GROUP 6 TRAVEL DEVICE (TYPE 2)

1. REMOVAL AND INSTALL

1) REMOVAL

- Swing the work equipment 90° and lower it completely to the ground.
- (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) Remove the track shoe assembly.For details, see removal of track shoe assembly.
- (5) Remove the cover.
- (6) Remove the hoses.
- * Fit blind plugs to the disconnected hoses.
- (7) Remove the bolts and the sprocket.
- (8) Sling travel device assembly (1).
- (9) Remove the mounting bolts (2), then remove the travel device assembly.
 Weight : 440 kg (970 lb)

2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from the travel 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.





2. TRAVEL MOTOR

1) STRUCTURE (1/2)



82

13

14

26

41

O-ring

O-ring

Socket bolt

Valve plate pin

- 83 O-ring
 - 98 Name plate
 - 99 Rivet screw
- 500 Reducing valve
- 501 Cover

8-108



202 Drive shaft
203 Swash plate
204 Cylinder block
205 Piston
206 Shoe
207 Retainer plate

208 Thrust ball

210 Spring212 Piston213 Spring

214 Spring

- 215 Friction plate
- 216 Mating plate
- 230 O-ring

232 Oil seal233 O-ring236 Snap ring237 Snap ring

480H2TM03

- 249 Roller bearing
- 267 Pivot

8-109

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark		
Allen wrench	2		
	4 B		
	6		
	10		
	17		
Socket for socket wrench, spanner	19		
	22.4		
	41		
Torque wrench	Capable of tightening with the specified torques.		
Plier (For hole, TPR-90)	For snap ring (236)		
Plier (For shaft)	For snap ring (237)		
(-) Driver	-		
Plastic hammer	Wooden hammer allowed. Nominal 1 or so		
Steel rod approx	7×7×200mm, Bearing (50, 249)		
Monkey wrench	-		
Oil seal inserting jig	-		
Bearing plier	-		
Seal tape	-		

(2) Tightening torque

Part name	Item	Size	Torque		Wrench size	
			kgf ∙ m	lbf ∙ ft	in	mm
Socket bolt	14	M12×45	10	72.3	0.39	10
Socket bolt	43	M20×45	44	318	0.67	17
Plug	54	NPTF 1/16	1.0	72.3	0.16	4
Plug	45	PT 1/2	2.2	15.9	0.24	6
VP Plug	56	PF 1/4	3.7	26.8	0.75	19
Plug	52	PF 1/4	3.7	26.8	0.24	6
Plug	82	PF 1/2	11	79.6	0.39	10
Orifice	71	M4×0.7	0.36	2.6	0.08	2

3. TRAVEL REDUCTION GEAR

1) STRUCTURE



- 101 Spindle
- 102 Hub
- 103 Seat
- 105 Angular bearing
- 107 Socket bolt
- 108 O-ring
- 109 Piece
- 110 Coupling
- 111 Socket bolt
- 112 Thrust plate
- 113 Coupling
- 114 Ring gear
- 115 Snap ring
- 120 Carrier No. 3
- 121 Planetary gear No. 3

- 122 Needle bearing
- 123 Bushing
- 124 Shaft No. 3
- 125 Spring pin
- 126 Thrust washer
- 127 Spring pin
- 130 Carrier No. 2
- 131 Planetary gear No.2
- 132 Needle bearing
- 133 Shaft No.2
- 135 Thrust washer
- 140 Carrier No.1
- 141 Planetary gear No.1
- 142 Needle bearing
- 143 Ring

- 144 Plate
- 145 Snap ring
- 150 Sun gear No.3

480H2TM04

- 151 Thrust ring
- 152 Clip
- 160 Sun gear No.2
- 162 Clip
- 170 Drive gear
- 180 Cover
- 181 Thrust washer
- 182 Plug
- 183 O-ring
- 184 Thrust ring
- 185 Socket bolt

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark				
Allen wrench	10 B				
	17				
Torque wrench	Capable of tightening with the specified torques.				
Plier (for shaft)	Snap ring (145)				
Plier (for hole)	Snap ring (115)				
(-) Driver	For removing floating seal				
Plastic hammer	Wooden hammer allowed				
Eye bolt	M8, M16, M20, For lifting-up				
Press (1 ton)	Angular bearing (105)				
Tap M16	For removing screw lock in tapped holes				
Oil stone	For finishing mating faces				
Punch	For preventing spring pin from coming out				
Loctite	Socket bolt (107)				

(2) Tightening torque

Part name	Item	Size	Torque		Wrench size	
			kgf ∙ m	lbf ⋅ ft	inch	mm
Socket bolt	107	M20×90	50.3	364	17	0.67
	111	M16×35	25.7	186	14	0.55
Plug	182	PF 1/2	10	72.3	10	0.39
Set screw	185	M12×35	10.4	75.2	10	0.39

4. DISASSEMBLING

1) GENERAL PRECAUTIONS

- (1) Pay attention to not damaging contact surfaces for O-rings, oil seals, etc. and contact/sliding surfaces for gears, pins, bearings, etc.
- (2) This motor can be disassembled even in a state on the reduction gear.However, in that case, pay full attention to preventing mud, dust, etc. from entering in it.
- (3) The numerical in parentheses following each part name indicates its part number shown in the attached **assembly drawings.**
- (4) The piping side of the motor is referred to as the rear side, and the output side as the front side.

2) DISASSEMBLY OF REDUCTION GEAR

- (1) Select a disassembling place.
- * Select a clean place.
- * Spread rubber sheet or cloth on work bench to prevent parts from being damaged.
- (2) Remove dust, mud, etc. from reduction gear surfaces with washing oil or so.
- (3) Place reduction gear with its gear oil drain port or level gauge at the lowest position, and drain reduction gear oil.
- Receive gear oil with clean vessel and check it for abnormalities. Renew gear oil.
- (4) Place reduction gear with its side cover(180) upward, than remove socket bolt(185).
- * Don't reuse thrust washer (181) in cover.



- (5) Remove cover (180) from ring gear (114).
- Mount two eyebolt (PF 1/2), then lift it using crame.



(6) Remove drive gear (170).



370078TM02

- (7) Remove carrier 1 (140), together with planetary gears 1 (141), sun gear 2 (160), etc. fitted.
- 370078TM03

- (8) Remove snap ring (145), and then remove side plate (144), planetary gear 1 (141), needle cage (142).
- * If flaking is observed on the inner ring surface replace inner ring. In this case, replace planetary gear 1 and needle cage simultaneously.
- (9) Remove clip (162), and then remove carrier 1 (140) from sun gear 2 (160).





370078TM05

(10) Remove thrust ring (151).



370078TM06

- (11) Remove carrier 2 (130).
- Mount two eyebolt M16, then lift it using crane.



370078TM07

- (12) Remove spring pin (125), and shaft bearing 2 (133), from carrier 2 (130).
- Carry out the following check in advance.
 If any abnormality should be found, carry out disassembling.
- Is there any crevice, crack or pitting on tooth surface of planetary gear?
- When turning planetary gear lightly, is there any abnormal noise or eccentric clearance.
- (13) Remove planetary gear 2 (131), and needle bearing (132) from carrier 2 (130).







(14) Remove thrust ring (151) from sun gear(150), than remove clip (152) and remove carrier 2 (130) from sun gear 3 (150).

(15) Remove coupling (113) from drive shaft

(202).



480H8TM14



480H8TM15

- (16) Remove carrier 3 (120), with planetary gear 3 (121) that they are fitted. Then remove thrust plate (112).
- Mount two eyebolt M16, then lift it using crane.



480H8TM16

- (17) Remove spring pin (127) then remove shaft bearing 3 (124) from carrier 3.
- Remove shaft bearing 3 from carrier 3 rear.



(18) Remove planetary gear 4 (121), needle bearing (122), floating bush (123), thrust washer (126) from carrier 3.



480H8TM18

(19) Remove coupling (110), then distance piece.



480H8TM19

- (20) Remove subassembly with hub (102) and ring gear (114), then remove floating seal (103).
- * Mount two eyebolt (M12), then lift it using crane.



480H8TM20

(21) Remove socket bolt (107) then remove hub (102) and ring gear (114).



- (22) Remove angular bear (105, 2EA) from hub (102).
- * In case of removing bearing, exchange new angular bearing.



(23) As show right fiqure, remove angular bearing (105, 1EA) from hub (102).



(24) As show right figure, remove remained angular bearing (105) from hub (102).



3) DISASSEMBLY OF MOTOR

(1) Loosen reducing valve assy.



480H8TM25

(2) Loosen relief valve (RV1), (2ST).



480H8TM26



480H8TM27

through holes on rear flange.

(3) Remove plug (45, 2EA) then tight two $M10 \times 135L$ bolts with brake piston (212)

(4) Remove socket bolt (43, 8EA).



- (5) Remove it as lifting rear flange sub.
- * Please tight M20 eye bolt (1EA), lift rear flange sub using crane as a convenience.



(6) Remove socket bolt (M10 \times 135) then remove parking piston (212) and spring (213).



480H8TM30

(7) Remove spring (213) then remove timing plate (209).



480H8TM31

(8) Remove plug (56), then remove spring (66) and spool (65).



- (9) Remove socket bolt (14) and cover (12) then remove counter balance spool assy.
- * If any abnormality should be found, exchange new counter balance spool assy.



(10) Remove O-ring (233) (2EA).



480H8TM34





(11) Remove O-ring (230).



- (13) Remove friction plate (215, 4EA) and mating plate (216, 3EA).
- * In this case, motor should be located in horizontally.



- (14) Remove cylinder block kit.
- * In this case, motor should be located in horizontally.



480H8TM38

(15) Remove retainer (207) assembled piston assy from cylinder block (204).



480H8TM39

(16) Remove piston assy from retainer (207).



(17) Remove trust ball (208).



480H8TM41

(18) Remove cylinder block spring (214, 9EA).



480H8TM42

- (19) Remove swash plate (203).
- * In this case, motor should be located in horizontally.



480H8TM43





(21) Remove pivot (267, 2EA).



480H8TM45

- (22) Remove snap ring (236), and then hit front side end face of shaft (202) lightly with plastic hammer or so to remove from spindle (101).
- * As remove snap ring (236), use snap ring plier.
- (23) Remove snap ring (237), then remove roller bearing (249).
- * Use snap ring plier.



480H8TM46



480H8TM47

- (24) Remove oil seal (232) from spindle (101).
- * Do not reuse the disassembling oil seal (232). As reassembly, use new oil seal.



Remove the oil seal (232) by hammering from the spindle (101) at the circumference of the oil seal (232) using (-) driver.



That is all of disassembling work. The pins (41) force-fitted to the valve casing cannot be removed.

5. ASSEMBLING

1) GENERAL CAUTIONS

(1) Clean each part fully with washing oil and dry it by blasting compressed air. It is better not to use waste cloths as much as possible.

However, if they are to be used, use clean ones, and pay attention to not leaving lint and so on. Don't clean the friction plate with washing oil without fail.

- (2) Use the torque wrench in tightening fitting screws and plugs to their respective torque shown in page 8-72, 8-74.
- (3) When hammering is required, use the plastic hammer and try to hit parts lightly.
- (4) Similarly to the disassembling procedures, the numeral in parentheses following each part name indicates its item number shown in the attached assembly drawings.

2) ASSEMBLY OF REDUCTION GEAR

(1) Assemble side plate E (144) and inner race (143) to carrier 1 (140).



480H8TM50

(2) Assemble needle bearing (142).



480H8TM51

(3) Assemble sun gear 2 to carrier 1 and fit clip (162).



(4) Assemble planetary gear 1 (141) and side plate (144).



480H8TM53

(5) Assemble snap ring (145) using snap ring plier.



480H8TM54

(6) Assemble sun gear 3 (150) to carrier 2 and fit clip (152).



480H8TM55

(7) Assemble thrust washer (135) and needle bearing (132), thrust washer (136) to planetary gear 2 (131).



(8) Assemble sub assy assembled in the above process and shaft bearing 2 (133).



480H8TM57

- (9) Insert spring pin (125) into pin holes of carrier 2 (130).
- * Mate pin of carrier 2 (130) with center of shaft bearing.



480H8TM58

(10) Assemble needle bearing (122) and floating bush (123) into inside of planetary gear 3 (121) and insert them into carrier 3 (120) holding them between thrust washer (126).



(11) Insert shaft bearing 3 (124).



- (12) Insert spring pin (127) into pin holes of carrier 3 (120).
- Mate pin of carrier 3 (120) with center of shaft bearing.



480H8TM61

(13) Assemble angular bearing (105) to hub (102).



480H8TM62

(14) Assemble angular bearing (105) in other side of hub (102).



480H8TM63

- (15) Assemble hub (102) into ring gear (114) then tighten socket bolt (107) to specified torque to fix hub.
- ※ Tightening torque Socket bolt (107) : 50.3 kgf ⋅ m (364 lbf ⋅ ft)



(16) Assemble hub (102) and ring gear (114) assy to spindle (101).



480H8TM65

- (17) Steps 1 through 4 of the original assembling procedure must be carried out as directed.
 - Mount a measure plate on the spindle without inserting a distance piece.
 - ② Tighten socket bolt (111) lightly.
 - ③ As shown in the diagram at right, measure dimension "A" using depth micrometer.
 - ④ As shown in the diagram at right, measure dimension "C" of coupling (B) (110) to be mounted.
 - ⑤ Using the clearance measurements calculate the appropriate distance piece (109) thickness as follows.
 - a. Measure the clearance between the edge of the spindle (101) and that of the ball bearing (105).
 Take this clearance as "X"
 - "X" = "A" "B"
 - b. Next, determine the distance piece (109) of the appropriate thickness. Take this thickness as "T" "T" = ("C" - "X") \pm 0.1
 - ⑥ Using the results the of step (1) through(5) above, select the appropriate thickness from 9 types.



480H8TM66







- (18) Tighten to specified torque socket bolt (111) to coupling B (110).
- Tightening torque socket bolt (111) : 25.7 kgf · m (186 lbf · ft)



480H8TM69

- (19) Mount thrust plate R (112) to spindle(101), and then assemble carrier 3 subassembly to ring gear (114).
- Mount two eyebolt (M16), then assemble it using crane.



480H8TM70

(20) Assemble coupling (113) to drive shaft (202).



480H8TM71

- (21) Assemble carrier 2 sub-assembly to ring gear (114).
- Mount two eyebolt (M16), then assemble it using crane.



(22) Assemble carrier 1 sub assembly to ring gear (114).Assemble thrust ring 90 (151).



480H8TM73





480H8TM74



480H8TM75

(25) Apply sealant to the ring gear (114) after installing with the cover.

(24) Assemble thrust washer M (181) to cover

(180) using plastic hammer.

Mount two eyebolt (PF 1/2), then assemble it using crane.



- (26) Assemble socket bolt (185) to cover (180).
- ※ Tightening torque Socket bolt (185) : 10.4 kgf ⋅ m (75.2 lbf ⋅ ft)



480H8TM77

(27) Injection reduction gear oil.

* Injected reduction gear oil :

Approximately 10.0 l



480H8TM78

- (28) Tighten plug (182) to reduction gear oil inlets.
- Tightening torque
 Plug (182) : 10 kgf · m
 (72.3 lbf · ft)



2) ASSEMBLY OF MOTOR

- (1) Tighten plugs (54, 7EA) into rear flange(1) with specified torque.
- * Tightening torque Plug (54) : 1 kgf · m (7.2 lbf · tf)



480H8TM80

- (2) Tighten plugs (56, 2EA) into rear flange(1) with specified torque.
- * Tightening torquePlug (56) : 3.7 kgf · m (26.7 lbf · tf)





480H8TM81



(4) Tighten plug (82) into rear flange (1) with specified torque.

* Tightening torque Plug (82) : 11 kgf · m (80 lbf · ft)



(5) Assemble steel ball (68).



480H8TM84

- (6) Tighten plugs (52) into rear flange (1) with specified torque.
- * Tightening torque Plug (52) : 3.7 kgf · m (27 lbf · ft)



480H8TM85

- (7) Tighten orifice (71) into rear flange (1) with specified torque.
- * Tightening torque Orifice (71) : 0.36 kgf · m (2.6 lbf · ft)



(8) Assemble counterbalance spool (2).



(9) Assemble washer (7) into rear flange (1).



18048

(10) Assemble O-ring (13) (P44).



480H8TM89

(11) Assemble main spring (6).



(12) Assemble counter balance spool (2), washer (7), main spring (6), seat (8) in the order named.



- (13) Fix cover (12) by tightening socket bolt (14).
- * Tightening torque Socket bolt (14) : 10 kgf · m (72.3 lbf · ft)

(14) Interference-fit pin (41).



480H8TM92

480H8TM93





* It isn't necessary when needle bearing was disassembled from the rear flange.



- (16) Assemble timing plate (209) to gear flange (1) sub-assembly.
- * Apply grease on timing plate rear flange surface and pay attention to not dropping timing plate.



(17) Assemble O-ring (26) (WG51) to rear flange (1) sub-assembly.



480H8TM96

- (18) Assemble brake spring (213) (14EA) to rear flange (1) sub-assembly.
- * Apply grease on spring and pay attention to not dropping spring.



480H8TM97

- (19) Assembly orifice (71) to piston (parking) (212).
- * Tightening torque : 0.36 kgf · m (0.3 lbf · ft)



- (20) Screw two $M10 \times 135$ bolts on the holes for compelling brake release. Sub-assembly (rear flange & piston (parking)).
- * After finishing assembly, two M10×135 (2EA) bolts will be removed.



(21) Assemble cylinder spring (214, 9EA) to cylinder block (204).



480H8TM100

(22) Assemble thrust ball (208) to cylinder block (204).



480H8TM101

(23) Put piston (261), shoe (262) subassembly (9EA) to retainer plate (207).



(24) Assemble retainer plate assembly to cylinder block (204).



- (25) Put roller bearing (249) on drive shaft (202), and assemble snap ring (236) by using the plier.
- * Pay attention to not damaging oil seal sliding area of driving shaft.
- * Pay attention to not fitting snap ring the other way around.
- (26) Interference-fit oil seal (232) into spindle (101) by special tool.

(27) Assemble drive shaft (202) to spindle (101), and assemble snap ring (236) by



480H8TM104



480H8TM105



480H8TM106



using the plier.



(29) Assemble two speed piston (261), shoe (262) assy.



480H8TM108

- (30) Apply grease on sliding area of swash plate (203) rear surface and then assemble swash plate (203) to spindle (101).
- * Confirm with finger tips of both hands whether swash plate moves smoothly.
- (31) Assemble cylinder block sub-assembly (CB1) to spindle (101).
- * Apply working fluid to the swash plate (203) thinly.



480H8TM109



480H8TM110

- (32) Assemble mating plate (216, 3EA) and friction plate (215, 4EA) into cylinder block (204).
- * Ortehr:



- (33) Assemble O-ring (233) (P8) into spindle (101).
- Do not reuse the disassembling O-ring (233).



- (34) Assemble O-ring (231) (WG48) into spindle (101).
- Do not reuse the disassembling O-ring (231).



480H8TM113

- (35) Assemble O-ring (230) (WG52) into spindle (101).
- Do not reuse the disassembling O-ring (230).



480H8TM114

- (36) Tighten socket bolt (43) (8EA) to rear flange (1).
- Apply grease on roller of needle bearing (50) in rear flange (1).
 Tightening torque : Socket bolt (43) : 44 kgf · m (318 lbf · ft)



480H8TM115

- (37) Disassemble socket bolt $(M10 \times 135)$ on the holes for compelling brake release. And then assemble plug (45, 2EA).
- * Tightening torque : Plug (45) : 2.2 kgf · m (15.9 lbf · ft)



- (38) Tighten to specified torque relief valve (RV1) (2 set) to rear flange sub-assembly.
 - Tightening torque : Relief valve (RV1) : 25 kgf · m (181 lbf · ft)



480H8TM117

- (39) Tighten to specified torque reducing valve (500) (1 set) to rear flange sub-assembly.
- Tightening torque
 Reducing valve (500) :
 - 4.5 kgf \cdot m (32.5 lbf \cdot ft)



480H8TM25

(40) Assemble reducing valve cover (501) to rear flange sub-assembly.

