MAINTENANCE

1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

- You may inspect and service the machine by the period as described at page 6-12 based on hour meter at control panel.
- (2) Shorten the interval of inspect and service depending on site condition. (such as dusty area, quarry, sea shore and etc.)
- (3) Practice the entire related details at the same time when the service interval is doubled.
 For example, in case of 100 hours, carry out all the maintenance 「Each 100 hours, each 50 hours and daily service」 at the same time.



2) PRECAUTION

- (1) Start to maintenance after you have the full knowledge of machine.
- (2) The monitor installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to clause 4, maintenance check list.
- (3) Engine and hydraulic components have been preset in the factory.Do not allow unauthorized personnel to reset them.
- (4) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.
- ▲ Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.
- △ Accumulated grease and oil on the machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours.
- Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.
- (5) Ask to your local dealer or HD Hyundai Construction Equipment for the maintenance advice if unknown.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket tooth, side cutter, filter and etc., regularly. Replace damaged or worn parts at proper time to keep the performance of machine.

- (2) Use genuine parts.
- (3) Use the recommended oil.
- (4) Remove the dust or water around the inlet of oil tank before supplying oil.
- (5) Drain oil when the temperature of oil is warm.
- (6) Do not repair anything while operating the engine.Stop the engine when you fill the oil.
- (7) Relieve hydraulic system of the pressure before repairing the hydraulic system.
- (8) Confirm if the cluster is in the normal condition after completion of service.
- (9) For more detail information of maintenance, please contact local HD Hyundai Construction Equipment dealer.
- ※ Be sure to start the maintenance after fully understand the chapter 1, safety hints.

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

- Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.
 Be sure to relieve the pressure in the system before repairing hydraulic system.
- (1) Place machine in parking position, and stop the engine.



- (2) Set the safety knob completely in the UNLOCK position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.
- * This does not completely release the pressure, so when serving hydraulic component, loosen the connections slowly and do not stand in the direction where the oil spurt out.



(3) Relieve the pressure in the tank by pushing the top of the air breather.



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

- Be particularly careful that the joint of hose, pipe and functioning item are not damaged. Avoid contamination.
- (2) Assemble after cleaning the hose, pipe and joint of functioning item.
- (3) Use genuine parts.
- (4) Do not assemble the hose in the condition of twisted or sharp radius.
- (5) Keep the specified tighten torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

 It is desirable to do periodic maintenance the machine for using the machine safely for a long time.

However, recommend to replace regularly the parts related safety not only safety but maintain satisfied performance.

(2) These parts can cause the disaster of life and material as the quality changes by passing time and it is worn, diluted, and gets fatigued by using repeatedly.

These are the parts which the operator can not judge the remained lifetime of them by visual inspection.

(3) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

Perio	Interval			
Engine		Fuel hose (tank-engine)	_	
		Heater hose (heater-engine)	Every 2 years	
	Pump suction hose		_	
	Main	Main Pump delivery hose		Every 2 vears
Hydraulic	CIICUIL	Swing hose	2 youro	
system		Boom cylinder line hose		
	Working	Arm cylinder line hose	Every 2 vears	
		Bucket cylinder line hose	z youro	

- * 1. Replace O-ring and gasket at the same time when replacing the hose.
 - 2. Replace clamp at the same time if the hose clamp is cracked when checking and replacing the hose.

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

8.8T		10	.9T	12.9T			
DOILSIZE	kgf · m	lbf ⋅ ft	kgf · m	lbf ⋅ ft	kgf · m	lbf · ft	
M 6×1.0	0.8 ~ 1.2	5.8 ~ 8.6	1.2 ~ 1.8	8.7 ~ 13.0	1.5 ~ 2.1	10.9 ~ 15.1	
M 8×1.25	2.0 ~ 3.0	14.5 ~ 21.6	2.8 ~ 4.2	20.3 ~ 30.4	3.4 ~ 5.0	24.6 ~ 36.1	
M10 × 1.5	4.0 ~ 6.0	29.0 ~ 43.3	5.6 ~ 8.4	40.5 ~ 60.8	6.8 ~ 10.0	49.2 ~ 72.3	
M12 × 1.75	6.8 ~ 10.2	50.0 ~ 73.7	9.6 ~ 14.4	69.5 ~ 104	12.3 ~ 16.5	89.0 ~ 119	
M14 × 2.0	10.9 ~ 16.3	78.9 ~ 117	16.3 ~ 21.9	118 ~ 158	19.5 ~ 26.3	141 ~ 190	
M16 × 2.0	17.9 ~ 24.1	130 ~ 174	25.1 ~ 33.9	182 ~ 245	30.2 ~ 40.8	141 ~ 295	
M18 × 2.5	24.8 ~ 33.4	180 ~ 241	34.8 ~ 47.0	252 ~ 340	41.8 ~ 56.4	302 ~ 407	
M20 × 2.5	34.9 ~ 47.1	253 ~ 340	49.1 ~ 66.3	355 ~ 479	58.9 ~ 79.5	426 ~ 575	
M22 × 2.5	46.8 ~ 63.2	339 ~ 457	65.8 ~ 88.8	476 ~ 642	78.9 ~ 106	570 ~ 766	
M24 × 3.0	60.2 ~ 81.4	436 ~ 588	84.6 ~ 114	612 ~ 824	102 ~ 137	738 ~ 991	
M30 × 3.5	120 ~ 161	868 ~ 1164	168 ~ 227	1216 ~ 1641	202 ~ 272	1461 ~ 1967	

(2) Fine thread

Polt oizo	8.	8T	10	.9T	12.9T		
DOILSIZE	kgf · m	lbf ⋅ ft	kgf · m	lbf ⋅ ft	kgf · m	lbf ⋅ ft	
M 8×1.0	2.1 ~ 3.1	15.2 ~ 22.4	3.0 ~ 4.4	21.7 ~ 31.8	3.6 ~ 5.4	26.1 ~ 39.0	
M10×1.25	4.2 ~ 6.2	30.4 ~ 44.9	5.9 ~ 8.7	42.7 ~ 62.9	7.0 ~ 10.4	50.1 ~ 75.2	
M12 × 1.25	7.3 ~ 10.9	52.8 ~ 78.8	10.3 ~ 15.3	74.5 ~ 110	13.1 ~ 17.7	94.8 ~ 128	
M14 imes 1.5	12.4 ~ 16.6	89.7 ~ 120	17.4 ~ 23.4	126 ~ 169	20.8 ~ 28.0	151 ~ 202	
M16×1.5	18.7 ~ 25.3	136 ~ 182	26.3 ~ 35.5	191 ~ 256	31.6 ~ 42.6	229 ~ 308	
M18×1.5	27.1 ~ 36.5	196 ~ 264	38.0 ~ 51.4	275 ~ 371	45.7 ~ 61.7	331 ~ 446	
M20 imes 1.5	37.7 ~ 50.9	273 ~ 368	53.1 ~ 71.7	384 ~ 518	63.6 ~ 86.0	460 ~ 622	
M22×1.5	51.2 ~ 69.2	370 ~ 500	72.0 ~ 97.2	521 ~ 703	86.4 ~ 116	625 ~ 839	
M24×2.0	64.1 ~ 86.5	464 ~ 625	90.1 ~ 121	652 ~ 875	108 ~ 146	782 ~ 1056	
M30×2.0	129 ~ 174	933 ~ 1258	181 ~ 245	1310 ~ 1772	217 ~ 294	1570 ~ 2126	

2) PIPE AND HOSE (FLARE type)

Thread size (PF)	Width across flat (mm)	kgf · m	lbf ⋅ ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

Thread size (UNF)	Width across flat (mm)	kgf · m	lbf ⋅ ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

Thread size	Width across flat (mm)	kgf · m	lbf ⋅ ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

5) TIGHTENING TORQUE OF MAJOR COMPONENT

· HX480S L

No	lo Docoriptiono		Dolt oize	Torque		
INO.		Descriptions	DOIL SIZE	kgf · m	lbf · ft	
1		Engine mounting bolt (FR, bracket)	M20 $ imes$ 2.5	$\textbf{57.9} \pm \textbf{8.0}$	$\textbf{419} \pm \textbf{62.9}$	
2		Engine mounting bolt (RR, bracket)	M16 × 2.0	$\textbf{29.7} \pm \textbf{4.5}$	$\textbf{215} \pm \textbf{32.5}$	
3	Finalina	Engine mounting bolt (frame)	M22 $ imes$ 2.5	69.6 ± 7.0	503 ± 50.6	
4	Engine	Radiator mounting bolt	M16 × 2.0	$\textbf{29.7} \pm \textbf{4.5}$	$\textbf{215} \pm \textbf{32.5}$	
5		Coupling mounting socket bolt	M20 $ imes$ 2.5	$\textbf{46.5} \pm \textbf{2.5}$	$\textbf{336} \pm \textbf{18.1}$	
6		Main pump housing mounting bolt	M10 × 1.5	$\textbf{6.7} \pm \textbf{1.0}$	48.7 ± 7.2	
7		Main pump mounting bolt	M20 $ imes$ 2.5	44 ± 6.6	$\textbf{318} \pm \textbf{47.7}$	
8		Main control valve mounting nut	M20 $ imes$ 2.5	57.9 ± 8.7	$\textbf{419} \pm \textbf{62.9}$	
9	Hydraulic	Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9	
10	- cyclom	Hydraulic oil tank mounting bolt	M20 $ imes$ 2.5	$\textbf{57.9} \pm \textbf{8.0}$	$\textbf{419} \pm \textbf{57.9}$	
11	Turning joint mounting bolt, nut		M16 × 2.0	$\textbf{29.7} \pm \textbf{4.5}$	$\textbf{215} \pm \textbf{32.5}$	
12		Swing motor mounting bolt	M20 $ imes$ 2.5	$\textbf{57.9} \pm \textbf{8.7}$	$\textbf{419} \pm \textbf{62.9}$	
13	Power	Swing bearing upper part mounting bolt	M24 $ imes$ 3.0	100 ± 10	$\textbf{723} \pm \textbf{72.3}$	
14	train	Swing bearing lower part mounting bolt	M24 $ imes$ 3.0	100 ± 10	$\textbf{723} \pm \textbf{72.3}$	
15	system	Travel motor mounting bolt	M20 $ imes$ 2.5	$\textbf{57.9} \pm \textbf{8.7}$	$\textbf{419} \pm \textbf{62.9}$	
16		Sprocket mounting bolt	M20 $ imes$ 2.5	$\textbf{57.9} \pm \textbf{6.0}$	$\textbf{419} \pm \textbf{43.4}$	
17		Carrier roller mounting bolt, nut	M16 × 2.0	$\textbf{29.7} \pm \textbf{3.0}$	$\textbf{215} \pm \textbf{21.7}$	
18		Track roller mounting bolt	M24 $ imes$ 3.0	100 ± 10	$\textbf{723} \pm \textbf{72.3}$	
19	Under	Track tension cylinder mounting bolt	M22 $ imes$ 1.5	$\textbf{87.2} \pm \textbf{12.5}$	$\textbf{631} \pm \textbf{90.4}$	
20	Gamage	Track shoe mounting bolt, nut	M24 $ imes$ 3.0	140 ± 14	1012 ± 101	
21		Track guard mounting bolt	M24 $ imes$ 3.0	100 ± 15	723 \pm 108	
22		Counterweight mounting bolt	M42 $ imes$ 3.0	390 ± 40	$\textbf{2821} \pm \textbf{289}$	
23	Others	Cab mounting bolt	M12 × 1.75	$\textbf{12.8} \pm \textbf{3.0}$	92.6 ± 21.7	
24		Operator's seat mounting bolt	M 8 × 1.25	$\textbf{4.05} \pm \textbf{0.8}$	29.3 ± 5.8	

* For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.

· HX520S L

No	Descriptions		Polt oizo	Torque		
110.			DUILSIZE	kgf · m	lbf · ft	
1		Engine mounting bolt (FR, bracket)	M20 $ imes$ 2.5	$\textbf{57.9} \pm \textbf{8.0}$	$\textbf{419} \pm \textbf{62.9}$	
2		Engine mounting bolt (RR, bracket)	M16 × 2.0	$\textbf{29.7} \pm \textbf{4.5}$	$\textbf{215} \pm \textbf{32.5}$	
3	Engino	Engine mounting bolt (frame)	M22 $ imes$ 2.5	69.6 ± 7.0	$\textbf{503} \pm \textbf{50.6}$	
4	Engine	Radiator mounting bolt	M16 × 2.0	$\textbf{29.7} \pm \textbf{4.5}$	$\textbf{215} \pm \textbf{32.5}$	
5		Coupling mounting socket bolt	M20 $ imes$ 2.5	$\textbf{46.5} \pm \textbf{2.5}$	$\textbf{336} \pm \textbf{18.1}$	
6		Main pump housing mounting bolt	M10 × 1.5	$\textbf{6.7} \pm \textbf{1.0}$	48.7 ± 7.2	
7		Main pump mounting bolt	M20 $ imes$ 2.5	44 ± 6.6	318 ± 47.7	
8		Main control valve mounting nut	M20 $ imes$ 2.5	57.9 ± 8.7	$\textbf{419} \pm \textbf{62.9}$	
9	Hydraulic	Fuel tank mounting bolt	M20 $ imes$ 2.5	$\textbf{46} \pm \textbf{5.1}$	$\textbf{333} \pm \textbf{36.9}$	
10	Gyotom	Hydraulic oil tank mounting bolt	M20 $ imes$ 2.5	57.9 ± 8.0	$\textbf{419} \pm \textbf{57.9}$	
11	Turning joint mounting bolt, nut		M16 × 2.0	$\textbf{29.7} \pm \textbf{4.5}$	$\textbf{215} \pm \textbf{32.5}$	
12		Swing motor mounting bolt	M20 $ imes$ 2.5	57.9 ± 8.7	$\textbf{419} \pm \textbf{62.9}$	
13	Power	Swing bearing upper part mounting bolt	M24 $ imes$ 3.0	100 ± 10	$\textbf{723} \pm \textbf{72.3}$	
14	train	Swing bearing lower part mounting bolt	M24 $ imes$ 3.0	100 ± 10	$\textbf{723} \pm \textbf{72.3}$	
15	system	Travel motor mounting bolt	M20 $ imes$ 2.5	57.9 ± 8.7	$\textbf{419} \pm \textbf{62.9}$	
16		Sprocket mounting bolt	M20 $ imes$ 2.5	57.9 ± 6.0	$\textbf{419} \pm \textbf{43.4}$	
17		Carrier roller mounting bolt, nut	M16 × 2.0	$\textbf{29.7} \pm \textbf{3.0}$	$\textbf{215} \pm \textbf{21.7}$	
18		Track roller mounting bolt	M24 $ imes$ 3.0	100 ± 10	$\textbf{723} \pm \textbf{72.3}$	
19	Under	Track tension cylinder mounting bolt	M22 × 1.5	$\textbf{87.2} \pm \textbf{12.5}$	631 ± 90.4	
20	carriage	Track shoe mounting bolt, nut	M24 $ imes$ 3.0	140 ± 14	1012 ± 101	
21		Track guard mounting bolt	M24 $ imes$ 3.0	100 ± 15	723 ± 108	
22	Adjustable track gauge bolt		M33 $ imes$ 3.5	$\textbf{220} \pm \textbf{20}$	1590 ± 145	
23		Counterweight mounting bolt	M42 imes 3.0	390 ± 40	2821 ± 289	
24		Center frame support & lower track mounting bolt	M33 $ imes$ 3.5	220 ± 20	1591 ± 145	
25	Others	Cab mounting bolt	M12 imes 1.75	$\textbf{12.8} \pm \textbf{3.0}$	92.6 ± 21.7	
26		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8	

* For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification			
Engine oil (API CI-4, ACEA-E9)	SAE 15W-40, *SAE 5W-40			
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG 46, VG 68) Conventional hydraulic oil (ISO VG 15*)			
Swing and travel reduction gear	SAE 85W-140 (API GL-5)			
Grease	Lithium base grease NLGI No. 2			
Fuel	ASTM D975-No. 2			
	ASTM D6210			
Coolant (DCA4)	Mixture of 50% ethylene glycol base antifreeze and 50% water.			
	Mixture of 60% ethylene glycol base antifreeze and 40% water. \star			

SAE : Society of Automotive Engineers : American Petroleum Institute

API

- ★Cold region Russia, CIS, Mongolia
- **ISO** : International Organization for Standardization
- NLGI : National Lubricating Grease Institute
- **ASTM** : American Society of Testing and Material
- DCA4: Brand name of Chemical Additive manufactured by the Cummins Fleetguard Co

2) RECOMMENDED OILS

HD Hyundai Construction Equipment genuine lubricating oils have been developed to offer the best performance and service life for your equipment. These oils have been tested according to the specifications of HD Hyundai Construction Equipment and, therefore, will meet the highest safety and quality require-ments. We recommend that you use only HD Hyundai Construction Equipment genuine lubricating oils and grease offici-ally appr-oved by HD Hyundai Construction Equipment.

Service		Capacity				Ar	nbie	ent temp	oeratu	ure °C	C(°F)			
point	Kind of fluid	ℓ (U.S. gal)	-50	-30	-	20	-1	0	0	10) 2	20 (30	40
point			(-58)	(-22)) (-4)	(1	4) (32)	(50	D) (6	8) (8	6)	(104)
					*	SAE	5W-	40						
											SAL	= 30		
Engine												_ 00		
oil pan	Engine oil	37.9 (10.0)				S	SAE	10W						
								S	SAE 1	10W-3	80			
									9		5\//_/0			
											000-40			
Swing		7.0×2			+	SAF 7	75\\/	-90						
drive	Gear oil	(1.8×2)			~`		500	-30						
Final		12×2							SA	AE 85	W-140			
unve		(3.2 ~ 2)												
		Tank : 260				★IS(O V C	G 15						
Hydraulic	Hvdraulic oil	(00.7)							ISC) VG 4	16			1
tank	j	System : 486 (128.4)												
							l			15	50 VG 6	8		
Fueltank	Discol	CCO (174 4)		*/	ASTM I	D975	NO.	1	-					
ruei larik	Diesei Tuei	660 (174.4)								ASTN	/I D975	NO.2		
Fitting	-					★	NLG	I NO.1						
(grease nipple)	Grease	As required								N	lgi no.	2		
Badiator	Mixture of					Ethyle	ene g	glycol ba	ase p	erma	nent typ	e (50 : 50))	
(reservoir	antifreeze	49 (12.9)						(00 10)	-					
tank)	water*1		★Ethy	ylene gl	ycol base	perman	ent ty	oe (60 : 40)						

- SAE : Society of Automotive Engineers
- API : American Petroleum Institute
- **ISO** : International Organization for Standardization
- NLGI : National Lubricating Grease Institute
- **ASTM** : American Society of Testing and Material
- * Using any lubricating oils other than HD Hyundai Construction Equipment genuine products may lead to a deterioration of performance and cause damage to major components.
- * Do not mix HD Hyundai Construction Equipment genuine oil with any other lubricating oil as it may result in damage to the sytems of major components.
- * For HD Hyundai Construction Equipment genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HD Hyundai Construction Equipment dealers.

- * : Cold region Russia, CIS, Mongolia
- *1 : Soft water City water or distilled water

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Engine oil level	Check, Add	6-19
Coolant level	Check, Add	6-21
Fan belt tension and damage	Check, Adjust	6-24
Fuel tank	Check, Refill	6-27
Air cleaner (oil bath, option)	Check, Clean, Add	6-28, 29, 29-1
Prefilter (water)	Check, Drain	6-31
Hydraulic oil level	Check, Add	6-35
Attachment pin and bushing \star	Lubricate	6-44
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		
Control panel & pilot lamp	Check, Clean	6-45

★ Lubricate every 10 hours or daily for initial 100 hours.

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Drain	6-27
Swing reduction gear oil	Check, Add	6-37
Track tension	Check, Adjust	6-40
Attachment pin and bushing	Lubricate	6-44
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
Return filter ★	Replace	6-37
Drain filter cartridge ★	Replace	6-37
Pilot line filter ★	Replace	6-38

★ Replace 3 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page	
Engine oil	Change	6-19, 20	
Engine oil filter	Replace	6-19,20	
Fuel filter element	Replace	6-30	
Prefilter element	Replace	6-31	
Hydraulic oil return filter	Replace	6-37	
Drain filter cartridge	Replace	6-37	
Pilot line filter element	Replace	6-38	
Swing reduction gear oil	Change	6-38	
Travel reduction gear oil	Change	6-39	

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
 Track shoe mounting bolts and nuts 		
Hydraulic pump mounting bolts		
Swing bearing grease	Lubricate	6-38
Attachment pin and bushing	Lubricate	6-44
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		
Battery (voltage)	Check, Clean	6-45

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
Engine oil ★	Change	6-19, 20
Engine oil filter★	Replace	6-19, 20
Coolant test (DCA4 concentration)	Test, Add	6-21-1, 2
Radiator, and charge air cooler	Check, Clean	6-24
Oil cooler	Check, Clean	6-24
Air cleaner element (primary) *1	Check, Clean	6-27
Fuel filter element	Replace	6-30
Prefilter element	Change	6-31
Corrosion resistor	Replace	6-32
Aircon & heater filter (inner and outer)	Replace	6-48
Air compressor air filter (option)	Check, Clean	6-43-1

*¹ When working in dusty environments, more frequent cleaning is highly recommended.

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page	
Hydraulic oil return filter	Replace	6-37	
Drain filter cartridge	Replace	6-37	
Air breather element	Replace	6-37	
Swing reduction gear oil	Change	6-38	
Pilot line filter	Replace	6-38	
Travel motor reduction gear oil	Change	6-39	
Grease in swing gear and pinion	Change	6-39	

9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant*1	Change	6-20, 21, 22, 23
Air cleaner element (primary, safety)*2	Replace	6-27
Air cleaner (oil bath, option)	Disassemblle, Clean, Replace	6-28, 29, 29-1
Hydraulic oil*1	Change	6-37
Hydraulic tank suction strainer	Check, Clean	6-37
RCV lever	Check, Lubricate	6-40
Air compressor air filter (option)	Replace	6-43-1
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

*1 Conventional

*² When working in dusty environments, more frequent replacing is highly recommended.

* Change hydraulic oil every 600 hours of continuous hydraulic breaker operation.

10) EVERY 4000 HOURS SERVICE

Check items	Service	Page
Fuel tank breather	Replace	6-33

11) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil*3	Change	6-37

*³ HD Hyundai Consturction Equipment genuine long life

* Change hydraulic oil every 1000 hours of continuous hydraulic breaker operation.

12) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Coolant*3	Change	6-20, 21, 22, 23

*³ HD Hyundai Construction Equipment genuine long life

* Change hydraulic oil every 1000 hours of continuous hydraulic breaker operation.

13) WHEN REQUIRED

Whenever you have trouble in the machine, you must perform the service of related items, system by system.

Check items	Service Page				
Engine lubrication system					
· Engine oil	Change 6-19, 20				
· Engine oil filter	Replace	6-19, 20			
Engine cooling system					
· Coolant	Add or Change 6-21, 22, 23,				
· Radiator	Clean or Flush	6-21, 22, 23, 24			
· Charge air cooler	Check	6-24			
Engine air system					
· Air cleaner element (primary)	Clean or Replace	6-27			
· Air cleaner element (safety)	Replace	6-27			
· Air cleaner (oil bath, option)	Check, Clean, Replace	6-28, 29, 29-1			
Fuel system		6-27			
· Fuel tank	Drain or Clean	6-30			
· Fuel filter element	Replace	6-31			
· Prefilter element	Drain or Replace				
Hydraulic system		6-36			
· Hydraulic oil	Add or Change	6-36			
· Suction strainer	Clean	6-37			
· Return filter	Replace 6-37				
· Drain line filter	Replace 6-37				
· Element of breather	Replace	6-38			
· Pilot line filter	Replace	6-40			
· RCV lever	Lubricate				
Undercarriage		6-40			
· Track tension	Check, Adjust				
Bucket		6-40			
· Bucket assy	Replace	6-41			
· Tooth	Replace 6-41				
· Side cutter	Replace 6-42				
· Linkage	Adjust				
Air conditioner and heater	6-48				
· Fresh air filter	Replace 6-48, 4				
· Recirculation filter	Clean,Replace				
Other					
· Alr compressor air filter	Clean or Replace 6-43-1				

5. MAINTENANCE CHART





480S6MA46A

Caution

- 1. Service intervals are based on the hour meter reading.
- 2. The number of each item shows the lubrication point on the machine.
- 3. Stop engine while filling oil, and use no open flames.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
	1	Hydraulic oil level	Check, Add	HO	260 (68.7)	1
	2	Engine oil level	Check, Add	EO	37.9 (10.0)	1
	4	Radiator coolant	Check, Add	С	49 (12.9)	1
10 Hours	5	Prefilter filter element (water)	Check, Drain	-	-	1
or daily 6 7 9	6	Fan belt tension and damage	Check, Adjust	-	-	1
	7	Attatchment pin & bushing*	Lubricate	PGL	-	11
	9	Fuel tank	Check, Refill	DF	660 (174.4)	1
	21	Air cleaner (oil bath, option)	Check, Clean, Add	EO	5.0 (1.3)	1
	8	Bucket linkage pins	Check, Add	PGL	-	6
50 Hours or weekly	9	Fuel tank (water, sediment)	Drain	-	660 (174.4)	1
	11	Swing reduction gear oil	Check, Add	GO	7.0 (1.8)	2
	13	Track tension	Check, Adjust	PGL	-	2

* Lubricate every 10 hours or daily for initial 100 hours.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
050	7	Attachment pins & bushing	Check, Add	PGL	-	11
250 Hours	10	Swing bearing grease	Check, Add	PGL	-	2
Tiouro	14	Battery (voltage)	Check, Clean	-	-	1
	2	Engine oil	Change	EO	37.9 (10.0)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter element	Replace	-	-	1
Initial 250	11	Swing reduction gear oil	Change	GO	7.0 (1.8)	2
Initial 250	15	Hydraulic oil return filter	Replace	-	-	2
Hours	16	Drain filter cartridge	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	22	Fuel filter element	Replace	-	-	2
	24	Travel reduction gear oil	Change	GO	12 (3.2)	2
	2	Engine oil	Change	EO	37.9 (10.0)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter element	Replace	-	-	1
	20	Aircon and heater filter (inner & outer)	Replace	-	-	2
500	21	Air cleaner element (primary)	Check, Clean	-	-	1
Hours	22	Fuel filter element	Replace	-	-	2
	23	Radiator, oil cooler, charge air cooler	Check, Clean	-	-	3
	25	Corrosion resistor	Replace	-	-	1
	25	Coolant test (DCA4 concentration)	Test, Add	DCA4	-	1
	28	Air compressor air filter (option)	Check, Clean	-	-	1
	11	Swing reduction gear oil	Change	GO	7.0 (1.8)	2
	12	Swing gear and pinion grease	Change	PGL	14 kg (31 lb)	1
1000	15	Hydraulic oil return filter	Replace	-	-	2
Hours	16	Drain filter cartridge	Replace	-	-	1
	17	Air breather element	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	24	Travel reduction gear oil	Change	GO	12 (3.2)	2
	1	Hydraulic oil*1	Change	HO	260 (68.7)	1
	4	Radiator coolant*1	Change	С	49 (12.9)	1
	18	Hydraulic oil suction strainer	Check, Clean	-	-	1
	21	Air cleaner element (primary)	Replace	-	-	1
2000	21	Air cleaner element (safety)	Replace	-	-	1
Hours	21	Air cleaner (oil bath, option)	Disassemble, Clean, Replace	EO	5.0 (1.3)	1
	26	RCV lever	Check, Lubricate	PGL	-	2
	28	Air compressor air filter (option)	Replace	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
4000 Hours	27	Fuel tank breather filter	Replace	-	-	1
5000 Hours	1	Hydraulic oil*2	Change	HO	260 (68.7)	1
6000 Hours	4	Radiator coolant*2	Change	С	49 (12.9)	1
	20	Aircon & heater fresh filter	Replace	-	-	1
	20	Aircon & heater recirculation filter	Clean, Replace	-	-	1
As	21	Air cleaner element (primary)	Clean, Replace	-	-	1
required	21	Air cleaner element (safety)	Replace	-	-	1
	21	Air cleaner (oil bath, option)	Check, Clean, Replace	EO	5.0 (1.3)	1
	28	Air compressor air filter (option)	Clean, Replace	-	-	1

*1 Conventional

*² HD Hyundai Construction Equipment genuine long life

※ Oil symbol Please refer to the recommended lubricants for specification.

Flease relef to the	recommended lubricar	its for specification.
DF : Diesel fuel	GO : Gear oil	HO : Hydraulic oil
C : Coolant	PGL : Grease	EO : Engine oil
		0-10

6. SERVICE INSTRUCTION

1) CHECK ENGINE OIL LEVEL

Check the oil level with the machine on a flat ground before starting engine.

- (1) Pull out the dipstick and wipe with a clean cloth.
- (2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.
- (3) If oil level is LOW, add oil and then check again.
- If the oil is contaminated or diluted, change the oil regardless of the regular change interval.
- * Check oil level after engine has been stopped for 15 minutes.
- A Do not operate unless the oil level is in the normal range.



2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

- (1) Warm up the engine until the coolant temperature reaches 60° C (140°F). Shut off the engine.
- (2) Turn the lever of oil drain valve to open position. Drain the oil immediately to be sure all the oil and suspended contaminants are removed from the engine.
- A drain pan with a capacity of 40 liters (11U.
 S. gallons) will be adequate.
- (3) Clean the area around the lubricating oil filter head.
 - · Wrench size : 120 mm (4.72 in)
- (4) Use oil filter wrench to remove the oil filter.
- (5) Clean the gasket surface of oil filter head.





- (6) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.
- * Fill the filters with clean lubricating oil.



- (7) Install the filter to the filter head.
- Mechanical over-tightening may distort the threads or damage the filter element seal.
 - · Install the filter as specified by the filter manufacturer.



(8) Fill the engine with clean oil to the proper level. \cdot Quantity : 37.9 ℓ (10 U.S.gallons)



(9) Operate the engine at low idle and inspect for leaks at the filters and the drain valve.Shut the engine off and check the oil level with the dipstick. Allow 15 minutes for oil to drain down before checking.



3) CHECK COOLANT

- (1) Check if the level of coolant in reservoir tank is between FULL and LOW.
- (2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.
- (3) Be sure to use the reservoir empty, add the coolant by opening the cap of surge tank.
- (4) Replace gasket of surge tank cap when it is damaged.
- ▲ Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.





3-1) COOLANT TEST STRIPS INSTRUCTIONS

(1) Pre-test instruction

Recommended testing frequency - at every coolant filter change interval.

- ① Collect coolant sample from the radiator drain valve.
 - Do not collect from the coolant recovery or overflow system
 - Coolant must be between 10~54 $^\circ\!\!\mathbb{C}$ when tested
 - Room temperature is best.
- ② For accurate results, test must be completed within 75 seconds.
 - Follow recommended test times. Use a stopwatch.
- ③ Record and track results.

(2) Test instruction

 Remove one strip from bottle and replace cap immediately.

Do not touch the pads on the end of the strip. Discard kit if nitrite test pads of unused strips have turned brown.

- ② Dip strip for 1 second in coolant sample, remove, and shake strip briskly to remove excess liquid.
- ③ 45 seconds after dipping strip, compare results to color chart and record in the following order:



- ④ All three readings must be completed no later than 75 seconds after dipping strip.
- (5) If uncertain about the color match, pick the low numbered block.

ex.) If nitrite color is not F, use column E.

6 Determine where the molybdate level intersect the nitrite level on the chart. The amount of SCA units per gallon in the cooling system is given where the molybdate row intersect the nitrite column.



380L6CT01





(3) Maintenance actions based on results

- ① Above normal
 - ABOVE NORMAL
 Do not replace the coolant filter or add DCA4 liquid until additive concentration falls below 3 units per gallon.
 - Test at every subsequent coolant filter change interval.

② Normal

- Continue to replace the coolant filter at your normal interval.

③ Below normal

NORMAL

- Replace the coolant filter and add 1 pint of additive per each 4 gallons of coolant.
 - Replace the coolant filter and add 40 cc of additive per each 1 liter of coolant.
- If you need part number of Test kit or DCA4, please see Parts Manual.

¹⁰ 0.0	1.7	2.8	3.1	37	41 0VE N	49	57
0.0	1.7	2.3	2.7	3.1	3.5	4.3	5.1
®90.0	1.4	10			<u>ې 8</u>	3.6	4.4
0.0	1.2	1.5	1.7	2.1	2.5	3.3	4.1
¥0.0	1.0	1.2	1.4	1.8	2.2	3.0	3.8
			 Al	1.5	1.9	2.7	3.5
20.0	0.3	0.6	0.8	1.2	1.6	2.4	3.2

380L6CT04

4) FLUSHING AND REFILLING OF RADIATOR

- (1) Change coolant
- A void prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.

Avoid excessive contact-wash thoroughly after contact.

Keep out of reach of children.

Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.

Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.

If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



▲ Wait until the temperature is below 50°C (122°F) before removing the coolant system pressure cap.

Failure to do so can cause personal injury from heated coolant spray.

Drain the cooling system by opening the drain valve on the radiator and removing the plug in the bottom of the water inlet. A drain pan with a capacity of 49 liters (12.9 U.S.gallons) will be adequate in most applications.



(2) Flushing of cooling system

- Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).
- W Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.
- Do not install the surge tank cap. The engine is to be operated without the cap for this process.



During filling, air must be vented from the engine coolant passages. Open the engine venting petcock.

The system must be filled slowly to prevent air locks. Wait 2 to 3 minutes to allow air to be vented, then add mixture to bring the level to the top.



② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.



- ③ Fill the cooling system with clean water.
- * Be sure to vent the engine and aftercooler for complete filling.
- ※ Do not install the surge tank cap or the new coolant filter.

- ④ Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F).
 Shut the engine off, and drain the cooling system.
- If the water being drained is still dirty, the system must be flushed again until the water is clean.





(3) Cooling system filling

- Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-11. Coolant capacity (engine only) : 9.5 ℓ (2.5 U.S. gallons)
- * Use the correct amount of DCA4 corrosion inhibitor to protect the cooling system.
- ※ Do not use hard water such as river water or well water.
- ② The system has a maximum fill rate of 19 liters (5.0 U.S. gallons)

Do not exceed this fill rate.

* The system must be filled slowly to prevent air locks.

During filling, air must be vented from the engine coolant passage.

Be sure to open the petcock.

Then add mixture to bring the level to the top.





③ Install the pressure cap. Operate the engine until it reaches a temperature 80°C (176°F), and check for coolant leaks. Check the coolant level again to make sure the

system is full of coolant.



Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

- (1) Visually inspect the radiator for clogged radiator fins.
- (2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.Blow the air in the opposite direction of the fan air flow.
- (3) Visually inspect the radiator for bent or broken fins.
- If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.
- (4) Visually inspect the radiator for core and gasket leaks.







6) CHECK CHARGE AIR COOLER

Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact HD Hyundai Construction Equipment distributor.



7) FAN BELT TENSION AND DAMAGE

(1) Inspect the drive for damage.



(2) Inspect the drive belt and fan hub.



8) INSPECTION OF COOLING FAN

- ▲ Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.
- * Rotate the crankshaft by using the engine barring gear.
- * A visual inspection of the cooling fan is required daily.

Check for cracks, loose rivets, and bent or loose blades.

Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary. Replace any fan that is damaged.



9) BELT TENSIONER, AUTOMATIC Adjustment

- Every 1000 hours, or 1 year, whichever occurs first, inspect the automatic belt tensioner.
 With the engine turned off, check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body. If either of the stops is touching a boss, the alternator belt must be replaced. Check to make sure the correct belt part number is being used it either condition exists.
- (2) Check the tensioner pulley and body for cracks. If any cracks are noticed, the tensioner must be replaced. Refer to a Cummins Authorized Repair facility. Check the tensioner for dirt buildup. If this condition exists, the tensioner must be removed and steam-cleaned.





(3) Check that the bottom tensioner arm stop is in contact with the bottom tensioner arm stop boss on the tensioner body. If these two are not touching, the tensioner must be replaced.







- (5) A worn tensioner that has play in it or a belt that "walks" off its pulley possibly indicates pulley misalignment.
- Maximum pulley mislignment is three degrees. This measurement can be taken with a straightedge and an inclinometer.
- (6) Install the belt.



Clamp

10) CLEANING OF AIR CLEANER

riangle Always cover the engine intake hole while the air cleaner is being serviced.

(1) Primary element

- 1 Loosen the clamps and remove the element.
- 2 Clean the inside of the body.
- 3 Clean the element with pressurized air.
 - Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.
- ④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
- 5 Insert element and tighten wing nut.
- Replace the primary element after 4 times cleanings.
- (2) Safety element
 - * Replace the safety element only when the primary element is cleaned for the 4 times.
 - ※ Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.

<image><image><image>

11) FUEL TANK

- Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.
- (2) Drain the water and sediment in the fuel tank by opening the drain cock.
- * Be sure to LOCK the cap of fuel tank.
- Remove the strainer of the fuel tank and clean it if contaminated.
- ▲ Stop the engine when refueling. All lights and flames shall be kept at a safe distance while refueling.



12) AIR CLEANER (OIL BATH, OPTION)

(S/N HX480S L : -#0010 / HX520S L : -#0004)

 \triangle Always cover the engine intake hole while the air cleaner is being serviced.

(1) General service

- ① The wet type air cleaner should be inspected constantly for leaks and damage.
- ② The removable element assembly (4) should be removed from the from the oil cups (1, 2) and inspected daily or at each oil cup service.
- ③ Watch all connections for mechanical tightness. Be sure cleaner outlet pipe is not fractured.
- ④ If air cleaner has been dented or damaged, check all connections immediately.
- ⑤ In case of leakage and if adjustment does not correct the trouble, replace necessary parts or O-ring.



(2) Oil cup

- Service the inner oil cup (1) and outer oil cup
 (2) daily or when 1/2" of dirt has collected in bottom of either cup.
- Severe operating conditions may require several inspections daily.
- 2 Loosen the side clamps and removing bottom of unit and lift the removable element assembly (4) from the oil cup.
- ③ Pour out the oil and remove inner cup (1) from out cup (2) and remove sludge and wipe clean.
- ④ Reassembled inner cup (1) in outer cup (2) and refill both cups to indicated oil level.
- (5) The same oil specified for the engine crankcase is generally acceptable.
- Do not over fill or under fill the cup. Overfilling means loss of capacity and under filling means lack of efficiency.



(3) Removable element

- First step in servicing removable element assembly is hold up to a strong light. An even, bright pattern of light through the wire element means if is clean.
- ② If removable element is even partially plugged with dirt, lint or chaff, wash thoroughly with solvent.

Then blowout with compressed air.

- ③ Inspect lower portion of body assembly and center tube each time oil cup is serviced. See back side for service details.
- ④ Reassemble removable element assembly to serviced oil cups and to air cleaner body.
 Be sure the oil cup is tight to body assembly.



(4) Body assembly

The lower portion of the body assembly should be inspected each time the air cleaner is serviced. If there is any sign of build-up or plugging, the body assembly should be removed and cleaned. At least once a year, remove the body assembly and perform the following service steps.

- Remove oil cup and removable element assembly.
- 2 Check and clean center tube.



③ Pump solvent through the air outlet with sufficient force and volume to produce a hard, even stream out the bottom of the body assembly. Reverse flush until all foreign material is removed.



12-1) AIR CLEANER (OIL BATH, OPTION)

(S/N HX480S L : #0011- / HX520S L : #0005-)

- In harsh working condition, the filter element must be inspected and cleaned daily or change the oil.
- Failure to manage filters can cause degradation. If the filter is clogged, engine damage and power loss will occur.
- In order to ensure the filtration efficiency of oil bath, it is recommended to replace a set of metal elements every year.

The maximum ash capacity of the filter element is approximately to 14 kg (31 lb).

(1) Check air cleaner

Check the inside and out side of the air cleaner.



(2) Cleaning and replacement of filter element

- 1 Disassemble as shown the illustration.
- 2 Check the filter element with the light.
- ③ Clean or chagne the filter element if necessary. Immerse the filter element in diesel for 20 to 30 minutes, take out the filter element and then wash is with diesel to remove the remaining dust on the filter element.
- ④ Use commpressed air to dry completely.
- 5 Check the housing WA.
- 6 Check the lower body of the air cleaner and center tube everytime when the oil tank is serviced. Replace any broken, cracked or missing part.
- \bigcirc After serviced, assemble oil tank with oil plate and fill the oil (3 ~ 5 ℓ / 0.8 ~ 1.3 U.S. gal) in the guide line. Frequently check whether the oil tank buckle for looseness.



13) REPLACEMENT OF FUEL FILTER

- (1) Clean around the filter head, remove the filter and clean the gasket surface.
- (2) Replace the O-ring.
- (3) Fully fill fuel in the new filter.
- (4) Apply engine oil on the gasket of filter when mounting, and tighten 1/2 to 3/4 turn more after the gasket touches the filter head.
- (5) Relieve the air after mounting.
- * Check for fuel leakage after the engine starts.
- If air is in the fuel system, the engine will not start. Start engine after bleeding the air according to the method of bleeding air.

14) FUEL WATER SEPARATOR

- Drain the water and sediment from the separator daily.
- Shut off the engine.
- Use your hand to open the drain valve.
- Turn the valve counterclockwise 3-1/2 complete turns until the valve drops down 1".
- Drain the filter sump of water until clear fuel is visible.
- Do not overtighten the valve.
 Overtightening can damage the threads.
- Push the valve up and turn the valve clockwise to close the drain valve.





15) PREFILTER

Inspect or drain the collection bowl of water daily and replace the element every 500 hours.

(1) Drain water

- $(\ensuremath{\underline{1}})$ Open bowl drain value to evacuate water.
- 2 Close drain valve.
- * Don't tighten up a drain valve so strong.
- * Please inspect and drain water frequently for remain water volume to be less than 1/3 volume of a collection bowl.



(2) Replace element

- ① Drain the unit of fuel. Follow "Drain water" instructions above.
- 2 Remove element / bowl from filter head.
- * The bowl is reusable, do not damage or discard.
- ③ Separate element from bowl. Clean bowl and seal gland.



- ④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.
- ⁵ Attach bowl to new element firmly by hand.
- 6 Lubricate new element seal and place in element top gland.
- $\ensuremath{\overline{\mathcal{O}}}$ Attach the element and bowl to the head.



16) CORROSION RESISTOR (COOLANT FILTER)

- ▲ Do not remove the radiator cap from a hot engine. Wait until the coolant temperature is below 50°C (120°C) before removing the radiator cap. Heated coolant spray or steam can cause personal injury
- (1) Remove the surge tank cap.



- (2) Turn the valve to the OFF position.
- (3) Remove and discard the filter.Clean the coolant filter head gasket's surface.
- A small amount of coolant can leak when servicing the filter with the shutoff valve in the OFF position. To avoid personal injury, avoid contact with hot coolant.
- (4) Apply a thin film of clean engine oil to the gasket sealing surface before installing a new filter.
- If the filter canister is damaged in any way, do not use it. Dents or scrapes can lead to a rupture or premature failure of the filter.





- (5) Install a new filter on the filter head. Tighten the filter until the gasket contacts the filter head surface.
- (6) Tighten the filter an additional 1/2 to 3/4 of a turn.
- Mechanical over tightening can distort the filter threads or damage the filter head.



- (7) Turn the valve to the ON position, and install the surge tank cap.
- (8) Operate the engine and check for leaks.
- * The valve must be in the ON position to prevent engine damage.



17) LEAKAGE OF FUEL

A Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.



18) REPLACEMENT OF FUEL TANK AIR BREATH-ER FILTER

- (1) Stop the engine.
- (2) Remove the air breather filter using the special spanner wrench and dispose it in accordance with environmental regulations.
- (3) Replace the filter with a new one.
 Tightening torque : 0.95±1.0 kgf ⋅ m (6.9±7.2 lbf ⋅ ft)



19) HYDRAULIC OIL CHECK

- Position the machine as shown in the illustration on the right. Please stop the engine and wait for about 5 minutes.
- (2) Check the oil level at the level gauge of hydraulic oil tank.
- (3) The oil level is normal if the oil is between the red lines. The oil level depends on the temperature of the hydraulic oil. Refer to the height (A) in the below table to check the level gauge.

Temperature		Height A	
°C	°F	mm	inch
0	32	15	0.6
10	50	25	1.0
20	68	30	1.2
30	86	35	1.4
40	104	40	1.6

- * Refer to page 3-22 for checking the temperature of the hydraulic oil.
- * Add the hydraulic oil, if necessary.

20) FILLING HYDRAULIC OIL

- (1) Stop the engine to the position of level check.
- (2) Relieve the pressure in the tank by pushing the top of the air breather.
- (3) Remove the breather on the top of oil tank and fill the oil to the specified level.
- (4) Start engine after filling and operate the work equipment several times.
- (5) Check the oil level at the level check position after engine stops.







21) CHANGE HYDRAULIC OIL

- (1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.
- (2) Relieve the pressure in the tank by pushing the top of the air breather.
- (3) Remove the cover.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$ (50±10 lbf · ft)
- (4) Prepare a suitable container.
- (5) To drain the oil open the drain valve at the bottom of the oil tank.
- (6) Fill proper amount of recommended oil.
- (7) Put the breather in the right position.
- (8) Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.
- (9) Start engine and run continually. Release the air by full stroke of each control lever.

22) CLEAN SUCTION STRAINER

Clean suction strainer as follows paying attention to the cause to be kept during oil filling.

- (1) Remove the cover.
 - Tightening torque : 6.9 ± 1.4 kgf · m (50 ± 10 lbf · ft)
- (2) Pull out the strainer in the tank.
- (3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.
- (4) Replace the suction strainer if it is damaged.
- (5) Assemble with reverse order of disassembly. Be sure to install a new O-ring and reinsert in the oil tank.
- Loosen the bolt slowly at the cover can be spring out by the spring when removing it.





23) REPLACEMENT OF RETURN FILTER

Replace as follows paying attention to the cause to be kept during the replacement.

- (1) Remove the cover.
 - \cdot Tightening torque : 6.9 \pm 1.4 kgf \cdot m (50 \pm 10 lbf \cdot ft)
- (2) Remove the spring, by-pass valve and return filter in the tank.
- (3) Replace the element with a new one.



24) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

- (1) Relieve the pressure in the tank by pushing the top of the air breather.
- (2) Loosen the bolt and remove the cover.
- (3) Pull out the filter element.
- (4) Replace the filter element new one.
- (5) Reassemble by reverse order of disassembly.
 Tightening torque : 0.8~1.0 kgf · m (5.9~7.4 lbf · ft)



25) REPLACE OF DRAIN FILTER CARTRIDGE

Clean the dust around filter and replace with new one after removing the cartridge.

- Tighten about 2/3 turn more after the gasket of cartridge contacts seal side of filter body for mounting.
- * Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.



26) REPLACE OF PILOT LINE FILTER

- (1) Loosen the nut positioned on the filter body.
- (2) Pull out the filter element and clean filter housing.
- (3) Install the new element and tighten using specified torque.
- * Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.

27) CHECK THE SWING REDUCTION GEAR OIL

- (1) Pull out the dipstick and clean it.
- (2) Insert it again.
- (3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.





28) CHANGE SWING REDUCTION GEAR OIL

- (1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.
- (2) Prepare a proper container.
- (3) Open the cap and loosen the drain valve.
- (4) Clean around the valve and close the drain valve and cap.

Fill proper amount of recommended oil.

· Amount of oil : 7.0 ℓ (1.8 U.S.gal)

29) LUBRICATE SWING BEARING

- (1) Grease at 2 fitting.
- * Lubricate every 250 hours.





30) SWING GEAR AND PINION

(1) Drain old grease

(2) Refill new grease ① Install drain cover.

Fill with new grease.
 Install filler cover.

· Capacity : 14 kg (31 lb)

- 1 Remove under cover of lower frame.
- ② Remove drain cover of lower frame.
- ③ Remove filler cover of upper frame.
- ④ Operate full turn (360°) of swing several times.





31) CHECK THE TRAVEL REDUCTION GEAR OIL

- (1) Operate the machine to the position of drain plug down to the flat ground.
- (2) Loosen the level plug and check the oil level.If the level is at the hole of the plug, it is normal.Fill the oil if it is not sufficient.
 - · Amount of oil : 12ℓ (3.2 U.S.gal)

32) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

- (1) Raise the temperature of the oil by traveling machine first.
- (2) Stop when the position of the drain plug is down.
- (3) Loosen the level plug and then the drain plug.
- (4) Drain the oil to adequate container.
- (5) Tighten the drain plug and fill specified amount of oil at filling port.
- (6) Tighten the level plug and travel slowly to check if there is any leakage of oil.





33) LUBRICATE RCV LEVER

Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



34) ADJUSTMENT OF TRACK TENSION

- It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.
- * The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties.

It is thus necessary to continually inspect the track tension so as to maintain the standard tension on it.

- (1) Raise the chassis with the boom and arm.
- (2) Measure the distance between bottom of track frame on track center and back of shoe.
- Remove mud with rotating the track before measuring.
- (3) If the tension is tight, drain the grease in the grease nipple and if the tension is loose, charge the grease.
- A Personal injury or death can result from grease under pressure.
- A Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.

Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

When the grease is drained, move the track to the forward and backward slightly.

If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as there are worn seriously.



Working condition	Lengtl	n (L)
General	390~420 mm	15.4~16.5"
Swamp	420~460 mm	16.5~18.1"
Sand, Mud, Pebbles	About 460 mm	About 18.1"

35) REPLACEMENT OF BUCKET

- △ When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.
- When the bucket is removed, place it in a stable condition.
- When performing joint work, make sure signals to each other and work carefully for safety's sake.
- (1) Lower the bucket on the ground as the picture shown in the right.
- (2) Lock the safety knob to the LOCK position and stop the engine.
- (3) Remove the stopper bolts (1) and nuts (2), then remove pins (3, 4) and remove the bucket.
- When removing the pins, place the bucket so that it is in light contact with the ground.
- If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.
- * After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.
- (4) Align the arm with holes (A) and the link with holes (B), then coat with grease and install pins (3, 4)
- When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture. After knocking the pin, move the O-ring down to the regular groove.
- (5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.









36) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

- Check wearing condition as shown in the illustration and replace tooth point before adapter starts to wear.
- ② If excessive use, tooth adapter has worn out, replacement may become impossible.



(2) Instructions for replacement

- ① Pull out pin by striking pin with punch or hammer, avoiding damage to lock washer.
- ② Remove dust and mud from surface of tooth adapter by using knife.
- ③ Place lock washer in its proper place, and fit tooth point to adapter.
- ④ Insert pin until lock washer is positioned at tooth pin groove.
- A Personal injury can result from bucket falling.
- A Block the bucket before changing tooth points or side cutters.



37) ADJUSTMENT OF BUCKET CLEARANCE

- (1) Lower the bucket on the ground as the picture shown in the right.
- (2) Swing to the right and keep the arm boss to be contact to the bucket left.
- (3) Lock the safety knob to the LOCK position and stop the engine.
- (4) Measure the clearance (A) between bucket and arm boss. This is the total clearance.

(5) Adjusting

- Loosen bolt (2), and remove washer (3), plate
 (1) and shim (4).
- ② Remove the shim equivalent value with measuring value.
- ③ Assemble the parts in the reverse order of removal.
 - \cdot Tightening torque : 29.6 \pm 3.2 kgf \cdot m (214.0 \pm 23.1 lbf \cdot ft)
 - Normal clearance : 0.5 ~ 1.0 mm (0.02 ~ 0.04 in)
- If the bucket is not adjusted correctly, noise and vibration created during operation, and damaged O-ring, pin and bushing quickly.



38) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device Lubricate the grease to the grease nipple according to the lubricating interval.

No.	Description	
1	Lubrication manifold at boom	5
2	Boom cylinder pin (head)	
3	Lubrication manifold at arm	
	Bucket cylinder pin (rod)	
	Bucket link (control rod)	2
4	Arm and bucket connection pin	
	Bucket and control rod connection pin	
	Arm and control link connection pin	1
5	5 Boom rear bearing center *	



- * Shorten lubricating interval when working in water or dusty places.
- ★ Not required : If necessary, lubricate the grease.
- (2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.
- * Mount the lip to be faced outside when replace the dust seal.



- If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.
- * Assemble the seal same direction with picture and use with plastic hammer when replace.



39) REPLACEMENT OF THE AIR COMPRESSOR'S AIR FILTER

- (1) Loosen the air filter cap counterclockwise.
- (2) Use pressurized air from the inside to the outside when cleaning the air filter.
- (3) Reassemble by reverse order of disassembly.
- * Please install the air inlet in the lower direction.
- (4) If the air filter is damaged or badly contaminated, use a new filter.
- △ If you are using the air compressor on the equipment when cleaning the air filter, the use for a long time can cause internal damage to a piston ring or a liner. Because dust or a contaminant may be inhaled through the air inlet. Please use for a short time at a clean place.









7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

(1) Clean

- ① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.
- A Battery gas can explode. Keep sparks and flames away from batteries.
- Always wear protective glasses when working with batteries.
- ▲ Do not stain clothes or skin with electrolyte as it is acid.

Be careful not to get the electrolyte in eyes. Wash with clean water and go to the doctor if it enters the eyes.



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(2) Recycle

Never discard a battery.

Always return used batteries to one of the following locations.

- · A battery supplier
- · An authorized battery collection facility
- · Recycling facility

(3) Method of removing the battery cable

Remove the cable from the ground connection first (\ominus terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

* Use the same capacity of battery for starting.

- Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.
- ② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.
- ③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.
- ※ Keep firmly all connection, the spark will be caused when connecting finally.



(2) Starting the engine

- ① Starting the engine of the normal machine and keep it to run at high idle.
- ② Start engine of the trouble machine with starting switch.
- ③ If you can not start it by one time, restart the engine after 2 minutes.

(3) Taking off the booster cable

- ① Take off the booster cable (black).
- ② Take off the booster cable (red) connected to the (+) terminal.
- ③ Run engine with high idle until charging the exhausted battery by alternator, fully.
- ▲ Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.
- * Charge the battery in the well ventilated place.
- * Place the machine on the earth or concrete. Avoid charging the machine on the steel plate.
- Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.





(4) Welding repair

Before start to welding, follow the below procedure.

- ① Shut off the engine and remove the starting switch.
- ② Disconnect ground cable from battery by master switch.
- ③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, ECM, cluster etc).
- ④ Connect the earth (ground) lead of the welding equipment as close to the welding point as possible.
- * Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.
- ▲ Do not attempt to welding work before carry out the above.

If not, it will caused serious damage at electric system.



8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF FRESH AIR FILTER

- * Always stop the engine before servicing.
- (1) Open the fresh air filter room.





- (2) Remove the fresh air filter.
- When installing a filter, be careful not to change the filter direction.

- (3) Clean the filter using a pressurized air (below 2 kgf/cm², 28 psi).
- \triangle When using pressurized air, be sure to wear safety glasses.
- (4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



2) CLEAN AND REPLACE OF RECIRCULATION FILTER

- * Always stop the engine before servicing.
- Move seat and console box to arrow direction using the adjust knob.



(2) Remove recirculation filter.



- (3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.
- When using pressurized air, be sure to wear safety glasses.
- * Dry off after washing with water.
- (4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



3) PRECAUTIONS FOR USING AIR CONDITIONER

- (1) When using the air conditioner for a long time, open the window once every one hour.
- (2) Be careful not to overcool the cab.
- (3) The cab is properly cooled if the operator feels cool when entering there from outside (about 5°C lower than the outside temperature).
- (4) When cooling, change air occasionally.

4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

5) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (each for a few minutes) to avoid loss of oil film in the compressor.

6) Refrigerant (R134-a) amount : 850 \pm 20 g