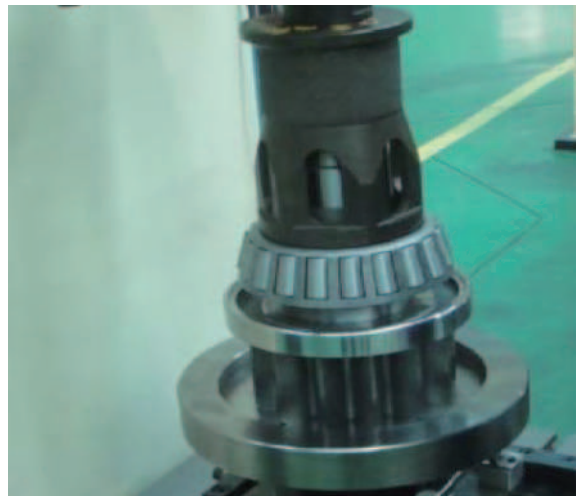
480L2SM70

- ② Fully apply grease (albania ep02) to sleeve's O-ring gutter.
(Be sure to maintain it vertical with ground when assembling it.)
- ③ Put O-ring into sleeve's O-ring gutter.
(Fully apply grease on O-ring.)



480L2SM71

- ④ Assemble bearing taper and sleeve into drive shaft using press jig.
(Use special jig for pressing. Leave no space between sleeve and bearing taper.)



480L2SM72



480L2SM73

(5) Assembling bearing cup & oil seal

- ① Put top, bottom bearing cup into casing.
(Use special jig for pressing. Pay attention to foreign materials while assembling bearing cup.)
- ※ Flip over casing to assemble oil seal.

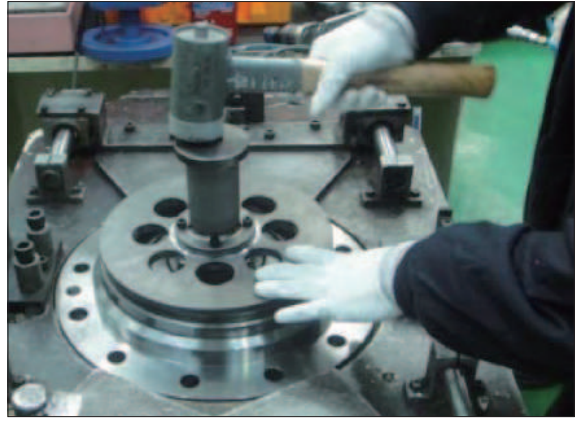


480L2SM74



480L2SM75

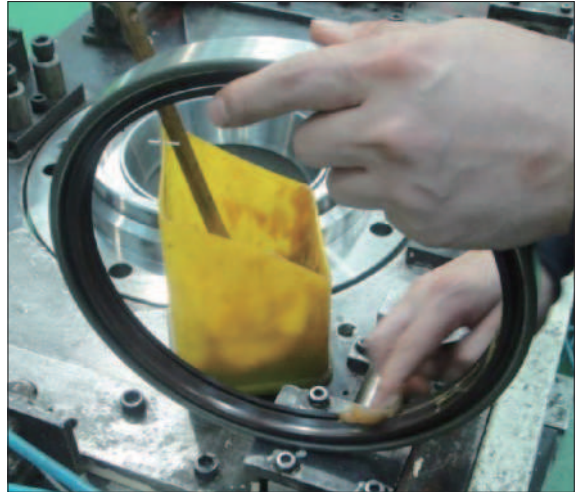
- ② Assemble oil seal to casing.
(Use special jig for pressing. Pay attention to direction of dust seal and dent.)



480L2SM76

While assembling oil seal

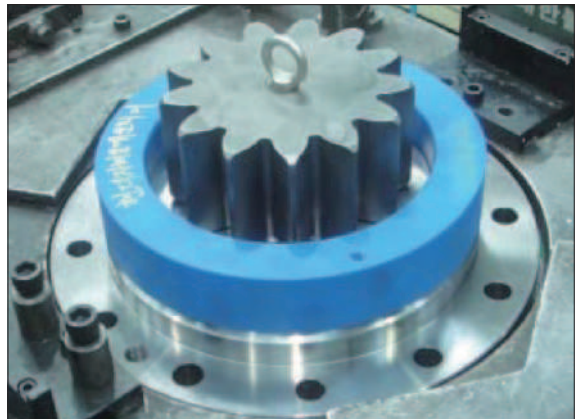
1. Be sure to set dust seal to gear oil.
2. Before assembling, charge enough grease in oil seal.
3. Before assembling, apply enough grease in and outside of oil seal.



480L2SM77

(6) Assembling shaft sub assy & nut ring

- ① After assembling casing & drive shaft sub assy, flip it over.



480L2SM78

- ② Put drive shaft sub assy into casing.
(Be sure to maintain it vertical with ground when assembling it.)



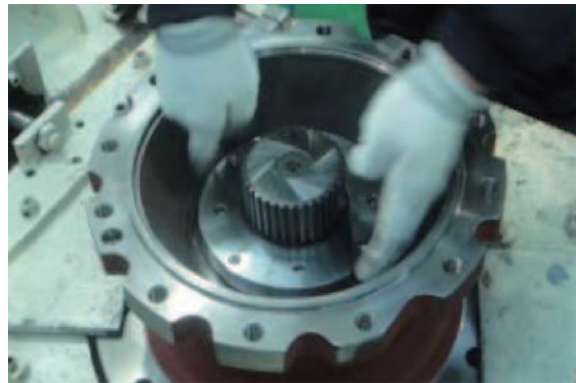
480L2SM79

- ③ Put bearing taper into it.
(Rotate bearing by hands for checking after assembly.)

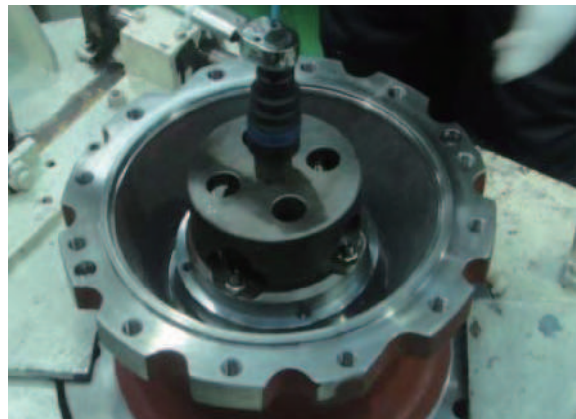


480L2SM80

- ④ Put nut ring into drive shaft sub assy by using special jig.
· M95 / The tightening torque :
 $3.5 \pm 0.4 \text{ kgf} \cdot \text{m}$ ($25.3 \pm 2.9 \text{ lbf} \cdot \text{ft}$)
※ Apply enough loctite #242 before screwing bolts.

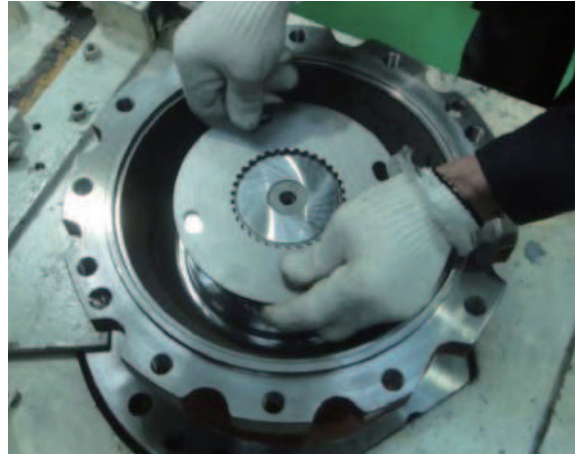


480L2SM81



480L2SM82

- ⑤ Align nut ring's bolt screw with lock plate's hole.
(In case of misalign between nut ring's bolt screw and lock plate's hole, put lock plate's hole as near as possible to nut ring's bolt screw and make it in line by increasing tightening torque.)

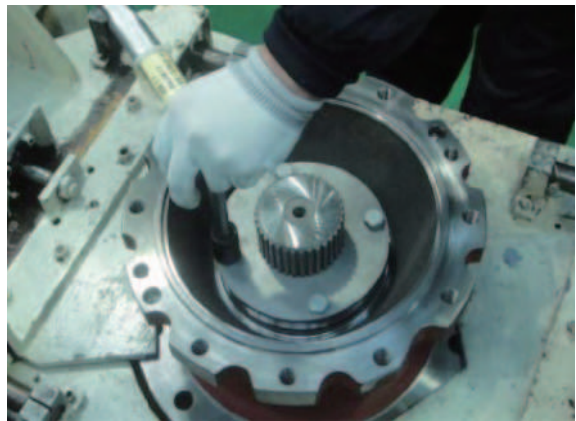


480L2SM83



480L2SM84

- ⑥ Screw 4 bolts (M12×16) to connect nut ring and lock plate by using torque wrench.
· 4-M12 / bolt = 12.9T
· The tightening torque :
 $8.8 \pm 0.9 \text{ kgf} \cdot \text{m}$ ($63.7 \pm 6.5 \text{ lbf} \cdot \text{ft}$)
※ Apply enough loctite #242 before screwing bolts.



480L2SM85

- ⑦ Use paint marker for checking surplus parts after assembling.



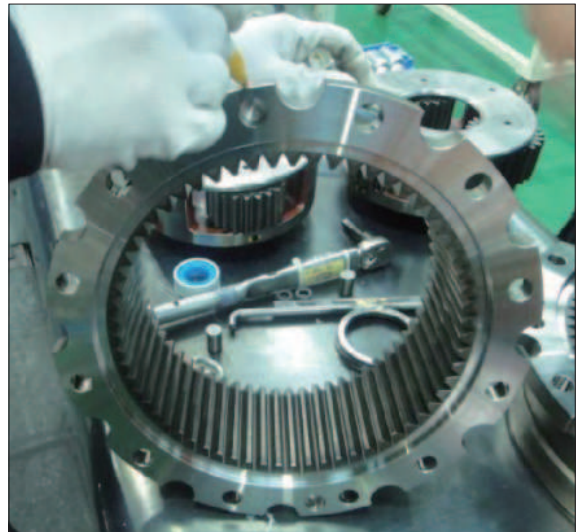
480L2SM86

(7) Assembling ring gear

- ① Apply loctite #515 bottom of casing sub assy contacting with ring gear without disconnection. (Refer to loctite detail)



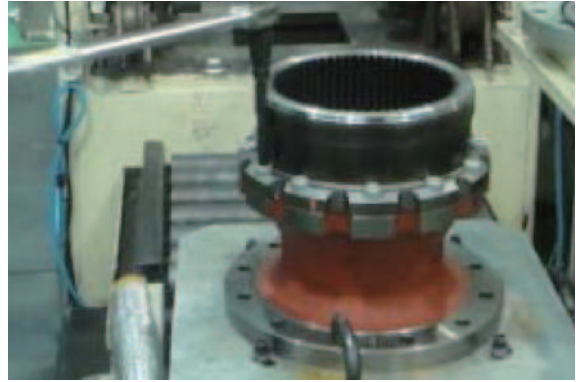
- ② Put pin parallel into casing sub assy hole. (Mark pin parallel position using paint marker.)



- ③ Align ring gear with pin parallel to put them into casing sub assy. (Be sure to maintain them vertical with ground while using press.)

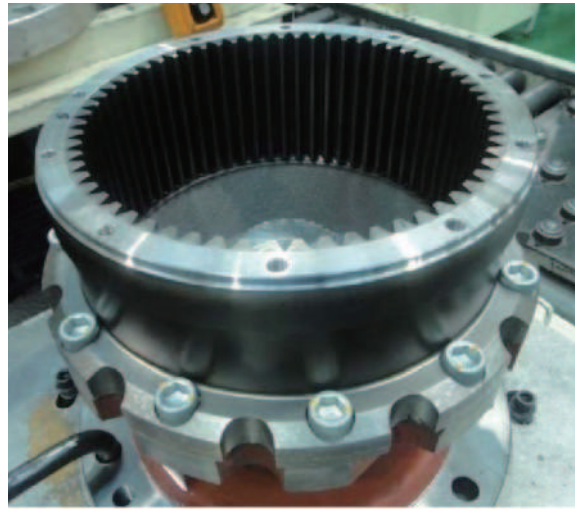


- ④ Screw 12 bolts (M16×45) to connect casing sub assy and ring gear (01) by using torque wrench.
- 12-M16 / bolt : 12.9T
 - Tightening torque : 27 ± 2.7 kgf · m
(195 ± 19.5 lbf · ft)
- ※ Apply enough loctite #242 before screwing bolts.



480L2SM91

- ⑤ Use paint marker for checking surplus parts after assembling.



480L2SM92

(8) Assembling carrier sub assy & sun gear

- ① Put No.2 carrier sub assy along drive shaft's spline.
 - Screw M10 I-bolt to No.2 carrier sub assy.
 - Lifting up No.2 carrier sub assy and align planetary gear and ring gear's tooth by rotating planetary gear by hands.
 - Rotate No.2 carrier sub assy by hands to fit No.2 carrier sub assy into drive shaft spline.



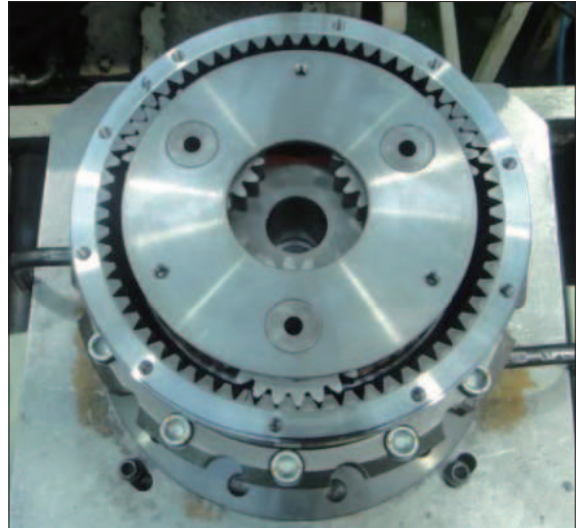
480L2SM93

- ② Put No.2 sun gear into No.2 carrier sub assy.



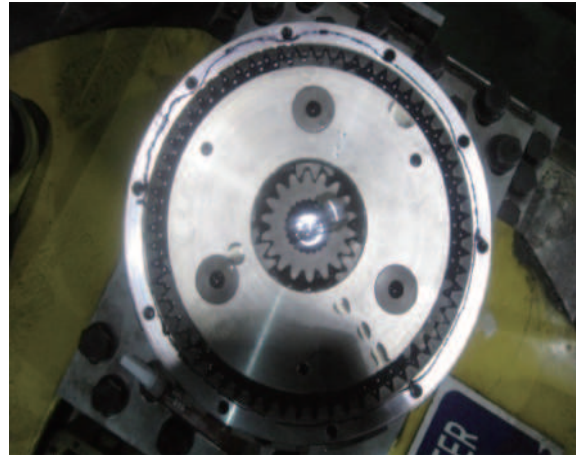
480L2SM94

- ③ Put No.1 carrier sub assy into No.2 sun gear along spline.
- Screw M10 I-bolt to No.1 carrier sub assy.
 - Lifting up No.1 carrier sub assy and align planetary gear and ring gear's tooth by rotating planetary gear by hands.
 - Rotate No.1 carrier sub assy by hands to fit No.1 carrier into No.2 sun gear spline.



480L2SM95

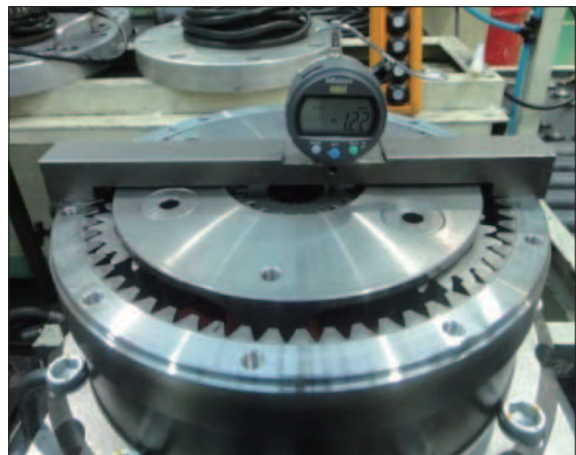
- ④ Put No.1 sun gear into No.1 carrier sub assy.
(Be sure to maintain it vertical with ground. And align with No.1 planetary gear spline.)
- ⑤ Rotate No.1 carrier sub assy by hands to check noise.



480L2SM96

(9) Measuring clearance & assembling name plate

- ① Check the clearance between ring gear and No.1 sun gear using a tool with dial gauge.
(Check the clearance / Dial gauge = -0.3 ~ +2.95)



480L2SM97