CEBM012502

Shop Manual

GALEO

PC400LC-7L

HYDRAULIC EXCAVATOR

SERIAL NUMBERS **PC400LC-7L** **A86001** and UP

CONTENTS

SAFETY

SAFETY NOTICE

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine. The service and repair techniques recommended and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed for the purpose.

To prevent injury to workers, the symbols ⚠ and ⚠ are used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the OPERATION & MAINTENANCE MANUAL carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.

2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
- Always wear safety glasses when hitting parts with a hammer.
- Always wear safety glasses when grinding parts with a grinder, etc.

3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.

4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.

5. Keep all tools in good condition and learn the correct way to use them.

6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.

PREPARATIONS FOR WORK

1. Before adding oil or making repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.

2. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.

3. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.

4. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

PRECAUTIONS DURING WORK

1. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out. Before disconnecting or removing components of the oil, water or air circuits, first remove the pressure completely from the circuit.

2. The water and oil in the circuits are hot when the engine is stopped, so be careful not to get burned. Wait for the oil and water to cool before carrying out any work on the oil or water circuits.

3. Before starting work, remove the leads from the battery. ALWAYS remove the lead from the negative (-) terminal first.

4. When raising heavy components, use a hoist or crane. Check that the wire rope, chains and hooks are free from damage. Always use lifting equipment which has ample capacity. Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.

5. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.

6. When removing components, be careful not to break or damage the wiring, Damaged wiring may cause electrical fires.

7. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips on to the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.

8. As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts.

9. Be sure to assemble all parts again in their original places. Replace any damaged part with new parts.
   - When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.

10. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also check that connecting parts are correctly installed.

11. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.

12. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.

13. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.

14. Take care when removing or installing the tracks of track-type machines. When removing the track, the track separates suddenly, so never let anyone stand at either end of the track.

GENERAL

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following sections. These sections are further divided into each main group of components.

GENERAL

This section lists the general machine dimensions, performance specifications, component weights, and fuel, coolant and lubricant specification charts.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

TESTING, ADJUSTING AND TROUBLESHOOTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs. Troubleshooting charts correlating “Problems” to “Causes” are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

NOTICE

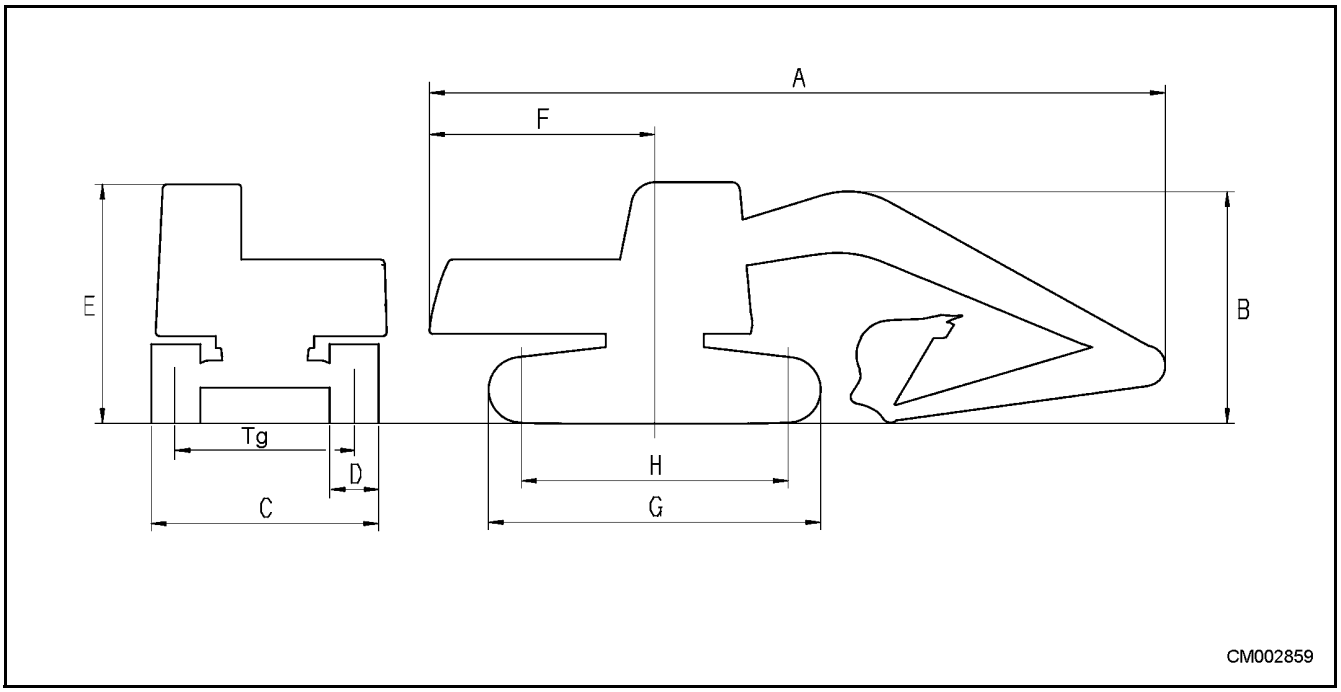
The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your distributor for the latest information.

01 GENERAL

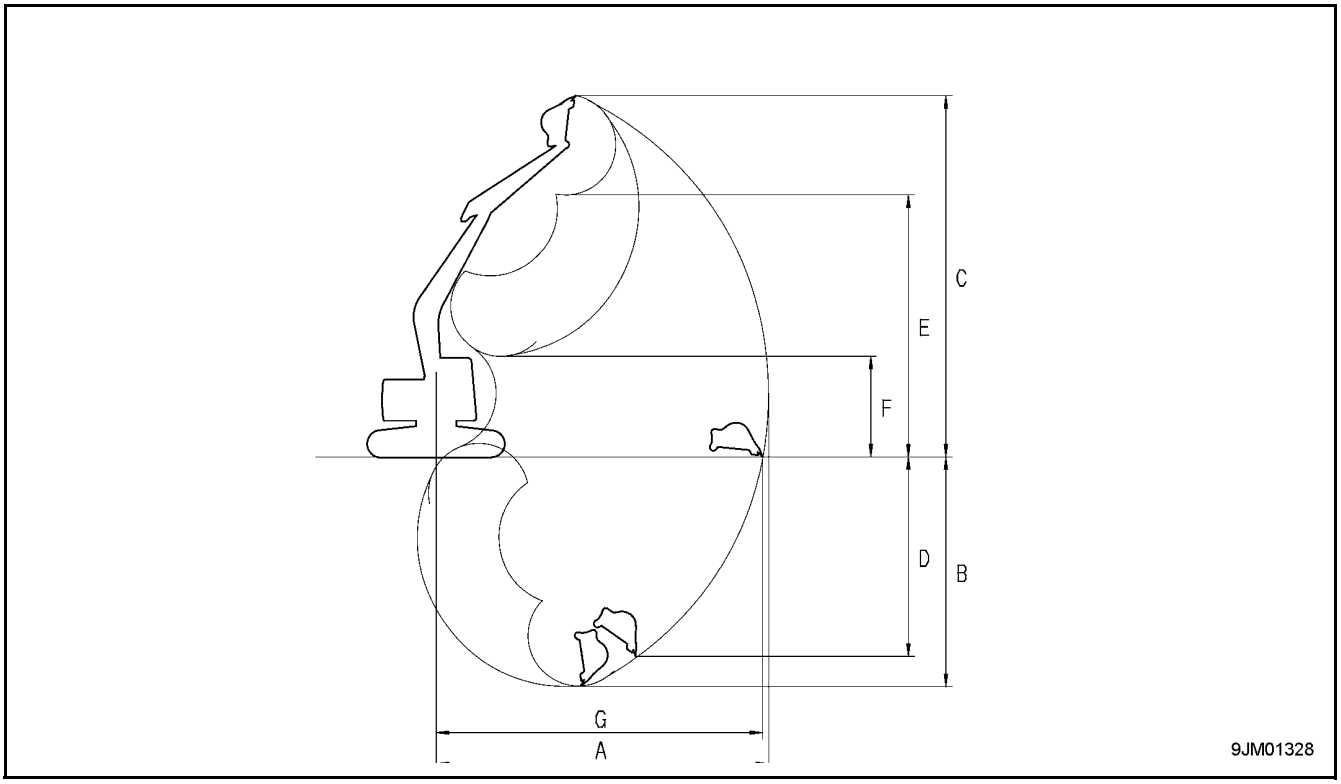
SPECIFICATIONS

	Item	Unit	PC400LC-7L
	Operating weight (Variable gauge specification)	kg (lb)	44,600 (98,343)
	Operating weight (Fixed gauge specification)		43,700 (96,359)
	Operating weight		43,700 (96,359)
	Bucket capacity	m3 (cu.yd)	1.9 (2.5)
	Name of engine	-	KOMATSU SAA6D125E-3 diesel engine
	Rated horsepower of engine	kW (HP)/rpm	246(330) /1,850
A	Overall length	mm (ft in)	12,040 (39' 6“)
B	Overall height	mm (ft in)	3,670 (12')
C	Overall width (Variable gauge specification)	mm (ft in)	3,690 (12' 1.2“)
C	Overall width (Fixed gauge specification)		3,640 (11' 11.3“)
D	Track shoe width (Variable gauge)	mm (ft in)	800 (2' 7.5“)
D	Track shoe width (Fixed gauge)	mm (ft in)	900 (2' 11.4“)
E	Height of cab	mm (ft in)	3,250 (10' 8“)
F	Radius of upper structure	mm (ft in)	3,645 (11' 12“)
G	Overall length of track	mm (ft in)	5,355 (17’ 7“)
H	Length of track on ground	mm (ft in)	4,350 (14' 3“)
	Min. ground clearance	mm (ft in)	685 (2' 3“)
	Traveling speed (low/middle/high)	km/h (MPH)	3.0/4.4/5.5 (1.9/2.7/3.4)
	Swing speed	rpm	9.1
Tg	Track gage	F/G V/G	2740 2890
Tg	(for transport)	F/G V/G	--- 2392

- "Variable gauge specification" means the machine can extend and retract overall width (C) of the track frame.
  "Fixed gauge specification" means the machine cannot extend or retract overall width (C) of the track frame.



	Working ranges	Unit	PC400LC-7
A	Max. digging reach	mm (ft in)	12,030 (39' 6“)
B	Max. digging depth	mm (ft in)	7,830 (25' 8“)
C	Max. digging height	mm (ft in)	10,930 (35' 10“)
D	Max. vertical wall digging depth	mm (ft in)	6,870 (22' 6“)
E	Max. dumping height	mm (ft in)	7,625 (25')
F	Min. dump height	mm (ft in)	-
G	Max. digging reached at ground level	mm (ft in)	11,820 (38' 9“)



Machine model			PC400LC-7L	
Serial Number			A86001 and UP	
Bucket capacity		m^3 yd^3	1.4 1.83	
Weight of machine		kg lb	Fixed gauge spec. 43,700 96,342	Variable gauge spec. 44,600 98,326
Performance	Max. digging force	kgf (lbf)	26,100 (57,541)	
	(using power max. function)	kgf (lbf)	28,000 (61,729)	
	Swing speed	rpm	9.1	
	Swing max. slope angle	deg.	20	
	Travel speed	km/h (mi/h)	Lo: 3.0 (0.00186), Mi: 4.4 (0.00273), Hi: 5.5 (0.00341)	
	Gradeability	deg.	35	
	Ground pressure	kg/cm^2 (lbf/ft^2)	0.82 (11.66)	0.67 (9.52)
	(standard shoe width)	mm (in)	900 (35.4)	800 (31.5)
Dimensions	Overall length (for transport)	mm (ft in)	12,040 (39’ 6")	12,040 (39’ 6")
	Overall width		3,640 (11’ 11")	3,690 (12’ 1")
	Overall width of track (for transport)		---	3,192 (10’ 6")
	Overall width of track when extended		---	3,690 (12’ 1")
	Overall height (for transport)		3,635 (11’ 11")	3,635 (11’ 11")
	Overall height to top of machine		3,265 (10’ 9")	3,265 (10’ 9")
	Ground clearance of upper structure		1,320 (4’ 4")	1,320 (4’ 4")
	Min. ground clearance		555 (1’ 10")	685 (2’ 3")
	Tail swing radius		3,645 (12’ 0")	3,645 (12’ 0")
	Min. swing radius of work equipment		4,735 (15’ 6")	4,735 (15’ 6")
	Height of work equipment at min. swing radius		9,210 (30’ 3")	9,210 (30’ 3")
	Length of track on ground		4,020 (13’ 2")	4,020 (13’ 2")
	Track gauge (Tg)		2,740 (9’ 0’)	2,890 (9’ 6")
	Track gauge (for transport)		---	2,392 (7’ 10")
	Height of machine cab		3,265 (10’ 9")	3,265 (10’ 9")
Engine	Model		SAA6D125E-3	
	Type		4-cycle, water-cooled, in-line, vertical, direct injection, with turbocharger and aftercooler	
	No. of cylinders - bore x stroke	mm (in)	6 - 125x150 (6 - 4.921x5.905)	
	Piston displacement	L (in^3)	11.045 (674.007)	
	Performance: Flywheel horsepower	kW/rpm (HP/rpm)	246.4/1,850 (330/1,850)	
	Performance: Max. torque	kgm/rpm (lbf ft/rpm)	136/1,400 (983.9/rpm)	
	Performance: Max. speed at no load	rpm	1,930	
	Performance: Min. speed at no load	rpm	1,000	
	Performance: Min. fuel consumption	g/kWh (g/HPh)	203 (151)	
	Starting motor		24 V, 11 Kw	
	Alternator		24 V, 50 A	
	Battery		12 V, 110 Ahx2	
	Radiator core type		ALW-4	

★ The "Mi" mode is on the multi-monitor specification machine only.

Undercarriage	Carrier roller			2 on each side		
	Track roller			8 on each side		
	Track shoe			Assembly-type triple grouser, 49 on each side		
Hydraulic system	Hydraulic pump	Type x No.		HPV190+190, variable displacement, piston type x2		
		Delivery	L/min (in³)	345x2 (21053.2)		
		Set pressure	kgf/cm² (lbf/in²)	380 (5404.87)		
	Control valve	Type x No.		6-spool type + 1-spool type x 1		
		Control method		Hydraulic		
	Hydraulic motor	Travel motor		KMV200ADT-2, Variable displacement, piston type (with brake valve, parking brake): x 2		
		Swing motor		KMF230ABE-5, Fixed displacement piston type (with safety valve, holding brake, reverse rotation preventive valve): x 1		
	Hydraulic cylinder			Boom	Arm	Bucket
		Type		Double-acting piston		
		Inside diameter of cylinder	mm (ft in)	160 (0’ 6")	185 (0’ 7")	160 (0’ 6")
		Diameter of piston rod		110 (0’ 4")	120 (0’ 5")	110 (0’ 4")
		Stroke		1,570 (5’ 2")	1,820 (6’ 0")	1,270 (4’ 2")
		Max. distance between pins		3,830 (12’ 7")	4,325 (14’ 2")	3,140 (10’ 4")
		Min. distance between pins		2,260 (7’ 5")	2,505 (8’ 3")	1,870 (6’ 2")
	Hydraulic tank Hydraulic filter Hydraulic cooler			Closed box type Tank return side CF40-1 (Air cooled)		

WEIGHT TABLE

WARNING! This weight table is for use when handling components or when transporting the machine

Unit: kg (lb)

Engine assembly ● Engine ● Damper ● Hydraulic pump	1,500 (3,307) 1,150 (2,535) 14.7 (32) 210 (463)	
Radiator, oil cooler assembly	195 (430)	
Hydraulic tank, filter assembly (excluding hydraulic oil)	198 (437)	
Fuel tank (excluding fuel)	251 (554)	
Revolving frame	3,297 (7,269)	
Operator's cab	279 (616)	
Operator's seat	35 (78)	
Counterweight	9,500 (20,944)	
Swing machinery (including swing motor)	526 (1,160)	
Control valve (with service valve0	257 (567)	
Swing motor	105 (232)	
Travel motor	208 (459) x 2	
Center swivel joint	40 (89)	
	Fixed gauge specification	Variable gauge specification
Track frame assembly Track frame ● Center frame ● Crawler frame	10,965 (24,174) 6,077 (13,398) --- ---	11,934 (26,310) 7,096 (15,644) 3,229 (7,119) 1,921 (4,235) x 2
Swing circle Idler Idler cushion Carrier roller Track roller Final drive (including travel motor)	605 (1,334) x 2 230 (507) x 2 338 (745) x 2 32 (71) x 4 72 (159) x 16 722 (1,592) x 2	
Track shoe assembly ● Standard triple grouser shoe (600 mm) ● Standard triple grouser shoe (700 mm) ● Wide triple grouser shoe (800 mm) ● Wide triple grouser shoe (900 mm)	 4,760 (10,494) 5,210 (11,486) 5,670 (12,500) 6,130 (13,515)	
Boom assembly	3,290 (7,254)	
Arm assembly	1,374 (3,030)	
Bucket assembly	1,366 (3,012)	
Boom cylinder assembly	355 (783) x 2	
Arm cylinder assembly	510 (1,125)	

Bucket cylinder assembly	280 (618)
Link assembly	258 (569)
Boom pin	92 (203) + 20 (45) x 2 + 73 (161) + 27 (60) + 54 (120)
Arm pin	17 (38) + 23 (51)
Bucket pin	38 (102) x 2
Link pin	34 (75) x 2

FUEL COOLANT AND LUBRICANTS

It is not our policy to approve fuel, coolant and lubricants or to guarantee performance in service. The responsibility for the quality of the fuel, coolant and lubricant must remain with the supplier. When in doubt, consult your distributor. The specified fuel, coolant and lubricants recommended for this machine are as shown in the following table.

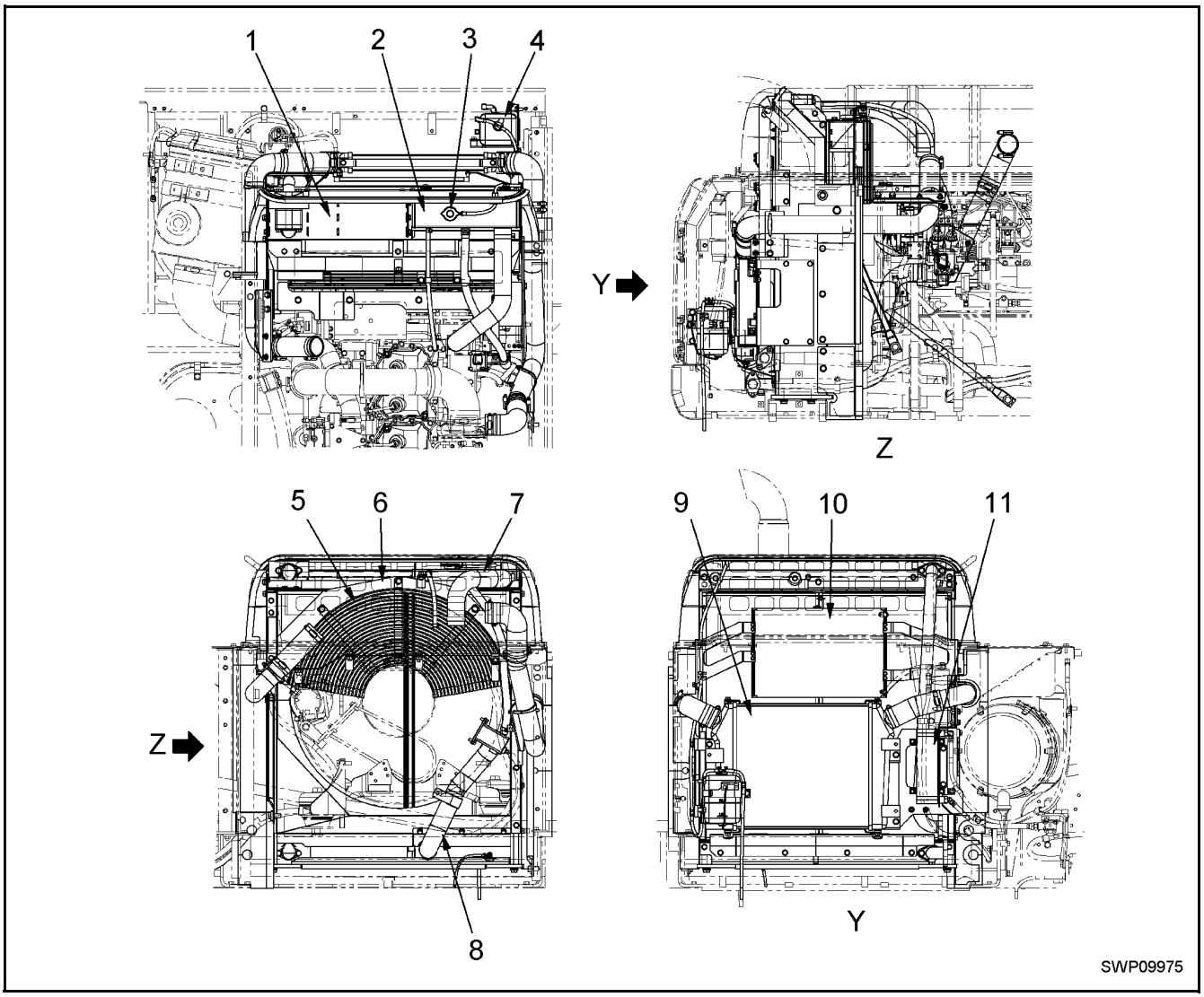
RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE -22 -4 14 32 50 68 86 104°F -30 -20 -10 0 10 20 30 40°C	CAPACITY - L (gal)	
			Specified	Refill
Engine oil pan	Engine oil	SAE 30 / SAE 10W / SAE 10W-30 / SAE 15W-40	42 (11.09)	38 (10.03)
Damper case	Engine oil	SAE 10W / SAE 10W-30 / SAE 15W-40	1.07 (0.282)	---
Swing machinery case	Engine oil	SAE 10W / SAE 10W-30 / SAE 15W-40	13.4 (3.53)	
Final drive case (each side)	Engine oil	SAE 30	12 (3.17)	
Idler (1 each)	Engine oil	SAE 30	0.335-0.355 (0.0884-0.0937)	
Track roller (1 each)	Engine oil	SAE 30	0.28-0.31 (0.0739-0.0818)	
Carrier roller (1 each)	Engine oil	SAE 30	0.12-0.18 (0.0317-0.0475)	
Hydraulic system	Engine oil	SAE 10W / SAE 10W-30 / SAE 15W-40	472 (124.6)	248 (65.5)
	Hydraulic oil	H046-HM (H)★★		
Fuel tank	Diesel fuel	ASTM D975 No. 2 / ★	650 (171.7)	---
Cooling system	Coolant	Add antifreeze	36 (9.51)	---

★ ASTM D975 No. 1

★ ★ For the H-046-HM, use the oil recommended by Komatsu.

10 STRUCTURE AND FUNCTION

RADIATOR • OIL COOLER • AFTERCOOLER



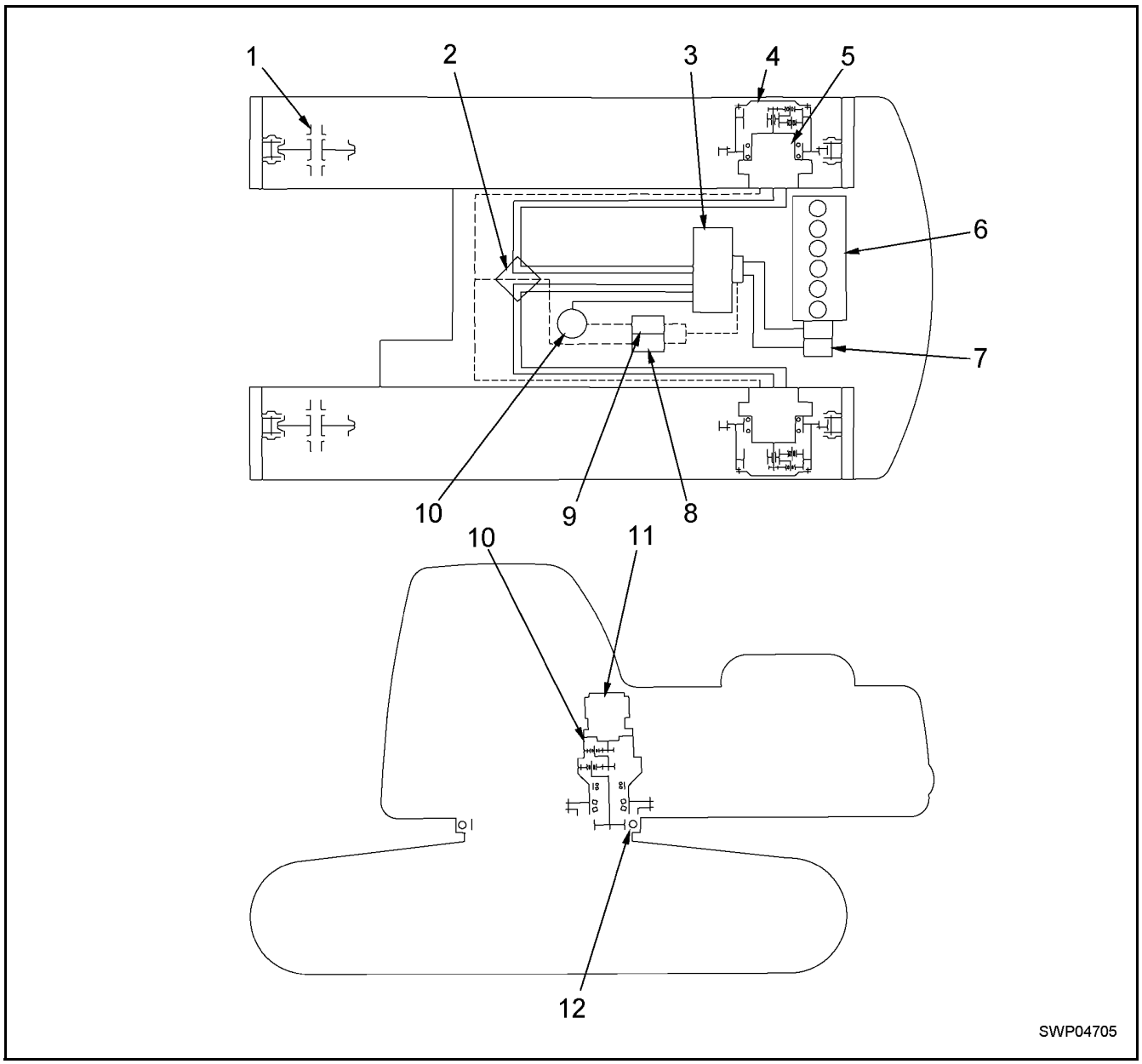
1. Oil cooler
2. Radiator
3. Radiator cap
4. Reservoir tank
5. Net
6. Shroud
7. Radiator inlet hose
8. Radiator outlet hose
9. Aftercooler
10. Condenser
11. Fuel cooler

Specifications

Radiator: ALW-4

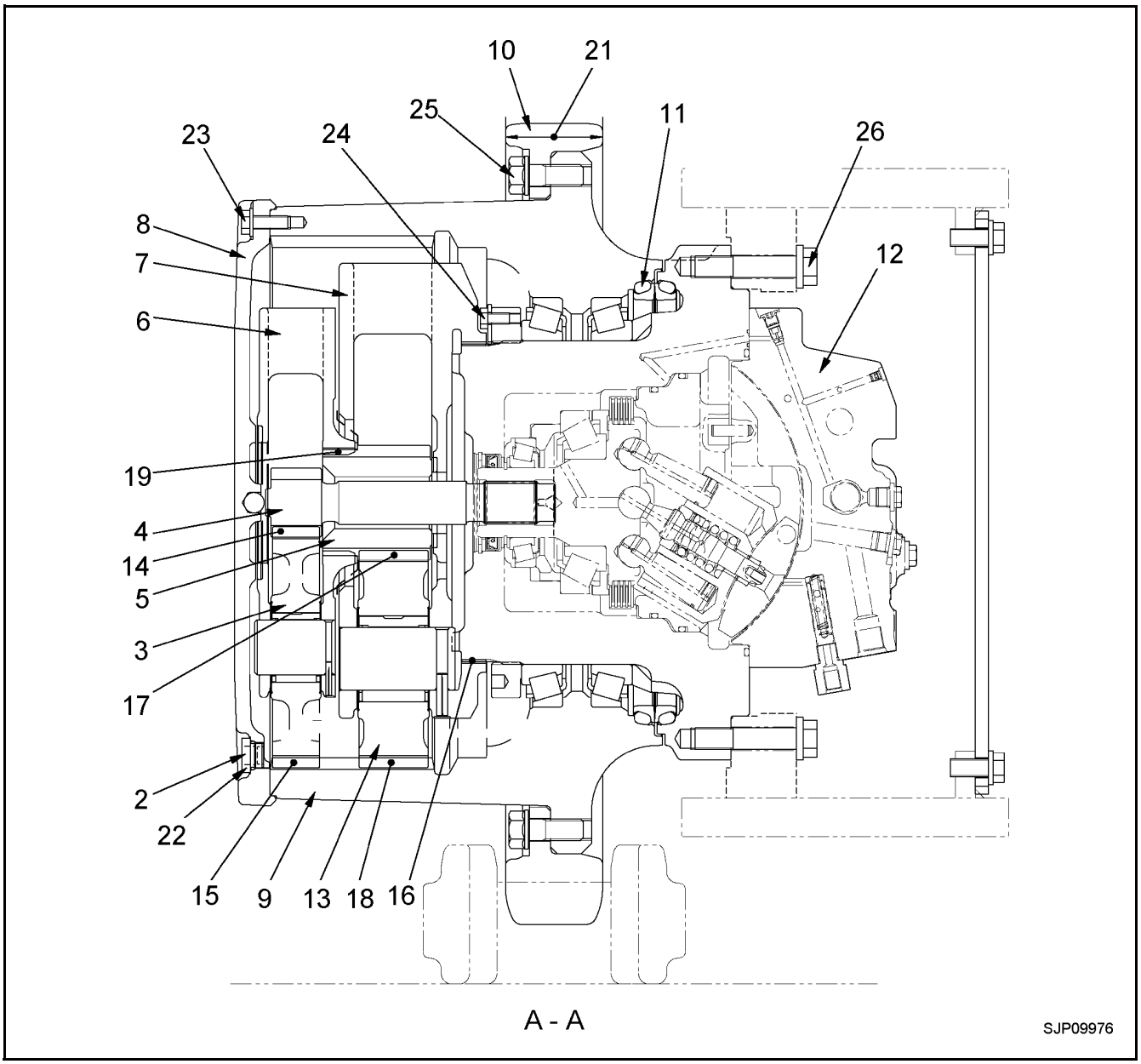
Oil cooler: CF40-1

POWER TRAIN



1. Idler
2. Center swivel joint
3. Control valve
4. Final drive
5. Travel motor (KMV 200ADT-2)
6. Engine (SAA6D125-3E)
7. Hydraulic pump (HPV190+190)
8. Travel speed solenoid valve
9. Swing brake solenoid valve
10. Swing machinery
11. Swing motor (KMF230ABE-5)
12. Swing circle

FINAL DRIVE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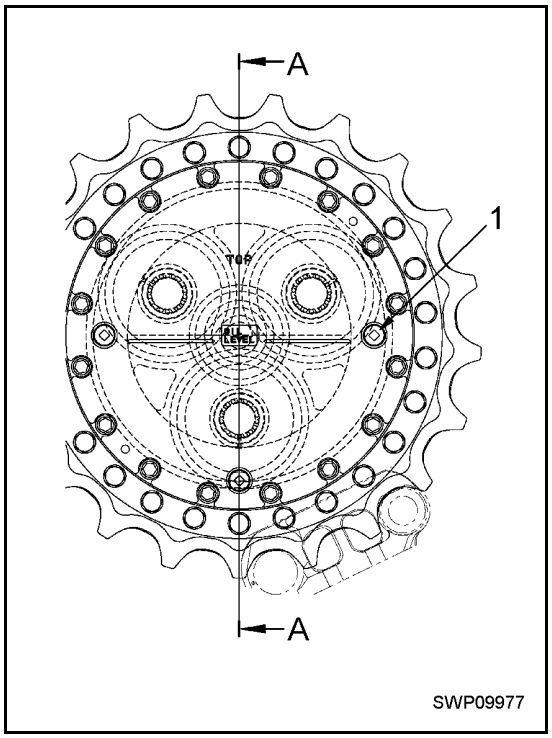


1. Level plug
2. Drain plug
3. No. 1 planetary gear (No. of teeth: 43)
4. No. 1 sun gear (No. of teeth: 10)
5. No. 2 sun gear (No. of teeth: 18)
6. No. 1 planetary carrier
7. No. 2 planetary carrier
8. Cover
9. Ring gear (No. of teeth: 98)
10. Sprocket
11. Floating seal
12. Travel motor
13. No. 2 planetary gear (No. of teeth: 38)

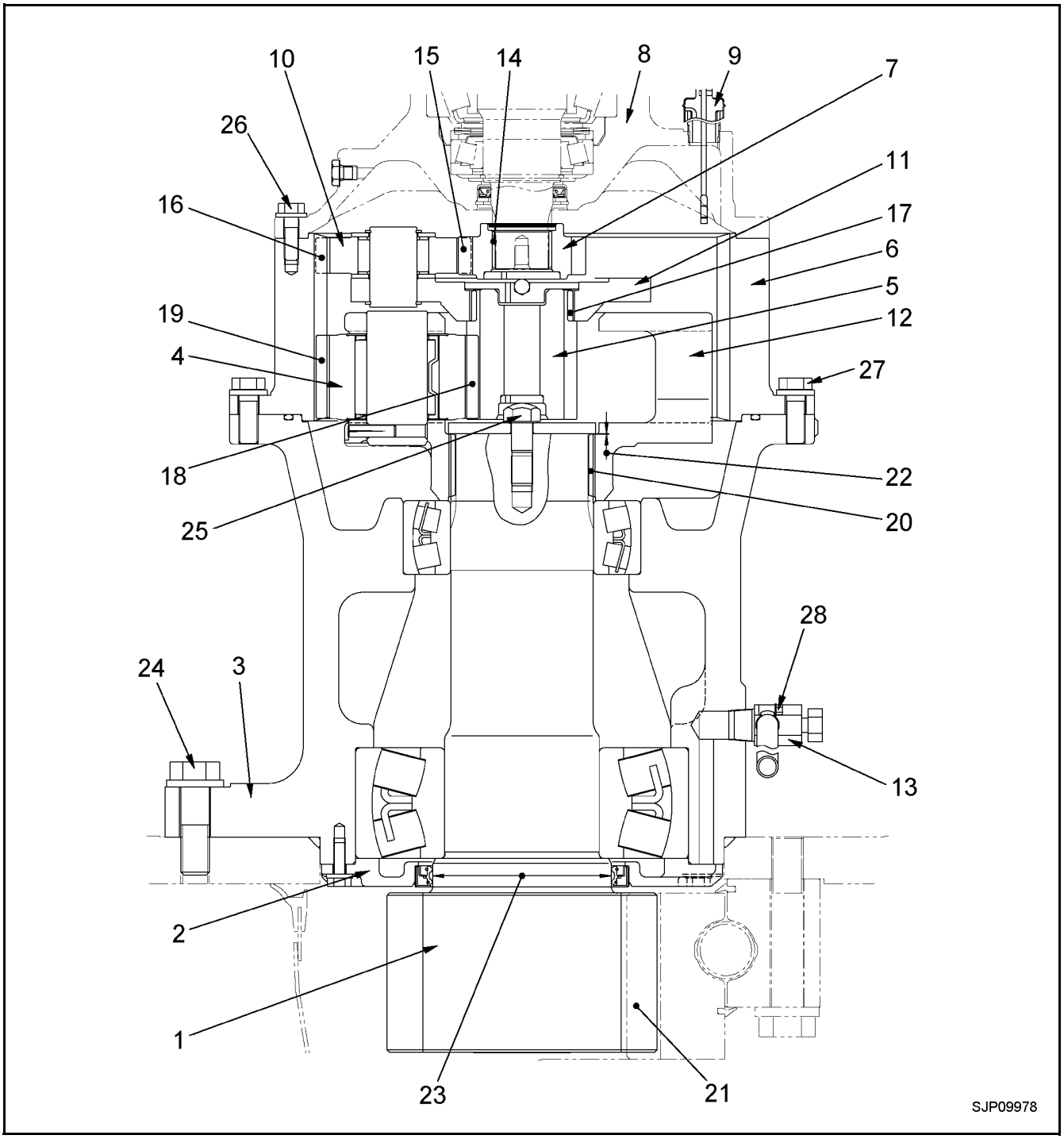
Specification

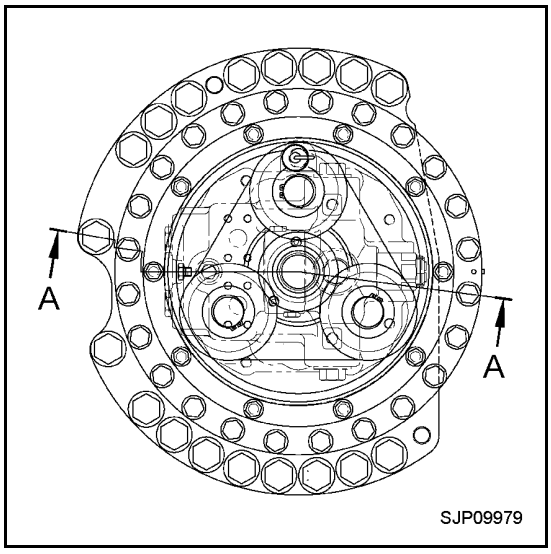
Reduction ratio:
-((10 + 98)/10)x((18+98)/18)=-68.600

Unit: mm

No.	Check item	Criteria		Remedy
14	Backlash between No. 1 sun gear and No. 1 planetary gear	Standard clearance	Clearance limit	Replace
		0.15 - 0.54	1.10	
15	Backlash between No. 1 planetary gear and ring gear	0.18 - 0.66	1.30	
16	Backlash between No. 2 planetary carrier and motor	0.06 - 0.24	---	
17	Backlash between No. 2 sun gear and No. 2 planetary gear	0.15 - 0.51	1.00	
18	Backlash between No. 2 planetary gear and ring gear	0.17 - 0.60	1.20	
19	Backlash between No. 2 planetary carrier and No. 2 sun gear	0.15 - 0.54	---	
20	Amount of wear on sprocket tooth	Repair limit: 6		Rebuild or replace
21	Width of sprocket tooth	Standard size	Repair limit	
		90	87	
22	Bolt	Torque Nm	Torque lbf ft	
		59 - 78	44 - 57	
23	Bolt	98 - 123	73 - 90	
24	Bolt	59 - 74	44 - 54	
25	Bolt	640 - 785	473 - 578	
26	Bolt	490 - 608	362 - 448	

SWING MACHINERY





1. Swing pinion (No. of teeth: 13)
2. Cover
3. Case
4. No. 2 planetary gear
5. No. 2 sun gear
6. Ring gear
7. No. 1 sun gear
8. Swing motor
9. Oil level gauge
10. No. 1 planetary gear
11. No. 1 planetary carrier
12. No. 2 planetary carrier
13. Drain plug

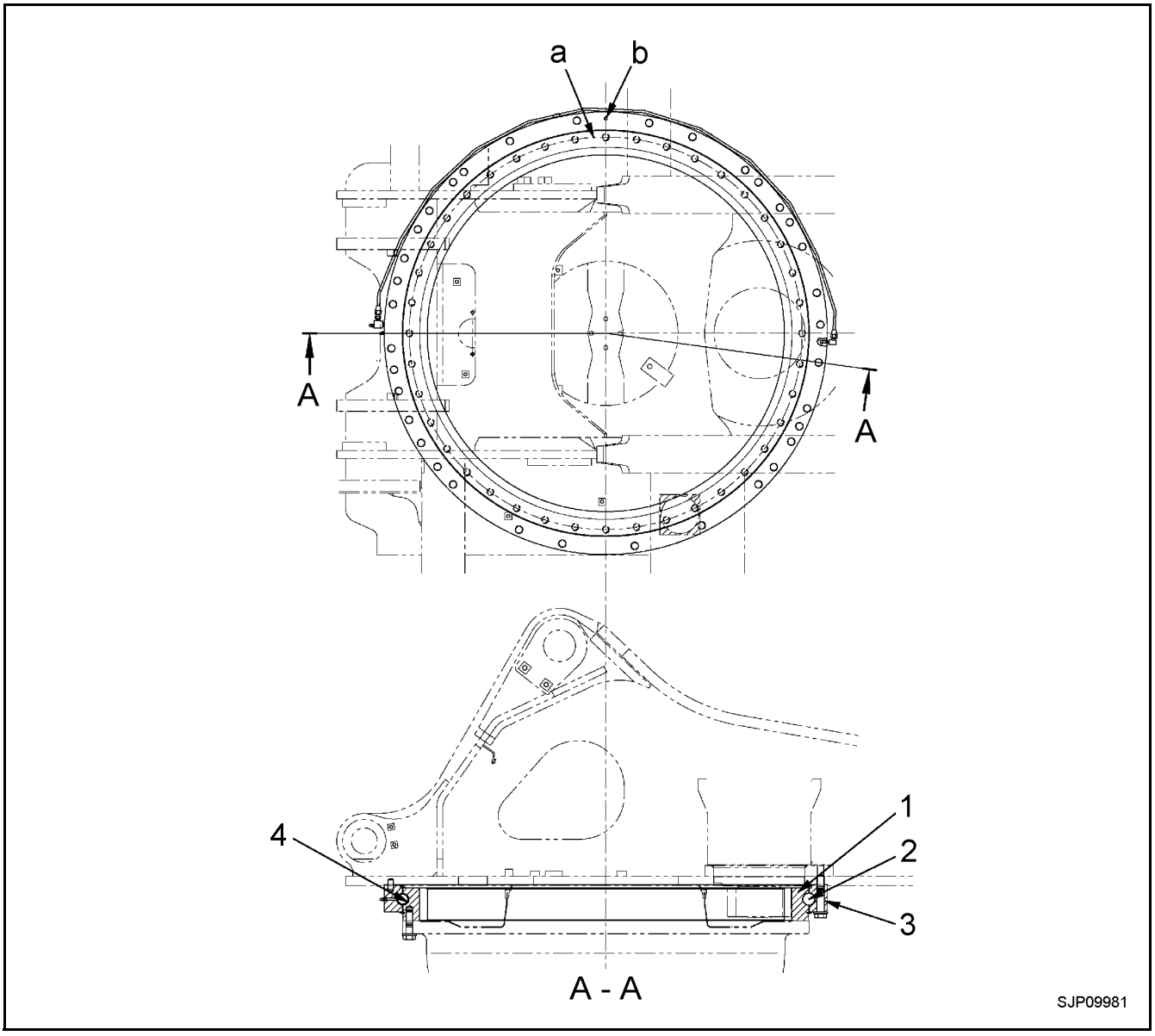
Specification

Reduction ratio:
((19 +68)/19)x((16+68)/16)=24.039

Unit: mm

No.	Check item	Criteria		Remedy
14	Backlash between swing motor shaft and No. 1 sun gear	Standard clearance	Clearance limit	Replace
		0.18 - 0.28	---	
15	Backlash between No. 1 sun gear and No. 1 planetary gear	0.15 - 0.51	1.00	
16	Backlash between No. 1 planetary gear and ring gear	0.17 - 0.60	1.10	
17	Backlash between No. 1 planetary carrier and No. 2 sun gear	0.40 - 0.75	1.20	
18	Backlash between No. 2 sun gear and No. 2 planetary gear	0.16 - 0.55	1.00	
19	Backlash between No. 2 planetary gear and ring gear	0.17 - 0.60	1.10	
20	Backlash between coupling and swing pinion	0.08 - 0.25	---	
21	Backlash between swing pinion and swing circle	0.00 - 1.21	2.00	
22	Clearance between plate and coupling	0.57 - 1.09	---	
23	Wear of swing pinion surface contacting with oil seal	Standard size	Repair limit	Apply hard chrome plating, recondition, or replace
		$150\ ^{0}_{-0.100}$	---	
24	Bolt	Torque Nm	Torque lbf ft	
		824 - 1030	608 - 759	
25	Bolt	343 - 427	253 - 314	
26	Bolt	98 - 123	73 - 90	
27	Bolt	245 - 309	181 - 228	
28	Bolt	2.81 - 3.79	2.07 - 2.79	

SWING CIRCLE



1. Swing circle inner race (No. of teeth: 84)
2. Ball
3. Swing circle outer race
a. Inner race soft zone “S” position
b. Outer race soft zone “S” position

Specification

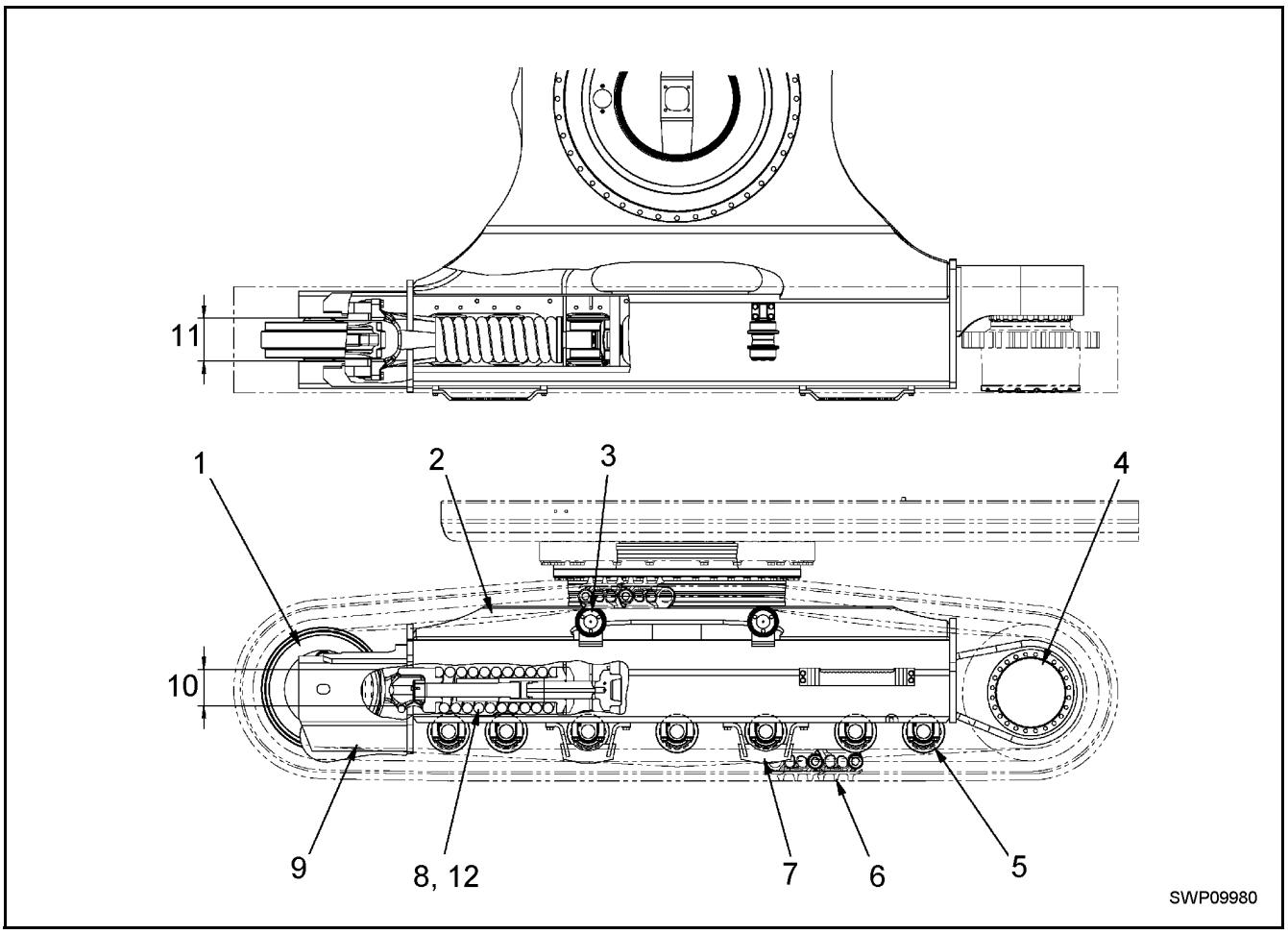
Reduction ration: $-\frac{84}{13} = -6.462$

Amount of grease: 33 L (8.71 gal) {G2-LI}

Unit: mm

No.	Check item	Criteria		Remedy
4	Axial clearance of bearing (when mounted on chassis)	Standard clearance	Repair limit	Replace
		0.5 - 1.6	3.2	

TRACK FRAME AND RECOIL SPRING



1. Idler
2. Track frame
3. Carrier roller
4. Final drive
5. Track roller
6. Track shoe
7. Center guard
8. Recoil spring
9. Front guard

- The dimensions and the number of track rollers depend on the model, but the basic structure is not different.
- Number of track rollers: 8