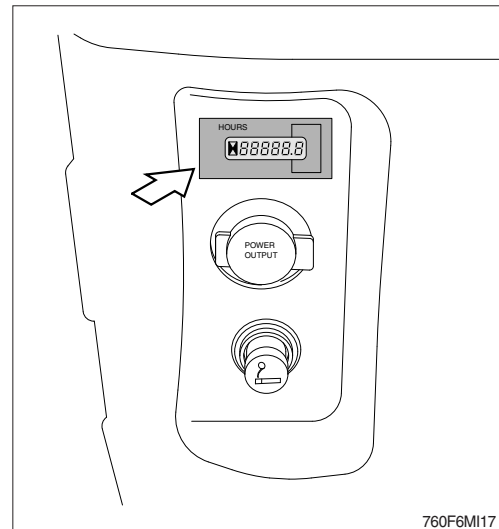


1. INSTRUCTIONS

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 maintenance after you have read the operator's manual.
- (2) The monitor installed on this machine does not entirely guarantee the condition of the machine.
Daily inspection should be performed according to chapter 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) Contact your local HD Hyundai Construction Equipment dealer for service.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket teeth, cutting edges, filters and etc., regularly.

Replace damaged or worn parts at proper time to prevent damage to other components.

(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 the hydraulic system of the pressure by opening the breather when repairing the hydraulic system.

(8) Confirm if the cluster is in the normal condition after completion of service.

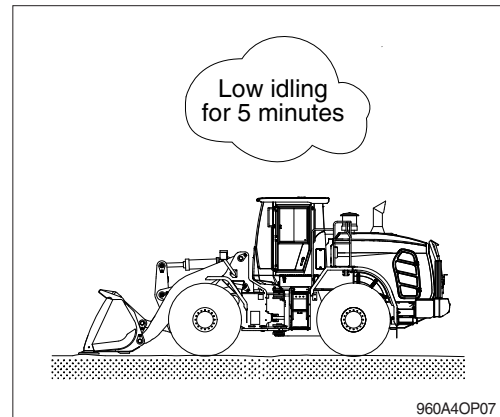
(9) For more detailed information on maintenance, contact your local HD Hyundai Construction Equipment dealer.

※ **Be sure to read the entire contents of this manual before performing maintenance.**

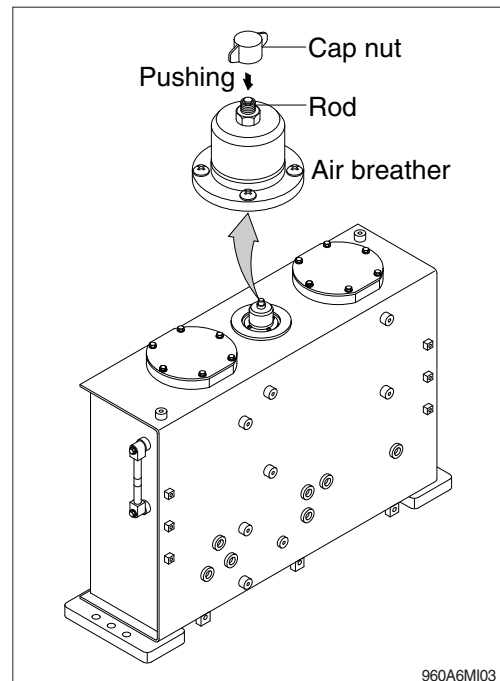
4) RELIEVING PRESSURE IN THE HYDRAULIC SYSTEM

※ Pressurized oil can cause injury when loosening the cap or hoses after operating the machine when the machine or oil is still under a high pressure condition. Be sure to relieve the pressure in the system before attempting repairs.

- (1) Repairs or maintenance of the machine shall be performed only after the power is off, and the machine blocked against hazardous motion. The attachment shall be lowered.



- (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 a twisted or tight radius.
- (5) Tighten all hoses to the specified torque rating.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

- (1) These are the parts which the operator can not judge the remaining life 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, 8EA) | M12×1.75 | 11.7 ± 1.8 | 84.6 ± 13.0 |
| 3 | | Engine mounting bolt (T/C housing, 3EA) | M10×1.5 | 4.6 ± 0.9 | 33.3 ± 6.5 |
| 4 | | Engine mounting bolt (flywheel, 8EA) | M10×1.5 | 4.5 ± 0.6 | 32.5 ± 4.3 |
| 5 | | Fan motor mounting bolt | M12×1.75 | 12.8 ± 3.0 | 92.6 ± 21.7 |
| 6 | | Radiator mounting bolt | M16×2.0 | 29.7 ± 5.9 | 215 ± 42.7 |
| 7 | | Fuel tank mounting bolt, nut | M16×2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 8 | Hydraulic system | Main pump housing mounting bolt | M16×2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 9 | | Fan & brake pump housing mounting bolt | M10×1.5 | 6.9 ± 1.4 | 50 ± 10.1 |
| 10 | | Main control valve mounting bolt | M12×1.75 | 12.8 ± 3.0 | 92.6 ± 21.7 |
| 11 | | Steering unit mounting bolt | M10×1.5 | 6.9 ± 1.4 | 50 ± 10.1 |
| 12 | | Steering valve (EHPS) mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 13 | | Brake valve mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 14 | | Cut-off valve mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 15 | | EH control block mounting bolt | M8×1.25 | 2.5 ± 0.5 | 18.1 ± 3.6 |
| 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 | 46.3 ± 7.0 | 335 ± 50.6 |
| 20 | | Front axle mounting bolt, nut | M33×2.0 | 225 ± 20 | 1627 ± 145 |
| 21 | | Rear axle support mounting bolt, nut | M36×3.0 | 308 ± 46.2 | 2227 ± 334 |
| 22 | | Tire mounting nut | M22×1.5 | 79 ± 2.5 | 571 ± 18.1 |
| 23 | | Drive shaft joint mounting bolt | 1/2-20UNF | 15 ± 2.0 | 108 ± 14.5 |
| 24 | Others | Counterweight mounting bolt | M30×3.5 | 199 ± 30 | 1439 ± 216 |
| 25 | | Operator's seat mounting bolt | M8×1.25 | 3.4 ± 0.8 | 24.6 ± 5 |
| 26 | | ROPS Cab mounting bolt (4EA) | M30×3.5 | 199 ± 29.9 | 1440 ± 216 |
| | | 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, ^{★2} 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 ^{★2}) 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 | [★] Refer to below list |
| Grease | Lithium base grease NLGI No. 2 |
| Fuel | ASTM D975-No. 2, ^{★1} 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 ^{★2} |

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®

[★] 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

^{★1} Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

^{★2} 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 | 18 (4.8) | | | | SAE 15W-40 | | | | | |
| | | | | | ★ ² SAE 5W-40 | | | | | | |
| | | | SAE 0W-40 | | | | | | | | |
| DEF/ AdBlue® tank | Mixture of urea and deionized water | 37.1 (9.8) | | | | | | | | | |
| | | | ISO 22241, High-purity urea + deionized water (32.5 : 67.5) | | | | | | | | |
| Transmission | Engine oil | 33 (8.7) | | SAE 10W-30 | | | | | | | |
| | | | | SAE 15W-40 | | | | | | | |
| Axle ★ ⁴ | UTTO | FR : 35 (9.2) RR : 35 (9.2) FR : 42 (11.1)★ ⁶ RR : 40 (10.6)★ ⁶ | | ★Refer to below list | | | | | | | |
| | | | | | | | | | | | |
| Hydraulic tank | Hydraulic oil | Tank: 110 (29.1) | ★ ² ISO VG 15 | | | | | | | | |
| | | System: 200 (52.8) | ISO VG 46, HBHO VG 46★ ⁵ | | | | | | | | |
| | | | ISO VG 68 | | | | | | | | |
| Fuel tank | Diesel fuel★ ¹ | 260 (68.6) | ★ 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 | 42 (11.1) | 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®

★¹ 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

★² Cold region : Russia, CIS, Mongolia

★³ Soft water : City water or distilled water

★⁴ If the machine is equipped with axle oil cooler,
refer to page 6-44.

★⁵ HD Hyundai Construction Equipment Bio Hydraulic Oil

★⁶ HL960A HD

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 | 6-35 |
| 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 | 6-29 |
| 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 | 6-48 |
| Tire (air) | Check, Add | 6-38 |
| Drive shaft (flange bearing, front, center, rear) | Lubricate | 6-45 |
| Steering cylinder pins | Lubricate | 6-45 |
| Rear axle pivot | Lubricate | 6-45 |
| 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 | 6-41, 42 |
| Front and rear axle oil | Change | 6-44 |
| Axle oil filter (option) | Replace | 6-44 |
| Hydraulic oil return filter | Replace | 6-36 |
| Pilot line filter element | Replace | 6-37 |
| Pressure filter element | Replace | 6-37 |

4) EVERY 250 HOURS SERVICE

| Check items | Service | Page |
|---|--------------|----------|
| Wheel nuts | Check, Tight | 6-38, 39 |
| Battery (voltage) / Battery cable and connections | Check | 6-50, 51 |
| Air conditioner and heater filter (inner and outer) | Check, Clean | 6-53 |

5) EVERY 500 HOURS SERVICE

| Check items | Service | Page |
|--|---------------|----------------|
| Radiator, oil cooler, change air cooler, condenser | Check, Clean | 6-21 |
| Parking brake clearance | Check, Adjust | 6-42-1, 6-42-2 |
| Air cleaner element (primary)★ | Replace | 6-24 |
| Air compressor air filter (option) | Check, Clean | 6-49-1 |

★ 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 | 6-26 |
| Drive belt, cooling fan, belt tensioner | Check | 6-22, 23 |
| Hydraulic oil return filter | Replace | 6-36 |
| Pilot line filter element | Replace | 6-37 |
| Pressure filter element | Replace | 6-37 |
| Hydraulic tank air breather element | Replace | 6-37 |
| Center pivot pin | Lubricate | 6-45 |
| Transmission oil | Change | 6-41, 42 |
| Transmission oil filter | Replace | 6-41, 42 |
| Aircon and heater outer filter | Replace | 6-53 |

8) EVERY 1500 HOURS SERVICE

| Check items | Service | Page |
|--------------------------|---------|------|
| Front axle oil | Change | 6-44 |
| Rear axle oil | Change | 6-44 |
| Axle oil filter (option) | Replace | 6-44 |

9) EVERY 2000 HOURS SERVICE

| Check items | Service | Page |
|--|---------------------------|------------------|
| Coolant, cooling system and antifreeze★ ¹ | Change, Flush | 6-17, 18, 19, 20 |
| Engine cleaning | Clean | 6-30 |
| Air cleaner element (safety and primary) | Replace | 6-24 |
| Vibration damper (rubber, viscous) | Check | 6-31 |
| Hydraulic oil★ ¹ | Change | 6-36 |
| HBHO★ ² | Change | 6-36 |
| Hydraulic oil suction strainer | Check, Clean | 6-36 |
| Airconditioner and heater inner filter | Replace | 6-53 |
| DEF/AdBlue® tank filter | Replace | 6-29 |
| Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | - |
| Air compressor air filter (option) | Replace | 6-49-1 |

★¹ Conventional

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

10) EVERY 4500 HOURS SERVICE

| Check items | Service | Page |
|-----------------------------------|---------|------|
| DEF/AdBlue® supply module filter★ | Replace | 6-29 |

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

11) EVERY 5000 HOURS SERVICE

| Check items | Service | Page |
|--------------------------------|---------|--------------|
| Overhead set (shop inspection) | Adjust | 6-32, 33, 34 |
| Hydraulic oil★ ³ | Change | 6-36 |

★³ HD Hyundai Construction Equipment genuine long life

12) EVERY 6000 HOURS SERVICE

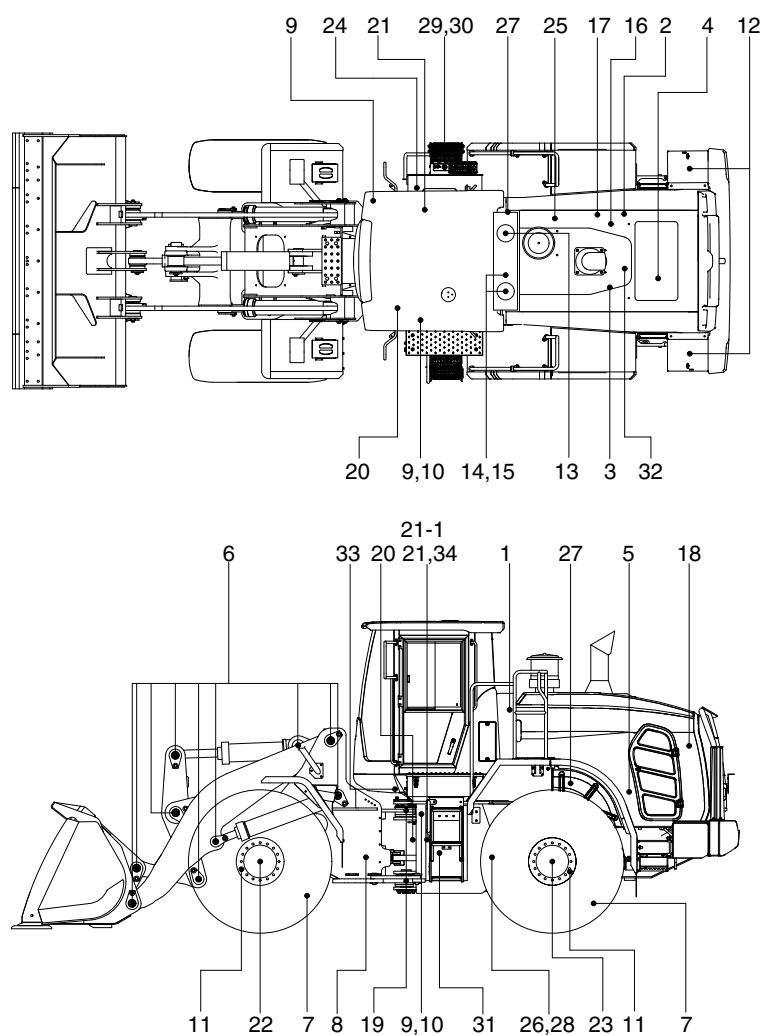
| Check items | Service | Page |
|--|---------------|------------------|
| Coolant, cooling system and antifreeze★ ³ | Change, Flush | 6-17, 18, 19, 20 |

★³ HD Hyundai Construction Equipment genuine long life

13) 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 | 6-53 |
| · Inner filter | Clean, Replace | 6-53 |
| DPF (diesel particulate filter) | Clean | 6-30 |
| Air compressor air filter (option) | Clean or Replace | 6-49-1 |

5. MAINTENANCE CHART



960A6MI10A

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 | 110 (29.1) | 1 |
| | 2 | Engine oil level | Check, Add | EO | 18 (4.8) | 1 |
| | 4 | Radiator coolant level | Check, Add | C | 42 (11.1) | 1 |
| | 5 | Fan belt tension & damage | Check, Adjust | - | - | 1 |
| | 17 | Fuel pre-filter (water) | Drain | - | - | 1 |
| | 29 | DEF/AdBlue® tank | Check, Add | DEF | 37.1 (9.8) | 1 |
| 50 Hours or weekly | 6 | Attachment pins | Lubricate | PGL | - | 13 |
| | 7 | Tire (air) | Check, Add | - | - | 4 |
| | 8 | Drive shaft (flange bearing) | Lubricate | PGL | - | 1 |
| | 9 | Steering cylinder pin | Lubricate | PGL | - | 4 |
| | 10 | Rear axle pivot | Lubricate | PGL | - | 2 |
| | 26 | Drive shaft sleeve yoke | Lubricate | PGL | - | 2 |
| | 28 | Drive shaft journal bearing assy | Lubricate | PGL | - | 5 |

| Service interval | No. | Description | Service action | Oil symbol | Capacity ℓ (U.S.gal) | Service points No. |
|-------------------|------|--|---------------------------|------------|----------------------|--------------------|
| 250 Hours | 11 | Wheel nuts | Check, Tight | - | - | 64 |
| | 12 | Battery voltage, cable and connection | Check, Add | - | - | 2 |
| | 24 | Aircon and heater inner and outer filter | Check, Clean | - | - | 2 |
| Initial 250 Hours | 2 | Engine oil | Change | EO | 18 (4.8) | 1 |
| | 3 | Engine oil filter | Replace | - | - | 1 |
| | 13 | Hydraulic oil return filter | Replace | - | - | 1 |
| | 16 | Fuel filter element | Replace | - | - | 1 |
| | 17 | Fuel pre-filter element | Replace | - | - | 1 |
| | 20 | Transmission oil | Change | EO | 33 (8.7) | 1 |
| | 21 | Transmission oil filter | Replace | - | - | 1 |
| | 22 | Axle oil (front) | Change | UTTO | See 6-9 | 3 |
| | 23 | Axle oil (rear) | Change | UTTO | See 6-9 | 3 |
| | - | Axle oil filter (option) | Replace | - | See 6-44 | 1 |
| | 31 | Pilot line filter element | Replace | - | - | 1 |
| | 33 | Pressure 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 |
| | 34 | Air compressor air filter (option) | Check, Clean | - | - | 1 |
| 800 Hours | 2 | Engine oil | Change | EO | 18 (4.8) | 1 |
| | 3 | Engine oil filter | Replace | - | - | 1 |
| 1000 Hours | 13 | Hydraulic oil return filter | Replace | - | - | 1 |
| | 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 | 33 (8.7) | 1 |
| | 21 | Transmission oil filter | Replace | - | - | 1 |
| | 24 | Airconditioner and heater outer filter | Replace | - | - | 1 |
| | 31 | Pilot line filter element | Replace | - | - | 1 |
| | 33 | Pressure filter element | Replace | - | - | 1 |
| 1500 Hours | 22 | Axle oil (front) | Change | UTTO | See 6-9 | 3 |
| | 23 | Axle oil (rear) | Change | UTTO | See 6-9 | 3 |
| | - | Axle oil filter (opt) | Replace | - | See 6-44 | 1 |
| 2000 Hours | 1 | Hydraulic oil* ¹ | Change | HO | 110 (29.1) | 1 |
| | 1 | Hydraulic oil (HBHO* ²) | Change | - | 110 (29.1) | 1 |
| | 4 | Radiator coolant* ¹ | Change | C | 42 (11.1) | 1 |
| | 15 | Hydraulic oil suction strainer | Check, Clean | - | - | 1 |
| | 24 | Air conditioner and heater inner filter | Replace | - | - | 1 |
| | 25 | Air cleaner element (safety and primary) | Replace | - | - | 2 |
| | - | Engine cleaning, Vibration damper | Clean, Check | - | - | 2 |
| | - | Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | - | - | - |
| | 30 | DEF/AdBlue® tank filter | Replace | - | - | 1 |
| | 34 | Air compressor air filter (option) | Replace | - | - | 1 |
| 4500 Hours | 27 | DEF/AdBlue® supply module filter | Replace | - | - | 1 |
| 5000 Hours | 1 | Hydraulic oil* ³ | Change | HO | 110 (29.1) | 1 |
| | - | Overhead set (shop inspection) | Adjust | - | - | 1 |
| 6000 Hours | 4 | Radiator coolant* ³ | Change | C | 42 (11.1) | 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 |
| | 34 | Air compressor air filter (option) | Clean, Replace | - | - | 1 |

*¹ Conventional *² HD Hyundai Construction Equipment Bio Hydraulic Oil

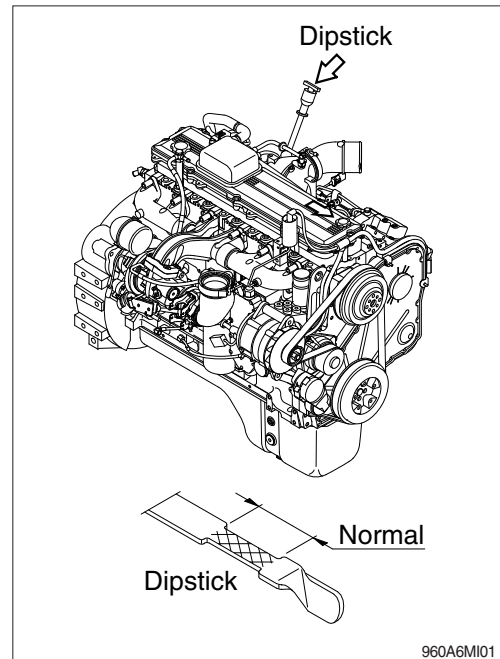
*³ HD Hyundai Construction Equipment genuine long life

6. SERVICE INSTRUCTION

1) CHECK ENGINE OIL LEVEL

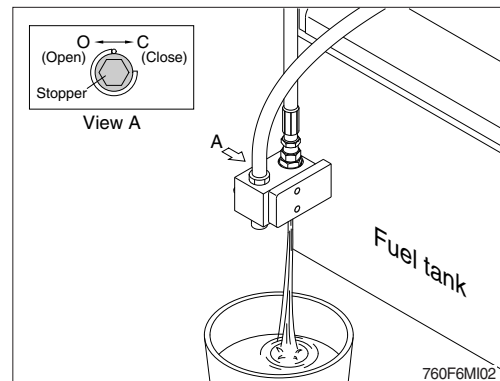
Check the oil level with the machine on a flat ground before starting engine.

- (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.

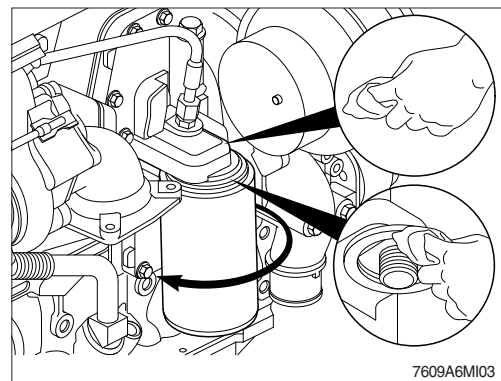


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

- (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 20 liters (5.3 U.S.gallons) will be adequate.

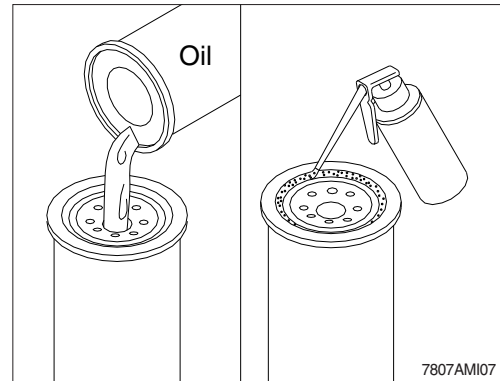


- (3) Clean the area around the oil filter head.
 - (4) Use oil filter wrench to remove the oil filter.
 - (5) Clean the gasket surface of oil filter head.
- ※ The O-ring can stick on the filter head; make sure it is removed.



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

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

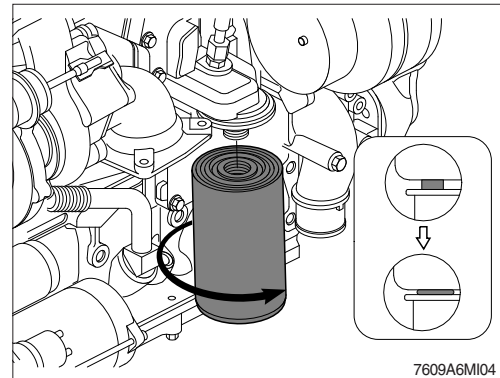


(7) Install the filter to the filter head.

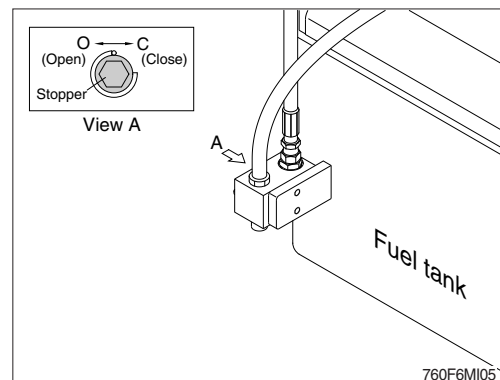
Tighten the filter until the gasket contacts the filter head surface.

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.**

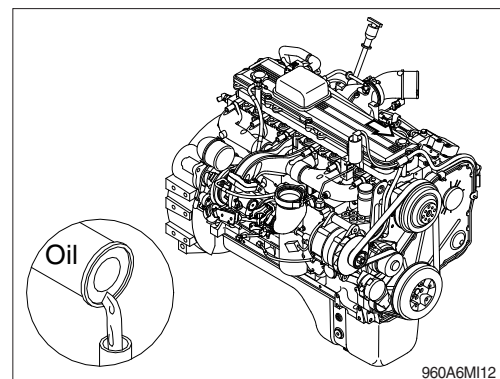


(8) Turn the stopper to the close position.



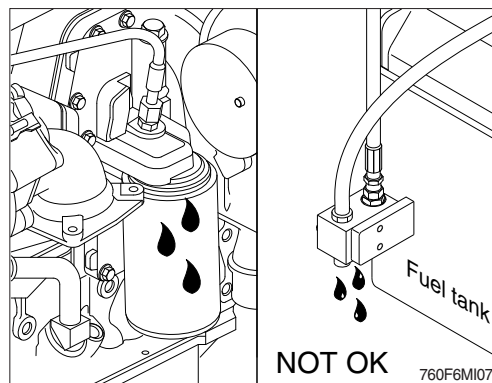
(9) Fill the engine with clean oil to the proper level.

· Quantity : 18 ℓ (4.8 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.

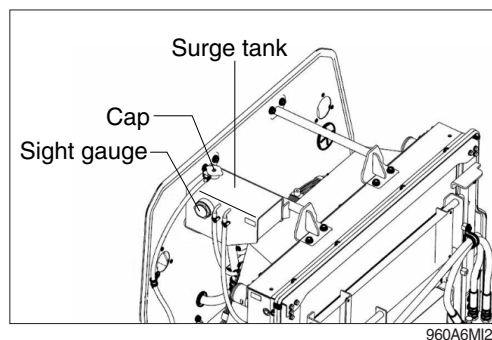
- (3) Add the mixture of antifreeze and water after removing the cap of the surge tank if coolant is not sufficient.

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

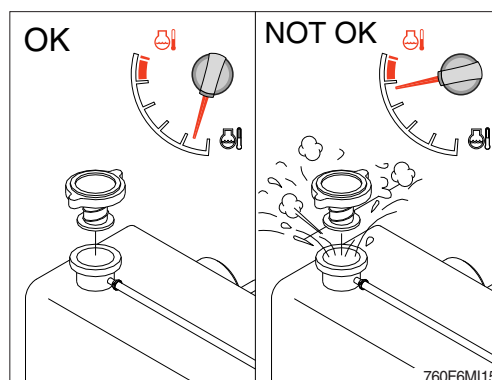
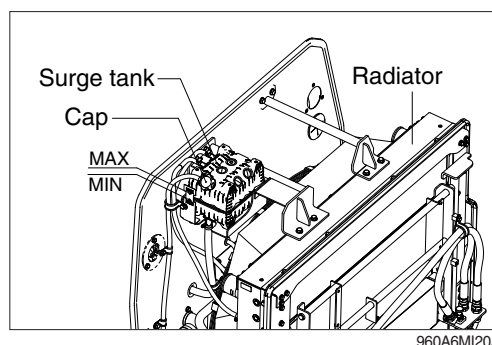
▲ **Do not remove the surge tank cap from a hot engine. Wait until the coolant temperature is below 50°C (120°F) before removing the cap. Heated coolant spray or steam can cause personal injury.**

※ **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.**

Machine serial No.: ~#0199



Machine serial No.: #0200~



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.

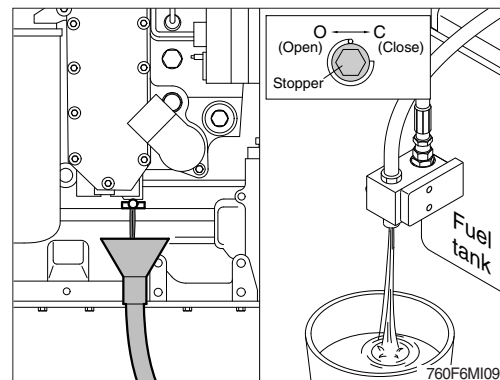
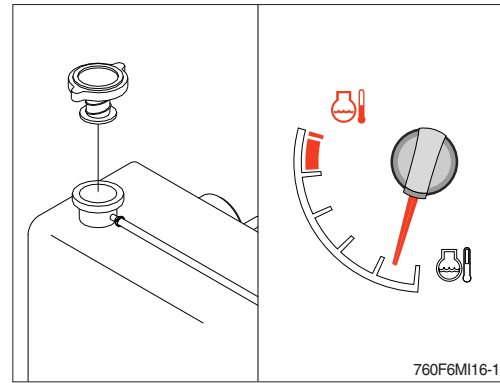
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.

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.

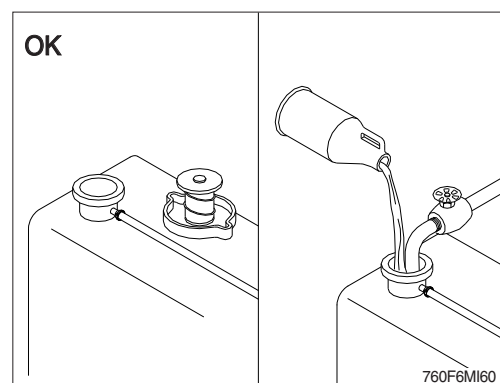


(2) Flushing of cooling system

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

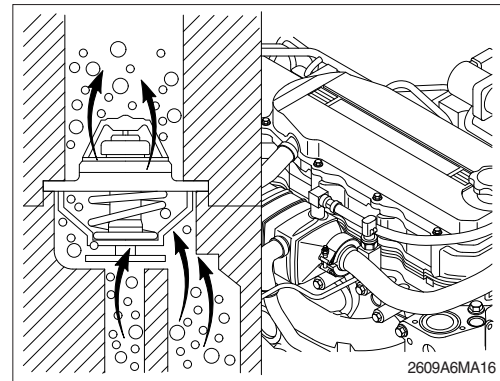
- ※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.

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

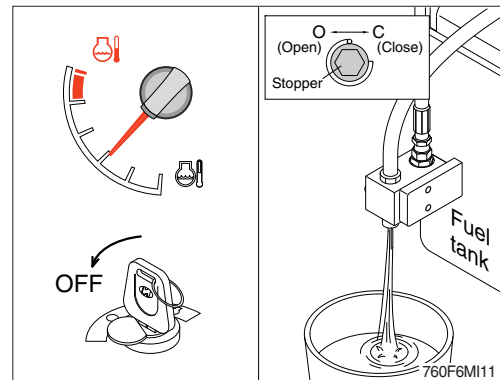


- ※ During filling, air must be vented from the engine coolant passages.

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.

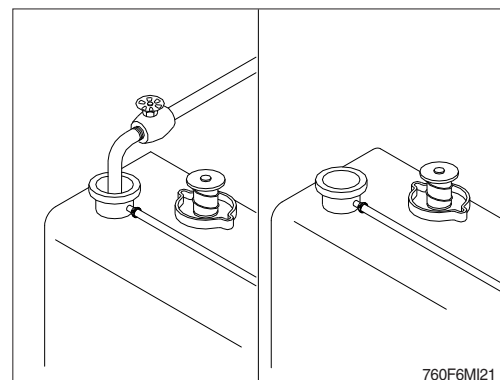


- ② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.



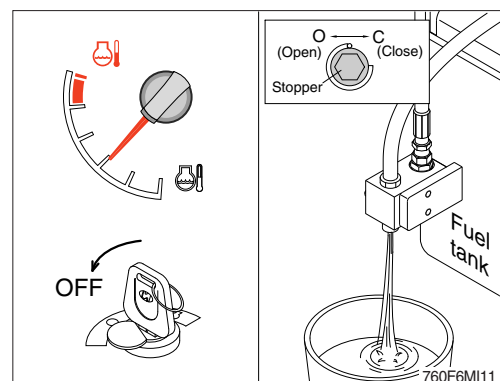
- ③ Fill the cooling system with clean water.

- ※ 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.

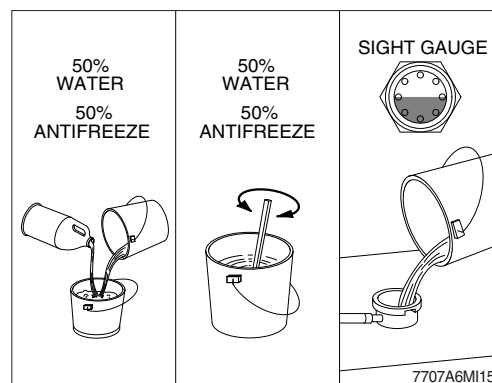
- ※ If the water being drained is still dirty, the system must be flushed again until the water is clean.



(3) Cooling system filling

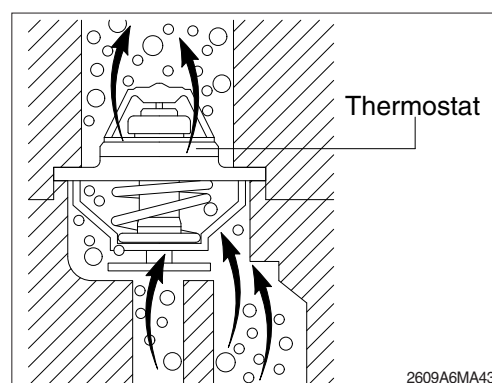
- ① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-9.

- ※ **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.**



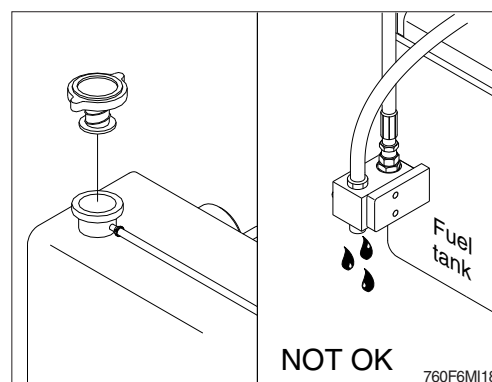
- ② The system has a maximum fill rate of 19 liters (5.0 U.S. gallons) per minute. Do not exceed this fill rate.

- ※ **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.

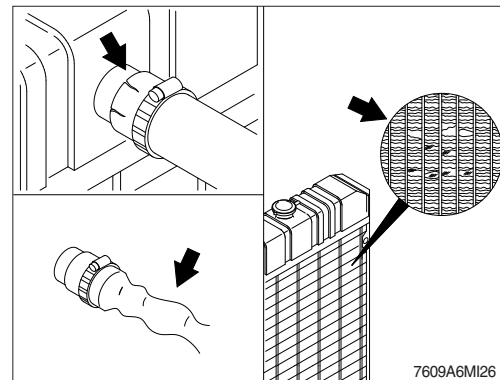
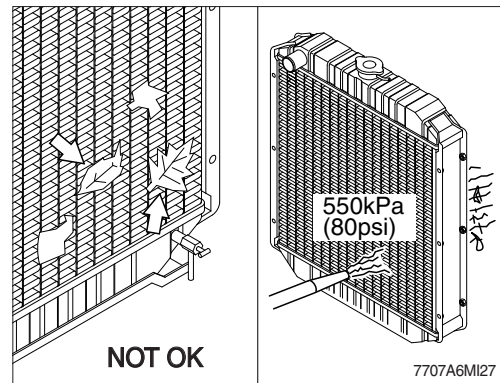
Check the coolant level again to make sure the system is full of coolant.



5) CLEAN RADIATOR AND OIL COOLER

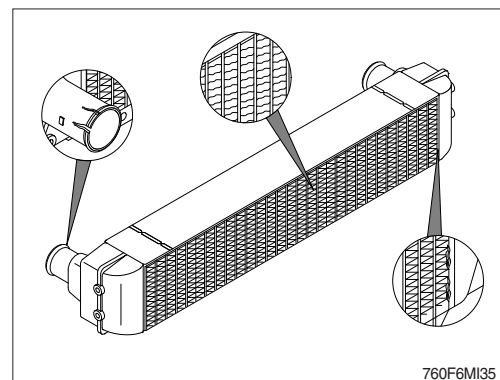
Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

- (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 AND PIPING

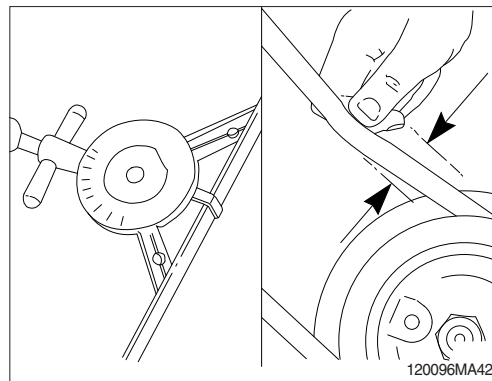
- (1) Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact your local HD Hyundai Construction Equipment dealer.
- (2) Inspect the charge air piping and hoses for leaks, holes, cracks, or loose connections. Tighten the hose clamps if necessary.



7) FAN BELT

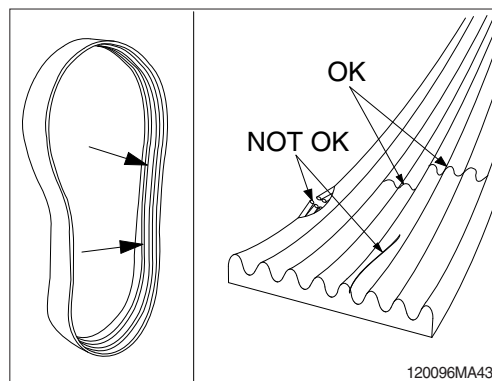
- (1) Use the belt tension gage to measure the belt tension.

· Fan belt tension : 11.3 kg (25 lb)

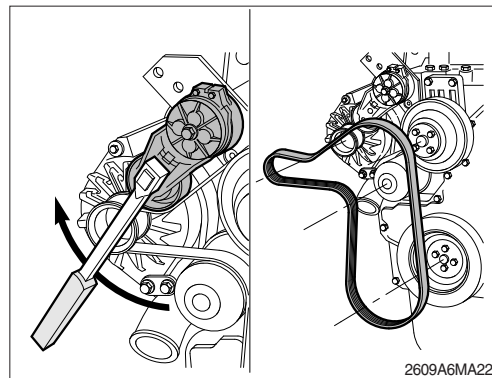


- (2) Inspect the fan belt for damage.

- 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.

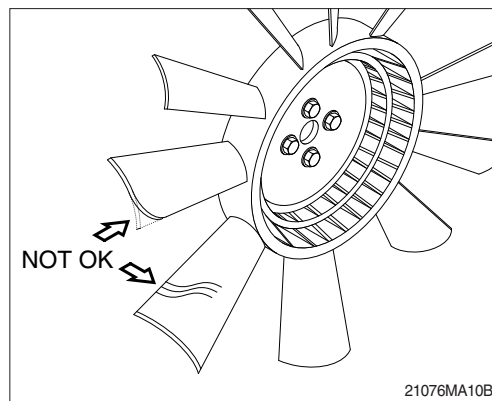
※ Rotate the crankshaft by using the engine barring gear.

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

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

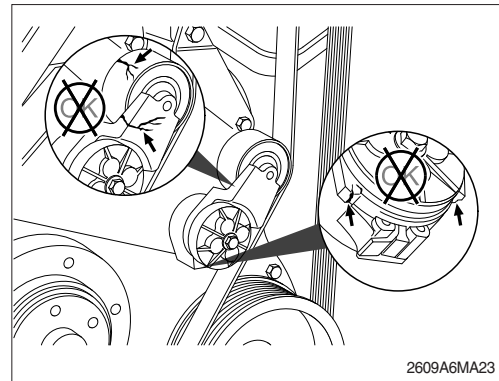
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.



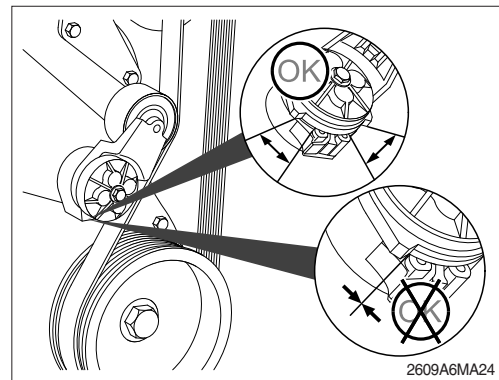
9) FAN BELT TENSIONER

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



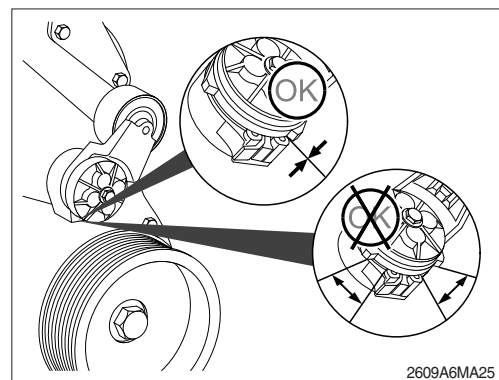
- (2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.

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

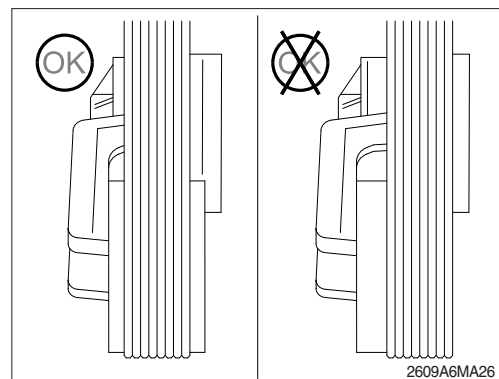


- (3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop. If these two are not touching, the tensioner must be replaced.

※ **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.



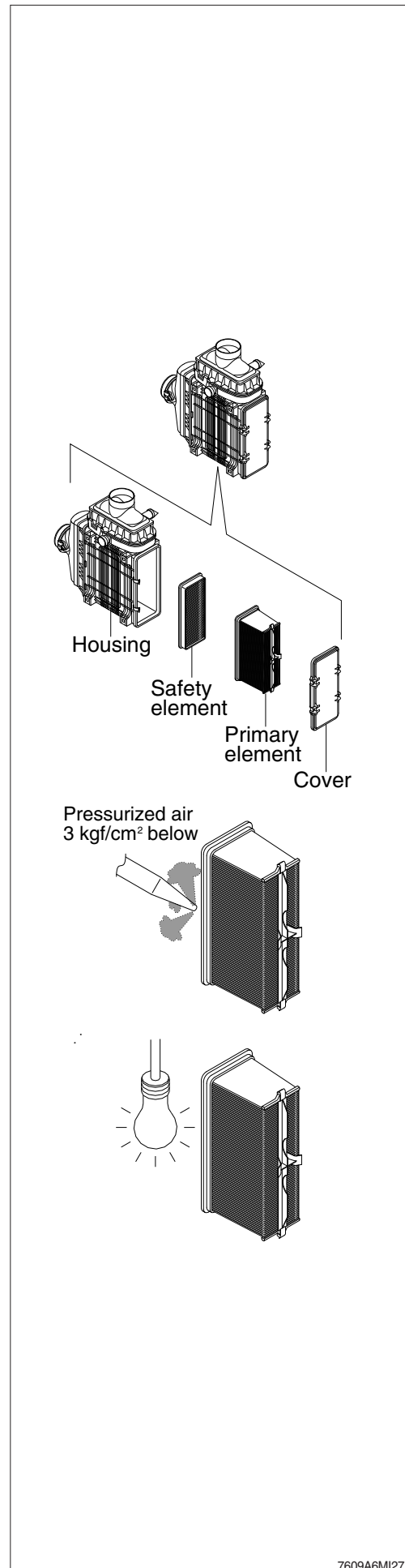
10) CLEANING OF AIR CLEANER

(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 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

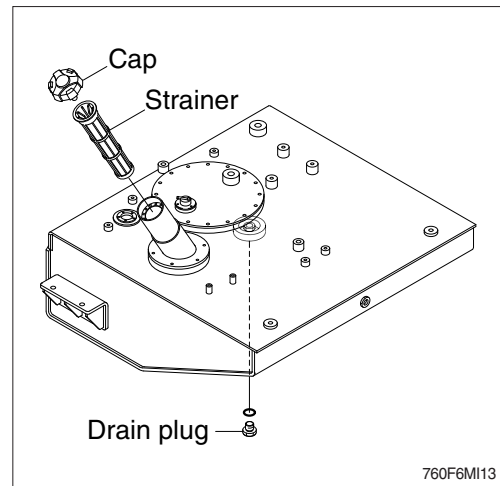
The safety filter element should never be cleaned since the safety filter is the last barrier to contaminant before it reaches engine/equipment. The useful life of the safety filter is equivalent to that of the primary air filter only if the primary filter element is being regularly cleaned. If the primary 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.



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11) FUEL TANK

- (1) Fully fill the fuel tank to minimize water condensation and check the 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.

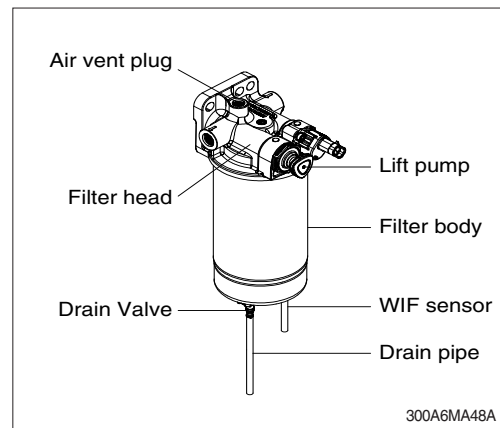


12) PREFILTER

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

(1) Drain water

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



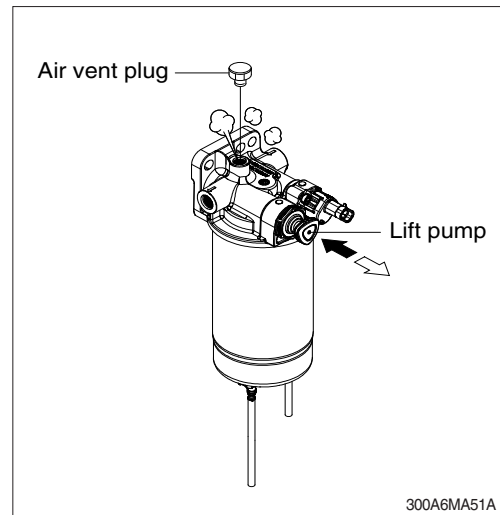
(2) Replace element

- 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

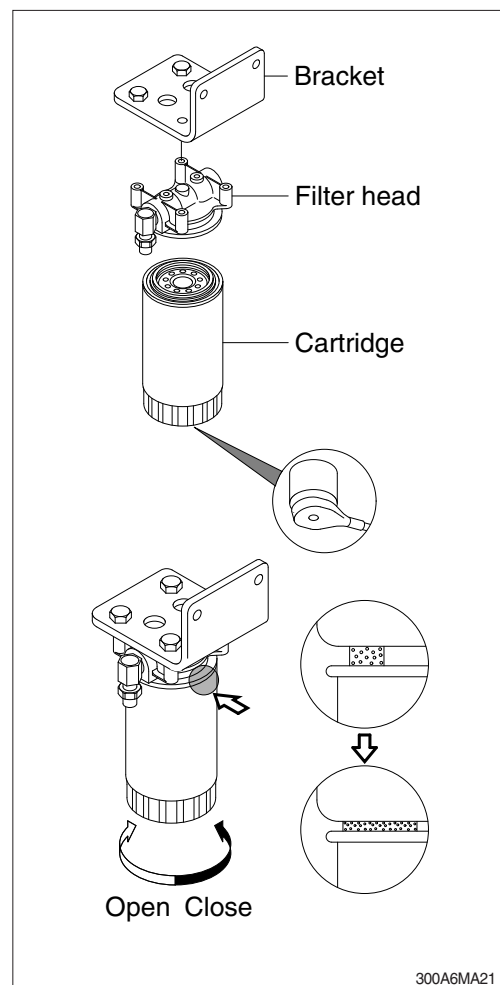
- ① Hand prime the lift pump repeatedly until air bubbles are no longer present from the air vent hole.
- ② Tighten the air vent plug to its origin position.

▲ 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.



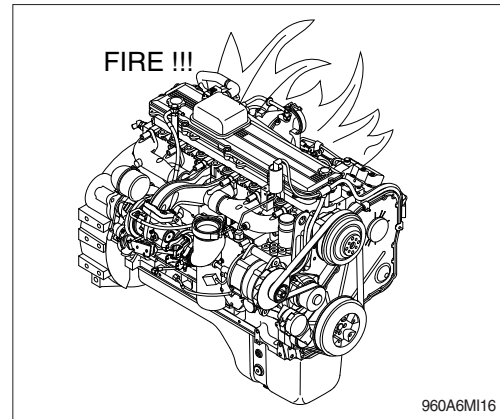
14) REPLACEMENT OF FUEL FILTER

- (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.**



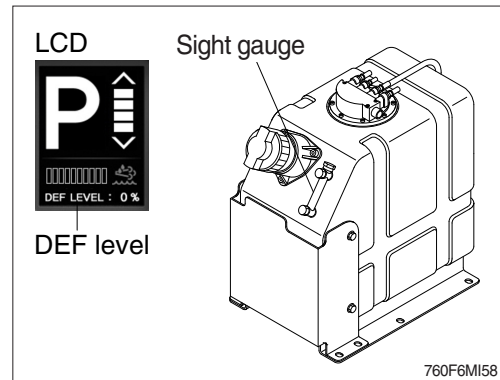
15) LEAKAGE OF FUEL

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



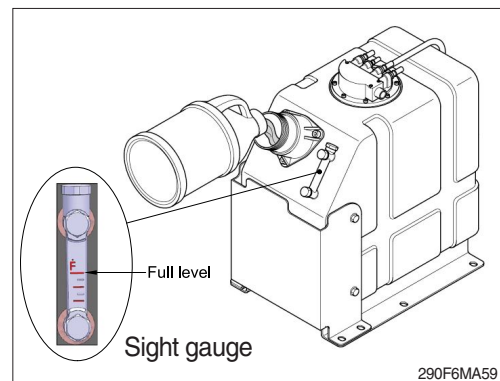
16) DEF/AdBlue® TANK

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



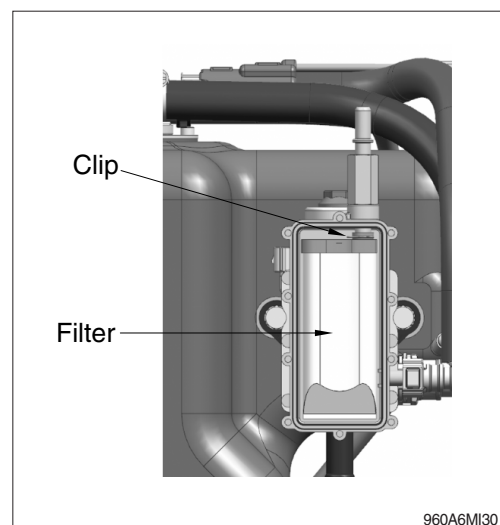
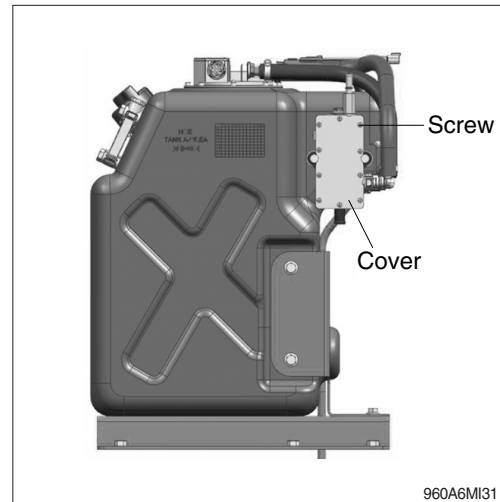
- (2) If the DEF/AdBlue® level is found to below, DEF/AdBlue® must be added.
- (3) When fill the tank with DEF/AdBlue®, check the sight gauge and don't fill up "F" level line to prevent overflow.

- ▲ 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) DEF/AdBlue® TANK FILTER

- (1) The filter is located on DEF/AdBlue® tank.
- (2) Loosen the screws (10EA) and remove the cover.
- (3) Loosen the clip and remove the DEF/AdBlue® tank filter.
- (4) Replace the filter and install the cover and screws.



18) DEF/AdBlue® SUPPLY MODULE FILTER

(1) Inspect the area around the DEF/AdBlue® supply module filter case for signs of leakage.

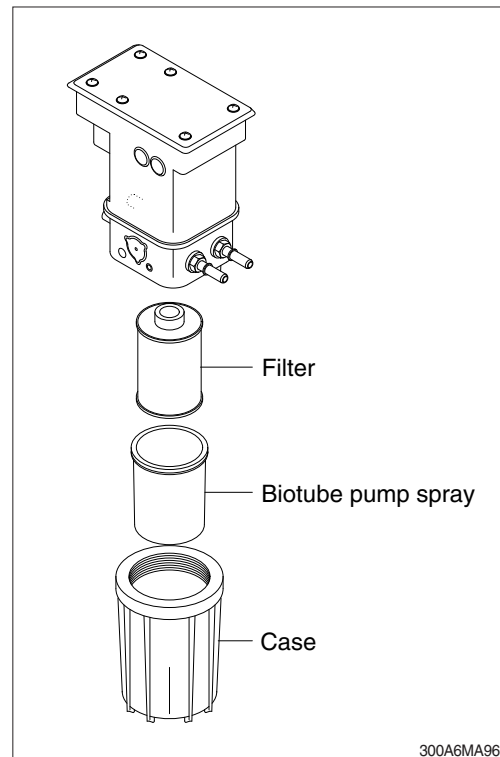
※ Turn OFF the master switch located in tool box near cab entry steps.

(2) Remove the filter case with the biotube pump spray and filter.

(3) Remove the filter and biotube pump spray from the case.

※ Clean the case inside and biotube pump spray.

(4) Insert a new filter and biotube pump spray into the case and tighten the case.



19) ENGINE CLEANING

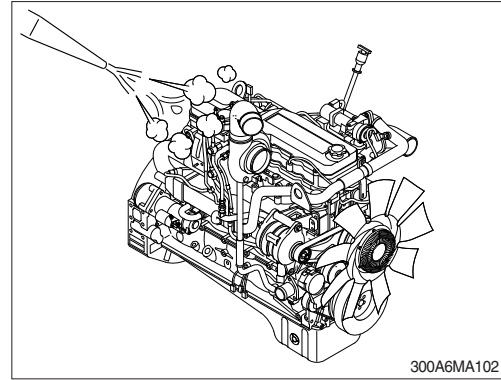
⚠ When using a steam cleaner, wear safety glasses or a face shield, as well as protective clothing. Hot steam can cause serious personal injury.

※ 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.

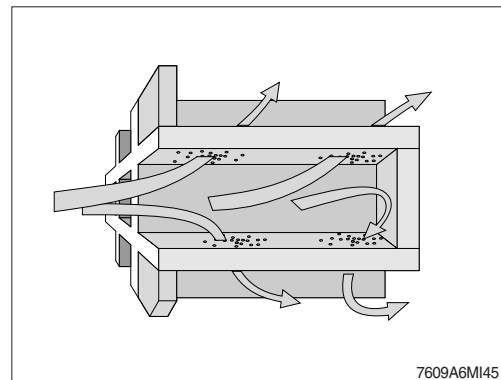


20) DPF (diesel particulate filter) CLEANING

- (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.

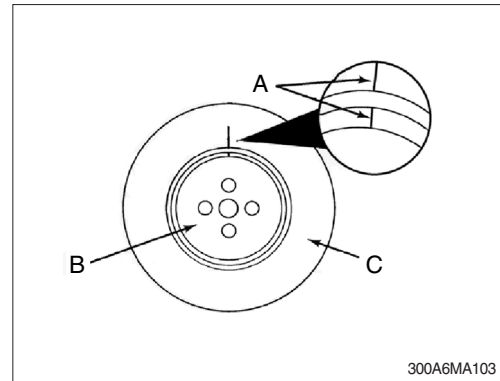
※ Please contact your local HD Hyundai Construction Equipment dealer.



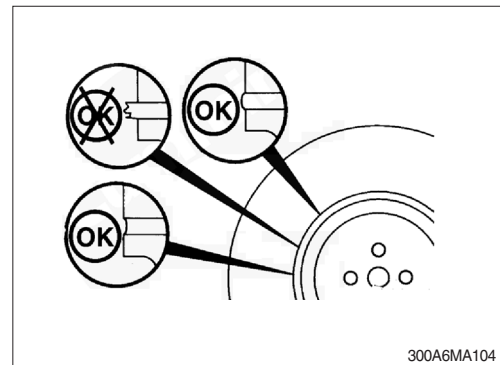
21) VIBRATION DAMPER

(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.



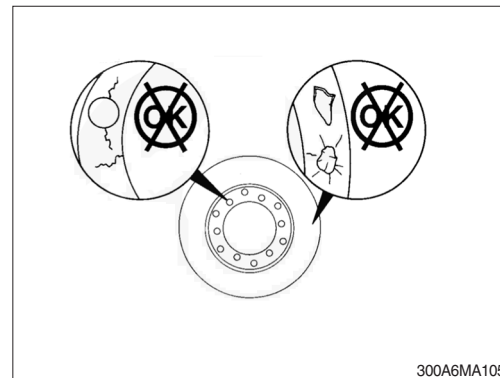
- ② Inspect the rubber member for deterioration. If pieces of rubber are missing or if the elastic member is more than 3.18 mm (1/8 in) below the metal surface, replace the damper.
- ③ Look for forward movement of the damper ring on the hub. Replace the vibration damper if any movement is detected.



(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.

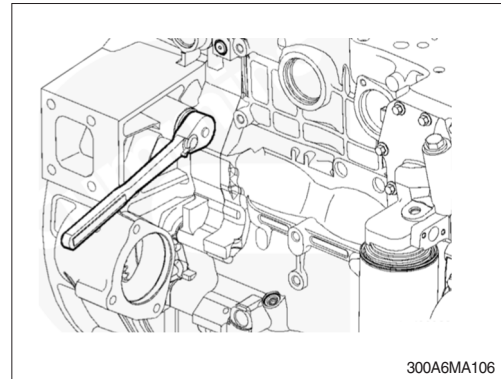
- ① Check the vibration damper for evidence of fluid loss, dents, and wobble. Inspect the vibration damper thickness for any deformation or raising of the damper cover plate.
- ② If any of these conditions are identified, contact you local HD Hyundai Construction Equipment dealer to replace the vibration damper, if movement is detected.



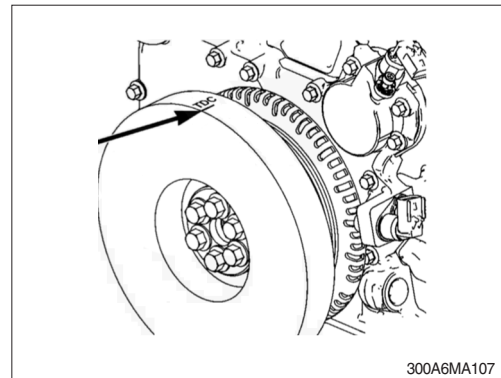
22) OVERHEAD SET ADJUSTMENT

- ※ This procedures are perform the repair shop.
- ※ **Service tools**
 - Cummins barring tool, p/no. 5299073
 - Feeler gauge
- ※ **Remove the rocker lever cover and gasket, refer to engine maintenance manual.**

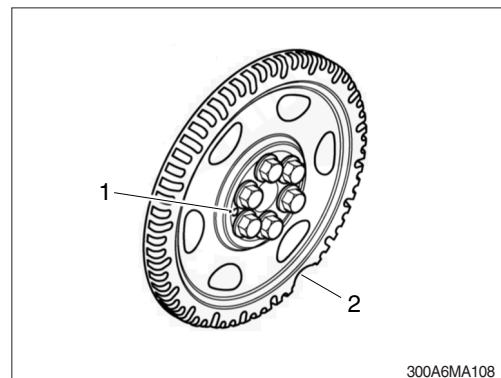
- (1) Use the barring tool, to rotate the crankshaft until the number 1 cylinder is at topdead center (TDC).



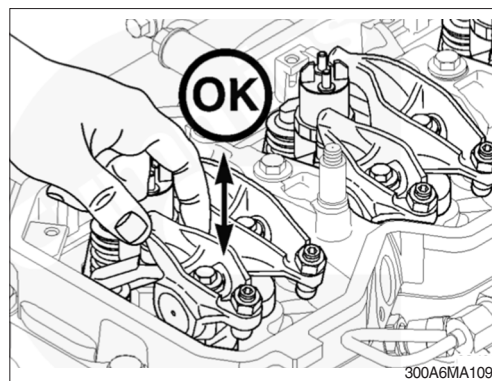
- (2) The TDC indicator is on the vibration damper. Align the vibration damper so the TDC indicator is at the 12 o'clock position.



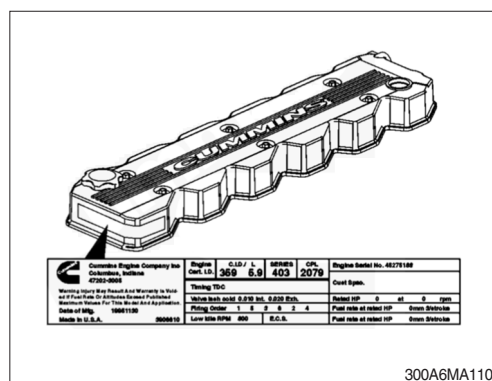
- (3) If no TDC mark is present on either the vibration damper or the crankshaft speed indicator ring, align the large gap in the crankshaft speed indicator ring to the 5 o'clock position (2). The dowel pin will be visible in the 9 o'clock position (1). Check that both number 1 cylinder rocker levers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



- (4) If both of the number 1 cylinder rocker levers are loose, proceed to the next step; If the number 1 cylinder rocker levers are not loose, rotate the crankshaft 360 degrees and proceed to the next step.



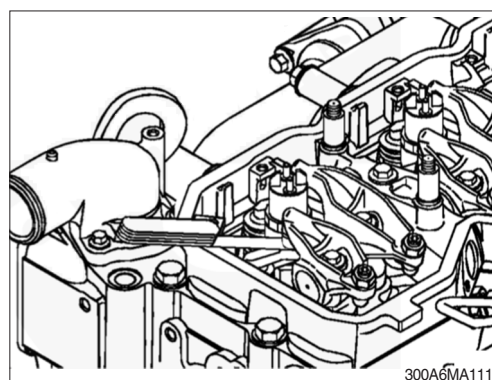
- (5) Make sure to check the engine dataplate for correct valve lash (overhead set) specifications. The engine dataplate is typically located on the engine rocker lever cover, but may also be located on the left side of the gear housing.



- (6) If the number 1 cylinder is at TDC and both rocker levers are loose, the valve lash (overhead set) can be checked on the following rocker levers:
(E = exhaust, I = Intake)
1I, 1E, 2I, 3E, 4I, and 5E.

Overhead set 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 |



- (7) 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 specifications shown above.

- (8) The clearance is correct when some resistance is felt when the feeler gauge is slipped between the crosshead and the rocker lever socket. Measure the valve lash (overhead set) by inserting a feeler gauge between the crosshead and the rocker lever socket. If the measurement is out of specification, loosen the locknut and adjust the lash to nominal specifications.

Overhead set valve lash

| Item | | mm | inch |
|---------|-----|-------|-------|
| Intake | Min | 0.254 | 0.010 |
| Exhaust | Max | 0.508 | 0.020 |

- ※ **Tighten the lock nut and measure the clearance again.**

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

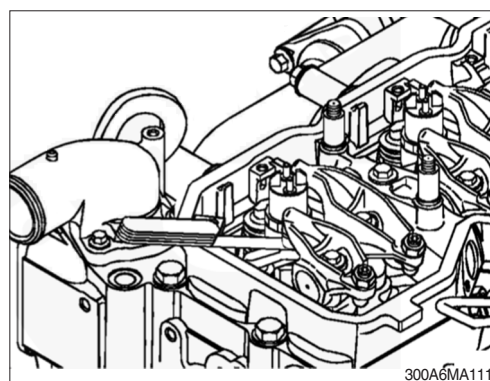
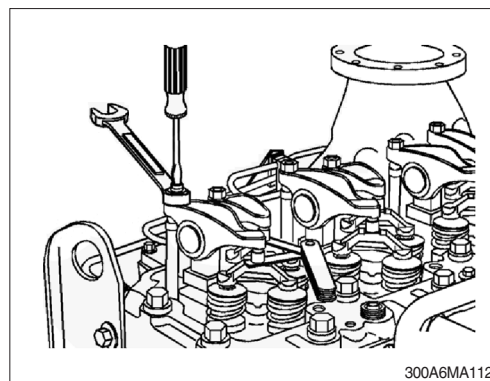
- (9) Use the barring tool, to rotate the crankshaft 360 degrees.

Use the previous steps and specifications to set the valve lash on the following rocker levers:

(E = exhaust, I = Intake)

2E, 3I, 4E, 5I, 6I, and 6E.

If the measurements are out of specification, set the valve lash.



- (10) Install the rocker lever cover gasket and cover, refer to engine maintenance manual.

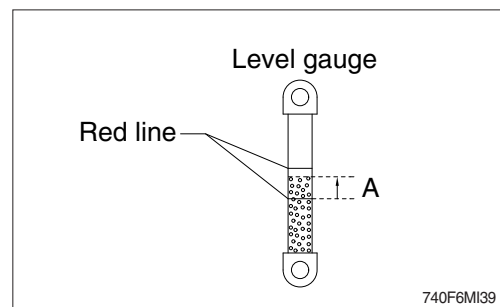
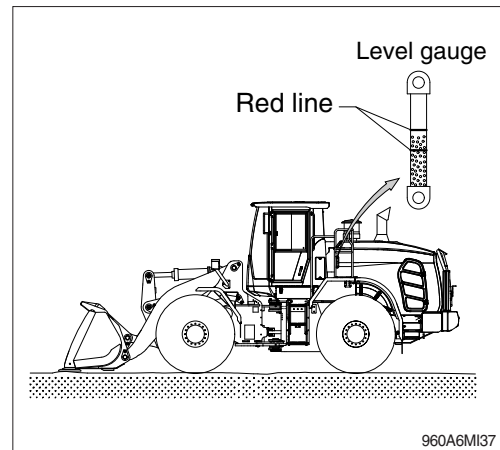
- (11) Operate the engine. Check for leaks.

23) HYDRAULIC OIL CHECK

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

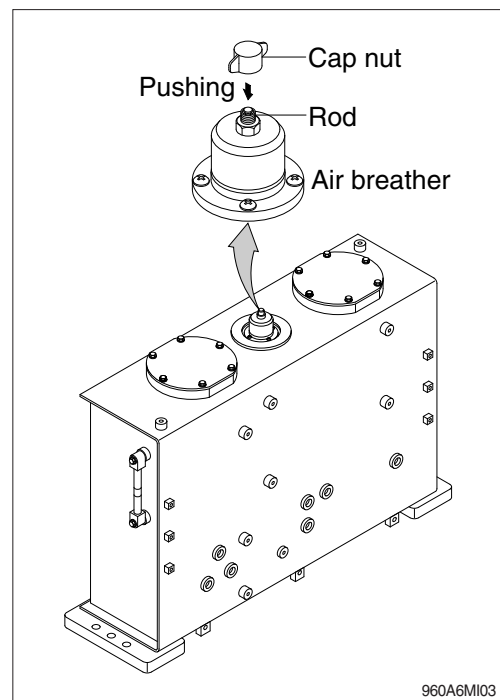
| Temperature | | Height A | |
|-------------|-----|----------|------|
| ℃ | °F | mm | inch |
| 0 | 32 | 15 | 0.6 |
| 10 | 50 | 25 | 1.0 |
| 20 | 68 | 30 | 1.2 |
| 30 | 86 | 35 | 1.4 |
| 40 | 104 | 40 | 1.6 |

- ※ Refer to page 3-28 for checking the temperature of the hydraulic oil.
- ※ Add the 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

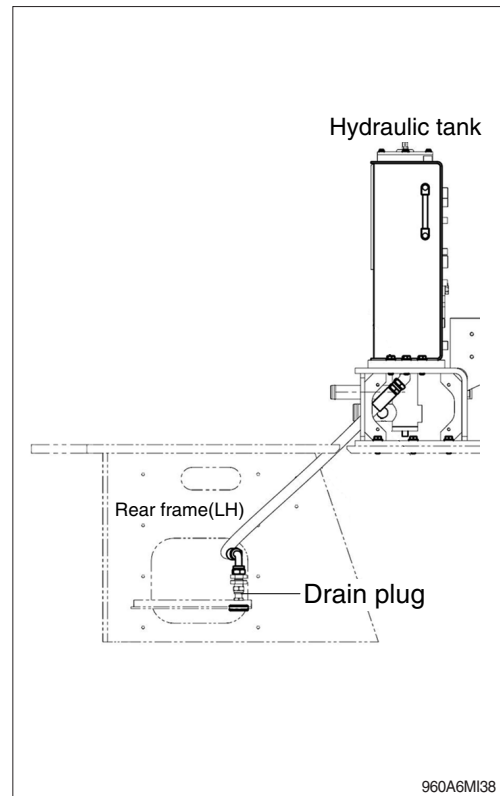
- (1) Lower the bucket on the ground extend the bucket cylinder to the maximum.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Prepare a suitable container.
- (4) To drain the oil loosen the drain plug on the rear frame LH side.
- (5) Tighten the 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.

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

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

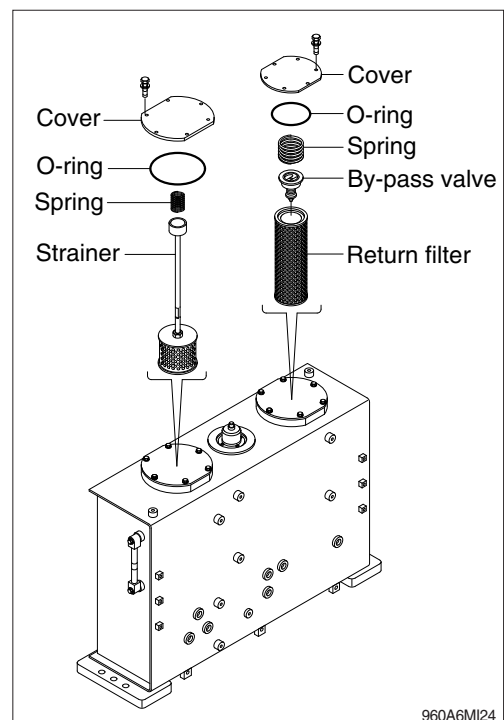
If changing to Bio oil, contact HD Hyundai Construction Equipment dealer.



26) CLEANING AND REPLACING RETURN FILTER

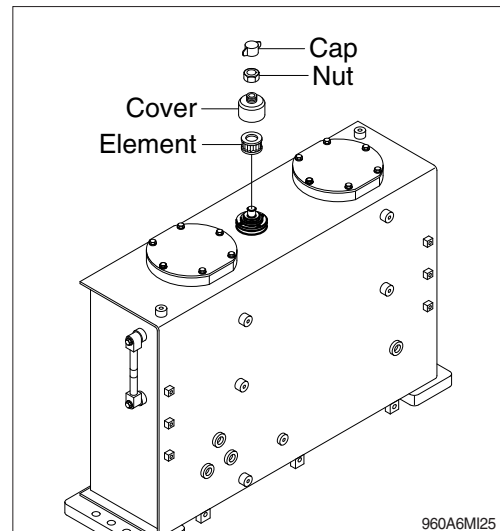
Clean and replace the return filter in the following manner.

- (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 : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)



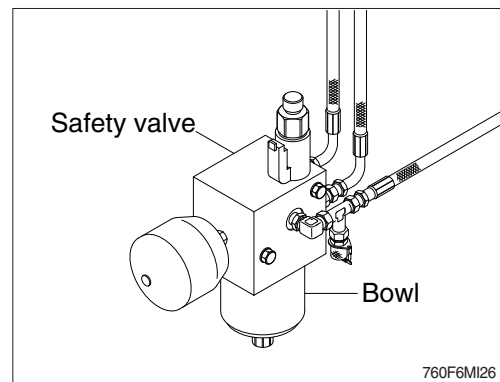
27) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

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



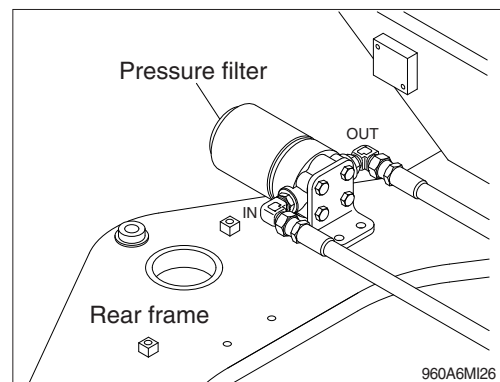
28) REPLACE OF PILOT LINE FILTER

- (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



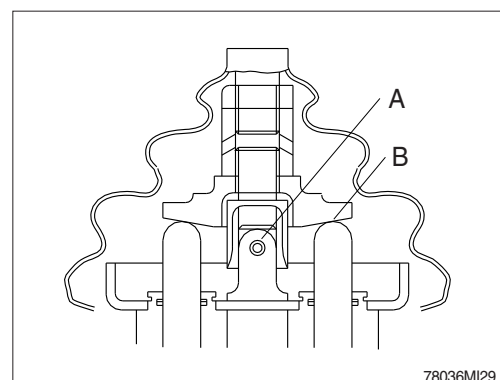
28-1) REPLACE OF PRESSURE FILTER

- (1) Loosen the pressure filter.
- (2) Install the new filter and tighten.



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 |
|-----------------|----------|
| 23.5 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 can cause explosion or personal injury.

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

▲ 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.

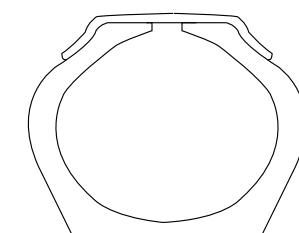
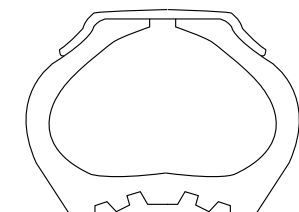
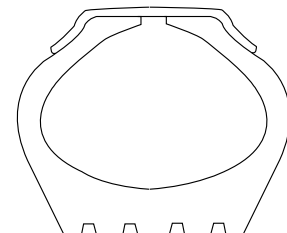
▲ When removing lock ring or inflating tire, use a safety cable or chain to ensure safety.

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

Avoid the followings when traveling.

- ① Rubbing tires against road bank or rack at cargo-unloading spot.
- ② Tires slippage during working.

- ③ Abrupt starting of machine.
- ④ Remove oil, grease or fuel found on tires to prevent permanent deformation.



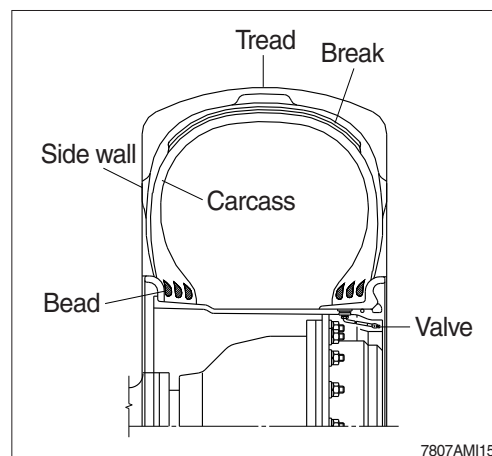
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31) REPLACEMENT OF TIRE

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

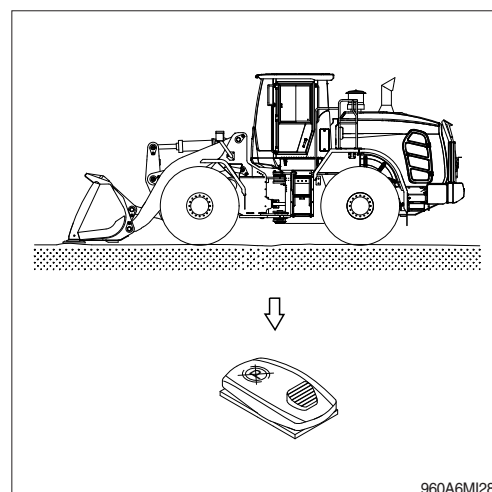
(1) Tires to be replaced

- 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 have a radial crack near the carcass.
- ⑥ Tires which are judged to be unsuitable for use because of deformation or damage.

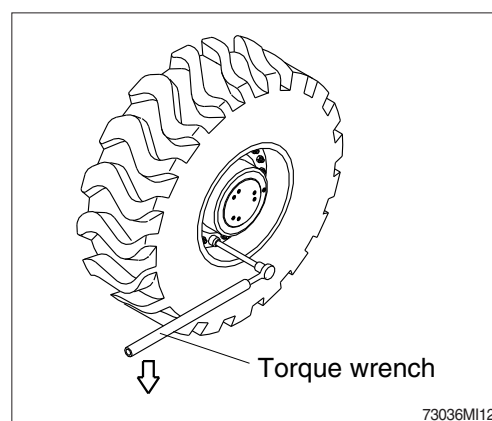


(2) Separation of tire

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

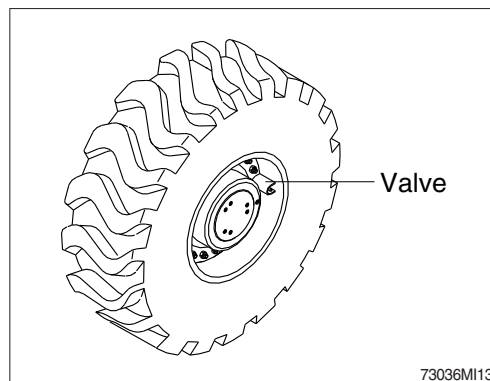


- ② Loosen slightly all wheel mounting.
 - Tools : Socket 32 mm
 - Torque wrench
 - Extension bar
- ③ Lift the machine with a jack.
- ④ Loosen all wheel mounting nuts and replace the tire.



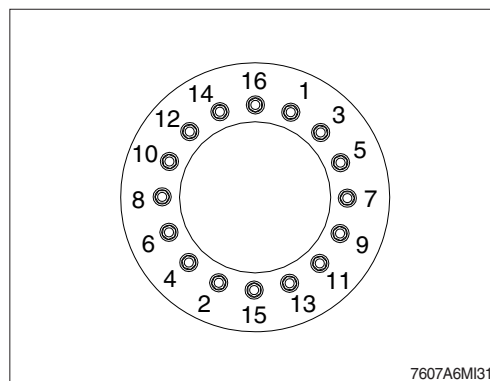
(3) Direction of tire to be installed

- 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 : $79 \pm 2.5 \text{ kgf} \cdot \text{m}$
($571 \pm 18 \text{ lbf} \cdot \text{ft}$)

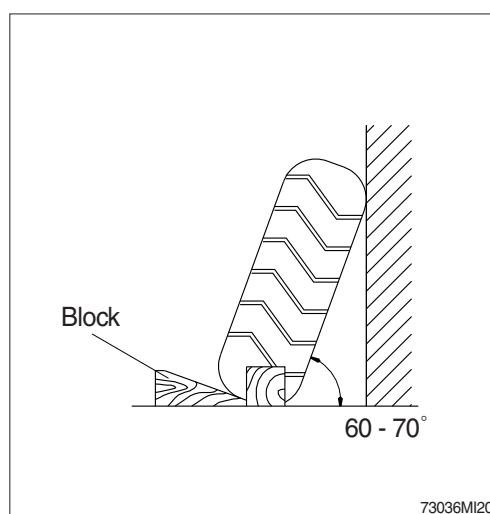


32) STORING TIRES AFTER REMOVAL

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.

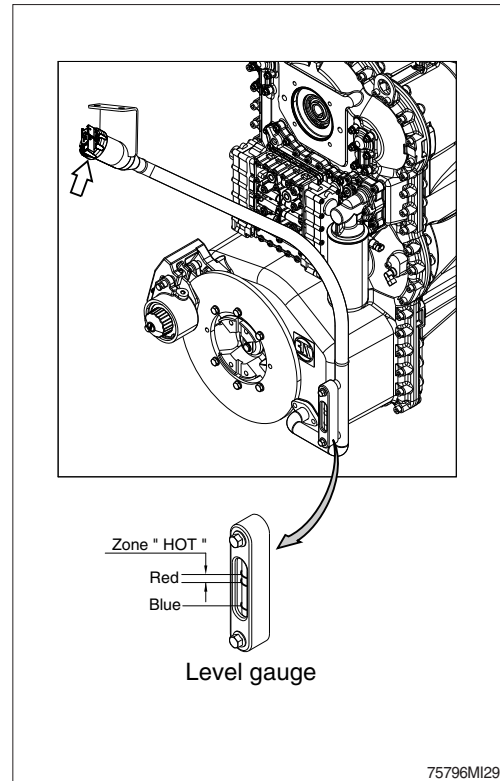
If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



33) CHECK TRANSMISSION OIL LEVEL

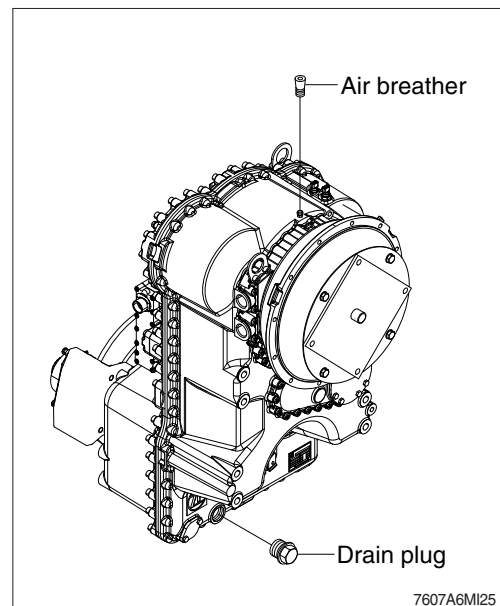
- (1) The oil level check must be carried out as follows;
oil level check (weekly).
- (2) Before the oil level check, Transmission must have been running to warm up enough.
- (3) When the oil level is checked, machine must be on flat ground and engine must be at idling speed, transmission must be in 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.

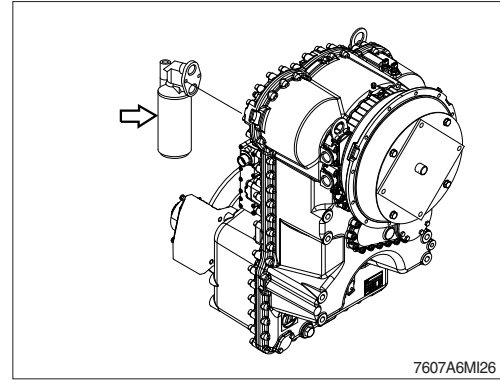


34) REPLACEMENT OF TRANSMISSION OIL AND FILTER ELEMENT

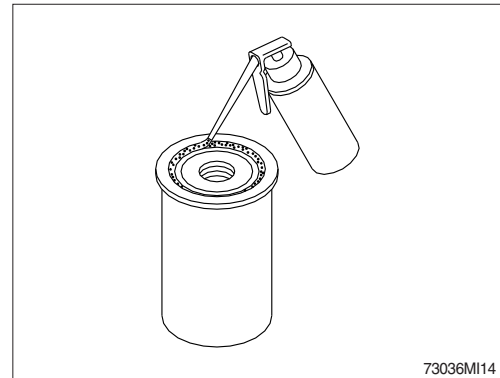
- (1) Operate the machine for a few minutes in order to warm the transmission oil.
- (2) Move the machine to flat ground. Lower the bucket to the ground and slightly apply downward force.
- (3) Press the parking brake switch and stop the engine.
- (4) Open transmission air breather to relieve internal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

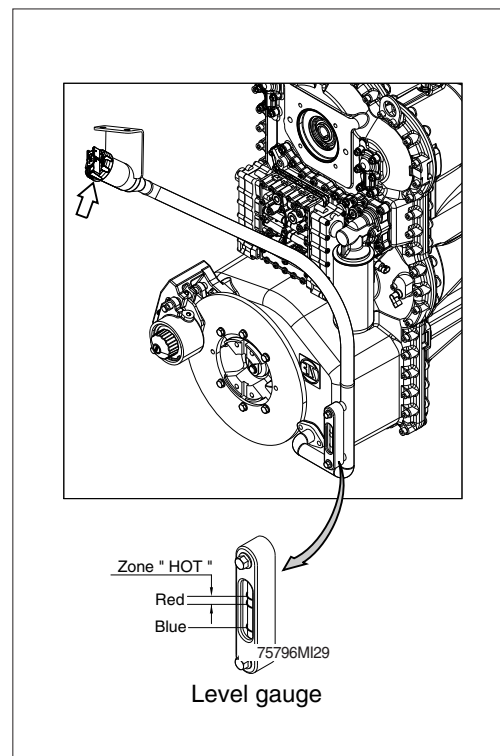


- (8) Apply a light coat of oil to the gasket of a new transmission oil filter cartridge.
- (9) Install the new transmission oil filter cartridge.
Screw the filter in until contacts with the sealing surface is obtained and tighten it now by hand about 1/3 to 1/2 turn.



- (10) Fill the oil through filler cap and check if the oil is at the appropriate level.
- (11) The proper oil amount is 33 liters. (8.7 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.
- ※ Be careful not to inject water into the fill cap when you wash the machine.

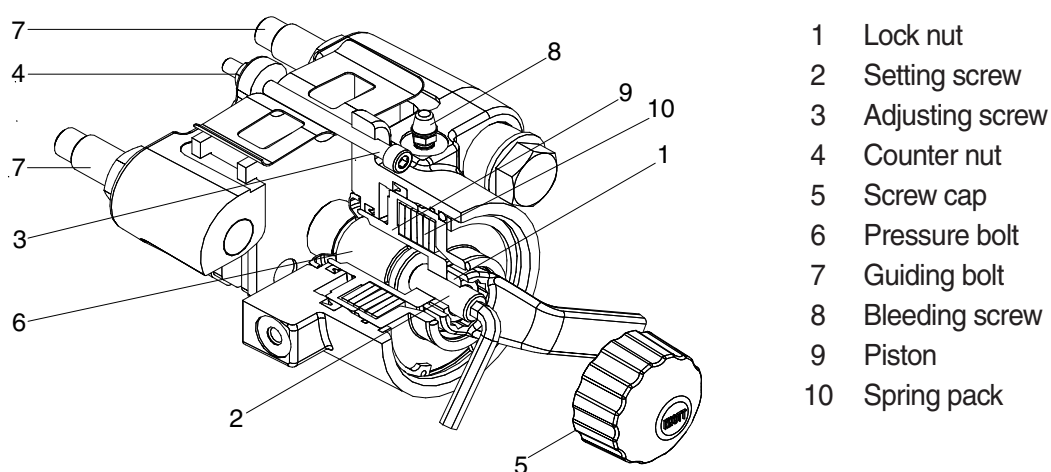


34-1) PARKING BRAKE CLEARANCE

(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



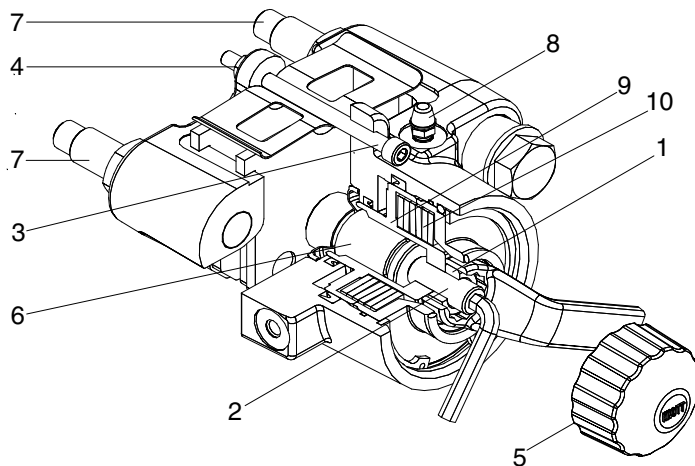
- ① Place the machine on flat ground and secure against rolling away.
- ② Start the engine and run at low idle. Release the parking brake by releasing the parking brake switch in the cabin.
- ③ Check the parking brake clearance with inserting a setting gauge on both sides between the brake lining carrier 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 4-28.**

| 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.

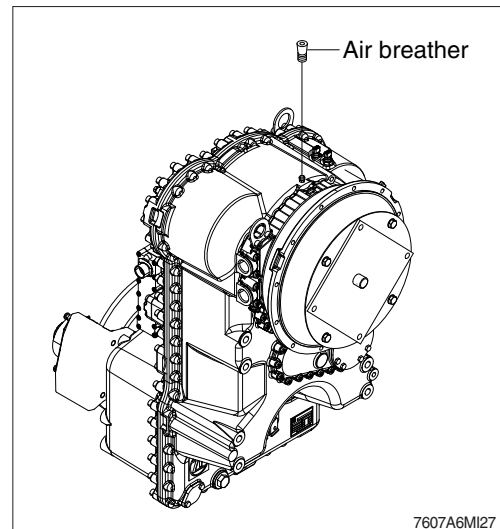
- ④ Rotate the screw cap (5) in a counter-clockwise direction and unscrew it.
- ⑤ Release the lock nut (1) of the setting screw (2).
- ⑥ Insert a setting gauge on both sides between the brake lining carrier and brake disc and hold them in position.
- ⑦ Turn the setting screw (2) in a clockwise direction 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 |

35) CLEANING TRANSMISSION AIR BREATHER

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



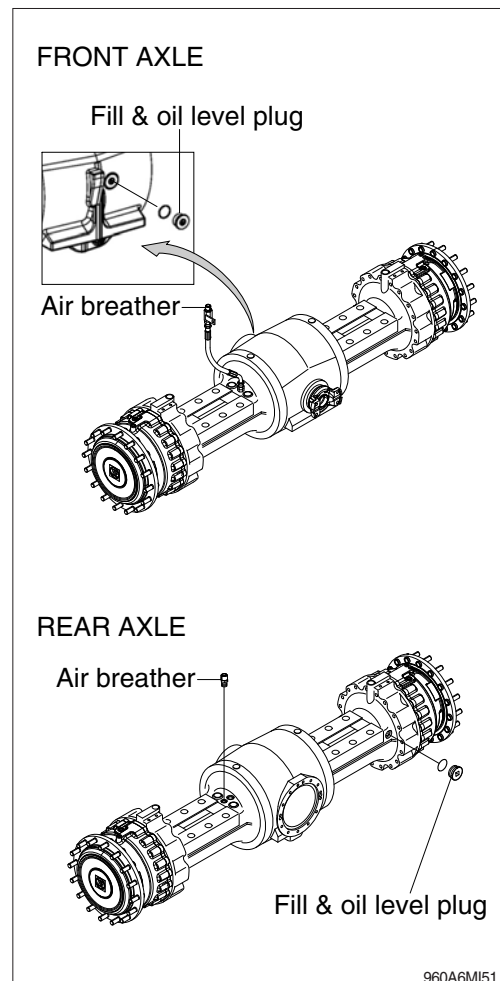
36) CHECK AND SUPPLYING AXLE OIL

- (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.



37) CHANGE THE AXLE OIL

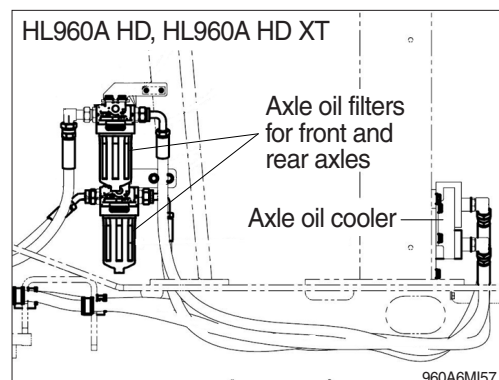
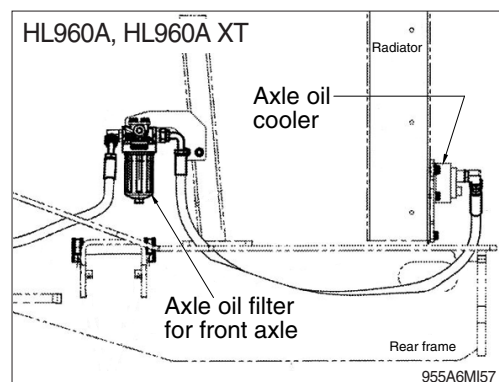
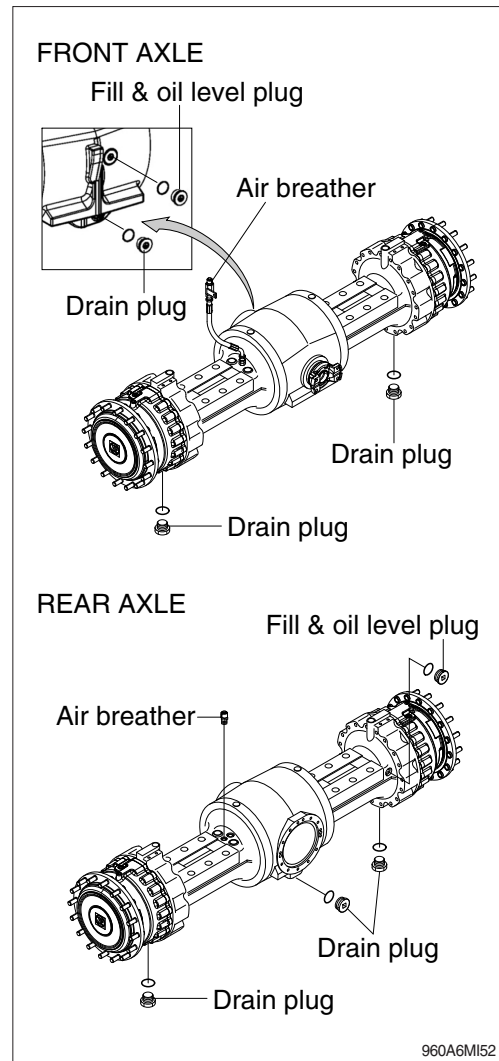
- (1) Place a container under drain plug to catch oil.
- (2) Remove the air breather to relieve internal pressure.
- (3) For a correct oil change, the machine must be on a level plane.
- (4) All plugs must be cleaned carefully before opening.
- (5) Loosen drain plugs and drain oil.
- (6) Provide drain plugs with new O-ring and install them.
- (7) Fill up oil to the overflow on fill & level plug.
 - Oil amount (HL960A, HL960A XT)
 - Front axle : 35 ℓ (9.2 U.S. gal)
 - Rear axle : 35 ℓ (9.2 U.S. gal)
 - Oil amount (HL960A HD, HL960A HD XT)
 - Front axle : 42 ℓ (11.1 U.S. gal)
 - Rear axle : 40 ℓ (10.6 U.S. gal)

- If equipped with axle oil coolers (option)

- (8) Replace front and rear axle oil filters.
- (9) Run the engine for five minutes at low idle on flat ground.
- (10) Fill up oil to the overflow on fill & level plug at low idle and install plugs.
 - Oil amount (HL960A, HL960A XT)
 - Front axle : 41 ℓ (axle only 35 ℓ)
 - Oil amount (HL960A HD, HL960A HD XT)
 - Front axle : 48 ℓ (axle only 42 ℓ)
 - Rear axle : 45 ℓ (axle only 40 ℓ)

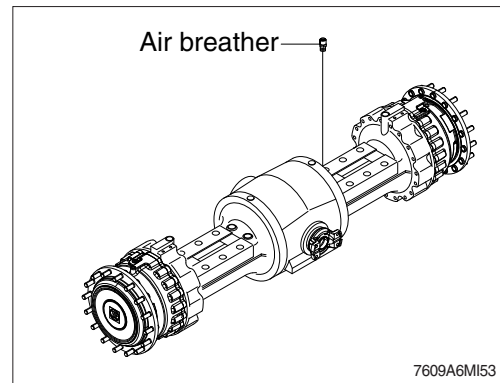
As the machine is hot after operation, wait until the temperature has dropped.

▲ If operating conditions require frequent use of the brakes, decrease the changer interval accordingly.



38) CLEANING AXLE BREATHER

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



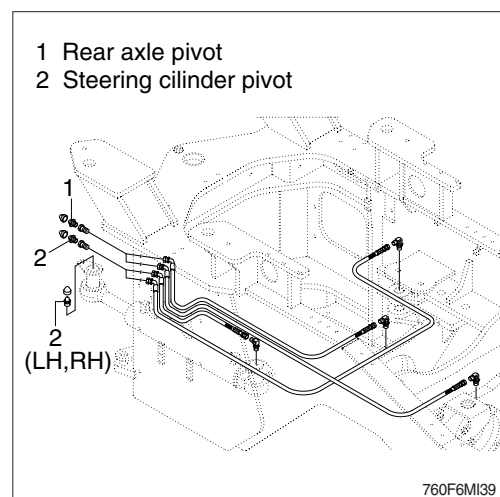
39) LUBRICATION

- (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.

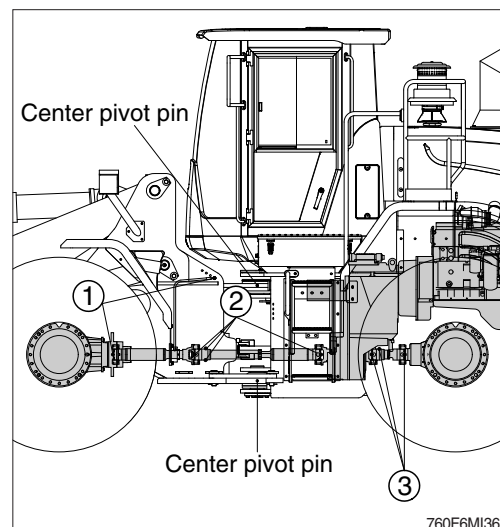
- (3) Rear axle pivot : 2EA
- (4) Steering cylinder pin : 4EA



- (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



40) REPLACEMENT OF BOLT ON CUTTING EDGE

(1) Replacement time

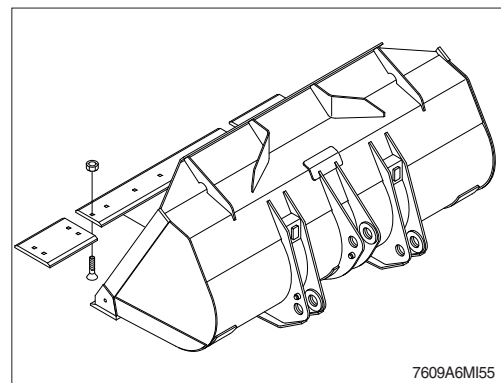
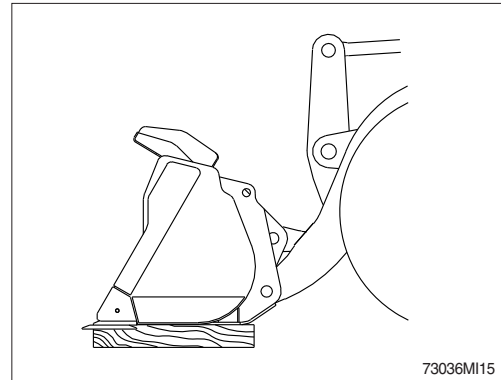
Replace the cutting edge before it is worn to the welded edge of the bucket.

(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 : $83.2 \pm 12.5 \text{ kgf} \cdot \text{m}$
($60.2 \pm 90.4 \text{ lbf} \cdot \text{ft}$)
- ⑥ After a few hours of operation, retighten bolts.



41) REPLACEMENT OF BUCKET TOOTH

(1) Replacement time

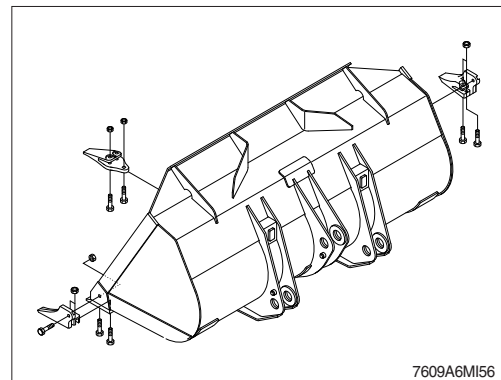
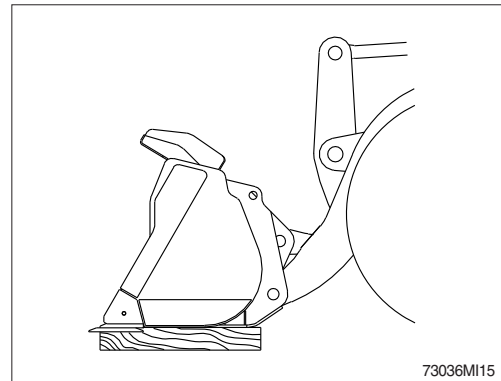
Replace the bucket tooth before it has worn out to the end of the bucket.

(2) Replacement method

▲ Make sure the work equipment does not move when replacing the bucket tooth.

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

- 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 bucket tooth.
- ③ Clean the contacted surface.
- ※ **If the contacted face of bucket tooth has worn out, repair the contacted face of it.**
- ④ Install new bucket tooth on the bucket, and tighten bolts and nuts.
 - Tightening torque : $83.2 \pm 12.5 \text{ kgf} \cdot \text{m}$
($602 \pm 90.4 \text{ lbf} \cdot \text{ft}$)
- ⑤ After a few hours of operation, retighten bolts.

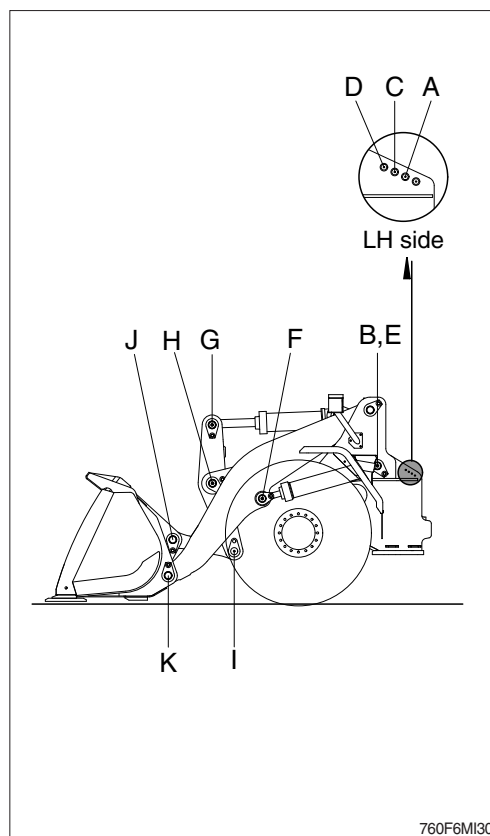


42) MAINTENANCE OF WORK EQUIPMENT

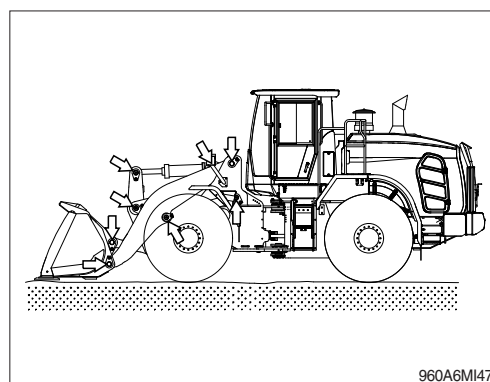
- (1) Lubricate to each pin of working device.
Lubricate the grease to grease nipple in accordance with lubrication intervals.

| No. | Description | Qty |
|-----|--|-----|
| A | Bucket cylinder (front frame side) pin | 1 |
| B | Boom cylinder (front frame side) right pin | 1 |
| C | Boom-front frame right connection pin | 1 |
| D | Boom-front frame left connection pin | 1 |
| E | Boom cylinder (front frame side) left pin | 1 |
| F | Boom cylinder-boom connection pin | 2 |
| G | Bucket cylinder-bell crank connection pin | 1 |
| H | Boom-bell crank connection pin | 1 |
| I | Bell crank-bucket link connection pin | 1 |
| J | Bucket-Bucket link connection pin | 2 |
| K | Bucket-boom connection pin | 2 |

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

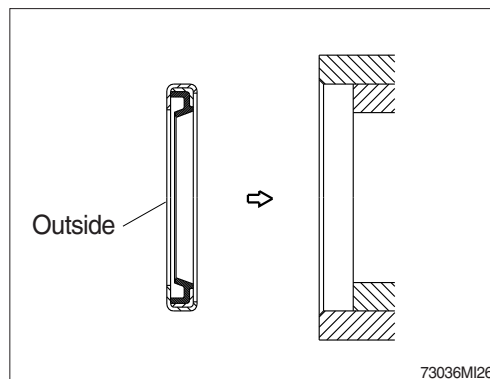


- (2) Check for wear and tear of work equipment pins and bushings.
(3) Check for damage of boom and bell crank.



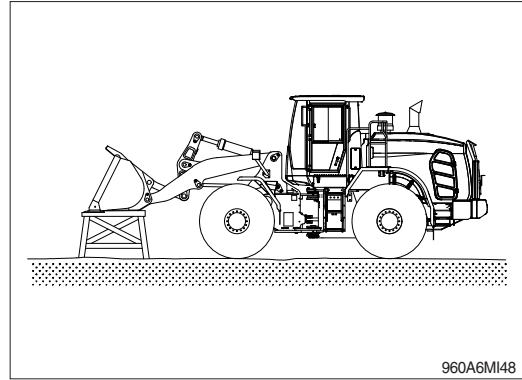
- (4) Dust seal are mounted on the rotating part of working device to extend the lubricating interval.

- ※ **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.**



43) 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.



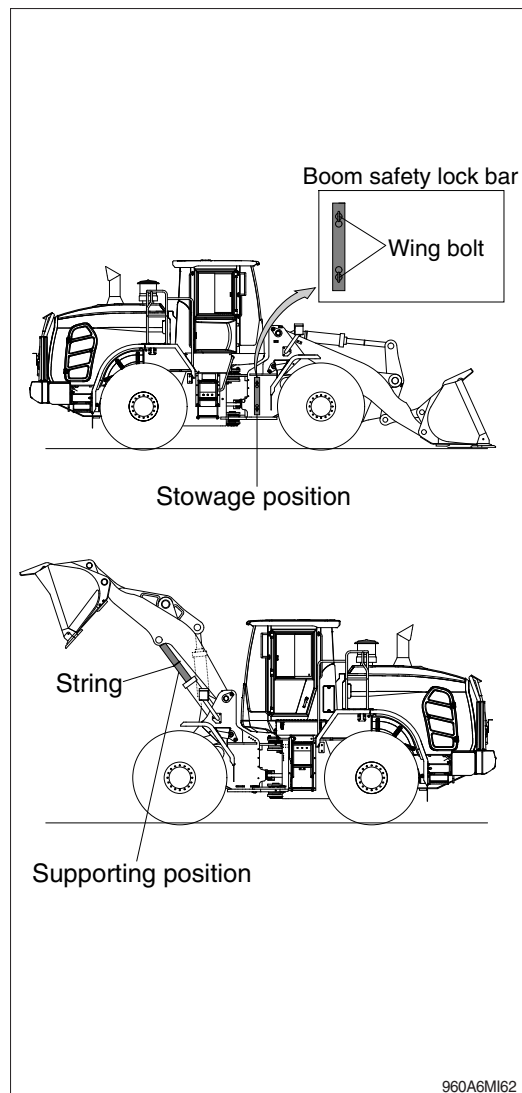
44) BOOM SAFETY LOCK BAR (option)

(1) Supporting

▲ If it is necessary to carry out any maintenance operation or to stop the machine with raised boom, always use the boom safety lock bar and put the pilot cut off switch to the OFF position.

※ The attachment should be empty.

- ① Raise the boom fully.
 - ② Stop the engine and remove the starter key.
 - ③ Loosen the two wing bolts and remove safety lock bar from its stowage position.
 - ④ Place the safety lock bar onto the boom cylinder and secure the safety lock bar by tying the string shown as figure.
 - ⑤ Slowly lower the boom to fix the safety lock bar.
- ※ When lowering the boom, operate the control lever very slowly.



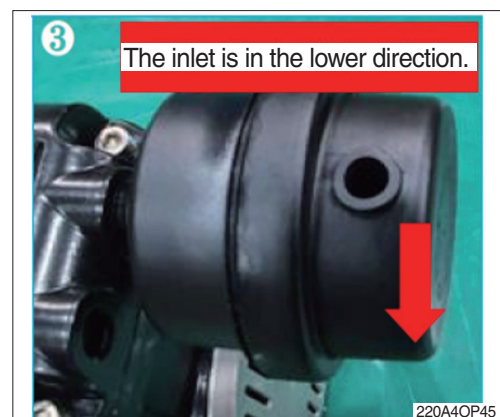
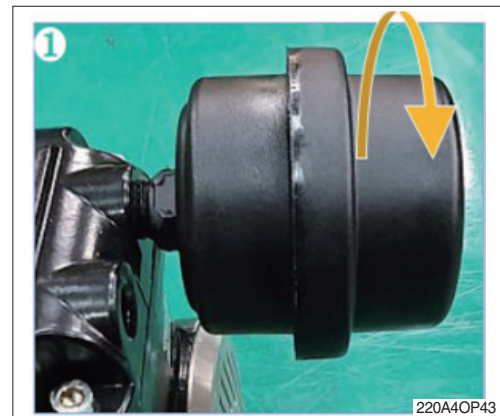
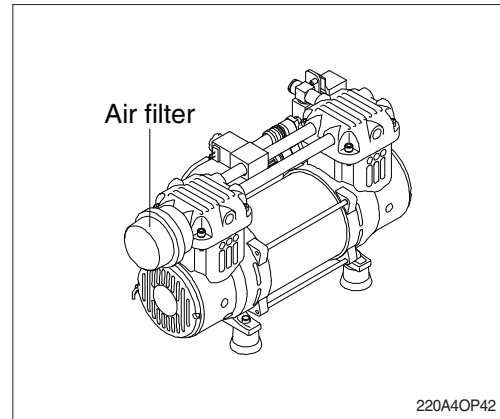
(2) Lowering

- ① Raise the boom to take the weight off the safety lock bar.
- ② Stop the engine and remove the starter key.
- ③ Loosen the string and remove the safety lock bar carefully.
- ④ Reinstall the safety lock bar onto its stowage position using the wing bolts.

45) 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.

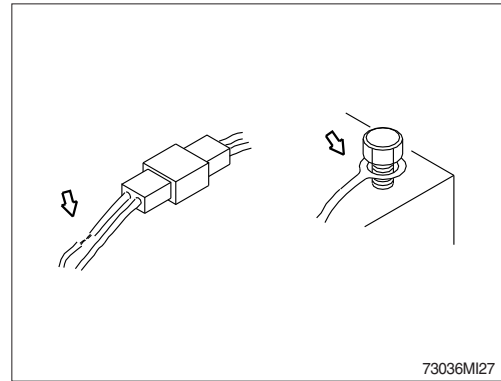
△ If you are using the air compressor on the equipment when cleaning the air filter, the use for a long time can cause internal damage to a piston ring or a liner. Because dust or a contaminant may be inhaled through the air inlet. Please use for a short time at a clean place.



7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

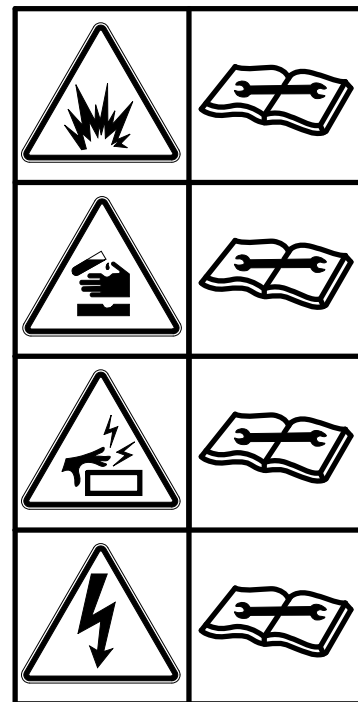
Check regularly and repair loose or malfunctioning gauges when found.



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.

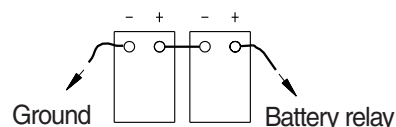
Always return used batteries to one of the following locations.

- 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.

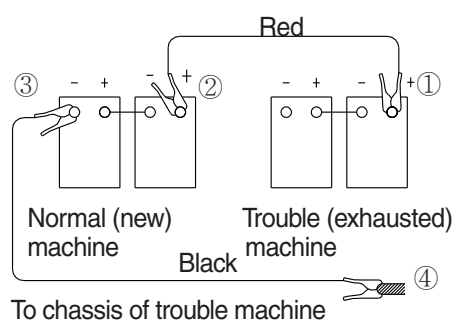
(1) Connection of booster cable

※ 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

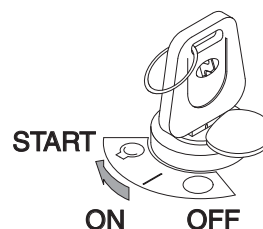


Connection order : ①→②→③→④

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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.

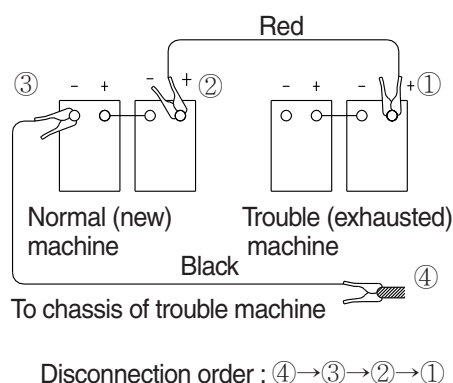
▲ **Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.**

※ **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



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4) Welding repair

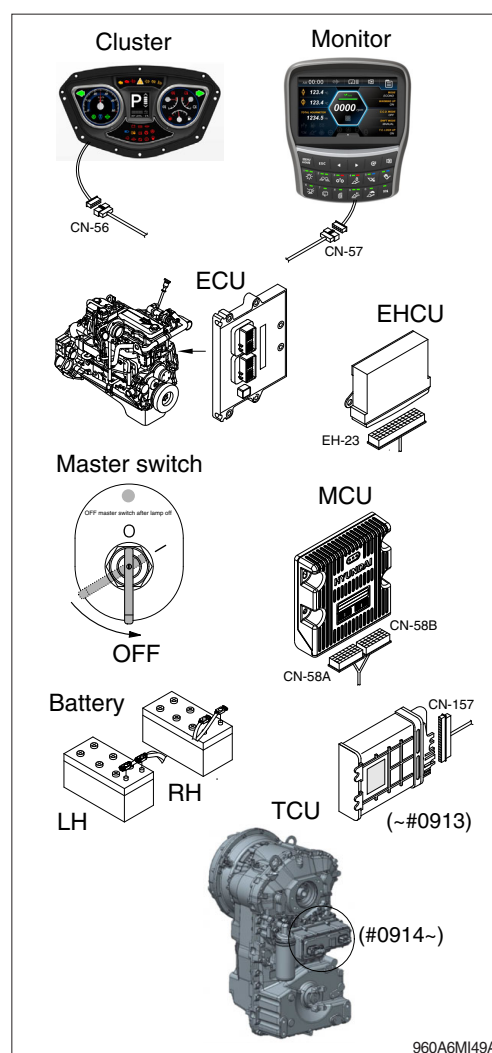
Before start to welding, follow the below procedure.

- (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, EHCU, 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.



8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF INNER AND OUTER FILTER

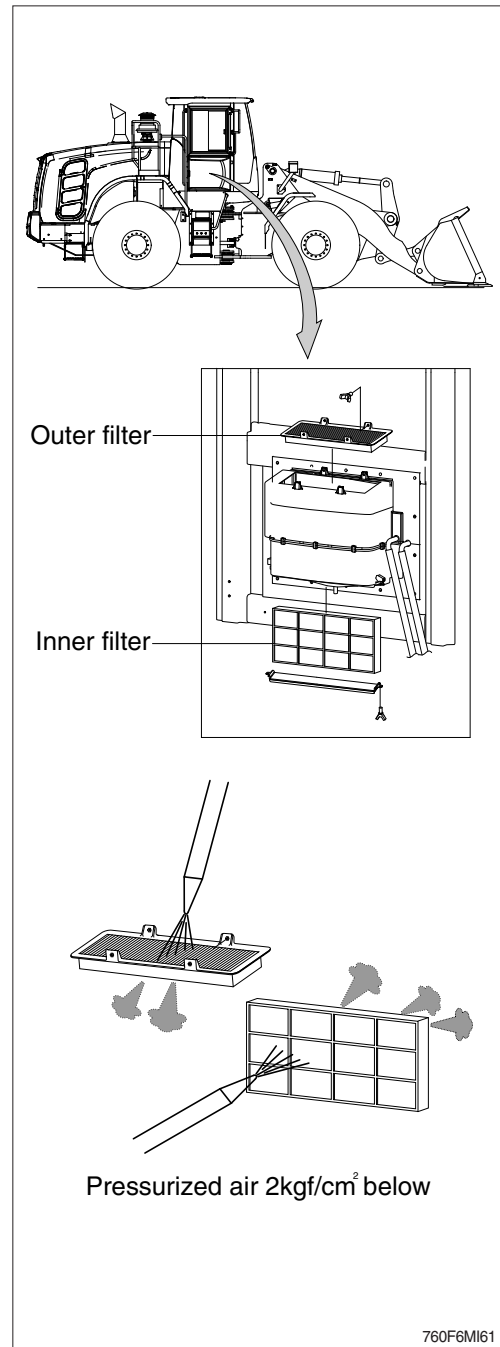
※ Always stop the engine before servicing.

(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^2 , 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

Contact your local HD Hyundai Construction Equipment dealer annually for AC system inspections.

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 | Total mass | GWP : 1430 |
|--------|----------|-------------------|--------------------------------|
| HL960A | HFC-134a | 0.75 kg (1.65 lb) | CO ₂ 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 (CO₂). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO₂.

(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.