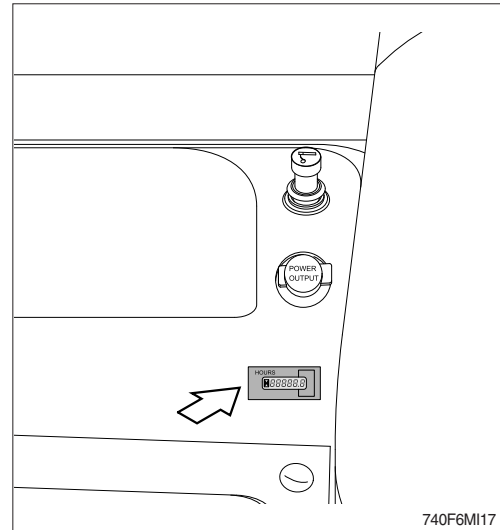


### 1. INSTRUCTIONS

#### 1) INTERVAL OF MAINTENANCE

- (1) You may inspect and service the machine by the period as described at page 6-10 based on service meter of monitor.
- (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 250 hours, carry out all the maintenance 「each 250 hours, each 100 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 Hyundai 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, cutting edge, 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 by opening of breather when 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 Hyundai dealer.

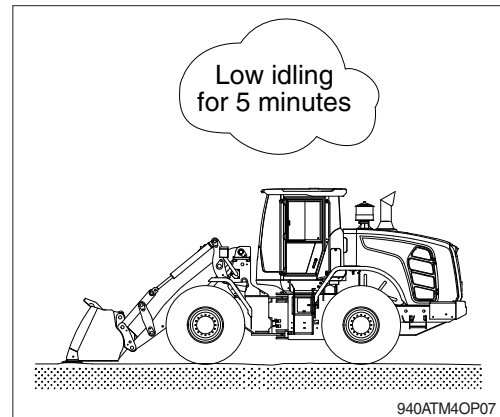
※ **Be sure to start the maintenance after fully understand the chapter 1, Safety hints.**

#### 4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

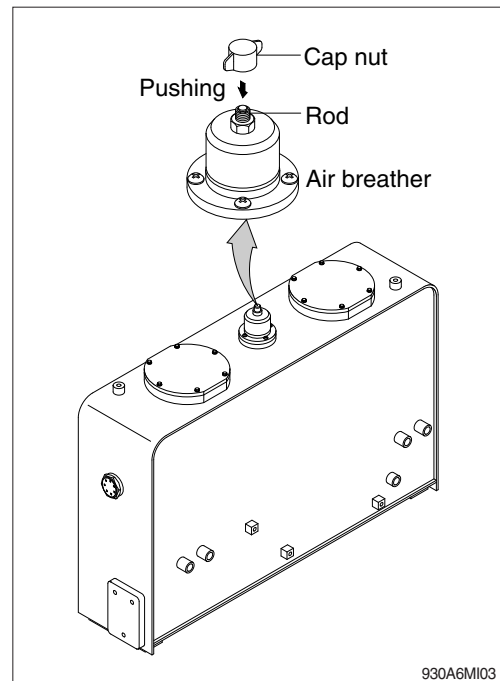
※ Spouting of oil can cause the accident when loosening the cap or hose right after the operating of the machine as the machine or oil is on the high pressure on the condition.

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

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



- (2) Rotate the cap nut counter-clockwise by hand and push the rod to release the air pressure.



## 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) These are the parts which the operator can not judge the remained lifetime of them by visual inspection.
- (2) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

Periodical replacement of safety parts	Interval
Fuel hose (engine-tank)	Every 2 years
Hose of steering system	
Packing, seal and O-ring of steering cylinder	
Hose of brake system	
Piston seal and packing of boom, bucket cylinder	

- ※ 1. **Replace the O-ring and gasket at the same time when replace 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

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	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	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, nut (rubber, 2EA)	M20×2.5	57.9 ± 8.7	419 ± 63
2		Engine mounting bolt (bracket, 6EA)	M12×1.75	11.7 ± 1.8	84.6 ± 13
3		Engine mounting bolt (T/C plate-adapter, 4EA)	M10×1.5	6.9 ± 1.4	49.9 ± 10.1
4		Engine mounting bolt (adapter-flywheel, 4EA)	3/8-16UNC	5.78 ± 1.2	41.8 ± 8.7
5		Fan motor mounting bolt	M12×1.75	12.8 ± 3.0	92.6 ± 21.7
6		Fan motor adapter mounting bolt	M10×1.5	6.9 ± 1.4	49.9 ± 10.1
7		Radiator mounting bolt	M16×2.0	29.7 ± 5.9	215 ± 42.7
8		Fuel tank mounting bolt	M16×2.0	29.7 ± 4.5	215 ± 32.5
9	Hydraulic system	Main pump housing mounting bolt	M16×2.0	29.7 ± 4.5	215 ± 32.5
10		Fan & brake pump housing mounting bolt	M10×1.5	6.9 ± 1.4	50 ± 10.1
11		Main control valve mounting bolt	M10×1.5	6.9 ± 1.4	50 ± 10.1
12		Steering unit mounting bolt	M10×1.5	6.9 ± 1.4	50 ± 10.1
13		Brake valve mounting bolt	M8×1.25	2.5 ± 0.5	18.1 ± 3.6
14		Cut-off valve mounting bolt	M12×1.75	12.8 ± 3.0	92.6 ± 21.7
15		Remote control lever mounting bolt	M6×1.0	1.1 ± 0.2	8.0 ± 1.4
16		Safety valve	M10×1.5	6.9 ± 1.4	50 ± 10.1
17		Hydraulic oil tank mounting bolt	M16×2.0	29.7 ± 4.5	215 ± 32.5
18	Power train system	Transmission mounting bolt, nut (rubber, 2EA)	M24×3.0	100 ± 15	723 ± 108
19		Transmission mounting bolt (bracket, 6EA)	M20×2.5	56.1 ± 8.4	406 ± 60.8
20		Front axle mounting bolt, nut	M27×2.0	135 ± 20	976 ± 146
21		Rear axle support mounting bolt, nut	M24×2.0	100 ± 15	723 ± 108
22		Axle air breather	-	1.2	8.7
23		Tire mounting nut	M22×1.5	79 ± 2.5	571 ± 18.1
24		Drive shaft joint mounting bolt	3/8-24UNF	6.0 ± 0.8	43.4 ± 5.8
25	Others	Counterweight mounting bolt (4EA)	M30×3.5	199 ± 30	1439 ± 216
26		Operator's seat mounting bolt	M8×1.25	3.4 ± 0.8	24.6 ± 5.0
27		ROPS Cab mounting bolt (4EA)	M20×2.5	58 ± 8.7	419 ± 63
		ROPS Cab mounting nut (4EA)	M16×2.0	20.5 ± 4.7	148 ± 34

### 3. SPECIFICATION OF FUEL, COOLANT AND LUBRICANTS

#### 1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil (API CK-4)	SAE 15W-40, <sup>★2</sup> SAE 5W-40
DEF/AdBlue®	ISO 22241 (32.5% high-purity urea and 67.5 deionized water)
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG 46, VG 68 only) Conventional (ISO VG15 <sup>★2</sup> ) HD Hyundai Construction Equipment Bio Hydraulic Oil (HBHO, ISO VG 46)
Transmission oil	SAE 15W-40 (Oils of the API CI-4+, CJ-4, CK-4, SM, or ACEA specification, Category E9 are not permitted to use for the transmission)
Axle oil	<sup>★</sup> Refer to below list
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2, <sup>★1</sup> Ultra low sulfur diesel
Coolant	ASTM D6210 Mixture of 50% ethylene glycol base antifreeze and 50% water Mixture of 60% ethylene glycol base antifreeze and 40% water <sup>★2</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

**DEF** : Diesel Exhaust Fluid

DEF compatible with AdBlue®

<sup>★</sup> Recommended oil list

- Gear oil with limited-slip additive

- Viscosity grades: SAE 75W-90/75W-110/

75W-140 /80W-90/85W-90

- Universal axle and transmission oil

- Premium universal axle and transmission oil

<sup>★1</sup> Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

<sup>★2</sup> Cold region

Russia, CIS, Mongolia

#### 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 requirements.

We recommend that you use only HD Hyundai Construction Equipment genuine lubricating oils and grease officially approved by HD Hyundai Construction Equipment.

※ 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 systems of major components.

※ Do not use any engine oil other than that specified above, as it may clog the diesel particulate filter(DPF).

※ 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.



Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature °C(°F)								
			-50 (-58)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)
Engine oil pan	Engine oil	11 (2.9)				SAE 15W-40					
					*2SAE 5W-40						
			SAE 0W-40								
DEF/ AdBlue® tank	Mixture of urea and deionized water	19 (5.0)									
			ISO 22241, High-purity urea + deionized water (32.5 : 67.5)								
Transmission	Engine oil	34.5 (9.1)		SAE 10W-30							
				SAE 15W-40							
Axle	UTTO	Front : 23 (6.1) Rear : 23 (6.1)	*Refer to below list								
Hydraulic tank	Hydraulic oil	Tank: 90 (23.7)	*2 ISO VG 15								
		System: 130 (34.3)	ISO VG 46, HBHO VG 46*4								
			ISO VG 68								
Fuel tank	Diesel fuel*1	189.5 (50)	*2 ASTM D975 NO.1								
			ASTM D975 NO.2								
Fitting (grease nipple)	Grease	As required	*2 NLGI NO.1								
			NLGI NO.2								
Radiator (reservoir tank)	Mixture of antifreeze and soft water*3	31.5 (8.3)		Ethylene glycol base permanent type (50 : 50)							
			*2 Ethylene glycol base permanent type (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

**UTTO** : Universal Tractor Transmission Oil

**DEF** : Diesel Exhaust Fluid

DEF compatible with AdBlue®

★<sup>1</sup> Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

★ Recommended oil list

- Gear oil with limited-slip additive

- Viscosity grades: SAE 75W-90/75W-110/  
75W-140 /80W-90/85W-90

- Universal axle and transmission oil

- Premium universal axle and transmission oil

★<sup>2</sup> Cold region : Russia, CIS, Mongolia

★<sup>3</sup> Soft water : City water or distilled water

★<sup>4</sup> HD Hyundai Construction Equipment Bio Hydraulic Oil

## 4. MAINTENANCE CHECK LIST

Scheduled maintenance is the normal maintenance necessary to provide proper and efficient machine operation. To protect your investment and prolong the service life of your machine, follow the scheduled maintenance list below.

### 1) EVERY 10 HOURS SERVICE

Check items	Service	Page
Hydraulic oil level	Check, Add	6-39
Engine oil level	Check, Add	6-15
Radiator coolant level	Check, Add	6-17
Belt tension & damage	Check	6-22, 23
Fuel pre-filter element (water)	Drain	6-25
DEF/AdBlue® tank	Check, Add	6-27
Charge air piping	Check	6-21
Cooling fan	Check	6-22
After treatment exhaust piping	Check	-
Air intake piping	Check	-
Air cleaner and dust ejection valve	Check	-
Crankcase breather tube	Check	-

### 2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Attachment pins	Lubricate	6-52
Tire (air)	Check, Add	6-42
Steering cylinder pins	Lubricate	6-49
Rear axle pivot	Lubricate	6-49
Fuel tank (water, sediment)	Drain	6-25

### 3) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil and filter	Change	6-15, 16, 17
Fuel filter element	Replace	6-26
Fuel pre-filter element	Replace	6-25
Transmission oil and filter	Change	6-45, 46
Front and rear axle oil	Change	6-47
Hydraulic oil return filter	Replace	6-40
Pilot line filter element	Replace	6-41

#### 4) EVERY 250 HOURS SERVICE

Check items	Service	Page
Drive shaft (flange bearing, front, center, rear)	Lubricate	6-49
Wheel nuts	Check, Tight	6-42, 43
Battery (voltage) / Battery cable and connections	Check	6-54, 55
Air conditioner and heater filter (inner and outer)	Check, Clean	6-57

#### 5) EVERY 500 HOURS SERVICE

Check items	Service	Page
Radiator, oil cooler, change air cooler, condenser	Check, Clean	6-21
Air cleaner element (primary)★	Clean	6-24
Air compressor air filter (option)	Check, Clean	6-53-1
Parking brake clearance	Check, Adjust	6-46-1, 6-46-2

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

#### 6) EVERY 800 HOURS SERVICE

Check items	Service	Page
Engine oil ★	Change	6-15, 16, 17
Engine oil filter ★	Replace	6-15, 16, 17

★ Change oil and filter every 500 hours when using API CJ-4.

#### 7) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Fuel filter element	Replace	6-26
Fuel pre-filter element	Replace	6-25
Drive belt, cooling fan, belt tensioner	Check	6-22, 23
Hydraulic oil return filter	Replace	6-40
Pilot line filter element	Replace	6-41
Hydraulic tank air breather element	Replace	6-41
Center pivot pin	Lubricate	6-49
Transmission oil	Change	6-45, 46
Transmission oil filter	Replace	6-45, 46
Aircon and heater outer filter	Replace	6-57

#### 8) EVERY 1500 HOURS SERVICE

Check items	Service	Page
Front axle oil	Change	6-48
Rear axle oil	Change	6-48

## 9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant, cooling system and antifreeze★ <sup>1</sup>	Change, Flush	6-17, 18, 19, 20
Engine cleaning	Clean	6-31
Vibration damper (rubber, viscous)	Check	6-32
Hydraulic oil★ <sup>1</sup>	Change	6-39
HBHO (Hyundai Bio Hydraulic Oil, ISO VG 46)★ <sup>2</sup>	Change	6-39
Hydraulic oil suction strainer	Check, Clean	6-40
Air conditioner and heater inner filter	Replace	6-57
Air cleaner element (safety and primary)	Replace	6-24
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-
Air compressor air filter (option)	Replace	6-53-1

★<sup>1</sup> Conventional

★<sup>2</sup> If do not want to change HBHO every 2000 hours, contact HYUNDAI dealer and ask about SAMPLING.

## 10) EVERY 4000 HOURS SERVICE

Check items	Service	Page
DEF/AdBlue® tank filter	Replace	6-28

## 11) EVERY 4500 HOURS SERVICE

Check items	Service	Page
DEF/AdBlue® supply module filter★	Replace	6-28

★ When working in dusty environments, inspection per 1500 hours is highly recommended.

## 12) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Overhead set (shop inspection)	Adjust	6-33
Hydraulic oil★ <sup>3</sup>	Change	6-39

★<sup>3</sup> Hyundai genuine long life

## 13) EVERY 6000 HOURS SERVICE

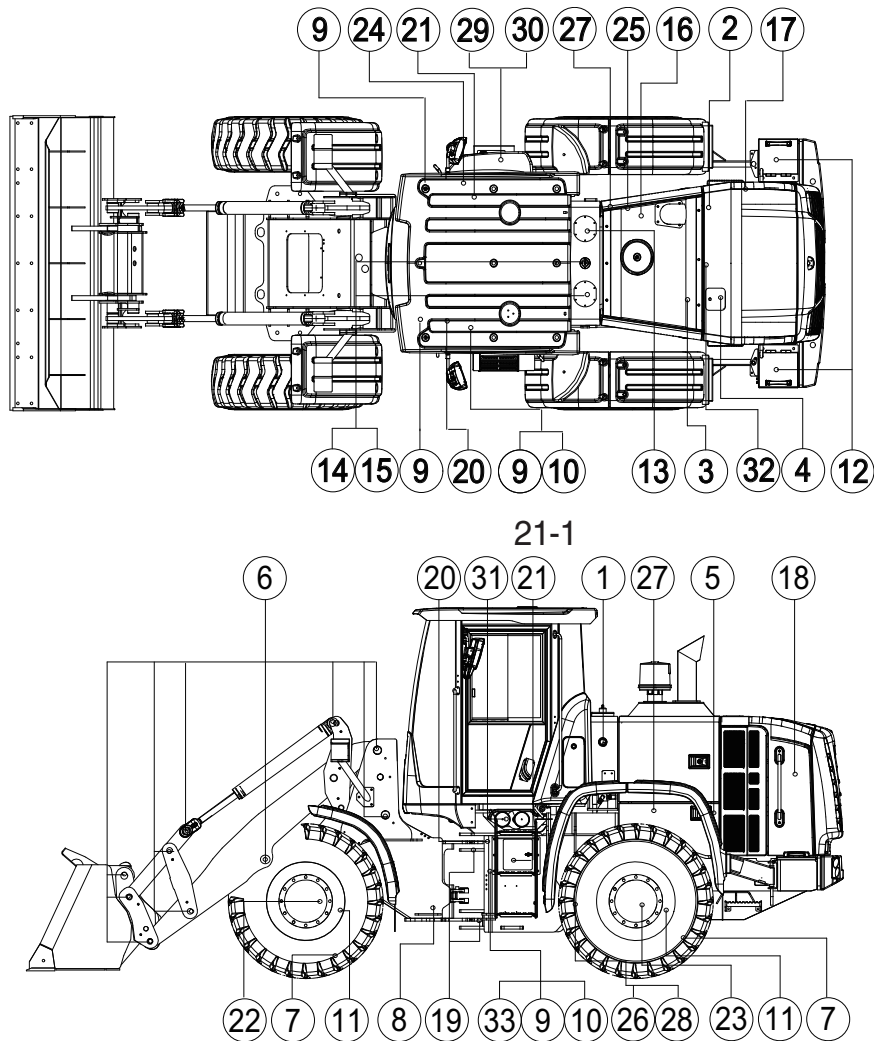
Check items	Service	Page
Coolant, cooling system and antifreeze★ <sup>3</sup>	Change, Flush	6-17, 18, 19, 20

★<sup>3</sup> Hyundai genuine long life

## 14) WHEN REQUIRED

Check items	Service	Page
Air cleaner element		
· Safety	Replace	6-24
· Primary	Clean, Replace	6-24
Air conditioner and heater		
· Outer filter	Replace	6-57
· Inner filter	Clean, Replace	6-57
DPF (diesel particulate filter)	Clean	6-31
Air compressor air filter (option)	Clean or Replace	6-53-1

## 5. MAINTENANCE CHART



930ATM6M110A

### 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.

- EO : Engine oil      - GO : Gear oil
- C : Coolant      - DEF : DEF/AdBlue®
- HO : Hydraulic oil      - PGL : Grease
- UTTO : Refer to page 6-9.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10 Hours or daily	1	Hydraulic oil level	Check, Add	HO	90 (23.8)	1
	2	Engine oil level	Check, Add	EO	11 (2.9)	1
	4	Radiator coolant level	Check, Add	C	31.5 (8.3)	1
	5	Fan belt tension & damage	Check, Adjust	-	-	1
	17	Fuel pre-filter (water)	Drain	-	-	1
	29	DEF/AdBlue® tank	Check, Add	DEF	19 (5.0)	1
50 Hours or weekly	6	Attachment pins	Lubricate	PGL	-	24
	7	Tires (air)	Check, Add	-	-	4
	9	Steering cylinder pin	Lubricate	PGL	-	4
	10	Rear axle pivot	Lubricate	PGL	-	2

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
250 Hours	8	Drive shaft (flange bearing)	Lubricate	PGL	-	1
	11	Wheel nuts	Check, Tight	-	-	48
	12	Battery voltage, cable and connection	Check, Add	-	-	2
	24	Aircon and heater inner and outer filter	Check, Clean	-	-	2
	26	Drive shaft sleeve yoke	Lubricate	PGL	-	2
	28	Drive shaft journal bearing assy	Lubricate	PGL	-	5
Initial 250 Hours	2	Engine oil	Change	EO	11 (2.9)	1
	3	Engine oil filter	Replace	-	-	1
	13	Hydraulic oil return filter	Replace	-	-	2
	16	Fuel filter element	Replace	-	-	1
	17	Fuel pre-filter element	Replace	-	-	1
	20	Transmission oil	Change	EO	34.5 (9.1)	1
	21	Transmission oil filter	Replace	-	-	1
	22	Axle oil (front)	Change	UTTO	23 (6.1)	3
	23	Axle oil (rear)	Change	UTTO	23 (6.1)	3
	31	Pilot line filter element	Replace	-	-	1
500 Hours	18	Radiator, oil cooler, CAC, condenser	Clean	-	-	5
	21-1	Parking brake clearance	Check, Adjust	-	-	1
	25	Air cleaner element (primary)	Clean	-	-	1
	33	Air compressor air filter (option)	Check, Clean	-	-	1
800 Hours	2	Engine oil	Change	EO	11 (2.9)	1
	3	Engine oil filter	Replace	-	-	1
1000 Hours	13	Hydraulic oil return filter	Replace	-	-	2
	14	Hydraulic tank air breather element	Replace	-	-	1
	16	Fuel filter element	Replace	-	-	1
	17	Fuel pre-filter element	Replace	-	-	1
	19	Center pivot pin	Lubricate	PGL	-	2
	20	Transmission oil	Change	EO	34.5 (9.1)	1
	21	Transmission oil filter	Replace	-	-	1
	24	Airconditioner and heater outer filter	Replace	-	-	1
	31	Pilot line filter element	Replace	-	-	1
1500 Hours	22	Axle oil (front)	Change	UTTO	23 (6.1)	3
	23	Axle oil (rear)	Change	UTTO	23 (6.1)	3
2000 Hours	1	Hydraulic oil★ <sup>1</sup>	Change	HO	90 (23.8)	1
	1	Hydraulic oil (HBHO★ <sup>2</sup> )	Change	-	90 (23.8)	1
	4	Radiator coolant★ <sup>1</sup>	Change	C	37 (9.8)	1
	15	Hydraulic oil suction strainer	Check, Clean	-	-	1
	24	Air conditioner and heater inner filter	Replace	-	-	1
	-	Engine cleaning, Vibration damper	Clean, Check	-	-	2
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
	25	Air cleaner element (safety and primary)	Replace	-	-	2
	33	Air compressor air filter (option)	Replace	-	-	1
4000 Hours	30	DEF/AdBlue® tank filter	Replace	-	-	1
4500 Hours	27	DEF/AdBlue® supply module filter	Replace	-	-	1
5000 Hours	1	Hydraulic oil★ <sup>3</sup>	Change	HO	90 (23.8)	1
	-	Overhead set (shop inspection)	Adjust	-	-	1
6000 Hours	4	Radiator coolant★ <sup>3</sup>	Change	C	37 (9.8)	1
When required	24	Air conditioner and heater outer filter	Replace	-	-	1
		Air conditioner and heater inner filter	Clean, Replace	-	-	1
	25	Air cleaner element (safety)	Replace	-	-	1
		Air cleaner element (primary)	Clean, Replace	-	-	1
	33	Air compressor air filter (option)	Check, Clean	-	-	1

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

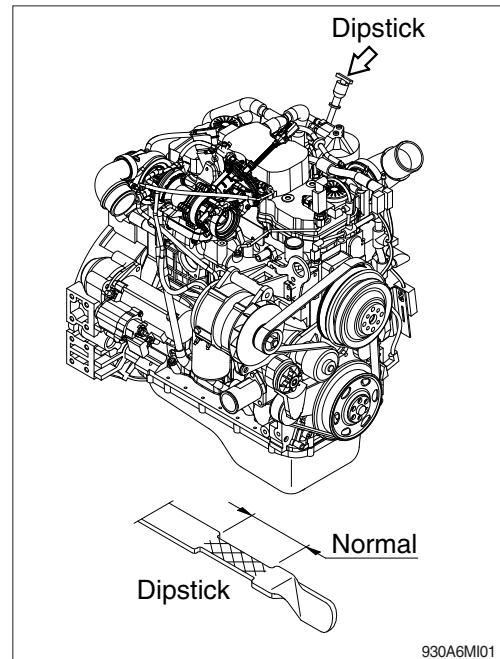
★<sup>3</sup> HD Hyundai Construction Equipment genuine long life

## 6. SERVICE INSTRUCTION

### 1) CHECK ENGINE OIL LEVEL

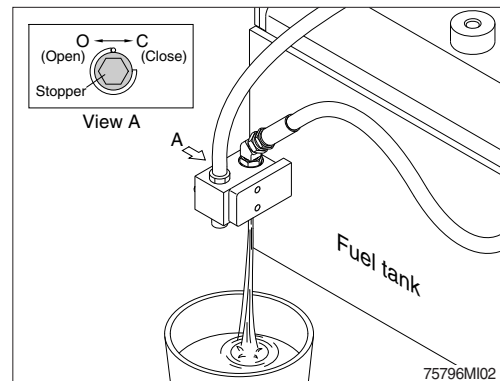
Check the oil level with the machine on a flat ground before starting engine.

- (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.

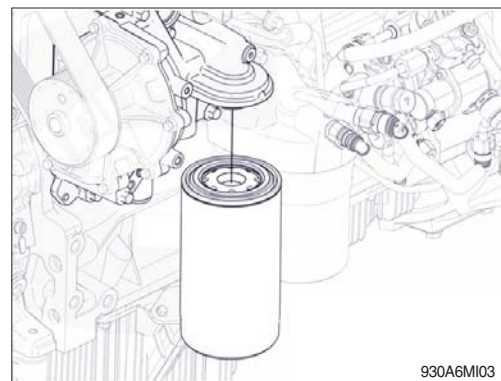


### 2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

- (1) Operate the engine until the coolant temperature reaches 60°C (140°F). Shut off the engine.
  - (2) Turn the stopper to the open position and allow the oil to drain.
    - Wrench size : 10 mm
- ※ A drain pan with a capacity of 30 liters (6.6 U.S.gallons) will be adequate.



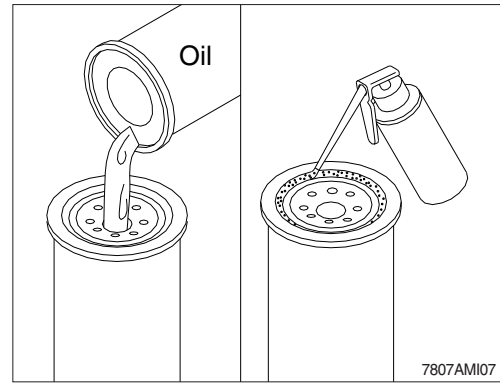
- (3) Clean the area around the oil filter head.
  - (4) Use oil filter wrench to remove the oil filter.
  - (5) Clean the gasket surface of oil filter head.
- ※ The O-ring can stick on the filter head; make sure it is removed.





(6) Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.

※ **Fill the filter with clean lubricating oil.**

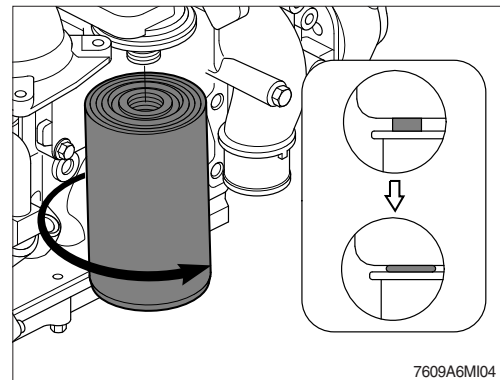


(7) Install the filter to the filter head.

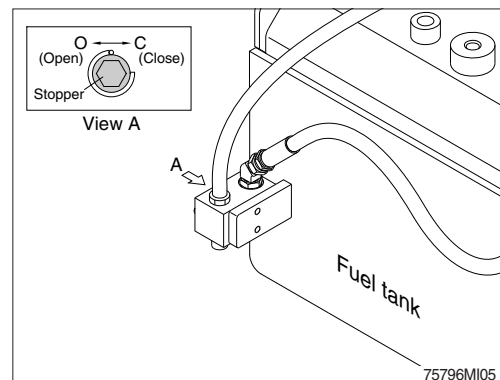
Tighten the filter until the gasket contacts the filter head surface.

Tighten 3/4 to 1 turn after gasket makes contact with the filter head.

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

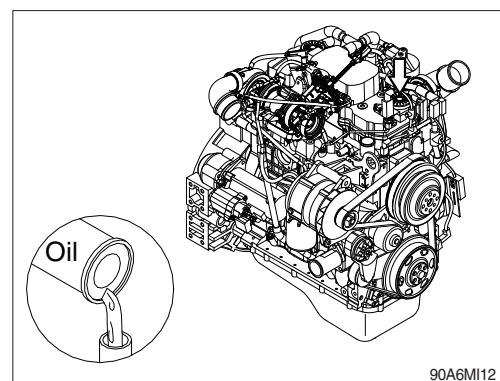


(8) Turn the stopper to the close position.



(9) Fill the engine with clean oil to the proper level.

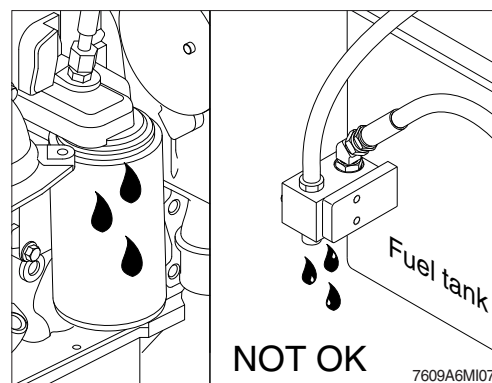
· Quantity : 11 ℓ (2.9 U.S.gallons)





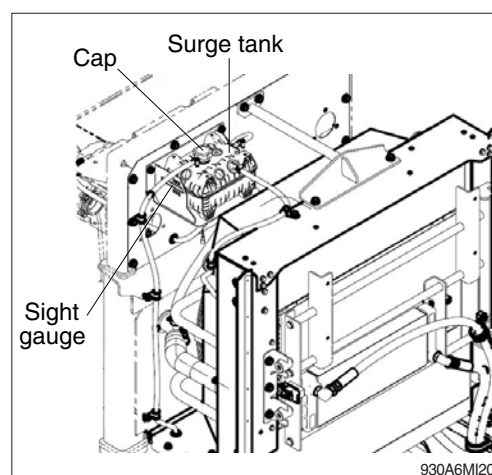
- (10) Operate the engine at low idle and inspect for leaks at the filter and the drain plug.  
Shut the engine off and check oil level with dipstick. Allow 15 minutes for oil to drain down before checking.

※ **Do not overfill the engine with oil.**



### 3) CHECK COOLANT LEVEL

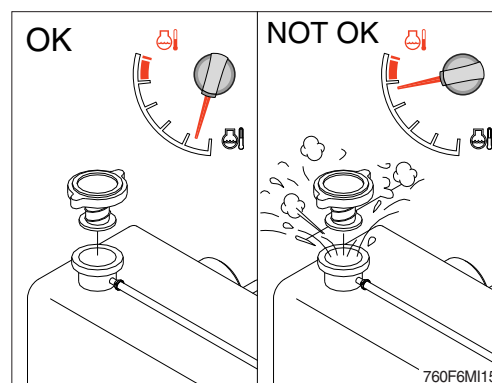
- (1) Check the engine fault code on the monitor.
- (2) If you following fault codes exist, check the coolant level.
- SPN : 111, FMI : 18
    - Coolant level is low.
  - SPN : 111, FMI : 1
    - Coolant level is the most severely low.
- (3) Add the mixture of antifreeze and water after removing the cap of the surge tank if coolant is not sufficient.



- (4) Replace gasket of surge tank cap when it is damaged.

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

※ **Do not add cold coolant to a hot engine ; engine castings can be damaged. Allow the engine to cool to below 50°C (120°F) before adding coolant.**



#### 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.

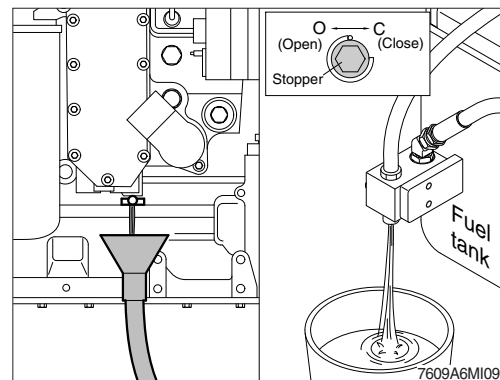
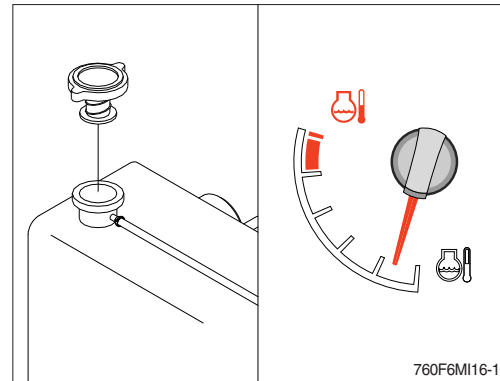
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.

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

- ⚠ Wait until the temperature is below 50°C (120°F) before removing the coolant system cap. Failure to do so can cause personal injury from heated coolant spray.

Drain the cooling system by turning the stopper to the open position.

A drain pan with a capacity of 45 liters (11.9 U.S.gallons) will be adequate in most applications.

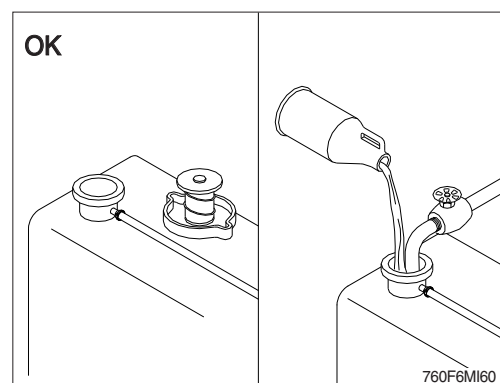


##### (2) Flushing of cooling system

- ① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

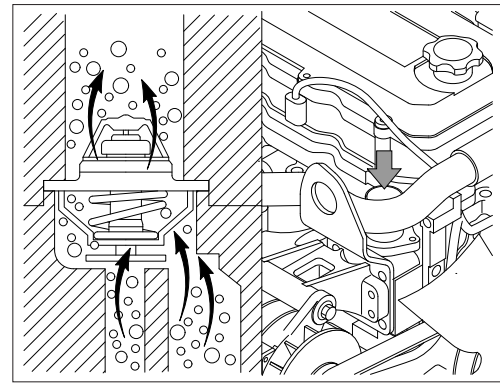
- ※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.

- ※ Do not install the cap. The engine is to be operated without the cap for this process.

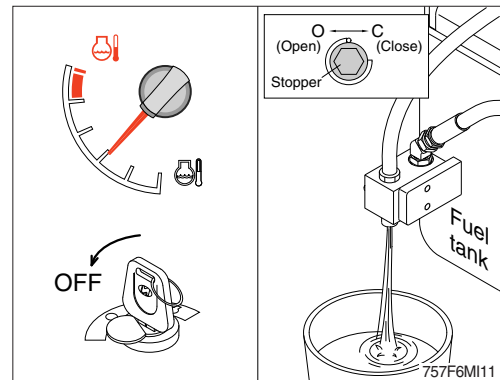


- ※ During filling, air must be vented from the engine coolant passages.

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.

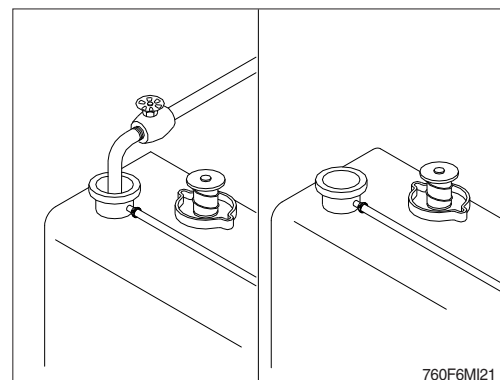


- ② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.



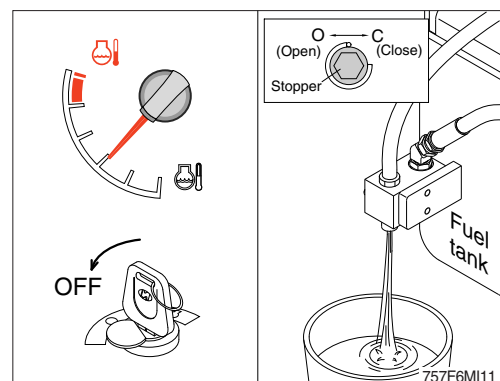
- ③ Fill the cooling system with clean water.

- ※ 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.

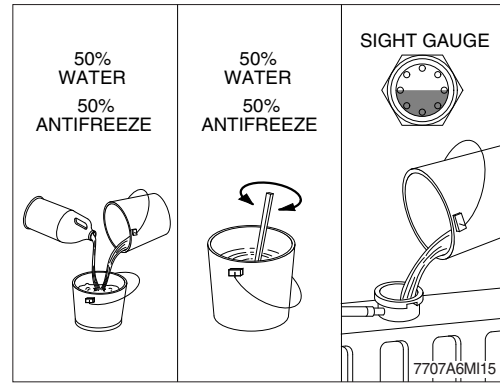
- ※ If the water being drained is still dirty, the system must be flushed again until the water is clean.



### (3) Cooling system filling

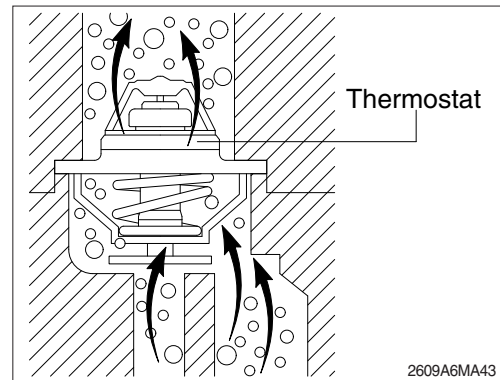
- ① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-9.

- ※ **Never use water alone for coolant.**  
**This can result in damage from corrosion.**
- ※ **Do not use hard water such as river water or well water.**

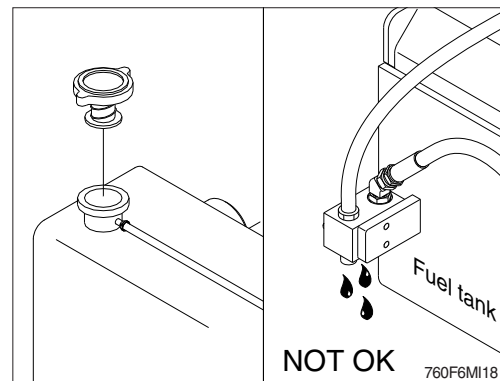


- ② The system has a maximum fill rate of 19 liters (5.0 U.S. gallons) per minute. Do not exceed this fill rate.

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



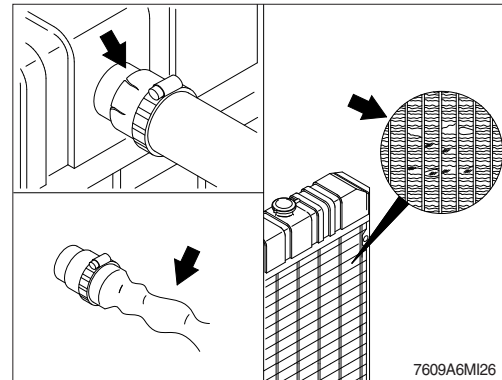
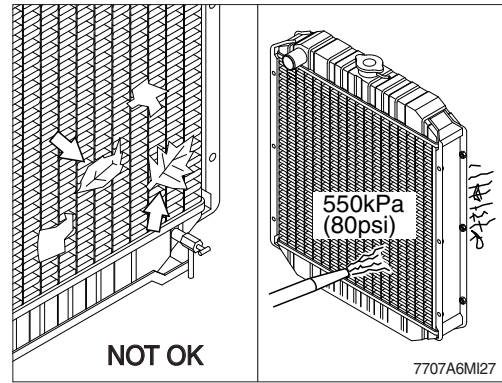
- ③ Install the cap. Operate the engine until it reaches a temperature 80°C (176°F), and check for coolant leaks. Check the coolant level again to make sure the system is full of coolant.



## 5) CLEAN RADIATOR AND OIL COOLER

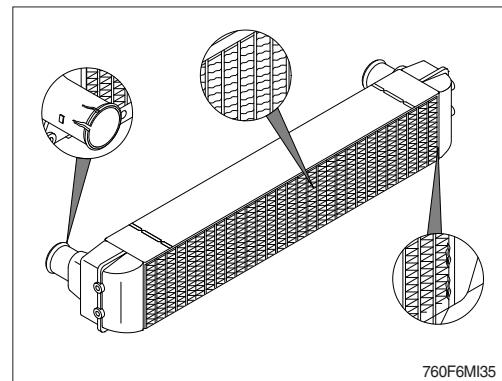
Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

- (1) Visually inspect the radiator for clogged radiator fins.
- (2) Use 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

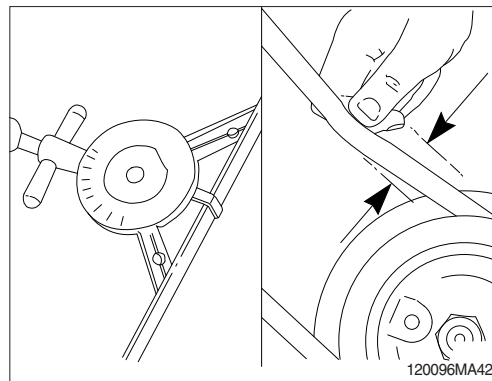
- (1) Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact hyundai distributor.



## 7) FAN BELT

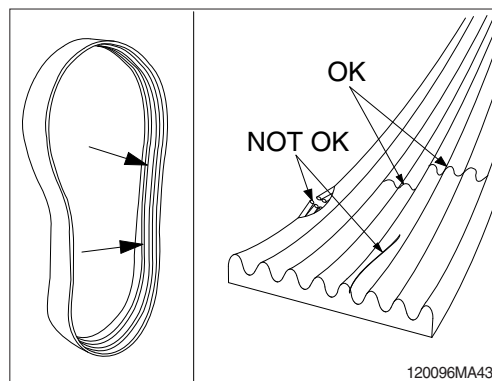
- (1) Use the belt tension gage to measure the belt tension.

· Fan belt tension : 11.3 kg (25 lb)

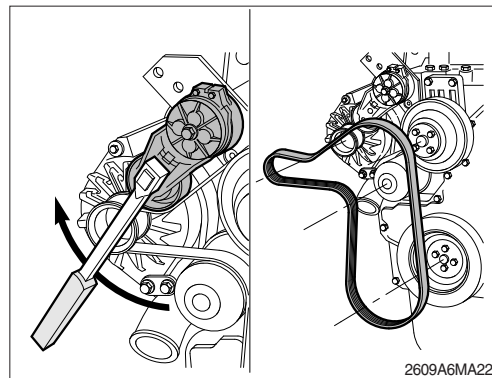


- (2) Inspect the fan belt for damage.

- 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.



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



## 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.**

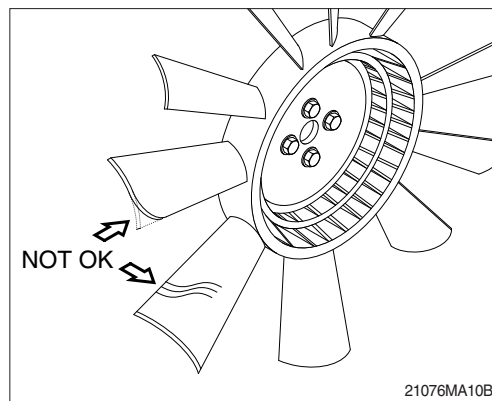
※ Rotate the crankshaft by using the engine barring gear.

※ A visual inspection of the cooling fan is required daily.

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

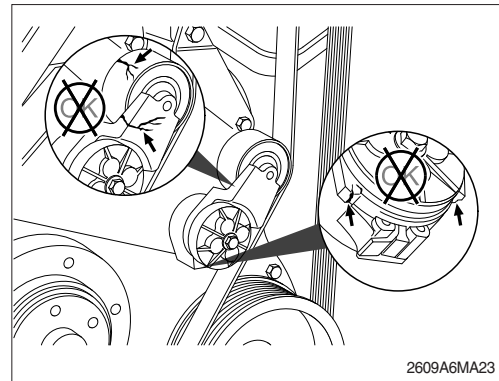
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.



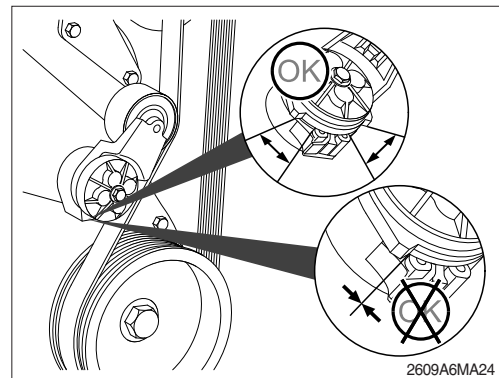
## 9) FAN BELT TENSIONER

- (1) With the engine stopped, check the tensioner arm, pulley, and stops for cracks. If any cracks are found, the tensioner must be replaced.



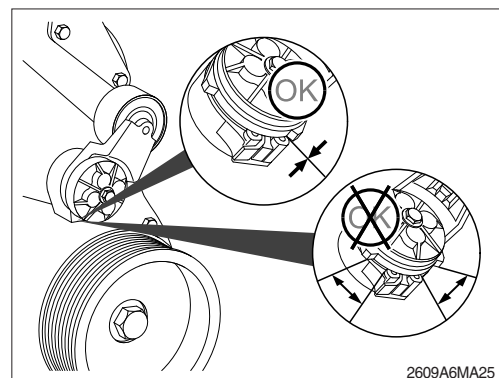
- (2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.

After replacing the belt, if the tensioner arm stops are still in contact with the spring case stop, replace the tensioner.

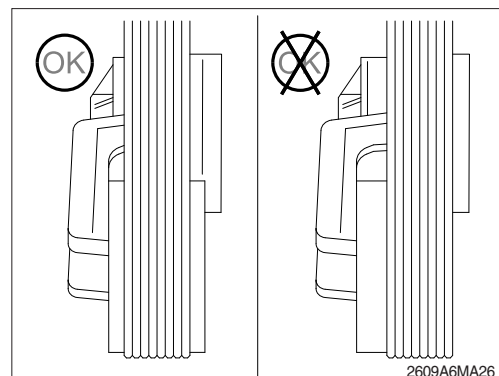


- (3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop. If these two are not touching, the tensioner must be replaced.

※ **After replacing the belt, if the tensioner arm stop is still in contact with the spring case stop, the tensioner MUST be replace.**



- (4) Check the location of the drive belt on the belt tensioner pulley. The belt should be centered on, or close to the middle of, the pulley. Misaligned belts, either too far forward or backward, can cause belt wear, belt roll-offs, or increase uneven tensioner bushing wear.





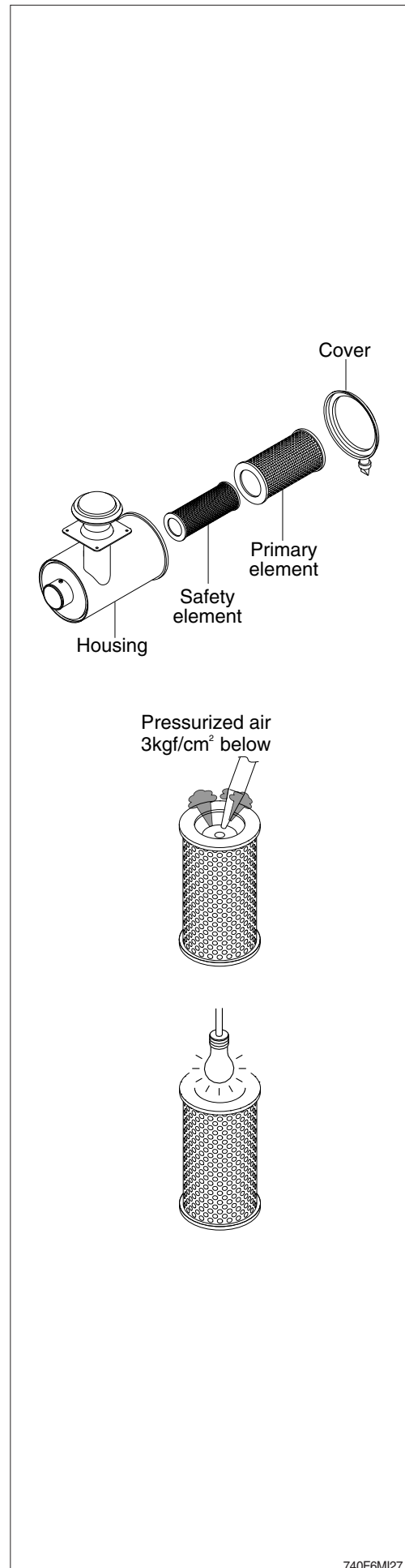
## 10) CLEANING OF AIR CLEANER

### (1) Primary element

- ① Open the cover and remove the element.
- ② Wipe all contaminant and debris from inside the housing body.
- ③ Do not clean the filter element by striking or hitting the filter against any object to shake the debris from the filter element.
- ④ Clean the filter element with compressed air.
  - a. Remove dust from filter element by directing the compressed air into the opening of the air filter element.
  - b. Use  $3 \text{ kg/cm}^2$  (40 psi) maximum air pressure and hold the compressed air nozzle at least 2.5 cm (1") away from the pleats while cleaning. Make sure to keep the clean side of air filter free of debris.
- ⑤ Visually inspect for damage to the filter elements and components. Use a light source to help identify any defects in the media. If any defects are observed discard the filter element and replace with a new primary filter element.
  - a. Before any type of cleaning, a visual inspection of the filter is needed. If there is any damage to the filter body, gaskets or endplates, do not clean or reuse; the filter should be discarded. Always clean filters in a clean environment, observe strict inspection procedures and repackage filters immediately after the cleaning process with appropriate materials.
  - b. Use observe proper safety precautions and dispose of waste materials in an environmentally compliant manner.
- ⑥ Re-install filter element into the air housing.
- ⑦ Replace the primary element at the fourth cleaning.

### (2) Safety element

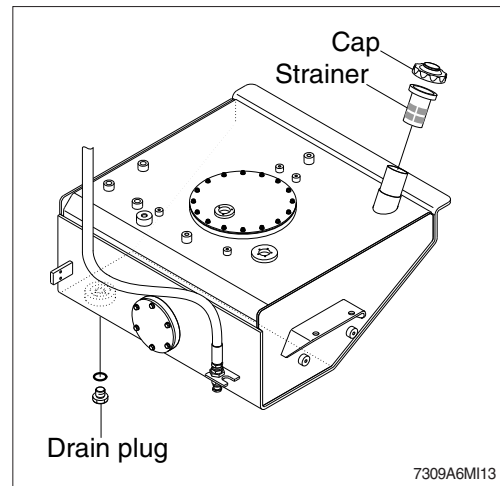
The safety filter element should never be cleaned since the safety filter is the last barrier to contaminant before it reaches engine/equipment. The useful life of the safety filter is equivalent to that of the primary air filter only if the primary filter element is being regularly cleaned. If the primary filter element is not cleaned, the safety filter should be changed at every third primary air filter change or after one year of continuous service, whichever occurs first.





## 11) 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.**

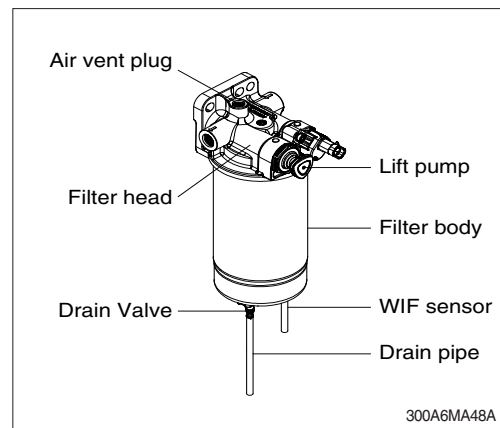


## 12) FUEL PRE-FILTER

- ※ Inspect or drain the collected water daily and replace the element every 1000 hours.

### (1) Drain water

- ① Open the drain valve to evacuate water for 10 seconds.
  - ② Close drain valve.
- ※ Do not use tools.
  - ※ Don't tighten up a drain valve so strong.



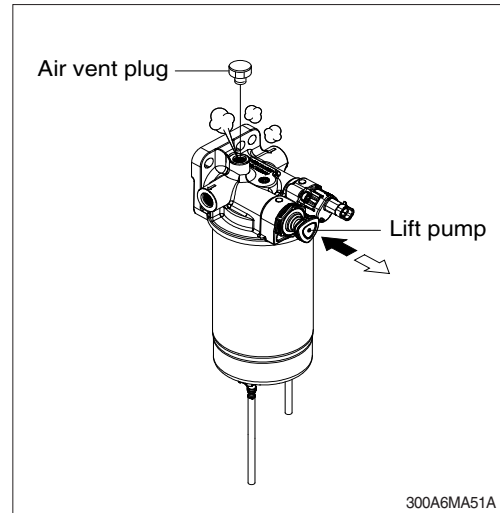
### (2) Replace element

- ① Loosen the air vent plug and drain the unit of fuel. Follow "Drain water" instructions above.
- ② Remove the drain pipe and WIF sensor from filter body.
- ③ Remove the filter body from filter head.
- ④ Pre-fill a new filter body with fuel and lubricate a gasket on the new filter body.
- ⑤ Install the filter on the filter head. Tighten the filter until the gasket contacts the filter head surface. Tighten the prefilter an additional 3/4 turn after contact.
- ⑥ Connect the drain pipe and WIF sensor to filter body.

### (3) Air bleeding

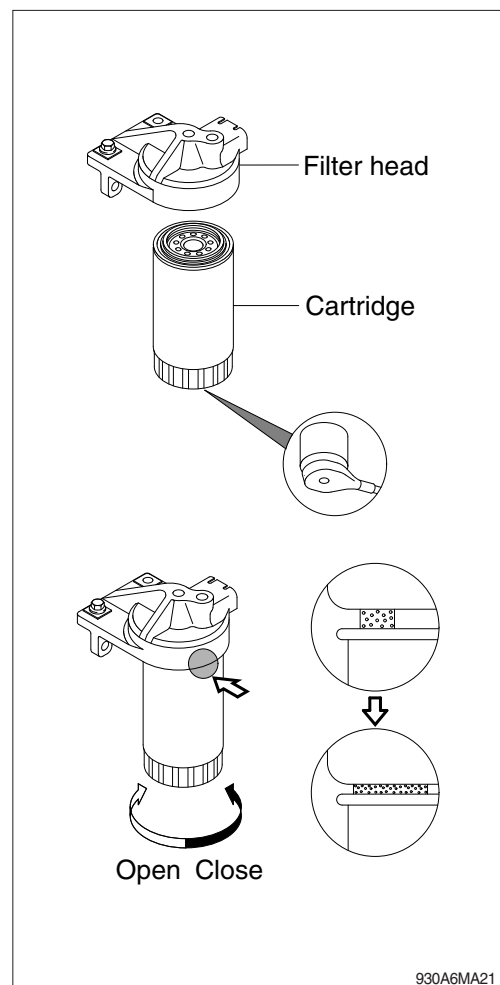
- ① Do hand-priming the lift pump repeatedly until air bubbles comes out from air vent hole completely.
- ② Tighten the air vent plug to its origin position.

▲ The fuel pump, high-pressure fuel lines, and fuel rail contain very high-pressure fuel. Do not loosen any fittings while the engine is running. Personal injury and property damage can result. Wait at least 10 minutes after shutting down the engine before loosening any fittings in the high-pressure fuel system to allow pressure to decrease to a lower level.



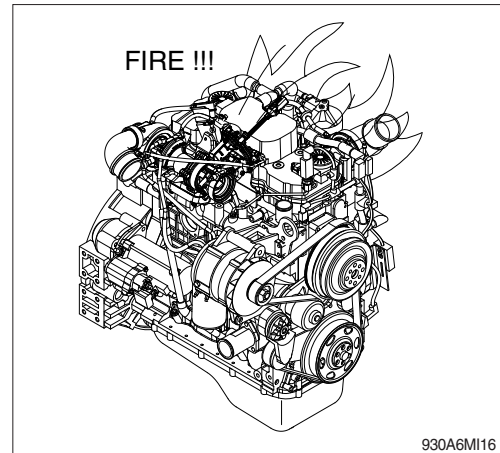
### 14) REPLACEMENT OF FUEL FILTER

- (1) Use 1" wrench, loosen and remove the filter and clean the gasket surface.
- ※ **Make sure O-ring does not stick to filter head. Remove O-ring with screwdriver if necessary.**
- (2) Lubricate the fuel filter O-ring with clean lubricating oil.
- (3) Install the filter on the filter head. Tighten the filter until the gasket contacts the filter head surface. Tighten the fuel filter an additional 3/4 turn after contact.
- ※ **Mechanical overtightening can distort the threads or damage the filter element seal.**
- (4) Relieve the air after mounting.
- ※ **Do not pre-fill an on-engine fuel filter with fuel. The system must be primed after the fuel filter is installed. Pre filling the fuel filter can result in debris entering the fuel system and damaging fuel system components.**
- ※ **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.**



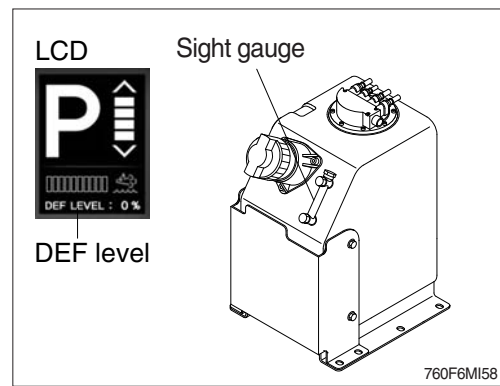
## 16) LEAKAGE OF FUEL

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



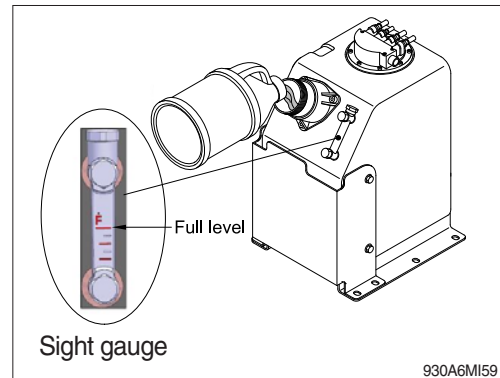
## 17) DEF/AdBlue® TANK

- (1) The DEF/AdBlue® tank level must be checked daily with DEF/AdBlue® level on LCD. Refer to the page 3-12.
- ※ Make sure that the filler filter in cap is clean. If it is dirty, clean the filler filter with clean water and refit it.



- (2) If the DEF/AdBlue® level is found to below, DEF/AdBlue® must be added.
- (3) When fill the tank with DEF/AdBlue®, check the sight gauge and don't fill up "F" level line to prevent overflow.

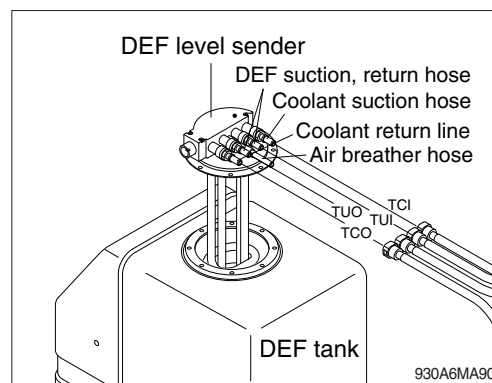
- ⚠ It is unlawful to tamper with or remove any component of the aftertreatment system. It is also unlawful to use a catalyst solution that does not meet the specifications provided or the operate the machine with no catalytic solution.
- ※ Be careful to entering dust, sand or other contamination substance when you refill the DEF/AdBlue® into the tank. Otherwise, fatal problem such as engine idle locking, derating or engine stopping can be happen.



### 17-1) DEF/AdBlue® TANK FILTER

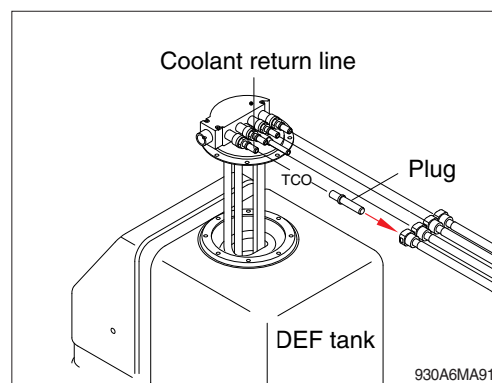
- (1) Remove coolant, DEF/AdBlue® and air vent hoses.

※ Move hoses back and forth 3~4 times to easily remove the hoses.

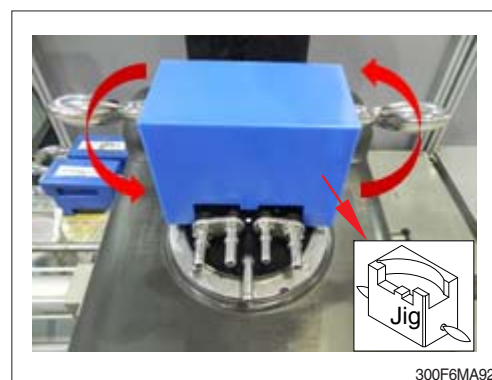


- (2) Plugging the coolant return line with the plug (P/ no : HDB030-0002).

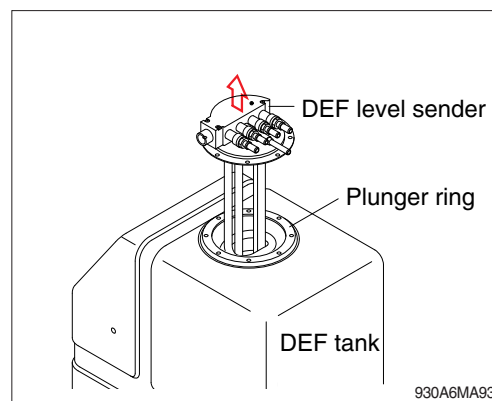
※ When the coolant return line is removed, the coolant come out from the return line (TCO). Nearly comes out the coolant or DEF from other lines.



- (3) Rotate the DEF/AdBlue® level sender counter-clockwise about 20 degree with the Jig (P/no : HDB030-0001).



- (4) Remove the DEF/AdBlue® level sender without removal of the plunger ring.



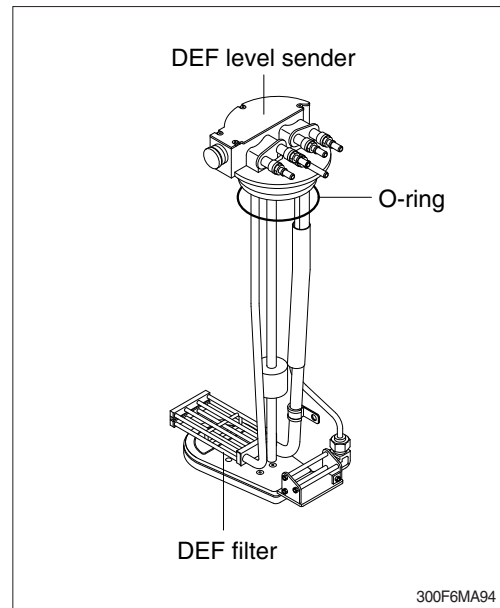
(5) Removed DEF/AdBlue® level sender.

※ **Make sure O-ring is on the right position.**

(6) Replace the DEF/AdBlue® filter and fit with a new filter.

※ **Replace the filter every 4000 hours.**

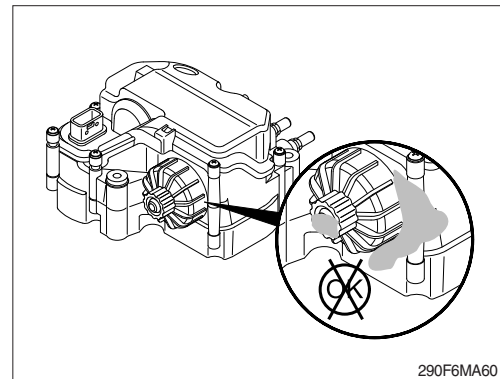
※ **Carry out installation in the reverse order to removal.**



## 18) DEF/AdBlue® SUPPLY MODULE FILTER

(1) Inspect the area around the seal and vent of DEF/AdBlue® supply module filter cap for signs of leakage.

※ **Turn OFF the master switch.**



(2) Unscrew the DEF/AdBlue® supply module filter cap. A 30 mm wrench can be used on the cap to aid in removal.

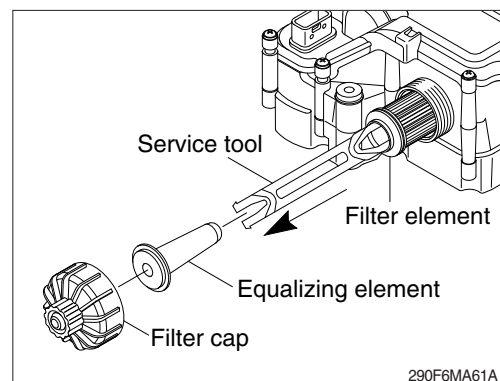
(3) Remove the filter equalizing element.

(4) Remove the old filter element.

A disposable service tool is included with the filter to aid in filter removal. Use the appropriate end of the tool, depending on the color of the plastic on the filter.

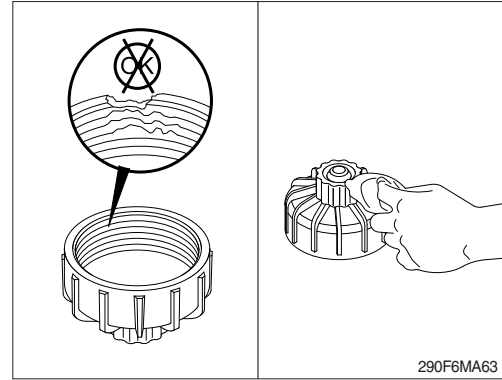
When inserting the tool a "click" sound can be heard which indicates proper engagement with the filter.

※ **If the filter element and equalizing element are removed from the aftertreatment DEF/AdBlue® tank, they must be discarded and replaced; regardless of condition.**



(5) Clean and inspect the filter cap

- ① Clean the aftertreatment DEF/AdBlue® tank cap and threads on the DEF/AdBlue® tank with warm water and a clean cloth.
- ② Check the condition of the threads on the filter cap, if the threads are damaged, replace the filter cap.

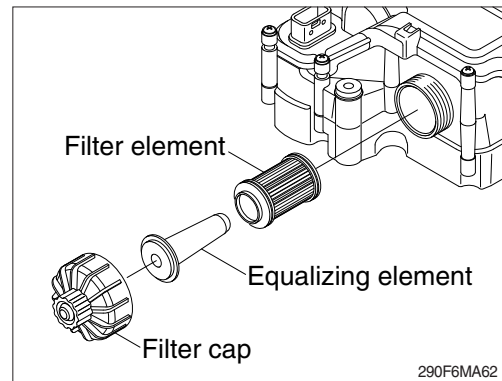


(6) Slide the filter equalizing element in to the new filter element.

(7) Insert the assembly into the aftertreatment DEF/AdBlue® supply module.

(8) Install and tighten the filter cap.

- Tightening torque : 2.0 kgf · m (14.5 lbf · ft)



## 19) ENGINE CLEANING

**⚠ When using a steam cleaner, wear safety glasses or a face shield, as well as protective clothing. Hot steam can cause serious personal injury.**

**※ Turn OFF the master switch mounted electric box.**

(1) Steam is the recommended method of cleaning a dirty engine or a piece of equipment.

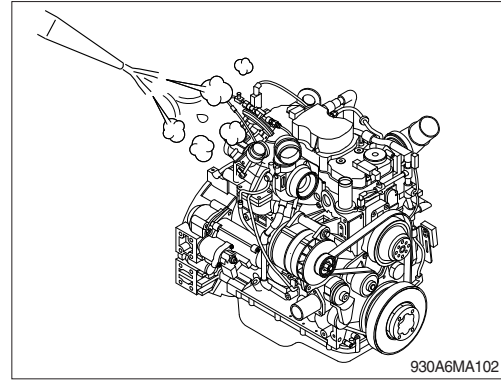
(2) Protect all electrical components, openings, and wiring from the full force of the cleaner spray nozzle.

(3) Components to protect include, but are not limited to the following:

- Electrical components and connectors
- Wiring harnesses
- Electronic control module (ECM) and connectors.
- Belts and hoses
- Bearings (ball or taper roller)

**△ Soap, solvent, or water ingress into air intake system can cause engine damage.**

**△ Do not directly spray or allow soap, solvent, or water to enter any passages, ports, or cowlings that lead to the engine air intake system.**

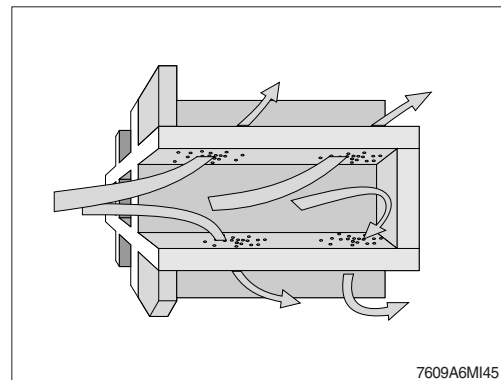


## 20) DPF (diesel particulate filter) CLEANING

(1) The diesel particulate filter can not be cleaned for maintenance purpose using conventional tools.

(2) The diesel particulate filter needs to be cleaned and checked using an approved cleaning machine at a authorized service center.

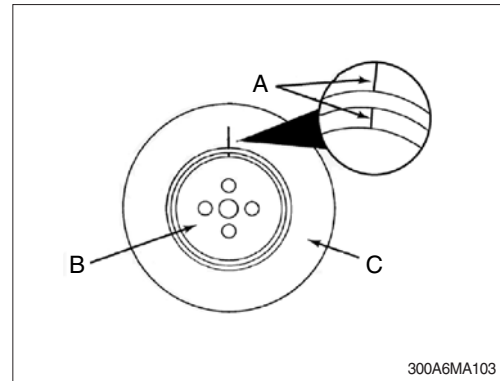
**※ Please contact your Hyundai service center or local dealer.**



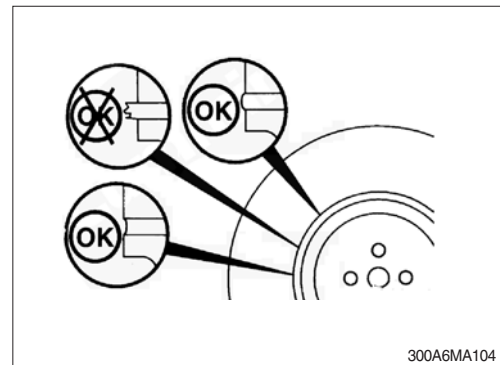
## 21) VIBRATION DAMPER

### (1) Rubber

- ① Check the index lines (A) in the vibration damper hub (B) and the inertia member (C). If the lines are more than 1.59 mm (1/16 in) out of alignment, replace the vibration damper.



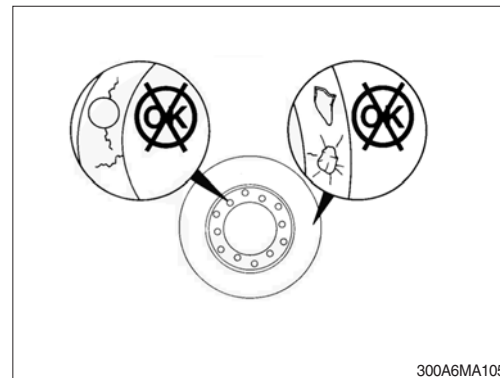
- ② Inspect the rubber member for deterioration. If pieces of rubber are missing or if the elastic member is more than 3.18 mm (1/8 in) below the metal surface, replace the damper.
- ③ Look for forward movement of the damper ring on the hub. Replace the vibration damper if any movement is detected.



### (2) Viscous

※ The silicone fluid in the vibration damper will become solid after extended service and will make the damper inoperative. An inoperative vibration damper can cause major engine or drivetrain failures.

- ① Check the vibration damper for evidence of fluid loss, dents, and wobble. Inspect the vibration damper thickness for any deformation or raising of the damper cover plate.
- ② If any of these conditions are identified, contact your local Cummins authorized repair location to replace the vibration damper.





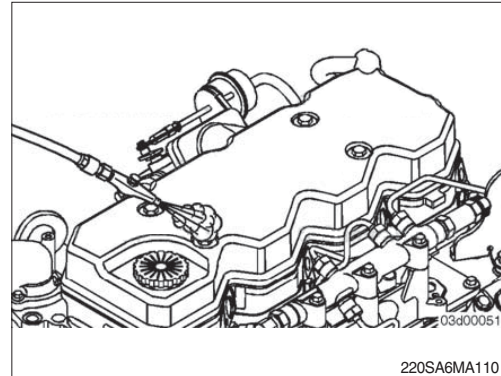
## 22) OVERHEAD SET ADJUSTMENT

This procedures are perform the repair shop.

### ※ Service tools

- Cummins barring tool, p/no. 3824591
- Feeler gauge

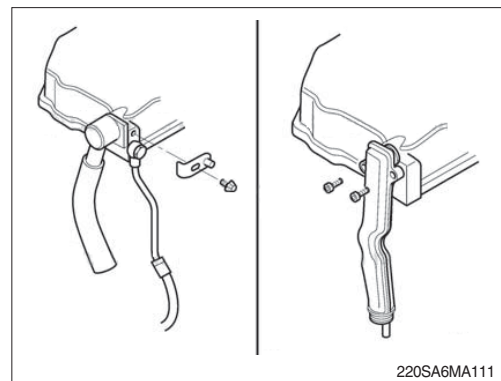
- (1) Prior to removing any components, use compressed air to remove any loose debris from around the mounting fasteners and sealing joints.



- (2) Disconnect the breather tube connection at the back of the rocker lever cover.

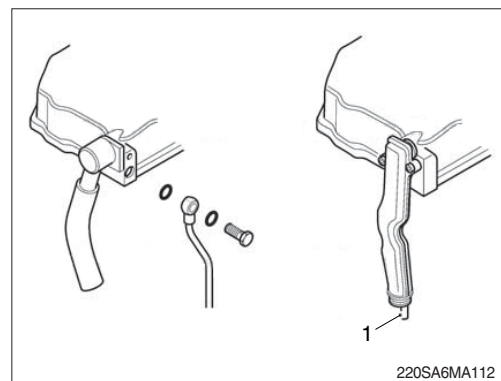
In general, two types of breather tube connections are used at the rocker lever cover.

- A clamping plate and capscrew hole the breather tube connection to the rocker lever cover. Remove the capscrew and clamping plate to disconnect the breather tube connection from the rocker lever cover.
- One or two capscrew(s) directly mount the breather tube connection to the rocker lever cover. Remove the capscrew(s) to disconnect the breather tube connection from the rocker lever cover.



- (3) If equipped, at the rear of the rocker lever, remove the banjo bolt and sealing washers connecting the breather oil drain line to the rocker lever cover.

※ Some engine the breather oil drain line is internal to the breathe connection tube (1).

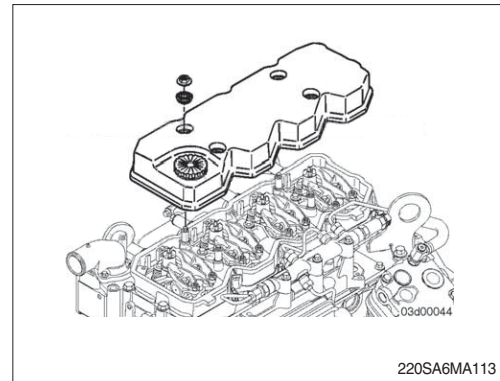


※ Do not remove the rocker lever gasket on engines in which the rocker lever cover gasket is fit into a groove at the base of the rocker lever cover. The gasket is reusable. Once the gasket is removed from the rocker lever cover, it must be replaced.

(4) Remove the mounting nuts and isolators from the rocker lever cover.

※ If equipped, it may be necessary to gently pry the breather tube connection from the back of the rocker lever cover while removing.

(5) Remove the rocker lever cover.

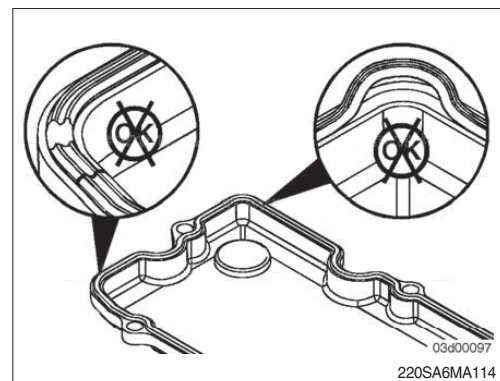


※ Check the gasket while it is installed in the valve cover. Once the gasket is removed from the cover it must be replaced.

(6) Check the gasket for cracks on the sealing surface.

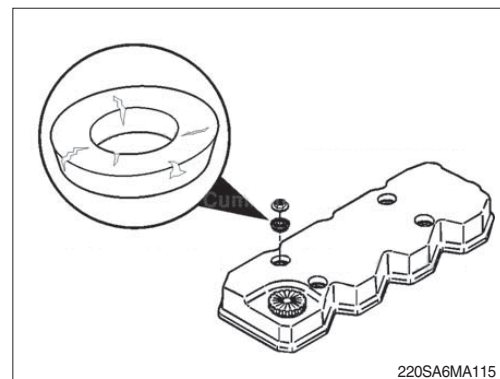
Replace the gasket if damage is present.

Replace the gasket if it is removed from the groove in the rocker lever cover.



(7) Inspect the rubber isolators for cracks.

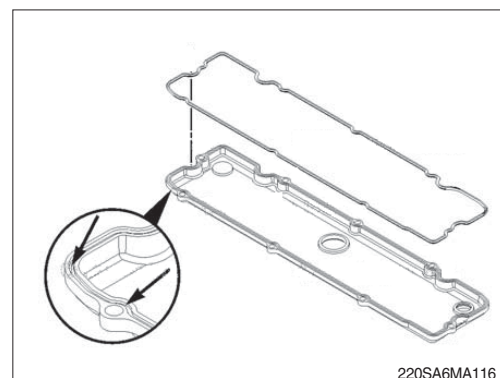
Replace if cracked or broken.



※ If the gasket has been removed from the rocker lever cover, a new gasket must be used.

(8) If replacing the press-in rocker lever gasket, the following installation procedure must be used.

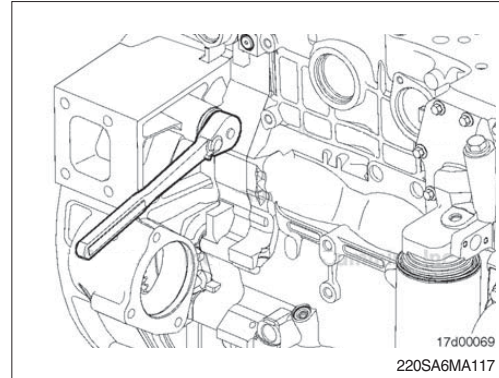
- Press the molded gasket into the corners of the rocker lever cover.
- Press the rest of the gasket into the rocker lever cover.



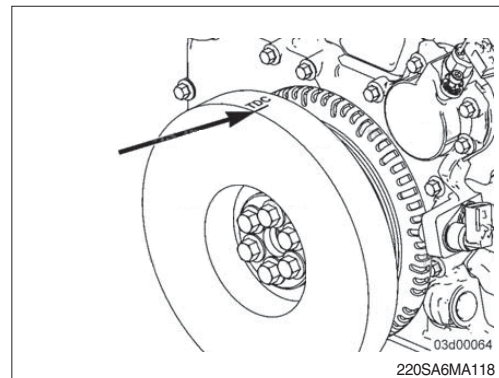
※ Engine coolant temperature must be less than 60 °C (140 °F).

- (9) Use the barring tool, to rotate the crankshaft until the number is at TDC.

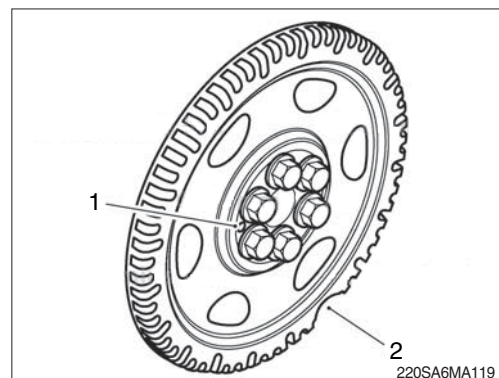
TDC can be determined by the following method.



- (10) Align the vibration damper/crankshaft speed indicator ring so the TDC indicator is at the 12 o'clock position. If both number 1 cylinder rocker levers are loose, move to the following steps. If both number 1 cylinder rocker levers are not loose, rotate the crankshaft 360 degrees.



※ If no TDC mark is present on either the vibration damper or the crankshaft speed indicator ring, align the large gap in the crankshaft speed indicator ring to the 5 o'clock position (2). The dowel pin will be visible in the 9 o'clock position (1). Check that both number 1 cylinder rocker levers are loose. If they are not loose, rotate the crankshaft 360 degrees and check again.

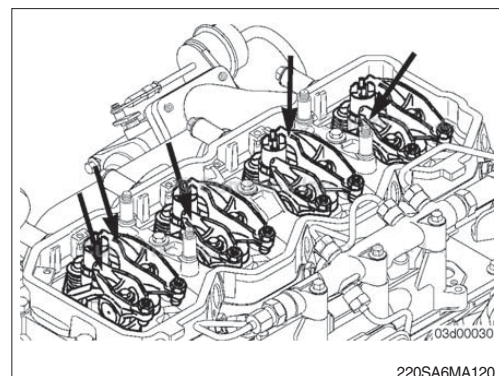


- (11) With the engine in this position, lash can be checked on the following rocker arms.

(E=exhaust, I=Intake)

Four-cylinder 1I, 1E, 2I and 3E)

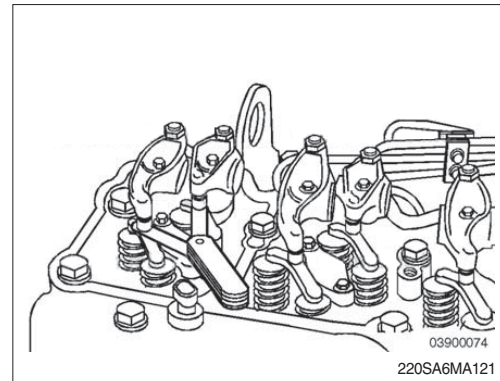
Six-cylinder 1I, 1E, 2I, 3E, 4I and 5E)



※ **Lash check limits**

Item		mm	inch
Intake	Min	0.152	0.006
	Max	0.381	0.015
Exhaust	Min	0.381	0.015
	Max	0.762	0.030

- ※ **Checking the overhead setting is usually performed as part of a troubleshooting procedure, and resetting is not required during checks, as long as the lash measurements are within the above ranges.**

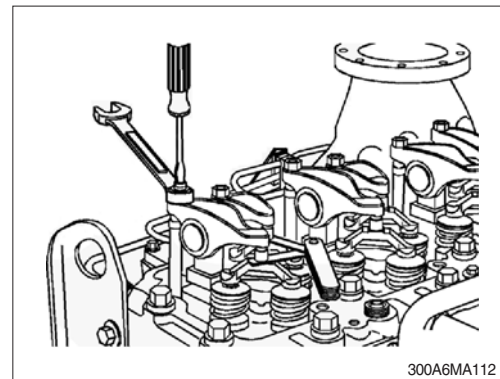


- ※ **The clearance is correct when some resistance is "felt" when the feeler gauge is slipped between the crosshead and the rocker lever socket.**

- (12) Measure lash by inserting a feeler gauge between the crosshead and the rocker lever socket. If the lash measurement is out of specification, loosen the locknut, and adjust the lash to nominal specifications.

**Lash specifications**

Item	mm	inch
Intake	0.254	0.010
Exhaust	0.508	0.020



- (13) Tighten the locknut.

Tightening torque : 2.4 kgf · m (17.4 lbf · ft)

- (14) Use the barring tool, to rotate the crankshaft 360 degrees.

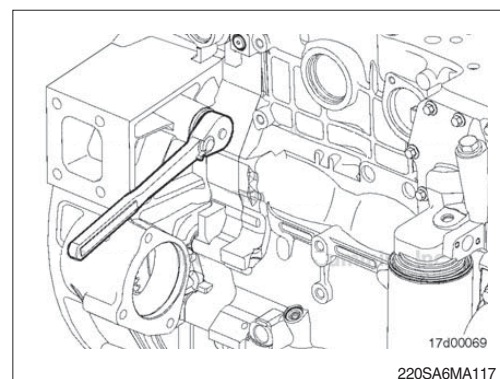
Following the same steps and specifications as previously stated, measure lash for the following rockers.

(E=exhaust, I=Intake)

Four-cylinder 2E, 3I, 4E and 4I)

Six-cylinder 2E, 3I, 4E, 5I, 6I and 6E)

Reset if out of specification.

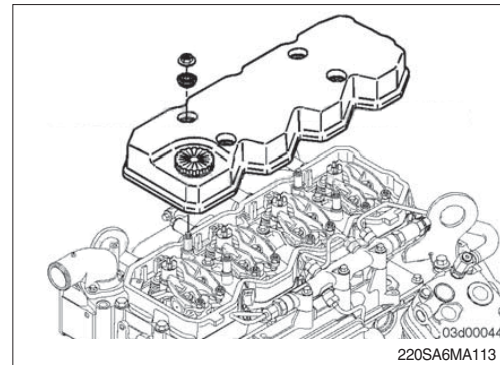




**(15) Stud mounted rocker lever cover**

- ① Install the rocker lever cover over the mounting capscrews.
- ② Install the isolators and mounting nuts.
- ③ Tighten the mounting nuts.

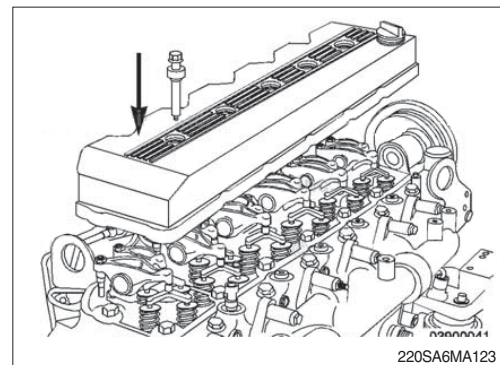
Tightening torque : 2.4 kgf · m (17.4 lbf · ft)



**(16) Capscrew mounted rocker lever cover**

- ① Install the rocker lever cover.
- ② Install the mounting capscrews and isolators.
- ③ Tighten the mounting capscrews.

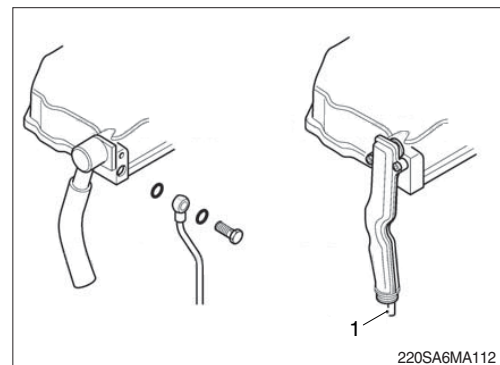
Tightening torque : 2.4 kgf · m (17.4 lbf · ft)



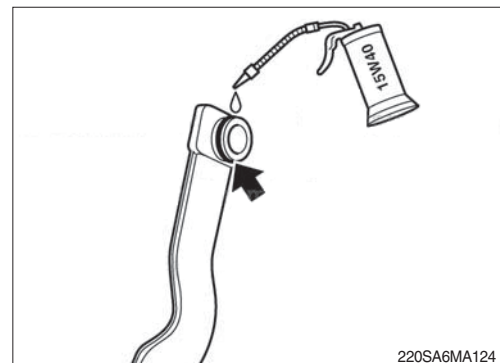
- (17) If equipped, at the rear of the rocker lever cover, install the banjo bolt and sealing washers connecting the breather oil drain line to the rocker lever cover.

Tightening torque : 1.2 kgf · m (8.7 lbf · ft)

※ **Some engine the breather oil drain line is internal to the breathe connection tube (1).**



- (18) Prior to connecting the breather connection tube to the rocker lever cover, apply clean engine oil to the O-ring located on the breather tube connection.



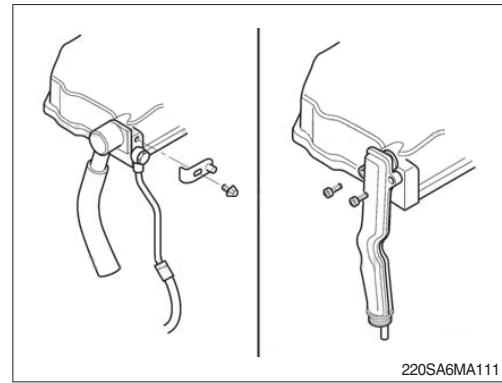
(19) Connect the breather tube connection to the rocker lever cover.

In general, two types of breather tube connections are used at the rocker lever cover.

- A clamping plate and capscrew hold the breather tube connection to the rocker lever cover. Remove the capscrew and clamping plate to disconnect the breather tube connection from the rocker lever cover.
- One or two capscrew(s) directly mount the breather tube connection to the rocker lever cover. Remove the capscrew(s) to disconnect the breather tube connection from the rocker lever cover.

(20) Tighten the capscrew(s).

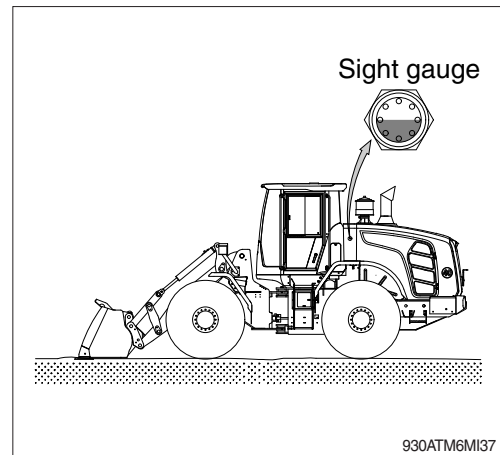
Tightening torque : 1.0 kgf·m (7.2 lbf·ft)



### 23) HYDRAULIC OIL CHECK

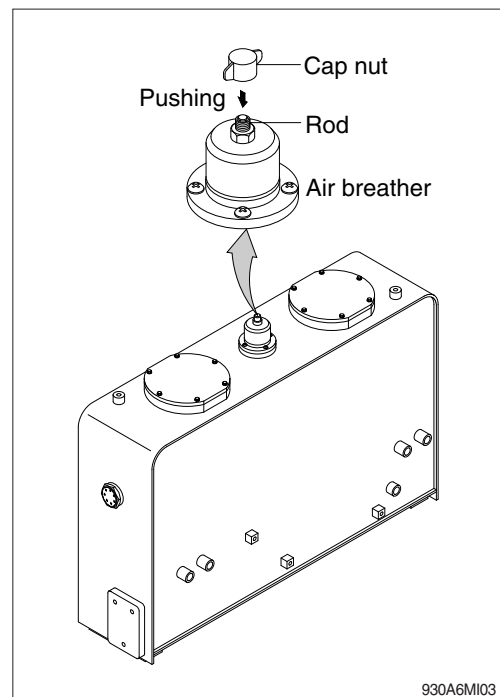
- (1) Lower the bucket on the ground at a flat location as in the illustration.  
Stop the engine and then leave for about 5 minutes.
- (2) Check the oil level at the sight gauge. The sight gauge is located on the left side of the hydraulic oil tank.
- (3) The sight gauge should indicate the middle position.

※ **Add hydraulic oil, If necessary.**



### 24) FILLING HYDRAULIC OIL

- (1) Stop the engine to the position of level check.
- (2) Rotate the cap nut counter-clockwise by hand and push the rod to release the air pressure.
- (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.



## 25) CHANGE THE HYDRAULIC OIL

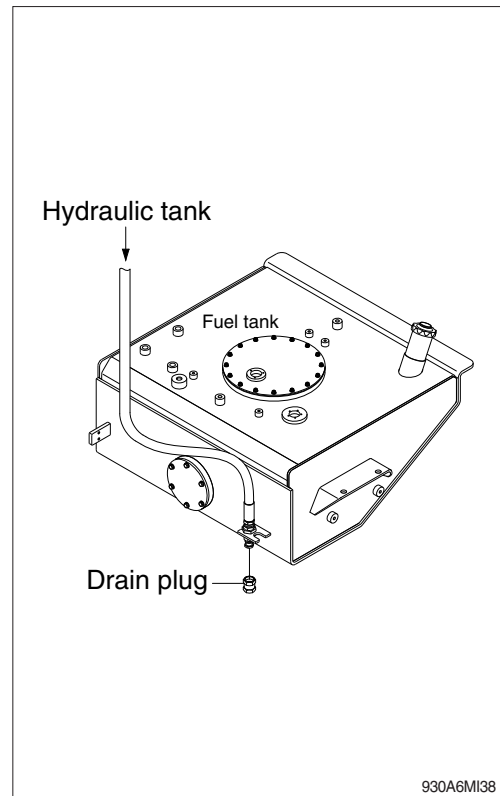
- (1) Lower the bucket on the ground extend the bucket cylinder to the maximum.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Prepare a suitable container.
- (4) To drain the oil loosen the drain plug at the fuel tank block.
- (5) Tighten the drain plug.
- (6) Fill proper amount of recommended oil.
- (7) Put the breather in the right position.
- (8) Start engine and run continually. Release the air by full stroke of control lever.

※ The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps. Tighten the drain plug.

※ Incase of injecting HBHO (Hyundai 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.

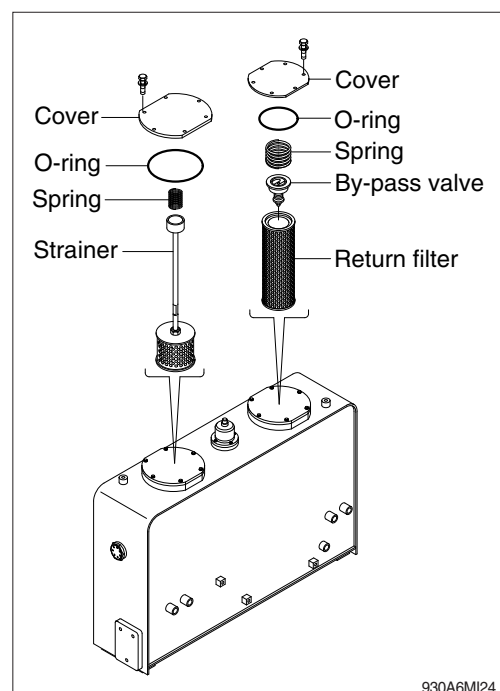
If changing to Bio oil, contact HYUNDAI dealer.



## 26) CLEANING AND REPLACING RETURN FILTER

Clean and replace the return filter in the following manner.

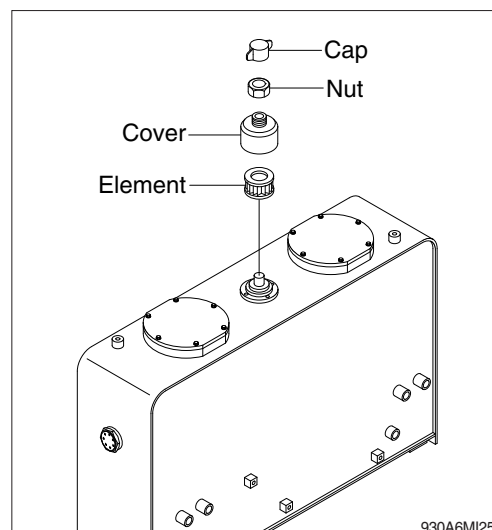
- (1) Remove the cover.
- (2) Remove spring, by-pass valve and return filter from the tank.
- (3) Replace element with new one and assemble spring and by-pass valve after cleaning.
- (4) Install the cover on the tank.
  - Tightening torque :  $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$   
( $50 \pm 10 \text{ lbf} \cdot \text{ft}$ )





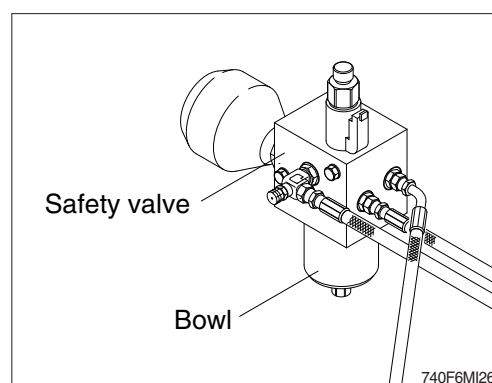
## 27) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

- (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 :  $1.05 \pm 0.21 \text{ kgf} \cdot \text{m}$   
( $7.6 \pm 1.5 \text{ lbf} \cdot \text{ft}$ )



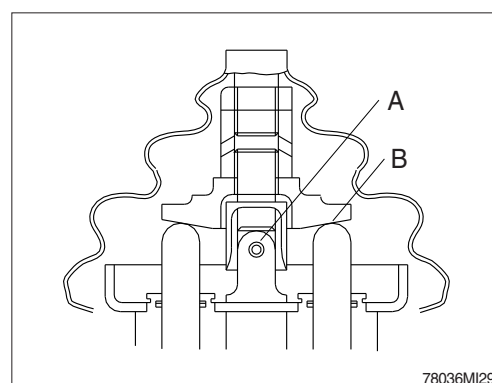
## 28) REPLACE OF PILOT LINE FILTER

- (1) Loosen the bowl positioned on the safety valve.
- (2) Pull out the filter element and clean the bowl.
- (3) Install the new element and tighten the bowl using spanner.
  - Spanner size : 27 mm



## 29) LUBRICATE RCV LEVER

Remove bellows and grease the joint (A) and the sliding parts (B).



### 30) TIRE PRESSURE

- (1) Inappropriate tire pressure is a primary cause for tire damage. Insufficient tire pressure will damage internal carcass of tire. Repeated excessive bending will damage or break the carcass. Excessive pressure will also cause premature damage of tire.
- (2) Recommended tire pressure (When tire is cooled). Refer to the page 5-1.

Size	Pressure
17.5 R25, L3★(★★)	-

- (3) Continuous operation will produce heat and increase pressure on tire. But such phenomenon was already taken into account when designing a tire. Do not try to remove normally increased air because tires may be crushed or overinflated.
- (4) The three major causes for excessive heat and pressure of tire are insufficient pressure, excessive load and overspeed. Avoid excessive load and overspeed in order to keep tires in good shape.

▲ Do not inflate tires using flammable gases or alcohol injector.

This cause explosion or personal injury.

▲ Inflate tires at the pressure level recommended by the manufacturer, and check periodically pressure and wear of tires.

▲ When replacing the inflated tire, do not stand near the tire.

※ Check the tire when the tire is at normal temperature and the machine is not loaded.

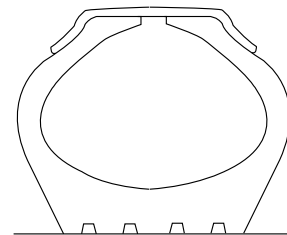
▲ Do not use recycled wheel parts.

▲ When removing lockering or inflating tire, use safety cable or chain to ensure safety.

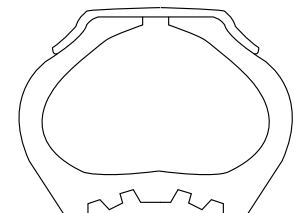
※ Be sure to bleed air before removing lockering. Never inflate tires unless the lockering is assembled in its place.

- ① Avoid the followings when traveling.
- ② Rubbing tires against road bank or rack at cargo-unloading spot.
- ③ Tires slippage during working.
- ④ Abrupt starting of machine.

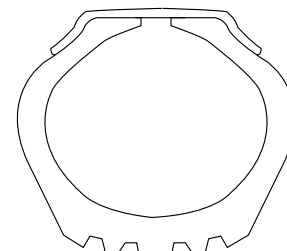
When oil, grease or gasoline smeared on tire, clean those. Otherwise it may cause of permanent deformation.



Normal



Too low pressure



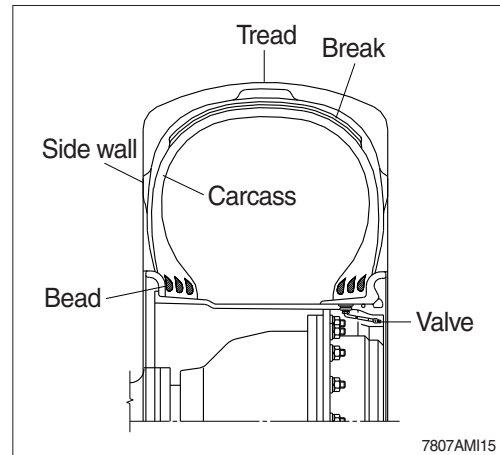
Excess pressure

### 31) REPLACEMENT OF TIRE

⚠ Disassembly, reassembly, replacement and repair of tire requires special skills and equipment. Contact a tire repair shop.

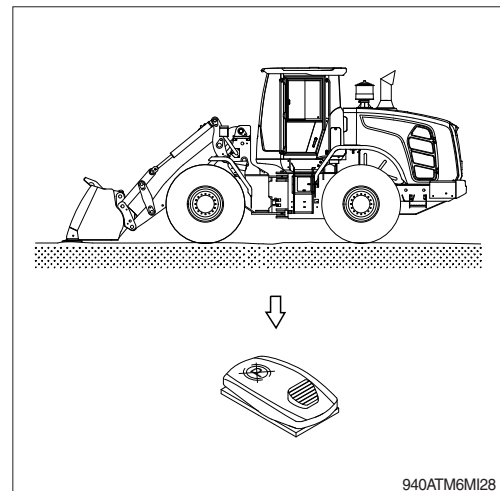
#### (1) Tires to be replaced

- ① Tires with broken or bent bead wires
- ② Tires exposed more than 1/4 of carcass ply.
- ③ Tires whose carcass is damaged more than 1/3 of the tire width.
- ④ Tires which show fly separation.
- ⑤ Tires which has a radial crack near the carcass.
- ⑥ Tires which are judged to be unsuitable for use because of deformation or damage.

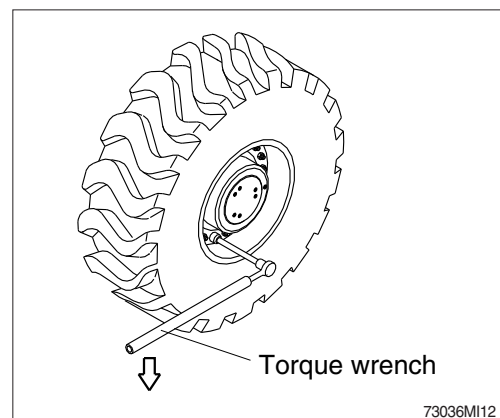


#### (2) Separation of tire

- ① After moving the machine to flat ground, lower the bucket to the ground and turn the parking brake switch ON.

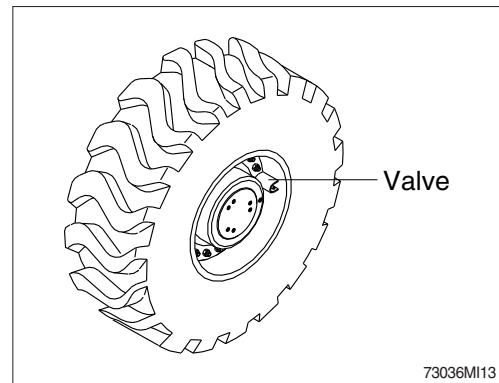


- ② Loosen slightly all wheel mounting.
  - Tools : Socket 32 mm
  - Torque wrench
  - Extension bar
- ③ Lift the machine with a jack.
- ④ Loosen all wheel mounting nuts and replace the tire.



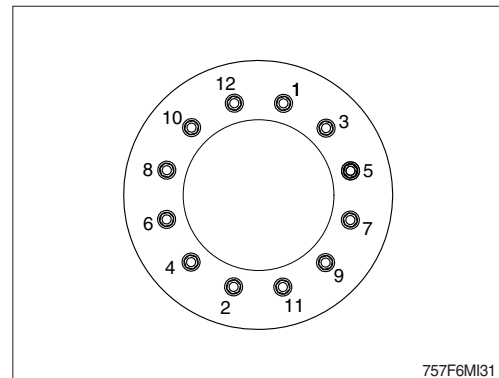
### (3) Direction of tire to be installed

- ① Be careful that the valve should be facing the outside.



### (4) Mounting of tire

- ① Lightly tighten nuts as shown in the illustration.
- ② Lower the jack after tire is replaced.
- ③ Tighten nuts according to the specified tighten torque.
  - Tightening torque :  $79 \pm 2.5 \text{ kgf} \cdot \text{m}$   
( $571 \pm 18.1 \text{ lbf} \cdot \text{ft}$ )

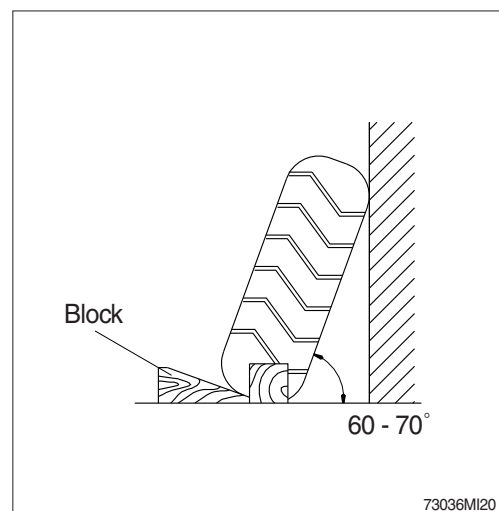


## 32) STORING TIRES AFTER REMOVAL

As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tire are stored outside, always erect a fence around the tires and put up "No Entry" and other warning signs that even young children can understand.

Stand the tire on level ground, and block it securely so that it cannot roll or fall over.

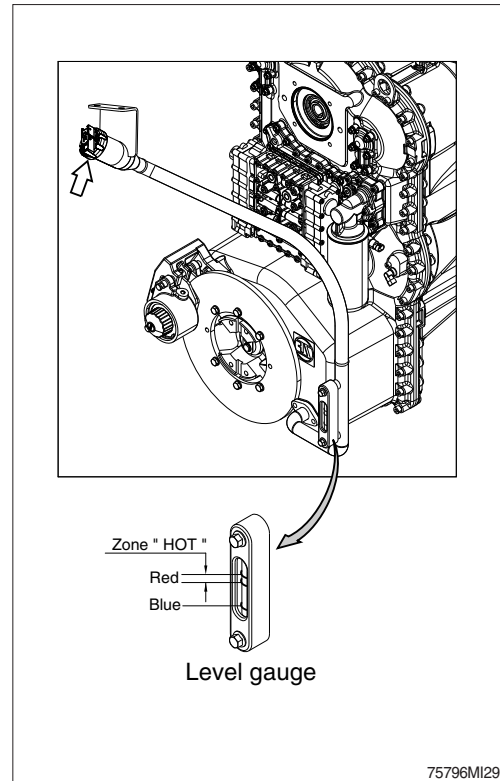
If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



### 33) CHECK TRANSMISSION OIL LEVEL

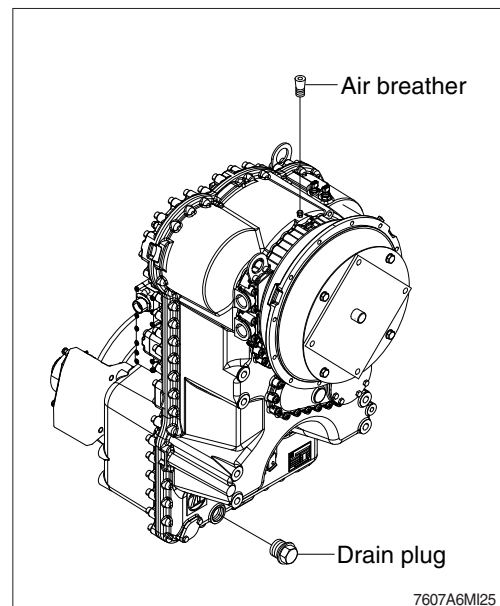
- (1) The oil level check must be carried out as follows;  
oil level check (weekly).
- (2) Before the oil level check, transmission must have been running to warm up enough.
- (3) When the oil level is checked, machine must be on flat ground and engine must be at idling speed, transmission must be in neutral position.
- (4) Check the oil level on level (sight) gauge.
- (5) Oil level
  - Operating temperature (about 80~90°C)  
:The Oil level must be lying in zone HOT (between two red lines).
  - Cold phase (about 40°C)  
:The Oil level must be lying near cold mark (blue line).

**▲ When checking, press the parking brake switch and fix the front and rear frames with the safety lock bar.**

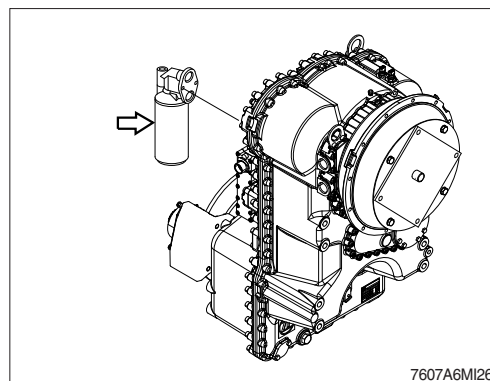


### 34) REPLACEMENT OF TRANSMISSION OIL AND FILTER ELEMENT

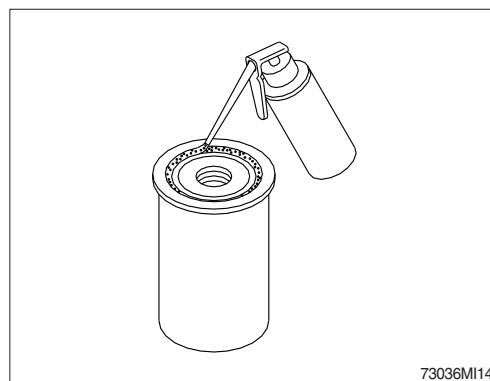
- (1) Operate the machine for a few minutes in order to warm the transmission oil.
- (2) Move the machine to flat ground.  
Lower the bucket to the ground and slightly apply downward force.
- (3) Press the parking brake switch and stop the engine.
- (4) Open transmission air breather to relieve internal air pressure.
- (5) Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container.



- (6) Remove the transmission oil filter cartridge.  
Dispose of the used transmission oil filter cartridge properly.
- (7) Clean the filter cartridge mounting base.  
Remove any part of the filter cartridge gasket that remains on the filter cartridge mounting base.

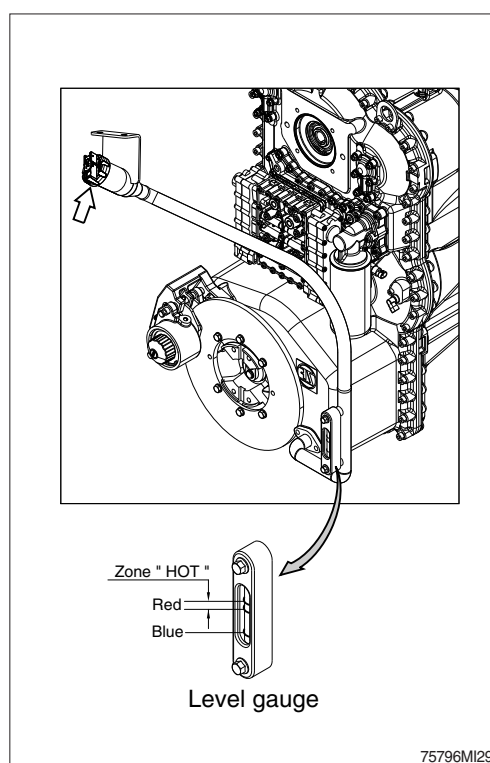


- (8) Apply a light coat of oil to the gasket of a new transmission oil filter cartridge.
- (9) Install the new transmission oil filter cartridge.  
Screw the filter in until contacts with the sealing surface is obtained and tighten it now by hand about 1/3 to 1/2 turn.



- (10) Fill the oil through filler cap and check if the oil is at the appropriate level.
- (11) The proper oil amount is 34.5 liters. (9.1 U.S. gallons)

- ▲ As the machine is hot after operation wait until the temperature has dropped.
- ▲ It is imperative to pay attention to absolute cleanliness of oil and filter.  
Binding is in any case the marking on the oil level gauge.
- ※ Prohibition to inject water to filler cap directly when you wash the machine.

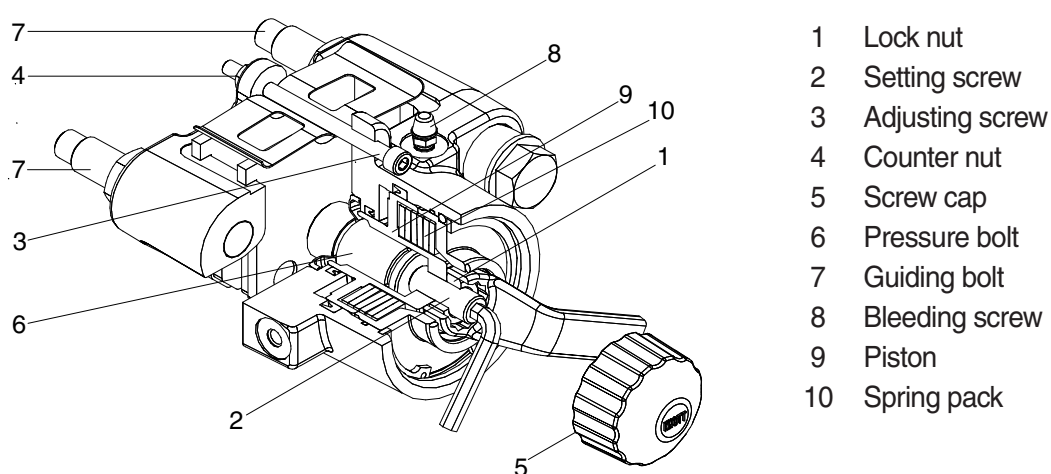


### 34-1) PARKING BRAKE CLEARANCE

#### (1) Safety instruction

- ① Park the machine on level ground, lower equipment to the ground.
- ② Insert wheel chocks.
- ③ Insert steering lock.
- ④ Leave the engine running.
- ※ **Isolate the machine from driving.**
- ⑤ Release the parking brake.
- ⑥ Check clearance and adjust accordingly.

#### (2) Check and adjusting instruction



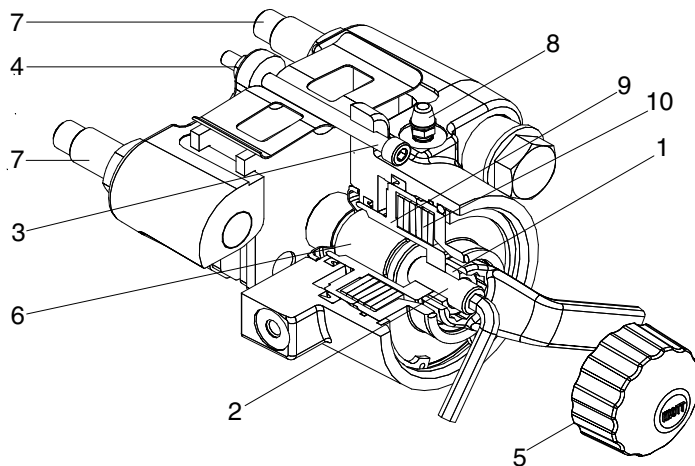
- ① Place the machine on flat ground and secure against rolling away.
- ② Start the engine and run at low idle. Release the parking brake by releasing the parking brake switch in the cabin.
- ③ Check the parking brake clearance with inserting a setting gauge on both sides between the brake lining carrier and brake disc.

※ **If the thickness of lining carriers are too thin (1.0 mm ~1.5 mm), then replace the lining carrier first referring to the service manual page 4-22.**

Clearance		Setting gauge
Min.	0.5 mm	0.25 mm
Nominal clearance	1.0 mm	0.50 mm
Max.	1.5 mm	0.75 mm

If the clearance is out of specification, adjust the clearance as follows.

- ④ Rotate the screw cap (5) in a counter-clockwise direction and unscrew it.
- ⑤ Release the lock nut (1) of the setting screw (2).
- ⑥ Insert a setting gauge on both sides between the brake lining carrier and brake disc and hold them in position.
- ⑦ Turn the setting screw (2) in a clockwise direction until the two setting gauges are clamped between the brake lining carriers and the brake disc.
- ※ **The application pressure for clamping the setting gauges must be selected so that both gauges can be removed using a small amount of force after locking in position.**
- ⑧ Apply the lock nut (1) to the setting screw (2).
  - Tightening torque for the lock nut (1) : 6.1 kgf · m (44.3 lbf · ft)
- ⑨ Release the counter nut (4) and then turn the adjusting screw (3) in a clockwise direction until the end surface of the adjusting screw (3) is in contact with the surface provided for setting.
- ⑩ Hold the adjusting screw (3) in position and lock using the counter nut (4).
  - Tightening torque for the counter nut (4) : 2.3 kgf · m (17 lbf · ft)
- ⑪ Remove the setting gauge from both sides of the brake disc.
- ※ **The adjustment of the desired air gap is now complete. The brake is ready for use.**
- ⑫ Turn the screw cap (5) in a clockwise direction and tighten hand-tight.
- ※ **Check if the parking brake is working properly with operating the parking brake switch on and off.**

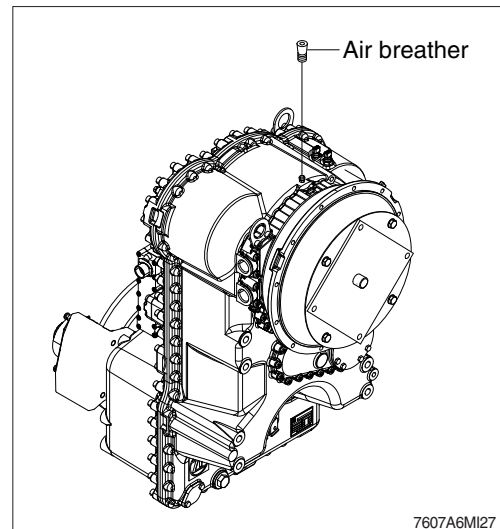


- |    |                 |
|----|-----------------|
| 1  | Lock nut        |
| 2  | Setting screw   |
| 3  | Adjusting screw |
| 4  | Counter nut     |
| 5  | Screw cap       |
| 6  | Pressure bolt   |
| 7  | Guiding bolt    |
| 8  | Bleeding screw  |
| 9  | Piston          |
| 10 | Spring pack     |



### 31) CLEANING TRANSMISSION AIR BREATHER

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



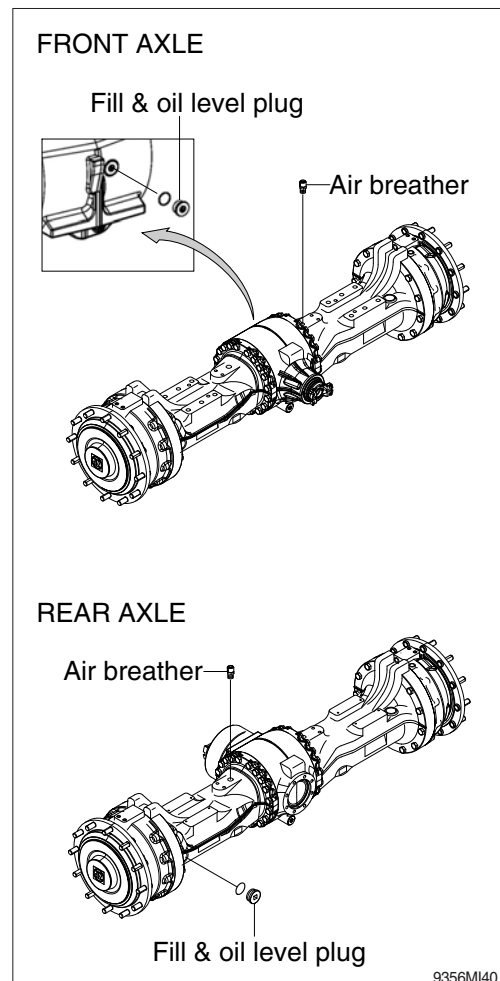
### 32) CHECK AND SUPPLYING AXLE OIL

- (1) Move the machine to flat ground.
- (2) Open the axle air breather to relieve internal air pressure.
- (3) Remove the plug and check the oil amount.  
If the oil level is at the hole of the plug, it is normal.

※ Provide fill & level plug with O-ring and install it.

▲ When checking the oil level, press the parking brake switch and fix front and rear frames using the safety lock bar.

▲ As the machine is hot after operation, wait until the temperature has dropped.  
Set the plug of planetary gear in parallel to the ground.

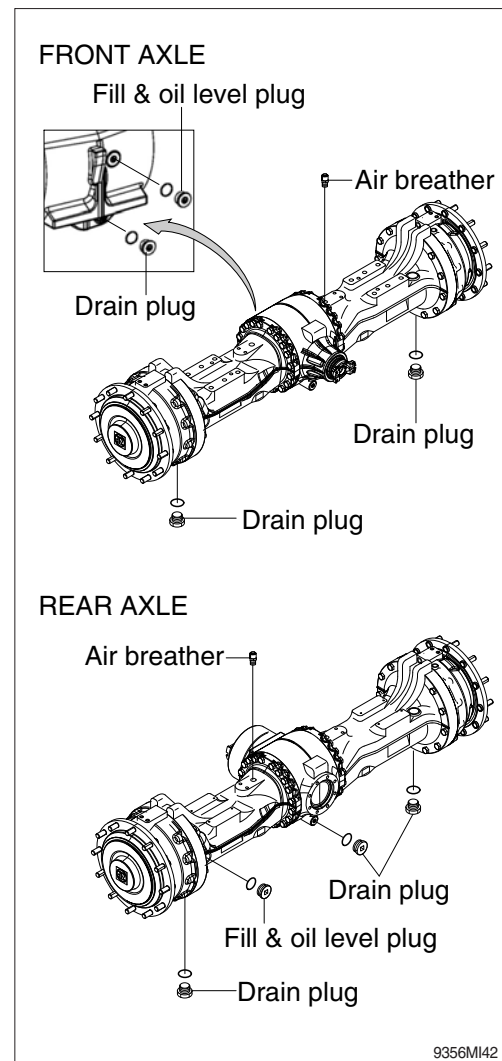


### 33) CHANGE THE AXLE OIL

- (1) Place a case under drain plug to catch oil.
- (2) Remove the air breather to relieve internal pressure.
- (3) The basic condition for a correct oil change of the axle is horizontal plane of installation in every direction.  
Place machine in a horizontal position
- (4) All plugs must be cleaned carefully before opening.
- (5) Loosen drain plugs and drain oil.
- (6) Provide drain plugs with new O-ring and install them.
- (7) Fill up oil to the overflow on fill & level plug.
  - Oil amount
  - Front axle : 23 ℓ (6.1 U.S. gal)
  - Rear axle : 23 ℓ (6.1 U.S. gal)

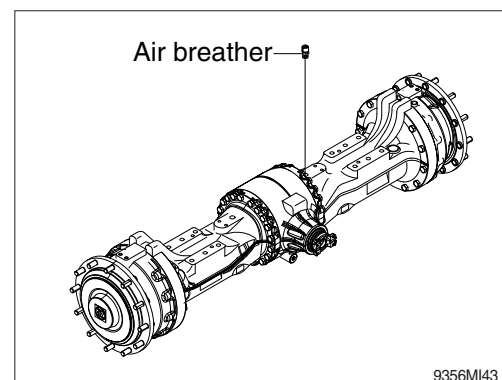
**▲ As the machine is hot after operation, wait until the temperature has dropped.**

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



### 34) CLEANING AXLE BREATHER

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



### 35) LUBRICATION

(1) Supply grease through the grease nipple, using grease gun.

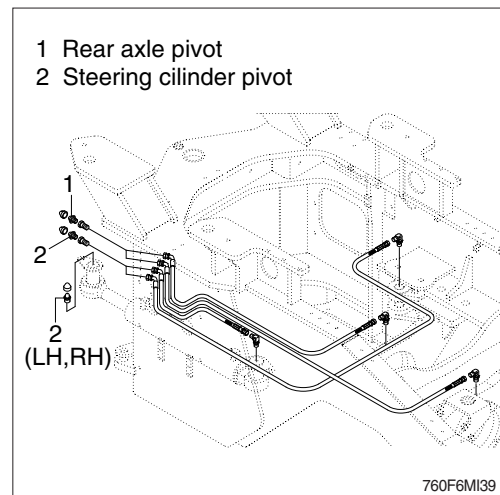
(2) After lubricating, clean off spilled grease.

▲ Press the parking brake switch and fix front and rear frames using the safety lock bar.

▲ Set the work equipment in a stable position and push the pilot cut off switch to the OFF position.

(3) Rear axle pivot : 2EA

(4) Steering cylinder pin : 4EA



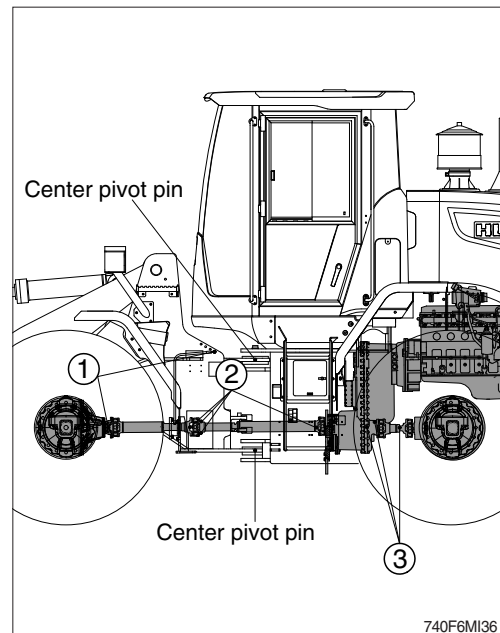
(5) Center pivot pin : 2EA

#### (6) Drive shaft

① Front (flange bearing, journal bearing) : 2EA

② Center (sleeve yoke, journal bearing) : 4EA

③ Rear (sleeve yoke, journal bearing) : 3EA



### 36) REPLACEMENT OF BOLT ON CUTTING EDGE

#### (1) Replacement time

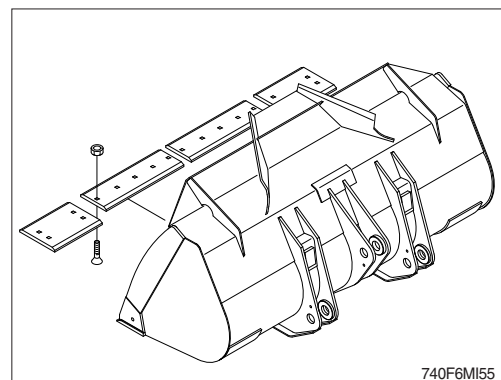
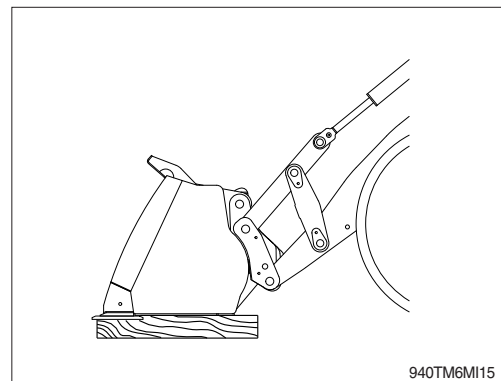
Replace the cutting edge before it has worn out to the end of bucket.

#### (2) Replacement method

**▲ Make sure the work equipment does not move when replacing the cutting edge.**

**Set the work equipment in a stable position, put the pilot cut off switch in the OFF position.**

- ① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
- ② Loosen bolts and nuts, and remove the cutting edge.
- ③ Clean the contacted surface.
- ④ Turn the cutting edge and install on the bucket.
- ※ **If both sides have worn out, replace it with new ones.**
- ※ **If the contacted face of cutting edge has worn out, repair the contacted face of it.**
- ⑤ Tighten evenly bolts and nuts to remove the clearance between bucket and cutting edge.
  - Tightening torque :  $62.8 \pm 9.4 \text{ kgf} \cdot \text{m}$   
( $454 \pm 68 \text{ lbf} \cdot \text{ft}$ )
- ⑥ After a few hours of operation, retighten bolts.

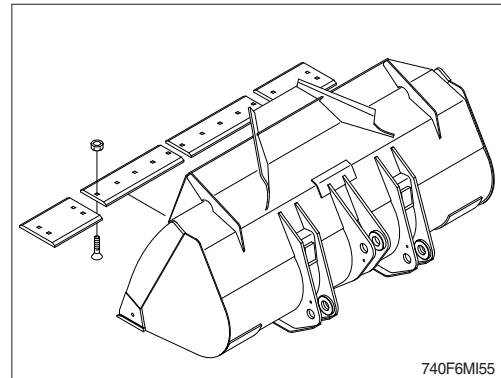
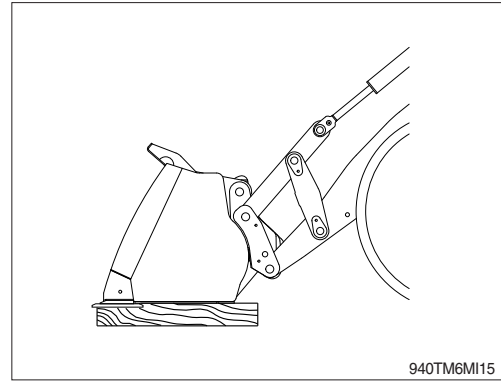


## (2) Replacement method

▲ **Make sure the work equipment does not move when replacing the cutting edge.**

**Set the work equipment in a stable position, put the pilot cut off switch in the OFF position.**

- ① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
- ② Loosen bolts and nuts, and remove the cutting edge.
- ③ Clean the contacted surface.
- ④ Turn the cutting edge and install on the bucket.
- ※ **If both sides have worn out, replace it with new ones.**
- ※ **If the contacted face of cutting edge has worn out, repair the contacted face of it.**
- ⑤ Tighten evenly bolts and nuts to remove the clearance between bucket and cutting edge.
  - Tightening torque :  $62.8 \pm 9.4 \text{ kgf} \cdot \text{m}$   
( $454 \pm 68 \text{ lbf} \cdot \text{ft}$ )
- ⑥ After a few hours of operation, retighten bolts.

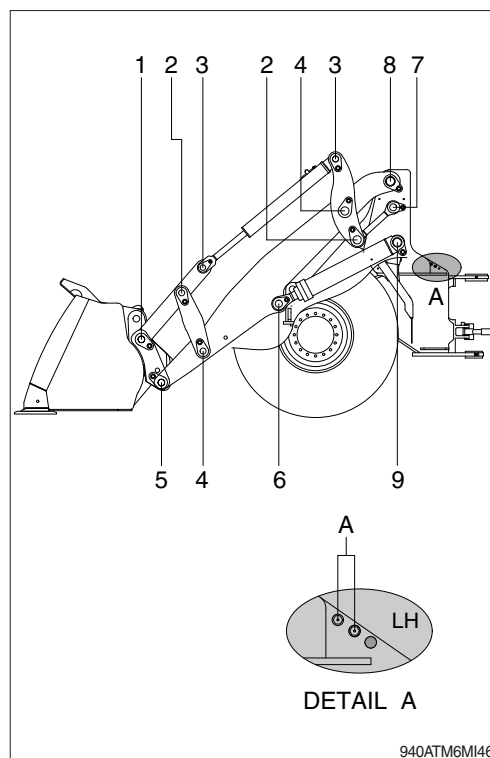


### 37) MAINTENANCE OF WORK EQUIPMENT

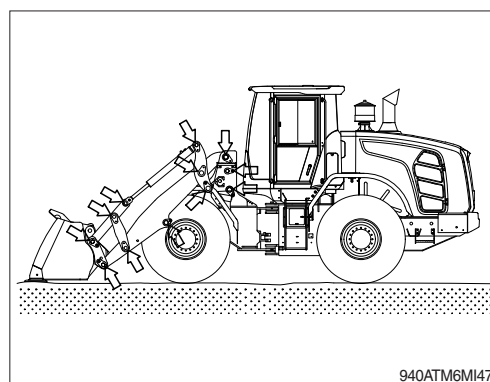
- (1) Lubricate to each pin of working device.  
Lubricate the grease to grease nipple in accordance with lubrication intervals.

No.	Description	Qty
1	Quick coupler-Link connection pin	2
2	Link-Link connection pin	4
3	Bucket cylinder-Link connection pin	4
4	Boom-Link connection pin	4
5	Quick coupler-Boom connection pin	2
6	Boom cylinder-Boom connection pin	2
7	Link-Link connection pin	2
8	Boom-Front frame connection pin	A 2
9	Boom cylinder-Front frame connection pin	2

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

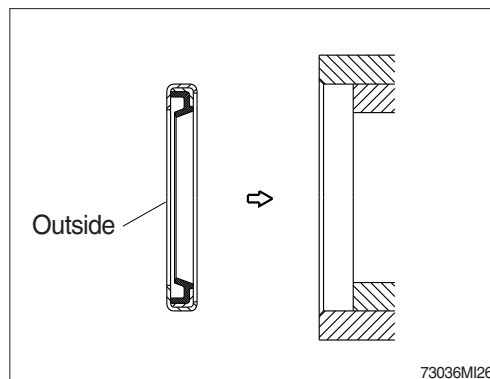


- (2) Check for wear and tear of work equipment pins and bushings.  
(3) Check for damage of boom and bell crank.



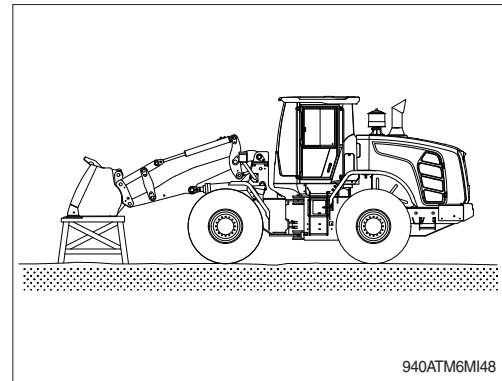
- (4) Dust seal are mounted on the rotating part of working device to extend the lubricating interval.

- ※ **Mount the lip to be faced out side 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.**
- ※ **Make sure the seals are not damaged or deformed.**



### 38) WORK EQUIPMENT SUPPORT

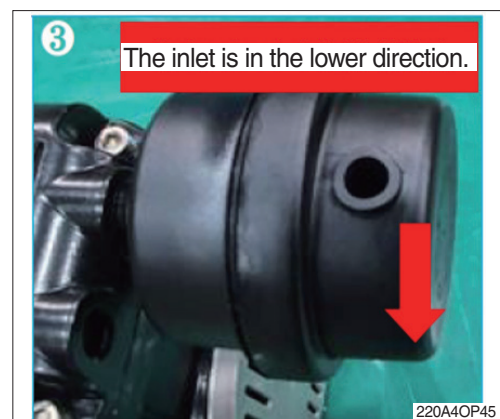
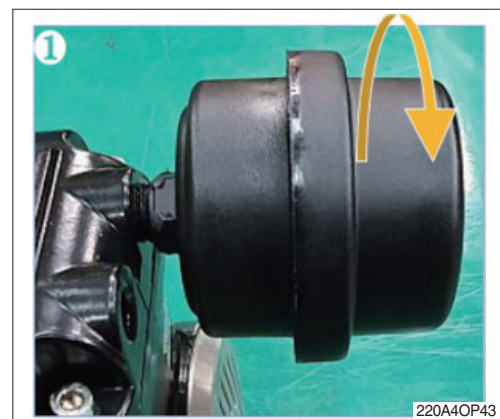
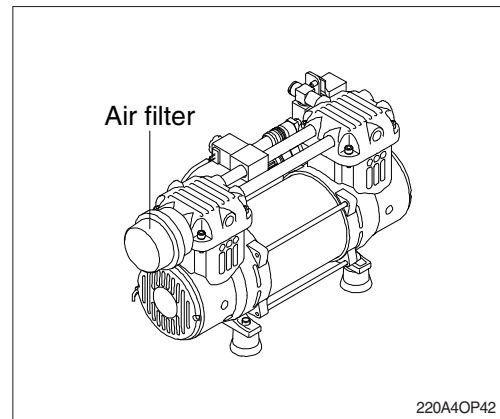
When carrying out inspection and maintenance with the equipment raised, fit a stand under the lift arm securely to prevent the work equipment from coming down. In addition, set the work equipment control levers to the Hold position and put the pilot cut off switch to the OFF position.



### 39) REPLACEMENT OF THE AIR COMPRESSOR'S AIR FILTER (option)

- (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.

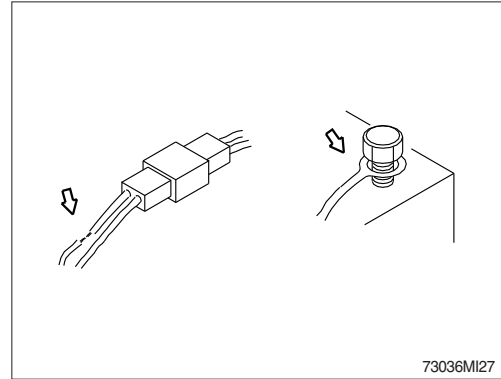




## 7. ELECTRICAL SYSTEM

### 1) WIRING, GAUGES

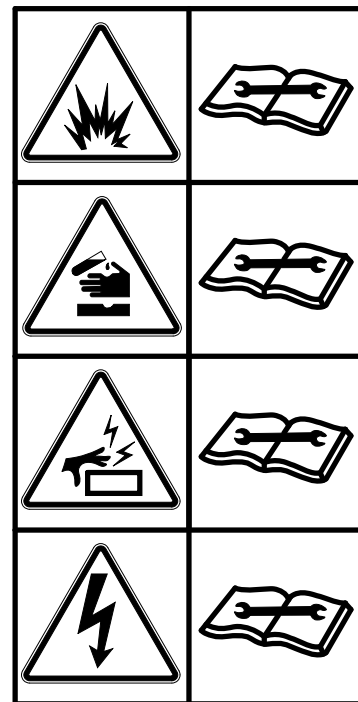
Check regularly and repair loose or malfunctioning gauges when found.



### 2) BATTERY

#### (1) Clean

- ① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.
- ⚠ 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.
- ⚠ Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.
- ⚠ Do not store tools, bucket tooth and other flammable things in battery box. They could cause a fire.
- ⚠ Tighten the battery terminals securely.  
Loosened terminals can generate sparks and lead to explosion.
- ⚠ Make sure that the battery terminal's caps always are installed.



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## (2) Recycle

Never discard a battery.

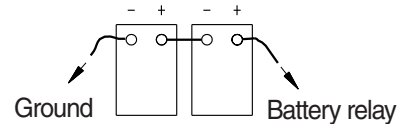
Always return used batteries to one of the following locations.

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

※ Pay attention to the correct polarity.



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## 3) STARTING THE ENGINE WITH A BOOSTER CABLE

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

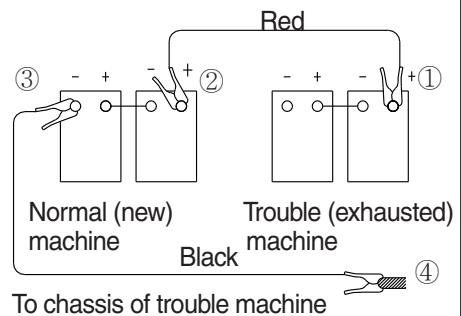
### (1) Connection of booster cable

※ Use the same capacity of battery for starting

- ① Connect the red terminal of booster cable to the battery(+) terminal between exhausted and new battery.
- ② Connect the black terminal of the booster cable to the battery (-) terminal between exhausted and new battery.

※ Keep firmly all connection, the spark will be caused when connecting finally.

Connection of booster cable

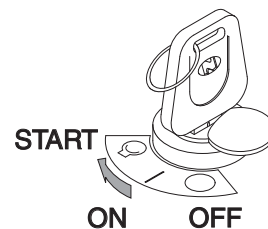


Connection order : ①→②→③→④

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### (2) Starting the engine

- ① Start engine with starting key.
- ② If you can not start it by one time, restart the engine after 2 minutes.



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### (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.

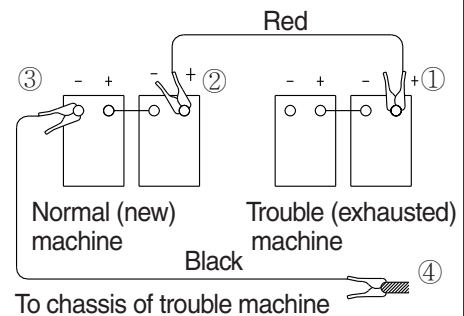
**▲ Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.**

※ Charge the battery in the well ventilated place.

※ Place the machine on the earth or concrete. Avoid to charge the machine on the steel plate.

※ Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.

Disconnection of booster cable



Disconnection order : ④→③→②→①

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### 4) Welding repair

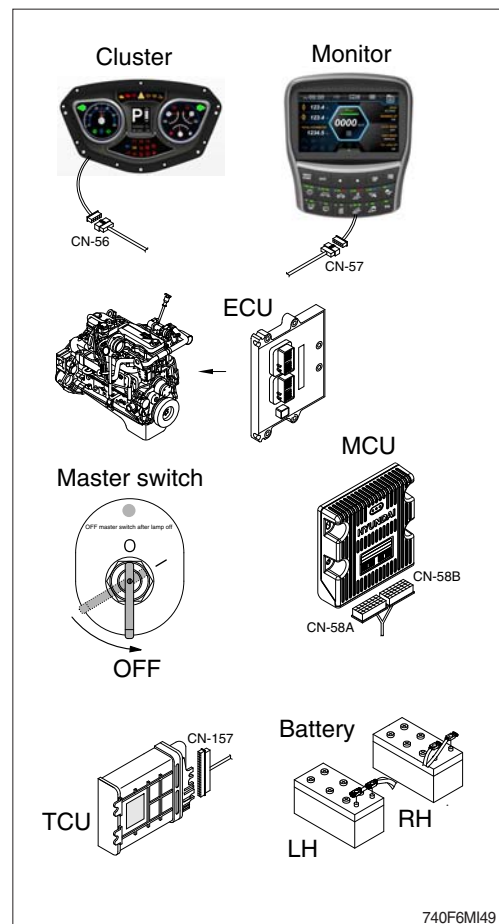
Before start to welding, follow the below procedure.

- (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, TCU, ECU, cluster, monitor etc).
- (4) Connect the earth (ground) lead of the welding equipment as close to the welding points 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.



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## 8. AIR CONDITIONER AND HEATER

### 1) CLEAN AND REPLACE OF INNER AND OUTER FILTER

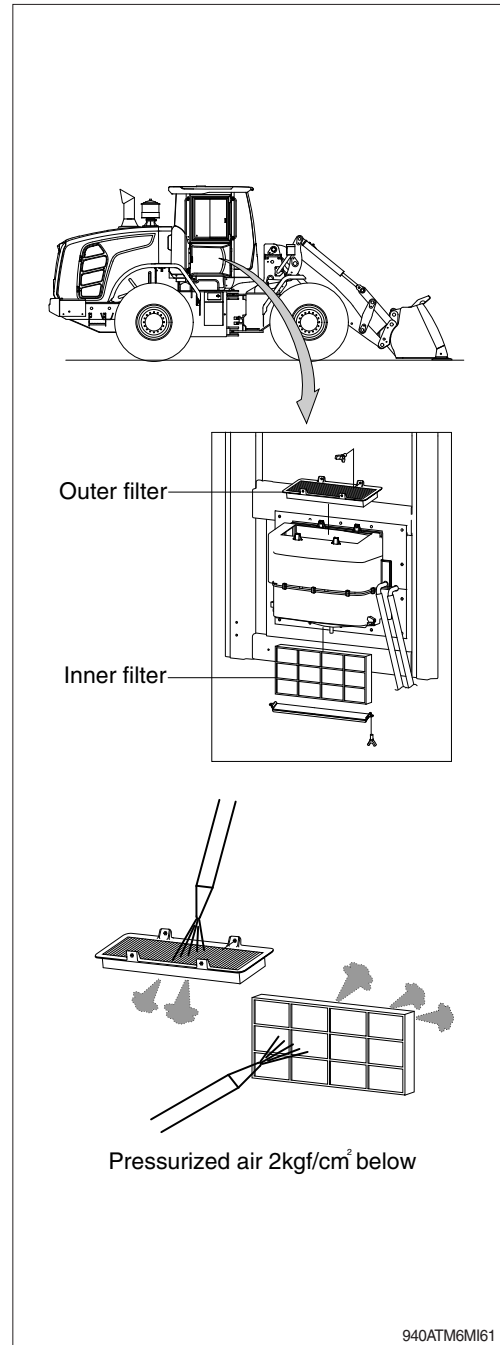
※ Always stop the engine before servicing.

(1) Open the air conditioner cover, loosen the wing bolt and remove the inner and outer filter.

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

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

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



## 2) 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.

## 3) CHECK DURING SEASON

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

## 4) 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.

## 5) REFRIGERANT

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

Model	Type	Quantity	GWP : 1430
HL930A TM	HFC-134a	0.75 kg (1.65 lb)	CO <sub>2</sub> eq. : 1.0725 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.