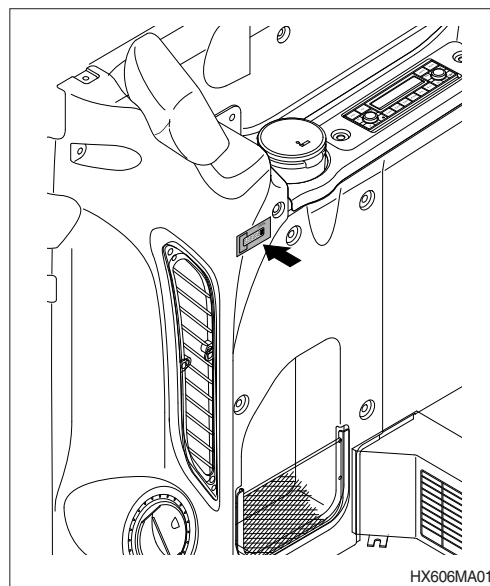


## 1. INSTRUCTION

### 1) INTERVAL OF MAINTENANCE

- (1) Inspect and service machine as described on page 6-10.
- (2) Shorten intervals of inspection and service depending on site conditions. (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) Do not perform maintenance on the machine until you have read the operator's manual and are familiar with the machine.
- (2) Daily inspection should be performed according to section, Maintenance check list.
- (3) Engine and hydraulic components have been preset from the factory.  
Do not allow unauthorized personnel to reset them.
- (4) Drain the used oil and coolant (always in separate containers). Handle and dispose of the waste per regulation of each province/country as well as any local laws.
- ▲ **Hot oil and hot components can cause serious injury or death. Do not allow hot oil or hot components to contact skin. Failure to comply may result in serious injury or death.**
- △ **Accumulated grease and oil on the machine is a fire hazard. Remove any coating/film of fuel, oil or grease by steam cleaning the machine with high pressure water. Preform this at minimum of 1000 hours.**
- △ **Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.**
- (5) Ask 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 before or at the required time to maintain machine performance.

(2) Always use only HD Hyundai Construction Equipment genuine parts.

(3) Use the recommended oil.

(4) Do not perform repairs while the machine is running. Stop the engine when you fill the oil.

(5) Always wear protective goggles, protective gloves and other personal protective equipment.

(6) Clean around the inlet of oil tank before adding oil.

(7) Drain oil when the temperature of oil is warm.

(8) Relieve hydraulic system of pressure before repairing the hydraulic system.

(9) Confirm if cluster has any warnings present after completion of service.

(10) For more detail information of maintenance, please contact your local HD Hyundai Construction Equipment dealer.

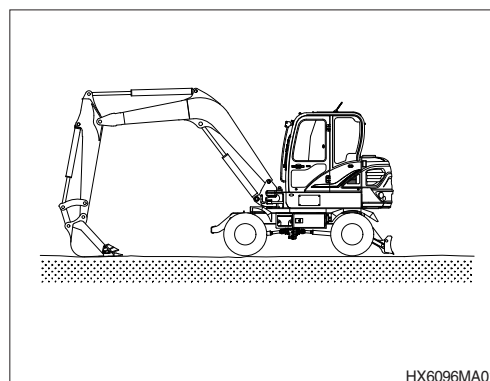
※ **Read chapter 1 of this manual for safety instructions prior to performing any maintenance on the machine.**

#### 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.

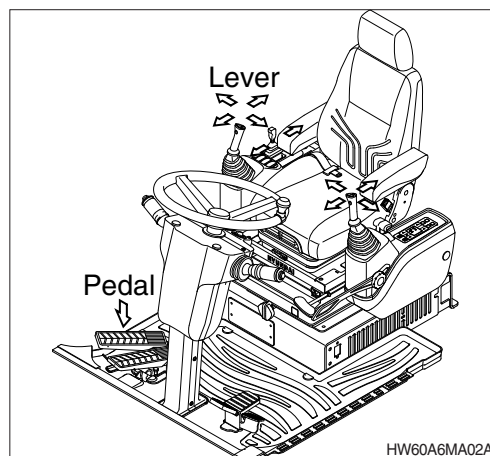
Be sure to relieve the pressure in the system before repairing hydraulic system.

- (1) Place machine in parking position, and stop the engine.

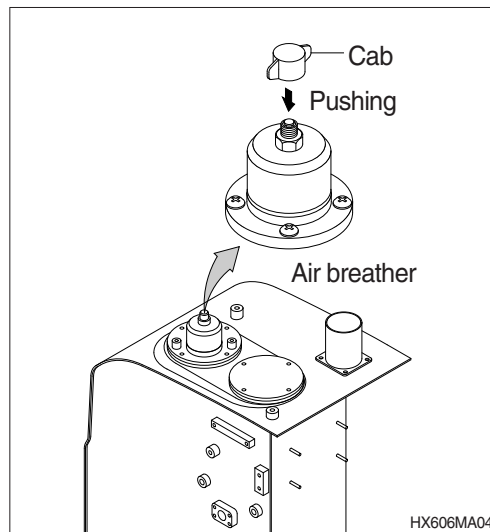


- (2) Set the safety knob completely in the UNLOCK position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **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) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.



## **5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES**

- (1) 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

- (1) 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.

Periodical replacement of safety parts			Interval
Engine		Fuel hose(tank-engine)	Every 2 years
		Heater hose (heater-engine)	
Hydraulic system	Main circuit	Pump suction hose	
		Pump delivery hose	
		Swing hose	
	Working device	Boom cylinder line hose	
		Arm cylinder line hose	
		Bucket cylinder line hose	
	Brake line	Service brake line hose	
		Parking brake line hose	
		Steering line hose	

※ Replace O-ring and gasket at the same time when replacing the hose.

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

Bolt size	8.8T		10.9T		12.9T	
	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

Bolt size	8.8T		10.9T		12.9T	
	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
M14×1.5	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
M20×1.5	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

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-Bracket)	M10 × 1.5	6.5±0.7	47.0±5.1
2		Engine mounting bolt (bracket-Frame)	M16 × 2.0	29.7±3.0	215±22.0
3		Radiator mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79±7.2
5	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12.3±3.0	89±22.0
		Main pump housing mounting bolt	M10 × 1.5	6.5±0.7	47±5.1
6		Main control valve mounting bolt	M12 × 1.75	12.8±3.0	92.6±22.0
7		Travel motor mounting bolt	M12 × 1.75	14.7±2.2	106±15.9
8		Fuel tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
9		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
10		Turning joint mounting bolt, nut	M12 × 1.75	14.7±2.2	106±16.0
11	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
12		Swing bearing upper mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
13		Swing bearing lower mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
14		Front axle mounting bolt, nut	M16 × 2.0	29.7±4.5	215±33.0
15		Rear axle mounting bolt, nut	M16 × 2.0	29.7±4.5	215±33.0
16		Gear box mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
17		Oscillating cylinder mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
18		Oscillating cylinder support bolt	M12 × 1.75	12.8±3.0	92.6±22.0
19		Wheel nut	M18 × 1.5	46.0±3.0	333±22.0
20		Front drive shaft mounting bolt, nut	M10 × 1.25	7.4±1.5	53.5±11.0
21		Rear drive shaft mounting bolt, nut	M10 × 1.25	7.4±1.5	53.5±11.0
22	Others	Counterweight mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
23		Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92±22.0
24		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.1	8.5±0.7



### 3. FUEL, COOLANT AND LUBRICANTS

#### 1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil (API CK-4)	SAE 10W-30
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG 46, VG 68) Conventional (ISO VG15, <sup>★1</sup> )
Swing reduction gear oil	SAE 85W-140 (API GL-5)
Transmission gear oil	SAE 85W-90 LSD (API GL-5)
Axle gear oil	SAE 85W-90 LSD (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2, <sup>★2</sup> Ultra low sulfur fuel
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water. Mixture of 60% ethylene glycol base antifreeze and 40% water. <sup>★1</sup>

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

<sup>★1</sup> Cold region

- Russia, CIS, Mongolia

<sup>★2</sup> Ultra low sulfur diesel

- Sulfur content ≤ 15 ppm

## 4. MAINTENANCE CHECK LIST

### 1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-24
Hydraulic oil level	Check, Add	6-26
Engine oil level	Check, Add	6-17
Coolant level	Check, Add	6-19
Control panel & pilot lamp	Check, Clean	6-39
Prefilter (water, element)	Check, Drain	6-24
★ Attachment pin and bushing	Lubricate	6-39
· 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		

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

### 2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water sediment)	Drain	6-24
Drive shaft joint (flange bearing)	Check, Add	6-32
Swing reduction gear oil	Check, Add	6-30
Swing gear & pinion	Check, Add	6-30
Wheel nut	Check, Tight	6-33
Tire air pressure	Check, Inflate	6-33
Bucket linkage & blade pins	Lubricate	6-39
· Bucket cylinder rod end		
· Arm + Bucket connecting		
· Arm + Bucket control link		
· Bucket control rod		
· Bucket link connecting		
· Boom swing cylinder head and rod		
· Boom swing post pin		
· Dozer blade cylinder (rod end, tube end)	Lubricate	6-32
· Dozer blade pivot pin	Lubricate	6-32
· Drive shaft (front and rear)	Lubricate	6-32
· Axle pivot	Lubricate	6-32
· Hub pivot	Lubricate	6-32
· Steering links	Lubricate	6-32
Prefilter (water, element)	Replace	6-24
Transmission case	Lubricate, Add	-
Front axle pivot pin bushing	Lubricate, Add	-
Front axle differential gear case	Check, Add	6-35
Rear axle differential gear case	Check, Add	6-35
Axle planetary gear case	Change	-
Front axle steering case	Change	6-34

### 3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Fan belt tension & damage	Check	-
Bolts & Nuts	Check, Tight	6-8
· Power train mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Hydraulic pump mounting bolts		
Boom swing cylinder (swivel type)	Add, Lubricate	-

※ **Service the above items only for the new machine, and thereafter keep the normal service interval.**

### 4) EVERY 200 HOURS SERVICE

Check items	Service	Page
★ Hydraulic oil return filter	Replace	6-28
★ Pilot line filter element	Replace	6-29

★ **Replace 2 filters for continuous hydraulic breaker operation only.**

### 5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-17, 18
Engine oil filter	Replace	6-17, 18
Prefilter	Replace	6-25
Swing reduction gear case	Change	6-30
Swing reduction gear grease	Check, Add	6-30
Transmission case	Check	-
Pilot line filter element	Replace	6-29
Front / Rear axle differential gear case	Change	6-35
Axle planetary gear case	Change	6-35
Fuel filter element	Replace	6-25

※ **Service the above items only for the new machine, and thereafter keep the normal service interval.**

## 6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check, Clean	6-40
Aircon & heater circulation filter (outer filter)	Check	6-43
Swing bearing grease	Lubricate	6-30
Air cleaner element (primary)	Check	6-23
Fan belt tension & damage	Check	6-22
Bolts & Nuts	Check, Tight	-
· 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		
Attachment pin and bushing	Lubricate	6-39
· Boom cylinder tube end		
· Boom swing cylinder tube and rod end		
· Boom foot		
· Boom and arm cylinder rod end		
· Arm and boom cylinder tube end		
· Boom + Arm connecting		
Boom swing cylinder (boom swing type)	Lubricate	6-39
Attachment pins (boom swing type)	Lubricate	6-39

## 7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★ Engine oil	Change	6-17, 18
Prefilter	Replace	6-24
☆ Air cleaner element (primary)	Inspect, Clean	6-23
Fuel filter element	Replace	6-25
Radiator, cooler fin and charge air cooler	Check, Clean	6-22

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

★ Change oil every 1000 hours when using API CK-4.

☆ Clean the primary element only after 500 hours operation or when the air cleaner warning lamp blinks. Replace primary element and safety element after 4 times cleanings of primary element.

## 8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Engine oil filter <sup>★4</sup>	Replace	6-17, 18
Hydraulic tank air breather element	Change	6-29
Swing reduction gear case	Change	6-30
Swing reduction gear grease	Change	6-30
Front axle differential gear case	Change	6-35
Rear axle differential gear case	Change	6-35
Transmission case	Change, Replace	-
Axle planetary gear case	Change	-
Front axle steering case	Change	6-34
Hydraulic oil return filter	Replace	6-28
Pilot line filter element	Replace	6-29

<sup>★4</sup> Change oil filter every 500 hours when using API CJ-4

## 9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Radiator coolant <sup>★1</sup>	Change	-
Hydraulic tank suction strainer	Check, Clean	6-28
Hydraulic oil <sup>★1</sup>	Change	6-28
HBHO <sup>★2</sup>	Change	6-28
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

<sup>★1</sup> Conventional

<sup>★2</sup> If do not want to change HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil, ISO VG 46) every 2000 hours, contact HD Hyundai Construction Equipment dealer and ask about SAMPLING.

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

## 10) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil <sup>★3</sup>	Change	6-27

<sup>★3</sup> HD Hyundai Construction Equipment genuine long life

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

## 11) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Radiator coolant <sup>★3</sup>	Change	-

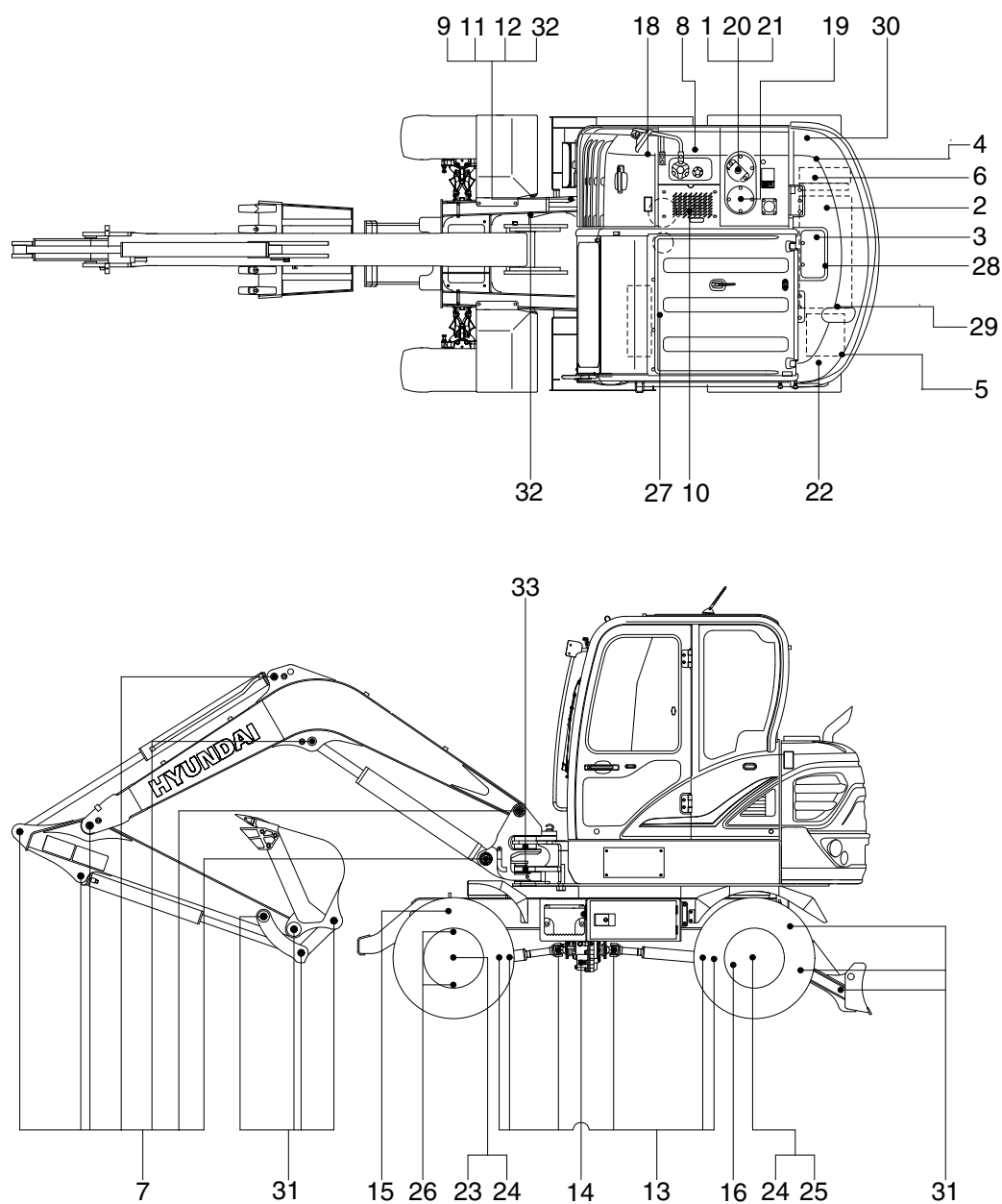
<sup>★3</sup> HD Hyundai Construction Equipment genuine long life

## 12) WHEN REQUIRED

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

Check items	Service	Page
Fuel system		
· Fuel tank	Drain or Clean	6-24
· Prefilter	Clean or Replace	6-24
· Fuel filter element	Replace	6-25
Engine lubrication system		
· Engine oil	Change	6-17, 18
· Engine oil filter	Replace	6-17, 18
Engine cooling system		
· Coolant	Add or Change	6-19, 20, 21, 22
· Radiator	Clean or Flush	6-19, 20, 21, 22
· Charge air cooler	Check	6-22
Engine air system		
· Air cleaner element (primary, safety)	Replace	6-23
Hydraulic system		
· Hydraulic oil	Add or Change	6-27
· Hydraulic oil return filter	Replace	6-28
· Pilot line filter element	Replace	6-29
· Element of breather	Replace	6-29
· Suction strainer	Clean	6-28
Tire pressure	Check, Inflate	6-33
Bucket		
· Tooth	Replace	6-38
· Side cutter	Replace	6-38
· Linkage	Adjust	6-37
· Bucket assy	Replace	6-37
Air conditioner and heater		
· Fresh air filter	Clean, Replace	6-43
· Recirculation filter	Replace	6-43

## 5. MAINTENANCE CHART



HW65AH6MA03

### 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.
4. For other details, refer to the service manual.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10Hours or daily	1	Hydraulic oil level	Check, Add	HO	70 (18.5)	1
	2	Engine oil level	Check, Add	EO	8.6 (2.3)	1
	4	Radiator coolant level	Check, Add	C	11 (2.9)	1
50 hours or weekly	5	Prefilter (water, element)	Check, Clean	-	-	1
	8	Fuel tank (water, sediment)	Check, Clean	-	-	1
	10	Swing reduction gear oil	Check, Add	GO	1.5 (0.4)	1
	12	Swing gear and pinion	Lubricate	PGL	-	1
	13	Drive shaft(flange bearing)	Lubricate	PGL	-	6
	14	Transmission gear oil	Check, Add	GO	1.8 (0.5)	1
	15	Front axle pivot pin bushing	Check, Add	PGL	-	1
	16	Wheel nut	Check, Tighten	-	-	24
	17	Tire air pressure	Check, Add	-	-	8
	23	Front axle differential gear oil	Check, Add	GO	4.5 (1.2)	1
	24	Rear axle differential gear oil	Check, Add	GO	4.5 (1.2)	1
	25	Axle planetary gear oil(Front, rear)	Check, Add	GO	0.4 (0.1)	4
	26	Front axle steering case	Add, Lubricate	PGL	-	4
	31	Bucket linkage & blade pins	Lubricate	PGL	-	8
250 Hours	6	Fan belt tension & damage	Clean	-	-	1
	7	Attachment pins	Lubricate	PGL	-	8
	9	Swing bearing	Lubricate	PGL	-	1
	18	Battery (Voltage)	Check	-	-	1
	27	Air conditioner filter (outer)	Clean	-	-	1
	28	Air conditioner filter (primary)	Check	-	-	1
	32	Boom swing cylinder (swivel type)	Lubricate	PGL	-	2
	33	Attachment pins (swivel type)	Lubricate	PGL	-	2
500 Hours	2	Engine oil	Change	EO	8.6 (2.3)	1
	5	Prefilter (water, element)	Replace	-	-	1
	28	Air cleaner element (primary)	Check, Clean	-	-	1
	29	Fuel filter element	Replace	-	-	1
	30	Radiator, cooler fin and charge air cooler	Check, Clean	-	-	3
1000 Hours	3	Engine oil filter	Replace	-	-	1
	10	Swing reduction gear oil	Change	GO	1.5 (0.4)	1
	11	Swing reduction gear grease	Change	PGL	0.2 (0.1)	1
	14	Transmission gear oil	Change	GO	1.8 (0.5)	1
	19	Hydraulic oil return filter	Replace	-	-	1
	20	Hydraulic tank air breather element	Replace	-	-	1
	22	Pilot line filter element	Replace	-	-	1
	23	Front axle differential gear oil	Change	GO	4.5 (1.2)	1
	24	Rear axle differential gear oil	Change	GO	4.5 (1.2)	1
	25	Axle planetary gear oil(Front, rear)	Change	GO	0.4 (0.1)	4
	26	Front axle steering case	Change	PGL	-	4
2000 Hours	1	Hydraulic oil* <sup>1</sup>	Change	HO	70 (18.5)	1
	1	Hydraulic oil (HBHO* <sup>2</sup> )	Change	HO	70 (18.5)	1
	4	Radiator coolant* <sup>1</sup>	Change	C	11 (2.9)	1
	21	Hydraulic oil suction strainer	Check, Clean	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	2
5000 hours	1	Hydraulic oil* <sup>3</sup>	Change	HO	70 (18.5)	1
6000 hours	4	Radiator coolant* <sup>3</sup>	Change	C	11 (2.9)	1
	-	DPF (diesel particulate filter)	Clean	-	-	1
As required	27	Air conditioner filters	Check, Replace	-	-	2
	28	Air cleaner element(primary, safety)	Check, Replace	-	-	2

\*<sup>1</sup> Conventional      \*<sup>2</sup> HD Hyundai Construction Equipment Bio Hydraulic Oil

\*<sup>3</sup> HD Hyundai Construction Equipment genuine long life

※ Oil symbol

Please refer the recommended lubricants for specification.

DF : Diesel fuel      GO : Gear oil      HO : Hydraulic oil  
C : Coolant      PGL : Grease      EO : Engine oil

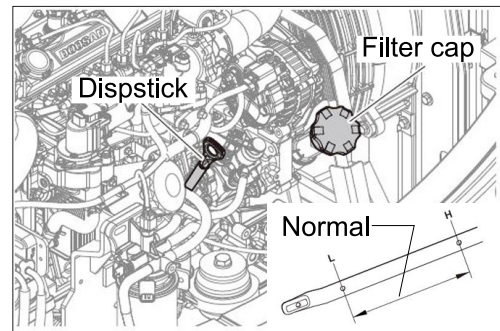


## 6. SERVICE INSTRUCTION

### 1) CHECK ENGINE OIL LEVEL

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

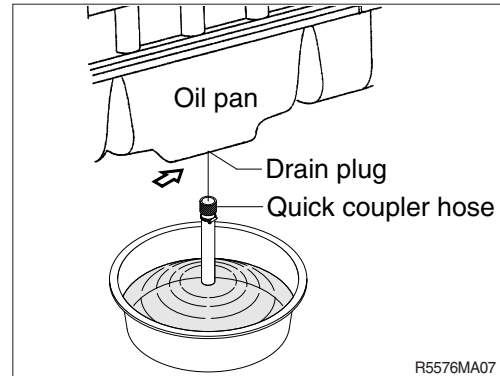
- (1) Pull out the dipstick and wipe with a clean cloth.
  - (2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.
  - (3) If oil level is LOW, add oil and then check again.
- ※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**
  - ※ **Check oil level after engine has been stopped for 15 minutes.**
  - ▲ **Do not operate unless the oil level is in the normal range.**
  - ※ **Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.**



HW65AH6MA05

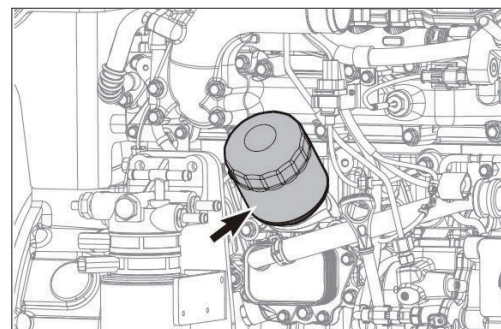
### 2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

- (1) Warm up the engine.
  - (2) Remove the cover of drain plug and connect the quick coupler hose.
- ※ **A drain pan with a capacity of 20 liters (5 U.S. gallons) will be adequate.**



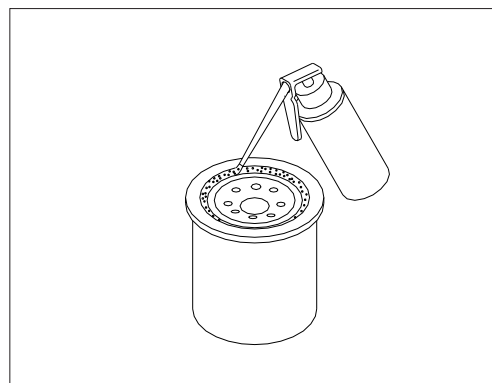
R5576MA07

- (3) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.



HX656MA06

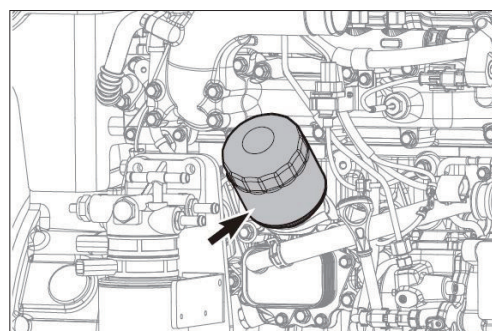
- (4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.



R5576MA50

- (5) Install the new filter manually by turning it clockwise until it contacts the filter head.  
Tighten to 2.0~2.4 kgf·m (14~17 lbf·ft) or one additional turn using the filter wrench.  
Remove the quick coupler hose.

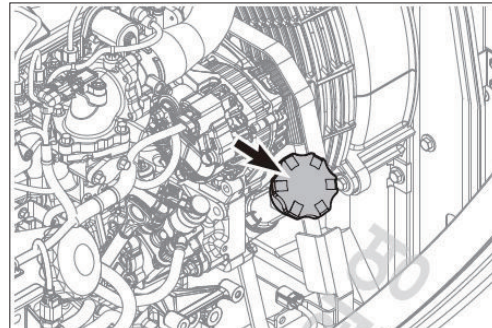
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**



HX656MA06

- (6) Fill the engine with clean oil to the proper level.  
· Quantity : 8.6 ℓ (2.3 U.S.gallons)

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



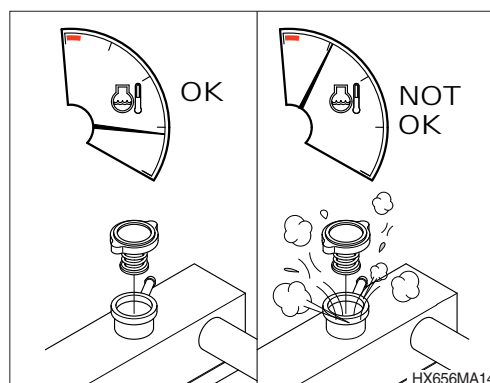
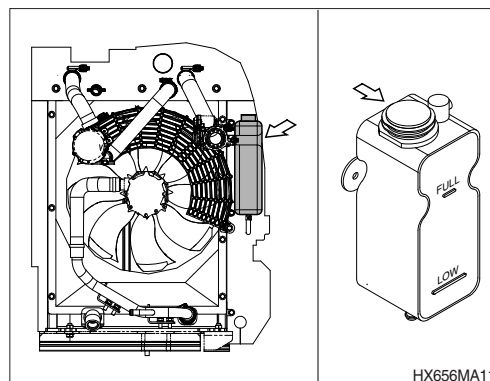
HX656MA07

- (8) Reinstall the oil filler cap. If any engine oil is spilled, wipe it away with a clean cloth.

### 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 add the coolant by opening the cap of radiator when coolant level is below LOW.
- (4) Replace gasket of radiator 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.**



### 4) FLUSHING AND REFILLING OF RADIATOR

- (1) Change coolant

**▲ Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.**

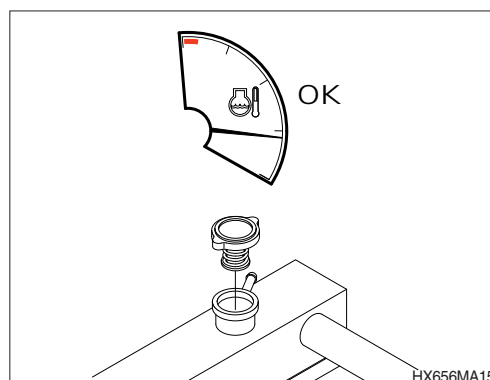
**Avoid excessive contact-wash thoroughly after contact.**

**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.**

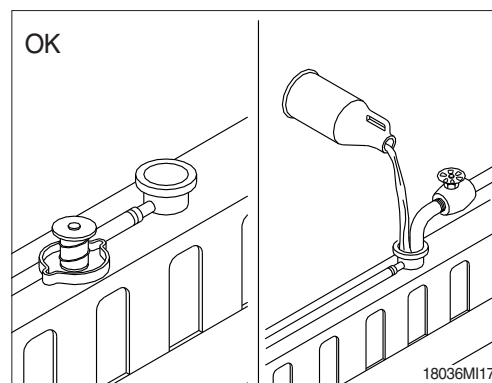
**Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.**

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

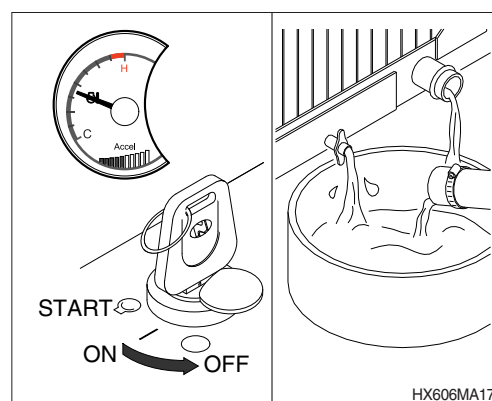


## (2) Flushing of cooling system

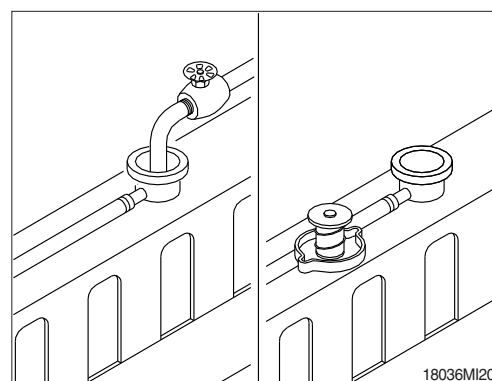
- ① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).
  - ※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.
  - ※ Do not install the radiator cap. The engine is to be operated without the cap for this process.



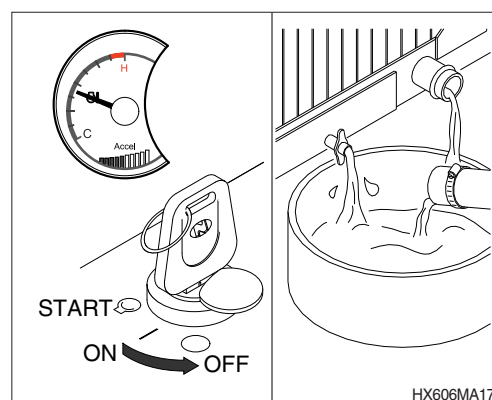
- ② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.



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

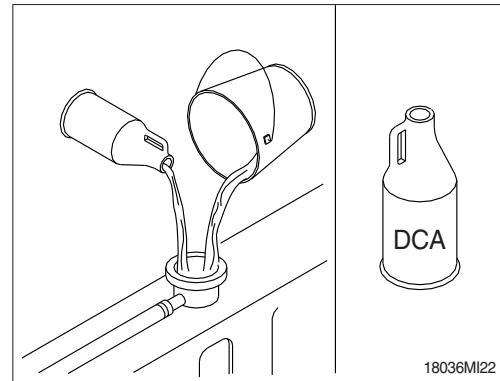


- ④ Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.
  - ※ If the water being drained is still dirty, the system must be flushed again until the water is clean.



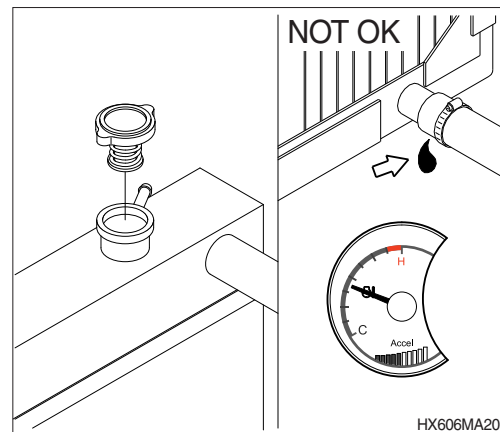
### (3) Cooling system filling

- ① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-10.
- ※ **Do not use hard water such as river water or well water.**



- ※ **The system must be filled slowly to prevent air locks.**  
During filling, air must be vented from the engine coolant passage.

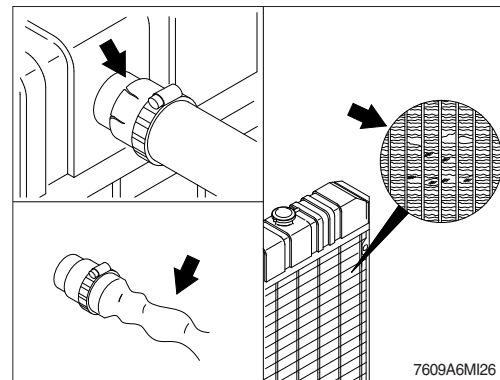
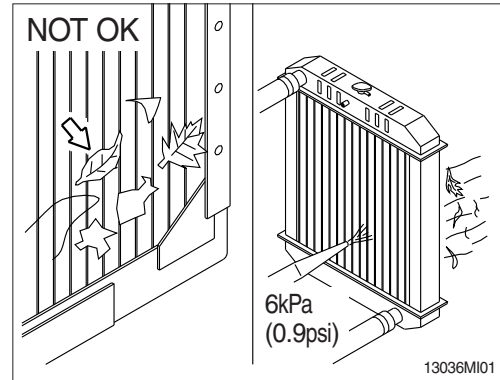
- ② Install the pressure cap. Operate the engine until it reaches a temperature 80°C (176°F), and check for coolant leaks. Check the coolant level again to make sure the system is full of coolant.



## 5) CLEAN RADIATOR AND OIL COOLER

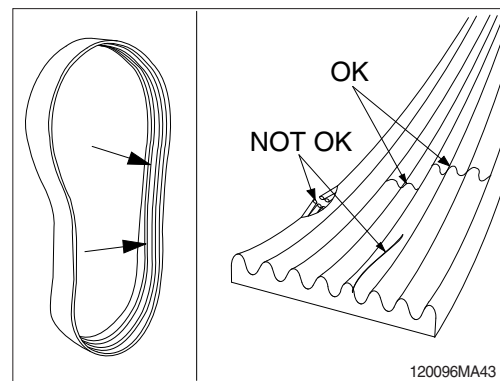
Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

- (1) Visually inspect the radiator for clogged radiator fins.
- (2) Use 6 kPa (0.9 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) FAN BELT

- (1) Inspect the fan belt for damage.
  - ① Transverse (across the belt) cracks are acceptable.
  - ② Longitudinal (direction of belt ribs) cracks that intersect with transverse cracks are not acceptable.
  - ③ Replace the belt if it is frayed or has pieces of material missing.



- (2) Inspect the idle and drive pulleys for wear or cracks.



## 7) 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.

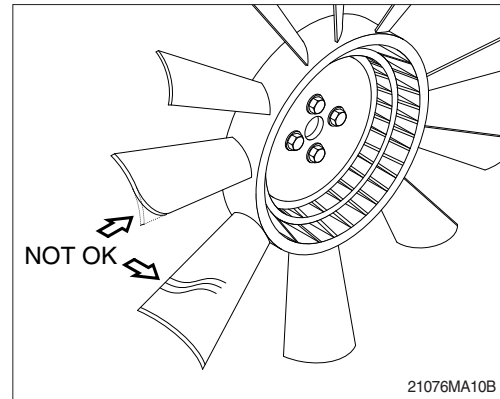
※ Rotate the crankshaft by using the engine barring gear.

※ 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.



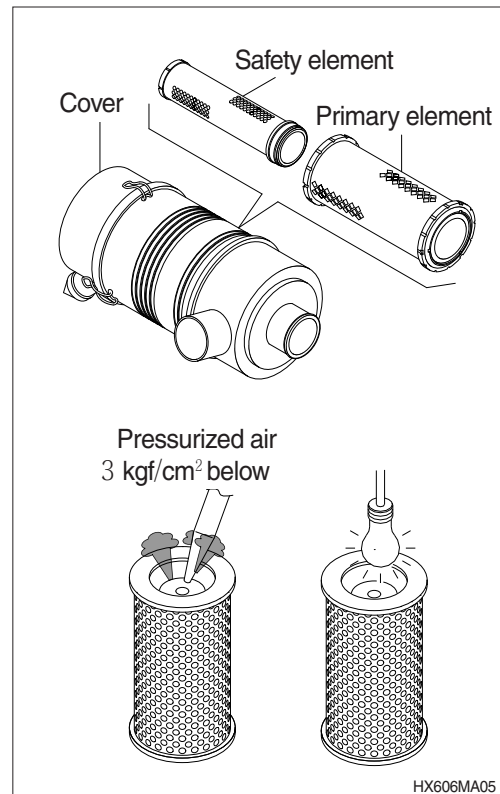
## 8) CLEANING OF AIR CLEANER

### (1) Primary element

- ① Open cover 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/cm<sup>2</sup>, 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 close cover.
- ※ **Replace the primary element after 4 times cleanings.**

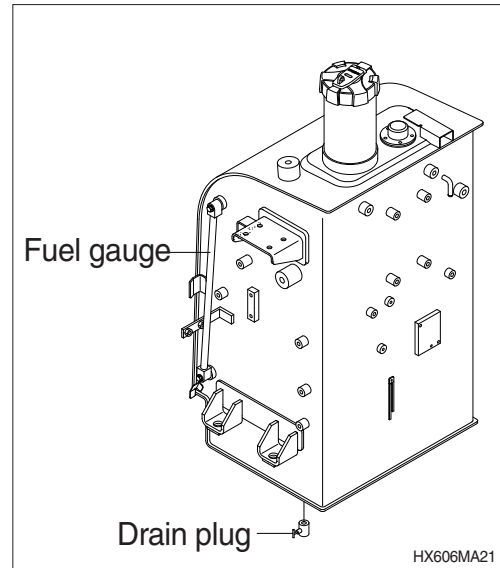
### (2) Safety element

- ※ **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.**



## 9) FUEL TANK

- (1) 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.

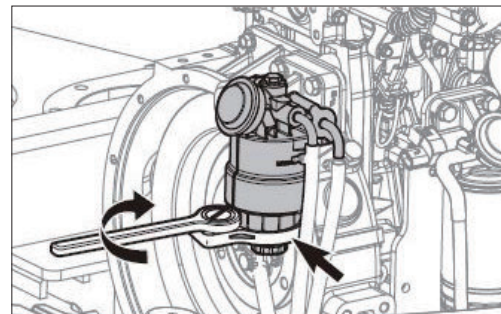
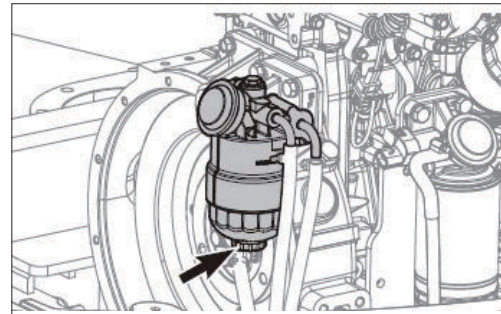


## 10) WATER SEPARATO (PRE FILTER)

- ※ **Inspect or drain the collection bowl of water every 50 hours and replace the element every 500 hours.**

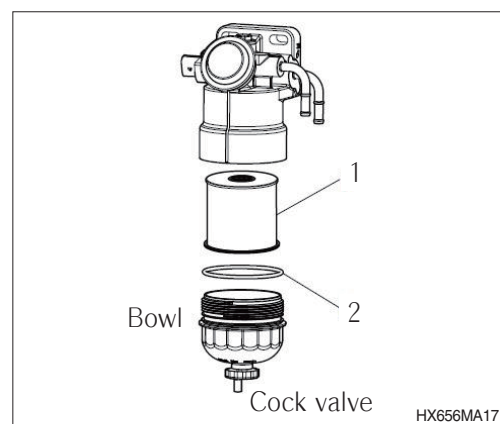
### (1) Drain water

- ① Close the cock valve.
- ② Loosen the drain valve at the bottom of the water separator. Drain water collected inside.
- ③ Remove the bowl.



### (2) Replace element

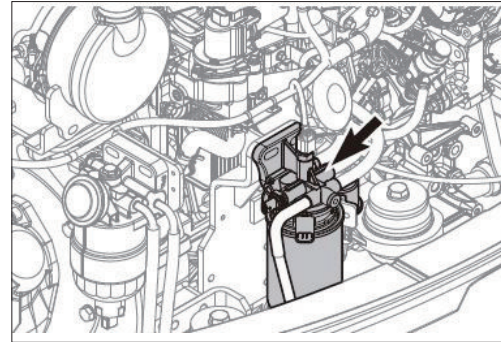
- ① Remove the element (1) from the filter head.
- ② Pre-fill a new element with fuel and lubricate O-ring (2) on the new element.
- ③ Install the new element on the filter head and bowl.
- ④ Open the cock valve.



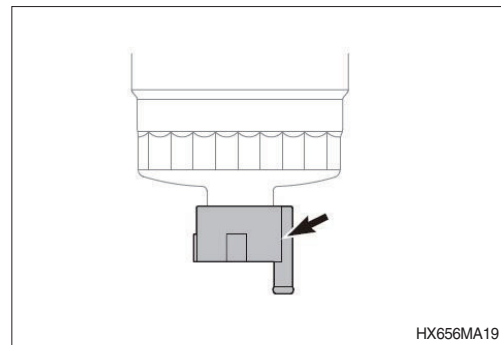


## 11) FUEL FILTER

- (1) Close the cock valve.
- (2) Remove the fuel filter element with a filter wrench, turning it to the left. When removing the fuel filter element, carefully hold it to prevent the fuel from spilling. Wipe up all spilled fuel.
- ※ **Do not discard drain valve (WIF sensor).**
- (3) Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter element.
- (4) Install the new fuel filter element and WIF sensor.  
Turn to the right and hand-tighten it only until it comes in contact with the mounting surface.  
Tighten the filter an additional 1/2 of a turn.
- (5) Open the cock valve



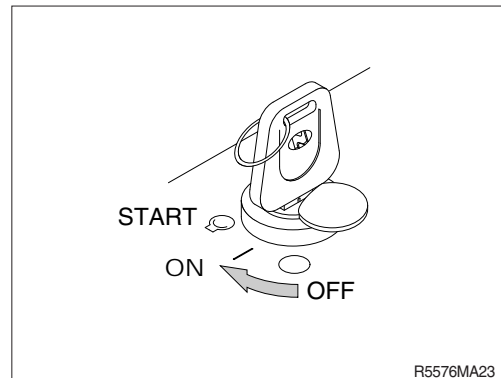
HX656MA18



HX656MA19

## 12) PRIMING THE FUEL SYSTEM

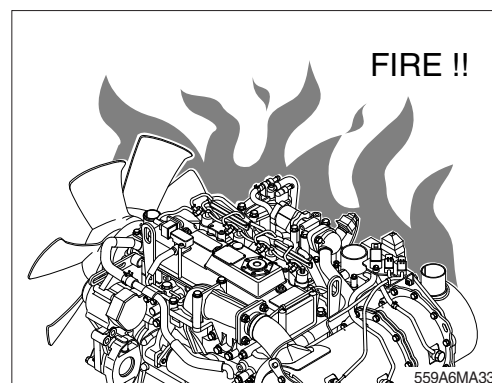
- (1) Turn the starting switch to the ON position for 10~15 seconds. This will allow the electric fuel pump to prime the fuel system.
- ※ **Never use the starter motor to crank the engine in order to prime the fuel system. This may cause the starter motor to overheat and damage the coils, pinion and/or ring gear.**



R5576MA23

### 13) LEAKAGE OF FUEL

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

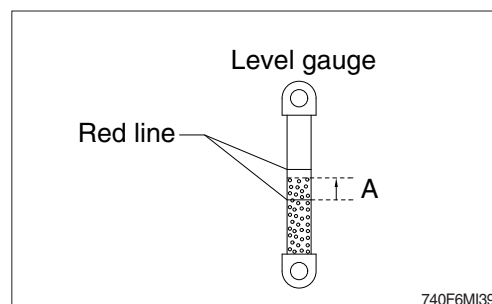
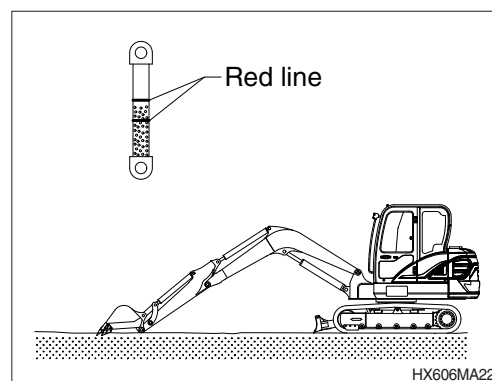


### 14) HYDRAULIC OIL CHECK

- (1) 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.

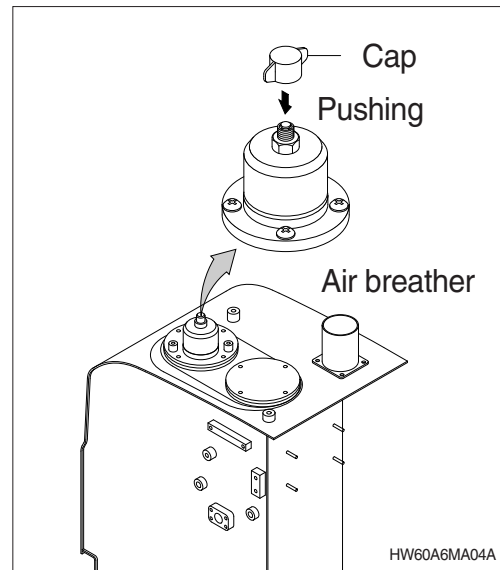
Temperature		Height A	
°C	°F	mm	inch
0	32	15	0.6
10	50	25	1.0
20	68	30	1.2
30	86	35	1.4
40	104	40	1.6

- ※ Refer to page 3-17 for checking the temperature of the hydraulic oil.
- ※ Add the hydraulic oil, if necessary.



## 15) FILLING HYDRAULIC OIL

- (1) Stop the engine to the position of level check.
- (2) Loosen the cap and 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.
  - Tightening torque :  $1.44 \pm 0.3$  kgf·m  
( $10.4 \pm 2.1$  lbf·ft)
- (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.



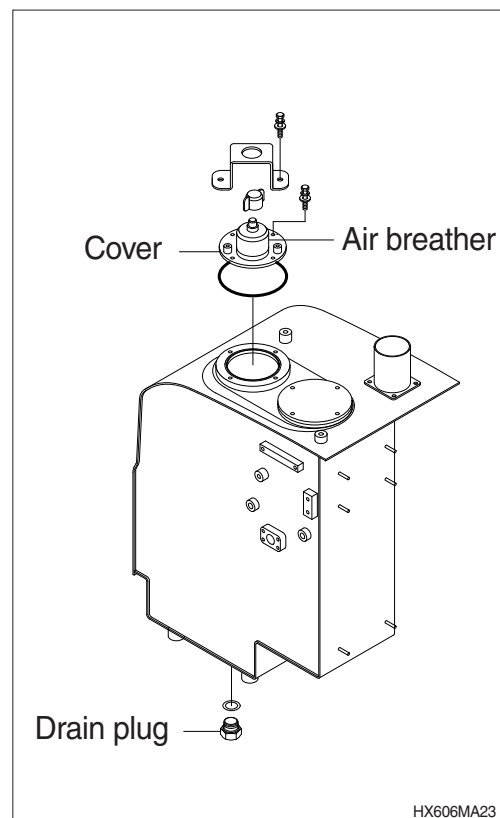
## 16) CHANGE HYDRAULIC OIL

- (1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Remove the cover.
  - Tightening torque :  $6.9 \pm 1.4$  kgf · m  
( $50 \pm 10$  lbf · ft)
- (4) Prepare a suitable container.
- (5) To drain the oil loosen the drain plug 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.

※ In case of injecting HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil) to machines that have formerly used different hydraulic oil, the proportion of residual oil must not exceed 2 %

※ Do not mix any other Bio oil, use only HBHO as bio oil.

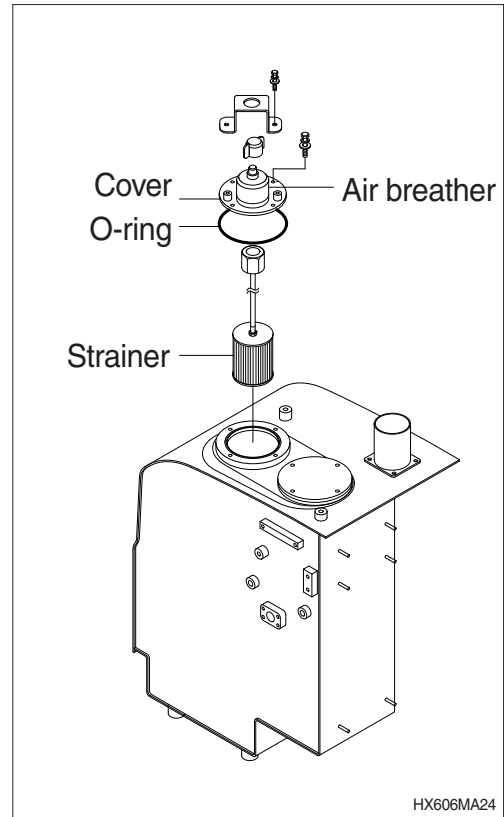
If changing to Bio oil, contact HD Hyundai Construction Equipment dealer.



### 17) CLEAN SUCTION STRAINER

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

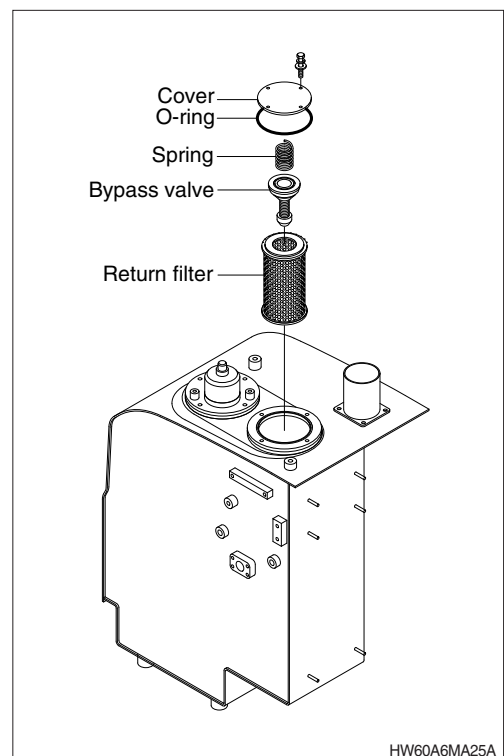
- (1) Remove the cover on the top of the oil tank.
    - Tightening torque :  $6.9 \pm 1.4$  kgf·m  
( $50 \pm 10$  lbf·ft)
  - (2) Pull out the strainer in the tank.
  - (3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.
  - (4) Replace the suction strainer if it is 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.



### 18) REPLACEMENT OF RETURN FILTER

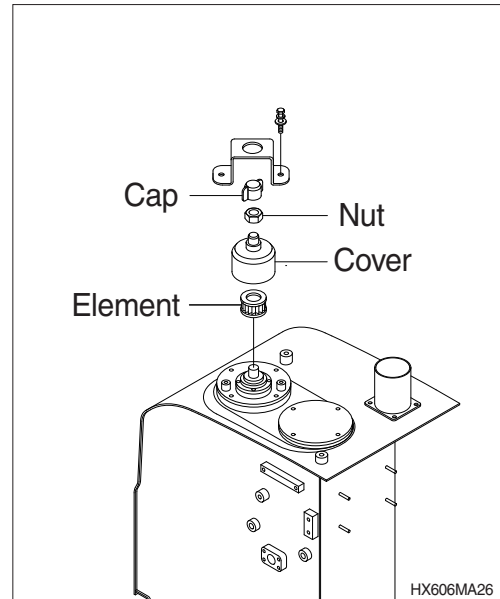
Replace as follows paying attention to the cause to be kept during the replacement.

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



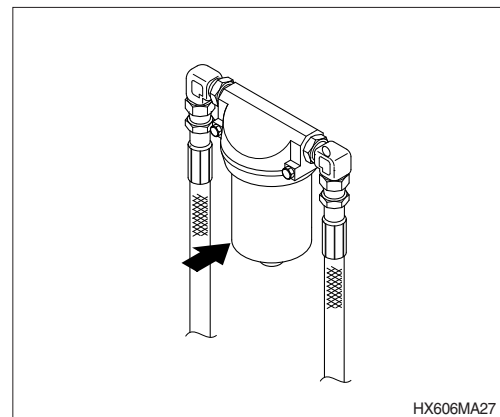
### 19) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

- (1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (2) Loosen the lock nut 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 : 0.2~0.3 kgf · m  
(1.4~2.1 lbf · ft)



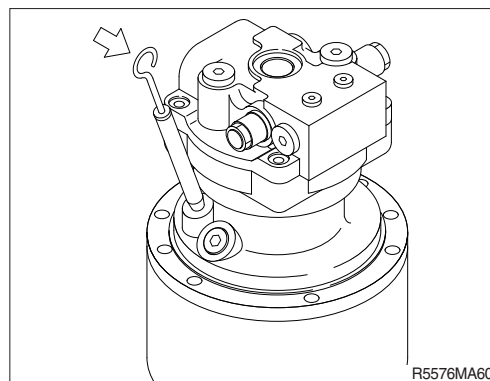
### 20) REPLACE OF PILOT LINE FILTER

- (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.**



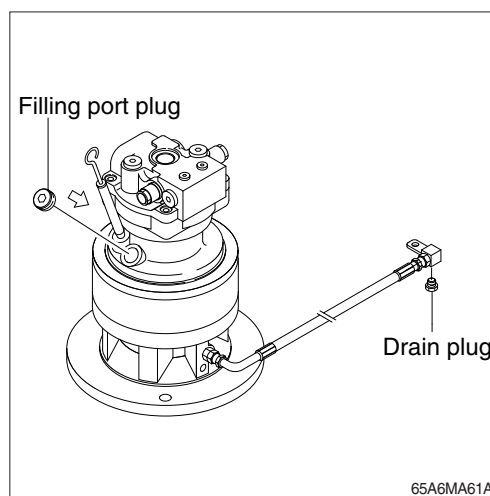
## 21) CHECK THE SWING REDUCTION GEAR OIL

- (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.



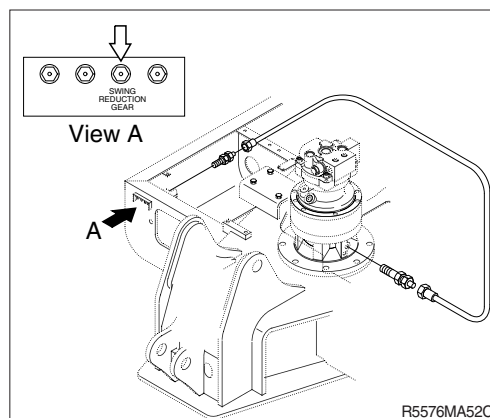
## 22) CHANGE SWING REDUCTION GEAR OIL

- (1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.
- (2) Loosen the plug.
- (3) Drain into a proper container.
- (4) Wash the drain plug and reinstall it with sealing tape.  
Fill proper amount of recommended oil.  
· Amount of oil : 1.5 ℓ (0.4 U.S.gal)



## 23) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

- (1) Grease at fitting.
- ※ Check initial 250 hours and lubricate every 1000 hours.



## 24) MANIFOLD

### (1) Swing bearing

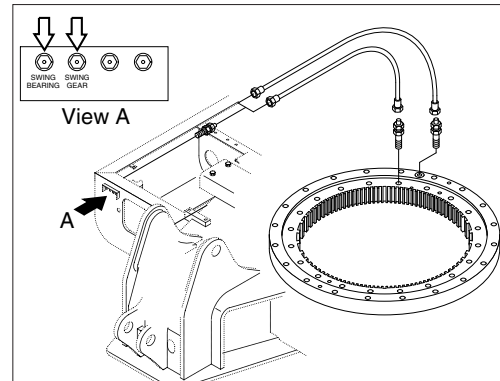
Grease at fitting.

※ Lubricate every 250 hours.

### (2) Swing gear

Grease at fitting.

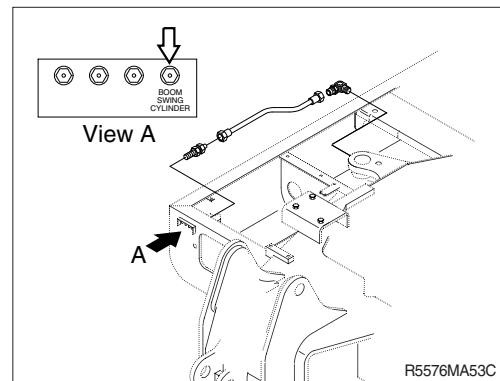
※ Lubricate every 50 hours.



### (3) Boom swing cylinder

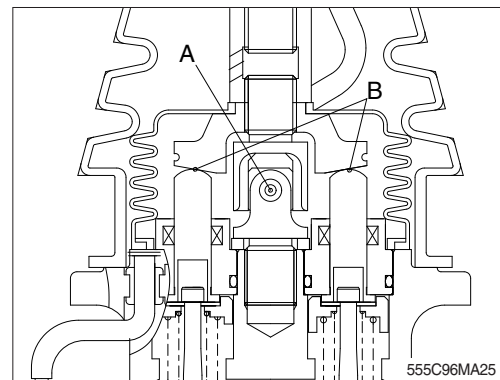
Grease at fitting.

※ Lubricate initial 50 hours and every 250 hours.



## 25) LUBRICATE RCV LEVER

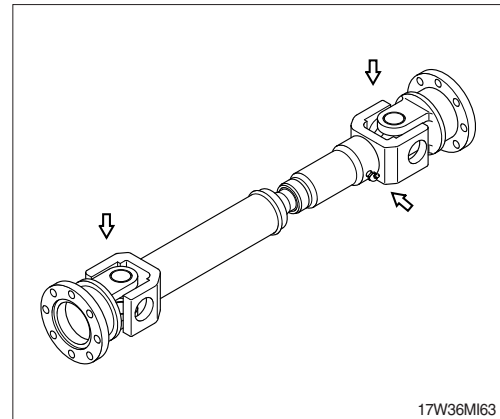
Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



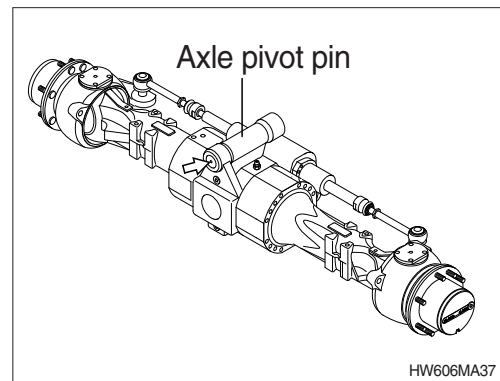
## 26) LUBRICATE

### (1) Drive shaft

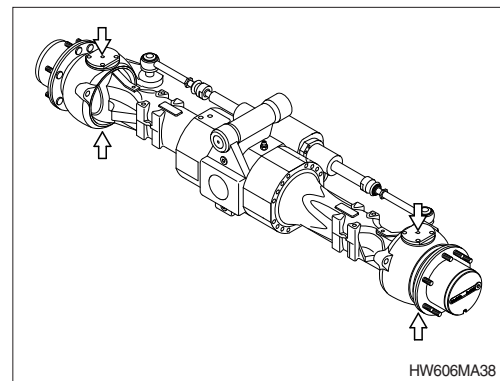
- ① Front drive shaft : 3 point
- ② Rear drive shaft : 3 point



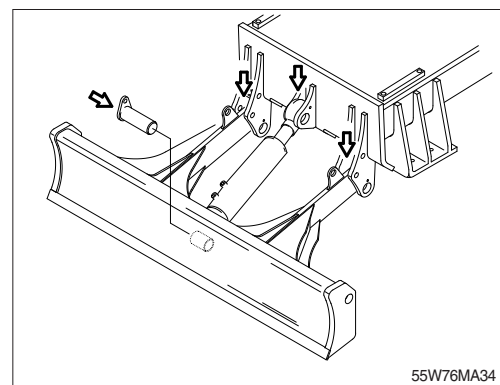
### (2) Front axle : 1 point



### (3) Steering link : 4 point



### (4) Dozer blade : 4 point





## 27) TIRE

### (1) Air pressure

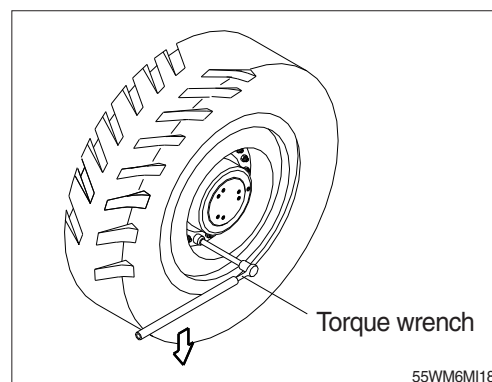
It is important to keep air pressure properly for maximizing tire life. Both excessive and insufficient air pressure of tires should be avoided not to damage tires.

Item	Air pressure
Single	5.6 kgf/cm <sup>2</sup> (80 psi)
Double	10.2 kgf/cm <sup>2</sup> (145 psi)

### (2) Handling of tire

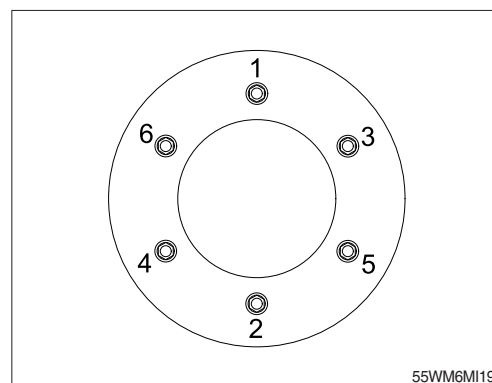
#### ① Removal of tire

- Lift the main body until a tire separate from the ground, and place the block under front and rear axle.
- Loosen wheel nut with torque wrench and remove tire.



#### ② Installation of tire

- Coat some grease on wheel stud and nut screw.
- Install the tires and tighten a nut slightly and get down a tire on the ground, and then tighten the torque in the order as figure.
  - Tightening torque : 43~49 kgf · m  
(311~354 lbf · ft)

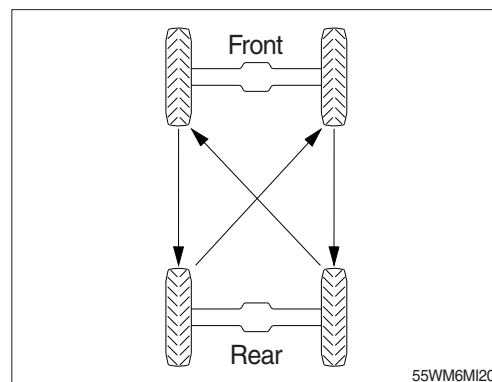


#### ③ Position change of tire

- Tire is worn out differently part by part according to installing position, so change position regularly as figure.

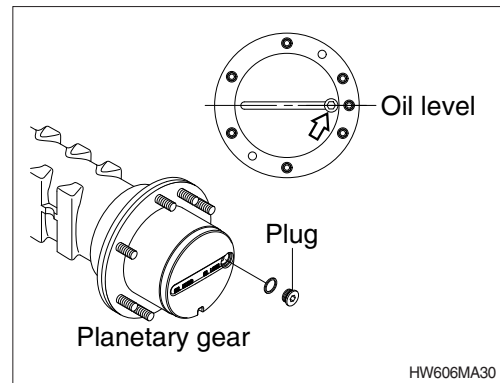
**Keep air pressure at standard.**

**Use same pattern of groove and same maker's tire.**



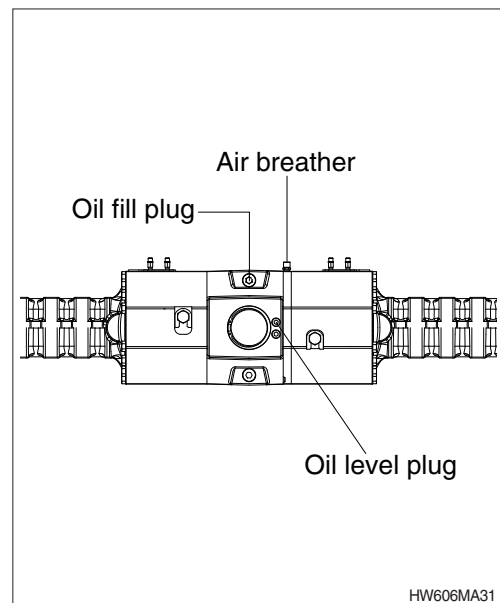
## 28) CHECK PLANETARY GEAR OIL LEVEL

- (1) Move the machine to flat ground.
  - (2) Remove the plug and check the oil amount.
  - (3) If the oil level is below the plug hole, supply oil through a plug hole.
- ※ **Set the plug of planetary gear in parallel to the ground.**
- (4) After checking, install plug.



## 29) CHECK AND SUPPLYING AXLE OIL

- (1) Move the machine to flat ground.
  - (2) Open the axle air breather to relieve internal air pressure.
  - (3) Remove the oil level plug and check the oil amount. If the oil level is at the hole of the plug, it is normal.
  - (4) If the oil level is below the plug hole, supply oil through a oil fill plug hole.
- ▲ **When checking the oil level, press the service brake.**
- ▲ **As the machine is hot after operation, wait until the oil temperature has dropped.**



### 30) CHANGE THE AXLE OIL

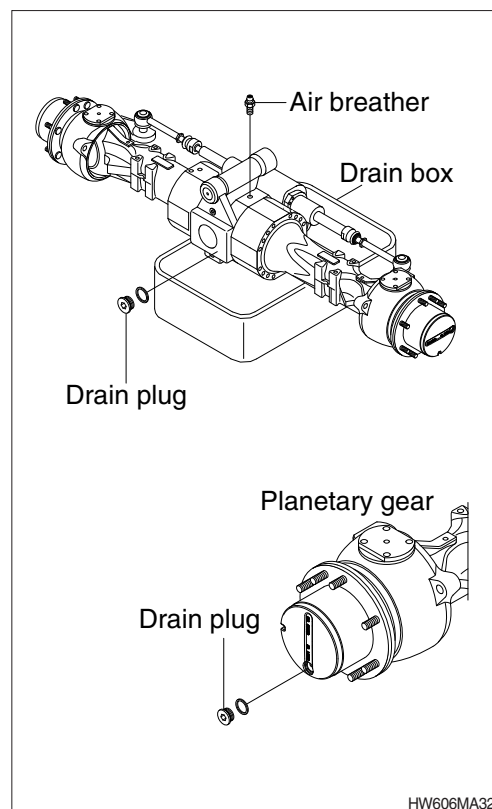
- (1) Place a drain box under drain plug to catch oil.
- (2) Remove the air breather to relieve internal pressure.

#### (3) Drain oil into the differential gear

- ① Remove the drain plug to drain oil off.
- ② Wash drain plug and install it.

#### (4) Drain oil into the planetary gear

- ① Drain oil by removing drain plug.
- ※ The drain plug should be facing to the ground.



- (5) Supply oil into the differential gear and the planetary gear.

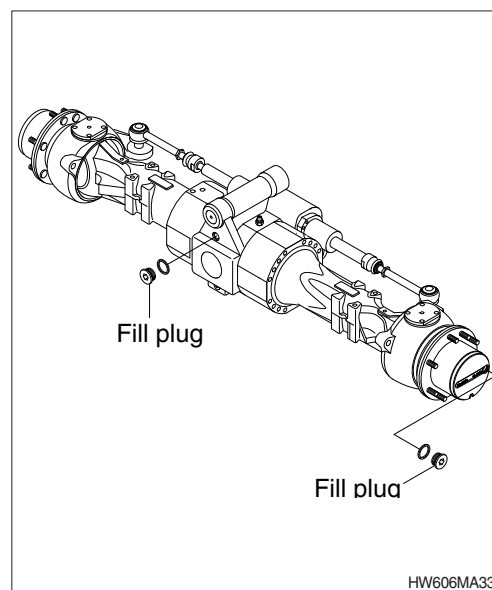
· Oil amount

Description	Capacity
Front axle differential gear	4.5 ℓ (1.19 U.S. gal)
Rear axle differential gear	4.5 ℓ (1.19 U.S. gal)
Planetary gear case (each)	0.4 ℓ (0.11 U.S. gal)

- (6) Supply oil until it overflows from the oil filler, then install the plug.

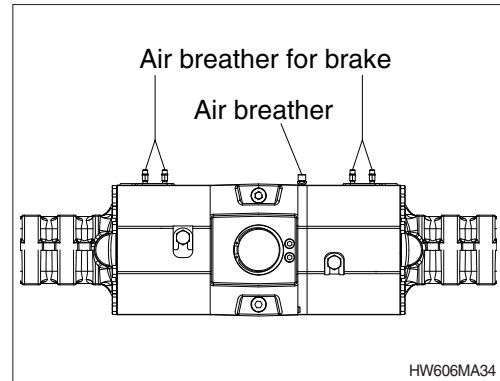
▲ As the machine is hot after operation, wait until the temperature has dropped.

※ If a work requires frequent use of brake, replace it earlier than normal change interval.



### 31) CLEANING AXLE BREATHER

- (1) Remove dust or debris around the breather.
- (2) Remove the breather and wash it with cleaning oil.

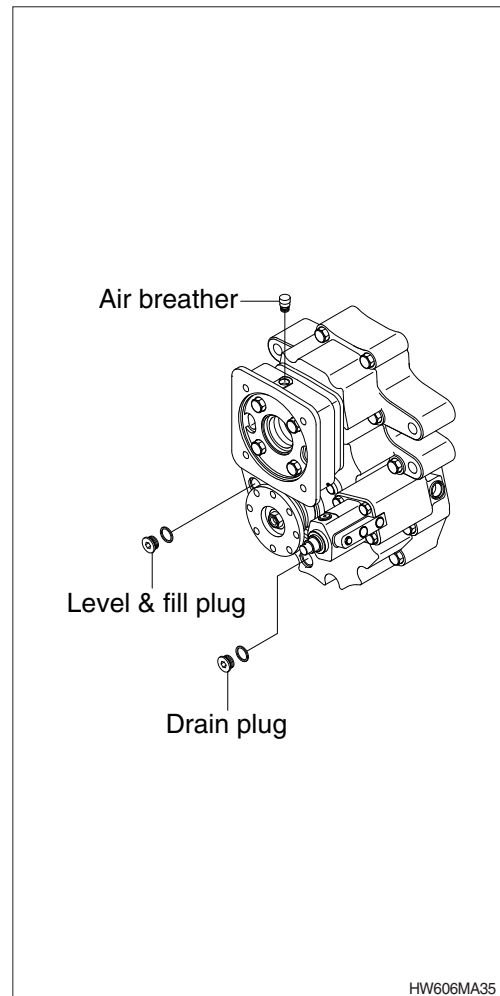


### 32) CHECK AND SUPPLYING T/M GEAR OIL

- (1) Move the machine to flat ground.
  - (2) Open the transmission air breather to relieve internal air pressure.
  - (3) Remove the level & fill plug and check the oil amount. If the oil level is at the hole of the plug, it is normal.
  - (4) If the oil level is below the plug hole, supply oil through a plug hole.
- ▲ **As the machine is hot after operation, wait until the oil temperature has dropped.**

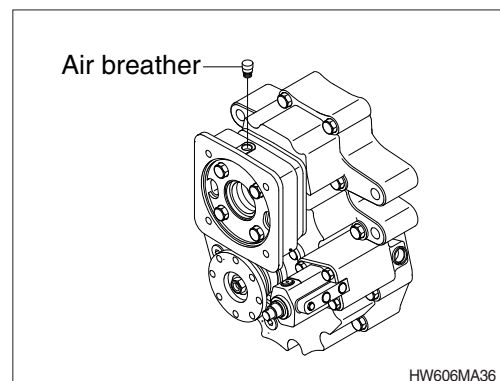
### 33) CHANGE THE T/M GEAR OIL

- (1) Place a drain transmission under drain plug to catch oil.
- (2) Open transmission air breather to relieve internal air pressure.
- (3) Remove the drain plug to drain oil.
- (4) Wash drain plug and install it.
- (5) Supply oil into the transmission case.
  - Oil amount : 1.8 ℓ (0.48 U.S. gal)



### 34) CLEANING T/M AIR BREATHER

- (1) Remove dust or debris around the air breather.
- (2) Remove the air breather and wash it with cleaning oil.



### 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.

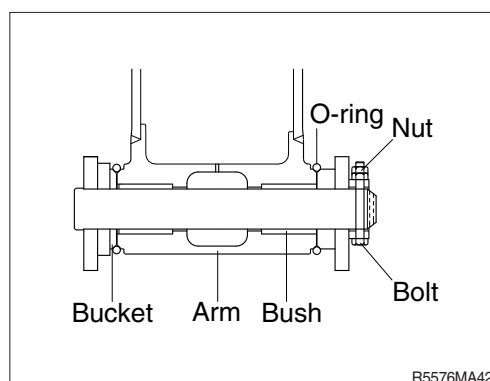
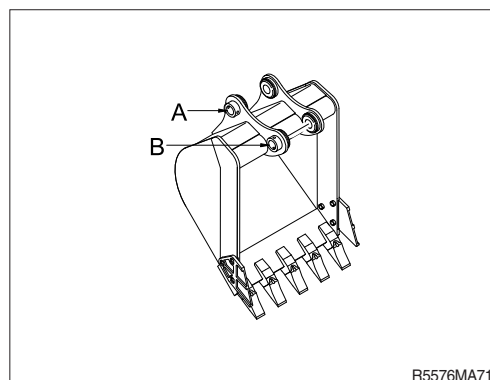
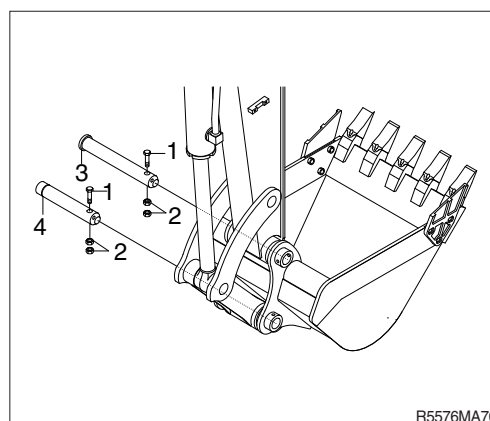
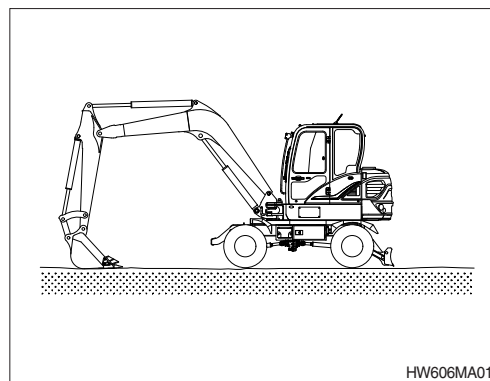
※ After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.

(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.

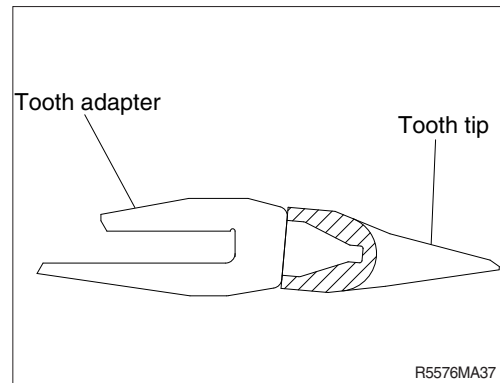
(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.



### 36) REPLACEMENT OF BUCKET TOOTH

#### (1) Timing of replacement

- ① Check wearing condition as shown in the illustration and replace tooth tip before adapter starts to wear.
- ② If excessive use, tooth adapter has worn out, replacement may become impossible.

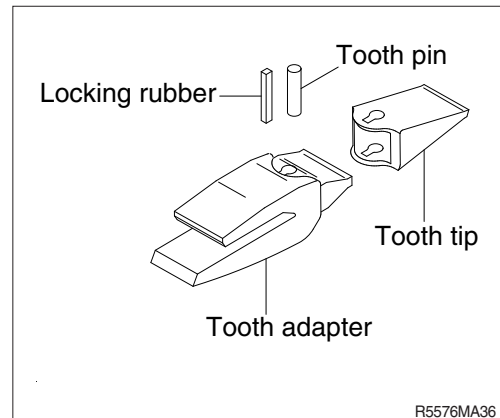


#### (2) Instructions for replacement

- ① Pull out pin by striking pin with punch or hammer, avoiding damage to locking rubber.
- ② Remove dust and mud from surface of tooth adapter by using knife.
- ③ Place locking rubber in its proper place, and fit tooth tip to adapter.
- ④ Insert pin until locking rubber is positioned at tooth pin groove.

▲ Personal injury can result from bucket falling.

▲ Block the bucket before changing tooth tips or side cutters.



### 37) 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	Qty
1	Lubrication manifold at upper frame	4
2	Boom connection pin	2
3	Boom cylinder pin	2
4	Arm cylinder pin	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin(Head and rod)	2
	Bucket link(Control rod)	1
	Arm and bucket connection pin	1
	Arm and control link connection pin	1
7	Dozer connection pin	2
	Dozer cylinder pin	2
8	Boom swing post pin	2
9	Boom swing cylinder pin	1

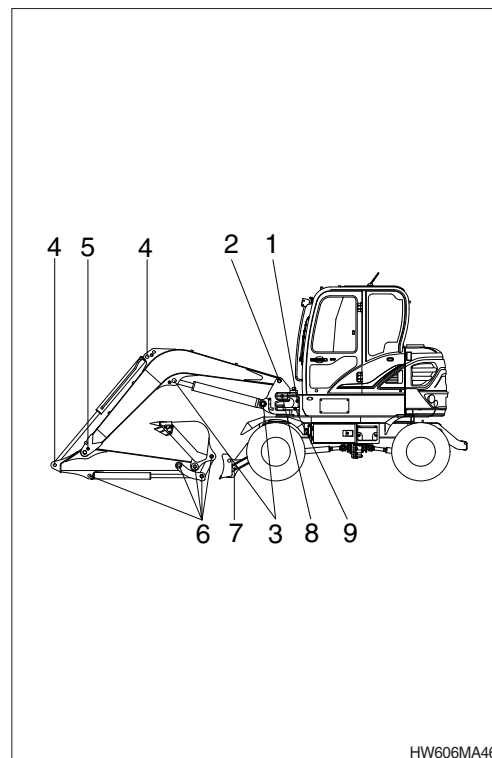
※ **Shorten lubricating interval when working in the water or dusty place.**

(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

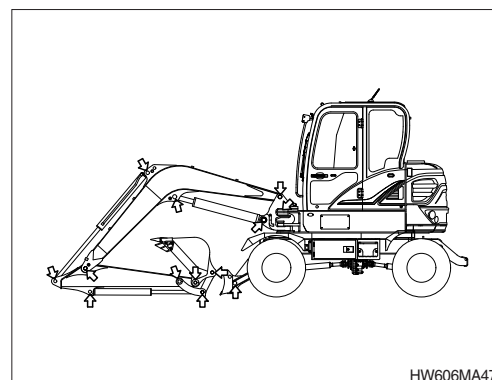
※ **Mount the lip to be faced outside when replace the dust seal.**

※ **If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.**

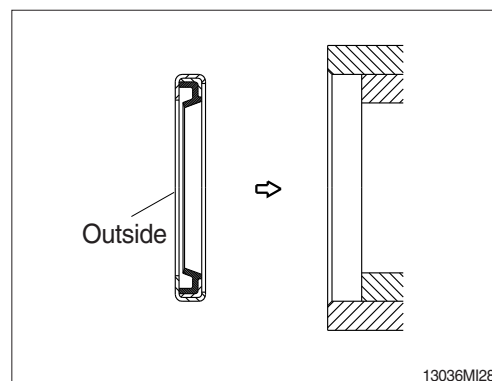
※ **Assemble the seal same direction with picture and use with plastic hammer when replace.**



HW606MA46



HW606MA47

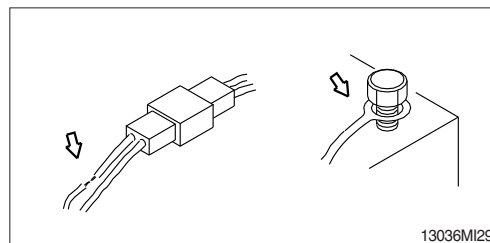


13036MI28

## 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.

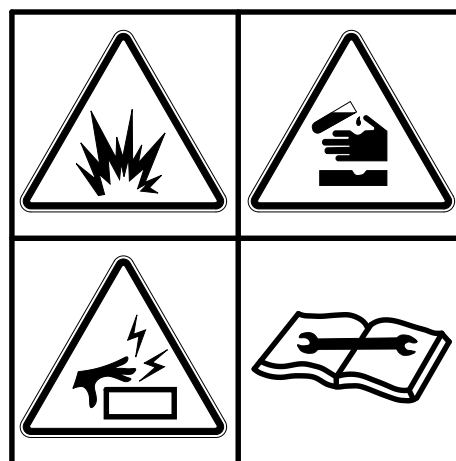
⚠ **Battery gas can explode. Keep sparks and flames away from batteries.**

⚠ **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.



#### (2) Recycle

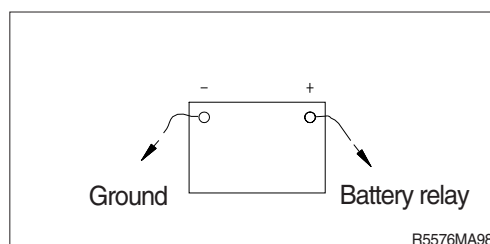
Never discard a battery.

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 (⊖ terminal side) and reconnect it last when reassembling.





### 3) STARTING THE ENGINE WITH A BOOSTER CABLE

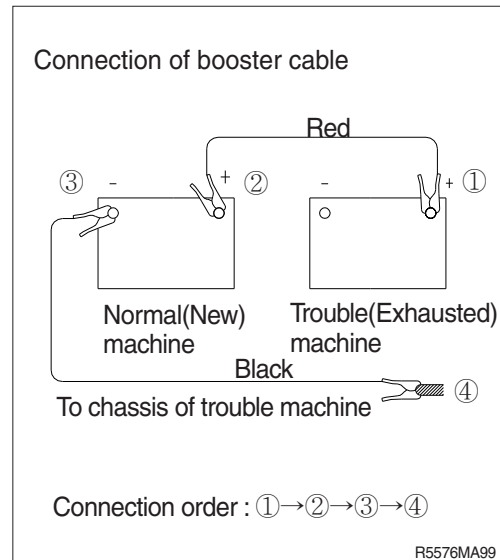
Keep following order when you are going to start engine using booster cable.

#### (1) Connection of booster cable

※ **Use the same capacity of battery for starting.**

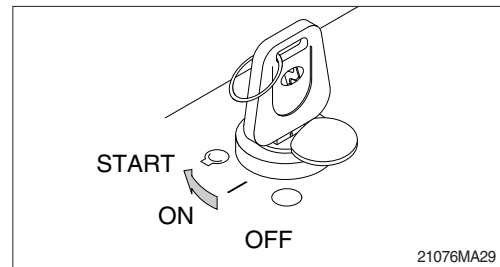
- ① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.
- ② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.
- ③ Connect the black terminal of the booster cable between new battery (-) terminal 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

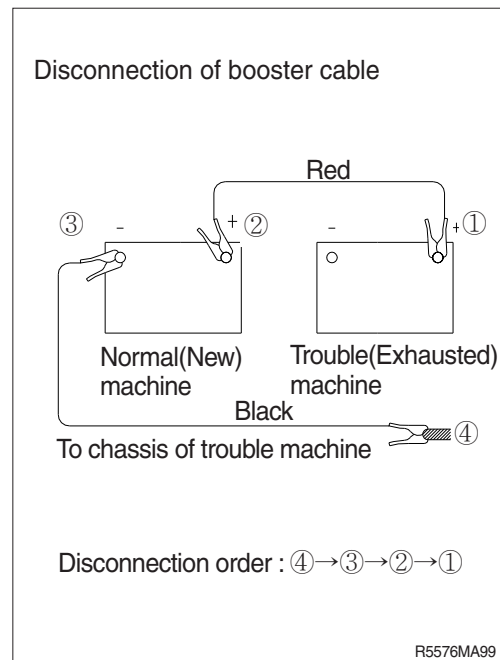
- ① Take off the booster cable(black).
- ② Take off the booster cable(red) connected to the (+) terminal.
- ③ Run engine with high idle until charging the exhausted battery by alternator, fully.

▲ **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

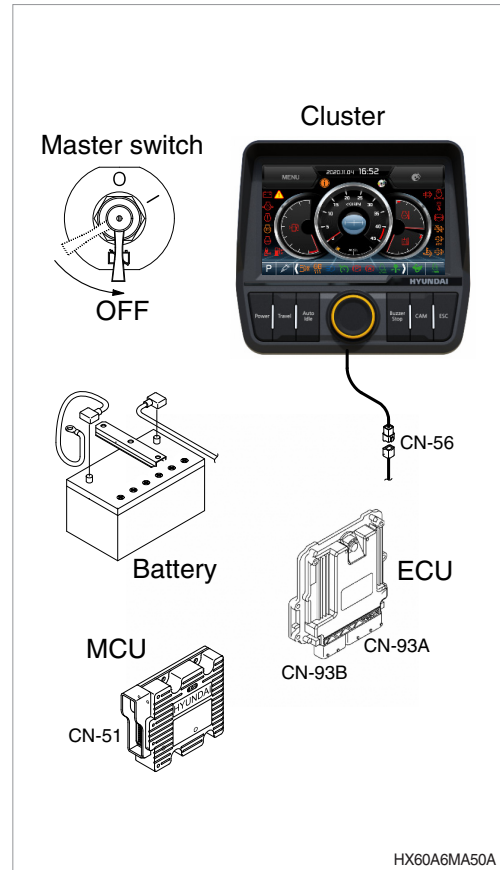
Before start to welding, follow the below procedure.

- 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, ECU, 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.

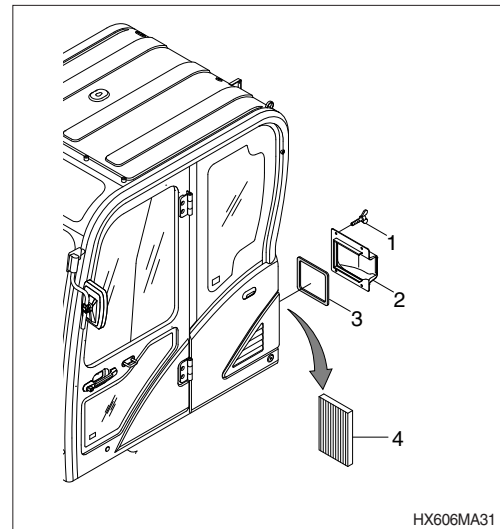


## 8. AIR CONDITIONER AND HEATER

### 1) CLEAN AND REPLACE OF THE CIRCULATION FILTER

※ **Always stop the engine before servicing.**

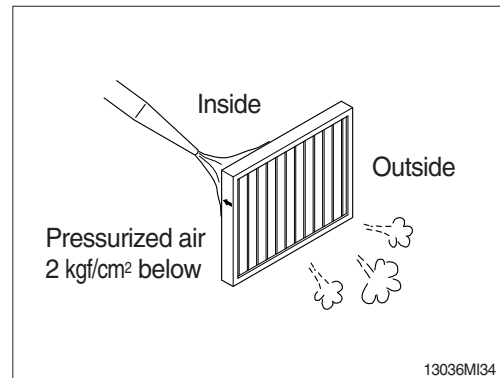
- (1) Remove the screw (1) and cover (2) on the seat base.
- (2) Remove the circulation filter (3).



- (3) Clean the filter using a pressurized air (Below 2 kgf/cm<sup>2</sup>, 28psi).

△ **When using pressurized air, be sure to wear safety glasses.**

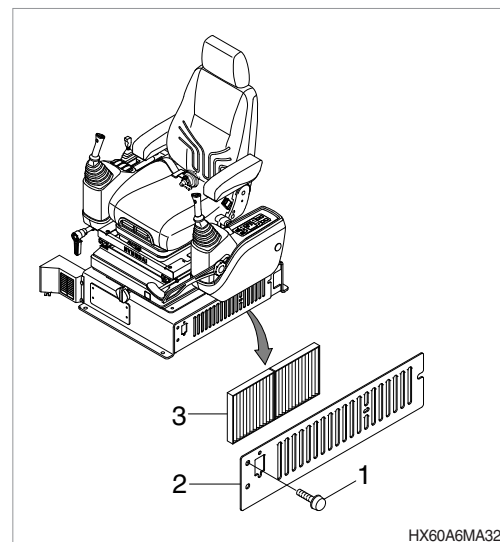
- (4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



### 2) CLEAN AND REPLACE OF THE RECIRCULATION FILTER

※ **Always stop the engine before servicing.**

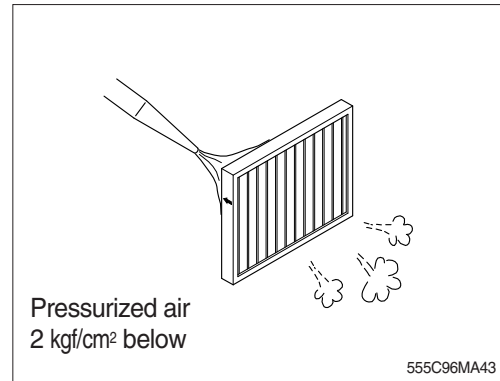
- (1) Remove the screw (1), cover (2) and pad (3).
- (2) Remove the recirculation filter (4).



- (3) Clean the recirculation filter using a pressurizes are (Below 2 kgf/cm<sup>2</sup>, 28psi) or washing with water.

△ **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.



### 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

### (1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP : 1430
HW65AH	HFC-134a	0.65 kg (1.43 lb)	CO <sub>2</sub> eq. : 0.9295 t

#### ※ GWP

Global warming potential (GWP) is a measure of how much heat a gas traps in the atmosphere relative to that of carbon dioxide (CO<sub>2</sub>). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO<sub>2</sub>.

### (2) Environmental precautions

The air conditioning system of the machine is filled with HFC-134a refrigerant at the factory.

HFC-134a refrigerant is a fluorinated greenhouse gas and contributes to global warming.

Do not release refrigerant into the environment.

### (3) Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician.

Do not attempt to perform work on the air conditioning system.

Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

### (4) Action in case of exposure

#### ① Eye contact / Limited skin contact

Rinse with warm water and apply a light bandage. Seek medical attention immediately.

#### ② Extensive skin contact

Rinse with warm water and carefully heat the area with warm water or warm clothing.

Seek medical attention immediately.

#### ③ Inhalation

Leave the area and find fresh air. Seek medical attention immediately.