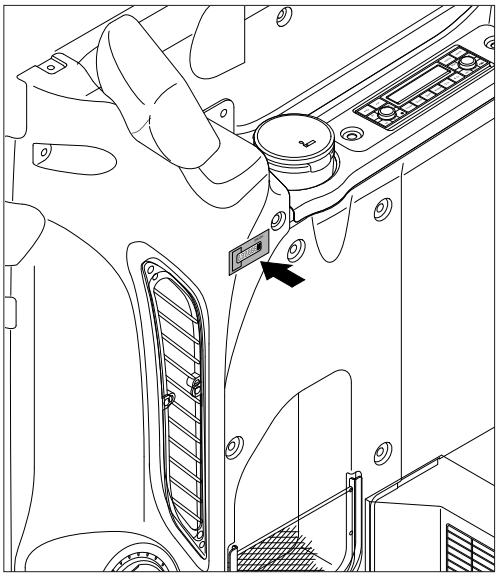
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

(1) Inspect and service machine as described on page 6-11.

(2) Shorten intervals of inspection and service depending on site conditions. (such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 100 hours, carry out all the maintenance「Each 100hours, each 50 hours and daily service」at the same time.



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2) PRECAUTION

(1) Do not perform maintenance on the machine until you have read the operator's manual and are familiar with the machine.

(2) Daily inspection should be performed according to section, Maintenance check list.

(3) Engine and hydraulic components have been preset from the factory.
Do not allow unauthorized personnel to reset them.

(4) Drain the used oil and coolant (always in separate containers). Handle and dispose of the waste per regulation of each province/country as well as any local laws.

⚠ Hot oil and hot components can cause serious injury or death. Do not allow hot oil or hot components to contact skin. Failure to comply may result in serious injury or death.

△ Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.

(5) Ask your local dealer or HD Hyundai Construction Equipment for the maintenance advice if unknown.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

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

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

(3) Use the recommended oil.

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

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

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

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

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

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

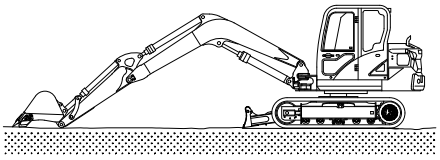
(10) For more detail information of maintenance, please contact your local HD Hyundai Construction Equipment dealer.

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

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

※ **Spewing of oil can cause an severe personal injury. Before you loosen hydraulic cap or any hydraulic line on the machine, always make sure machine of off, cooled down and that pressure is relived of the hydraulic system.**

(1) Place the machine in the position shown and stop engine.



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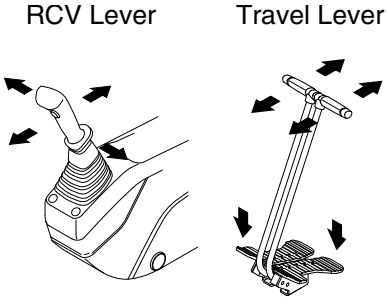
(2) Set the safety knob completely in the UNLOCK position. Refer to section Levers and pedals. Operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **This does not completely release the pressure, so when servicing hydraulic component, loosen the connections slowly and do not stand in the direction where the oil may shoot out.**



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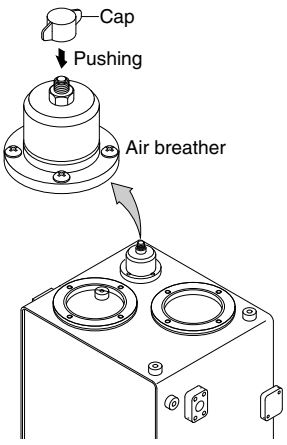
(3) Relieve the pressure in the tank by pushing the top of the air breather.



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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 install hose in a twisted, bent or crimped way.

(5) Always maintain the specified torque.

6) PERIODIC REPLACEMENT OF PARTS

(1) Perform periodic maintenance of the machine to prolong its useful life. This will assure and allow you to use the machine safely for a long time.
It is recommended to replace any parts related to safety (as needed), not only for safety but in order to maintain performance as well.

(2) These parts can shorten the life of the machine. The life span of such parts cannot be viewed visually and judged by the operator.

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

<table>
<tr><th colspan="3">Periodic replacement of parts</th><th>Interval</th></tr>
<tr><td colspan="2" rowspan="2">Engine</td><td>Fuel hose (tank-engine)</td><td rowspan="2">Every
2 years</td></tr>
<tr><td>Heater hose
(heater-engine)</td></tr>
<tr><td rowspan="6">Hydraulic system</td><td rowspan="3">Main circuit</td><td>Pump suction hose</td><td rowspan="3">Every
2 years</td></tr>
<tr><td>Pump delivery hose</td></tr>
<tr><td>Swing hose</td></tr>
<tr><td rowspan="3">Working device</td><td>Boom cylinder line hose</td><td rowspan="3">Every
2 years</td></tr>
<tr><td>Arm cylinder line hose</td></tr>
<tr><td>Bucket cylinder line hose</td></tr>
</table>

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

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6 × 1.0	0.9 ~ 1.3	6.5 ~ 9.4	1.1 ~ 1.7	8.0 ~ 12.3
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60.0
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.0	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

2) PIPE AND HOSE (FLARE TYPE)

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

3) PIPE AND HOSE (ORFS TYPE)

Thread size (PF)	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	130.2
1-7/16-12	41	21	151.9
1-11/16-12	50	35	253.2

4) FITTING

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

4) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-bracket)	M10 × 1.5	7±1.5	50.6±10.9
2		Engine mounting bolt (bracket-frame)	M16 × 2.0	30±4.5	217±32.5
3		Radiator mounting bolt, nut	M14 × 2.0	14±1.0	101±7.2
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79.6±7.2
5	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12±1.0	86.8±7.2
6		Main control valve mounting bolt	M 8 × 1.25	3.4±0.7	24.6±5.0
7			M10 × 1.5	7±1.5	50.6±10.9
8		Fuel tank mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
9		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
10		Turning joint mounting bolt, nut	M12 × 1.75	12.3±1.3	89±9.4
11	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
12		Swing bearing upper mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
13		Swing bearing lower mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
14		Travel motor mounting bolt	M16 × 2.0	23±2.5	166±18.1
15	Under carriage	Sprocket mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
16		Carrier roller mounting bolt, nut	M16 × 2.0	29.7±3.0	215±21.7
17		Track roller mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
18		Track tension cylinder mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
19		Track shoe mounting bolt, nut	M14 × 1.5	25.5±2.5	184±18.1
20	Others	Counter weight mounting bolt	M27 × 3.0	140±15	1013±108
21		Cab mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
22		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.5	8.5±3.6

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil	SAE 10W-30 (API CK-4)
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG46, VG68) Conventional (ISO VG15)
Swing and travel reduction gear	SAE 80W-90 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2 (low sulfur fuel or ultra low sulfur fuel)
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50 % water.

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

- Low sulfur fuel : sulfur content $\leq$500 ppm
- Ultra low sulfur fuel : sulfur content $\leq$15 ppm

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.

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	10.5 (2.8)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Final drive	Gear oil	1.1×2 (0.3×2)	★SAE 75W-90 SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank; 56 (14.8) System; 109 (28.8)	★ISO VG 15 ISO VG 32 ISO VG 46, HBHO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	115 (30.4)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and water 50 : 50★2	13 (3.4)	Ethylene glycol base permanent type ★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

★ : Cold region (Russia, CIS, Mongolia)
★1 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm
★2 : Soft water : City water or distilled water
★3 : HD Hyundai Construction Equipment Bio Hydrauilc Oil

※ 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 your local HD Hyundai Construction Equipment dealer.

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-25
Hydraulic oil level	Check, Add	6-27, 27-1
Engine oil level	Check, Add	6-18
Radiator coolant level	Check, Add	6-20
Control panel & pilot lamp	Check, Clean	-
Fan belt tension and damage	Check, Adjust	6-23
★ Attachment pin and bushing	Lubricate	6-35
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		

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

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Water separator	Check, Drain	6-25
Fuel tank (water, sediment)	Drain	6-25
Swing gear & piston	Lubricate	6-30
Track tension	Lubricate	6-32
Bucket linkage & blade pins	Lubricate	6-35
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		
· Boom swing post + Upper frame connecting		
· Boom swing cylinder head and rod		
· Dozer blade + Lower frame connecting		
· Dozer blade cylinder head and rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Attachment pins	Add, Lubricate	6-35
Boom swing cylinder	Check, Add	6-30
Bolts & Nuts	Check, Tight	6-6
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		
Fan belt tension & damage	Check	-

4) EVERY 200 HOURS SERVICE

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

★ Replace 2 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-18, 19
Engine oil filter	Replace	6-18, 19
Fuel filter element	Replace	6-26
Hydraulic oil return filter	Replace	6-29
Pilot line filter element	Replace	6-29
Travel reduction gear oil	Replace	6-31

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check, Add	6-37
Boom swing cylinder	Check, Add	6-30
Aircon and heater outer filter	Check, Clean	6-40
Swing bearing grease	Lubricate	6-30
Attachment pin and bushing	Lubricate	6-35
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		
Bolts & Nuts	Check, Tight	6-6
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		
Fan belt tension & damage	Check	-

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★Engine oil	Change	6-18, 19
★Engine oil filter	Replace	6-18, 19
Radiator and oil cooler fin	Check, clean	6-23
☆Air cleaner element (primary)	Check, clean	6-24
Fuel filter element	Replace	6-26
Water separator element	Replace	6-25

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

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

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Hydraulic tank air breather element	Replace	6-29
Travel reduction gear oil	Change	6-31
Hydraulic oil return filter	Replace	6-29
Pilot line filter element	Replace	6-29

9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Radiator coolant★1	Change	6-20, 21, 22
Hydraulic oil suction strainer	Check, Clean	6-28
Hydraulic oil★1	Change	6-28
HBHO★2	Change	6-28
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

★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.

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

10) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil★3	Change	6-28

★3 HD Hyundai Construction Equipment genuine long life

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

11) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Radiator coolant★3	Change	6-20, 21, 22

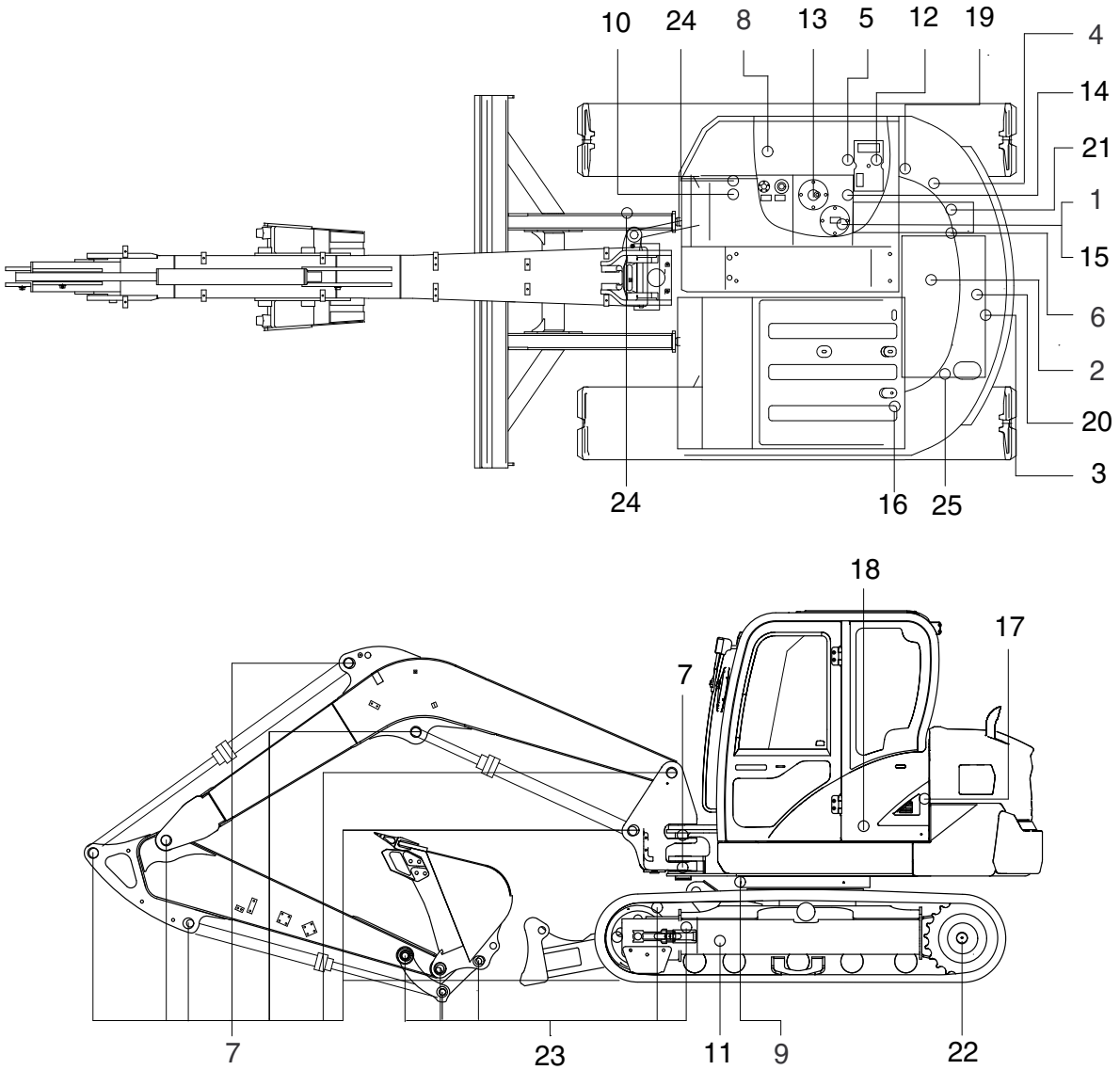
★3 HD Hyundai Construction Equipment genuine long life

12) WHEN REQUIRED

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

Check items	Service	Page
Fuel system		
· Fuel tank	Drain or Clean	6-25
· Water separator	Drain or Replace	6-25
· Fuel filter element	Replace	6-26
Engine lubrication system		
· Engine oil	Change	6-18, 19
· Engine oil filter	Replace	6-18, 19
Engine cooling system		
· Radiator coolant	Add or Change	6-20, 21, 22, 23
· Radiator	Clean or Flush	6-20, 21, 22, 23
Engine air system		
· Air cleaner element (primary, safety)	Replace	6-24
Hydraulic system		
· Hydraulic oil	Add or Change	6-27-1, 28
· Hydraulic oil return filter	Replace	6-29
· Pilot line filter element	Replace	6-29
· Hydraulic tank air breather element	Replace	6-29
· Hydraulic oil suction strainer	Clean	6-28
Under carriage		
· Track tension	Check, Adjust	6-32
Bucket		
· Tooth	Replace	6-34
· Side cutter	Replace	6-33
· Linkage	Adjust	6-33
· Bucket assy	Replace	6-33
Aircon and heater		
· Outer filter	Clean, Replace	6-40
· Inner filter	Replace	6-41

5. MAINTENANCE CHART



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Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.
4. For other details, refer to the service manual.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10 Hours or daily	1	Hydraulic oil level	Check, Add	HO	56 (14.8)	1
	2	Engine oil level	Check, Add	EO	10.5 (2.8)	1
	4	Radiator coolant	Check, Add	C	13 (3.4)	1
	8	Fuel tank	Check, Add	DF	115 (30.4)	1

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

DF : Diesel fuel GO : Gear oil HO : Hydraulic oil

C : Coolant PGL : Grease EO : Engine oil

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
50 Hours or weekly	5	Water separator	Check, Drain	-	-	1
	8	Fuel tank (water, sediment)	Check, Clean	-	-	1
	10	Swing gear & piston	Check, Lubricate	PGL	-	1
	11	Track tension	Check, Adjust	PGL	-	2
	23	Bucket linkage & blade pin	Lubricate	PGL	-	9
		Bucket linkage & angle dozer pin	Lubricate	PGL	-	12
Initial 250 Hours	2	Engine oil	Change	EO	11.6 (3.1)	1
	3	Engine oil filter	Replace	-	-	1
	13	Hydraulic oil return filter	Replace	-	-	1
	16	Pilot line filter element	Replace	-	-	1
	20	Fuel filter element	Replace	-	-	1
	22	Travel reduction gear oil	Change	GO	1.1 (0.3)	2
250 Hours	6	Fan belt tension and damage	Check, Adjust	-	-	1
	7	Attachment pin	Lubricate	PGL	-	11
	9	Swing bearing	Lubricate	PGL	-	3
	12	Battery (voltage)	Check, Clean	-	-	1
	17	Aircon and heater outer filter	Clean	-	-	1
	24	Boom swing cylinder	Lubricate	PGL	-	2
500 Hours	2	Engine oil	Change	EO	10.5 (2.8)	1
	3	Engine oil filter	Replace	-	-	1
	5	Water separator element	Replace	-	-	1
	19	Air cleaner element (primary)	Clean	-	-	1
	20	Fuel filter element	Replace	-	-	1
	21	Radiator and oil cooler fin	Check, Clean	-	-	3
1000 Hours	13	Hydraulic oil return filter	Replace	-	-	1
	14	Hydraulic tank air breather element	Replace	-	-	1
	16	Pilot line filter element	Replace	-	-	1
	22	Travel reduction gear oil	Change	GO	1.1 (0.3)	2
2000 Hours	1	Hydraulic oil★1	Change	HO	56 (14.8)	1
	1	Hydraulic oil (HBHO★2)	Change	-	56 (14.8)	1
	4	Radiator coolant★1	Change	C	13 (3.4)	1
	15	Hydraulic oil suction strainer	Check, Clean	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
3000 Hours	25	DPF (diesel particulate filter)	Clean	-	-	1
5000 Hours	1	Hydraulic oil★3	Change	HO	56 (14.8)	1
6000 Hours	4	Radiator coolant★3	Change	C	13 (3.4)	1
As required	17	Aircon and heater outer filter	Clean, Replace	-	-	1
	18	Aircon and heater inner filter	Change, Replace	-	-	1
	19	Air cleaner element (primary)	Change, Replace	-	-	1
		Air cleaner element (safety)	Change, Replace	-	-	1

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

★3 HD Hyundai Construction Equipment genuine long life

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

DF : Diesel fuel GO : Gear oil HO : Hydraulic oil

C : Coolant PGL : Grease EO : Engine oil

1) CHECK ENGINE OIL LEVEL

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

(1) Pull out the dipstick and wipe with a clean cloth.

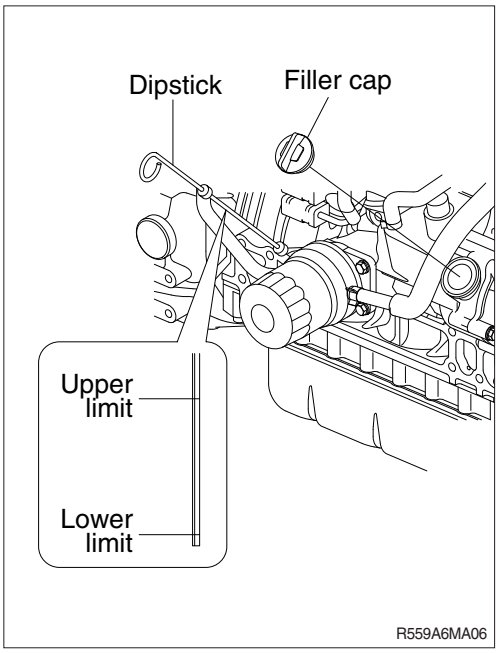
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

(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.**



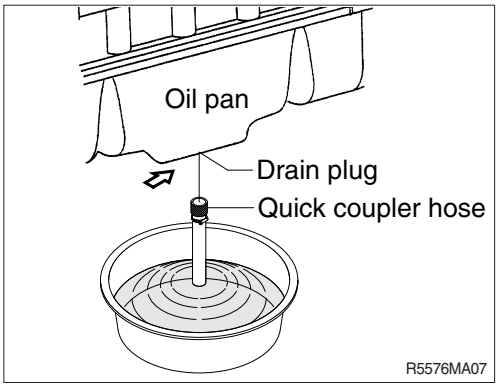
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine.

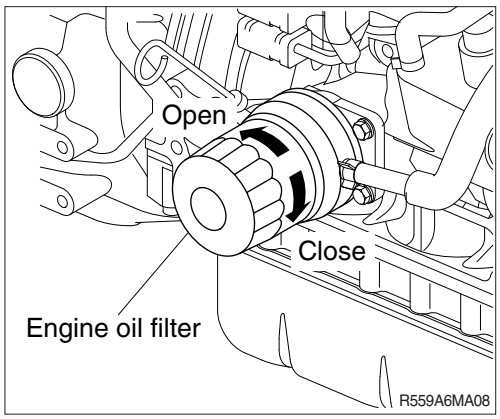
(2) Remove the cover of drain plug and connect the quick coupler hose.

※ **A drain pan with a capacity of 20 liters (5 U.S. gallons) will be adequate.**

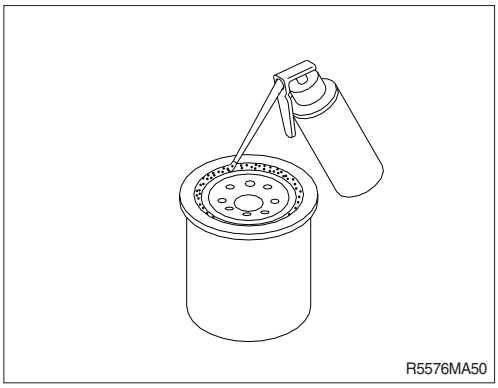
※ **Dispose of the waste oil in accordance with local regulations.**



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

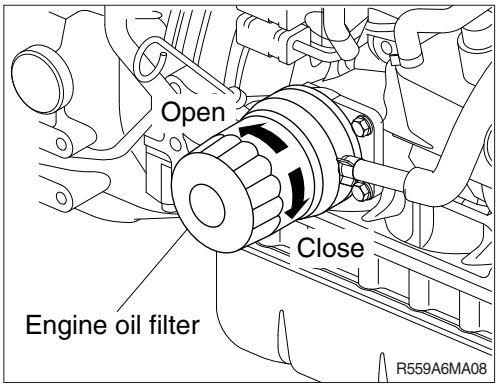


(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.

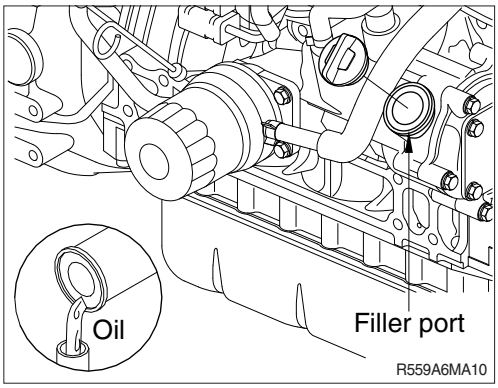


(5) Install the new filter manually by turning it clockwise until if contacts the filter head.
Tighten to 2.0~2.4 kgf · m (14~17 lbf · ft) or one additional turn using the filter wrench.
Remove the quick coupler hose.

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

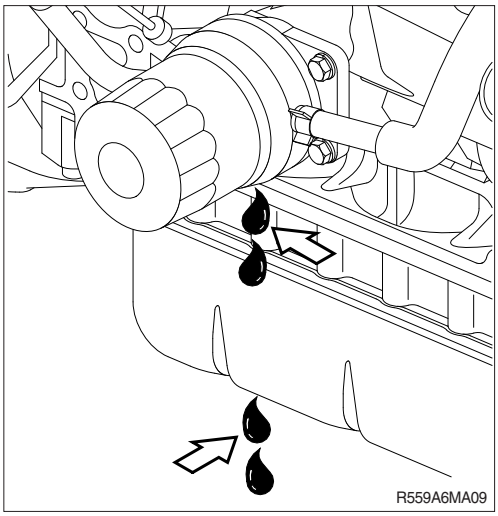


(6) Fill the engine with clean oil to the proper level.
· Quantity : 10.5 ℓ (2.8 U.S.gallons)



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

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



3) CHECK RADIATOR COOLANT

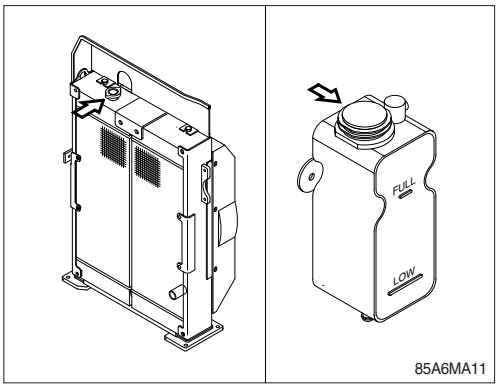
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

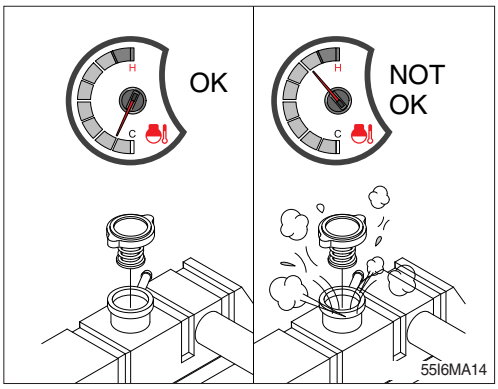
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

(3) Be sure to add the coolant by opening the cap of radiator when coolant level is below LOW.

(4) Replace gasket of radiator cap when it is damaged.

⚠ **Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.**



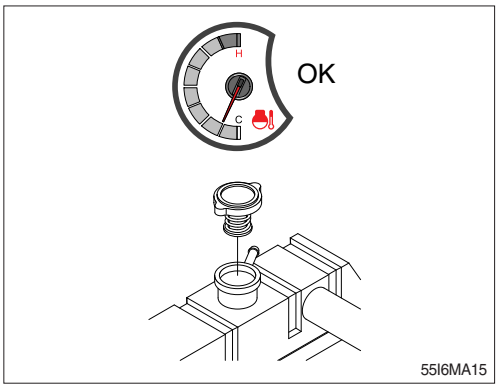


4) FLUSHING AND REFILLING OF RADIATOR

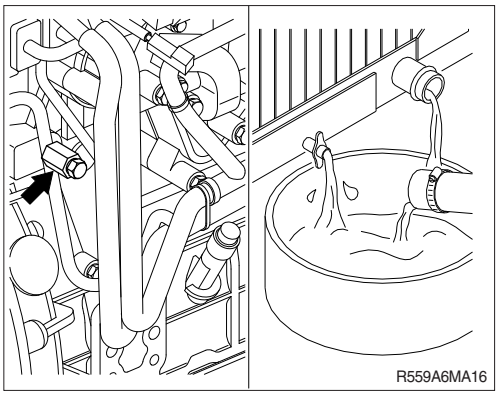
(1) Change radiator coolant

⚠ **Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged and repeated contact can cause skin disorders or other bodily injury.**
Avoid excessive contact-wash thoroughly after contact is made.
Keep out of reach of children.

※ **Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.**
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



⚠ **Wait until the temperature is below 50˚C (122˚F) before removing the coolant system pressure cap.**
Failure to do so can cause personal injury from heated coolant spray.
Drain the cooling system by opening the drain valve on the radiator and removing the plug in the bottom of the water inlet. Drain the coolant from engine block. A drain pan with a capacity of 20 liters (5 U.S.gallons) will be adequate in most applications.

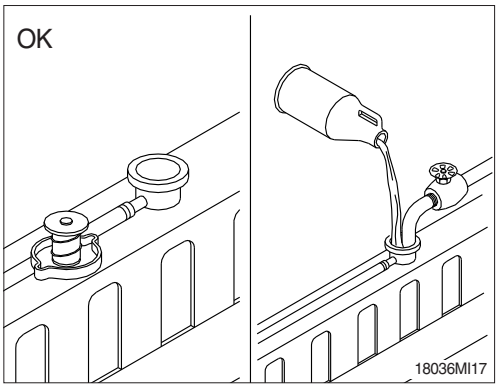


(2) Flushing of cooling system

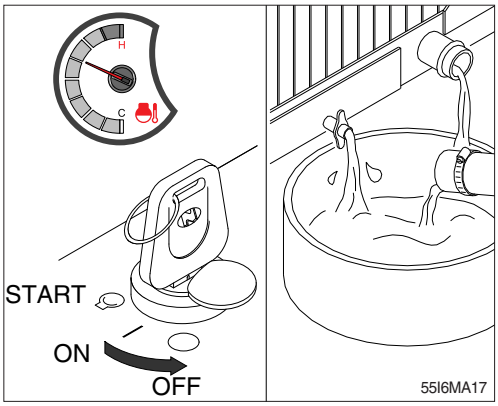
① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).

※ **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 radiator cap. The engine is to be operated without the cap for this process.**



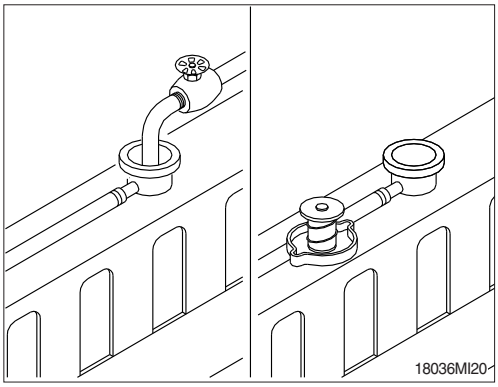
② Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F) .
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

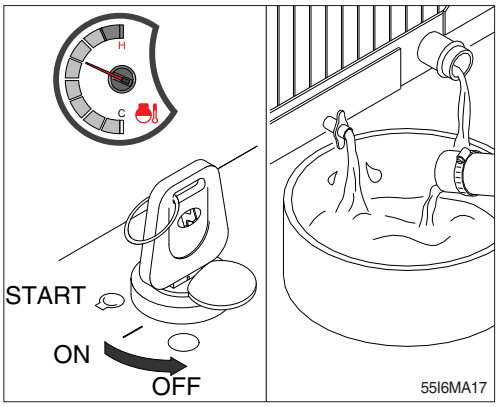
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **Do not install the radiator cap or the new coolant filter.**



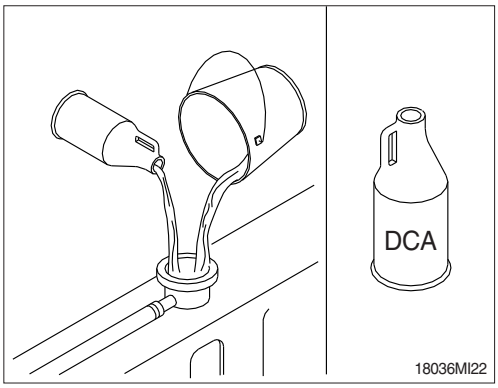
④ Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F).
Shut the engine off, and drain the cooling system.

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



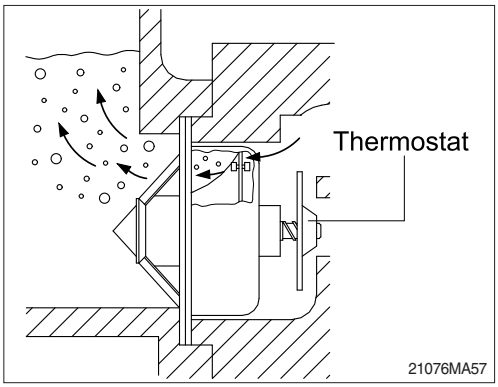
(3) Cooling system filling

① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity (engine only) : 4.2 ℓ (1.1 U.S. gallons)



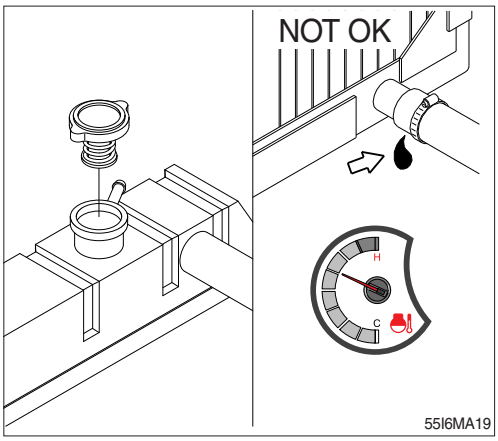
② The system has a maximum fill rate of 14 liters (3.5 U.S. gallons) per minute.
Do not exceed this fill rate.

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



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

※ **If the gasket of the surge tank cap is damaged, discard the old filler cap and install a new cap.**

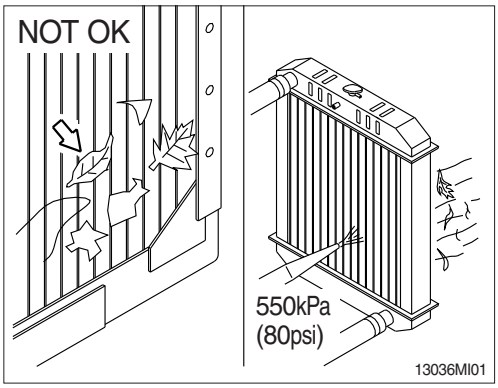


5) CLEAN RADIATOR AND OIL COOLER

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.

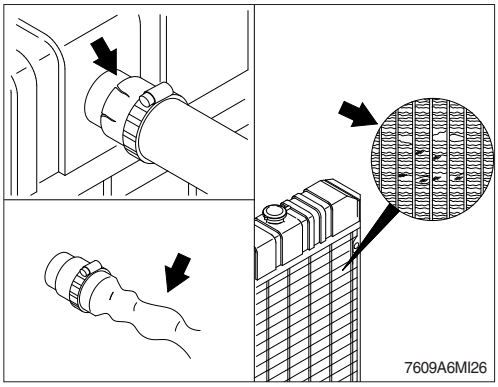
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



(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.

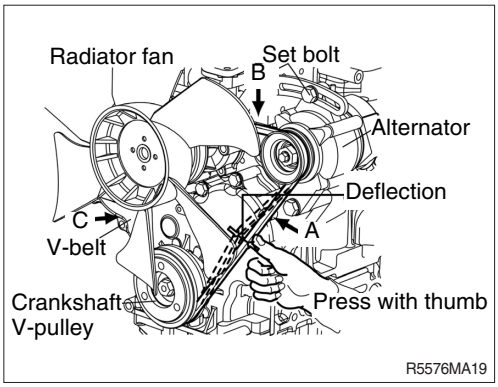


6) FAN BELT TENSION

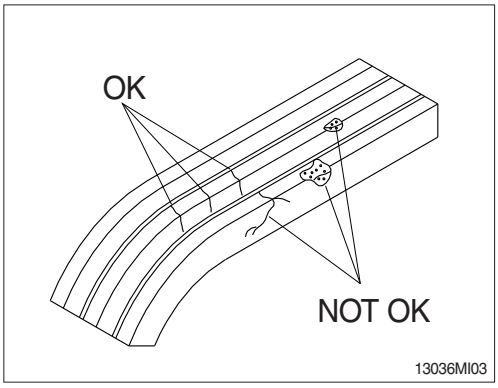
(1) Measure the belt deflection at the longest span of the belt.

· Deflection

	A	B	C
Used belt	10~14	7~10	9~13
New belt	8~12	5~8	7~11



(2) Inspect the drive for damage (cracks, oil or wear).
If any of these conditions exist, replace.

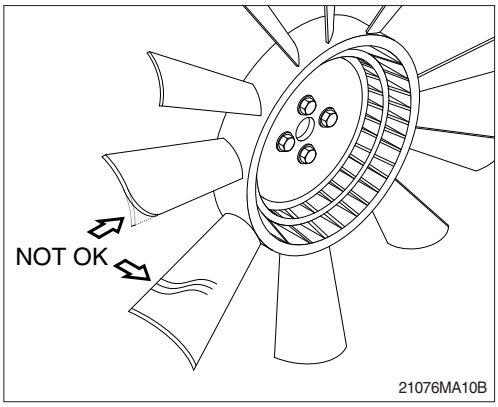


7) INSPECTION OF COOLING FAN

⚠ Serious injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.

※ Rotate the crankshaft by using the engine barring gear.

※ A visual inspection of the cooling fan is required daily.
Check for cracks, loose rivets, and bent or loose blades.
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.
Replace any fan that is damaged.



8) CLEANING OF AIR CLEANER

(1) Primary element

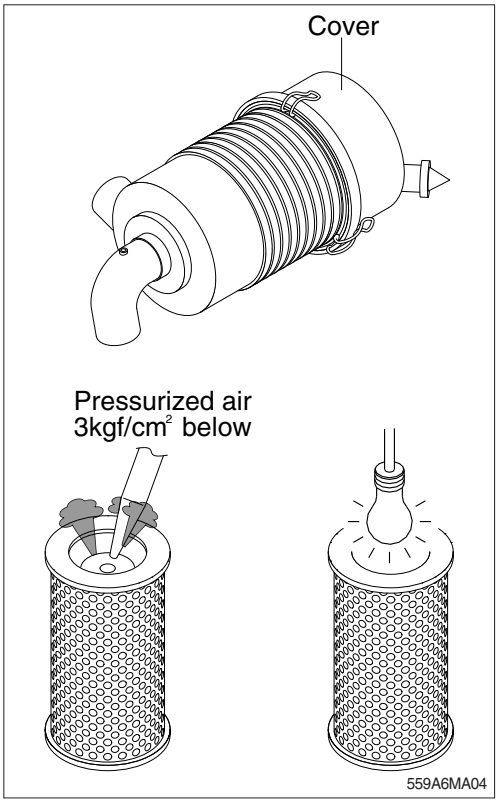
① Open cover and remove the element.
② Clean the inside of the body.
③ Clean the element with pressurized air.
· Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.
④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
⑤ Insert element and close cover.

※ Replace the primary element after 4 cleanings.

(2) Safety element

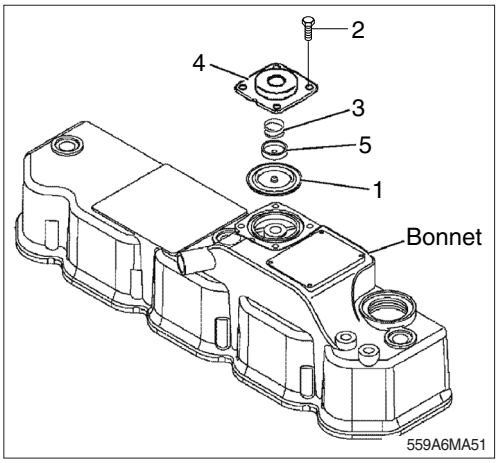
※ Replace the safety element only when the primary element is cleaned 4 times.

△ Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.



9) CRANKCASE BREATHER

(1) Remove the bolts (2) retaining the diaphragm cover.
(2) Remove the diaphragm cover (4), spring (3), diaphragm plate (5) and diaphragm (1).
(3) Inspect the diaphragm for tears. Inspect the spring for distortion. Replace components if necessary.
(4) Reinstall the diaphragm, diaphragm plate, spring and diaphragm cover. Tighten the bolts.



10) FUEL TANK

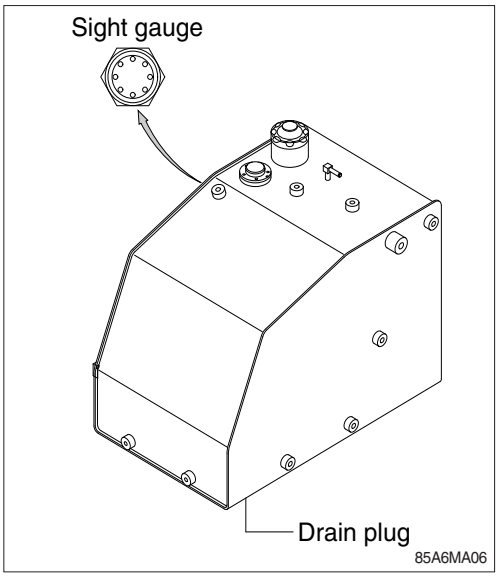
※ **Remove the strainer of the fuel tank and clean it if contaminated.**

(1) Fill fuel tank fully to minimize water condensation and check the fuel gauge level 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.**

△ **Stop the engine when refueling.**
All lights and flames shall be kept at a safe distance while refueling.

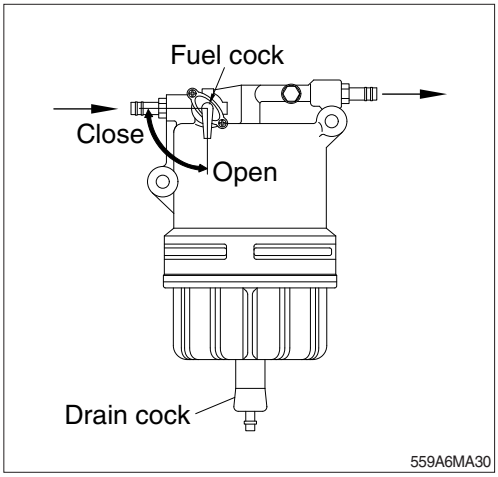


11) WATER SEPARATOR

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

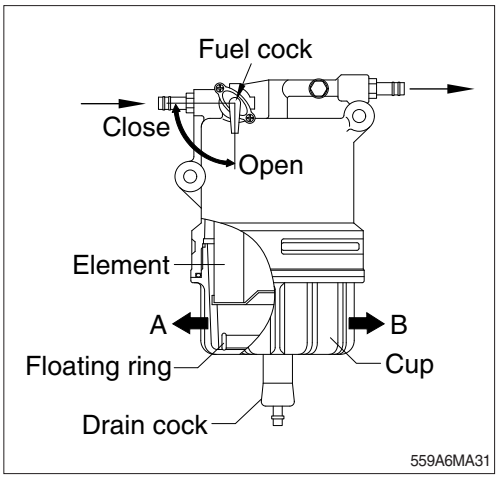
(1) Drain water

① Close the fuel cock.
② Loosen the drain cock at the bottom of the water separator. Drain water collected inside.
③ Hand-tighten the drain cock.
· Tightening torque : 0.15±0.05 kgf · m
(1.1±0.37 lbf · ft)
④ Open the fuel cock.
⑤ Be sure to prime the diesel fuel system when you are finished. See priming the fuel system on page 6-26.
⑥ Check for leaks.

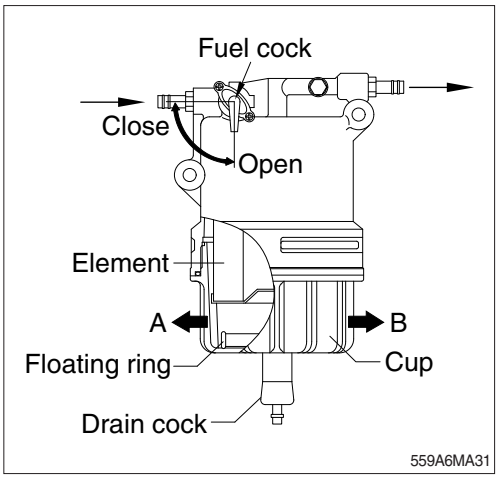


(2) Replace element

① Close the fuel cock.
② Turn the retaining ring to the left (A) and remove the cup.
③ Carefully hold the cup to prevent fuel from spilling. If you spill any fuel, clean up the spill completely.
④ Remove the float ring from the cup. Pour the contaminants into the container and dispose of it properly.



⑤ Replace the new element into the top of the water separator.
⑥ Install the new O-ring in the cup.
⑦ Position the floating ring in the cup.
⑧ Check the condition of the cup. Replace if necessary.
⑨ Install the cup to the bracket by tightening the retaining ring to the right (B) to a torque of 2.8~3.4 kgf · m (20.3~24.6 lbf · ft).
⑩ Close the drain cock.
⑪ Open the fuel cock.
⑫ Prime the fuel system.
⑬ Check for leaks.



12) REPLACEMENT OF FUEL FILTER ELEMENT

(1) Stop the engine and allow it to cool.

(2) Close the fuel cock of the water separator.

(3) Remove the fuel filter element with a filter wrench, turning it to the left. When removing the fuel filter element, carefully hold it to prevent the fuel from spilling. Wipe up all spilled fuel.

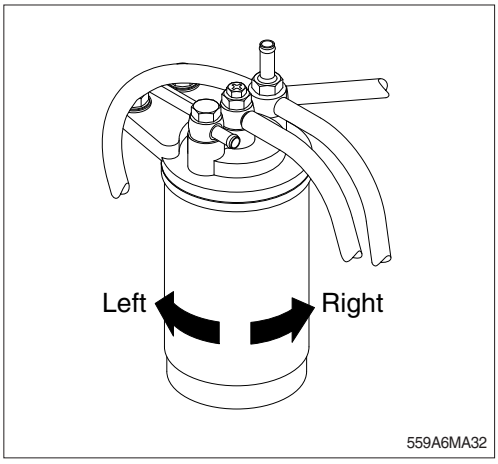
(4) Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter element.

(5) Install the new fuel filter element. Turn to the right and hand-taghten if only until it comes in contact with the mounting surface. Tighten to 2.0~2.4 kgf · m (14.5~17.4 lbf · ft) or one additional turn using the filter wrench.

(6) Open the fuel cock of the water separator.

(7) Prime the fuel system.

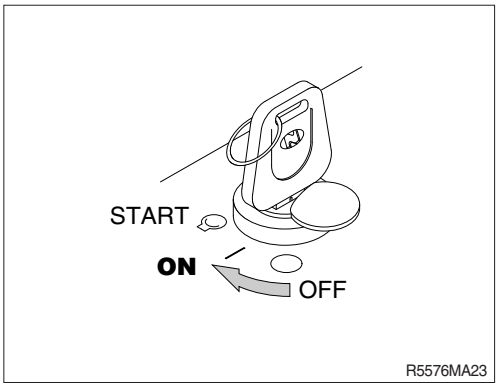
(8) Check for leaks.



13) PRIMING THE FUEL SYSTEM

(1) Turn the starting switch to the ON position for 10~15 seconds. This will allow the electric fuel pump to prime the fuel system.

※ **Never use the starter motor to crank the engine in order to prime the fuel system. This may cause the starter motor to overheat and damage the coils, pinion and/or ring gear.**

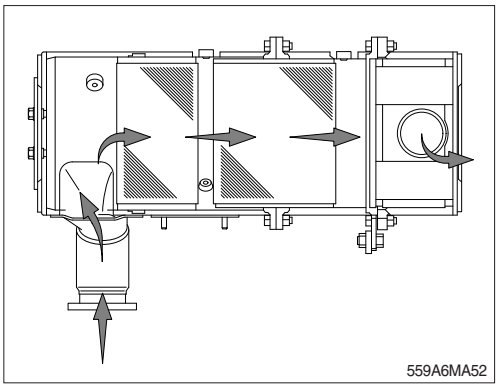


14) DPF (diesel particulate filter) CLEANING

The diesel particulate filter can not be cleaned for maintenance purpose using conventional tools. The diesel particulate filter needs to be cleaned and checked using an approved cleaning machine at a authorized service center.

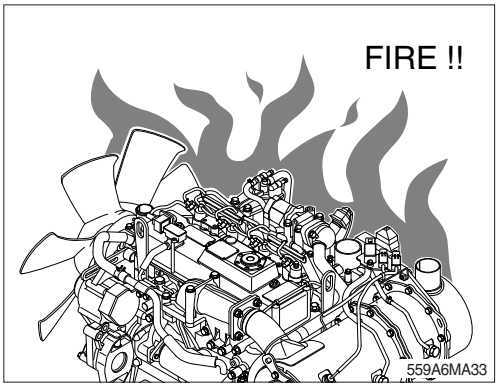
※ **The diesel particulate filter shall be cleaned every 6000 hours.**

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



15) LEAKAGE OF FUEL

⚠ **Use care when cleaning the fuel hose, injection pump, fuel filter and other connections as the leakage from these parts can cause fire.**



16) HYDRAULIC OIL CHECK

(1) Position the machine as shown in the illustration on the right. Please stop the engine and wait for about 5 minutes.

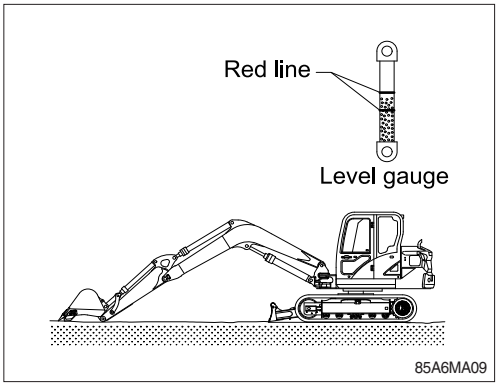
(2) Check the oil level at the level gauge of hydraulic oil tank.

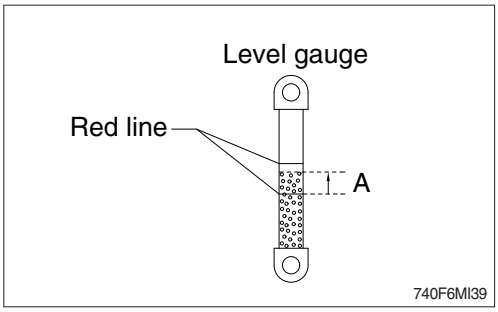
(3) The oil level is normal if the oil is between the red lines. The oil level depends on the temperature of the hydraulic oil. Refer to the height (A) in the below table to check the level gauge.

Temperature		Height A	
℃	°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 3-19 for checking the temperature of the hydraulic oil.**

※ **Add the hydraulic oil, if necessary.**





17) FILLING HYDRAULIC OIL

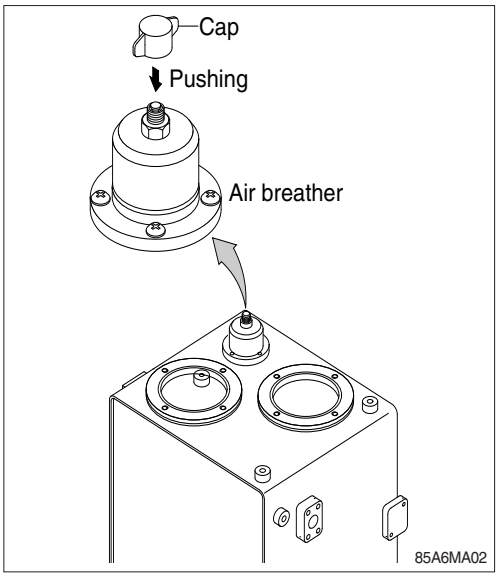
(1) Position the machine like the hydraulic oil check. Then stop engine.

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

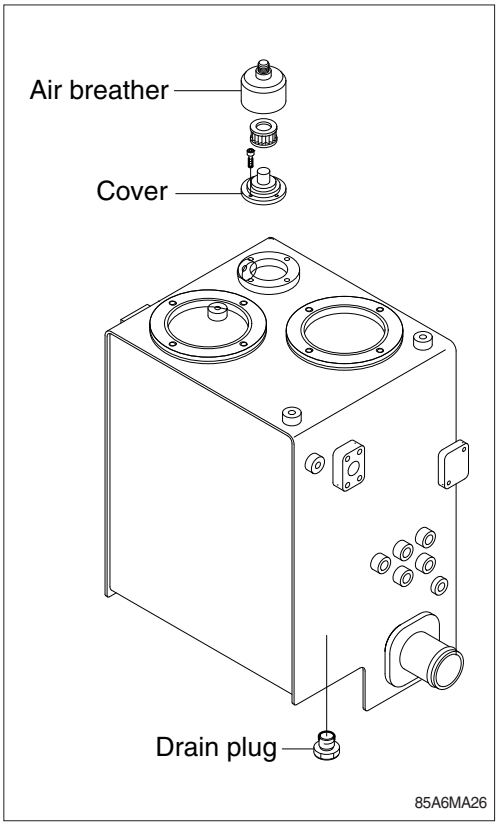
(3) Remove the breather on the top of oil tank and fill the oil to the specified level.
- Tightening torque : 4.05±0.8 kgf · m
  (29.3±5.8 lbf · ft)

(4) Start engine after filling and operate the work equipment several times.

(5) Check the oil level at the level check position after engine stops.



18) CHANGE HYDRAULIC OIL



(1) Position the machine like the hydraulic oil check. Then stop engine.

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

(3) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(4) Prepare a suitable container with a capacity of 109 ℓ (28.8 U.S. gal)

(5) To drain the oil loosen the drain plug at the bottom of the oil tank.

(6) Close the drain vavle and fill proper amount of recommended oil.

(7) Put the breather in the right position.

(8) To bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.

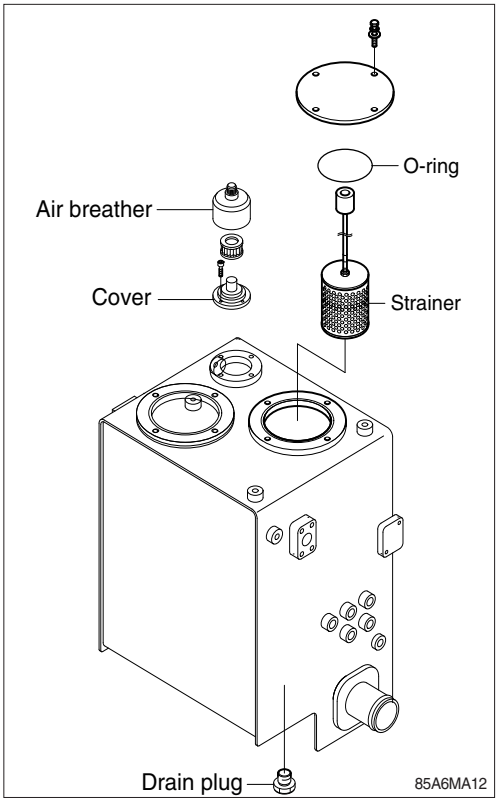
(9) Start engine and run continually. Release the air by full stroke of each control lever.

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

※ Do not mix any other Bio oil, use only HBHO as bio oil. If changing to Bio oil, contact your local HD Hyundai Construction Equipment dealer.

19) CLEAN SUCTION STRAINER

Clean suction stainer as follows.



(1) Remove the cover on the top of the oil tank.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(2) Pull out the strainer in the tank.

(3) Wash the suction strainer with gasoline or cleaning oil (mineral spirits).

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly. Be sure to install a new O-ring.

※ Loosen bolts on the cover slowly as the cover has spring force applied. This will prevent cover from popping off without notice.

20) REPLACEMENT OF RETURN FILTER

Replace return filter as follow.

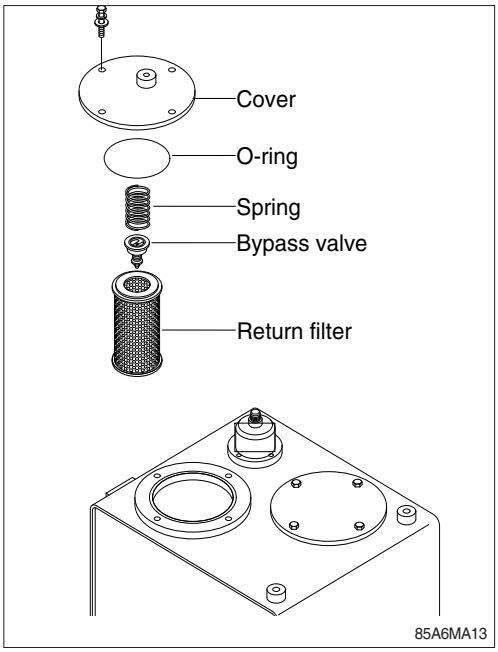
(1) Remove the cover.

(2) Remove the spring, by-pass valve, and return filter in the tank.

(3) Replace the return filter with a new one.

(4) Reassemble by reverse order of disassembly.

· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)



21) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK AIR BREATHER

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

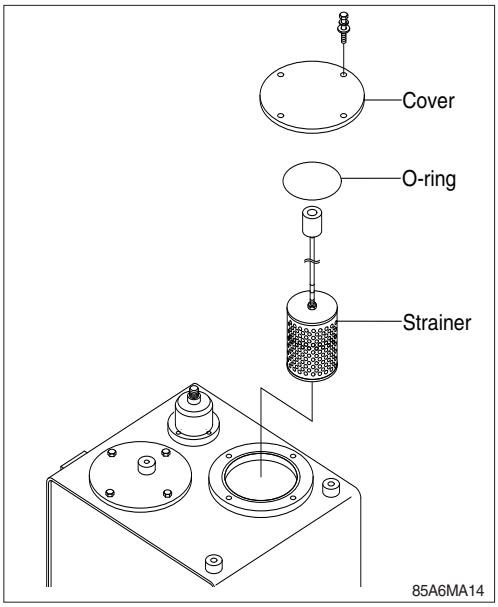
(2) Loosen the lock nut and remove the cover.

(3) Pull out the ari breather element.

(4) Replace the air breather element with a new one.

(5) Reassemble by reverse order of disassembly.

· Tightening torque : 4.05±0.8 kgf · m
(29.3±5.8 lbf · ft)



22) REPLACEMENT OF PILOT LINE FILTER ELEMENT

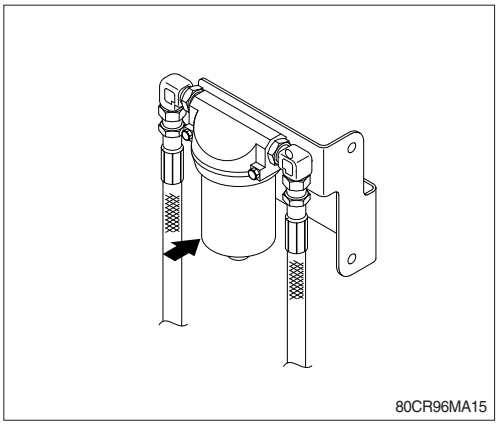
(1) Loosen the nut positioned on the filter body.

(2) Pull out the filter element and clean filter housing.

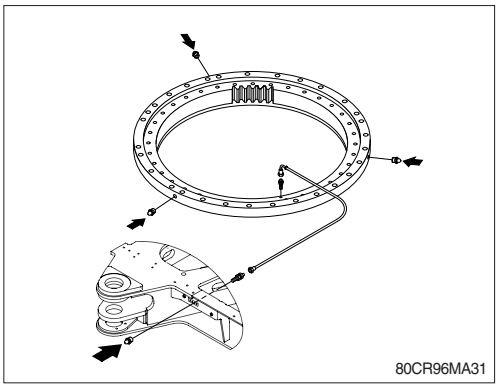
(3) Install the new element and tighten using specified torque.

· Tightening torque : 3.0±0.5 kgf · m
(21.7±3.6 lbf · ft)

※ Change the element after initial 250 hours of operation. Thereafter, change the element every 1000 hours.



23) LUBRICATE SWING BEARING AND RING GEAR



(1) Swing bearing

Grease at 3 fittings shown in the illustration.

※ **Lubricate every 250 hours.**

(2) Swing ring gear (manifold)

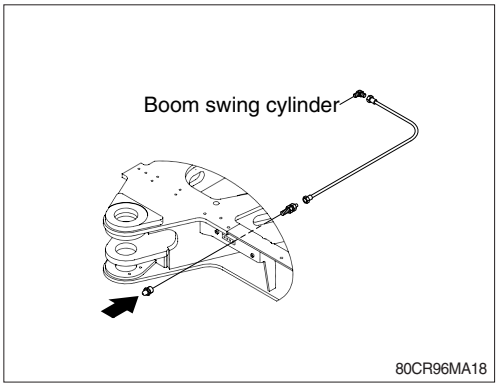
Grease at 1 fitting shown in the illustration..

※ **Lubricate every 50 hours.**

(3) Boom swing cylinder

Grease at fitting shown in the illustration.

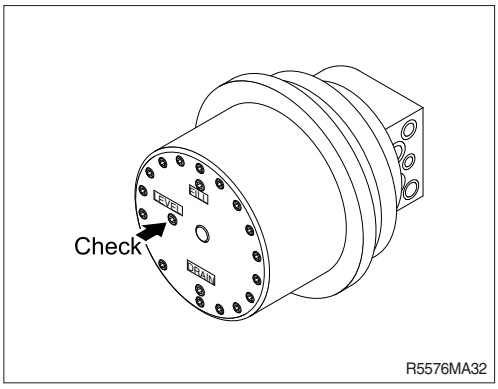
※ **Lubricate every 250 hours.**



24) CHECK THE TRAVEL REDUCTION GEAR OIL

(1) Position the travel motor as shown in the illustration and make sure the machine is on flat ground.

(2) Loosen the level plug and check the oil level.
If the level is at the hole of the plug, it is normal. Fill the oil if it is not sufficient.
· Tightening torque : 6.0±1.0 kgf · m
(43.4±7.2 lbf · ft)



25) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

(1) Raise the temperature of the oil by operating the machine first.

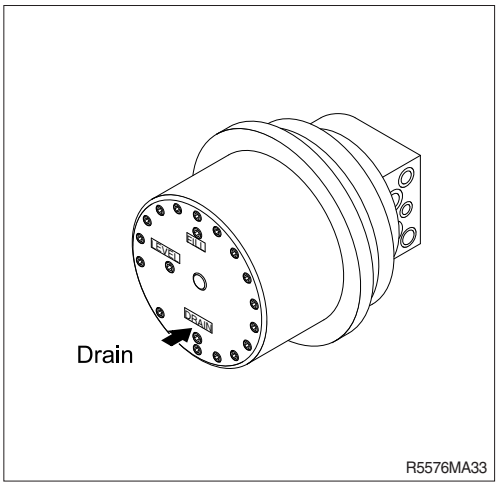
(2) Position the travel motor as shown in the illustration and make sure the machine is on flat ground.

(3) Loosen the level plug and then the drain plug.

(4) Drain the oil to adequate container with a capacity of 5 ℓ (1.3 U.S. gal).

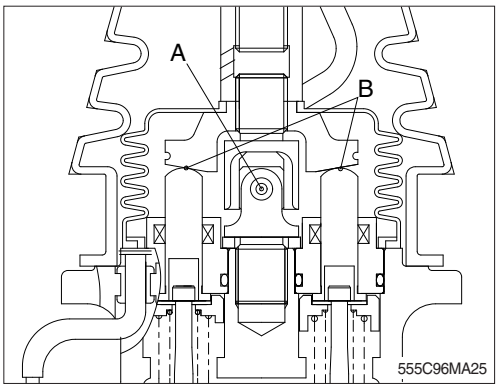
(5) Tighten the drain plug and fill specified amount of oil at filling port.
· Amount of oil : 1.1 ℓ (0.3 U.S. gal)
· Tightening torque : 6.0±1.0 kgf · m
(43.4±7.2 lbf · ft)

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.



26) LUBRICATE RCV LEVER

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



27) ADJUSTMENT OF TRACK TENSION

⚠ **Serious injury or death can result from grease under pressure.**

※ **It is important to adjust the tension of track properly to extend the life of track and traveling components.**

※ **The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties.**
It is thus necessary to continually inspect the track tension so as to maintain the standard tension on it.

(1) Raise the chassis with the boom and arm as shown in the illustration.

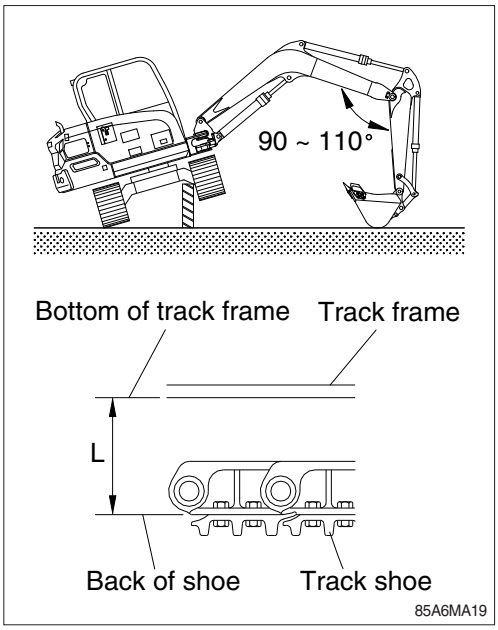
(2) Measure the distance between bottom of track frame on track center and back of shoe.

※ **Remove mud by rotating the track before measuring.**

(3) If the tension is tight, drain the grease in the grease nipple and if the tension is loose, charge the grease.

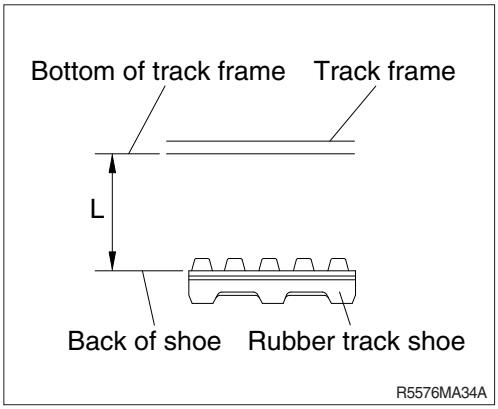
⚠ **Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.**
Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

※ **When the grease does not drained smoothly, move the machine to forward and backward a short distance.**
If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as they are worn excessively.



Steel track

Length (L)	
210~240 mm	8.3"~9.4"



Rubber track

Length (L)	
100~110 mm	3.9~4.3"

28) REPLACEMENT OF BUCKET

△ **When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.**

※ **When the bucket is removed, place it in a stable condition.**

※ **When performing joint work, make sure to signal clearly to each other and work carefully to avoid serious injury.**

(1) Lower the bucket on the ground as shown in the illustration on the top right.

(2) Lock the safety knob to the LOCK position and stop the engine.

(3) Remove the stopper bolts (1) and nuts (2), then remove pins (3, 4) and remove the bucket.

※ **When removing the pins, place the bucket so that it is in light contact with the ground.**

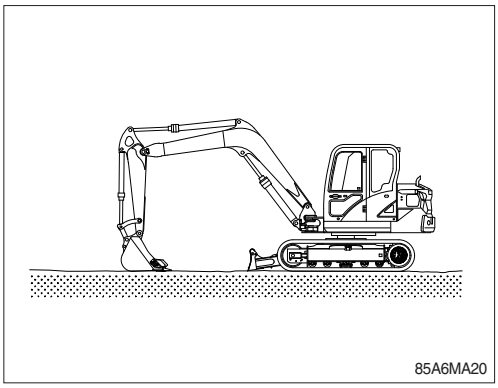
※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**

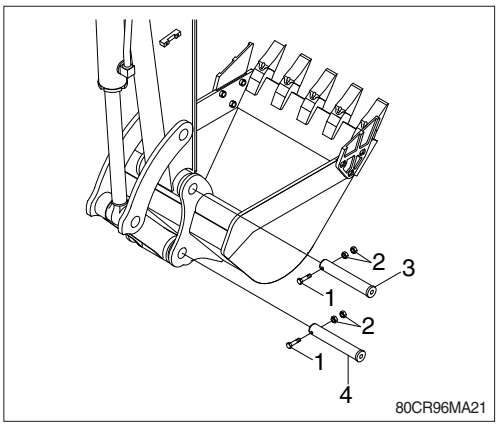
※ **After removing the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushings on both sides do not become damaged.**

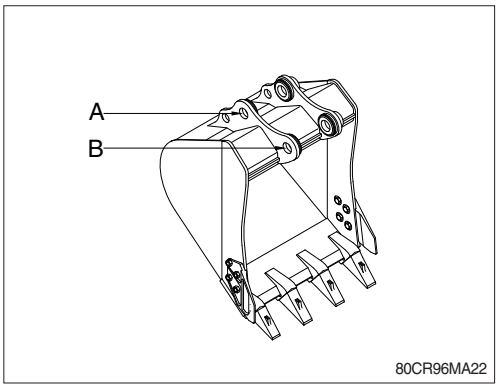
(4) Align the arm with holes (A) and the link with holes (B), then coat with grease and install pins (3, 4)

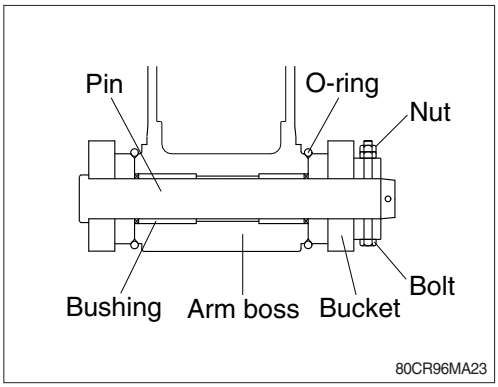
※ **When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture.**
After hitting the pin, move the O-ring down to the regular groove.

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







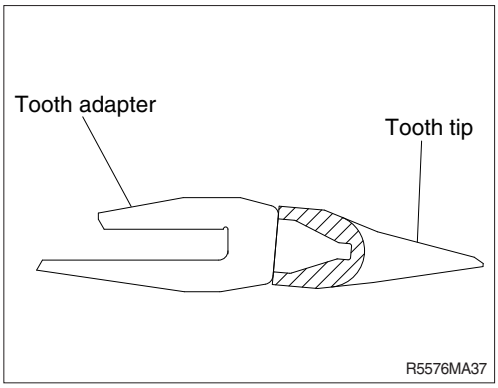


29) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth tip before adapter starts to wear.

② In case of excessive use and tooth adapter has worn excessively, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to rubber pin lock.

② Remove dust and mud from surface of tooth adapter by using knife.

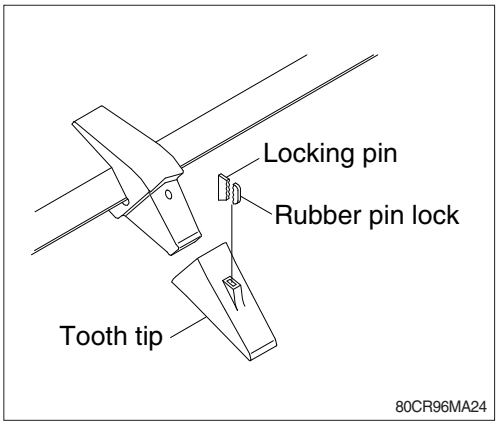
③ Place rubber pin lock in its proper place, and fit tooth tip to adapter.

④ Insert pin until rubber pin lock is positioned at locking pin groove.

⚠ Serious injury or death can result from bucket falling.

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

⚠ The operator should wear clothes and personal protection gear that are appropriate for the work environment. Protects the eyes from dust, particles and airborne materials with a protection gear like goggle.



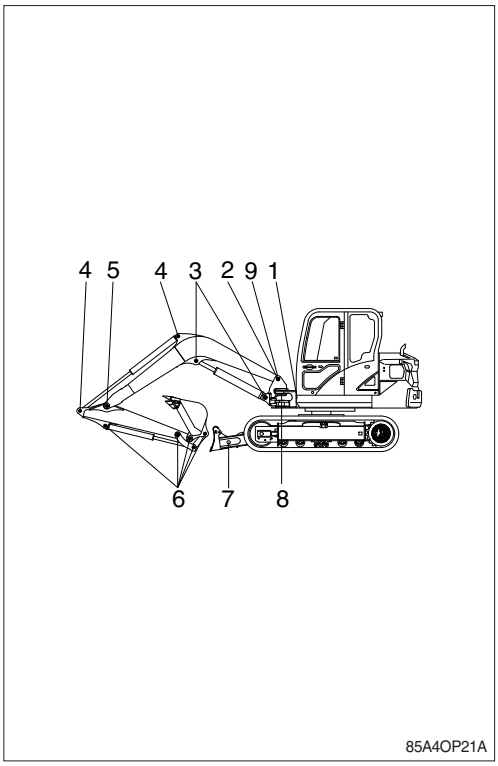
30) LUBRICATE PIN AND BUSHING

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

No.	Description	Qty
1	Lubrication manifold at upper frame	2
2	Boom connection pin	2
3	Boom cylinder pin (head and rod)	2
4	Arm cylinder pin (head and rod)	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin (head and rod)	2
	Bucket link (control rod)	2
	Arm and bucket connection pin	1
	Bucket and control rod connection pin	1
	Arm and control link connection pin	1
7	Dozer blade connection pin	4
8	Boom swing post	3
9	Boom rear bearing center ★	1

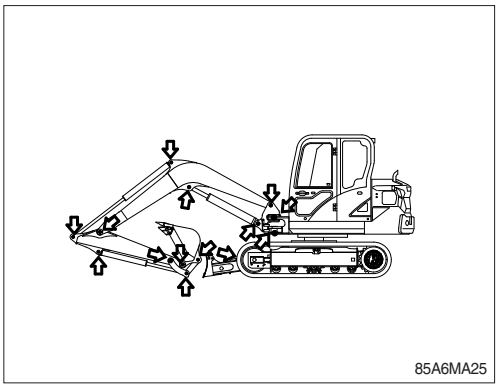
※ Shorten lubricating interval when working in water or dusty places.

★ Not required : If necessary, lubricate the grease.



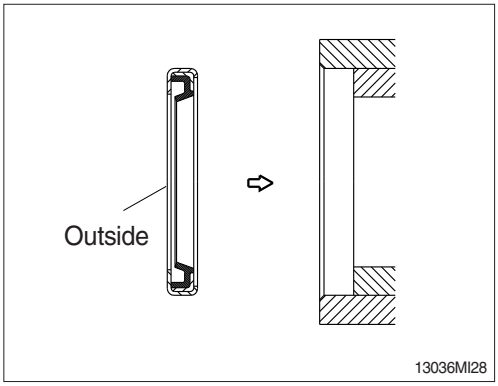
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ Mount the lip so it is facing outside when replacing dust seals.



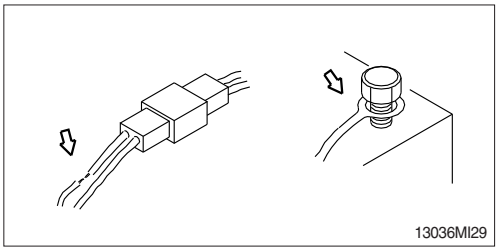
※ If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.

※ Install seal in the same manner as shown in the illustration. Use a plastic hammer to lightly and evenly tap the seal into place.



1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

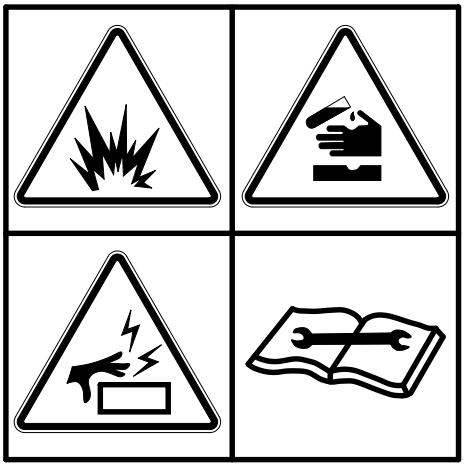
(1) Clean

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.
If eyes are affected, flush with clean water or eye solution and seek immediate medical attention.



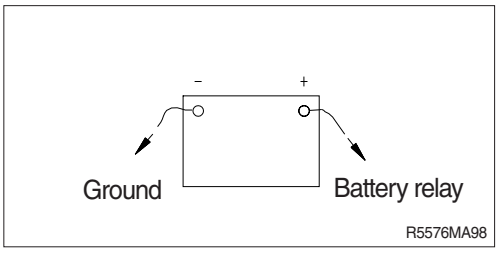
(2) Recycle

Never discard a battery.
Always return used batteries to one of the following locations.

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

(3) Method of removing the battery cable

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



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Follow these procedures when starting.

(1) Connection of booster cable

※ Use the same capacity of battery for starting.

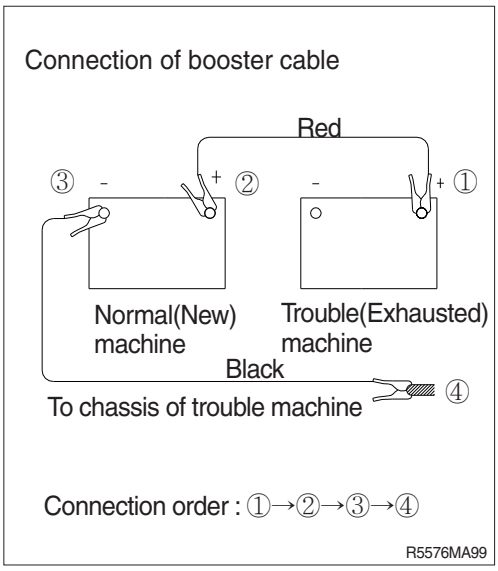
① Make sure that the starting switches of the normal machine and trouble machine are both in the OFF position.

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

③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ Make and maintain a firm connection.

※ Sparks will occur slightly when making the final connection.

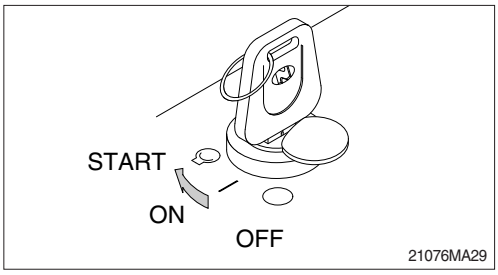


(2) Starting the engine

① Start the engine of the normal machine and keep it running at high idle.

② Start engine of the troubled machine with starting switch.

③ If you can not start it with the first attempt, try again after 2 minutes.



(3) Taking off the booster cable

① Take off the booster cable (black).

② Take off the booster cable (red) connected to the (+) terminal.

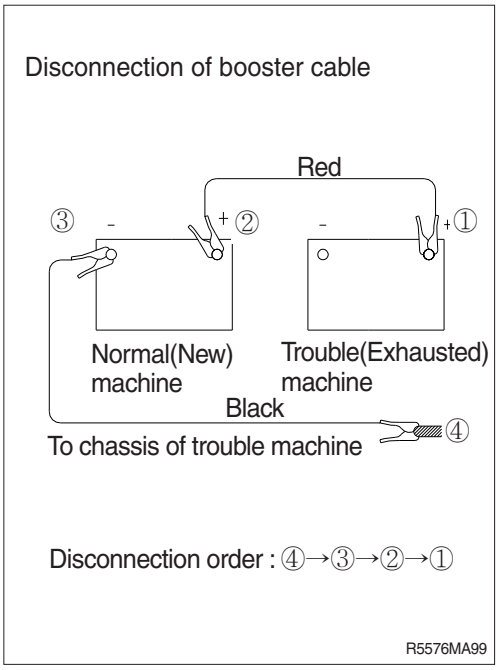
③ Run engine at high idle until charging of the exhausted battery is complete.

⚠ Explosive gas is generated while using the battery or charging it. Keep any flames away and be careful not to cause a spark.

※ Charge the battery in a well ventilated area.

※ Place the machine on the earth or concrete. Avoid charging the machine on any steel or steel plates.

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



(4) Welding repair

Before welding, follow the below procedure.

① Shut off the engine and remove the key.

② Disconnect ground cable from battery by master switch.

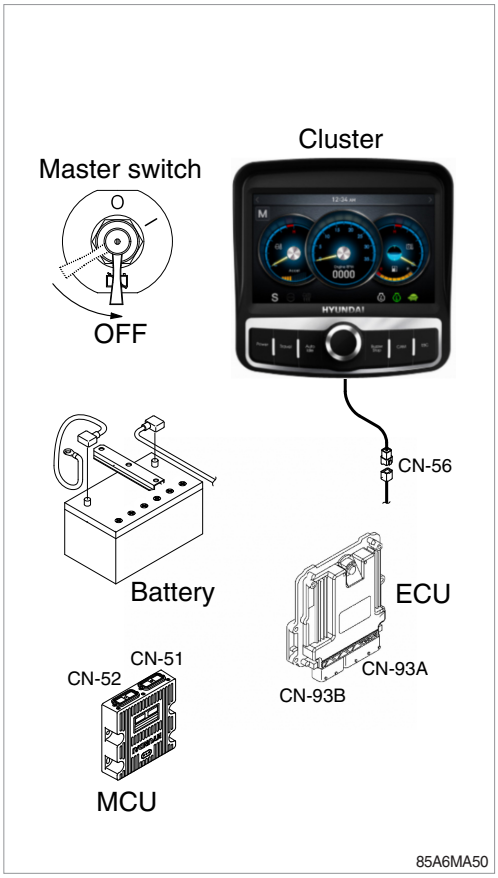
③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (cluster etc).

④ Connect the earth (ground) lead of the welding equipment as close to the welding point as possible.

※ **Remove all paint to ensure a solid ground is achieved.**

※ **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 weld before carrying out the above.**
If not, it will cause serious damage to electric system.



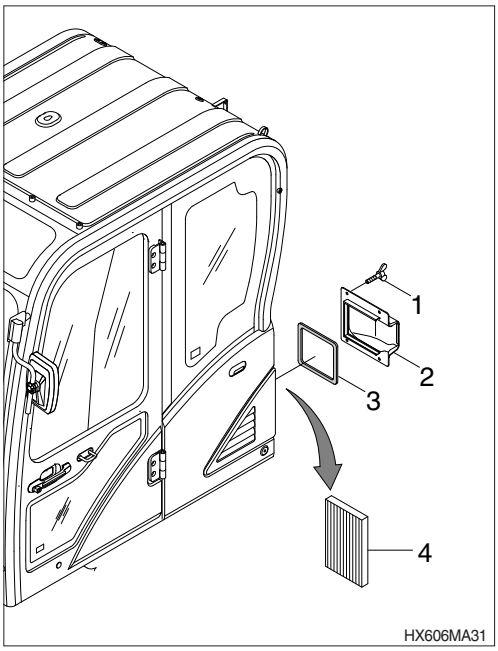
8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF THE OUTER FILTER

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

(1) Remove the screw (1), cover (2) and pad (3).

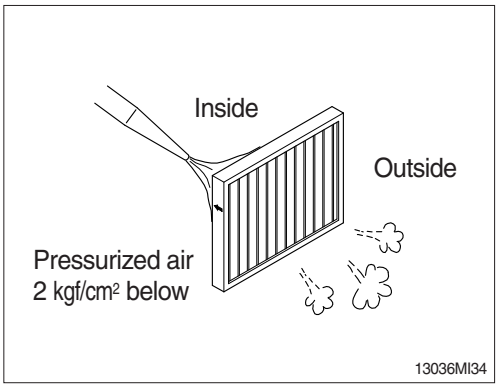
(2) Remove the outer filter (4).



(3) Clean the outer filter using pressurized air (below 2 kgf/cm², 28 psi).

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

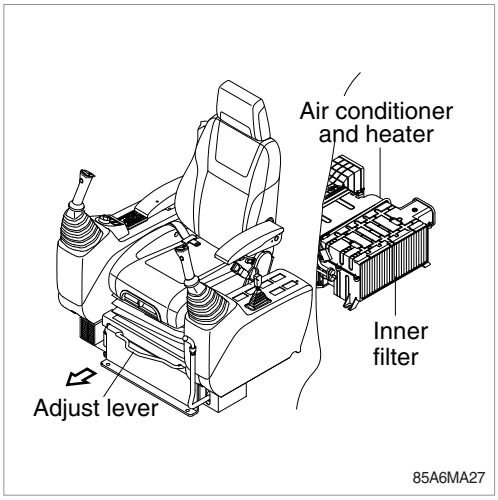
(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



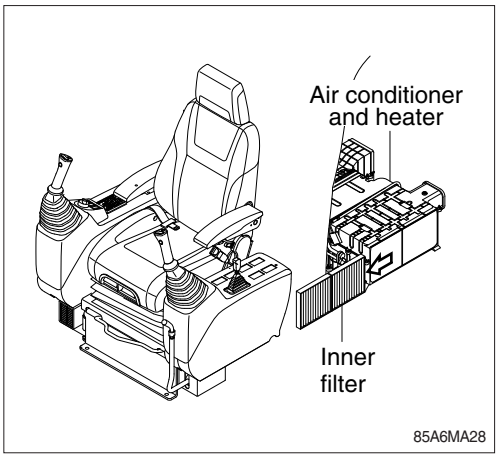
2) CLEAN AND REPLACE OF THE INNER FILTER

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

(1) Move seat and console box to arrow diction using the adjust lever.



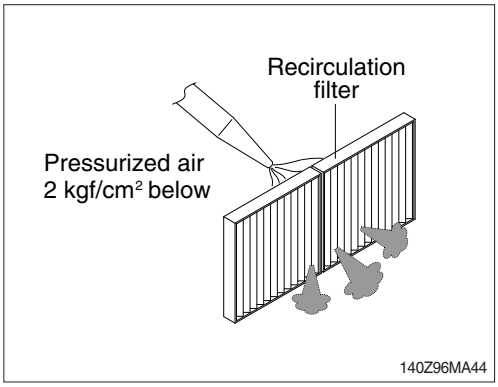
(2) Remove the inner filter.



(3) Clean the inner filter using pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

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

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



3) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour or ventilate by using the fresh air function.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering from outside (about 5˚C lower than the outside temperature).

4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance does not wear prematurely.

5) CHECK DURING OFF-SEASON

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

6) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP : 1430
HX85A	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 flourinated 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 preform 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.